

Continuous Emissions Monitoring with the Rosemount QX1000 and QX1400 Continuous Gas Analyzers

Application Note

Process Overview

Continuous emissions monitoring systems (CEMS) play a critical role in ensuring regulatory compliance 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™ QX Continuous Gas Analyzer Series is designed specifically to address these challenges in **cold/dry extractive CEMS applications.** By combining proven laser-based spectroscopy with robust paramagnetic oxygen measurement in a single, modular platform, the QX product series delivers precise, interference-free measurement of regulated gases with minimal maintenance and long-term stability. The platform is available in two complementary offerings – the general-purpose Rosemount QX1000 for safe-area installations and the hazardous area-certified Rosemount QX1400 – allowing the same measurement capability to be deployed wherever the application demands.

Measurement 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 stack components can compromise accuracy, particularly at low measurement ranges.

High maintenance and consumable burden: Technologies relying on converters, lamps, moving parts, or consumables increase downtime and lifetime 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.

Hazardous area installation: Many CEMS installations are located in classified areas, requiring analyzers that are certified for safe operation in hazardous locations without compromising measurement performance.

The Emerson Solution

The Rosemount QX product series provides continuous gas analysis solutions engineered specifically for reliable, real-time measurement making it ideal for CEM installations. 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 hazardous area,cold/dry applications measuring standard components, the Rosemount QX1000 and QX1400 Continuous Gas Analyzers are available in a variety of configurations

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QX1000 – General Purpose CEMS Analyzer

To meet the full range of site requirements, the platform is offered in two variants that share the same core measurement technology. The Rosemount QX1000 is engineered for safe-area, cold/dry extractive CEMS applications. It delivers stable, interference-free measurement of regulated gases in a compact, general-purpose package, making it the ideal choice for the majority of standard emissions monitoring installations.

QX1400 – Hazardous Area CEMS Analyzer

The Rosemount QX1400 extends the same measurement capability into classified environments. It is the first in the world to combine laser-based and paramagnetic detection technologies in a single analyzer with a flameproof (Ex d) enclosure.

Measurement Technologies

Both the QX1000 and QX1400 combine 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. By targeting specific absorption wavelengths in the mid-infrared region, the laser measurement system provides highly precise detection of gas species such as NO, NO_2, CO, CO_2, and SO_2. Unlike conventional analyzer technologies that often infer gas concentrations through conversions or calculated ratios, or rely on reference gas cells, the QX analyzers utilize the fundamental principles of absorption spectroscopy, ensuring accuracy, repeatability, and long-term stability. 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 QX platform delivers a complete emissions monitoring solution within a single analyzer architecture, reducing the need for multiple analyzer solutions.

Configurable, plug and play solution

The modular approach to design in the QX platform architecture supports flexible configurations for different plant requirements, from oxygen-only installations to multi-gas CEMS solutions.

To support modern operational needs, both analyzers feature an integrated web-based human-machine interface (the QX Web Application) as standard, so customers get consistent performance and a common user experience whether the analyzer is installed in a safe area or a classified hazardous area. This interface enables intuitive access to analyzer configuration, diagnostics, calibration workflows, and measurement data using standard web browsers. Continuous diagnostics and health 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 2

By combining laser-based selectivity, proven oxygen measurement, and a modular analyzer design, the Rosemount QX platform provides a robust and future-ready solution for continuous emissions monitoring. With the general-purpose QX1000 for safe areas and the hazardous area-certified QX1400 for classified environments, customers can standardize on a single measurement platform across their sites – delivering accurate, repeatable measurements with reduced maintenance requirements and improved lifecycle performance compared to traditional analyzer technologies.

For more information, visit
Emerson.com/RosemountQX1000
Emerson.com/RosemountQX1400

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