

Natural Gas Quality Monitoring with the Rosemount™ QX1400 Continuous Gas Analyzer

Application Note

Process Overview

Natural gas must meet defined quality specifications as it moves from production and processing through transmission, storage, and custody transfer. Two of the most important quality parameters are water (moisture) content and carbon dioxide (CO_2) content. Ensuring the quality of the gas – and protecting the integrity of the pipeline infrastructure that carries it – depends on accurate, continuous measurement of these components.

Excess moisture in natural gas can lead to hydrate formation under suitable pressure and temperature conditions, potentially restricting flow and disrupting operations. The presence of water together with acid gases such as CO_2 can also increase the risk of internal corrosion, making accurate and reliable monitoring essential for maintaining gas quality and pipeline integrity. Operators therefore face continual pressure to demonstrate that gas meets pipeline and custody-transfer specifications, while keeping measurement reliable and maintenance low across often remote and hazardous installations.

The Rosemount™ QX1400 Continuous Gas Analyzer is designed to address these needs directly. By applying proven laser-based spectroscopy in a hazardous area-certified, flameproof package, the QX1400 delivers precise, interference-free measurement of moisture and CO_2 in natural gas with minimal maintenance and long-term stability – wherever the application demands.

Measurement Challenges

Low-level moisture measurement: Measuring water at low ppm levels is inherently difficult due to the high sensitivity required, the need for suitably dry equipment and samples, and cross-interference from other components in the gas.

Interference from background hydrocarbons: Natural gas is a complex, variable mixture which can interfere with conventional measurement of trace impurities such as water and CO_2.

Measurement drift and frequent calibration: Many conventional technologies require regular calibration to compensate for drift, aging components, or contamination, increasing operating cost and the risk of out-of-specification gas.

Maintenance and consumables burden: Technologies relying on moving parts, reference cells, and consumables increase downtime and lifecycle costs, particularly at remote sites.

Hazardous area installation: Natural gas installations require analyzers that are certified for safe operation in hazardous locations without compromising measurement performance.

The Emerson Solution



Figure 1. *Emerson Rosemount QX1400 Continuous Gas Analyzer for Hazardous Areas*

The Rosemount QX1400 is a hazardous area-certified, multi-component gas analyzer engineered for reliable, real-time measurement in cold/dry applications. It is the first analyzer in the world to combine laser-based and paramagnetic detection technologies in a single instrument housed in a flameproof (Ex d) enclosure

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Measurement Technologies

The QX1400 uses Quantum Cascade Laser (QCL) spectroscopy, with the option to add a paramagnetic oxygen bench, in a single, modular analyzer platform. This approach enables direct, selective measurement of multiple gas components without the need for converters, consumables, or complex sample conditioning inside the analyzer.

For natural gas quality measurements, the QX1400 is typically configured with a laser based measurement bench, with QCLs targeting specific absorption wavelengths in the mid-infrared region. The laser measurement bench provides highly selective detection of moisture and CO_2, while remaining insensitive to the background hydrocarbons present in natural gas. A key benefit for moisture measurement is the ability to reject interference from external (atmospheric) water, removing the need for complex compensation or continuous internal purging and enabling a robust, high-resolution measurement down to low ppm levels. This direct measurement approach improves accuracy, repeatability, and long-term stability – well suited to quality-critical and custody-transfer natural gas applications.

Housed in a flameproof, wall-mounted enclosure (Type 3RX, IP66) and certified for hazardous areas, the QX1400 brings this high-performance measurement capability directly to classified natural gas installations.

Configurable, Plug and Play Solution

The QX1400 is built on a modular, scalable design, allowing customers to configure the required measurement channels and communication options depending on application requirements in a single analyzer solution, thus reducing the need for multiple analyzers and simplifying system architecture.

To support modern operational needs, the analyzer features an integrated web-based interface (the QX Web Application) as standard, enabling intuitive access to configuration, diagnostics, calibration workflows, and measurement data using standard web browsers.

A front-panel screen with a rolling display provides critical measurements and status updates during onsite checks. Continuous diagnostics and status monitoring give operators greater visibility into analyzer health and measurement validity, supporting higher availability and easier troubleshooting.

Natural Gas Quality Measurement Specifications

The measurement performance below applies to the Rosemount QX1400 for natural gas quality applications.

Measurement Specifications for Standard Ranges[1]

Gas	Range		LOD
H_2O	Low	0–100 to 0-300 ppm	0.5 ppm
	High	0–500 to 0-1,400 ppm	2.5 ppm
CO_2	Low	0–1,000 to 0-500 ppm	5 ppm
	High	0-5 to 0-20 %	0.025 %

(1) The performance for natural gas quality applications assumes a typical background gas composition of methane balance with ethane (C_2H_6) up to 20 %, CO_2 up to 20 %, propane (C_3H_8) up to 10 %, butane (C_4H_{10}) up to 5 %, and H_2O up to 0.14 %. Not all ranges are available on a single analyzer; exact specification is dependent on configuration. Note that LOD specification corresponds to 2σ. Other gases and ranges are available on request.

By combining laser-based selectivity with a hazardous area-certified, flameproof design, the Rosemount QX1400 provides a robust and future-ready solution for natural gas quality monitoring. Delivering accurate, low-drift measurement of moisture and CO_2 with minimal maintenance, the QX1400 helps operators protect infrastructure integrity, meet pipeline and custody-transfer specifications, and lower total cost of ownership – all from a single analyzer that can be installed directly in hazardous area natural gas environments.

For more information, visit
Emerson.com/RosemountQX1400

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