

# Continuous Emissions Monitoring Solutions

## Rosemount Analytical: The Smart Choice for CEMS



Visualize > Analyze > Optimize

**ROSEMOUNT**<sup>®</sup>  
Analytical

  
**EMERSON**<sup>™</sup>  
Process Management

# Visualize



## *Visualize* a solution that simplifies the way you handle regulatory compliance

With our continuous emissions monitoring systems, Rosemount Analytical designs and engineers the right system for your specific needs, and provides startup and commissioning support, training, and ongoing maintenance contracts.

Designed in consideration of CEM regulations as specified in clean air laws around the world, including U.S. EPA 40 CFR Part 75 and 40 CFR Part 60, the Rosemount Analytical continuous emissions monitoring system helps you meet data reporting requirements and emissions compliance, and ensures certification and compliance with your local regulatory agencies. Our systems monitor:

- Sulfur Dioxide (SO<sub>2</sub>)
- Nitrogen Monoxide (NO)
- Nitrogen Dioxide (NO<sub>2</sub>)
- Carbon Dioxide (CO<sub>2</sub>)
- Oxygen (O<sub>2</sub>)
- Carbon Monoxide (CO)
- Total Hydrocarbon (THC)
- Hydrogen Sulfide (H<sub>2</sub>S)
- Opacity



Our CEMS solutions range from pre-engineered, packaged systems to more complex custom-engineered systems that measure multiple gases using data acquisition and handling. They are designed to perform the required daily zero and span checks automatically and unattended. Automatic calibration makes it less costly and time consuming to meet the environmental requirements for daily validation of the system.

With our CEMS products, the goal is to safeguard the environment and adhere to new, complex regulations, while continually improving business processes.

With field-proven reliability, low total cost of ownership, application flexibility, and superior performance, the Rosemount Analytical continuous emissions monitoring system is the smart choice to help you manage your business in today's tough regulatory environment.

## *Our solutions encompass*

- > **Industry-Leading Analyzers**
- > **System Design**
- > **Project Coordination and Management**
- > **Startup and Commissioning**
- > **Ongoing Maintenance and Support**

## Analyze the range of emissions *for accurate, reliable compliance data*



*Rosemount Analytical's MLT2 offers multi-component, multi-method analysis utilizing infrared, visible, ultraviolet, thermal conductivity, paramagnetic, and electrochemical sensor technologies, as well as trace oxygen and moisture.*

### **A Modular Approach for Emissions Monitoring**

For basic continuous emissions monitoring, we offer a pre-engineered modular CEMS solution that ensures quick and easy field installation in a compact design.

Our modular CEMS solution is designed with the Rosemount Analytical MLT 2 multi-component gas analyzer or X-STREAM XE field housing gas analyzer, combined with the SMP1000 sample conditioning package and SP 110 sample extraction probe. Together, these powerful analytical components form a CEMS approach that offers tremendous cost savings because it doesn't require a shelter.

This shelterless system is ideal for mounting directly in the field in an inexpensive, three-sided protective covering. It is also available in a hazardous area designed, wall-mounted, temperature-controlled enclosure. The sample conditioning portion of the system is housed in a compact, purgeable, weatherproof enclosure.

We also offer customized CEMS for measuring multiple gases, built to customer specifications.

### **Pre-Engineered Solutions**

Rosemount Analytical also offers a cost-effective, pre-engineered CEMS for monitoring stack gases for regulatory compliance.

The GMP1000M continuous emissions monitoring package with MLT multicomponent analyzers (MLT 1, MLT 3, or MLT 4) measures up to five gases plus opacity, including O<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, and NO<sub>x</sub>. It can also include the OPM4000 for opacity monitoring. The GMP 1000M performs self-diagnostics and is fully pre-engineered for maximum uptime.

### **Chromatograph Solutions for CEMS**

Rosemount Analytical gas chromatographs use thermal conductivity detectors (TCDs), flame photometric detectors (FPDs), or flame ionization detectors (FIDs) to precisely measure the data you need for virtually any EPA or ASTM test method.

### X-STREAM XEXF Enhanced Gas Analyzer



- Analyzes up to four components
- Includes wall-mountable NEMA 4X/IP66 painted cast aluminum housing
- Offers a dual-compartment version, with separated physics and electronics
- Includes a web-browser interface option offering a built-in PLC, data, calibration, and event logger, calculator, and more

### MLT 2 Multicomponent Gas Analyzer



- Measures up to five gas components in a single or dual compartment IP 65 (NEMA 4/4X) wall-mount enclosure
- Features a front-panel display and keypad configuration
- Comes equipped with an impact-tested, intrinsically safe front panel and simplified pressurization (Z purge) for Ex Zone 2 in hazardous areas
- Features an optional EExpi-approved purge system for CENELEC Ex Zone 1 applications

### SMP1000 Sample Handling System



- Combines moisture removal, sample and calibration valving, flow regulation, and power distribution in a compact, wall-mounted enclosure
- Regulates sample line and probe temperatures using integrated temperature control circuits and controls the condensation of entrained moisture vapor using a thermoelectric cooler to present a dry sample for analysis

### SP 110 Sample Probe



- Extracts a representative sample from a gas stream for analysis
- Reduces particulate in the sample, virtually eliminating blockage of the heated sample line
- Features an optional back-purge designed to rapidly and simply clean the filter

### GMP 1000M Continuous Emissions Monitoring Package



- Measures up to five gases, including O<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, & NO<sub>x</sub>, plus opacity
- Performs self diagnostics for maximum availability

### OPM4000 Opacity Dust Density Monitor



- Provides high-performance opacity monitoring with double-pass transmissometer that meets or exceeds revised PS-1 and ASTM D 6216
- Features a digital display with instant percent opacity, average percent opacity, and time to next calibration

### Rosemount Analytical Gas Chromatographs



- Offers micro-packed and/or capillary columns for improved component separation, shortened analysis time, and reduced carrier gas consumption
- Includes an optional FOUNDATION fieldbus communication protocol with XA series GCs
- Provides higher heating value measurement and speciated component values for a variety of reporting requirements

## Optimize process performance *to ensure emissions compliance*

*Rosemount Analytical applies a straight extraction sampling technique, where the sample is continuously drawn from the gas stream through a filter to remove particulates, and is then sent through a conditioning system to remove moisture and other inconsistencies. Finally, the conditioned gas is sent to the analyzer(s) to be evaluated for numerous parameters, which are collected and compiled by a data acquisition system, for customizable reporting and full compliance with regulating bodies.*

### **Diluent Gas Monitoring**

Rosemount Analytical's CEMS technology uses a paramagnetic technique with a fast response and a wide dynamic range to measure oxygen as a diluent gas in ranges varying from 0–1 % to 0–100 % (full scale). It includes a corrosion-resistant, long-life cell with a rugged, self-tensioning suspension. Carbon dioxide can be measured as a diluent using the nondispersive infrared technique that includes a wide dynamic range of 0–1% to 0–100% (full scale).

### **Flow Monitoring**

Rosemount Analytical's CEMS solution offers third-party flow monitoring equipment to measure the rate of exhaust gases being sent through the plant's ducts and stacks before being exhausted into the atmosphere. Data can be calculated using direct in-stack measurements or indirect, built-in calculations based on fuel usage or other process parameters.

### **Pollutant Concentration**

With Rosemount Analytical's CEMS technology, stack gas is continuously sampled and monitored for NO<sub>x</sub>, SO<sub>2</sub>, and CO pollutant concentrations using user-selectable, full-scale ranges from 0–10.0 ppm to 0–10,000 ppm.

### **Hydrocarbon Analysis**

Rosemount Analytical uses a flame ionization detector to accurately measure the total hydrocarbon content of stack emissions over a wide selection of user-selectable, full-scale ranges from 0–1.0 ppm to 0–10 %.

### **Opacity/Dust Density**

Using an opacity monitor that combines a single light source, single detector, and double-pass principle of measurement with no moving parts, Rosemount Analytical offers accurate, reliable opacity measurements.

### **Data Acquisition and Reporting**

Rosemount Analytical's CEMS use third-party data acquisition and handling systems that provide superior data handling and display functions. The extensive, real-time and instantaneous data available in the system, coupled with operator interface capabilities, make it a valuable operations tool, providing information for avoiding excess emissions and reducing out-of-compliance occurrences.



*Rosemount Analytical's CEMS offer superior data handling and display functions to help plants avoid excess emissions and reduce out-of-compliance occurrences.*

## Benefits of a Rosemount Analytical CEMS Solution

- > Reduced costs
- > Improved performance
- > Proven reliability
- > Reduced time for installation, testing, startup, & service
- > Compact size
- > System expandability
- > Guaranteed EPA certification

## Industry Applications

### Gas Turbines

Our CEMS are ideal for the low emissions requirements of gas turbines.

### Cogeneration Facilities

Depending upon the geographic location, type of fuel burned, and plant size, any or all of the following parameters may be monitored: CO, O<sub>2</sub>, CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, THC, NH<sub>3</sub>, and opacity.

### Refining

Process heaters and FCC units often require enhanced sample handling features that are a Rosemount Analytical specialty.

### Utilities and Municipalities

With emissions allowances being a potentially valuable commodity, accurate and reliable CEMS are a necessity.

### Industrial Boilers

Depending upon the size and location of the plant, CEMS may be required.

### Commercial and Institutional Boilers

Typical measurements include CO, CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, O<sub>2</sub>, and opacity.

### Pulp and Paper

Pulp and paper facilities may be required to measure SO<sub>2</sub>, O<sub>2</sub>, CO, NO<sub>x</sub>, and opacity in a variety of emissions sources, including power and recovery boilers.

### Selective Catalytic Reduction (SCR) Systems

A NO<sub>x</sub> measurement is used upstream of the SCR to control the feed rate and downstream of the SCR for NO<sub>x</sub> emissions compliance.

## Unparalleled Global Experience

*means a custom CEMS solution you can count on*

*Rosemount Analytical has two teams of dedicated continuous emissions monitoring experts based in our Solon, Ohio, USA and Hasselroth, Germany facilities. The CEMS engineering specialists in these offices have an average of 15 years of CEMS experience and are committed to designing and engineering CEMS solutions that fit the unique needs of each project.*



## Rosemount Analytical helps process facilities around the world to comply with in-country environmental regulations

### United States

- 40CFR 60 – Standards of performance for new stationary sources
- 40CFR 75 – Continuous emission monitoring
- 40CFR 96 – NO<sub>x</sub> budget trading program and CAIR NO<sub>x</sub> and SO<sub>2</sub> trading programs for state implementation plans

### Mexico

- Procuraduría Federal de Protección al Ambiente (PROFEBA)

### Canada

- New Source Emission Guidelines for Thermal Electricity Generation

### European Union

- Directive 24 – Cap-and-trade program for greenhouse gases
- Directive 8 – Municipal incinerators (particulate, HCl, CO, O<sub>2</sub>)

### Germany

- TUV certifications
- Article 29 (authority to demand and regulate CEMS installations)
- Order 13 (for >100MW furnaces)
- Order 17 (Incinerators)
- Section 3.3 of TA Luft (CEMS requirements)

### Rest of World

- Country-specific regulations





Our field-mountable gas chromatographs provide higher heating values and speciated component values for a variety of reporting requirements. They even output calculated values for site-specific reporting.



Built to a customer's specifications, this customized CEMS is housed in a walk-in shelter with a wall-mounted sample handling system and wall-mounted MLT2 gas analyzer, which allows for ease of maintenance.



The continuous emissions monitoring package with X-STREAM general purpose gas analyzers performs self-diagnostics and is fully pre-engineered for maximum uptime. The system can measure up to four of the following gas constituents: O<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, NO, NO<sub>2</sub>, and NO<sub>x</sub>. Opacity can be measured with the addition of an opacity monitor.

Over the past 20 years, we've installed **more than 3,000** continuous emissions monitoring systems around the world.

## Advanced Engineering & Services *for a one-of-a-kind CEMS solution to fit your needs*

*The keys to a successful project are the proper execution strategies, a knowledgeable and committed project team, and world-class products and services. Rosemount Analytical has more than 20 years of experience designing, engineering, and executing CEMS projects that ensure our customers meet stringent, ever-changing environmental regulations. We partner with each customer to clearly understand and engineer a solution that meets their specific needs and budget requirements.*

### **Continuous Emissions Monitoring Project Management Overview**

Rosemount Analytical has highly experienced teams of world-area dedicated CEMS experts who are responsible for the project management and implementation of CEMS projects of all sizes and scope. We use detailed work processes for planning, design, engineering, implementation, delivery, and support to ensure that CEMS projects are delivered on time and on budget.

Our CEMS project teams adapt their processes and execution tools to each project's unique requirements. By combining industry-recognized analytical solutions with unparalleled industry expertise, Rosemount Analytical offers a low-risk CEMS solution that ensures full regulatory compliance. Our CEMS project management process:

- Ensures that the analytical design meets time, budget, and regulatory requirements
- Offers more accurate data analysis and communication
- Ensures compliance with environmental regulations

### **Planning & Initial Engineering**

#### **Project Identification & Scope**

- Develop project team
- Hold kickoff meetings
- Define project objectives
- Review project scope
- Develop initial project schedule

#### **Initial Engineering**

- Develop implementation and procurement plan
- Handle data collection and analysis
- Create application engineering plan



## Dependable Sample Handling Can Make the Difference

Rosemount Analytical's modular sample handling system combines moisture removal, sample and calibration valving, flow regulation and power distribution in a compact, wall-mounted enclosure.

Daily calibration and other routine tasks are performed automatically by the analyzer. All system functionality can be manually initiated for troubleshooting purposes and testing. The analyzer eliminates the need for the integration of a separate PLC or external control system.

### Design, Implementation, & Testing

#### Design

- Develop application design
- Design sample handling system
- Develop system integration plan

#### Implementation

- Manufacture analyzers
- Build sample handling system
- Procure required third-party equipment
- Integrate complete system

#### Testing

- Conduct electronics testing
- Conduct application testing
- Conduct sample handling system leak testing
- Handle overall quality assurance

### Installation, Commissioning, & Startup

#### Installation

- Supervise installation
- Offer technical support

#### Commissioning

- Supervise or handle commissioning as required
- Integrate historical data
- Check loops and parameters
- Work with third-parties to perform RATA certification testing

#### Startup

- Manage tuning
- Handle site acceptance testing
- Provide as-built documentation
- Provide spare parts as specified

### Lifecycle Support

#### Training

- Formal on-site training
- Informal on-the-job refresher training

#### Maintenance

- Scheduled on-site maintenance services
- Emergency on-site maintenance services
- Emergency spare parts support

#### SureService Contracts

- Custom support agreements to meet your specific needs

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