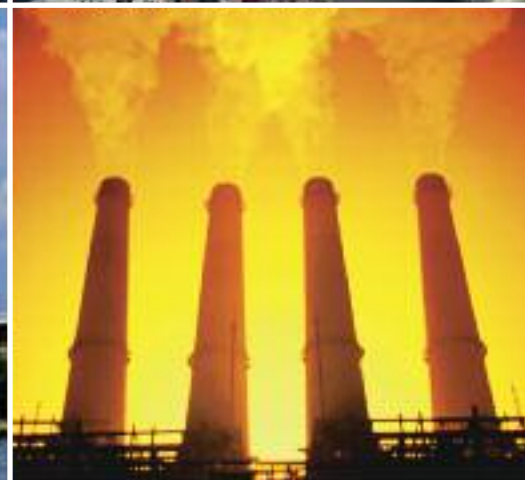




Advanced Power Analytical Solutions

Optimizing power plants for peak performance



Visualize > Analyze > Optimize

EMERSON PROCESS MANAGEMENT – THE TRUSTED LEADER IN POWER INDUSTRY OPTIMIZATION

UNMATCHED ACCURACY. SUPERIOR PERFORMANCE. WORRY-FREE DEPENDABILITY.

Leading-edge instruments; applications expertise; unmatched customer service; worldwide support – that's what makes Emerson's Rosemount Analytical instruments the world leader. We help our customers maximize process performance, productivity, and profitability. Our power industry solutions provide reduced

installation and maintenance costs while improving process quality. We offer a complete range of analyzers, transmitters and sensors for continuous on-line measurement for liquid and gas processes. In power facilities around the world, Rosemount Analytical products prove their worth every day. Read on to find out more.



WORLDWIDE STRENGTH

Emerson Process Management is part of Emerson, a global company that brings together technology and engineering to provide innovative solutions for our customers in a wide range of industrial, commercial and consumer markets. Our priority is to design, produce and deliver products, systems and solutions that make people's lives better.



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LIQUID ANALYSIS – ON THE FRONT LINE FOR FIGHTING CORROSION

Corrosion costs the electric power industry billions of dollars a year in damaged equipment and power replacement costs. Although corrosion can never be eliminated, it can be significantly controlled by good water chemistry. Reliable measurement of process conditions is central to that control. Count on Emerson to be your partner in this key step to keeping corrosion to a minimum. Our wide range of Rosemount Analytical liquid instrumentation offer proven performance, reliability, and ease of use.

Monitoring waterside chemistry

Feedwater pH is one of the most difficult measurements to make in a power plant, but the Rosemount Analytical Model 3200HP pH sensor makes the job easy. The gravity-fed flowing junction reference ensures a small, stable liquid junction potential even in samples having conductivity as low as 0.3 uS/cm. The result is a measurement error no greater than ± 0.05 pH after buffer calibration. The 3200HP has almost no sensitivity to changes in sample flow. Boiler water pH is less difficult to measure because the conductivity is greater. Use a General Purpose Model 3900 sensor for these applications.

Many plant chemists use conductivity instead of pH to measure amines in feedwater. Amines are weak bases, so they increase both the pH and conductivity of the water. For a given amine, the pH can be calculated if the conductivity is known. For conductivity measurements, the Rosemount Analytical Model 400 and 404 ENDURANCE sensors are ideal.

For feedwater oxygen measurements, the Model 499A TrDO is easy to use and reliable. It accurately measures oxygen from saturation to 1 ppb. Maintenance frequency is as low as every six months to a year.

Monitoring steam chemistry

Corrosion and deposition in the turbine are caused by mechanical and vaporous carryover of boiler water into the steam. Because the contaminants are primarily ionic, monitoring boiler water conductivity with a Model 400 sensor and deconcentrating, if necessary, is an easy and inexpensive first step toward controlling steam purity. Many plants regularly monitor specific impurities. Sodium is a particularly hazardous corrodent and can be measured using the Model 185 sodium analyzer. Silica, a major component of turbine deposits, is not ionic and can be measured directly using the Model 185 wet chemistry analyzer.



Model 3200HP High Purity pH Sensor



Model 3900 General Purpose pH Sensors



Model 404 ENDURANCE Sensor



Model 400 ENDURANCE Sensor



Model 499A TrDO Sensor



Model 185 Wet Chemistry Analyzer



COMPLETE SYSTEMS AND SOLUTIONS FOR PROCESS MANAGEMENT



Monitoring makeup water

The makeup water system provides demineralized water for startups and to replace normal losses. Because the minerals in raw water are mostly ionic, the Model 400 (screw in) or Model 402 (retractable) sensors are ideal for monitoring demineralizer performance. Poorly ionized contaminants, like silica, must be measured directly using the Model 185 silica analyzer.

The two common demineralization methods, reverse osmosis (RO) and ion exchange, require specific additional monitoring. RO membranes are susceptible to chemical degradation and fouling from suspended solids, scale, and micro-organisms.

Membranes are expensive, so careful monitoring of the pre-treatment system is vital. Technologies include the Clarity II turbidimeter to monitor filter performance, the Model 3900 general purpose pH sensor to optimize acid injection for scale control, the Model FCL chlorine analyzer to monitor biocide residuals, and the Model 3900 ORP sensor to control bisulfite addition for dechlorination. Ion exchange demineralizers generally require little pretreatment, but do require regular regeneration with acid and caustic. To ensure good regeneration and reduce waste, acid and base concentrations are carefully controlled. The Model 228 toroidal conductivity sensor continuously monitors conductivity in

the chemical injection lines, and the analyzer automatically converts the result to concentration.

Monitoring Cooling Water

Corrosion and scale formation are ever present problems in recirculating cooling water. Treatment consists primarily of controlling dissolved solids by blowdown, adding sulfuric acid to reduce alkalinity, treating with scale and corrosion inhibitors, and adding biocides.

Because the dissolved solids are primarily ionic, measuring conductivity is the easiest way to control blowdown. Cooling water is often dirty, so a toroidal sensor like the Model 228 is ideal.

Blowdown also reduces the concentration of treatment chemicals. The programmable bleed and feed relays in the Model 56 Analyzer make it easy to automatically replenish treatment chemicals every time the system is blown down. Sulfuric acid injection is usually controlled by measuring pH. The Model 396P or Model 3500 are the sensors of choice. Both resist fouling, and the Model 3500 has the additional advantage of being rebuildable.



Clarity II™ Dual-sensor Turbidimeter



Model 3900 General Purpose pH Sensors



Model 228 Submersion/Insertion Sensor



FCL/MCL Free Chlorine Systems



Model 56 Analyzer



Model 3500 Insertion/Submersion pH/ORP Sensor



ROSEMOUNT ANALYTICAL LIQUID INSTRUMENTATION



Features	6081 Series	1056 Series	1057 Series	56 Series	5081 Series	1066 Series
Power Requirement	Lithium power module	115 - 230 VAC or 24 VDC	115 - 230 VAC or 24 VDC	115 - 230 VAC or 24 VDC	24 VDC	24 VDC
Number of 4-20 mA Outputs	Wireless	Two	Four	four	One	Two
Number of Sensor Inputs	One	Two	Three	Two	One	One
Available Measurements	pH and contacting conductivity	pH/ORP/ISE, Conductivity, Resistivity, % Concentration, Dissolved Oxygen, Ozone, Flow,* Turbidity,* Chlorine (Total, Free, Monochloramine, pH Independent Free Chlorine)	pH/ORP/ISE, Contacting Conductivity	pH/ORP, resistivity/conductivity/TDS, % concentration, ratio conductivity, total and free chlorine, dissolved O ₂ dissolved ozone, turbidity, pulse flow, temperature and raw 4-20mA input	Select one: pH, ORP, Conductivity, Resistivity, Dissolved Oxygen, Ozone, Chlorine, Gaseous Oxygen	Select one: pH, ORP, Conductivity, Resistivity, Dissolved Oxygen, Ozone, Chlorine
SMART pH	Yes	Yes	Yes	Yes	No	Yes
HART Compatible	Yes	Yes	No	Yes	Yes	Yes
FOUNDATION fieldbus Compatible	No	No	No	No	Yes	Yes
Wireless THUM Adaptor compatible	NA	Yes	No	Yes	Yes	Yes
Multi-lingual Menus	Yes	Yes	Yes	Yes	No	Yes
Relays	NA	4	4	4	NA	NA
PID Control	No	Timer control only	Timer control only	Yes	Yes/Ff	Future/Ff
Advanced Diagnostics Capability	Yes	Yes	Yes	Yes	Yes	Yes
Area Classifications	Class 1, Div. 1	Class I, Div 2	Class I, Div 2	Class I, Div. 2	Class I, Div. 1 & Div. 2, Explosion proof	Class I, Div. 1 & Div. 2
Available Approvals	CE, CSA, ATEX Spectrum Approvals. FM pending	FM, CE, CSA, UL	CE, UL, CSA	Pending	CE, FM, CSA, ATEX	Pending

COMBUSTION SOLUTIONS – FOR PEAK PERFORMANCE AND MINIMAL GREENHOUSE GASES



Combustion flue gas analysis has been used for decades as a method of optimizing fuel/air ratio. By measuring the amount of excess oxygen and/or CO in the flue gases resulting from combustion, users can operate at the best heat rate efficiency and lowest NO_x, while also generating the least amount of greenhouse gas. The theoretical ideal where all fuel is reacted with available oxygen in the combustion air, and no fuel or O₂ is left over, is where Emerson comes in. We offer true process optimization with direct, in-line, in-process measurements which results in:

- > Reduced energy, installation and maintenance costs
- > Lower process variability and improve process diagnostics and safety
- > Reduced greenhouse gas emissions
- > Meeting or exceeding regulatory compliance requirements

Oxymitter In Situ Flu Gas Oxygen Transmitter

The most widely used technology for measuring combustion flue gas is the zirconium oxide fuel cell oxygen analyzer. The Rosemount Analytical Oxymitter utilizes this proven technology, integrating it with field electronics into a single, compact package. Its probe inserts directly into a flue gas duct to measure oxygen in combustion processes – no sampling system is required. The Oxymitter electronics also require 95% less power to operate, so the components last



Oxymitter In Situ Flu Gas Oxygen Transmitter

longer. Traditional architecture with remote-mounted electronics is also available. The Oxymitter is fully field-repairable with a design that provides convenient access to internal probe components for easy in-house servicing. The cell and heater/thermocouple are fully field-replaceable. The Oxymitter contains no potentiometer adjustments or jumpers.

Flue gas stratification is common in large multi-burner furnaces. An array of Oxymitter probes of various lengths cannot only provide a good total furnace average, but also assist an operator in balancing out a large furnace. Oxymitter's variable insertion capability permits ideal placement, burner column by burner column.

The Oxymitter's Xi remote electronics unit offers new capability, including operation at elevated flue gas temperatures, fully automatic calibration, and plugged diffuser (filter) diagnostics.

OCX 8800 O₂ / Combustibles Transmitter

This rugged compact unit has two of the world's most reliable and accurate sensors – the same high-performance oxygen sensor as the Oxymitter – while its unique combustibles detector has proven to be the most reliable on the market. This rugged transmitter has not only a General Purpose version, but also a Hazardous Area version.

- > Rugged sulfur resistant catalytic bead sensor
- > Vacuum Fluorescent Local Operator Interface with thru-glass IR push button capability
- > Line Voltage Detection
- > State of art sensor and sample block temperature stabilization
- > HART and optional Foundation fieldbus communications
- > Calibration check and full calibration communications



OCX 8800 O₂ / Combustibles Transmitter



PlantWeb® brings combustion control to your fingertips

Emerson's PlantWeb® field-based architecture uses HART® protocol to link Rosemount Analytical instruments with a control room or any specified location. Service diagnostics and calibrations can be performed remotely with a HART hand-held communicator or a personal computer equipped with AMS Suite asset management system.



GAS ANALYSIS SOLUTIONS – FOR TIGHT PROCESS CONTROL

Emerson offers reliable analytical packages with comprehensive application capabilities for gas-fired simple cycle and combined cycle power plants, including:

- > Fuel gas BTU and Wobbe Index
- > Continuous Emissions Monitoring
- > Selective Catalytic Reduction (SCR)

With our complete lines of gas chromatograph and process gas analyzer solutions, Rosemount Analytical analyzes and communicates the analytical data you need for tight process control.



CEMS in Cogeneration and Combined Cycle Applications

Emerson uses its industry-leading process gas analyzers to offer continuous emissions monitoring solutions for cogeneration and combined cycle power plant applications. Our CEMS capabilities range from pre-engineered, packaged systems to more complex custom-engineered systems that measure multiple gases using data acquisition and handling.

Rosemount Analytical's CEMS helps power plants meet data reporting requirements and emissions compliance and ensures certification and compliance with local regulatory agencies. Our CEMS solution is ideal for the low-emissions requirements of gas turbines. For cogeneration applications, depending on geographic location, type of fuel burned, and plant size, our CEMS can monitor carbon monoxide, oxygen, sulfur dioxide, NOx, total hydrocarbons, ammonia, and opacity.



Gas Chromatographs in Combustion Turbine Power Plants, Cogeneration Power Plants, and Power Plants with Natural-Gas-Fired Burners

Emerson offers low-cost, reliable gas chromatograph solutions for gas turbines and other natural gas combustion processes. Our gas chromatographs provide a reliable, online measurement of natural gas heating value (BTU or CV) for more efficient control of turbine and burner combustion. The quality and composition of fuel burned in a gas turbine or a natural-gas-fired burner have a tremendous impact on the life span and maintenance requirements of the plant asset. With a gas chromatograph from Emerson, gas-fired turbines and burners can utilize three key gas measurements:

- > Gas Composition Converted to BTU or CV
- > Wobbe Index
- > Hydrocarbon Dew Point



Gas Turbines

In today's world of high energy demand, Emerson offers low-cost, reliable analytical packages with short deliveries for gas turbine and other combustion processes. Our Gas Chromatographs provide an accurate on-line measurement of natural gas BTU value for more efficient control of turbine combustion. Also, our emissions monitoring packages are designed to meet US EPA and local regulations, and are ideal solutions for Selective Catalytic Reduction (SCR) applications. And our pre-engineered solutions can get your operation up and running quickly.





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CONTACT US WORLDWIDE

Emerson Process Management's field offices are your source for more information on the full line of Rosemount Analytical products. Field sales personnel will work closely with you to supply technical data and application information.

For more information on Rosemount Analytical products and their applications, please contact your nearest Emerson field office. To request copies of our literature, call 949-757-8536 or visit our website.

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ANALYZE US

Emerson Process Management the worldwide industry leaders in:

- > **Combustion Analysis and Optimization**
- > **Process Gas Analysis**
- > **Environmental Analysis and Systems**

WE'LL PROVE IT.

Let us prove what Emerson Process Management can do for you. Call your Emerson representative today.

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