SUPPORTING YOUR COMBUSTION AND EMISSIONS APPLICATIONS

NEW PRODUCTS
Solutions for the toughest of emissions measurements

APPLICATION STUDY
Combustion control in coal and gas boilers

EXPERT ADVICE
Advantages of the SERVOTOUGH Laser 3 Plus in ammonia slip

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Get an insight into our world-class manufacturing facilities where sensors and analyzers are built to the highest-quality standards

SERVOMEX OxyDetect
Our non-depleting Paramagnetic oxygen monitor available for safe and hazardous areas – see the benefits

AMMONIA SLIP CONTROL
See why the SERVOTOUGH Laser 3 Plus Ammonia TDL analyzer is the ideal solution for your DeNOx process

SERVOTOUGH LASER 3 PLUS
See the advantages of Servomex's latest product range as we introduce three new compact TDL analyzers

DEAR READER
WELCOME TO THE LATEST EDITION OF OUR MAGAZINE FOCUSED ON THE POWER MARKET SECTOR.

In this edition, we look at emissions regulations and compliance, a major concern for both public and private power generating utility plants across the globe. Many countries are now enforcing current emissions standards, while others are legislating increasingly stricter ones.

Europe has committed itself to taking on the task of reducing CO2 emissions by 80-95% below 1990 levels by 2050, which can only happen if the power industry moves to a zero-carbon power supply.

Significant reductions in emissions can be achieved by repurposing the waste heat within the emission stream, producing heat or electricity from generated steam. Co-generation plants use the steam for heating, while combined cycle gas turbines use it for electricity. These are just two examples of effective emissions reduction that also improve plant efficiency. We look at this in greater detail on page four and in our process feature on page 11.

China is determined to become a world leader in emissions reduction and has completely embraced Selective Catalytic Reduction (SCR) as the required post-combustion NOx control process for all large power plants. It is looking at further emissions reductions strategies with boiler efficiency and control, as seen on page eight.

We also highlight three key Servomex analyzers used for keeping emissions under control. The NOx, SO2, and HFID are all from our SERVOPRO family of analyzers, and form part of a comprehensive solution for accurate emissions monitoring.

And we’ll explore how the SERVOTOUGH Laser 3 Plus analyzers and SERVOTOUGH FluegasExact 2700 can be used in boiler feedback controls for coal and natural gas.

Servomex is continuing to invest in the global power and environmental emissions market and I am personally very pleased to announce we now have a stronger presence in Asia with the arrival of Tao Wee “TW” Loo as our new Business Development Manager for our Power & Environmental Emissions Market serving all of Asia. Find out more about TW on page five.

Barbara Marshik
Power Market Sector Manager.

Email: bmarshik@servomex.com

SEE THE FULL PICTURE ONLINE

IN THIS ISSUE
POWER MARKET FOCUS
How Europe and China are driving down emissions

RELIABLE EMISSIONS MEASUREMENT SOLUTIONS
Servomex’s comprehensive analyzer suite for monitoring emissions

COMBUSTION CONTROL IN COAL AND GAS BOILERS
A comparison of the challenges and solutions for boiler operators

KEEPS YOUR ANALYZER UP AND RUNNING
See how our range of spares kits can maximize the SERVOTOUGH FluegasExact 2700’s uptime

BENEFITS OF COMBINED CYCLE POWER PLANTS
Discover the Servomex solution for the challenges of emissions control in combined cycle power plants

USING THE Laser 3 Plus IN AMMONIA SLIP
How our compact TDL analyser provides a total application solution for your DeNOx processes

See our latest product ranges. Analyzer guide starts on page 16

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www.facebook.com/ServomexGroup

FOR THE FULL RANGE OF ANALYZERS VISIT servomex.com/gas-analyzers
The European Union (EU) is pursuing new initiatives to become the world leader in low carbon emissions. By 2050, it aims to reduce greenhouse gas emissions by 80-95% below 1990 levels.

Power was identified as a segment where significant reductions can occur through energy efficiency, fossil fuel replacement with renewable energy sources like wind and solar, and European grid infrastructure investments. Programs like the Medium Combustion Plant (MCP) directive affect more than 143,000 medium-sized plants that must now regulate NOx, SOx, and dust. Combined with tougher Emissions Limit Values (ELVs) in the Large Combustion Plants (LCP) directive, it plays a large part in European emissions reduction.

Any plant with a thermal input rating exceeding 50 Megawatts falls under the new LCP directive and must apply the Best Available Techniques (BAT) provided in the BAT reference (BREF) document to reduce emissions to meet the new emissions requirements.

Daily emissions reporting has been added to ensure that the abatement equipment is functioning properly, limiting undetected excursions as well as new start-up and shut-down emissions measurements. The BREF includes comments on equipment corrosion or fouling that may occur with various techniques. Adding analyzers for control of the process can help minimize the impact on the plant emissions and performance.

EUROPE AIMS TO CUT CARBON LEVELS

Highly accurate measurement equipment will be key for maintaining both compliance and equipment whether the emissions reduction was provided by optimizing the combustion process or adding DeNOx equipment. Servomex has been instrumental in boiler and turbine optimization with the use of our SERVOTOUGH FluegasExact 2700 Zirconia O2 analyzer, or the SERVOTOUGH Laser 3 Plus Combustion TDL analyzer for CO, O2, or CO + CH4 analysis as feedback control monitors. Post-combustion control of <3-10mg/ Nm3 of NH3 Slip from installed DeNOx SCR and/or SNCR equipment will now be required as a yearly average or averaged over the sampling period. By using a SERVOTOUGH Laser 3 Plus TDL analyzer, not only will the plant be able to maintain compliance, but the NH3 signal provides feedback control for dosing, reducing operating costs as well.

China is driving emissions reductions in the region with the goal of being the world leader by equipping all large industrial power generating equipment with Selective Catalytic Reduction (SCR) nitrogen oxide reduction or DeNOx equipment. In the meantime, Beijing and Shanghai have converted all their electrical generation plants from coal to natural gas; however, the district heating still relies on coal-fired production. China’s new goal is to reduce emissions even further, which will require optimizing the performance of the boiler and equipping them with more efficient low NOx burners.

Other process changes including renewable fuels are also being implemented to produce less NOx and promote lower NOx emissions into the atmosphere.

Boiler optimization with feedback control is crucial right now, and Servomex has the perfect suite of analyzers to support these processes, backed up by a talented and experienced team of experts.

China’s Drive Towards Lower Emissions in Asia

SERVOMEX SOLUTIONS FOR EMISSIONS REDUCTION

SERVOTOUGH FluegasExact 2700

SERVOTOUGH Laser 3 Plus Combustion

SERVOTOUGH Laser 3 Plus Ammonia

Servomex has a wide variety of analyzers that can handle emissions from any fuel, including high-particulate fuels like biomass or coal and cleaner fuels which produce low NOx emissions as seen in natural gas turbines.

Let us help you cut emissions for your process. Contact the Asia Pacific Business Centre:

Email: tloo@servomex.com or ssun@servomex.com

SERVOMEX’S EXPERT TEAM FOR ASIA

Servomex’s strong support for the power and environmental emissions market in the Asia-Pacific region has been reinforced by the recent appointments of Tao Wei “TW” Loo as the Power and Environmental Emissions Business Development Manager for the Asia-Pacific region, and Sherwin Sun as the new China Sales Manager.

With a strong engineering background and extensive business experience, TW is establishing a closer working relationship with our power and environmental emissions market customers providing support and solutions that will meet their needs.

Sherwin is responsible for leading the China sales team, and has a decade of sales experience in the environmental emissions market.

With several recent product launches providing more advanced solutions to gas analysis applications, the team is also focused on providing support to those Servomex customers in Asia who are looking to upgrade their existing installations.

Contact us today to discuss your needs. Visit servomex.com
Solutions for the Toughest Emissions Measurements

Servomex offers a comprehensive suite of analyzers for advanced combustion control and emissions monitoring, covering a broad range of gas components and ranges supporting the ever-tightening regulatory environment seen worldwide.

The new SERVOPRO NOx analyzer combines a high dynamic range and rapid response time. This provides an ideal solution for turbine emissions monitoring, not only during operation but also at start-up and shut-down, measuring NO or NO/NO/NOx concentrations in four user-selectable ranges, from 0-3 parts-per-million (ppm) to 0-3,000ppm.

For low sulfur dioxide emissions measurements, the SERVOPRO SO2 provides a 0-20ppm analysis range using pulsed Ultraviolet (UV) Fluorescence Technology for a highly accurate and low cost of ownership analyzer.

For industrial emissions or vehicle/engine certification applications that require heated gas analysis of total hydrocarbons (THC), methane, and non-methane hydrocarbons (NMHC) or volatile organic carbons (VOC) the heated SERVOPRO HFID delivers a reliable, accurate analytical solution with a high dynamic range from 0-30ppm up to 0-30,000ppm as methane.

Together, they join Servomex’s existing SERVOPRO-4900 multi-gas analyzer, offering a comprehensive line of accurate emissions monitoring solutions for NO, NO, NO, O3, SO2, CO, CO2, and hydrocarbons (methane, total hydrocarbons, and non-methane hydrocarbons), with a low cost of ownership over the lifetime of the products.

"The NOx, SO2 and HFID analyzers make a significant impact on the Servomex solution portfolio for emissions control and monitoring, adding support for a diverse range of stationary/industrial and mobile source emissions applications."

Barbara Marshik - Power Market Segment Manager. Email: bmarshik@servomex.com

Find out more about the SERVOPRO range of analyzers: servomex.com/servopro
In a coal-fired power plant, pre-heated air and pulverized coal are fed to the boiler where combustion takes place. As combustion processes are by nature variable and coal quality is never consistent, variable amounts of excess air are required to ensure complete combustion. Too much air, and combustion efficiency will drop, producing lower levels of CO but higher levels of NOx toxic emission gases. NOx emissions are also created at higher temperatures as a by-product of the combustion process where excess nitrogen (N2) in the air reacts with O2, as well as reacting with any elemental nitrogen that may be resident in the fuel. This temperature variation affects the production of CO2, CO and NOx differently, so by controlling the combustion process the boiler efficiency increases.

The biggest issue for coal boilers, compared to gas-fired systems, is the amount of dust produced. Coal dust can obscure the beam in TDL analysis, and causes abrasion to the probe (for Zirconia analyzers) or insertion tubes (for TDL). Temperatures can reach more than 1,000°C in the radiant section and can fall to less than 400°C around the economizer, affecting both analyzer types. These challenges make the placement of the TDL and Zirconia analyzers key for each type of boiler.

Monitoring above the burners, in the radiant section, can help detect any burner issues. The correct product for this challenging measurement will depend on the fuel type, dust loading and process temperature. A SERVOTOUGH Laser 3 Plus can be installed on the duct to measure O2, CO and CO+CH4 measurements. Although it is very fast, the extractive sampling technology of the FluegasExact 2700 means it is not fast enough to be used as a safety device.

A SERVOTOUGH FluegasExact 2700 (Zirconia) Combined O2 & COe in one unit
A SERVOTOUGH Laser 3 Plus (TDL) Single units required for O2, CO & CO+CH4

**A COMPARISON OF TDL AND ZIRCONIA TECHNOLOGIES FOR COMBUSTION CONTROL**

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<td>None</td>
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<td>Combined O2 &amp; COe in one unit</td>
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<td>Installation</td>
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**COMBUSTION CONTROL IN COAL AND GAS BOILERS**

- **In a coal-fired power plant, pre-heated air and pulverized coal are fed to the boiler where combustion takes place.**
- As combustion processes are by nature variable and coal quality is never consistent, variable amounts of excess air are required to ensure complete combustion. Too much air, and combustion efficiency will drop, producing lower levels of CO but higher levels of NOx toxic emission gases. NOx emissions are also created at higher temperatures as a by-product of the combustion process where excess nitrogen (N2) in the air reacts with O2, as well as reacting with any elemental nitrogen that may be resident in the fuel.

**CHALLENGES OF COAL VS GAS BOILERS**

- The biggest issue for coal boilers, compared to gas-fired systems, is the amount of dust produced. Coal dust can obscure the beam in TDL analysis, and causes abrasion to the probe (for Zirconia analyzers) or insertion tubes (for TDL). Temperatures can reach more than 1,000°C in the radiant section and can fall to less than 400°C around the economizer, affecting both analyzer types. These challenges make the placement of the TDL and Zirconia analyzers key for each type of boiler.

**ELECTROSTATIC PRECIPITATION (ESP)**

- Recovering waste heat in a gas turbine combined cycle is 50-75% more efficient than using improper generators.

**SAFETY**

- Emission levels of NOx are typically much higher for coal-based boilers, due to the nitrogen bound within the coal.

**COMBUSTION CONTROL IN COAL AND GAS BOILERS**

- Combustion control in coal and gas-fired boilers is critical for efficient operation and emissions management.

**BURNER MONITORING**

- Monitoring above the burners, in the radiant section, can help detect any burner issues. The correct product for this challenging measurement will depend on the fuel type, dust loading and process temperature.

- A SERVOTOUGH Laser 3 Plus can be installed on the duct to measure O2, CO and CO+CH4 measurements. Although it is very fast, the extractive sampling technology of the FluegasExact 2700 means it is not fast enough to be used as a safety device.
MAXIMIZE YOUR ANALYZER UPTIME WITH SPARES KITS

Servomex spares kits provide the parts you need to minimize system downtime and keep your analyzer operating in the most demanding conditions.

The SERVOTOUGH FluegasExact 2700 monitors oxygen and combustibles in the harshest environments, for example measuring high dew point, acid gas rich samples in high-temperature incinerators.

It is rugged and reliable, but when parts inevitably need replacing, it is also quick and easy to maintain.

We provide comprehensive spares kits with everything you need to complete a repair or replacement, from main parts, like PCBs or filters, to ancillary items such as seals, gaskets and anti- seize compounds.

Base spares kits are offered at the point of sale and ensure you'll have the critical spares on your shelf should a part need replacing, reducing your analyzer downtime.

For example, the popular FluegasExact 2700 base pack includes parts vital to the heating system, spare main filter, fuses, and flange gaskets in case a sensor head is ever removed from the process.

Packs of common consumable items — including mounting gaskets or aspirator and flame arrestor seals — are also available, allowing you to hold stock for when it's needed.

The FluegasExact 2700 manual has a full list of available spares and recommended quantities, depending on the number of kits in use. This allows you to select the parts you need more easily.

You can also download quick reference spares sheets from the Servomex website, which show compatibility for previous and current 2700 variants. These can be conveniently stored or placed near the analyzer for quick reference.

And, if you don't have the parts you need, our network of Business Centers holds extensive stocks of all key spare parts, enabling them to provide a 48-hour despatch on all stocked spares, so you get the parts quickly.

Get the spares you need to maximize your uptime: servomex.com/service-network

THE BENEFITS OF COMBINED CYCLE POWER PLANTS

POWER PLANTS ARE CONSIDERED ONE AREA WHERE SIGNIFICANT DECREASES IN EMISSIONS CAN BE ACHIEVED BY APPLYING A COMBINATION OF THE BEST AVAILABLE CONTROL TECHNOLOGIES ALREADY IN USE BY THE MARKET

CONTROL IN COMBINED CYCLE POWER PLANTS

Following the industrial trend, power utilities are using exhaust gas recycling to reap the highest overall benefit, producing steam for secondary electrical generation while increasing plant efficiency and in the process greatly reducing NOx, CO, volatile organic compounds (VOC) and particulate matter (PM) emissions.

NOx and CO reduction is key for Gas Turbine Combined Cycle (GTCC) plants and, in some cases, all that is needed is lean-burn air/fuel ratio control, plus a dry low-NOx (DLN) combustor, which premixes the fuel and air for a more even heat production.

Post-combustion technologies designed to lower NOx and other emissions include Selective Catalytic Reduction (SCR), Selective Non-Catalytic Reduction (SNCR), selective CO and NOx catalyst reduction, or the addition of fogging (water or steam injection).

The technology used depends on the turbine size, the regulatory requirements, and the environmental impact.

Advanced operational control using sensors or analyzers located in and around the heat recovery steam generator (HRSG) housing is used to balance operational efficiency against regulatory emissions, but because there is not much room inside the HRSG, analyzers need to be as compact as possible.

Extractions-based analyzers face a number of obstacles when deployed in a GTCC plant.

The biggest challenge comes from corrosion of the probe due to the high shear forces and the fluctuating temperatures and pressures coming from the exhaust gas exiting the turbine.

Analyzers placed farther downstream will benefit from lower and less turbulent flows; however the time lag of the analyzer response may now pose a problem, especially when used for safety purposes during the turbine start-up.

Get our analyzers across the process OVERLEAF

See our analyzers across the process OVERLEAF
Gas Turbines with SCR for NOx control are generally permitted an NH3 slip of <10ppm, with many countries requiring <5ppm and even some <2ppm. Monitoring is done using the SERVOTOUGH Laser 3 Plus Ammonia, which provides low level NH3 detection with a fast response, even when high dust is present.

Running the GT only during the start-up process means that NOx emissions are high until the ST process begins, so any delay reducing the GT exhaust emissions to minimum allowable limits could put the plant permit at risk.

The analyzers used must be fast and accurate throughout the GTCC plant start-up, operation and shut-down, tracking the NOx concentration spikes accurately as well as at the low permitted values of 2-3ppm for NOx in order to maintain compliance.

The SERVOPRO NOx chemiluminescent analyzer provides a rapid NOx response with high accuracy from the lowest range of 0-3ppm (as NO) all the way up to 3000ppm (as NO) with the same analyzer.

The more economical SERVOPRO 4900 multi-gas NOx analyzer can be used for higher levels of NO or NOx for feedforward control.

When combined with the SERVOPRO NOx, they can be used to monitor the actual NOx reduction capabilities of the SCR, to look at the destruction efficiency.

Find out more at servomex.com or contact your nearest business center.
ADVANTAGES OF THE Laser 3 Plus IN AMMONIA SLIP

OPTIMIZED FOR THE PRECISE, STABLE AND RELIABLE MEASUREMENT OF PPM AMMONIA, THE SERVOTOUGH Laser 3 Plus Ammonia PROVIDES THE TOTAL APPLICATION SOLUTION FOR YOUR AMMONIA SLIP DeNOx PROCESS

1. Combustion processes produce harmful NOx emissions, which are controlled by using ammonia to lower NOx output. If the process is overdosed with ammonia, this is called ammonia slip.

2. Excess ammonia can contaminate the flue gas, reduce the value of the fly ash, and causes a damaging build-up of ammonium bisulfate in the catalyst.

3. So, it is important to control the level of ammonia slip between 2-3ppm ammonia to ensure NOx reduction and prevent acid and particulate formation associated with excess ammonia.

TDL ANALYZERS VS EXTRACTIVE SYSTEMS

Tunable Diode Laser (TDL) gas analyzers have taken over from extractive systems as the industry standard for ammonia slip monitoring. As there is no physical interaction with the process, TDL can offer a highly stable, fast measurement response. Not all TDL solutions are robust or effective enough for this process, but the Laser 3 Plus Ammonia is specifically designed for the ammonia slip DeNOx process, meeting the challenges of high dust levels while providing a highly sensitive measurement.

EXCESS NOx
EXCESS AMMONIA LEADING TO AMMONIUM BISULFATE BUILD UP
AMMONIA SLIP

1. Incorrect measurements can threaten compliance with NOx emissions legislation, leading to heavy fines.
2. The Laser 3 Plus Ammonia provides a stable, reliable measurement, optimized for measuring 0-5ppm ammonia.
3. While traditional signal lock measurements use less stable water lines, the Laser 3 Plus Ammonia uses Servomex’s unique ‘line lock’ cuvette system, which provides an absolute signal reference for ammonia. So it never loses its lock on the ammonia reading, providing an accurate measurement at all times.

“Servomex’s systems engineering capability enables us to manufacture a complete analyzer system optimized for each specific customer process. Our global service network ensures your process is protected at all times, for complete peace of mind, while training packages are also available for your in-house teams.”

Rhys Jenkins - Product Manager - Process Photometric Analyzers. Email: rjenkins@servomex.com

Control your DeNOx process today: servomex.com/ammoniaslip-l3plus
POWER PRODUCT GUIDE

Power generation is a demanding and competitive industry – producing energy for a global market is a complicated balancing act between process efficiency, emissions control, safety requirements and cost control.

Servomex offers a comprehensive gas analysis that enables the world’s power producers to optimize their processes, meet legally binding emissions targets and raise profitability.

By working with industry regulators, Servomex ensures its gas analyzers meet the global compliance standards and the specific demands of power generation applications throughout the world.

Supported by a global service and support network, Servomex analyzers are used with confidence in power stations, incinerators and co-generation plants internationally.

For the full range of Servomex analyzers, visit servomex.com/gas-analyzers

SERVOTOUGH Oxy 1800

ACCUARATE AND STABLE SAFE AREA O₂ ANALYZER

Designed to reliably measure percent O₂ in many safety critical industrial applications, the Oxy 1800 is a stable, accurate and highly specific O₂ analyzer for safe area use.

- Internal/external use (IP66/NEMA 4X rated)
- Special version for solvent bearing samples
- Range of alarm outputs aids integration with other systems

GAS | MEASURES | APPLICATION
--- | --- | ---
O₂ | % PERCENT | PROCESS CONTROL

SERVOTOUGH Oxy 1900

AWARD-WINNING PARAMAGNETIC DIGITAL O₂ ANALYZER DESIGNED FOR HAZARDOUS AREA USE

Offering an exceptional range of industry standard options and three unique, ground-breaking functions, the Oxy 1900 O₂ gas analyzer sets new standards of flexibility, stability and reliability from a single, cost-effective unit.

- Can be used in Safe Area to Zone 1/Div 1 hazardous locations
- Heated sample cell allowing simplified sample system requirements
- Unique Servomex Flowcube flow sensor technology for improved safety

GAS | MEASURES | APPLICATION
--- | --- | ---
O₂ | % PERCENT | PROCESS CONTROL

SERVOTOUGH SpectraScan 2400

REVOLUTIONARY INLINE REAL-TIME ANALYSIS OF HYDROCARBON COMPONENTS C1-C6

A real time optical analyzer utilizing the Precisive field proven optical bench, the SpectraScan 2400 delivers a breakthrough capability in the continuous analysis of light hydrocarbons C1-C6.

- North American Cat 1, Div 2 ATEX Cat 3 Zone 2
- Tunable band-pass filter enables simultaneous scanning of selected wavelength bands for gases including methane, ethane, propane and iso-Butane
- Unique tunable filter process with IR photometer technology delivers industry-leading interference compensation

GAS | MEASURES | APPLICATION
--- | --- | ---
CO | % PERCENT | PROCESS CONTROL
CO₂ | % PERCENT | PROCESS CONTROL
CV | CALORIFIC VALUE | PROCESS CONTROL
H₂S | ppm | PROCESS CONTROL
C₁-C₆ | % | PROCESS CONTROL

SERVOTOUGH SpectraExact 2500

RUGGED PHOTOMETRIC GAS ANALYZER FOR DEMANDING PROCESS APPLICATIONS

Servomex’s iconic industry-leading photometric analyzer delivers flexible single and multi-component gas analysis capability for corrosive, toxic and flammable sample streams. The SpectraExact 2500’s reliable, accurate and stable real-time online process analysis makes it ideal for a range of process, combustion and emissions gas analysis applications.

- IECEx and North American hazardous area approvals
- Easy integration with DCS – from 4-20mA to Modbus TCP
- Sample cell and electronics segregated – for easy maintenance and safe operation

GAS | MEASURES | APPLICATION
--- | --- | ---
TOXIC | % PERCENT | PROCESS CONTROL
FLAMMABLE | ppm | PROCESS CONTROL
CORROSIVE | Trace | PROCESS CONTROL

HIGH-SPEC PROCESS O₂ ANALYZER OFFERS SAFE OR HAZARDOUS AREA CONTROL WITH UP TO SIX TRANSMITTERS

The OxyExact 2200 High specification O₂ analyzer offers an unrivalled combination of precision, flexibility and performance for optimum process and safety control. The OxyExact can be configured with a safe or hazardous area control unit with up to six transmitters.

- Zone 1 certified to ATEX Cat 2, IECEx and FM CSA Class 1 Div 1
- Three enclosure systems allow sampling of any flammable gas up to 100% O₂ and pressures of up to 40psi
- High-temperature version eliminates the need to condense hot sample prior to analysis

GAS | MEASURES | APPLICATION
--- | --- | ---
O₂ | % PERCENT | PROCESS CONTROL

### SERVOTOUGH FluegasExact 2700

**Advanced Flue Gas Analyzer for High-Temperature Measurement of O₂ and Combustibles**

- Designed to measure O₂ and CO₂ in flue gases for improved combustion efficiency and reduced emissions.
- LaserCompact 2940 delivers fast response time, highly stable performance and minimum maintenance.
- Unique Flowcube flow sensor technology enables positive flow conditions to be validated.
- Sulfur-resistant combustibles sensor enables sensor to operate at elevated sulfur levels.
- ATEX Cat. 3, IECEx Zone 2 & North America Class I, Div 2

### SERVOTOUGH LaserCompact 2940

**Short Path Length TDL Analyzer**

- Optimized for measurement across pipes and along short measurement cells and able to measure through very thin nozzles, reducing or eliminating consumption of purge gas.
- LaserCompact 2940 delivers fast response time, highly stable performance and minimum sample conditioning advantages of TDL technology.
- ATEX, IECEx and North American hazardous area approvals. ATEX Cat. 3 (Gases) and Cat. 2 (Dusts) IECEx Zone 2 and Zone 21, CSA Divisions and Zones (Gas and Dust).
- Line width correction delivers accurate measurement with variations in matrix.
- In-situ with low purge gas consumption.

### SERVOTOUGH LaserSP 2930

**High-Sensitivity Cross-Stack TDL Analyzer**

- A high performance gas analyzer designed for continuous in-situ monitoring, the LaserSP 2930 delivers fast response time and highly stable performance.
- Suitable for measuring a range of gases including H₂, H₂S, H₂O, N₂, HCN, and other hydrocarbons, the LaserSP is ideal for a wide range of process, combustion control and emissions applications.
- Designed for Zone 1 and Zone 2 hazard rated (gas/dust) locations.
- In-situ with no sample conditioning delivers reliable operation.
- Wavelength Modulated Spectroscopy provides wide dynamic range and lowest cross interference.

### SERVOTOUGH LaserExact 2950

**Extractive TDL Trace Multi-Gas Analyzer, Designed for Measuring Trace Gases Offline**

- Specifically designed for extractive trace analysis applications, the LaserExact 2950’s TDL technology offers unsurpassed low ppb detection limits for most gases, making it ideal for the measurement of trace gases offline.
- Designed for use in harsh and hazardous areas, including H₂, C₃H₆ and PE production, oil refining and polyethylene production, with no sensor drifting, false low readings, or frequent calibration requirements.

### SERVOTOUGH DF-140E

**Reliable Results in a Testing Range of Environments**

- The DF-140E allows for reliable oxygen measurement in a wide variety of environments, including outdoors and in explosive environments with a NEMA 7 remote sensor enclosure. Using the revolutionary non-depleting E-Sensor, the DF-140E delivers reliable readings without frequent recalibration and periodic sensor replacement.
- Designed for use in harsh and hazardous areas, including hydrogen, propene and polyethylene production, oil refining and petrochemical process monitoring.
- Ideal analytical solution for applications including hydrogen, propane and polyethylene production, oil refining and petrochemical process monitoring.
- Microprocessor-driven for easy configuration and maintenance.
- Coulometric sensor delivers accurate results with no sensor drifting, false low readings, or frequent calibration requirements.
SERVOTOUGH DF-340E

HIGH SENSITIVITY TRACE/PERCENT COULOMETRIC OXYGEN ANALYZER CERTIFIED FOR HAZARDOUS AREA USE

Designed for heated or external locations, the DF-340E remains stable in changing sample and flow rate conditions, and is designed to provide measurements of trace or percent level oxygen in pure gas streams and multi-gas backgrounds. It is ideal for upset probe conditions.

- Coulometric sensing ideal for upset probe applications and compensates for sample and flow rate fluctuations
- Suitable for outdoor installation, with NEMA 4-rated sensor enclosure options
- Multiple background gas stream monitoring, with simplified ongoing maintenance requirements

SERVOTOUGH Laser 3 Plus Ammonia

WORLD-LEADING NH₃ MEASUREMENT, OPTIMIZED FOR AMMONIA SLIP DeNOx APPLICATIONS

This TDL analyzer specifically optimized for ammonia slip measurement provides all the benefits of Servomex’s TDL technology in a compact, light unit, offering unparalleled installation flexibility and performance benefits.

- High measurement reliability utilizing Servomex’s own line lock cuvette technology
- ATEX, IECEx and North American hazardous area approved
- All the benefits of Servomex’s TDL technology
- Ideal for slip ammonia application on power plants and fired heaters

SERVOTOUGH Laser 3 Plus Combustion

THE REVOLUTIONARY COMPACT COMBUSTION ANALYZER OPTIMIZED FOR CO, O₂, OR CO + CH₄ MEASUREMENTS

Containing all the benefits of Servomex’s TDL technology in a light, compact unit, with unmatched installation flexibility plus cost and performance benefits, this analyzer is optimized for fast, accurate and responsive measurements in combustion and process control, making it a must for safety applications.

- High safety integrity utilizing Servomex’s own line lock cuvette technology
- Compact size means quick and easy installation by one person with on-board display negating the need for laptop configuration
- ATEX, IECEx and North American hazardous area approved. Approved for process Zone 2. SIL 2 assessed and CE marked
- Optimized for combustion processes

SERVO PRO 4900

CONTINUOUS EMISSIONS MONITORING (CEMS) ANALYSIS OF MULTIPLE FLUE GAS COMPONENTS

The 4900 is specifically designed for Continuous Emissions Monitoring, where legislation requires the measurement of several gas components in flue gas. The 4900 offers multi-gas capability for pollutants, greenhouse gases and reference O₂, including CO, CO₂, NO, SO₂, C₂H₄, N₂O.

- MCERTS/TÜV approved measurements
- Low maintenance and cost of ownership
- Easy integration with other systems

THE WORLD’S SMALLEST TDL GAS ANALYZER, OPTIMIZED FOR PROCESS O₂ AND CO MEASUREMENTS

All the benefits of Servomex’s TDL technology in a small, light unit offering unparalleled installation flexibility plus cost and performance benefits. Optimized for the fast, accurate and responsive measurement of process oxygen in hot or hazardous conditions.

- High safety integrity utilizing Servomex’s own line lock cuvette technology
- ATEX, IECEx and North American hazardous area approved. Approved for process Zone 2. SIL 2 assessed and CE marked
- Quick and easy installation by one person with on-board display negating the need for laptop configuration
- Suitable for a range of combustion and process control applications
SERVOPRO NOx

CHEMILUMINESCENCE DETECTOR (CLD) ANALYZER FOR KEY EMISSIONS APPLICATIONS INVOLVING ULTRA-LOW NO, NO2, AND NOx

Utilizing Chemiluminescence detection technology to measure NO or NOx/NO2 concentrations in industrial gas and vehicle emission applications, the versatile SERVOPRO NOX can be calibrated for four measurement ranges starting from ultra-low to high ppm and is easy to install and operate.

- Multiple range NOx emissions monitoring solution with a fast response
- Non-depleting light-based measurement and electronic flow control keeps costs low
- Heated version available for wet to dry conversion option

SERVOPRO SO2

USES PROVEN PULSED UV FLUORESCENCE TECHNOLOGY TO DELIVER A PRECISE AND RELIABLE MEASUREMENT OF ULTRA-LOW SULFUR DIOXIDE IN EMISSIONS AND AMBIENT AIR

For industrial applications that require ultra-low emissions monitoring of sulfur dioxide, this robust analyzer is designed to slot seamlessly into rack systems, making it easy to integrate with existing emissions monitoring systems to provide unrivaled performance.

- Ultra-long-lasting UV light source
- Removable flash memory stores up to 10 years of data
- Operation over wide temperature range reduces cost of ownership

SERVOPRO HFID

HIGH-PERFORMANCE FAST ANALYSIS OF TOTAL HYDROCARBONS, METHANE AND NON-METHANE HYDROCARBONS

Using a highly sensitive Flame ionization Detector (FID) for measuring volatile hydrocarbon concentrations in industrial or vehicle emission applications, the HFID utilizes an internally heated oven set to 190°C to maintain the sample gas above its dew point, for optimum performance in total hydrocarbon analysis (THC).

- Four user-definable measurement ranges, reconfigurable in the field
- High-accuracy gas-selective FID technology for maximized uptime
- Heated oven for maximum stability and “hot/wet” sampling

SERVOFLEX Micro i.s. 5100

INTRINSICALLY SAFE ANALYZER MEASURES OXYGEN, CARBON MONOXIDE OR CARBON DIOXIDE

Designed for the measurement of toxic and flammable gas samples, the intrinsically safe Micro i.s. 5100 is a unique analyzer certified to Zone 0 and Zone 1 and suitable for measuring percent levels of O2 and CO.

- Intrinsically safe design to ATEX and IEC standards ensures safety operation in hazardous environments
- Ergonomic design ensures easy operation on the move
- Available in non-pump or pump versions with optional sample conditioning kit

SERVOFLEX MiniMP 5200

BENCHTOP ANALYZER OFFERING SINGLE OR DUAL MEASUREMENTS OF OXYGEN AND CARBON DIOXIDE

The only truly portable battery powered gas analyzer with MCERTS certification, the MiniMP is designed to offer single or dual measurement of O2 and CO2 by utilizing Servomex’s advanced Paramagnetic and Infrared sensing technologies.

- EN15267-3 (MCERTS V3.3, Annex F) makes the MiniMP ideal for source testers that require reference O2 analysis for CEMS verification
- Li-ion battery system offers unique true portability
- Non-depleting sensor design ensures long service with minimal calibration

SERVOFLEX MiniHD 5200

PORTABLE GAS ANALYZER FOR MEASUREMENT OF COMMON GAS MIXTURES

Designed for use in field locations or light industrial applications, the MiniHD 5200 portable gas analyzer is a rugged, heavy duty analyzer designed to accurately measure the levels of O2, CO and CO2 within common gas mixtures. The MiniHD 5200 utilizes Servomex’s non-depleting Paramagnetic and Infrared sensors to give dependable and accurate results.

- Robust IP65 construction meets the demanding needs of field location analysis
- Long life Li-ion rechargeable batteries and range of sampling options ensure ease of use
- Accurate measurement of O2, CO and CO2 levels with no background interference
WE’RE READY TO HELP
WHATEVER YOUR POWER REQUIREMENTS, WHEREVER YOU ARE