

# POWER GENERATION

## GAS ANALYSIS MAGAZINE



ISSUE  
ONE - 2017

SUPPORTING YOUR COMBUSTION  
AND EMISSIONS APPLICATIONS

### NEW PRODUCTS

Laser 3 Plus TDL analyzer series

### APPLICATION STUDY

DeNOx Ammonia

### EXPERT ADVICE

Remote mounting makes  
maintenance easier



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# DEAR READER

WELCOME TO THE FIRST EDITION OF OUR NEW MAGAZINE FOCUSED ON THE POWER MARKET SECTOR.

I would like to take this opportunity to let everyone know how excited I am to join the Servomex family. I have come to Servomex after more than 12 years at MKS Instruments, which makes infrared gas analyzers for the same markets served here at Servomex.

We influenced and changed the way regulatory emissions testing was done by listening and working with our customers, coming up with solutions that were accepted by the regulatory agencies. This cooperation and team work has proven to be very successful and we will be working to do the same here at Servomex for our customers.

One of my goals over the next year is to deepen our direct connection to our customers by working with and understanding the customer's real needs; allowing us to grow and maintain close relationships is what will build up our Servomex brand.

Customers will help us define the next generation products and services needed to expand our lead in the power market and help move us into the adjacent environmental emissions markets. We will work closely with regulatory agencies and trade groups to make sure our new products are compliant for those customers required to meet clean air emissions targets.

At Servomex we have several products deployed very successfully in the Asian power industry and we are looking to expand this success worldwide. We would like to make Servomex a recognized brand name that is synonymous with a company that provides solutions along with great customer support.

Look for us next year at targeted trade shows and conferences where we will be showcasing the Servomex power product line. We are also looking at hosting user meetings where we can let our customers and potential customers hear about our new products and services and provide direct feedback on what they would like to see.

I am looking forward to meeting many of the Servomex end users, channel partners and resellers where I hope to hear about their experiences so that we can begin to shape our future together going forward.

**Barbara Marshik**  
Power Market Sector Manager.



Email: [bmarshik@servomex.com](mailto:bmarshik@servomex.com)

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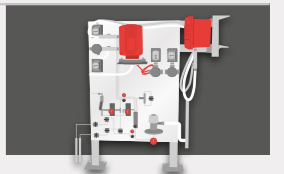
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# SEE THE FULL PICTURE ONLINE

## INSIDE SERVOMEX UK

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



## SERVOTOUGH LASER 3 PLUS

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



## SERVOFLEX PORTABLES

Four gas analyzers in sixty seconds – see why we've made gas analysis easy to handle in this product range movie



Watch at [servomex.com/videos](http://servomex.com/videos)

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

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FOR THE FULL RANGE OF ANALYZERS VISIT [servomex.com/gas-analyzers](http://servomex.com/gas-analyzers)

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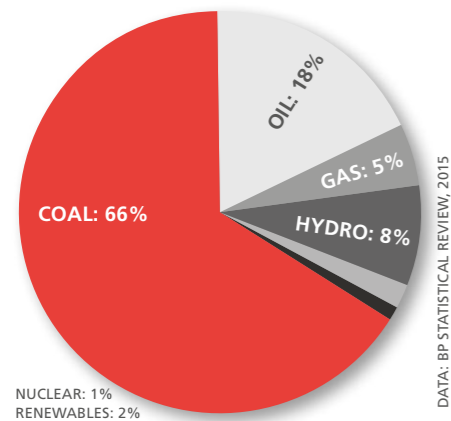
# MARKET FOCUS: CHINA



## BIGGEST COAL USER

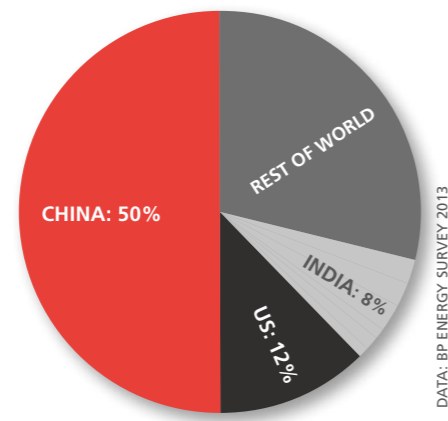
China is the world's largest energy consumer. It is also the biggest producer and consumer of coal, relying on coal for between 65% and 70% of its total energy supply.

### CHINA'S ENERGY CONSUMPTION:



In fact, China, the US and India together account for more than 70% of the world's coal use, with China making up the majority of this figure.

### WORLD COAL CONSUMPTION:



## MAKING CHANGES

While China is making strong efforts to reduce coal use, the lack of alternative fuel sources will continue seeing China as the world's leading coal consumer for many years yet.

A move towards renewable and nuclear energy has reduced the rate of increase, but coal use is still projected to grow through to 2025, with demand reaching a plateau between 2019 and 2025.

Even though China is expanding its use of non-fossil fuels, thermal heat, as well as power generation capacity using coal, oil and gas, is expected to grow, though this growth could be held back by a need to upgrade the energy infrastructure. To ensure China can meet its commitments under the Paris agreement, companies are investing in greater efficiency strategies not only in new but also existing power and thermal heating projects.

# GLOBAL TRENDS ANALYSIS FOR 2017

SERVOMEX MARKET SECTOR MANAGER BARBARA MARSHIK PREDICTS POWER MARKET DEVELOPMENTS



CHINA IS TAKING STEPS TO REDUCE NO<sub>x</sub> AND SO<sub>2</sub> EMISSIONS LIMITS

## LEGISLATION AND COMPLIANCE

In 2006 China overtook the US to become the world's biggest producer of carbon dioxide (CO<sub>2</sub>). By 2014 this made up 28.8% of the world total and it is projected that by 2030 the CO<sub>2</sub> emissions could equal those of the rest of the world put together.

To counter this, China is investing between US \$75bn and US \$100bn in clean energy each year from 2010 to 2020 as part of a ten-year plan to develop a greener economy. By 2010 the country

was already regarded as the world leader in low-carbon energy investment.

New, state of the art national air pollution standards for thermal power plants went into effect from 2012 - more stringent than those operated in the EU. New power plants built in China now have much more aggressive emission control technologies and the older plants are being fitted with controls as well.

In the past, new plants built after 2004 had to keep NO<sub>x</sub> emissions to 100mg/m<sup>3</sup>, while plants built prior to 2004 must keep emissions below 200mg/m<sup>3</sup> but in 2017 China is implementing new Ultra Low CEM NO<sub>x</sub> limits of 50 mg/m<sup>3</sup>.

Like the NO<sub>x</sub> CEMs, there are now stronger emission limits for SO<sub>2</sub> and particulate matter (PM) going in to effect in 2017 as well. The Ultra Low CEM emissions for SO<sub>2</sub> are now 35 mg/m<sup>3</sup> while the PM will be limited to 5 mg/m<sup>3</sup> and older plants to 10 mg/m<sup>3</sup> particulates.

With the older limits, China has managed to greatly reduce the SO<sub>2</sub> and NO<sub>x</sub> emissions in the power sector but with the ratification of the Paris Climate Change Agreement last September and the release of the new Ultra Low CEM limits, they are continuing their commitment to even stronger emissions control.

DATA: WWW.CHINAFAQS.ORG

Globally, we can expect emissions and pollution control to play a major part in the way the power market develops.

Servomex has been providing industries across the world with analyzers and solutions that allow greater control over pollution control devices and monitoring equipment that comply with regional regulatory requirements. The Servomex solutions provide enormous return on investment that not only lowers operational costs, but reduces emissions while extending equipment lifetimes.

In the US the Clean Air Act was the big winner in 2016. Several key litigations were made on environmental enforcement activities, seeing \$13.4 billion levied against companies, with the bulk attributed to the BP Deepwater Horizon oil spill and the VW diesel emissions defeat device scandal. The oil and gas industry faced further environmental emissions enforcement requiring some refineries to install state of the art

air pollution control devices at non-compliant plants.

Even though there is much uncertainty about the upcoming US EPA regulations, the fight for clean air is being led by China and India as they undertake huge new initiatives to reduce emissions, mainly from coal-fired power plants. China has initiated a clean-up effort that will drastically reduce NO<sub>x</sub> and dust emissions with a goal to eventually reduce their reliance upon coal. The Environment Ministry of India has just released new stricter standards for coal-based thermal power plants, implementing for the first time NO<sub>x</sub> and SO<sub>2</sub> emissions limits, bringing them much closer to western standards.

Both countries rely heavily on cheap coal for power and heat, but transitioning from coal to alternative fuel sources can take centuries, and coal is still the cheapest source of energy in the region. The two countries are looking to deploy new

efficient coal-fired plants while setting tighter emission limits and requiring higher efficiency improvements to existing plants as well.

Countries all around the world are also implementing new initiatives to reduce global greenhouse gas emissions by investing in renewable and low carbon fuels as well as pollution control devices.

### RECOMMENDED SOLUTION: SERVOPRO 4900 CEMS ANALYZER



High performance continuous emissions monitoring analyzer certified for multi-gas measurement of flue gases, pollutants and reference oxygen in regulatory environments.

## TALK TO OUR ASIA PACIFIC TEAM

Servomex's Asia Pacific team has a number of experts in China, each responsible for a different region, who can provide solutions to monitoring and controlling emissions.

Led by Richard Sun, they are able to provide advice and support on gas analysis systems to anyone working in China's power sector.

Contact the Asia Pacific Business Centre on +86 (0)21 6489 7570  
asia\_sales@servomex.com



# PRODUCT NEWS

## LASER 3 PLUS TDL MONITOR

### MAKING A BIG IMPACT ON COMBUSTION AND EMISSIONS: SERVOMEX'S NEW TUNABLE DIODE LASER ANALYZER



The revolutionary new Laser 3 Plus range is comprised of the world's smallest cross-stack Tunable Diode Laser (TDL) gas analyzers, each optimized for key application measurements. Targeted at gas analysis in the hydrocarbon processing and power generation market sectors and emissions control, the new family of analyzers includes versions for ammonia slip monitoring for NOx emissions reduction and process control.

The benefits of the Laser 3 Plus analyzers are immediate. Instead of the time-intensive installation associated with traditional, bulky TDL analyzers, they can be installed quickly by just one person due to the compact design and advanced optical improvement that includes a

wider acceptance angle of the transmitted light source.

A separate laptop for installation is no longer required, as the Laser 3 Plus now has a new built-in display for configuration and diagnostics.

To ensure precision alignment from the outset, a new mounting assembly for multi-direction adjustment is included and when combined with the new, quick-release mechanism of the heads, fast and accurate re-installation - without the need for re-alignment - is achieved every time. The new Laser 3 Plus analyzer purge design reduces nitrogen (N<sub>2</sub>) and air purge costs by an impressive ninety per cent per annum; a significant return

on investment when calculating lifetime operational costs.

The Laser 3 Plus family of analyzers delivers exceptional TDL performance, with a fast response to measuring gas in a wide range of applications. Utilizing the unique Servomex signal processing techniques based upon Wavelength Modulated Spectroscopy (WMS), the Laser 3 Plus provides the most stable, repeatable results with minimal cross-interference from other gases present in the matrix.

The Laser 3 Plus analyzers join the SERVOTOUGH Laser family of TDL analyzers, providing the same industry-leading performance that has always been delivered by Servomex's in-situ cross stack and extractive monitors.

### Laser 3 Plus Ammonia DeNOx



Specifically optimized for ammonia (NH<sub>3</sub>) slip measurements in NOx reduction systems, the environmental emissions version is a must for owners that need to meet the lower NOx limits that have been legislated.

Accurate measurement of the amount of NH<sub>3</sub> that slips past a catalytic NOx converter is crucial, as high levels of unreacted NH<sub>3</sub> are costly for the plant operator and can plug the catalyst due to salt formation within the flue gas. Without direct NH<sub>3</sub> measurements NOx emissions can reach beyond permitted levels, resulting in fines and plant shut downs.

With the Laser 3 Plus NH<sub>3</sub> analyzer installed in situ, NH<sub>3</sub> is easily identified, enabling precise monitoring and control of ammonia concentration, while the cross-duct installation means ammonia levels can be measured with much greater certainty than in extractive methods.

### Laser 3 Plus Combustion



The latest addition is the Laser 3 Plus Combustion analyzer version, which can be optimized for CO or O<sub>2</sub> measurements, or for a combination of CO and CH<sub>4</sub>.

The Laser 3 Plus Combustion CO and Combustion CO+CH<sub>4</sub> models are a must for safety applications in gas-fired and coal-fired processes. CO is monitored in the flue gas to trim oxygen levels and optimize combustion efficiency and safety. The CO+CH<sub>4</sub> version adds the additional capability of monitoring light-off and running conditions to maximize safety.

The Combustion O<sub>2</sub> version measures oxygen in flue gas, used to control and optimize combustion efficiency. The new Laser 3 Plus Combustion O<sub>2</sub> has been optimized for use from -20°C up to 1400°C with the same analyzer.

### SAFETY BREAKTHROUGH

#### UNIQUE LINE LOCK CUVETTE SYSTEM TRANSFORMS PROCESS SAFETY

To avoid the possibility of 'drift', that is, the analyzer losing its lock on the gas it is monitoring, the Laser 3 Plus family

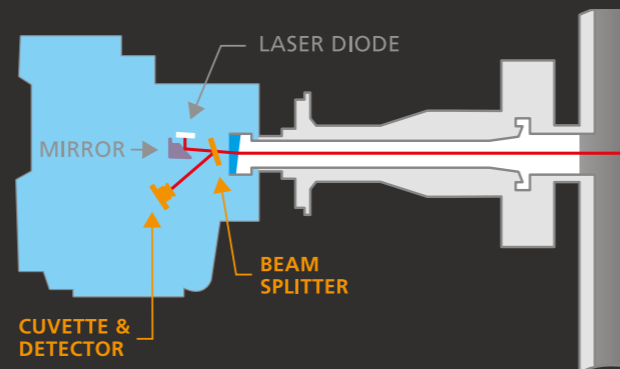
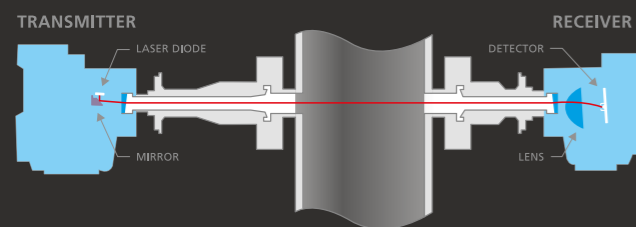
employs a unique 'line lock' reference cuvette system.

Usually in TDL analysis, a bump cell or reference gas is used, giving a reference directly in the measurement path. However, if the detection is continuous, this can add a measurement error.

If, on the other hand, the detection is interrupted, it is impossible to know if the analyzer has a lock between bumps.

By using a cuvette filled with the gas of interest, the analyzer has a reference that is always available and continuously scanned, providing a much better reading stability.

In addition to keeping the analyzer firmly locked on line, the cuvette system requires no maintenance, and has self-diagnostics inbuilt.



*"Based around Servomex's revolutionary Laser 3 Plus platform developed at our UK Technical Centre, the Laser 3 Plus analyzer is a remarkable ninety per cent smaller and eighty per cent lighter than many other comparable TDL analyzers. As a consequence, the Laser 3 Plus's compact size and dramatically reduced footprint offers unparalleled installation flexibility and a host of cost and performance benefits".*

Rhys Jenkins, Photometric Product Manager  
rjenkins@servomex.com



Find out more on the best in compact TDL analysis and watch the video at [servomex.com/l3plus](http://servomex.com/l3plus)

# APPLICATION STUDY



## BENEFITS OF CONTROLLING AMMONIA (NH<sub>3</sub>) SLIP

### IN NO<sub>x</sub> REDUCTION EMISSION STRATEGIES

Burning coal and other fossil fuels is widely used in the power industry for electrical generation, but because of the combustion process, particulate matter (or smoke) and nitrogen oxides (NO<sub>x</sub>) are released into the atmosphere.

NO<sub>x</sub> and dust are the leading cause of human respiratory issues and government agencies worldwide are releasing stronger regulatory measures designed to reduce air pollution. In fact, some countries such as the United States go even further, offering credits which can be traded for any excess NO<sub>x</sub> reduction that occurs, making it more valuable than fuel savings to a plant owner.

Even if NO<sub>x</sub> credits are not available, prolonging the lifetime of the NO<sub>x</sub> reduction equipment also makes economic sense as it greatly reduces operating costs.

**Two main NO<sub>x</sub> control strategies have been successfully deployed in the power industry: Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR), both based upon the use of ammonia (NH<sub>3</sub>) or urea to participate in the suppression of NO<sub>x</sub> formation.**

These NO<sub>x</sub> reduction strategies have also been successful in other combustion and chemical processes, including co-generation and pulp and paper boilers; cement kilns and smelting furnaces; gas turbines; stationary engines; and catalytic cracker furnaces to name just a few.

SCR and SNCR both rely on accurate NH<sub>3</sub> or urea dosing to reduce NO<sub>x</sub> formation. NH<sub>3</sub> overdosing (called NH<sub>3</sub> slip) causes the formation of ammonium bisulfate (ABS) precipitation – a white powder that forms when sulfur trioxide (SO<sub>3</sub>) is present (especially when coal is burned).

The ABS deposits on and eventually plugs the NO<sub>x</sub> reduction catalyst, but it can also cause fouling or corrosion of boilers or, for those power plants that sell their fly ash to the cement industry, it results in sub-standard product which is no longer fit for use. Rapid and accurate monitoring of the NH<sub>3</sub> slip saves the power industry millions by providing a feedback process loop that reduces ABS formation and catalyst aging effects.

## MONITORING THE NH<sub>3</sub> SLIP

Traditional NH<sub>3</sub> slip process monitoring methods have in the past used extractive sampling techniques with an infrared (IR) based analyzer. A sample of the gas must be transported to the analyzer which results in a delay of up to 30 seconds in the reported NH<sub>3</sub> value.

The sample gas during the extraction process must be kept very hot (>290°C) in order to keep ABS as well as sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) from forming and damaging the sampling and analytic equipment.

Even if the sample transport issues can be solved, the high flow rate and particulate loadings of a coal-fired combustion process makes a single point extractive sampling system unreliable as a process control trigger.

A carefully controlled NH<sub>3</sub> slip of <2ppm is needed to optimize the process and, without a direct gas measurement it will be difficult as many parameters influence the process including the inlet NO<sub>x</sub> concentration, fuel composition and catalyst performance.

Extractive sampling systems using IR-based analyzers must also be concerned with signal interferences from a range of gases including SO<sub>2</sub> or H<sub>2</sub>O formed by the process, as well as high levels of dust.

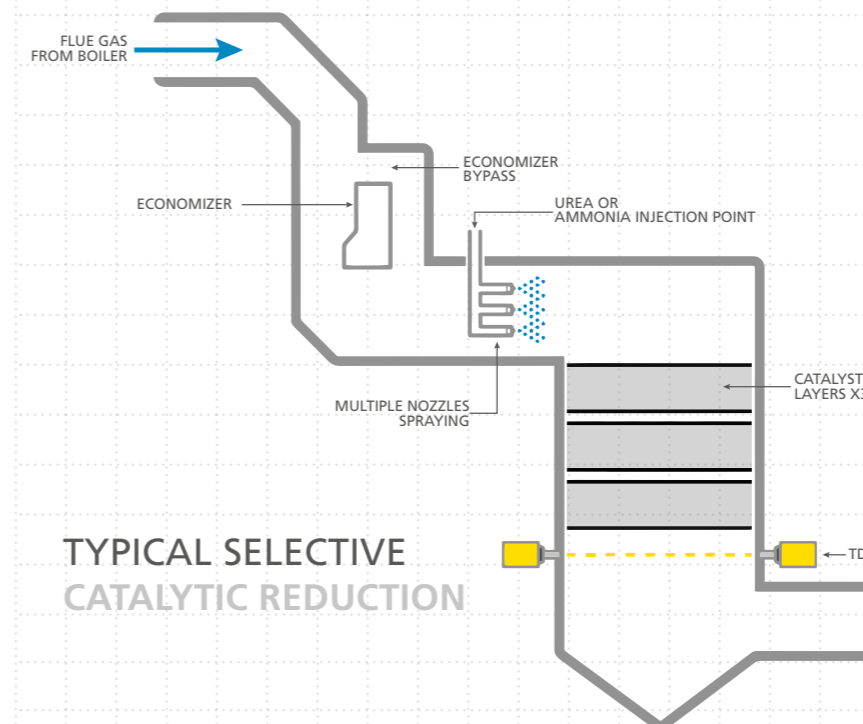
All of these issues lead to an uncertainty over the NH<sub>3</sub> measurement which, combined with a growing demand for ultra-low NO<sub>x</sub> emissions (which translates to even lower levels of NH<sub>3</sub>), means that the monitoring analyzers must have higher sensitivity and a faster response than the traditional extractive systems which are unable to meet the demands of the process.

Tunable Diode Laser (TDL) based analyzers have been successfully installed directly into the process stacks, providing an instantaneous signal that is averaged across the duct providing greater accuracy in the NH<sub>3</sub> reading even if the flow through the stack is uneven. TDL analyzers have taken over as the industry standard for monitoring the NH<sub>3</sub> slip and feeding the results back to the control process.

The SERVOTOUGH Laser 3 Plus analyzer includes a new and unique signal processing routine that provides highly stable, repeatable results with minimal cross interference from other gases compared to any other TDL or IR analyzer on the market.

Packaged in a much smaller and lighter unit, the Laser 3 Plus occupies only a fraction (one-tenth) of the footprint of its competitors. And while other TDL analyzers require two to three people to install and align the analyzer, the new lighter and smaller Laser 3 Plus only requires one person to install in just a few hours.

As there is no physical or mechanical interaction with the process, the Laser 3 Plus offers a highly stable and fast measurement response, even in hot, wet, corrosive and dusty process conditions. It offers the longest intervals between calibrations or cleaning on the market today, making it an ideal system where analyzer downtime is critical.



TYPICAL SELECTIVE CATALYTIC REDUCTION

The SERVOTOUGH Laser 3 Plus analyzer is the only TDL analyzer specifically optimized for the accurate and fastest response measurement of NH<sub>3</sub>.



- Fast measurement response with highly stable, repeatable results
- Minimal cross interference from other gases
- One person installation

Visit [servomex.com/l3plus](http://servomex.com/l3plus)

Get your expert solutions now, contact your local business center at [servomex.com](http://servomex.com)

## NUCLEAR POWER SAFETY ROLE FOR OxyDetect



Visit [servomex.com/oxydetect](http://servomex.com/oxydetect)

The OxyDetect helps nuclear power operators monitor oxygen in sub-ambient conditions.

The Servomex OxyDetect Paramagnetic gas detector has been chosen to provide the ultimate in oxygen safety monitoring for the nuclear power industry.

A large European nuclear power station recently spent several months evaluating the new Servomex OxyDetect detector, used to monitor the oxygen (O<sub>2</sub>) level in a sub-ambient environment where any increase can produce a risk of fire.

The OxyDetect underwent rigorous validation testing at the nuclear power station, including a controlled

environment test where the O<sub>2</sub> content was reduced and the analyzer responded accurately and reliably.

The OxyDetect uses the patented Hummingbird Paracube Modus sensor, providing a long lasting, fast reporting O<sub>2</sub> depletion measurement.

Unlike electrochemical cells, which have been the standard in the industry for O<sub>2</sub> ambient air monitoring, the new OxyDetect's Paramagnetic technology is non-depleting, meaning it will never run out or require replacement.

Electrochemical cells require regular calibration every few months to reduce drift, whereas the OxyDetect requires infrequent calibration, making it the best choice for critical area monitoring.

These benefits to performance also significantly reduce the cost of lifetime ownership of the OxyDetect. In addition, it is easy to use, with a simple front panel digital interface allowing easy access to advanced microprocessor-based diagnostics.

*"Servomex is delighted to have been selected to supply our OxyDetect detectors to such a safety critical industry. The fact we were chosen after an intensive validation testing process shows how well suited the OxyDetect is to a critical safety role in an environment where such safety is of paramount importance".*



Matt Halsey, Product Manager - Process Oxygen, Zirconia & Oxygen Deficiency [mhalsey@servomex.com](mailto:mhalsey@servomex.com)

Find out more about the OxyDetect at [servomex.com/oxydetect](http://servomex.com/oxydetect)

## COAL-FIRED THERMAL POWER GENERATION



EMISSIONS



COMBUSTION

Regulatory bodies worldwide are cracking down on environmental pollutants stemming from stationary sources. Many plant owners are now faced with new challenges which require monitoring during start up and shut down of equipment where the emission level during that time can put the plant out of compliance.

Plant operators need to ensure that the equipment is running at the best process efficiencies while maintaining safety, reducing fuel costs and emissions simultaneously – not only during plant start up and shut down, but also during normal operating periods.

Precise monitoring linked with feedforward and feedback control of

plant equipment is crucial. Furnace operation that combines combustion efficiency optimization with NOx emissions monitoring leads to lower fuel costs with reduced NOx emissions, particularly during start up and shut down when the system temperatures are not ideal.

Servomex is the expert partner to provide a total gas analysis solution for plant emissions control and monitoring, delivering cost, process, safety and emissions benefits across all aspects of your process. Servomex's cutting-edge combustion gas analyzers and emissions gas monitoring equipment meet this challenge directly, saving up to 4% of fuel

costs, lowering emissions and maintaining the highest standards of safety.

Servomex analyzers offer reliable and trustworthy monitoring of gases affecting the emissions output at your plant (such as O<sub>2</sub>, CO and NH<sub>3</sub>). They also provide analyzers that are certified for use under world recognized regulatory organizations for compliance monitoring, as required by TUV, MCERTS, China EPA and US EPA.

These analyzers can be provided as standalone or custom-configured systems, which not only improve core processes, but reduce maintenance costs. They are rugged enough for challenging facilities that use coal-fired equipment, or other heavy dust processes.

### SERVOMEX ANALYZER SOLUTIONS FOR COAL-FIRED THERMAL POWER GENERATION

#### SERVOTOUGH OxyExact 2200



Hazardous area process O<sub>2</sub> analyzer utilizing high-precision Paramagnetic sensing technology for ultimate monitoring performance.

#### SERVOTOUGH SpectraExact 2500



Rugged Photometric multi-gas analyzer for reliable analysis of corrosive, toxic and flammable gas streams.

#### SERVOPRO 4200



High specification multigas analysis of flammable gas samples and trace contaminants including H<sub>2</sub>/CO, HyCO or Syngas mixtures.

#### SERVOTOUGH FluegasExact 2700



Advanced flue gas analyzer for combustion process analysis of oxygen and combustibles in challenging locations.

#### SERVOTOUGH Laser 3 Plus

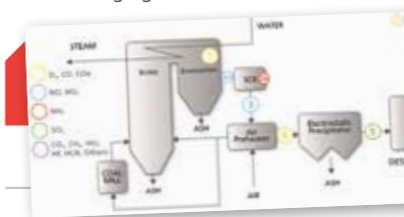


High sensitivity cross-stack TDL analyzer optimized for fast and accurate gas measurements in hazardous locations.

#### SERVOPRO 4900



High performance continuous emissions monitoring analyzer certified for multi-gas measurement of flue gases, pollutants and reference oxygen in regulatory environments.



See our analyzers across the process **OVERLEAF**

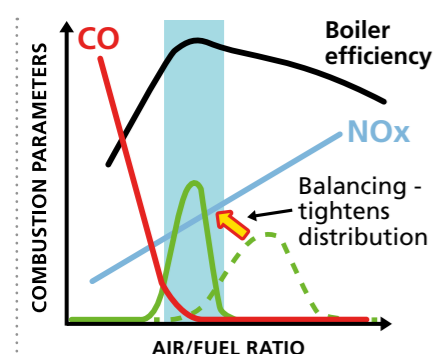
## COMBUSTION ANALYSIS

In a coal-fired power plant, pre-heated air and pulverized coal are fed to the boiler where combustion takes place.

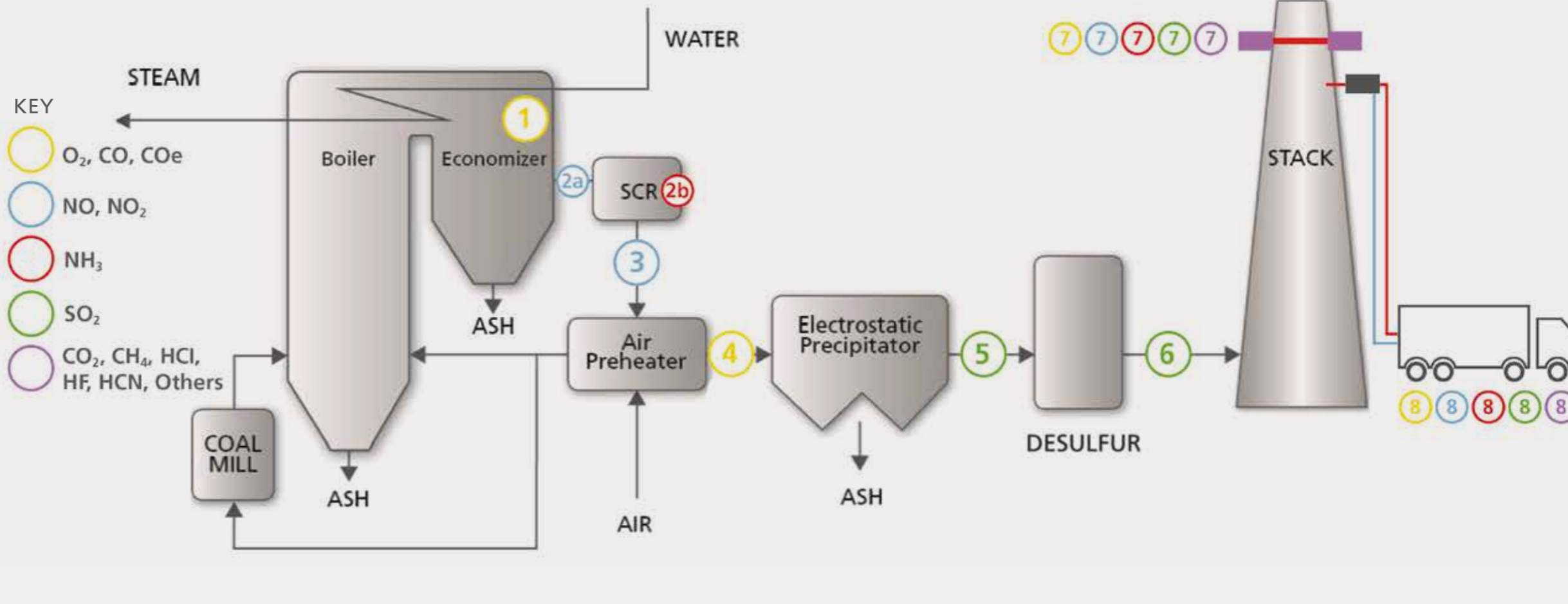
As combustion processes are by nature variable and coal quality is never consistent, variable amounts of excess air are required to ensure complete combustion. Too much air, and combustion efficiency drops, producing lower levels of CO but higher levels of NOx toxic emission gases.

At higher temperatures, greater amounts of NOx emissions are created as a by-product of the combustion process where excess nitrogen (N<sub>2</sub>) reacts with O<sub>2</sub>.

This temperature variation affects the production of CO<sub>2</sub>, CO and NOx differently, so by controlling the combustion process the boiler efficiency increases. This produces a more predictable and balanced CO to NOx emission level as well.



## PROCESS MAP



Within the Economizer ① the SERVOTOUGH FluegasExact 2700 or SERVOTOUGH Laser 3 Plus continuously monitor oxygen (O<sub>2</sub>). Additionally, the Laser 3 Plus can be added as a CO monitor, allowing operators to achieve optimum combustion conditions, saving fuel and improving safety in the process. The FluegasExact can also monitor combustibles as a combination of CO and hydrocarbons (COe) in low sulfur fuels such as natural gas.

## EMISSIONS ANALYSIS

The gas leaving the combustion chamber now contains harmful NOx emissions which must be reduced according to the permitted level at the plant. There are several NOx reduction strategies but, with tightening regulations on NOx emissions, the most successful ones use

Selective Catalytic Reduction (SCR) or Selective Non-Catalytic Reduction (SNCR) equipment, or a combination of the two.

Ammonia (NH<sub>3</sub>) or urea converted to NH<sub>3</sub> is injected into the flue gas which then reacts with NOx with the assistance of a catalyst or high temperature respectively to form H<sub>2</sub>O and N<sub>2</sub>. These reactions are not perfect and most equipment manufacturers guarantee that the process will produce less than 2 parts per million (ppm) of excess NH<sub>3</sub> on the outlet.

The Laser 3 Plus TDL analyzer enables precise monitoring in-situ of the amount of NH<sub>3</sub> that slips past the catalyst in the SCR ②b (or in the high temperature zone in the case of SNCR), which can then be fed back and used to control the NH<sub>3</sub> or urea feed stream, producing direct feedstock savings while controlling NOx emissions.

Further process monitoring and control feedback can be provided by the SERVOPRO 4900 which is a Non-Dispersive Infrared (NDIR) analyzer that monitors NO or the SERVOPRO NOx Chemiluminescence (CLD) analyzer that monitors both NO and NO<sub>2</sub>. By placing the NO or NOx analyzers near the inlet to the catalyst ②a the dosing levels of NH<sub>3</sub> can be controlled in a feedforward manner based upon the level of NOx produced by the combustion process.

The analyzers can also be placed downstream of the catalyst ③ in a feedback control pattern monitoring the actual NOx emissions. Monitoring at this stage prolongs the lifetime of the SCR catalyst and reduces blowback maintenance since lower soot and salts are produced by controlling the NH<sub>3</sub> content.

After the flue gas leaves the SCR or SNCR, it moves through the air preheater, where the amount of air leakage across the preheater is measured by the FluegasExact or the Laser 3 Plus Combustion O<sub>2</sub> ④ and then onto the electrostatic precipitator which filters out the fly ash. If the fly ash is to be sold to a cement plant for use in concrete, then the amount of NH<sub>3</sub> in the flue gas must be controlled to reduce the levels of ammonium salts in the fly ash.

After the removal of the fly ash, the flue gas may require SO<sub>2</sub> reduction. Flue Gas Desulfurization (FGD) is a control device which is used to remove sulfur dioxide (SO<sub>2</sub>) from exhaust gases using a limestone reagent that reacts with SO<sub>2</sub> to produce gypsum. The FGD process can be

controlled by using either the SERVOPRO 4900 CEMS or the SERVOTOUGH SpectraExact 2500 Photometric gas analyzer to monitor the SO<sub>2</sub> concentration before the FGD ⑤ and using the 4900 after ⑥ the FGD. These systems provide a means to monitor the process, resulting in reduced material costs and SO<sub>2</sub> emissions which remain within the permitted levels before entering the stack.

Once the sulfur is removed, the flue gas is then vented to the stack ⑦, where the 4900 delivers a comprehensive and certified Continuous Emissions Monitoring (CEMS) solution for O<sub>2</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub> and NOx using an extractive sampling method, while the US EPA validated SERVOTOUGH LaserSP 2900 provides

solutions for HCl, HF, HCN, and other gases across the stack. Since the acid gases have more issues with gas transportation, the best way to monitor them is directly in the stack with the LaserSP 2900.

On a regular basis (as determined by the regulatory body) a third party source or stack testing company will perform a validation check on the stack emissions or they will run ratification tests side by side with the incumbent CEMs system. In this case the stack tester has a mobile lab ⑧ that is equipped with the 4900 or SERVOPRO 4200 analyzers depending upon the gases and concentration ranges needed.

Find out more at [servomex.com](http://servomex.com) or contact your nearest business center

# REMOTE MOUNTING BENEFITS FOR EXTRACTIVE SAMPLE ANALYSIS

For any process, sensor head mounting is a critical design consideration which can have serious implications for long-term measurement performance and maintenance requirements.

With its integral sampling system designed specifically for operation in some of the hottest and most extreme combustion environments, the SERVOTOUGH FluegasExact 2700 is an ideal choice for monitoring oxygen and combustibles in the most demanding power generation and combustion efficiency applications, including thermal power (coal and gas), incinerators, cremators and utility boilers.

In addition to the other benefits of the FluegasExact, Servomex offers both direct and remote mounting options to make access and maintenance easier, regardless of whether or not the desired measurement point is freely accessible.

While direct mounting is sometimes seen as the standard approach, remote mounting can offer a number of advantages, particularly for applications in the power and hydrocarbon processing industries.

In remote mounting, the sensor head is situated on a skid panel up to 30m (100ft) away from the process, and is connected to the sample take-off point via a heated sample line. This sample line, and the exhaust lines, are heated to minimize the chance of sample condensation.

For longer sample lines, a second high-flow aspirator is used to create a fast loop of several liters per minute. The sensor head then uses its own internal aspirator to draw an appropriate sample from this fast loop, thus maintaining a good response time.

The moisture-rich, non-conditioned sample is passed under the sensor head and then fed back into the flow, giving a continuous measurement.

This system has distinct benefits for power generation applications, particularly when it comes to maintenance operations.

By removing the sensor head from what would be considered a potentially dangerous or unpleasant environment for personnel to work in, and putting it on a remote panel, it allows a person to approach it and work quickly and easily, with far fewer health and safety risks.

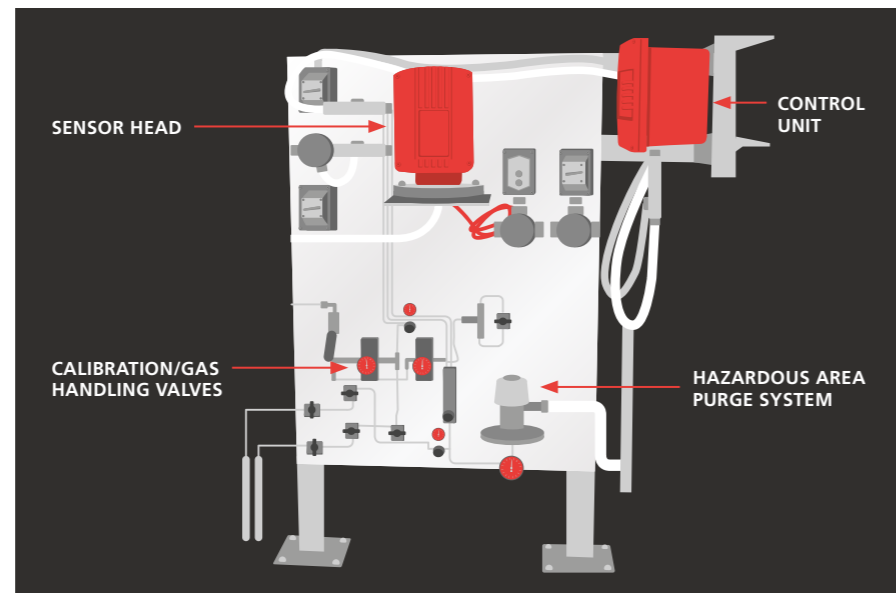
The working environment for anyone carrying out maintenance is thus a lot safer and more comfortable, and access is much improved, potentially reducing the time required.

In certain circumstances, relocating the analyzer away from the process can

also help when there are zoning considerations, ie a hazardous area. For direct mounting, 'hot work' permits would be required and strict regulation imposed for work in such areas.

While such zone restrictions rarely affect power generation applications, removing the analyzer from a hazardous area can in many cases 'de-rate' the analyzer, as you are now installing it in a safe area instead of a hazardous one.

So it is clear that while direct mounting will continue to have an important place, the advantages of remote mounting should not be overlooked in aiding access, maintenance and safety in demanding power generation applications.



# FluegasExact 2700 COMMISSIONING

Servomex's Matt Halsey explains the advantages of using a highly-trained Servomex commissioning engineer to make sure your FluegasExact 2700 analyzer pays dividends right from the start.



Designed for use in challenging and hazardous environments, the SERVOTOUGH FluegasExact 2700, like most other gas analyzers, is a relatively complex product, with various wiring, pneumatic and temperature considerations.

The FluegasExact is often key to the process operation in power applications, which makes correct installation, start-up and commissioning crucial to ensure you get the benefits of hassle-free operation from the outset.

In power applications, the FluegasExact is typically used to measure O<sub>2</sub> and combustibles in samples that contain high levels of H<sub>2</sub>O and acid gases (for example SO<sub>2</sub>). A hot, wet analysis is performed (the best type of measurement for process control purposes), meaning the sensor head has to reach the correct operating temperature before being exposed to the sample gas. If the sensor head is too cold, there is a high risk of sample condensation.

To counter this, the analyzer has temperature interlocks, which means it won't start aspirating and extracting a sample until it reaches a threshold temperature. However, despite this safeguard, natural diffusion of gas up the probe can still occur, and must be considered.

It is best for the installer to wire up and fit all pneumatics and other fittings to the head off-process first.

During the crucial commissioning process, Servomex engineers can apply power, check the analyzer is operating correctly and fit the head when up to temperature, minimizing the risk of the sample condensing somewhere cold.

**FOR EFFICIENT OPERATION OF THE FluegasExact, THE PNEUMATICS ARE KEY. CLEAN, DRY INSTRUMENT AIR IS CRITICAL TO:**

- Driving the aspirator which pulls the sample through the sensors and thus affects response time
- Supplying auxiliary combustion air to the combustibles sensor (to ensure an analysis can be performed even in reducing O<sub>2</sub> environments)
- Supplying reference air to the zirconia O<sub>2</sub> sensor so it can make an accurate measurement
- Calibration when required
- Blow-back, to blow dust out of the probe and off the probe filter (especially important for coal-fired applications)

Other gases required (CO and low O<sub>2</sub> – around 0.3%) are critical to calibration, which ensures a reliable reading at all times.

**LEAKS IN THE SYSTEM CAN CAUSE HAVOC, SO A SERVOMEX COMMISSIONING ENGINEER WILL THOROUGHLY CHECK FOR LEAKS IN THESE AREAS:**

- Mains air supply
- Calibration gas
- Around all compression and push fittings (as stray air entering the system can cause confusion and calibration gas/sample dilution)
- Around all flange connections (gasket integrity)

The majority of power processes run at a slightly negative pressure in relation to the atmosphere. This means that if any leaks are present, ambient air will enter the system and could cause a number of unwanted effects, such as spurious readings and, more importantly, cooling of metal parts which need to remain hot for effective, accurate operation.

Commissioning by one of Servomex's highly-trained engineers can avoid the problems an incorrectly set-up system can bring, ensuring customers have somebody present on site with the knowledge, experience and expertise when it counts. This ensures maximum performance, reliability and often cost saving is achieved from day one.

**COMMISSIONING**



HEALTH CHECK



ON-SITE SERVICE SUPPORT



SERVICE CONTRACTS



SPARES



SERVICE CENTER SUPPORT



RENTAL EQUIPMENT



TRAINING



CALIBRATION KITS



For more expert advice on your analyzer system visit [servomex.com](http://servomex.com)

For information on all our nine service products visit [servomex.com/service](http://servomex.com/service)



# > 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.

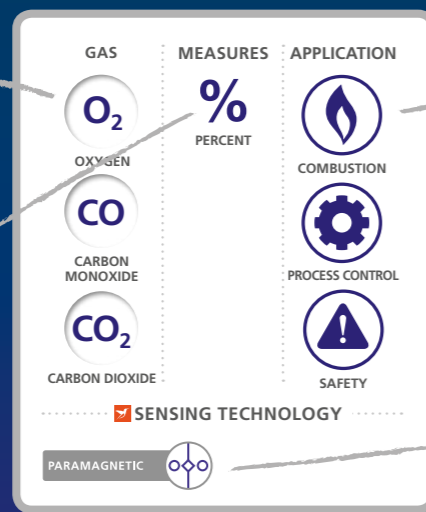
By working with industry regulators, Servomex ensures its gas analyzers meet the global compliance standards and the specific demands of power generation applications throughout the world.

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

# > HOW TO GUIDE

*Some analyzers are optimized for single gas measurements while others monitor multiple gas types.*

*We offer all measurement ranges from percentage to ultra trace parts per trillion analysis.*



*We identify which application types the analyzer is suitable for operating in.*

*The Hummingbird sensing technologies used are listed.*

For the full range of Servomex analyzers, visit [servomex.com/gas-analyzers](http://servomex.com/gas-analyzers)

## SERVOTOUGH Oxy 1800

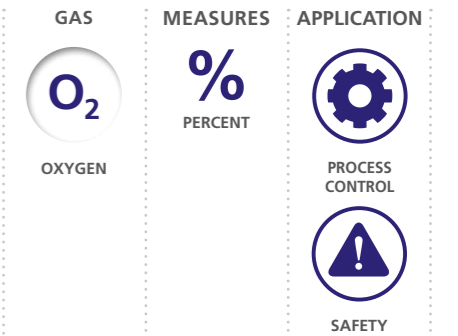
SAFE AREA



### ACCURATE AND STABLE SAFE AREA O<sub>2</sub> ANALYZER

Designed to reliably measure percent O<sub>2</sub> in many safety critical industrial applications, the Oxy 1800 is a stable, accurate and highly specific O<sub>2</sub> 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



SENSING TECHNOLOGY



## SERVOTOUGH Oxy 1900

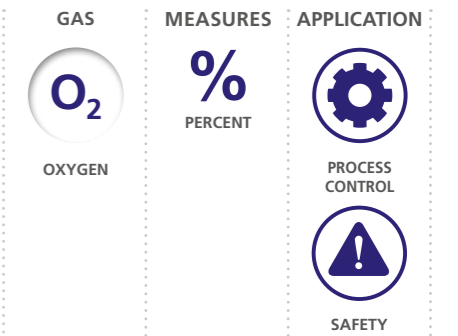
HAZARDOUS AREA



### AWARD-WINNING PARAMAGNETIC DIGITAL O<sub>2</sub> ANALYZER DESIGNED FOR HAZARDOUS AREA USE

Offering an exceptional range of industry-standard options and three unique, ground-breaking functions, the Oxy 1900 O<sub>2</sub> 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 hazard rated locations
- Heated sample cell allowing simplified sample system requirements
- Unique Servomex Flowcube flow sensor technology for improved safety



SENSING TECHNOLOGY



## GAS DETECTION OxyDetect

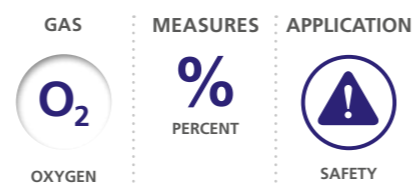
SERVOMEX



### NON-DEPLETING PARAMAGNETIC OXYGEN MONITOR DESIGNED FOR LIFE SAFETY APPLICATIONS

Life safety monitor designed for safe area or hazardous area environments, utilizing superior performance of non-depleting Hummingbird Paramagnetic O<sub>2</sub> sensing technology.

- IP66 (indoor use only)
- The most reliable O<sub>2</sub> detector on the market
- No more false readings or false alarms caused by depleting cell technologies
- SIL 2 approval



SENSING TECHNOLOGY



## SERVOTOUGH OxyExact 2200

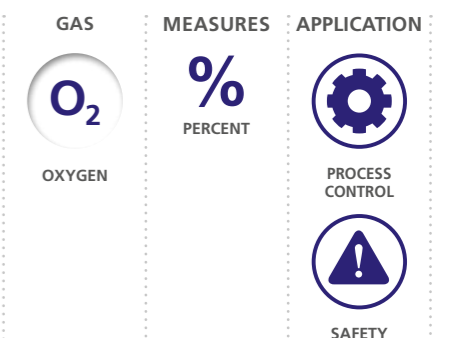
HAZARDOUS AREA



### HIGH SPEC PROCESS O<sub>2</sub> ANALYZER OFFERS SAFE OR HAZARDOUS AREA CONTROL WITH UP TO SIX TRANSMITTERS

The OxyExact 2200 high specification O<sub>2</sub> analyzer offers an unrivaled 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% O<sub>2</sub> and pressures of up to 40psi
- High temperature version eliminates the need to condense hot sample prior to analysis



SENSING TECHNOLOGY



# SERVOTOUGH SpectraScan 2400

HAZARDOUS AREA



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

A real time optical analyzer utilizing the Precise 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 IECEx 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 CARBON MONOXIDE	% PERCENT	PROCESS CONTROL
CO <sub>2</sub> CARBON DIOXIDE	CV CALORIFIC VALUE	QUALITY
C1-C6		
H <sub>2</sub> S HYDROGEN SULFIDE		

SENSING TECHNOLOGY

SPECTROSCOPIC

# SERVOTOUGH LaserSP 2930

HAZARDOUS AREA



## HIGH-SENSITIVITY CROSS-STACK TDL ANALYZER

A high performance gas analyzer designed for continuous in-situ monitoring, the LaserSP 2930 delivers a fast response time and highly stable performance. Suitable for measuring a range of gases including HCl, HF, CO<sub>2</sub>, H<sub>2</sub>O, H<sub>2</sub>S, 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

GAS	MEASURES	APPLICATION
MULTIPLE	% PERCENT	PROCESS CONTROL
	ppm TRACE	EMISSIONS

SENSING TECHNOLOGY

TUNABLE DIODE LASER

# SERVOTOUGH SpectraExact 2500

HAZARDOUS AREA



## 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.

- ATEX, 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 TRACE	QUALITY
CORROSIVE		

SENSING TECHNOLOGY

GAS FILTER CORRELATION    INFRARED

# SERVOTOUGH LaserCompact 2940

HAZARDOUS AREA



## 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 even eliminating consumption of purge gas, the LaserCompact 2940 delivers the 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

GAS	MEASURES	APPLICATION
MULTIPLE	% PERCENT	PROCESS CONTROL
	ppm TRACE	QUALITY

SENSING TECHNOLOGY

TUNABLE DIODE LASER

# SERVOTOUGH FluegasExact 2700

HAZARDOUS AREA



## ADVANCED FLUEGAS ANALYZER FOR HIGH-TEMPERATURE MEASUREMENT OF O<sub>2</sub> AND COMBUSTIBLES

Designed to measure O<sub>2</sub> and CO<sub>e</sub> in flue gases for improved combustion efficiency and reduced emissions, the FluegasExact 2700 gas analyzer is designed to suit the most demanding needs of combustion efficiency applications in the Power Generation and Process Industries.

- ATEX Cat. 3, IECEx Zone 2 & North America Class I, Div 2
- Unique Flowcube flow sensor technology enables positive flow conditions to be validated
- Sulfur-resistant combustibles sensor enables sensor to operate at elevated sulfur levels

GAS	MEASURES	APPLICATION
O <sub>2</sub> OXYGEN	% PERCENT	COMBUSTION
CO <sub>e</sub> COMBUSTIBLES	ppm TRACE	PROCESS CONTROL

SENSING TECHNOLOGY

CALORIMETRY    ZIRCONIA

# SERVOTOUGH LaserExact 2950

HAZARDOUS AREA



## EXTRACTIVE TDL TRACE MULTIGAS 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.

- Zone 2/ Div 2 hazard rated locations and use without purge
- Advanced multipass cell delivers ppb or low ppm detection limits
- Innovative PeakLock pattern recognition line tracking eliminates drift over extended operational periods

GAS	MEASURES	APPLICATION
MULTIPLE	ppb ULTRA TRACE	PROCESS CONTROL
	ppm TRACE	QUALITY

SENSING TECHNOLOGY

TUNABLE DIODE LASER

# SERVOTOUGH DF-140E

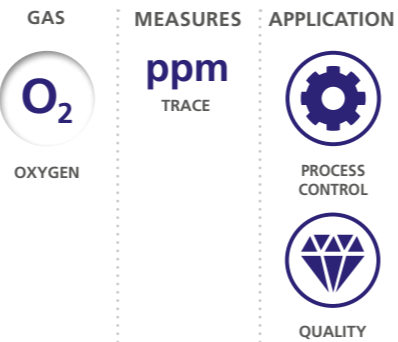
HAZARDOUS AREA



## 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.

- Long-term reliability and stability with minimal maintenance
- Durability – can be used in Class 1, Div 1 or 2 areas
- STAB-EL option allows for accurate measurement in the presence of acid gases



### SENSING TECHNOLOGY



# SERVOTOUGH DF-320E

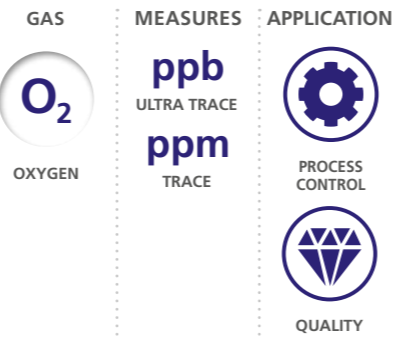
HAZARDOUS AREA



## HIGH RELIABILITY TRACE AND PERCENT O<sub>2</sub> MEASUREMENTS IN HAZARDOUS AREA LOCATIONS

Designed for use in harsh and hazardous areas, the DF-320E uses Servomex's unique, non-depleting Coulometric sensor technology to give highly stable O<sub>2</sub> measurements, making it ideal for applications including hydrogen, propene and polyethylene production, oil refining and petrochemical process monitoring.

- Ideal analytical solution for applications including H<sub>2</sub>, C<sub>3</sub>H<sub>6</sub> and PE 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



### SENSING TECHNOLOGY



# SERVOTOUGH DF-340E

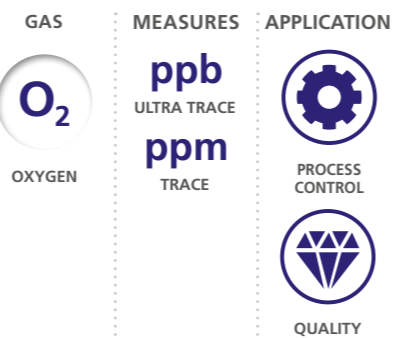
HAZARDOUS AREA



## 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 multigas backgrounds. It is ideal for upset prone conditions.

- Coulometric sensing ideal for upset prone 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



### SENSING TECHNOLOGY



# SERVOTOUGH DF-370E

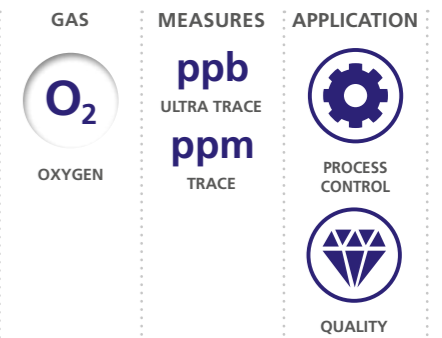
HAZARDOUS AREA



## DUSTPROOF, WATERPROOF, EXPLOSION-PROOF TRACE O<sub>2</sub> MEASUREMENT FOR POLYMER GRADE FEEDSTOCKS AND OTHER HIGH PURITY GASES

Microprocessor-driven for easy configuration and maintenance, the rugged DF-370E is optimized for the accurate measurement of trace and percent level O<sub>2</sub> in hazardous environments, with both the control unit and remote sensor housed in a durable NEMA 7 enclosure.

- Highly stable Coulometric sensor requires annual SPAN calibration only, with no programmed cell replacement needed
- Low detection limit of 10 ppb when operating on 0-1 ppm or lower range
- Suitable for multiple background gases with a single unit



### SENSING TECHNOLOGY



# SERVOTOUGH Laser 3 Plus

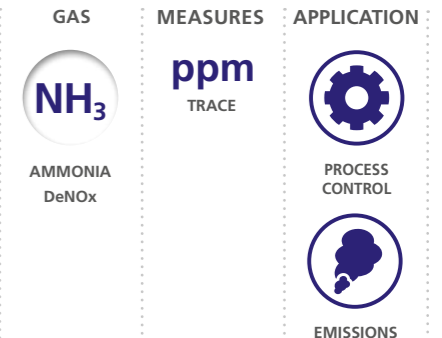
HAZARDOUS AREA



## WORLD-LEADING NH<sub>3</sub> 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 plus cost and performance benefits.

- High measurement reliability utilizing Servomex's own line lock cuvette technology
- ATEX, IECEx and North American hazardous area approvals
- A compact analyzer specifically optimized for the fast, accurate and responsive measurement of NH<sub>3</sub>
- Ideal for slip ammonia application on power plants and fired heaters



### SENSING TECHNOLOGY



# SERVOTOUGH Laser 3 Plus Combustion

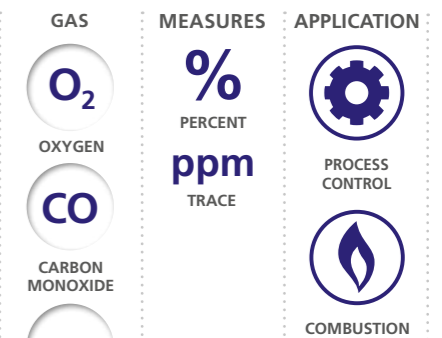
HAZARDOUS AREA



## THE REVOLUTIONARY COMPACT COMBUSTION ANALYZER OPTIMIZED FOR CO, O<sub>2</sub>, OR CO + CH<sub>4</sub> 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 approvals. Approved for process Zone 2. SIL 2 assessed and CE marked
- Optimized for combustion processes



### SENSING TECHNOLOGY



# SERVOTOUGH Laser 3 Plus Process

HAZARDOUS AREA



## THE WORLD'S SMALLEST TDL GAS ANALYZER, OPTIMIZED FOR PROCESS O<sub>2</sub> 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 approvals. 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

GAS	MEASURES	APPLICATION
O <sub>2</sub> OXYGEN	% PERCENT	PROCESS CONTROL
CO CARBON MONOXIDE	TRACE	COMBUSTION

### SENSING TECHNOLOGY

TUNABLE DIODE LASER

# SERVOTOUGH AquaXact 1688

HAZARDOUS AREA



## A FAST, ACCURATE AND RESILIENT MOISTURE MEASUREMENT SOLUTION

The AquaXact 1688 is a rugged ultra-thin film aluminum oxide moisture sensor that enables the measurement of moisture in a wide variety of gas phase process applications, such as glove boxes, air separation units, natural gas processing, transportation, and instrument air, with no calibration required after sensor replacement or dry-out.

- Functions as a standalone 4-20 mA transmitter or remotely interfaces with SERVOPRO MonoExact DF310E multichannel gas analyzer system
- High-performance field-replaceable sensor element unaffected by condensation and liquid water
- Stainless steel, weatherproof casing (which is Class 1 Div 2) enables operation in ambient temperatures ranging from -10°C to +70°C

GAS	MEASURES	APPLICATION
H <sub>2</sub> O WATER	DEW POINT ppmv	PROCESS CONTROL

### SENSING TECHNOLOGY

Ultra-thin film Al<sub>2</sub>O<sub>3</sub>

# SERVOPRO 4900

SAFE AREA



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

The SERVOPRO 4900 is specifically designed for Continuous Emissions Monitoring, where legislation requires the measurement of several gas components in flue gas. The 4900 offers multigas capability for pollutants, greenhouse gases and reference O<sub>2</sub>, including CO, CO<sub>2</sub>, NO, SO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O.

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

GAS	MEASURES	APPLICATION
MULTIPLE	% PERCENT ppm TRACE	EMISSIONS

### SENSING TECHNOLOGY

GAS FILTER CORRELATION INFRARED  
PARAMAGNETIC

# SERVOFLEX Micro i.s. 5100

PORTABLES



## 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. is a unique analyzer certified to Zone 0 and Zone 1 and suitable for measuring percent levels of O<sub>2</sub>, CO and CO<sub>2</sub>.

- 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

GAS	MEASURES	APPLICATION
O <sub>2</sub> OXYGEN	% PERCENT	COMBUSTION
CO CARBON MONOXIDE		PROCESS CONTROL
CO <sub>2</sub> CARBON DIOXIDE		SAFETY

### SENSING TECHNOLOGY

PARAMAGNETIC INFRARED

# SERVOFLEX MiniMP 5200

PORTABLES



## 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 O<sub>2</sub> and CO<sub>2</sub> 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 O<sub>2</sub> analysis for CEMS verification
- Li-ion battery system offers unique true portability
- Non-depleting sensor design ensures long service with minimal calibration

GAS	MEASURES	APPLICATION
O <sub>2</sub> OXYGEN	% PERCENT	EMISSIONS
CO <sub>2</sub> CARBON DIOXIDE		PROCESS CONTROL
		QUALITY

### SENSING TECHNOLOGY

PARAMAGNETIC INFRARED

# SERVOFLEX MiniHD 5200

PORTABLES



## PORTABLE GAS ANALYZER FOR MEASUREMENT OF COMMON GAS MIXTURES

Designed for use in field locations or light industrial applications, the MiniHD portable gas analyzer is a rugged, heavy duty analyzer designed to accurately measure the levels of O<sub>2</sub>, CO and CO<sub>2</sub> within common gas mixtures. The MiniHD 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 O<sub>2</sub>, CO and CO<sub>2</sub> levels with no background interference

GAS	MEASURES	APPLICATION
O <sub>2</sub> OXYGEN	% PERCENT	COMBUSTION
CO CARBON MONOXIDE		PROCESS CONTROL
CO <sub>2</sub> CARBON DIOXIDE		SAFETY

### SENSING TECHNOLOGY

PARAMAGNETIC INFRARED

# POWER GENERATION

## WE'RE READY TO HELP

WHATEVER YOUR POWER REQUIREMENTS, WHEREVER YOU ARE



**SERVOMEX** 

A MEASURABLE ADVANTAGE

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