

HYDROCARBON PROCESSING



GAS ANALYSIS MAGAZINE

ISSUE
ONE - 2017

SUPPORTING:



PROCESS
CONTROL



COMBUSTION
CONTROL



EMISSIONS
MONITORING



PROCESS
SAFETY



PRODUCT
QUALITY

NEW PRODUCTS

Laser 3 Plus TDL analyzer series

APPLICATION STUDY

Flare stack analysis

EXPERT ADVICE

Remote mounting makes
maintenance easier

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WELCOME TO THE FIRST EDITION OF OUR NEW MAGAZINE FOCUSED ON THE HYDROCARBON PROCESSING (HP) MARKET SECTOR.

Accurate and reliable gas analysis is a vital part of all HP processes, and Servomex's analyzers and systems are used extensively in midstream and downstream applications.

We also provide a wealth of expertise and applications knowledge to ensure the best result for you and your plant. Our dedicated and experienced HP team will help you find the right gas analysis solutions.



Left to right: Zarina, David, Stephen, Matt and Rhys. Below: Huiyu Guan

It is led by Hydrocarbon Processing Market Sector Manager David Fahle (dfahle@servomex.com), who is based in Houston, Texas, and is responsible for setting the company's HP strategy and action plan.

Zarina Stanley (zstanley@servomex.com) is our Global Market Manager for HP and is responsible for key account management, developing key industry groups such as the User Advisory Council for critical industry issues, and getting Servomex Technologies and solutions specified on Chemical Technology Licences.

Stephen Firth (sfirth@servomex.com) has worked at Servomex for 23 years and holds the role of Global Business Development Manager. He is responsible for key project coordination where the end user customer, EPC and Licensor could all be in different regions or countries.

Business development in the HP sector in China is the responsibility of the newest member of the HP team, Huiyu Guan (hguan@servomex.com). With 14 years' experience at Servomex, her brief is to develop the China HP strategy and implement this in co-operation with the China Sales Team.



Rhys Jenkins (rjenkins@servomex.com) is Product Manager – Photometric, and is responsible for the product lifecycle of the SERVOTOUGH Laser 3 Plus range, the SERVOTOUGH SpectraExact 2500 and the SERVOTOUGH SpectraScan 2400. These analyzers are key products in our offer to the HP market.

Our Product Manager - Oxygen, Oxygen Deficiency & Combustion is Matt Halsey (mhalsey@servomex.com), making him responsible for the product lifecycle of a number of other key HP analysis products: the SERVOTOUGH Oxy 1900, the SERVOTOUGH OxyExact 2200, the OxyDetect range and the SERVOTOUGH FlueGasExact 2700.

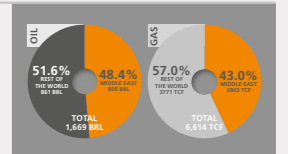
Together, our team stands ready to offer the experience and expertise you need to find the most efficient, accurate and cost-effective resolution to your HP requirements in 2017 and beyond. Get in touch with us today.

IN THIS ISSUE

P04

HP MARKET FOCUS

What are the trends in HP gas analysis in the Middle East?



P05

GLOBAL HP SECTOR TRENDS FOR 2017

Our predictions for the year ahead.



P06

SMALL FOOTPRINT – BIG STEP FORWARD

Servomex's new Laser 3 Plus analyzers are here.



P08

MEETING THE NEW MACT REGULATIONS

Flare stack emissions control in HP applications.



P10

A FULL ANALYZER SOLUTION FOR PTA PLANT

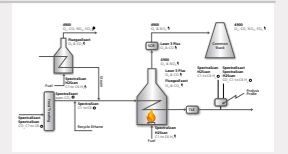
Servomex supplies system for phase two of Jiaxing project.



P11

COMBUSTION IN ETHYLENE PROCESS STUDY

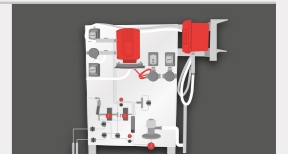
Supporting a core application of ethylene production.



P14

EXTRACTING THE BENEFITS OF REMOTE MOUNTING

How sensor head placement can boost maintenance operations.



P15

SERVICE FOCUS

How the Laser 3 Plus makes one person installation an easy process.



SEE THE FULL PICTURE ONLINE

INSIDE SERVOMEX UK

Get an insight into our world-class manufacturing facilities where sensors and SERVOTOUGH & SERVOFLEX analyzers are built



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

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

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P02

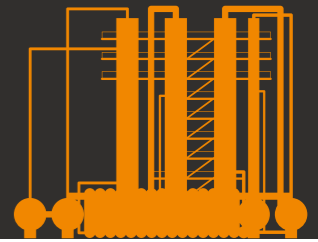


FOR THE FULL RANGE OF ANALYZERS VISIT servomex.com/gas-analyzers

FOR THE FULL RANGE OF ANALYZERS VISIT servomex.com/gas-analyzers

P03

MARKET FOCUS: MIDDLE EAST



AN ABUNDANCE OF OIL

Thanks to its unique geology, the Middle East region is the most abundant oil producer in the world.

In 2014 the Middle East's conventional oil was estimated at 800 billion barrels, nearly half of the world's proven recoverable crude oil.

The region has only 2% of the world's oil producing wells, but these are so prolific that they output more than 30% of the world's crude oil. The Middle East also holds 40% of the world's conventional gas reserves.

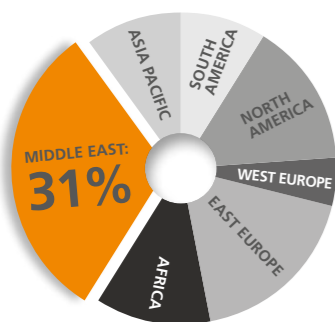
Analysis firm, Wood Mackenzie, has projected that by 2035 oil production capacity in the Middle East will reach

almost 40 million barrels per day, far ahead of any other oil-producing region, as Saudi Arabia continues to build capacity, Iran returns to the oil market, and Iraqi supply expands.

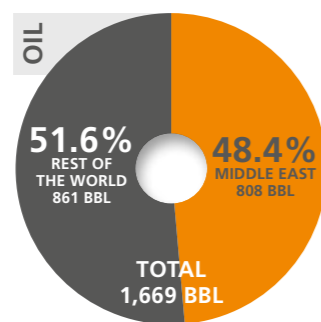
DID YOU KNOW...

The Ghawar oil field in Saudi Arabia is the largest in the world and produces more than half of the country's oil.

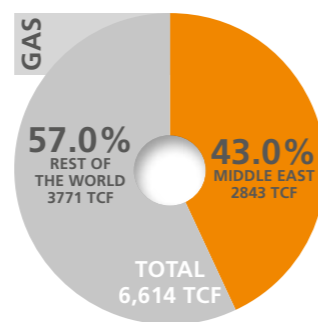
WORLD OIL PRODUCTION



PROVEN CONVENTIONAL RESERVES



BBL = BILLION BARRELS OF PETROLEUM LIQUIDS



TCF = TRILLION CUBIC FEET



DATA: BP 2013
DATA: RASOUL SORKHABI 2014

THE IMPACT OF FALLING OIL PRICES

Being highly oil-dependent economies, countries of the Gulf Cooperation Council (GCC) – which consists of all Arab states in the Persian Gulf except Iraq – have been deeply affected by the recent oil price

drop (approx 60% since 2013), causing macro-economic instability that hinders job creation and slows growth.

The oil price drop has largely impacted GCC public finances, mostly generated by the oil sector, and has hampered Foreign Direct Investment (FDI).

GDP growth in GCC countries is forecasted

at +2.3% in 2017, far from the growth experienced in the past. Oil price is the main driver of GCC economy and it is expected to remain around US \$51 per barrel in 2017.

However, the forecast may be affected by a number of factors, including the increasing global oil production, uncertain consumption patterns and investments in the oil industry.

DIVERSIFICATION STRATEGIES

The oil production agreements between OPEC (the organization of the oil producing countries) and non-OPEC members appear to be effective and this has helped stabilize the price of oil above US \$50 per barrel.

Higher energy prices will help restore the needed confidence in the market, and an increase in activity for new projects and analysis system upgrades is expected.

However, the overall strategy for the region appears to be to diversify out of oil, and produce more value-added chemicals.

This means expanding downstream activities and integrating the businesses to create greater efficiency. More of these

chemicals being produced within the region will result in more of the value being captured and invested locally.

The petrochemical industry in the region has developed rapidly in the last 30 years or so. According to a 2012 report by McKinsey, the chemical industry in GCC countries supported 840,000 jobs, with 110,000 in chemical production, and, indirectly, a further 730,000 jobs, including suppliers and contractors involved in areas such as gas production, outsourced maintenance, transportation services, and other logistics services.

In Saudi Arabia, chemicals represented 4.5% of non-oil and gas GDP in 2011— a share that increased to 11% if indirect and induced contributions were included.

According to Technical Review Middle East (2015), GCC manufacturers account

for about one-fifth of global output of ethylene glycol, and of total linear low-density polyethylene (18%); high-density polyethylene (17%); ethylene (14%); polypropylene (13%); and methanol production (11%). The region currently exports around four-fifths of its products to more than 80 countries, amounting to 66.1 million tons.

Talk to our Middle East team

From our UAE business centre we provide complete solutions for gas analysis in hydrocarbon processing applications.

Contact the Middle East Business Centre today on
+971 6552 8073
mei_sales@servomex.com

GLOBAL TRENDS ANALYSIS FOR 2017

DAVID FAHLE, SERVOMEX'S HYDROCARBON PROCESSING MARKET SECTOR MANAGER PREDICTS HP MARKET DEVELOPMENTS AND OPPORTUNITIES IN 2017



With energy prices beginning to rise again, we can expect to see increased confidence in the hydrocarbon processing (HP) market in the year ahead.

After many projects were delayed or slowed by the recent market uncertainties, the schedules for many of these are now accelerating, and global and regional operators are now investing in new projects.

Markets in Europe and China particularly are showing signs of recovery; margins are improving in Europe, the Middle East and Southeast Asia; and consumer demand is on the rise in many regions. This all adds up to a more optimistic outlook for the sector than we perhaps had at the beginning of 2016. So, over 2017, we will be increasing support to our sales teams around the world to meet increased demand, so they can respond to customers more quickly and effectively.

Certainly, we expect the US to thrive, with the resurgence of shale gas production fueling exports, a wave of new projects, and improved trading conditions. The incoming US administration seems committed to internal infrastructure investment, and this may also have a positive impact on demand.

Elsewhere in the Americas, Mexico should be an improving market as it opens the

petroleum industry up to outside investment. Brazil, however, is showing only modest domestic growth; minor OPEC partners, such as Venezuela, could struggle.

In the Middle East, we expect Saudi Arabia to lead the way, with a high level of momentum in its export market. We have noted growing demand for our reliable combustion analysis solutions, in particular to solve problems in applications that use high sulfur fuels.

In China there is an accelerating emphasis on improving process efficiency and controlling environmental emissions. The situation is not dissimilar for India: we expect domestic demand to slow, but there is also rising demand for Continuous Emissions Monitoring (CEM) solutions in response to growing compliance requirements and domestic pressures.

Even under the tougher conditions of last year, 2016 saw Servomex win some major contracts in the HP sector, and we expect that success to continue. Our core solutions continue to bring considerable process and safety optimization advantages in a wide range of downstream chemical applications, including production of ethylene, ethylene oxide, vinyl chloride monomer and polyvinyl chloride.

We will further consolidate our position as the leading expert in combustion gas analysis, with customers now able to choose from the flexible range of combustion measurements available in the new SERVOTOUGH Laser 3 Plus TDL range, as well as the trusted combustibles measurement provided by the SERVOTOUGH FluegasExact 2700.

Alongside the growing demand for CEMs outlined earlier, growing compliance requirements around flare gas emissions are driving a more urgent requirement for effective monitoring solutions – a challenge met by the powerful, fast inline hydrocarbon analysis provided by a combination of the SERVOTOUGH SpectraScan 2400 and H2Scan analyzers (see pages 8 & 9).

Plant safety is as important as ever. The process-critical safety measurements provided by analyzers like the SERVOTOUGH Oxy 1900 and OxyExact are now mirrored by the stable oxygen measurements of the SERVOTOUGH OxyDetect, our safe, non-depleting replacement for inferior electrochemical-based gas monitors used for life safety monitoring.

DID YOU KNOW...

Shale gas production accounted for half of the US natural gas production in 2015 and is expected to double by 2040.



PRODUCT NEWS

SMALL FOOTPRINT BIG STEP FORWARD NEW PRODUCT



LASER 3 PLUS TDL MONITOR

Servomex's newest compact analyzer is making a big impact on combustion applications.

The SERVOTOUGH 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 both the hydrocarbon processing and power generation market sectors, and emissions control, the new family of analyzers includes versions for ammonia slip monitoring for combustion optimization 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 reinstallation - without the need for re-alignment - is achieved every time. The new Laser 3 Plus analyzer purge design reduces nitrogen (N₂) 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 range of TDL analyzers, providing the same industry-leading performance delivered by Servomex's in-situ cross stack and extractive monitors.

Laser 3 Plus Process



Capable of being optimized for the fast, accurate and responsive measurement of process oxygen or carbon monoxide in hot or hazardous conditions, the process control version monitors these gases in processes where such monitoring is vital for the safe, efficient and reliable running of the process. It is essential for safety applications.

Compact for simple installation, it offers fast response times, low maintenance, only annual calibration, no contact with the process and an average measurement across the process.

An inbuilt measurement reference guarantees measurement lock without the need for reference purge gases, or the need to rely on the process conditions.

This provides peace of mind, lower maintenance and enhanced diagnostics.

Laser 3 Plus Combustion



The Combustion version can be optimized for CO measurements, for O₂, or for a combination of CO and CH₄.

Servomex's Combustion CO and Combustion CO+CH₄ models are a must for safety applications in gas-fired and coal-fired processes. They can monitor CO in flue gas to trim oxygen levels and optimize combustion efficiency and safety. The CO+CH₄ version will also monitor light-off and running conditions to maximize safety.

The Combustion O₂ version measures oxygen in flue gas, used to control and optimize combustion efficiency. It uses two absorbance lines to optimize from ambient to 1500°C, uniquely enabling the measurement of combustion O₂ with an air rather than nitrogen purge in processes over 700°C.

SAFETY BREAKTHROUGH

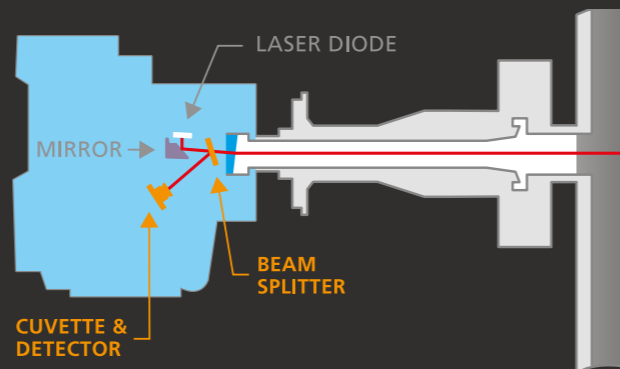
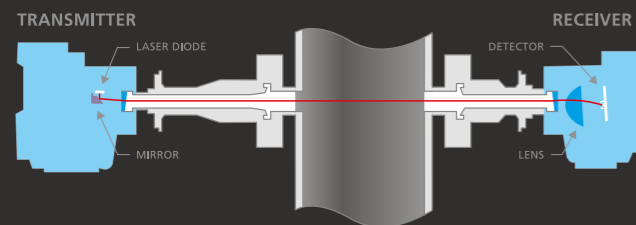
UNIQUE LINE LOCK CUVETTE SYSTEM TRANSFORMS PROCESS SAFETY

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

APPLICATION STUDY

FLARE STACK ANALYSIS AND EMISSIONS CONTROL UNDER THE NEW MACT REGULATIONS

AUTHORS: DAVID FAHLE, SERVOMEX'S HYDROCARBON PROCESSING MARKET SECTOR MANAGER AND ZARINA STANLEY, GLOBAL MARKETING MANAGER HYDROCARBON PROCESSING

A vital safety mechanism in industrial plants, flares stacks are used to burn off flammable gases released by pressure relief valves, avoiding unplanned pressure build-ups and disposing of excess gases. They are also used for the planned combustion of gases over short periods during plant start-ups or shut-downs.

A flare stack is an elevated vertical stack or chimney, and steam-assisted flaring of the associated gas occurs at the top of this structure to control the Combustion Efficiency (CE), a percentage that represents the number of molecules of the compound destroyed by incineration relative to the amount that entered the system. In an efficient flare system, the CE should be 98% or higher.

Combustion of the vent gas is much more environmentally responsible than simply releasing the gas into the air. For example,

if methane is burnt, the products are CO₂ and water, which are much less harmful than releasing methane itself.

Flares are active all the time, with a continuous release of gas being burned off at the flare stack. When this mix of stream and hydrocarbons is correct, the flame is clean and no harmful emissions escape into the atmosphere.

In steam-assisted flares, the ratio of steam to vent gas is critical. Under-steaming leads to an inefficient process, while over-steaming can be a cause of incomplete combustion, and visible smoke is a clear sign of pollutants being released into the atmosphere.

Recently, the United States has been a leader in the field of studying flare stack emissions, with the most recent performance tests of steam-assisted flares by Marathon Petroleum in Detroit.

While there are obvious commercial benefits in keeping the process as efficient as possible, these studies are also driven by a desire to stay ahead of impending changes to US Environmental Protection Agency (EPA) regulations.

Based on the latest industry-scale flare tests, the EPA has proposed revisions to the flare exit velocity limit and introduced new metrics for flare operation under refinery Most Achievable Control Technology (MACT) regulations. MACT standards were developed by the EPA to reduce the effects of hazardous air pollutants generated by industry.

The major implication of the proposed rules is the requirement for flare monitoring, which the EPA estimates will cost the industry \$147 million in capital investment for flare monitoring infrastructure.

DID YOU KNOW...

The SpectraScan 2400/H2Scan system is so reliable it can be used as a benchmark to determine the performance of GC/calorimeter analyzers.

MEASURING EFFICIENT COMBUSTION

The excursion of gases from a flare stack can be very quick, inconsistent, and made up of a variety of components. This is particularly the case in petrochemical plants, making them harder to monitor than refineries.

The steam-to-vent-gas ratio required can be very different for each gas - for example ethane requires 0.1 to 0.15 kg of steam per kg of gas, whereas butadiene requires the ratio to be nine times higher, between 0.9 to 1.0 kg.

Efficient regulation therefore needs continuous compositional analysis to ensure the steam-to-vent-gas ratio is maintained at its most efficient level and complies with the CE target. A device capable of this continuous compositional analysis can therefore provide a much better understanding of the overall flare performance.

Three technologies exist to help measure the efficiency of flare stack combustion: Gas Chromatography, Calorimetry, and the innovative Tunable Filter Infrared

technology used in Servomex's SpectraScan 2400/H2Scan system.

Gas Chromatography (GC) has been used extensively in the past, as it meets measurement requirements for most flare applications. However, GC has an issue with cycle time: a complex analysis can take up to 15 minutes. Also, temperature, density and flow can all affect GC measurements.

A calorimeter works in a different way, by burning the sample and taking a measurement of the temperature. However, it does not inform you what the composition of the sample may be. While the reading can be continuous, there is also some latency.

Servomex's system, comprising the SERVOTOUGH SpectraScan 2400 and H2Scan working in combination, gives a continuous reading with a good compositional measurement. It measures 14 components, giving an overall British Thermal Unit (BTU) value and individual component values.

This completely integrated system has no carrier gas and needs no recalibration or

adjustment, so there are few, if any, parameters to affect the sample.

The SpectraScan 2400 is a Tunable Filter Infrared analyzer which can accurately separate light hydrocarbon components in the C1 to C6 range. With a unique wavelength-scanning spectrometer, fast analysis is performed for these light hydrocarbons, as well as H₂S if required.

Sampling is made continuously using a flow-through system, which makes it suitable for online, unattended operation, while the analyzer, having no carrier gas or recalibration requirements, does not need high maintenance.

The H2Scan integrates simply with the SpectraScan, using non-depleting thin film technology to provide a direct, real-time hydrogen measurement that is not cross-sensitive to other gases. Hydrogen is commonly vented more than any other gas, so is always present in flare lines.

The combination of these two technologies provides a detection system that is simpler and superior to traditional analysis, with considerably lower implementation and product lifetime costs.

FLARE SYSTEM

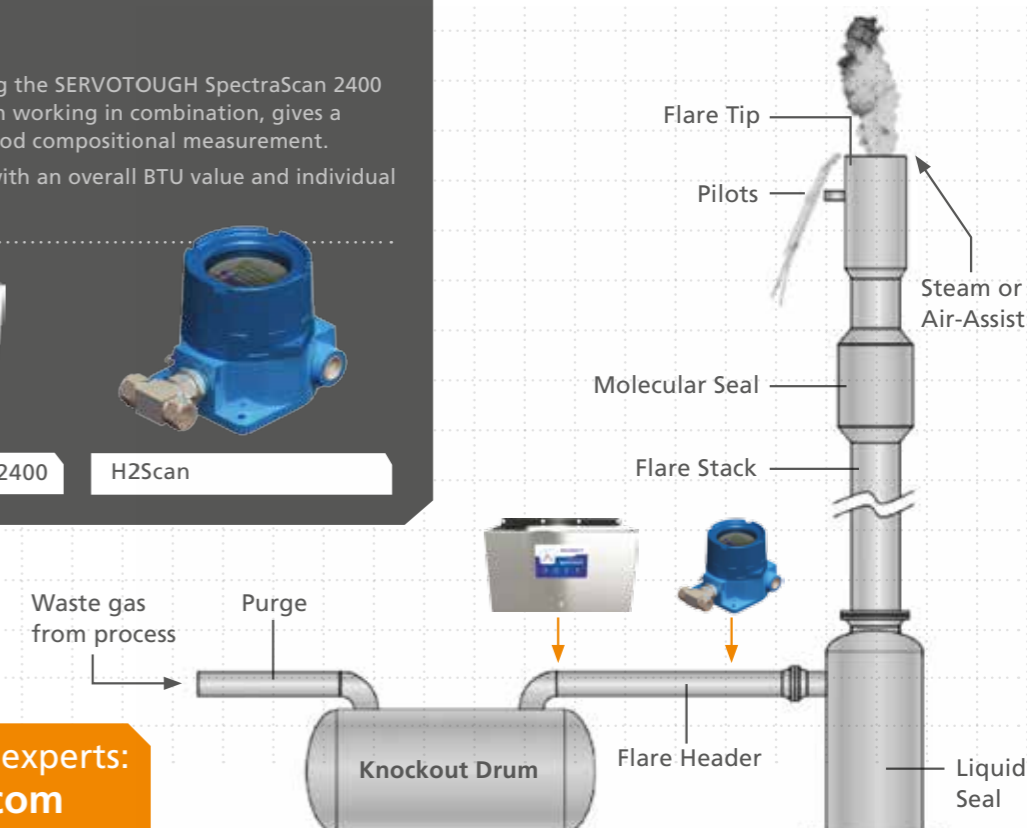
Servomex's system, comprising the SERVOTOUGH SpectraScan 2400 and the SERVOTOUGH H2Scan working in combination, gives a continuous reading with a good compositional measurement.

It measures 14 components, with an overall BTU value and individual component values.



SERVOTOUGH SpectraScan 2400

H2Scan



Get advice from the experts:
sales@servomex.com



SERVOMEX PROVIDES COMPLETE PTA SOLUTION TO CHINA

Servomex will supply a complete analyzer solution for the second phase development of Jiaxing Petrochemical Co Ltd's purified terephthalic acid (PTA) production facility in Zhejiang province, China.

Four years after supplying a system for phase one of the project, Servomex was chosen to supply the plant with three SERVOTOUGH Oxy 1900 oxygen and three SERVOTOUGH SpectraExact 2500 toxic gas analyzers. These will be integrated into a bespoke analyzer house designed and built at Servomex's Systems Integration facility at the company's Asia Pacific Business Centre in Shanghai.

In a typical PTA process a mixture containing p-xylene, ethanoic acid, a catalyst system and compressed air is fed into a reactor, where a two-stage oxidation process creates PTA. As a result, precise, accurate and reliable monitoring and control of the oxidation reactions is critical.

The high reliability of the existing phase one system was a major factor in Servomex being selected for the next stage of the development, as well as Servomex's low cost of ownership and long-term reliability in comparison to inferior competitor solutions.

In addition, Jiaxing Petrochemical Co Ltd was impressed by the quality of Servomex's service offer, which will deliver fast, responsive maintenance and support from the Asia Pacific Business Centre.

DID YOU KNOW...

Servomex is the leading supplier of PTA gas analysis solutions, with more than 30 projects having been fulfilled since 1995.

"Servomex is delighted to have been chosen for the next stage of this high-profile project, which shows great confidence in our system and the service and maintenance we offer. Both the analyzers they have chosen have strong track records in delivering accurate, stable results in the most challenging of environments. Jiaxing Petrochemical Co Ltd was further reassured to choose Servomex on the basis of numerous successful installations for other PTA plants, and confirmed that our current system is working well."



Michael Xie, General Manager of Servomex's Asia Pacific region

SERVOTOUGH OXY 1900



By selecting Servomex's award-winning SERVOTOUGH Oxy 1900 analyzer, Jiaxing Petrochemical is able to rely on the unique Paramagnetic oxygen sensor technology for accurate and stable measurements of oxygen. With a non-depleting measurement requiring minimal calibration, the Oxy 1900 was a compelling choice because of its optimization for hazardous applications including safety critical oxidation, long lifetime of ownership, and low maintenance costs.

servomex.com/oxy1900

SERVOTOUGH SPECTRAEXACT 2500



The SERVOTOUGH SpectraExact 2500 analyzer is a rugged, highly-flexible multigas solution designed for a wide range of demanding process applications. It combines Gas Filter Correlation and Infrared technologies to deliver proven performance in the harshest process conditions, making it an ideal choice for the high-temperature, acidic environments encountered in PTA production.

servomex.com/spectraexact2500

COMBUSTION CONTROL IN ETHYLENE PRODUCTION

Precise and rapid analysis of process gases within an ethylene plant is vital to ensure optimum efficiency while maintaining the highest levels of safety. These efficiencies can be achieved in a variety of ways, including: shortening the residence time in the cracking furnace; rapid adaptation to changing feed-stocks; improving combustion control; optimizing fractionation; and improving process reliability. Safety can also be improved through fast, reliable process analysis technologies with high measurement availabilities.

Combustion control for the cracking furnace is provided through monitoring both oxygen and combustibles in flue

gases. This has been commonly achieved by utilizing a close-coupled extractive combustion analyzer capable of measuring both oxygen (O₂) and carbon monoxide (CO). In these analyzers, sensors are housed in a sensor head mounted on the process wall, to which a sample is aspirated via a sample probe, giving fast in-phase response of both O₂ and CO.

However, the advent of Tunable Diode Laser (TDL) technologies now allows a path-averaged combustion measurement of O₂, CO and CH₄ to be made in-situ of the process. TDL offers a highly stable measurement at very low concentrations, a reduction in cross-interference from other gases and a fast, continuous measurement.

Furnace wall vibration or thermal expansion can cause measurement failure for basic TDL technologies, due to the movement of the wall on which the analyzer is mounted resulting in a reduction or variation in laser light falling on the laser detector.

Servomex's TDL analyzers, including the new SERVOTOUGH Laser 3 Plus range, avoid this problem by allowing the laser transmitter optics to diverge the laser beam, ensuring the receiver remains unaffected by thermal movements and vibrations of the process.

This offers a significant advantage to Servomex's TDL analyzers as a combustion control solution for ethylene furnaces.

SERVOMEX SOLUTIONS FOR COMBUSTION ANALYSIS IN ETHYLENE PRODUCTION

SERVOTOUGH SpectraScan 2400



Revolutionary inline real-time analysis of hydrocarbon components.

H2Scan



Explosion-proof inline hydrogen process analyzer which complements the SpectraScan 2400.

SERVOTOUGH SpectraExact 2500



Reliable real-time photometric analysis of corrosive, toxic and flammable gas streams.

SERVOTOUGH Laser 3 Plus Analyzers



Full-featured TDL monitor providing fast, accurate combustion gas measurements.

SERVOTOUGH FluegasExact 2700



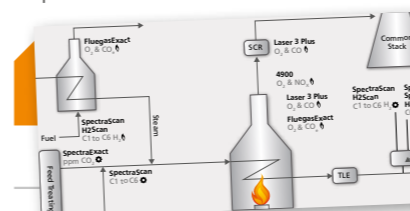
Advanced fluegas analyzer for high temperature measurements of O₂ and combustibles.

SERVOPRO 4900



Continuous Emissions Monitoring (CEMS) analysis of multiple flue gas components.

Find out more about the OxyDetect at servomex.com/gas-analyzers



See our analyzers across the process **OVERLEAF**

COMBUSTION IN ETHYLENE PRODUCTION

The quality of the raw ethane feedstock, particularly if obtained from natural gas, is critical. Thus the feed gas quality is monitored for high levels of carbon monoxide (CO) and to maintain a consistent feed to the cracking unit by the SERVOTOUGH SpectraExact 2500 and SpectraScan 2400 (1). As carbon dioxide (CO₂) can freeze out on the process equipment at the 'cold end' of the operation, it is removed to levels of less than 100ppm (typically 10ppm)

in the treatment plants. The SpectraExact (2) is used to monitor the feed treating for CO₂ removal.

After any recycled ethane is blended with the treated feed, a SpectraScan measurement (3) maintains a consistent feed to the cracking unit. The SpectraScan and H2Scan (4) (5) maintain constant fire and heating rates of the steam boiler and cracking unit, with a real time, low maintenance BTU analysis, especially when tail gases rich in hydrogen (H₂) and methane (CH₄) are recycled to the burners.

Another important process measurement is the monitoring of the oxygen in cracking furnace combustion gases, where optimized combustion and reduced fuel consumption is achieved by both detailed fuel analysis and rapid flue gas analysis. The SERVOTOUGH FluegasExact 2700 (6) and (8), provides analysis of both oxygen (O₂) and combustibles (COe), while an in-situ TDL measurement by the SERVOTOUGH Laser 3 Plus Combustion (7), offers an average path analysis of O₂ across the furnace.

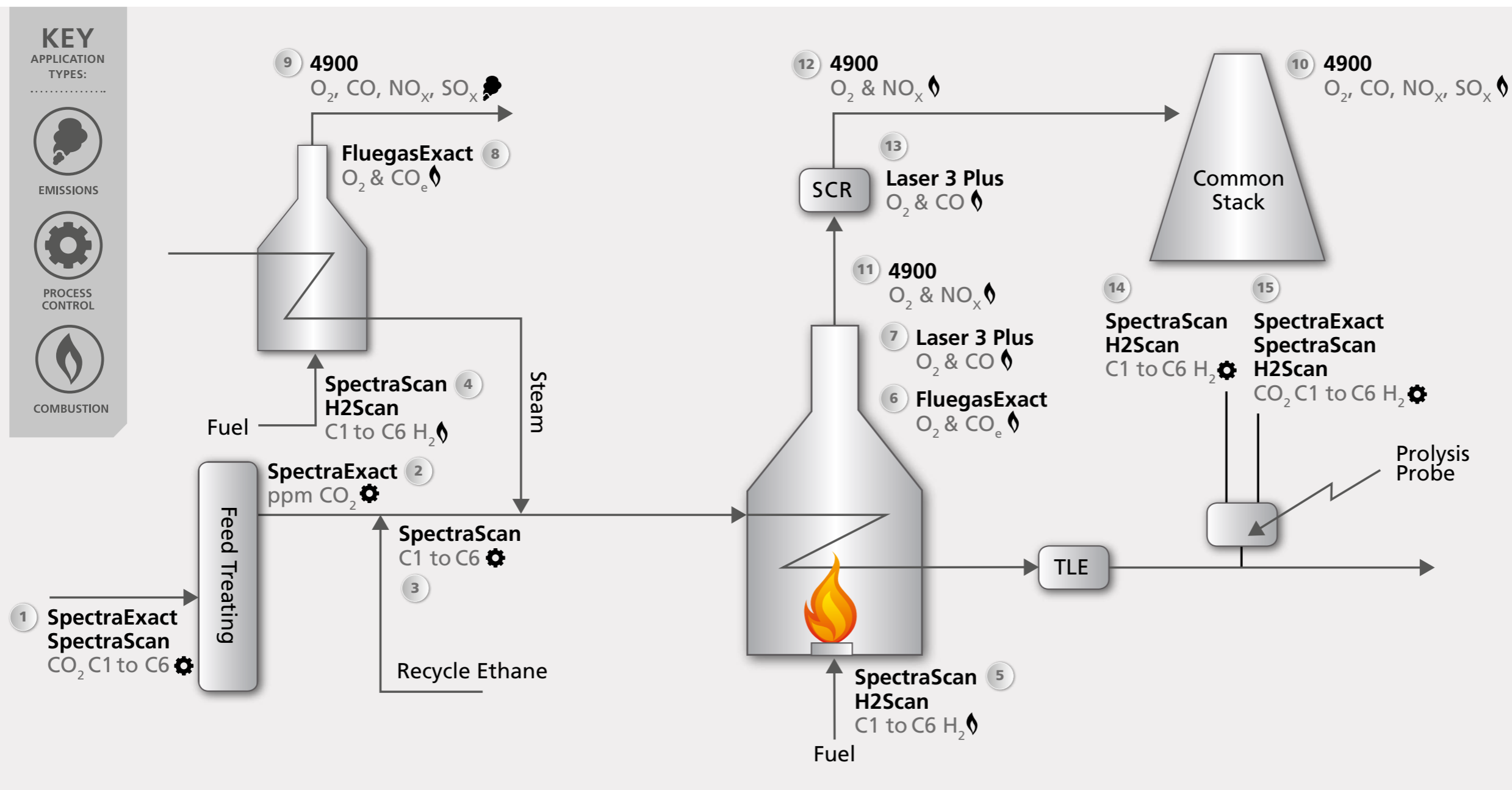
Continuous Emissions Monitoring Systems (CEMS), using the SERVOPRO 4900 (9) (10) (11) (12) and Servomex sample systems are used to measure the stack emissions for legislative requirements of O₂, CO, NO_x and SO_x. The 4900 can also be installed either side of a Selective Catalytic Reduction (SCR) unit to monitor the SCR's efficiency in reducing NO_x emissions, while the SERVOTOUGH Laser 3 Plus Ammonia (13) monitors the NH₃ level, which is allowed to "slip" through the catalysis during the NO_x reduction reaction.

On the outlet of the cracker unit a transfer line exchanger (TLE) rapidly cools the cracked gas to preserve the gas composition: a SpectraScan and H2Scan (14) monitor the gas quality after the cracking unit, ensuring the highest possible ethylene yield and to prevent under-cracking or over-cracking.

After every 20 days or so of operation, the cracking furnaces need to be decoked since they acquire a coating of carbon over time and lose efficiency. This is done by burning off the coke with air in a steam atmosphere.

The progress of the decoking phase is monitored by measuring the amount of CO₂ (0-5%) in the effluent. It rises as the carbon is burnt off and then reduces to zero when the furnaces are clean again, and the plant can be returned to normal operation.

During the decoke cycle a SpectraScan (14) with added CO₂ channel can also be utilized to monitor CO₂ levels, as well as to ensure the shortest decoking cycle with real-time analysis, or a separate SpectraExact (15) can be utilized for this measurement.



BENEFITS OF TDL TECHNOLOGY

Servomex's advanced TDL technologies offer significant advantages when applied as a combustion control solution for ethylene furnaces, maximizing efficiency whilst reducing greenhouse gas emissions.

The highly robust technique provides reliable measurement of combustion gases with less associated maintenance, while the location of the measurement close to the flame delivers the fastest response, optimizing combustion and minimizing fuel costs.

TDL technologies are particularly suitable for in-situ cross-stack measurements, with a typical cross-stack system consisting of the laser emitter module and receiver mounted across the process pipe line or flue stack.

NEW PRODUCT

AVAILABLE NOW:
The SERVOTOUGH Laser 3 Plus TDL range.
See pages 6 and 7.

We have the solution for HP process - contact your local business center at servomex.com

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 hydrocarbon processing (HP) applications, including process heaters, utility boilers, thermal crackers, incinerators and furnaces.

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 hydrocarbon processing industry.

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 an insulated 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 three distinct benefits for HP applications. Firstly, it removes the sensor head from what would be considered a potentially dangerous environment for personnel to work in.

For example, thermal cracking processes for ethylene production are very hot, and are extremely uncomfortable to work next to for prolonged periods of time.

By moving everything away from the process and putting it on a remote panel, it allows a person to approach it and work easily, with far fewer health and safety risks.

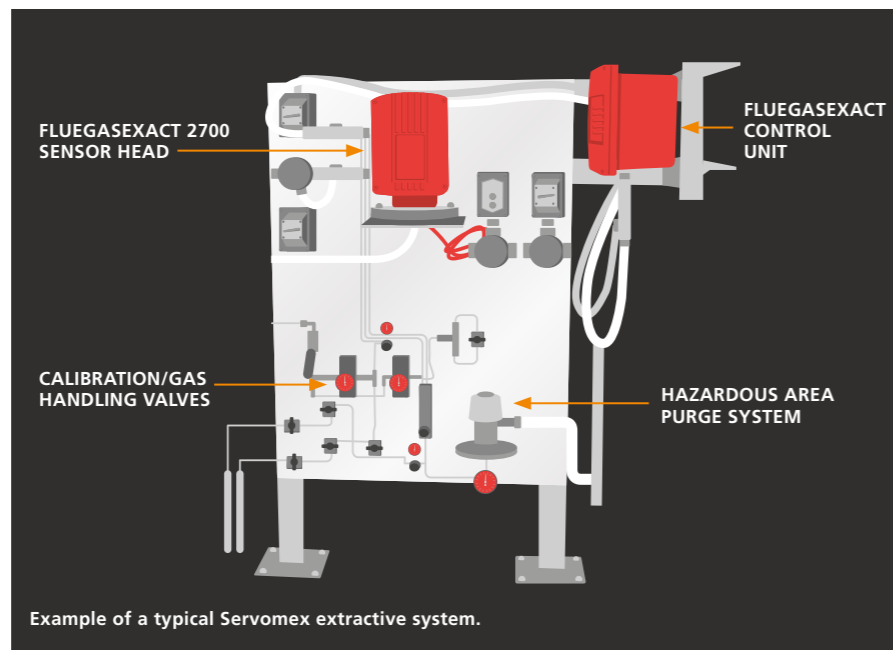
Secondly, many of these processes are "zoned" and classed as hazardous areas.

Permits are required and strict regulation imposed for working in such areas.

Removing the analyzer from the hazardous area can in many cases 'de-rate' the analyzer, as you are installing it in a safe area.

Also, moving the analyzer away from the process makes maintenance easier as the working environment is safer and more comfortable, and access is improved.

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 hydrocarbon processing applications.



For more expert advice on remote extractive mounting visit servomex.com

LASER 3 PLUS RANGE EASILY INSTALLED BY ONE PERSON

Light and compact, the SERVOTOUGH Laser 3 Plus TDL monitor range is simple to install. Unlike the cumbersome design of traditional TDL analyzers, which occupy a large installation footprint and typically takes two people to install, the Laser 3 Plus can be installed quickly by just one person in five easy steps – reducing costs and saving valuable space in confined areas.



SIMPLE FIVE-STEP INSTALLATION:

STEP 1



Attach the flange to the side of the flue and secure by tightening bolts.

STEP 2



To mount the transmitter, align the three mounting screws with the corresponding openings on the flange, twist into place, and secure by tightening the three screws.

STEP 3



Repeat the installation process on the other side of the flue for the receiver.

STEP 4



Remove the front panel and connect cables to the base of the transmitter, then re-secure the panels.

STEP 5



Switch on and align using built-in color display.

COMMISSIONING



While installation is designed to be straightforward, we recommend initial commissioning by a trained Servomex engineer. A trained engineer will be able to advise on ongoing maintenance and train site engineers on best practice. This provides maximum performance, reliability, safe operation and cost-saving benefits of your analyzer from day one.

Watch the installation video at:
servomex.com/l3plus-install

HEALTH CHECK



ON-SITE SERVICE SUPPORT



SERVICE CONTRACTS



SPARES



SERVICE CENTER SUPPORT



RENTAL EQUIPMENT



TRAINING



CALIBRATION KITS



For information on all our nine service products visit servomex.com/service

> HP PRODUCT GUIDE

Hydrocarbon processing (HP) is one of the most demanding industries in the world. High levels of productivity must be achieved while constantly maintaining the very highest safety standards.

Effective gas analysis is a critical component of all HP processes, typically requiring a wide range of measurements to ensure the safe, optimized running of the process.

As the world leader in gas analysis, Servomex analyzers and systems are used extensively in midstream and downstream HP processes covering refining and the production of chemicals, petrochemicals, natural gas and fuels.

These rugged, resilient analyzers are custom designed to perform in the most extreme process conditions; our expertise, combined with a detailed applications knowledge, ensures the best gas analysis solution is delivered to your plant.

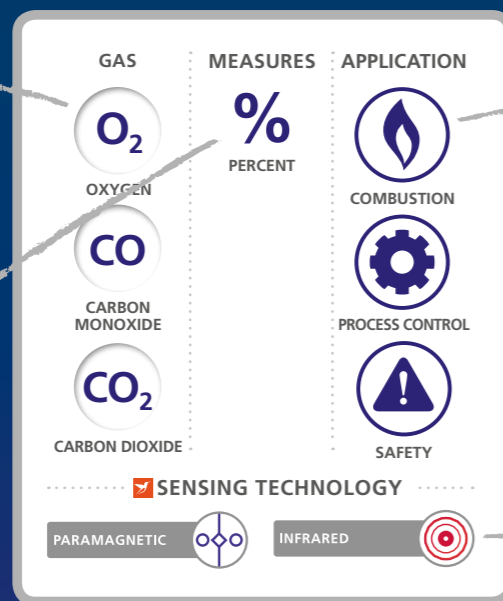
Supported by a global network of service and support, Servomex analyzers are chosen with confidence by HP operators worldwide in the knowledge that they guarantee operational safety, product quality and process efficiency.

FIND YOUR PRODUCT NOW

> 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



SERVOTOUGH

Built to meet the extreme challenges of measuring gases in hot and hazardous environments, the SERVOTOUGH process and combustion analyzers integrate Servomex's exceptional analytical performance into a highly robust and resilient design.

Optimized for hazardous area use, and utilizing both extractive and in-situ analysis techniques, common gas measurements receive higher level analysis for light hydrocarbons and combustibles; this makes SERVOTOUGH analyzers ideal for extensive use within most hydrocarbon processing applications.

Manufactured to the highest specifications using custom-designed stainless steel enclosures, SERVOTOUGH analyzers are intrinsically safe and certified to the uppermost safety standards.

SUPPORTING



PROCESS CONTROL



PROCESS SAFETY



EMISSIONS MONITORING



COMBUSTION CONTROL



PRODUCT QUALITY

SERVOTOUGH Oxy 1800

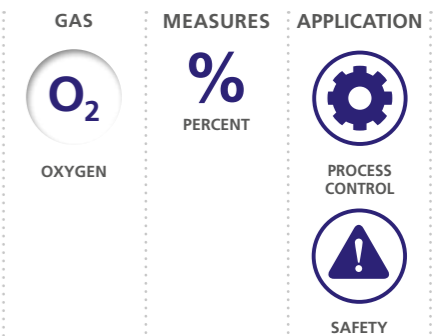
SAFE AREA



ACCURATE 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



SENSING TECHNOLOGY

PARAMAGNETIC

SERVOTOUGH Oxy 1900

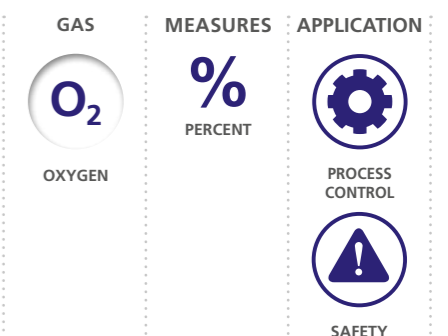
HAZARDOUS AREA



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 hazard rated locations
- Heated sample cell allowing simplified sample system requirements
- Unique Servomex Flowcube flow sensor technology for improved safety



SENSING TECHNOLOGY

PARAMAGNETIC

SERVOTOUGH OxyExact 2200 HAZARDOUS AREA



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 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% O₂ and pressures of up to 40psi
- High temperature version eliminates the need to condense hot sample prior to analysis

GAS	MEASURES	APPLICATION
O ₂ OXYGEN	% PERCENT	PROCESS CONTROL SAFETY

SENSING TECHNOLOGY

PARAMAGNETIC

SERVOTOUGH FluegasExact 2700 HAZARDOUS AREA



ADVANCED FLUEGAS ANALYZER FOR HIGH-TEMPERATURE MEASUREMENT OF O₂ AND COMBUSTIBLES

Designed to measure O₂ and CO_e 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 ₂ OXYGEN	% PERCENT	COMBUSTION
CO _e COMBUSTIBLES	ppm TRACE	PROCESS CONTROL

SENSING TECHNOLOGY

CALORIMETRY ZIRCONIA

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 ₂ CARBON DIOXIDE	CV CALORIFIC VALUE	QUALITY
C1-C6		
H ₂ S HYDROGEN SULFIDE		

SENSING TECHNOLOGY

SPECTROSCOPIC

SERVOTOUGH Laser 3 Plus Process HAZARDOUS AREA



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 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 ₂ OXYGEN	% PERCENT	PROCESS CONTROL
CO CARBON MONOXIDE	TRACE	COMBUSTION

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	
CORROSIVE		

SENSING TECHNOLOGY

GAS FILTER CORRELATION INFRARED

SERVOTOUGH Laser 3 Plus Combustion HAZARDOUS AREA



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 approvals. Approved for process Zone 2. SIL 2 assessed and CE marked
- Optimized for combustion processes

GAS	MEASURES	APPLICATION
O ₂ OXYGEN	% PERCENT	PROCESS CONTROL
CO CARBON MONOXIDE	ppm TRACE	COMBUSTION
CO+CH ₄ CARBON MONOXIDE + METHANE		

SENSING TECHNOLOGY

TUNABLE DIODE LASER

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, H₂O, H₂S, 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 ppm TRACE	PROCESS CONTROL EMISSIONS

SENSING TECHNOLOGY



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 ppm TRACE	PROCESS CONTROL QUALITY

SENSING TECHNOLOGY



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 ppm TRACE	PROCESS CONTROL QUALITY

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

GAS	MEASURES	APPLICATION
O ₂ OXYGEN	ppb ULTRA TRACE ppm TRACE	PROCESS CONTROL QUALITY

SENSING TECHNOLOGY



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 ₂ O WATER	DEW POINT ppmv	PROCESS CONTROL

SENSING TECHNOLOGY

Ultra-thin film Al₂O₃

H2Scan

HAZARDOUS AREA



EXPLOSION-PROOF IN-LINE HYDROGEN PROCESS ANALYZER, USING A SOLID-STATE, NON-CONSUMABLE SENSOR CONFIGURED TO OPERATE IN PROCESS GAS STREAMS

The H2Scan hydrogen process analyzer features thin film technology that provides a direct hydrogen measurement that is not cross-sensitive to other gases.

- UL Class 1, Div 1, Groups B, C, D. ATEX & CSA certifications
- Easily configurable alongside SERVOTOUGH SpectraScan 2400
- Simple system integration

GAS	MEASURES	APPLICATION
H ₂ HYDROGEN	% PERCENT	PROCESS CONTROL QUALITY

SENSING TECHNOLOGY

H2Scan thin film

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 O₂ sensing technology.

- IP66 (indoor use only)
- The most reliable O₂ detector on the market
- No more false readings or false alarms caused by depleting cell technologies
- SIL 2 approval

GAS	MEASURES	APPLICATION
O ₂ OXYGEN	% PERCENT	SAFETY

SENSING TECHNOLOGY

PARAMAGNETIC

SERVOFLEX SUPPORTING

With the precision sensing technology of Servomex fixed analyzers in a compact, easy to use package, SERVOFLEX analyzers deliver high performance portable gas analysis for safe or hazardous area use.

Utilizing Servomex's non-depleting Paramagnetic and Infrared sensor technology, SERVOFLEX analyzers provide stable and reliable measurements for oxygen, carbon monoxide and carbon dioxide.

Ergonomically designed for easy handling, and powered by resilient lithium-ion batteries to ensure long usage with every charge, each analyzer offers an extensive range of features that includes audible alarms, data-logging and RS232 outputs.

Certified to a range of relevant safety requirements, Servomex's SERVOFLEX analyzers make the grade wherever they are used.

PROCESS CONTROL

PROCESS SAFETY

EMISSIONS MONITORING

COMBUSTION CONTROL

PRODUCT QUALITY

SERVOPRO SUPPORTING

The SERVOPRO range makes Servomex's reliable, stable and accurate gas measurements available to a diverse range of safe area applications.

An extensive range of non-depleting Servomex gas sensing technologies - including Paramagnetic, Zirconium Oxide, Thermal Conductivity, Plasma and Gas Chromatography - are integrated into flexible analyzers that either meet specific measurement requirements, such as for syngas, hydrocarbons or trace gas mixtures, or provide multi-gas monitoring capabilities for applications including ASU production and continuous emissions monitoring (CEMS).

Designed for benchtop use, or mounting in a 19" rack, all SERVOPRO analyzers feature extensive functionality, remote communication options and can be operated directly via intuitive onboard software.

PROCESS CONTROL

PROCESS SAFETY

EMISSIONS MONITORING

COMBUSTION CONTROL

PRODUCT QUALITY

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 O₂, CO and CO₂.

- 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 ₂ OXYGEN	% PERCENT	COMBUSTION
CO CARBON MONOXIDE		PROCESS CONTROL
CO ₂ CARBON DIOXIDE		SAFETY

SENSING TECHNOLOGY

PARAMAGNETIC INFRARED

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 O₂, including CO, CO₂, NO, SO₂, CH₄, N₂O.

- 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 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 O₂, CO and CO₂ 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 O₂, CO and CO₂ levels with no background interference

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

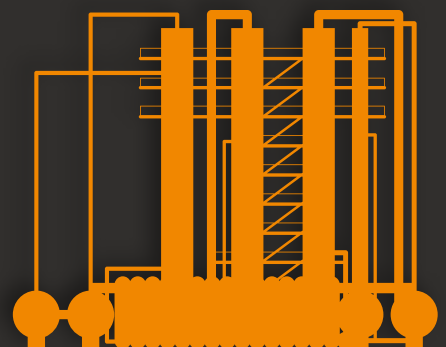
SENSING TECHNOLOGY

PARAMAGNETIC INFRARED

HYDROCARBON PROCESSING

WE'RE READY TO HELP

WHATEVER YOUR HP REQUIREMENTS, WHEREVER YOU ARE



SERVOMEX 

A MEASURABLE ADVANTAGE

SERVOMEX.COM