



Analytical Instruments & Systems



Protecting Your Analytical Investment

Investing in Yokogawa analyzers and industrial automation solutions equipment is only the start of improvements to your plant's efficiency and productivity. Our complements its automation products with a rich array of operational support that extend from simple maintenance and repair, all the way to performance optimization.

We supply high quality professional installations, start-up and commissioning as well as training regarding the proper operation and maintenance of the analyzers. This is critical to ensure the long-term reliable performance of your analytical system. We have the experience and resources to work with you during all phases of the field installation and commissioning.



As part of the our global service team, we can work with you regardless of where the plant site is located.

Furthermore, we have the knowledge and expertise to provide service and maintenance on nearly any type and manufacturers of process analyzer on the market. Whether the analyzer is a robust oxygen or infrared analyzer or a complete analytical shelter accommodating several process gas chromatographs, TDLS', NIR's and even third party analyzers we have the skills to be the single source for all your service and maintenance needs. We also have the flexibility to tailor a service program to meet your needs and budgets.



Making Critical Plant Information Fully Visible is Just the Beginning of the Vigilant Cycle

Digital SENCOM Sensors

Yokogawa sensors are well known for their robustness and performance. The latest new SENCOM platform products sets the beginning of a new area and will bring Yokogawa's pH and ORP measurement into the digital area. This will be the start of a series of new digital sensors.



SENCOM
Digital pH/ORP



Combustion Gas Analysis Solution

The TruePeak TDLS 8000 analyzer utilizes powerful and highly sensitive lasers and can detect and analyze combustion gases under a wide variety of conditions.



TDLS₈₀₀₀



Envision a plant where people are watchful and attentive while your business responds to change quickly and efficiently. Now picture an operation that delivers non-stop produvd VigilantPlant, the clear path to operational excellence.

Seeing clearly gives you the knowledge necessary to anticipate the changes required in your process. **Knowing in advance** brings you the speed and flexibility to optimize your plant in real time. Acting with agility, you are able to adapt to the ups and downs of your business environment. **VigilantPlant** excels at bringing out the best in your plant and your people - keeping them fully aware, well informed, and ready to face the next challenge.

Yokogawa analyzers are the heart of the control- and optimization process. With their robustness and accuracy, the analyzers must and will give **you confidence** in getting the critical process information to the operators and control systems. The analyzer excellence will **satisfy the customer** and therefore is a very important part in the value chain.



EXAxt ZR & AV Analyzer O₂

In the spirit of the zirconia sensor "remaining life" diagnostic, Yokogawa introduces predictive, calibration dates, cell asymmetry alarms and detector validation features.



O₂mation

Process Gas Chromatograph

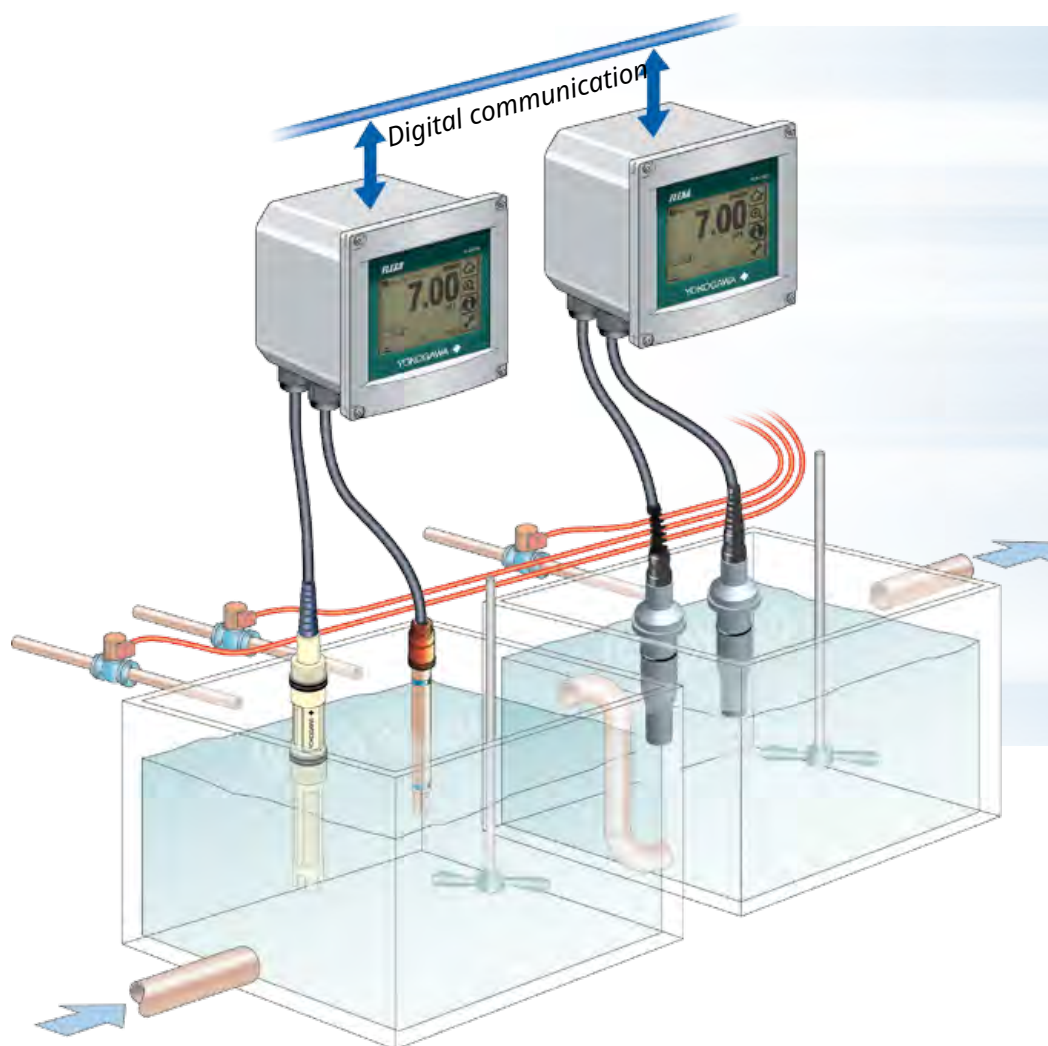
The GC8000 Process Gas Chromatograph continues Yokogawa's long tradition of process GC excellence with a design that takes the best of emerging technologies yet continues to utilize proven reliable components.



GC8000

FLEXA Modular 2-wire Liquid Analyzer

The FLEXA is a next-generation modular liquid analyzer that can be flexibly configured to measure pH/ORP, contacting conductivity, inductive conductivity, or dissolved oxygen. The FLEXA also supports the installation of up to two sensors of the same type, thereby reducing installation costs and saving space in addition to enabling the configuration of a highly reliable backup system. It has reliable and advanced features and functions such as a Touchscreen for improved operability, sensor self-diagnosis, maintenance time estimation, and 12 language display options.



Support of Up to Two Sensors

- The FLEXA supports the use of up to two sensors.
 - The two sensors must be of the same type
 - With inductivity and SENCOM sensors, only one sensor may be connected
- Backup system with two sensors increases measurement reliability
- Interruption-free measurement is assured even during maintenance
- Measurement at two points with a single analyzer reduces installation costs and saves space
- Digital communications options for reduced maintenance and instrumentation costs
 - HART communications option
 - FOUNDATION™ fieldbus and Profibus options

Measures Several Different Liquid Properties and Supports the Use of up to Two Sensors



FLEXA

Modular Design for Increased Scalability

- The modular design enables the construction of a variety of systems
- System changeover can be done quickly and easily by replacing and adding modules
- Users can also select the case material (plastic or stainless steel)
- TIS flameproof approval

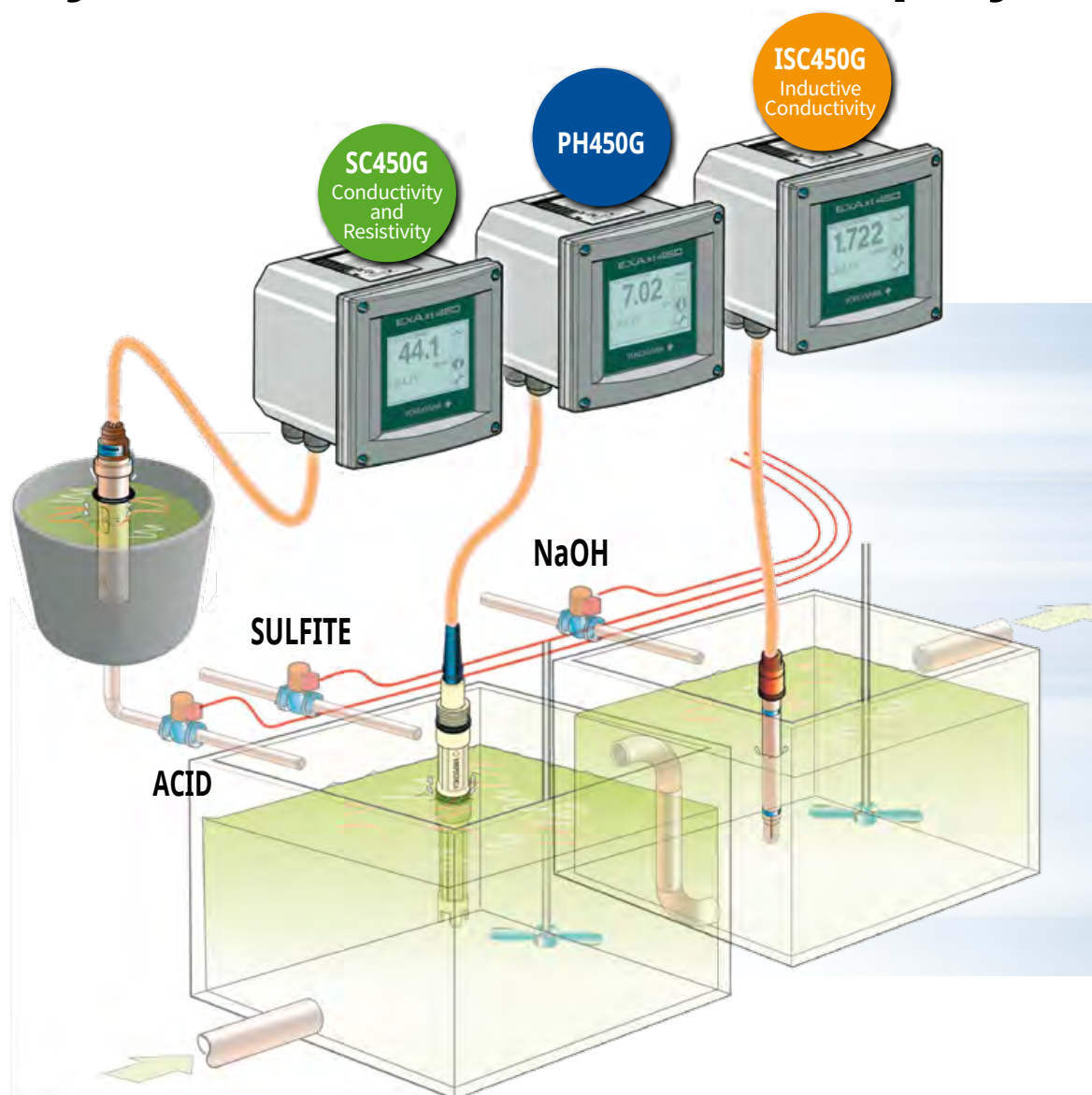


Touchscreen for Improved Operability

- The interactive touchscreen is easy to use and helps eliminate operator errors
- Several different display modes are available
- In the event of an error, the screen displays an error code and indicates the corrective action to be taken
- With routine operations, prompts and other messages it eliminates the need to consult the instruction manual



Analyzers with Touchscreen Display



SC450G

Model SC450G Conductivity/Resistivity Analyzer

- Supports 2-electrode and 4-electrode sensors for high accuracy
- Automatic compensation of cable resistance by 4-wire measurement
- Cell condition monitoring eliminates risk of errors by cell fouling
- Advanced temperature compensation techniques for all pure water applications and concentration measurements in standard units
- USP<645> functionality present in all configurations including resistivity mode
- 0,5% of reading accuracy over the full range of 6 decades

PH450G

Model PH450G pH and Redox Analyzer

- Advanced Temperature compensation methods include NEN6411 algorithm as best fit for ultra pure water analysis
- Three preloaded sets of buffer tables cover most commonly used pH calibration practices
- Capable of analyzing pH, Redox or rH and Temperature measurements at the same time with the same sensor
- Full PID control possible for both acid and alkaline addition simultaneously
- Supports many temperature compensation elements and sensor types

ISC450G

Model ISC450G Inductive Conductivity Analyzer

- Preloaded calibration methods according to OIML recommendations
- Preloaded matrices for most common electrolytes
- Accuracy of 0,5% plus 1 $\mu\text{S}/\text{cm}$ from 0 to 2000 mS/cm with one cell constant
- Two ranges with two temperature compensation methods can be used for different fluids measured with the same sensor

EXAxt450 Series

pH, Redox, ORP, SC, ISC

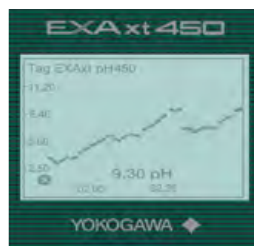


Features of the EXAxt Series

- Touchscreen operation
- Unique intuitive HMI menu structure in 8 languages
- Intelligent step by step calibration routines
- Various temperature compensation algorithms
- Full P, PI, PID control on all outputs
- Two mA-outputs and four SPDT relay contacts with display indicators
- HART® Communications
- Process data trending up to 2 weeks
- Extensive logbooks for event storage
- Unique problem solving guidance
- Predefined buffer solutions

Intuitive Touchscreens

Operation, presents process parameters and the advanced diagnostics in a clear and unambiguous way. Modern data processing methods enhance the ability to provide on-line monitoring, trending, logging of process events, and controlling to allow for rapid intervention in demand and changes in the process dynamics.



Industrial Electrodes & Sensors

pH, Redox, SC, ISC and DO

Industries



Power Generation

Monitoring the quality of water is essential. EXAxt 450 is especially suitable for this industry because of its dedicated functionality. PH450 offers NEN6411 Temperature compensation methods for accurate pH analysis of the boiler feed water, condensate and steam quality. SC450 offers cation, morpholine and ammonia temperature compensation functions for accurate conductivity measurement of all water streams in the water-steam circuitry. ISC450 offers the necessary wide range ability and high accuracy. Obviously, dedicated algorithms for concentration control of the regeneration chemicals are standard.



Oil and Gas - Petrochemical

In this industry sensors are widely used. If it is in crude oil applications or steam boilers, everywhere our robust sensors are active. In the early days these measurements were hampered by the severe conditions e.g. in refinery. But now Yokogawa made the sensors more robust and reliable.



Chemical

Our sensors can be used in harsh conditions. If it is hazardous areas or aggressive acidic or caustic environment, they always achieve their goal of controlling the process. The latest digital sensor, SENCOM can be calibrated in the lab, and valuable data is stored in the "smart" digital chip inside the sensor!



Pulp and Paper

The pulp and paper industry requires hassle free measurements. PH450 is especially suitable for the many pH and Redox control loops in the pulp and paper processing. SC450 is the best assurance for reliable monitoring of the conductivity in condensates to protect the steam boilers. ISC450 is the ideal instrument to monitor the conductivity in the effluent streams and the concentration control of the various liquor streams.

Single and combination pH/ ORP electrodes, SENCOM

The dimensions and design meet the requirements of DIN 19263 (excluding the refillable types). A high degree of standardisation makes it possible to mount any electrode in the available program of fittings. The combination electrode plug and cable socket is watertight and temperature is resistant up to 130°C. It meets the requirements of IP65. SENCOM is a digital device and Yokogawa's latest NEW sensor.

Digital sensor: SENCOM Suitable for FLEXA202 2-wire Analyzer



The Complete Electrode & Sensor Series



Innovative, multi-element 2/4 electrode conductivity sensors

Yokogawa produces different conductivity sensors for many different applications. E.g. the SX42 can handle up to 40 bar pressure and a maximum of 250°C. The sensors also have a special treatment (coating) to ensure optimal resistance against polarisation. Suitable fittings are available. A high degree of standardization simplifies mounting, servicing and replacement of the sensor.



ISC40 Inductive Conductivity sensors & fittings

The model ISC40 sensors are designed for use with the EXA ISC analyzers. This combination exceeds all expectations for conductivity measurement in terms of reliability, accuracy, rangeability and price performance. The accuracy is 0.5% of reading plus 0.5 microS/cm for any conductivity value, whether measured in rinse water or in concentrated acids.



Dissolved Oxygen Sensors

The measurement of Dissolved Oxygen is one of the key parameters to monitor, but most users complain about unreliable sensor performance, high maintenance requirements and therefore high costs or a short lifetime. Our dissolved oxygen sensors are designed to meet the severe requirements in food and beverage, pharma, biotech and waste water treatment, in terms of long term stability and low maintenance. DO70G is the latest sensor in this series.

Direct *in situ* measurement, Fast and Accurate, Monitor, Control and Safety

■ **Innovative:** Our TruePeak Process Laser Analyzer uses a tunable diode laser and measures across an infrared absorbance region. This means you can make measurements in the most demanding applications (high dust, corrosive, aggressive) typically without sample conditioning.

■ **Accurate:** The TruePeak measurement integrates the area of the absorbance rather than measuring peak height or peak width value alone. This means you get a true interference free analysis.

■ **Dependable:** TruePeak measurement ensures accuracy even during simultaneous sample pressure, temperature, and background gas changes.

■ **Process Hardened:** Flexible installation options, materials of construction, and validation methods makes the Yokogawa TDL a perfect solution for the most aggressive process applications. A unique alignment method allows adjustment without compromising the process seal.



Combustion Control

Measurement of excess oxygen and carbon monoxide on a precise and continuous basis is the recognised methodology. Tunable Diode Lasers Spectroscopy (TDLS) together with zirconia based O₂ analyzers enable a range of fast and accurate measurements of waste combustion gas for point or space average. Additionally, CO can for the first time be accurately measured on a continuous basis at low ppm levels, using TDLS such as air fuel ratios can be precisely and continually optimised. This type of optimization will give economical benefits.



Refinery Control & Safety

In addition to straightforward combustion control (where TDLS can monitor in combustion chambers across multiple burners), laser based analyzers can now be offered (patent applied for) monitoring of CO and CH₄ on a single TDLS unit to enable burner flame out and process tube leaks to be identified. Additionally, O₂ on flare lines, alkylation units and gas plants as well as CO and O₂ on FCCU's for safety and catalyst regeneration and low ppm H₂O in hydrocarbons in catalytic reforming are among many applications of these fast non contacting devices.



Environmental Monitoring & Control

Furthermore sustainable technologies are contributing positively to the environment. In coal fired power stations NO_x emissions must be monitored and controlled. By adding ammonia in combination with Selective Catalytic Reduction (SCR), NO_x emission reduction can be achieved. The addition of ammonia must be accurately measured to keep the excess to a minimum. Also the speed of measurement is important. TDLS is both sensitive and has very short response times.

TruePeak TDLS8000 Analyzer

O₂, H₂O, CO, CO₂, CH₄ and more...



Reliability & Robustness

Enhanced Diagnostics

Built In diagnostics with on board CPU, data storage, and retrieval. No PC required to record data, spectra, and critical diagnostics:

- Data transfer via wired/wireless ethernet, memory stick or PDA
- Spectra capture (timed, manual capture, event-based)

Maintenance

- All components field repairable
- Remote diagnostics and analyzer control
- Fully field repairable with 50 days of data and spectra storage
- Compact design for one-man installation without sacrificing ruggedness

Long-Term Stability

- Reliable measurement
- Less calibration
- Extended MTBF
- SIL2, Zone2/Div2 or Zone1/Div1

MEASURED COMPONENT		MINIMUM RANGE	MAXIMUM RANGE
O ₂		0-1%	0-25
CO(ppm)		0-200 PPM	0-200 PPM
CO+ CH ₄	CO	0-200 PPM	0-200 PPM
	CH ₄	0-5%	
NH ₃		0-30 PPM	0-50,00 PPM
H ₂ O (PPM) in non HC		0-30 PPM	0-30,00 PPM
H ₂ O (PPM) in HC		0-30 PPM	0-30,00 PPM
CO(%)		0-20%	0-50 %
CO(%) + CO ₂ (%)		0-200 PPM	0-200 PPM
NH ₃ +H ₂ O	NH ₃	0-30 PPM	0-200 PPM
	H ₂ O	0-5%	0-50%
H ₂ S		0-5%	0-100%
CO ₂ (%) High Range		0-1%	0-5%
CO ₂ (%) Extended Range		0-30%	0-50%
H ₂ O(%)		0-10%	0-100%
HCl		0-50 PPM	0-5,000 PPM

TruePeak TDLS220 Extractive Analyzer

The new TDLS220 is the intermediate between in situ measurement and off line extractive measurement. The TDLS220 design has a small footprint and therefore can be mounted close to the process, at-line measurement! The system is a probe type laser system, with laser source and detector accommodated in one small housing.

The TDLS220 also has the validation chamber (well known from the TDLS200 type), a space, separated from the laser and flow cell by special windows, which can be used for quick validation of the system! The TDLS220 extractive analyzer is specially designed for determination of oxygen in a large variety of processes.



Refinery

Oxygen measurement is critical in many refining applications to ensure safety, increase efficiency, and enhance process control. The TDLS220 was designed to provide a near real time measurement that is unaffected by background interference. Applications include but not limited to marine vapor recovery, flare headers, flare gas recovery drums and waste gas from a gas plant.



Safety

In ethylene oxide production O₂ is measured not only for process control and optimization, but for a very important safety reason. As the process mixture of ethylene oxide and oxygen is highly explosive, it is mandatory to have a precise and fast oxygen measurement.

With an improved accuracy, due to vent pressure compensation, and a bi-annual calibration interval makes the TDLS220 the most reliable instrument in the field!



Typical Applications

- Vapour Recovery Systems
- Flare and Vent Headers
- Reactor Control
- Refining
- Formaldehyde
- VCM/EDC
- IPA, TiO_2 , Isocyanates
- Acrylo/Acrylonitriles
- Ethylene Oxide



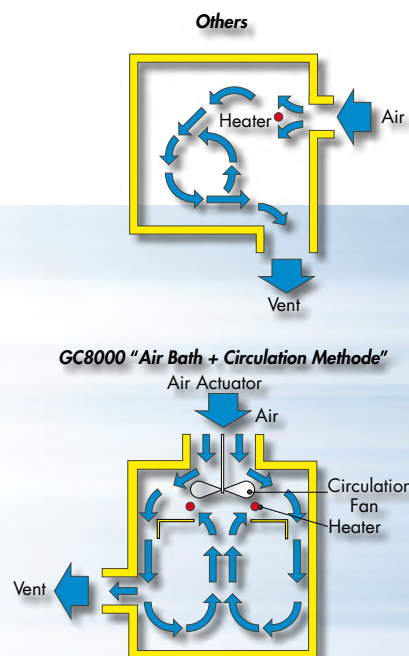
CE ATEX II 3G Expz II T4

Ease of use, Reliability & Robustness

The Process Gas Chromatograph (PGC) has been Yokogawa's flagship analytical product since 1959. As a leading Japanese manufacturer of PGC's with application centers in Japan, Singapore, USA and Europe, we offer you the most advanced and sophisticated gas chromatograph solutions available in the market today.

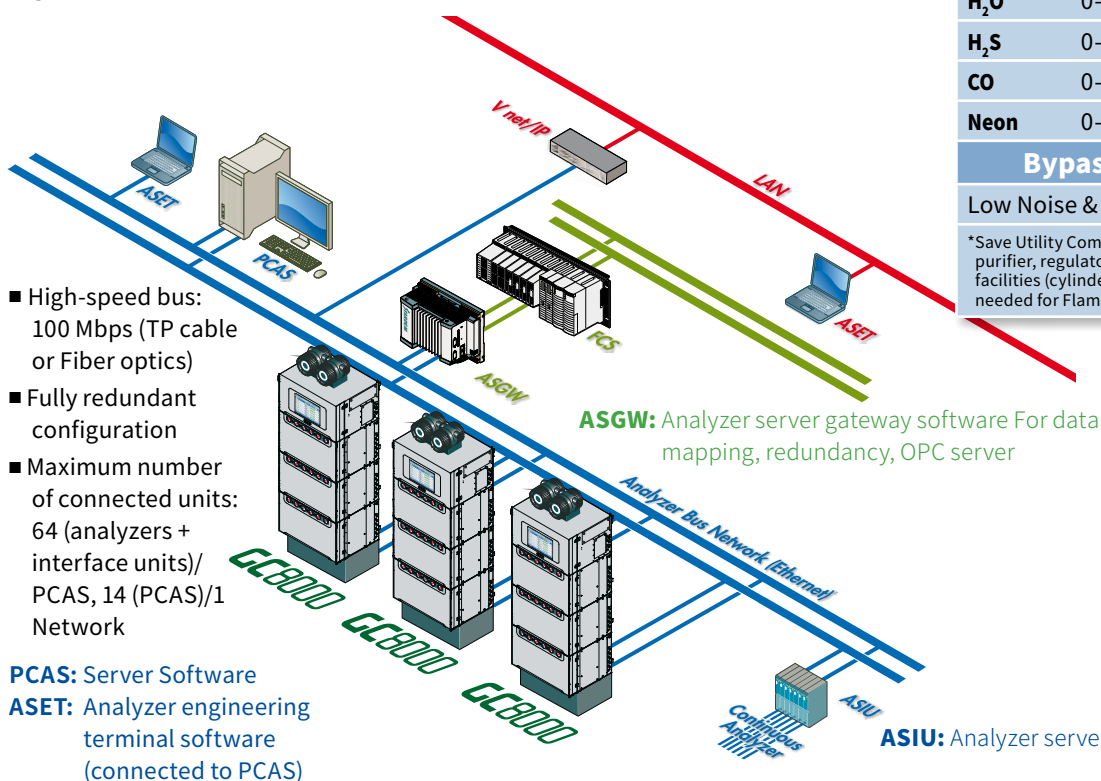
Key Features of the GC8000

- Built-in 12-inch color touchscreen display that dramatically simplifies maintenance. At the touch of the screen, the technician can access all of the analytical parameters and measurement results; displayed in easy-to-understand graphical color screens.
- Parallel chromatography is made practical with the introduction of the GC Module (GCM) concept. By setting up virtual GCs within a single analyzer, all chromatograph settings, displays, and data are truly segregated for easy understanding and maintenance.
- Uses the same proven analytical hardware found in our previous model of GC; recognized for its reliable and precise performance. But with the GC8000, the analytical possibilities are greatly expanded through the multiple oven capability of the analyzer.



Maintenance Management System

Link all of your process analyzers via our Analyzer Bus to achieve centralized maintenance management and data acquisition capabilities.



HIGH SENSITIVE TCD FEATURES

Small Cell Diameter

H ₂	0-10 ppm Trace Analysis
H ₂ O	0-30 ppm in EDC
H ₂ S	0-50 ppm in LPG
CO	0-20 ppm, CO ₂ 0-30 ppm
Neon	0-10 ppm in Air

Bypass Construction

Low Noise & High Speed Response*

*Save Utility Combustible Air and facilities (air purifier, regulator and piping), H₂ bottle and facilities (cylinder, regulator and piping) as needed for Flame Ionization Detector.

Process Gas Chromatograph

GC8000



Yokogawa highly reliable rotary valves
Millions of movements without maintenance.

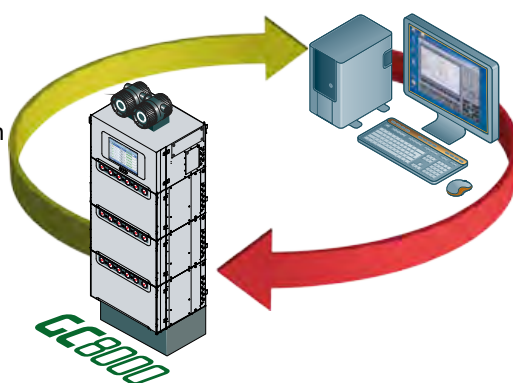
Maintenance Terminal Software

With our maintenance terminal software, you can operate your GC8000 process gas chromatographs from a PC in the control room, your office or any centralized location. This significantly simplifies maintenance.

FIELD

Upload Functions

- Analysis data
- Self-diagnostic and alarm information
- Calibration data
- Validation data
- Chromatogram
- Analysis parameters
- Load factor data
- Preventive maintenance data
- Auto peak tracking information



CONTROL ROOM OR OFFICE

Download Functions

- Mode change/startup commands
- Stream/range changes
- Calibration/validation requests
- Analysis parameter changes
- Remote startup functions
- Data requests
- Remote maintenance

GD402 Gas Density Analyzer

Its innovative cylinder resonator design enables direct linear measurement of gas density eliminating problems exhibited by conventional thermal conductivity equipment.

Driven by a multi-mode oscillation, the GD402 Gas Density Analyzer provides $\pm 0.1\%$ linearity and the total reliability and stability you need to maintain continuous on-line system operation, reducing outages and costs.

H₂ COOLING

The EXA GD402 monitors the concentration of hydrogen in air. Typical ranges are 85-100% H₂ in air,

but this range can be changed by the user. The settable low hydrogen alarm alerts the operator that corrective action is required.

The EJA absolute pressure transmitter allows the EXA GD402 to automatically compensate for any changes in density due to pressure fluctuations. Together with the integral temperature measurement it gives a stable, reliable percent volume output.

PURGING

The EXA GD402 also serves as a purge gas monitor. When the generator is down for maintenance, the analyzer can be switched for H₂ in Air Hydrogen Purity mode to H₂ in

CO₂ (0-100%). As the H₂ is displaced by the CO₂. Once the hydrogen has been displaced, the EXA GD402 is switched to measure Air in CO₂ (0-100%), completing the purge cycle. This purge cycle is reversed as the generator is prepared to go back online.



Industries



Refinery



Medical



Chemical



Electronics



Pharma



Food

Advanced Reflux Sampler

YARS100

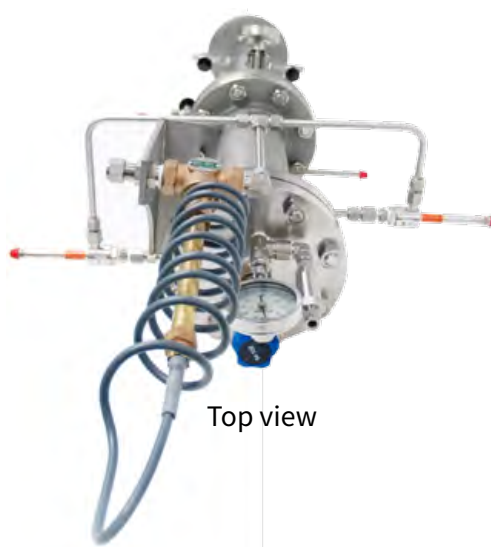
The Advanced Reflux Sampler (YARS) has been developed specifically to meet the needs of modern petrochemical analyzer sampling, especially ethylene cracked gas effluents.

The reflux sampler was originally designed to overcome the problem of constantly plugging sample probes installed on the Transfer Line Exchangers (TLE) of ethylene cracking furnace effluents. This high temperature cracked gas effluent is high in particulate and condensates (moisture and heavy hydrocarbons) content and therefore prone to plugging. The idea that the condensates could be used to backwash a particulate filter was conceived and a Reflux Sampler was then developed.

Key Features

Based on a proven simpler concept, the YARS includes several technologically advanced features outlined below:

- Self-acting temperature controller requiring no electrical power supply – Adjustable across the selected control range
- Dual 360° cooling coils section ensures optimal sample cooling
- Outlet filter mesh/screen for mist trap to determine liquid carry over
- Sample outlet over temperature shut-off valve.
- Enhanced, high stability temperature control system design
- High sample flow rate 3-5 lit per minute for reduced lag time



EXAxt ZR & AV550G Analyzer

O₂, Humidity

ZR22S/G

Separate Type *in situ* Zirconia Oxygen / High Temperature Humidity Analyzer

- Liquid-crystal touch panel display provides easy operation
- Interactive model displays instructions to follow, including those for: settings, oxygen concentration trends, and calibration operations
- Digital communications features are provided as standard – this enables remote maintenance
- Can measure either oxygen concentration or humidity with a single analyzer
- Highly reliable measurements with trend-data graphs
- The zirconia cell and heater assembly can be replaced in the field



Multipoint Analyzer

The O₂mation, model AV550G, averaging oxygen analyzer was designed with a focus on practical performance. We have refined our expertise in the combustion oxygen business into this new and creative product. It is packed with features designed to minimize plant down time and technical support for the oxygen measurement.

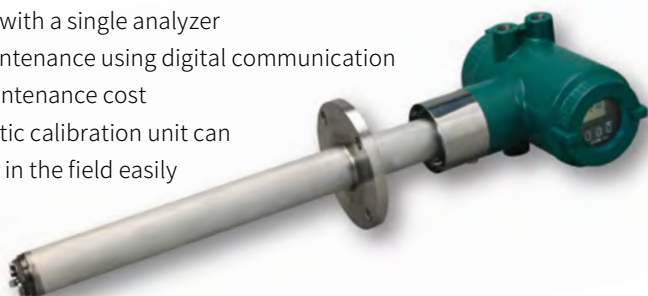


Maintenance and inspection are simplified by a modular hardware design. The Hot Swap feature allows changing channel modules without powering off the analyzer. Each channel card is fitted with spacious, and accessible, self-trapping terminal strips that make wiring and maintenance fast and easy.

ZR202G

Integrated Type *in situ* Zirconia Oxygen / High Temperature Humidity Analyzer

- Can cut wiring, piping and installation costs
- Can be operated in the field without opening the cover using an infrared switch
- Allows replacement of the zirconia cell and heater in the field
- Can measure either oxygen concentration or humidity with a single analyzer
- Remote maintenance using digital communication reduces maintenance cost
- The automatic calibration unit can be attached in the field easily



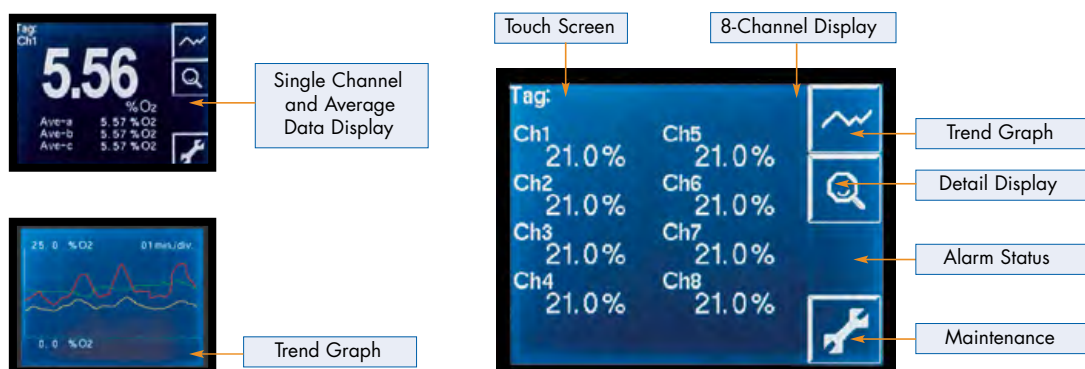
Sensor Diagnostics

In the spirit of the zirconia sensor “remaining life” diagnostic, Yokogawa introduces predictive calibration dates, cell asymmetry alarms and detector validation features. These process diagnostic tools use historical process data to provide operators new ways to reduce measurement down time. The predictive calibration and detector validation features reduce the number of redundant calibrations. The sensor asymmetry alarm provides users new diagnostic into the problem of fly ash plugging by monitoring the particular symptoms of the pressure-induced drift.



Trend Graph Diagnose - Intuitive Touchscreen

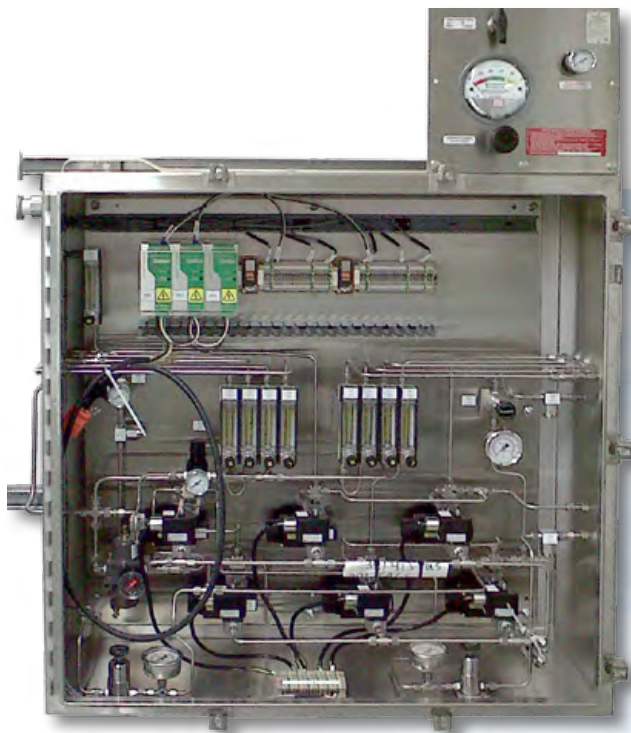
The intuitive touchscreen virtually eliminates the need for an instruction manual. The trend graph helps diagnose problems and view individual detector performance over time.



Integrated Analyzer Systems & Services

Yokogawa has gained its reputation in the oil & gas and the chemical industries which are amongst the most demanding industries when it comes to robustness, availability and reliability.

Providing a one-stop solution, we have a comprehensive services start from front-end engineering design, project management and execution, right through to life cycle services including spare parts and site service support. Through the global service organization, we offer a full line of field support services for all of our analytical system integration projects.



Analyzer House/Shelter



Key Features

The project execution by Yokogawa's Analyzer Systems division is based on Single Point Responsibility with complete Project Engineering, Management, Design, Fabrication, System integration & Service Scope as below:

- Front end basic engineering design (based on project scope)
- Detailed engineering (incl. Yokogawa, 3rd party analyzers, Analyzer Houses, Sample Conditioning Systems, F&G, etc.)
- In-house fabrication and system assembly integration
- Project management
- In-house testing & F.A.T (incl. Yokogawa, 3rd party Analyzers, Analyzer House/Shelter/HVAC, F&G, Network, etc.)
- Site installation supervision services
- Start-up Commissioning (single point responsibility for all analyzers)
- Training, Repair & Annual Maintenance Support

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