



OpreX™ Analyzers

Improved Combustion with TDLS

TDLS8000/8200 Series

Oxygen, Methane, and Carbon Monoxide Measurements

Safety 01

Flexibility 02

Maintenance and Support 03

Innovative Solutions 04

Combustion Success with a Strong Foundation

Robust and Versatile Family of Analyzers for Combustion Applications

Combustion sources such as furnaces and fired heaters play critical roles in the process industry. Because combustion burns large amounts of fuel, efficiency intertwines with safety as key influencers in production facilities.

A well-designed combustion system using Yokogawa's Tunable Diode Laser Spectroscopy (TDLS) technology delivers control at safe upper and lower operational limits.

TDLS measures the amount of laser light absorbed as it travels through the gas being measured. The TDLS line offers measurements for process gas, flue gas, impurity analysis, custody transfer, safety, with in-situ and extractive methods supported.

Measurements from TDLS include CO, CH4, and O2. Using an average gas concentration produces safer burner control and greater overall heater efficiency. By optimizing air flow control, O2 concentration is typically reduced from 6% to 2%, increasing thermal efficiency of the furnace.

Measurement Reliability

Versatile Design

Unparalleled Support

Diagnostics

Partners in Long-Lasting Solutions

01 Safety is the Key



Critical to safety is achieving balance in air and gas flows. Yokogawa's responsive analyzers monitor furnace conditions and deliver information in near real-time that helps users know, for example, when there is rapid combustible breakthrough, leading to an unsafe furnace condition.



Yokogawa co-innovates with customers to develop combustion processes that both sustain safety and deliver profitability. In fact, many combustion partners can control assets' air-to-fuel ratios near the combustible breakthrough point, often lower than 2% O2.

Flexibility for Every Application Condition 02



Each combustion process presents unique requirements. Yokogawa's solutions are as flexible as they are reliable and can include products to fit any combustion application.

Reliability, robust design, and intuitive interfaces reduce maintenance time. Yokogawa support organizations are ready to assist in designing solutions and answering users' application questions.



04 Innovative Solutions

Maintenance and Expert Support 03

YOKOGAWA
Co-innovating tomorrow™

Combustion Intertwines Safety with Process and Organizational Efficiency

Improve Safety through Balance in Combustion



Balance and Safety

Safety is priority number one. Safe combustion requires fuel and air in the proper balance in the ever-changing furnace environment. The TDLS family provides the feedback necessary to balance aggressive air-to-fuel ratios safely.

Balance and Optimization

Optimizing efficiency is a close second to safety, but the only way to fully optimize fired heater operation is to control at more aggressive limits. Teams no longer need to consider sacrificing efficiency in exchange for safety; the TDLS response allows the ideal balance due to its fast, reliable, and accurate readings.



Yokogawa Solutions For Industry Challenges



Startup and Upset Conditions

The largest risk in fired heater operation is during the startup and shutdown sequencing.

TDLS Advantage – TDLS measures concentrations of air and gases in the radiant section of large-scale combustion furnaces and process heaters in near real-time. This enables users quickly to identify a leaking fuel valve, fouled burner, or suboptimal stoichiometric conditions due to rapid fuel composition changes.



Missing Measurements and Manual Control

Although today's fired heaters have a variety of measurements in place, most are natural draft units with the damper held in a fixed position. Safety might be at risk because the heaters do not have feed-forward BTU control, an oxygen analyzer for trim control, or a combustibles analyzer for monitoring.

TDLS Advantage – The TDLS can provide measurements which are crucial to adding automation on your fired assets or simply controlling what you currently have safely.



Crossing Limits

Variation in fuel quality, low emission burners, aging heaters, and the desire to increase production could push the limits of proper control and safety.

TDLS Advantage – Facilities can optimize combustion efficiency easily for increased throughput, reduced emissions, and increased overall asset safety.

Safe, Complete Combustion

Incomplete combustion and the use of excess air can lead to higher levels of toxic emissions and other unsafe conditions.

Safety — Historically, combustibles measurements have only been used for monitoring, but the reliability of the TDLS has changed that. TDLS allows for implementation of fuel overrides on top of traditional cross-limiting controls, or full integration into SIL2 or SIL3 rated safety system.

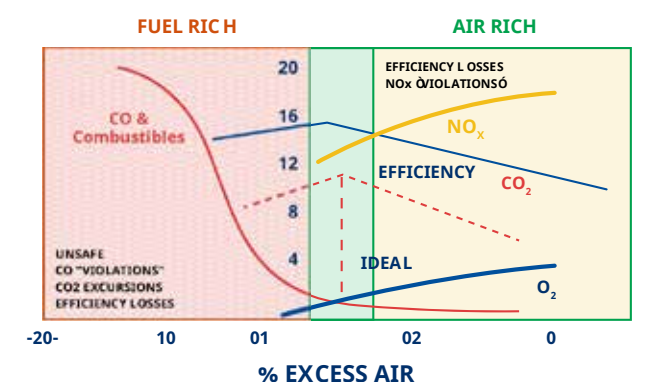
Representative measurements — The TDLS uses a path-average measurement rather than traditional point measurements, yielding a measurement that is more representative of actual operating conditions.

Speed of Response — The TDLS family provides near real-time measurements (2.3 seconds) to give users the time they need to respond to rapidly changing conditions. This time can be used to avoid what would have been a trip condition with legacy technology, and bring the asset back to safe operational state.

Endurance in harsh environments — Yokogawa's TDLS family performs well in severe conditions whether in a small package boiler, a crude heater, an olefins furnace, or an incinerator.

Advanced diagnostics — Unlike traditional measurement platforms that do not show what happened during an upset, the TDLS onboard data logging provides months' worth of results as well as spectra from events to positively identify events.

Combustion Measurements are our Specialty



Choices in Harsh Conditions

Yokogawa's TDLS Models have Robustness in Common

The non-contacting sensor allows measurements in the most severe conditions, such as high temperature, high pressure, corrosive/abrasive conditions, and high dust loading.



Conventional or TDLS?

Conventional analyzer technologies, such as zirconia and catalytic bead, are point-style measurements that can fail to capture the whole picture of what's happening in a furnace.

TDLS technology measures in the radiant section of the heater where combustion occurs. This capability gives users real-time insight into what's going on in your firebox, without effects of CO afterburning, stratification, or tramp-air dilution.

Rugged features common to all Yokogawa TDLS analyzers:

- SIL2 Certified / SIL 3 Capable
- Compact design for one-person installation without sacrificing ruggedness
- Area classification Zone2/Div2 or Zone1/Div1
- Process temperatures up to 1500°C
- Process pressures up to 1 MPa
- Modular design allows for complete field serviceability and repairability



Choices in All Applications



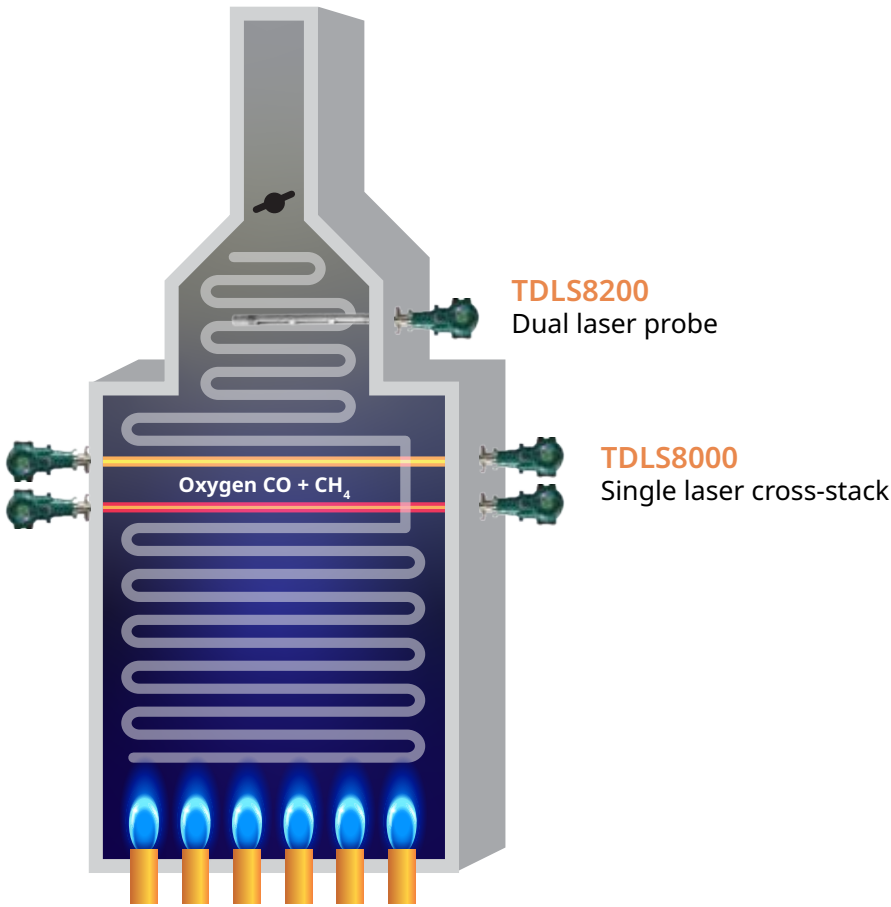
In-Situ Gas Analyzer
TDLS8000

The cross-stack installation option provides an averaging measurement across the furnace to reduce stratification effects caused by factors such as burner differences and heater geometry. Up to 30m optical path lengths.



Probe Type Gas Analyzer
TDLS8200

An alternative in-situ measurement for situations where cross-stack installation may be challenging or cost-prohibitive. Available in single or dual laser configurations for direct one flange replacement of legacy technologies.



TDLS8000/8200 Series Installation Type by Model

Ease of Ownership

Long Life, Reliability, and Reduced Maintenance

All the benefits of a well-designed device combine with the support of the full Yokogawa expertise mean ease of ownership and fewer concerns for users.



Designed for Maintenance Ease and Reliability

Quick System Validation

The TDLS has an integrated validation chamber that allows end users to quickly validate performance without removing the analyzer from process.

Low Failure Rate

Because the TDLS analyzer has no sensor contact with the process and has no moving parts, users notice a high mean time between failures (MTBF) and a low long-term cost of ownership.

Reliability

Quick and reliable combustion measurements are a necessity for efficient industrial combustion operations. The internal reference cell in each TDLS analyzer ensures measurement reliability.

Long-Lasting Operation

Due to virtually zero measurable drift, a properly installed TDLS will have minimal maintenance for years, reducing lower total cost of ownership (TCO) compared to legacy technologies.

Unparalleled Support

Achieve long-term top performance and protect analytical investments with expert Yokogawa services — delivery, installation, startup and commissioning, and maintenance and training programs.

Easy Serviceability In the Field

The TDLS modular design allows for complete field serviceability and reparability. And because the laser is isolated with glass windows, the analyzer is maintainable without breaking process isolation.

Less Routine Maintenance

The in-situ analyzer eliminates the need for sample handling and extraction and reduces the need for routine maintenance and calibration.

Intelligent Diagnostics

The analyzers have full diagnostic capabilities that will alert the operator if there is an issue. An intuitive touchscreen and well-designed human machine interface (HMI) simplifies interaction with the analyzer.

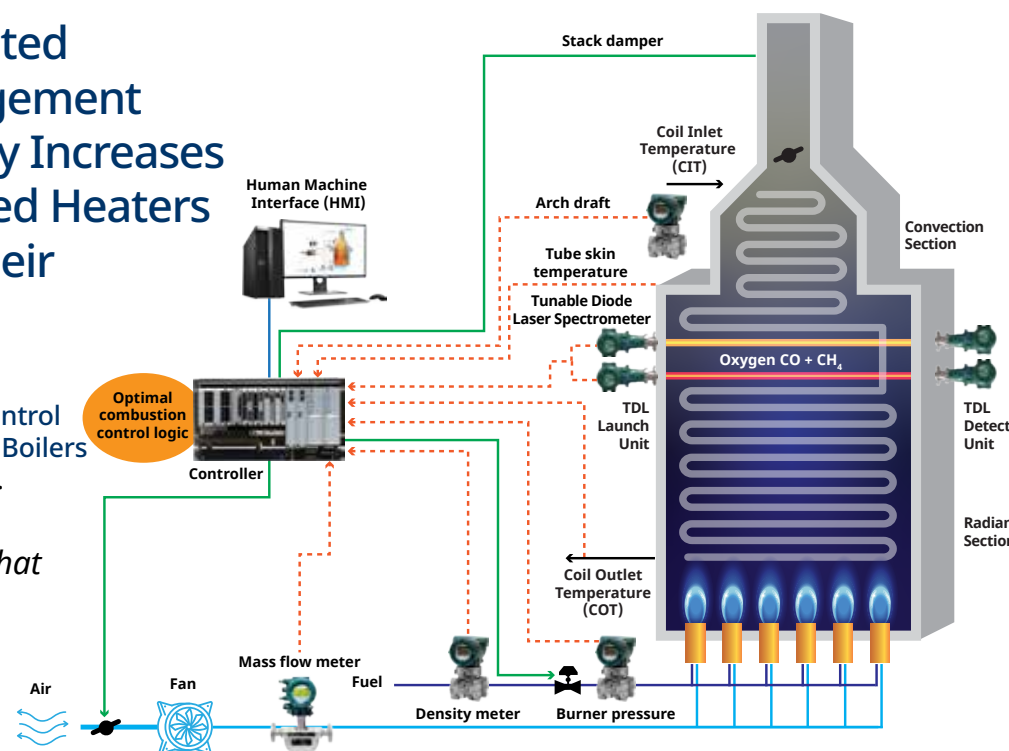


CombustionONE

Yokogawa's Integrated Combustion Management System Dramatically Increases the Efficiency of Fired Heaters whilst Improving their Margin of Safety

According to the Advanced Combustion Diagnostics and Control for Furnaces, Fired Heaters and Boilers Final Report found on OSTI.GOV.

"[This] data demonstrate[s] that it is possible to continuously optimize the air-to-fuel... via tunable diode laser."



PRESSURE TRANSMITTERS



DPharp EJA/EJX Series

- Best-in-class total accuracy and long-term stability of up to 15 years
- DPharp digital sensor with simultaneous DP and static pressure with NE107 diagnostics
- SIL2 safety as standard on wired devices
- Available with wireless communications

TEMPERATURE TRANSMITTERS



YTA Series/YTMX580

- Multi-sensor input with NE107 diagnostics
- Dual-compartment housing for harsh environments
- SIL2 safety as standard on wired devices
- Available with wireless communications

FLOW METERS



Mass Flow/Vortex Meters

- Best-in-class performance for highly accurate flow measurements
- Digital technology provides overall diagnostics and condition-based maintenance
- Wide variety of models and materials are available to resist corrosion and extreme environments

CONTROL AND SAFETY SYSTEMS



CENTUM VP/ProSafe-RS

- Integrated control and safety system
- Maintain control/safety segregation while providing a common operator environment, common system maintenance, precise time synchronization and sequence of events to minimize CAPEX and OPEX "On-the-fly" updates – Version updates and applications with no shutdown required.

Refinery Success with Combustion Control

The Operators Can Reduce the Percentage of O₂ by 1% to 1.5%, thus Making the Heater More Efficient



The furnace is now near its optimum operating point, using minimum excess air.

- The TDLS measurements have been verified by the existing stack gas analyzers, but with a percentage O₂ reading of 1% to 1.5% lower than the stack gas analysis because the measurements are taken in the radiant section.
- Furnace conditions can now be controlled (or shut down) quicker since the TDLS system is taking concentration measurements at less than five second intervals in the radiant section.
- If there were to be an excess concentration of CO or CH₄ in the furnace, the gases can be detected earlier than with the conventional stack gas analyzer, enabling the heater to be shut down sooner, avoiding unsafe conditions.



MOL Group, a multinational company that partnered with Yokogawa Advanced Solutions, aimed to safely optimize their existing fired heaters.

"We decided to use Yokogawa's package solution because it is good to know that the vendor of the equipment is responsible for the complete package. We are providing a tailor made solution for each and every furnace with the involvement of the operational people, maintenance team and of course Yokogawa."

László Cserna, MOL Group

Watch Video

Other Publications



COMBUSTION AND FIRED HEATERS

This eBook explains how to improve a fired heater's safety and efficiency by controlling combustion using Tunable Diode Laser Spectrometer (TDLS) technology.

DOWNLOAD



COMBUSTION WHITE PAPERS

Deploying contemporary measurement and control technologies in conjunction with updated operation and maintenance procedures, fired heater users can realize significant improvements in energy efficiency, safety, and asset performance/lifespan.

DOWNLOAD



COMBUSTIONONE

CombustionONE has a proven record of improving safety, increasing fuel efficiency, increasing productivity, minimizing trips, decreasing fouling and coking, reducing NOx and CO2 emissions, reducing SCR ammonia injection, and increasing asset and catalyst life spans.

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OpreX™ Through the comprehensive OpreX portfolio of products, services, and solutions, Yokogawa enables operational excellence across the enterprise.

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