Tunable Diode Laser Spectroscopy (TDLS) Analyzer

The Process TDLS Solution

NEW FEATURES

TDLS 200
Tunable Diode Laser Spectroscopy (TDLS) Analyzer
The first Tunable Diode Laser analyzer

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.

DEPENDABLE
TruePeak measurement ensures accuracy even during simultaneous sample pressure, temperature, and background gas changes.

USER INTERFACE

▶ Stand Alone
  - Mini Display (integral or remote), 4x20 VFD with scrolling information
  - 6.5” Color Screen with Keypad

REMOTE INTERFACE UNIT

Use with any type of analyzer, a separate wall mount enclosure with screen and keypad. Connects via Ethernet (VNC), up to 4 standard; 7 with internal switch; more with external switch. Requires 24 VDC input power

- Wall mount enclosure, IP65 (NEMA 4) powder coated aluminum
- Approx 460x330x180mm (18”w x 13”h x 7”d)
- Weight 11.5kg (25lbs)
- Purged for ATEX CAT 2G or CAT 3G, CE, NEC CI.1, BCD, Division 1 or 2
- Requires 23.8 - 24.5VDC Input power
- Integral keypad and 6.5” display
- Accepts 4 standard; 7 with internal switch; more with external switch
- Connection to Analyzer Unit via strike 8 pair; use CAT 5e cable.

TruePeak Virtual Analyzer Controller (VAC) software included, running Window XP embedded OS.
**Hazardous Area**

- **NEC Class 1, Div 2 Group B,C,D when purged**
  - Suitable for Division 1 or 2 Installations with Purge System
  - CSA/CSAu Special Acceptance Available

Analyzer for Division 2 Configuration

Analyzer for Division 1 Configuration

**Reliability**

- **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 Ethernet or memory stick
  - Spectra capture (timed, manual capture, event-based)

- **Maintenance**
  - All components field repairable
  - Remote diagnostics and analyzer control

**Communications**

- **Wired**
  - Analog Outputs (3, 4-20mA)
  - Digital Outputs (Warning/Fault Relays + 3x Valve Control)
  - Ethernet (standard)
  - USB Data Transfer (standard)
  - Other Options Available

Sample Diagnostics Screenshots
The Process TDLS Solution

- In situ or extractive analysis
- Interference free for most applications
- TruePeak measurement
- Rapid measurement (as fast as 3 seconds)
- Process pressure up to 20 bar
- Process temperature up to 1500° Celsius
- Optical measurement - no sensor contact with process
- Flexible installation options
- Aggressive applications - high particulate, corrosives, and more

**Process Interface**

- **True Process Interface**
  Alignment without affecting the process seal is achieved by the use of a flexible bellows.

- **Options**
  Windows, O-rings and wetted metal parts available for corrosive/lethal service Insertion tubes to reduce path length for high particulate applications. Window purge protection for flow cell and in-situ applications available.

- **Layers of Protection**
  Optional second window set provides seal, chamber behind process window, purge-able (can be monitored for breakthrough).

- **Extractive**
  Process sample is fully extracted from the process (and may be conditioned before measurement).

- **In Situ**
  Measurement across the process (stack or pipe)

- **Bypass**
  Process is diverted through a bypass line where analyzer is installed. Allows isolation of analyzer for verification, calibration, and maintenance.

- **Close Coupled Extractive**
  Process is extracted to a flow cell where analyzer is installed. Allows isolation of analyzer for verification, clarification, and maintenance.
Combustion Control

Ever increasing energy prices and the need to minimize harmful emissions require now more than ever that the combustion process needs to be fully optimized by controlling the air fuel ratio to ensure minimum energy use for maximum reward.

Measurement of excess oxygen and carbon monoxide on a precise and continuous basis is the recognized methodology. Tuneable diode lasers (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 that air fuel ratios can be precisely and continually optimized.

Validation

- **Validation**
  Validation can be initiated manually, remotely, or automatically on a daily, weekly, bi-weekly, or monthly basis with time defined by the user.

- **Automated Dynamic Spiking**
  With integral bump cell and analyzer driven valve control, on line validation can be performed using dynamic spiking. Gas standard and Nitrogen are alternately sent to the bump cell which is in series with the process gas being measured.

- **Off Line**
  For cross stack/pipe installations, analyzer can be mounted on a calibration cell to check or calibrate zero and span.

  For bypass or close coupled extractive installations, analyzer can be isolated from the process to check or calibrate zero and span. This process can be automatically controlled by the analyzer.
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) which monitor CO, CH\textsubscript{4} and O\textsubscript{2} to enable burner flame out and process tube leaks to be identified.

Additionally, O\textsubscript{2} on flare lines, Alkylation Units and Gas plant as well as CO and O\textsubscript{2} on FCCU’s for safety and catalyst regeneration and low ppm H\textsubscript{2}O in hydrocarbons in catalytic reforming are among many applications of these fast non contacting devices.
### Technical Specifications

<table>
<thead>
<tr>
<th><strong>Path Length</strong></th>
<th>0.5-30 meters</th>
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<tbody>
<tr>
<td><strong>Response Time</strong></td>
<td>2-20 seconds</td>
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<tr>
<td><strong>Accuracy</strong></td>
<td>Application Dependent</td>
</tr>
<tr>
<td><strong>Linearity</strong></td>
<td>R²=0.9999</td>
</tr>
<tr>
<td><strong>Ambient Temperature</strong></td>
<td>Continuous operation - 10°C to 50°C, start up temperature 0°C to 50°C. Extended temperature installation options are available please contact Yokogawa.</td>
</tr>
<tr>
<td><strong>Analog I/O (optional)</strong></td>
<td>Outputs: Concentration/Transmission (3@0/4-20mA isolated) Sub 4mA for warnings/faults Pressure/Temperature Feed for Compensation (2@4-20mA isolated, powered or loop power) Inputs:</td>
</tr>
<tr>
<td><strong>Digital I/O</strong></td>
<td>Outputs: *Warning/Fault/Concentration Limit Relays (3 Form C Relay SPDT rated 1A@24VDC) Valve Control (3@24VDC, Max 10W per valve), zero/span/dynamic spiking Inputs: Remote Validation (3 voltage free floating contacts) for zero/span/dynamic spiking</td>
</tr>
<tr>
<td><strong>Window Purge (if required)</strong></td>
<td>Application Dependent (Contact Yokogawa)</td>
</tr>
<tr>
<td><strong>Area Classification</strong></td>
<td>Zone/Div 1/2 with purge</td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td>Ethernet, IEEE 802.3, 10/100 Mbps, RJ45 Automatic USB data transfer (upload/download settings and data)</td>
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<tr>
<td><strong>Calibration</strong></td>
<td>Recommended Calibration Check Interval 3-6 Months</td>
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### Gases Measured

<table>
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<tr>
<th><strong>Gas</strong></th>
<th><strong>Details</strong></th>
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<tr>
<td><strong>O₂</strong></td>
<td>0.01% detection limit, Min Range 0-1%</td>
</tr>
<tr>
<td><strong>H₂O (low/high)</strong></td>
<td>0.2 ppm, Min Range 0-20ppm; ppm to % levels</td>
</tr>
<tr>
<td><strong>HCl</strong></td>
<td>% Concentrations contact Yokogawa</td>
</tr>
<tr>
<td><strong>CO (low/high)</strong></td>
<td>low ppm range; high-ppm to % levels contact Yokogawa</td>
</tr>
<tr>
<td><strong>CH₄</strong></td>
<td>% Concentrations contact Yokogawa</td>
</tr>
<tr>
<td><strong>CO₂</strong></td>
<td>low ppm range contact Yokogawa</td>
</tr>
<tr>
<td><strong>CO + CO₂</strong></td>
<td>dual gas, % concentrations contact Yokogawa</td>
</tr>
<tr>
<td><strong>NH₃</strong></td>
<td>Minimum Range 0-30 ppm contact Yokogawa</td>
</tr>
<tr>
<td><strong>H₂S</strong></td>
<td>High ppm to % level contact Yokogawa</td>
</tr>
</tbody>
</table>

Detection Limits, accuracy, etc. are application dependant. Contact Yokogawa for more details.

* Consult Yokogawa for ranges, other gas measurements possible. All detection limits for 1 meter path, 25°C, 1 bar. Consult representative for detection limits at other conditions.
New Features
TruePeak v3.0 Software
• Improved gas temperature measurement algorithm for High temperate Oxygen plus Temperature (-X3) analyzer.
  o Minimum measurable temperature can be configured.
  o If process temperature is lower than minimum measurable temperature, an analog input will be used so that O2 reading is still valid.
• 4-20mA output block mode value can be configured by user
  o Applies to warning, fault, cal/val, entering menu.
• User my configure validation failure tolerance.
• User may configure alarm digital outputs delay (how many updates).
• User may configure the IP address much easier through TruePeak user interface.
• Two gas offline validation with one initiate. Example, O2 safety analyzers.
• Two automatic online validations can be configured. Example automatic CO and CH4 online validations
• Validation Failure Fault
• Validation alarms can be cleared through TruePeak user interface.
• Implement user selectable concentration reading during automatic online validation. The concentration reading can be calculated based on target gas absorption only in validation cell using validation cell parameters (length, temperature, pressure), or based on total target gas absorption in process and validation cell using process parameters. To avoid concentration reading outside measurement or AO range for “Validation Only” selection, a factor can be input for the final concentration reading. This factor can be a negative number for reverse online validation.

New main electronics
• Increased reliability and performance

New main processor
• Twice as fast as previous processor
• Wider operating temperature
• Protected XP Embedded image, improved shut down protection
• Twice as much memory as previous processor