The TruePeak Tunable Diode Laser (TDL) Analyzer is capable of measuring a number of near-infrared absorbing gases in difficult process applications. With the capability of measuring at very high temperature, high pressures and under difficult conditions (corrosive, aggressive, high particulate service), the TruePeak analyzer is one of the most robust process analyzers available. Most applications are measured in-situ, reducing installation and maintenance costs. In addition, most measurements are rapid (5 seconds) and interference free, offering improved accuracy when compared to other process analyzers.

The TruePeak TDL Analyzer is manufactured by Analytical Specialties Inc.

Typical gases measured include:

- Oxygen in process applications and combustion applications. Process temperatures can be as high as 1500ºC, pressures can be as high as 20barA. Measurement span is typically between 1% and 100% oxygen.
- Carbon Monoxide in process and combustion applications. Process temperatures can be as high as 1500ºC. Two versions are available, high sensitivity with sub-ppm detection limits possible and standard sensitivity for high ppm and percent level CO measurements.
- Part per million Moisture in aggressive process streams. Sub-ppm detection limits are possible with measurement in corrosive and aggressive process streams.

Other applications and gases are possible with the TruePeak TDL. Please fill out the Application Data Sheet at the end of this document.

Features:

- In Situ Analysis
- Fast Response (1-20 seconds)
- Interference Free for most applications
- TruePeak Measurement Capable of measuring under changing pressure, temperature and background
- Process Pressures up to 20 Bar
- Process Temperature up to 1500ºC
- Optical Measurement, no sensor contact with process
- Low LTCC (no moving parts, high MTBF for components)
- Flexible Installation Options
- On Board Diagnostics
- ATEX Group II for zone 1 (Cat 2G) or 2 (Cat 3G) with purge systems

System configuration:

Cross stack/Pipe

Close Coupled Extrative / Bypass*

Extractive*

* Contact Yokogawa for further information
Operational Principle

Tunable Diode Laser (or TDL) measurements are based on absorption spectroscopy. The TruePeak Analyzer is a TDL system and operates by measuring the amount of laser light that is absorbed (lost) as it travels through the gas being measured. In the simplest form a TDL analyzer consists of a laser that produces infrared light, optical lenses to focus the laser light through the gas to be measured and then on to a detector, the detector, and electronics that control the laser and translate the detector signal into a signal representing the gas concentration.

Gas molecules absorb light at specific colors, called absorption lines. This absorption follows Beer’s law.

TDL Analysers are effectively infra red analysers which obey the Beer-Lambert Law.

\[ I = I_0 e^{-E G L} \]

where \( I \) is the radiation intensity after absorption
\( I_0 \) is the initial radiation intensity
\( E \) is the extinction coefficient
\( G \) is the gas concentration
and \( L \) is the pathlength of the measurement area

Using a Tunable Diode Laser as a light source for spectroscopy has the following benefits:

- **Sensitivity.** As low as ppm with pathlength enhancement
- **Selectivity.** The narrow linewidth of the laser is able to resolve single absorption lines. This provides more choices of a particular peak to use for measurement, usually allowing one isolated peak to be used.
- **Power.** Diode lasers have power ranging from 0.5mW to 35mW. Also, being highly coherent this allows measurement in optically thick environments (high particulate loading).
- **Monochromatic.** no dispersive element (filter, etc.) required. Light source itself is selective.
- **Tunable.** Wavelength can be swept across the entire absorption feature, this allows resonant (peak) and non resonant (baseline) measurement during every scan. By measuring the baseline and peak power at the detector can fluctuate rapidly by large amounts without affecting the measurement. This is useful for high particulate applications.

Measurement

- During measurement the laser is held at a fixed temperature. This is the coarse wavelength adjustment.
- A current ramp is fed to the laser. This is the fine wavelength adjustment (figure 1).
- The current is ramped to scan across the wavelength region desired.
- The collimated light passes through the gas to be measured. The amount of light absorbed by the peak is proportional to the analyte concentration.
- The light is then focused on a detector (figure 2).
- This signal is used to quantify the light absorbed by the analyte (figure 3).
General Specifications

A. Measurement range: Dependent on application and Optical Path length. Typical 0- 100% for analysis of Oxygen or Carbon Monoxide. Measuring in ppm range is possible for Carbon Monoxide or Moisture.

B. Output signal: (3x) 4- 20 mA DC with maximum load of 900 Ohm. Three isolated outputs for concentration, transmission of light and may be used for gas concentration, transmission, retransmission of data inputs, dual range, or second gas measurement where possible. 3.3 mA user configurable on warnings and faults.

C. Output Span: Freely programmable within measuring range

D. Contact outputs: (3x) configurable relays for Status (Fault, Warning, In Validation, concentration level, etc.) Form C Single Pole Double Throw (SPDT) contact outputs with maximum 1A@24VDC or 0.5A@125 VAC.

E. Valve control: (3x) Form C SPDT contact outputs with C connected to 24VDC power supply to activate calibration solenoid valves for zero, span and dynamic spiking (validation) gas. Maximum load 1A (max 10W/ valve for zero and span gas and dynamic spiking).

F. Contact Input: (2x) 4-20 mA inputs for Temperature and Pressure Compensation

G. Digital Communication: Ethernet IEEE 802.3 10/100 mbps, RJ45

H. Data storage: USB1 and USB2 connection for data transfer using memory stick, internal storage in SD card (result files, spectra capture, configuration data, etc.) Capture rate is configurable.

I. Warm-up time: 5 min for functioning, 60 min for full operation within specifications

J. Power supply: 100-240VAC 50/60Hz to Analyzer 24VDC power supply or to Universal Remote Display Unit (URD) or to Utility Panel.

Note: End User may supply 23.5 to 24.5VDC direct to analyzer (typ.4A). Optional heat trace system may require additional and/or alternate power supplies.

Environmental Specifications

A. Ambient Temperature: -20 to +50 °C

B. Humidity: 0- 90 % RH non condensing or 0- 100% with correct purge gas specifications

C. Area Classification: The standard analyzer is designed for operation in Safe Area (General Purpose) The addition of a Purge System facilitates operation in Hazardous Area in accordance with the relevant UL, CSA and ATEX standards for gaseous releases. (ATEX CAT 2G or ATEX CAT 3G).

D. Weather resistance: IP65 which is equivalent to NEMA 4X

E. Cable entries: ¾” FNPT threads

F. Gas Connections: Analyzer ¼” o.d. Swagelok ONLY, Flow Cells 3/8” NPT(f) and ¼” NPT(f) with others on request

G. Enclosures: Die Cast copper free Aluminum grade AL Si 12 with a powder coat exterior finish. The alloy is particularly resistant to salt atmosphere, Sulfur gases and galvanic corrosion Stainless Steel captive screws and optional keypad. Laminated Safety Glass for optional display(s)

H. Sample Gas Temperature: Maximum 1500°C, Application Dependant

I. Sample Gas Pressure: Maximum 2 Mpa (20 bar), Application Dependant

J. Mounting Flanges: 2” 150# ANSI RF or 3” 150# ANSI RF or adaptors for 4” 150# ANSI RF

K. Mounting Angle: Flange alignment tolerance within ±2 degrees

L. Weights, approx: Launch Unit 16kg x (35lbs), Detect Unit 5.5kg (12lbs) 2” 150# Alignment flange 4.5kg (10lbs), 3” 150# Alignment flange 9.5kg (15lbs)

M. Particulate loading: Maximum 99% transmission loss

Note: Each application may differ in maximum limitations depending upon the combination of gas temperature, gas pressure, optical path length and concentration of gas being measured.
Performance specification

**Precision:** 1 % of F.S.D. (Full Scale Deflection) reading

**Linearity:** Typically $R^2 > 0.999$

**Response time:** Application dependent, typically 2-10 seconds for in situ applications at 25°C, atmospheric conditions 1 meter path length.

**Drift:** Typically less than 3% F.S.D. in ambient temperature range -20°C to 50°C.

Installation Specifications

**Hazardous Area:**
- CE Marked
  - For zone 1: ATEX group II Cat. 2G with purge system EEx p II T5 (-20°C ≤ $T_a$ ≤ 50°C)
  - For zone 2: ATEX group II Cat. 3G with purge system EEx pz II T5 (-20°C ≤ $T_a$ ≤ 50°C)
- NEC Class 1, Grp. B,C & D, Division 2 or Division - (Purged)

**Maximum Distance between Launch and Detect:**
- 20 m (±60ft)
- (maximum distance for cable connection is ±40m (120ft)
- Maximum interconnecting cable 30 m

**Wetted Parts:**
- Analyzer & standard Alignment Flange - 316 SS, BK-7 Glass, Teflon encapsulated Viton and Silicone RTV sealant.
- Isolation Flanges and Flow Cells - 316 SS, Sapphire, Kalrez - Also available in Monel A400, Hastelloy C-276, Carpenter 20, Titanium Grade 2 and others on request.

**Optional:**
- Instrument Air may be used as a purge gas in principle for all of the below applications, but this will depend on the application type and the required precision of the measurement.
  - Oxygen Analyzer: $N_2$
  - CO Analyzer: $N_2$ or Instrument Air
  - $CO_2$ Analyzer: $N_2$ or other non-$CO_2$ containing inert gas
  - $H_2O$ ppm Analyzer: $N_2$ with <20ppm levels $H_2O$ for feed to optional Dryer Package
  - $H_2O$ % Analyzer: $N_2$

Basic System Configuration

The TruePeak can be installed in a number of ways depending on process requirements. The most typical installation types are shown below, however other installation methods are possible, please contact Yokogawa with your application details.

**Cross Stack/Pipe Configuration**

- Measures directly across process pipe or vessel
- Typically has nitrogen or other purge gas protecting process windows
- Span Validation via serial flow cell (see Operation Specifications).
- Full calibration requires removal from process
- May require pressure and temperature inputs (application dependant)
- Multiple methods to increase Optical Path Length (OPL) if needed

**Close Coupled Extractive / Bypass Configuration**

- Measures across a section of pipe where process flow is directed.
- The measurement section can be isolated from process flow for full calibration/validation, zero and span
- Process pressure and temperature can be controlled or the analyzer may require pressure and temperature inputs (application dependant)
- Length of measurement section dependant on accuracy requirements and process conditions

**Extractive Configuration**

- Sample is fully extracted from process (and may be conditioned before measurement).
- Flow cells are available with ability to purge in front of windows (balanced flow cell) if required.
- Process pressure and temperature can be controlled or the analyzer may require pressure and temperature inputs (application dependant)
- Length of flow cell dependant on accuracy requirements and process conditions

* Contact Yokogawa for further details
Standard Accessoires

Calibration Cell:
- Used for off-line calibrations and validations
- Stainless steel 316 with free standing frame
- Connects Launch and Detect with 72.6 cm (28.6") OPL

Flow Cells:
- Used for extracted sample streams at any location
- 316SS low volume fixed alignment; 50°C, 5.5 bar (80psig) max
- Enhanced for 200°C, 13.8 bar (200psig), Sapphire window, Kalrez o-rings and can be constructed from 316SS, Monel A400, Hastelloy C-276, Carpenter 20 and other materials on request to suit the process

Isolation Flanges:
- Used for additional protection for in-situ or by-pass installations
- 2" or 3" 150#/ or 300#/ ANSI RF, welded 5/8" bolt studs included sapphire 13.8 bar (200 psig) or BK-7 5.5 bar (80 psig) isolation window
- Kalrez window seal o-ring rated max 200°C
- 316SS, Monel A400, Hastelloy C-276, Carpenter 20, other on request

Note: must use in conjunction with alignment flanges

Utility Panel:
- Used for convenient field installation of utilities, configurations for
- Single, dual or four analyzers
- Manual or automatic on-line validation (controlled by analyzer)
- Safe area (GP), Div 2 purged or non-purged, ATEX CAT 2G components
- Purge flowmeters with integral needle valve, glass tube variable area
- Swagelok double ferrule stainless steel tube fittings and tubing standard
- Panel mounted or fiberglass (NEMA 4X/IP65), with viewing window
- 5A 24VDC power supply, output to analyzer – requires VAC input power

Note: any custom configuration available to suit customer requirements

Integration:
- Used for convenient analyzer & extractive system/flow cell integration
- Free standing frame, galvanized steel with 304SS roof
- Fiberglass enclosure with powder coated steel frame
- Heat tracing and insulation for flow cells and sample handling
- 316SS and/or Monel A400 wetted parts – other on request
- Sample handling and conditioning systems to suit applications
- Stream switching manual or automatic (controlled by analyzer)

Note: any custom configuration available to suit customer requirements

Display and Software Functions

TruePeak Software has multiple levels, the default (or start page) is the Main Menu:

Main Menu Displays:
- Concentration & Units (% or ppm)
- Transmission %
- Status (warm-up, OK, Warning, Fault, etc.)
- Temperature (Fixed, Active Ambient or Active)
- Pressure (Fixed or Active)

Main Menu:
Basic Menu
- Configure, 3 functions
- View Spectra, 2 functions
- Data, 3 sub-menus
- Trends

Advanced Menu
(User Password)
- Calibrate & Validate, 3 sub-menus
- Data, 4 sub-menus
- Trends
- List of active alarms

Active Alarms
- Instructions to close TruePeak local or VAC

Shut Down Analyzer
- Calibration Functions:
  Off-line Calibrations:
  - Zero calibration
  - Zero off-set
  - Span calibration
  - Transmission
  - Dark current
  - peak search

  Off-line Validations:
  - Check gas #1
  - Check gas #2
  - Check gas #3

  On-Line Validations:
  - Manual
  - Automatic

Setup Functions: Configuration;
- Process Path Length
- Temperature
- Units
- System I/O
- System
- Valve Control
- Laser Spectra & Control

Diagnostics:
Warnings include;
- Detector signal low
- Transmission low
- Spectrum noise high
- Process pressure out of range
- Process temperature out of range
- Concentration out of range
- Board temperature out of range
- Validation failure

Faults include;
- Laser temperature out of range
- Detector signal high
- Detector signal lost
- Peak center out of range

Output Settings:
Analog Output
- Channel 1
- Channel 2
- Channel 3
- Warning Mode
- Fault Mode
- Field Loop Check
- AO CH calibration

GS 11Y01B01-01E-E
In-Situ Calibration / Validation

Validation (shown below) can be performed on-line. A serial validation flow cell is fitted in the analyzer between the laser source and the process window. During normal operation the validation cell is filled with nitrogen (analyzer measuring process gas only). After initiating a validation, this cell is filled with a known standard of the gas being measured, the analyzer will then measure the process gas + the validation gas (dynamic spike). The validation cell flow is then returned to nitrogen (analyzer measuring process gas only).

The analyzer will calculate the validation response by averaging the process readings before and after the dynamic spike and subtracting that value from the reading during the dynamic spike. This provides a relative proof of span and a positive indication of operation.

Calibration must be performed manually. The analyzer is removed from the process connections and installed on a calibration cell. Zero and span gas can then be applied to the analyzer with calibration performed through the user menu.

Extractive or Close Coupled Calibration / Validation:

Validation can be performed manually or automatically with the serial validation cell (span check only described above), or by isolating the analyzer from the process and flowing zero and span gas through the optical path (flow cell or bypass piping).

Calibration must be performed manually. The analyzer is isolated from the process gas, zero and span gas can then be applied to the analyzer with calibration performed through the user menu.

For applications where the measured gas is typically not present (0 level concentration), ASI recommends an auto-validation sequence once per month.
User Interface

1. Local Analyzer Interface

Basic Unit (Blind)
(10/2000-3055-A or 10/2000-3065-A for ATEX)

No local interface built-in. USB port is provided for data transfer. To configure, start-up and service the analyser, User must use: a PC/Laptop with Ethernet (VNC) connection and (VAC) Virtual Analyzer Controller Software Package (included), or a (RIU) Remote Interface Unit (select 10/2000-2900-A).

Mini-Display (10/2000-2905-A option)

A 4 line 20 character (4x20) vacuum florescent display (VFD) built in to the door of the launch unit. It will display measurement concentration, Transmission, scrolling Status (including alarm types) and scrolling system information (including process parameters). User must use: a PC/Laptop with Ethernet (VNC) connection and (VAC) Virtual Analyzer Controller Software Package (included), or a (RIU) Remote Interface Unit (select 10/2000-2900-A). A USB port is provided for data transfer.

Screen & Keypad (10/2000-2910-A option)

A 30 key stainless steel keypad and 6.5” graphical LCD panel built in to the door of the launch unit. This provides full local interface. It eliminates the need for a PC/laptop or (RIU) Remote Interface Units. USB port is provided for data transfer.

2. Remote Interface Unit (RIU):
(10/2000-2900-A option)

Use with any type of analyzer, a separate wall mount enclosure with screen and keypad. Connects via Ethernet (VNC), up to 3 (standard) 7 (on request) analyzers. 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 Cl.1, BCD, Division 1 or 2
- Requires 23.5 - 24.5VDC Input power
- Integral keypad and 6.5” display
- Accepts up to 3 analyzer Ethernet connections – Standard Accepts up to 7 analyzer Ethernet connections – On request
- Connection to Analyzer Unit via 8 pair shielded twisted pair cable (select 10/2000-1476-A).

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

3. Universal Remote Display (URD):
(10/2000-2760-A option)

Used with the Basic Unit (Blind), a separate wall mount enclosure with integral Mini-Display (same function as 4x20 VFD above). Includes RJ-45 Ethernet port to use a RIU or a PC/laptop with Ethernet (Ultra-VNC) connection. Includes a 24VDC power supply with universal 90-240VAC 50/60Hz input (by customer). Connection to Analyzer Unit via 8 pair shielded twisted pair cable (select 10/2000-1476-A).

- Wall mount enclosure, IP65 (NEMA 4) powder coated aluminum
- Approx 254x228x204mm (10”h x 9”w x 8”d), 7kg (15lbs)
- Purged for ATEX CAT 2G or CAT 3G, CE, NEC Cl.1, BCD, Division 1 or 2. Note, can be purged in series with Analyzer Launch & Detect Units
- Requires input power, provide 24VDC analyzer power output
- Integral 4x20 VFD Mini-Display, with signal from analyzer launch unit
- RJ-45 port for local PC connection

Pluggable SAK 2.5 terminals for 8 pair cable connection to analyzer launch unit

GS 11Y01B01-01E-E
Notes:
1. When powering a process compensation transmitter (pressure or temperature), connect the + MA terminal from the loop powered device to the +24 VDC and the – terminal to the + input terminal.
2. Alarm relay contacts are form C, SPDT rated max 1A@24VDC.
3. The analyzer sends a voltage out to the customer voltage free contacts (or switch) and the analyzer monitors for a return voltage.
   Do not ground or apply any external voltage.
4. When an optional DIV2/Zone 2 purge kit is installed, terminals 3 & 4 are used to power the purge kit.
5. Pair 3 white conductor is not terminated. Ensure it is insulated and do not ground.
6. Recommended cable for connecting launch unit to detect unit is belden 1475A, 4 shielded pairs, 18 AWG with overall shield and PVC jacket. Power limited tray rated for outdoor use.
7. Cable overall shield to be wound with individual pair shields. Overall shield to be connected to terminal #8 on TB7.
8. Wound individual pair shields to be landed on earth/chassis ground.

Analyzer Interface

Notes:
1. Pair 3 white conductor is not terminated. Ensure it is insulated and do not ground.
2. Recommended cable for connecting launch unit to detect unit is belden 1475A, 4 shielded pairs, 18 AWG, with overall shield, and PVC jacket. Power limited tray rated for outdoor use.
3. Cable overall shield to be landed to earth ground.
4. Individual pair shield ground pig-tail to be individually isolated.
The analyser requires purge gas N\textsubscript{2} /air/other the flow of which needs to be controlled. Utility panels may be provided in various forms for one or two units to control purge gas and validation gases as standard and additional purge gas for hazardous area application when required. The Utility panel can automatically control via the analyser validation gases which will indicate whether the analyser is within calibration.

The Analyser in normal usage is a non contact device. Purge gases are used to ensure sample does not contact the analyser, and these gases are often a gas which does not contain the gas to be measured. Nitrogen, for example, is often used as a purge gas in Oxygen measurement. However, depending on the application, it may be possible to use air as a purge gas (even for oxygen measurements) and purge gases are not invariably required.
### Models, Options and Description (For possible applications)

**Note:** the mark * indicates the most basic selection for a basic safe area Oxygen $O_2$ <600ºC application

#### 1. Application (measurement selection)

<table>
<thead>
<tr>
<th>Model No</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10/2000-3200-A</td>
<td>Oxygen ($O_2$) &lt;600ºC, 0-1% up to 0-25%</td>
</tr>
<tr>
<td>10/2000-3202-A</td>
<td>Oxygen ($O_2$) High Temperature &lt;1500ºC, 0-1% up to 0-25%</td>
</tr>
<tr>
<td>10/2000-3204-A</td>
<td>Oxygen ($O_2$) High Temperature &lt;1500ºC, 0-1% up to 0-25% + Process Temperature</td>
</tr>
<tr>
<td>10/2000-3210-A</td>
<td>Carbon monoxide (CO) % level &lt;500ºC</td>
</tr>
<tr>
<td>10/2000-3212-A</td>
<td>Carbon monoxide (CO) ppm level &lt;500ºC</td>
</tr>
<tr>
<td>10/2000-3214-A</td>
<td>Carbon monoxide (CO) High Temperature ppm &lt;1500ºC</td>
</tr>
<tr>
<td>10/2000-3220-A</td>
<td>Trace Moisture ($H_2O$) min range 0-30ppm - Chlorine Gas</td>
</tr>
<tr>
<td>10/2000-3222-A</td>
<td>Trace Moisture ($H_2O$) min range 0-30ppm - non Hydrocarbon background</td>
</tr>
<tr>
<td>10/2000-3224-A</td>
<td>Trace Moisture ($H_2O$) min range 0-30ppm - Hydrocarbon background</td>
</tr>
<tr>
<td>10/2000-3226-A</td>
<td>Moisture High Level ($H_2O$) min range 0-5%</td>
</tr>
<tr>
<td>10/2000-3228-A</td>
<td>CO$_2$ High Range (0-1%) Analyzer</td>
</tr>
<tr>
<td>10/2000-3230-A</td>
<td>Three components (CO / CH$_4$ / Moisture (H2O)) for Combustion Processes on request</td>
</tr>
</tbody>
</table>

#### 2. Analyser Interface

- **Basic Analyzer Unit (Blind)** - CE marked for Safe Area, no display - European Standard (VAC) Virtual Analyzer Controller Software Package (Windows XP) included, installs to customer PC/Laptop
- **Basic Analyzer Unit (Blind)** - for Hazardous Area (ATEX CAT 3G purged), no display (VAC) Virtual Analyzer Controller Software Package (Windows XP) included, installs to customer PC/Laptop

#### 3. Local Interface Options

- **Integral Mini Display (4 Line 20 Character Vacuum Fluorescent)** Requires customer PC/Laptop or (RIU) Remote Interface option for Configuration
- **Integral Color LCD Backlit Display & Stainless Steel Key Pad** Eliminates needs of customer PC/Laptop or (RIU) Remote Interface option
- **Display Sun Shield (use with Integral Color LCDs)**
- **IP-66 External USB Data Export Port with cap** - Use in General Purpose/Safe Areas only
- **Universal Power Supply Unit 24 Vdc - max 4A** (Input power 100-240 Vac 50/60Hz)

#### 4. Remote Interface Options

- **(RIU) Remote Interface Unit** for remote access to multiple analyzers (up to 3 in standard and 7 on request). Access Includes all functions available on the analyzer. Wall mount enclosure with field terminals, CPU, Screen display, keypad Connects to analyzer via Ethernet 10-Base-T for remote control via VNC suitable for Safe Area use. Requires Analyst to RIU cable 10/2000-1476-A
- **(URD) Universal Remote Display** (250 ft max) - wall mount enclosure includes; Power Supply, Mini Display and Feedthrough Board w/Ethernet socket. Requires customer PC/Laptop or (RIU) Remote Interface option for Configuration, Requires Analyst to RIU cable 10/2000-2905-A
- **Analyzer to RIU or URD Interface Interconnect cable (8-pair) shielded Power Limited Tray Rated per foot up to max 330ft (max 100m) Belden Type 1476A or equal**

#### 5. Process Interface & Calibration Cell options

- For In-situ Applications: 2" 150# 316 SS Process Flange (Set of 2) - Metal Bellows Seal
- For In-situ Applications: 3" 150# 316 SS Process Flange (Set of 2) - Metal Bellows Seal
- For In-situ Applications: 4" 150# Flange Adaptor to 2" 150#, Studded 316 SS Process Flange (Set of 2) - Requires 10/2000-5200-A
- For Extractive Applications: Basic Flow Cell 40" OPL <120 ºC, <80psig and Stainless Steel 316 Construction. Includes three 3/8" NPTF ports, approx 3.2lts sample volume, approx. 52" overall length
- Off-Line Calibration Cell (316 SS) with stand to support the Calibration Cell and Analyzer while performing. Allows for off line calibration while leaving Process Flange in place. A large range of options are available where flow cells are used in aggressive conditions

#### 6. Hazardous Area Purge Kit Options

- Zone 2 ATEX95 Cat 3G - Z Purge Kit - all Gas Groups - CSA/UL/ATEX
- Zone 1 ATEX95 Cat 2G Purge System. Includes purge controller, air inlet control valve system and pressure regulator with indicator mounted to analyzer.

#### 7. Utility Panels & Auto-Validation Systems

- Single TDL Analyzer system with two window purge flowmeters, one analyzer flowmeter and one check gas flow cell flowmeter (all with inlet NV). Solenoid valve and Pneumatic actuated ball valve for auto-validate, 24VDC power supply, AC isolation switch, I/O terminals Fiberglass enclosure
- Single TDL Analyzer system with two window purge flowmeters, one analyzer flowmeter and one check gas flow cell flowmeter (all with inlet NV). Solenoid valve and Pneumatic actuated ball valve for auto-validate, 24VDC power supply, AC isolation switch, I/O terminals Fiberglass enclosure

#### 8. Moisture in Chlorine System options and other Aggressive samples

Contact Yokogawa for further information

**Note:** Contact Yokogawa for Multiple Analyser Utility Panel Applications
Application Inquiry Form

1. General Information
   Company: Requested Delivery Date:
   Address: Contact Person:
   Email: Telephone: Fax:
   Plant Location Brief Description of application:

2. Installation Details (check one - see drawings):
   □ Cross Stack/Pipe. For measurement across the process.
     Path length: Process Connection
   □ Bypass Leg. Measurement across bypass leg located at process measurement point.
     Path length: Process Connection
   □ _ x _ Extractive. Sample is extracted and transported (by others) to analyzer.

3. Analyzer Options:
   Cable (10/2000-1476-A) length from Analyzer Unit to User Interface (specify units):
   Area Classification:
   Ambient Temperature (Min-Max.) Specify units

4. Validation
   Validation Method  □ Not supplied  □ Dynamic spiking (incl. valves and controls)  □ Auto-calibration check (extractive system)

5. Process Wetted Materials
   Must Use Must Not Use

6. Electrical Power Supply:
   □ Optional: Universal AC Power Supply Unit, Accepts 100-240 VAC 50/60Hz input and outputs 24VDC, one per analyzer or RIU 10/2000-2700-A

7. Stream Composition (1 sheet per stream analyzed)

<table>
<thead>
<tr>
<th>Component Name</th>
<th>Concentrations Min.</th>
<th>Concentrations Typ.</th>
<th>Concentrations Max.</th>
<th>Units ppm(v) vol%</th>
<th>Measured Yes/No</th>
<th>Range if Measured</th>
<th>Precision if Measured</th>
<th>Rel</th>
<th>Abs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td>+/-</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Units</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dew Point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water Vapor</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flow</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velocity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulate Concentration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. General Application & Installation Notes/Comments:

GS 11Y01B01-01E-E
Yokogawa has an extensive sales and distribution network.
Please refer to the European website (www.yokogawa.com/eu) to contact your nearest representative.