



**TELEDYNE**  
**ANALYTICAL INSTRUMENTS**  
A Teledyne Technologies Company

Model

# LGA-4000

Process LaserGas Analysis System

Tunable Diode Laser Absorption Spectroscopy (TDLAS)

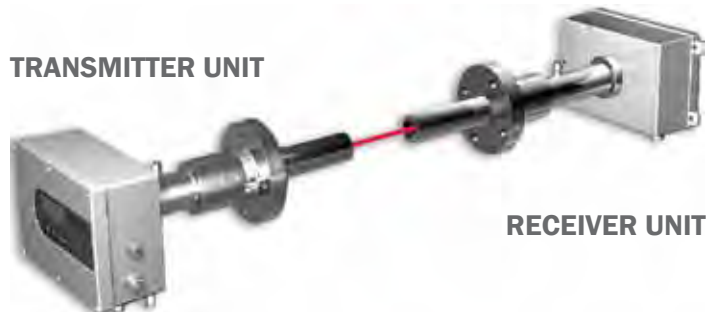


# MODEL LGA-4000 Process Laser Gas Analysis System

## PROCESS LASER GAS ANALYSIS SYSTEM

Using Tunable Diode Laser Absorption Spectroscopy (TDLAS) technology, Teledyne offers the LGA-4000 process laser gas analysis system, applicable to almost all environments -- even adverse ones with high temperature, pressure, dust density and corrosion.

The systems use in-situ detection in lieu of sampling and feature high accuracy, quick response, strong reliability, and low costs. The LGA-4000 is ideal for process optimization, energy recovery, safety control, and scientific research as well as environment protection. To date, these units have been employed in metallurgy, petrochemical and chemical industries, environment protection, power plants, and other situations where gas measurement is needed.



### TRANSMITTER UNIT

- Generates and launches a collimated modulated laser beam into the gas environment under analysis to the Receiver Unit

### RECEIVER UNIT

- Collects the laser beam from the Transmitter Unit, converts the light intensity into an electric signal and sends it real-time to the Central Processing Unit

| Gas | Lower Detections Limit | Measurement Range          |
|-----|------------------------|----------------------------|
| O2  | 0.01 %Vol.             | 0-1 %Vol., 0-100 %Vol.     |
| CO  | 0.6 ppm                | 0-60 ppm, 0-100% Vol.      |
| CO2 | 1.5 ppm                | 0-150 ppm, 0-100% Vol.     |
| H2O | 0.3 ppm                | 0-30 ppm, 0-100% Vol.      |
| H2S | 2 ppm                  | 0-200 ppm, 0-30% Vol.      |
| HF  | 0.02 ppm               | 0-2 ppm, 0-10,000 ppm Vol. |

| Gas  | Lower Detections Limit | Measurement Range           |
|------|------------------------|-----------------------------|
| HCL  | 0.01 ppm               | 0-7 ppm, 0-8,000 ppm Vol.   |
| HCN  | 0.3 ppm                | 0-30 ppm, 0-10,000 ppm Vol. |
| NH3  | 0.4 ppm                | 0-40 ppm, 0-100% Vol.       |
| CH4  | 10 ppm                 | 0-200 ppm, 0-10 %Vol.       |
| C2H2 | 0.1 ppm                | 0-10 ppm, 0-100% Vol.       |
| C2H4 | 0.6 ppm                | 0-60 ppm, 0-100% Vol.       |

Notes: I. Listed are gases that can be measured. Others can be made to order. II. Detailed measurement ranges are available on request.



LGA-4000 Two-Sided Sequenced System for Trace Moisture in Chlorine Analysis with PLC and Touch-Screen HMI

## CONFIGURATION

The transmitter portion of the LGA-4000 consists mainly of diode laser, laser driver and HMI modules, realizing diode laser driving, spectrum data processing and human-machine interface. The receiver unit of the analyzer, composed of a photoelectric sensor, signal processing and purge control modules, is capable of signal processing and power control.

## PRINCIPLE

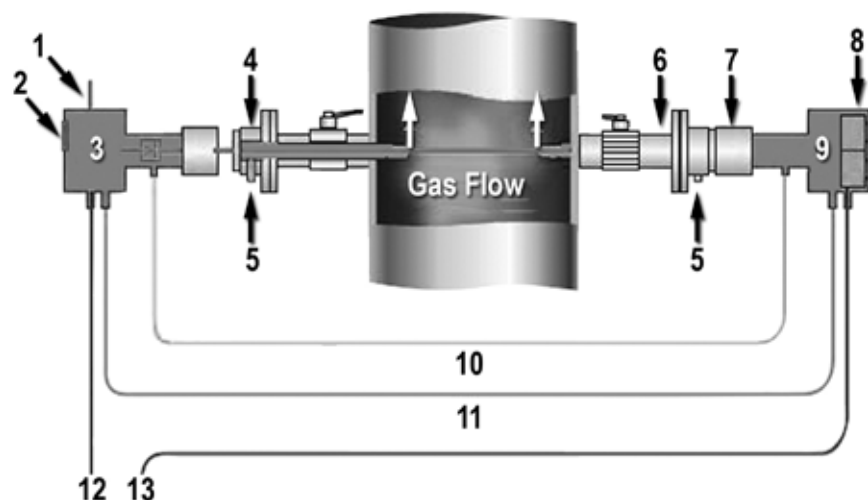
The laser beam from the transmitter unit passes across the stack or duct work and is absorbed by the measured gas. The attenuated light is then detected by the photoelectric sensor in the receiver unit, and the resulting signal is sent back to the transmitter unit and analyzed to yield gas concentration.

## FEATURES

- In-situ or extractive measurement (application dependent), measurement, unique optical design and high sensitivity
- Integrated explosion proof design, compact structure and high reliability
- Modular design, easy replacement of all function modules
- Digital and smart, easy operation and maintenance

# MODEL LGA-4000 Process Laser Gas Analysis System

## INSTALLATION



1. Bluetooth communication module
2. HMI
3. Transmitter unit
4. Instrument flange
5. Purging gas
6. Welding flange
7. Mounting nut
8. Purge control module
9. Receiver unit
10. Positive pressure gas
11. Measurement site
12. 4-20 mA Input, 4-20mA Output, Relay Output, RS485
13. 24V power supply

## SPECIFICATIONS

|                       |                                      |
|-----------------------|--------------------------------------|
| Linearity:            | 2% of FS, application dependent      |
| Optical path:         | <15m                                 |
| Maintenance:          | <2 times/year, application dependent |
| Enclosure protection: | IP65                                 |
| Span drift:           | Application dependent                |
| Response time:        | <1s                                  |
| Calibration:          | <2 times/year                        |

## INTERFACE

|                    |  |
|--------------------|--|
| Analog output:     | 2-channel 4-20mA (isolated, 750 Ω max) |
| Digital interface: | RS485 / GPRS / Bluetooth               |
| Analog input:      | 2-channel 4-20mA (T, P compensation)   |
| Relay output:      | 3-channel (24V, 1A)                    |

## UTILITIES

|                      |   |
|----------------------|---|
| Power supply:        | 24VDC (220VAC optional), <20W                       |
| Ambient temperature: | -30 to 60°C   |
| Purging gas:         | 0.3 - 0.8MPa, 99.99% N <sub>2</sub> /instrument air |

## TECHNOLOGY COMPARISON

| Item                      | LGA-4000 Laser Analysis System   | Conventional Online Analysis System   |
|---------------------------|--|---|
| Adaptability              | Applicable to high temperature & pressure, flowrate and corrosion  | Applicable to constant temperature & pressure, moisture and dust-free   |
| Measurement               | In-situ, continuous, real-time measurement; sample gas evacuation free   | With sample conditioning system, discontinuous measurement  |
| Response time             | Fast, only limited by instrument electronics response, less than 1 sec.  | Slow, limited by gas sampling, transport, and instrument electronics response, 20+ sec.   |
| Accuracy                  | Average concentration along the optical path; no cross interference from other gas species, dust, and gas parameter fluctuations | Gas concentration at the tip of the sampling probe only, affected by gas influence, absorption, and leak during gas sampling and transport; cross interference from other gas species, dust, and gas parameter fluctuations; gas information lost due to dissolution, absorption, and leakage |
| Reliability               | No moving parts, highly reliable   | Many moving parts, low reliability  |
| Calibration & Maintenance | Calibration: <2 times/year<br>Maintenance: <2 times/year   | Calibration: 2-3 times/month<br>Maintenance: frequent   |
| Operation costs           | No spare parts, only electricity   | Lots of spare parts, ~20% of the equipment cost per year  |

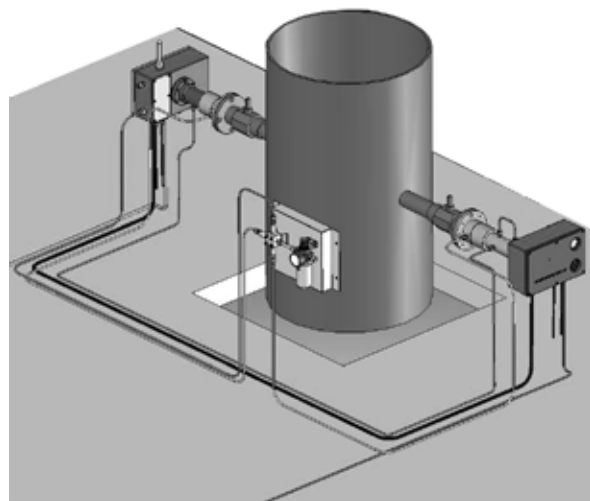
# MODEL LGA-4000 Process Laser Gas Analysis System

## TECHNICAL PRINCIPLE

TDLAS gas analyzers use a laser spectral scanning technique. The unit periodically scans the gas under test with a modulation frequency range larger than the gas absorption spectral line-width such that, within one scan period, there are two distinctive areas.

Area I is unaffected by the gas absorption and gives  $T_d$ , whereas Area II is effected and gives  $T_{gd}$ . The transmittance of the gas under test is then calculated accurately by  $T_g = T_{gd} / T_d$ . The interference from dust and optical window contamination is, therefore, automatically screened out. Automatic compensation for the spectral line broadening eliminates the influence of gas environment parameters (temperature and pressure) variance.

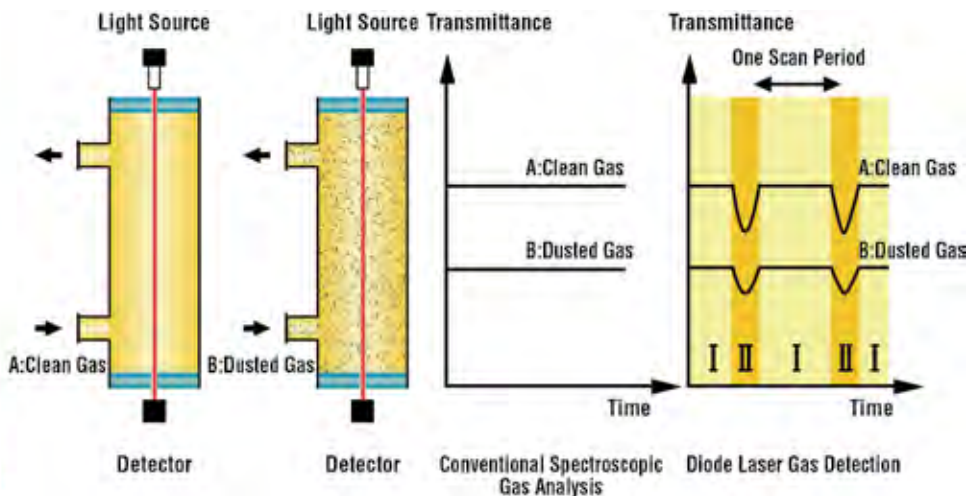
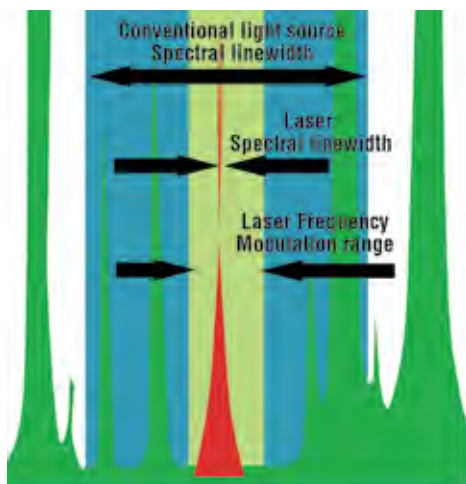
When gas temperature and pressure under measurement undergo changes, the width and height of the measured gas absorption spectral line change, which effects the accuracy of the measurement. By having a 4-20mA process temperature and pressure input, the LGA-4000 analyzer automatically compensates for them with a proprietary algorithm to ensure measurement accuracy.



## MODULATED SPECTRUM

### Modulation feature of diode laser

Wavelength Modulation → automatically corrects for dust  
Phase Signal Detecting (PSD) → high sensitivity.



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### Warranty

Instrument is warranted for one year against defects in material or workmanship

**NOTE:** Specifications and features will vary with application. The above are established and validated during design, but are not to be construed as test criteria for every product. All specifications and features are subject to change without notice.

