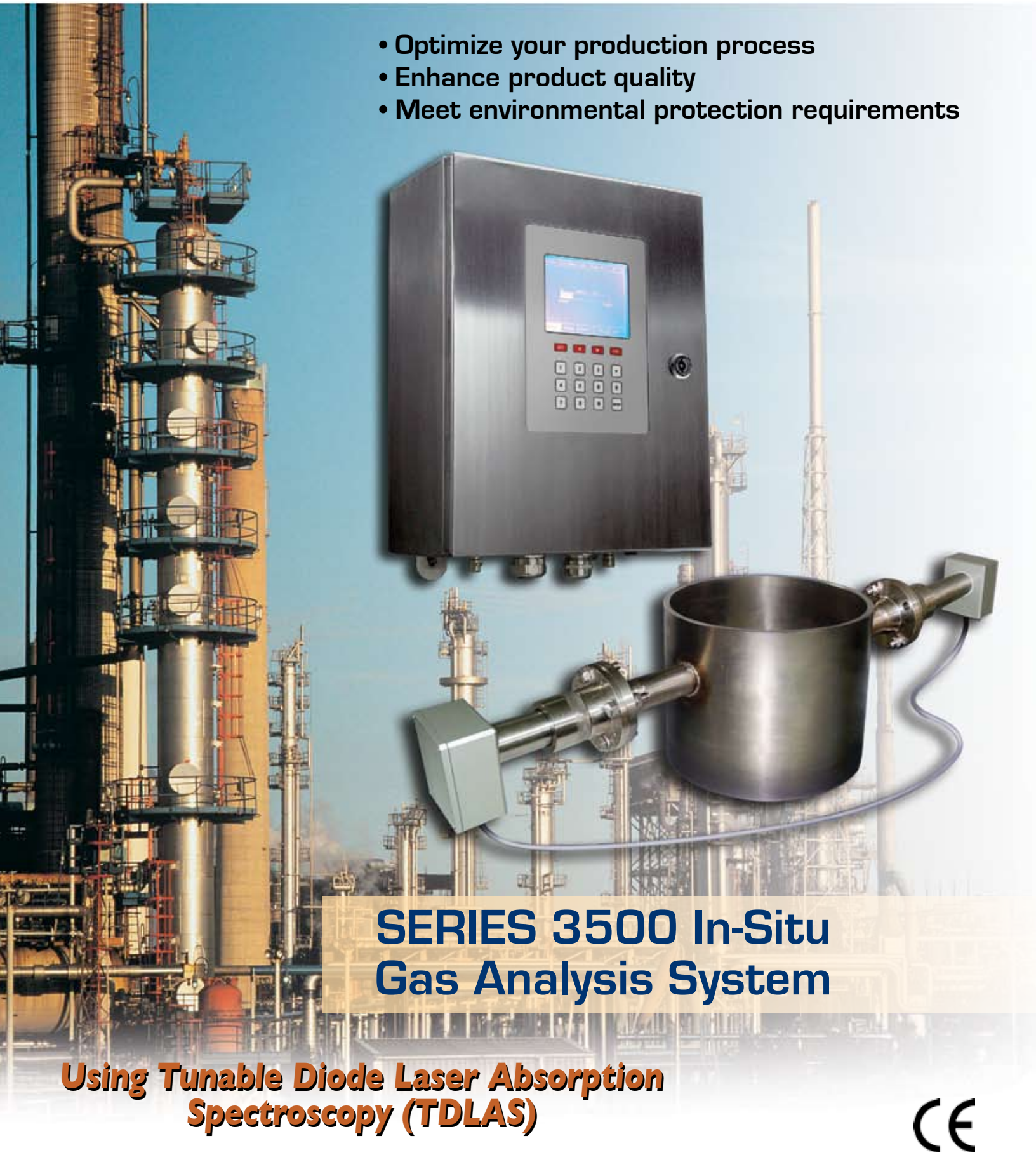
TELEDYNE ANALYTICAL INSTRUMENTS



- Optimize your production process
- Enhance product quality
- Meet environmental protection requirements

SERIES 3500 In-Situ Gas Analysis System

Using Tunable Diode Laser Absorption Spectroscopy (TDLAS)

CE

A Reliable Solution for Challenging Applications

Conventional, extractive gas analysis solutions, while normally effective, cannot always be reliably or economically deployed owing to various application hurdles one must overcome (i.e., corrosive gas composition, particulates / catalyst fines, condensibles, etc). The Tunable Diode Laser Absorption Spectroscopy (TDLAS) method, being a cross-stack solution, provides the user with the opportunity to breakthrough difficult application boundaries. Furthermore, this approach serves to enhance real-time control of a process and significantly reduce installation and sample system maintenance costs.

Focused Application Areas:

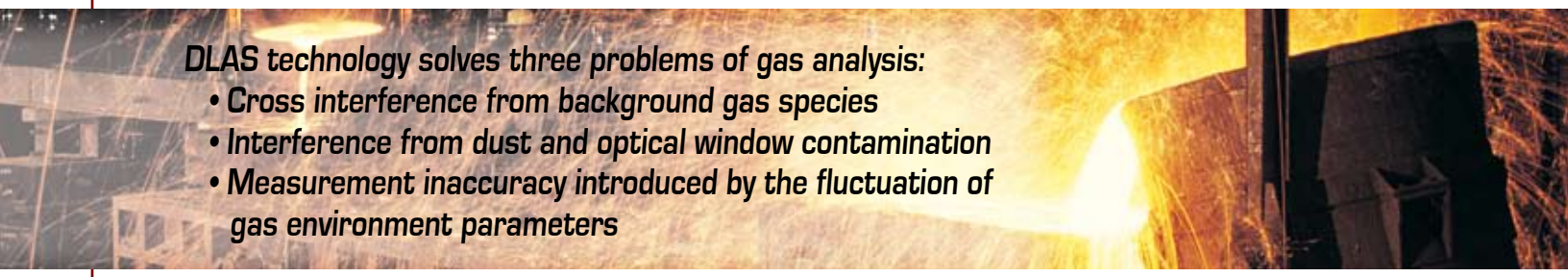
- Steel Industry (Blast Furnace, Coke Ovens, Converter Coal Gas, etc)
- Petrochemical (FCC Catalyst Regeneration, SRU Tail Gas Treating Unit, etc)
- Power Plants (Coal & Heavy-Oil Fired Boilers, Baghouse, Economizer, etc)
- Waste-to-Energy (Syngas) Production; Waste Incineration
- Cement & Glass Industries; Ammonia / Urea Plants

Typical Parameters Measured

Ammonia	CO
CO2	O2
HCl	HF
Dust	HCN
Acetylene (C2H2)	

Other parameters available; please contact factory for details.

Actual parameters measured are instrument specific and should be specified at time of purchase.

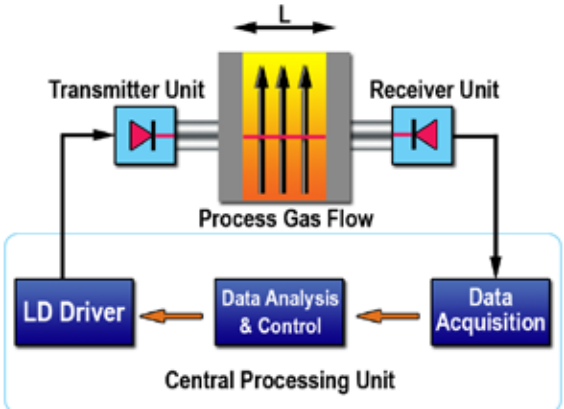


TDLAS Advantages & Benefits

- Provides immediate response to process changes
- Eliminates sample handling cost and maintenance issues
- Can be applied for O2, CO, CO2, CH4, NH3, HCL, and H2Ov Analysis
- Eliminates cross interferences from background gases and dust, significantly improving measurement accuracy

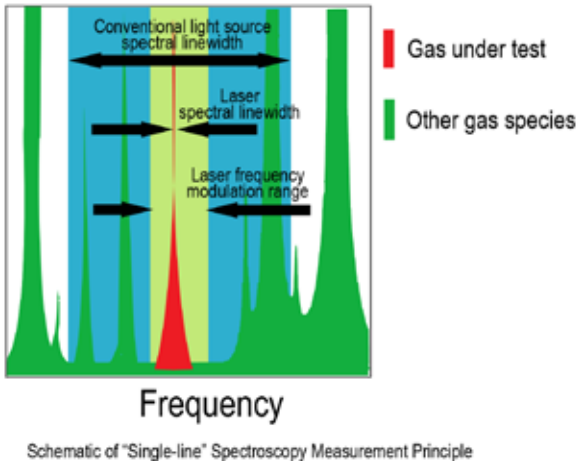
TDLAS Theory of Operation:

Gas molecules absorb energy at specific wavelengths in the electromagnetic spectrum. At wavelengths slightly different than these absorption lines, there is essentially no absorption. By transmitting a beam of light through a sample gas mixture containing the compound of interest, and tuning the beam's wavelength to one of the target gas's absorption lines and then measuring the absorption of that beam, we can monitor the concentration of the gas of interest over the beam's path length.



The laser's fast tuning capability is used to quickly and repeatedly scan the wavelength across the selected gas absorption line. For O2, the absorption line is 760 nanometers. During the scanning process the portion of emitted laser power that is passed through the sample gas is measured by a photodetector.

When the wavelength is tuned to be off of the absorption line, the transmitted power is higher than when it is on the line. By measuring the relative amplitudes of the off-line to on-line transmission, the LGA-3500 is able to provide an accurate and highly sensitive analysis of the gas of interest.

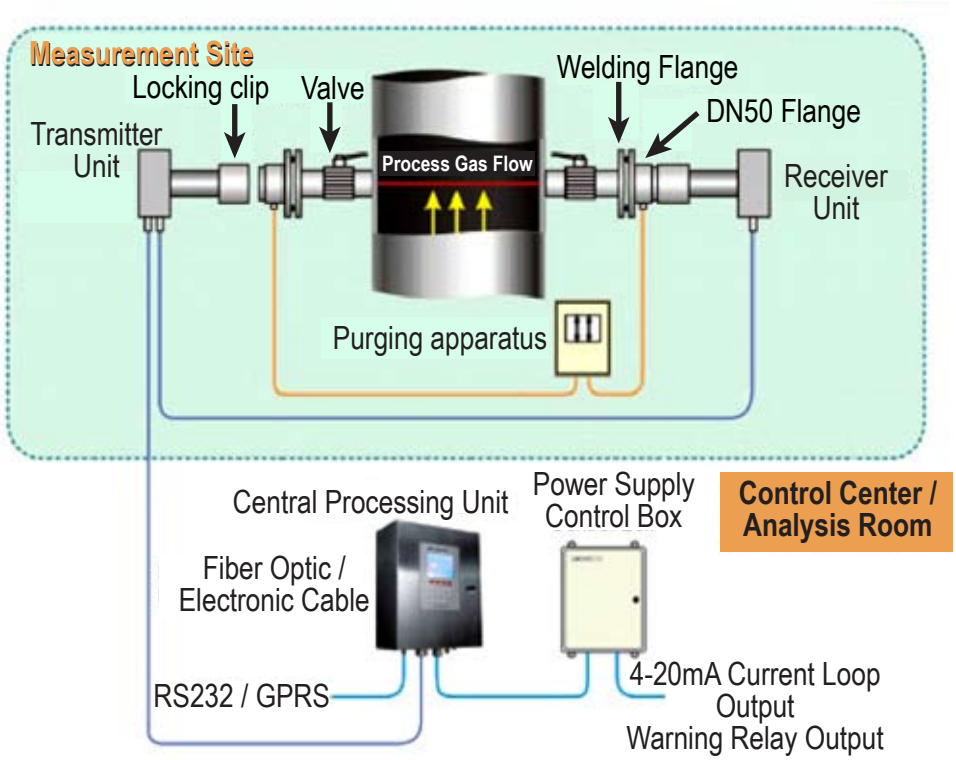


Schematic of "Single-line" Spectroscopy Measurement Principle

System Composition

The LGA-3500 is comprised of a laser transmitter, receiver and a central processing unit. The transmitter and receiver are installed directly opposite one another on the process pipe / duct work. The transmitter launches a laser beam with a selected wavelength across the diameter of the pipe to the receiver unit.

The resulting electrical signal is then sent to the central processing unit (CPU) placed in a nearby (up to 300 meters) shelter or control room. The CPU acts as the key electronics interface module.



Transmitter Unit

Consists of: Laser Source Module (VCSEL type)

Function: Generates and conveys a collimated / modulated laser beam into the sample gas under analysis.

Receiver Unit

Consists of: Opto-electronic Detector Module with signal amplification electronics (InGaAs Photodiode)

Function: Collects the laser beam from the transmitter, converts the light intensity into a meaningful electronic signal and relays it real-time to the CPU.

Connection Units

Consists of: Base valve, soldering flange and instrument flange

Function: The connection units are used to mount the Transmitter and Receiver Units to the process pipe.

Central Processing Unit

Consists of: Power Supply PCB, Signal Processing PCB, User Interface PCB all contained within a wall mount enclosure

Function: The CPU or System Control Unit processes the spectral signal from the Receiver / Detector Module. Also acts as the user interface, displays gas concentration, and LGA-3500 configuration set-up modes.

TAI Model LGA-3500
Central Processing Unit

Power Control Module:

Function: Input power line and output signal interface. Also used for intrinsically safe designs.

Purge Unit:

Consists of: Filter regulator, flowmeter and case

Function: Delivers clean, dry N2 to the Connection Units providing a purge protection against the optical windows to prevent the sample gas from fouling the same.

Calibration Unit

Consists of: Calibration tube, needle valve and cal gas inlet / outlet fittings

Function: Used to interface the Transmitter and Receiver Units for system recalibration. Typically conducted once or twice a year.

LGA-3500 Laser In-Situ Online Gas Analysis System

Technical features	
Range	Application / parameter dependent (Laser Spectrum Range 700 - 2500 nm)
Optical path length (OPL)	≤ 12m; path length determines analyzer sensitivity
Response time	< 1 second
Linear accuracy	≤ ± 1% FS
Span drift	≤ ± 1% FS (within a maintenance interval)
Zero drift	Negligible
Warm-up time	< 1 hour
Calibration inteval	< 4 times / year
Input & Output Signal	
Analog output	4-20 mA current loop, 500Ω Max, isolated
Digital output	RS-232 serial interface
Relay alarm	2 concentration alarms, 1 system failure alarm
Analog inputs (2)	4-20 mA gas temperature and pressure inputs (optional)
Operation conditions	
Environment temperature	0° to 45°C (standard); -20° to 50°C (optional)
Protection class	Transmitter / Receiver: IP65
Power supply	110/220 VAC, 50/60 Hz (specify)
Purge gas	N2 (5 liters/min)
Installation	
Mounting method	Use DN50 / PN2.5 flanges to install transmitter and receiver
Dimensions and Weight	
Transmitter / Receiver Unit	260 x 200 x 150 mm, 10 kg / each
Connecting Units (2)	385 x 150 x 160 mm, 10 kg / each
Central processing Unit	400 x 320 x 170 mm, 10 kg
Process pressure	Up to 8 BAR(G) - application dependent
Process temperature	Up to 1500°C - application dependent

Typical Installation

TELEDYNE ANALYTICAL INSTRUMENTS

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Warranty

Instrument is warranted for 1 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.

ISO 9001:2000 – QMS

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