



Gas	Measures	Application
Oxygen	Percent	Process control
Ammonia		
Carbon Monoxide	Trace ppm	Combustion
Methane		



### Key applications

- Combustion control
- Denitrification ammonia slip (SNCR & SCR)
- Oxidation control
- Safety monitoring
- Flare monitoring

## Highly adaptable tunable diode laser (TDL) spectrometer for single or dual component gas monitoring

### Unrivalled performance

- Low detection limit
- Negligible zero drift
- Robust design, wide range of ambient temperatures

### Flexible

- Compact design
- Wide range of applications
- Path lengths up to 25m (82ft) and process temperatures up to 1300°C (2372°F) depending on application

### Easy to use

- Simple to install and operate
- Digital communications, Modbus over Ethernet
- Rapid disconnect for ease of calibration

### Low cost of ownership

- No sample conditioning system - reduced maintenance costs
- No moving parts, no consumables
- 12 months between calibrations

### Benchmark compliance

- ATEX, IECEx and North American hazardous area approvals
- Certified for gases and dust
- Hardware safety integrity certification supports use in SIL 2 safety instrumented systems
- IP66
- CE approved

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# SERVOTOUGH Laser 3 Plus

## Product overview Hazardous area

### Flexible performance you can depend on

By combining advances in hardware with leading edge software processing; Servomex has approached TDL analysis afresh, creating an analyser a fraction of the size without compromising performance. The result is an analysis solution that is easier and faster to install – saving valuable space while enabling much greater installation flexibility.

### A no compromise solution

The hardware advances of the Laser 3 Plus are matched by advanced second harmonic wavelength modulation spectroscopy processing software which eliminates drift over extended operational periods by automatically tracking on a sealed reference cuvette absorption line – Line Lock Technology. This robust tracking mechanism ensures reliable and accurate operational availability over long periods with calibration frequencies extended beyond twelve months for many applications.

The result is a sturdy, general purpose and hazardous area optimized design which ensures Laser 3 Plus can handle the most challenging of installations, including particulate-rich environments.

### Unbeatable value over product life

The next generation ethos of the Laser 3 Plus works hard to reduce costs at all stages. In addition to the immediate advantages of TDL technology – a non-depleting measurement which requires no sample conditioning system – the Laser 3 Plus compact design greatly reduces installation time, with small, light intuitive alignment for easy installation and maintenance. Full ethernet communications for commissioning, diagnosis and trouble shooting.

### LINE LOCK TECHNOLOGY - SAFE, SECURE, RELIABLE.

These analyzers are not intended for any form of use on humans and are not medical devices as described in the Medical Devices legislation or regulation.

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# Technical data sheet

## SERVOTOUGH Laser 3 Plus



### Specifications

Application category	Measurement		Sample conditions		
	Detection limit (LDL)	Range min/max	Max. pressure bar absolute	Max. temp.	Measurement path length
Process oxygen	0.02% O <sub>2</sub> *	0-1% O <sub>2</sub> 0-21% O <sub>2</sub>	2	500°C (932°F)	0.1-5m (0.3-16ft)
DeNOx ammonia	0.2ppm NH <sub>3</sub> *	0-15ppm NH <sub>3</sub> 0-150ppm NH <sub>3</sub>			0.7-10m (2.3-32ft)
Combustion oxygen In addition to the standard oxygen measurement, this product offers a second 'hot oxygen' reading that allows the unit to differentiate between oxygen in the process (above 700°C (1292°F)) and oxygen in instrument air used for purge reasons, consult Servomex	0.1% Hot O <sub>2</sub> ** (instrument air or N <sub>2</sub> purge) 0.05% O <sub>2</sub> * (N <sub>2</sub> purge only)	0-5% O <sub>2</sub> 0-21% O <sub>2</sub>	1.2	1300°C (2372°F)	0.5-25m (1.6to82ft)
Combustion Carbon monoxide	1.0ppm CO*	0-100ppm CO 0-10,000ppm CO			
Combustion Carbon monoxide	3.0ppm CO*				
Plus methane	0.05% CH <sub>4</sub> *	0-5% CH <sub>4</sub> 0-5% CH <sub>4</sub>		500°C (932°F)	
Notes	<p>All ranges and parameters above are dependent on temperature, path length and dust. Refer to Servomex for application specific performance and limits.</p> <p>* Detection limits are specified as the 95% confidence interval for 1m (3.3ft) optical path, a gas temperature of 25°C (77°F) and pressure of 1 barA</p> <p>** Detection limits are specified as the 95% confidence interval for 1m (3.3ft) optical path, a gas temperature of 1000°C (1832°F) and pressure of 1 barA</p>				
<b>Technology</b>	Tunable Diode Laser Spectroscopy				
<b>Performance</b>					
Measurement update rate	5 readings per second				
Response time T <sub>90</sub>	<2s Process Oxygen; <10s Combustion O <sub>2</sub> , CO, CH <sub>4</sub> ; <30s Ammonia, for quoted performance above (Min. 1 second. Refer to Servomex, LDL and noise affected)				
Drift (zero)	Negligible, <2% Full Scale Range (FSR) between calibrations				
Drift (span)	<4% FSR between calibrations				
Linearity	<1% FSR				
Repeatability	± detection limit or ± 1% of reading, whichever is the greater				
Ambient temperature coefficient	± 3% of reading per 10°C (18°F)				
Calibration	Recommended every 12 months (up to 36 months, application dependent, consult Servomex)				
Maintenance	Recommended every 12 months				

The performance specification has been written and verified in accordance with the international standard IEC 61207-1:1994 "Expression of performance of gas analyzers"

Signal outputs/inputs		
Analog output	1 isolated 4-20mA: 500Ω maximum as standard 1 x additional output (specification as above) may be fitted as an option	
Output range	Analog output parameters freely selectable over measurement range	
Alarms & relays	1 x status relay 1A at 30V dc/ac as standard 2 x additional outputs (specification as above) may be fitted as an option	
Analog input (optional)	2 x 4-20mA inputs, maximum current 22mA; input impedance 50Ω	
Digital communications	Modbus TCP/IP Ethernet (10 or 100 base)	
Physical	Transmitter	Receiver
Weight	3kg (6.6lbs)	2kg (4.4lbs)
Dimensions, WxDxH	131 x 164 x 303mm (5 1/8" x 6 1/2" x 12")	110 x 146 x 248mm (4 5/16" x 5 3/4" x 9 3/4")
Mounting	Flange to DN25, DN50, ANSI 1", 2", 3" or 4"	
Operating environment	Ensure the effects of any local thermal radiation is considered when assessing the operating environment	
Operation	-20°C to +65°C (-4°F to +41°F)	
Mounting flange temperature	135°C (275°F)	
Storage temperature	-20°C to +65°C (-4°F to +41°F)	
Relative humidity	0-80% RH, non-condensing	
Altitude (maximum)	4,000m (13,120ft) 2,000m (6,560ft) for hazardous area variants	
Warm-up time	Functional within 10 minutes; Servomex recommend allowing 3 hours for the analyzer to stabilize	
Ingress protection	IP66, NEMA 4X	
Utilities		
Supply voltage	24V dc (18-30V dc)	
Rated power	25W maximum	
Purge gas	Dry and oil-free air (ISO 8573.1 Class 2-3) or N <sub>2</sub> 99.99, gas requirement and flow rate is application dependent	
Zero gas	Typically nitrogen	
Span gas	Application dependent	

## Sample wetted materials

	Application configurable from
Sample wetted seals	Viton® 70 (standard) or Chemraz® 505 (solvent resist) or equivalent
Flanges	Stainless steel (typically 316)†
Insertion tubes	Stainless steel (typically 316)†
Process flange gasket	Stainless steel/graphite composite
Process windows	Fused silica (standard) or Sapphire (application dependent)
Process window seal	Loctite® 595

† Other options are available, such as titanium CP-2 or Hastelloy® C276

## Compliance

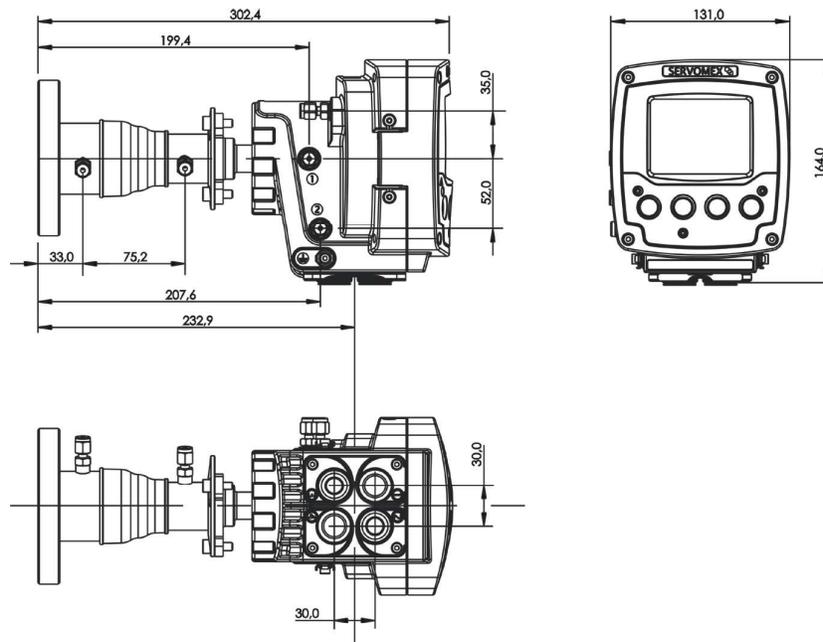
<b>Hazardous area approvals</b>	For process hazardous area zones no greater than Zone 2 or Zone 21
<b>ATEX (Europe)</b>	 II 3G Ex ic ec nC op is IIC T4 Gc (-20°C ≤ Ta ≤ +65°C)  II 2D Ex tb [Ex op is] IIIB T135°C IP66 Db (-20°C ≤ Ta ≤ +65°C)
<b>IECEX (International)</b>	Ex ic ec nC op is IIC T4 Gc (-20°C ≤ Ta ≤ +65°C) Ex tb [Ex op is] IIIB T135°C IP66 Db (-20°C ≤ Ta ≤ +65°C)
<b>North America</b>	Class I, Division 2, Groups A-D Class II, Division 2, Groups F&G Class III Class I, Zone 2 Group IIC Ambient temperature range -20°C to +65°C, T4 IP66 and type 4X
<b>EC directives</b>	The SERVOTOUGH Laser 3 Plus complies with the EMC Directive, RoHS, and all other applicable directives
<b>Electrical safety</b>	Electrical safety to IEC 61010-1; the SERVOTOUGH Laser 3 Plus has also been certified for use in ordinary locations in USA and Canada

## Configuration

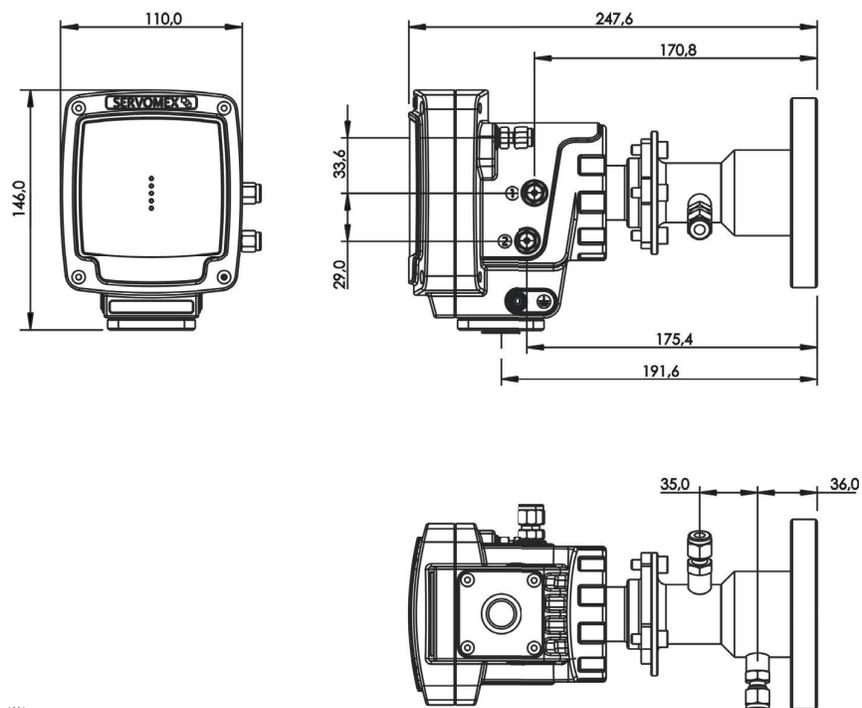
<b>Analyzer features</b>	The SERVOTOUGH Laser 3 Plus measurement arrangement is configured to suit a specific application (see the supplementary configuration sheet), the following features may be configured independently
<b>Outputs and alarm options</b>	Standard: 1 x 4–20mA output and 1 x status relay Additional option card: 1 x 4–20mA output, 2 x status relays, 2 x 4–20mA inputs
<b>Certification (select one)</b>	Safe area/general purpose Gas: ATEX Cat 3 / IEC Ex zone 2 Dust: ATEX Cat 21 / IEC Ex zone 21 North American Class 1 Division 2 (gas and dust)
<b>Functional safety manual</b>	Demonstrates analyzer hardware compliance to SIL 2, IEC 61508 (application dependent)

# Dimensional drawings

## Transmitter



## Receiver



Dimensions shown in millimetres

# We're ready to help

Whatever your gas  
analysis requirements,  
wherever you are.

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