



SERVOTOUGH LaserSP

The SERVOTOUGH LaserSP is a high performance gas monitor, optimised for in-situ cross stack measurements and extractive applications. Designed for use in a diverse range of emissions monitoring and process control applications for both safe and hazardous areas in refineries, natural gas plants, chemical plants, IG, power and steel plants

The Wavelength Modulated Spectroscopy (WMS) signal processing technique reduces interference from other gases and provides the most stable, repeatable results.

KEY FEATURES

- Fast response time (typically 2 sec for in-situ applications)
- Option of in-situ measurement without gas sampling
- WMS limits interference from background gases
- Utilises proven Tuneable Diode Laser (TDL) Spectroscopy measurement technique
- Stable calibration with no zero drift minimises maintenance costs
- Low detection limits
- High temperature and high pressure operation
- Ethernet connectivity option
- ATEX, IECEx and North American hazardous area approvals
- Low cost of ownership

KEY APPLICATIONS

- Combustion
- Thermal oxidisers
- Emissions
- Waste incinerators
- Ammonia slip (DeNOx)
- FCCU Process Control
- Flare Gas

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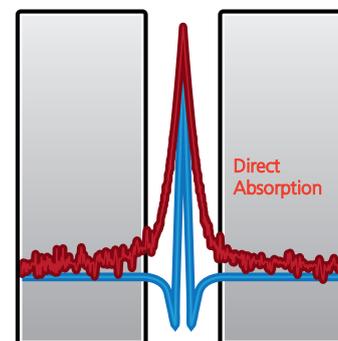
LaserSP

KEY FEATURES

For continuous in-situ applications the SERVOTOUGH LaserSP monitor is designed for direct installation across stacks, ducts and reactors typically employing path lengths of 0.5 to 20m.

For by-pass and extractive applications the SERVOTOUGH LaserSP is supplied with the optimum sample cell for the application.

The LaserSP comprises a transmitter unit with a laser source whose light is transmitted through the gas to be measured to a photodetector in the receiver unit. The gas concentration is calculated based on the absorption of laser light for the selected spectral absorption. A multicore cable provides signal and power connections between the transmitter and receiver. The transmitter unit contains the main processor board, power supply, optional Ethernet card and provides all customer connection terminals. A Liquid Crystal Display (LCD) continuously displays the gas concentration, laser beam transmission and instrument status.



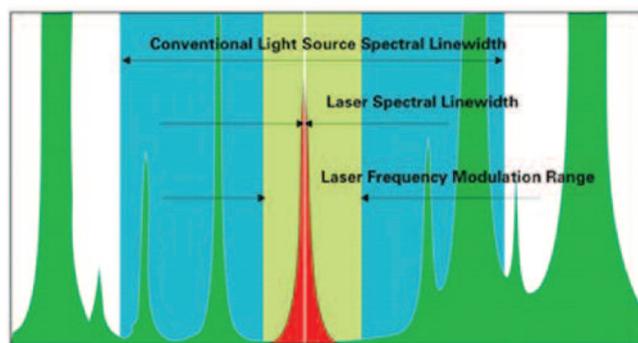
Wavelength Modulated Spectroscopy 2f

Tunable Diode Laser (TDL) Spectroscopy is a non-contact optical measurement method employing stable solid-state laser sources. The sensor is unaffected by contaminants and corrosive gases, so does not require regular maintenance.

Servomex uses Wavelength Modulated Spectroscopy (WMS) with a high frequency carrier providing a second harmonic of the gas absorption. This provides a much greater resolution between the target gas absorption and possible interference in addition to improved signal to noise performance when compared to first generation laser direct absorption measurement. This core technology reduces interference from other gases and combined with line width correction provides the most stable, repeatable results.

Servomex have been delivering TDL Spectroscopy solutions to the harsh environments of the process industry for nearly 10 years and with the extensive application database, the application teams select a spectral absorption of the target gas which minimises interference from other gases that may be present in the process stream.

The laser line width is very narrow, much less than the target gas absorption line width and the laser scans over a range monitoring the zero baseline and absorption peak. As the laser scans typically 20 times/second, correcting the baseline zero, this method ensures no zero drift.



- █ Gas under test, typical absorption line width 0.05nm
- █ Absorption lines from other (background) gases
- █ Laser scan range, typically 0.2 -03nm, note Laser spectral line width is about 0.0001nm
- █ UV/IR absorption spectroscopy line width >2nm

The LaserSP utilises advanced PeakLock technology, which eliminates drift over extended operational periods by automatically tracking on the measured gas absorption line or - in applications where the measured gas is not normally present - tracking the absorption line of another gas present in the stream (e.g. H₂O). This robust tracking mechanism ensures a highly reliable and accurate operation by the LaserSP over long periods, with calibration frequencies extended beyond twelve months for many applications.

The SERVOTOUGH LaserSP monitor is mounted directly onto measurement cells or DN50 / ANSI 2" flanges. The latter include purge gas connections and a tilting mechanism for easy alignment. A continuous purge flow will prevent dust and other contamination from settling on the optical windows. Once power and data lines are connected, measurements are performed in real-time.

The monitor is certified to the latest standards, fully meeting the requirements of the new flammable sample regulations, allowing safe operation in situations where the process stream itself is flammable.

HAZARDOUS AREA	ATEX	ATEX & IECEx	HAZARDOUS PROCESS
Gas	Ex II 3(2) G	Ex nA nC op is IIC T5 Gc [Ex op is IIC T6 Gb]	Gas
Gas	Ex II 3G (1D)	Ex nA nC op is IIC T5 Gc [IIIB T70°C Da]	Dust
Dust	Ex II 2D(2G)	Ex tb IIIB IP66 T75°C Db [Ex op is IIC T6 Gb]	Gas
Dust	Ex II 2(1) D	Ex tb IIIB IP66 T75°C Db [IIIB T70°C Da]	Dust

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SPECIFICATIONS

GAS MEASURED:	Detection Limit	Min. Measuring Range	Max. Sample Pressure	Max. Sample Temperature/°C
NH ₃	0.11mg/m ³ (0.15ppm)	0 - 15ppm	2 bar abs.	600
HCl	0.08mg/m ³ (0.05ppm)	0 - 5ppm	2 bar abs.	600
HF	0.013mg/m ³ (0.015ppm)	0 - 1.5ppm	2 bar abs.	400
H ₂ S	4.5mg/m ³ (3ppm)	0 - 300ppm	2 bar abs.	300
O ₂	0.01%	0 - 1%	20 bar abs.	1500
H ₂ O (ppm)	0.08mg/m ³ (0.1ppm)	0 - 10ppm	2 bar abs.	400
H ₂ O (%)	40mg/m ³ (50ppm)	0 - 5000ppm	2 bar abs.	1500
CO (%)	38mg/m ³ (30ppm)	0 - 3000ppm	2 bar abs.	1500
CO ₂ (%)	59mg/m ³ (30ppm)	0 - 3000ppm	2 bar abs.	1200
CO (ppm)	0.4mg/m ³ (0.3ppm)	0 - 30ppm	2 bar abs.	1500
CO ₂ (ppm)	0.4mg/m ³ (0.2ppm)	0 - 20ppm	2 bar abs.	300
HCN	0.36mg/m ³ (0.3ppm)	0 - 30ppm	2 bar abs.	300
CH ₄	0.14mg/m ³ (0.2ppm)	0 - 20ppm	3 bar abs.	300
C ₂ H ₂	0.12mg/m ³ (0.1ppm)	0 - 10ppm	2 bar abs.	200
C ₃ H ₆	0.01%	0 - 1%	3 bar abs.	200
CH ₃ I	9mg/m ³ (3ppm)	0-300ppm	2 bar abs.	200
NH ₃ + H ₂ O	0.15mg/m ³ (0.2ppm NH ₃) / 0.05% H ₂ O*	0 - 20ppm / 0 - 5%	1.5 bar abs.	500
HCl + H ₂ O	0.16mg/m ³ (0.1ppm HCl) / 0.1% H ₂ O*	0 - 10ppm / 0 - 5%	1.5 bar abs.	400
HF + H ₂ O	0.018mg/m ³ (0.02ppm HF) / 0.01% H ₂ O*	0 - 2ppm / 0 - 1%	1.5 bar abs.	400
CO + CO ₂	0.01% (both)	0 - 1% /0-1%	1.5 bar abs.	300
O ₂ + Temp	0.05%/10°C	0-5%	1.5 bar abs.	1500

Notes:

1. Detection limits are specified as the 95% confidence interval for 1m optical path and gas temperature/pressure = to 25°C/1 bar abs.
 2. Also available CH₂O, C₂H₄O (EtO).
 3. Other dual gas measurements available are CO+H₂O, CO+CH₄, O₂+temp, CO+temp.
 4. Pressures quoted are spectroscopic limits for the LaserSP. ATEX and IEC Ex certified products will be limited to 1.1 bar abs maximum process pressures for flammable samples.
 5. Higher pressures are available on some gas measurements - please contact Servomex.
- * H₂O specified at 180°C

PERFORMANCE:

Technology:	Single Line Laser Diode Spectroscopy
Optical path:	0.5 - 20 meters
In-situ response time:	<2 Seconds
Extractive response time:	2 Seconds + sample system response time (dependent on sample flow rate and sample system volume)
Drift:	Application dependent
Repeatability:	+/- Detection Limit or +/- 1% of Reading, whichever is greater
Linearity:	<1% FSR
Averaging time:	Rolling average from 2 seconds to 24 hours (exponential decay)
Calibration:	Check recommended every 6 - 12 months In-situ with flow through cell (application dependent), or using optional external calibration cell
Maintenance:	Recommended every 6 - 12 months. Remote instrument check possible via optional Ethernet or modem connection
SIGNAL INPUTS/ OUTPUTS:	
Analogue output:	Isolated 4-20mA current loop (500 ohms maximum) Second 4-20mA current loop (500 ohms maximum) for transmission reading (optional)
Serial output:	RS232 format (for PC connection during installation/maintenance)
Digital communications:	Optional 10 or 10/100 Base T Ethernet and MODBUS (read only)
Optical fibre output:	ASCII format (optional)
Relay output:	High gas relay (normally closed contact), 1A at 30V DC/AC Warning relay (normally closed contact), 1A at 30V DC/AC Fault relay (normally closed contact), 1A at 30V DC/AC
Analogue input:	2 customer 4-20mA inputs available for process temperature and pressure

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SPECIFICATIONS

POWER SUPPLY:

Input:

Mains: 100-240V AC, 50/60 Hz, 50VA max.
24V DC: 20-30V DC, 25W max.

Standard mounting:

DN50/PN10 (optional DN80 or ANSI)

Alignment tolerances:

Flanges parallel within 1.5°

Window purging:

Dry and oil free air or N₂ (application dependent)

Purge flow:

20-50 litres/min (application dependent)

OPERATING ENVIRONMENT:

Operating & storage temperatures:

-20°C to +55°C (standard)
-20°C to +65°C (high temp)*

Protection classification:

IP66

HAZARDOUS AREA:

Gases & Dusts:

ATEX Cat 3 (Gases) and Cat 2 (Dusts)
IECEX Zone 2 and Zone 21
CSA Divisions and Zones (Gas and Dust)

Certificate Baseefa10ATEX0100X
Certificate IECEX BAS 10.0038X
Certificate CSA II.2393527X

Dimensions (HxWxD) & weights

Transmitter unit	284 x 263 x 198mm	13.15kg
Receiver unit	255 x 127 x 90mm	4.9kg

* For operation at ambient temperatures between 55°C and 65°C (131°F - 149°F) please consult Servomex.

SYSTEMS

Innovative sampling systems are custom designed to meet process stream requirements including:

- Oxygen in chlorine – TiO₂ production

Systems options to simplify installation:

- Analyser graphical user interface
- Auto validation and auto calibration systems
- Standard purge flow control panels for window and instrument purge

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