



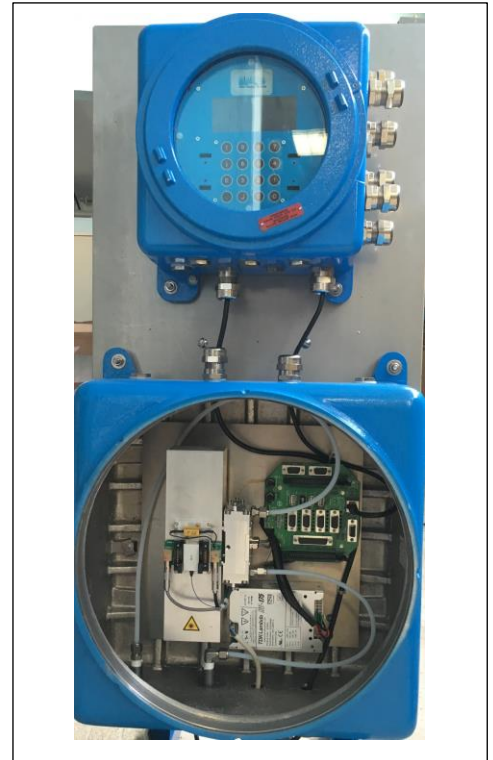
TYPICAL APPLICATIONS

- Gas pipeline
- LPG/LNG
- Biogas
- Sour Gas Treaters
- Refineries
- Chemical plants
- Gas wells (offshore/onshore)
- Gas manufacturers
- Food industry
- Pulp and Paper
- Water treatments
- Stack gas
- Ambient Air
- Power plants/ Steel plants

SPECIAL FEATURES

The Photoacoustic Spectroscopy (PAS) has many advantages compared to other more classical IR spectroscopy techniques.

- **Versatility:** The design of the patented PAS cell is independent of the gas detected. According to the operating principle of the PAS, the soundwave is generated by the molecules specifically absorbing a modulated IR light. To change the molecules detected, one requires just to swap or to tune the QCL to the wavelength of the specific absorption band of the new molecule.
- **Zero-Background Technology.** This technique is called a zero-background technology as there is no signal as long as there is no gas.
- **Robustness:** The photoacoustic cell platform does not have any moving parts and is not sensitive to environmental vibrations because of the high-frequency acquisition rate. There are no wavelength-specific optics or mirrors.
- **Atmospheric pressure measurements:** the gases to be analysed flow through the cell without any specific pressure conditioning.
- **High sensitivity:** The PAS can detect ppb levels with a 10 cm path length. Depending on the power of the QCL, ppt levels can be reached.
- **Small internal volume:** the internal volume of the PAS cell is small (approx. 50 cm³). This volume could be further reduced as the sensitivity response is inversely proportional to the cell dimensions.
- **Larger than 5 orders of magnitude measurements:** PAS measurements can be carried out routinely over 6 orders of magnitude (from ppm to a few %).
- **Linearity of the PAS Signal:** The response of the PAS cell is linear (< 1 % deviation / linear response) over the 5 orders of magnitude (i.e. ppm-%) without any deconvolution or interpolation. A calibration function is used outside this linear range.
- **Specific measurements:** PAS in the IR spectral range allows for accurate and specific measurements of most gases even in very complex gas matrices.
- **Operations at a temperature between -10°C et 40°C and temperature variations $\Delta T < 1^\circ\text{C/h}$**



OPERATING PRINCIPLE

This analyser is designed for hazardous area installations due to the laser based technology and requires very little annual maintenance. This laser spectrometry technology was first developed and patented at the University of Champagne-Ardenne – France.

Factory calibration for the full lifetime of the analyser. It offers the best measurement reliability and an excellent repeatability.

Our innovative photoacoustic spectrometer is based on a patented Helmholtz resonance cell combined with Quantum Cascade Lasers (QCL) in the Mid IR spectral range. The QCL give access to fundamentals rays of most molecules and specifically those of H₂S and H₂O and allow for the continuous measurement of H₂S traces in a mainly CH₄-composed matrix.

The measurements are interference free despite methane concentration fluctuations in the gas matrix.

The measurement is carried out directly on the sample without any additional sampling system (no risk of H₂S adsorption).

The response time is less than 10 seconds due to the small chamber volume.

STANDARD SPECIFICATIONS

Measurement Technique	Photoacoustic spectroscopy		
Additional Environmental sensors	<ul style="list-style-type: none"> • Humidity sensor • Pressure sensor • Temperature sensor • Mass Flow 		
Measurements			
Response time	T90 < 10 s (flow = 400 cm ³ /mn)		
Linearity	± 1 % of calibration full scale.		
Reproducibility	± 1 % of the signal (with a minimum of 0.3 ppm)		
Accuracy	± 2 % of the signal (min. 1 ppm).		
Zero/span drift	Negligible due to zero background technique		
Instrument failure alarm	1 per stream. Potential free relay contacts 3A 230VAC rated in N.O. or N.C. Relay coil normally energised. Dedicated alarms available on the digital output (RS 485).		
Process alarm	1 per stream. Adjustable level. Potential free relay contacts 3A 230 VAC rated in N.O. or N.C. Relay coil normally energised or de-energised (programmable).		
Built in keyboard	16 keys, optical TOUCHSENSE™ technology.		
Built in display	Alphanumeric 4 lines, 20 characters each, back lighted. H ₂ S concentration. - Functional parameters - Alarms		
Area classification	<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> Electronic module : CE 0080 II 2 (1) GD Ex d [ia] IIC T4 Ex tD [iaD] A21 IP66 T135°C Ex [is op Ga] IIC T4 </td> <td style="width: 50%; vertical-align: top; text-align: right;"> Detection Module : LSRS-0001 II 2 GD Ex d IIC T5 Ex tD A21 IP66 T 100 °C Ineris 11 ATEX 0020 </td> </tr> </table>	Electronic module : CE 0080 II 2 (1) GD Ex d [ia] IIC T4 Ex tD [iaD] A21 IP66 T135°C Ex [is op Ga] IIC T4	Detection Module : LSRS-0001 II 2 GD Ex d IIC T5 Ex tD A21 IP66 T 100 °C Ineris 11 ATEX 0020
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Environnemental			
Temperature Range	from -10°C up to 40°C (55°C on request) (Storage between -10°C and +55°C)		
Sample Gas Temperature	-10°C to 80°C		
Pressure range	0.7 to 2 bar Pressure in the gas system must be stable at +/- 5 mbar (over 1 h)		
Humidity Range	< 99 % non condensing		
Sampling			
Measurement Gas Flow Rates	<ul style="list-style-type: none"> • Sampling mode: 1 – 36 l/h, (optimum performances between 50 and 100 cm³/min) • Continuous mode: 24 ± 5 L/h required 		
Measurement Rate	2Hz, 10 s interval between measurements		
Warm-up time	10 min to measurement start 2 hours to reach optimal performances		
Inputs and outputs			
Analog Signal out	1 as standard - up to 4 on option. 4-20 mA self powered, galvanically isolated, 1000 ohms max, loop load.		
Digital Signal out	RJ-45 for TCP/IP communications		
USB port	Standard USB port for data back-up		
Software	C++, Windows™ XPe based.		
Electrical configuration			
Power Supply	230 V 50-60 Hz (on demand 110 V 50-60 Hz)		
Electronic Calibration	Factory calibration of IR sources		
RFI protection	Conform to EN 50270 : 2006 (Product type 2)		

In our continuing research and development, we reserve the right to make any model revisions and specification changes without prior notice

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