

# Laser Diode Gas Detectors



## Laser Diode Gas Detectors for OEM Integration

Axetris' Laser Gas Detectors (LGDs) are self-contained, ready-to-use modules for the measurement of gases such as  $\text{NH}_3$ ,  $\text{CH}_4$ ,  $\text{H}_2\text{O}$ ,  $\text{CO}_2$ ,  $\text{HCl}$ ,  $\text{HF}$  or  $\text{O}_2$ . The modules are designed for integration by Original Equipment Manufacturers (OEMs), active in the field of gas detection and monitoring in diverse industries. Typical applications include process control, emission & environmental monitoring, safety and air conditioning. Based on state-of-the-art Tunable Diode Laser Spectrometry (TDLS), the LGD modules have virtually no cross-sensitivity with other gases and feature an innovative, patented measurement principle eliminating the need for a reference-channel.

### Benefits

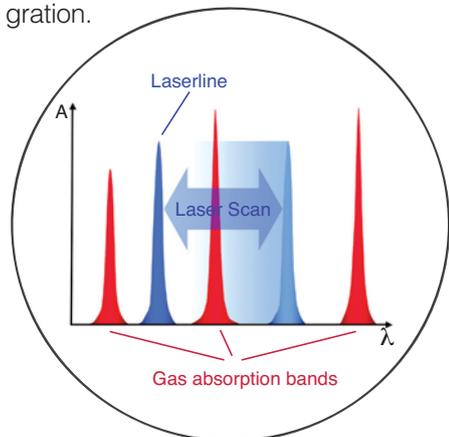
- Optical, contact-less, accurate laser measurement
- High selectivity
- Fast response
- Self-contained, easy to integrate
- Continuous sensor status monitoring
- Calibration-free
- Low cost-of-ownership
- Hot-gas measurement option up to 190°C

### Laser Gas Detection Applications

- Process control:  
SCR, incineration, combustion processes, ...
- Emission monitoring:  
power generation, engine development, ...
- Environmental monitoring:  
Landfills, green-house gases, livestock, ...
- Safety:  
Leak detection, refrigeration, toxic gases, ...
- Climate control & monitoring:  
Livestock, climate chambers & rooms, ...

### Technology Brief

Axetris uses proprietary technology-enhanced TDLS for gas detection, where a 0.1 nm narrow bandwidth diode laser beam is scanned across an absorption band of the target gas, performing a high-resolution near-infrared absorption measurement. Electronic lock-in technology allows separating the gas absorption information from electro-optical system information, leading to a detection method eliminating the need for a physical reference channel and offering continuous sensor status monitoring. Axetris' LGDs thus present a clear alternative to current sub-optimal detection solutions and combine precise, contact-less optical measurements with high target gas selectivity, calibration-free operation, low-cost-of-ownership and easy OEM integration.



## Application Examples

- **Monitoring of NH<sub>3</sub> slip in de-NO<sub>x</sub> processes based on Selective Catalytic Reduction (SCR)**

In power generation, NO<sub>x</sub> can be reduced by 99% with SCR where NH<sub>3</sub> is injected into the exhaust gas. This process is extensively used in power plants and has found its way into emission control of truck and car diesel engines. In all applications ammonia slip can occur, which either needs monitoring during operation or for system design and testing.

The LGD is a perfect tool for OEM integrators because it offers a contact-less low ppm-level measurement of NH<sub>3</sub> in a heated sample gas cell (190°C).



- **Environmental monitoring of methane green house & landfill gas**

CH<sub>4</sub> is a potent green house gas - about 25 times stronger than CO<sub>2</sub> and outgases from reservoirs, landfills and permafrost soils.

The LGD can reliably & selectively measure methane in low ppm concentrations without the need for frequent recalibrations. It is thus ideally suited for under-water or remote-site applications, e.g. in environmental research or for tasks related to the commerce of CO<sub>2</sub> certificates.



- **Ammonia monitoring & scrubbing in livestock climate, ventilation & emission control**

Livestock production is a major contributor to ammonia emission and presents a serious health & safety hazard for personnel and animals.

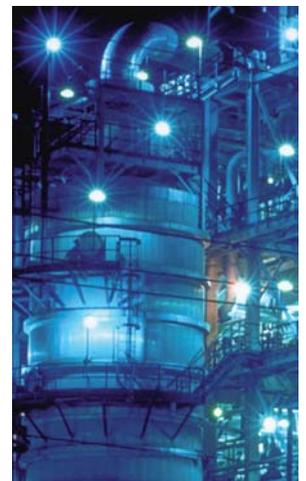
Since the LGD does not degrade over time like other detection solutions, it enables continuous, low ppm-range NH<sub>3</sub> monitoring in livestock related applications, where it is used for effective ventilation control and scrubbing installation management to reduce health threats and odor nuisance from stable discharge air.



## Detection Limits

Main Target Gases*		Precision 2σ ** 1 s integration time	Precision 2σ ** 10 s integration time
NH <sub>3</sub>	Ammonia ***	0.8 ppm	0.3 ppm
CH <sub>4</sub>	Methane	0.7 ppm	0.3 ppm
CO <sub>2</sub>	Carbon Dioxide	10.0 ppm	3.0 ppm

\*Other gases on request. \*\*Detection limits at constant system temperature, 20°C, 1013 hPa and 50 ± 1.5 % r.H. Detection limits may change where system temperature changes occur significantly faster than concentration changes, and/or where a difficult gas matrix is present. \*\*\* Detection limits at high temperature degrade due to spectroscopic reasons; e.g. NH<sub>3</sub> at 190°C, 10 s integration time: 0.8 ppm detection limit.





Corporate Headquarters of the Leister Group, Switzerland

## About Axetris AG

Axetris AG, a company of the Leister group, is serving OEM customers with micro technology based (MEMS) infrared light sources, laser gas sensors, mass flow sensors and controllers and micro-optical components used in industrial, process control, environmental, medical automotive and telecom applications.

Axetris supports its customers in many industries with in-depth application know-how. Our engineering and manufacturing teams combine broad experience in simulation, design, manufacturing and metrology from microchip level to advanced electronic and electro-optic

modules. Customers benefit from excellent product value, consistent high product quality and outstanding customer support. OEMs rely on Axetris as a competent and sub-system partner for a wide range of high-quality off-the shelf products as well as customer specific solutions from concept to volume production.

Axetris is ISO 9001 certified and ISO TS 16949 compliant and operates its own 6" to 8" wafer MEMS foundry in Central Switzerland for its own products and external customers.

## Contact

### Headquarters:

**Axetris AG, Switzerland**  
Schwarzenbergstrasse 10  
CH-6056 Kaegiswil  
Switzerland  
phone: +41 41 662 76 76  
fax: +41 41 662 75 25  
axetris@axetris.com  
www.axetris.com

### USA:

**Leister Technologies LLC**  
1275 Hamilton Parkway  
Itasca, IL 60143  
USA  
phone: +1 630 760 1000  
fax: +1 630 760 1001  
axetris@leisterusa.com  
www.axetris.com

### China:

**Leister Technologies Ltd.**  
Building A, 1588 Zhuanxing Road  
Shanghai 201 108  
China  
phone: +86 21 6442 2398  
fax: +86 21 6442 2338  
axetris@axetris.cn  
www.axetris.cn

### Japan:

**Leister Technologis KK**  
Shinyokohama Bousei Bldg 1F  
3-20-12, Shinyokohama, Kohoku-ku  
Yokohama 222-0033 / Japan  
phone: +81 45 477 36 37  
fax: +81 45 477 36 38  
axetris@axetris.jp  
www.axetris.jp