

BOREAL

Application Bulletin LASER

NH₃ Safety in Nitrogen Operations

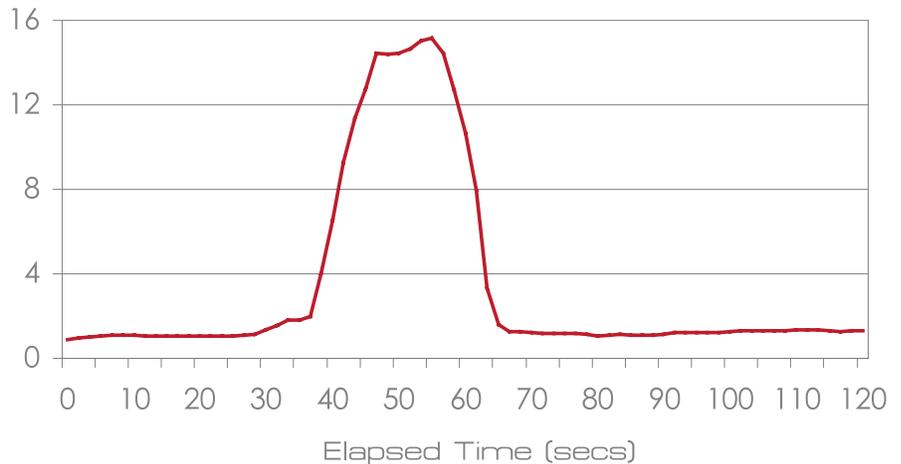
A nitrogen facility's primary activities consist of manufacturing nitrogen based chemicals. These substances include both anhydrous as well as aqueous ammonia. Anhydrous ammonia is a manufactured product, as well as a feedstock chemical in the urea production process. Aqueous ammonia is a by product of the urea production process. Ammonia is a dangerous chemical and the effects of exposure can range from mild irritation to death, depending on the concentration and length of time of exposure.

Existing NH₃ point sensors are maintenance extensive, slow to respond and provide limited coverage. Most NH₃ sensors do not work reliably in hot or cold weather, or in humid marine environments.

Open path monitoring with GasFinder detects NH₃ leaks from nitrogen operations quickly and unambiguously. Path lengths can be up to 1km. GasFinder can be used for fixed monitoring applications or for temporary protection of workers during construction projects.

Using the multiple path capability of GasFinderMC, it is now possible to provide complete facility perimeter coverage at relatively low cost. Linear array early warning detection systems, covering several kilometers with no breaks in coverage, can be established between large producing fields and nearby population centers.

GasFinders have been monitoring fence line levels of NH₃ at one US facility for 9 years, 75,000 hours of continuous trouble free operation.



Representation of NH₃ GasFinder response; fast, no memory effect and no loss in performance over time..

Features

Patented Features provide laser gas detector leadership in price, performance, and ease of use.

"No phase adjustment" detection technology enables paths from 1m to 1000m without requiring any phase adjustments or calibration.

Built in, permanent calibration reference cell means GasFinders are delivered calibrated stay in calibration and never need to be recalibrated.

Benefits

Low Cost of Ownership

- Low engineering, installation and training costs
- No consumables and no maintenance

Better than point sensor arrays

- NH₃ Specific - no interference from other gases
- 1 second response, 0.01ppm accuracy over 100m
- No hysteresis, returns to 0 after event
- Detects over a large area, not just single points
- Reliable performance in all conditions

Better than other open path monitors

- Self calibrating
- Easy set up and alignment
- Path lengths from 1 - 750m
- Portable operation possible

GasFinderMC/GasFinder2



How GasFinder Works

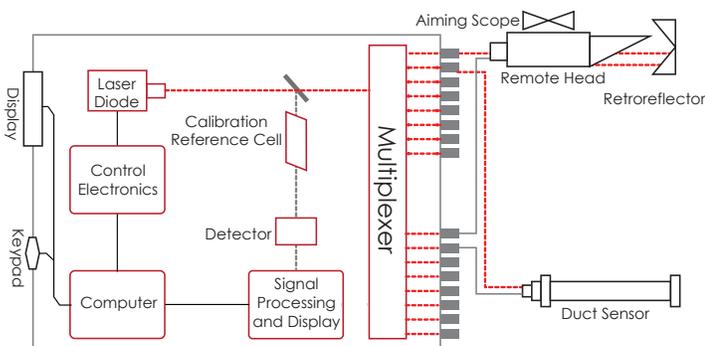
Boreal Laser's GasFinder and GasFinderMC are open path gas detectors that use an integrated transmitter/receiver unit and a remote, passive retro-reflector.

In GasFinder (see below) the transceiver also houses the laser diode, drive electronics, detector module and micro computer subsystems. The transceiver unit is contained in an IP65 enclosure and has connectors for power input and data I/O. Laser light is emitted from the transceiver through the atmosphere to the reflector and back. The return light is focused onto a photo diode. A portion of the laser beam is passed through an onboard reference cell to provide continuous calibration update. These two optical signals are then compared to determine the actual concentration of gas along the optical path. The computed gas concentration is displayed on the back panel of the instrument as well as being transmitted to a computer where the data may be displayed and stored.

In GasFinderMC a small Central Control Unit (CCU) contains the laser, electronics, and computer. Fibre optic cable carries the laser light to transmitter heads, which direct the beam along an open path to a reflector. The return light is collected on a photo detector and the photo current is carried to the CCU via coaxial cable. The transmitter heads are intrinsically safe. One CCU can monitor up to 8 heads.

Both GasFinder and GasFinderMC employ visible aiming lasers, making alignment easy and swift. The outgoing beam diverges and overfills the reflector, providing excellent tolerance to vibration and heating effects.

Schematic Representation



Operational Specifications

NH ₃ Sensitivity and Accuracy	Better than 1 ppm-m
Dynamic Range	4 orders of magnitude
Response Time	1 second default
Path Length	<1m to >1000m
Light Source	Semiconductor Diode Laser
Eye Safety	Class I or Class IIIa (ANSI) FDA/CDRH approved
Data I/O Interface Options	RS232, Modbus option 4-20 mA analog option Dry contact relay option
No. of paths	up to 8 (with GasFinderMC)

Physical Specifications

GasFinderMC

Central Control Unit

Weight: 12.0 kg [26.5 lbs]
Dimensions(W x D x H):
440 mm x 380 mm x 130 mm
[17.3 x 15.0 x 5.1 inches]
Power <1A@110Vac
Ambient Temp 0°C to 50°C

Duct Transceiver Unit

Weight: 4.5 kg [9.9 lbs]
Dimensions(L x dia):
300 mm x 160 mm
[11.8 x 6.3 inches]
Ambient Temp: -45°C to +80°C
Stack Temp: up to 300°C

GasFinder2

Weight: 5.0 kg [11.0 lbs]
Dimensions(L x W x H):
260 mm x 200 mm x 160 mm
[10.2 x 7.9 x 6.3 inches]

Open Path Transceiver

Weight: 4.0 kg [8.8 lbs]
Dimensions(L x dia):
350 mm x 100 mm
[13.8 x 3.9 inches]
Ambient Temp: -45°C to +80°C

Open Path Reflector

Example for 200m path
Weight: 9.0 kg [19.8 lbs]
Dimensions(L x D x H):
400 mm x 300 mm x 250 mm
10 corner cube elements
Exact configurations depends on path length

Ingress Protection: IP 65
Power: <2A@12Vdc
Ambient Temp: -30°C to +50°C

