Application Bulletin

BOREAL LASER GasFinder

Leak detection in natural gas pipelines

Natural gas pipeline owners require improved routine monitoring of pipelines for safety, economic and regulatory reasons. Leaking natural gas can cause explosions leading to loss of life and property. Loss of product through undetected leaks dramatically reduces a pipeline operator's profitability.

Traditional ground-based leak detection with hand-held or vehicle mounted FID detectors is slow and labour- and maintenance- intensive. IR detectors have been used for both airborne and vehicle mounted surveys, but with limited success because of cross interference from other atmospheric gases.

Boreal Laser's GasFinder CH4 detector enables both airborne and ground based pipeline monitoring with the same analyzer. With over 7 years of experience, and thousands of kilometers of pipeline surveyed, Boreal's GasFinder has detected many pipeline leaks that would not otherwise have been detected. Recently, the robust external probe, proven in the airborne system, has been adapted for ground based measurements on a truck or car.

Unlike other optical methods which can be confused by other gases present in air, the single line laser spectroscopy technology in the GasFinderFC responds only to methane.

One analyzer, two probe options:

1. **Airborne probe for helicopter surveys**
2. **Vehicle probe for truck or quad surveys**

BENEFITS

- Methane specific
- No interferences & no false alarms
- High resolution – 1 ppm
- Wide measurement range
- Fast response time – 0.25 seconds
- Survey vehicle can fly/drive at normal speed
- Self-calibrating—no calibration needed
- Direct measurement – no sample line
- Robust, solid state instrument
- No need for instrument operator
- Easy installation and removal
- Optional GPS

Above: GasFinderFC CH4 analyzer

Left: Probe mounted under aircraft. Foam shroud prevents dust and debris entering the cell, but allows free passage of air.

THE Standard in gas detection

GasFinder

How the Methane leak GasFinder works

The heart of the system is a GasFinderFC CH4 gas analyzer (see schematic below). The GasFinderFC houses a laser diode, drive electronics, and micro-computer subsystems. A fibre-optic cable carries the laser light to an external measurement probe (shown without shroud in the photo below). The laser light makes four passes through this probe and is focused on a photo-detector. The resulting photo current is returned to the GasFinderFC control unit via coaxial cable for analysis.

The measurement probe for airborne surveys has an effective path length of 2m. The probe employs a robust mechanical design with simple, stable optical components. It is provided with a foam shroud that prevents dust and debris entering the path, but allows free passage of ambient air into the measurement zone.

The vehicle probe employs the same basic design but is shorter with an effective path length of 1.5m.

A portion of the laser beam is passed through a stable built-in reference cell inside the GasFinderFC to provide a continuous calibration update. The measure and reference signals are compared to determine the actual concentration of gas in the probe. This value can be viewed on a display unit and is transferred via serial interface to a data logging PC. The serial data signal also includes comprehensive system diagnostics.

A GPS system provides spatial coordinates to the data-logging PC once a second, which enables CH4 data to be mapped along the flight profile.

Operational Specifications

Detection Limit & Resolution	<1 ppm (CH_4)
Range	0 to 100 ppm (CH_4)
Alarm settings	Programmable - default 10 ppm
Sampling rate	4 readings per second
Recommended flying speed	60 – 100 knots
Recommended altitude	150 – 200 feet
Maximum driving speed	60 km/hr

Physical Specifications

GasFinderFC

Weight	4.8 kg
Dimensions (L x W x H)	29 x 20 x 15 cm
Power Requirements	2A @ 12 Vdc
Ambient Temperature	-30°C to +50°C
Eye Safety Class	IIIa (as per ANSI Zi36)

External Airborne Probe

Weight	11 kg
Dimensions (L x W x H)	150 x 28 x 17 cm
Ambient Temperature	-30°C to +50°C

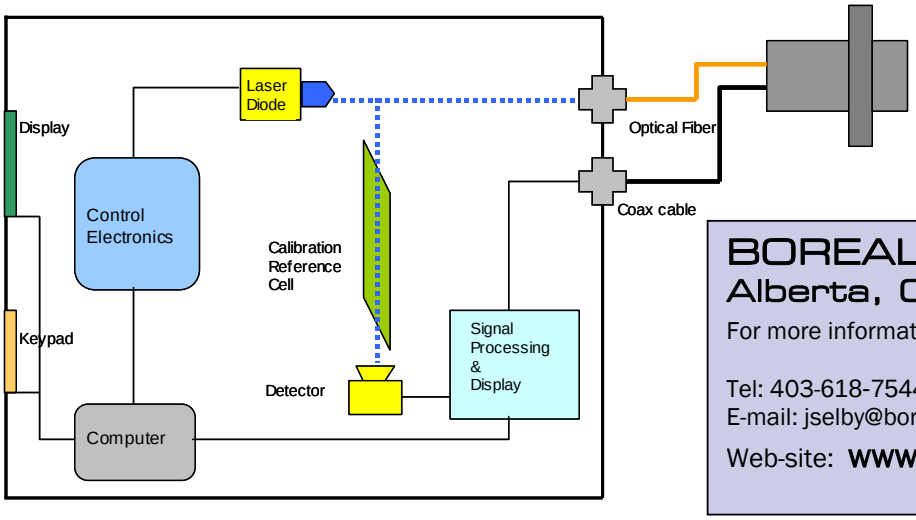
Transport Canada approvals for Eurocopter AS-355 TwinStar and Bell 206B JetRanger.

External Vehicle Probe

Weight	7.5 kg
Dimensions (L x W x H)	100 x 28 x 17 cm
Ambient Temperature	-30°C to +50°C

Accessories

GPS receiver	Display Unit with Alarm
Rugged laptop	28Vdc to 12Vdc Power Converter



Transmitter/Receiver unit with transmission and collection optics and photo-detector housed in:

- Fixed length probe
- Short path transmitter
- Long path transmitter
- Custom head

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