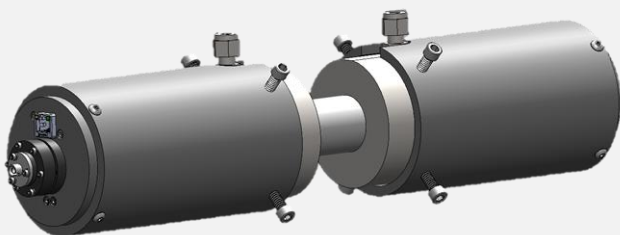




Extractive Measurement (EMX) Cell Laser Based – Extractive Gas Analysis

Enhanced Sensing Element



**Remotely Mounted
Extractive Measurement (EMX) Cell
with Variable Path Length**

Laser Based - Extractive Measurements

No sensor poisoning, fouling, or over-ranging

Fast Speed of Response + Recovery

New and independent result every second

No Sensor Poisoning + Over Ranging

Due to the GasFinder's Internal Reference Cell

Fail Safe Operation + SIL2 Suitable

Diagnostics with no undisclosed failure modes

Where and Why is it Used?

Thrives Where Others Do Not Survive

Separation of electronics from hot process temps.

Need for Enhanced Performance

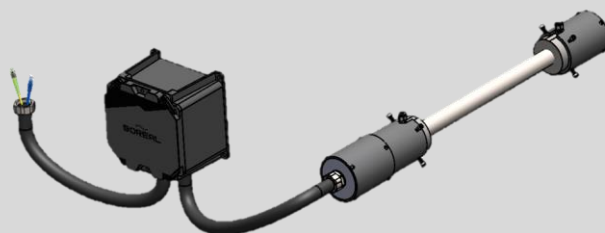
Fast quantitative results produced every second

Operational Cost Savings

Low maintenance burden and no consumables

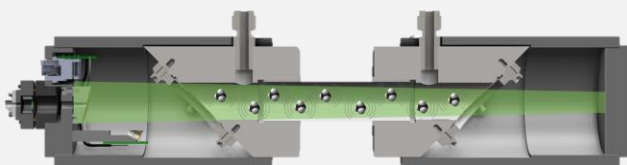
Use in Hazardous Area Applications

IIC T5 Tamb <70°C Gb (C1 Div1, G: A,B,C,D)



**Extractive Measurement (EMX) Cell Assembly
with Cable Length from 5-300m (15-1,000 ft)**

About Tunable Diode Laser (TDL)



**Target Gas Molecules shown passing through the
Active Measurement Path of the Extractive
Measurement (EMX) Cell**

Laser Light is the Sensing Element

Class 1 Eye Safe: Near Infrared (NIR) laser light

This Counts Target Gas Molecules

As the pass through the Active Measurement Path

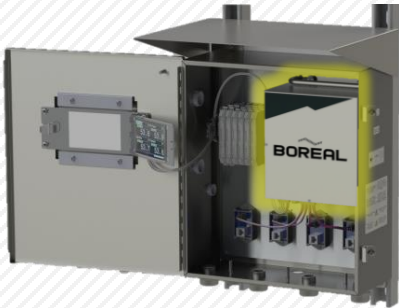
Quantifiable Volumetric Measurement

It knows which gas and how much is detected

No Cross Interference + No False Alarms

This only detects the specific target gas of interest

Laser Light is generated from the Laser Analyzer Module.



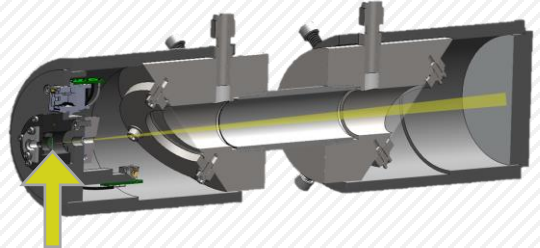
The Laser Light travels to the EMX Cell via Fiber Optic Cable.



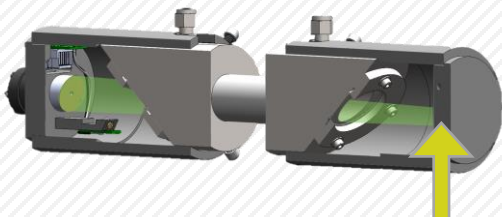
The Fiber Optic Cable is connected to the Optical Bench of the EMX Cell.



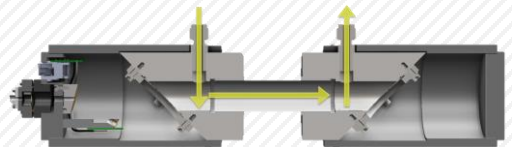
The Laser Light is Collimated and Launched from the Optical Bench.



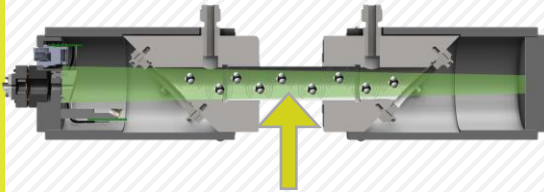
The Collimated Laser Beam enters the Retro-Array and is returned.



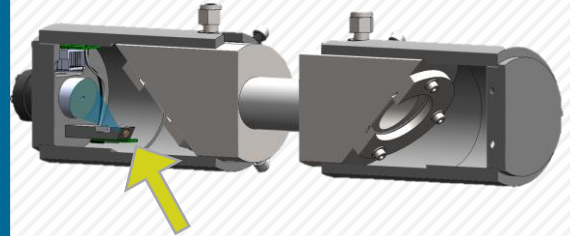
Wetted Process passes through the Extractive Measurement (EMX) Cell.



Any Target Gas Molecules present in the Laser Beam are “counted”.



The Collecting Optics focus the Laser Light on the Photodiode.



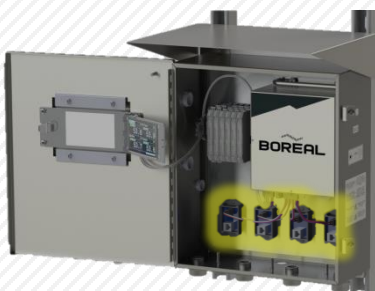
The Photodiode converts the Laser Beam to a small electrical signal.



Shielded CAT6/5e Cable carries the electrical signal to the GasFinder.



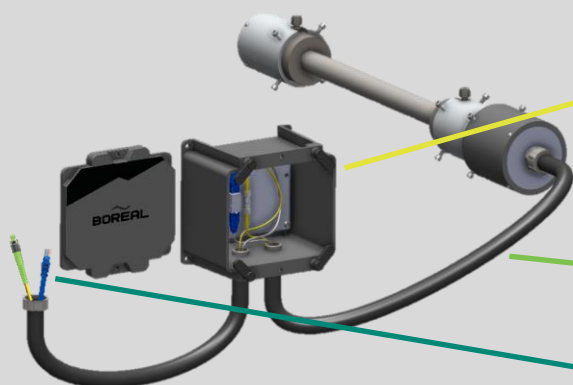
CAT6/5e Cables are landed in the GasFinder and performs its analysis.



The Data is then communicated via HART 7, Relays Outputs, & MODBUS.



Cabling Options



Extractive Measurement (EMX) Cell shown with Cable in Flex Conduit and a Measurement Head Junction Box

Measurement Head Junction Box

Allows for easy access to use Alignment Kit tools

Allowable Lengths of Cabling to GasFinder

Allows for easy access to use Alignment Kit tools

Cable Jacketing Options

Flex Conduit (<30m) & Standard or Armored (>30m)

Specific Cabling Used

Single Mode Fiber Optic and CAT6/5e Cabling

Extractive Measurement (EMX)

Retro-Cover

Returns the Laser Light back to the Transceiver

Window Fixture

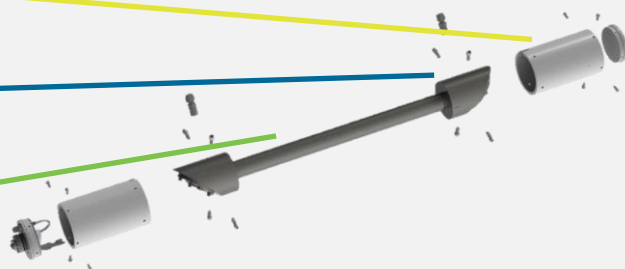
Houses the window, 1/4" FNPT, and 1" FPNT threads

Adjustable Path Length with 1" Pipe

Available in 1 m (3.3 ft), 0.5 m (1.6 ft), or no pipe

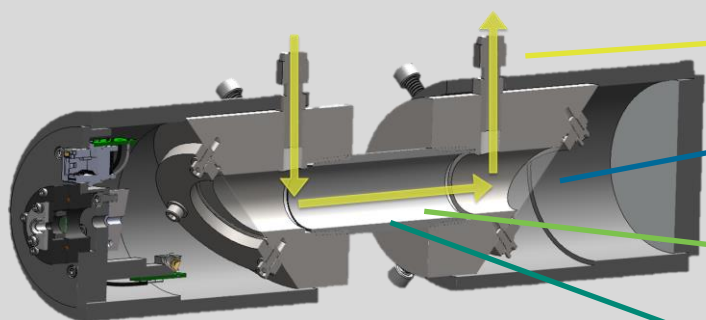
Transceiver Cover

Contains both the sending and receiving optics



Exploded view of the Extractive Measurement (EMX) Cell

Wetted Process Connections



Cross sectional view of the Extractive Measurement (EMX) Cell

1/4" FNPT Process Connections

Temperature Range: -55 to 120°C (-67 to 248°F)

Sapphire Windows

Pressure Range: 50 to 200 KPa (7.25 to 29 PSia)

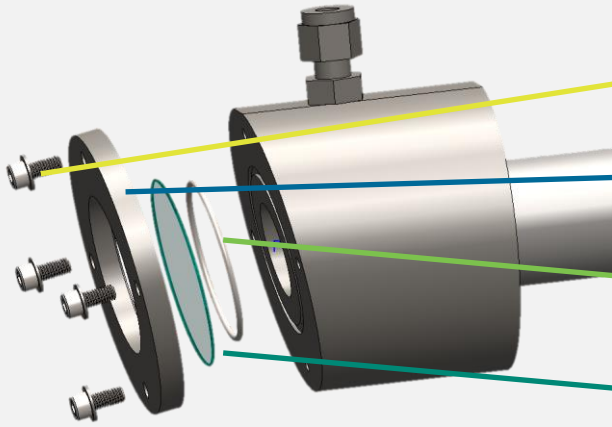
Wetted Process Flow Rate

Flow rate determined based on response time

Active Measurement Path

Is formed by the 1" NPT Pipe

Replaceable Sapphire Window



Four (4) Hex Keyed Screws

Simply remove to clean or replace the window

Retainer Ring

Holds the window to the Window Fixture

Gasket

Suitable gaskets materials can be sourced

Sapphire Window

Required to transmit Near Infrared Laser Light

Above is an exploded view of the Window Fixture showing the individual components

Alignment Kit

Optical Multi-Meter

Includes Laser Power Meter and Visible Laser

Remote Light Meter (RLM)

Provides indication of laser intensity for alignment

Fiber Cleaning Tape

To ensure FC/APC (Fiber) Connectors remain clean

Other Useful Components

IR Card, Grey Tape Retro-Arrays, & Connectors

Note: While the Alignment Kit is not required to perform alignment, it is a very useful and recommend accessory



Contents of the Alignment Kit

In-Line Response Cell



In-Line Response Cell shown

Note: There is no field calibration required or available

“Bump”, “Challenge”, & “Verify”

That GasFinder responds to actual target gas

End-to-End Verification

See response within Active Measurement Path

Ease of Use Design

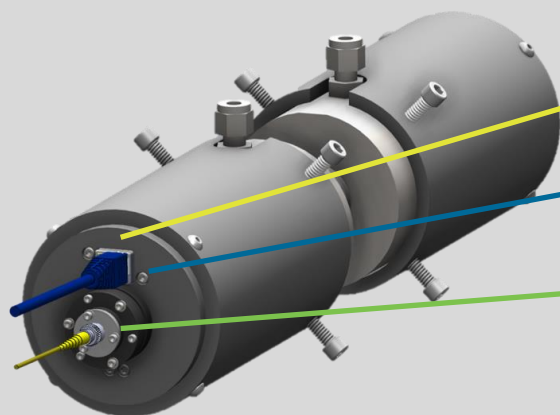
The handle and Retro-Flap provide easy handling

Target Gas Availability

HF is only available in the In-Line Response Cell

Cabling Connections

Note: The Extractive Measurement (EMX) Cell is a passive device and does not require power to operate.



Optical Bench

Removable from enclosure for easy terminations

RJ45 Connector for CAT6/5e Cable

Includes the Photodiode Amplifier Board

FC/APC Connector for Fiber Optic Cabling

Used with Single Mode Fiber Optic Cabling

Cable Connection

Fitting and Cabling included within Assembly

Optical Bench (Transceiver)

Note: This optical configuration is called a bi-static as it contains both the sending and receiving optics on one side

Optical Bench

Removable from enclosure for easy terminations

Launch Optics

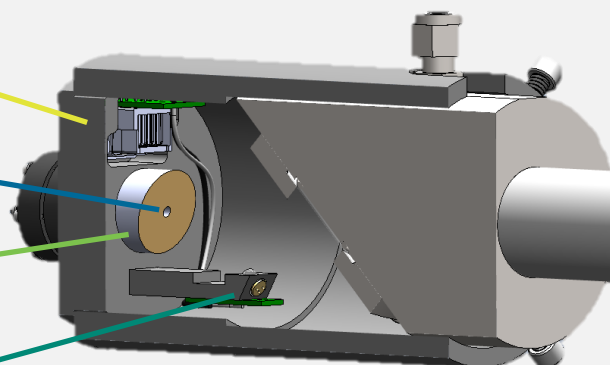
The collimated beam is launched via this hole

Photodiode

Converts the laser light to a small electrical signal

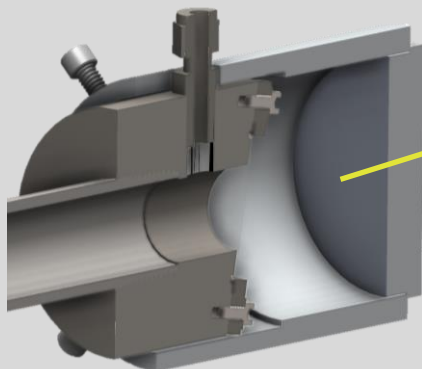
Collecting Optics

Converts the laser light to a small electrical signal



Cross Sectional Diagram and Overview of the Components of the Optical Bench

Retro-Reflector



Cross Sectional Diagram of the Retro-Cover showing the Grey Tape Retro-Array

The Retro-Array Returns the Laser Light

Back to the Open Path (OPX) Head for analysis

The Laser Light is Always Reflected 180°

Due to the orientation of the three faceted mirror

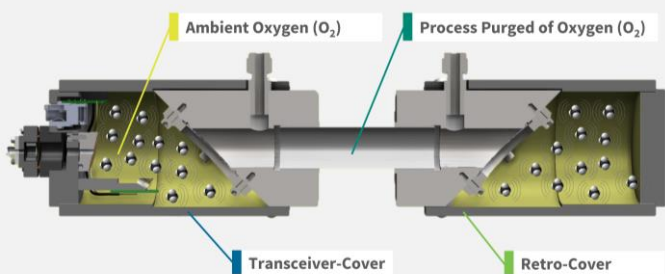
Easily Obtain + Maintain Alignment

Only the Transceiver needs to be aligned

Superior Tolerance to Vibration

Optimized for use in short/long path applications

No Purge Required for Oxygen



Ambient concentrations of Oxygen (O_2), shown in yellow, are made in addition to the Process Measurement. Ambient Concentrations help measurement immediately exceed the Minimal Detectable Limit (MDL).

We Measure the Ambient O_2 Background

This brings the measurement above the MDL

Zero Process Oxygen (O_2) = 40,000 ppm (4%)

4mA on Analog Loop = Ambient Background

No Nitrogen (N_2) Purge Required

This saves the maintenance burden of bottled N_2

Obtain the Highest Possible Performance

Immediately make O_2 measurements with MDL

Utilize Redundant EMX Cells

EMX #1 (Primary) – Run Until Foul or Dirty

Light Level (Rx) shows cleanliness of the windows

EMX #2 (Secondary) – Easily Bring On-Line

Redundant system ready and waiting to be used

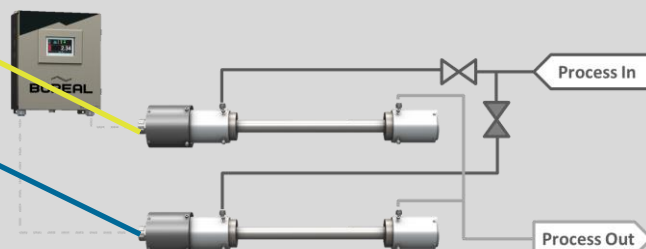
Quickly Return to Operation

With simply opening/closing valves to bring on-line

Easy on the Maintenance Planner

Extra EMX Cell takes the urgency of repair away

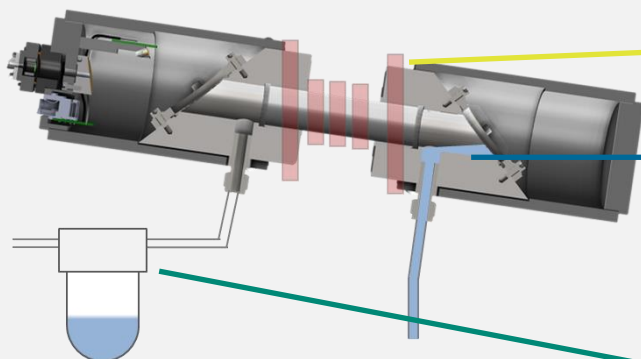
Note: The two (2) Extractive Measurement (EMX) Cell can be run in either series or parallel



Since the GasFinder3-MC can support multiple Measurement Heads, it allows for redundant installations

Integration Tips & Tricks

Note: See the General Arrangement Drawings for specific dimensions



Illustrative example of tips and tricks

Heat Trace or Heated Enclosure

Keep condensation from building on windows

Angled Installation

If condensed liquids do enter, allow them to drain

Allow Room for Removal of Covers

Have easy access to clean/replace windows

Filters + Knock-Out Pots

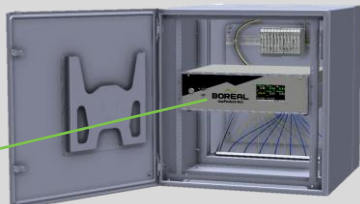
Keep condensed Liquids from entering the cell

Next Step: Pick your GasFinder



GasFinder3-MC
(Field Mount)

GasFinder3-MCr
(Rack Mount)



Click on the Images above to visit the
respective Webpages

Two (2), Four (4), or Eight (8) Channels

Enables the use of multiple Measurement Heads

No Calibration + No Intervention

Due to Internal Reference Cell & Fail-Safe Design

Certified for use in Hazardous Areas

(A)Ex ib Gb IIC T4 Tamb <65°C (C1 Div2, G: A,B,C,D)

HART 7, Relay, and MODBUS Outputs

24 VDC @ 20 Watts with 4A Cartridge Fuse

Take a Look at these Resources

Visit our Website

Where there is much more you can read about

Instrument Data Sheets

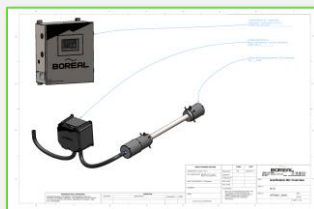
Invaluable resource for designing the installation

General Arrangement Drawings

Where there is much more you can read about

Detailed Instructions

Step-by-step guide through installation + support



Click on the Image above to access these Resources

Detectable Gases with TDL

Temperature Range: -55 to 150°C (-67 to 300 ° F)
Pressure Range: 50 to 200 kPaa (7.25 to 29 psia)

HF

Hydrogen Fluoride

HFL: 0.4 - 250 ppm-m
HFH: 1 - 1,000 ppm-m

H₂S

Hydrogen Sulfide

H2SL: 100 - 100,000 ppm-m
H2SH: 1,000 - 500,000 ppm-m

CH₄

Methane

CH4L: 2 - 8,500 ppm-m
CH4H: 100 ppm-m - 10 LEL-m

CO₂

Carbon Dioxide

CO2L: 120 - 80,000 ppm-m
CO2H: 1,000 - 500,000 ppm-m

CO

Carbon Monoxide

COL: 8 - 8,500 ppm-m
COH: 250 - 500,000 ppm-m

NH₃

Ammonia

NH3L/H: 8 - 6,500/15,000 ppm-m
NH3UH: 0.4 - 100%-m

HCN

Hydrogen Cyanide

HCN: 8 - 2,500 ppm-m

HCl

Hydrogen Chloride

HCl: 2 - 2,500 ppm-m

C₂H₄

Ethylene

C2H4: 20 - 15,000 ppm-m

C₂H₂

Acetylene

C2H2: 4 - 2,500 ppm-m

O₂

Oxygen

O2: 2,500 - >1,000,000 ppm-m

H₂O

Water Vapor

Various Ranges Available

Rev: Aug. 31st 2022