

**LASER BASED - OPEN PATH GAS DETECTOR  
ISA DATA SHEET**



<b>Highlighted Specifications (Quick Glance Guide)</b>	1	Manufacturer / Product Name / Model	Boreal Laser Inc. / GasFinder Line-of-Sight / GasFinder-SP	
	2	Technology Type (Measurement Principle)	Laser Based - Open Gas Detector (Tunable Diode Laser Absorption Spectroscopy)	
	3	Warranty Period	10 years on Laser (Light Source) and 3 years Full Warranty	
	4	Hazardous Area Classification	Intertek Certified (US/CAN): Class 1, Zone 1, AEx db ib IIC T5 Gb	
	5	Hazardous Area Classification	ATEX Certified: Class 1, Zone 1, II 2 G Ex db ib IIC T5 Gb - Pending Certification	
	6	Eye Safety	Class 1 AEL under IEC 60825-1 (e.g. No Engineering Safeguards or PPE Required)	
	7	Safety Integrity Level	SIL2 Capable Hardware as per FMEDA Analysis in IEC/CSA-C22.22.2 No. 61508	
	8	Performance Standards	Verified per ANSI ISA-92.00.04-2014 Performance Requirements for Open Path Toxic Gas Detectors	
	9	Material of Construction	6061-T6 Aluminum, Powder Coating Tiger Drylac 138 (All External Components)	
	10	Ingress Protection	IP 66 & NEMA Type 4X	
	11	Operating Temperature Range	-50 to 65°C (-58 to 149°F)	
	12	LED Status Indication (Front & Back)	Status Conditions: Green = Fully Functional, Yellow = Misaligned/Beam Block or Fault, Red: Gas Alarm	
	13	LCD Display	Concentration, Light Level (Alignment), Status (Beam Block, Fault, & Gas Alarm), Time Delay Settings	
	14	Communication Outputs	HART 7 (over Analog), Dry-Contact Relay, & MODBUS	
	<b>General Mechanical Information</b>	15	Mounting Orientation Relative to Structure	Top Mount, Bottom Mount, or Side Mount (Hanging, Perched, or Vertical)
		16	Tools Required to Perform Alignment	None - Everything needed to perform the alignment is integral to the GasFinder Line-of-Sight
17		Components Included	GasFinder Line-of-Sight: Instrument Enclosure, Sunshield, and Alignment Mount	
18		Material of Construction	6061-T6 Aluminum, Powder Coating Tiger Drylac 138 (All External Components)	
19		Overall Dimensions (LxWxH)	57 x 29 x 29 cm (22.4 x 11.5 x 11.5 inches)	
20		Instrument Weight	6.5 kg (13 lbs)	
21		Alignment Mount Weight	4 kg (9 lbs)	
<b>Enclosure Specifics</b>	22	Overall Weight	10.5 kg (23 lbs)	
	23	Shipping Weight	12 kg (26 lbs)	
	24	Material of Construction	6061-T6 Aluminum, Powder Coating Tiger Drylac 138 - Instrument Enclosure, and Sunshield	
	25	Hazardous Area Classification	Class 1, Zone 1, AEx db ib IIC T5 Gb	
	26	Method of Protection	Two Parts: Explosion Proof (XP Enclosure) and Intrinsic Safety (IS Section)	
	27	Ingress Protection	IP 66 & NEMA Type 4X	
	28	Operating Temperature Range	-50 to 65°C (-58 to 149°F)	
<b>Alignment Mount</b>	29	Storage Temperature	-50 to 65°C (-58 to 149°F)	
	30	Cable Entries and Size	Three (3) - 3/4" FNPT Entries	
	31	Cable Glands/Fittings	Not included and to be supplied by End-User to meet local electrical standards and area classifications	
	32	Sunshield	Standard sunshield included. Extended shroud available as optional accessory.	
	33	Material of Construction	6061-T6 Aluminum, Powder Coating Tiger Drylac 138	
	34	Mounting Orientation Relative to Structure	Top Mount, Bottom Mount, or Side Mount (Hanging, Perched, or Vertical)	
	35	Locking Mechanism	Integrated Handle on the Alignment Mount to provide mechanical advantage needed	
<b>Alignment Tools</b>	36	Adjustment Mechanism	Integrated Adjustment Knobs	
	37	Connecting Enclosure to Alignment Mount	3/16" hex Coupling/Extractive Bolt to easily affix or remove the Enclosure	
	38	Degrees of Adjustments	18° total angle pitch and yaw	
	39	Tools Required to Perform Alignment	None - Everything needed to perform the alignment is integral to the GasFinder Line-of-Sight	
	40	Status/Operability During Alignment	GasFinder Line-of-Sight remains fully functional and maintains its area classification	
<b>Optical Specifications</b>	41	Rough Alignment (Integrated Tool)	Scope located on top of the GasFinder Line-of-Sight	
	42	Coarse Alignment (Integrated Tool)	LED Status Indication located on the front and back of the GasFinder Line-of-Sight	
	43	Fine Alignment (Integrated Tool)	LCD Display provides indication of amount of received Laser Light (Rx)	
	44	Function	Detects free gaseous molecules of one (1) specific target gas within the Active Measurement Path	
	45	Detection/Operating Principle	Tunable Diode Laser Absorption Spectroscopy (TDLAS)	
	46	Sensor Type	One (1) Semiconductor Diode Laser which emits Laser Light in the Near Infrared (NIR)	
	47	Eye Safety	Class 1 AEL under IEC 60825-1 (e.g. No Engineering Safeguards or PPE Required)	
	48	Optical Configuration	Transceiver and Retro-Reflector (Mono-Static)	
	49	Beam Divergence (Laser Dot Size)	0.05° / 0.9 milliradian (milliradian x path length (m) = laser dot size (mm))	
	50	Obscuration / Beam Block	Operates down to 97% Obscuration (40x Turndown)	
<b>General Performance Specifications</b>	51	Solar Blind	No False Positives from Solar Interference	
	52	Active Measurement Path - Temperature	-50 to 300°C (-58 to 600°F)	
	53	Active Measurement Path - Humidity	0-100% RH (Non-Condensing)	
	54	Active Measurement Path - Pressure	50 to 200 kPaa (7.25 to 29 psia)	
	55	Window Material	Lexan, Mylar, or Teflon	
	56	Safety Integrity Level	SIL2 Capable Hardware as per FMEDA Analysis in IEC/CSA-C22.22.2 No. 61508	
	57	Performance Standards	Verified per ANSI ISA-92.00.04-2014 Performance Requirements for Open Path Toxic Gas Detectors	
	58	Response Time	1.6 Seconds per Sample	
	59	Recovery Time	Instantaneous (Each sample is independent of the last)	
	60	Beam Block Time Delay	Default - 30 Seconds (Configurable Range: 0-300 Seconds)	
61	Gas Alarm Time Delay (Relay Output Only)	Default - 3 Seconds (Configurable Range: 0-5 Seconds)		
62	Accuracy	±2% of Reading		
63	Drift	±0.1% over operating temperature and pressure ratings		
64	Warm-up / Start-up Time	~2 Minutes @ 20°C (68°F) - variable for colder ambient temperatures		
65	Communication Outputs	HART 7 (over Analog), Dry-Contact Relay, & MODBUS		
66	EMI/RFI	Pending		

<b>Intervention, Calibration, Diagnostic, and Fail-Safe Capabilities</b>	67	Calibration	Factory calibrated with no requirement for periodic/inherent calibration
	68	Field Calibration	None Required or Available
	69	Automatic Validation	Internal Reference Cell (interrogated once a minute to ensure laser light emitted is at correct wavelength)
	70	User Function Testing	External Response Cell to "bump", "test" or "challenge" response to the target gas (Optional Accessory)
	71	Fault Diagnostics	Fail Safe Operation - Status Codes via Outputs, LEDs, LCD Display, HMI Service Module, and Logfiles
	72	User Intervention on Start-up	None Required (if Aligned)
	73	LED Status Indication (Front & Back)	Green = Fully Functional, Yellow = Misaligned/Beam Block, or Fault, Red = Gas Alarm
	74	LCD Display	Concentration, Light Level (Alignment), Status (Beam Block, Fault, & Gas Alarm), Time Delay Settings
<b>Power Requirements</b>	75	Internal Data Logging	User has access to 20 years worth of storage capacity via USB Stick
	76	Accessing Logfiles and Arrays	USB Thumb drive will automatically download daily Logfiles/Array at midnight each night
	77	Input Voltage Required	24 VDC (24-30 VDC)
	78	Input Power Wiring Options	4-Wire Isolated (Passive/Sink), 3-Wire (Active/Source), and 3-Wire (Passive/Sink)
	79	Polarity Protection	Internal biasing diode for reverse polarity protection
	80	Power/Communication Terminals Size	16 AWG recommended, 14-24 AWG
<b>Analog Output</b>	81	Power Consumption	20 Watts under Normal Operation
	82	In-Rush Current	Non-Hydrogen Fluoride (HF): 2.5A for 100ms & Hydrogen Fluoride (HF): 3.1A for 100ms
	83	Recommended External Fuse	4A Fast Blow Fuse
	84	Number of Analog Loops	One (1) HART 7 over Analog Loop
	85	HART	PV = ppm-m, SV = Light Level (Rx), TV = R2 Confidence Factor (R2), QV = 2nd ppm-m (Full Scale)
	86	Device Drivers	Available for download at <a href="http://www.boreal-laser.com">www.boreal-laser.com</a>
	87	Supply of Loop Power	4-Wire Isolated (Passive/Sink), 3-Wire (Active/Source), and 3-Wire (Passive/Sink)
	88	Configurable Analog Output Options	Concentration (ppm-m, ppm, %, or mg/Nm3), Light Level (Rx), & R2 Confidence Factor (R2)
	89	Analog Range Settings	Gas Specific, See Gas Specifications
	90	Analog Load Impedance	1,000 ohms (4 Devices)
	91	Analog Range	0-20 mA
<b>Relay Output</b>	92	Low Light Alarm (Beam Block)	2.7 mA
	93	General System Fault	3.6 mA
	94	Number of Relay Outputs	One (1) Isolated Digital Relay
	95	Configurable Relay Output Options	Hi-Alarm, Hi-Hi-Alarm, Low Light (Low Rx), Alarm, & General System Fault
	96	Contact Relay Type	Voltage Free (24 V, 1A Max)
	97	Terminals	Normally Open (N/O), Normally Closed (N/C), and Common (COM)
<b>MODBUS</b>	98	Alarm Threshold Settings	User Programmable via Wireless Interface, HMI Touchscreen, or HART Communicator
	99	Alarm Delay	Default - 3 Consecutive Samples (User Programmable from 0 to 5 Consecutive Samples)
	100	Beam Block Time Delay	Default - 30 Consecutive Samples (User Programmable from 0 to 300 Consecutive Samples)
<b>Interface Options</b>	101	MODBUS	RS-485 - See Address Register Map for more information
	102	Commonly Used Registers	Concentration (ppm-m) - 41001, Light Level (Rx) - 41101, & Confidence Factor (R2) - 41061
	103	LED Status on Front and Back	LED Status Colours: Green = Normal Operation, Yellow = Beam Block/Fault, Red = Gas Alarm
	104	Wireless Interface	Full Configuration & Alignment Capabilities: Wi-Fi Transmitted to Mobile/Tablet/Computer
<b>Retro-Reflector (Separate from the GasFinder3-LoS)</b>	105	HMI Service Module (Optional Accessory)	Full Interface Capabilities: Configuration, Alignment, Access to Logfiles, and Upload Firmware
	106	HART Communicator (User Supplied)	Limited Interface Capabilities: Basic Commissioning including Alignment - Laser Light (Rx)
	107	Retro-Enclosure - Material	304 Stainless Steel (SST), Powder Coated Steel, or Fiberglass Reinforced Plastic (FRP)
	108	Retro-Enclosure - Rain/Dust Hood	Included with Retro-Enclosure
	109	Retro-Enclosure - Temperature Range	-45°C to +120°C (-49°F to 248°F)
	110	Retro Enclosure - Cable Entry	None
	111	Retro Enclosure - Cable Glands	None
	112	Retro-Enclosure - Window Material	Lexan, Mylar, or Teflon (Gas/Application Dependent)
	113	Retro-Enclosure - Area Classification	None
	114	Retro-Enclosure - Ingress Protection	None, Weathertight
	115	Retro-Array - Short Path Lengths	Grey Tape (G) = 0.5-5 m or IMOS (M) = 5-20 m
	116	Retro-Array - Medium Path Lengths	Wafer (W) = 20-50 m
	117	Retro-Array - Long Path Lengths	Fourteen (14) Cornercube = 50-100 m or Twenty-One (21) Cornercube = 50-200 m
	118	Retro-Array - Cornercube Specification	63.5 mm (2.5") Cornercube at 30 arc-seconds
	119	Retro-Heater - Power Options	24 VDC @ 25W or 110-240 VAC @ 50W
	120	Retro-Heater - Thermostat	40°C Thermostat
	<b>Recommended Accessories</b>	121	Retro-Heater - Area Classification
122		Retro Heater - Termination	Heater and Thermostat are Mounted with flying leads (to be installed as per local electrical standards)
123		Retro-Reflector - Total Weights - SST	Small SST - 7.3 kg (16 lbs) & Large SST - 15 kg (34 lbs): Includes Enclosure, Largest Array, and Heater.
124		Retro-Reflector - Total Weights - FRP	Small FRP - 3.6 kg (8 lbs) & Large FRP - 10.4 kg (23 lbs): Includes Enclosure, Largest Array, and Heater.
125		Post Mounted Bracket	Stainless Steel Bracket for mounting the GasFinder-LoS onto a 4-6" Post (No Hardware Included)
	126	Response Cell	Used for Functional Testing - to "bump", "test" or "challenge" response to the target gas
	127	HMI Service Module	Handheld Touchscreen Display that connects via RJ12 Connector