

# Ultima<sup>®</sup> OPIR-5 Open Path Infrared Detector Engineering Specification

## 1.0 GENERAL DESCRIPTION

The open path infrared gas monitoring system shall consist of an infrared source and a microprocessor based IR receiver unit. This system will measure gas concentrations by an IR method based on absorption of IR radiation as it passes through a volume of gas. The gas to be measured must be infrared active like hydrocarbons and the corresponding output of the system will be expressed in both 0-5 LEL-meter and 0-5000 ppm-meter (methane) or 0-1 LEL-meter and 0-2000 ppm-meter (propane).

## 2.0 SYSTEM SPECIFICATIONS

- 2.1 MEASUREMENT RANGE: The system shall have two independent measurement ranges of 0 to 5 LEL-meter and 0 to 5000 ppm-meter of methane or 0 to 1 LEL-meter and 0 to 2000 ppm-meter (propane).
- 2.2 PATH LENGTH: The Path length shall be 5 to 100 meters (16 to 328 ft) from source to receiver, with product configurations for 5 to 30 meters (16 to 98 ft) or 20 to 100 meters (66 to 328 ft).
- 2.3 SPLIT RANGE: The system shall be able to measure ppm-m and LEL-m concentrations using a single 4 – 20 mA analog output signal by dividing the analog range between 4 and 20 mA into two scales (split range mode).
- 2.4 RESPONSE TIME: The response time when exposed to full scale gas concentration shall be T90 < 5 seconds.
- 2.5 REPEATABILITY: System repeatability shall be ±5% of last reading for each scale. No traditional routine calibration shall be required. Alignment will be performed without opening the enclosure.
- 2.6 MODES OF OPERATION: The system must have three specific modes of operation for applying a test gas, selection of user defined options, and alignment of the source and receiver.
- 2.7 APPROVALS: The system shall be designed to meet certifications for CSA Class I, Division 1 & 2, Groups B, C, and D; Class II, Div. 1 & 2, Groups E, F, and G; Class III; and ATEX Class I, Zone 1, IIB+H<sub>2</sub>; II 2 G D, Ex d IIB+H<sub>2</sub> T4 Gb Ex tb IIIC T135°C Db.
  - 2.7.1 The device shall be IEC 61508 certified to SIL 3
  - 2.7.2 The system must meet the performance requirements of FM 6325, EN 50241-1, -2, and IEC 60079-29-4.
  - 2.7.3 The system shall have a weatherproof rating of Type 4X, IP66/67.

## 3.0 MECHANICAL SPECIFICATIONS

- 3.1 DIMENSIONS: Housing size for the IR source and receiver units shall be:
 

Source:	5.3" Dia x 12.4" Length (135 mm Dia. x 315 mm Length)
Receiver:	5.3" Dia x 12.4" Length (135 mm Dia. x 315 mm Length)
- 3.2 MATERIAL: The enclosure material shall be 316 stainless steel. Weight for the system components shall be:
 

Source:	12.2 lbs (5.53 kg)
Receiver:	12.34 lbs (5.6 kg)
- 3.3 CONDUIT ENTRIES: There shall be two conduit entries supplied with ¾" NPT or M25 x 1.5-6H.

## 4.0 ELECTRICAL SPECIFICATIONS

- 4.1 POWER: The operating voltage shall be 24 VDC nominal with a range of 20-36 VDC.
  - 4.1.1 Power consumption for the system shall be:
 

Source:	24 VDC @ 12 W (max.) with relays
Receiver:	24 VDC @ 10 W (max.) with relays, 24 VDC @ 5 W (max.) with no relays, no heater
- 4.2 ALARM OUTPUTS: Standard alarm outputs shall include two (2) 4-20 mA signals (600 ohm load max.) and four (4) SPDT relays as follows:

	<u>0-5000 ppm-meter</u>	<u>0-5 LEL-meter</u>
0 mA*	Startup/Fault	Startup/Fault
1.5 mA*	Test Gas/Setup	Test Gas/Setup
2 mA*	Beam Block	Beam Block
4-20 mA**	0-5000 ppm-m	0-5 LEL-m
4-12 mA***	0-5000 ppm-m	-----
12-20 mA***	-----	0-5 LEL-m
21.7 mA	Over-range	Over-range

\* HART units can be configured to never output current less than 3.5 mA if the host equipment is incapable of working below this level.

\*\* 0 to 2000 ppm-meter and 0 to 1 LEL-meter on propane unit.

\*\*\* Using optional split range

- 4.3 RELAYS: The internal relays shall be four (4) SPDT, 8 amperes @ 30 VDC resistive max.; 250 VAC; ppm-meter Alarm, LEL-meter Warning, LEL-meter Alarm and Fault.
- 4.3.1 Relay options shall be software selectable for:  
Latching/Non-Latching Warning and Alarm  
Energized/De-Energized Warning and Alarm
- 4.4 ALARM SET POINTS: Warning & Alarm level set-points set in 0.5 LEL-meter (0.2 LEL-meter) increments from 2.0 to 4.5 LEL-meter and 500 ppm-meter (0.8 to 1.8 LEL-meter and 200 ppm-meter) increments from 2000 to 4500 ppm-meter (800 to 1800 ppm-meter).
- 4.5 DISPLAY: The IR receiver unit shall have a two digit, seven segment digital display which automatically changes ranges between ppm-meter and LEL-meter scales.
- 4.5.1 In addition, a LED indication of scale displayed shall be present.
- 4.6 FAULT DIAGNOSTICS: The system shall have fault diagnostics and fault codes (F0-F11) shall be displayed on the digital display for specific fault indication):
- F0 – Excessive negative drift or high IR
  - F1 – Partial beam block or dirty lens
  - F2 – Alignment
  - F3 – Beam block
  - F4 – Not used
  - F5 – Setup menu
  - F6 – Low supply voltage
  - F7 – Heater
  - F8 – Failed zeroing
  - F9 – Gas left
  - F10 – Reset short
  - F11 – Unit overheating
  - tF7 – Source internal failure
- 4.7 OTHER DIAGNOSTICS: The optical path will be continuously tested for beam block (100% block) and will indicate a fault if blocked for longer than 30 seconds.
- 4.7.1 The system shall have an automatic gain control which will adjust for signal reduction of the reference wavelength. The system shall provide a field background zero adjustment.

## 5.0 ENVIRONMENTAL SPECIFICATIONS

- 5.1 OPERATING TEMPERATURE: The operating temperature of the system shall be -67°F to +149°F (-55°C to +65°C).
- 5.2 HUMIDITY: The operating humidity range of the system shall be 0 to 95% RH, non-condensing.

## 6.0 WARRANTY

- 6.1 The detector's warranty shall be 2 years or greater.

## 7.0 MANUFACTURER

- 7.1 The manufacturer must be capable of supplying all equipment used to check or calibrate the sensor/transmitter units.
- 7.2 The manufacturer must be capable of providing on-site training for owner/operator.