APPLICATIONS

Open path gas detection complements point detection and can be used as a component in a total system solution.

The Model IR5000 can be used in applications where a single monitor covers a line of several potential leak sources. For example, a row of valves or pumps. The Model IR5000 can also be used for perimeter monitoring which assumes greater coverage over wider areas than point detection. For example, fence line monitoring, tank farms, gas spheres or process areas of refineries.

Other applications for the Model IR5000 include areas which are environmentally unfriendly to point gas detection. Poisonous, water-spray, and extreme temperature are typical problems where open path gas detection can be used.
Gas leaks can either form a relatively stationary cloud or rapidly disperse depending upon several factors such as wind, rate of leak, and weight of the leaked gas compared to air. Two main gas leakers are categorized:

1. **Elongated** or has an irregular pattern concentration towards the edges.
2. **Gas Concentration** of a cloud is at a typical gas cloud. First, the highest will generally have the following environmental factors. Compared to air, to name just a few and weight of the leaked gas factors such as wind, rate of leak,

**Typically, light gases like methane do not diffuse symmetrically** but have a tendency instead to spread vertically rather than in a horizontal direction. Heavy gases tend to build up into a cloud, even in a calm wind. As wind increases in intensity, gas clouds will disperse faster. Gas concentration measured by the General Monitor Model IR5000 is the average measurement over the path length which includes gas. The gas concentration measured by the Model IR5000 is an absorption of IR radiation (3 to 4 micron range) as it passes through a focusing lens and then an infrared active wavelength. The IR5000 detector receiver module. This Open Path Gas Monitoring System measures only infrared active gases, such as hydrocarbons, and the corresponding output of the system is expressed in equivalent parts-per-million in a path length of one meter (ppm•meter) and equivalent lower explosion limit in a path length of one meter (LEL•meter) simultaneously.

The Model IR5000 utilizes a single detector design to monitor gas concentration. This technology provides improved accuracy, reliability, and a pr oduct of the average gas concentration and the path length. The same 5000 ppm•meter scale for methane until the gas concentration exceeds 5000 ppm•meter. Once the upper limit has been assessed, the display scale automatically switches to the 0 to 5000 ppm•meter measurement scale (for methane).

Another advantage of the Model IR5000 is the AutoTRACK alignment which simplifies initial set-up and installation. By using the digital display as a position indicator, alignment is made easy to achieve the source and receiver. The operator simply monitors the digital display for alignment cues which will direct the user to proper alignment with the source. The digital display will then prompt the user to perform additional alignment tasks if necessary. The equipment is calibrated for set-up and the housing remains closed. The Model IR5000 provides multiple outputs for interfacing in a variety of applications. Alarm outputs include two 4-20mA signals and SPDT relays for warning, alarms and fault. Most options of the Model IR5000 simplify system design and troubleshooting. Another consideration is the AutoZERO feature is provided to allow the system "counts" the number of hydrocarbon molecules in the beam path.

Open path IR gas detection is an effective means of measuring hydrocarbon gas using an infrared (IR) detector method based on absorption of IR radiation (3 to 5 micron range) as it passes through a volume of gas.

With an open path system, there is no definite beam path length so the measurement is expressed as a product of the average gas concentration and the gas cloud path width passing through the infrared path length. This means that a small dense cloud of hydrocarbon gas could give the same output signal as a large dispersed cloud if the product of the concentration of the leak and the path length were the same. It is as though the system "counts" the number of hydrocarbon molecules in the beam path gas detector receiver module. This Open Path Gas Monitoring System measures only infrared active gases, such as hydrocarbons, and the corresponding output of the system is expressed in equivalent parts-per-million in a path length of one meter (ppm•meter) and equivalent lower explosion limit in a path length of one meter (LEL•meter) simultaneously.

The Model IR5000 is a product of the average gas concentration and the path length. The same 5000 ppm•meter scale for methane until the gas concentration exceeds 5000 ppm•meter. Once the upper limit has been assessed, the display scale automatically switches to the 0 to 5000 ppm•meter measurement scale (for methane).

Another advantage of the Model IR5000 is the AutoTRACK alignment which simplifies initial set-up and installation. By using the digital display as a position indicator, alignment is made easy to adjust the source and receiver. The operator simply monitors the digital display for alignment cues which will direct the user to proper alignment with the source. The digital display will then prompt the user to perform additional alignment tasks if necessary. The equipment is calibrated for set-up and the housing remains closed. The Model IR5000 provides multiple outputs for interfacing in a variety of applications. Alarm outputs include two 4-20mA signals and SPDT relays for warning, alarms and fault. Most options of the Model IR5000 simplify system design and troubleshooting. Another consideration is the AutoZERO feature is provided to allow the system "counts" the number of hydrocarbon molecules in the beam path.
Gas leaks can either form a relatively stationary cloud or may disperse depending upon several factors such as wind, rate of leak, and weight of the leaked gas compared to air. Secondly, the gas cloud shape is concentration towards the edges. The concentration of a cloud is at typical gas cloud. First, the highest factors such as wind, rate of leak, dissipate depending upon several gas leaks can either form a cloud, it will generally have the cloud shape. First, the highest cloud shape is elongated and has an irregular pattern influenced by air currents. Even a mild wind (3-4 mph) can change the shape of a cloud.

Typically, light gases like methane do not diffuse symmetrically but have a tendency instead to spread vertically rather than in a horizontal direction. Heavy gases tend to build up into a cloud, even in a calm wind. As wind increases in intensity, gas clouds will dissipate faster. Gas leaks can either form a cloud or remain stationary depending on the factors of wind, rate of leak, and weight of the leaked gas.

The Model IR5000 is composed of an infrared source unit and a microprocessor-based array of detector receiver modules. This Open Path Gas Monitoring System measures only infrared active gases, such as hydrocarbons, and the corresponding output of the system is expressed in equivalent parts-per-million in a path length of one meter (ppm•meter) and equivalent lower-explosive-level in a path length of one meter of LEL•meter (LEL•meter), respectively. The Model IR5000 utilizes a single active and single reference detector to monitor gas concentrations. This technology provides improved accuracy, reliability, and a reduced maintenance requirement. The General Monitors Model IR5000 can effectively detect gas leaks with high sensitivity and operate as a hazardous situation monitor for higher gas concentrations.

One of the main advantages of the Model IR5000 is its simultaneous dual range detection of hydrocarbon leaks reaching low warning levels and catalytic hydrocarbon leaks reaching hazardous levels. The Model IR5000's digital display incorporates an AutoRANGING design which displays the output to 5000 ppm•meter scale for methane until the gas concentration exceeds 5000 ppm•meter. Once the upper limit has been exceeded, the digital display automatically switches to the 0 to 5 LEL•meter measurement scale (for methane).

Another advantage of the Model IR5000 is the AutoTRACK alignment which simplifies initial set-up and installation. By using the digital display as a position indicator, alignment is made easy. To align the source and receiver, the operator simply monitors the digital display for alignment cues which will direct the source to proper alignment with the source. The digital display will then prompt the operator to the proper alignment. Additional flexibility is provided in the use of additional equipment for set-up and the housing remains closed.

The Model IR5000 provides multiple outputs for interface in a variety of applications. Alarm outputs include two 4-20mA signals and SPDT relays for warning, alarms and fault. Most options of the Model IR5000 should be considered for alarm states and alarms set points are adjustable electronically. The Model IR5000 incorporates fail-safe-to-design and microprocessor technology for advanced performance features and fault diagnostics. Additional diagnostics include a continuous optical path check and fault alarms will occur if the optics are dirty (as automatic gas control will adjust for loss of signal due to dirty optics) or if the IR signal is weak or blocked or if an instrument malfunction occurs. The mechanical packaging of the Model IR5000 source and receiver units utilize a stand alone, mounted design and are available in aluminum or 316 stainless steel housings. Integral housing design provides protection and ease of maintenance for each source and receiver unit.

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Open path IR gas detection is an effective means of measuring hydrocarbon gas using a single (IR) detection method based on absorption of IR radiation (3 to 5 microns) as it passes through a volume of gas. With an open path system, there is no definite fixed path length so the measurement is expressed as a product of the average gas concentration and the gas cloud thickness passing through the infrared path length. This means that a small dense cloud of hydrocarbon gas leaking could give the same output signal as a large dispersed cloud if the product of the concentration concentration of sensor drift and improved immunity to false alarms.

Open path gas detection is recommended for large open areas or small dense clouds of hydrocarbon gas leaking. Open path IR gas detection can be considered impractical if it offers another solution to gas detection challenges, and should be used in combination with point gas detection due to its limitations in targeting specific locations of leaks.
Gas leaks can either form a relatively stationary cloud or readily dissipate depending upon several factors such as wind, rate of leak, and weight of the leaked gas compared to air to name just a few environmental factors. If a gas leak creates a cloud, it will generally have the following characteristics although there is no typical gas cloud. First, the highest gas concentration of a cloud is at the source and it decreases in concentration towards the edges. Secondly, the gas cloud shape is elongated and has an irregular pattern with the shape of a cloud affected by air currents. Even a mild wind (3-4 MPH) can significantly change the shape of a cloud.

Typically, light gases like methane do not diffuse symmetrically but have a tendency instead to spread vertically rather than in a horizontal direction. Heavy gases tend to build up into a cloud, even in a calm wind. As wind increases in intensity, gas clouds will dissipate faster.

GAS DISPERSION

If the product of the concentration and the gas cloud width passing through the infrared path length is a constant, the concentration and the gas cloud will generally have the following characteristics.

Path Gas Monitoring System

The Model IR5000 is composed of an infrared source unit and a microprocessor-based array detector module. This Open Path Gas Monitoring System measures only infrared active gases, such as hydrocarbons, and the corresponding output of the system is expressed in equivalent parts-per-million in a path length of one meter (ppm•meter) and equivalent low-explosive-levels in a path length of one meter (LEL•meter), respectively.

The Model IR5000 utilizes a single beam, single source and single detector design to monitor gas concentrations. This technology provides improved accuracy, reliability and portability when the leak and the path length are the same. It is as though the system "counts" the number of hydrocarbon molecules in the path by absorb infrared radiation in a specific wavelength band.

The gas concentration measured by the Model IR5000 is an average measurement over the path length which includes gas. The output is expressed in ppm•meter (highly sensitive range) or LEL•meter (baseline range).

Open path IR gas detection is an effective means of measuring hydrocarbon gas passing through (IR) detection method based on absorption of IR radiation (3 to 4 micron range) as it passes through a volume of gas.

Open path gas detection is recommended for large open areas or moveable locations where point monitoring can be impractical. It offers another solution to gas detection challenges, and should be used in combination with point gas detection due to its limitations in targeting specific locations of leaks.

Open Path Gas Monitoring System

Digital Display

The Model IR5000 source projects an infrared beam between 5 and 150 meters through the hazardous area being monitored to the IR5000 detector. As the IR beam reaches the receiver it passes through a housing and then alternately passes through two narrow band IR filters. One of the IR filters is the active wavelength and the second IR filter is the reference wavelength. The IR5000 detector compares the ratio between the active and reference signals to provide an output that is proportional to the gas concentration in the beam path.

The Model IR5000 incorporates fail-safe design and microprocessor technology for advanced performance features and fault diagnosis. Included in the fault diagnostics is a continous optical path check and alarm alarms will occur if the optics are dirty (as automatic gain control will adjust for loss of signal due to dirty optics) or if the IR signal is weak or blocked or if an instrument malfunction occurs. The Model IR5000 provides multiple outputs for interfacing in a variety of applications. Alarm outputs include two 4-20mA signals and SPDT relays for warning, alarms and fault. Most options of the Model IR5000 satisfy the National Electric Code for alarm states and alarm set points are easily selectable.

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One of the main advantages of the Model IR5000 is its simultaneous dual range detection of hydrocarbon leaks reaching low warning levels and catastrophic hydrocarbon leaks exceeding 50,000 ppm•meter. The Model IR5000 digital display incorporates an AutoRANGING design which displays the 0 to 5000 ppm•meter scale for methane until the gas concentration exceeds 5000 ppm•meter. Once the upper limit has been exceeded, the display scale automatically switches to the 0 to 50 LEL•meter measurement scale (for methane).

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**APPLICATIONS**

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Other applications for the Model IR5000 include ones which are environmentally unfriendly to point gas detection. Poisonous, water spray, and extreme temperatures are typical problems where open path gas detection can be used.

**GENERAL MONITORS**

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OPEN PATH HYDROCARBON GAS MONITORING SYSTEM

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>SYSTEM</th>
<th>ELECTRICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source Type</td>
<td>LED Hydrocarbon Methane Unit</td>
</tr>
<tr>
<td>Range</td>
<td>0 to 1000 ppm</td>
</tr>
<tr>
<td>Path Length</td>
<td>3 to 50 m</td>
</tr>
<tr>
<td>Response Time</td>
<td>5 to 15 s (at 2 % LEL)</td>
</tr>
<tr>
<td>Calibrator</td>
<td>No</td>
</tr>
<tr>
<td>Field calibration</td>
<td>Provided</td>
</tr>
<tr>
<td>Alarm</td>
<td>2 point</td>
</tr>
</tbody>
</table>

**TECHNICAL**

- **Source**
  - LED Hydrocarbon Methane Unit
  - Range: 0 to 1000 ppm
  - Path Length: 3 to 50 m
  - Response Time: 5 to 15 s (at 2 % LEL)

- **Excitation Source**
  - Copper-free Lanthanum or Tin Stannum Sheet

**ENVIRONMENTAL**

- **Operating Temperature**
  - -40°C to 60°C

- **Operating Humidity**
  - 10% to 90% non-condensing

- **Vibration**
  - Per ISA/CSA C22.2 and IEC 60068

- **Pollutant Emission**
  - Per ISA/CSA C22.2 and IEC 60068

- **Accessories**
  - Test Gas Filters

**POWER CONSUMPTIONS**

- Source: 24 VDC
- Power: 1.5 W

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- Power: 1.5 W

- Source: 24 VDC
- Power: 1.5 W

**APPLICATIONS**

- **Gas Type**
  - Light Hydrocarbon Methane

- **Path Length**
  - 3 to 50 m

- **Response Time**
  - 5 to 15 s (at 2 % LEL)

- **Calibrator**
  - Not required

- **Field calibration**
  - Provided

- **Alarm**
  - Two (2) multi-sensors and alarm

- **Power**
  - 24 VDC

- **Range**
  - 0 to 1000 ppm

- **Connections**
  - RS-232

**GENERAL NOTES**

- **Configuration**
  - 20 IR5000s (1-10 m)

- **Specifications**
  - Subject to change without notice.

**Represented by:**

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