OPTICAL GAS IMAGING
Infrared Cameras for Gas Leak Detection

FLIR
MAKE INVISIBLE GASES VISIBLE
SAVE LIVES, REVENUE, AND THE DAY

A facility can have thousands of connections and fittings that require regular inspection, but the reality is less than one percent of these components will ever leak. Testing them all with a traditional “sniffer” takes a great deal of time and effort.

Optical gas imaging cameras give you the power to spot invisible gases as they escape, so you can find fugitive emissions faster and more reliably than with sniffer detectors. With a FLIR GF-Series camera, you can document gas leaks that lead to lost product, lost revenue, fines, and safety hazards.

From natural gas extraction to petrochemical operations and power generation, companies have saved more than $10 million annually in lost product by including FLIR optical gas imaging in their leak detection and repair (LDAR) programs.

METHANE AND HYDROCARBONS
Scan thousands of connections for natural gas (methane) and other hydrocarbon leaks quickly and from a safe distance to avoid regulatory violations, fines, and lost revenue.

SULFUR HEXAFLUORIDE (SF₆)
Scan substation circuit breakers for sulfur hexafluoride (SF₆) leaks at a safe distance from high-voltage areas, without the need to shut down operations.

HYDROGEN (CO₂ TRACER GAS)
Imaging the tracer gas, CO₂, with an optical gas camera allows operators of hydrogen-cooled generators to efficiently find hydrogen leaks.

CARBON DIOXIDE (CO₂)
Prevent shut-downs by detecting carbon dioxide (CO₂) leaks early in chemical production, manufacturing, and Enhanced Oil Recovery programs.

CARBON MONOXIDE (CO)
Protect workers and the environment from toxic levels of carbon monoxide (CO) by pinpointing leaks quickly and efficiently.

REFRIGERANTS
Find leaks early to avoid interruptions in operations, prevent the loss of perishable products, and limit the environmental impact of toxic refrigerants.

WWW.FLIR.COM/OGI, OR CALL 866.477.3687 FOR ADDITIONAL INFORMATION.
The GF-Series optical gas imaging cameras can detect natural gas, SF₆, and CO₂ leaks quickly, accurately, and safely without the need to shut down systems, or the need for contact with the components. Gas leaks that are invisible to the naked eye look like smoke on infrared optical gas imaging cameras, making them easy to see—even from a distance.

**WITH FLIR OPTICAL GAS IMAGERS, YOU CAN:**
- Scan broad areas quickly, from a safe distance
- Survey hard-to-reach connections and fittings
- Improve compliance with environmental regulations
- Check electro-mechanical systems for signs of failure, using temperature measurement capability

**HANDHELD CAMERAS**
When you need to survey large work areas for industrial gas or chemical leaks, a handheld optical gas imaging camera can help you get the job done quickly and efficiently. Cameras such as the GFx320, GF306, and GF346 allow you to check every component throughout multiple sites, and are ergonomically designed for comfortable, all-day use. These cameras also offer features such as temperature calibration for improved contrast between the gas compound and the background scene.

**GF-SERIES HANDHELD CAMERAS ARE IDEAL FOR:**
- Natural gas wellsites
- Electrical substations
- Manufacturing plants
- Power generators

**FLEXIBLE SYSTEMS THAT MEET YOUR CHANGING NEEDS**
No other thermal imaging camera manufacturer offers a wider range of accessories than FLIR Systems. Hundreds of accessories are available to customize our cameras for a wide variety of imaging and measurement applications. From a comprehensive range of lenses, through LCD screens, to remote control devices, everything is available to tailor your camera to your specific application.

**HELPFUL ACCESSORIES**
- High sensitivity mode
- High value well sites
- Underground storage facilities
- Critical pipeline crossings

**FIXED CAMERAS**
Have a need for continuous monitoring or automated leak detection in critical areas? With thermal imaging cameras such as the G300a, G300pt, and A6604, you can constantly monitor vital gas pipelines and installations in remote or difficult to access zones. You will immediately see if a dangerous and costly gas leak appears. Monitoring is performed from a safe distance without the need to send technicians into potentially dangerous areas.

**G300A, G300PT, AND THE A6604 CAMERAS ARE IDEAL FOR:**
- Offshore oil platforms
- Natural gas processing plants
- Biogas generation plants
- Petrochemical facilities
- High value wellsites
- Underground storage facilities
- Critical pipeline crossings
**REFRIGERANTS**

**FLIR GF304**
The FLIR GF304 detects refrigerant gas leaks without interrupting or shutting down operations. Most modern refrigerants are organofluorine compounds, and while they are not ozone-depleting, some blends contain Volatile Organic Compounds (VOCs). Refrigerants are used in a variety of systems, including food production, pharmaceutical storage, and air conditioning.

**GF304 DETECTS THE FOLLOWING REFRIGERANT GASES:**
- R22
- R125
- R134A
- R143A
- R245fa
- R404A
- R407C
- R507A

**FLIR GF306**
The FLIR GF306 detects sulfur hexafluoride (SF₆) – used to insulate high voltage circuit breakers – as well as the industrial refrigerant and fertilizer anhydrous ammonia (NH₃). SF₆ is a potent greenhouse gas, with a global warming potential that’s 22,000 times greater than CO₂ over a 100-year period. By detecting and repairing SF₆ leaks, energy producers can avoid costly damage to circuit breakers while protecting the environment.

**GF306 DETECTS THE FOLLOWING GASES:**
- Acetic acid
- Acetyl chloride
- Allyl bromide
- Allyl chloride
- Allyl fluoride
- Anhydrous ammonia
- Bromomethane
- Chlorine dioxide
- Ethyl cyanoacrylate (superglue)
- Ethylene
- Freon-12
- Furan
- Hydrazine
- Methylsilane
- Methyl ethyl ketone (MEK)
- Methyl vinyl ketone
- Propenal
- Propene
- Sulfur hexafluoride
- Tetrahydrofuran
- Trichloroethylene
- Uranium fluoride
- Vinyl chloride
- Vinyl cyanide
- Vinyl ether

**URLS**
WWW.FLIR.COM/OGI, OR CALL 866.477.3687 FOR ADDITIONAL INFORMATION.
The GFx320 and GF320 detect methane emissions from the production, transportation, and use of oil and natural gas. They allow you to survey large areas up to nine-times faster than with traditional gas sniffer methods. These OGI cameras also offer highly accurate temperature measurements, so inspectors can assess and improve thermal contrast between the gas cloud and the background.

**METHANE & HYDROCARBONS**

**NEW!**

The GFx320 and GF320 detect methane emissions from the production, transportation, and use of oil and natural gas. They allow you to survey large areas up to nine-times faster than with traditional gas sniffer methods. These OGI cameras also offer highly accurate temperature measurements, so inspectors can assess and improve thermal contrast between the gas cloud and the background.

**INTRINSICALLY SAFE**
The FLIR GFx320 allows you to quickly detect and visualize fugitive natural gas emissions while maintaining safety inside hazardous locations. This Intrinsically Safe OGI camera is third-party certified for use in Class I Div II safety areas. The GFx320 is verified to meet sensitivity standards defined in the US EPA’s OOIDA methane rule and meets reporting requirements by tagging each recording with GPS data. By finding leaks and fixing them quickly, your company can protect the environment while avoiding product losses and the cost of regulatory fines.

**THE GFx320/GF320 DETECT MORE THAN 400 GASES, INCLUDING:**

- Methane
- Methanol
- Propane
- Benzene
- Ethane
- Propylene
- Ethanol
- Pentane
- 1-pentene
- Isoprene
- Butane
- Ethylbenzene
- MEK
- MIBK
- Toluene
- Octane
- Heptane
- Xylene
- Ethylene
- Hexane

**THE GFx320 AND GF320 ARE IDEAL FOR:**

- Offshore platforms
- Liquid natural gas shipping terminals
- Oil refineries
- Natural gas wellheads and processing plants
- Compressor stations
- Bio-gas and power generation plants

**GFx320: SAFETY ZONE COMPLIANT**

At offshore rigs, well sites, and production plants, there’s often a risk of gas collecting and igniting with a stray spark or hot surface. Working in these areas requires special clothing and equipment — if it’s possible at all. The oil and gas industry has long awaited a gas detection solution such as the GFx320, because its Intrinsically Safe designation allows the user to work confidently and focus on the job at hand.

**THE GFx320 HAS THE FOLLOWING CERTIFICATIONS:**

- ATEX/IECEx, Ex ic nC T4 Gc II 3 G
- ANSI/ISA-12.12.01-2013, Class I Division 2
- CSA 22.2 No. 213, Class 1 Division 2

[WWW.FLIR.COM/OGI, OR CALL 866.477.3687 FOR ADDITIONAL INFORMATION.]
The GF343 lets you see CO₂ leaks quickly and accurately, whether the gas is the result of a production process, part of an Enhanced Oil Recovery program, or being used as a tracer gas for hydrogen. CO₂ is a primary greenhouse gas, with emissions resulting not only from the combustion of fossil fuels but also from industrial processes, oil production, and manufacturing. Reliable non-contact CO₂ detection allows plants to inspect equipment while it is still online in the course of normal operations, avoiding unplanned outages. It also helps keep operations safe while moving towards carbon-neutral capture and storage operations.

The FLIR GF346 exposes invisible, odorless carbon monoxide (CO) emissions from a safe distance. CO leaking from vent stacks or pipes can be deadly, especially if the gas is allowed to collect in an enclosed area. The GF346 can quickly scan broad areas and pinpoint even small leaks from several meters away, increasing worker safety and protecting the environment.

**GF343 CAMERAS ARE IDEAL FOR:**
- Enhanced Oil Recovery programs
- Hydrogen-cooled power generators
- Carbon capture systems
- Ethanol producers
- Industrial tightness testing

**GF346 CAMERAS ARE IDEAL FOR:**
- Steel industry
- Bulk chemicals manufacturing
- Packaging systems
- Petrochemical industry

**GF346 DETECTS CARBON MONOXIDE AND THE FOLLOWING GASES:**
- Acetonitrile
- Acetyl cyanide
- Arsine
- Bromine isocyanate
- Butyl isocyanide
- Chlorine isocyanate
- Chlorodimethylsilane
- Cyanogen bromide
- Dichloromethylsilane
- Ethene
- Ethyl thiocyanate
- Germane
- Hexyl isocyanide
- Ketene
- Methyl thiocyanate
- Nitrous oxide
- Silane

**IMPACT**
- Spot hard-to-find CO₂ leaks
- See more with high sensitivity mode (HSM)
- Venting from blast furnace
- Leaking flange
- Enhanced Oil Recovery programs
- Hydrogen-cooled power generators
- Carbon capture systems
- Ethanol producers
- Industrial tightness testing
- Steel industry
- Bulk chemicals manufacturing
- Packaging systems
- Petrochemical industry
## Imaging Specifications

<table>
<thead>
<tr>
<th></th>
<th>GFx320</th>
<th>GF320</th>
<th>GF304</th>
<th>GF306</th>
<th>GF343</th>
<th>GF346</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Gas Seen</strong></td>
<td>Methane (CH₄)</td>
<td>Methane (CH₄)</td>
<td>Refrigerants</td>
<td>Sulfur hexafluoride (SF₆) / Ammonia (NH₃)</td>
<td>Carbon dioxide (CO₂)</td>
<td>Carbon monoxide (CO)</td>
</tr>
<tr>
<td><strong>Detector Type</strong></td>
<td>Cooled InSb</td>
<td>Cooled InSb</td>
<td>Cooled QWIP</td>
<td>Cooled QWIP</td>
<td>Cooled InSb</td>
<td>Cooled InSb</td>
</tr>
<tr>
<td><strong>Spectral Range</strong></td>
<td>3.2 – 3.4 μm</td>
<td>3.2 – 3.4 μm</td>
<td>8.0 – 8.6 μm</td>
<td>10.3 – 16.7 μm</td>
<td>4.0 – 4.6 μm</td>
<td>4.52 – 4.67 μm</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>320 x 240</td>
<td>320 x 240</td>
<td></td>
<td></td>
<td>320 x 240</td>
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<tr>
<td><strong>Total Pixels</strong></td>
<td>76,800</td>
<td>76,800</td>
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<tr>
<td><strong>Hazardous Location Certifications</strong></td>
<td>ATEX/IECEx, Ex ia IIC T4 Gc II 3 G</td>
<td>ATEX/IECEx, Ex ia IIC T4 Gc II 3 G</td>
<td>ANSI/ISA-12.12.01-2013, Class I Division 2</td>
<td>CSA 22.2 No. 213, Class I Division 2</td>
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<tr>
<td><strong>Thermal Sensitivity</strong></td>
<td>&lt;15 mK at 30°C (86°F)</td>
<td>&lt;15 mK at 30°C (86°F)</td>
<td>&lt;15 mK at 30°C (86°F)</td>
<td>±1°C at 30°C (86°F)</td>
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<td>±1°C at 30°C (86°F)</td>
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<tr>
<td><strong>Accuracy</strong></td>
<td>±1°C at 30°C (86°F) for temperature range 0°C to 100°C (32°F to 212°F) or ±2% of reading for temperature range &gt;100°C (212°F)</td>
<td>±1°C at 30°C (86°F) for temperature range 0°C to 100°C (32°F to 212°F) or ±2% of reading for temperature range &gt;100°C (212°F)</td>
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</tr>
<tr>
<td><strong>Temperature Range</strong></td>
<td>-20°C to 350°C (-4°F to 662°F)</td>
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<td>-20°C to 320°C (-4°F to 622°F)</td>
<td>-20°C to 320°C (-4°F to 622°F)</td>
<td>-20°C to 320°C (-4°F to 622°F)</td>
<td>-20°C to 320°C (-4°F to 622°F)</td>
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<tr>
<td><strong>Zoom</strong></td>
<td>Auto and manual</td>
<td>Auto and manual</td>
<td>Auto and manual</td>
<td>Auto and manual</td>
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<td>Auto and manual</td>
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<tr>
<td><strong>Color LCD Monitor</strong></td>
<td>4.3 in., 800 x 480 pixels</td>
<td>4.3 in., 800 x 480 pixels</td>
<td>4.3 in., 800 x 480 pixels</td>
<td>4.3 in., 800 x 480 pixels</td>
<td>4.3 in., 800 x 480 pixels</td>
<td>4.3 in., 800 x 480 pixels</td>
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<tr>
<td><strong>Adjustable Viewfinder</strong></td>
<td>Tiltable OLED, 800 x 480 pixels</td>
<td>Tiltable OLED, 800 x 480 pixels</td>
<td>Tiltable OLED, 800 x 480 pixels</td>
<td>Tiltable OLED, 800 x 480 pixels</td>
<td>Tiltable OLED, 800 x 480 pixels</td>
<td>Tiltable OLED, 800 x 480 pixels</td>
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<tr>
<td><strong>Video Camera w/Lamp</strong></td>
<td>3.2 MP</td>
<td>3.2 MP</td>
<td>3.2 MP</td>
<td>3.2 MP</td>
<td>3.2 MP</td>
<td>3.2 MP</td>
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<tr>
<td><strong>Video Out</strong></td>
<td>HDMI</td>
<td>HDMI</td>
<td>HDMI</td>
<td>HDMI</td>
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<td>HDMI</td>
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<tr>
<td><strong>Analysis</strong></td>
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<tr>
<td><strong>Spotmeters</strong></td>
<td>10°</td>
<td>10°</td>
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<tr>
<td><strong>Area Boxes</strong></td>
<td>5 mm (min.), 10 mm (avg.), 20 mm (max.)</td>
<td>5 mm (min.), 10 mm (avg.), 20 mm (max.)</td>
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<tr>
<td><strong>Profiles</strong></td>
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<tr>
<td><strong>ΔT</strong></td>
<td>Delta temperature between measurement functions or reference temperature</td>
<td>Delta temperature between measurement functions or reference temperature</td>
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<tr>
<td><strong>Annotation</strong></td>
<td>GPS, Location data automatically added to images</td>
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<tr>
<td><strong>File Storage</strong></td>
<td>Radiometric JPG, 14-bit measurement data included</td>
<td>Radiometric JPG, 14-bit measurement data included</td>
<td>Radiometric IR Video, 15 Hz direct to memory card</td>
<td>Radiometric IR Video, 15 Hz direct to memory card</td>
<td>RTP/MPEG4</td>
<td>RTP/MPEG4</td>
</tr>
</tbody>
</table>

*GF343 is not calibrated for temperature measurement.
Your professionalism drives you to know everything you can about your business; that’s why you’ll want to get the most out of your GF-Series camera.

FLIR cameras are easy to use and intuitive, but only expert training will give you the knowledge and skills to wring every last bit of capability from your investment. An Infrared Training Center (ITC) certificate is proof of your expertise in operating your camera and interpreting the thermal information it provides.

During the three-day ITC Optical Gas Imaging certification course, you’ll learn how to set up and operate FLIR GF-Series cameras, which gases these cameras can see, and how environmental conditions affect gas leak detection, all while earning 2.0 IACET CEUs. Training includes classroom instruction and lab time covering basic inspection procedures, permitting requirements, safety practices, and more.

For full course descriptions, updated schedules, and more information, visit the itc website at: Infraredtraining.com or call 1.866.872.4647.

ITC COURSES PROVIDE:
• Industry-leading, high-quality interactive instruction
• The most qualified international instructors
• The most extensive hands-on laboratories
• ISO 9001-registered
• Optional online training courses

OTHER ITC COURSES INCLUDE:
• ODOSA Fugitive Emissions Monitoring (U.S. Only)
• Thermography Fundamentals
• General Thermography Primer
• Level I, Level II, and Level III Thermography
• IR Electrical Inspection
• IR Mechanical Inspection

Attend classes at our training center, locally at one of our regional classes, or in your facility with our on-site service.