PRO THERMAL IMAGING

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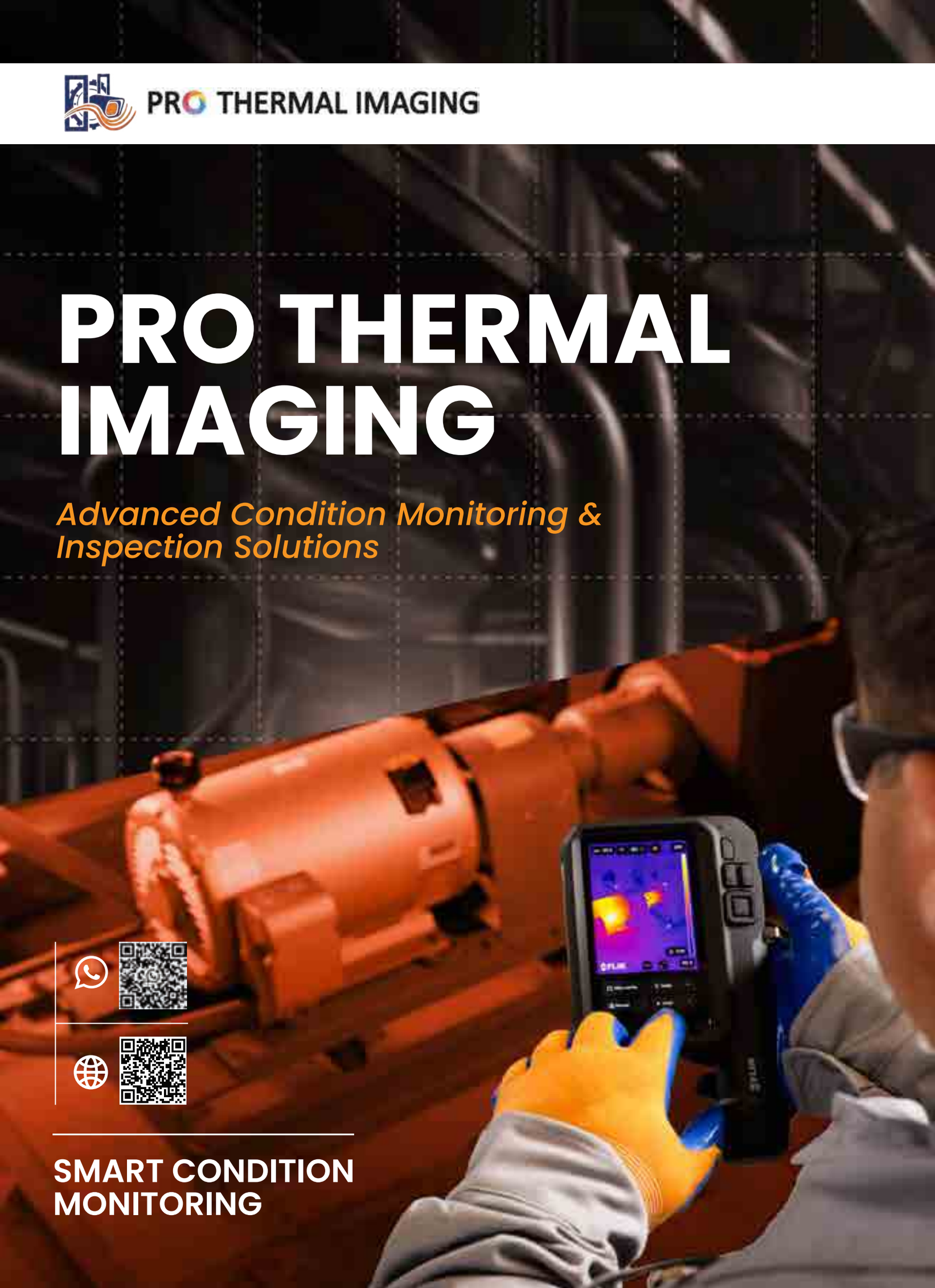
Advanced Condition Monitoring & Inspection Solutions



SMART CONDITION MONITORING

Engineering Reliability Preventing Failure Powering Performance

About Us

Pro Thermal Imaging provides advanced inspection solutions to detect hidden faults, reduce downtime, and prevent costly failures

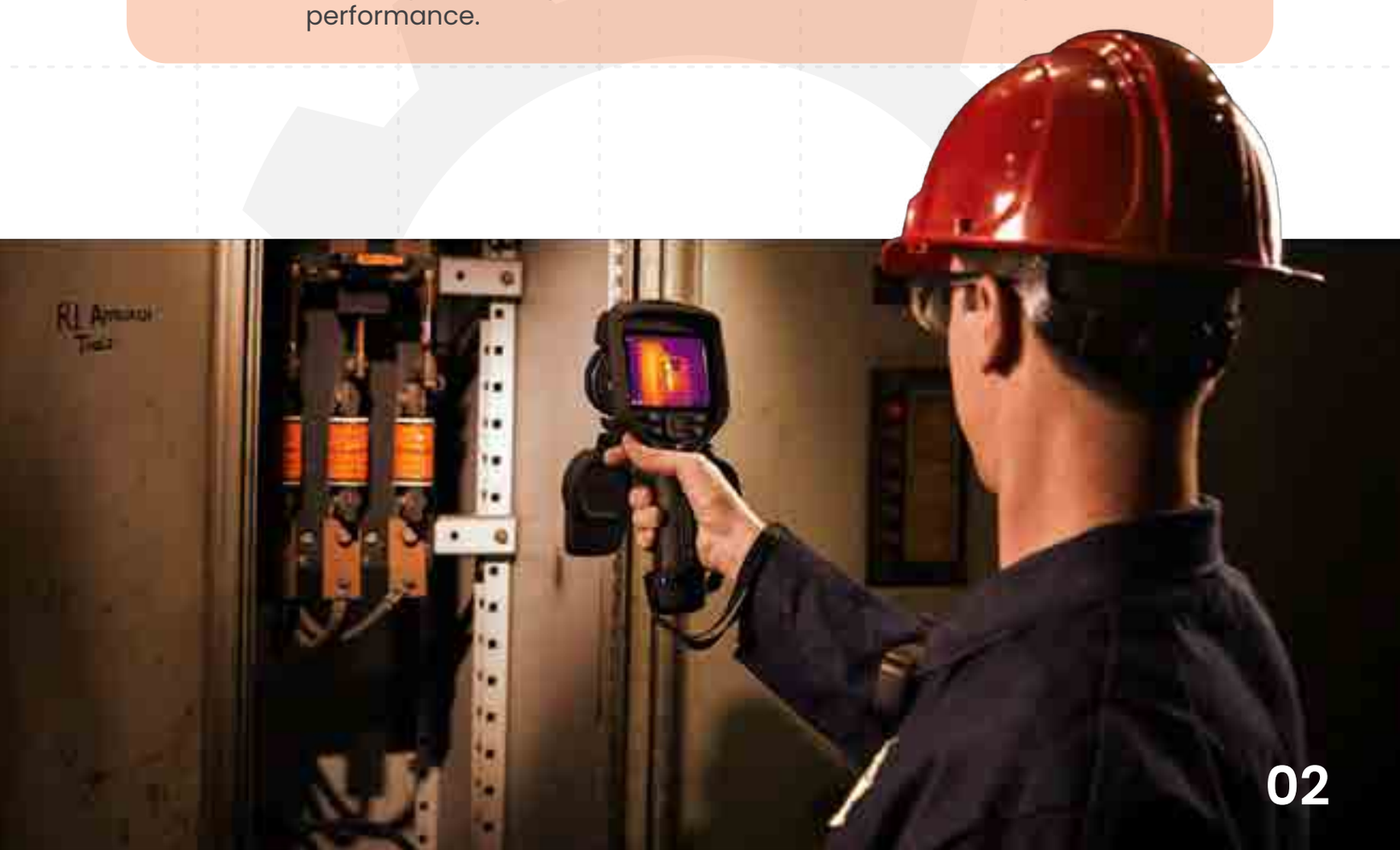
We identify problems before they become failures.

Vision

To become a trusted leader in intelligent condition monitoring, helping industries operate **safer, smarter, and more efficiently.**

Mission

To deliver **precision-driven inspection solutions** that enhance asset reliability, reduce operational risks, and ensure uninterrupted performance.



THERMOGRAPHY

Find the Fault Before It Finds You

We use advanced thermography to detect hidden faults early without interrupting operations

Key Applications:

- Electrical Panel Inspection
- Power Distribution Systems
- Mechanical Equipment Monitoring
- Building Envelope Analysis
- Preventive Maintenance Programs

Why It Matters:

- Detect overheating components before failure
- Prevent electrical fires and system breakdowns
- Improve operational safety and reliability

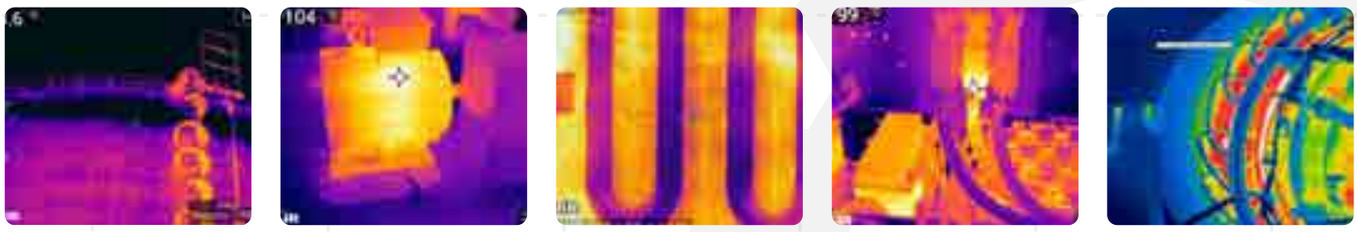
Advanced Thermal Intelligence for Critical Assets

Specialized Services:

- Furnace & Boiler Thermography
- Optical Gas Imaging (OGI)
- Oil & Gas Tank Inspection
- Solar Panel Thermography
- Turbine Inspection
- Water Leak Detection

Value Delivered:

- Reduce maintenance costs
- Increase equipment lifespan
- Optimize energy efficiency
- Ensure compliance and safety



DRONE THERMOGRAPHY

Elevate Your Inspection Standards

Drone-based thermography enables fast, safe, and high-accuracy inspections in hard-to-reach or hazardous areas

Applications:

- Buildings & Towers
- Flare Stacks
- Overhead Electrical Lines
- Solar Fields
- Telecom Towers

Value Line:

- Zero-risk inspections
- Faster coverage
- Cost-efficient large-area scanning

ULTRASOUND INSPECTIONS

Detect Issues Before They Escalate

Ultrasound technology detects high-frequency sound signals generated by leaks, friction, and electrical discharge.

Services Include:

- Air & Gas Leak Detection
- Bearing Lubrication Monitoring
- Electrical Inspections
- Mechanical Fault Detection
- Steam Trap Testing
- Tank Tightness Testing
- Valve Inspection

Value Line:

- Minimize energy loss
- Improve system efficiency
- Early fault detection










VIBRATION ANALYSIS

Engineered for Consistent Performance

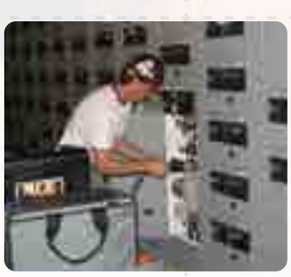
Vibration analysis helps identify mechanical issues in rotating equipment before breakdown occurs.

Services Include:

- Motor Current Signature Analysis
- Rotating Equipment Monitoring
- Shaft Alignment

Value Line:

- Reduce unexpected breakdowns
- Increase equipment lifespan
- Optimize performance



ACOUSTIC INSPECTIONS

Advanced Sound Imaging for Precision Detection.

Acoustic imaging enables visual detection of sound sources, helping identify faults quickly and accurately.

Services Include:

- Air & Gas Leak Detection
- Mechanical Fault Detection
- Partial Discharge Detection

Value Line:

- Faster fault localization
- Non-invasive inspections
- Improved maintenance accuracy






INTEGRATED INSPECTION SOLUTIONS

One Partner. Complete Condition Monitoring

We combine multiple inspection technologies to provide a holistic view of asset health, ensuring no fault goes undetected.

What We Deliver:

- Multi-technology inspection approach
- Detailed diagnostic reports
- Actionable maintenance insights
- Industry-specific solutions

Why It Matters:

- Oil & Gas
- Power Plants
- Manufacturing
- Facilities Management
- Infrastructure

TRAINING & CERTIFICATION PROGRAMS

Build Expertise. Upgrade Skills. Get Certified

We provide professional training programs designed to enhance technical skills and industry knowledge in condition monitoring.

Training Programs:

- IR Thermography Training
- Vibration Analysis Training
- Ultrasound Training
- Acoustic Imaging Training
- OGI & Furnace Inspection Training
- Shaft Alignment Training
- Customized Condition Monitoring Programs

Value Line:

- Industry-recognized certifications
- Hands-on practical training
- Expert-led sessions

Accreditations & Partnerships

FLIR® EXTECH®

INFRARED TRAINING CENTER

IMC Service

PRO THERMAL IMAGING

Get in Touch with Us

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Partner with us for smarter inspections, safer operations, and reliable performance.

Flir iXX Series

App Enabled Thermal Cameras

The iXX-Series is a new class of app-powered thermal cameras designed to make inspections faster, easier, and more consistent—no matter the skill level of your team. From experienced thermographers to technicians new to thermal imaging, iXX cameras simplify every step of the process: capturing the right data, sharing it instantly, and turning it into actionable insights.

Built on the Flir Ace platform, the i34 and i64 work with apps developed by Flir, customers, and trusted third-party developers—so your camera can evolve with your inspection needs.

60% of maintenance teams report a shortage of skilled thermographers. iXX enables non-experts to perform inspections using intuitive, app-guided workflows.

43% of cyberattacks target manufacturing and critical infrastructure. iXX is backed by Flir's ISO 27001 certification, ensuring secure data handling.

Reporting takes up to 50% of technicians' time using traditional workflows. iXX enables automated report generation, asset linkage, and data dashboards—accelerating and enhancing maintenance workflows.

Flir Assetlink Connect thermal imagery to asset-hierarchy

Flir Ignite™ Cloud Services Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

SPECIFICATIONS	i34	i35	i64	i65
IR resolution	240 × 320	240 × 320	480 × 640	480 × 640
Object temperature range	-20°C to 450°C (-4°F to 842°F) in two ranges		-20°C to 550°C (-4°F to 1022°F) in two ranges	
Thermal sensitivity	<40 mK			
Accuracy	±2% of reading			
Image frequency	30 Hz			
Field of view (FOV)	38° × 49°			
Digital camera	8 MP, Autofocus			
Measurement tools	Center spot, box with min/max, Delta T			
Image modes	Infrared, Visual, MSX, Picture-in-picture			
Image file format	Radiometric JPEG			
Storage media	Internal memory, onboard Flir Ignite cloud and Assetlink connectivity			
Communication interfaces	USB-C, Wi-Fi, Bluetooth	USB-C, Wi-Fi, Bluetooth, LTE Cellular	USB-C, Wi-Fi, Bluetooth	USB-C, Wi-Fi, Bluetooth, LTE Cellular

www.flir.com/ixx-series

Flir One® and Flir Edge Series

Thermal Imaging for Mobile Devices

Flir Edge & Edge Pro

Flir One Pro

Flir One and Flir Edge Series cameras give you the power to find invisible problems faster than ever, with brilliant imagery that is easy for even the casual user to interpret. Choose the Flir Edge or Edge Pro for wireless connection to your smart device, so you can inspect targets in spaces that are small or difficult to reach. Compatibility with iOS and Android devices ensures your Flir Edge-Series camera won't be limited by operating systems, port styles, or device upgrades.

All Flir One and Flir Edge Series thermal camera attachments offer Flir MSX® (Multi-Spectral Dynamic) for enhanced image quality. Flir One Pro models offer additional image processing through Flir VividIR™ technology, which combines a series of images to produce even more crisp thermal images.

The Flir One App is integrated with the Flir Ignite cloud for instant image uploads, up to 1 TB of secure storage, and access to image editing, analysis, and custom thermal inspection reports. The app includes a range of step-by-step inspection guides to help you use your Flir One with confidence by demonstrating what to look for, providing tips for better inspections, and offering examples of typical faults for comparison. You can also explore an expanded range of third-party apps or even create your own with the Flir Mobile SDK.

For full specifications see the product matrix on page 10-11

Key Features:

- Identify problem areas easier with the added detail and perspective from Flir MSX
- Directly upload and store images to the Flir Ignite cloud, where you can organize and back up files, instantly share images or create professional reports from a mobile device or computer
- Flir One Pro: fit most popular phone cases thanks to OneFit™ adjustable connection
- Flir One Pro and Edge Pro: Measure the temperature of any spot in a scene up to 400°C/752°F

Flir Ignite™ Cloud Services
Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

Flir Cx-Series

Full-Featured, Pocket-Sized Thermal Cameras

Cx5

C5

*Flir Ignite Pro subscription required

The Flir Cx-Series cameras are your go-to tools for facilities maintenance, electrical repair, and electro/mechanical inspections. With the addition of the intrinsically safe Flir Cx5 Hazardous Location-Rated Thermal Camera, the Cx-Series is your go-to choice for quick performance checks on industrial equipment. The C3-X, C5, C8, and Cx5 all offer MSX® real-time image enhancement, picture-in-picture, area maximum or minimum temperature measurement, and Wi-Fi connectivity so you can quickly get to the job of finding and fixing hidden problems, sharing images, and documenting repairs. Cx-Series cameras feature direct connections to the Flir Ignite cloud for instant image uploads, up to 1 TB of secure storage, and access to image editing, analysis, temperature trending graphs*, custom thermal inspection reports, and unlimited PDF exports*.

For full specifications see the product matrix on page 10-11

Key Features:

- Capture thermal measurements from -20°C to 450°C/-4°F to 842°F
- Easy viewing thanks to brilliant 3.5 in. intuitive touchscreen with auto-orientation
- Isolate temperature measurements on any pixel and create convincing reports using fully-radiometric thermal image JPEGs that are easy to adjust and analyze in Flir Thermal Studio
- Determine hottest or coldest (max./min.) target in the scene with area measurement box
- Certified for use in many explosive vapor and dust atmospheres, potentially eliminating the need for hot work permits (Cx5 only)

Flir Ignite™ Cloud Services
Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

Flir Ex Pro-Series

Infrared Cameras with Ignite™ Cloud

Flir Ex Pro cameras are essential tools designed for pinpointing and diagnosing electrical, mechanical, and building issues. With vibrant thermal imagery enhanced by Flir's patented MSX®, you can quickly identify hot spots and problem areas. The E5, E6, and E8 Pro models offer an expanded temperature range of up to 550°C (1022°F), along with professional features accessible via the touchscreen. And what's more, all new Ex Pro-Series cameras come with the added value of an extended warranty, professional-level analysis and reporting software, and on-line training that covers both camera use and basic thermography.

Key Features:

- Diagnose faults faster with the help of stunning MSX images
- Edit, analyze, and share images from Flir Ignite and create quick reports to validate repairs
- Navigate features, add text notes, and organize files through the simplified touchscreen
- Rely on the temperature measurement accuracy of ±2°C (±3.6°F) or ±2% of reading
- Work longer thanks to the swappable Li-ion battery with 4-hour life

Flir Ignite™ Cloud Services
Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

SPECIFICATIONS	E5 PRO	E6 PRO	E8 PRO
IR Resolution	160 × 120 (19,200 pixels)	240 × 180 (43,200 pixels)	320 × 240 (76,800 pixels)
Object temperature range	-20°C to 400°C (-4°F to 752°F) in two ranges	-20°C to 550°C (-4°F to 1022°F) in two ranges	20°C to 550°C (-4°F to 1022°F) in two ranges
Thermal sensitivity	<60 mK	<50 mK	<40 mK
Accuracy	At ambient temp. 10°C to 35°C (50°F to 95°F) and object temperature above 0°C (32°F), ±2°C (±3.6°F) or ±2% of reading		
Image frequency	9 Hz		
Field of view (FOV)	33° × 25°		
Focus	Focus free		
Image modes	Infrared, Visual, MSX, Picture-in-picture		
Area box	Box with min/max		
Spotmeters	Center spot		
Image file format	Standard JPEG, 14-bit measurement data included		
Image streaming	Radiometric* and non-radiometric over USB-C (*requires Flir Thermal Studio software)		
Communication interfaces	USB-C, Wi-Fi, Bluetooth®		
Certifications	IP54 (IEC 60529), UL, CSA, CE, PSE and CCC, WEEE 2012/19/EC, RoHs 2011/65/EC		

Flir Exx-Series

Advanced Thermal Imaging Cameras

Flir redesigned the Exx-Series from the handle up to deliver the best performance, resolution, and sensitivity of any pistol-grip handheld thermal camera. These high-performance models—E52, E54, E76, E86, E95—are packed with features you need for a wide range of electrical, mechanical, and building applications.

The Exx-Series offers superior sensitivity, up to 307,200 pixel resolution, and a vibrant 4 in. LCD in a user-friendly, handheld platform that can detect even subtle indications of electrical faults, building deficiencies, and moisture intrusion.

Key Features:

- Switch quickly between fields of view during inspections with Flir FlexView® lenses (dual FOV: 24°/14° or 42°/24°) or easily share single FOV, auto-calibrating lenses between cameras
- Put more pixels on your target from a safe distance with up to 640 × 480 (307,200 pixels) IR resolution
- Maximize efficiency with Flir Routing with Reference Imaging: a downloadable inspection plan you build in Flir Thermal Studio Pro that runs from the camera and allows you to align new images with an initial baseline shot
- Add depth and detail to images with our best MSX® image enhancement
- Ensure accurate temperature measurements with laser-assisted autofocus; measure area on-screen using laser distance meter
- Produce brilliant imagery at 4x the thermal pixel resolution with UltraMax® processing
- Directly upload images via Wi-Fi to the Flir IgniteTM cloud, so you can organize, edit, and share images securely
- Connect to mobile devices via Wi-Fi
- Embed meter readings like load and voltage to aid in issue understanding from Flir clamps, multimeters, and moisture meters via Meterlink®
- Instantly improve contrast for target with 1-Touch Level/Span
- Connecting over Wi-Fi automatically prompts Over-the-Air updates, ensuring your camera has the latest features and firmware updates
- Learn to use your camera like a pro through free Flir Academy training, provided with each Exx purchase

Certain features are model-dependent. See matrix below.

Flir Assetlink Connect thermal imagery to asset-hierarchy

Flir Ignite™ Cloud Services
Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

SPECIFICATIONS	E52	E54	E76	E86	E96
IR Resolution	240 × 180 (43,200 pixels)	320 × 240 (76,800 pixels)		464 × 348 (161,472 pixels)	640 × 480 (307,200 pixels)
Resolution with UltraMax	NA		307,200 pixels	645,888 pixels	1.2 MP
Object temperature range	-20°C to 550°C (-4°F to 1022°F) in two ranges	-20°C to 650°C (-4°F to 1202°F) in two ranges	-20°C to 650°C (-4°F to 1202°F) in two ranges / optional 300°C to 1000°C (572°F to 1832°F)	-20°C to 1500°C (-4°F to 2732°F) in three ranges	
Laser area measurement (m^2 or ft^2)	No			Yes, on screen	
Thermal sensitivity	<40 mK @ 30°C (86°F)				
Accuracy	±2°C (±3.6°F) or ±2% of reading				
Image frequency	30 Hz				
Field of view (FOV)	24° × 18° (fixed)		42° × 32° (10 mm lens), 24° × 18° (17 mm lens), 14° × 10° (29 mm lens), 80° × 63° (5 mm lens), 24° × 18°/14° × 10° (17/29 mm DFOV lens), 42° × 32°/24° × 18° (10/17 mm DFOV lens)		
Focus	Manual	Continuous LDM, One-shot LDM, One-shot contrast, manual			
Image modes	Infrared, Visual, MSX‡, Picture-in-picture				
Area box	1 in live mode	3 in live mode			
Spotmeters	3 in live mode				
Image file format	Standard JPEG, measurement data included				
Video recording and streaming	Radiometric, non-radiometric, and visual video recording to memory card or streaming over Wi-Fi				
Communication interfaces	USB-C, DisplayPort, Wi-Fi, and Bluetooth®				
Certifications	IP54 (IEC 60529), Camera: IEC/EN 60950-1, IEC/EN 62368-1 Power supply: IEC/EN 62368-1, CSA/UL/KC/SAA/PSE 60950-1				

‡ not available with 6°. 80°, or macro lenses

Flir T-Series

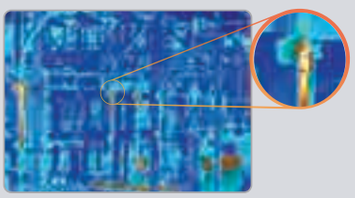
Professional Thermal Imaging Cameras

UltraMax®

Unmatched performance at four times the resolution

A unique image processing technique that allows you to generate reports with images that have four times as many pixels, improving image detail and measurement accuracy.

Without UltraMax



UltraMax at 8x zoom

With UltraMax

The Flir T-Series simplifies inspections through a broad range of professional features—from on-board inspection routing and multiple spot meters to dual FOV lenses for instantaneous shifts between wide and narrow fields of view. Choose from a range of resolutions, maximum temperatures, and measurement features with the T5xx and T8xx models, or gain the highest resolution, crisp imagery, and measurement accuracy with our flagship T1K HD thermal camera.

Key Features:

- Ergonomic design provides all-day comfort, so you can scan from tough angles while keeping the display in view
- Add the Flir FlexView® dual-FOV lens so you can instantly switch from wide angle to telephoto with the press of a button instead of exchanging lenses (T5xx & T8xx models)
- Maximize efficiency by enabling Inspection Route, which runs a pre-defined survey route you can build with the Route Creator feature in Flir Thermal Studio Pro
- Connect via Wi-Fi to the Flir Ignite cloud where you can organize, edit, and share images securely
- Add depth and brilliant detail to images with Flir MSX® enhancement and Flir UltraMax super resolution
- Simplify manual contrast adjustments with 1-Touch Level/Span
- Analyze, edit, and process images then output professional reports with free 3-month subscription to Flir Thermal Studio Pro software
- Quickly access measurement tools, parameters, image modes, and more through easy-to-use touchscreen interface
- Ensure you always have the latest features and firmware with over-the-air updates any time you connect to Wi-Fi
- Learn to use your camera like a pro through free Flir Academy training, provided with the purchase of any T5xx or T8xx camera

Certain features are model-dependent. See matrix below.

Flir Ignite™ Cloud Services
Upload, Access, & Edit Images + Create Reports—Anywhere, Anytime

SPECIFICATIONS	T530	T540	T560	T840	T865	T1020
IR Resolution	320 × 240 (76,800 pixels)	464 × 348 (161,472 pixels)	640 × 480 (307,200 pixels	464 × 348 (161,472 pixels)	640 × 480 (307,200 pixels)	1024 × 768 (786,432 pixels)
Resolution with UltraMax	307,200 pixels	645,888 pixels	1.2 MP	645,888 pixels	1.2 MP	3.1 MP
Object temperature range	-20°C to 650°C (-4°F to 1202°F) in two ranges / optional 300°C to 1200°C (572°C to 2192°F)	-20°C to 1500°C (-4°F to 2732°F) in three ranges	-20°C to 1500°C (-4°F to 2732°F) in three ranges	-20°C to 1500°C (-4°F to 2732°F) in three ranges	-40°C to 2000°C (-40°F to 3632°F) in three ranges	-40°C to 2000°C (-40°F to 3632°F) in three ranges
Laser area measurement (m^2 or ft^2)	Yes					No
Thermal sensitivity	<40 mK @ 30°C (86°F)					<20 mK @ 30°C (86°F)
Accuracy	±2°C (±3.6°F) or ±2% of reading					±1°C (±1.8°F) or ±1% at 25°C for temperatures between 5°C to 150°C ±2°C (±3.6°F) or ±2% of reading at 25°C for temperatures up to 1200°C
Image frequency	30 Hz					
Field of view (FOV)	42° × 32° (10 mm lens), 24° × 18° (17 mm lens), 14° × 10° (29 mm lens), 80° × 63° (5 mm lens), 24° × 18°/14° × 10° (17/29 mm DFOV lens), 42° × 32°/24° × 18° (10/17 mm DFOV lens)					45° × 34° (21.2 mm lens), 28° × 21° (36 mm lens), 12° x 9° (83.4 mm lens), 7° × 5.3° (142 mm lens)
Focus	Continuous LDM, One-shot LDM, One-shot contrast, manual					One-shot, manual
Image modes	Infrared, Visual, MSX*, Picture-in-picture					Infrared, Visual, MSX, Picture-in-picture
Area box	3 in live mode				5 in live mode	5 + 5 areas (boxes & circles)
Spotmeters	3 in live mode				10 in live mode	10 in live mode
Image file format	Standard JPEG, measurement data included					
Video recording and streaming	Radiometric, non-radiometric, and visual video recording to memory card or streaming over USB video class (UVC) and Wi-Fi					Radiometric, non-radiometric, and visual video recording to memory card or streaming over USB and Wi-Fi
Communication interfaces	USB 2.0, DisplayPort, Wi-Fi, Bluetooth®, and Assetlink					USB Micro-B, Wi-Fi, Bluetooth, HDMI
Certifications	IP54 (IEC 60529) Camera: IEC/EN 60950-1, IEC/EN 62368-1 Power supply: IEC/EN 62368-1, CSA/UL/KC/SAA/PSE 60950-1					IP54 (IEC 60529), ETSI EN 301 489-1 (radio), ETSI EN 301 489-17, EN 61000-6-2 (Immunity), EN 61000-6-3 (Emission), FCC 47 CFR Part 15 Class B (Emission), ICES-003

*not available with 6°. 80°, or macro lenses

Flir Si-Series

Acoustic Imaging Cameras

Cut energy costs, prevent downtime, and identify issues with bearings, compressed air systems, industrial gas systems, or electric utility transmission lines with the Flir Si-Series industrial acoustic imaging cameras. This series includes a range of lightweight, handheld models: the Si1-LD, an entry-level acoustic imager for detecting and quantifying compressed air leaks; the Si2-LD, which locates and measures specialized gas leaks and mechanical faults as well as finding and quantifying compressed air leaks; the Si2-PD, for detecting, classifying, and determining the severity of partial electrical discharge; and the Si2-Pro, with detection and analysis capabilities for partial discharge, leaks, and mechanical faults for efficient inspections across applications.

Key Features:

- Pinpoint the source of compressed air or industrial gas leaks from a distance, even in noisy environments
- Quantify compressed air leak rates and estimated yearly energy loss, so you can prioritize repair and calculate savings
- Locate and quantify expensive compressed industrial gas leaks
- Detect and measure bearing and other mechanical faults to avoid production disruptions
- Asses the severity and type of partial discharge issues through on-camera and in-software
- Manage tool use and maintenance across large-scale operations with fleet management functionality
- Automatically upload, store, and backup acoustic images to the Flir Acoustic Camera Viewer (cloud service)
- Evaluate images in Flir Thermal Studio Pro and determine costs, severity, and classifications
- Featuring both automatic and manual frequency tuning, 8x zoom, 12 MP digital camera, IP54 rating, and a QR code reader

Certain features are model-dependent. See matrix below.

Now with GPS

SPECIFICATIONS	Si1-LD	Si2-LD	Si2-PD	Si2-Pro
Leak localization	Yes	Yes	No	Yes
Leak rate detection threshold	Minimum detectable: 0.01 l/min from 2.5 m (8.2 ft)	0.0032 l/min from 2.5 m 0.0044 l/min from 6 m	NA	0.0032 l/min from 2.5 m 0.0044 l/min from 6 m
Discharge detection	No		Yes	Yes
Mechanical mode	No	Yes	No	Yes
Severity assessment	NA		Automatic AI-based severity assessment including recommended actions onboard camera	
Acoustic measurement	96 low-noise MEMS microphones, real-time sound visualization	124 low-noise MEMS microphones, real-time sound visualization		
Detection threshold	20 kHz to 100 kHz range: -5 dB to 56 dB SPL	20 kHz to 100 kHz range: -7 dB to 51 dB SPL		
Bandwidth	2 kHz to 100 kHz	2 kHz to 130 kHz		
Data transfer	Over Wi-Fi or USB memory stick			
Video recording	Yes, up to 5 minutes			
Image storage	Internal: 64 GB SD card; external: USB 8 GB. Cloud storage capacity is unlimited	Internal: 128 GB SD card; external: USB 8 GB. Cloud storage capacity is unlimited		
Explosive (hazardous) environment ratings	NA			

Partial Discharge

Compressed Air Leak

Mech Mode

Flir Si2x-Series

Industrial Acoustic Imaging Cameras

Reduce energy costs, identify mechanical issues, and work efficiently without compromising safety with Flir Si2x-Series acoustic imagers. These cameras are certified for use in certain explosive vapor and dust atmospheres for monitoring leaks, detecting mechanical faults, and identifying partial discharge in hazardous environments. Flir designed the Si2x-Series for safe use in locations where there's a risk for combustible dust and explosive vapor, including oil and gas refineries, wood and paper mills, petrochemical factories, mines, wastewater facilities, and pharmaceutical manufacturing facilities.

Key Features:

- Work safely in hazardous environments certifications for Zone 2 (gas) and Zone 22 (dust), certifications available at support.flir.com/Si2
- Quantify pressurized gases, including compressed air, ammonia, hydrogen, CO_2, methane, helium, and argon, efficiently and precisely
- Ensure optimal use and maintenance of equipment in large-scale industrial settings with fleet management, cloud data integration, and OTA software updates
- Speed audits in hazardous areas with wide, 75° diagonal field of view, which allows for scanning large areas quickly without interrupting operations
- Asses the severity and type of partial discharge issues through on-camera and in-software
- Automatically upload acoustic images to the Flir Acoustic Camera Viewer and evaluate in Flir Thermal Studio Pro to determine costs, severity, and classifications

SPECIFICATIONS	Si2x-LD	Si2x-Pro
Leak localization	Yes	Yes
Leak rate detection threshold	0.0032 l/min from 2.5 m 0.0044 l/min from 6 m	0.0032 l/min from 2.5 m 0.0044 l/min from 6 m
Discharge detection	No	Yes
Mechanical mode	Yes	Yes
Severity assessment	NA	Automatic AI-based severity assessment including recommended actions onboard camera
Acoustic measurement	124 low-noise MEMS microphones, real-time sound visualization	
Detection threshold	20 kHz to 100 kHz range: -7 dB to 51 dB SPL	
Bandwidth	2 kHz to 130 kHz	
Data transfer	Over Wi-Fi or USB memory stick	
Video recording	Yes, up to 5 minutes	
Image storage	Internal: 128 GB SD card; external: USB 8 GB. Cloud storage capacity is unlimited	
Explosive (hazardous) environment ratings	Ex II 3 G Ex ic IIC T4 Gc Ex II 3 D Ex ic IIIC T135°C Dc Tamb -10°C to 40°C	

Upload, Analyze, Report, and Share

Flir Acoustic Viewer and Flir Thermal Studio for the Si-Series

Understanding the data captured by your Flir acoustic camera is the most important step of any acoustic inspection, so it's crucial to have the right tools in place for your team. Whether you need to categorize and determine the severity of partial discharge, are inspecting for signs of bearing faults or other mechanical issues, or want to determine the cost of air and gas leaks, Flir offers the software solutions to help you analyze, quantify, and report on acoustic imaging inspections.

Flir Acoustic Camera Viewer:
This cloud system offers not only image storage but the ability to easily compile reports. Once you've set up a cloud profile you can connect and upload data in real-time through Wi-Fi or a hot spot.

A key advantage of the Acoustic Camera Viewer is its Organization feature: a simplified solution for following up on reporting from several separate locations, such as factories and production units, by different cameras and users. The Organization feature lets you share snapshots, reports, and other information from the camera to an assigned group, so you can centralize and execute management tasks from within Acoustic Camera Viewer.

Flir Thermal Studio Suite:
This fully customizable reporting and analytics software offers acoustic-specific tools such as estimated leak volume and cost savings analysis for industrial gas and air leaks, support for automatic fault classification from mechanical inspections, and severity indication and recommended action for utility inspections. This software can quantify gas leaks based on images and videos as well as allow you to combine acoustic images with thermal images within the same report for a more comprehensive inspection analysis. Finally, if your company's IT policy doesn't allow Wi-Fi uploads and cloud sharing through Acoustic Viewer, you can still access the reporting and analytics available in Thermal Studio by downloading files to a USB stick or the new USB to USB direct transfer cable and moving them into your Thermal Studio library.

TURN MEASUREMENTS INTO DECISIONS, COVER MORE ASSETS IN LESS TIME

Finding a fault is only useful if the data reaches the right person in a clear, documented format. Flir software and connectivity tools take you from image capture to signed-off work order with less manual effort.

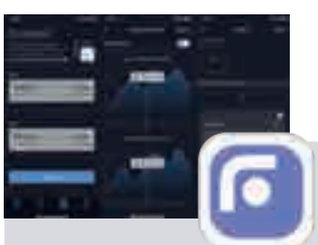
Flir Acoustic Viewer: This cloud system allows you to store acoustic images and compile reports you can share with your team. It streamlines camera and user management with features such as Organization, which seamlessly shares device access and camera information such as snapshots and reports within assigned groups.

Flir Assetlink: Turn thermal images into actionable insights with the browser-based platform that automatically connects inspection data to your asset hierarchy. Assetlink helps you cut reporting time, streamline workflows, and keep your operations running at peak efficiency.

iOS Android

Extech ExView®: Connects to as many as eight Extech meters at once for safe monitoring—all from one location—as well as remote videoscope control and datalogging.

Flir Ignite: Analyze, share, trend temperature data (Pro version), and create reports with images instantly from your smart device with this cloud storage and reporting software. All Flir Ignite-enabled cameras provide automatic uploads to this secure site.



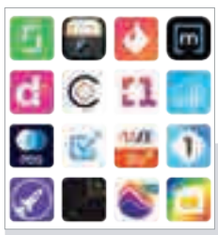
iOS Android

Flir Meterlink®: Connects via Bluetooth® with up to seven Flir meters, for remote, real-time collection of electrical and environmental data. Use the app to map trends, set alarms, and embed meter data into thermal images or to create and send reports directly to colleagues.

iOS Android

Flir Tools: Our mobile image processing app lets you import images from most Wi-Fi-enabled Flir thermal cameras for editing and adjustments, as well as stream live video to your mobile device. Use the app to incorporate images into reports to send to customers and co-workers.

Routing with Reference Image: This feature of Flir Thermal Studio Pro and Assetlink generates an inspection route. When the camera activates this routing plan, it loads the reference image for each asset so the thermographer can align new images with the initial baseline shot. This ensures accurate data collection over the history of that asset's inspections.



Flir SDKs: Our software development kits (SDKs) are powerful, flexible development tools that enable industrial and independent developers to create powerful apps and integrations with compatible thermal cameras and meters.

Flir Thermal Studio Suite: Streamline inspections, organize data, and manage thousands of thermal images and videos within this desktop analysis and reporting software. This subscription software offers advanced features such as batch image processing to accelerate post-processing tasks. Thermal Studio is also compatible with Flir acoustic imaging cameras, providing features such as automatic fault classification and severity indication for electrical inspections and estimation of leak volume and cost savings for compressed air and gas leaks.

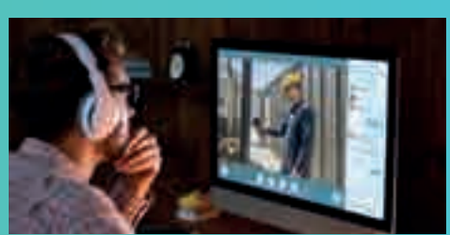
KEEP YOUR TEAM AND TOOLS READY

Thermal and acoustic inspection programs only work if your cameras are healthy and your people know how to use them. Flir backs its hardware with service and training that keep your measurements trustworthy.

Flir Care & Flir Protect: Avoid unforeseen downtime, ensure your thermal data is correct, and rely on the protection of premium warranties with world-class product services from Flir. Our packages include calibration adjustments, camera service, warranty extensions, and options for fast-delivered loaner cameras.

Infrared Training Center: Certification from the Infrared Training Center demonstrates you have a clear understanding of thermography and can take a leadership role in an infrared inspection program. You'll benefit from our staff's decades of practical experience as they connect thermography theory to real-world applications. We offer courses at training centers around the globe, at locations within your country, at your company's facility, and even online.

Flir Professional Services: For new installations or system upgrades, rely on Flir Professional Services for system design and commissioning, performance optimization, risk mitigation, and seamless project delivery.



Flir AX8-Series

Thermal Imaging Temperature Sensor

Flir AX8 is a thermal sensor with imaging capabilities. Combining thermal and visual cameras in a small, affordable package, the AX8 provides continuous temperature monitoring and automated alarms for critical electrical and mechanical equipment. Compact and easy to install, AX8 provides continuous monitoring of electrical cabinets, manufacturing areas, data centers, energy distribution, mass transit, refrigeration warehouses, and much more.

Key Features:

- Streaming live-video output
- Automated alarming at pre-set temperature thresholds
- Ethernet/IP and Modbus TP compliant for easy sharing of alarm and analysis results to a PLC
- Image masking function allows for analysis of just the target
- MSX® image enhancement for improved visual details
- Compact design for easy installation in space-constrained areas
- Ability to stream live video via Ethernet

SPECIFICATIONS	AX8
IR Resolution	80 × 60 (4,800 pixels)
Object temperature range	-10°C to 150°C (-14°F to 302°F)
Thermal sensitivity	<100 mK
Accuracy	±2°C (±3.6°F) or ±2% of reading
Image frequency	9 Hz
Field of view (FOV)	48° × 37°
Focus	Fixed
Image modes	Infrared, Visual, MSX
Area box	6 boxes with min/max/average
Spotmeters	6
Image file format	Standard JPEG, 14-bit measurement data included
Image streaming	Motion JPEG, MPEG-4, h.264
Storage media	Built-in memory for image storage
Ethernet protocols	Ethernet/IP, Modbus TCP, TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, sftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour)
Alarm function	Set up to 5 alarms on any selected measurement function
Alarm output	Digital Out, store image, file sending (ftp), email (SMTP), notification

Flir SV88 and SV89

Vibration Monitoring Solution Kits

SV89-KIT

Flir SV8x vibration monitoring kits continuously analyze vibrations from critical equipment, allowing you to detect faults such as misalignment or spot potential issues such as bearing defects and gear damage. Featuring multi-communication protocols, rugged, IP66 rating and wireless capability, these vibration monitors allow you to make critical, data-driven decisions that ensure the continued, consistent functioning of valuable assets.

Key Features:

- Gain detailed insights into equipment's vibrational characteristics through precise measurements of GRMS, VRMS, peak, crest factor, kurtosis, skewness, and standard deviation
- Identify patterns, trends, potential failure modes, and the severity of detected issues in your equipment
- Easily deploy throughout industrial environment thanks to wireless connectivity
- Web based GUI ensures complete control over collection of vibration data, deployment of sensors, and management of integrations on Gateway
- Rely on the monitor's performance in demanding conditions—including moisture, dust, and debris—thanks to IP66 rating
- Integrate with advanced analysis tools through multi-communication protocols (Modbus, MQTT, OPC UA)

SENSOR SPECS	SV88	SV89
Sensitivity range	±16 g	±50 g
Frequency range	10 Hz to 5 kHz	10 Hz to 10 kHz
Output data	5 KHz, X/Y/Z: 19,200 raw data	10 KHz, Z: 12,800 raw data
Vibration analysis data	Grms, Vrms, ISO10816, Peak, Crest Factor, Kurtosis, Skewness, Standard Deviation, FFT	
Capture rate	Configurable: 1 min (minimum) to 1 day (maximum)	
Temperature range	Display measurement trend of contact temperature -20°C to 80°C (-4°F to 176°F)	
Range (during a session)	Up to 50 m (160 ft), line of sight	
GATEWAY SPECS		
Processor	ARM Cortex-A7	
Memory	DDR3L 512 MB	
Storage	32 MB NOR Flash	
Communication protocol	MQTT, Modbus, OPC UA	
Operating systems	Built-in webserver (Linux)	
Output data	Vibration analysis data: Grms, Vrms, (ISO10816), Peak, Crest Factor, Kurtosis, Skewness, Standard Deviation, FFT	

flir.com/AX8 • www.flir.com/sv88-kit • flir.com/sv89-kit

Flir IRP-1

Indoor Inspection Port

Electrical Safety Product

Designed specifically for use with the Flir 80° thermal camera lens, the Flir IRP-1 lens-free port reduces the risk of arc flash, improves worker safety, and increases inspection efficiency. Technicians can execute predictive maintenance inspections faster, reducing the time needed to take on and off heavy arc-flash PPE or remove and replace electrical panels—plus, there's no need to access your thermal camera settings menu to input transmission and IR window temperature correction factors. IRP-1 offers quick, precise connection with the Flir 80° lens (T300805) for a super-wide view in confined spaces. Easy and inexpensive to install, this inspect port ensures companies comply with electrical codes (e.g. NFPA 70B) requiring direct line of sight inspection of all electrical equipment.

Key Features:

- Provides instant access to energized equipment without opening the panel door and compromising safety
- Ensures accurate thermal measurements with no glass, plastic, or mesh to compromise the image
- Designed for quick and precise connection with a Flir 80° lens
- Decreases the risk of arc flash incidents and resultant injuries
- Installs easily using standard knockout punches, no screws

SPECIFICATIONS	IRP-1
Viewing aperture diameter	12.5 mm (0.49 in)
Viewing aperture area	123 mm² (0.1885 in²)
NEMA environment type	Standard 250
Maximum operating temperature	100°C (212°F)
Body material	Body: Plastic (PC/PBT) Cover: Anodized aluminum Hardware: Stainless steel
Required hole diameter	21 mm (0.827 in)
Certifications	CE, UL (UL50V), IP67

Flir IRW-xC/xS

Round IR Windows

Electrical Safety Product

Flir IR Windows add a protective barrier between you and energized equipment, so you can perform inspections more efficiently and reduce the threat of arc flash injury. Flir IRW-Series windows feature a permanent hinged cover that flips open easily, so there's nothing to drop, mix up, or lose. If there are mixed-metal concerns, choose the stainless-steel model to prevent corrosion.

Key Features:

- Minimize time/cost of complying with NFPA 70B for electrical inspections
- Decrease the risk of arc flash incidents and resultant injuries
- Perform both visual and thermal inspections through the crystal window
- Maintain integrity of cabinet environmental ratings, even after installation
- Install easily using standard knockout punches, no screws
- Avoid contact between dissimilar metals by choosing stainless steel models

SPECIFICATIONS	IRW-2C	IRW-3C / IRW-3C-XT*	IRW-4C	IRW-2S	IRW-3S	IRW-4S
Optic diameter	50 mm (1.97 in)	75 mm (2.95 in)	95 mm (3.74 in)	50 mm (1.97 in)	75 mm (2.95 in)	95 mm (3.74 in)
Viewing aperture diameter	45 mm (1.77 in)	69 mm (2.71 in)	89 mm (3.50 in)	45 mm (1.77 in)	69 mm (2.71 in)	89 mm (3.50 in)
Viewing aperture area	1590 mm² (2.46 in²)	3739 mm² (5.79 in²)	6221 mm² (9.64 in²)	1590 mm² (2.46 in²)	3739 mm² (5.79 in²)	6221 mm² (9.64 in²)
NEMA environment type	Type 4/12 (outdoor/indoor)					
Automatically grounded	Yes					
Maximum operating temperature	260°C (500°F)					
Body material	Anodized aluminum			AISI-grade 316 stainless steel		
Greenlee punch	76BB	739BB	742BB	76BB	739BB	742BB

*IRW-3C-XT has extended thread with a total depth of 24.6 mm (0.97 in)

Flir IRW-xPC/xPS

Large Format IR Windows

Flir IRW-xPC and IRW-xPS large format infrared inspection windows offer the field of view you need to image inaccessible components, improving inspection efficiency and helping to prevent unplanned downtime. The rectangular polymer windows provide the largest viewing area available to monitor completely undisturbed assets inside energized electrical equipment. Durable and stable in harsh environments, these IR windows are suitable for most industrial settings as well as for shipboard use.

Key Benefits:

- Meet IP2x standard for safe maximum hole size and fail-safe design
- Tested and certified to the highest industry standards
- Use IRW-xPC windows for indoor applications and IRW-xPS windows for outdoor applications
- Maintain fixed and stable transmission to ensure temperature data is accurate and reliable
- Proven compatibility with acids, alkalis, UV, moisture, humidity, vibration, and high frequency noise
- Protect viewing panes from flying debris, dust, or impact with the lockable window covers

Electrical Safety Product

SPECIFICATIONS	IRW-6PC	IRW-12PC	IRW-24PC	IRW-12PS	IRW-24PS
Overall height	21.8 cm (8.6 in)	20.6 cm (8.1 in)	21.8 cm (8.6 in)	20.6 cm (8.1 in)	21.8 cm (8.6 in)
Overall width	16 cm (6.3 in)	30.5 cm (12.0 in)	61 cm (24.0 in)	30.5 cm (12.0 in)	61 cm (24.0 in)
Aperture overall height	15 cm (5.9 in)	12.7 cm (5.0 in)	15 cm (5.9 in)	12.7 cm (5.0 in)	15 cm (5.9 in)
Aperture overall width	9.1 cm (3.6 in)	23.6 cm (9.3 in)	53 cm (20.9 in)	23.6 cm (9.3 in)	53 cm (20.9 in)
Optic temperature range	-40°C to 325°C (-40°F to 617°F)				
IP/NEMA environment type	IP65 / NEMA 4x			IP67 / NEMA 6	
Maximum operating temperature	-40°C to 200°C (-40°F to 392°F)			-40°C to 273°C (-40°F to 523°F)	
Body material	Aluminum			Powder-coated stainless steel	
Optic reinforced grill material	Aluminum reinforcing grill (IP22/ IP2x standard)			Stainless steel reinforcing grill (IP22/ IP2x standard)	

Flir Product Service and Support

Extended warranties, calibration packages, and product services from Flir help ensure your camera is functioning well, properly calibrated, and protected from material defects.

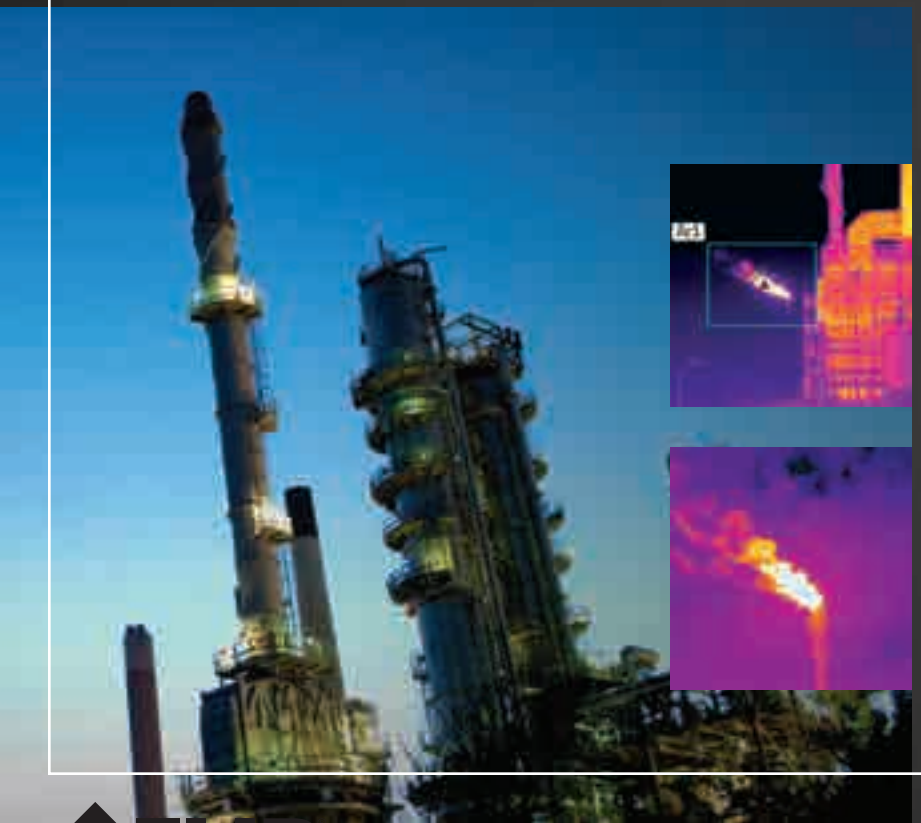
Flir PROTECT warranty options range from a three-year extension to premium plans that include one free service with calibration, discounts on additional service needs, and fast delivery of loaner cameras.

Flir CARE calibration services range from performance verification to priority calibration and adjustment, with a multi-point inspection as well as traceable calibration included at every level to ensure your camera is accurate and performing to factory specifications.

Finally, **Flir Professional Services** delivers comprehensive remote and on-site services customized to meet the unique demands of every project, plus in-depth system training to empower your team.

CONDITION MONITORING

Monitoring the condition of assets across a manufacturing facility helps identify problems before failures occur, preventing costly production stops. Typical target assets include high- and low-voltage installations, turbines, compressors, and other electrical and mechanical equipment. Sometimes processes need to be monitored because an anomaly can cause dangerous situations. For example, flares that have a flame invisible to the naked eye need to be monitored to see if they are effectively burning gas exhaust.



FLARE STACKS

Thermal Imaging Value

Flare stacks are used in many industries to burn off unwanted waste gas byproducts, or flammable gases released by pressure relief valves during unplanned over-pressuring of plant equipment. Thermal imaging cameras are ideal monitoring tools because they allow full-time automated remote monitoring in virtually any weather. In addition, thermal imaging cameras avoid many of the technical and cost-related problems associated with other technologies such as ultraviolet (UV) flame detectors, flame ionization spectrometers, thermocouples, and pyrometers.

Application Story

Customers use FLIR thermal imaging cameras such as the FLIR A700f to not only monitor flare stack flames, but also to actively regulate assist gas control programs. If a flame is not burning within preset parameters, the camera-based automated system will alarm, prompting immediate adjustments to air or steam volume to maintain proper combustion. As a bonus, automated assist gas injection control can help prevent excessive steam consumption and provide significant cost savings.

FLIR SOLUTION

FLIR A500f/A700f

ELECTRIC SUBSTATIONS

Thermal Imaging Value

Electric power utilities today are faced with an aging infrastructure, increasing risk of blackouts and brownouts as well as security threats. Unplanned maintenance can be expensive in the best-case scenarios and catastrophic in the worst. With FLIR thermal imaging cameras and condition monitoring software, impending equipment failures and security breaches can be detected anytime, day or night, from a remote monitoring location.

Application Story

Sensei Solutions LLC, a North Carolina-based provider of smart grid solutions, uses thermal imaging technology to improve stability and security of electric substations. According to Robin Thompson, Sensei Solutions founder and CTO, "Continuous automated radiometry has many benefits. This method is non-invasive, it eliminates human errors and mitigates the risk of greater failures." Their customers use automated thermal imaging for temperature measurement of bushings, breakers, and capacitor banks, as well as to detect the heat signatures of intruders.

FLIR SOLUTION

FLIR A500f/A700f

STEEL MILL LADLES

Thermal Imaging Value

Steel mill ladles have limited lives. As their refractory linings wear or break due to shock, the outer part of a ladle can be exposed to excessive temperatures. If not caught in time, the result can be ladle disintegration and a molten metal breakout, threatening the lives of workers and destroying equipment. FLIR thermal imaging camera systems monitor ladles in real time and warn of a breakout before it happens.

Application Story

Customers place FLIR A50/A70 Smart Sensor Cameras in a robust housing or employ FLIR A500f/A700f cameras—with their protective housing—in fixed positions where they have a clear view of a filled ladle as it passes by on a gantry crane. Those cameras capture video images of the ladle in real time and calculate temperatures over the ladle's surface. A few cameras can cover the entire surface of the ladle, but typically some regions of interest are predefined for closer scrutiny and analysis. If a temperature exceeds the ladle's predefined parameters, an alarm is triggered. The exact temperature parameters for alarms can be adjusted easily, based on mill experience.

FLIR SOLUTIONS

FLIR A50/A70

FLIR A500f/A700f

ELECTRICAL & MECHANICAL INSTALLATIONS

Thermal Imaging Value

Some critical electrical and mechanical installations in manufacturing companies and utilities are monotored 24/7 with a thermal imaging camera. Heat buildup indicates poor equipment health and possible impending failure. With a fixed-mounted thermal imaging camera, you don't need to rely on periodic inspections. Instead, the camera can monitor several pieces of equipment simultaneously, sending temperature data to your asset data historian and activating alarms if temperature thresholds are exceeded.

Application Story

ADE Technology Inc., in Taiwan developed an affordable condition monitoring solution for electrical and mechanical installations that is compact enough to fit inside of a cabinet with the installation. Called T-Guard, ADE's solution can manage up to nine FLIR AX8 cameras to monitor enterprise-wide electricity management, solar PV management, Environment Control Systems (ECS), and more. According to Jeffrey Chow, ADE's general manager, "The AX8 is a definitely a game changer for traditional condition monitoring."

FLIR SOLUTIONS

FLIR A50/A70

FLIR AX8

IIoT Integration

Thermal Imaging Value

Industrial thermal automation sensors provide multi-zone, wide-area, non-contact, continuous temperature monitoring of assets. This temperature data can be combined with vibration, current, dissolved gas, and many other types of sensor data so that companies can gain deep insight into their asset health. Electric utilities that are successful doing this can improve the reliability of their grid, lower operational and capital costs while extending asset life.

Application Story

Collecting data from sensors using different communication protocols into one preferred data lake can be difficult to achieve and even more difficult to scale up across an entire grid. Electric utilities can solve the issues of sensor-system incompatibility and lack of skilled IIoT programmers with the FLIR Bridge, a condition monitoring solution that makes integration of different sensors easy—no coding required. It can connect to a variety of systems, such as OSI PI Historian and OPC UA, to record and analyze time-series data. Bridging the gap between sensors, software, and hardware resources allows companies to aggregate the condition data needed to improve situational awareness, empower decisions that keep operations running, reduce maintenance costs, and improve productivity, reliability, and safety.

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR Bridge

FLIR A50/A70

EARLY FIRE DETECTION

Fire can destroy multiple buildings or installations within an extremely short time frame. The value of the goods destroyed during a fire can be tremendous, and the cost of a life that is lost during a fire is impossible to calculate. With their non-contact method of measuring temperatures, thermal imaging cameras can help prevent fires by detecting hot spots before they ignite.

FUEL STORAGE

Thermal Imaging Value

Fuel storage is notoriously hazardous because the commodity itself is so flammable. Corrosion, leaks, and human error can lead to explosive, sometimes catastrophic, consequences. Automatically monitoring temperature changes in fuel storage depots with thermal imaging cameras can avert disaster, satisfy insurer oversight and improve safety for workers and the public.

Application Story

On the French-Belgian border, in the town of Wattrelos, a Transpole bus depot stores all of the natural gas for its bus fleet. Natural gas is stored under high pressure and is highly flammable. An explosion would endanger employees as well as citizens in nearby towns. French FLIR products integrator ALOATEC developed a fuel storage monitoring system comprised of FLIR thermal imaging cameras. “Not only do thermal imaging cameras function regardless of the light conditions, they also help to spot a rise in temperature even before fire breaks out,” said Philippe Bourrier, director of ALOATEC.

FLIR SOLUTIONS

FLIR FH-Series R

FLIR A310 ex

FLIR A500f/A700f

WAREHOUSES

Thermal Imaging Value

Even though warehouses are equipped with fire alarms and firefighting systems, once a fire starts, asset damage is almost certain. FLIR thermal imaging cameras can identify hot spots before they ignite and provide an early warning response to avoid full-on conflagration before assets are harmed or safety is compromised.

Application Story

An enclosed chemical waste storage facility used stand-alone thermal imaging cameras to detect temperature changes among its stockpiles. Waste exposed to air or water could become unstable and possibly explosive. So, the company brought in FLIR thermal imaging cameras to monitor the entire storage warehouse, 24/7. Now, these cameras broadcast images on a control room monitor that can direct personnel to the exact location of a hot spot. Preconfigured temperature alarms can be adjusted to compensate for temporary changes such as the presence of a forklift or worker. Thermal imaging cameras can also integrate with automated fire alarms and extinguishing systems to minimize the footprint of fire damage if it ignites before preventative measures can be imposed.

FLIR SOLUTIONS

FLIR AX8

FLIR A50/A70

FLIR FH-Series R

COMBUSTIBLE PILES

Thermal Imaging Value

Storage of some material invites the risk of spontaneous combustion. As always, prevention is better than a cure. A thermal imaging camera can help to ensure safety and detect spontaneous combustion. It provides continuous, remote monitoring of temperatures in piles of coal, wood chips, fertilizers, and more.

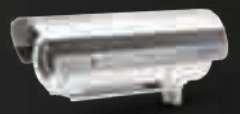
Application Story

When coal is exposed to oxygen, it can react and heat up. This is more likely to happen when there is insufficient ventilation for cooling, such as in the massive coal piles at OBA Bulk Terminal Amsterdam. OBA uses three rugged FLIR thermal imaging cameras to monitor coal in piles and on conveyor belts. “We used to engage external measurement professionals for this, which was an extra cost for the end customer. Now we can do the measurement ourselves, not only at one moment in time, but continuously on a 24/7 basis,” said Dick Meijer, OBA planner.

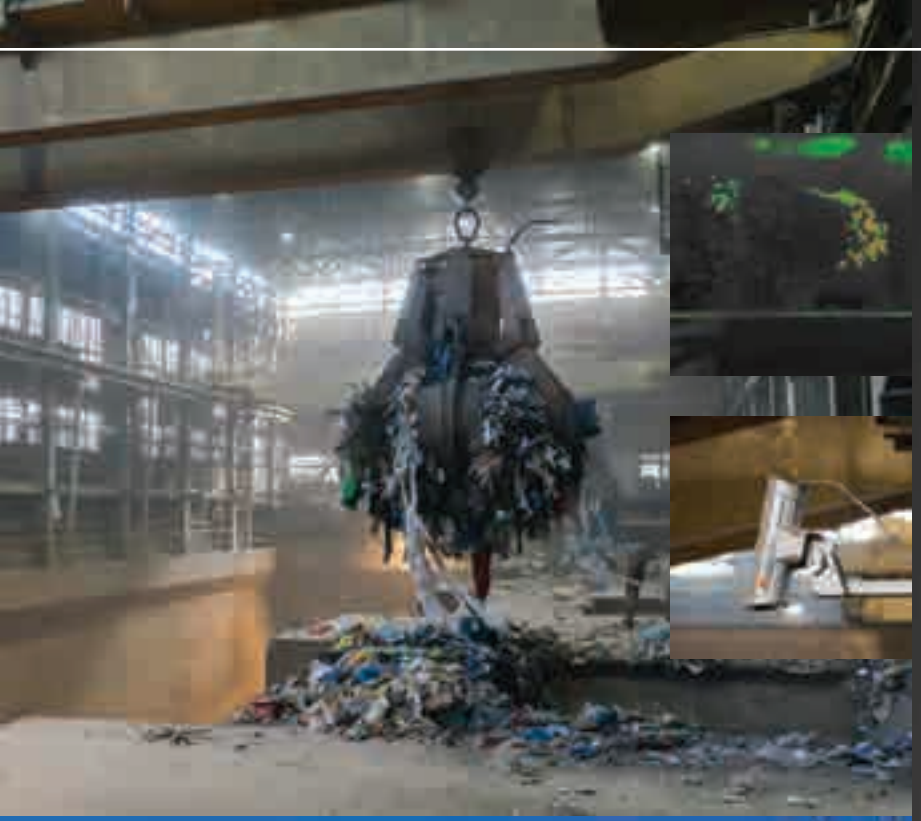
FLIR SOLUTIONS

FLIR A500f/A700f

FLIR FH-Series R



FLIR A310 ex



WASTE BUNKER MONITORING

Thermal Imaging Value

Similar to combustible pile applications, waste is potentially flammable when stored. Self-combustion, heat development due to pressure, spontaneous chemical reactions between disposals and methane gas-building are all potential fire hazards. Thermal imaging cameras can help prevent fires by identifying hot spots with the potential to flare up.

Application Story

Czech company Workswell developed Waste Bunker Monitor, an end-to-end solution that includes FLIR thermal imaging cameras. Glassworks, foundries, cement plants, municipal waste incinerators, and more use Waste Bunker Monitor to combat spontaneous chemical combustion and other causes of fire in waste bunkers. After a site evaluation, Workswell determines how many FLIR thermal imaging cameras are needed. Jan Kov , Workswell managing director said, "The whole system is scalable and can consist of several thermal imaging cameras with high spatial resolution and with thermal sensitivity greater than 0.05°C."

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR FH-Series R

FLIR A500f/A700f

FLIR A50/A70

REMOTE FIREFIGHTING

Thermal Imaging Value

Identifying the hot spot is only part one of a fire prevention solution. Part two is remediation. And that can be challenging in remote monitoring scenarios. FLIR thermal imaging cameras and software can pinpoint hot spots and then initiate an automated fire-fighting response, such as turning on a sprinkler system, shutting down a system, or targeting the hot spot to be soaked in firefighting foam–all controlled remotely over the Internet.

Application Story

Watchdog Security created the Fire Rover to fight fires remotely. When an alarm is triggered by the thermal imaging camera, a self-contained system of tanks disperses concentrated foam called FireAde 2000 on a specific hot spot. Operators can also manually control Fire Rover using a joystick. Jeremy Dusing, Watchdog Security operations manager, said, "We trust the name FLIR because of how widely it's used, plus they had all the technical specs we needed to connect their equipment to ours. With the information it gives us we know how to fight a fire and where to aim the foam."

FLIR SOLUTIONS

FLIR A500f/A700f

FLIR A310 ex

PROCESS CONTROL & QUALITY ASSURANCE

Process control monitoring and quality assurance is all about measuring the temperature and/or determining the shape of certain products on a production line. The acquired thermal imaging data is used to control and improve the process so that the resulting products will meet specifications.

METAL MANUFACTURING

Thermal Imaging Value

Heat treatment is used in metal manufacturing to alter the chemical and physical properties of the resulting metal parts. Careful application of a specific sequence of heating and cooling cycles for predetermined intervals enables metallurgists to control the parts' hardness or softness. Thermal imaging can be used to monitor the temperature of metal parts after leaving a cooling bath, or "quench pit."

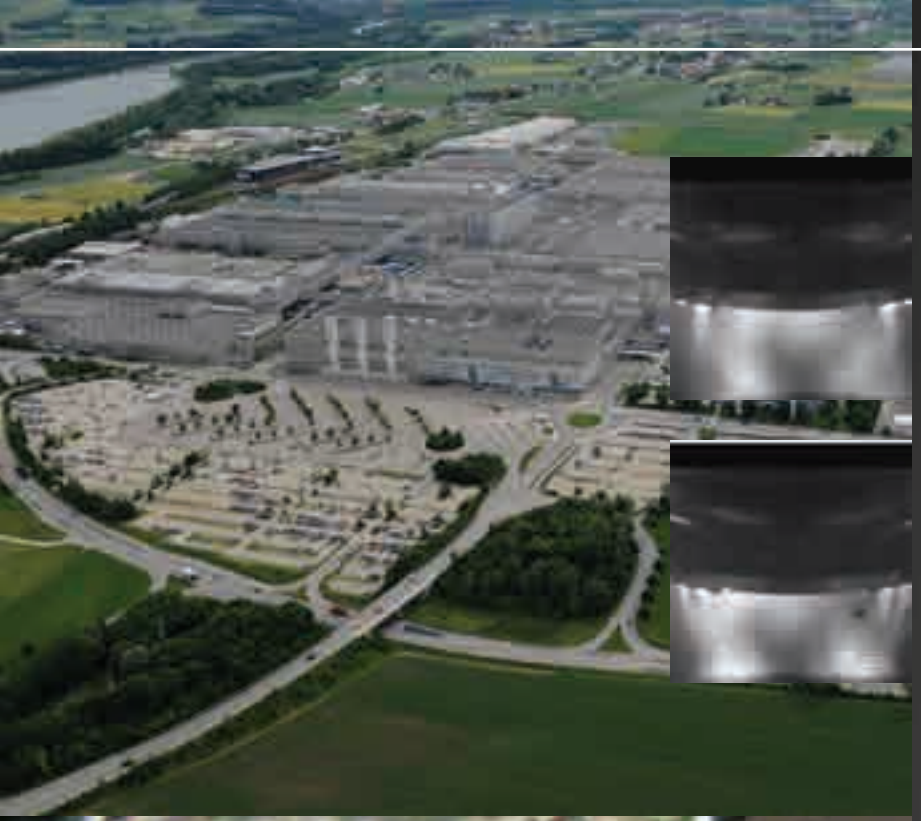
Application Story

Thermography specialist MoviTHERM developed a dedicated thermal inspection system with cameras from FLIR Systems to inspect parts immediately following a critical quenching process. A FLIR thermal imaging camera identifies hot spots on parts in a cooling chamber to see if additional cooling cycles will be necessary.

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR A50/A70



AUTOMOTIVE MANUFACTURING

Thermal Imaging Value

New vehicles are subjected to many individual and automated quality control tests. Many automobile manufacturers are using thermal imaging cameras for quality control. Typical applications include inspection of rear window heating, heated seats, checking exhaust flaps, air-conditioning outlets, and more.

Application Story

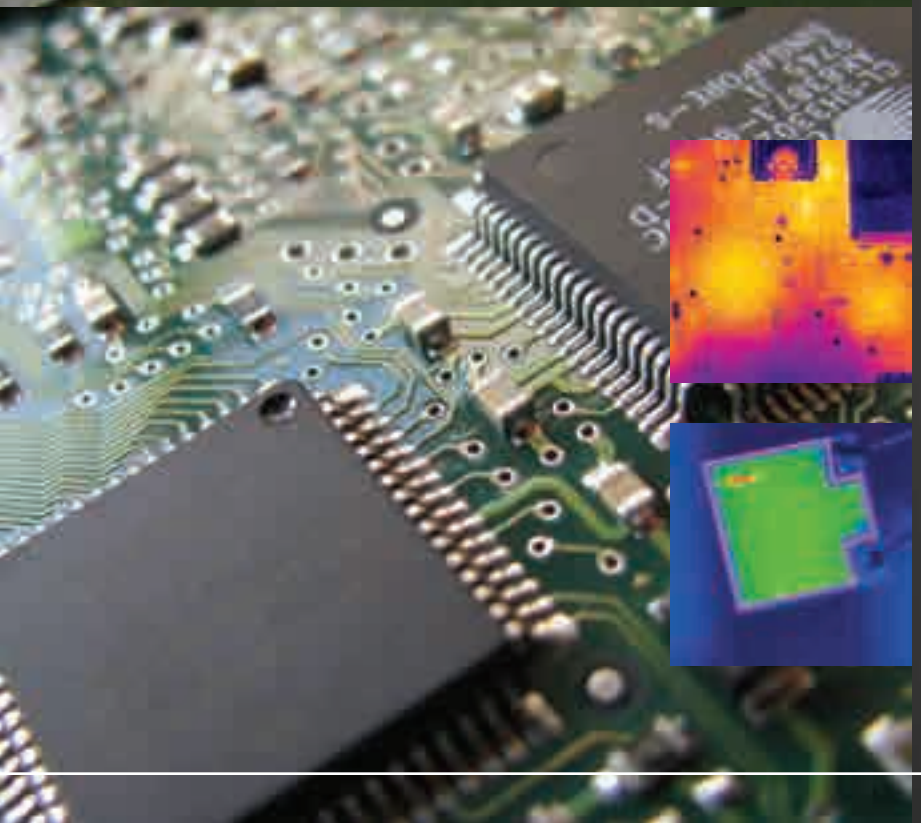
The BMW M5 has distinctive, powerful engine sound. This intentional acoustic design is the result of a second tailpipe exhaust pipe flap that opens only at higher RPMs. Company engineers needed a way to confirm that the flap worked properly without opening the exhaust system. Thermal imaging cameras for automation proved to be the answer. Through thermal imaging, BMW can record exhaust flow to confirm that the flap is opening and closing correctly.

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR AX8

FLIR A50/A70



ELECTRONIC COMPONENTS

Thermal Imaging Value

Cutting down failure rates of electronic components is essential for companies that want to supply a flawless product to their customers. The only way to ensure this is by checking each individual component to provide 100 percent quality control. Thermal imaging enables electronic components manufacturers to detect hot spots, which are indicative of defective products.

Application Story

Isabellenhütte manufactures electronic components that are used by the automotive industry in fuel injection systems and other control units. With a reputation for high-quality workmanship, Isabellenhütte prioritizes quality control throughout its manufacturing process. They use a FLIR A-Series Smart Sensor thermal camera in their automated process to observe a component's thermal cycle within only 20 milliseconds. "Our initial investment in the thermal imaging camera repaid itself within an extremely short period of time. What is more important, each and every resistor is now checked, allowing us to deliver a perfect product to our customers," said the Isabellenhütte production manager.

FLIR SOLUTIONS

FLIR A400/A700 Science Kits

FLIR A50/A70 R&D Kits

FLIR A6700/A6750

FOOD PROCESSING

Thermal Imaging Value

In the food industry, it's essential to carefully control the temperature and shape of perishable goods throughout production, transportation, storage, and sales. Food processors need tools that automate crucial operations in a way that helps minimize human error while holding down costs.

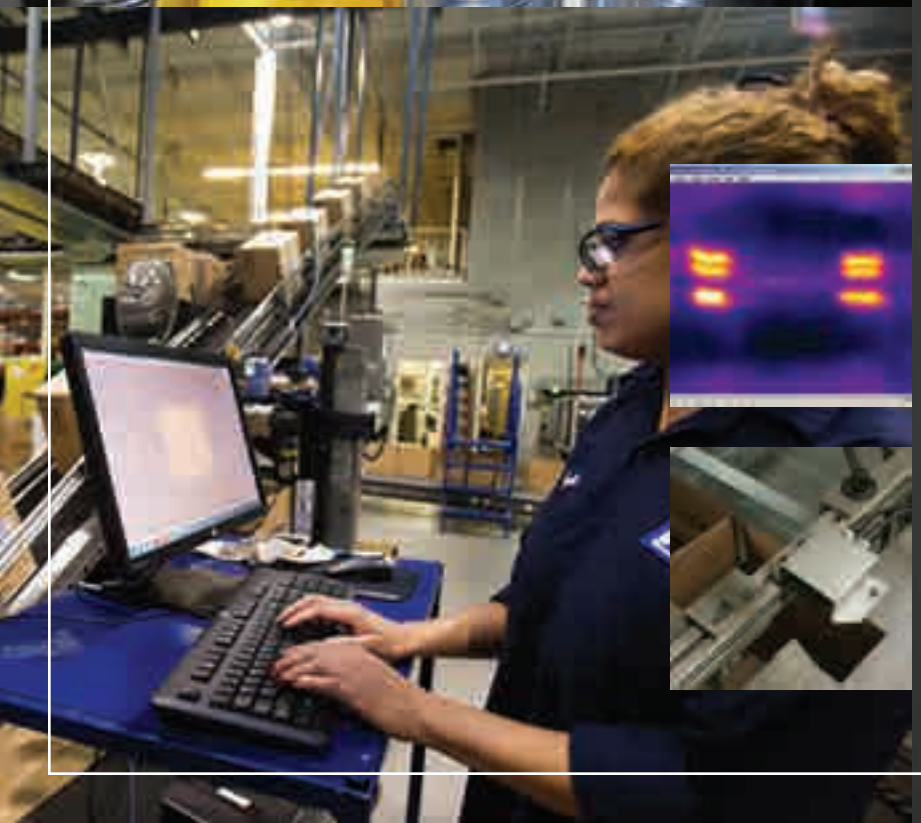
Application Story

Food processing companies use thermal imaging cameras to make automated non-contact temperature measurements of cooked foods, ovens, refrigeration, and packaging. FLIR customers have used thermal imaging cameras for quality control, monitoring temperature uniformity across the width of a conveyor oven cooking belt and confirming cellophane seals on finished microwave meals.

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR A50/A70



PACKAGING

Thermal Imaging Value

Thermal imaging cameras make a clear distinction between what is hot and what is not. This, combined with emissivity effects, sometimes allows thermal imaging cameras to "see through" plastic or other material to confirm adhesive placement for packaging.

Application Story

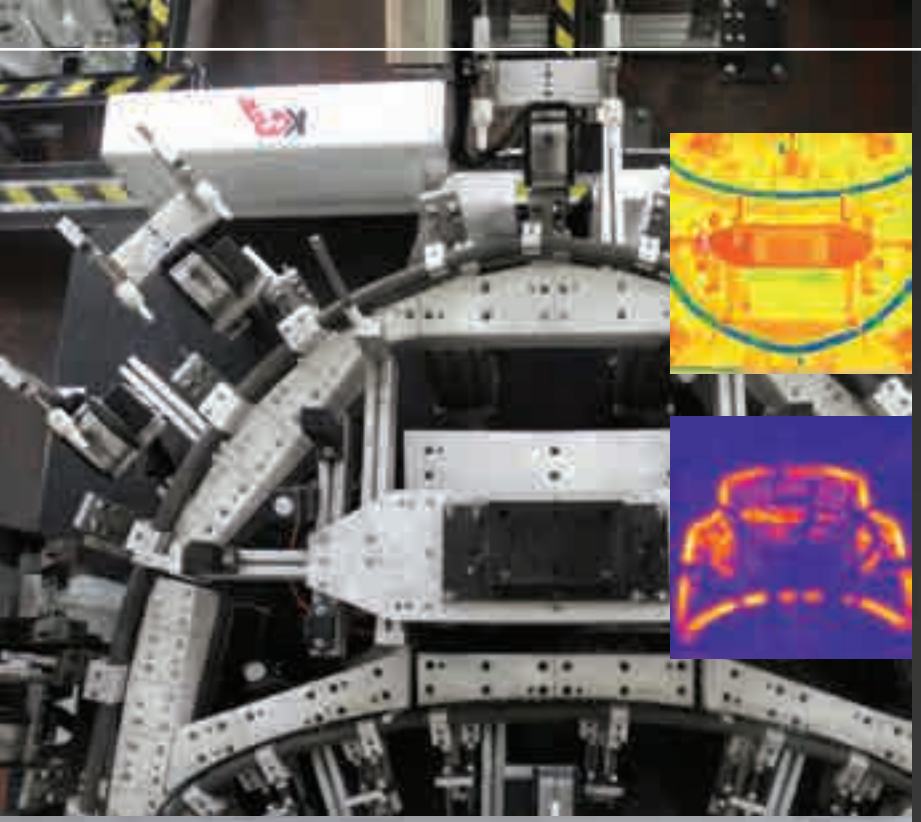
Recochem, a Canadian manufacturer and distributor of chemical products and fluids, uses infrared imaging to continuously monitor the quality of its packaging. Recochem uses a FLIR AX8 to inspect the glue spots on their boxes. Thanks to its compact size, the AX8 fits in a tight area and is able to inspect the bottom of boxes. "If you look at the AX8 thermal images, then you clearly see the hotter spots where the glue has been applied," said Adam Wolszczan, plant engineering manager at Recochem.

FLIR SOLUTIONS

FLIR AX8

FLIR Axxx-Series

FLIR A50/A70



ADHESION

Thermal Imaging Value

Clear or black glue applied to a black background is very difficult for a visible light camera to see and measure. FLIR automation infrared cameras, however, can easily determine whether the glue bead has been applied properly, has gaps and even if it is within the allowable temperature limits. FLIR thermal imaging is also integral to adhesive bonding using induction, a trending process in the automotive industry.

Application Story

Modern car panels are made of a combination of a metal layer on top and a structural adhesive layer underneath. These layers are glued together using induction. The temperature must be exactly right for the adhesion to work properly. To ensure that the adhesion goes smoothly, FIAT uses FLIR thermal imaging cameras to provide automatic feedback during the process. According to Marco Simoli, technical manager at KGR (the induction equipment manufacturer), "With the FLIR thermal camera, we are able to reach the optimum performance of the production line. The thermal data allows us to evaluate and optimize the heating process."

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR A50/A70

IR WELDING

Thermal Imaging Value

Infrared welding is a heat-based joining technique that creates a very strong bond. But inconsistencies in heating, subsurface defects, and other anomalies can cause an incomplete or bad weld pattern. Because thermal imaging cameras can visualize the IR weld as it's applied, it allows manufacturers to monitor the weld process as it happens and verify the weld quality without pulling pieces apart for spot-checks.

Application Story

Yanfeng Automotive Interiors relies on infrared welding to assemble plastic automotive parts in their Kentucky plant. They use this relatively new technology to join large plastic parts with high strength requirements, such as defroster grills. Ensuring a proper weld required halting production for visual quality checks, as well as disassembling some pieces for more in-depth inspections. So Yanfeng consulted with Emitted Energy of Ohio, which brought in a monitoring system consisting of four FLIR thermal imaging cameras and analytical software. With this setup, Yanfeng can monitor production, map heat trends, and provide continuous non-contact evaluation of the infrared welds without the need to interrupt production.

FLIR SOLUTIONS

FLIR Axxx-Series

FLIR A50/A70

FLIR A6700/A6750

AUTOMATION & INDUSTRIAL SAFETY SOLUTIONS

FLIR provides thermal imaging cameras, software, and services to make your condition monitoring, early fire detection, or process control monitoring system a reality.

INDUSTRY 4.0 SOLUTIONS

FLIR AX8

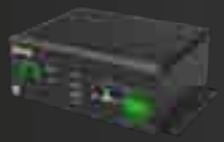
Combining thermal and visual cameras in a small, affordable package, the AX8 provides continuous temperature monitoring and alarming for uninterrupted condition monitoring of critical electrical and mechanical equipment.

FLIR A50/A70 Smart Sensor

The FLIR A50/A70 Smart Sensor Cameras integrate seamlessly into existing systems, offering comprehensive visual temperature monitoring with on-camera analytics and alarm capabilities.

FLIR Axxx-Series Smart Sensor

FLIR A400, A500, and A700 Smart Sensor Cameras target safety and automation applications where networking capabilities and compliance with networking protocols are mission critical.



FLIR Bridge/Bridge Pro

FLIR Bridge is an Industrial Internet of Things (IIoT) edge gateway that easily connects condition monitoring sensors and FLIR automation thermal cameras to your preferred software.

FLIR A500f/A700f Adv. Smart Sensor

FLIR A500f/A700f thermal systems offer on-camera anaylitics and alarming capabilities within a housing designed to withstand harsh elements, for reliable outdoor condition monitoring and early fire detection.

FLIR A310 ex

FLIR A310 ex is an ATEX-compliant solution, with a thermal imaging camera mounted in an enclosure, making it possible to monitor critical and other valuable assets in explosive atmospheres.

FLIR FH-Series R

FLIR FH-Series R thermal security cameras feature onboard, non-contact temperature measurement capabilities for fire detection, safety, and thermal monitoring of valuable equipment, plus 4K visual camera and easy VMS integration.

FLIR Axxx-Series Image Streaming

FLIR A400, A500, and A700 Image Streaming Cameras are plug-and-play devices within third-parties' machine vision software such as NIs IMAQ Vision™ and MVTec Halcon™.

FLIR A6700/A6750

Powerful cooled FLIR A67xx-Series thermal cameras can help you see minute temperature differences, capture high-speed processes and thermal events, and synchronize with other measuring devices.

SOFTWARE

FLIR offers a set of software tools and utilities to help companies fully integrate FLIR automation products into working systems for condition monitoring, early fire detection, and process control monitoring/quality assurance. To learn more about these tools and to download updates, please visit flir.custhelp.com.

IP Config

Utility program for network camera detection and IP address setting that can be downloaded from FLIR Custhelp.

FLIR Research Studio

FLIR Research Studio provides robust recording and analysis capabilities with an intuitive user interface for a variety of research & development applications. This premium, advanced thermal analysis software offers a simplified workflow for displaying, recording, and evaluating data from multiple FLIR cameras simultaneously—allowing you to quickly interpret and understand critical information.

FLIR Atlas SDK

This software development kit allows developers to create custom applications, supporting communication, streaming, and recording using Gigabit, RTSP and USB interfaces. It also gives developers full access to the radiometric data for individual pixels.

FLIR GigE Vision Compliant SDKs

For application development, a Pleora eBus SDK or FLIR GEV Demo sample can be downloaded from FLIR Custhelp.

GigE Vision and GenICam Compliance

This machine vision camera standard is supported in many third-party image processing software.

MAKE INVISIBLE GASES VISIBLE

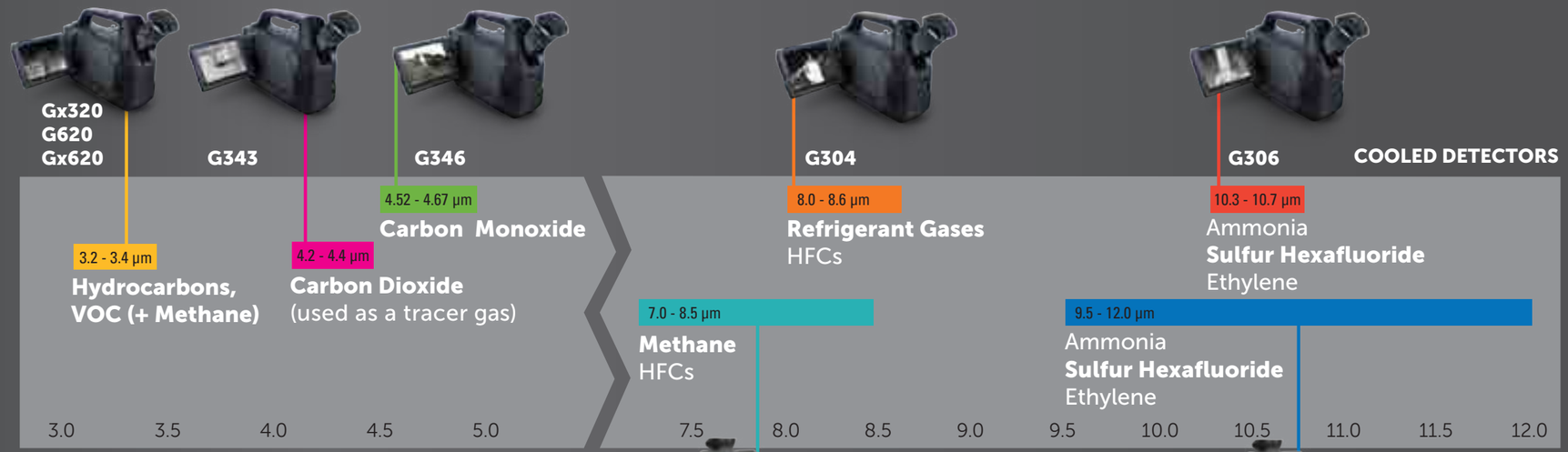
SAVE LIVES, INCREASE REVENUE

A facility can have thousands of connections and fittings that require regular inspection, but the reality is only a small percentage of these components will ever leak. Testing them all with a traditional “sniffer” takes a great deal of time and effort and may put the inspector in an unsafe environment.

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 G-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.

KEY GASES DETECTED BY CAMERA



MAIN INDUSTRY / APPLICATION

Oil and Gas Regulatory Compliance	**Utility** Hydrogen Leak Detection	**Steel** Safety & Environmental Stewardship	**Oil and Gas** Safety & Large Emission Event Detection	**Chemical** Safety & Environmental Compliance	**Utility** Environmental Stewardship	**Food & Beverage** Safety & Productivity

SEE HYDROCARBON LEAKS CLEARLY

FIND LEAKS AT STEEL PLANTS

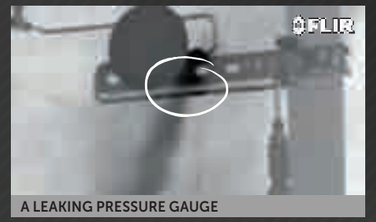
DETECT R-124 COMPRESSOR LEAKS

TRACK LEAKS TO THEIR SOURCE

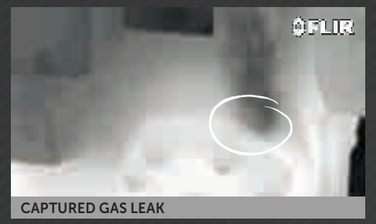
G-Series optical gas imaging cameras can detect natural gas, SF_6, and CO_2 leaks quickly, accurately, and safely without the need to shut down systems, or the need for contact with the components. Gas leaks that are invisible to the naked eye look like smoke on infrared optical gas imaging cameras, making them easy to see – even from a distance.

WITH FLIR OPTICAL GAS IMAGERS, YOU CAN:

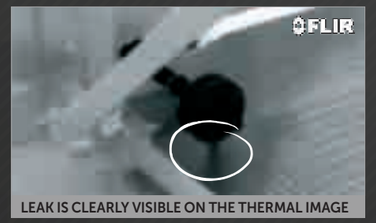
- Scan broad areas quickly, from a safe distance
- Survey hard-to-reach connections and fittings
- Improve compliance with environmental regulations
- Check electro-mechanical systems for signs of failure, using temperature measurement capability
- Check tanks for leaks, level and efficiency



A LEAKING PRESSURE GAUGE



CAPTURED GAS LEAK



LEAK IS CLEARLY VISIBLE ON THE THERMAL IMAGE

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 Gx320, G306 and G346 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.

G-SERIES HANDHELD CAMERAS ARE IDEAL FOR:

- Natural gas wellsites
- Electrical substations
- Power generators
- Chemical processing plants
- Manufacturing plants
- Refineries

FIXED CAMERAS

Have a need for continuous monitoring or automated leak detection in critical areas? With thermal imaging cameras such as the G300a and GF77a, you can constantly monitor vital gas pipelines, installations, and critical components 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 AND GF77a CAMERAS ARE IDEAL FOR:

- Offshore oil platforms
- Natural gas processing plants
- Biogas generation plants
- Petrochemical facilities
- High value well sites
- Underground storage facilities
- Critical pipeline crossings
- Compression stations

SCAN BROAD AREAS QUICKLY, FROM A SAFE DISTANCE

VISIBLE IMAGE | INFRARED IMAGE | HIGH SENSITIVITY MODE

HELPFUL ACCESSORIES

FLEXIBLE SYSTEMS THAT MEET YOUR CHANGING NEEDS

No other thermal imaging camera manufacturer offers a wider range of accessories than Teledyne FLIR. Hundreds of accessories are available to customize our cameras for a wide variety of imaging and measurement applications, including a comprehensive range of lenses, LCD screens, remote control devices, and more.

METHANE & HYDROCARBONS

FLIR Gx320™
FLIR G620™
FLIR Gx620™

The FLIR Gx320, G620, and Gx620 are cooled OGI cameras that are filtered to detect methane and hydrocarbon emissions from the production, transportation, and processing facilities in the oil and gas industry. Survey large areas up to nine times faster than with traditional gas sniffer methods to catch leaks early and reduce emissions.

Providing up to 640 × 480 IR resolution (G620 & Gx620) and highly accurate temperature measurements, inspectors can assess and improve thermal contrast between the gas cloud and the background.

The Gx320, G620, and Gx620 are verified to meet sensitivity standards defined in the US EPA's 0000a methane rule and meet reporting requirements by tagging each recording with GPS data. By finding leaks and fixing them quickly, companies can protect the environment while avoiding product losses and regulatory fines.

Safely scan for gases at great distances on difficult to monitor components, check thousands of connections quickly, and pinpoint the smallest leaks.

HAZARDOUS LOCATIONS

The FLIR Gx320 and Gx620 allow you to quickly detect and visualize fugitive natural gas emissions while maintaining safety inside hazardous locations. These OGI cameras are certified for use in Class 1; Division 2 or Zone 2 **hazardous locations**, improving worker safety and potentially reducing pre-survey paperwork (depending on company protocols).

THE Gx320/G620/Gx620 DETECT NEARLY 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 Gx320, G620, AND Gx620 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

Gx320 & Gx620: 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.

The oil and gas industry has long awaited a gas detection solution such as the Gx320 & Gx620, because its hazardous location designation allows the user to work confidently and focus on the job at hand.

THE Gx320 AND Gx620 HAVE THE FOLLOWING CERTIFICATIONS:

ATEX/IECEx, Ex ic nC op is IIC T4 Gc II 3 G

ANSI/ISA-12.12.01-2013, Class I Division 2

CSA 22.2 No. 213, Class 1 Division 2

THE MOST ADVANCED GAS VISUALIZATION AND IN-CAMERA GAS LEAK QUANTIFICATION

At Teledyne FLIR, we understand that the work you do is critical and dangerous. That's why we designed the FLIR G-Series to help you do your job safer and more efficiently.

FLIR G-Series OGI cameras bring you wireless connectivity, interchangeable lens options, an ergonomic rotating touchscreen, and in-camera gas quantification* to expand your inspection capabilities.

- Quantify gas leak size and type within the camera, eliminating the need for a secondary device*
- Comfortably inspect from any distance with quick-swap interchangeable lenses
- Streamline the inspection process with Multi-REC (recording mode), which allows you to record across various video types including infrared, high sensitivity mode (HSM), and visual
- Instantly connect to smartphones or tablets with advanced built-in Wi-Fi and Bluetooth®
- Automatically upload and store saved images/videos to FLIR Ignite cloud software while in the field

*Gx320, Gx620, and G620 models only

CARBON DIOXIDE

FLIR G343™

The G343 lets you see carbon dioxide (CO_2) 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. CO_2 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 CO_2 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.

CARBON MONOXIDE

FLIR G346™

The FLIR G346 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 G346 can quickly scan broad areas and pinpoint even small leaks from several meters away, increasing worker safety and protecting the environment.

G346 DETECTS CARBON MONOXIDE AND THE FOLLOWING GASES:

- Acetonitrile
- Acetyl cyanide
- Arsine
- Bromine isocyanate
- Butyl isocyanide
- Chlorine isocyanate
- Chlorodimethylsilane
- Cyanogen bromide
- Dichloromethylsilane
- Ethenone
- Ethyl thiocyanate
- Germane
- Hexyl isocyanide
- Ketene
- Methyl thiocyanate
- Nitrous oxide
- Silanev

G343 CAMERAS ARE IDEAL FOR:

- Enhanced Oil Recovery programs
- Hydrogen-cooled power generators
- Carbon capture systems
- Ethanol producers
- Industrial tightness testing

G346 CAMERAS ARE IDEAL FOR:

- Steel industry
- Bulk chemicals manufacturing
- Packaging systems
- Petrochemical industry

REFRIGERANTS

FLIR G304™

The FLIR G304 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.

G304 DETECTS THE FOLLOWING REFRIGERANT GASES:

- R22
- R125
- R134A
- R143A
- R245fa
- R404A
- R407C
- R410A
- R417A
- R422A
- R507A

SULFUR HEXAFLUORIDE AND AMMONIA

FLIR G306™

The FLIR G306 detects SF_6 – used to insulate high voltage circuit breakers – as well as the industrial refrigerant and fertilizer anhydrous ammonia (NH_3). SF_6 is a potent greenhouse gas, with a global warming potential that's 22,000 times greater than CO_2 over a 100-year period. By detecting and repairing SF_6 leaks, energy producers can avoid costly damage to circuit breakers while protecting the environment.

G306 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
- Uranyl fluoride
- Vinyl chloride
- Vinyl cyanide
- Vinyl ether

FLIR GF77™

Gas Find IR with HR lens

The FLIR GF77 with the HR (9.5-12 µm) lens—designed exclusively for use with this uncooled OGI camera—detects and visualizes sulfur hexafluoride (SF_6), ethylene, and ammonia. This affordable solution is useful for both gas detection and radiometric temperature measurement, so you can safely locate leaks and perform accurate thermal inspections using one camera.

G304 CAMERAS ARE IDEAL FOR:

- Food production, storage, and retail
- Automotive production and repair
- Air conditioning
- Pharmaceutical production, transport, and storage

G306 CAMERAS ARE IDEAL FOR:

- Utilities
- Ammonia plants
- Industrial refrigeration systems
- Chemical plants

GF77 CAMERAS WITH HR LENSES ARE IDEAL FOR:

- Electric power utilities
- Oil and natural gas operations
- Chemical/manufacturing facilities
- Food and agriculture
- First responders

SPECIFICATIONS

	Gx320	Gx620	G620	G343	G346	G304	G306	GF77	
Primary Gas Seen	Hydrocarbons (CxHx)	Hydrocarbons (CxHx)	Hydrocarbons (CxHx)	Carbon dioxide (CO_2)	Carbon monoxide (CO)	Refrigerants	Sulfur hexafluoride (SF_6), ammonia (NH_3)	LR lens: methane, R-134a, R-152a	HR lens: sulfur hexafluoride (SF_6), ammonia (NH_3), ethylene
Detector Type	Cooled InSb	Cooled InSb	Cooled InSb	Cooled InSb	Cooled QWIP	Cooled QWIP	Cooled QWIP	Uncooled microbolometer	
Spectral Range	3.2 µm to 3.4 µm	3.2 µm to 3.4 µm	3.2 µm to 3.4 µm	4.2 µm to 4.4 µm	4.52 µm to 4.67 µm	8.0 µm to 8.6 µm	10.3 µm to 10.7 µm	LR lens: 7 µm to 8.5 µm	HR lens: 9.5 µm to 12 µm
Resolution	320 × 240 (76,800 pixels)	640 × 480 pixels (307,200 pixels)	640 × 480 pixels (307,200 pixels)	320 × 240 (76,800 pixels)	320 × 240 (76,800 pixels)	320 × 240 (76,800 pixels)	320 × 240 (76,800 pixels)	320 × 240 (76,800 pixels)	
Quantification in Camera	Yes	Yes	Yes	No	No	No	No	No	
Thermal Sensitivity	<10 mK at 30°C (86°F)	20 mK at 30°C (86°F)	20 mK at 30°C (86°F)	15 mK at 30°C (86°F)	15 mK at 30°C (86°F)	15 mK at 30°C (86°F)	15 mK at 30°C (86°F)	25° lens: <25 mK at 30°C (86°F) 6° lens: <40 mK at 30°C (86°F)	
Accuracy	±1°C (±1.8°F) for temperature range (0°C, to 100°C, 32°F to 212°F) or ±2% of reading for temperature range (>100°C, >212°F)	±1°C (±1.8°F) for temperature range (0°C, to 100°C, 32°F to 212°F) or ±2% of reading for temperature range (>100°C, >212°F)	±1°C (±1.8°F) for temperature range (0°C, to 100°C, 32°F to 212°F) or ±2% of reading for temperature range (>100°C, >212°F)	N/A	±1°C (±1.8°F) for temperature range (0°C to 100°C, 32°F to 212°F) or ±1% of reading for temperature range (>100°C, >212	±1°C (±1.8°F) for temperature range (0°C, to 100°C, 32°F to 212°F) or ±2% of reading for temperature range (>100°C, >212°F)	±1°C (±1.8°F) for temperature range (0°C, to 100°C, 32°F to 212°F) or ±2% of reading for temperature range (>100°C, >212°F)	±5°C (±9°F) for ambient temperatures 15°C to 35°C (59°F to 95°F)	
Noise Equivalent Concentration Length (NECL) [ΔT=10°C, Distance= 1 m]	Methane - 13 ppm-m	Methane - 29 ppm-m	Methane - 29 ppm-m	Carbon dioxide (CO_2) - 5.6 ppm-m	Carbon monoxide (CO) - 9 ppm-m	-	Sulfur hexafluoride (SF_6) - 0.3 ppm-m, Ethylene (C_2H_4) - 6.3 ppm-m	LR lens: CH_4: <100 ppm × m R-134a: <20 ppm × m R-152a: <100 ppm × m	HR lens: SF_6: <1 ppm × m C2H4: <20 ppm × m NH_3: <20 ppm × m
Minimum Laboratory Leak Rate (MLLR) [known gases]	Methane: 0.6 g/hr Propane: 0.6 g/hr Butane: 0.4 g/hr	Methane: 0.6 g/hr Propane: 0.6 g/hr	Methane: 0.6 g/hr Propane: 0.6 g/hr	-	-	-	Sulfur hexafluoride (SF_6): 0.026 g/hr Ammonia: 0.127 g/hr	Methane: 2.7 g/hr	Sulfur hexafluoride (SF_6): 0.74 g/hr
Temperature Range	-20°C to 350°C (-4°F to 662°F)	-20°C to 350°C (-4°F to 662°F)	-20°C to 350°C (-4°F to 662°F)	-	-20°C to 350°C (-4°F to 662°F)	-20°C to 250°C (-4°F to 482°F)	-40°C to 500°C (-40°F to 932°F)	-20°C to 80°C (-4°F to 176°F), 0°C to 250°C (32°F to 482°F) 100°C to 500°C (212°F to 932°F)	
Available Lenses	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm); 6° × 4.5° (92 mm)	24° × 18° (23 mm); 14.5° × 10.8° (38 mm)	
Zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–8× continuous, digital zoom	1–6× continuous, digital zoom	
Focus	Manual	Manual	Autofocus, manual	Autofocus, manual	Autofocus, manual	Autofocus, manual	Autofocus, manual	Continuous (laser), one-shot (laser), one-shot contrast, manual	
Display									
Adjustable Viewfinder	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	4", 640 × 480 pixel rotatable, touchscreen LCD	Dragontrail® Touchscreen (QVGA), 640 × 480 pixels	
Visual Camera w/ Lamp	3.2 MP	3.2 MP	3.2 MP	3.2 MP	3.2 MP	3.2 MP	3.2 MP	5 MP	
Laser Pointer	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)	Class 2, dedicated button, used in focus and distance measurement	
Video Out	HDMI, DVI	HDMI, DVI	HDMI, DVI	HDMI, DVI	HDMI, DVI	HDMI, DVI	HDMI, DVI	DisplayPort over USB Type-C	
Certifications									
Hazardous Locations	ATEX/IECEx, Ex ic nC op is IIC T4 Gc II 3 G - ANSI/ISA-12.12.01-2013, Class I Division 2 - CSA 22.2 No. 213, Class I Division 2	ATEX/IECEx, Ex ic nC op is IIC T4 Gc II 3 G - ANSI/ISA-12.12.01-2013, Class I Division 2 - CSA 22.2 No. 213, Class I Division 2	-	-	-	-	-	-	
US EPA 0000a	Yes	Yes	Yes	-	-	-	-	-	
Image Analysis	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	-	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	10 spots, 5 boxes with max/min/average, 1 line, Delta T, measurement corrections	3 spot and boxes in live mode	
Annotations	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	Voice: 60 secs with Bluetooth on still images and video Text from predefined list or soft keyboard on touchscreen	
Communication Interfaces	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth via headset, Wi-Fi, HDMI	USB 2.0, Bluetooth, Wi-Fi, DisplayPort	
Data Storage	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	Removable SD card, cloud via FLIR Ignite	
File Format	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, MJEG, MPEG4, H.264, RTRR(.csq)	Standard JPEG, RTRR(.csq)	
MultiREC Recording	Record multiple files automatically in customizable order	Record multiple files automatically in customizable order	Record multiple files automatically in customizable order	Record multiple files auto-matically in customizable order	Record multiple files automatically in customizable order	Record multiple files automatically in customizable order	Record multiple files automatically in customizable order	-	
GPS	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS; data logging feature	Location data automatically added to every still image; first frame in video from built-in GPS	

For an overview of the specifications for the FLIR GF77a and G300a please visit FLIR.com

FLIR G620a

Fixed-Mount Hydrocarbon/VOC Optical Gas Imaging (OGI) Camera

www.flir.com/products/G620a

Gases Detected

Hydrocarbons, methane (CH_4), and other Volatile Organic Compound (VOC) emissions

Key Features

- Unmatched image clarity to visualize even small gas leaks thanks to high-resolution, high sensitivity cooled sensor
- Rely on consistent monitoring with more than 27,000 hours of runtime needed before service (mean time to failure)
- Connect and run cameras easily through included web interface, available software development kits (SDKs), and industry-standard protocol GigE vision

Main Applications

- Meet methane and VOC detection sensitivity requirements set forth in U.S. EPA 0000a and Appendix K
- Achieve global ESG pledges to reduce hydrocarbon and methane emissions
- Mitigate emission events where methane is low in overall gas composition percentage

SPECIFICATIONS

Imaging and optical	
IR resolution	640 × 512
Field of view (FOV)	6° lens: 6° × 4.8° 14.5° lens: 14.4° × 11.5° 24° lens: 23.6° × 19°
Focal length	6° lens: 92 mm 14.5° lens: 38 mm 24° lens: 23 mm
Minimum focus distance	6° lens: 2 m 14.5° lens: 0.5 m 24° lens: 0.3 m
Focus	Motorized
Zoom	Digital zoom, 1x, 2x, 4x, 8x
Digital image enhancement	High sensitivity mode (HSM)
Detector type	High Operating Temperature (HOT) MWIR T2SLS
Spectral range	3.2–3.4 µm
Detector pitch	15 µm
F/#	f/1.59
Frame rate	30 Hz
Sensor cooling	FLIR FL100 Linear cooler
Image modes	IR image, high sensitivity mode (HSM)
Automatic image adjustment	Linear, PE
Color palettes	Selectable 8-bit
Overlay	RTSP Only
Measurement & Analysis	
Thermal sensitivity (NETD)	<15 mK at 25°C
Temperature measurement range	-10°C to 120°C
Temperature measurement sub-ranges	-10°C to 30°C 10°C to 60°C 30°C to 80°C 55°C to 120°C
Ambient drift compensation (with factory calibration)	Yes
Accuracy	≤100°C ±2°C, >100°C ±2% of reading
Gas sensitivity	NECL: 1 m ΔT 10°C Methane: 16 ppm × m Hydrocarbons (niabara gas mix): 6.4 ppm × m
Communication & Data Storage	
Synchronization modes	Sync In
Radiometric IR video recording	None
Non-radiometric IR recording	None
Radiometric IR video streaming	GigE Vision
Non-radiometric IR video streaming	H.264 or MJPEG over RTSP
Command & control	GEV: Genicam; RTSP: Web Interface, REST API
Storage media	None
Digital I/O connector type	M12 12-pin A-coded, Male (shared with external power)
Digital inputs	2x opto-isolated, Vin(low)= 0–1.5 V, Vin(high)= 3–25 V
Digital outputs	3x opto-isolated, 0–48 V DC, max. 350 mA; solid-state opto relay; 1x dedicated as Fault output (NC)
Communication interfaces	Ethernet
Power	
Primary power source	PoE+ Type 2 (30 W min)
Optional DC power connection	M12 12-pin A-coded, male (shared with Digital I/O)
Power consumption	25 W (cool down)
DC voltage range	18 V-56 V

Specifications subject to change. For the most up-to-date specifications, please visit flir.com.

For technical or sales support, please visit:
www.flir.com/about/general-inquiries

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FLIR G609

High Resolution Furnace and Boiler Inspection Camera

Key Features:

- Filtered to see through flames for clear inspections of furnaces, heaters, and boilers
- Detachable heat shield for increased operator protection and ease of use
- High resolution detector for enhanced image clarity and accurate measurements

Main Applications:

- Industrial furnace and boiler inspections
- Chemical and petrochemical plant monitoring
- Utility industry maintenance and safety checks

www.FLIR.com/G609

SPECIFICATIONS

Imaging and optical	
Thermal Lens options	24° furnace, 6° lenses
IR resolution	640 × 480 pixels
Field of view (FOV)	24°
Focal length	23 mm
Minimum focus distance	0.3 m (1.0 ft)
F-number	2.9
Focus	Autofocus, manual focus
Zoom	1 – 8× continuous, digital zoom
Detector type	Focal plane array (FPA), cooled InSb
Detector pitch	15 µm
Sensor cooling	Stirling Microcooler (FLIR MC-3)
Image presentation modes	IR image, visual image
Color palettes	• Arctic • White hot • Black hot • Iron • Lava • Rainbow • Rainbow HC
Radiometric IR video recording	RTRR .csq (compressed) & .seq 15 hz (uncompressed)
Non-radiometric IR or visual video	H.264 compression to memory card, .mpeg4 file format
Radiometric IR video streaming	Over UVC
Non-radiometric IR video streaming	• H.264 (AVC) over RTSP (Wi-Fi) • MPEG4 over RTSP (Wi-Fi) • MJPEG over UVC and RTSP (Wi-Fi)
Visual recording	H.264 to memory card

Viewfinder	Built-in, tiltable OLED, 800 × 480 pixels
Built-in digital camera	5 MP
Measurement and analysis	
Thermal sensitivity/NETD	20 mK @ 30°C (86°F)
Measurement temperature range	-20°C to 1500°C (-4°F to 2732°F)
Accuracy	±1°C (±1.8°F) for temperature range 0°C, to 100°C (32°F to 212°F) or ±2% of reading for temperature range >100°C (>212°F)
Spotmeter	10
Area	5 boxes with max./min./average
Profile	1 line (horizontal or vertical)
Measurement corrections	Reflected temperature, distance, atmospheric transmission, humidity, external optics
Languages	21
Communication and data storage	
FLIR Inspection Route	Enabled in the camera
Cloud services (via Wi-Fi)	FLIR Ignite for direct, secure image uploading, organizing, storage, and sharing (required firmware available), wireless file transfer via userweb library
Bluetooth	Communication with headset
Storage media	Removable SD memory card
Image file formats	Standard JPEG, measurement data included. Infrared-only mode.
Communication interfaces	USB 2.0, Bluetooth®, Wi-Fi, HDMI
Video out	HDMI 640 × 480, HDMI 1280 × 720, DVI 640 × 480, DVI 800 × 600
(continued)	

For more information contact: Sales@TeledyneFLIR.com
or to find your local support number, visit: flir.com/contactsupport

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FLIR G609

High Resolution Furnace and Boiler Inspection Camera

SPECIFICATIONS

Radio	Operating frequency • Bluetooth + EDR: 2402–2480 MHz • WLAN 2.4 GHz: 2412–2462 MHz • WLAN 5 GHz: 5150-5250 MHz Note that frequency band 5150-5250 MHz is for indoor use only, see national regulations. RF output (EIRP) • Bluetooth + EDR: <10 dBm • WLAN: <17 dBm Antenna • Integrated PIFA antenna (gain: maximum 2.6 dBi)
Recording modes	Multi-REC, Periodic storage
General	
Package size	600 mm × 510 mm × 410 mm (23.6 in × 20.1 in × 16.1 in)
Package weight	14.2 kg (31.3 lb)
Camera size (L × W × H)	251.6 mm × 164.5 mm × 170.9 mm (9.9 in × 6.48 in × 6.73 in)
Camera weight	3.0 kg (6.61 lb)
Mounting interface	UNC ¼"-20
GPS	Location data automatically added to every still image and first frame in video from built-in GPS
Laser pointer	Class 2 Semiconductor AlGaInP diode laser, 1 mW, 635 nm (red)
User interface	
Display	640 × 480 pixels (VGA)
Display frame rate	60 Hz
Voice	60 seconds with Bluetooth on still images and video
Text	Text from predefined list or soft keyboard on touchscreen
Image sketch	Yes: on infrared images
Power	
Battery type	Rechargeable Li-Ion battery
Battery weight	232 g (8.2 oz.)
Battery voltage	7.4 V
Battery capacity	5.5 Ah
Battery operating time	>2 hours at 25°C (+68°F) and typical use
Battery charging time	2.5 h to 95% capacity, charging status indicated by LEDs
Battery code	UN3481
Startup time	Typically 7 min. @ 25°C (77°F)
Battery documents	For documents like MSDS and UN38.3 test reports/ summaries, see: https://support.flir.com/resources/msds
Environmental and certifications	
Operating temperature range	-20°C to 50°C (-4°F to 122°F)
Storage temperature range	-30°C to 60°C (-22°F to 140°F)
Humidity	IEC 60068-2-30 / 24 h 95% Relative Humidity 25°C to 40°C (77°F to 104°F) (2 cycles)
ROHS and Reach Directive	2011/65/EU
WEEE	2012/19/EU
RoHS	2011/65/EU
RED	2014/53/EU

EMC	• ETSI EN 301 489-1 (radio) • ETSI EN 301 489-17 • EN 55032 (emission) • EN 55035 (immunity) • EN 61000-4-8 Level 5 (magnetic field) • EN 61000-6-2, Immunity Industrial Environment • FCC 47 CFR part 15 B, class B (emission) • ICES-003
Radio spectrum	• ETSI EN 300 328 • ETSI EN 301 893 • FCC 47 CFR part 15 C • FCC 47 CFR part 15 E • RSS-247
Encapsulation	IP54 (IEC 60529)
Shock	25 g (IEC 60068-2-27)
Vibration	2 g (IEC 60068-2-6)
Warranty and service	
Warranty	support.flir.com/g609
Ordering	
P/N	15902-0101
What's included	• G609 infrared camera with lens • Battery, 2 pcs. • Battery charger • Power supply • Hand strap • Neck strap • Lens cap • Lens cap strap • Memory card • HDMI-HDMI cable • USB cable • Screwdriver TX20 • Knob screw (optional screw for the rear cover) • Printed documentation • Hard transport case * Camera body "lens" cap • Heatshield with skirt and pouch

Specifications are subject to change without notice.
For the most up-to-date specs, go to www.flir.com

For more information contact: **Sales@TeledyneFLIR.com**
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