FLIR thermal imaging cameras for predictive maintenance







The next generation of test & measurement

## The power of thermal imaging

FLIR thermal imaging cameras are must have tools for electricians and maintenance technicians. They give you the power to see problems in a way no other technology can, and allow you to inspect equipment quickly and take accurate temperature measurements from a safe distance. FLIR cameras help you find impending trouble before it hurts someone, shuts things down or wastes energy.



## Which camera is right for you?

Whether you're new to infrared inspections or already a Level III thermographer, a variety of important factors will figure into your thermal camera decision: how often you use the camera, what you're inspecting, the angles you're shooting from, target size, high temperatures, distance, and other considerations. That's why we've created this guide to help you determine the right fit for your application, budget, and the way you like to work.

For example, many utilities prefer our T640 because the camera's rotating lens system makes it comfortable to aim up at overhead components – significant when doing a full day of intensive substation inspections. 640 resolution and interchangeable lenses make detecting distant, small targets easier for them, too. Those same companies may also outfit crews with handy E4 or E6 cameras for quick scans and safety checks before entering underground vaults or using a disconnect stick.

Obviously, different requirements mean one thermal imager may or may not fit all. So, along with this guide, we encourage you to consult with your FLIR dealer or representative who will gladly help you hone your decision.





## MSX: A bold new form of thermal imaging

If you plan to share saved images with customers or co-workers, a thermal image alone isn't always enough to help them understand what they're seeing. That's why FLIR developed MSX® Multi-Spectral Dynamic Imaging to bring together the best of both spectrums in a striking, innovative way. Now onboard the full line of new FLIR Ex-series, Exx-series and T-series cameras, MSX instantaneously generates a definitive, all-in-one thermal picture that easily orients you to the location of the problem as soon you see it on the screen or in a report. No more guesswork or messing around with extra photos.

#### Why you need MSX

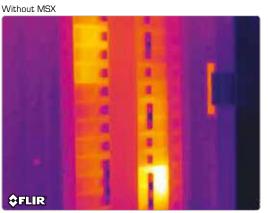
Key details apparent to the naked eye like numbers, labels, signage, and structural features can get lost in a regular thermal image, often



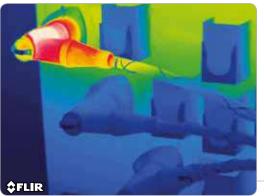
requiring a separate digital photo to reference the location of the temperature issue you've found. Thermal imagers of the past have featured ways to blend or insert a portion of a thermal image into a visible light picture. But these modes have only provided a partial solution and typically take extra time to dial in and interpret. They also tend to dilute or obscure the thermal view of the scene.

#### What makes it unique

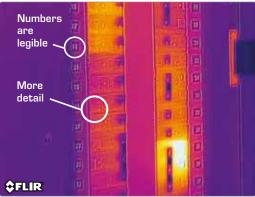
MSX is completely different. Using FLIR's patented algorithm, MSX extracts the highcontrast highlights from the built-in visible camera's image and then virtually etches the skeletonized details onto the entire corresponding FLIR infrared image in real time. The result: totally recognizable thermal video and snapshots integrated with all the texture, depth and definition you need to isolate the problem in one simple picture.



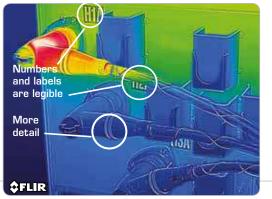
Without MSX







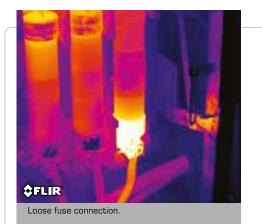
With MSX





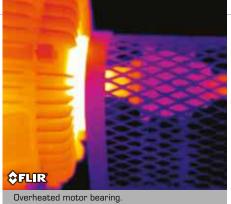
## A broad range of applications

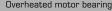
FLIR thermal cameras can be used in many different areas of your business, which can accelerate your return on investment. Most electrical and mechanical devices get hot before they fail. Finding these problems early allows you to do repairs on a more convenient schedule rather than in an emergency. But there are plenty of other areas you can use your camera to save money, including flat roof water damage detection, process control and energy loss. Check out FLIR.com and the Infrared Training Center (ITC) to learn about more applications.



#### **Electrical**

Find hidden problems quickly, make timely repairs, prevent unscheduled shutdowns, and improve plant safety.





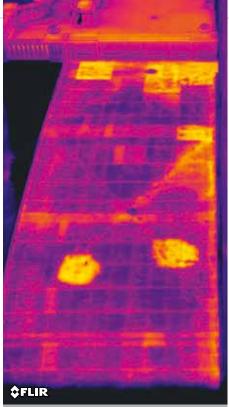
#### Mechanical

Discover overheated bearings, linkages, and other components before they can interrupt your operations or create safety hazards.



#### Utility

Scan large areas and hundreds of connections quickly and efficiently to prevent unexpected service outages and lost revenues.



Wet insulation on flat roof.

#### Roofing

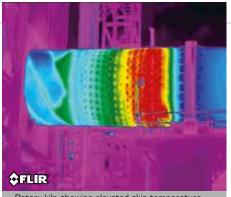
FLIR cameras can help you find leaks and wet areas on flat roofing systems which can help save money by doing spot repairs as opposed to full replacements.



Moisture damage on ceiling, wall, and floor.

#### **Building diagnostics**

Even small areas of moisture intrusion can be easy to spot with an infrared camera. Locate and repair hidden water damage before mold and rot begins.



Rotary kiln showing elevated skin temperature.



Steam leak underground.

Kilns and furnaces and more

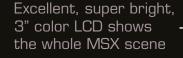
Some FLIR thermal cameras can measure up to 2000°C, helping you to monitor high temperature processes and refractory breakdown all from a safe distance. Underground steam leaks and many other problems can be found using FLIR cameras.



## FLIR E4, E5, E6 and E8

#### The First with thermal, visible, and MSX imaging starting under €1K

Now every technician can afford to keep an E-Series camera handy for quick equipment scans and safety checks. Easier to use than a smart phone, FLIR's economical thermal imagers offer everything you need for on-the-spot thermal inspections. These are invaluable tools that can help you clearly see and find hidden electrical and mechanical overheating in time to stop problems from turning into serious, expensive trouble. With an E4, E5, E6 or E8, you'll become a well-armed preventive action hero.



<image>

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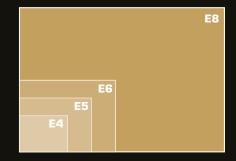
\*The thermal images shown are for illustrative purposes only, and may not have been taken by the camera series depicted.

#### What E4, E5, E6 & E8 cameras offer

- MSX Recognize problem locations instantly when you see thermal images enhanced with visible camera details such as numbers, signage, labels, and other identifiable features.
- **IR resolutions to fit your application –** Choose from the E4's 4,800 pixel resolution all the way up to the impressive 320 × 240 thermal imagery of the E8.
- Reliable results FLIR's outstanding thermal accuracy (within 2% or +/- 2°C) and broad measurement range for results you can count on.
- Fully radiometric images Stores hundreds of thermal, MSX and visible image JPEGs with all temperature data intact ready to download to your Mac or PC.
- **Compact design –** Light at about 575g for easy one-handed operation, yet tough enough to stow with the rest of your tools.

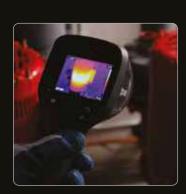
#### Four best-in-class imagers

- E4 4,800 pixels
- Highly-affordable MSX imagery • E5 – 10,800 pixels
- Auto hot or cold spot efficiency
- E6 19,200 pixels
- E8 76,800 pixels
  - 4 times the resolution of E6





USB output for fast image downloads





Reporting software included



Quick-release rechargeable battery

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## FLIR E40, E50 and E60

#### Powerful, flexible and feature rich thermal imaging performance

If you're a busy electrician, plant maintenance engineer or facilities technician who plans to do frequent thermal imaging inspections of high energy or high temperature equipment at a distance, you'll appreciate the features in this line of cameras. You can add wide angle or telephoto lenses to measure small objects from a distance, connect to smartphones and tablets, and do reporting right from the field with a comprehensive set of measurement tools. You can also connect to select devices supporting MeterLink<sup>®</sup>. All E-series models include MSX, a patented FLIR-only feature designed for busy electrical and mechanical users that gives you all of the vital visual data right inside your thermal image.



Connect to smartphones and tablets with FLIR Tools Mobile for Apple<sup>®</sup> and Android<sup>™</sup> to stream video and import, process, and share images fast.



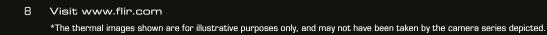
Large, bright touchscreen with intuitive user interface makes field analysis easy

3.1 MP digital camera

**OFLIR** 

Bright LED camera lamp illuminates dark areas

Laser pointer pinpoints problems on the visual image



Interchangeable

**\$FLIR** 

OFLIR

lenses

Superior MSX thermal imaging up to 76,800 pixels for longer range clarity

Built rugged to withstand a 2 meter drop

Simple, one-handed operation

#### Productivity and imaging features

- Lens options If you have a large facility or will be looking for problems up high on an overhead bus or at lots of MCC's, you can add a 45° wide angle or a 15° telephoto lens to speed up your inspections or to accurately measure small hot spots from a distance.
- Wireless connectivity You can generate reports right in the field with smartphones and tablets and send them to coworkers instantly. It's also a great way to share what you are seeing with others on your team who need to stay at a safe distance from the camera and energized or moving equipment.
- **Touchscreen control** This allows you to do analysis right on the image, in the field. You can move multiple measurement spots and areas to assess rise above reference temperatures quickly and easily. All of this data is stored on the radiometric jpeg.
- **MeterLink**<sup>®</sup> Connect to select FLIR and Extech multimeters, clamp meters and moisture meters to record measurements right on your thermal image for reporting and as a permanent reference. It's a great way to save load data right along with the thermal image.
- Auto orientation This is a helpful feature for managing the best orientation on scenes where you can't get the whole shot in landscape format. It automatically orients the temperature measurement data on the screen for the optimum view.



Auto-orientation keeps diagnostics overlays upright.



\* After product registration on www.flir.cor



## **FLIR T-series**

#### Incredible performance and flexibility - the ultimate thermal imager

If you want powerful communication and onboard infrared camera tools, superior thermal imaging, and the most ergonomic way to get more IR surveys done, T-series is as good as it gets. Packed with every expert feature in a portable thermography system, FLIR T-series cameras are designed for intensive inspections where long range or high temperature measurements are required, and high resolution and thermal sensitivity are critical. Plus our flexible rotating optical block helps you scan overhead targets and from tough angles while keeping the display comfortably positioned – just one example how FLIR makes T-series so user friendly.



#### T420 & T440 features

- **Superior IR images –** Sharp thermal resolution at 76,800 pixels for solid accuracy from farther away.
- Advanced optics The widest array of lens options to fit the view and spot size you need for your application.
- **MSX enhancement –** Multi-Spectral Dynamic Imaging adds visible spectrum definition to IR images in real time for extraordinary thermal detail that instantly highlights and orients problem locations.
- Scalable P-i-P Overlay thermal images onto visible light pictures as an alternative reference.
- Delta T & multiple measurement tools Powerful onscreen analytics include differential temperature, 5 measurement spots, 5 box areas, isotherm and more for detailed diagnostics.
- Sketch on IR/visual Draw circles, pointers and notes or use pre-defined shapes using the touchscreen user interface to highlight points of interest.\*
- Auto orientation Automatically orients onscreen temperature measurement data whether in portrait or landscape view.
- Annotation Add voice or text comments to images or use the touchscreen to sketch notes and drawings; include additional measurements with MeterLink-enabled clamp and moisture meters.
- **Compass –** Adds camera pointing direction to every image for additional location documentation.



With MSX Enhancement



Predefined Stamps for Sketch

\*Available on T440 only

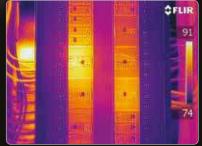
\*The thermal images shown are for illustrative purposes only, and may not have been taken by the camera series depicted.



#### T620 & T640 features

- Highest IR resolutions Crisp thermal images with 307,200 pixels (640 x 480) on the T620 and T640 .
- Advanced optics A range of lens options includes our new, light 7° telephoto lens that provides astounding clarity, accuracy, and portability for imaging overhead and distant targets.
- **Continuous auto focus** Keeps your image sharp automatically no matter where you aim for the highest clarity, accuracy, and efficiency.\*
- **MSX image enhancement** Onboard and real time, MSX adds visible spectrum definition to IR images for extraordinary thermal detail that instantly highlights and orients problem locations.
- Scalable P-i-P Overlay thermal images onto visible light pictures as an alternative reference.
- More measurement tools Report all the details with 10 measurement spots, 5 box areas, Delta T temperature differential, isotherm, and more.
- Sketch on IR/visual Draw circles, pointers and notes or use pre-defined shapes using the capacitive touchscreen user interface to highlight points of interest.\*
- GPS Built-in GPS automatically adds location data to images for including in reports.

\*Available on T640 only



With MSX enhancement



Auto Orientation



## Which FLIR camera is right for you?

FLIR has an amazing selection of cameras for electrical and mechanical users; but which one is right for you? For the maintenance professional it's all about finding problems fast and getting accurate temperature measurements, so your first step is to establish what kind of equipment you will need to measure.

Single spot

Shorter

250° C

Temperature range

Resolution

Analysis tools

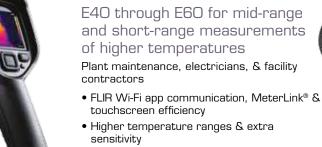
Measurement distance

### 80 x 60

## E4 through E8 are extremely handy for quick, shorter-range inspections

Utility troublemen, HVAC pros, and facility maintenance

- Perfect for quick scans and safety checks
- Far more effective than IR temp guns
- Rugged and affordable enough for everyone
- Includes excellent software for Mac and PC



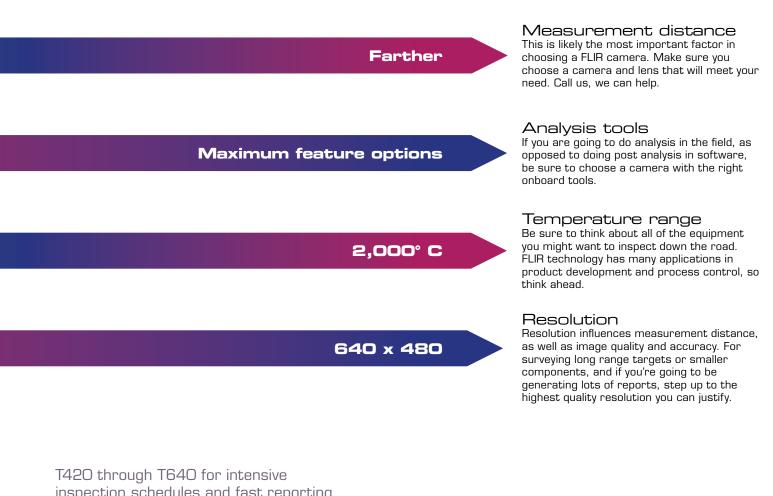
- Interchangeable telephoto & wide angle lenses
- Includes excellent software for Mac and PC



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Hot connections come in all sizes, but if you're working in a plant with hundreds of small motor control centers or small connections that are hard to reach, you will likely need a special lens to measure these hot spots from a safe distance. If you are going to do thermal inspections all day long, you should consider a T-series camera for its flexibility and comfort for extended use.

If you need to measure high temperatures including kilns or furnace skins, be sure that you choose a camera that can be calibrated to meet those needs.



inspection schedules and fast reporting Substation & solar farm surveys, roofing companies, and RCM programs

- Ergonomic and hi-res for hero shots from any angle
- Short-, mid- & long-range imaging of small or high-temp targets
- Feature-rich performance
- Includes excellent software for Mac and PC





## Imaging specifications



			8				
Specifications	Point & shoot			Performance			
Model	E4	E5	E6	E8	E40	E50	E60
Accuracy		±2% of reading, for 95°F) and object te				±2% of reading, for °C to 35°C (+50°F t	
Thermal resolution	4,800 (80 × 60)	10,800 (120 × 90)	19,200 (160 × 120)	76,800 (320 × 240)	19,200 (160 × 120)	43,200 (240 × 180)	76,800 (320 × 240)
Thermal sensitivity	<0.15°C	<0.10°C	<0.06°C	<0.06°C	<0.07°C	<0.0	D5℃
Temperature range		–20° to 250°C	(-4° F to 482°F)		-20°C t	o 650°C (-4° F to 1	,202°F)
Measurement presets	2 presets: center spot; no measurements			7 presets: center spot; hot spot (box max); cold spot (box min); 3 spots; hot spot - spot (box max + spot + delta); hot spot - temperature (box max + ref temp + delta); no measurements			
User presets							
Spot mode		Center	r/fixed			3 moveable	
Area mode		•	•	•	•	•	•
Profile							
Color alarm (isotherm)			Blue below a	or red above	Blue belo	ow, red above, yellov	v interval
Screening							
Frame rate		9	Hz			60Hz	
Field of view		45° :	< 34°			25° × 19°	
Optional lenses					15° T	elephoto; 45° Wide	Angle
Focus		Focus	s free			Manual	
Continuous auto focus							
Min. focus distance		0.5	ōm			0.4 m	
Radiometric JPEG via USB	•	•	•	•	•	•	•
Radiometric JPEG to SD card					•	•	•
MPEG4 to SD (non-radiometric IR)					•	•	•
MPEG4 via USB (non-radiometric IR/visual)					•	•	•
Radiometric streaming via USB					•	•	•
Display size		3.	<b>O</b> "			3.5"	
Touchscreen					•	•	•
Auto orientation					•	•	•
MSX Thermal Image Enhancement	•	•	•	•	•	•	-
Viewfinder	•	-	•	•	-	-	-
Color (palettes)		3: Iron, Raint	oow, and Gray			hot, Black hot, Iror Rainbow High Cont	
Battery operating time		~4	hrs			>4 hrs	
Built-in digital camera			< 480			3.1 MP	
Built-in illuminator LED		0-07	<b>100</b>		•	•	•
Digital zoom					2×		×
MeterLink® connectivity					•	•	•
Laser Pointer + laser locator (on IR image)					•	•	•
Compass						-	
GPS							
IR Window correction					•	•	•
Difference temperature/Delta T					•	•	-
Picture in Picture			Fixed PIP	Fixed PIP	Fixed PIP	Scalat	
			FIXEU PIP	FIXEU PIP	FIXEU PIP	SCalar	
Notes							
Sketch on IR/visual image							•
Voice/text annotation					•	•	-
FLIR Tools for PC and Mac	•	•	•	•	•	•	•
FLIR Tools Mobile app (Wi-Fi)					•	•	•
Streaming video via app (Wi-Fi)					•	•	•
Remote control via app (Wi-Fi)							
Drop (2 meter/6.6 feet)	•	•	•	•	•	•	•
Weight (including battery)		0.57	′5 kg			0.88 kg	

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	High-perform	hance				
T420	T440	т620	T640			
±2°C (±3.6	5°F) or ±2% of reading, for ambient temp	perature 10°C to 35°C (+50°F to +95°F)				
76,800 (320 × 240	ŋ	307,200 (640 × 480)				
<0.04°C @ 30		<0.04°C @ 30° C	<0.035°C @ 30° C			
-20°C to 650°C (-4°F to 1,202°F) Optional to 1,200°C (2,192°F)	-20°C to 1,200°C (-4°F to 2,192°F)	-40°C to 650°C (-40°F to 1,202°F) Optional: to 2,000°C (3,632°F)	-40°C to 2,000°C (-40°F to 3,632°F)			
7 presets: center spot; hot spot (box max); cold spot (box min); 3 spots; hot spot - spot (box max + spot + delta); hot spot - temperature (box max + ref temp + delta); no measurements	6 presets: center spot; hot spot (box max); cold spot (box min); no measurements; user preset 1; user preset 2					
	•	•	•			
5 moveable		10 moveable				
•	•	• •				
	•		•			
	Blue below, red above, y	ellow interval				
•	•					
60 Hz 30 Hz						
	25° × 19°					
6°, 15° Tele, 45° & 90° Wide; Clo			Close up: 100 µm, 50 µm, 25 µm			
	Manual & Autor	nauc	•			
0.4 m		0.2				
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•	•	•	•			
3.5"	-	4.				
•	•	Capacitive touch screen	Capacitive touch screen			
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7: Apr	tic, White hot, Black hot, Iron, Lava, Ra	sinhow, and Bainhow High Contrast	I			
>4 hrs		>2.5 hrs				
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# The next generation of test & measurement

Building upon our 50-year history as the world leader in thermal imaging, FLIR introduces our new line of test & measurement tools.

FLIR has expanded into test & measurement because we identified a need for test tools that simplify electrical and mechanical troubleshooting on complex industrial equipment. The company's goal: to develop a new line of T&M products with world-class features that address advanced diagnostics, enhanced productivity, improved safety, and increased connectivity. Because you need to measure more than temperature to get the job done.

## FLIR DM93

#### Prepare yourself for VFD troubleshooting

- Finally, a digital multimeter that works as hard as you do
- Variable frequency drive mode for enhanced diagnostics
- LoZ mode reduces ghost voltage errors
- Extremely bright dual-LED worklight
- Bluetooth<sup>®</sup> connectivity to mobile devices
- METERLINK® sends data to compatible FLIR cameras



Data recording finds sporadic faults





Extremely bright dual-LED worklights.



VFD mode offers superior accuracy.

## FLIR CM83

Power analysis & VFD diagnostics in one package

- World-class features that meet your real-world needs
- Advanced power analysis functions
- Extremely bright dual-LED worklight
- Bluetooth<sup>®</sup> connectivity to mobile devices
- METERLINK® transmits data to compatible FLIR cameras





FLIR CM83 incorporates a bright dual-LED worklight.

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## FLIR CM78

Multifunctional meter reduces your payload Equip yourself to troubleshoot complex systems

- AC/DC (up to 1000A or 1000V)
- Spot-Laser IR Thermometer
- Type K Thermocouple
- Bluetooth<sup>®</sup> connectivity to mobile devices
- METERLINK® links meter to FLIR IR cameras





FLIR CM78 transmits real-time electrical measurements to FLIR IR cameras via METERLINK

## FLIR VP52

Double-Duty detector: Non Contact Voltage (NCV) tester plus bright worklight

- Quick voltage checking and area lighting at your fingertips
- Tactile feedback alarms
- Powerful worklight
- Rugged, waterproof, CAT IV-rated





High sensitivity detects voltage in low-powered systems; visual & vibration alerts for noisy areas.

## MeterLink® brings it all together

Measure more than temperature with your camera

FLIR thermal cameras can help you find electrical problems, moisture damage, and energy loss quickly and easily by detecting and measuring temperature differences. But in many cases, you'll need to quantify the severity of those problems with electrical load and moisture content readings.

FLIR's new METERLiNK-enabled DMM, clamp, and moisture meters transmit essential diagnostic data wirelessly to compatible FLIR cameras so thermal images can be automatically annotated with extra information that customers, colleagues, and insurance companies require.





## Powerful FLIR software

#### FLIR Tools for PC & Mac OS

No matter what handheld FLIR thermography camera you choose, we want you to be able to share important images with others efficiently and professionally. To make sure, all come with FLIR Tools.

Key features:

- Import images from your camera via USB.
- Search for images using file name, text description, and other image properties.
- Analyze and tune radiometric images and measure any point on the image.
- Create PDF reports from a variety of pre-defined template formats or customize your own.
- Remotely control USB Video, Ethernet, and Firewire cameras.
- Update camera firmware.

#### FLIR Tools Mobile

Connect your mobile device via Wi-Fi to an E4O, E5O, E6O or any T-Series camera to import, process, and share images quickly while you're still out in the field with the free app that speeds decisions.

Key features:

- Stream live video wirelessly.
- Remotely control and record images from T-Series cameras.
- Post process images and create PDF reports.
- Share images and findings from the field via uploads and email.

#### FLIR Tools+

Expanded groundbreaking reporting power for the busiest thermographers.

Key features:

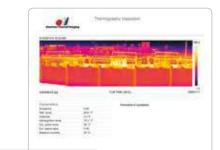
- Stitch FLIR IR images into radiometric panoramas regardless of the order they were taken.
- Record/replay radiometric thermal video sequences and create temporal plots.
- Automatically link to Google Maps<sup>™</sup> for images with GPS coordinates.
- Allows you to create a customized Microsoft Word report fast.













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## FLIR Infrared Training Center

The Infrared Training Center (ITC) offers the world's leading infrared training and thermographer certification programs.

Although all our cameras are designed for easy installation and operation, there is a lot more to thermal imaging than just knowing how to handle the camera. As the leading company for thermal imaging technology, we like to share our knowledge with our customers and other interested parties.

We therefore organize regular courses and seminars. We also organize incompany training on request, so that you, or your staff, can gain familiarity with thermal imaging and its applications.

The ITC not only welcomes FLIR Systems customers but also users of other brands of cameras. In fact, anyone who wants to learn more about thermal imaging for any applications, before deciding to purchase a camera, is also invited.

The mission of the ITC is to make our customers and partners successful by enhancing their knowledge of IR technology, thermal imaging products, and relevant applications. The ITC offers a portfolio of courses that presents the right mix of theoretical and practical content to help professionals quickly apply thermal imaging technology to real life applications.

All our instructors are experienced thermal imaging specialists. Not only do they have a profound theoretical knowledge but they also have practical experience with numerous applications. For our customers, this means that attending one of the ITC's courses will give them a real hands-on learning experience.

Follow one of our courses and become a thermal imaging expert.











## About FLIR

The largest commercial infrared company in the world, FLIR has nearly 50 years of experience building and integrating high-performance infrared cameras, giving us a command of these specialized technologies that no one else can touch. FLIR's products are at work every day saving lives, protecting troops, and helping to keep borders and facilities safe.

Now, FLIR's cameras are available for your personal use, too. You can have a FLIR on your boat, your car, or even as a home security camera. The same FLIR technology in your maintenance camera is in Audi and BMW cars as a pedestrian detection system. And if you enjoy hunting and outdoor actives, there's an inexpensive FLIR for you too. You might not know FLIR by name, but you have been seeing our products at work since the 1960's.

If you are looking for infrared camera products, you've come to the right place.





#### **EMEA**

FLIR Commercial Systems Luxemburgstraat 2 2321 Meer Belgium Tel. : +32 (D) 3665 5100 Fax : +32 (D) 3303 5624 E-mail : flir@flir.com

FLIR Systems AB Antennvägen 6 187 66 Täby Sweden Tel. : +46 (0)8 753 25 00 E-mail : flir@flir.com FLIR Systems UK 2 Kings Hill Avenue - Kings Hill West Malling - Kent ME19 4AQ United Kingdom Tel. : +44 (0)1732 220 011 E-mail : flir@flir.com

FLIR Systems GmbH Berner Strasse 81 D-60437 Frankfurt am Main Germany Tel. : +49 (0)69 95 00 900 E-mail : flir@flir.com

FLIR Systems France 20, bd de Beaubourg 77183 Croissy-Beaubourg France Tel. : +33 (0)1 60 37 55 02 E-mail : flir@flir.com

FLIR Systems Italy Via Luciano Manara, 2 I-20812 Limbiate (MB) Italy Tel. : +39 (0)2 99 45 10 01 E-mail : fiir@flir.com

FLIR Commercial Systems Avenida de Bruselas, 15- 3° 28108 Alcobendas (Madrid) Spain Tel. : +34 91 573 48 27 E-mail : fir@flir.com

FLIR Systems, Middle East FZE Dubai Airport Free Zone P.O. Box 54262 Office B-22, Street WB-21 Dubai - United Arab Emirates Tel. : +971 4 299 6898 E-mail : flir@flir.com

FLIR Systems Russia 6 bld.1, 1st Kozjevnichesky lane 115114 Moscow Russia Tel. : + 7 495 669 70 72 E-mail : fir@flir.com

#### APAC

Asia Pacific Headquarters HONG KONG FLIR Systems Co. Ltd. Room 1613 – 16, Tower 2, Grand Central Plaza, No. 138 Shatin Rural Committee Road, Shatin, New Territories, Hong Kong Tel. : +852 2792 8955 Fax : +852 2792 8952 Email : flir@flir.com.hk

 FLIR Systems (Shanghai) Co. Ltd.

 Head Office

 Tel.
 : +86 21 5169 7628

 Fax
 : +86 21 5466 0289

 Email
 : info@flin.cn

 
 Beijing Representative Office

 Tel.
 : +86 10 5979 7755

 Fax
 : +86 10 5907 3180
 : info@flir.cn Email

Guangzhou Representative Office +86 20 8600 0559 +86 20 8550 0405 info@flir.cn Tel. Fax Email

 
 FLIR Systems Japan K.K.

 Tel.
 : +81 3 6277 5681

 Fax
 : +81 3 6277 5682
 Email : info@flir.jp

 FLIR Systems Korea Co., Ltd

 Tel.
 : +82 2 565 2714

 Fax
 : +82 2 565 2718

 Email
 : flir@flirkorea.com

FLIR Systems Taiwan Representative Office Tel. : +886 2 2757 9662 Fax : +886 2 2757 6723 Email : flir@flir.com.hk

 FLIR Systems India PVT. Ltd.

 Tel.
 : +91 11 4560 3555

 Fax
 : +91 11 4721 2006

 Email
 : flirindia@flir.com.hk

FLIR Systems Australia Pty

 FLIH Systems Australia Pt

 Ltd.

 Head Office (Vic)

 Tel.
 : 1300 729 987

 NZ
 : 0800 785 492

 Fax
 : +61 3 9558 9853

 Email
 : info@flir.com.au

NSW Office Tel. : +61 2 8853 7870 Fax : +61 2 8853 7877 Email : info@flir.com.au

WA Office Tel. : +61 8 6263 4438 Fax : +61 8 9226 4409 Email : info@flir.com

www.flir.com NASDAQ: FLIR

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