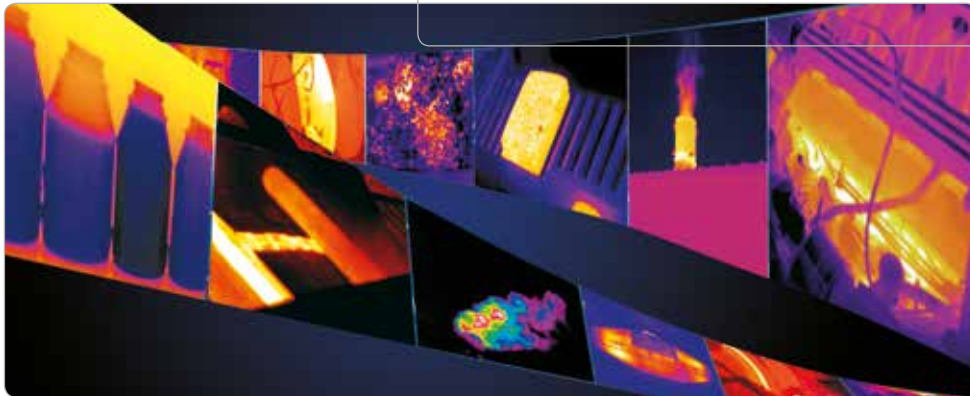


Thermal imaging cameras for Automation & Fire and Safety



Machine Vision

Process Monitoring

Quality Control

Fire Detection

Critical Equipment Monitoring





FLIR Systems: the world leader in thermal imaging cameras

FLIR Systems is the world leader in the design, manufacturing and marketing of thermal imaging systems for a wide variety of commercial, industrial and government applications.

FLIR Systems' thermal imaging systems use state-of-the-art thermal imaging technology that detects infrared radiation - or heat. Based on detected temperature differences, thermal imaging cameras can create a crisp image. Complicated algorithms make it also possible to read correct temperature values from this image. We design and manufacture all of the critical technologies inside our products, including detectors, electronics, and special lenses ourselves.



FLIR Systems, Stockholm



FLIR Systems, Portland



FLIR Systems, Boston



FLIR Systems Santa Barbara

Rapidly emerging markets and organization

Interest for thermal imaging has grown considerably over the last few years in a large variety of markets. To face this increased demand, FLIR Systems has expanded its organization drastically. Today we employ more than 3,200 people. Together, these infrared specialists realize a consolidated annual turnover of more than 1 billion US dollars. This makes FLIR Systems the largest manufacturer of commercial thermal imaging cameras in the world.

Manufacturing capabilities

FLIR Systems currently operates 6 manufacturing plants: three in the USA (Portland, Boston and Santa Barbara, California) one in Stockholm, Sweden, one in Estonia and one in Paris, France.

Thermal imaging: more than building a camera

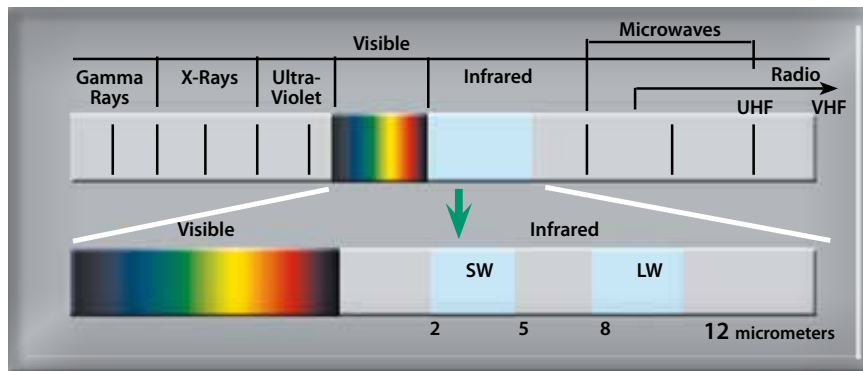
There is more to the world of thermal imaging than building a camera. FLIR Systems is not only committed to providing you with the best camera, we are also able to offer you the best software, service and training to suit your thermal imaging needs.

INFRARED: more than meets the eye

Infrared - part of the electromagnetic spectrum

Our eyes are detectors that are designed to detect visible light (or visible radiation). There are other forms of light (or radiation) that we cannot see. The human eye can only see a very small part of the electromagnetic spectrum. At one end of the spectrum we cannot see ultraviolet light, while at the other end our eyes cannot see infrared. Infrared radiation lies between the visible and microwave portions of the electromagnetic spectrum. The primary source of infrared radiation is heat or thermal radiation.

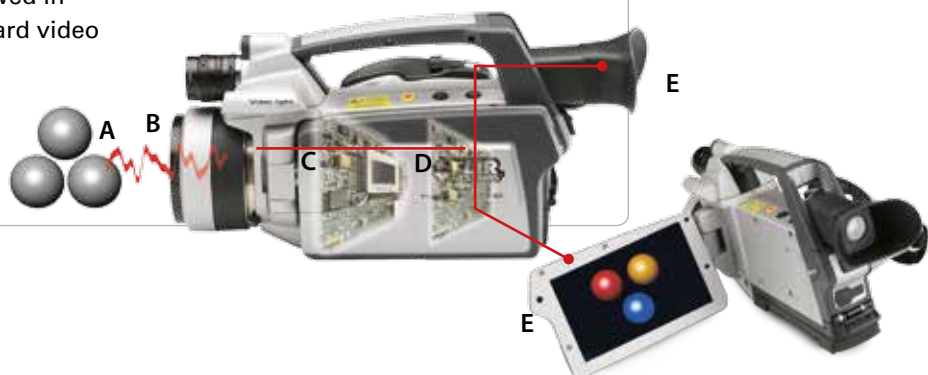
Any object that has a temperature above absolute zero (-273.15 degrees Celsius or 0 Kelvin) emits radiation in the infrared region. Even objects that we think of as being very cold, such as ice cubes, emit infrared radiation. We experience infrared radiation every day. The heat that we feel from sunlight, a fire or a radiator is all infrared. Although our eyes cannot see it, the nerves in our skin can feel it as heat. The warmer the object, the more infrared radiation it emits.



The infrared camera

Infrared energy (A) coming from an object is focused by the optics (B) onto an infrared detector (C). The detector sends the information to sensor electronics (D) for image processing. The electronics translate the data coming from the detector into an image (E) that can be viewed in the viewfinder or on a standard video monitor or LCD screen.

Infrared thermography is the art of transforming an infrared image into a radiometric one, which allows temperature values to be read from the image. In order to do this, complex algorithms are incorporated into the thermal imaging camera.



Why use thermal imaging cameras?

Why would you choose a FLIR thermal imaging camera? There are other technologies available to help you measure temperatures in a non-contact mode. Infrared thermometers for example.

Infrared thermometers vs thermal imaging cameras

Infrared (IR) thermometers are reliable and very useful for single-spot temperature readings, but for scanning large areas or components, it's easy to miss critical components that may be near failure and need repair.

A FLIR thermal imaging camera can scan entire motors, components, or panels at once - never missing any overheating hazards, no matter how small.

Use thousands of infrared thermometers at the same time

With an infrared thermometer you are able to measure the temperature at one single spot. FLIR thermal imaging cameras can measure temperatures on the entire image. The i3 has an image resolution of 60 x 60 pixels. This means that it is equal to using 3,600 IR thermometers at the same time. If we look at the FLIR P660, our top model, which has an image resolution of 640 x 480 pixels, this means 307,200 pixels or using 307,200 infrared thermometers at the same time.



IR thermometer, temperature measurement in one spot



FLIR i3, temperature in 3,600 spots

Find problems faster and easier with extreme accuracy.

It's easy to miss critical problems with a spot IR thermometer. A FLIR thermal imaging camera scans entire components giving you instant diagnostic insights showing the full extent of problems.



What an IR Thermometer sees.



What a thermal imaging camera sees.



What an IR Thermometer sees.



What a thermal imaging camera sees.



What an IR Thermometer sees.

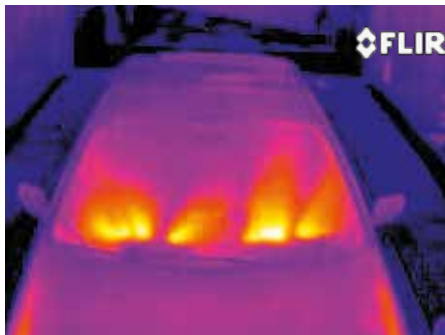


What a thermal imaging camera sees.

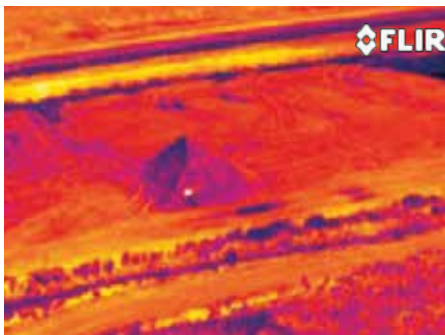
Thermal imaging cameras for automation and fire & safety

Production engineers and technicians are faced by the demand for higher production output at a constant quality and at lower cost. The FLIR A-series thermal imaging cameras are the most effective tool available for Infrared Machine Vision, Closed loop Process control and Quality Assurance imaging, helping you to validate and increase product quality and throughput and thereby give your products a competitive edge and increased profitability.

The FLIR A-Series thermal imaging cameras are also great tools for fire and safety applications. Safety applications exist in any industry where protection of lives and assets is of importance and where an early warning of a potential critical condition is of utmost importance.



Inspection of car windscreen defroster.



Coal pile monitoring.

Automation

Problems can occur at any time in a production process. In most cases, it will not be possible to see the problem with the naked eye or to quickly spot potentially harmful temperature variations. For many applications, such as the production of parts and components for the automotive or electronics industry, thermal data are critical.

While machine vision can see a production problem, it cannot detect thermal irregularities. Thermal imagery provides much more information to production specialists and decision makers. Indeed, for non-contact precision temperature measurement there is nothing to equal thermal imaging. It adds a new dimension to machine vision and is the perfect solution for applications involving non-contact precision temperature measurement and non-destructive testing.

Fire and safety

Safety applications can be found in many industries. Just a few examples are oil and gas production, power generation or distribution, steel manufacturing, or any industry which has some type of storage area where goods or material is kept that can self combust. Examples on this is storage of splint wood, batteries, waste, coal and more. All these applications have in common that there is a fundamental need to detect hot spots and then prevent that this turns in to a fire or a costly break down.

Thermal imaging cameras

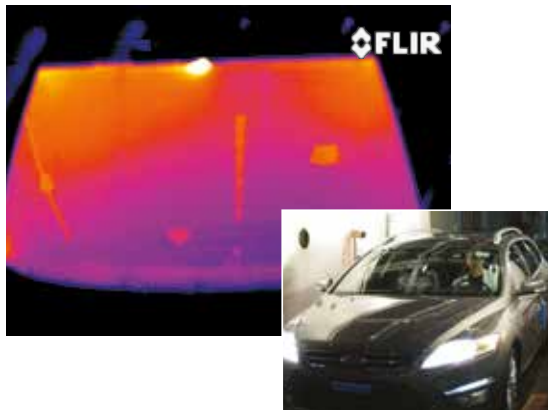
Advanced thermal imaging cameras allow you to monitor what you can't see, providing quality assurance and safety in the fastest and easiest way possible. They can be installed almost anywhere to monitor the efficiency and safety of your production process by detecting and measuring temperature differences.

Thermal imaging cameras have proven to be an invaluable tool for safety monitoring and to improve production quality.



The advantages of thermal imaging at a glance!

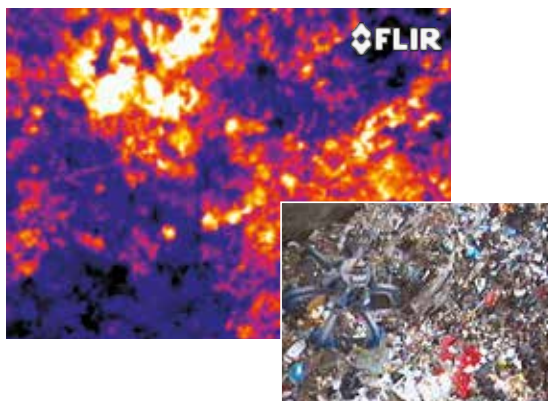
- Sees the heat produced
- Can trigger alarms
- Non-contact, quick and easy to use
- Performs inspections when systems are in production
- Identifies and locates the problem
- Measures the temperature
- Stores the information
- Saves you valuable time and money



Automation

Function test and quality assessment of car windows and seats

Due to the high quality demands of the automobile industry all front and rear windows, car seat heatings and various other components are assessed with thermal imaging cameras. In addition to the traditional presence check and the search for weak points in the material on the heating wires in the rear windows, the product quality of a heated front window is also monitored continuously. Furthermore infrared cameras are used for air conditioning test benches in order to acquire valuable temperature data.



Fire and safety

Fire detection in waste bunkers

In vast storage warehouses at waste incineration plants, many different materials are collected. Spontaneous fires can be caused by the decomposition processes. Also the inclusion of highly combustible objects is a fire hazard. A thermal imaging camera prevents spontaneous fires by identifying fire pockets in an early stage so that a fire alarm can be triggered.



Outdoor fire detection

After coal has been mined the various product grades are homogenised on different storage areas. As spontaneous combustion, due to an increase in temperature, cannot be disregarded, the storage areas are monitored continuously for hot spots, so that an early fire alarm may be triggered and fires can be avoided.

FLIR A65 / A35 / A15 / A5



Compact thermal imaging cameras for machine vision applications

Thermal imaging cameras are used worldwide across a wide variety of industries to monitor continuous processes. Thermal imaging can easily collect information on product quality and/or production efficiency that is difficult or impossible to capture using conventional means such as thermocouples or visible light cameras.

The FLIR Axx-Series is the perfect solution for those applications that require the benefits of a thermal image. The FLIR Axx-Series camera has features and functions that make it the natural choice for anyone who uses PC software to solve problems.



Extremely affordable

The Axx-Series are low-cost infrared cameras where the Flir A5 is the most affordable. They are ideal tools for putting thermal imaging at work in an automation or machine vision environment.



Extremely compact

All models are extremely compact. They can easily be integrated in a machine vision environment.



Choice of image quality

The FLIR A65 produces crisp thermal images of 640 x 512 pixels. Users that do not need this high image quality for their application can choose for the FLIR A35 which produces thermal images of 320 x 256 pixels, for the FLIR A15 which produces thermal images of 160 x 128 pixels or for the FLIR A5 which produces thermal images of 80 x 64 pixels.



GigE Vision™ standard compatibility

GigE Vision is a new camera interface standard developed using the Gigabit Ethernet communication interface. GigE Vision is the first standard to allow for fast image transfer using low cost standard cables even over long distances. With GigE Vision, hardware and software from different vendors can interoperate seamlessly over GigE connections.



GeniCam™ protocol support

The goal of GeniCam is to provide a generic programming interface for all types of cameras. Regardless of interface technology (GigE Vision, Camera Link, 1394 DCAM, etc.) or features implemented, the Application Programming Interface (API) will always be the same. The GeniCam protocol also makes it possible to use third party software with the camera.



Power over Ethernet (PoE)

Communication and power supplied with only one cable.



Synchronization

Possible to configure one camera to be master and others to be slave(s) for applications that call for more than one camera to cover the object or for stereoscopic applications.



General Purpose Input/Output (GPIO)

One output that can be used to control other equipment and one input to read the status from the same equipment.



Wide temperature range

The FLIR Axx-Series visualizes temperatures between -40°C and $+550^{\circ}\text{C}$ in two ranges. (A65: -25°C to $+135^{\circ}\text{C}$).

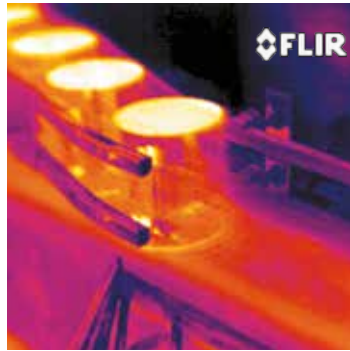


High sensitivity < 50 mK

< 50 mK thermal sensitivity captures the finest image details and temperature difference information.



Process monitoring of production line

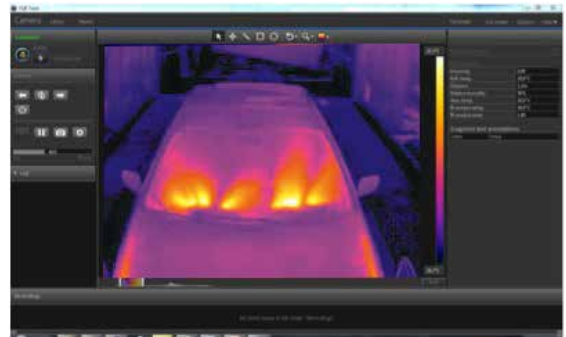
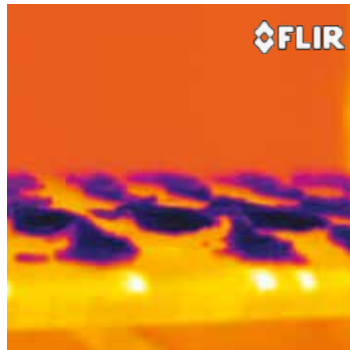


Software included

The FLIR Axx thermal imaging cameras work seamlessly together with FLIR Tools. It allows for viewing and analyzing thermal images and includes functions such as time versus temperature plots. Users that need more functionality and also want to be able to record images can optionally choose for FLIRTools+.



Quality control of food production line



Available models

	FLIR A65	FLIR A35	FLIR A15	FLIR A5
Resolution	640 x 512 pixels	320 x 256 pixels	160 x 128 pixels	80 x 64 pixels
Available lenses	Focal length 13 mm Focal length 25 mm	Focal length 9 mm Focal length 19 mm	Focal length 9 mm Focal length 19 mm	Focal length 5 mm Focal length 9 mm

FLIR A300 / A310

Hotspot detection: the thermal eye that never sleeps

Fixed mounted thermal imaging cameras like FLIR A300/ A310 can be installed almost anywhere to monitor your critical equipment and other valuable assets. It will safeguard your plant and measure temperature differences to assess the criticality of the situation. This allows you to see problems before they become costly failures, preventing downtime and enhancing worker safety.



Built-in extensive analysis functions (only FLIR A310)

Spot, area measurement and difference temperature functions.



Built-in alarm functions (only FLIR A310)

As function of analysis, internal temperature or digital input.



Ethernet/IP and Modbus TCP compliance (only FLIR A310)

Easy sharing of analysis, alarm results to PLC's.



Messaging functionality (only FLIR A310)

The camera automatically sends analysis results, IR images and more as an e-mail on schedule or at alarm. Autonomous dispatch of files or e-mails, acting as an FTP- or SMTP-client.



Image masking functionality (only FLIR A310)

Select only the relevant part of the image for your analysis.



MPEG-4 streamed video

MPEG-4 streamed video output over Ethernet to show live images on a PC, 640x480 with overlay up to 30 Hz, system dependent.



PoE (Power over Ethernet)

Communication and power supplied with only one cable.



Digital inputs/outputs (only FLIR A310)

For alarms and control of external equipment.



Video output

Composite video output, PAL and NTSC compatible.



Lens

Built-in 25 degree lens with both motorized focus and autofocus. Optional lenses available.



High sensitivity < 50 mK

< 50 mK thermal sensitivity captures the finest image details and temperature difference information.



Remote control

Remote control of the camera over the Web and TCP/IP protocol.



16 bit image

16 bit radiometric image streaming to PC for analysis.



Built-in 100 Mb Ethernet connection

100 Mb Ethernet.



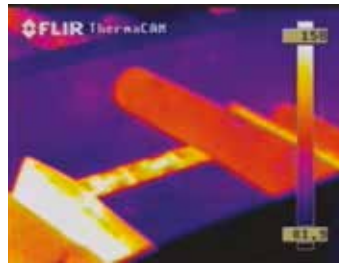
FLIR A300f / A310f

The FLIR A300 / A310 can be ordered in an environmental housing. The housing increases the environmental specifications of the FLIR A300 / A310 to IP66, without effecting any of the camera features. It is ideal when the camera needs to be installed in dusty or wet environments. The housing is available for A300 cameras that are equipped with a 25° or 45° lens and A310 cameras that are equipped with a 25°, 45° or 90° lens.

Users that want to build in the camera in the housing themselves or that already have a FLIR A300 or A310 that needs to be extra protected against dust and water can order the housing separately as an accessory.



Digital photo and thermal image of a substation showing a transformer with excessive temperature.



Thermal imaging offers another pair of "eyes" to see through the steam into the log vat for proper log alignment.



Operators cannot see through the steam cloud caused by condensation in cooler air temperatures.



Who will benefit from this technology?

Oil and Gas

Oil refineries and exploration, petrochemical plants:

- Natural gas processing, transport and storage
- Fire prevention in storage areas
- Refractory lining monitoring
- Flare detection
- Process quality control

Power Generation and Distribution

- Fire prevention on coal piles
- Fire prevention in wood storage areas
- Fire prevention in waste storage areas
- Sub-station monitoring
- Critical equipment monitoring

FLIR A300 / FLIR A310 housing options



A300f / A310f

The FLIR A300f and A310f are thermal imaging cameras with an environmental housing protecting the A300 or A310 against dust and water. The housing increases the environmental specifications of the FLIR A300 / A310 to IP66, without affecting any of the camera features.



FLIR A310pt

The FLIR A310pt pan/tilt has all the necessary features and functions to build single- or multi-camera solutions. The FLIR A310pt can pan +/- 360° continuous and tilt +/- 45°. It is ideal to cover large areas. Typical application examples are coal pile, waste bunker and sub-station monitoring, utilizing standard Ethernet hardware and software protocols.

The FLIR A310pt is a multi-sensor and includes a lowlight 36x zoom color CCD camera.

FLIR A315 / A615



Automation: speed up your design cycle with thermal imaging

Fixed mounted thermal imaging cameras like FLIR A615/A315 can be installed almost anywhere to monitor your production process by detecting and measuring temperature differences and visualize heat patterns. The FLIR A315 / A615 is a series of compact and affordable thermal imaging cameras, fully controlled by a PC. Due to their compliance to standards, FLIR A315 / A615 are Plug&Play with 3rd parties Machine Vision software like National instruments, Cognex, Matrox, MVtec and Stemmer Imaging.



GigE Vision™ standard compatibility

An industry first. GigE Vision is a new camera interface standard developed using the Gigabit Ethernet communication interface. GigE Vision is the first standard to allow for fast image transfer using low cost standard cables even over long distances. With GigE Vision, hardware and software from different vendors can interoperate seamlessly over GigE connections.



High sensitivity < 50 mK

< 50 mK thermal sensitivity captures the finest image details and temperature difference information.



Built-in Gigabit Ethernet connection

Real time 16-bit image streaming to computer.



Lens (only FLIR A315)

Built-in 25 degree lens with both motorized focus and autofocus. Optional lenses available.



FLIR A315f

The FLIR A315 can be ordered in an environmental housing. The housing increases the environmental specifications of the FLIR A315 to IP66, without effecting any of the camera features. It is ideal when the camera needs to be installed in dusty or wet environments. The housing is available for cameras that are equipped with a 25°, 45° or 90° lens.

Users that want to build in the camera in the housing themselves or that already have a FLIR A315 that needs to be extra protected against dust and water can order the housing separately as an accessory.



A315f, thermal imaging camera with environmental housing (IP 66 rated).



GenICam™ protocol support

An industry first. The goal of GenICam is to provide a generic programming interface for all kinds of cameras. Regardless of interface technology (GigE Vision, Camera Link, 1394 DCAM, etc.) or features implemented, the application programming interface (API) will always be the same. The GenICam protocol also makes third party software being possible to use with the camera.



16-bit temperature linear output

Allows you to do temperature measurements, in a non-contact mode, within any 3rd party software.



640x480 pixels (only FLIR A615)

The FLIR A615 has a resolution pixel detector of 640x480 pixels that allows more accuracy and shows more details at a longer distance.



High speed infrared windowing (only FLIR A615)

The FLIR A615 has a high speed infrared windowing option.

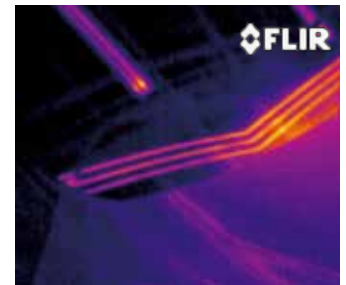
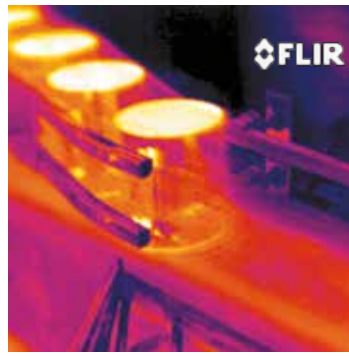


Image flow control

Let an external signal control the image streaming.



Process monitoring of production line



Thermal image of a windshield defroster.



Thermal image of a car engine.

Who will benefit from this technology?

Automotive

Cars and commercial vehicles, engine manufacturing and subcontractors serving the industry:

- Soldering and welding
- Car seat heating
- Verification of window defrosting
- Heating, air conditioning functions
- Casting of plastic or metallic parts
- Quality checking of laminated parts such as dashboards
- Quality checking of leather upholstery
- Friction control of tires

Electronics

Electronics design, PCB and component manufacture and electronics assembly:

- PCB testing, validation and verification
- Fault tracing in board assemblies
- Power electronics design

Software



Turning tools into solutions

In order to fully utilize the FLIR A-Series cameras and integrate them into working systems for safety and automation the A-Series offer a set of software tools and utilities. Further information regarding downloads and updates is available at <http://flir.custhelp.com/>

General

IP Config

Utility program for network camera detection and IP address setting, the program comes with the Utility CD in the delivery box or can be downloaded from FLIR Custhelp.

FLIR Tools

The FLIR Axx-Series thermal imaging cameras work seamlessly together with FLIR Tools. It allows for viewing and analyzing thermal images and includes functions such as time versus temperature plots. Users that need more functionality and also want to be able to record images can optionally choose for FLIRTools+.

EtherNet/IP™
conformance tested

For Safety (A300/A310/A310Opt/A310f)

- **FLIR IR Monitor**

Utility program for first camera connection and control and setup of internal features/functions, supports up to 9 cameras simultaneously, the program comes with the Utility CD in the delivery box or can be downloaded from FLIR Custhelp.

- **Built in WEB server**

Simple built in camera control and image viewer, connect using `http://camera ip adress` in a WEB browser or connect through the IP Config program.

- **Ethernet/IP or Modbus TCP (A310 only)**

Industrial Field bus protocols, allows that Analyse, Alarm and Camera control is shared with PLC's. This function is always turned on in the A310 Camera.

- **ThermoVision SDK**

An ActiveX component that allows camera control and image grabbing and transformation, purchased separately.

For Automation (A315/A615/Axx)

- **FLIR Camera Player**

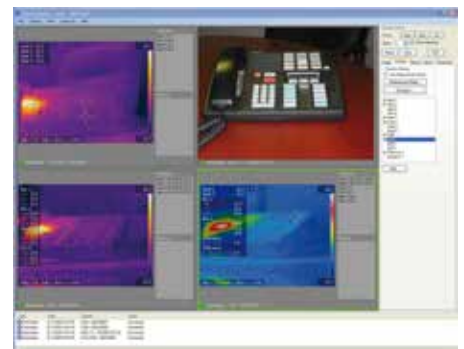
Utility program for first camera connection and streamed image viewing, the program comes with the Utility CD in the delivery box or can be downloaded from FLIR Custhelp.

- **GigE Vision and GeniCam compliance**

Machine Vision camera standard supported in many 3:rd party image processing software.

- **SDK's for application development**

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



GigE^T
VISION
GEN<i>i>CAM



FLIR Sensors Manager

FLIR Sensors Manager is suited for managing thermal imaging cameras with temperature capabilities like the FLIR A310f and FLIR A310pt.

FLIR Sensors Manager allows you to get the most out of your thermal imaging camera with temperature measurement capability. It is ideal for monitoring critical infrastructure and for preventing fires.

FLIR Sensors Manager allows to automatically locate FLIR A310pt and FLIR A310f cameras in the network. They can be easily controlled and set-up in a distributed multi-camera environment.

Stop, stare and check temperature

Allows to look at Regions Of Interest periodically. If the temperature rises above a value set by the operator, an alarm will go off.

Image and settings

You can change the color palette, choose appropriate image quality, manage image adjustments and select overlay graphics.

Wide range of analysis possibilities

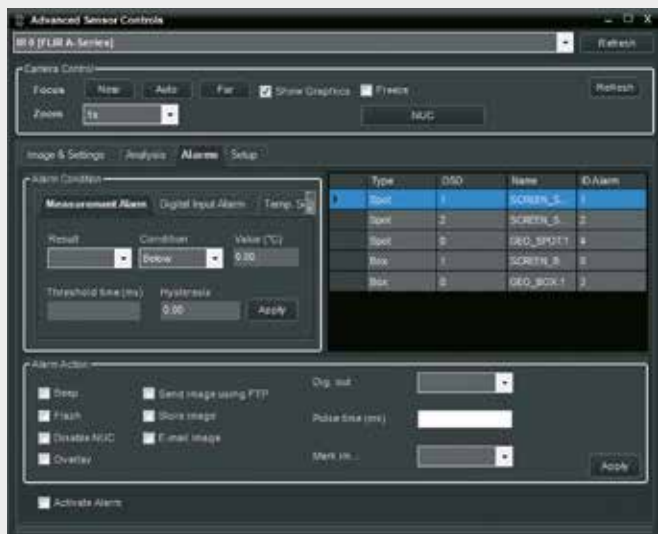
FLIR Sensors Manager allows for putting spots or boxes on the thermal images so that temperature values can be read. You can also create geo-referenced spots and areas when using a FLIR A310pt thermal imaging camera.

Alarm settings

Allows configuring alarm conditions. Measurement alarms, digital input alarms, temperature sensors alarms.

All features are included in the basic version of FLIR Sensors Manager. All the functionality that is necessary for protecting your perimeter will be available as well.

Combined with FLIR Sensors Manager your FLIR A310f and FLIR A310 pt thermal imaging cameras will become real dual use systems: temperature monitoring of critical installations and perimeter security.



FLIR Sensors Manager allows for easy setting of alarm conditions and alarm actions

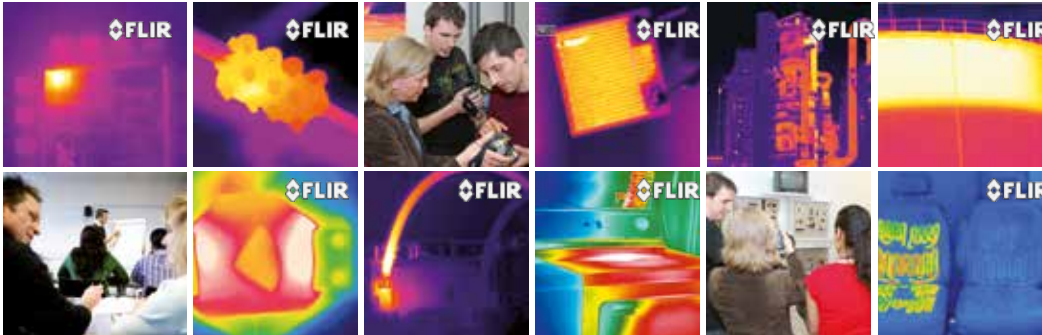


With FLIR Sensors Manager you can geo-reference your thermal imaging camera and easily change image settings, alarm conditions,...

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 in-company 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.



Each ITC course is a perfect combination of theoretical fundamentals and practical exercises. It guarantees participants a real hands-on learning experience.

After Sales

FLIR After Sales

At FLIR Systems, building a relationship with a customer takes more than just selling a thermal imaging camera. After the camera has been delivered, FLIR Systems is there to help meet your needs.



Once purchased, thermal imaging cameras are vital pieces of equipment. To keep them running at all times, we operate a worldwide service network with subsidiaries in Belgium, China, France, Germany, Hong Kong, Italy, the Netherlands, Sweden, United Arab Emirates, the United Kingdom and the USA.

If there should be a problem with one of our camera systems, these local service centers have all the know-how and equipment to solve it within the shortest possible time. Local camera service gives you the assurance that your system will be ready for use again within an extremely short timeframe.

Buying a thermal imaging camera is a long-term investment. You need a reliable supplier who can provide you with support over a long period of time.

Our service personnel regularly follows training programs at our production facilities in Sweden or the USA. Not only to learn about the technical aspects of the products, but also to familiarize themselves with your individual customer requirements and the latest applications.

Different types of maintenance contracts can be offered to make sure that, whatever happens, your thermal imaging camera is always available for use.

**CUSTOMER CARE is not just a slogan.
We write it in capital letters at FLIR.**



FLIR A300 / A310

Technical specifications



Camera specific

	FLIR A300	FLIR A310
Measurement analysis		
Spotmeter	N/A	10
Area	N/A	10 boxes with max./min./average/position
Isotherm	N/A	1 with above/below/interval
Measurement option	N/A	Measurement Mask Filter Schedule response: File sending (ftp), email (SMTP)
Difference temperature	N/A	Delta temperature between measurement functions or reference temperature
Reference temperature	N/A	Manually set or captured from any measurement function
Atmospheric transmission correction	N/A	Automatic, based on inputs for distance, atmospheric temperature and relative humidity
Optics transmission correction	N/A	Automatic, based on signals from internal sensors
Emissivity correction	N/A	Variable from 0.01 to 1.0
Reflected apparent temperature correction	N/A	Automatic, based on input of reflected temperature
External optics/windows correction	N/A	Automatic, based on input of optics/window transmission and temperature
Measurement corrections	N/A	Global and individual object parameters
Alarm		
Alarm functions	N/A	6 automatic alarms on any selected measurement function, Digital In, Camera temperature, timer
Alarm output	N/A	Digital Out, log, store image, file sending (ftp), email (SMTP), notification
Ethernet		
Ethernet	Control and image	Control, result and image
Ethernet, protocols	TCP, UDP, SNMP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP	Ethernet/IP, Modbus TCP, TCP, UDP, SNMP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP
Ethernet, image streaming	16-bit 320 x 240 pixels at 3 Hz - Radiometric	16-bit 320 x 240 pixels at 7-8 Hz - Radiometric



FLIR A300 / A310 - Standard



FLIR A300f / A310f - Environmental housing



FLIR A310pt - Pan/tilt

	FLIR A300 / A310 - Standard	FLIR A300f / A310f - Environmental housing	FLIR A310pt - Pan/tilt
Environmental data			
Operating temperature range	-15°C to +50°C	-25°C to +50°C	-25°C to +50°C
Encapsulation	IP 40 (IEC 60529)	IP 66 (IEC 60529)	IP 66 (IEC 60529)
Bump	25 g (IEC 60068-2-29)	5 g, 11 ms (IEC 60068-2-27)	5 g, 11 ms, (IEC 60068-2-27)
Physical data			
Weight	0.7 kg	5 kg	17.9 kg
Camera size (L x W x H)	170 x 70 x 70 mm	460 x 140 x 159 mm	460 x 467 x 326 mm
Tripod mounting	UNC ¼"-20 (on three sides)	N/A	N/A
Base mounting	2 x M4 thread mounting holes (on three sides)	TBA	TBA
System features			
Automatic heaters	N/A	Clears ice from window	Clears ice from window
Pan/tilt			
Azimuth range	N/A	N/A	Az velocity 360° continuous, 0.1 to 60°/sec max.
Elevation range	N/A	N/A	El velocity +/- 45°, 0.1 to 30°/sec. max.
Programmable presets	N/A	N/A	128
Ethernet video streaming			
Ethernet, video streaming	MPEG-4, ISO/IEC 14496-1 MPEG-4 ASP@L5	MPEG-4, ISO/IEC 14496-1 MPEG-4 ASP@L5	Two independent channels for each camera -MPEG-4, H.264 or M-JPEG
Power system			
External power operation	12/24 VDC (10-30 VDC), 24 W absolute max	12/24 VDC (10-30 VDC), 24 W absolute max	24 VAC (21-30 VAC) 24 VDC (21-30 VDC)
Consumption			24 VAC: 215 VA max w/heater 24 VDC: 195 W max w/heater

General

Imaging and optical data	
Field of view (FOV) / Minimum focus distance	25° × 18.8° / 0.4 m
Lens identification	Automatic
Thermal sensitivity/NETD	< 0.05°C at +30°C / 50 mK
Focus	Automatic or manual (built in motor)
F-number	1.3
Image frequency	30 Hz
Zoom	1–8× continuous, digital, interpolating zooming on images
Detector data	
IR resolution	320 × 240 pixels
Detector pitch	25 µm
Detector time constant	Typical 12 ms
Focal Plane Array (FPA) / Spectral range	Uncooled microbolometer / 7.5–13 µm
Measurement	
Object temperature range	–20 to +120°C 0 to +350°C
Accuracy	±2°C or ±2% of reading
Set-up	
Color palettes	Color palettes (BW, BW inv, Iron, Rain)
Set-up commands	Date/time, Temperature °C
Storage of images	
Image storage type	Built-in memory for image storage
File formats	Standard JPEG, 16-bit measurement data included
Composite video	
Video	Composite video output, PAL and NTSC compatible
Video, standard	CVBS (ITU-R-BT.470 PAL/SMPTE 170M NTSC)
Digital input/output	
Digital input	2 opto-isolated, 10–30 VDC
Digital output, purpose	As function of ALARM, Output to ext. device (programmatically set)
Digital output	2 opto-isolated, 10–30 VDC, max 100 mA
Digital I/O, isolation voltage	500 VRMS
Digital I/O, supply voltage	12/24 VDC, max 200 mA
Digital I/O, connector type	6-pole jackable screw terminal
Digital input, purpose	Image tag (start/stop/general), Input ext. device (programmatically read)
Ethernet	
Ethernet, standard	IEEE 802.3
Ethernet, connector type	RJ-45
Ethernet, type	100 Mbps
Ethernet, communication	TCP/IP socket-based FLIR proprietary
Ethernet, power	Power over Ethernet, PoE IEEE 802.3af class 0
Environmental data	
Storage temperature range	–40°C to +70°C
Humidity (operating and storage)	IEC 60068-2-30/24 h 95% relative humidity +25°C to +40°C
EMC	<ul style="list-style-type: none"> • EN 61000-6-2:2001 (Immunity) • EN 61000-6-3:2001 (Emission) • FCC 47 CFR Part 15 Class B (Emission)
Vibration	2 g (IEC 60068-2-6)
Physical data	
Housing material	Aluminium
Scope of delivery	
Hard transport case or cardboard box, thermal imaging camera with lens, utility CD-ROM, calibration certificate, Ethernet™ cable, mains cable, power cable (pig-tailed), power supply, user documentation CD-ROM, printed documentation, 6-pole screw terminal (mounted on camera)	



FLIR A315 / A615

Camera specific



	FLIR A315	FLIR A615
Imaging and optical data		
Field of view (FOV) / Minimum focus distance	25° × 18.8° / 0.4 m	25° × 19° / 0.25 m
Spatial resolution (IFOV)	1.36 mrad	0.68 mrad
Focal length	18 mm	24.6 mm
F-number	1.3	1.0
Image frequency	60 Hz	50 Hz (100/200 Hz with windowing)
Detector data		
Focal Plane Array (FPA) / Spectral range	Uncooled microbolometer / 7.5–13 μm	Uncooled microbolometer / 7.5–14 μm
IR resolution	320 × 240 pixels	640 × 480 pixels
Detector pitch	25 μm	17 μm
Detector time constant	Typical 12 ms	Typical 8 ms
Measurement		
Object temperature range	-20 to +120°C 0 to +350°C	-20 to +150°C +100 to +650°C +300 to +2000°C
USB		
USB	N/A	Control and image
USB, standard	N/A	USB 2 HS
USB, connector type	N/A	USB Mini-B
USB, communication	N/A	TCP/IP socket-based FLIR proprietary
USB, image streaming	N/A	16-bit 640 × 480 pixels at 25 Hz - Signal linear - Temperature linear - Radiometric
USB, protocols	N/A	TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP
Ethernet		
Ethernet, image streaming	16-bit 320 × 240 pixels at 60 Hz - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible	16-bit 640 × 480 pixels at 50 Hz 16-bit 640 × 240 pixels at 100 Hz 16-bit 640 × 120 pixels at 200 Hz - Signal linear - Temperature linear - Radiometric GigE Vision and GenICam compatible



FLIR A315 - Standard



FLIR A315f - Environmental housing



FLIR A615 - Standard

Environmental data			
Operating temperature range	-15°C to +50°C	-25°C to +50°C	-15°C to +50°C
Encapsulation	IP 40 (IEC 60529)	IP 66 (IEC 60529)	IP 30 (IEC 60529)
Bump	25 g (IEC 60068-2-29)	5 g, 11 ms (IEC 60068-2-27)	25 g (IEC 60068-2-29)
Physical data			
Weight	0.7 kg	5 kg	0.9 kg
Camera size (L × W × H)	170 × 70 × 70 mm	460 × 140 × 159 mm	222 × 73 × 75 mm
Tripod mounting	UNC ¼"-20 (on three sides)	N/A	UNC ¼"-20 (on three sides)
Base mounting	2 × M4 thread mounting holes (on three sides)	TBA	2 × M4 thread mounting holes (on three sides)
System features			
Automatic heaters	N/A	Clears ice from window	N/A

Imaging and optical data	
Lens identification	Automatic
Thermal sensitivity/NETD	< 0.05°C @ +30°C / 50 mK
Focus	Automatic or manual (built in motor)
Measurement	
Accuracy	±2°C or ±2% of reading
Measurement analysis	
Atmospheric transmission correction	Automatic, based on inputs for distance, atmospheric temperature and relative humidity
Optics transmission correction	Automatic, based on signals from internal sensors
Emissivity correction	Variable from 0.01 to 1.0
Reflected apparent temperature correction	Automatic, based on input of reflected temperature
External optics/windows correction	Automatic, based on input of optics/window transmission and temperature
Measurement corrections	Global object parameters
Ethernet	
Ethernet	Control and image
Ethernet, standard	IEEE 802.3
Ethernet, connector type	RJ-45
Ethernet, type	Gigabit Ethernet
Ethernet, communication	TCP/IP socket-based FLIR proprietary and GenICam protocol
Ethernet, protocols	TCP, UDP, SNTP, RTSP, RTP, HTTP, ICMP, IGMP, ftp, SMTP, SMB (CIFS), DHCP, MDNS (Bonjour), uPnP
Digital input/output	
Digital input	2 opto-isolated, 10–30 VDC
Digital output, purpose	Output to ext. device (programmatically set)
Digital output	2 opto-isolated, 10–30 VDC, max 100 mA
Digital I/O, isolation voltage	500 VRMS
Digital I/O, supply voltage	12/24 VDC, max 200 mA
Digital I/O, connector type	6-pole jackable screw terminal
Digital input, purpose	Image tag (start, stop, general), Image flow ctrl. (Stream on/off), Input ext. device (programmatically read)
Power system	
External power operation	12/24 VDC, 24 W absolute max
External power, connector type	2-pole jackable screw terminal
Voltage	Allowed range 10–30 VDC
Environmental data	
Storage temperature range	–40°C to +70°C
Humidity (operating and storage)	IEC 60068-2-30/24 h 95% relative humidity +25°C to +40°C
EMC	<ul style="list-style-type: none"> • EN 61000-6-2:2001 (Immunity) • EN 61000-6-3:2001 (Emission) • FCC 47 CFR Part 15 Class B (Emission)
Vibration	2 g (IEC 60068-2-6)
Physical data	
Housing material	Aluminium
Scope of delivery	
Hard transport case or cardboard box, Thermal imaging camera with lens, Utility CD-ROM, Calibration certificate, Ethernet™ cable, USB cable (FLIR A615), Mains cable, Power cable (pig-tailed), Power supply, Printed Getting Started Guide, Printed Important Information Guide, User documentation CD-ROM, Warranty extension card or Registration card, 6-pole screw terminal (mounted on camera)	



FLIR A65 / A35 / A15 / A5

Technical specifications



Imaging and optical data	FLIR A65	FLIR A35	FLIR A15	FLIR A5
IR resolution	640 x 512 pixels	320 x 256 pixels	160 x 128 pixels	80 x 64 pixels
FOV (Field of view) / Focal length	45° (H) x 37° (V) with 13 mm lens 25° (H) x 20° (V) with 25 mm lens lenses are not interchangeable and need to be specified at time of order	48° (H) x 39° (V) with 9 mm lens 25° (H) x 19° (V) with 19 mm lens lenses are not interchangeable and need to be specified at time of order	48° (H) x 39° (V) with 9 mm lens 25° (H) x 19° (V) with 19 mm lens lenses are not interchangeable and need to be specified at time of order	44° (H) x 36° (V) with 5 mm lens 25° (H) x 20° (V) with 9 mm lens lenses are not interchangeable and need to be specified at time of order
Spatial resolution (IFOV)	1.31 mrad for 13 mm lens 0.68 mrad for 25 mm lens	2.78 mrad for 9 mm lens 1.32 mrad for 19 mm lens	5.56 mrad for 9 mm lens 2.63 mrad for 19 mm lens	10.0 mrad for 5 mm lens 5.56 mrad for 9 mm lens
Image frequency	9 Hz / 30Hz	60 Hz	60 Hz	60 Hz
Detector data				
Detector pitch	17 µm	25 µm	50 µm	50 µm
Measurement				
Object temperature range	-25°C to +135°C	-25°C to +135°C / -40°C to +550°C	-25°C to +135°C / -40°C to +550°C	-25°C to +135°C / -40°C to +550°C

General

Imaging and optical data	
Thermal sensitivity/NETD	< 0.05°C @ +30°C (+86°F) / 50 mK
Accuracy	Accuracy ±5°C (±9°F) or ±5% of reading
Minimum focus distance	20x focal length
F-number	1.25
Focus	Fixed
Detector data	
Focal Plane Array (FPA) / Spectral range	Uncooled VOX microbolometer / 7.5–13 µm
Detector time constant	Typical 12 ms
Ethernet	
Ethernet	Control and image
Ethernet, type	Gigabit Ethernet
Ethernet, standard	IEEE 802.3
Ethernet, connector type	RJ-45
Ethernet, communication	GigE Vision ver. 1.2
Ethernet, image streaming	Client API GenICam compliant 8-bit monochrome @ 9 / 30 / 60 Hz (variant dependant) Signal linear/ DDE, Automatic/ Manual, Flip H&V 14-bit @ 9 / 30 / 60 Hz (variant dependant) according to IR camera resolution Signal linear/ DDE, GigE Vision and GenICam compatible
Ethernet, power	Power over Ethernet, PoE IEEE 802.3af class 0 Power
Ethernet, protocols	TCP, UDP, ICMP, IGMP, DHCP, GigE Vision
Digital input/output	
Digital input, purpose	General purpose
Digital input	1x opto-isolated, "0" < 2, "1" = 2–40 VDC
Digital output, purpose	General purpose Output to ext. device (programmatically set)
Digital output	1x opto-isolated, 2–40 VDC, max 185 mA
Digital I/O, isolation voltage	500 VRMS
Digital I/O, supply voltage	2–40 VDC, max 200 mA
Digital I/O, connector type	12-pole M12 connector (shared with Digital Synchronization and External power)
Synchronization In, purpose	Frame sync In to control camera
Synchronization In	1x, non-isolated
Synchronization In, type	LVC Buffer @ 3.3V, "0" < 0.8 V, "1" > 2.0 V.
Synchronization Out, purpose	Frame sync Out to control another Ax5 camera
Synchronization Out	1x, non-isolated
Synchronization Out, type	LVC Buffer @ 3.3V, "0" = 24 MA max, "1" = -24 mA max.
Digital Synchronization, connector type	12-pole M12 connector (shared with Digital I/O and External power)
Power system	
External power operation	12/24 VDC, < 2.5 W absolute max
External power, connector type	12-pole M12 connector (shared with Digital I/O and Digital Synchronization)
Voltage	Allowed range 10–30 VDC
Environmental data	
Operating temperature range	-15°C to +50°C (+5°F to +122°F)
Storage temperature range	-40°C to +70°C (-40°F to +158°F)
Humidity (operating and storage)	IEC 60068-2-30/24 h 95% relative humidity +25°C to +40°C (+77°F to +104°F)
EMC	EN 61000-6-2 (Immunity) EN 61000-6-3 (Emission)
Encapsulation	FCC 47 CFR Part 15 Class B (Emission)
Bump	IP 40 (IEC 60529)
Vibration	25 g (IEC 60068-2-29) 2 g (IEC 60068-2-6)
Physical data	
Weight	0.200 kg (0.44 lb.)
Camera size (L x W x H)	106 x 40 x 43 mm (4.2 x 1.6 x 1.7 in.)
Tripod mounting	Optional with Accessory T198349, Base support
Base mounting	4 x M3 thread mounting holes (bottom)
Housing material	Magnesium and aluminum
Scope of delivery	
Packaging, contents	Cardboard box , thermal imaging camera with lens, focus adjustment tool, printed documentation, user documentation CD-ROM,.

Accessories



Flexible systems
that meet your changing needs

In today's fast-changing environment, requirements for purchased capital equipment can change from year to year or from project to project. Things that are vital today can be redundant tomorrow.

That makes it important for the equipment in which you invest to be flexible enough to meet the ever-changing needs of your applications. No other thermal imaging camera manufacturer offers a wider range of accessories than FLIR Systems.

Hundreds of accessories are available to customize our cameras for a wide variety of imaging and measurement applications.

From a comprehensive range of lenses, through LCD screens to remote control devices, everything is available to tailor your camera to your own, specific application.



A wide variety of accessories is available for every FLIR thermal imaging camera



FLIR A300 / A310 / A315



Accessories

Lenses



IR lens f = 76 mm, 6° incl. case and mounting

[T197407]

For maximum magnification, the 6° lens is the only choice. This optic provides almost 3.5X magnification compared to the 25° lens.



IR lens f = 30 mm, 15° incl. case

[1196961]

When the target in question is a distance away it may be useful to use a telescope lens. The 15° lens is a popular lens accessory and provides almost 2X magnification compared to the 25° lens. Ideal for small or distant targets.



IR lens f = 10 mm, 45° incl. case

[1196960]

Sometimes there isn't enough room to step back and see the whole picture. This wide angle lens has a field of view almost double than the one of the standard 25° lens. Perfect for wide or tall targets.



IR lens f = 4 mm, 90° incl. case and mounting support

[T197411]

This wide angle lens has a field of view almost four times the one of the standard 25° lens.



Close-up 1x (25 µm) incl. case and mounting support

[T197415]

This macro lens provides resolution of extremely small targets. Not suitable for thermal imaging cameras in an environmental housing.



Close-up lens 2x, 50 µm, incl. case

[T197214]

This macro lens provides resolution of extremely small targets. Not suitable for thermal imaging cameras in an environmental housing.



Close-up lens 4x, 100 µm, incl. case

[T197215]

This macro lens provides resolution of extremely small targets. Not suitable for thermal imaging cameras in an environmental housing.

Extended measurement ranges

High temperature option to +1200°C

[T197000]

Allow to measure temperatures of up to +1200°C with the camera.

Power



Power supply

[T910922]

Power supply incl. multi-plugs.



Ethernet cable CAT-6, 2m

[T951004]

This cable is used to connect the thermal imaging camera to Ethernet.



Power cable, pigtailed

[1910586]

This cable is used, when a separate power supply is used (not the one supplied with the camera).



Video cable (only FLIR A300/A310)

[908929]

Video cable 3 m.

Transport



Hard transport case

[T197871]

Rugged watertight plastic shipping case. Holds all items securely.



Delivery Box

[T197870]

Cardboard delivery box with plastic handle. Holds all items neatly.

**Fixed housing for A3xx with 6° / 15° lens**[\[61301-0001\]](#)

Protects the A300 / A310 / A315 against dust and water.
Suited for A3xx thermal imaging cameras with a 6° or 15° lens.

**Fixed housing for A3xx with 25° / 45° / 90° lens**[\[61301-0002\]](#)

Protects the A300 / A310 / A315 against dust and water.
Suited for A3xx thermal imaging cameras with a 25°, 45° or 90° lens.

Environmental data

Temperature range	-25 °C to +50 °C
Storage temperature range	-40 °C to +70 °C
Humidity	IEC 60068-2-30/24 h 95% relative humidity +25 °C to +40 °C
EMC	<ul style="list-style-type: none"> • EN 61000-6-2:2001 (Immunity) • EN 61000-6-3:2001 (Emission) • FCC 47 CFR Part 15 Class B (Emission)
Encapsulation	IP 66 (IEC 60529)
Bump	5 g, 11 ms, (IEC 60068-2-27)
Vibration	2 g (IEC 60068-2-6)

Physical data

Weight	5.0 kg (8.8 lb.)
Camera size (L x W x H)	460 x 140 x 159 mm (18.1 x 5.5 x 5.9 in.)
Tripod mounting	N/A
Base mounting	TBA
Housing material	Aluminum

Power system heater

External power operation	24 VDC (21-30 VDC)
	24 VDC: 25 W max w/heater
External power, connector type	2-pole jackable screw terminal
Voltage	Allowed range 21–30 VDC

System features

Automatic heaters	Clears ice from window
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FLIR A300f / A310f / A315f

Accessories

**Pedestal mount**[\[500-0463-00\]](#)

Mount to install an A3xxf-Series network-ready fixed mount thermal imaging camera. Typically used on a flat horizontal surface such as a wall or the top of a pole.

**Wall mount**[\[500-0462-00\]](#)

Mount to install an A3xxf-Series network-ready fixed mount thermal imaging camera against a wall.

**Pole mount adapter**[\[4119507\]](#)

Can be used to mount an A3xxf-Series network-ready thermal imaging camera against a new or existing pole.

**Power supply**[\[206-0004-01\]](#)

Power supply to power an A3xxf-Series or an A310pt network-ready thermal imaging camera.

FLIR A310pt



Accessories



Pedestal mount

[500-0461-00]

Mount to install an A310pt network-ready fixed mount thermal imaging camera. Typically used on a flat horizontal surface such as a wall or the top of a pole.



Wall mount

[500-0460-00]

Mount to install an A310pt network-ready fixed mount thermal imaging camera against a wall.



Pole mount adapter

[4119498]

Can be used to mount an A310pt network-ready thermal imaging camera against a new or existing pole.



Adapter plate

[4119468]

Can be used to mount an A310pt network-ready Multi-Sensor to a wide variety of existing mounts.



Power supply

[206-0004-01]

Power supply to power an A310pt or an A3xxf-Series network-ready thermal imaging camera.

FLIR A615



Accessories

Lenses



IR lens f = 88.9 mm, 7° incl. case

[T198165]

The 7° lens is a popular accessory and provides 3.6x magnification compared to the standard lens. Ideal for small or distant targets.



IR lens f = 41.3 mm, 15° incl. case

[T197914]

The 15° lens is a popular accessory and provides 1.7x magnification compared to the standard lens. Ideal for small or distant targets.



IR lens f = 24.6 mm, 25° incl. case

[T197922]

The standard 25° lens is suitable for the majority of applications.



IR lens f = 13.1 mm, 45° incl. case

[T197915]

This wide angle lens has a field of view almost double compared to the standard 25° lens.



IR lens f = 6.5 mm, 80° incl. case

[T198065]

This wide angle lens has a field of view approximately three times that of the standard 25° lens. This lens is suitable for extremely cramped situations where the operator can not step farther back from the object.



Close-up 2.9x (50 µm) incl. case

[T198059]

This macro lens provides resolution of extremely small targets









Close-up 5.8x (100 µm) incl. case

[T198060]

This macro lens provides resolution of extremely small targets










Power

	Power supply Power supply incl. multi-plugs.	[T910922]
	Ethernet cable CAT-6, 2m This cable is used to connect the infrared camera to Ethernet.	[T951004]
	Power cable, pigtailed This cable is used, when a separate power supply is used (not the one supplied with the camera).	[1910586]
	USB cable USB cable to connect the camera with a computer, using the USB protocol.	[1910423]
	Hard transport case Rugged watertight plastic shipping case. Holds all items securely.	[T197871]
	Delivery Box Cardboard delivery box with plastic handle. Holds all items neatly.	[T197870]

FLIR Axx-series



Accessories

	PoE injector Power supply, power over Ethernet (PoE) injector.	[T911112]
	Cable kit Mains (UK, EU, US) Cable kit consisting of three power cables (UK, EU, US).	[T198348]
	Cable M12 Pigtail Cable to access signals in M12 connector, pigtail.	[T127605]
	Cable M12 Sync Cable to synchronize two cameras, M12 connectors in both ends.	[T127606]
	Base support Adapter for connecting a tripod.	[T198349]
	Focus adjustment tool Focus adjustment tool	[T198342]
	Gigabit PoE injector 16 W, with multi-plugs Power supply, power over Ethernet (PoE) injector incl. multi plugs.	[T911183]
	Ethernet cable CAT-6, 2m This cable is used to connect the infrared camera to Ethernet.	[T951004]
	Transport case Rugged, watertight plastic shipping case. Holds all items neatly and securely.	[T198594]
	Table stand kit Table stand kit for the FLIR Ax5 series. The kit consists of a base support and a gooseneck.	[T198392]

FLIR Systems

Notes

A series of horizontal dotted lines for taking notes, spanning the width of the page below the 'Notes' header.

FLIR Systems

Notes

Lined area for notes.

FLIR Systems

Export Licensing



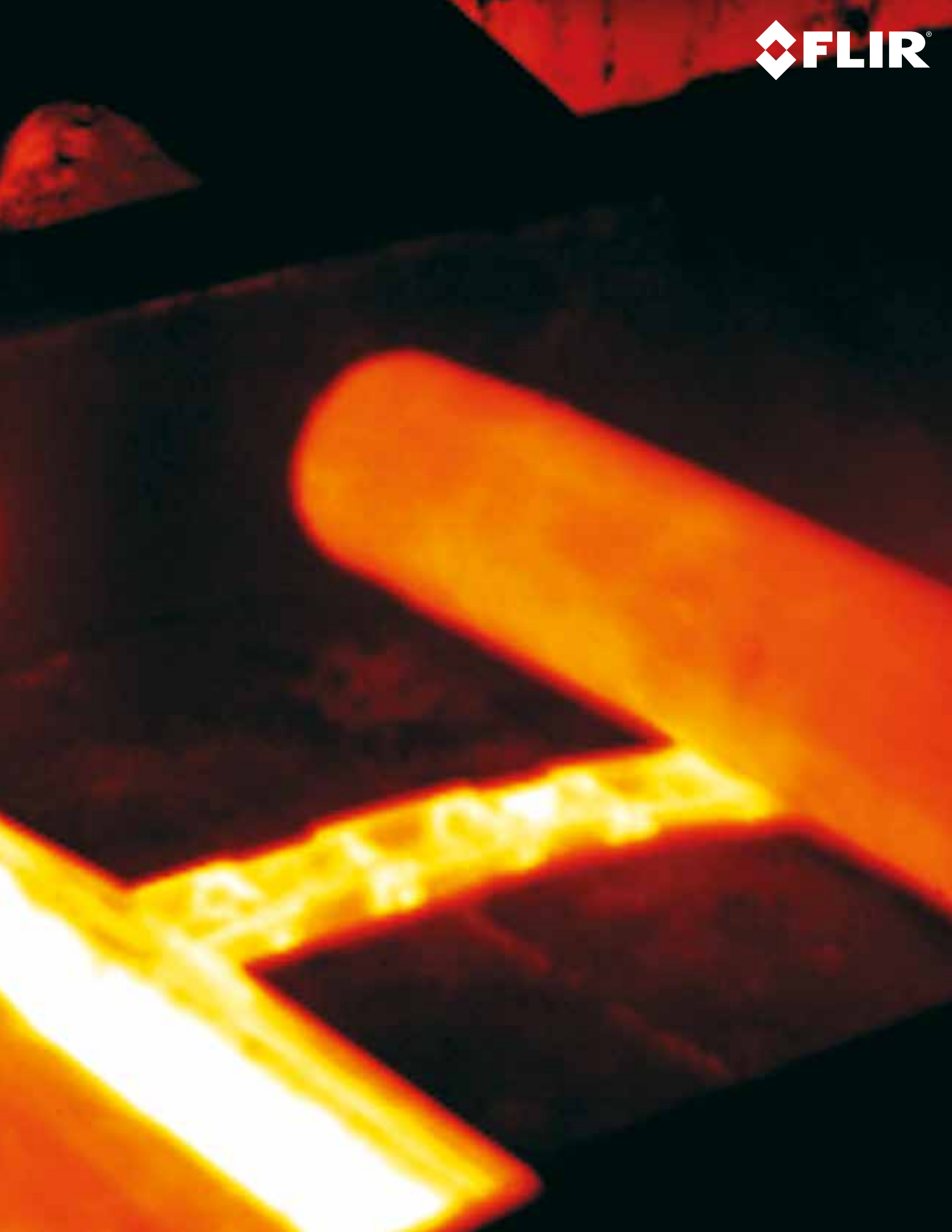
The products described in this publication may require government authorization for export/re-export, or transfer. Contact FLIR Systems for details.

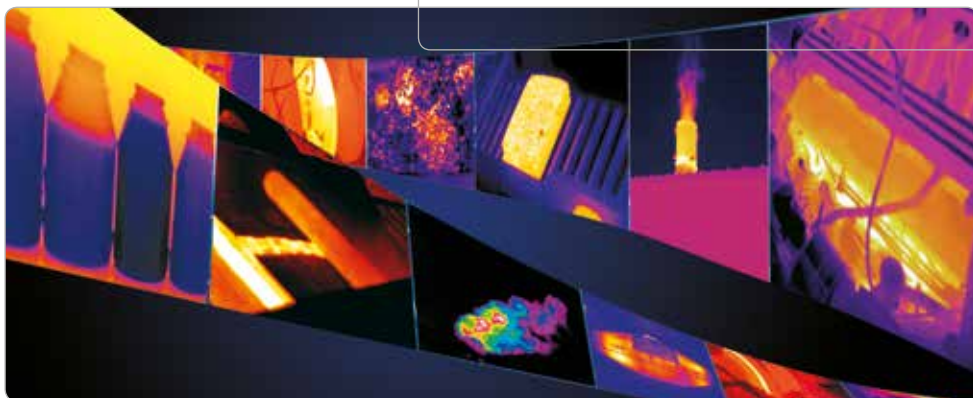
Specifications are subject to change without notice.

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