



# Thermal imaging cameras for maritime applications



**NEW**



MD-Series



M-Series



Voyager-Series



**NEW**

MU- / MV-Series







## FLIR Systems: The world leader in thermal imaging cameras

FLIR 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 thermal imaging systems use state-of-the-art infrared imaging technology that detects infrared radiation - or heat. Based on detected temperature differences, thermal imaging cameras can create a crisp image. At FLIR we design and manufacture all of the critical technologies inside FLIR products, including detectors, electronics, and special lenses ourselves.



*FLIR Stockholm, Sweden*



*FLIR Boston, USA*



*FLIR Santa Barbara, USA*



*FLIR Paris, France*

### **Rapidly emerging markets and organisation**

Interest in thermal imaging has grown considerably over the last few years in a large variety of markets. To face this increased demand, FLIR has expanded its organisation drastically. Today we employ more than 3,000 people. Together, these infrared specialists realise a consolidated annual turnover of more than 1 billion US dollars. This makes FLIR the largest manufacturer of commercial thermal imaging cameras in the world.

### **Manufacturing capabilities**

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

### **More than a camera, a complete solution**

There is more to the world of thermal imaging than building a camera. FLIR 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.

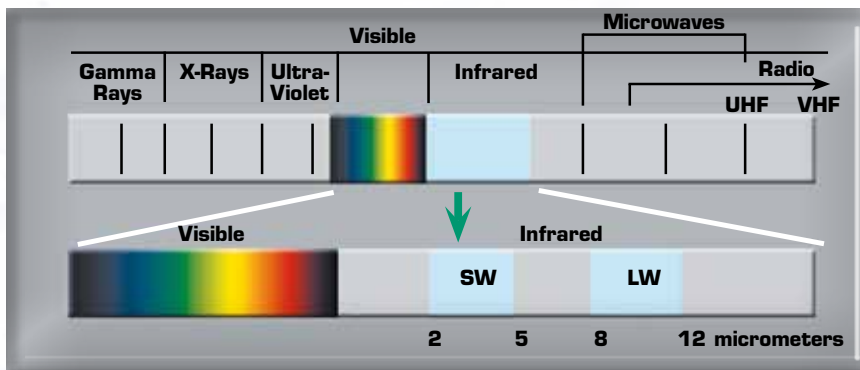
# Infrared:

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.



## Why thermal is better

Thermal imaging cameras detect and display tiny differences in heat, not light. So no matter how much light is available—from pitch black to moonlight to severe midday glare—thermal imagers display a clear image. The “detectors”—the key to FLIR technology for decades—pick up the thermal energy emitted by everything, even ice! FLIR thermal imaging cameras then convert that data into the crisp video you see on the display.



Your Vision



Thermal image

## Thermal imaging vs image intensification (I<sup>2</sup>)

Image intensification does require a certain level of ambient light, but even starlight can produce an image on a cloudless night. Because the system requires at least a minimum level of ambient light, conditions such as heavy overcast can limit its effectiveness. Thermal imaging cameras offer substantial benefits over image intensification. They work by detecting the heat energy being radiated and need no light at all to produce a clear image in the darkest environments.



Image intensification: image is saturated by looking directly at a light source.



Thermal imaging: is not affected by the light and produces a clear image.





## FLIR thermal imaging cameras

### On board of every vessel

FLIR Systems markets a full range of thermal imaging cameras for the most demanding maritime applications. Our thermal imaging cameras are rapidly finding their way to pleasure craft and yachts, commercial vessels, work boats, fishing boats, cruise ships and many other types of vessels.

They will help you to navigate in all circumstances, detect other vessels, assist in overboard searches, secure your vessel in the harbour and at open water (anti-piracy) and give you a good overview of what is happening in the dark.

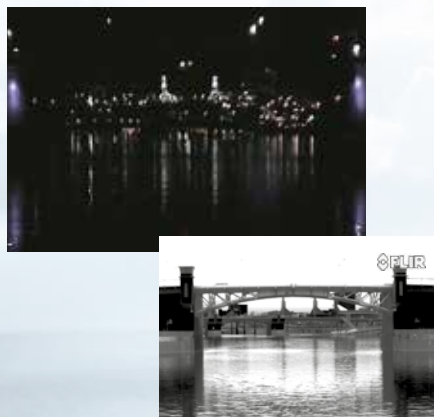


# A large number of applications

A thermal imaging camera is very effective in maritime environments. It is designed to meet the following customer requirements: port, waterway and coastal security, maritime safety, illegal immigrant detection at sea, law enforcement at sea, anti-piracy & threat detection, fishing fleet protection, vessel tracking & observation, search and rescue operations, environmental protection.

Even objects which can not be detected by a radar system such as sail boats, wooden boats, floating debris, ... become clearly visible when you are using a thermal imaging camera.

## See in total darkness



A FLIR thermal imaging camera allows you to see in total darkness. You can clearly see channel markers, shipping lane traffic, outcroppings of land, bridge pilings, floating debris, exposed rocks, other vessels and any other floating object that might damage your ship when undetected.

## Increase safety and security on board



Both yachts and commercial vessels contain a lot of valuable equipment that is susceptible to theft.

A thermal imaging camera can help you to see what is happening around your vessel.

## Long range threat detection



A shipboard environment can be very isolated and vulnerable.

Today, more than ever, shipboard security is important. A FLIR thermal imaging camera allows you to see what is around you, even at far distances. You can monitor activity in port or at anchor and see approaching vessels or people without alerting them that they are being watched.

## Law enforcement



A FLIR thermal imaging camera is an ideal tool for law enforcement applications. Coastguard, customs and police can benefit from the power of thermal imaging for monitoring illegal activities from a distance. Day and night.

They will clearly see what is happening but remain unseen themselves.



## Search and rescue operations and man overboard searches

Thermal imaging cameras are widely used by coastguard and rescue workers. They use thermal imaging cameras for man overboard searches. It is extremely important to find people floating in the water before hypothermia sets in.



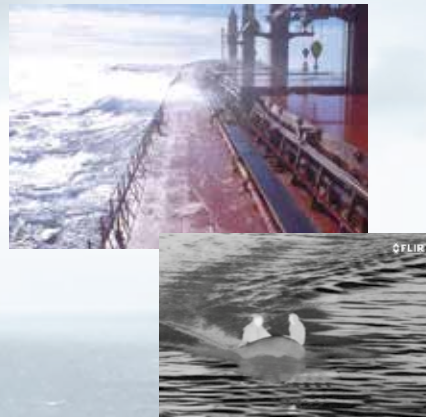
## Daytime navigation



A FLIR thermal imaging camera detects objects in any light condition. Also in broad daylight, a FLIR thermal imaging camera can detect objects that remain invisible to the naked eye. It is not affected by glare from the sun.

A FLIR thermal imaging camera will allow you to see through the glare, and detect possible obstacles, when navigating during sunrise or sunset.

## Anti-Piracy



An approaching "blip" on your radar screen can also mean danger. A FLIR thermal imaging camera allows you to see vessels on the horizon and provides you with decision making capability before it is too late.

## Ice detection



A FLIR thermal imaging camera is an ideal tool for ice detection. It can be installed on board of ice class tankers, ice class research ships and atomic class ice ships. Icebergs and floating ice can damage a vessel severely or even sink it.

Ice will however become clearly visible thanks to the FLIR thermal imaging camera so that the captain can take appropriate action to avoid a collision.

## Oil spill detection



A FLIR thermal imaging camera is extremely useful for detecting oil spills that are floating on the water.

Not only in case of an accident but also when loading or unloading fuel tankers. Oil floating on the water becomes clearly visible on a thermal image.



# Real life applications



## Genoa pilot corps

Just like any major port, Genoa has a port pilot service. The Genoa Pilot Corps provides an active service 24 hours a day and 365 days a year, covering the entire port area of Genoa.

Although the main reason for installing the FLIR M-Series was man overboard search, the Genoa Pilot Corps discovered quickly that a thermal imaging camera has more use than that in a maritime environment.

The FLIR M-Series is almost continuously being used to help the captain of the pilot boat to navigate safely to commercial vessels. All traffic is clearly visible on a thermal image. This helps the captain to approach the commercial vessel safely.



## NSSR Norway

Everyone that has been at sea at night will agree that being able to see in the dark is a very important asset to any sailor, but for the Norwegian Society for Sea Rescue (NSSR) it quite literally makes the difference between life and death.

In the winter months the northern parts of Norway are enveloped in utter darkness for months at an end, which would seriously reduce the effectiveness of the NSSR crews in emergency situations. Now that FLIR cameras have been installed on their vessels the darkness no longer limits the NSSR crews, not even during that long winter night.



## Lisbon ferry

The Portuguese capital Lisbon lies next to one of the busiest rivers of Europe: the Tagus. The Lisbon ferry service has the task to bring all of the commuters and tourists safely across the river. Hundreds of tourists and commuters use the Lisbon ferry service every day. But on a busy river like this accidents can happen all too easily.

Several ferries are travelling up and down the river all day. But it's not just ferries crossing the river; ships of all sizes and shapes traverse the Tagus. When darkness or smoke impedes vision this can lead to dangerous situations. To avoid collisions, the new Lisbon ferries have been enhanced with FLIR M-Series thermal imaging cameras.



## Ferretti Group

Thermal imaging is finding its way to a wide variety of ships. Ocean liners, tow boats, cruise ships, rescue boats and many other types of vessels have been enhanced with thermal imaging cameras from FLIR.

A very promising segment of the maritime industry is the category yachts. More and more yacht owners are incorporating FLIR thermal imaging cameras in their vessel's set of equipment. One of the first to realize the potential of this innovative technology is Norberto Ferretti, chairman of the Ferretti Group: "I've been using FLIR thermal cameras for four or five years now and it really is a great tool that helps to keep my yacht safe. In some situations it's actually even better than the radar."





# FLIR MD-Series

Affordable thermal night vision system

This affordable, fixed-mount thermal night vision system helps with steering around obstacles, collision avoidance and finding people in the water at night. Simple to mount and easy to integrate into your existing electronics, MD-Series outputs standard analog video that can be easily displayed on any monitor at the helm or other monitors on the vessel.

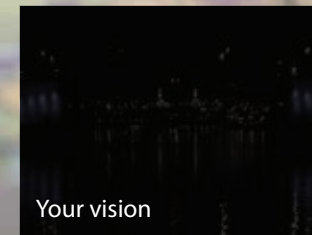
## Different versions available

	MD-324	MD-625
Sensor type	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer
FOV (Field of View)	24° x 18° (NTSC)	25° x 20° (NTSC)
Focal length	13 mm	25 mm
E-zoom	2x	2x, 4x
Image processing	FLIR Proprietary Digital Detail Enhancement	FLIR Proprietary Digital Detail Enhancement
<b>Range performance</b>		
Detect man-sized target	440 m	930 m
Detect small vessel	1,340 m	2,800 m



## Key Features:

- Available in 320 x 240 and 640 x 480 resolutions
- 2x e-zoom standard; 4x e-zoom included on MD-625
- Ethernet-enabled control for integration into your current electronics
- Compact, all weather, water proof enclosure provides for easy mounting options
- Ball up or ball down mounting



# FLIR M-Series

## Premium maritime thermal night vision systems

Powerful, flexible, and built to last, the award-winning M-Series is FLIR's premium line of maritime thermal night vision systems.

Available with a variety of sensors and resolutions to meet a wide range of maritime navigation, collision avoidance, security, and search and rescue needs, M-Series is easy to install, integrate, and operate. FLIR M-Series systems use Ethernet connectivity for easy installation, control, and interface with other on-board electronics. The rugged, waterproof pan/tilt enclosure provides a continuous 360° pan and +/-90° tilt.



Dual payload M-Series with thermal and low-light cameras

Single payload M-Series with thermal camera

### Key Features:

- Premium pan/tilt thermal imager
- Thermal only or thermal/lowlight multi-sensor configurations
- Standard- and high-resolution thermal camera options. Available in 320 x 240 and 640 x 480 resolutions
- Network-ready
- Auto-scan feature
- Easy to use joystick control



Red hot Fusion Rainbow



Low-light Video



Black hot White hot



High-resolution detail image



## Different versions available

	M-324XP	M-625XP	M-324L	M-625L	M-618CS
Sensor type	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer	640 x 480 VOx Microbolometer
FOV (Field of View)	24° x 18° (NTSC)	25° x 20° (NTSC)	24° x 18° (NTSC)	25° x 20° (NTSC)	18° x 14° (NTSC)
Focal length	19 mm	25 mm	19 mm	25 mm	35 mm
E-zoom	2x	2x, 4x	2x	2x, 4x	2x, 4x
Gyro-stabilized					√
Image processing	FLIR Proprietary Digital Detail Enhancement	FLIR Proprietary Digital Detail Enhancement	FLIR Proprietary Digital Detail Enhancement	FLIR Proprietary Digital Detail Enhancement	FLIR Proprietary Digital Detail Enhancement
Daylight camera			√	√	√
Detect man-sized target	440 m	930 m	440 m	930 m	1,100 m
Detect small vessel	1,250 m	2,800 m	1,250 m	2,800 m	3,300 m



### M-618CS Active gyro-stabilization

The M-618CS is equipped with a 640x480 pixels detector providing a 18° Field of view. It is also equipped with a color TV camera with 36x optical zoom. Ball up installation only.

## Other Features:

- **Heated LCD Screen:** Instant, always legible system status display.
- **Auto Scan Controls:** Program automatic scan speed and pointing angle arc ranging from 40° to 160°
- **Ethernet Connectivity:** Install multiple control stations to control M-Series from anywhere on your vessel



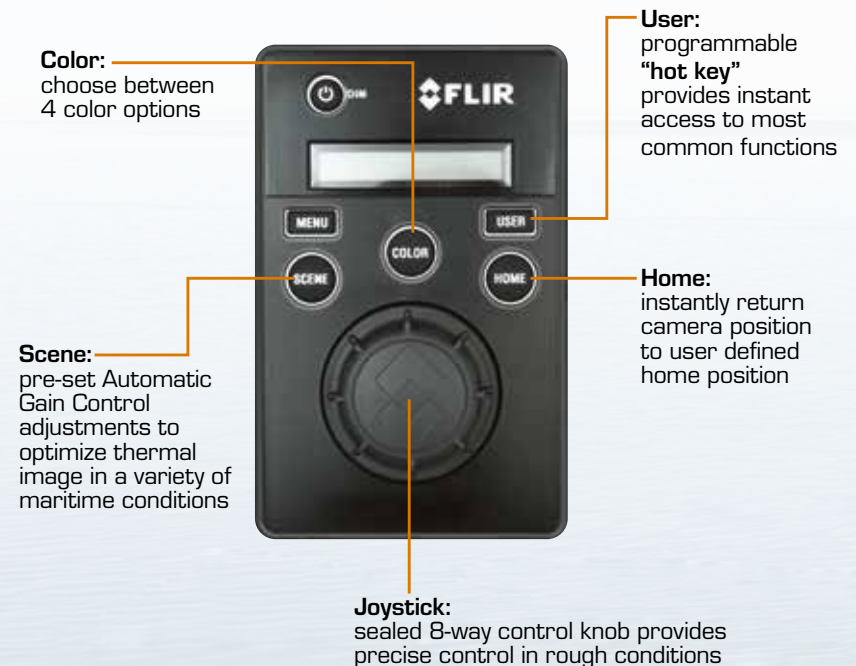
### On-Screen Icons

M-Series uses FLIR's color on-screen symbology to let you see where the system is pointing, and to give you instantaneous updates regarding the camera's configuration and status.



## Joystick Control Unit

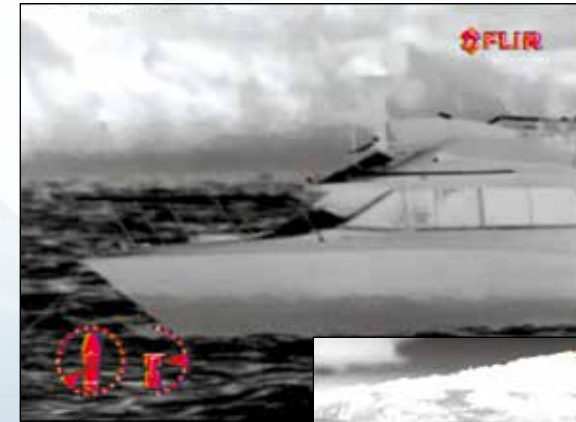
Ergonomic, effortless control of all critical M-Series functions.



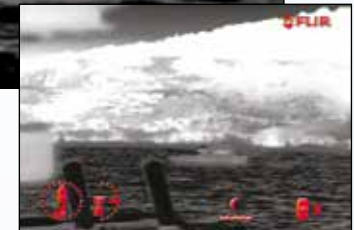
# FLIR Voyager Series

## Long-range multi-sensor thermal night vision system

Voyager II / Voyager III's wide-angle thermal camera lets you detect other boats or hazards easily, while its long-range 140 mm thermal camera lets you zoom in on them to get the valuable information you need to react in time. The Voyager II / Voyager III is equipped with a continuous optical zoom on the thermal image.



Voyager Zoom



### Key Features:

#### Voyager II & III

- **4x optical zoom and 15x total zoom:** Voyager II / Voyager III lets you see even farther at night.
- **Powerful, long-range daylight/lowlight color TV camera with 26x optical zoom, and 312x total zoom:** allows you to identify other boats and monitor activity onshore from farther away.
- **Active gyro-stabilization:** provides steady imagery, even in rough seas; this is critical for getting the most out of Voyager II / Voyager III's long-range imaging capability.
- **Radar tracking feature:** allows operators to use the Voyager II / Voyager III to identify and track specified radar returns, enhancing vessel safety in low visibility conditions.
- **Internet remote control feature:** lets you operate your Voyager II / Voyager III from any location in the world with a suitable internet connection, so you can check on your boat even when you're away.
- **Expanded interface capability:** lets Voyager II / Voyager III work hand-in-hand with your other marine electronics.

#### Voyager III

- **Video tracker:** automatically stays locked onto an object or vessel to follow its every movement.
- **Temperature indication scale:** determines temperature of objects in image.
- **Surveillance mode:** automatically pans left and right.



# Voyager III Joystick Control Unit

Ergonomic, effortless control of all critical Voyager III functions, even in rough conditions

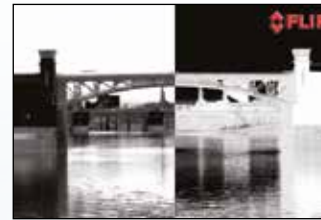
**Color:**  
choose between 4 color options

**User:**  
programmable "hot key" provides instant access to most common functions

**Scene:**  
pre-set Automatic Gain Control adjustments to optimize thermal image in a variety of maritime conditions

**Home:**  
instantly return camera position to user defined home position

**Joystick:**  
sealed 8-way control knob provides precise control in rough conditions



Black hot White hot



Red hot Fusion Rainbow



Daylight camera



Foveal View



Temperature Indication (Voyager III only)



Video Tracker (Voyager III only)

## Other Features:

- **Heated LCD screen:** instant, always legible system status display.
- **Auto scan controls:** program automatic scan speed and pointing angle arc ranging from 40° to 160°
- **Ethernet connectivity:** install multiple control stations to control Voyager Series from anywhere on your vessel

\*Some models of Voyager feature alternate joystick control units.



### On-Screen Icons

Voyager uses FLIR's color on-screen symbology to let you see where the system is pointing, and to give you instantaneous updates regarding the camera's configuration and status.

### Different versions available

	Voyager II	Voyager III
Long range detection	√	√
Auto scan	√	√
Video tracker		√
Temperature indication scale		√
Surveillance mode		√

# FLIR MU- / MV-series

## Ultra long-range multi-sensor thermal night vision system

**FLIR MU-series** is the most technologically advanced thermal night vision system available to the maritime industry today. It is a powerful, gyro-stabilized multi-sensor, long range, thermal night vision system.

MU-602C includes a cooled midwave, high-resolution 640 x 512 pixel thermal camera. It has a 14X optical zoom between a 28° and a 2° field of view. It comes standard with a high-resolution 550-line color camera. The daylight camera offers a 28X optical zoom.

MU-602CL is also equipped with a low-light black and white camera.

MU-602CLW is completed with an uncooled long-wave high resolution 640 x 480 pixel thermal camera giving the MU-Series multi-spectral capabilities. Ideal for detecting targets at short range.

**FLIR MV-series** offer a thermal imaging camera equipped with an uncooled Vanadium Oxide (VOx) detector producing thermal images of 640 x 480 pixels. It is the more affordable multi-sensor solution. The thermal imaging camera zooms between a 24.5° and a 4° field of view.

MV-604C is equipped with a thermal imaging camera and a visible color camera.

MV-604CL comes with a black & white low light camera as well.







## Continuous optical zoom

The FLIR MU- / MV-series have a continuous optical zoom on the thermal image allowing to have a closer look at objects which are far away.

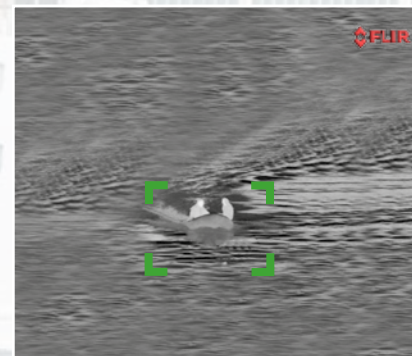


## Ball up / Ball down installation

The FLIR MU- / MV-series can be installed in ball-up or ball-down position, giving you more flexibility installing it on your vessel.

## Key Features:

- **Pan/tilt:** all versions of the MU- / MV-Series can pan 360° continuously and tilt +/- 90°. This provides excellent situational awareness.
- **Active gyro-stabilization:** provides steady imagery, even in rough seas; this is critical for getting the most out of the FLIR MU- / MV-Series long-range imaging capability.
- **Radar tracking:** allows operators to use the FLIR MU- / MV-Series to identify and track specified radar returns, enhancing vessel safety in low visibility conditions.
- **Video tracker:** the user can select a given target that can be automatically tracked by the video tracker. Selecting and engaging in tracking mode is easily done by the touch of a button. Once the tracker is engaged, the camera will follow the object as long as it can be seen.
- **Picture-in Picture mode:** with the Picture-in-Picture mode (PIP) two sensors can be displayed on a single display. The user can select which sensor to display as full screen.
- **Digital detail enhancement (DDE):** assures a crisp thermal image even in scenes with extreme temperature dynamics.



Video tracker



Picture-in-picture

## MU-/MV-series Joystick Control Unit

Ergonomic, effortless control of all functions, even in rough conditions. Multiple joysticks can be connected.



### Different versions available

	MU-602C	MU-602CL	MU-602CLW	MV-604C	MV-604CL
Sensor type	Focal Plane Array (FPA), Cooled MWIR 640 x 512 pixels			Focal Plane Array (FPA), Uncooled LWIR 640 x 480 pixels	
FOV (Field of View)	Continuous Optical Zoom WFOV 28° x 22.4° to NFOV 2° x 1.6° (PAL)			Continuous Optical Zoom WFOV 24.5° x 18.5° to NFOV 4.1° x 3.1°	
Focus	Focus free at infinity/Manual/Auto/Wide				
Visible color camera	✓	✓	✓	✓	✓
Lowlight camera		✓	✓		✓
Thermal LW camera			✓		
Detect man-sized target		9.2 km		4.4 km	
Detect small vessel		15.5 km		12.7 km	

**Payload 1**  
visible color camera

**Payload 2**  
MU-series:  
cooled 640x512  
thermal imaging  
camera  
MV-series:  
uncooled 640x480  
thermal imaging  
camera



**Payload 3**  
MU-602CL/CLW  
MV-604CL:  
low-light b/w  
camera

**Payload 4**  
MU-602CLW:  
wide field of view  
uncooled longwave  
infrared, 640  
x 480 thermal  
camera



Color camera and lowlight camera:  
Picture-in-Picture

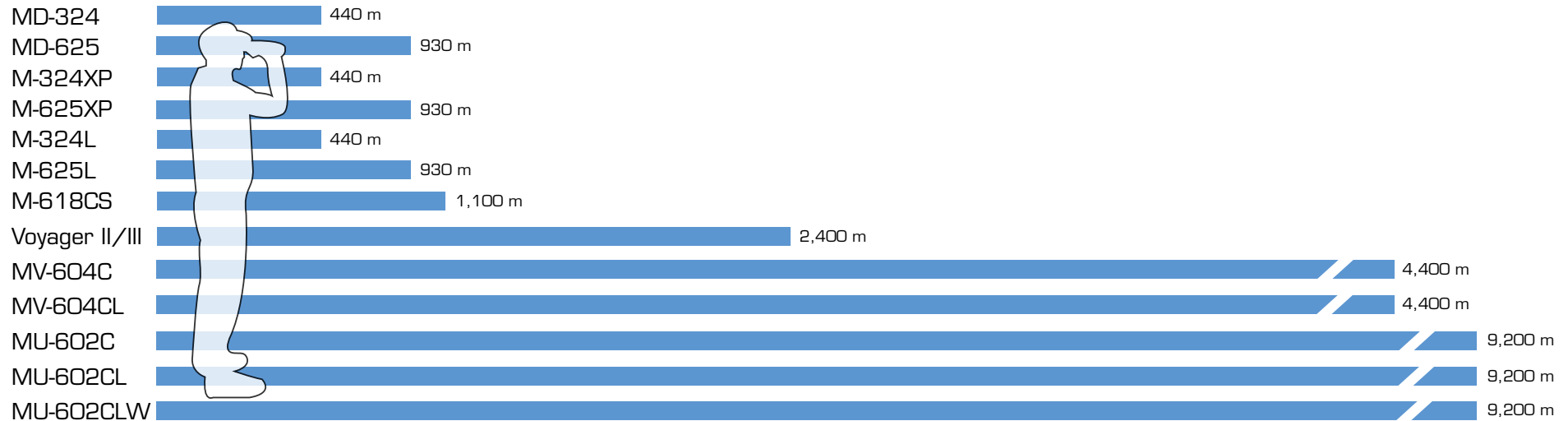


Both the MU- / MV-Series allow you to zoom in  
and have a closer look at the situation.

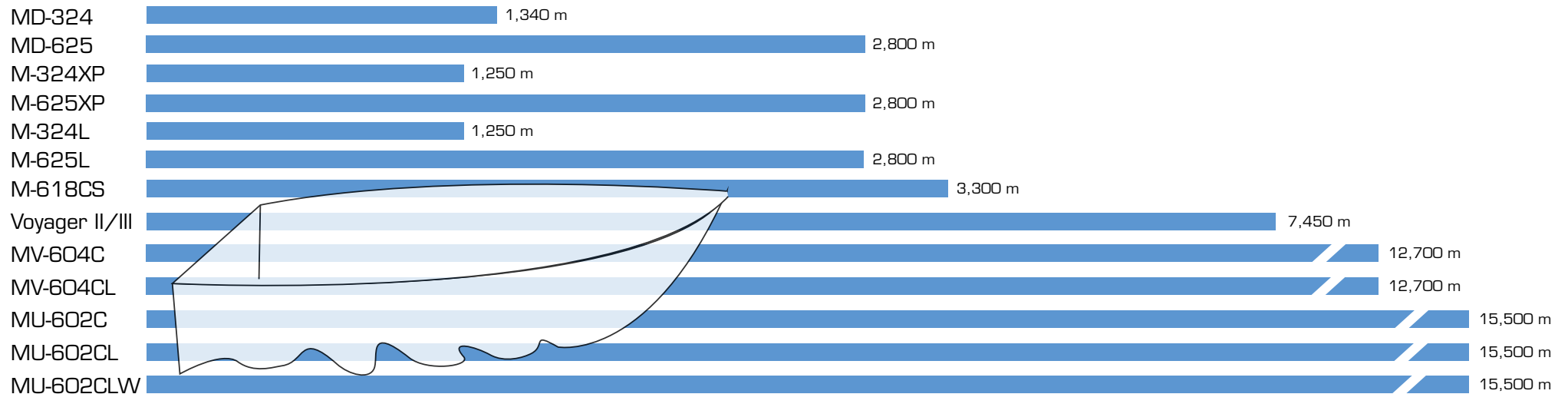


# Range performances

## Detect Man-Sized Target (1.8 m x 0.5 m)



## Detect small object (2.3 m x 2.3 m)

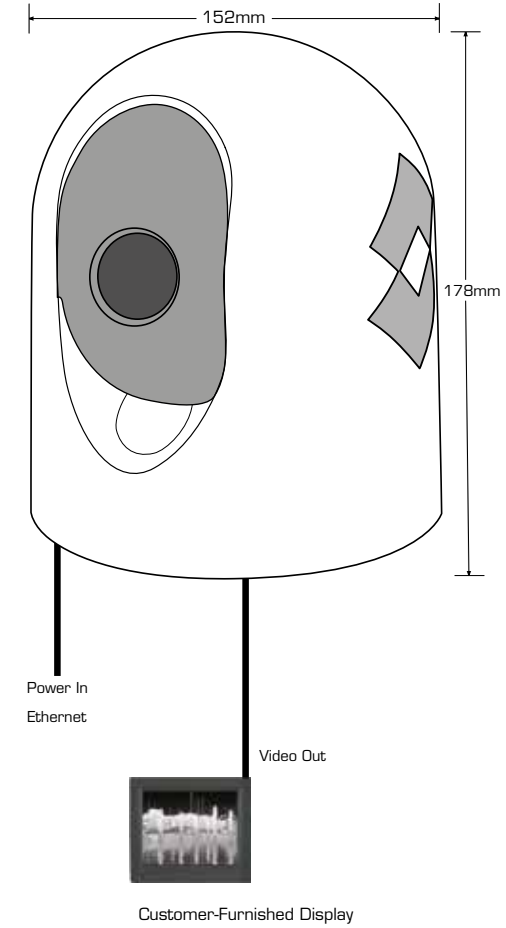


Actual object detection range performance may vary depending on camera set-up, environmental conditions, user experience, and type of display use. All specifications are subject to change without notice. Visit [www.flir.com](http://www.flir.com) for the most up-to-date specifications.

# MD-series



Thermal imaging specifications	MD-324	MD-625
Sensor type	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer
Field of view	24° x 18° (NTSC)	25° x 20° (NTSC)
Focal length	13 mm	25 mm
E-zoom	2x	2x, 4x
Image processing	FLIR Proprietary Digital Detail Enhancement	
<b>System specifications</b>		
Size	152mm x 178mm	
Weight	1360g	
Pan/Tilt adjustment range	Pan: ±30° per key, Tilt: +34°, -27° (Locked in at Installation)	
Video output	NTSC or PAL, 30 Hz or <9 Hz	
Connector types	F-type BNC with BNC-to-RCA adapter included for video out	
Power requirements	PoE injector required per IEEE 802.3af	
PoE Injector power requirement	12-24 VDC	
Power consumption	4.8 W nominal; 12.5 W max	
<b>Environmental</b>		
Operating temperature range	-25°C to +55°C	
Storage temperature range	-30°C to +70°C	
Automatic window defrost	Standard at Power-Up	
Sand/dust	Mil-Std-810E	
Water ingress	IPx6 (heavy seas, powerful jets of water)	
Shock	15 g vertical, 9 g horizontal	
Vibration	IEC 60945; MIL-STD-810E	
Lightning protection	Standard	
Salt mist	IEC60945	
Wind	100 knot (115.2 mph)	
EMI	IEC 60945	
<b>Thermal range performance</b>		
Detect man (1.8 m x 0.5 m)	440 m	930 m
Detect small vessel (2.3 m x 2.3 m)	1,340 m	2,800 m
<b>Standard package</b>	Camera Head with ~5' pigtail cable, 25' Analog Video cable, 25' Ethernet cable, PoE injector and Operator Manual CD	
<b>Warranty</b>	3 Year (with product registration)	
<b>Optional accessories</b>	Low smoke zero halogen ethernet cables	

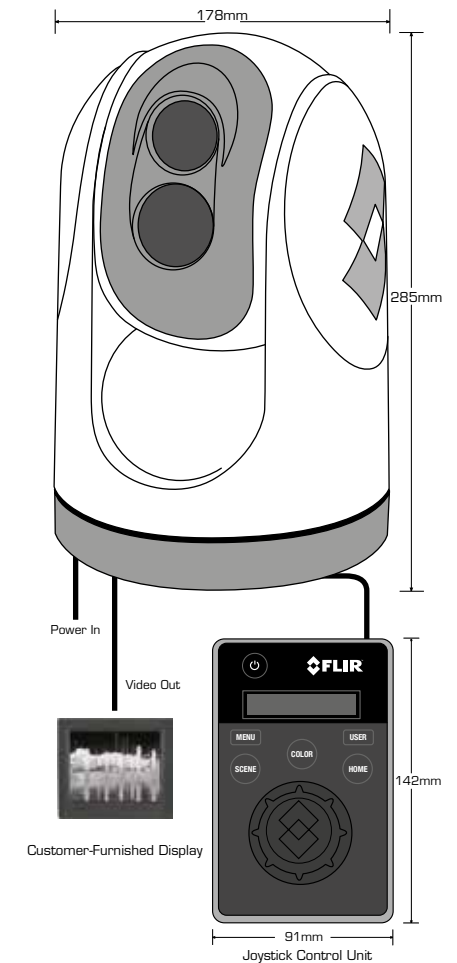




## M-series



Thermal imaging specifications	M-324XP	M-625XP	M-324L	M-625L	M-618CS
Sensor type	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer	320 x 240 VOx Microbolometer	640 x 480 VOx Microbolometer	640 x 480 VOx Microbolometer
Field of view	24° x 18° (NTSC)	25° x 20° (NTSC)	24° x 18° (NTSC)	25° x 20° (NTSC)	18° x 14° (NTSC)
Focal length	19 mm	25 mm	19 mm	25 mm	35 mm
E-zoom	2x	2x & 4x	2x	2x & 4x	2x & 4x
Image processing	FLIR Proprietary Digital Detail Enhancement				
<b>Daylight imaging specifications</b>					
Detector type	N/A	1/2" Interline Transfer Lowlight CCD		Color CCD	
Lines of resolution	N/A	768 (H) x 494 (V)		530	
Minimum illumination	N/A	100 µlx (@ f/1.4)		1.4 lux	
FOV	N/A	Matched to IR		58° (H) x 43° (V) w/36x optical zoom matched to IR	
<b>System specifications</b>					
Size	178 mm x 285mm.			178 mm x 291mm.	
Weight	~ 4 kg			~ 5.2 kg	
Pan/tilt coverage	360° Continuous Pan, +/-90° Tilt				
Stabilization	N/A			2-Axis gyro-stabilized	
Installation	Ball up / Ball down			Ball up only	
Video output	NTSC or PAL				
Connector types	BNC with BNC-to-RCA adapter included for video out				
Power requirements	12 VDC to 24 VDC (-10%/+30%)				
Power consumption	25 W nominal; 50 W max				
<b>Environmental</b>					
Operating temperature range	-25°C to +55°C				
Storage temperature range	-40°C to +85°C				
Automatic window defrost	Standard				
Sand/dust	Mil-Std-810E				
Water ingress	IPx6 (heavy seas, powerful jets of water)				
Shock	15 g vertical, 9 g horizontal				
Vibration	IEC 60945; MIL-STD-810E				
Lightning protection	Standard				
Salt mist	IEC60945				
Wind	100 knot (115.2 mph)				
EMI	IEC 60945				
<b>Thermal range performance†</b>					
Detect man (1.8 m x 0.5 m)	440 m	930 m	440 m	930 m	1,100 m
Detect small vessel (2.3 m x 2.3 m)	1,250 m	2,800 m	1,250 m	2,800 m	3,300 m
<b>Standard package</b>	Camera Head with 18-inch Pigtails for Power, Analog Video, and Ethernet; Joystick Control Unit; 25' LSZH Ethernet Cable, Operator Manual				
<b>Warranty</b>	3 Year (with product registration)				
<b>Optional accessories</b>	Dual Station JCU; Low Smoke Zero Halogen Ethernet Cables; Top-Down Mounting Riser				



† = Actual object detection range performance may vary depending on camera set-up, environmental conditions, user experience, and type of display use. All specifications are subject to change without notice. Visit [www.flir.com](http://www.flir.com) for the most up-to-date specifications.

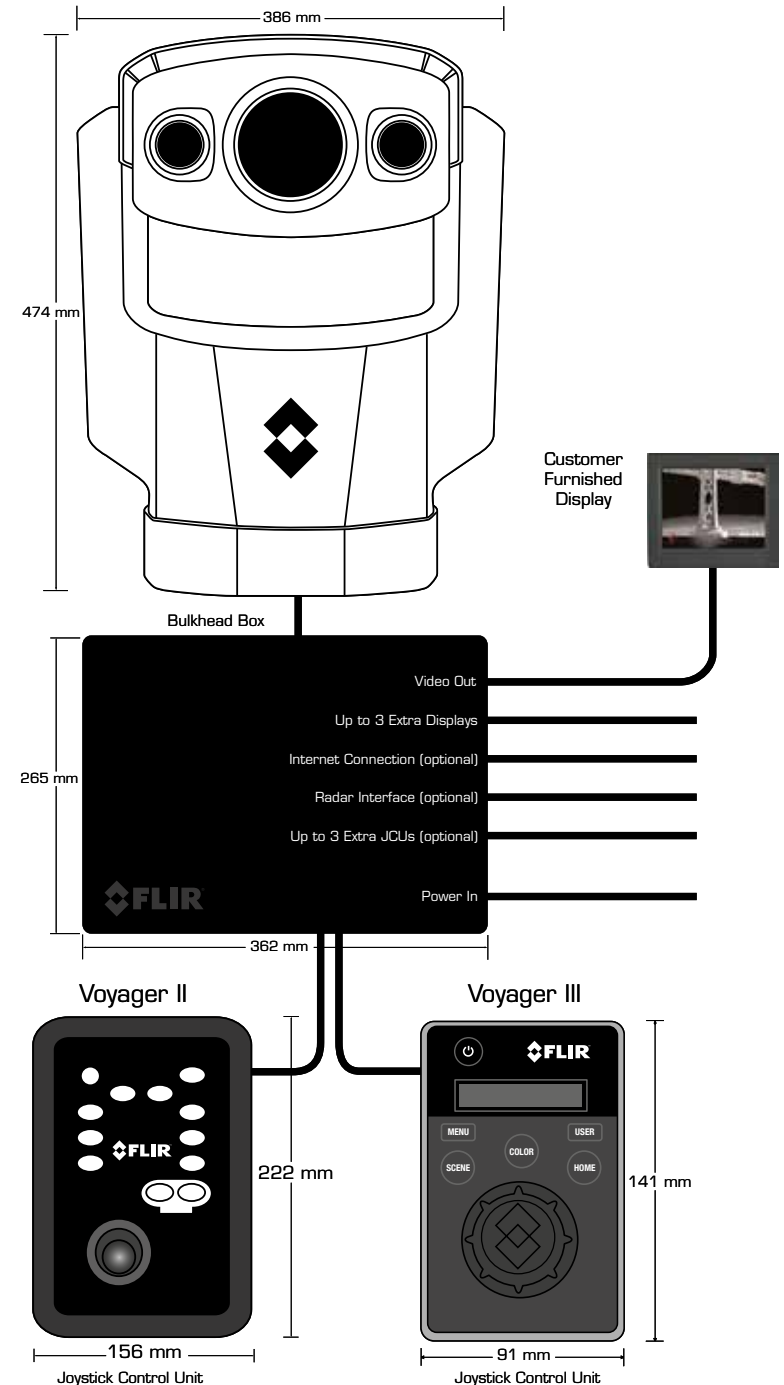
# Voyager II™ / Voyager III™



Thermal imaging specifications	
Sensor type	Two 320 x 240 VOx Microbolometers
Field of view	20° x 15° (Wide FOV); 5° x 3.75° (Narrow FOV)
Focal length	35 mm (Wide FOV); 140 mm (Narrow FOV)
E-Zoom	4x (15x total magnification)
Image processing	FLIR DDE
Daylight imaging specifications	
Detector type	1/4" Super HAD Daylight/Lowlight Color CCD
Lines of resolution	768 (H) x 494 (V)
Minimum illumination	2 lux (@ f/1.6)
FOV	42° (h) to 1.7° (h) plus 12x E-Zoom for 312x total magnification
System specifications	
Camera head size	386 mm x 474 mm; 394 mm x 559 mm swept volume cylinder
Bulkhead box	265 mm(w) x 362 mm(l) x 159(d)
Joystick control unit	156 mm(w) x 222 mm(l) x 68 mm(d)
Weight	45 lb
Pan/Tilt coverage	360° Continuous pan, +/-90° tilt
Automatic Video Tracker including e-stab	Yes - Voyager III only
Temperature indication*	Yes - Voyager III only
Video output	NTSC or PAL
Stabilization	2-Axis, gyro-stabilized
Connector types	BNC
Power requirements	24 VDC
Power consumption	<50 W nominal; 130 W peak, 270 W w/heaters
Environmental	
Operating temperature range	-20°C to 55°C
Storage temperature range	-50°C to 80°C
Automatic window defrost	Standard
Standard package	
	Camera head; Breakout box; Joystick Control Unit; cables; Operator manual
Warranty	
	2 Year
Accessories	
	Voyager II: 3 additional JCU's, up to 4 total Voyager III: unlimited number of JCU's can be connected
Range performance <sup>†</sup>	
Detect man (1.8 m x 0.5 m)	2,400 m
Detect small vessel (2.3 m x 2.3 m)	7,450 m

† = Actual object detection range performance may vary depending on camera set-up, environmental conditions, user experience, and type of display use.  
All specifications are subject to change without notice. Visit [www.flir.com](http://www.flir.com) for the most up-to-date specifications.

\* Important: A number of factors can affect the accuracy of the Voyager's temperature reading such as the distance to the target, humidity, and other atmospheric conditions. While the Firefighter Mode features of your Voyager III system provide an important reference point in understanding temperatures in a target environment, you should never rely on camera data as your primary source of information. The Voyager system should always be used in conjunction with other appropriate tools.





# MU- / MV-Series



**MU-602C**



**MU-602CL**



**MU-602CLW**



**MV-604C**



**MV-604CL**

<b>Main thermal camera</b>					
Detector type	Focal Plane Array (FPA), Cooled MWIR 640 x 512 pixels			Focal Plane Array (FPA), Uncooled LWIR 640 x 480 pixels	
Field of view <sup>1</sup>	Continuous Optical Zoom WFOV 28° x 22.4° to NFOV 2° x 1.6° (PAL)			Continuous Optical Zoom WFOV 24,5° x 18,5° to NFOV 4,1° x 3,1°	
Focus	Focus free at infinity - Manual/Auto				
<b>Visible color camera</b>					
Lines of resolution	550 TV Lines				
Minimum illumination	0.25 Lux				
Field of view	~56° to 2° (H) 28X optical zoom				
<b>Lowlight B/W Camera</b>					
Lines of resolution	N/A	570 TV Lines	570 TV Lines	N/A	570 TV Lines
Minimum illumination		0.0002 Lux (front plate)	0.0002 Lux (front plate)		0.0002 Lux (front plate)
Focus		Manual/AF	Manual/AF		Manual/AF
Field of view		41° to 2.4° (H) 18X optical zoom	41° to 2.4° (H) 18X optical zoom		41° to 2.4° (H) 18X optical zoom
<b>Thermal LW Camera</b>					
Detector type	N/A		Focal Plane Array (FPA), uncooled microbolometer 640 x 480 pixels	N/A	
Field of view <sup>1</sup>	N/A		32° (athermalized)	N/A	
Digital zoom	N/A		Continuous up to 4X	N/A	
<b>Video tracking (all cameras)</b>					
Tracking modes	Target (Correlation, Centroid) and Scene Electronic Stabilization				
<b>Pan-Tilt</b>					
Az. Range; Az. Velocity	Continuous 360° panning, proportional speed to 60°/s 60°/s on home command				
El. Range; El. Velocity	Normal Installation (Ball up): +/-90°, proportional speed to 35°/s Inverted Installation (Ball down): +/-90°, proportional speed to 35°/s				
LOS	Gyrostabilization				
<b>Environmental specification</b>					
Operating temperature range	-32°C to +55°C per IEC 60945				
Storage temperature range	-40°C to +70°C per IEC 60945				
Automatic window defrost	Standard				
Sand/dust	MIL-STD-810				
Automatic window de-icing	Standard				
Water ingress rating	IP66				
Shock	15g vertical, 9g horizontal				
Vibration, lightning Protection, salt mist, EMI	IEC 60945				
<b>System Specifications</b>					
Camera size	510mm wide x 454mm tall (nominal)				
Camera weight	27kg				
Video format	PAL or NTSC				
<b>Interfaces</b>					
Camera head input power	12 VDC to 24 VDC (-10%/+30% per IEC 60945)				
Consumption	100 W nominal; 200 W max			75 W nominal; 200 W max	
Camera head output power (to JCU)	Power over Ethernet (PoE) per IEEE 802.3af 48V mode B PoE, RJ 45 connector				
Video	Analog BNC x2, Digital Video via Ethernet				
Communication	Nexus via Ethernet				
<b>Standard package contents</b>					
	Camera Head with 18-inch Pigtailed for Power, Analog Video x2, and Ethernet; Joystick Control Unit; Operator Manual, Low Smoke/Zero Halogen Ethernet Cable				
<b>Warranty</b>					
	FLIR guarantees the product for a period of 12 months from shipment date, or 3000 operating hours, whichever is sooner.			FLIR guarantees the product for a period of 24 months from shipment date	

# 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 camera are vital pieces of equipment. The safety and security of assets and people depends on it. To keep them running at all times, we operate a worldwide service network with subsidiaries in China, France, Germany, Hong Kong, Italy, Sweden, United Arab Emirates, the United Kingdom and the USA.

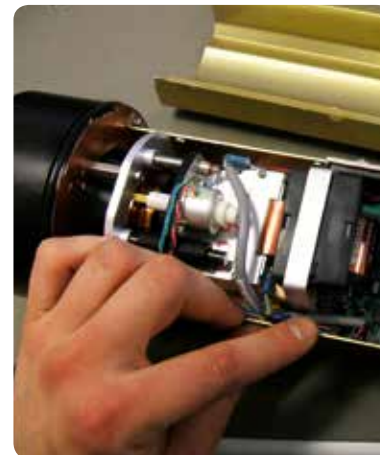
If there should be a problem with one of our camera systems, these local service centers have all the know-how and equipment to solve it within the shortest possible time. Local camera service gives you the assurance that your system will be ready for use again within an extremely short timeframe.

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. Even if things change rapidly in the world of thermal imaging, we guarantee to support each camera with service and spare parts for a minimum of five years after final sale.

Our service personnel regularly follow 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 IR camera is always available for use.

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





# FLIR Infrared Training Center (ITC)

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 for maritime professionals.

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 maritime applications. The ITC offers a portfolio of courses that presents the right mix of theoretical and practical content to help professionals quickly apply infrared technology to real life security 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 maritime projects. 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



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