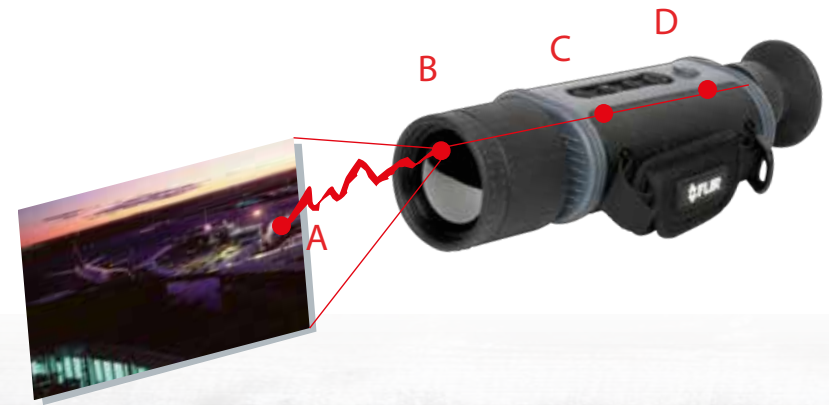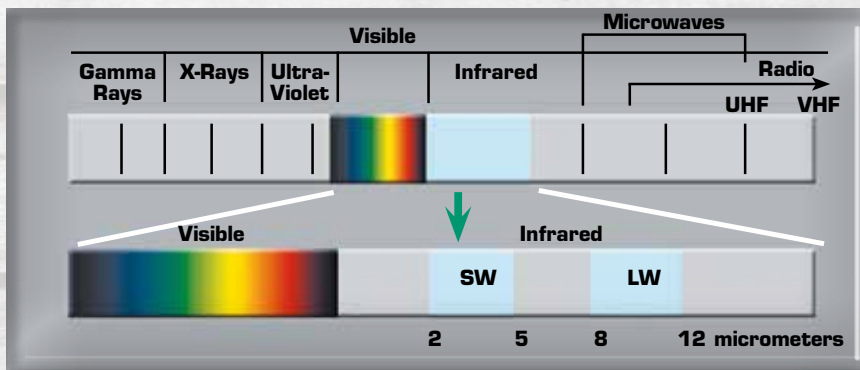# Infrared:
more than meets the eye

Infrared -
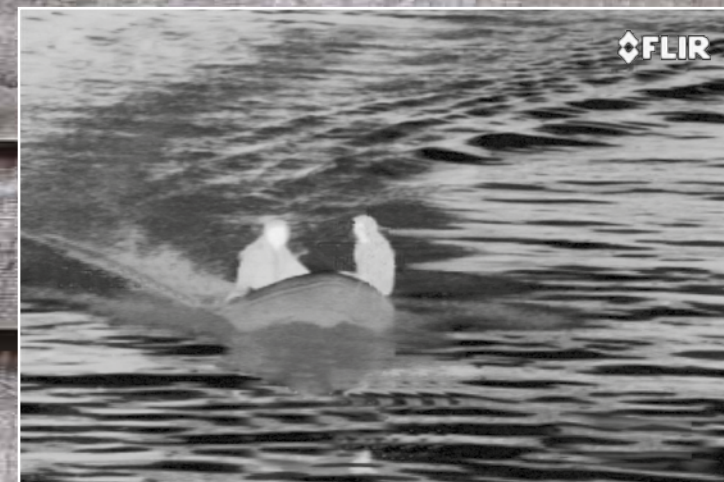## part of the electromagnetic spectrum

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 thermal imaging 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 that can be viewed in the viewfinder .

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, 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

Anti-piracy

Being able to spot small vessels at long distances, thermal imaging cameras will make you aware of approaching vessels so that you have time to react.

Night time navigation

Thermal imaging cameras can help captains to navigate safely at night. Other vessels, outcroppings of land and other obscurants become clearly visible on a thermal image.

Finding people in the water

Coastguard and rescue workers use thermal imaging to find people floating in the water before hypothermia sets in.

Shipboard security

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.

Ice detection

Even ice gives off heat, and FLIR technology detects the temperature difference between the ice and the seawater. Where radar and spotlights fall short, thermal imaging increases vessel safety in arctic waters, making passage safer and more cost-effective.

Oil spill detection

Thermal imaging can detect floating oil even when the naked eye cannot. FLIR thermal imaging systems can help commercial mariners avoid oil spills or limit their impact, and can assist response crews with clean up around the clock.

FLIR HM-Series

the power of thermal imaging in the palm of your hand

The HM-Series are portable shock-resistant thermal imaging cameras. They produce a crisp image in the darkest of nights. With the HM-Series captains of all types of vessels will be able to clearly see at night.

Being a monocular the HM-Series are extremely compact and lightweight. They can easily be stored in a pouch or hung on a belt. Another advantage of a monocular is that you always have one hand free.

InstAlert™

InstAlert™ highlights the hottest part in the scene red, making it easy to spot people in the water.

Crisp thermal images
The HM-Series produce thermal images of 320 x 240 pixels on which the smallest of details can be seen. Users that do not need this high image quality can choose for a 240 x 180 pixels version.

Advanced internal camera software delivers a crisp image without the need for user adjustments.

Digital zoom
Digital zoom allows you to have an even closer look at the situation when necessary.

Extremely portable and rugged
Weighing 660 grams, batteries included, the FLIR HM-Series are extremely compact and extremely light systems. They are ideal for go-anywhere operations, in all circumstances. They are IP67 rated.

Easy-to-operate
Ergonomic and easy-to-use, the HM-Series are fully controlled with just 5 buttons on top of the unit.

Image storage
HM-224b allows the user to freeze images. HM-224b Pro, HM-324b XP+ and HM-307b XP+ allows the user to store thermal images in JPEG and video in AVI format on a removable SDHC-card.

Hot shoe
The HM-Series comes standard with a "hot shoe" which can easily be mounted on the camera. The "hot shoe" has a power-in and video-out connection. This means that the HM-Series can be fully operational on a tripod while charging the batteries.

Long battery life
The HM-Series have an operating time of over 5 hours on a single charge. They work on 4 rechargeable AA NiMH batteries. The HM-Series can also run on standard commercial off the shelf non-rechargeable Alkaline AA-batteries.

Extender lens
The HM-224b and HM-324b versions of the HM-Series can be equipped with a 2X extender lens. It offers a 12° field of view for longer range performance.

320 x 240 pixels

	HM-324b XP+	HM-324b with 2x extender	HM-307b XP+
Lens	19 mm	19 mm	65 mm
Field of view	24°	12°	7°
Detect man-sized target at:	440 m	880 m	1.55 km
Zoom	2x	2x	2x
SD-card	Still image capture and video capture to SDHC-card		

240 x 180 pixels

	HM-224b	HM-224b with 2x extender	HM-224b Pro
Lens	19 mm	19 mm	19mm
Field of view	24°	12°	24°
Detect man-sized target at:	320 m	660 m	320 m
Zoom	2x	2x	2x
SD-card	N/A	N/A	Image capture to SDHC-card

Shuttered eye-piece

The HM-Series have a bellows eye cup. It prevents light from coming out of the viewfinder, helping the operator to stay covert.
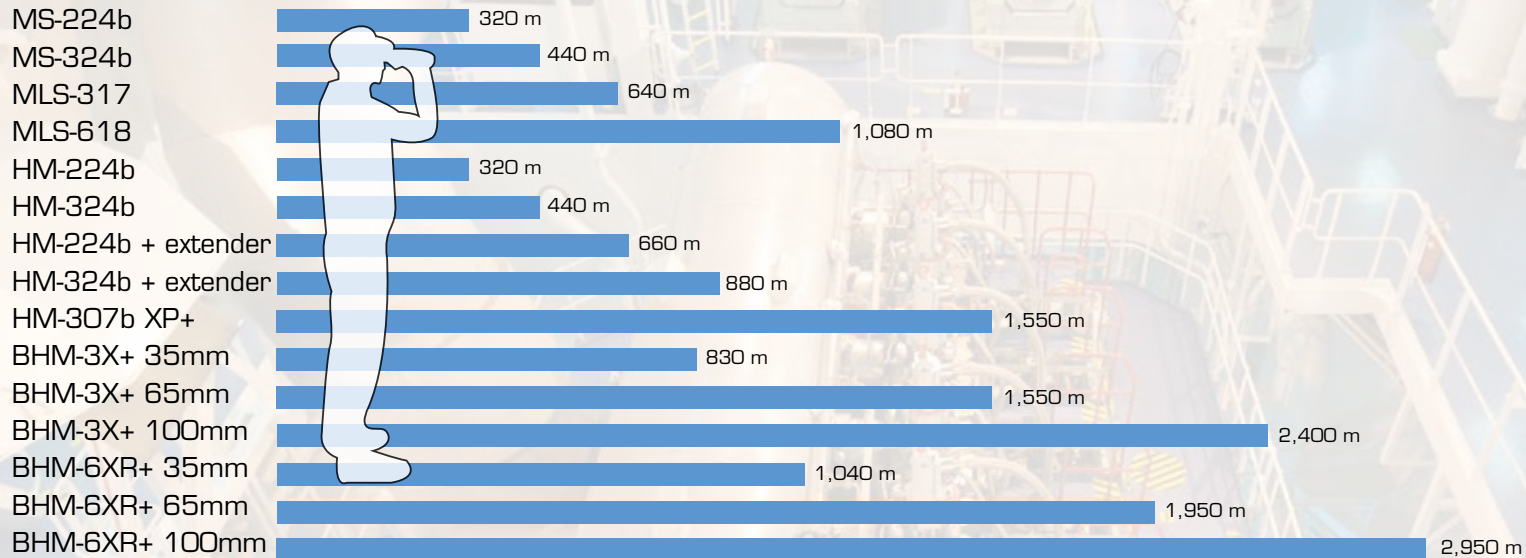
Lens protection

A lens cap, able to open 180°, assures that the lens is protected when the HM-Series are out in the field but not in use. It does not hinder the operator when the HM-Series are in operation.
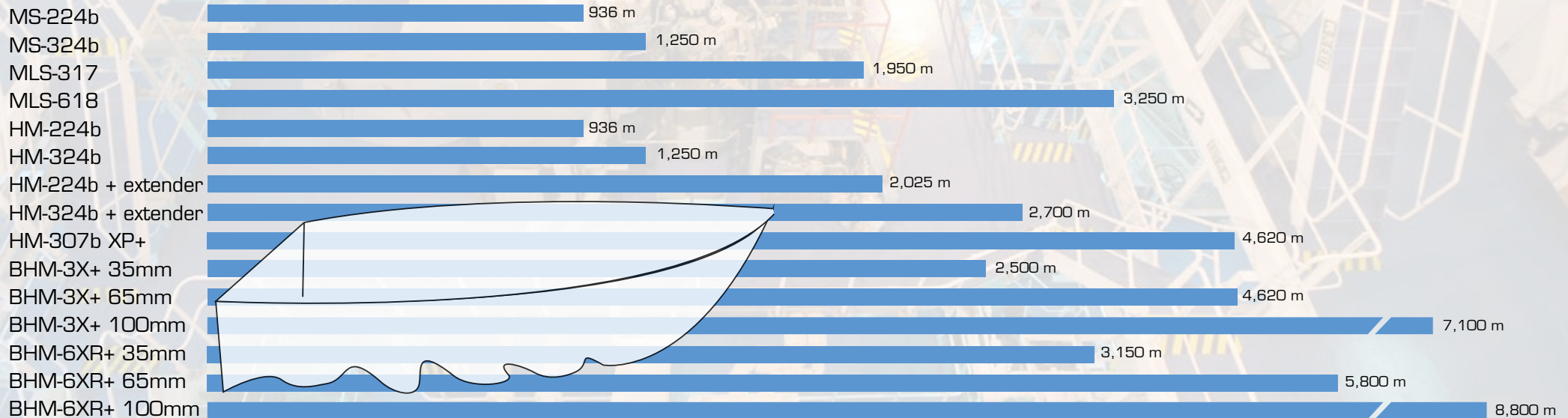
Power button

Image Capture/Video Record Button

Zoom/Freeze frame button

Palette button

Brightness Button

SD-card slot

Hand strap

Rugged design

Thermal image

Your vision

Range performances

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

Model	Range
MS-224b	320 m
MS-324b	440 m
MLS-317	640 m
MLS-618	1,080 m
HM-224b	320 m
HM-324b	440 m
HM-224b + extender	660 m
HM-324b + extender	880 m
HM-307b XP+	1,550 m
BHM-3X+ 35mm	830 m
BHM-3X+ 65mm	1,550 m
BHM-3X+ 100mm	2,400 m
BHM-6XR+ 35mm	1,040 m
BHM-6XR+ 65mm	1,950 m
BHM-6XR+ 100mm	2,950 m

Detect small object (2.3 m x 2.3 m)

Model	Range
MS-224b	936 m
MS-324b	1,250 m
MLS-317	1,950 m
MLS-618	3,250 m
HM-224b	936 m
HM-324b	1,250 m
HM-224b + extender	2,025 m
HM-324b + extender	2,700 m
HM-307b XP+	4,620 m
BHM-3X+ 35mm	2,500 m
BHM-3X+ 65mm	4,620 m
BHM-3X+ 100mm	7,100 m
BHM-6XR+ 35mm	3,150 m
BHM-6XR+ 65mm	5,800 m
BHM-6XR+ 100mm	8,800 m

Actual object detection range performance may vary depending on environmental conditions.
All specifications are subject to change without notice. Visit www.flir.com for the most up-to-date specifications.

HM-Series

Model specific specifications

IMAGING PERFORMANCE	HM-224b	HM-224b PRO	HM-324b XP+	HM-307b XP+
Field of view	24° (H) × 18°(V) / 12°(H) × 9° (V) with 2X extender	24° (H) × 18°(V) / 12°(H) × 9° (V) with 2X extender	24° (H) × 18°(V) / 12°(H) × 9° (V) with 2X extender	7° (H) × 5° (V)
Image resolution	240 x 180 pixels	240 x 180 pixels	320 x 240 pixels	320 x 240 pixels
Focus	Fixed - with 2x extender: manual	Fixed - with 2x extender: manual	Fixed - with 2x extender: manual	Manual
Zoom	NA	2X	2X	2X
IMAGE PRESENTATION				
Freeze frame	Yes	NA	NA	NA
Image polarity	White hot / black hot / InstAlert™; selectable	White hot / black hot / InstAlert™; selectable	White hot / black hot / InstAlert™; selectable	White hot / black hot / InstAlert™; selectable
IMAGE STORAGE				
Format	NA	Standard JPEG - SD-Card	Standard JPEG - SD-Card	Standard JPEG - SD-Card
Storage functions	NA	Single Image + video capture	Single Image + video capture	Single Image + video capture
VIDEO STORAGE				
Format	NA	AVI - SD-card	AVI - SD-card	AVI - SD-card
Storage functions	NA	9 Hz, Full frame up to limit of SD-card, approx. 8 seconds / MB	9 Hz, Full frame up to limit of SD-card, approx. 8 seconds / MB	9 Hz, Full frame up to limit of SD-card, approx. 8 seconds / MB
INTERFACES				
SD Cards	1 slot	1 slot	1 slot	1 slot
USB2	–	Image transfer to PC	Image transfer to PC	Image transfer to PC
ENVIRONMENTAL SPECIFICATIONS				
Operating temp.	0°C to +50°C	0°C to +50°C	-20°C to +50°C	-20°C to +50°C
Storage temp.	-20°C to +70°C	-20°C to +70°C	-40°C to +75°C	-40°C to +75°C
PHYSICAL CHARACTERISTICS				
Weight (incl. lens)	653 g with batteries 1000 g with 2X extender	653 g with batteries 1000 g with 2X extender	653 g with batteries 1000 g with 2X extender	Approx. 1000 g with batteries
Size (L × W × H)	238 x 84.5 x 66.5 mm without extender 265 x 85 x 75 mm with 2x extender	238 x 84.5 x 66.5 mm without extender 265 x 85 x 75 mm with 2x extender	238 x 84.5 x 66.5 mm without extender 265 x 85 x 75 mm with 2x extender	278.4 x 84.5 x 68.3 mm
Shipping size (camera + packaging)	450 x 280 x 180 mm	450 x 280 x 180 mm	450 x 280 x 180 mm	450 x 280 x 180 mm
Shipping weight (camera + packaging)	2.8 kg	2.8 kg	2.8 kg	2.8 kg
Shipping weight 2x extender (camera + packaging)	The 2x extender is being shipped in a separate box of approx. 1 kg	The 2x extender is being shipped in a separate box of approx. 1 kg	The 2x extender is being shipped in a separate box of approx. 1 kg	NA
OPTIONALLY AVAILABLE	Extender lens (not for HM-307 XP+), rigid camera case, soft carrying bag			

General specifications

IMAGING PERFORMANCE	
Detector type	Uncooled Focal plane array Vanadium Oxide (VOx) microbolometer
Spectral range	7.5 to 13.5 μm
Thermal sensitivity	<50 mK at f/1.0 at +25°C
Image frequency	8.3 Hz Pal / 7.5 Hz
Image processing	Digital Detail Enhancement (DDE)
IMAGE PRESENTATION	
Viewfinder	LCD screen
Video output	NTSC or PAL composite video; RCA jack
On-screen symbology	Standard
POWER	
Requirements	4 AA Batteries; rechargeable NiMH (included), non-rechargeable Alkaline
Battery life	> 5 hours on NiMH batteries - 120 hours in stand-by with NiMH batteries
ENVIRONMENTAL SPECIFICATIONS	
Humidity non condensing	5% to 95%
Encapsulation	IP67
Drop	Operational after 1 m drop onto concrete
STANDARD PACKAGE	
	Camera, Hot Shoe, 4 Rechargeable AA Batteries, AC Power Adapter/Charger, Neck Lanyard, Operator's Manual, USB Cable, Video Output Cable, SD Card.

3 YEAR FULL PRODUCT WARRANTY*

10 YEAR DETECTOR WARRANTY*

* After product registration on www.flir.com

Accessories

MS / MLS-series

Part number	Description
4126884	Camera carrying pouch, black
4127499	Camera case, rigid, black
4127305	Floating lanyard, orange
4132304	Belt holster, black

BHM-series

Part number	Description
322-0181-12	Lens, QD35
322-0195-12	Lens, QD65
322-0196-12	Lens, QD100

HM-series

Part number	Description
4116650	Camera case, rigid, yellow for HM-Series
4115397	Camera case, soft HM-Series
322-0152-00	2x Extender for HM224 and HM324
433-0000-00-50	Software upgrade HM-224b> HM-224b Pro