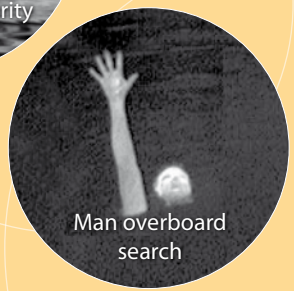
M-Series



Premium Multi-Sensor systems combining a thermal imaging and a low light camera for maritime applications

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Premium Multi-Sensor systems for maritime applications

The M-Series combine a thermal imaging camera with a low light camera. They provide crisp, clear thermal imagery in total darkness and light fog or smoke. Packaged in a small, ultra-compact gimbal they are designed for the most demanding maritime applications. The FLIR M-Series are perfect tools for night-time navigation, shipboard security, man overboard situations, anti-piracy and many other applications. The FLIR M-Series are the standard for maritime thermal imaging systems against which all others are compared.

Thermal imaging camera and low light camera

The M-Series are equipped with both a thermal imaging camera and a low light camera.

The thermal imaging camera is the perfect tool for navigating on the darkest of nights, needing no light whatsoever to produce a crisp image.

The low light camera can be used when at least some light like moonlight or environmental light is present. It provides enhanced navigational abilities during twilight hours and for docking inside a marina. Anywhere you can see a little, the low light camera will help you to see more.

Choice of systems

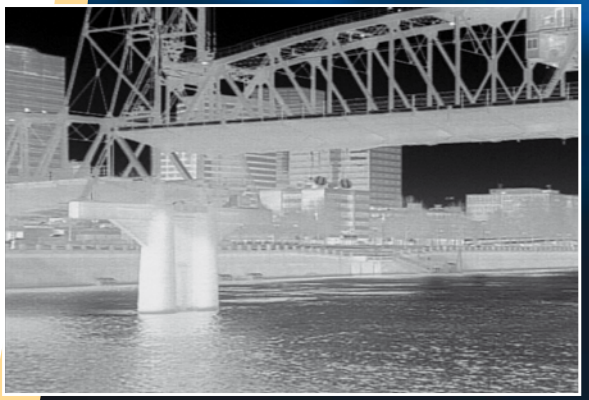
The M-Series are available in 2 different versions:

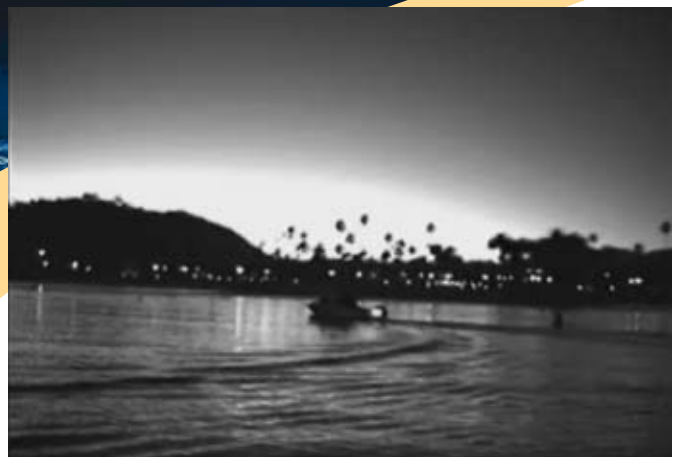
- M-320L: this version is equipped with a Vanadium Oxide microbolometer detector that produces crisp thermal images of 320 x 240 pixels.
- M-626L: this version is equipped with a Vanadium Oxide microbolometer detector that produces images of 640 x 480 pixels. This is four times the resolution of the M-320L. It produces the sharpest thermal images on which the smallest of details can be seen.

Both systems are also equipped with a low light camera.

Your Vision

Thermal Image





The low light camera incorporated in the FLIR Systems M-Series produces clear images, even when only a small amount of light is available.

Designed for use in harsh maritime environments

M-Series cameras are extremely rugged systems. The camera's vital core is rated IP66 and is well protected against humidity and water. The M-Series operate between -25°C and +55°C. The M-Series cameras have a built-in heater to defrost their protective window. This ensures a clear lens and good quality infrared images displayed on your monitor even in extremely cold environments.

Easy-to-use Pan/Tilt system

The M-Series come standard with an intuitive joystick control which allows the captain to see 360° horizontal and/or +/-90° vertically. This offers excellent situational awareness.

Lightweight

Extremely lightweight, both versions of the M-Series can be installed at any position on board. They can be mounted at an optimal observation point providing maximum field of view.

Remote control panel

The M-Series come standard with a remote Joystick Control Unit (JCU) to operate the Pan/Tilt. Additional JCUs, which can be used to control the M-Series from different locations on board of a vessel, are optionally available.

The JCU is the primary method of control for the M-Series camera. It can be used to move the camera (pan or tilt), electronically zoom the camera in and out, switch between the thermal imaging and low light camera, adjust the image quality, and access the on-screen menus.

The M-Series control panel is fully sealed for use in a maritime environment. Just like the camera itself it meets IP66 standards.

The control knob provides precise proportional speed control. Use it to have the M-Series look in the exact direction you want. The JCU Puck functions like a joystick - it can be moved left or right, or fore and aft, and it can be rotated in either direction. It can also be pressed down (like a mouse click) or pulled up. It is used to move the Pan/Tilt position of the camera and to navigate through the on-screen menus.

<u>The following functions are directly accessible through the control panel:</u>

- **POWER**: switches the M-Series from operation to low power standby mode. It can also be used to control the brightness of the control panel.

- **MENU**: the menu button is used to turn on or off the on-screen menu. When the on-screen menu is displayed, the joystick puck can be used to navigate through the menus and select various menu entries.

- **USER**: user-programmable key for commonly used functions such as digital zoom, switching image polarity, switching between thermal and low light image, ...

- **HOME**: the Home position is a programmable preset position - usually straight ahead and level with the horizon - which captains can use as a reference. A press on the "home" button moves the M-Series to the operator predefined position. When held down for at least 3 seconds, it sets the current position as the new "home" position.

- **SCENE**: cycles through "Night Running", "Day Running", "Man Overboard", or "Night Docking" settings to change the brightness and contrast of the thermal image. Varying conditions make one setting more appropriate than another for a specific task.

- **COLOR**: select "black hot", "white hot" or "red hot" video image mode. Hot object appears black, white or red respectively depending on the selected mode. Other color modes are "Fusion" and "Rainbow".

Video screen icons

Small icons, conveniently placed on the thermal image provide the captain a lot of useful information about the settings of the M-Series. The following icons are available:

Position indication
The azimuth indication shows the azimuth (or direction) of the camera relative to the vessel. The shaded triangle shows the direction of view of the camera.

JCU icon
A single 'JCU' icon indicates only one JCU is currently connected to the camera unit. If more than one JCU is discovered, the multiple JCU icon will appear on screen.

PC icon
The 'PC' icon indicates there is a PC on the network that has a connection with the camera.

Scene icons
Pressing the 'scene' button toggles between four presets Automatic Gain Control (AGC) settings.

- Night running
- Night docking
- Day running
- Man overboard

Rearview icon
The 'Rearview' setting flips the video image horizontally left to right. The image on the display provides the same perspective as a rearview mirror in a vehicle - objects off the stern on the starboard side of the vessel are displayed on the right hand side of the video.

Home icon
The 'Home' icon appears momentarily to indicate the camera is in the 'Home' position. The icon flashes when a new 'Home' position is set.

Thanks to small icons conveniently placed at the bottom of the thermal image, the captain can see immediately in which direction the M-Series are looking, whether it is in the "Home" position or not. Also other settings of the camera can easily be read from these icons.

Zoom (2X or 4X)
Indicates '2X' or '4X' digital zoom

Image frozen
The 'Image Frozen' icon appears when the puck has been double clicked (pressed two times in quick succession) and the video has been momentarily stopped.

Electronic zoom

To have a closer look at the situation the M-Series are equipped with an electronic zoom. Just push the control knob of the Joystick Control Unit down for 3 seconds to turn on 2X electronic zoom on the thermal image. Push and hold for 3 seconds for 4X zoom (M-626L model only). Pull up on the control knob to return to 2X zoom and pull again to return to no zoom.

Image freezing

The M-Series allow you to momentarily pause the video and freeze the current image on the screen. This can be useful when you want to have a more detailed look at certain objects on your screen.

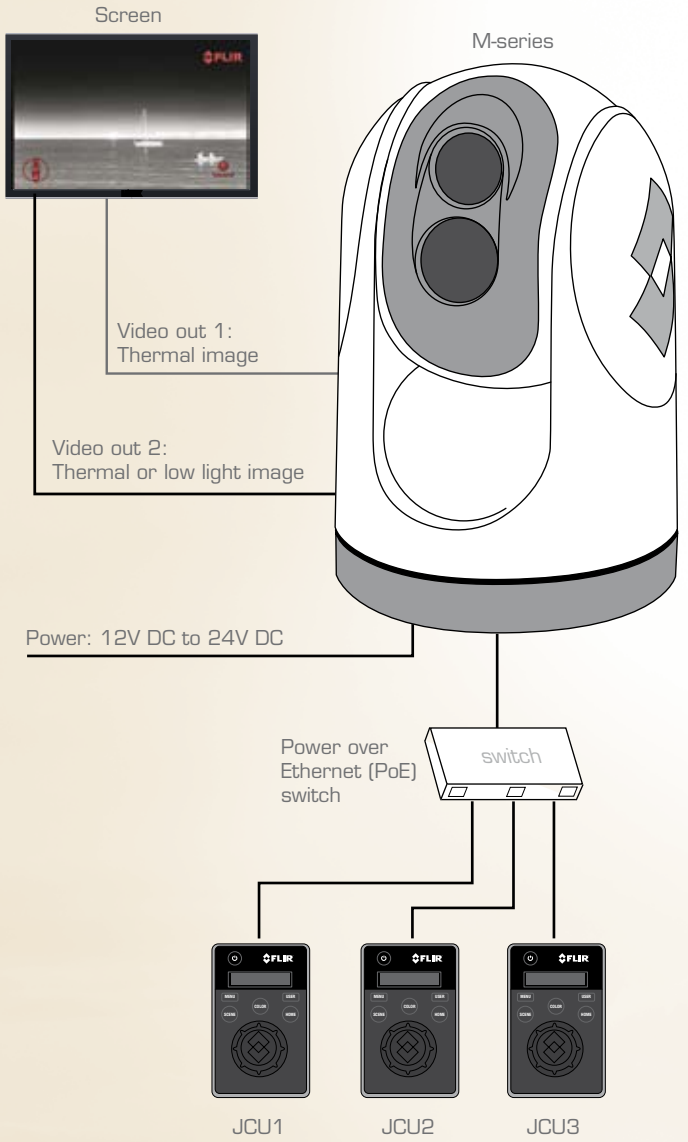
Parking position

When not in use, the M-Series can be set to a "parking position". This assures that the valuable lenses of the thermal imaging and the low light camera are protected.

Different, easy installation options

The M-Series can be mounted ball-up or ball-down. A menu setting allows the user to turn the direction of the image on the screen. The M-Series are extremely easy to integrate on board of a yacht. The images from the M-Series' 320 x 240 pixel or 640 x 480 pixel detector can be displayed on virtually any existing multifunction (i.e. chart plotter) display that accepts composite video.

The M-Series cameras provide two video outputs. One output is for the video signal from the thermal camera only. The other output is for video from either the thermal camera or the lowlight camera; it is switchable from the JCU. The video from the M-Series camera can therefore be displayed on one or two video displays.



M-Series Technical specifications

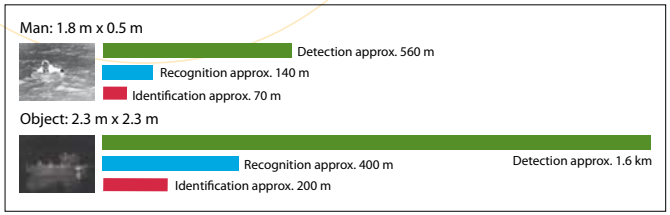
	M-626L	M-320L
IMAGING PERFORMANCE		
Thermal imaging camera		
Detector type	Focal plane array, uncooled Vanadium Oxide (VOx) Microbolometer	
Number of pixels	640 x 480	320 x 240
Field of view	26°(H) x 20° (V) with 35 mm lens	20°(H) x 15° (V) with 35 mm lens
Image frequency	8.3 Hz PAL / 7.5 Hz NTSC	*25 Hz PAL / 30 Hz NTSC or 8.3 Hz PAL / 7.5 Hz NTSC
Electronic zoom	2X, 4X	2X
Image processing	Digital Detail Enhancement (DDE)	
Thermal sensitivity	<50 mK at f/1.0 at +25°C	
Spectral range	7.5 to 13.5 µm	
Focus	Fixed	
Low light camera		
Detector type	1/2" interline transfer CCD	
Lines of resolution	768 (H) x 494 (V)	
Minimum Illumination	100 micro-lux @ f/1.4	
PAN / TILT		
Azimut range	360° continuous	
Elevation range	+/- 90°	
IMAGE PRESENTATION		
Video output	PAL Thermal and Lowlight or NTSC Thermal and Lowlight	
Connector types	BNC with BNC-to-RCA adapter included for video out	
POWER		
Requirements	12 V DC to 24 V DC (-10% / +30%)	
Consumption	25 W Nominal; 50 W Max (at -25°C with heaters operating); 7 W in standby mode	
ENVIRONMENTAL SPECIFICATIONS		
Operating temperature range	-25°C to +55°C	
Storage temperature range	-40°C to +85°C	
Sand/ Dust	Mil-Std-810E	
Encapsulation	IP66	
Shock	15 g vertical; 9 g horizontal	
Vibration	IEC 60945; Mil-Std-810E	
Salt / Mist	IEC60945	
Wind	100 knot	
EMI	IEC 60945	
Automatic window defrost	Standard	
Window de-icing	Standard	
Lightning protection	Standard	
PHYSICAL CHARACTERISTICS		
Camera size (L x W x H)	17.8 cm diameter, 27.9 cm high	
Camera weight	4.1 kg	
Shipping size (camera + packaging) (L x W x H)	39 cm x 39 cm x 40 cm	
Shipping weight (camera + packaging)	7.8 kg	
STANDARD PACKAGE	M-626L or M-320L Multi-Sensor System with 46 cm pigtails for power, analog video and Ethernet. Joystick control unit, Operator manual on CD, Mounting hardware, 7m Ethernet cable, Quick Start Guide	
OPTIONALLY AVAILABLE	Dual Station JCU Low smoke, zero halogen ethernet cables Top down mounting riser	

** 30 Hz NTSC or 25 Hz PAL available. Subject to approval of the US Department of Commerce for use outside the USA.*

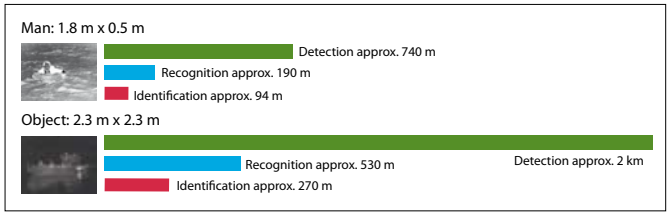
2 YEAR WARRANTY

The M-Series are backed up by 2 years of full warranty.

M-320L: range performance 35 mm lens



M-626L: range performance 35 mm lens



Actual range may vary depending on camera set-up, environmental conditions, user experience and type of monitor or display used.

Assumptions:
50 % probability of achieving objective at specified distance given 2°C temperature difference and 0.85 / km atmospheric attenuation factor.

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