

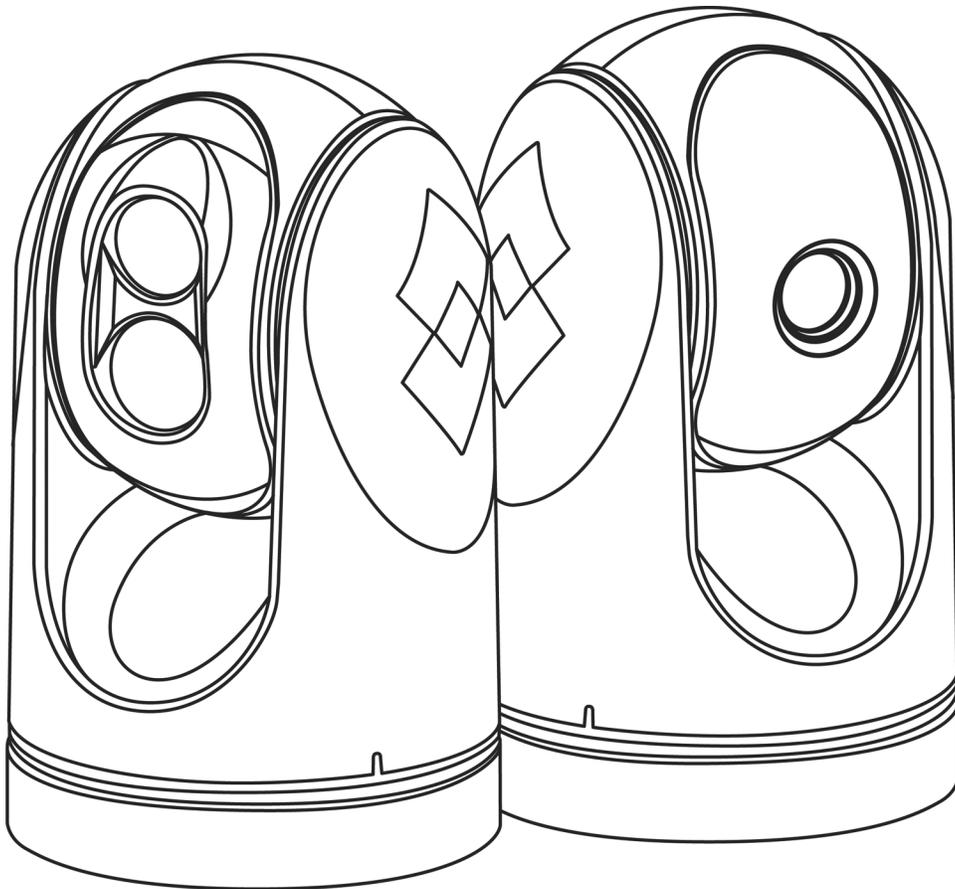


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# Operator's Manual

## M-Series

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This product is covered by one or more of US Patent Nos: 7470904; 7034301; 6812465; 7470902; 6929410 and other patents pending or design patents pending.

The M-Series thermal imaging system is controlled by US export laws. There are special versions of this system that are approved for international distribution and travel. Please contact FLIR Systems, Inc. if you have any questions.

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For additional information visit [www.flir.com](http://www.flir.com) or write to FLIR Systems, Inc.

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### Document History

Version	Date	Comment
100	May 2017	Initial release

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# M-Series Overview

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This manual describes the operation of the M-Series camera. If you need help or have additional questions, please call to speak with our support experts; see the phone numbers listed on the back cover of this manual.



This manual includes information about the following topics:

- System description
- Using the joystick control unit (JCU)
- System startup and shutdown
- Configuring your M-Series camera
- Setting up the interface between your camera and a PC
- Helpful reference information such as acronyms, parts lists, and a table of icons, and a comparison of model features

## Additional References

Your M-Series camera comes with a complete documentation set on a USB flash drive that includes this manual as well as others. All documents are in PDF format and can be viewed with Adobe Acrobat Reader:

- *M-Series Installation Guide* (FLIR Doc. # 432-0003-60-12) contains information about how to install the camera.
- *M-Series Quick Start Guide* (FLIR Doc. # 432-0003-60-11) is a double-sided card that shows the functions executed by the various JCU buttons.
- *M-Series Interface Control Document (ICD)* (FLIR Doc. # 432-0003-XX-YY) is a set of CAD drawings with detailed dimensions, wiring schemes, and mounting dimensions.

You may also refer to the Resources Web page for up-to-date documentation:

<http://www.flir.com/cvs/americas/en/maritime/resources/>

## Documentation Conventions

For safety, and to achieve the highest levels of performance from the M-Series system, always follow the warnings and cautions in this manual when handling and operating the M-Series camera system.

### Warning!

Warning notices are used to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury or death exist with this equipment, or may be associated with its use.

### Caution!

Caution notices are used where equipment might be damaged if care is not taken or an operation might have an unexpected outcome.

**Note:** Notes call attention to information that is especially significant to understanding and operating the equipment.

## Warnings and Cautions

### Warning!

Do not use the M-Series imaging system as the primary navigation system. Use it in conjunction with other navigation aids and a primary manual navigation system.

Use of insufficient wire gauge can result in fire.

The M-Series system is not designed to operate in an enclosed environment in the presence of flammable gases. Failure to follow this warning may result in explosion or fire.

The M-Series camera body is a remotely and automatically controlled device. Ensure camera motion has been disabled before cleaning surfaces that can cause pinch hazards.

### Caution!

Do not open the M-Series camera unit for any reason. Disassembly of the camera (including removal of the cover) can cause permanent damage and will void the warranty.

Be careful not to leave fingerprints on the M-Series camera optics.

The M-Series requires a power supply of 12 Vdc to 24 Vdc nominal, 50 watt maximum. Absolute voltage range: 10 Vdc to 32 Vdc. Operating the camera outside of the specified input voltage range or the specified operating temperature range [-25 °C to +55 °C (-13 °F to +131 °F) per IEC 60945] can cause permanent damage.

Ensure power is removed before accessing power wires during installation or removal of system components. DO NOT HOT SWAP components (such as the JCU). Damage to equipment or injury to personnel may result.

Ensure the camera is installed in a location that will allow it to be accessed for regular periodic cleaning (fresh water rinse), inspection of mounting point integrity and mechanical soundness, and preventative maintenance.

## System Description

M-Series is a maritime thermal imaging system for use on most types of vessels. The system is available in two configurations:

- The single payload models have a single thermal imaging camera.
- The dual payload models are equipped with both a thermal imaging camera and a color visible-light (DLTV) camera with low-light capability.



**Thermal Image at Night**

The infrared (IR) thermal camera provides night-time imagery, even in total darkness, based on temperature differences. The thermal camera provides a clear video image even under completely dark conditions because it is sensitive to thermal infrared energy. The infrared camera supports continuous zoom to 4X.

On dual payload models, the integrated DLTV camera options provide black and white imagery in low-light conditions or color imagery. The DLTV cameras provide enhanced navigational abilities in a variety of conditions, for example, during twilight hours or when operating along intercoastal waterways and near harbor entrances.

All M-Series models include a mechanical stabilization feature that improves image stability. The stabilization feature compensates for the motion of the vessel and improves the utility of the camera video output when operating in rough seas or swell conditions.

For a complete list of models and a comparison of key features, see [Feature Comparison of M-Series Models, pg. 53](#). The differences in camera operation are noted in relevant locations in the manual.

The M-Series consists of two main components:

- The gimbal assembly, also known as the pan/tilt camera unit. A gimbal is a pivoted support that allows the rotation of an object such as a ship's compass about a single axis.
- The joystick control unit (JCU).

The M-Series gimbal and JCU are network devices. In some installations, additional cameras and JCUs will also be used, and networking equipment such as Power over Ethernet (PoE) switches may be used to interconnect these components.

### M-Series Gimbal Assembly

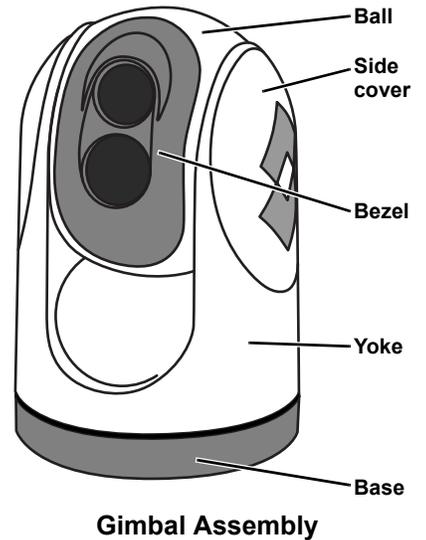
The gimbal assembly has a pan/tilt mechanism that allows the camera to rotate continuously 360° in azimuth, and to tilt plus or minus 90° in elevation. The M-Series imaging sensors are contained in the ball of the gimbal assembly.

The thermal infrared camera uses an uncooled vanadium oxide (VOx) detector sensitive to long-wave infrared (LWIR) thermal energy.

#### Video Options

The M-Series gimbal assembly has either one or two video cables:

- The cable labeled IR is for the composite—also known as analog—video signal from the thermal (infrared) camera. This is the only cable on single payload cameras.
- On dual payload models, the cable labeled VIS/IR is for video from either the thermal camera or the visible camera. Use the JCU to select the output. The cable labeled IR is also available for viewing only the IR video.

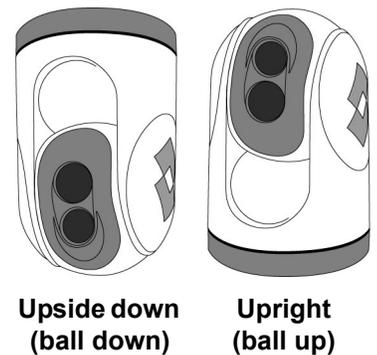


#### Ball-Up and Ball-Down Installation

In most installations, the M-Series is mounted upright on top of a mounting surface, with the pan/tilt base below the camera; this is known as the ball-up orientation. Optionally, the unit can be hung upside down or ball down (see page 27 for details on configuring this setting).

#### Joystick Control Unit (JCU)

The JCU is your primary method of controlling the camera. The JCU is used to power up the camera or put it in a standby state, to operate the pan (rotation) and tilt movement of the camera, to zoom the IR camera (and on dual payload models, the color visible camera), and to configure the camera settings by means of on-screen menus. The JCU connects to the camera using an Ethernet network connection, and that same connection provides power to the JCU.



The JCU has various buttons, an LCD display, and a joystick puck that is used to control the pan/tilt movement of the camera and to navigate through the on-screen display (OSD) menus. The puck can be rotated in either direction, moved left and right or forward and back, and pushed in and pulled up.

The M-Series uses OSD symbols to indicate the camera position (azimuth) and system settings that are enabled. These symbols are introduced in [Video Display, pg. 11](#) and are further explained throughout this manual in the discussion of related functions.

### Multiple Cameras, JCUs, and Other Devices

The system may include additional cameras or JCUs, video equipment, or network equipment. More than one JCU can be used to control the camera, and more than one display can be used to view the video. Also a single JCU can be used to control more than one camera and optionally you can also use a PC to control the camera.

Typically, the JCU and the video monitor are mounted in close physical proximity, as a pair, so you can immediately see the changes on the video screen when you use the JCU to change the camera position (pan or tilt).

In a simple installation, the JCU can be directly connected to the camera with the supplied double-shielded Ethernet cable. In this case, the JCU draws its power from the camera. In more complex installations, the camera and JCU can be interconnected using a network switch. If the network switch does not have Power over Ethernet (PoE) capability, a PoE injector can be used to provide power to the JCU. FLIR PoE injectors are available from your FLIR authorized dealer or integrator.

Contact FLIR for more information regarding available accessories including JCUs, PoE equipment, video distribution amplifiers, cables, connectors, mounting hardware, and so on.



**Joystick Control Unit**

## Video Display

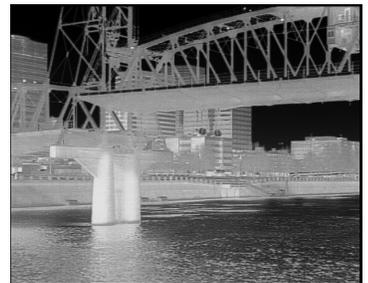
The M-Series thermal imager does not produce images from visible light like an ordinary camera does or like the human eye does. Rather, it uses energy contained in the infrared band to produce images by sensing subtle differences in temperature and generating images based on those differences.

### Thermal Imaging

The thermal imaging camera relies on the fact that all objects, even very cold objects like ice, emit thermal energy in the portion of the infrared spectrum that this camera can see, the long wave infrared (LWIR). Therefore, unlike an illuminated infrared camera, the thermal imaging camera does not need an additional active illumination source and images are based on directly radiated rather than reflected energy.

When the thermal camera is in white-hot mode, the warm objects in the scene display as white, or lighter shades of gray, and cold objects display as black or darker shades of gray. When you switch the video polarity, this is reversed.

Hot objects such as parts on an outboard motor that appear white (or black, or red depending on the video image mode selected), while the puddles of water and other cold objects appear dark (or cool). The camera automatically optimizes the image to provide you with the best contrast in most conditions.



FLIR Systems, Inc. offers a comprehensive selection of training courses to help you to get the best performance and value from your thermal imaging camera. You can find out more at the FLIR training Web page:

<http://www.flir.com/training>

### Video Screen Icons

Some of these icons always display on the screen, and some appear momentarily or only when certain functions are enabled or executed.

**Note:** The icons and OSD menus only display on the thermal image.

The display of icons can be modified using several configuration settings. See [Set Symbology, pg. 26](#) for a description of menu options relation to symbol display.

The following image of a screen illustrates some of the possible icons displayed by the system, as well as an example of the OSD menu that displays when you press the MENU button. Using the menus is described in [M-Series System Configuration, pg. 24](#).

A complete list of all of the icons used in the system and a brief description of how they are used can be found in [List of Icons, pg. 51](#).



**OSD Menu**

The OSD menu appears when the MENU button is pressed. Menu entries are selected using the joystick puck. Pressing the MENU button again removes the menu from the screen.

**Position Icon**



The position indication shows the azimuth (direction) of the camera relative to the vessel. The shaded triangle shows the approximate camera field of view (FOV).

**SCENE Icons**



Pressing the SCENE button cycles through four preset automatic gain control (AGC) settings, which change the image gain and level settings. Regardless of the scene setting, the thermal camera automatically adjusts to the scene to provide a balanced, high-quality image. However, you may prefer an image that has more or less contrast than the default one provided, and the SCENE button provides that type of fine adjustment.

Which setting you use depends on personal preference and environmental conditions; you may like the way the Man Overboard setting looks, even though you are running on open water during the daytime.

**Rearview Icon**



The rearview icon indicates the rearview mode option has been selected in the System Settings menu. The rearview setting flips the video image horizontally left to right. The image on the display provides the same perspective as a rear view 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. See page 28 for details on configuring this setting.

### Home Icon



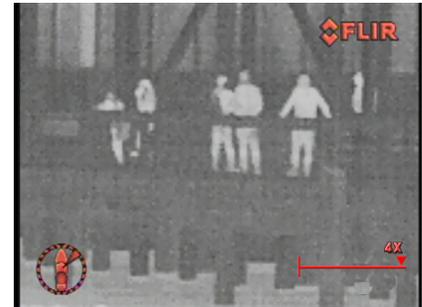
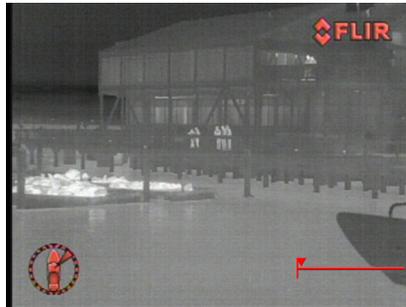
The home icon appears momentarily to indicate the camera is in the home position. The icon flashes when a new home position is set.

### Zoom (to 4X)



Pressing and holding the puck causes the thermal camera to digitally zoom in continuously to 4X magnification. Pull and hold the puck to zoom out.

On dual payload models, the color daylight camera zooms correspondingly with the changes to the thermal camera.



# M-Series Joystick Control Unit

## JCU Introduction

The JCU is the primary method of controlling the M-Series camera: move the camera (pan or tilt), zoom the camera, switch between IR and DLTV camera, adjust image settings, and access the OSD menus.

This chapter describes using the JCU buttons to operate the camera. The various configuration settings and how they affect operation are all discussed in [M-Series System Configuration, pg. 24](#). When specific settings affect a particular button, you can refer to that chapter for additional details.



## JCU Buttons

Buttons on the JCU perform multiple functions. In most cases, each performs one function when pressed briefly (short press) and a different function when pressed and held (long press). Table 2.1 on page 17 summarizes the actions for each button.

### Power/DIM Button

#### Short Press

A short press of the Power/DIM button cycles through the four levels of brightness for the JCU display. The JCU controls are backlit to make them easier to see at night. Use this button to adjust the brightness of the JCU backlighting for your comfort.



#### Long Press

Pressing and holding the Power/DIM button is used to “wake up” the camera, causing it to go from standby mode to powered on. It is also used to put the camera back in standby mode as well as complete other system functions such as calibrating the JCU and associating the JCU with a camera. These functions are described in more detail on page 19.

### MENU Button

Use the MENU button to turn the OSD menus on or off. In most cases, the factory default configuration does not need changing. However, some options may be tailored to personal preferences.



When the OSD menu is displayed, use the puck to navigate through the menus and select menu entries. Refer to [M-Series System Configuration, pg. 24](#).

## USER Button

The USER button is a programmable one-touch button to quickly access common or favorite settings or functions. Refer to [User Programmable Button](#), pg. 26.



### Short Press

A short press of the USER button is initially configured to start Surveillance Mode. You can choose from a number of other options.

### Long Press

Pressing and holding the USER button displays the OSD menu for programming the button. The menu can also be accessed by pressing the MENU button and then scrolling down to the User Programmable Button entry.

## SCENE Button

### Short Press

A short press of the SCENE button cycles through four preset automatic gain control (AGC) settings, which change the image gain and levels:

The M-Series automatically adjusts to changing scene conditions to provide a high-contrast image that is optimized for most conditions. The preset AGC settings for each scene have been optimized to offer the most balance and high quality image for specific conditions. Which setting to use depends on personal preference and environmental conditions.



Night Running



Night Docking



Day Running



Man Overboard

### Long Press

On dual payload models, pressing and holding the SCENE button switches between the thermal and visible-light cameras for the video signal on the VIS/IR cable.

## COLOR Button

### Short Press

Pressing the COLOR button switches the thermal camera color palette. Refer to [Enable \(Disable\) Color Thermal Video](#), pg. 25.

- When Color Thermal Video is enabled, pressing the COLOR button cycles through four color palettes.
- When Color Thermal Video is disabled, pressing the COLOR button switches between the white/black and red/black color palettes.



### Long Press

Press and hold the COLOR button to invert the polarity of the thermal camera. For example, white hot becomes black hot.

## HOME Button



### Short Press

A short press of the HOME button moves the camera to its home position. The home position is a programmable preset position—by default, straight ahead and level with the horizon—that operators can use as a reference. Home is the position the camera will most likely be in when it is in use.

### Long Press

Pressing and holding the HOME button sets the home position. First use the puck to point the camera's line of sight to the position you want to set as home. Press and hold the HOME button for 3 seconds; the home symbol  will flash on the screen when the new home position is set.

## Special Button Functions

You can use combinations of buttons to perform a few additional less common functions.

### JCU Reset

Occasionally it may be necessary to reset the JCU. Simultaneously pressing and holding the MENU and USER buttons causes the JCU to reset. Unplugging and plugging the Ethernet cable will also cause the JCU to lose power temporarily and reset. When it resets, it will reacquire a network IP address and display connection progress messages on the display.

### Display IP Addresses

Press the COLOR button while pushing the puck, first the IP address of the JCU is shown on the JCU screen, then the IP address of the camera is shown.

## Button Summary

Table 2.1 summarizes the action of each button on the JCU.

**TABLE 2.1 Summary of Button Actions**

Button	Action
COLOR Short	Cycle through thermal color options
COLOR Long	Invert polarity
DIM Short	Change JCU illumination level
DIM Long	JCU displays Power Menu
HOME Short	Return to Home position
HOME Long	Set Home value
MENU Short	Display or exit menus
SCENE Short	Cycle through four preset scenes
SCENE Long	Alternate visible and thermal camera output (dual payload only)
USER Short	Surveillance (can be reprogrammed)
USER Long	Display User Programmable Button menu entry
MENU + USER	Reset the JCU
COLOR + Puck	Display IP address of the JCU and camera

## JCU Puck

The JCU puck functions like a joystick and can be moved left/right, forward/back, and rotated in either direction. It can also be pushed in (like a mouse click) or pulled out. The puck movement is translated to control the pan/tilt position of the camera and zoom the camera.



In addition to controlling the camera, use the puck to navigate through the OSD menus and select available options. Push the puck forward and back to move up and down in the menus and push the puck in (click) to select.

**Note:** The puck implements proportional control; therefore, the farther you rotate it or direct it from center, the faster the camera will move.

### Tilting the Camera

Use the puck to tilt the camera up and down by moving the puck forward and backward. By default, forward causes the camera to tilt up; back causes the camera to tilt down. This is similar to the way a joystick for video games works.

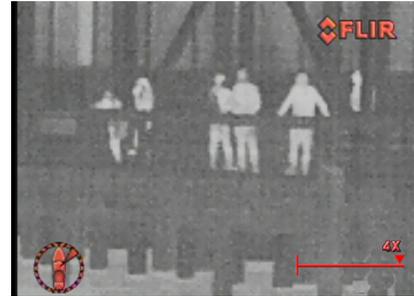
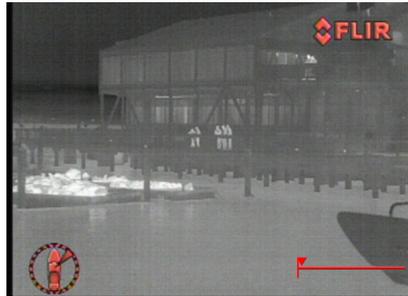
Setting the JCU to pilot mode reverses the tilt action: moving the joystick forward causes the camera to tilt down; back causes the camera to tilt up. Refer to [Enable \(Disable\) Pilot Mode, pg. 29](#).

### Panning the Camera

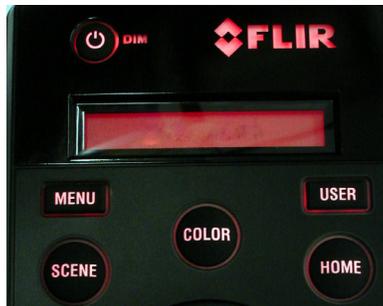
Use the puck to pan the camera to the left and right. By default, moving the puck left pans the camera to the left, moving the puck right pans the camera to the right.

### Zooming the Camera

Twist the puck to the right to zoom in, twist the puck to the left to zoom out. The thermal camera will continuously zoom up to 4X.



### JCU Display



JCU powered on with backlit display and buttons

The JCU display area generally shows the ID of the camera that the JCU is connected to. It also shows various JCU status messages, and it shows the countdown (3, 2, 1, 0) to access the Power Menu when the power button is pressed and held. The Power Menu displays on the LCD so you can choose various standby modes.

See [JCU Power Menu, pg. 21](#) for details about using this menu.

# M-Series System Startup

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## System Startup and Shutdown

The M-Series camera does not have an on/off switch. Generally, the camera is never completely off but in a standby state waiting for a “wake” command from the JCU.

Typically, the M-Series system is connected to its power source through a circuit breaker, which functions as the primary on/off switch for the system. Should it be necessary for some reason to completely shut down the system, the circuit breaker is used. In normal operation, however, the camera will have power and will be in one of three states:

- Bootup, or powering on
- Powered on, or fully functional
- Standby, a low-power state waiting for a wake command

## The Bootup Process

The bootup process is slightly different depending on whether the system had been completely turned off or is being wakened from a standby state. Most of what happens, however, is the same.

If starting from a full shutdown, ensure the monitor is turned on. Then power on the system. When power from the circuit breaker is initially applied to the system, the camera will perform a short pan/tilt initialization by rotating back and forth and tilting up and down and then begin a bootup sequence.

When the JCU receives power, the Power/DIM button lights amber. Hold the Power/DIM button for about two seconds, the JCU will power up and search for cameras on the network and try to connect to the last camera it was connected to.

**Troubleshooting Tip:** If the JCU does not have power, it may be connected to a Power over Ethernet (PoE) switch that has not been powered on, or it may be connected to a network switch that does not provide PoE power.

During bootup, a series of screens displays as various components are activated. How the screen looks will vary depending on the particular configuration settings of your installation. In general, the following sequence occurs:

1. FLIR splash screens are shown with two important notices.
2. The screen then clears and a message displays:  
Loading, please wait
3. Live video is shown using default colors and icons. A dual payload model initially displays the IR video on both channels. Then the IR/VIS video channel switches to the last active camera.
4. If a JCU or PC is not connected to the camera, it will display its IP address.



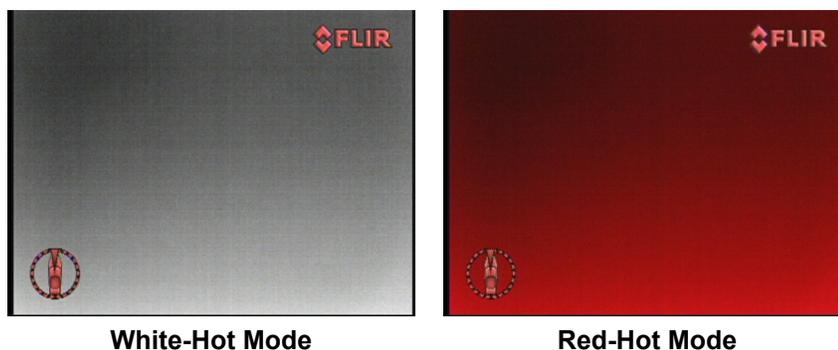
Pressing and holding the JCU Power/DIM button will activate the camera.

Starting, then Searching.. is shown on the JCU LCD screen. When the last-used camera is found, the message changes to Connecting... , which flashes until the camera is connected.

The first time the JCU is used to connect to a camera, you must first associate the JCU with the camera. Refer to [Assign JCU, pg. 21](#). Use the Assign function to choose a different camera when controlling multiple cameras. By default the JCU always connects to the last-used camera.

When the camera is fully connected, the Searching.. message on the JCU display is replaced by the camera name such as M-617CS A01234. This information blinks briefly to indicate the connection is final, and then remains on the screen to indicate an active camera/JCU connection. The camera will now respond to the JCU buttons and puck movements.

The camera initially boots up in white-hot mode, unless you have changed the color default using the Video Setup OSD menu (Refer to [Video Setup, pg. 25](#)). Press the COLOR button on the JCU to change the color palette.



## Standby Mode

After the bootup sequence, the camera is ready to use. Put the camera in standby mode when finished with the camera to conserve energy.

When in standby mode, the pan/tilt motors can be configured to remain engaged to hold the camera in place in rough seas. An alternative low-power configuration can disable the pan/tilt motors, further lowering the low-power mode power consumption. In either case, the camera does not generate a live video signal.

While in standby mode, the camera is in the stowed position—by default, pointing straight down—to protect the camera optics. The stow position can be configured with the OSD menus (see [Set Stow Position, pg. 31](#)).

To initiate standby, press and hold the Power/DIM button. A brief countdown (3, 2, 1, 0) is shown on the JCU display and then Power Menu is shown. The options on the menu are described in more detail in the following section. When System, or Global Standby is selected, Goodbye is shown on the display, the camera moves to the stow position, and goes into standby state.

If the camera will not be used for an extended period of time, to conserve power, first power down the camera from the JCU as described here so that the camera is in the stow position. Then switch the system circuit breaker to off. When the circuit breaker is switched on, the camera will go through the bootup sequence, as described previously.

## JCU Power Menu

The JCU has an LCD display that shows JCU messages, menu options, and general status information. The various JCU functions are accessed from a set of menus, with each menu entry selectable in the JCU display.

When the camera is powered on, pressing and holding the Power/DIM button causes the JCU to display the Power Menu. Use the JCU puck to scroll up and down within the menus (push forward and back), and select an entry by pushing in (clicking) the puck or pushing it to the right or left. When the JCU is in the Power Menu mode, the other JCU buttons such as HOME, COLOR, SCENE, and USER are disabled.

In the JCU display, a down arrow (v) indicates you can access additional menu choices by moving the puck down. An up arrow (^) indicates the last menu entry is displayed, and the other choices must be accessed by moving the puck up. A double arrow indicates you can move up or down in the menu.

The Power Menu shows the following menu options:

```
Power Menu
Assign JCU
JCU Stndby?
System Stndby?
Global Stndby?
Calibrate JCU
Cancel
```

### Power Menu

`Power Menu` displays when you enter the menu. Use the puck to scroll down through the other menu options. To exit the Power Menu, scroll down to the `Cancel` entry and push the puck.

### Assign JCU

Use the `Assign JCU` function to assign a JCU to a camera. When the `Assign JCU` entry is selected, the display prompts the user with `v Select Camera`. This indicates you can scroll down with the puck to select a camera to control. When the ID of the camera you want to use displays, press the puck to select it. The camera ID will blink momentarily to indicate it has been selected.

### JCU Stndby?

When the `JCU Stndby?` option is selected, the display momentarily shows `Goodbye` and then the backlit controls and the display are turned off. The JCU buttons and puck will no longer control the camera. The Power/DIM button remains backlit as long as power is supplied to the JCU. To power up the JCU again, press and hold the Power/DIM button.

The JCU display will prompt the user to select a camera to control, in case you want to switch to a different camera. If you select the same camera, it will return to the powered on mode.

### System Stndby?

When the `System Stndby?` option is selected, both the JCU and camera associated with it are placed in standby.

## Global Stndby?

When `Global Stndby?` is selected, all discovered cameras and JCUs found on the network are placed in standby. This function is used to properly shut down all cameras (return to stow position) and JCUs prior to removing power with the system breaker.

**Note:** `Global Stndby?` displays as an option only when multiple JCUs or cameras are found on the network.

## Calibrate JCU

`Calibrate JCU` is used to standardize the movements of the JCU puck. This function might be used, for example, if the camera responds at a different rate when the puck is pushed left rather than right, or when the puck is twisted in one direction compared to the other. The JCU display directs the user to move and twist the puck in certain ways so the device can be calibrated.

After entering calibration mode, you will be instructed to move the puck to the maximum extent possible in each direction separately. After that has been done, pressing the puck moves to the next step. For example, `Rotate CW/CCW` requires rotating the puck clockwise to the full extent possible, and then rotating counter clockwise to the full extent possible. When both directions are completed, press the puck to continue.

## Cancel

The `Cancel` option causes the JCU to exit the Power Menu and return to its normal state.

## Factory Default Settings

Table 3.1 shows the factory default settings for the M-Series configuration options and the JCU buttons. [M-Series System Configuration, pg. 24](#) describes how to modify and update settings.

**TABLE 3.1 Factory Default Settings**

Option	Factory Default Setting
Aircraft Joystick	Disabled
Ball-Down Installation	Disabled (not available on M-618CS model cameras)
Camera Name	Model number followed by serial number (for example, M-617CS JD-0123)
Color Thermal Video	Enabled
High Motor Torque	Enabled
High Power Standby	Enabled
Home Position	0° azimuth, 0° elevation
Icon Display Mode	Display Minimal
Network Configuration	Dynamic
Vertical Stab Only	Disabled
Rearview Mode	Disabled
Scan Width	Wide
Scan Speed	Slow

**TABLE 3.1 Factory Default Settings**

<b>Option</b>	<b>Factory Default Setting</b>
SCENE Button	Night Running
Stabilization Mode	Disabled
Stow Position	0° azimuth, -90° elevation
Thermal Color Default	White Hot
USER button (short press)	Surveillance
Video Polarity	White Hot, Black Cold
VIS/IR video signal (dual payload models only)	IR (Thermal)

# M-Series System Configuration

## Overview

This chapter describes configuring the system using on-screen display (OSD) menus. Operating the M-Series camera does not require modifying any of the factory configuration settings. However, the OSD menus let you:

- Choose configuration options that match your personal preferences or provide optimal performance under varying conditions, such as a default color scheme.
- Enable or disable specialized features such as using the camera in surveillance mode.

Some settings can be saved and, therefore, are preserved in the case of loss of power, and some settings will be configured as needed.

Some configuration settings are changed directly by pressing a button on the JCU. These are described in [JCU Buttons, pg. 14](#). The way some of the buttons work can be modified using OSD menus, described in this chapter.

The OSD menus are only shown on the thermal camera video. They do not appear on the video from the visible camera.

One of the specialized features that can be enabled or disabled with the OSD menus is mechanical stabilization. The menus for these options are described in [Mechanical Stabilization, pg. 33](#).

## Main Menu



Use the MENU button to turn the OSD menu on or off. When the menu is displayed, the JCU can be used to navigate through the menus and select menu entries.

When the MENU button is pushed, the main menu displays.

The current menu selection is indicated by a red bar.

If a menu entry begins with the word Enable—for example Enable Only Vertical Stab—then that option will be enabled if selected. Similarly, if an option begins with Disable, then that option will be disabled if selected. The menu will change to reflect the available choice.

To navigate the menus, use the puck to move the cursor up and down from one selection to the next. To make a selection, push the puck in (like a mouse click). Once you are satisfied with your changes, press the MENU button to exit the OSD menu or select Exit from the menu to go back to a previous menu.

### Enable (Disable) Only Vertical Stab

When only vertical stabilization is enabled, the icons at the right are shown on the display. The camera's azimuth position is now locked to the base.



### Enable (Disable) Vert & Horizontal Stab

When you enable full stabilization (horizontal and vertical), the icons at the right are shown on the display. If you disable vertical and horizontal stabilization, the wave icon remains on the screen to make you aware that motion of the vessel can affect the camera performance. Refer to [Mechanical Stabilization, pg. 33](#) for more details.



### Video Setup

When you select Video Setup from the main menu, the following OSD menu is shown.



#### Set Thermal Color Default

Saves the current color and polarity settings as the default value used when the system is booted up. When selected, the menu changes to **Thermal Color Default Saved** until Exit is selected.

#### Set Video Polarity

Change the colors representing hot and cold in the infrared imagery. Set the thermal color default to save this setting when the system is rebooted.

- Black-Hot polarity: darker colors represent hotter objects (the factory default).
- White-Hot polarity: lighter colors represent hotter objects.

Using a white-hot or black-hot display mode is a personal preference; experiment with the different settings in different conditions and see which is preferred.



White Hot



Black Hot

### Enable (Disable) Color Thermal Video

If Color Thermal Video is enabled, the camera can use one of four color palettes. Choose the palette to use by pressing the COLOR button. See [COLOR Button, pg. 15](#) for details. Inverting the polarity reverses the color map of the thermal output.

Disable Color Thermal Video: Day and night (white/black or red/black) display as the COLOR button is pressed.

Enable Color Thermal Video: Four palettes are shown as the COLOR button is pressed: grayscale, red, fusion, and fire ice.

Select **Set Thermal Color Default** to save the setting for the next time the system is booted up.

This setting when used in combination with the **Set Video Polarity** choice, doubles the possible ways of showing the same image on the display.

### **VIS CAM Low-Light Mode: Off**

Select the visible camera low-light mode: Off, On, or Auto.

## **Set Symbology**

When you select Set Symbology from the main menu, the following OSD menu displays.

A screenshot of an OSD menu with a black background and white text. The menu items are: Display All Icons (highlighted with an orange bar), Display Minimal Icons, Hide All Icons, Exit, and <Press Puck to Select>.

**Display All Icons**

**Display Minimal Icons**

**Hide All Icons**

**Exit**

**<Press Puck to Select>**

### **Display All Icons**

Selecting this option maximizes the display of the OSD icons. Some icons such as home are only displayed momentarily.

### **Display Minimal Icons**

Selecting this option turns off most of the OSD icons except when their corresponding controls are actively in use. For example, the zoom and rear view icons display only when they are active. The pan position (azimuth) icon and the FLIR logo are always displayed.

### **Hide All Icons**

Only the FLIR logo, the azimuth (pan position) icon, and icons for special modes: Rearview mode and Stabilization modes are shown at all times. Transitory icons display when selected functions are used, such as pressing the HOME button.

## **User Programmable Button**



The USER button is a programmable one-touch button to quickly access the most common or favorite settings or functions.

Use this menu to associate a function with the USER button. Select one of the choices; Surveillance Mode is the default selection. The active choice is shown in black type.

**Man-Over-Board settings.** A short press of the USER button causes the thermal camera to use the Man Overboard AGC setting. This is one of the settings also available using the SCENE button (see page 15).

**Switch Thermal/VIS Video.** A short press of the USER button causes the video signal to switch between the thermal camera and the visible-light camera (only available on dual payload camera models).

**Hide/Show All Icons.** A short press of the USER button switches between the Hide All Icons setting and Display All Icons (refer to [Set Symbology, pg. 26](#) for more information).

**Invert Video Polarity.** A short press of the USER button inverts the colors currently being used to indicate hot and cold in the infrared imagery. For example, if the current display is white-hot, it is inverted to black-hot (see [Set Video Polarity, pg. 25](#)). This is the factory default setting for the USER button.

**Rearview Mode.** A short press of the USER button enables or disables the Rearview Mode, causing the video image to be flipped horizontally (revert). If Rearview Mode is enabled, the rearview mirror icon is shown on the display. See [Enable \(Disable\) Rearview Mode, pg. 28](#) for details.

**Surveillance Mode.** A short press of the USER button enables or disables surveillance mode. See [Surveillance Mode, pg. 31](#) for more information about this mode of operation.

**Vertical & Horizontal Stab.** A short press of the USER button enables or disables full stabilization.

**Man-Over-Board settings****Switch Thermal/VIS Video****Hide/Show All Icons****Invert Video Polarity****Rearview Mode****Surveillance Mode****Vertical & Horizontal Stab****Exit****<Press Puck to Select>**

## System Setup Menu

When you select System Setup from the main menu, the following OSD menu is shown.

### Save Camera Settings

The current settings of the camera are saved and will be used when the camera is booted up.

### Camera Pan/Tilt Settings

Refer to [Camera Pan/Tilt Settings Menu, pg. 29](#).

### Enable (Disable) Ball-Down Installation

This menu option should be enabled when the camera is mounted upside down in the “ball-down” configuration. If it is not enabled, the video signal will be upside down on the monitor. When ball-down mode is first enabled, the camera rotates 180 degrees and the camera ball flips over. This option is disabled by default.

**Save Camera Settings****Camera Pan/Tilt Settings****Enable Ball-Down Installation****Enable Rearview Mode****Name Camera****Enable Defog Mode****Exit****<Press Puck to Select>**

### Enable (Disable) Rearview Mode

This menu entry enables or disables the Rearview mode, which causes the video image to be flipped horizontally (revert). The image on the display provides the same perspective as a rear view mirror in a vehicle. When Rearview mode is enabled, the rear view mirror icon is shown on the screen. You can configure the USER button to enable or disable Rearview Mode.



### Name Camera

Use this option to give the camera a new name. When you select the menu entry, the current camera name is displayed on the screen, and the first character of the name is highlighted. Move the puck forward and back or twist it to change the character. The next character can be selected by moving the puck to the right. The characters that can be used include the letters of the alphabet (upper or lower case), the numbers 0-9, and the hyphen (-). When you finish entering the name, push the puck to exit.

**M-617CS 577106**  
**Edit Camera Name and press**  
**puck when finished**

Then confirm the new camera name or cancel and continue making changes. When you are finished, select Exit.

**Confirm new Camera Name**  
**Cancel**  
**Exit**  
**<Press Puck to Select>**

### Enable (Disable) Defog Mode

Turns on the M-Series heater for two minutes to defog the window.

## About/Help

When you select About/Help from the main menu, the following OSD menu displays.

### Video Icon Help Screens

The Video Icon Help Screens provide explanations of each of the screen icons. Press the JCU puck to cycle through the icons shown on multiple screens.

**Video Icon Help Screens**  
**Product Information**  
**Contact FLIR**  
**Restore Factory Defaults**  
**Exit**  
**<Press Puck to Select>**

### Product Information

Selecting Product Information displays product information for the M-Series camera you are using, such as the camera model, serial number, and software release information. If you are having any problems with the camera, have this information available when contacting FLIR technical support. An example of the display is shown below.

**Name: M-617CS 577106**  
**S/N: 577106**  
**IP: 169.254.6.161**  
**v2.5.30.39 Built 5/25/2017**  
**MCU ver:4.1.9**  
**Exit**

### Contact FLIR

Selecting Contact FLIR displays the FLIR contact information on the screen. Additional contact information is included at the back of this manual. When contacting FLIR, please have the product information available.

**FLIR Systems, Inc.**  
**6769 Hollister Ave.**  
**Goleta, CA 93117**  
**USA**  
**www.flir.com**  
**+1 805 964 9797 (Factory)**  
**+1 877 773 3547 (Sales)**  
**+1 888 747 3547 (Tech Support)**  
**MaritimeCameraSupport@FLIR.com**  
**Exit**

### Restore Factory Defaults

Select Restore Factory Defaults to restore the M-Series to its factory default settings. The camera will prompt you to confirm before continuing.

**Confirm**  
**Exit**  
**<Press Puck to Select>**

Refer to Table 3.1 on page 22 for a list of the factory default settings.

### Camera Pan/Tilt Settings Menu

This menu provides configuration options for the pan/tilt functions of the camera. The following options are shown on the display.

**Enable Pilot Mode**  
**Enable Twist-to-Pan Mode**  
**Set Zero Azimuth**  
**Disable High Power Standby**  
**Disable High Motor Torque**  
**Set Stow Position**  
**Surveillance Mode**  
**Exit**

#### Enable (Disable) Pilot Mode

In managing the elevation (tilt) of the camera, the joystick can be used in one of two modes.

**Gaming Mode.** Moving the joystick forward causes the camera to tilt up. Moving the puck back causes the camera to tilt down. This is the factory default mode.

**Pilot Mode.** Moving the puck forward causes the camera to tilt down. Moving the puck back causes the camera to tilt up.

The choice of mode to use is a matter of personal preference. One mode may feel more natural than the other.

#### Enable (Disable) Twist-to-Pan Mode

This menu entry enables or disables the Twist-To-Pan Mode. This setting has a significant effect on how the puck is used (summarized in Table 4.1).

**Disabled.** Pan the camera by moving the puck left or right, rather than twisting. Zoom the IR camera in and out by twisting the puck right or left. This is the factory default mode.

**Enabled.** Pan the camera by rotating (twisting) the puck to the left or right. Zoom in and out by pushing the puck in and pulling it out.

**TABLE 4.1 Effect of Twist-to-Pan on Puck Movement**

<b>Puck Movement</b>	<b>Twist-to-Pan Enabled</b>	<b>Twist-to-Pan Disabled</b>
Push Puck Left	N/A	Pan Counter Clockwise
Push Puck Right	N/A	Pan Clockwise
Twist Counter Clockwise	Pan Counter Clockwise	Zoom Out
Twist Clockwise	Pan Clockwise	Zoom In
Push Puck In	Zoom In	N/A
Pull Puck Out	Zoom Out	N/A

**Set Zero Azimuth**

The Azimuth “0” direction marked on the camera base should be directly toward the front of the vessel; icons on the video show the direction the camera is facing in relation to an outline of a ship. If the camera can not be installed pointing directly toward the front of the ship, the zero azimuth can be set using this OSD menu selection.

**Enable (Disable) High Power Standby and High Motor Torque**

These two settings help you to manage power consumption:

**High Power Standby** controls whether power is supplied to the pan/tilt motors while the camera is in the standby mode.

**High Motor Torque** controls the amount of power that is supplied to the pan/tilt motors while the camera is in the powered on state.

Choosing the amount of power to use involves a trade-off between power consumption and the ability of the gimbal assembly to hold the camera in place in rough seas. If the gimbal moves due to shock or vibration, the camera may not be in line with the position indicator or may lose precision regarding the home position.

Disabling High Power Standby may also affect camera readiness in a cold environment. When High Power Standby is enabled and the motors are active, the unit stays closer to operating temperature.

High power standby mode may be useful for power boats that operate at higher speeds and experience high impact environments and can support higher power consumption.

When you select to enable or disable this setting, a prompts displays for you to confirm or cancel the change. See Table 4.2 below for power consumption.

**TABLE 4.2 Power Consumption**

<b>Camera State</b>	<b>Camera Setting</b>	<b>Dual Payload</b>	<b>Single Payload</b>
Standby	High Power Mode ON High Torque Mode ON	22 W	17.4 W
Standby	High Power Mode OFF High Torque Mode ON	8 W	7.4 W
Standby	High Power Mode ON High Torque Mode OFF	14.5 W	13 W

**TABLE 4.2 Power Consumption**

Camera State	Camera Setting	Dual Payload	Single Payload
Standby	High Power Mode OFF High Torque Mode OFF	8 W	7.4 W
Awake	High Power Mode ON High Torque Mode ON	30 W	19.4 W
Awake	High Power Mode OFF High Torque Mode ON	30 W	19.4 W
Awake	High Power Mode ON High Torque Mode OFF	21 W	16.5 W
Awake	High Power Mode OFF High Torque Mode OFF	21 W	16.5 W

These power numbers assume a single JCU is plugged into the camera and window heaters are not active. When heaters are active, additional power is consumed based on single or dual payload:

- For dual payload models, an additional 16 W is consumed for a maximum power consumption of under 46 W.
- For single payload models, an additional 6.5 W is consumed for a maximum power consumption of under 26 W.

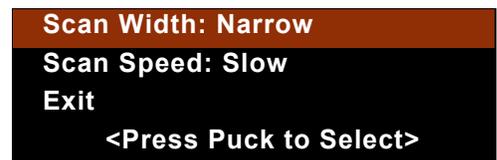
**Set Stow Position**

When Set Stow Position is selected, the camera stores the current position (camera azimuth and elevation) as the stow position. The camera moves to the stow position when it is turned off (put into standby mode). See [Standby Mode, pg. 20](#) for additional information about standby mode.

The stow position is not necessarily the same as the home position. The home position is typically the position the camera will most likely be in when the camera is in use, or a preferred reference position for the camera. The stow position is the preferred position when the camera is not in use, for protecting the camera optics. Both positions are programmable by the user.

**Surveillance Mode**

When you select Surveillance Mode from System Setup, the following OSD menu is shown.



The User Programmable Button can be programmed to enable or disable surveillance mode (see page 26).

When the camera is in surveillance mode, it pans continuously left and right, either until it is taken out of surveillance mode or until the JCU is used to move the camera. The camera does not automatically resume panning; you must enable surveillance again.

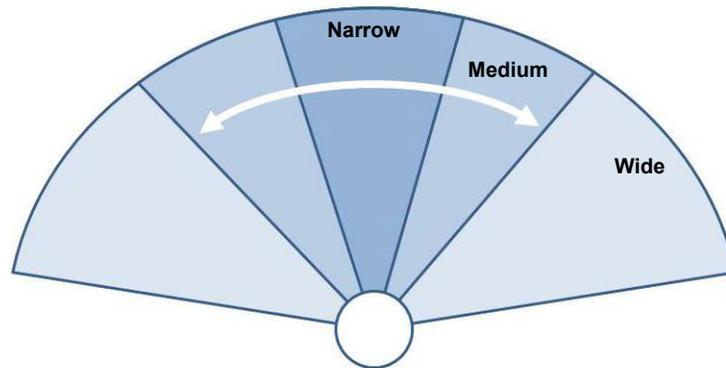
**Scan Width**

In surveillance mode, the Scan Width determines the range of horizontal azimuth (pan) covered by each scan. The choices are:

**Narrow.** The camera scans from approximately 20° left and right of center (40° total).

**Medium.** The camera scans from approximately 40° left and right of center (80° total).

**Wide.** The camera scan covers 80° to the left and right of center (160° total). The default scan width is wide.



**Note:** The center of the scan pattern is determined by the direction the camera is pointing when surveillance is enabled. The scan pattern is not centered about the home position, unless the camera is in the home position when surveillance is enabled.

### **Scan Speed**

In surveillance mode, the scan speed determines how quickly the camera scans back and forth. The choices are fast, medium, and slow. The scan speed is affected by the zoom state (if the camera is zoomed in, it scans at a slower rate). The default scan speed is slow.

## Mechanical Stabilization

One of the specialized features that can be enabled or disabled with the OSD menus is mechanical stabilization. This section describes the features available with stabilization.

### Mechanical Stabilization Icons

Mechanical stabilization has four icons that are shown on the screen based on the mode selected.



Mechanical stabilization improves image stability by compensating for vessel motion and keeping the camera aimed at a point of interest or at a fixed direction in relation to the ship. By default, mechanical stabilization is off. You can disable or enable stabilization whenever you want.

### Enable Vert & Horizontal Stab



When you enable full stabilization (horizontal and vertical), the two icons at the left are shown on the display.



If you disable vertical and horizontal stabilization, the wave icon remains on the screen to indicate stabilization is not engaged.

Stabilization is automatically turned off when the camera is stowed, but the system restores your setting when the camera is powered on.

When only vertical stabilization mode is enabled, the horizontal stabilization is turned off. This can be helpful when you want to use the camera as an aide to navigation and keep it pointing in the same position relative to the vessel as it turns.

### Enable Only Vertical Stab



When Vertical Stabilization Only mode is enabled, a lock icon displays. The camera's azimuth position is now locked to the base.

Enabling Only Vertical Stab turns off the horizontal (pan) stabilization while retaining the tilt stabilization.

# IP Interface and PC Operations

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The M-Series cameras and JCUs are network devices that communicate over an Ethernet network using Internet Protocol (IP). In addition to using the JCU to control and configure a camera, a user or installer can also complete similar operations and more advanced configurations using a Web browser<sup>1</sup> to view the video and control the camera.

The M-Series camera and JCU are shipped with Dynamic Host Configuration Protocol (DHCP) enabled to assign IP addresses. During installation or at other times the system may have been set to Static addressing and these addresses may have been changed.

## M-Series Web Browser Interface

This chapter describes how to use a Web browser to communicate with and configure the M-Series cameras and JCUs:

- [View Camera and JCU IP Address, pg. 35](#)
- [Camera Web Server Login Accounts, pg. 35](#)
- [Log in to the Camera Web Server, pg. 35](#)
- [Setup and Configuration Menus, pg. 39](#)
- [Maintenance Menus, pg. 43](#)
- [Changing the IP Address of the Camera, pg. 44](#)
- [Firmware Update, pg. 47](#)
- [Accessing the JCU Web Interface, pg. 47](#)

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1. The web interface is supported on Microsoft Internet Explorer version 9, as well as the latest versions of Google Chrome and Mozilla Firefox.

## View Camera and JCU IP Address

Connect the camera and JCU together through the switch and power on both the camera and the switch. (The JCU is a PoE device getting power from the switch.)

On the JCU, press and hold the COLOR button while pushing in the puck. The IP address of the JCU and then camera are shown for 3 seconds on the LCD display.

The PC or laptop must be on the same network as the camera and JCU. For example: for a camera IP address of 192.168.250.116, set the network adapter to a compatible IP address such as 192.168.250.1 with a netmask of 255.255.255.0.

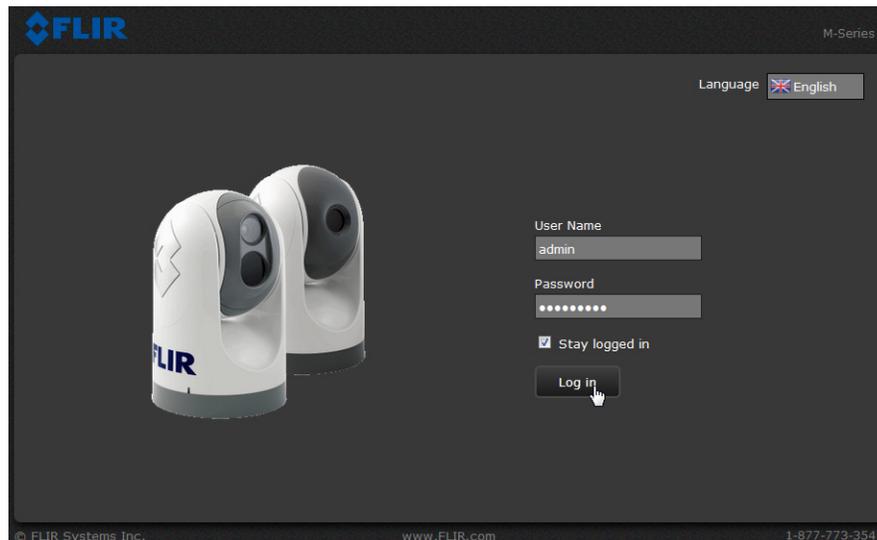
## Camera Web Server Login Accounts

It is possible to log in to the camera using one of three User Names: **user**, **expert**, or **admin**. By default, the passwords are: **user**, **expert**, and **fliradmin**, respectively. The **user** login can access the Toolbar page and control the camera. The **expert** login can also access the Setup menus and the Maintenance Server menus. The **admin** login can also access all the other menus as well as change all the login passwords. The default login passwords should be changed to prevent unauthorized log in. Refer to [Maintenance->Server->Security Options, pg. 45](#).

**Note:** Only two web sessions can be active at once.

## Log in to the Camera Web Server

1. Open a web browser and enter the camera IP address.  
The login screen with a picture of the camera will appear.
2. Select a different language if desired.
3. Enter **admin** for User Name and **fliradmin** for Password, then click Log in.



### Toolbar Page

The Toolbar page will be displayed, with a virtual joystick and function buttons on the page. Next to the FLIR logo along the top of the screen are some menu choices, including Toolbar (the red text indicates it is selected), Setup, Maintenance, Help, and Log out.

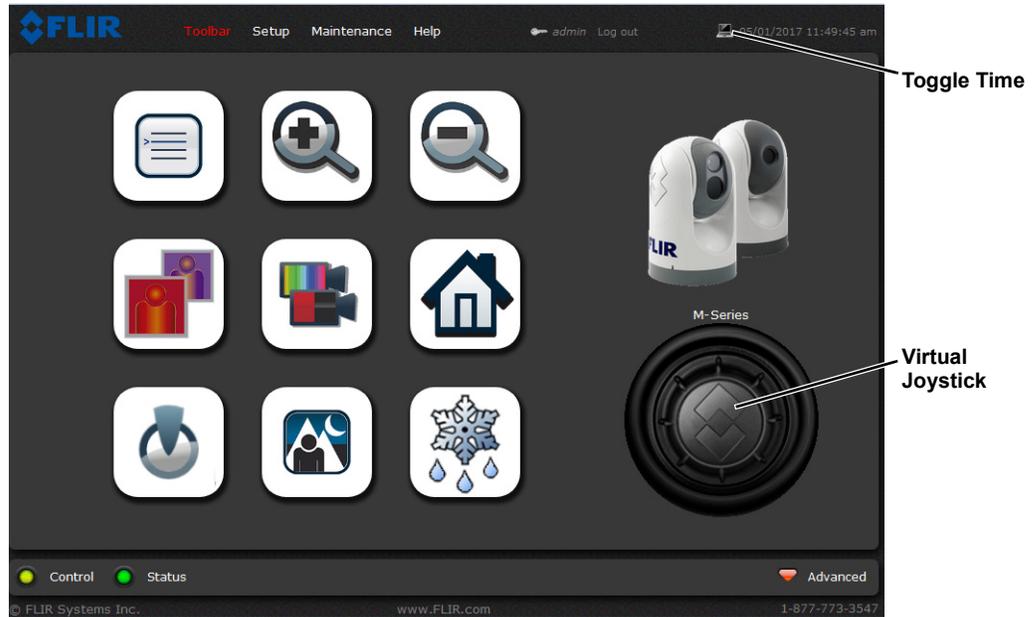


Figure 5-1: Toolbar Page from admin or expert Log in

The **user** log in, shown below, can only use the Toolbar page and controls and can only reset the user password if an admin or expert user has allowed the option for the user log in.

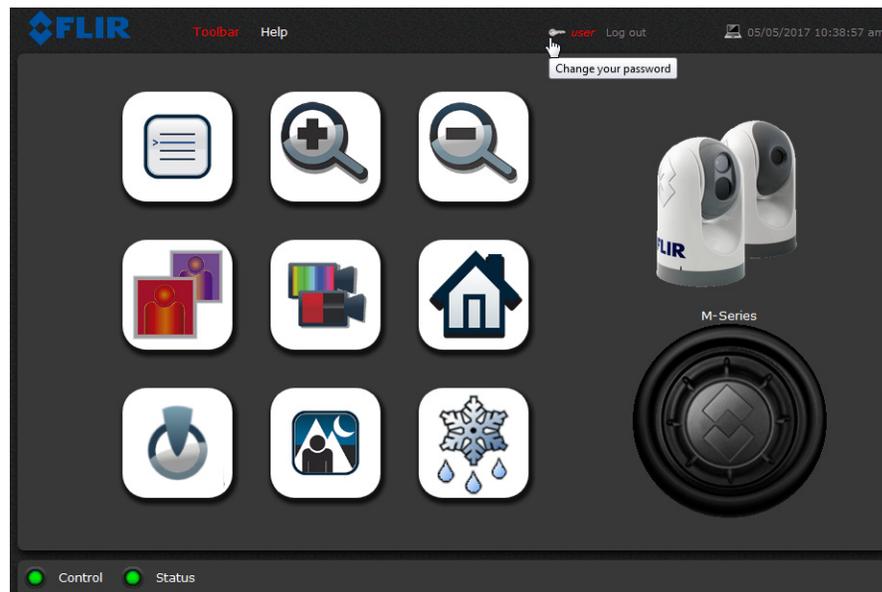


Figure 5-2: Live Video Page (user log in)

## Help

At the top of the page, the **Help** menu shows software version information. This page has information about the camera including hardware and software revision numbers, part numbers, and serial numbers. If it is necessary to contact FLIR Technical Support for assistance, it will be helpful to have the information from this page on hand.

## Log out

Use this button to disconnect from the camera and stop the display of the video stream. If a web session is inactive for 20 minutes, it will be stopped.

## Toggle Camera/PC time

Use this button to view either the PC time or the camera time.

## Camera Control and Status



In the lower left of the screen are two indicator lights: Control and Status. Initially the Control light is off, indicating the user is not able to control the camera. When multiple users are connected to a camera, only one user at a time can issue commands to the camera. If another user has control of the camera, the Control light is yellow. Request control of the camera by clicking on the yellow or black light, or simply by sending a command to the camera. The Status light may turn off temporarily while waiting for the response from the camera. Be patient, there may be a slight delay between each command while the browser waits for a response from the camera.

## Web Control Panel

The control buttons on the page provide a way to control the camera in a limited number of ways. When the mouse cursor is positioned over a button, a tool tip is displayed.

This same web interface is used with various FLIR thermal cameras—some are fixed and some are pan/tilt cameras. As a result, different buttons in the control panel appear for different cameras.



IR Control Keypad

Surveillance Mode  
On/Off



Visible Control Keypad

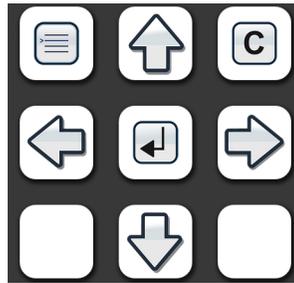
The functions of the buttons appearing for the M-Series cameras are described below:



## OSD Menu

When selected, the keypad changes to an OSD menu control panel. The OSD menu is shown on the IR video display. Select the Menu icon again or the back arrow to return to the main keypad.

Use the OSD menu keypad to navigate through the OSD menus and make selections. Refer to [M-Series System Configuration](#), pg. 24 for descriptions of the menu functions.



OSD Menu Keypad

OSD Menu Keypad	
	Return to Web menu
	Move up through OSD
	Exit current OSD function
	Move left through OSD
	Enter
	Move right through OSD
	Move down through OSD



**Zoom In/Zoom Out**

These buttons zoom the active camera (IR or daylight). Plus zooms the camera in; minus zooms the camera out.



**Toggle Palette - IR only**

This button causes the camera to cycle through different look up table (LUT) color palettes. Depending on the subjects viewed, one color palette may be preferable to the others. The Toggle Polarity button allows access to the inverse palettes.



**Toggle Low Light Mode - Visible only**

This button causes the camera to enter or exit low light mode.



**Toggle Video Source**

This button changes the active between the IR camera and the daylight camera. When the daylight camera is selected, only buttons that have a function on the daylight camera are shown.



**Home**

Click moves the camera to the Home position; Click and Hold sets the current pan and tilt position of the camera as the Home position.



**Surveillance**

This button starts surveillance mode. The camera will pan back and forth centered on the direction the camera is pointing when the mode is started.

### Toggle Scene Preset - IR only



This button causes the camera to cycle through four different image settings: Night, Day, Dock, and High Contrast. The Scene Presets cause the image brightness and contrast to adjust. Depending on the time of day, weather, and other conditions, one Scene Preset may be preferable to the others.



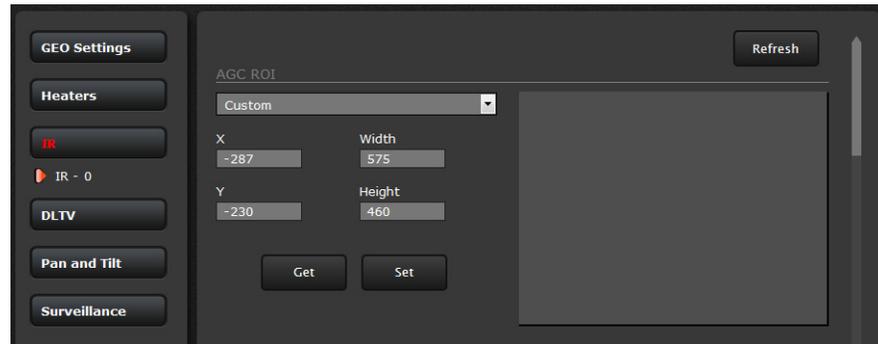
### Defog

This button starts Defog mode. The heater will turn on for two minutes.

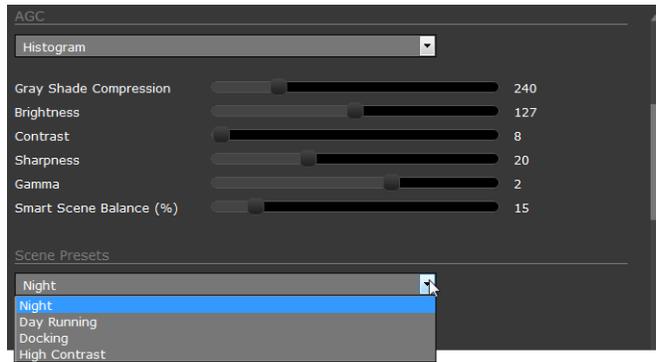
## Setup and Configuration Menus

Additional configuration options are available that are not described in this manual. For more information on setting or changing these camera parameters refer to the *Nexus IP Camera Configuration Guide* (FLIR Doc #427-0030-00-28) or contact the local FLIR representative or FLIR Technical Support.

### Setup->IR->ROI (region of interest)



The camera adjustments under the ROI heading allow the user to make changes to the Region Of Interest. The ROI determines what portion of the image is considered by the Automatic Gain Control (AGC) algorithm. By default all of the pixels in the image are considered; in some cases it may provide an improved image if a portion of the image is excluded. For example, the sky is generally very cold, so if the ROI excludes the sky it may add more contrast to the rest of the image. A pull-down list offers some convenient options.

**Setup->IR->AGC Scene Presets**

The AGC parameters affect how the overall IR video image appears. The default Histogram algorithm is suitable for most installations, but in some cases one of the other selections may provide a more appealing image, depending on personal preferences. Be aware the settings that are optimal at one time may be less optimal a short time later, since conditions such as weather and time of day affect the image and are constantly changing.

- **Gray Shade Compression** (Plateau value) when set high, the algorithm approaches the behavior of classic histogram equalization—gray shades are distributed proportionally to the cumulative histogram, and more gray shades will be devoted to large areas of similar temperature in a given scene. On the other hand, when the value is set low, the algorithm behaves more like a linear AGC algorithm—there is little compression in the resulting 8-bit histogram.
- **Brightness** (ITT Mean) setting determines the temperature that is at the middle of the 256 “shades of gray” available to the camera. Higher values allow more detail in hotter scenes, while lower values allow more detail in lower temperature scenes.
- **Contrast** (Max Gain) can generally be used to increase contrast (although it may also increase noise due to increased gain).
- **Sharpness** (DDE) is used to enhance image details and/or suppress fixed pattern noise. Higher values increase Sharpness, while lower values soften (blur) the image and filter fixed pattern noise.
- **Gamma** (ACE) provides a contrast adjustment dependent on the relative scene temperature. Gamma values greater than 0 give more contrast to the hotter scene content and decrease contrast for the colder scene content. Gamma values less than 0 do the opposite by decreasing the contrast for hotter scene content and leaving more of the “shades of gray” to represent the colder scene content.
- **Smart Scene Balance** (SSO) value defines the percentage of the scene that will be allotted a linear mapping. With SSO enabled (greater than zero), the difference in gray shades between two objects is more representative of the difference in temperature, although the optimization in local contrast can be lost.

It may be best to start with the Scene Presets selections, but experiment with different AGC settings. Select **Save Settings** button at the bottom of the page to keep the settings after a power cycle or select the **Factory Defaults** button to return the settings to default values.

Each Scene Preset provides a combination of parameters that are preferred for certain types of conditions. Select a Scene Preset that provides an image that is optimal for the situation. Recall the Scene preset can also be toggled by selecting the Toggle Scene Preset button from the **Toolbar** page control panel.

Setup->Pan and Tilt->Status

The screenshot shows the 'Pan and Tilt' status page. On the left is a sidebar with buttons for Heaters, IR, DLTV, Pan and Tilt (highlighted), Surveillance, and OSD. The main area is titled 'Status' and contains the following fields: 'Georeferenced' (Yes), 'Azimuth' (354.89), 'Elevation' (0), and 'Mode' (Manual). Below these are input fields for 'Azimuth' and 'Elevation' with a 'Go to' button. A 'Maximum Speed' section has 'Azimuth' and 'Elevation' sliders both set to 50. At the bottom are 'Save' and 'Read' buttons. Two callouts on the right point to the 'Mode' field and the 'Go to' button.

Reported direction coordinates, updated in real time.

To move the camera enter coordinates, click Go to.

The Pan and Tilt status shows the azimuth and elevation of the current direction of the camera.

The Azimuth “0” direction should be directly toward the front of the vessel; icons on the video show the direction the camera is facing in relation to an outline of a ship. The zero azimuth can be set using the OSD menu. Refer to the [Camera Pan/Tilt Settings Menu, pg. 29](#).

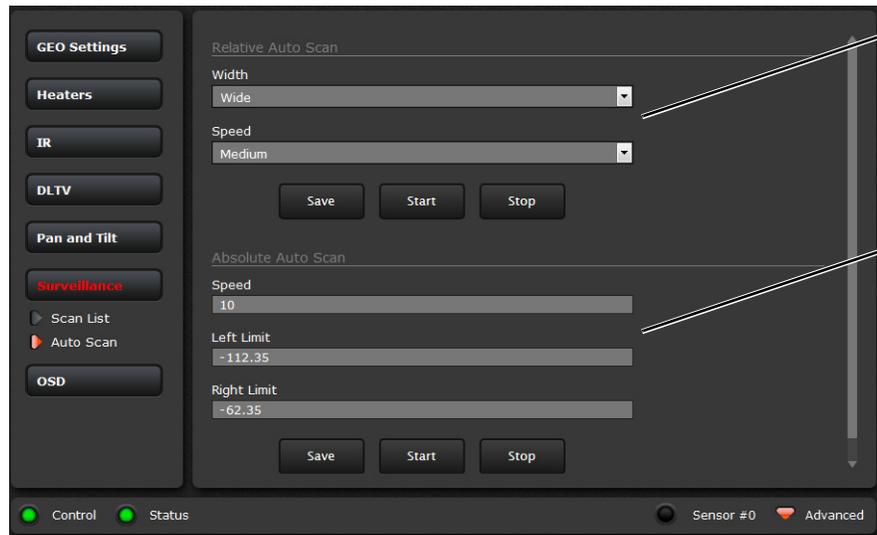
Setup->Surveillance->Scan List

The screenshot shows the 'Scan List' page. The sidebar includes buttons for GEO Settings, Heaters, IR, DLTV, Pan and Tilt, Surveillance (highlighted), Scan List, Auto Scan, and OSD. The main area is titled 'Status' and includes a 'State' (Stopped) and 'Current Point' (0) with 'Start' and 'Stop' buttons. Below is the 'Presets' section with 'Active Scan List' (empty dropdown), 'Selected Camera' (IR), and 'Scan List Mode' (Az/EI). There are 'Load', 'Save', and 'Read' buttons. At the bottom is a 'Preset ID' (1) with a 'Set' button. Two callouts on the right point to the 'Set' button and the 'Active Scan List' dropdown.

To setup Presets: position camera, select Preset ID

Click Set, then Save

Setup->Surveillance->Auto Scan



**To start Auto Scan:**  
select width and speed,  
then select Start

**Set Autoscan at Startup:**  
select speed,  
select limits,  
click Save

The Relative Auto Scan (Surveillance mode) can be started and the settings changed from the OSD menu, JCU (UPB), or the web page.

## Maintenance Menu

After making configuration changes, click the Save button at the bottom of the page. After saving, it is also necessary to stop and restart the server. The server has a configuration that is active and running, and another configuration that is saved.

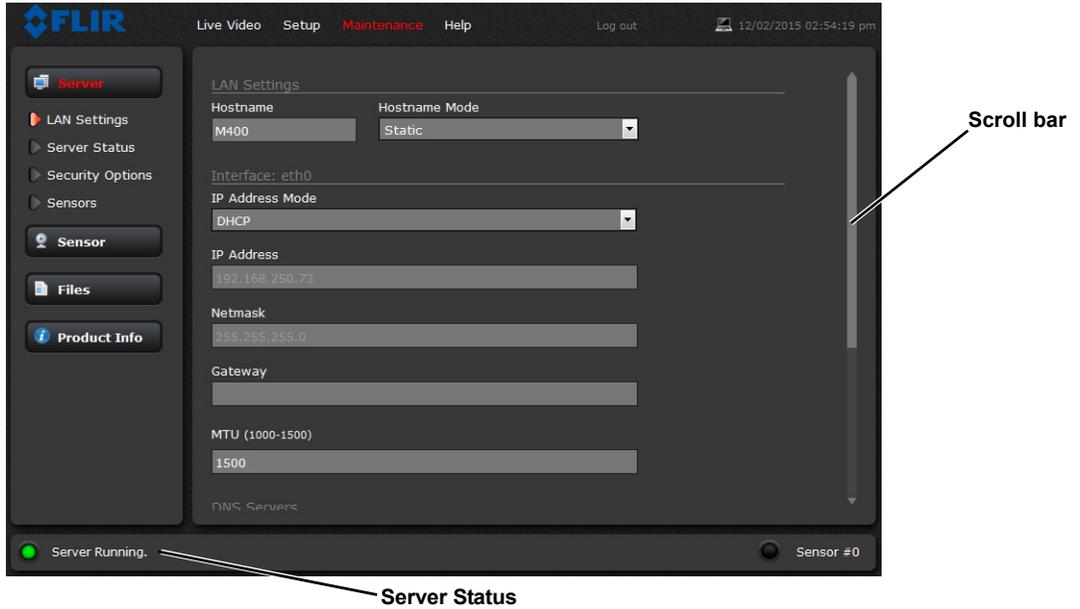
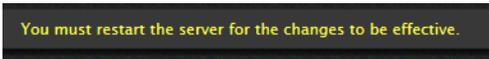


Figure 5-3: Maintenance Menu Pages

The message at the bottom of the page indicates the saved configuration is different than the active (running) configuration, and it is necessary to restart the server.



### Restarting the Server

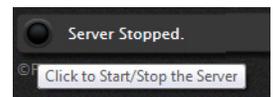
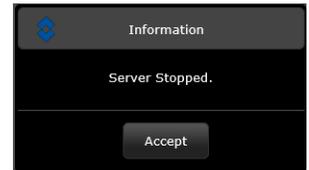
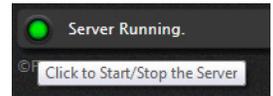
Click on the green light at the lower left next to “Server Running” to stop the server.

It may take up to 20 seconds for the server to stop, especially if multiple video streams are open. Be patient when stopping the server.

Once the server is stopped, an information message will pop up on the screen.

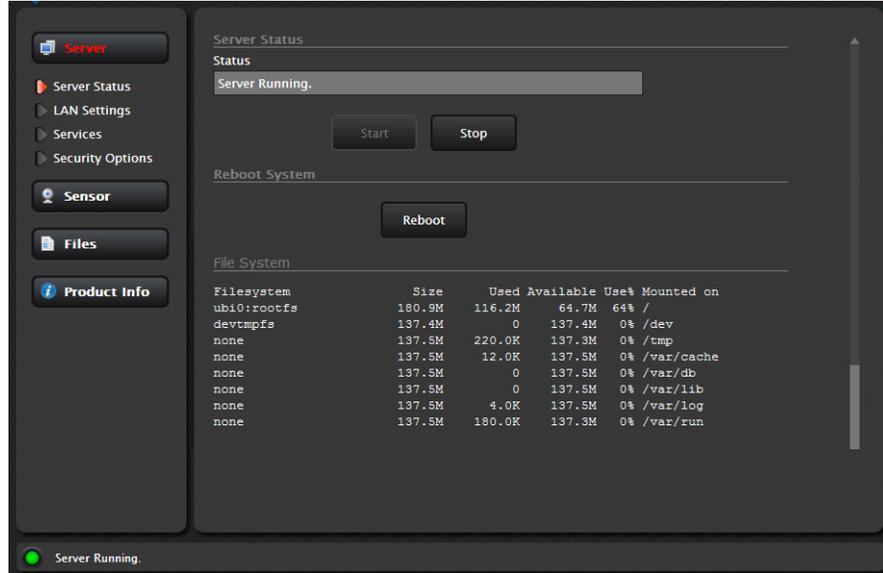
When the server is stopped and the page is refreshed, the status will show as “Server Stopped.”

Click to restart the server. When the page refreshes, the status will again show as “Server Running...”. The Start button will be replaced by a Stop button when the startup procedure has completed.



**Maintenance->Server->Server Status**

The page provides an indication of the current server status (either running or stopped) and buttons for starting or stopping the server or for rebooting the system. Scroll down to see additional status information which may be useful to FLIR technical support.

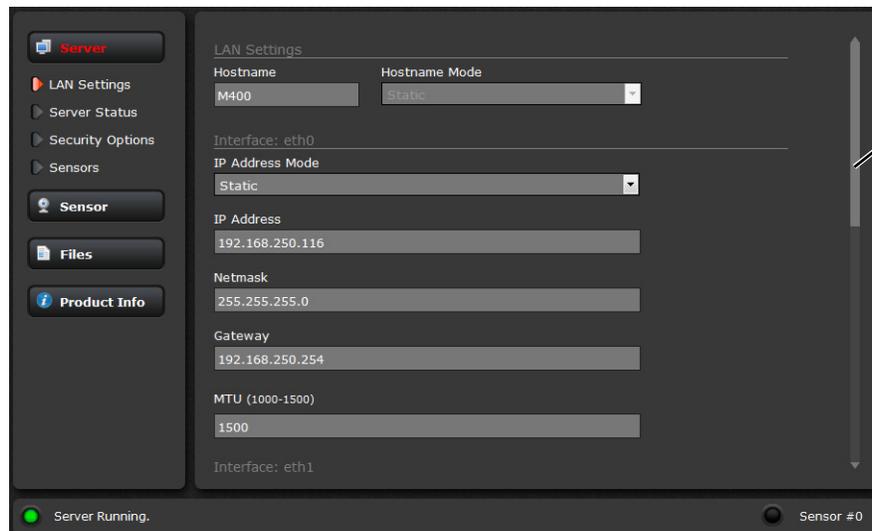


**Changing the IP Address of the Camera**

The admin and expert log in accounts can change LAN settings.

**Maintenance->Server->LAN Settings**

The M-Series system is shipped with DHCP IP address mode enabled. Some networks may require that a static IP address is set. The camera IP address, mask, and gateway is shown in the figure below. A Static option is selected with an IP address of 192.168.250.116.



Select the Static or DHCP option. The screen will refresh, enter the appropriate information for the network, then scroll down to select the Save button at the bottom of the page.

### Maintenance->Server->Security Options

Use the **Security Options** page to restrict access through the camera web server to specific IP addresses and to set and change passwords.

- To limit which computers have access to the web browser interface simply enter a computer's IP address and click **Add**. After all the allowed IP addresses are entered, select the Save button to save the changes.
- The **admin** log in, shown below, can use all screens and menus, reset all passwords, select to allow each of the log in accounts to change their own password, as well as restrict access to specific IP addresses.

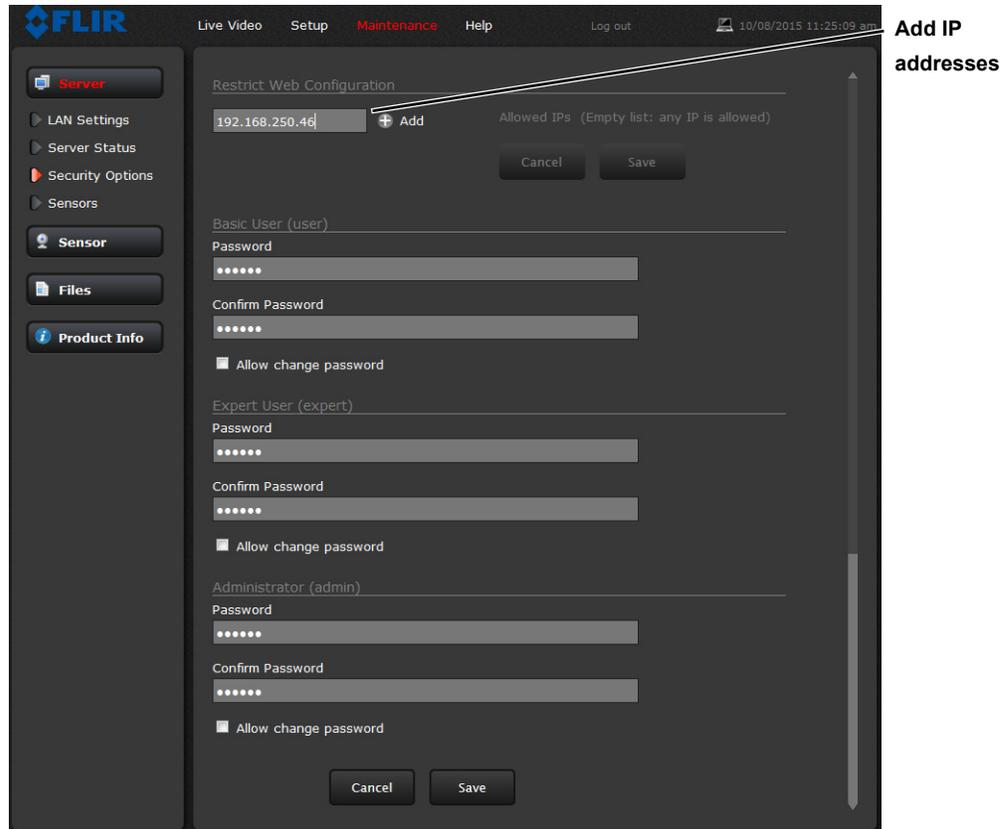


Figure 5-4: Security Options Page (admin log in)

To maintain security of the system set passwords for each of the three login accounts (requires the **admin** login).

After a password is set and confirmed, select the Save button at the bottom (scroll down the page, if necessary).

- The **expert** log in, shown below, can use the Live Video page, the Setup page, the Maintenance page Server menus, and can reset the **user** password or select to allow the **user** log in account to change their own password, as well as restrict access to specific IP addresses.

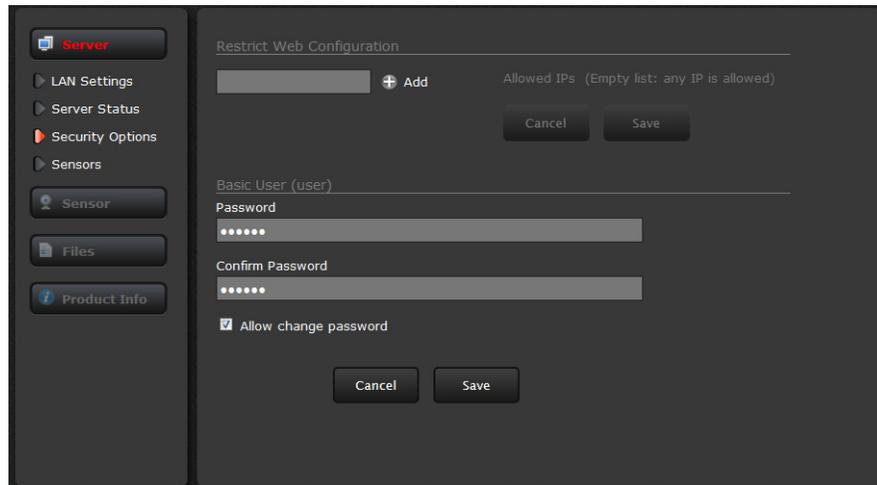
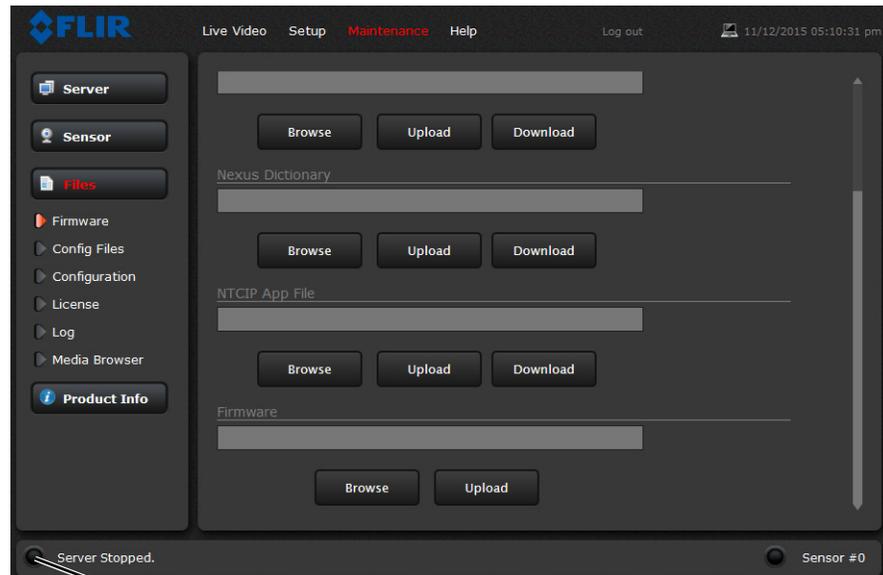


Figure 5-5: Security Options Page (expert log in)

## Firmware Update

When software updates become available, use the Firmware Update field to load the update to the camera. Contact the FLIR dealer where you purchased the camera for additional information, or contact FLIR directly.

### Maintenance->Files->Firmware



Click to stop server. The server must be stopped to upload or download any files.

## Accessing the JCU Web Interface

The JCU communicates through the Ethernet IP protocol just like the M-Series camera does.

### Changing the IP Address of the JCU

On the JCU, the IP address is displayed by pressing the COLOR button and pushing the joystick forward at the same time. The IP addresses of the JCU and the camera are displayed for 3 seconds and then the display returns to its state before the IP request was made.

On networks with specific requirements, you may need to assign the JCU a static IP address. Do this using steps similar to the way you changed the camera IP address:

1. Determine the JCU IP address by pressing the COLOR button and pushing the joystick forward at the same time. The IP address is shown on the JCU screen.
2. Type the JCU IP address into the address bar of the browser adding /index.html.  
for example: `http://192.168.250.110/index.html`  
The JCU Web page is shown, with a picture of the JCU.



FLIR  
1-888-747-3547  
[www.FLIR.com](http://www.FLIR.com)

### M-Series JCU Web Interface

**Firmware Update**  
Please specify a bin file:  
 No file chosen

**Network Addressing**  
 Dynamic  
 Static  
IP:  ?  
Mask:  ?



3. For Network Addressing, select Static.
4. Enter the new value in the IP field. The Network Mask should fill in automatically (255.255.255.0).
5. Click Save to save the changes and exit the Web page.

# M-Series Reference Information

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## Introduction

This chapter includes a glossary of acronyms, a list of symbols used in on-screen display, and other lists and tables that summarize system information, camera model features, and tips for troubleshooting issues.

- [Acronyms, pg. 50](#)
- [List of Icons, pg. 51](#)
- [System Specifications, pg. 52](#)
- [Feature Comparison of M-Series Models, pg. 53](#)
- [Troubleshooting Tips, pg. 54](#)
- [On-Screen Messages, pg. 56](#)
- [Restoring the Factory Network Settings, pg. 57](#)

## Acronyms

Table 6.1 lists each acronym that is used in this manual and its meaning.

**TABLE 6.1 Acronyms**

Acronym/Term	Definition
AGC	Automatic Gain Control
ANSI	American National Standards Institute
API	Application Programming Interface
DLTV	Daylight TV, used to reference visible-band cameras
EAR	Export Administration Regulations
EMI	Electromagnetic Interference
FFC	Flat Field Correction
FLIR	Forward Looking Infrared
FoV	Field of View
FPS	Frames per Second (refresh rate)
HFoV	Horizontal Field of View
ICD	Interface Control Document
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IP	Internet Protocol
IR	Infrared or thermal
JCU	Joystick Control Unit
LCD	Liquid Crystal Display
MFD	Multifunction display
NMEA	National Marine Electronics Association
NTSC	National Television System Committee
PAL	Phase Alternating Line
P/T	Pan/Tilt
PoE	Power over Ethernet
SCTE	Society of Cable Telecommunications Engineers
SDK	Software Developer's Kit
UPnP	Universal Plug and Play
VDC	Volts, Direct Current
VIS	Visible (visible band camera reference)

## List of Icons

Table 6.2 lists every icon that may display on the screen during various operations, with a brief description of its meaning. Some icons display permanently and some only display briefly. The display of some icons is affected by settings on the Symbology Menu (see page 26). The last four icons in this table display only on the camera model with stabilization.

**TABLE 6.2 Video Display Icons**

Icon	Name	Description
	Azimuth (Position)	Shows the azimuth (or direction) of the camera relative to the vessel. The shaded triangle shows the approximate camera field of view (FOV).
	Home	Indicates the camera is in the home position; the icon flashes when a new home position is set.
	Rearview Mode	Indicates camera is in rearview mode so that images are flipped horizontally.
	Scene: Night Running	One of four preset automatic gain control settings optimized for use on the open water at night.
	Scene: Night Docking	One of four preset automatic gain control settings optimized for use when the boat is docking at night.
	Scene: Day Running	One of four preset automatic gain control settings optimized for use on the open water during the day.
	Scene: Man Overboard	One of four preset automatic gain control settings optimized for providing visibility to small moving objects.
<b>Icons Used with Mechanical Stabilization</b>		
	Stabilization Off	Indicates the stabilization setting is disabled.
	Full Stabilization On	Indicates both vertical and horizontal stabilization is enabled.
	Vertical Stab Only	Indicates that vertical stabilization only is enabled and pan motion is not stabilized.

## System Specifications

Table 6.3 lists details about physical characteristics, power usage, and environmental features of your M-Series camera.

**TABLE 6.3 Specifications**

<b>Physical Characteristics</b>	
Camera Size	17.8 cm (7 in) diameter by under 29.2 cm (11.5 in) tall
Camera Weight	Under 5.4 kg (12 lb), depending on the camera model
Joystick Size	9.1 X 14.2 X 8.13 cm (3.6 X 5.6 X 3.2 in) 3.17 cm (1.25 in) above platform including joystick
Joystick Weight	.45 kg (1 lb)
<b>Power</b>	
Camera Input Power	12 Vdc to 24 Vdc nominal, 50 watt Max Absolute range 10 Vdc to 32 Vdc (-10%/+30% per IEC 60945)
Camera Output Power (to JCU)	Power Over Ethernet (PoE) per IEEE 802.3af 48 V mode B PoE, RJ45
JCU Input Power	Power over Ethernet (PoE) per IEEE 802.3af
Consumption	25 W Nominal 50 watt Max (dual payload)
<b>Environmental</b>	
Operating temperature range	-25 °C to +55 °C (-13 °F to +131 °F)
Storage temperature range	-40 °C to +85 °C (-40 °F to +185 °F)
Automatic Window defrost	Standard (automatic at unit power-up)
Sand/dust	Mil-Std-810E
Automatic Window de-icing	Standard (automatic at unit power-up)
Water Ingress	IPX6
Shock	15 g vertical, 9 g horizontal
Vibration	IEC 60945; MIL-STD-810E
Lightening Protection	Standard
Salt Mist	IEC 60945
Wind	100 knot (115.2 mph)
EMI	IEC 60945

## Feature Comparison of M-Series Models

The following table lists each M-Series model and its supported features. Each model is available in four variations, identified by a unique part number:

- <9 Hz thermal frame refresh rate (FPS), NTSC video format
- 30 Hz thermal frame refresh rate (FPS), NTSC video format

Model	Part Numbers	Camera Payload	Video Format	IR Video	Color Video (DLTV)	IR Video Resolution	IR Frame Refresh Rate	Mechanical Stabilization	HFoV	IR Continuous eZoom
M-324S	432-0003-66-00S	Single	NTSC	Yes	No	336 x 256	<9 Hz	Yes	24°	to 4x
	432-0003-66-00	Single	NTSC	Yes	No	336 x 256	30 Hz	Yes	24°	to 4x
	432-0003-67-00S <sup>a</sup>	Single	NTSC	Yes	No	336 x 256	<9 Hz	Yes	24°	to 4x
	432-0003-67-00 <sup>a</sup>	Single	NTSC	Yes	No	336 x 256	30 Hz	Yes	24°	to 4x
M-625S	432-0003-64-00S	Single	NTSC	Yes	No	640 x 480	<9 Hz	Yes	25°	to 4x
	432-0003-64-00	Single	NTSC	Yes	No	640 x 480	30 Hz	Yes	25°	to 4x
	432-0003-65-00S <sup>a</sup>	Single	NTSC	Yes	No	640 x 480	<9 Hz	Yes	25°	to 4x
	432-0003-65-00 <sup>a</sup>	Single	NTSC	Yes	No	640 x 480	30 Hz	Yes	25°	to 4x
M-324CS	432-0003-62-00S	Dual	NTSC	Yes	Yes	336 x 256	<9 Hz	Yes	24°	to 4x
	432-0003-62-00	Dual	NTSC	Yes	Yes	336 x 256	30 Hz	Yes	24°	to 4x
	432-0003-63-00S <sup>a</sup>	Dual	NTSC	Yes	Yes	336 x 256	<9 Hz	Yes	24°	to 4x
	432-0003-63-00 <sup>a</sup>	Dual	NTSC	Yes	Yes	336 x 256	30 Hz	Yes	24°	to 4x
M-625CS	432-0003-60-00S	Dual	NTSC	Yes	Yes	640 x 480	<9 Hz	Yes	25°	to 4x
	432-0003-60-00	Dual	NTSC	Yes	Yes	640 x 480	30 Hz	Yes	25°	to 4x
	432-0003-61-00S <sup>a</sup>	Dual	NTSC	Yes	Yes	640 x 480	<9 Hz	Yes	25°	to 4x
	432-0003-61-00 <sup>a</sup>	Dual	NTSC	Yes	Yes	640 x 480	30 Hz	Yes	25°	to 4x
M-617CS	432-0003-68-00S	Dual	NTSC	Yes	Yes	640 x 480	<9 Hz	Yes	17°	to 4x
	432-0003-68-00	Dual	NTSC	Yes	Yes	640 x 480	30 Hz	Yes	17°	to 4x
	432-0003-69-00S <sup>a</sup>	Dual	NTSC	Yes	Yes	640 x 480	<9 Hz	Yes	17°	to 4x
	432-0003-69-00 <sup>a</sup>	Dual	NTSC	Yes	Yes	640 x 480	30 Hz	Yes	17°	to 4x

a. Joystick Control Unit is not included. Camera and cables only.

## Troubleshooting Tips

This section includes information that may help you with common issues that may arise during operation of the M-Series system.

### Video not displayed on monitor

The camera will not display video if it is in standby mode. Power cycle the camera and allow the system to complete the boot cycle prior to JCU connection. Ensure the JCU is assigned to the camera, the camera ID appears in the JCU display, and the camera responds to JCU input (for example, pan/tilt movements).

If the camera will not produce an image, check the video connection at the camera and at your display. If the connectors appear to be properly connected but the camera still does not produce an image, ensure that power has been properly applied to the camera and circuit breaker is set properly. If a fuse was used, be sure the fuse is not blown.

Check the wiring at both the electrical panel and at the termination to the JCU. Ensure that the contacts are clean, dry and free from corrosion. If maintenance on the wiring connection is required, have an authorized service representative make the appropriate repairs.

If the camera still does not produce an image, contact the FLIR dealer or reseller who provided the camera, or contact FLIR directly (contact information is provided on the rear cover of this manual).

### Cleaning

If the camera lens has become smudged or dirty, clean it with low-pressure fresh water and a soft cloth. Improper care of the camera window can cause damage to its anti-reflective coating, degrade the camera's performance, and void the camera warranty.

The camera housing has a durable marine coating. Rinse the camera housing with very low-pressure fresh water to keep it clean. If the front window of the camera gets water spots, wipe it with a clean lens cloth folded in fourths and dampened with fresh water.

### Video not switching between thermal and visible (dual payload models)

On dual payload models, the display can be switched between the thermal camera and the visible camera either by pressing and holding the SCENE button, or, if the User Programmable Button is set to Switch IR/VIS Video, pressing the USER button. If neither of these operations causes the display to switch from the thermal camera to the visible-light camera, be sure the proper input channel is selected on the display, and be sure the cable labeled VIS/IR is connected to the display.

### Noisy image

A noisy image is usually attributed to a cable problem—too long or inferior quality—or the cable is picking up electromagnetic interference (EMI) from another device. Although coax cable has built-in losses, the longer the cable is or the smaller the wire gauge/thickness, the more severe the losses become; and the higher the signal frequency, the more pronounced the losses. Unfortunately this is one of the most common and unnecessary problems that plagues video systems in general.

Cable characteristics are determined by a number of factors such as core material, dielectric material and shield construction, among others and must be carefully matched to the specific application. Moreover, the transmission characteristics of the cable will be influenced by the

physical environment through which the cable is run and the method of installation. Use only high quality cable and ensure the cable is suitable to the marine environment.

Check cable connector terminations. Inferior quality connections may use multiple adapters that can cause unacceptable noise.

### **Image too dark or too light**

By default, the M-Series thermal camera uses an automatic gain control (AGC) setting that has proven to be superior for most applications. However, a specific environment may benefit from a different AGC setting. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate. You should keep the ocean, and not the sky or the boat, as the predominant object in the image. Refer to [SCENE Button, pg. 15](#) for information about how to make adjustments to the image.

### **Performance varies with time of day**

You may observe differences in the way the camera performs at different times of the day, due to the diurnal cycle of the sun. Recall that the camera produces an image based on temperature differences.

At certain times of the day, such as just before dawn, the objects in the image scene may all be roughly the same temperature, compared to other times of the day. Compare this to imagery right after sunset, when objects in the image may be radiating heat energy that has been absorbed during the day due to solar loading. Greater temperature differences in the scene generally will allow the camera to produce high-contrast imagery.

Performance may also be affected when objects in the scene are wet rather than dry, such as on a foggy day or in the early morning when everything may be coated with dew. Under these conditions, it may be difficult for the camera to show the temperature the object itself, rather than of the water coating.

### **Eastern or Western exposure**

While a boat is under way, the camera may inevitably end up pointing directly east or west, and this may cause the sun to be in the field of view during certain portions of the day. We do not recommend intentionally viewing the sun, but looking at the sun will not permanently damage the sensor. In fact the thermal imaging camera often provides a considerable advantage over a conventional camera in this type of back-lit situation.

However, the sun may introduce image artifacts that will eventually correct out and it may take some time for the camera to recover. The amount of time needed for recovery will depend on how long the camera was exposed to the sun. The longer the exposure, the longer the recovery time needed.

### **Image freezes momentarily**

By design, the camera image will freeze momentarily on a periodic basis during the flat field correction (FFC) cycle. A shutter activates inside the camera and provides a target of uniform temperature, allowing the camera to correct for ambient temperature changes and provide the best possible image. Just prior to the FFC, a small green square will appear in the upper left corner of the screen.

### **Multiple Cameras and/or JCUs on a single network**

You can configure your system with multiple cameras and multiple JCUs on the same network. More than one JCU can be used to control a given camera. The camera will respond to commands from both JCU's in the order the commands are received across the network. Unpredictable behavior may result from users sending conflicting commands from separate JCU's (for example, one user pans left and the other user pans right). In general, the camera will respond to the last command received and there is no way to set priority, given that IP networks use a "best effort" delivery protocol.

## **On-Screen Messages**

In some circumstances, a status or alert message may appear on the video screen. This section describes the messages and the appropriate actions that may be necessary.

Loading, please wait...

Indicates the camera has power and is booting up. No action is needed; the message will be removed when camera is ready for operation. Refer to [M-Series System Startup, pg. 19](#) for more information.

Reconnect network, now...

Indicates the camera has detected a loopback termination on the Ethernet RJ45 connector and has reverted to the Factory Default network settings. Remove the Ethernet RJ45 loopback termination adapter. The camera will then continue the startup process under the Factory Default network configuration (with DHCP dynamic IP addressing).

Warming, please wait...

Indicates the camera has detected a low temperature condition and does not allow pan/tilt motion until it is sufficiently warm. Wait for the camera to self-heat to an operational temperature (the amount of time varies depending on the outside temperature). The message is removed when camera is ready to operate.

High Temperature - Motor Halted

Indicates the camera has detected an over-temperature condition and has disabled the internal pan/tilt motor power. Confirm the temperature of the camera is within the allowed operational temperature range. Allow the camera to cool down to a temperature within the operating range.

High Temp. - Shutdown System #

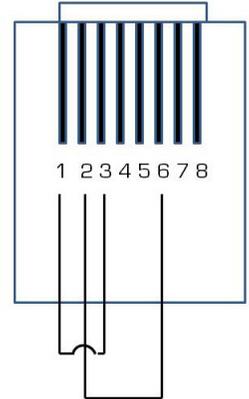
Indicates the camera has detected an over-temperature condition and must be shutdown. The # character displays a 5 second countdown. The user should confirm the temperature of the camera is within the allowed operational temperature range. Turn off the power to the camera and allow it to cool down to a temperature within the operating range. If the problem continues, contact FLIR.

## Restoring the Factory Network Settings

In some cases, it may be necessary to restore the network settings of the camera to the original factory settings. At each power up, the system transmits a packet and then checks to determine if that same packet has been received. Detection of the received packet indicates the camera has a custom loopback connector installed on its Ethernet interface. The detection of the loopback packet cues the camera to restore factory defaults and to revert to the same configuration and behavior as when the camera left the factory.

The following table describes the loopback connector.

Pin #	Signal	Tied to pin #
1	Transmit +	3
2	Transmit -	6
3	Receive +	1
4	Unused	N/A
5	Unused	N/A
6	Receive -	2
7	Unused	N/A
8	Unused	N/A



The RJ45 loopback termination ties pin 1 to pin 3, and pin 2 to pin 6. The other pins are not connected.

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