F-Series Camera

Installation Manual

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The F-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 if you have any questions.

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Document History

Revision	Date	Comment
100	February 2010	Initial Release
110	March 2010	Added FLIR Sensors Manager information
120	April 2010	Added IP66 and operating temperature to specifications
130	May 2010	Added Level 2 export statement
140	September 2010	Added inrush current and voltage specifications. Export version change.

This equipment must be disposed of as electronic waste.
Contact your nearest FLIR Commercial Vision Systems, Inc. representative for instructions on how to return the product to FLIR for proper disposal.

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1 F-Series Camera Installation

This manual describes the installation of the F-Series cameras. If you need help during the installation process, please call to speak with our support experts (877-773-3547).

This manual includes the following topics:

- Installation Overview
- Mounting the camera and its components
- Connecting the electronics

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

1.1 Warnings and Cautions

WARNING!

If mounting the F-Series camera on a pole, tower or any elevated location, use industry standard safe practices to avoid injuries.

Caution!

Except as described in this manual, do not open the F-Series camera 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 F-Series camera's infrared optics.

The F-Series camera requires a power supply of 24 Volts. Operating the camera outside of the specified input voltage range or the specified operating temperature range can cause permanent damage.

1.2 Installation Overview

The F-Series Camera is an infrared thermal imaging camera intended for outdoor applications, and can be installed in a fixed location or on a pan/tilt mechanism.

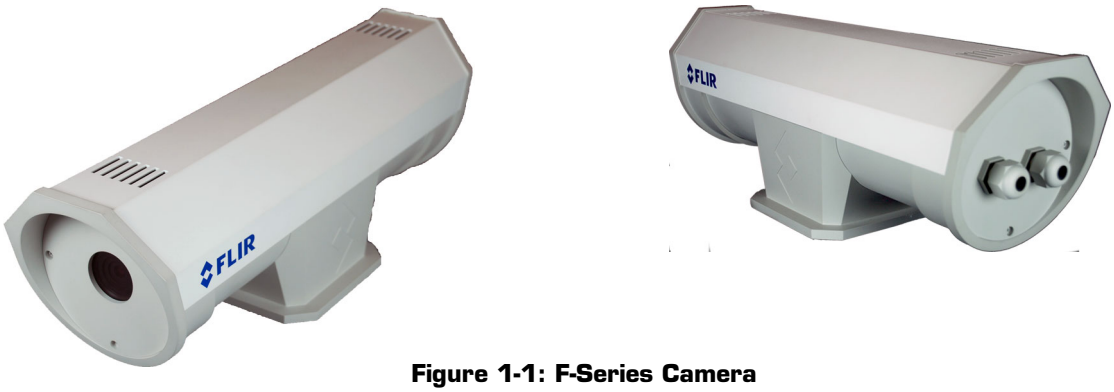


Figure 1-1: F-Series Camera

The F-Series camera is intended to be mounted on a medium-duty fixed pedestal mount or wall mount commonly used in the CCTV industry. Cables will exit from the back of the camera housing. The mount must support up to 30 lbs. (15 KG).

The F-Series is both an analog camera and an IP camera. The video from the camera can be viewed over a traditional analog video network, and it can be viewed by streaming it over an IP network using MPEG-4, M-JPEG and H.264 encoding. Analog video will require a connection to a video monitor or an analog matrix/switch. The IP video will require a connection to an Ethernet network switch, and a computer with the appropriate software for viewing the video.

The camera can be controlled through either serial or IP communications providing streaming video over an IP network.
The camera operates on 21 - 30 VAC or 21 - 30 VDC.

In order to access the electrical connections and install the cables, it is necessary to temporarily remove the back cover of the camera housing.

1.3 Installation Components

The F-Series camera includes these standard components:

- Fixed Camera Unit
- FLIR Sensors Manager CD
- F-Series Camera Documentation Package (including installation mounting templates)

The installer will need to supply the following items, the lengths of which are specific to the installation.

- Electrical wire, for system power; up to 100' (3-conductor, shielded, gauge determined by cable length and supply voltage; Refer to paragraph 1.7 "Electrical Connections and Schematics" on page 1-4 for additional information)
- Camera grounding strap
- Coaxial RG59U video cables (BNC connector at the camera end) for analog video
- Shielded Category 6 Ethernet cable for control and streaming video over an IP network; and also for software upgrades.
- Optional serial cable for serial communications
- Miscellaneous electrical hardware, connectors, and tools

1.4 Location Considerations

The camera will require connections for power, communications (IP Ethernet, and/or RS232/RS422}, and video.

Important Note

Install all cameras with an easily accessible Ethernet connection to support future software upgrades.

Refer to paragraph 1.7 “Electrical Connections and Schematics” on page 1-4 for interconnect diagrams showing system configurations.

Ensure that cable distances do not exceed the Referenced Standard specifications and adhere to all local and Industry Standards, Codes, and Best Practices.

1.5 Camera Mounting

F-Series cameras must be mounted upright on top of the mounting surface, with the base below the camera. The unit should not be hung upside down.

The F-Series camera can be secured to the mount with three to five 1/4-20 bolts or studs as shown below.

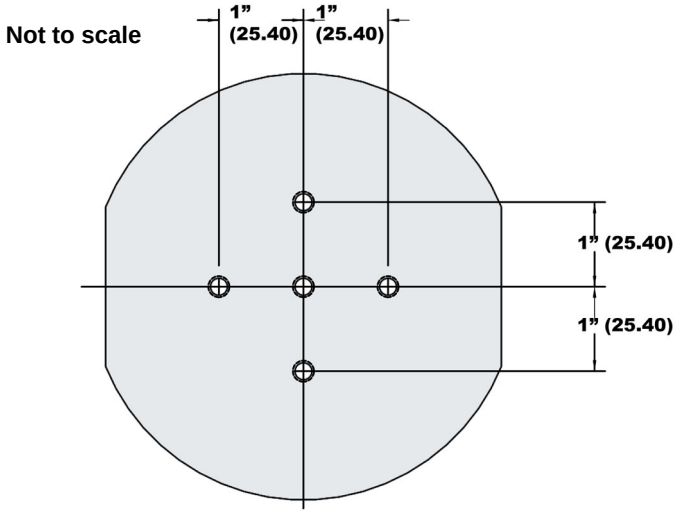


Figure 1-2: F-Series Camera Mounting Holes

Once the mounting location has been selected, verify both sides of the mounting surface are accessible.

Important Note

If the camera is to be mounted on a pole or tower or other hard-to-reach location, connect and operate the camera as a bench test at ground level prior to mounting the camera in its final location.

Use a thread locking compound such as Loctite 242 or equivalent with all metal to metal threaded connections.

Using the template supplied with the camera as a guide, mark the location of the holes for mounting the camera.

If the template is printed, be sure it is printed to scale so the dimensions are correct.

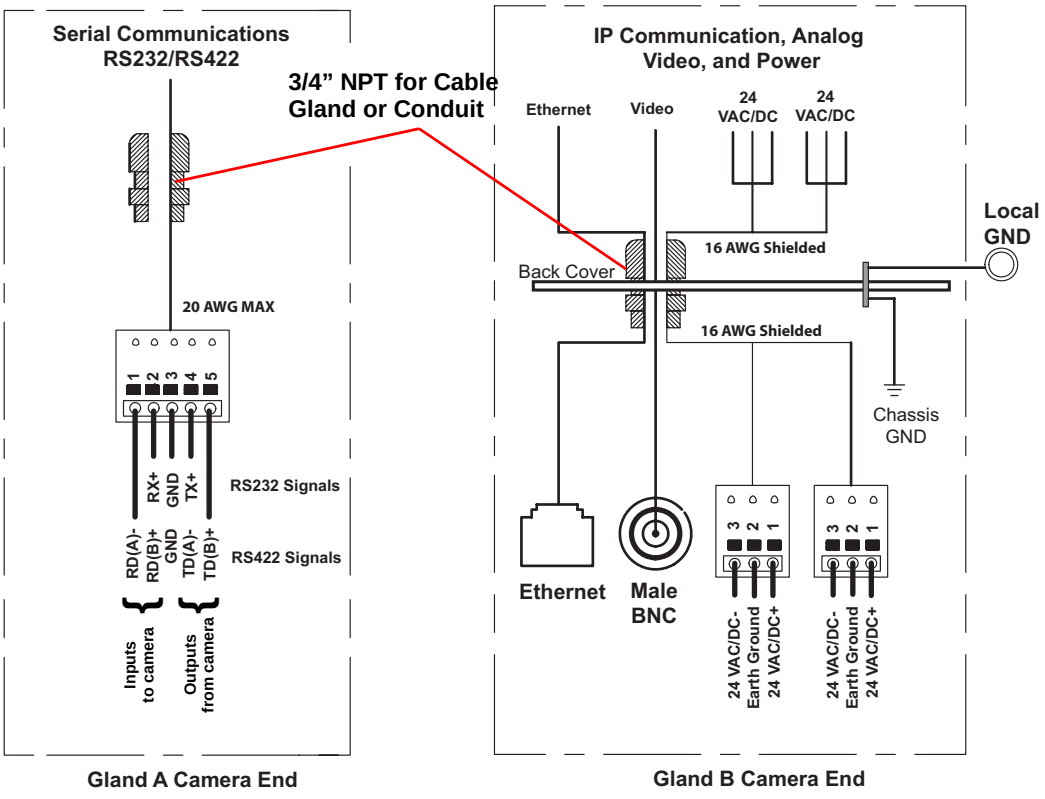
Once the holes are drilled in the mounting surface, install three (3) to five (5) 1/4-20 bolts or threaded studs into the base of the camera with thread-locking compound.

1.6 Prior to Cutting/Drilling Holes

When selecting a mounting location for the F-Series camera, consider cable lengths and cable routing. Ensure the cables are long enough, given the proposed mounting locations and cable routing requirements, and route the cables before you install the components.

Use cables that have sufficient dimensions to ensure safety (for power cables) and adequate signal strength (for video and communications).

1.7 Electrical Connections and Schematics



1.8 Removing the back of the camera

Use a 3 mm hex key to loosen the four captive screws, exposing the connections at the back of the camera enclosure. There is a green/yellow stripe grounding wire connected between the case and the back cover as shown.

Ensure the camera is properly grounded. Typical to good grounding practices, the camera chassis ground should be provided using the lowest resistance path possible. FLIR requires using a grounding strap anchored to the grounding lug on the back plate of the camera housing and connected to the nearest earth-grounding point.

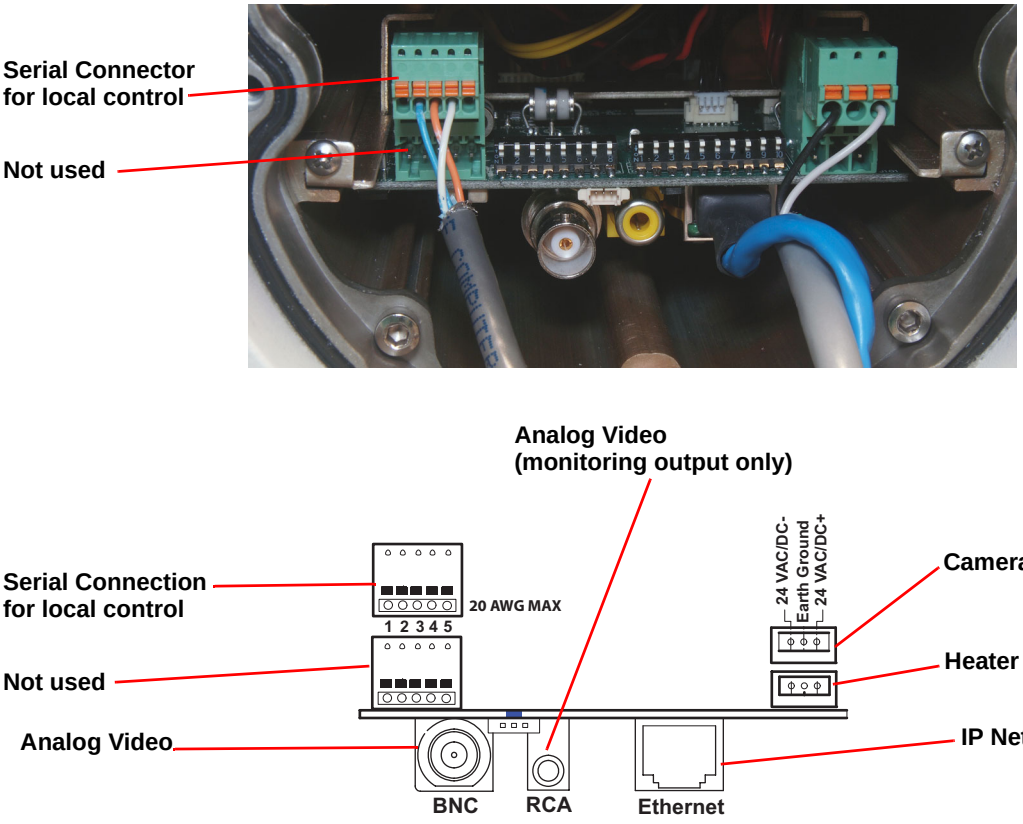


Figure 1-3: F-Series Camera Connections

1.9 Connecting power

The camera itself does not have an on/off switch. Generally the F-Series camera will be connected to a circuit breaker and the circuit breaker will be used to apply or remove power to the camera. If power is supplied to it, the camera will be in one of two modes: Booting Up or Powered On.

The power cable supplied by the installer must use wires that are sufficient size gauge (16 AWG recommended) for the supply voltage and length of the cable run, to ensure adequate current carrying capacity. Always follow local building codes!

Note

The terminal blocks for power connections will accept a maximum 16 AWG wire size.

1.10 Video Connection

The analog video connection on the back of the camera is a BNC connector.

The video cable used should be rated as RG59U or better to ensure a quality video signal.

1.11 Ethernet Connection

The cable gland seal is designed for use with Shielded Category 6 Ethernet cable.

1.12 Serial Connections

The camera supports RS-422 and RS-232 serial communications using common protocols (Pelco D, Bosch). For configuration settings see paragraph 1.13 “Setting Configuration Dip Switches” on page 1-8.

Note

The terminal blocks for serial connections will accept a maximum 20 AWG wire size.

1.12.1 Pelco D Commands

The following commands are given with the Pelco ID 01 (the second byte) and the last byte is a checksum that will change with a changing Pelco ID.
The rest is fixed.

Pelco Command	Command	F-Series
Zoom out	FF 01 00 40 00 00 41	Zoom out Electronically
Zoom in	FF 01 00 20 00 00 21	Zoom in Electronically
Aux 1 on	FF 01 00 09 00 01 0B	Black Hot
Aux 1 off	FF 01 00 0B 00 01 0D	White Hot
Aux 3 on	FF 01 00 09 00 03 0D	Toggle Plateau Values
Aux 3 off	FF 01 00 0B 00 03 0F	Toggle AGC Type
Aux 4 off	FF 01 00 0B 00 04 10	IR FFC
Aux 5 off	FF 01 00 0B 00 05 11	Toggle LUT Pallette
Aux 6 on	FF 01 00 09 00 06 10	Toggle DDE Gain
Aux 6 off	FF 01 00 0B 00 06 12	Toggle AGC ROI
Aux 7 on	FF 01 00 09 00 07 11	Toggle:MID ITT
Aux 7 off	FF 01 00 0B 00 07 13	Toggle Max Gain

Table 1-1: Pelco D AUX Structure

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Sync Byte	Address	Command 1	Command 2	Data 1	Data 2	Checksum
FF	Desired Pelco Address	00	09/0B = On/Off	00	AUX #	Hex Sum of Bytes 2-6

1.13 Setting Configuration Dip Switches

The figure below shows the locations of dip switches SW101 and SW102.

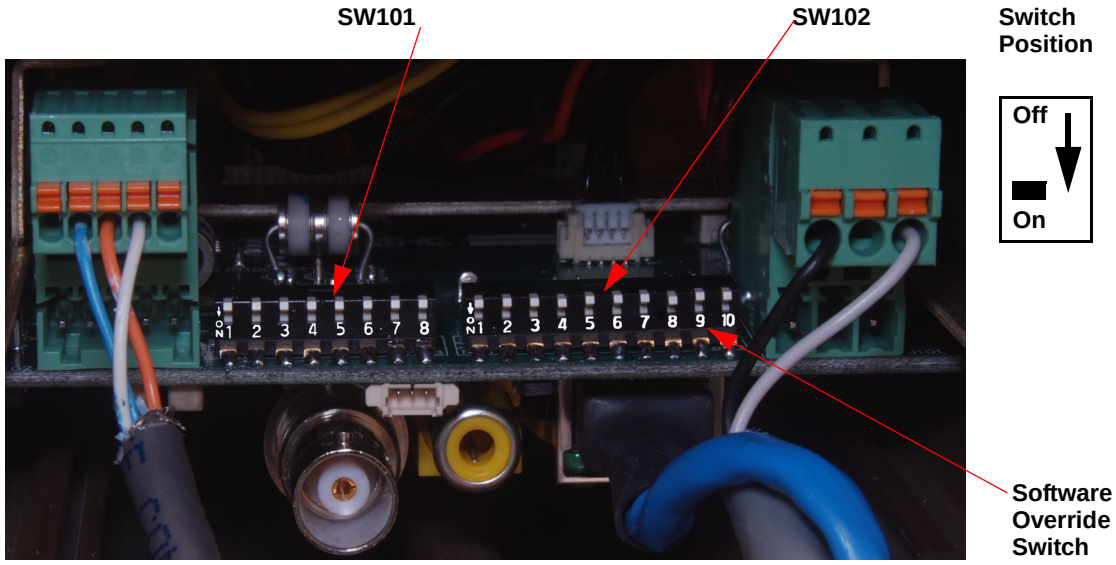


Figure 1-4: F-Series Camera Configuration

Note

The dip switch settings only control the serial communication settings when the Software Override switch (SW 102, bit 9) is set to ON. Refer to paragraph "Software Override of DIP Switches:" on page 1-9

Pelco Address: This is the address of the system when configured as a Pelco device. The available range of values is from decimal 0 to 255.

Table 1-2: Dip Switch Address/ID Settings—SW101

ID	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF
…	…	…	…	…	…	…	…	…
255	ON	ON	ON	ON	ON	ON	ON	ON

Power Board Switch Layout and Control. The tables below defines the switch locations, bit numbering and on/off settings.

Table 1-3: Dip Switch Settings—SW102

	Settings		Description
Baud Rate: This is the baud rate of the system user serial port. The available values are 2400, 4800, 9600, 19200 kbaud.	**Bit 1**	**Bit 2**	
	OFF	OFF	2400
	ON	OFF	4800
	OFF	ON	9600
	ON	ON	19200
Camera Control Protocol: This is the communication protocol selected for the system when operating over the serial port. The available protocols are Pelco-D and Bosch.	**Bit 3**	**Bit 4**	
	OFF	OFF	Pelco-D
	ON	OFF	NA
	OFF	ON	Bosch
	ON	ON	NA
Serial Communication Standard: This determines the electrical interface selected for the user serial port. The available settings are RS422 and RS232.	**Bit 5**	**Bit 6**	
	OFF	OFF	NA
	ON	OFF	RS422
	OFF	ON	RS232
	ON	ON	NA
Preset Octave: This setting determines which preset octave is used for mapping Pelco command sets. There are four available settings; section 1, section 2, section 3, and section 4.	**Bit 7**	**Bit 8**	
	OFF	OFF	Section1
	ON	OFF	Section2
	OFF	ON	Section3
	ON	ON	Section4
Software Override of DIP Switches: This setting determines whether the system will use the dip switches for configuration or if software settings will override the dip switch settings.	**Bit 9**		
	OFF		Software select
	ON		Hardware select
Not Used	**Bit 10**		
	X		

1.14 F-Series Camera Specifications

Camera Platform Type	Fixed		
THERMAL CAMERA SPECS			
Detector Type	Long-Life, Uncooled VOx Microbolometer		
Pixel Pitch	25 µm		
Focal Length (lens/model dependent)	9 mm, 13 mm, 19 mm	9 mm, 13 mm, 19 mm, 35 mm, 65 mm, 100 mm	21.5 mm, 35 mm
Field Of View (lens/model dependent)	24° x 20° (F-124; 9 mm) 17° x 14° (F-117; 13 mm) 12° x 10° (F-112; 19 mm)	48° x 39° (9 mm) 34° x 28° (13 mm) 24° x 19° (19 mm) 13 °x 10° (35 mm) 7° x 5° (65 mm) 4.6° x 3.7° (100 mm)	41° x 33° (21.5 mm) 26° x 21° (35 mm)
Zoom	2x E-zoom		
Spectral Range	7.5 µm to 13.5 µm		
Focus Range	Athermalized, focus-free		

OUTPUTS	
Composite Video NTSC or PAL	Standard
Video Over Ethernet	Two independent channels of streaming MPEG-4, H.264, or M-JPEG
CONTROL	
Point To Point (stand alone)	Standard
Ethernet	Standard
Serial	RS-232/-422; Pelco D, Bosch
Network Enabled	Standard
GENERAL	
Weight	9.5 lb (configuration dependent)
Dimensions (L,W,H)	18.1" x 5.5" x 6.3" (460 mm x 140 mm x 160 mm)
Power Requirements	24 VAC (21-30 VAC) 24 VDC (21-30 VDC)
Power Consumption	24 VAC: 15 VA max no heater, 51 VA max w/heater 24 VDC: 10 W max no heater, 46 W max w/heater
Inrush Current	<5 A for DC power supply with slew rate > 10 ms <19 A for AC power supply with slew rate > 4.17 ms

Note

Power consumption is independent of the input voltage when the heater is off. The power drawn by the heaters increases with the input voltage to a maximum at 30 Volts.

2 Verify Camera Operation

Prior to installing the camera, use a bench test to verify camera operation and configure the camera for the local network.

The camera provides analog video and can be controlled through either serial or IP communications providing streaming video over an IP network.

2.1 Power and analog video

Step 1 Connect the power, video, and serial cables to the camera as described in paragraph 1.7 “Electrical Connections and Schematics” on page 1-4.

Step 2 Connect the video cable from the camera to a display/monitor and connect the power cable to a power supply.
The camera operates on 21 - 30 VAC or 21 - 30 VDC.
Verify that video is displayed on the monitor.

Step 3 Connect the serial cable from the camera to a serial device such as a keyboard, and confirm that the camera is responding to serial commands. For more information about the supported serial commands, refer to paragraph 1.12 “Serial Connections” on page 1-7.

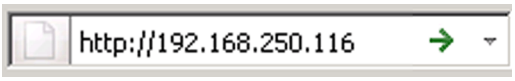
2.2 IP Communications

As shipped from the factory, the F-Series camera has an IP address of 192.168.250.116 with a netmask of 255.255.255.0.

Step 1 Configure a laptop or PC with another IP address from this network (for example, 192.168.250.1).

Step 2 Connect the camera and the laptop to the same Ethernet switch (or back-to-back with an Ethernet crossover cable).[1]

Step 3 Open a web browser, enter **http://192.168.250.116** in the address bar, and press Enter.



The Web Configurator will start at the Login screen.

Step 4 Enter **basic** as the User and click **Login**.
No password is required. Refer to paragraph 2.4 “F-Series Configuration” on page 2-5.

Prior to logging in to the Web Configurator tool and making changes to the configuration, it may be wise to bench test the camera with the FLIR Sensors Manager software using the factory configured IP address. Refer to paragraph 2.3 “Using FLIR Sensors Manager (FSM)” on page 2-2.

1. In some cases, a straight Ethernet cable can be used, because many PCs have auto detect Ethernet interfaces.

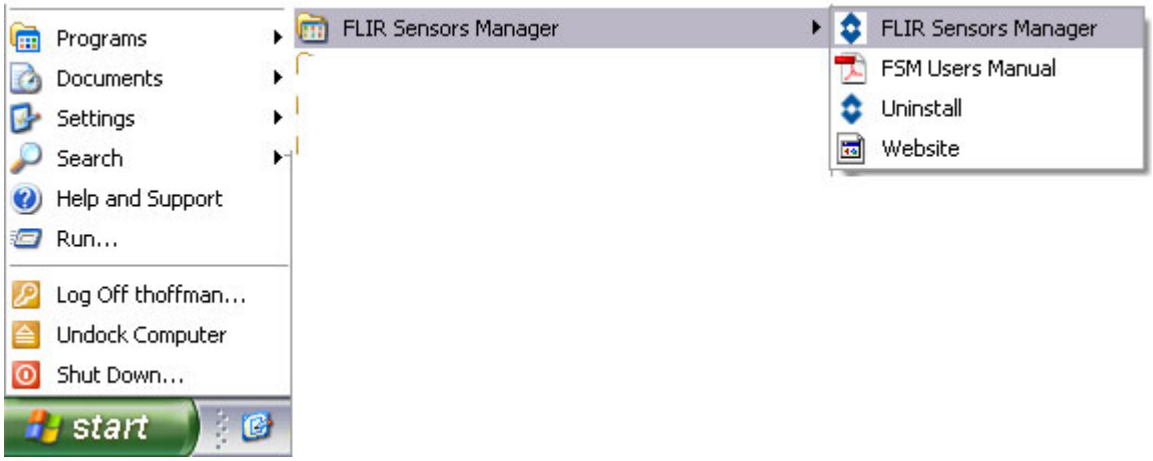
2.3 Using FLIR Sensors Manager (FSM)

The following provides a brief description of how to use FSM to control a camera and stream video from the camera. For more detailed information on how to use FSM, refer to the FLIR Sensors Manager User Manual.

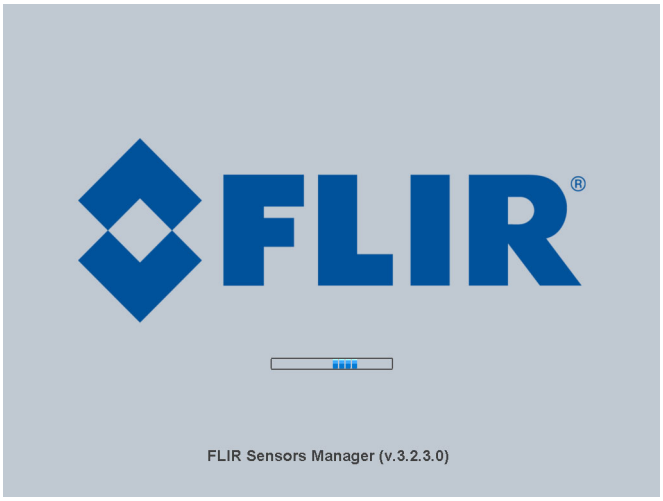
If the FSM software has not been installed yet, locate the CD that came with the camera and install it on the PC.

2.3.1 Running FSM

Step 1 Run the FSM software by double clicking the icon on the desktop, or click on the Windows Start button and select Programs > FLIR Sensors Manager > FLIR Sensors Manager.

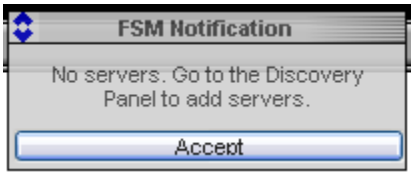


Initially the FLIR Sensors Manager splash screen will be displayed. The software version may be different than the version displayed below.



After a brief while, the FSM main window will appear, and a popup FSM Notification window will appear in the lower right of the screen indicating that no cameras (servers) have been discovered yet.

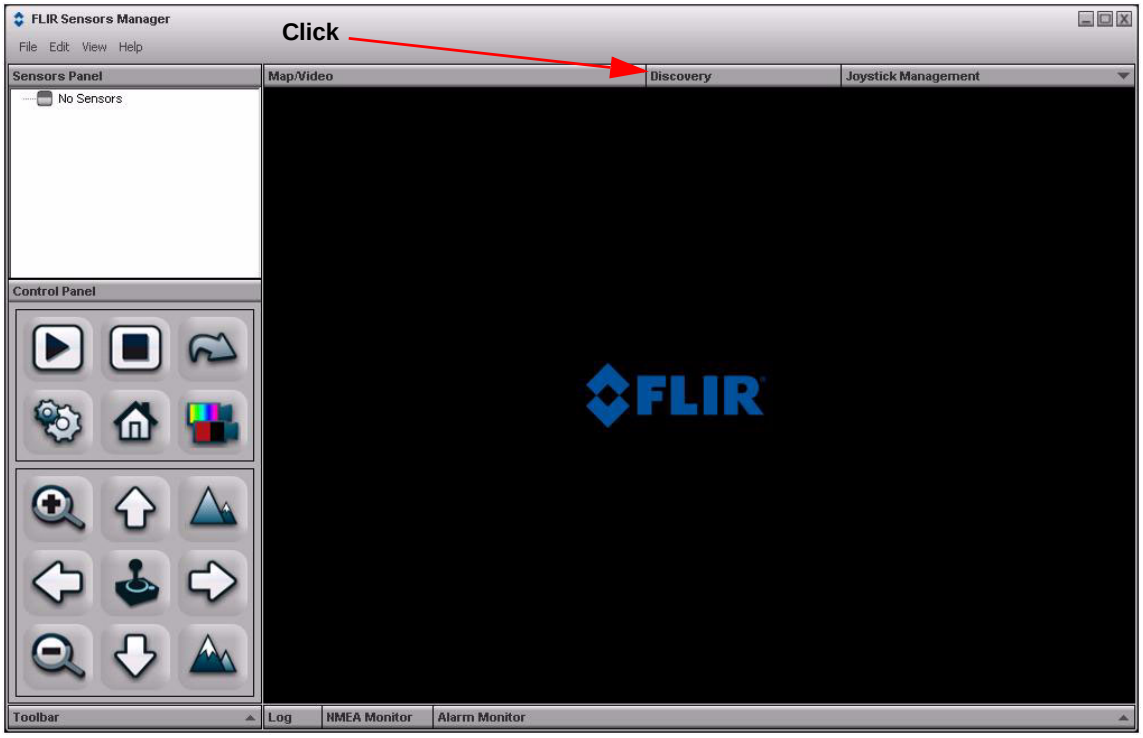
Step 2 Click on the Accept button to acknowledge the notification.



The FLIR Sensors Manager uses a “client/server” architecture. The FSM software is considered a client, and the cameras are considered servers or sensors.

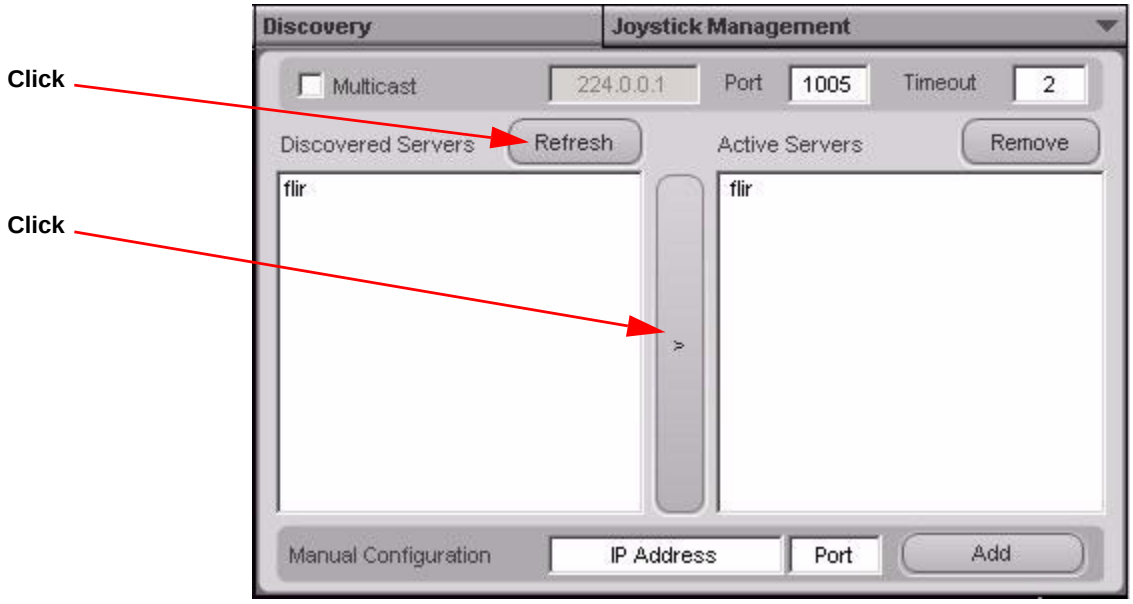
The Sensors Panel indicates no sensors have been discovered and added to the list of Active Sensors.

Step 3 Click on the **Discovery** button along the top of the window to bring up the Discovery Panel. The FSM software can automatically discover FLIR cameras on the network.



Step 4 When the Discovery Panel is displayed, click Refresh.
The FLIR camera will appear in the list of Discovered Servers. The camera will be called “flir”, and the asterisk in parenthesis “(*)” indicates the camera has not been added to the list of Active Servers on the right.

Step 5 Click on the center bar “>” to move the camera over to the list of Active Servers on the right as shown below.



Once the camera has been added to the list of Active Servers, you can click on the Discovery button again to close the Discovery Panel.

By default, the FSM software will automatically discover sensors in the network, connect to the first camera it finds, take control of the camera, and display the video from the camera in Video Wall 0 on the main FSM window.

Step 6 Confirm that video is streamed to the monitor and it is possible to control the camera using the zoom controls and so on. For example, click on the zoom button (magnifying glass with +), and the video will zoom to 2X. Once operation of the camera has been confirmed, the camera can be configured to an IP address that matches the installation network.

2.4 F-Series Configuration

After logging in, the Help screen is displayed. This screen has information about the camera including hardware and software revision numbers, part numbers, and serial numbers. If you need to contact FLIR for support, this information will be useful to the support engineer. Use the Menu entries at the left of the screen shown in Figure 2-1 to configure the F-Series camera.

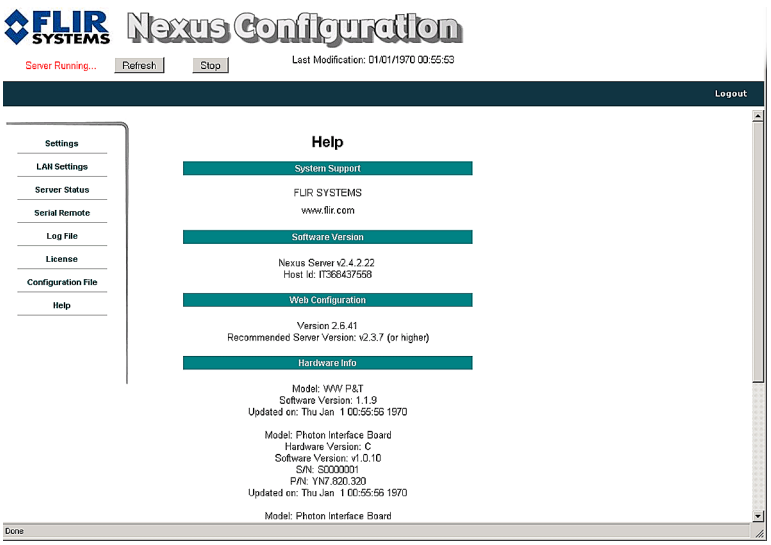


Figure 2-1: Web Configurator Help Screen

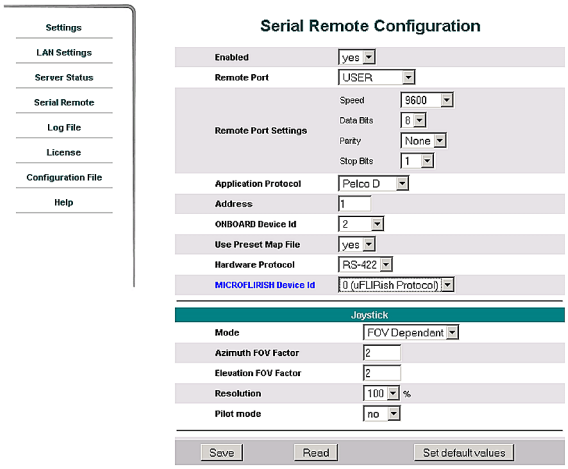
The following paragraphs show the pages for setting serial communication parameters and setting a new IP address for a camera on a local area network.

Serial Remote

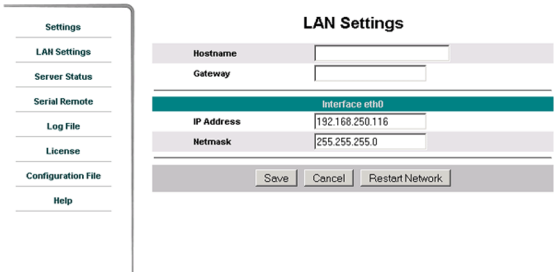
Step 1 Click **Serial Remote**. The screen at the right will be displayed.

Step 2 Enter the parameters for your serial control configuration.

The settings you make in this screen will only become active when the Software Override DIP switch is set OFF to allow software settings to override the DIP switch settings. Refer to paragraph 1.13 “Setting Configuration Dip Switches” on page 1-8.



Lan Settings



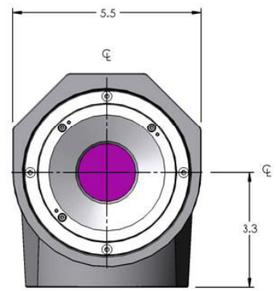
Step 1 Click **LAN Settings**. The screen at the right will be displayed.

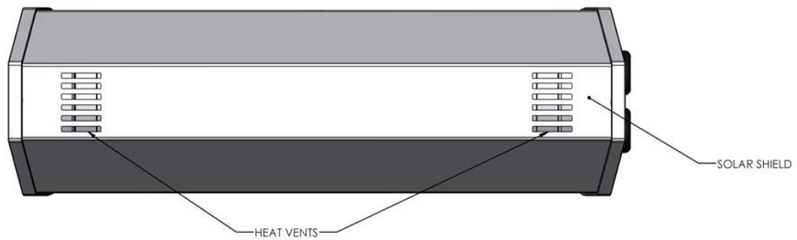
Step 2 Enter the Hostname, Gateway, IP Address, and Netmask that are appropriate for the local area network. Then click Save.

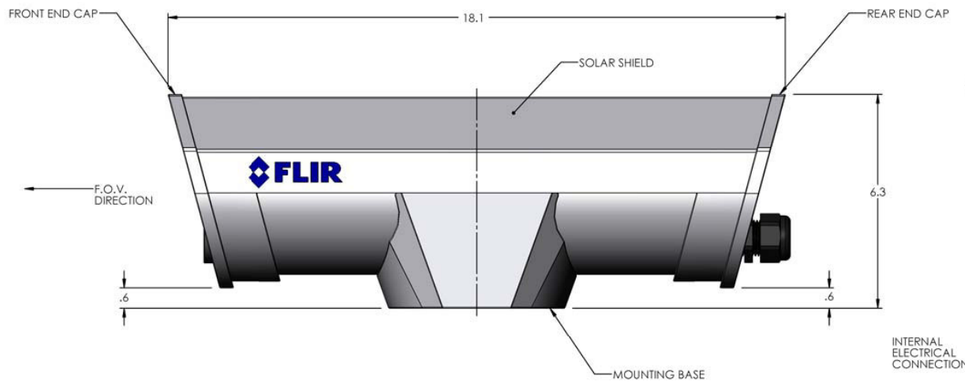
A message will appear indicating the IP address has been changed and the browser will no longer be able to communicate with the camera. You must connect the camera to an appropriate local area network (LAN) and connect to the camera using its new IP address.

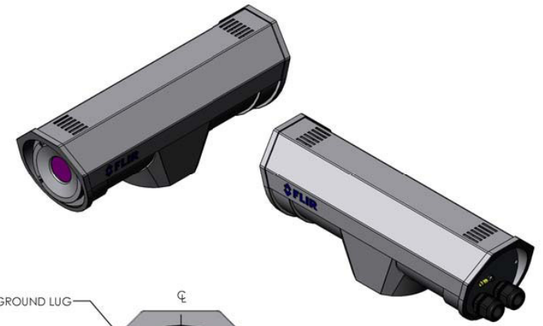
A Mechanical ICD Reference

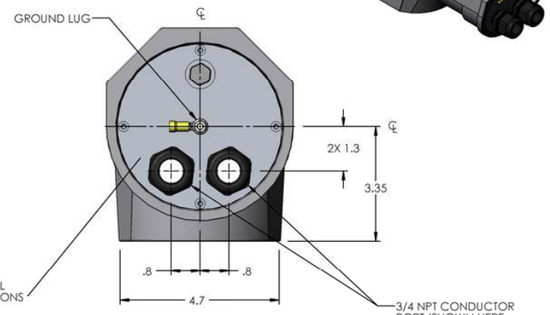
The following Mechanical Control Documents detail the outline and mounting for the F-Series cameras. These documents are provided for reference only. You should consult your local sales representative or application engineer to obtain current ICD information. Also, the F-Series Thermal Imaging Camera Core Data Sheet available from the website contains important mechanical interface data as well.

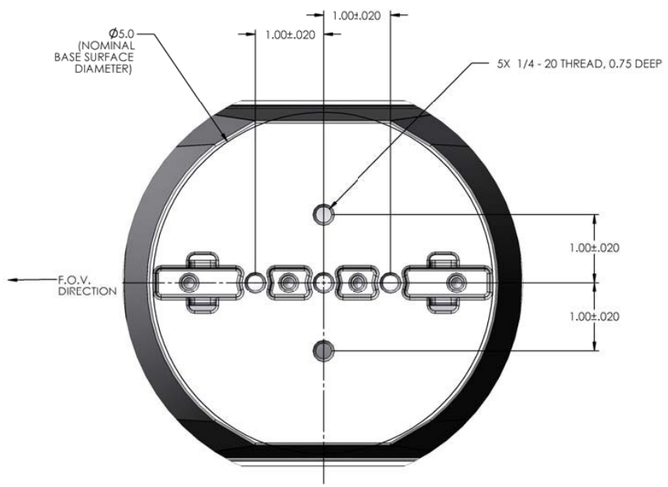






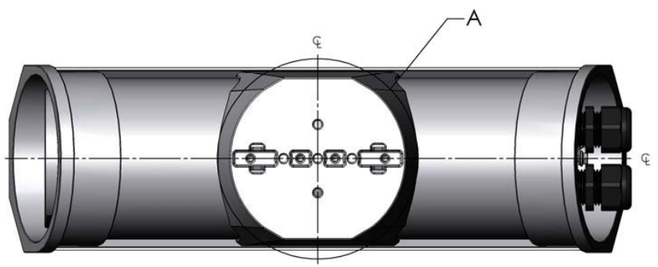






5-HOLE MOUNTING CONFIGURATION

DETAIL A
SCALE 1 : 1



F-Series Camera Mechanical Interface Control Document Sheet 1