F-Series Camera

Installation Manual

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Document History

Revision	Date	Comment
100	February 2010	Initial Release
110	July 2010	Added FLIR Sensors Manager information
120	August 2010	Added IP66 and operating temperature to specifications
130	September 2010	Changed the power consumption specifications, added inrush current specification,
140	November 2010	Changed camera model specifications. Added export statement.
150	January 2012	Increased operating temperature range specification to -50°C through 70°C. Added FCC and EMC radio emissions notices, additional software functionality, and export control changed to EAR 1.

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.

Federal Communications Commission Regulatory Information

Modification of this device without the express authorization of FLIR Commercial Systems, Inc., may void the user's authority under the FCC Rules to operate this device.

Note 1: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Shielded cables must be used to connect this device to other devices.

Note 2: If ferrites are supplied with this equipment, the equipment was tested for compliance with the FCC limits for a Class A digital device using power cables with the ferrites installed. When connecting one or two power cables to the equipment, the supplied ferrites must be used with this equipment.

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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, contact your local FLIR service representative or, call 877-773-3547 inside the US.

This manual includes the following topics:

- Installation overview
- Mounting the camera and its components
- Connecting the electronics
- Bench testing the camera
- Basic configuration and operation of the camera

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 camera.

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.

Shipping plugs only - Remove before installing

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.
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
• Cable Glands and Spare Parts kit
• 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 1.7.3 "Cable Gland Seal Inserts" on page 1-5 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 1.7.3 "Cable Gland Seal Inserts" on page 1-5 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 shall 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.
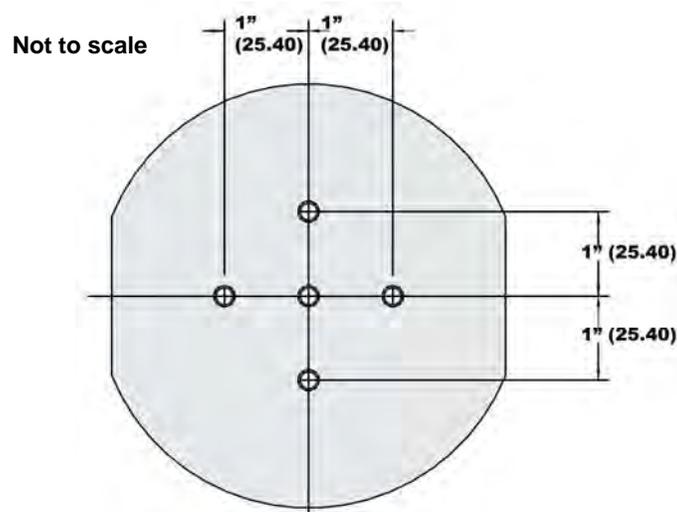
Figure 1-2: F-Series Camera Mounting Holes

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   Removing the Back Cover

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 grounding wire connected between the case and the back cover as shown.

1.7.1   Cable Gland Sealing

Proper installation of cable sealing glands and use of appropriate elastomer inserts is critical to long term reliability. Cables enter the camera mount enclosure through liquid-tight compression glands. Be sure to insert the cables through the cable glands on the enclosure before terminating and connecting them (the connectors will not fit through the cable gland). Leave the gland nuts loosened until all cable installation has been completed. Inspect and install gland fittings in the back cover with suitable leak sealant and tighten to ensure water tight fittings. Teflon tape or pipe sealant (i.e. DuPont RectorSeal T™) are suitable for this purpose.

1.7.2   Cable Glands and Spare Parts Kit

The kit contains the two 3/4" cable glands and gland seal plugs required for non-conduit installations.

The remaining parts included in the kit are:

• a spare ground wire
• a spare ground nut and lock washer
• two spare power terminal block plugs
• two spare serial port terminal block plugs
• four spare F-Series back cover screws
• four spare PT-Series back cover screws

1.7.3   Cable Gland Seal Inserts

The F-Series camera comes with two 3/4"
NPT cable glands, each with a three hole
gland seal insert. Cables may be between
0.23" to 0.29" od. Typically up to five cables
may be needed. Plugs are required for any
insert hole(s) not being used. The photograph
at the right shows two power cables, an
Ethernet cable, a serial control cable (no
analog video is installed), and two gland seal
plugs.

If non-standard cable diameters are used, you
may need to locate or fabricate the
appropriate insert to fit the desired cable.
FLIR Commercial Systems, Inc. does not
provide cable gland inserts other than what is
supplied with the system.

Note

> Insert the cables through the cable glands on the enclosure before terminating and
> connecting them. (In general, the terminated connectors will not fit through the cable gland.)
> If a terminated cable is required, you can make a clean and singular cut in the gland seal to
> install the cable into the gland seal.
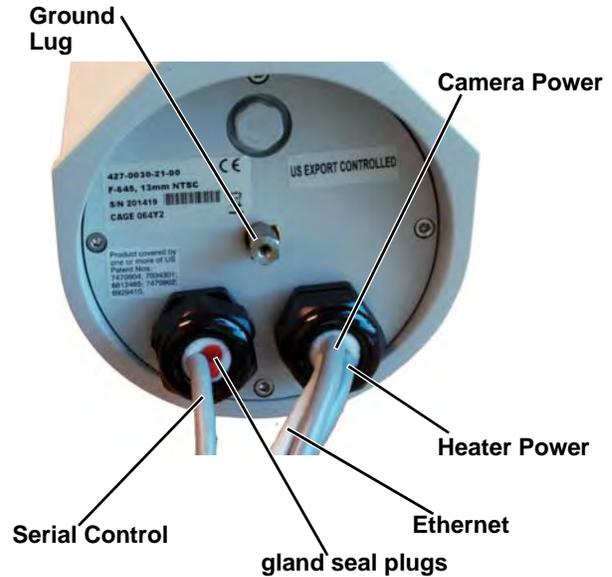
1.8   Electrical Connections and Schematics
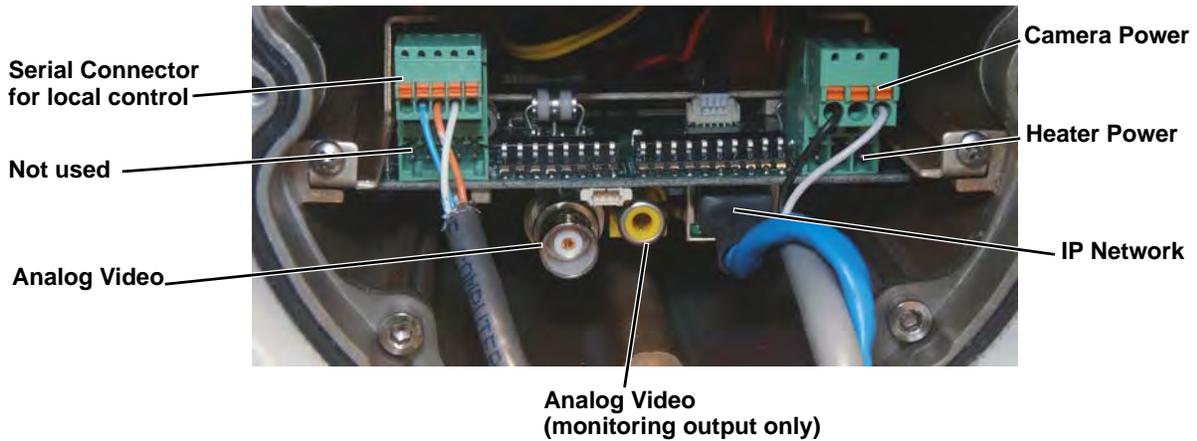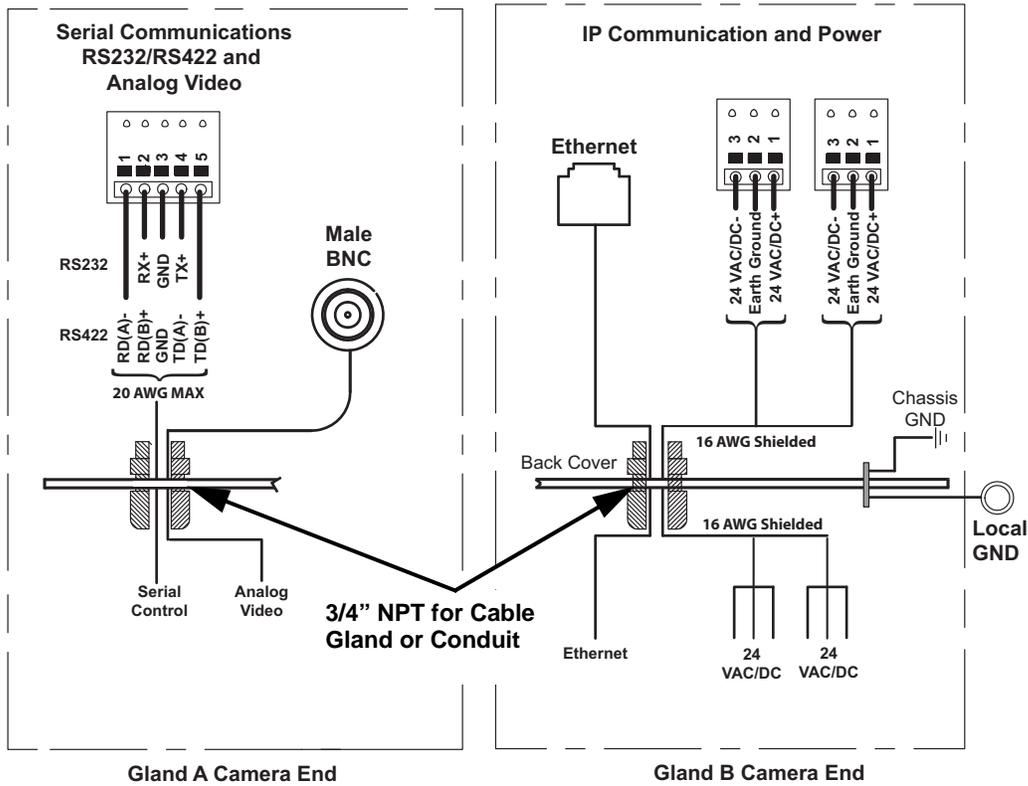
Figure 1-3: F-Series Camera Connections

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!

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.

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 camera also provides an RCA video connector that can be used to temporarily monitor the video output, without disconnecting the BNC connection.

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 Communications Overview

The camera supports a limited set of zoom and focus commands over RS-422 or RS-232 serial communications using common protocols (Pelco D, Bosch). The serial communication configuration parameters can be set by means of hardware DIP switches, or through software using a web browser. By default, the camera is configured for RS-422 standard, 9600 Baud, 8 bits, no parity, 1 stop bit, using the Pelco D protocol, and address 1.

For information about how to configure the camera for serial communications, refer to paragraph 3.4 "Serial Communications Quick Guide" on page 3-11.

Note

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

Connect the wires of the serial cable as described in paragraph 1.8 "Electrical Connections and Schematics" on page 1-6. When using the RS-422 standard, ensure that the transmit pair of the camera goes to the receive pair of the other device, and vice versa.

1.13 F-Series Camera Specifications

THERMAL CAMERA SPECS

Resolution	160 x 120	320 x 240	640 x 480
Detector Type	Long-Life, Uncooled VOx Microbolometer		
Pixel Pitch	25 µm	25 µm	17 µm
Focal Length (lens/model dependent)	9 mm, 13 mm, 19 mm	9 mm, 13 mm, 19 mm, 35 mm, 65 mm, 100 mm	13 mm, 25 mm, 35 mm, 50 mm, 65 mm, 100 mm
Field Of View (lens/model dependent)	24° × 20° (F-124; 9 mm) 17° × 14° (F-117; 13 mm) 12° × 10° (F-112; 19 mm)	48° × 39° (F-348; 9 mm) 34° × 28° (F-334; 13 mm) 24° × 19° (F-324; 19 mm) 13° × 10° (F-313; 35 mm) 7° × 5° (F-307; 65 mm) 4.6° × 3.7° (F-304; 100 mm)	45° × 37° (F-645; 13 mm) 25° × 20° (F-625; 25 mm) 18° × 14° (F-618; 35 mm) 12° × 10° (F-612; 50 mm) 10° × 8° (F-610; 65 mm) 6.2° × 5° (F-606; 100 mm)
Zoom (model dependent)	2× E-zoom	2× & 4× E-zoom	2× & 4× 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" × 5.5" × 6.3" (460 mm × 140 mm × 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

ENVIRONMENTAL

Dust, Water Protection Rating	IP66
Operating Temperature Cold start	-50°C to +70°C (-58°F to +158°F); -40°C to +70°C (-40°F to +158°F)

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.

2.1   Power and analog video

Step 1   Remove the rear cover and connect the power, video, and serial cables to the camera as required. See "Electrical Connections and Schematics" on page 1-6.

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.

Before using serial communications, it may be necessary to configure the serial device interface to operate with the camera. When the camera is turned on, the video temporarily displays system information including the serial number, IP address, Pelco address, Baud rate, and setting of the serial control DIP switch: SW - software control (the default) or HW - hardware.

S/N: 1234567
IP Addr: 192.168.250.116
PelcoD (Addr:1): 9600 SW

2.2   Verify 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. If the Login screen appears, then you have established IP communications with the camera. It is not necessary to log in and use the Web Configuration tool right away. At this time, perform a bench test of the camera using the FLIR Sensors Manager software and the factory configured IP address. Refer to paragraph 2.3 "Using FLIR Sensors Manager (FSM)" on page 2-2.

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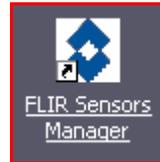
Initially the FLIR Sensors Manager splash screen will be displayed. The software version may be different than the version displayed below.

FLIR Sensors Manager 2010
(v.3.4.2.16)

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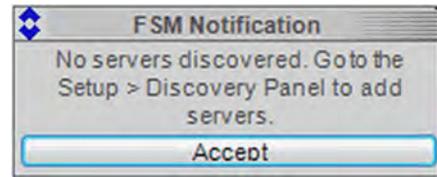
The FLIR Sensors Manager uses a "client/server" architecture. The FSM software is considered a client, and the cameras are considered servers or sensors.

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

Step 3   Click on **Setup**, if required, then the **Discovery** button on the side panel 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.

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.

No Sensors Discovered   **1. Setup**   **2. Discovery**

Zoom/Pan/Tilt Camera Controls   **3. Refresh**   **4. Move to Active**
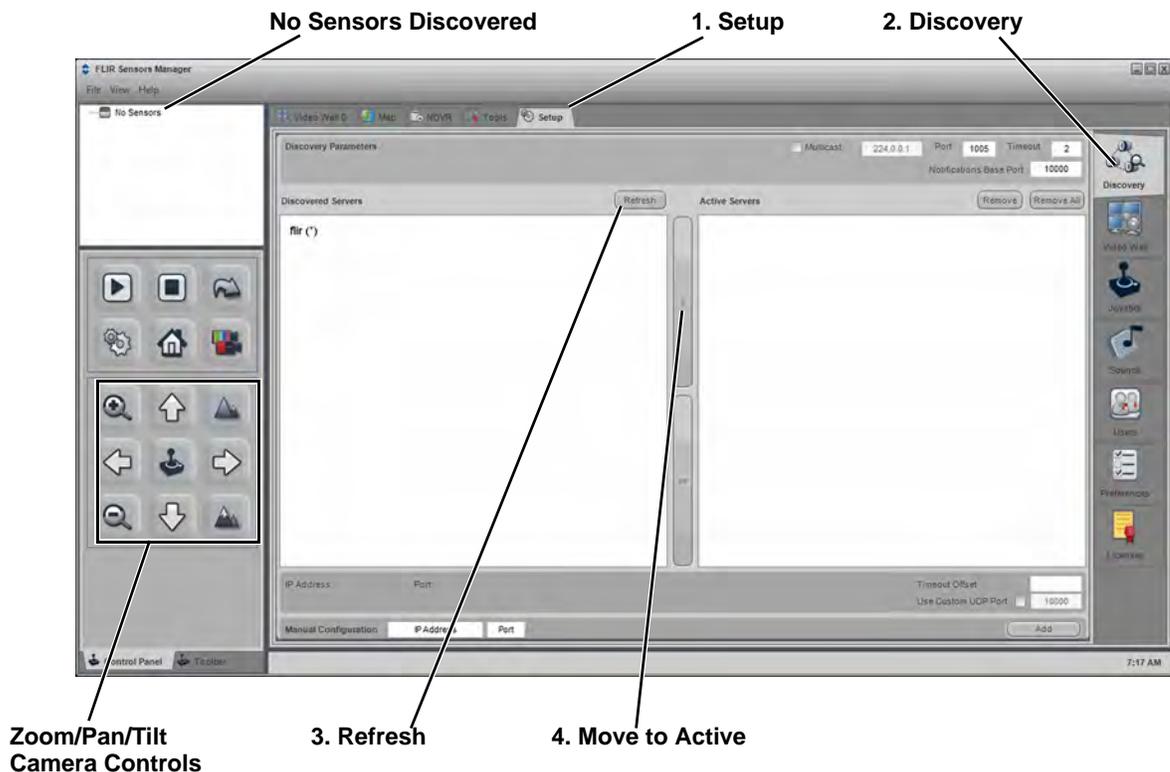
Step 6   Confirm that video is streamed to the monitor and it is possible to control the camera using the zoom controls and so on. For example, click on the zoom button (magnifying glass with +), and the video will zoom to 2X. Once operation of the camera has been confirmed, the camera can be configured to an IP address that matches the installation network.

Step 7   Return to the Web Configurator screen shown at the right and select **Login as Basic User** or enter **basic** as the User and click **Login**.
No password is required.

The Web Configurator will display the Help screen listing information on the camera's software and hardware configuration.
The menu on the left allows you to select various configuration web pages in order to set the camera configuration parameters.
See "F-Series Camera Configuration" on page 3-1.

Once you have verified the basic operation of the camera and successfully streamed video, you will want to install the camera in its proper location. Confirm the cables are properly attached and the DIP switches are set as desired. Reassemble the rear cover after confirming the ground wire is connected properly, and tighten the cable gland nuts to ensure a good seal all around.

3   F-Series Camera Configuration

3.1   Camera Configuration Overview

In general, it may be necessary for the installer to make a limited number of configuration changes for each camera, such as setting the serial and/or IP communication parameters. For example, each camera comes from the factory with the same default IP address, so adding more than one camera to an IP network requires different IP addresses. On the other hand, many of the configuration parameters will remain unchanged from the factory default settings. This section provides a brief guide to setting the configuration parameters which are most commonly changed in order to get the camera to communicate and to operate normally.

In order to control the camera, it is necessary to communicate with it either over serial communications (RS-232 or RS-422), or over Ethernet using Internet Protocol (IP). In either case, it is likely there are some communication parameters that are specific to each installation.

For a camera that is installed in a legacy-type CCTV network using analog video, the camera will commonly be controlled with serial communications. The serial cable from the camera will be connected to a keyboard/joystick device, or to a video switch or DVR that has a serial communication port. In this case the installer may want to configure parameters such as the address of the camera, the baud rate, and so on. These parameters can be set either using hardware DIP switches or through software using a web browser.

For a camera installed in an IP network, the camera will commonly be controlled over Ethernet by a PC or laptop running FLIR Sensors Manager (FSM) or a third-party Video Management System (VMS) software. FSM is an integral part of the Nexus architecture—it is a client program that communicates with the Nexus server on the camera. It allows control of the camera and video streaming and many other sophisticated functions. Additional information about the Nexus architecture and about FSM is available on the CD that ships with the camera, or online at www.flir.com.

For a camera installed in an IP network, configuration changes are made using a web browser. Refer to the Web Configuration Overview below for general information about the web interface and about saving configuration changes.

In many cases, a camera will be installed with both serial and Ethernet communications. As such, the camera can be controlled by means of a serial device or through software. When someone tries to control the camera with a serial device at the same time as someone does through the software IP interface, the serial device takes priority.

For basic configuration information, refer to section 3.3 "IP Communications Quick Guide" on page 3-5 and section 3.4 "Serial Communications Quick Guide" on page 3-11. Not all parameter settings are described in these sections. If you need help during the configuration process, contact your local FLIR service representative or, call 877-773-3547 inside the US.

3.2   Web Configuration Overview

This section provides a brief overview of how to use a web browser to connect to the camera and make configuration changes using the Web Configuration tool. First familiarize yourself with the information in this section, and then refer to the IP Communications Quick Guide for information about how to configure the IP interface, since the web browser communicates using the IP interface.

3.2.1   Web Configurator Login

Once you are able to use a web browser to connect to the camera, the login screen will appear; select Login as Basic User, or type "basic" as the User and click on Login (there is no password for the Basic user).

Note

Prior to making changes to the configuration, it may be wise to bench test the camera using the factory configured IP address. See "Verify IP Communications" on page 2-1..

Once you are logged in, the Help screen will appear. The web links available on the left side of the page (Settings, LAN Settings, and so on) correspond to different groups of configuration parameters.

Figure 3-1: Web Configurator Help Screen

The current status of the Nexus server is displayed in the upper left
(it should show as "Server Running…").

3.2.2   Saving Configuration Changes

After making any configuration changes, it is necessary to save the changes to the server (there is a Save button at the bottom of each configuration page). Once you save configuration changes to the server, the changes do not take effect immediately. Generally it is also necessary to stop and restart the server for the changes to become effective. The server has a configuration that is in effect and running, and another configuration that is saved (and possibly different than the running configuration). The following message indicates the saved configuration is different than the configuration in effect (the running configuration): "You must restart the server for the changes to be effective".
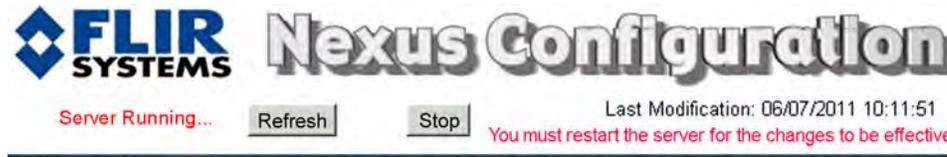
3.2.3   Restarting the Server

To restart the server, first click on the Stop button at the top of the page, and wait for the page to refresh. When the server is stopped and the page is refreshed, the status will show as "Server Stopped" and the button at the top of the page will change to Start rather than Stop.

Click on the Start button to restart the server, and 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.

When configuration changes are made with the web browser, the settings are saved to a configuration file. It is a good idea to make a backup of the existing configuration file prior to making changes. If necessary the camera can be restored to its original factory configuration also. For more information, refer to section 3.3.8 "Configuration File" on page 3-10.

3.3   IP Communications Quick Guide

The camera has an Ethernet connection that allows for configuration and control of the camera and for streaming video over an IP network. The camera comes configured from the factory with a default IP address (192.168.250.116). If necessary, the camera IP address can be restored to this factory default address by connecting an RJ-45 loopback device to the Ethernet port. See "Restoring the Factory Network Settings" on page 3-15.

It is possible to control the camera and stream video from the camera as configured from the factory, without making any changes. However in most cases the camera will have at least some configuration changes to allow it to connect with other devices on the existing network. Prior to making changes with the Web Configurator, be sure you are familiar with the information in section 3.2 "Web Configuration Overview" on page 3-2.

Getting the camera IP interface set up and working may require a level of familiarity with managing IP networks that is new to many security professionals. Prior to configuring the IP interface and streaming video parameters, make sure you know how to manage and configure the other equipment in the network (for example, any PC or device that will connect to the camera, any router or firewall that will carry the IP traffic, and so on). FLIR technical support can provide limited support in this regard.

3.3.1   IP Configuration Steps

Assuming the existing network uses IP addresses that are unique and different than the default address on the camera, configuring the camera for IP communications generally involves the following steps:

Step 1   Connect the Ethernet port to an IP network that is isolated from the existing network (for example, a standalone switch)

Step 2   Connect a PC or laptop to the same network

Step 3   Temporarily set the IP address of the PC or laptop to be compatible with the factory network address of the camera (for example, 192.168.250.1)

Step 4   Perform a bench test of the camera using FSM, prior to making any parameter changes (this step is optional but recommended)

Step 5   Open a web browser, enter http://192.168.250.116 in the address bar and press Enter to connect to the camera

Step 6   Configure the IP LAN settings and video streaming parameters to be compatible with the existing network

Step 7   Save the configuration changes and restart the server

Step 8   Connect the camera to the existing network and test the camera

Step 9   Make a backup of the configuration

3.3.2   Accessing the Web Configurator

To make configuration changes with software, use a web browser to connect with the camera. If the IP address of the camera is known, you can type the IP address into the browser. 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.

The Web Configurator will start at the Login screen, which shows an image of the camera. When this screen appears, the PC is successfully connected to the camera over the IP network.

Select Login as Basic User, or type "basic" as the User and click on Login (there is no password for the Basic user). Initially, the Help screen will be displayed.

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 to configure the F-Series camera.

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.

3.3.3   Set the Date and Time

Step 1   Click **Server Status**. The screen at the right will be displayed.

Step 2   Set the Timezone from the pull down menu. Click **Set**.

Step 3   Set the Date Format from the pull down menu. Click **Set**.

Step 4   Set the Date by typing in the dialog boxes. Click **Set**.

Step 5   Set the Time by typing in the dialog boxes. Click **Set**.

3.3.4   Configuring IP Video

The following descriptions apply to the configuration parameters related to video streams. In general, for most installations it will not be necessary to modify the default IP video parameters. However in some cases, such as when a video stream is sent over a wireless link, it may be useful to "tune" the video stream to try to reduce the bandwidth requirements.

Unicast/Multicast

By default, the video streams from the camera are sent using unicast packets rather than multicast. This means a given packet of IP Video will be sent separately to each client that has a video stream open (for example, FSM clients, nDVR, and so on), and therefore each additional client will cause the bandwidth consumption to go up and cause more overhead on the system in comparison to multicast. On the other hand, video packets sent using multicast

are shared by streaming clients, so additional clients do not cause bandwidth consumption to go up as dramatically. If the video streams are to be sent to more than one client/location, it may be wise to use multicast instead for more efficient bandwidth usage.

Note

> if more than one camera is providing multicast streams on the network, be sure to configure each with a unique multicast Destination Network IP address.

Settings

For each video stream, the Codec Type options are MPEG4, H.264 or MJPEG. The Bit Rate parameter is only used when the Rate Control parameter is set to CBR (Constant Bit Rate). With the CBR setting, the system attempts to keep the resulting bit rate of the video at or near the target bit rate.

The I-Frame Interval parameter controls the number of P-frames used between I-frames. I-frames are full frames of video and the P-frames contain the changes that occurred since the last I-frame. A smaller I-Frame Interval results in higher bandwidth (more full frames sent) and better video quality. A higher I-Frame Interval number means fewer I-frames are sent and therefore lower bandwidth and quality.

The Image Size parameter controls the video resolution size and therefore can have a considerable impact on bandwidth usage. The larger the size of the frame, the better the resolution and the larger the network bandwidth required. The following table provides the corresponding resolution for each Image Size setting.

Table 3-1: Image Size Settings

Image Size	NTSC	PAL
D1	720x480	720x576
4CIF	704x480	704x576
VGA	640x480	N/A
CIF	N/A	320x240
SIF	353x240	352x288
QVGA	320x240	N/A
QCIF	N/A	176x144

As a rule of thumb, if the video will be viewed on its own and on a reasonably large screen, a large image size setting may look better. On the other hand, if the video is shown as a tile in a video wall, a smaller image size may look as good and consume less bandwidth.

The Interlaced parameter controls if the video frames are interlaced or not. Interlacing is defined as the interleaving of two video fields to produce a frame and is typically adopted to reduce screen flicker for a given frame rate. By default, it is set to Yes for the DLTV video stream.

3.3.5   Digital Video Configuration

Note

> When defining the ports for digital video, streams are setup sequentially; 0, 1, 2, and 3. If a stream is enabled, the server will use the RTP/RTSP over HTTP port parameter to define the port number (if left blank, 8080 is used). A subsequent stream's configuration takes precedence so the same port needs to be defined for all enabled video streams. (But actually you could really only define a non-default port for the last video stream configured.)

Step 1   Click **Video IR**. The screen at the right will be displayed.

Step 2   Enter the parameters for your IR video stream.

The IR Stream Name contains the connection string for the IP video. The default value recognized by FSM as ch0 is:
rtsp://192.168.250.116/ch0.
Enter the appropriate IP video connection string for your installation.
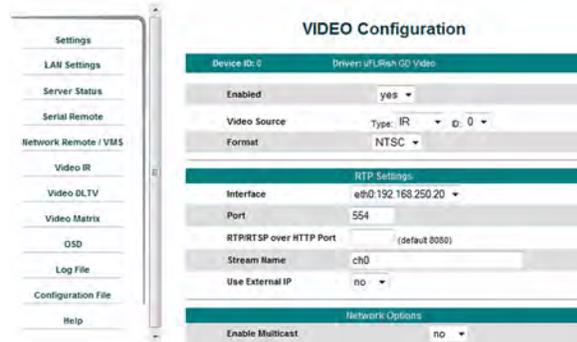
3.3.6   Configuring Network Remote / VMS

Several types of third-party Video Management System (VMS) systems are supported by the camera. To configure the camera to operate with a VMS Interface, select the Network Remote / VMS link on the left side of the page. By default no VMS Interface is configured; use the pulldown to select the appropriate type of VMS and click the Add button.

The New Device Creation screen will appear. Set the communication parameters to match the remote system and click on the Create button.

After the device is created, click on the Save button to save the configuration, and then restart the server.
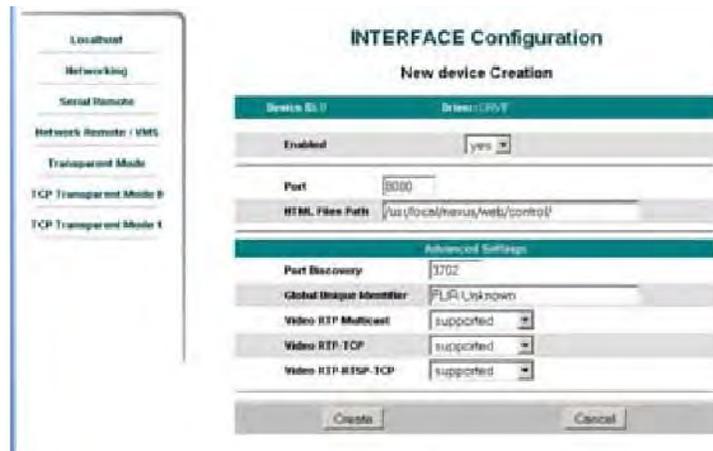
3.3.7 Serial Remote Menu

The settings you make in this screen will become active when the software override DIP switch is set to Off (the default) allowing software settings to control the camera. Refer to section 3.4 "Serial Communications Quick Guide" on page 3-11.

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

Step 2   Select the Protocol for your serial control configuration (**Pelco-D Serial Remote** in this example).

Step 3   Select Device ID: **1** to see the Pelco-D advanced settings. (If you selected Bosch Serial Remote in Step 2 above, you will select Device ID: **2** to see the Bosch advanced settings.)

Step 4   Enter the parameters for your specific location.

Step 5   Scroll down to see more advanced settings.
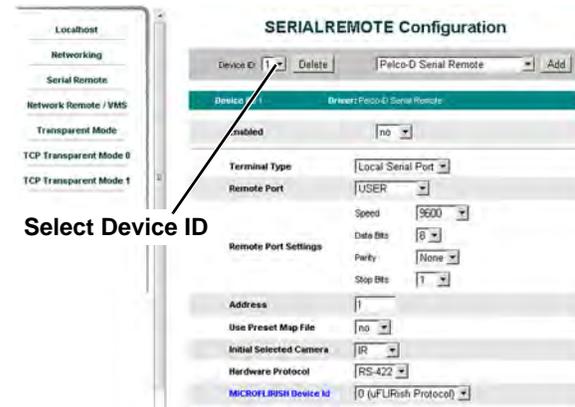
Scanlist Serial Control

Step 1   Scroll down until you see the Advanced Settings section shown in the screen at the right.

Step 2   Enter the scanning parameters for your specific location.

Select Device ID

3.3.8   Configuration File

Step 1   Click **Configuration File**. The screen at the right will be displayed.

Shown at the top of the screen is the .ini file in a scrollable window. This can help if you ever need help from a support engineer.

Step 2   Click **Restore** in the Factory Backup and Restore section to reconfigure the file to the settings sent from the factory. This file can not be modified or deleted, so it is always available.

Step 3   In the Customer Backup and Recovery section, make a backup of your final custom settings.

Step 4   In the Upload and Download section, download a copy to a different network location for safe keeping.
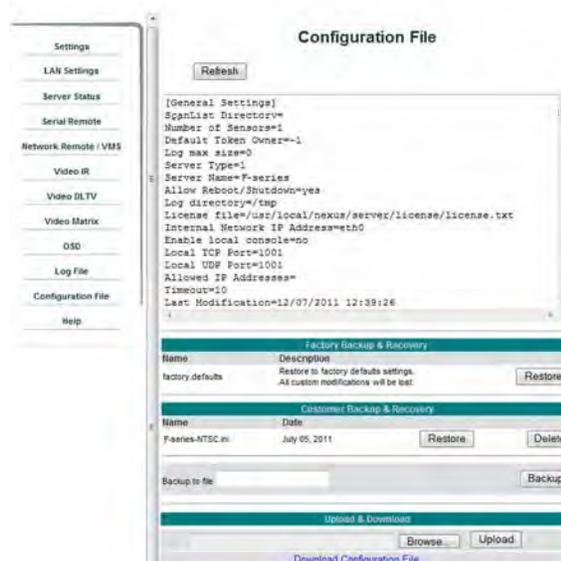
3.3.9   LAN Settings

As the final step in configuring the camera on the bench, you may want to insert a new IP address appropriate for the local area network receiving the camera. Once you are finished with this process you typically will no longer be able to access the camera from the same PC used to see the default IP address.

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. Click Save.

If you change to a new IP address and the browser can no longer 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.
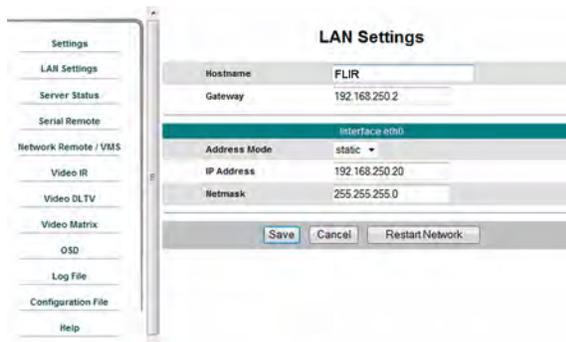
3.4   Serial Communications Quick Guide

The installer must first decide if the serial communications settings will be configured via hardware (DIP switch settings) or software. If the camera has an Ethernet connection, then generally it will be easier (and more convenient in the long run) to make configuration settings via software. Then configuration changes can be made over the network without physically accessing the camera. Also the settings can be saved to a file and backed up or restored as needed.

If you are using the IP interface to configure the serial communication settings for the camera, refer to section 3.3 "IP Communications Quick Guide" on page 3-5.
If you are using the hardware DIP switches to configure the settings, continue with this section.

If the camera does not have an Ethernet connection, the DIP switches must be used to set the serial communication options. In the future configuration changes may require accessing the camera on a tower or pole, dismounting it, and removing the back and so on.

Important Note

The serial communications parameters for the F-Series camera are set or modified either via hardware DIP switch settings or via software, through a web browser interface. A single DIP switch (SW102-9, Software Override determines whether the configuration comes from the hardware DIP switches or the software settings.

Note

The DIP switches are only used to control serial communications parameters. Other settings, related to IP camera functions etc., must be modified via software (using a web browser).

For serial communications, it is necessary to set the parameters such as the signalling standard (RS-232 or RS-422), baud rate, number of stop bits, parity and so on. It is also necessary to select the communication protocol used (either Pelco D or Bosch) and the camera address. The information for how to set these parameters is provided below using hardware DIP switches.

When the camera is turned on, the video temporarily displays system information including the serial number, IP address, Pelco address, Baud rate, and setting of the serial control DIP switch: SW - software control (the default) or HW - hardware.

S/N: 1234567
IP Addr: 192.168.250.116
PelcoD (Addr:1): 9600 SW

3.4.1　Serial Communications Settings - Hardware DIP Switches

The camera has two blocks of DIP switches that are used to configure the serial communications settings. One block of switches, on the left, has 8 switches and is used to set the serial address (or ID) of the camera. The other block of switches, on the right, has 10 switches and is used to set baud rate, hardware protocol (RS-232 or RS-422), serial protocol (Pelco D or Bosch), and Hardware/Software select (also known as Software Override).

The figure below shows the locations of dip switches SW101 and SW102.
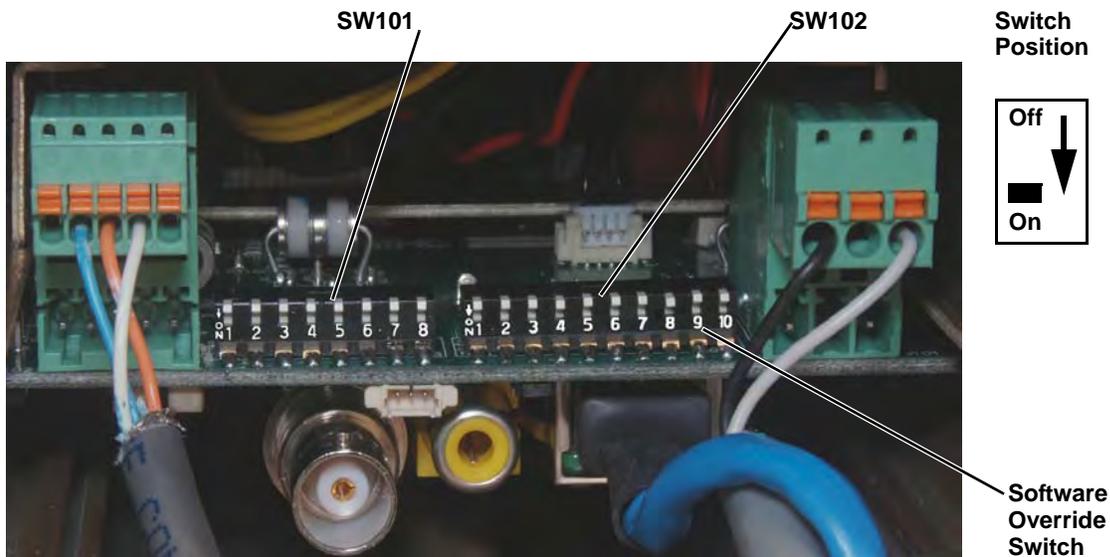
Figure 3-2: F-Series Camera Configuration

If the Software Override DIP switch is set to the software position (as it is by default), all of the other DIP switches will be ignored, and configuration changes must be made through software. If the switch is set to the hardware position, all configuration settings related to serial communications are made with the DIP switches, and changes that are made via software (with a web browser) will be ignored.

The following image shows the factory default settings (address 1, 9600 baud, Pelco D, RS-422, Software select):
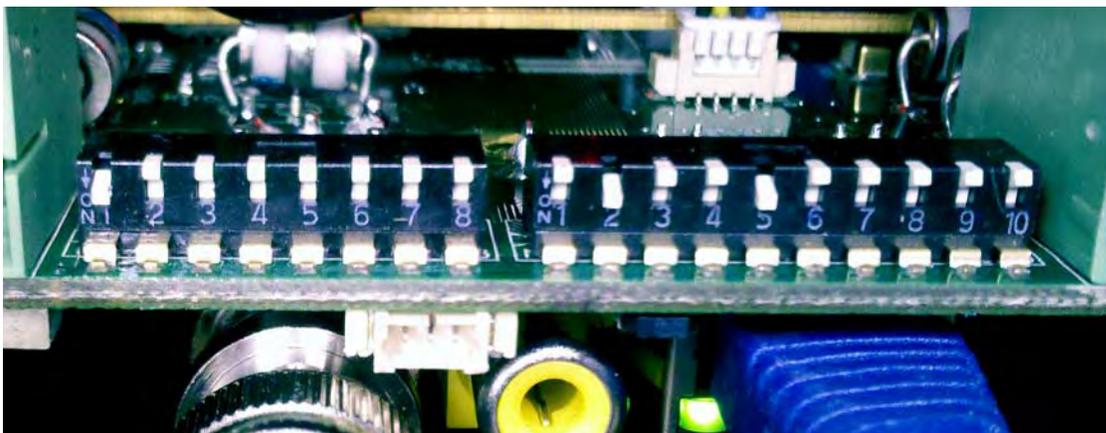
Serial Address: Use the block of switches on the left (SW101) to set the serial address of the camera. The available range of values is from decimal 1 to 255. The DIP switches represent the binary equivalent of the decimal address, so it is necessary for the installer to be able to convert the decimal address (for example 43) to its 8-bit binary equivalent (00101011). A switch set to Off represents 0, and a switch set to On represents 1. The switch has a label to indicate the On position. The factory default address is 1; do not use address 0 as the camera does not respond to this address.

Important Note

The switches are labeled 1-8 from left to right, and this is the reverse order of bits. For example, switch 1, on the left, represents the least significant (right most) bit in the binary number. The following table provides examples of how the switches should be set for addresses 1-3, 43, and 255. A table converting decimal numbers to binary numbers is included in section 5 "Serial Addresses: Decimal To Binary Conversion" on page 5-1.

Table 3-2: Dip Switch Address/ID Settings—SW101

ID	Sw 1 LSB	Sw 2	Sw 3	Sw 4	Sw 5	Sw 6	Sw 7	Sw 8 MSB
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
…	…	…	…	…	…	…	…	…
43	On	On	Off	On	Off	On	Off	Off
…	…	…	…	…	…	…	…	…
255	On	On	On	On	On	On	On	On

Other Serial Communication Parameters. The tables below defines the switch locations, bit numbering and on/off settings used in controlling the other serial communication parameters.

Table 3-3: 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
Not Used	**Bit 7**	**Bit 8**	
	X	X	
	X	X	
	X	X	
	X	X	
Software Override DIP Switch: This setting determines whether the system will use software settings for configuration or if the dip switch settings will override the software settings. Default is Off.	**Bit 9**		
	Off		Software select
	On		Hardware select
Not Used	**Bit 10**		
	X		

3.5   Restoring the Factory Network Settings

The camera comes configured from the factory with a default IP address (192.168.250.116). In some cases, it may be necessary to restore the network settings of the camera to the original factory settings. If necessary, the camera IP address can be restored to this factory default address by connecting a loopback device to the Ethernet port.

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 custom loopback connector is described below.
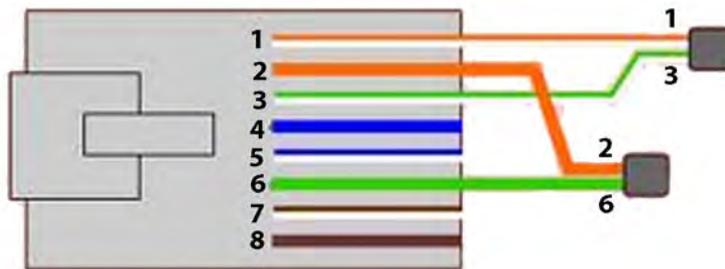
Pin #	Signal	Tied to pin #
1	Transmit +	3
2	Transmit -	6
3	Receive +	1
4	Unused	N/A
5	Unused	N/A
6	Receive -	2
7	Unused	N/A
8	Unused	N/A

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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A Serial Addresses: Decimal To Binary Conversion

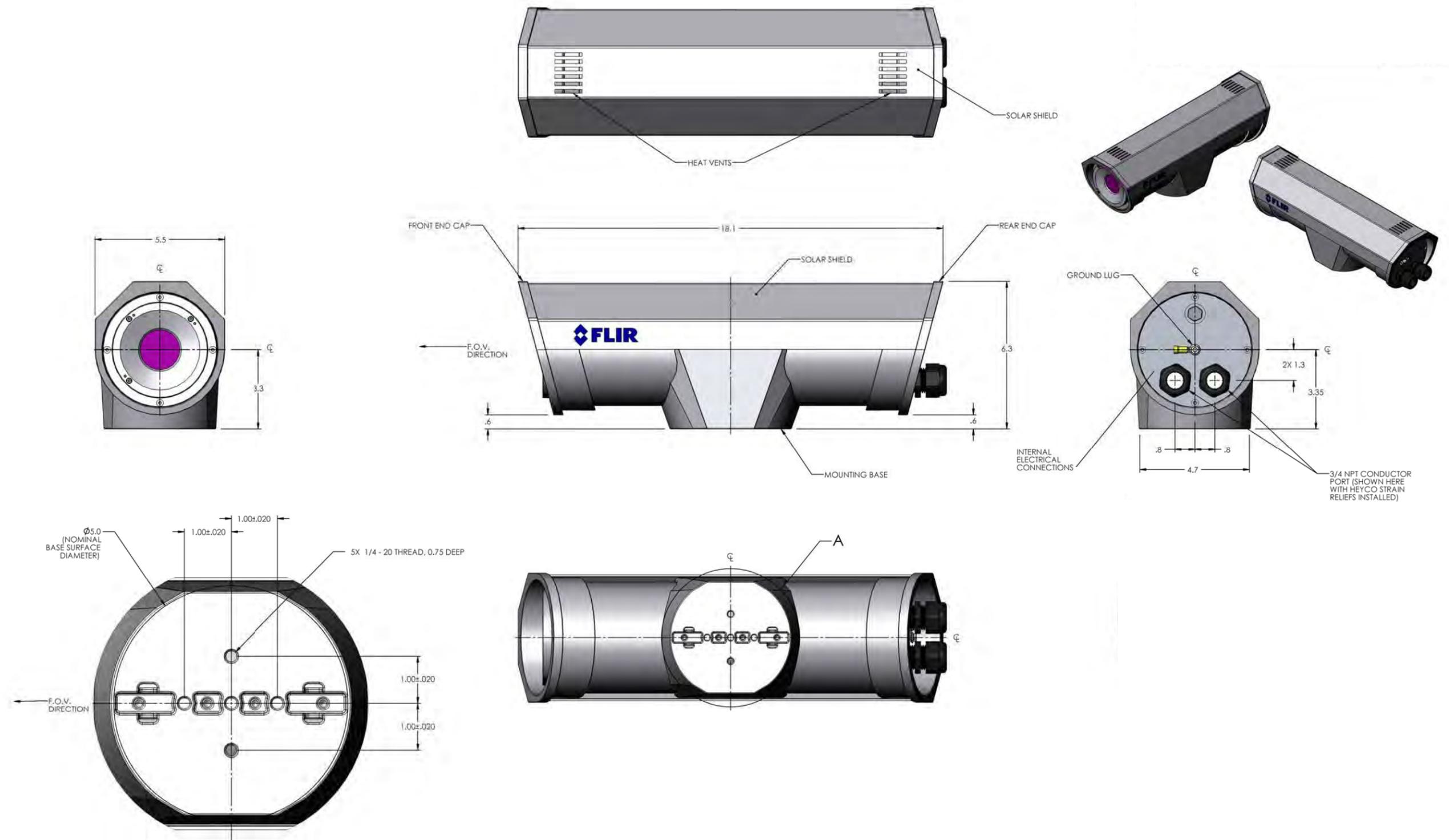The following table shows the binary equivalent for each decimal address between 1 and 255.

Decimal	Binary	Decimal	Binary	Decimal	Binary	Decimal	Binary
1	00000001	65	01000001	129	10000001	193	11000001
2	00000010	66	01000010	130	10000010	194	11000010
3	00000011	67	01000011	131	10000011	195	11000011
4	00000100	68	01000100	132	10000100	196	11000100
5	00000101	69	01000101	133	10000101	197	11000101
6	00000110	70	01000110	134	10000110	198	11000110
7	00000111	71	01000111	135	10000111	199	11000111
8	00001000	72	01001000	136	10001000	200	11001000
9	00001001	73	01001001	137	10001001	201	11001001
10	00001010	74	01001010	138	10001010	202	11001010
11	00001011	75	01001011	139	10001011	203	11001011
12	00001100	76	01001100	140	10001100	204	11001100
13	00001101	77	01001101	141	10001101	205	11001101
14	00001110	78	01001110	142	10001110	206	11001110
15	00001111	79	01001111	143	10001111	207	11001111
16	00010000	80	01010000	144	10010000	208	11010000
17	00010001	81	01010001	145	10010001	209	11010001
18	00010010	82	01010010	146	10010010	210	11010010
19	00010011	83	01010011	147	10010011	211	11010011
20	00010100	84	01010100	148	10010100	212	11010100
21	00010101	85	01010101	149	10010101	213	11010101
22	00010110	86	01010110	150	10010110	214	11010110
23	00010111	87	01010111	151	10010111	215	11010111
24	00011000	88	01011000	152	10011000	216	11011000
25	00011001	89	01011001	153	10011001	217	11011001
26	00011010	90	01011010	154	10011010	218	11011010
27	00011011	91	01011011	155	10011011	219	11011011
28	00011100	92	01011100	156	10011100	220	11011100
29	00011101	93	01011101	157	10011101	221	11011101
30	00011110	94	01011110	158	10011110	222	11011110
31	00011111	95	01011111	159	10011111	223	11011111
32	00100000	96	01100000	160	10100000	224	11100000
33	00100001	97	01100001	161	10100001	225	11100001
34	00100010	98	01100010	162	10100010	226	11100010
35	00100011	99	01100011	163	10100011	227	11100011
36	00100100	100	01100100	164	10100100	228	11100100
37	00100101	101	01100101	165	10100101	229	11100101
38	00100110	102	01100110	166	10100110	230	11100110
39	00100111	103	01100111	167	10100111	231	11100111
40	00101000	104	01101000	168	10101000	232	11101000

41	00101001	105	01101001	169	10101001	233	11101001
42	00101010	106	01101010	170	10101010	234	11101010
43	00101011	107	01101011	171	10101011	235	11101011
44	00101100	108	01101100	172	10101100	236	11101100
45	00101101	109	01101101	173	10101101	237	11101101
46	00101110	110	01101110	174	10101110	238	11101110
47	00101111	111	01101111	175	10101111	239	11101111
48	00110000	112	01110000	176	10110000	240	11110000
49	00110001	113	01110001	177	10110001	241	11110001
50	00110010	114	01110010	178	10110010	242	11110010
51	00110011	115	01110011	179	10110011	243	11110011
52	00110100	116	01110100	180	10110100	244	11110100
53	00110101	117	01110101	181	10110101	245	11110101
54	00110110	118	01110110	182	10110110	246	11110110
55	00110111	119	01110111	183	10110111	247	11110111
56	00111000	120	01111000	184	10111000	248	11111000
57	00111001	121	01111001	185	10111001	249	11111001
58	00111010	122	01111010	186	10111010	250	11111010
59	00111011	123	01111011	187	10111011	251	11111011
60	00111100	124	01111100	188	10111100	252	11111100
61	00111101	125	01111101	189	10111101	253	11111101
62	00111110	126	01111110	190	10111110	254	11111110
63	00111111	127	01111111	191	10111111	255	11111111
64	01000000	128	10000000	192	11000000		

B   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.

SOLAR SHIELD

HEAT VENTS

FRONT END CAP

18.1

REAR END CAP

SOLAR SHIELD

GROUND LUG

F.O.V.
DIRECTION

6.3

2X 1.3

3.35

.6

.6

.8   .8

4.7

INTERNAL
ELECTRICAL
CONNECTIONS

MOUNTING BASE

3/4 NPT CONDUCTOR
PORT (SHOWN HERE
WITH HEYCO STRAIN
RELIEFS INSTALLED)

5.5

3.3

Ø5.0
(NOMINAL
BASE SURFACE
DIAMETER)

1.00±.020

1.00±.020

5X 1/4 - 20 THREAD, 0.75 DEEP

A

F.O.V.
DIRECTION

1.00±.020

1.00±.020

5-HOLE MOUNTING CONFIGURATION
DETAIL A
SCALE 1 : 1

F-Series Camera Mechanical Interface Control Document Sheet 1