



Installation Manual

FC-Series S



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Important Instructions and Notices to the User:

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

Note 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment into an outlet on a circuit different from that of the receiver; and/or
- Consult the dealer or an experienced radio/television technician for help.

Note 2: This equipment was tested for compliance with the FCC limits for a Class B digital device using a shielded cable for connecting the equipment to an analog video output to a monitor and using a shielded USB cable for connecting the equipment to a personal computer. When making such connections, shielded cables must be used with this equipment.

Industry Canada Notice:

This Class B digital apparatus complies with Canadian ICES-003.

Avis d'Industrie Canada:

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Proper Disposal of Electrical and Electronic Equipment (EEE)



The European Union (EU) has enacted Waste Electrical and Electronic Equipment Directive 2002/96/EC (WEEE), which aims to prevent EEE waste from arising; to encourage reuse, recycling, and recovery of EEE waste; and to promote environmental responsibility.

In accordance with these regulations, all EEE products labeled with the "crossed out wheeled bin" either on the product itself or in the product literature must not be disposed of in regular rubbish bins, mixed with regular household or other commercial waste, or by other regular municipal waste collection means. Instead, and in order to prevent possible harm to the environment or human health, all EEE products (including any cables that came with the product) should be responsibly discarded or recycled.

To identify a responsible disposal method where you live, please contact your local waste collection or recycling service, your original place of purchase or product supplier, or the responsible government authority in your area. Business users should contact their supplier or refer to their purchase contract.

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Image from a standard camera in low light



Image from a thermal camera in the same conditions

This manual describes the installation of the FC-Series S camera. If you need help during the installation process, contact your local FLIR service representative or, call 877-773-3547 inside the US.

All installers and integrators are encouraged to take advantage of the training offered by FLIR; visit <http://www.flir.com/training> for more information.

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
- Camera Specifications

For safety, and to achieve the highest levels of performance from the FC-Series S 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 FC-Series S 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 FC-Series S camera for any reason. Damage to the camera can occur as the result of careless handling or electrostatic discharge (ESD). Always handle the camera with care to avoid damage to electrostatic-sensitive components.

Prior to making any connections, ensure the power supply or circuit breaker is switched off.

Be careful not to leave fingerprints on the FC-Series S camera's infrared optics.

Operating the camera outside of the specified input voltage range or the specified operating temperature range can cause permanent damage.

1.2 References

FLIR Doc # 427-00XX-XX-19S FC-Series S Interface Control Document (ICD), available on the documentation CD or from the FLIR website, provides further details regarding mechanical dimensions and mounting for the FC-Series S camera. These documents are provided for reference only.

1.3 Installation Overview

The FC-Series S Camera is an infrared thermal imaging camera intended for outdoor security applications, and can be installed in a fixed location or on a pan/tilt mechanism. The FC-Series S camera is intended to be mounted on a medium-duty fixed pedestal mount or wall mount commonly used in the security industry. The camera mount must support up to 5 lbs (2.3 kg).

Cables may exit from the back of the camera housing through the supplied cable gland or from the bottom of the camera housing when using the concealed cable wall mount (sold separately). A cable gland plug is supplied for the rear of the camera housing when cables are routed using the concealed cable wall mount.



1.3.1 Camera Connection Options

The FC-Series S Camera can be installed with an analog or digital (IP) video output (or both). Analog video will require a connection to a video monitor or an analog video matrix switch. The camera can be powered using Power over Ethernet (PoE) or with a conventional 24 V (AC or DC) power supply. For a PoE connection, an accessory PoE power supply (PN 4132391, also called a PoE injector) is available if the camera is not connected to a PoE switch. The maximum Ethernet cable run is 100 meters including the PoE power supply.

In installations using PoE power and IP video, only a single Ethernet cable from the camera is required. Optionally, an RG59U coaxial cable can also be used for analog video.

In installations using analog video and conventional power (24VAC is commonly used in many installations), an RG59U coaxial cable and a three-conductor power cable are installed. It is recommended an Ethernet cable should also be installed for camera configuration, operation and troubleshooting. The FC-Series camera does not support serial communications.

1.3.2 Camera Accessories

The following accessories are available for purchase from FLIR Systems, Inc.

- PoE power supply (PN 4132391) - For powering a single FC-Series S camera using PoE. In addition to PoE power and communications, the power supply provides surge protection. It complies with IEEE 802.3at and is backward compatible with the IEEE802.3af PoE standard.
- Concealed Cable Wall Mount (PN 4129742) - Includes camera mount gasket and hex wrench for adjusting the ball joint controlling the camera's view angle.
The FC-Series S camera is attached to the mounting arm using the four M5 threaded bottom mounting holes. A cable gland plug is supplied with the camera for the rear of the camera housing when cables are routed using the concealed cable accessory. Refer to section 1.4.4 "Camera Mounting with Concealed Cable Wall Mount" on page 1-5 for installation instructions.
- Pole Mount Adapter Kit - (PN 4132982) - Adapter kit that allows the Concealed Cable Wall Mount to be mounted to a pole (75 mm [3 in] min to 180 mm [7 in]; larger pole diameter requires use of customer supplied band clamps)

1.3.3 Supplied Components

The FC-Series S camera package includes these standard components:

- Fixed Camera Unit with sunshield and installed cable gland
- Cable gland plug and gland inserts for sealing camera housing
- Power terminal block plug
- Tools: 3 mm hex wrench (T-Handle), small blade screwdriver
- FC-Series S Camera Documentation Package

1.3.4 Required Supplies

The installer will need to supply the following items as required (specific to the installation).

- Power cable if used for system power, 3-conductor, shielded, gauge determined by cable length and supply voltage
- PoE power supply or PoE switch if used for system power
- Cat5e Ethernet cable for digital video and/or PoE for system power
- Coaxial RG59U cables (BNC connector at the camera end) for analog video
- Camera grounding strap, camera mount, miscellaneous electrical hardware, connectors, and tools

Be sure to use cables that fit in the cable gland holes, as described below. Refer to section 1.7 “Rear Access Cable Gland Sealing” on page 1-9 for more information.

1.4 Location Considerations

The camera will require connections for power and video. Ensure that cable distances do not exceed the specifications and that cables adhere to all local and industry standards, codes, and best practices. The FC-Series S camera must be mounted upright, either on top of the mounting surface, or underneath an overhanging mounting surface such as eaves or an awning. The unit should not be mounted upside down.

Note

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

1.4.1 Bench Testing

Connect the power and video, and confirm that the video can be displayed on a monitor when the power is turned on. For configuration and basic setup information using the onboard web server, refer to [“Camera Bench Test” on page 2-1](#) for specific details.

1.4.2 Prior to Cutting/Drilling Holes

When selecting a mounting location for the FC-Series S 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).

1.4.3 Camera Mounting for Rear Cable Access

The FC-Series S camera can be secured to the mount with two in-line 1/4-20 threaded fasteners on the top or bottom of the camera. Alternatively the camera can be mounted with four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength threadlocker for the top mount fasteners (can be used with the bottom mount fasteners also). Refer to the FC-Series S ICD, FLIR Doc. # 427-00XX-XX-19S for additional information.

If using two 1/4-20 fasteners in the center of base, the maximum depth of the fastener should not exceed 12.5 mm (0.5 in). If using four M5 x 0.8 fasteners, the maximum depth of the fastener should not exceed 10.0 mm (0.4 in).

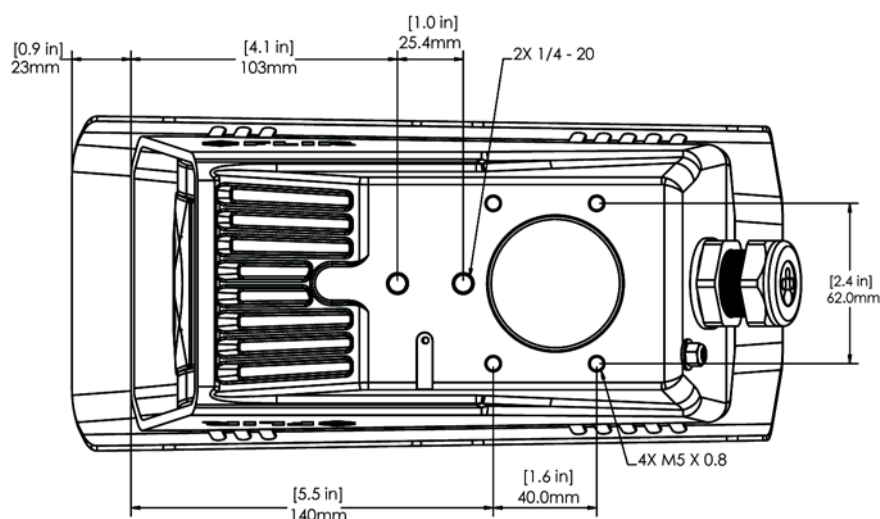


Figure 1-1: FC-Series S Camera Bottom Mounting Holes

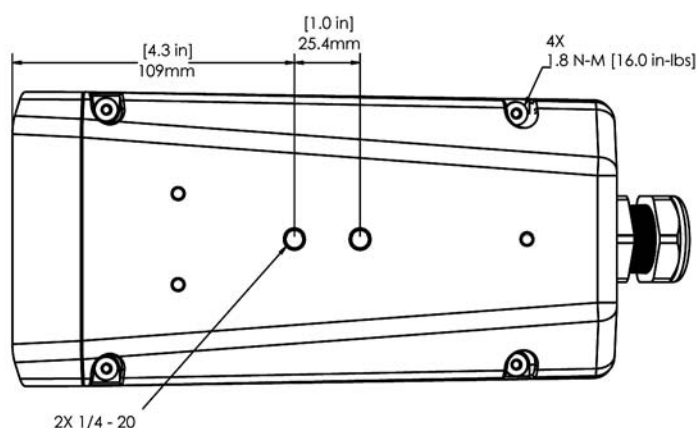


Figure 1-2: Top Side Mounting Holes

If using two 1/4-20 fasteners in the center of top, the maximum depth of the fastener should not exceed 12.5 mm (0.5 in). If the camera is mounted using the top of the camera, the sunshield must be removed.

As the diagram below indicates, be sure to allow adequate space for cable egress behind the gland. This requirement may vary, depending on the installation. Maintain the bend radius per the recommendation of the cable manufacturer. The typical cable bend radius is 50-75mm (2-3 in).

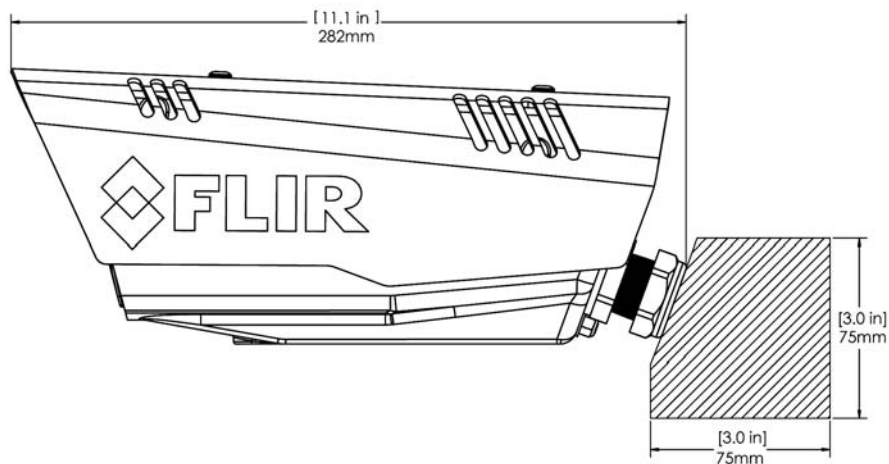


Figure 1-3: Rear Cable Bend Radius

1.4.4 Camera Mounting with Concealed Cable Wall Mount

The FC-Series S camera can be secured to the optional Concealed Cable Wall Mount with four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength threadlocker for the mount fasteners. See section 1.8 “Concealed Cable Mount Accessory” on page 1-11 for additional information.

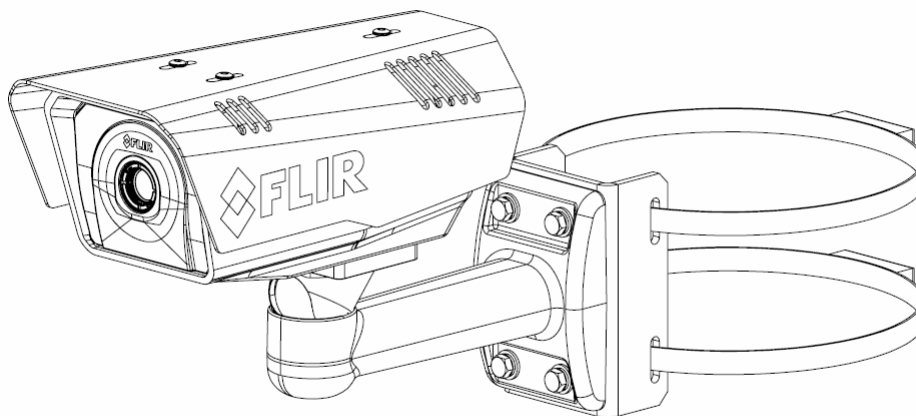


Figure 1-4: FC-Series S Installed with Concealed Cable Wall Mount and Pole Adapter kit

1.4.5 Sunshield

The camera includes a sunshield which should be used for any installation where the camera is exposed to direct sunlight or precipitation. If the camera is mounted with the top mounting holes, the sunshield is not used. Depending on the needs of the installation, the sunshield can be positioned in the neutral (middle) position, or slightly forward or rearward. To change the position of the sunshield, temporarily loosen the three 3 mm hex screws on top, slide the sunshield forward or backward, and retighten the screws.

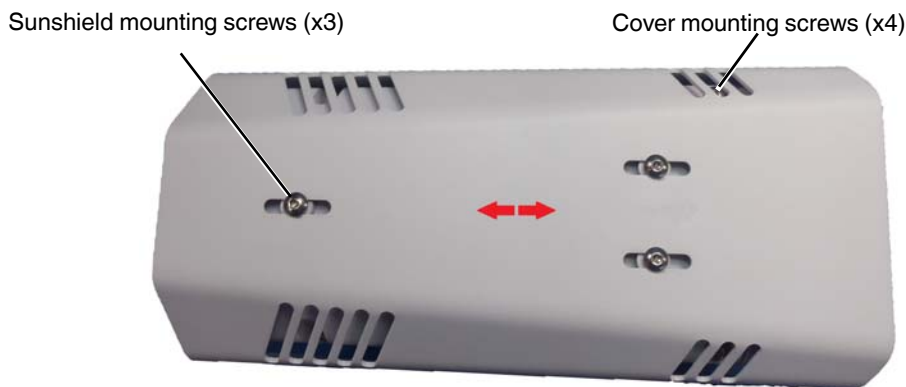


Figure 1-5: Sunshield Mounting

1.5 Removing the Cover

In order to access the electrical connections and install the cables, it is necessary to temporarily remove the top cover of the camera housing. The top cover of the camera is held in place with four 3 mm hex screws. The screws are accessible through slots in the sunshield, so the sunshield does not need to be removed from the top cover.

Use a 3 mm hex key to loosen the four captive screws, exposing the connections inside the camera enclosure. There is a grounding wire connected inside the case to the top cover, as shown. If it (or any of the grounding wires) is temporarily disconnected during the installation, it must be reconnected to ensure proper grounding of the camera.

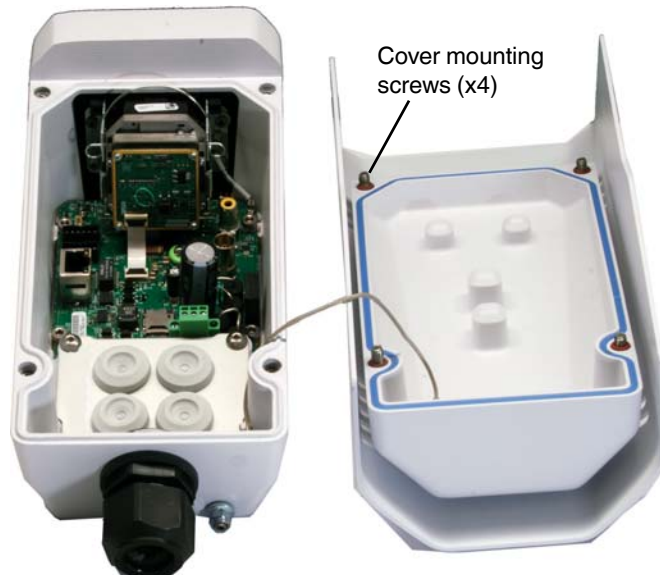


Figure 1-6: Cover Removed (Sunshield attached)

Caution!

When replacing the cover, ensure that the ground wire between the cover and the camera body is completely inside the o-ring groove. If the wire is pinched between the cover and body the camera is not sealed against water ingress and can be damaged.

Replace the cover and tighten the four 3 mm hex screws to 1.8 n-m (16.0 in-lbs).

1.6 Camera Connections

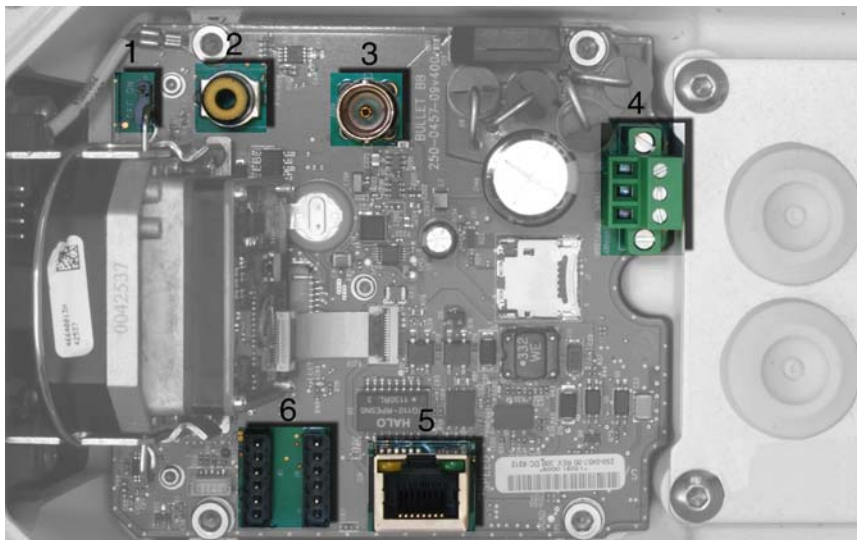


Figure 1-7: Camera Connections

Table 1-1:

	Connection	Purpose
1	3-pin Jumper	Lens heater on/off
2	RCA	Analog video test point
3	BNC	Analog video
4	3-pin Terminal	AC/DC Power
5	Ethernet	PoE power, communications, IP video stream
6	Accessory inputs	Reserved for future use

1.6.1 Analog Video Connections

The primary analog video connection of the camera is a BNC connector. Alternatively, the camera also provides an RCA analog video connector. Only one or the other connection should be used on a permanent basis to ensure adequate video quality. The RCA connection allows the installer to temporarily monitor the video output, without disconnecting the primary connection.

The video cable used should be rated as RG-59/U or better to ensure a quality video signal.

Note

Insert the cables through the cable glands on the enclosure before terminating and connecting them. In general, terminated connectors will not fit through the cable gland. If a terminated cable is required, it is possible to make a clean and singular cut in the gland seal to install the cable into the gland seal.

1.6.2 Ethernet

Connect a shielded cat5e/6 Ethernet cable to the RJ-45 jack. If using PoE to supply power to the camera, connect the other end of the Ethernet to a PoE switch or PoE injector. Otherwise connect the Ethernet to a network switch.

1.6.3 Connecting Power

The camera can be powered with a conventional AC or DC power supply, rather than PoE. Prior to making any connections, ensure the power supply or circuit breaker is switched off.

Table 1-2: Power Connections

1	Chassis
2	VAC/DC -
3	VAC/DC +

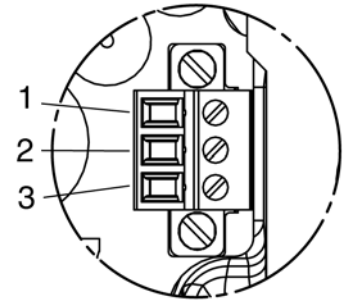


Figure 1-8: Power Connector

The power cable supplied by the installer must use wires that are sufficient size gauge for the supply voltage and length of the cable run, to ensure adequate current carrying capacity (18 AWG recommended for most installations). Always follow local building/safety codes.

Note

The terminal connector for power connections will accept 16 AWG to 24 AWG wire size.

The power connector plug may be removed for cable installation. After the plug is reattached to the board, retighten the screw terminals.

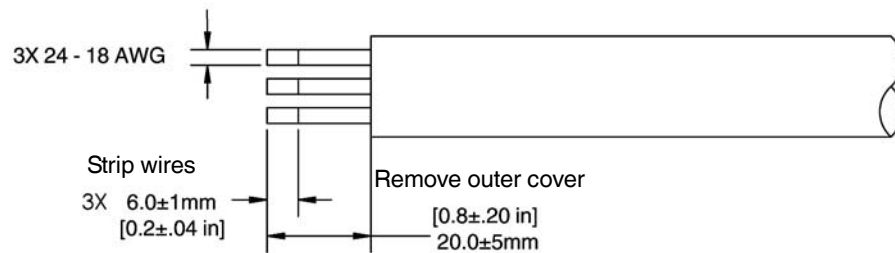


Figure 1-9: Power Cable (3 conductor)

The camera itself does not have an on/off switch. Generally the FC-Series S camera may 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 powered on and operating.

1.6.4 Connecting Heater Jumper

The heater selector jumper is used to either enable or disable the heater. The FC-Series S camera is shipped from the factory with a jumper installed between pin 1 and pin 2, which enables the heater. To disable the heater, move the heater selector jumper to pins 2 and 3.

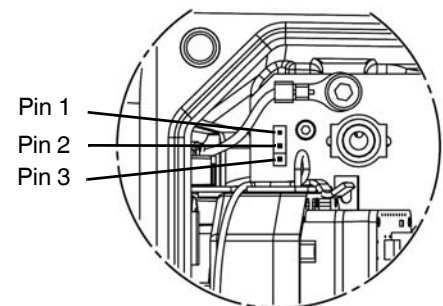


Figure 1-10: Heater Jumper Setup

1.6.5 Camera Grounding

Ensure the camera is properly grounded. Failure to properly ground the camera can lead to permanent damage to the camera. Typical to good grounding practices, the camera chassis ground should be connected to the lowest resistance path possible. The camera has an external ground connection on the outside back of the camera. FLIR requires a grounding strap anchored to the grounding lug and connected to the nearest earth-grounding point.

If, during installation, any ground connections inside the camera are disconnected, they should be reconnected prior to closing the camera.



Figure 1-11: Camera Ground Connection

1.7 Rear Access Cable Gland Sealing

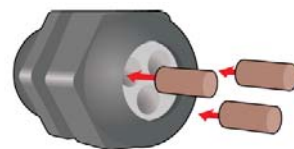
Proper installation of cable sealing gland and use of appropriate elastomer inserts is critical to long term reliability. Cables enter the rear of the camera mount enclosure through a liquid-tight compression gland.

Leave the gland nut loosened until all cable installation has been completed, and ensure the manufacturer's recommended cable bend radius is observed within the enclosure. Do not forget to tighten the cable gland seal nut to ensure a watertight seal and provide strain relief for cables.

1.7.1 Cable Gland Seal Inserts

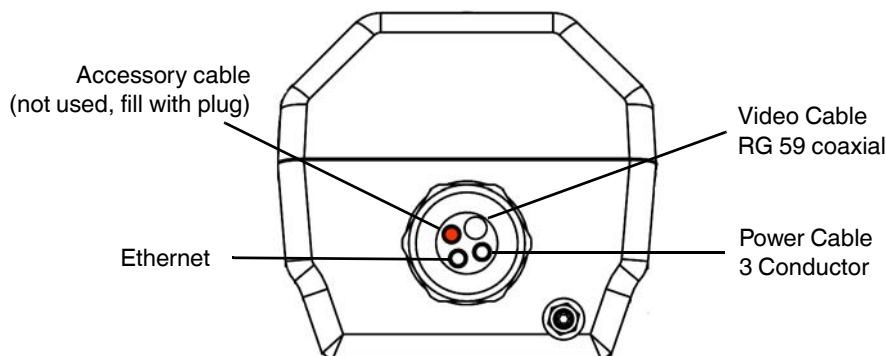
The FC-Series S camera comes with a single 3/4" NPT cable gland installed in the camera, with a four-hole gland seal insert. The gland includes a sealing washer and is secured to the camera with a nut on the inside of the enclosure. The gland insert has one hole for the RG-59/U analog video cable (the larger hole) and three more for a power cable, Ethernet cable, and an accessory cable (not used at this time).

Any of the holes which are not used for cables (for example, the hole for the accessory cable) should be filled with one of the orange hole plugs (supplied with the camera). Install the cables through the cable gland so that the cables line up with the connections inside the camera.



Note

Insert the cables through the cable glands on the enclosure before terminating and connecting them. In general, terminated connectors will not fit through the cable gland. If a terminated cable is required, it is possible to make a clean and singular cut in the gland seal to install the cable into the gland seal.

**Figure 1-12: Cable Routing**

To ensure a water tight seal when using the supplied rear cable gland, cable dimensions must be within the minimum and maximum as described in Table 1-3.

Table 1-3: Rear Exit Cable Min/Max Dimensions

Cable	Minimum	Maximum	Notes
Power (3 conductor), Ethernet, Accessory cables	4.5 mm [0.178 in]	5.2 mm [0.205 in]	When using the concealed cable wall mount (PN 4129742), cables can have a maximum diameter of 10 mm [0.394 in]
RG 59 Video cable	5.3 mm [0.209 in]	6.4 mm [0.245 in]	

If non-standard cable diameters are used, an appropriate cable gland and insert should be used to fit the desired cable and to fit the hole in the enclosure. FLIR Systems, Inc. does not provide cable gland inserts other than the insert supplied with the system.

If a replacement is used, inspect and install the gland fitting in the back cover with suitable leak seal or sealant and tighten to ensure water tight fittings. To fit the 1.050 in. (26.7 mm) hole in the enclosure, the thread size should be 3/4" NPT or M25. The gland should be installed with a sealing washer (for example, Heyco PN 3261 or equivalent) between the gland and the external surface of the enclosure.

1.8 Concealed Cable Mount Accessory

Do not route cables through the bottom of the camera unless the concealed cable wall mount (PN 4129742) is used. The wall mount is specifically designed for the camera and allows the opening to seal properly. When using the concealed cable wall mount, cable dimensions must be within the minimum and maximum as described in Table 1-4.

Table 1-4: Cable Min/Max Dimensions using Concealed Cable Wall Mount (PN 4129742)

Cable	Minimum	Maximum	Notes
Power (3 conductor), Ethernet, Accessory cables	4.5 mm [0.178 in]	10 mm [0.394 in]	When using the rear exit cable gland, the maximum diameter is 5.2 mm [0.205 in]
RG 59 Video cable	5.3 mm [0.209 in]	10 mm [0.394 in]	

Proper installation of the seal plate and panel mount gland seals is critical to long term reliability. Cables enter the bottom of the camera enclosure through the seal plate and panel mount glands. Be sure to insert each cable through its panel mount gland on the seal plate before terminating them (connectors will not fit through the gland). Ensure the manufacturer's recommended cable bend radius is not exceeded within the enclosure.

1.8.1 Prepare the Camera

- Step 1 Use a 3 mm hex key to loosen the four captive screws and remove the top cover as described above.
- Step 2 Remove the rear cable gland and replace it with the cable gland plug. Use the gasket and nut that were removed with the cable gland.
- Step 3 Use a 3 mm hex key to loosen the four captive screws and remove the seal plate, o-ring, and plug.



Figure 1-14: Removed Parts

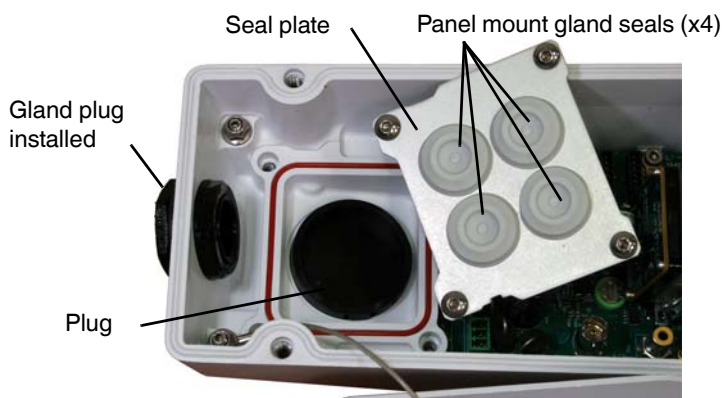


Figure 1-13: Seal Plate Removed

- Step 4 Install the wall mount (PN 4129742) to the wall and pull the cable(s) through the mount. Cut a small cross-slit in the black mount gasket and push the cable(s) through the gasket. Pull the cable(s) through the opening in the bottom of the camera. A single Ethernet/PoE cable is shown in the images.
- Step 5 Secure the camera to the mount using four M5 x 0.8 threaded fasteners to the bottom of the camera. Use Loctite 222 low strength thread locker for the mount fasteners.

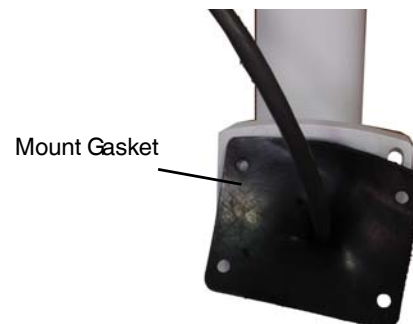
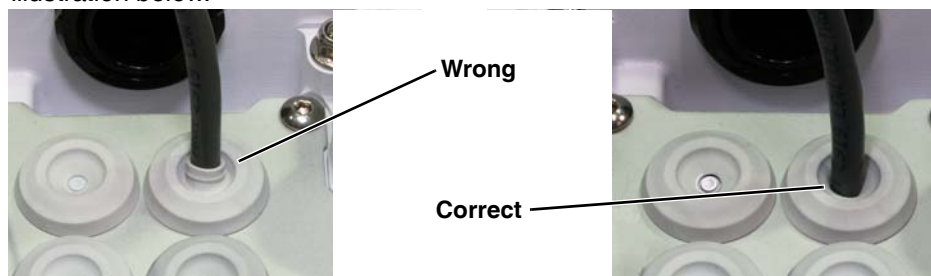


Figure 1-15: Camera Mount

- Step 6 As needed, clean the o-ring and the o-ring groove in the bottom of the camera using isopropyl alcohol and press the o-ring into its groove.
- Step 7 For each cable, punch hole in the center of a gland seal from the top using the 3 mm hex key. Insert the cable from the bottom through the hole.
- Step 8 Place the gland plate back into position and tighten the four 3 mm captive screws using a torque value of 1.8 n-m (16.0 in-lbs).
- Step 9 Check the length of each cable to ensure an appropriate bend radius and terminate the cable.
- Step 10 Push the cable back through the gland seal so that the seal is extended down not up, as shown in the illustration below.



Figure 1-16: Cable through Seal Plate



- Step 11 Connect the cables as indicated in Figure 1-7 on page 1-7. Ensure that any ground wire that was removed during installation is reconnected. Replace the cover and tighten the four 3 mm hex screws to 1.8 n-m (16.0 in-lbs).

Caution!

When replacing the cover, make sure the ground wire between the cover and the camera body is completely inside the o-ring groove. If the wire is pinched between the cover and the base, the camera will not be sealed against water ingress and could be damaged.

- Step 12 Using the hex key that is included with the concealed cable mount, loosen the ball joint on the bottom of the mount, position the camera as required, and then re-tighten the ball joint.

1.9 Camera specifications

Camera Model	FC-Series S
Camera Platform Type	Fixed
Composite Video	NTSC or PAL (switch selectable)
Thermal Camera	
Array Format	324x256 (25 μ m pixel pitch) 336x256, 640x480 (17 μ m pixel pitch)
Detector Type	Long-Life, Uncooled VOx Microbolometer
Effective Resolution	76,800
Field Of View (Focal Length)	FC-363 S = 63° × 50° (7.5 mm) FC-348 S = 48° × 39° (9 mm) FC-334 S = 34° × 28° (13 mm) FC-324 S = 24° × 19° (19 mm) FC-313 S = 13° × 10° (35 mm) FC-309 S = 9° × 8° (35 mm) FC-690 S = 90° × 69° (7.5 mm) FC-669 S = 69° × 56° (9 mm) FC-645 S = 45° × 37° (13 mm) FC-632 S = 32° × 26° (19 mm) FC-618 S = 18° × 14° (35 mm)
Spectral Range	7.5 to 13.5 μ m
Lens	Athermalized, focus-free
General	
Weight	4.8 lb (2.2 kg) with sun shield
Dimensions (L,W,H)	11.1" x 5.1" x 4.5" with sunshield, (282mm x 129mm x 115mm)
Input Voltage	12-40VDC, 24VAC POE (IEEE 802.3af-2003 standard or higher power, IEEE 802.3at-2009 standard)
Power Consumption	5W nominal at 24VDC 8 VA nominal at 24 VAC Peak at 24 VDC: 21W with heaters Peak at 24 VAC: 29VA with heaters
Mounting Provisions	Two 1/4-20" threaded holes on top and bottom, 1" spacing along center line front to back. Four M5 threaded holes bottom, 40 mm x 62 mm (1.6 in x 2.4 in) spacing square.
Shipping weight	6.1 lbs (2.8kg)
Shipping Dimensions	14.375"(L) x 7.375"(W) x 7"(H)

Environmental	
IP rating (dust and water ingress)	IP66 & IP67
Operating temperature range	-50°C to 75°C (-58° F to 167° F) continuous -40°C to 75°C (-40° F to 167° F) cold start
Storage Temperature range	-55°C to 85°C (-67° F to 185° F)
Humidity	0-95% relative
Shock	MIL-STD-810F
Vibration	IEC 60068-2-27 10g shock pulse with a 11ms half-sine profile
Approvals	FCC Part15, Subpart B, Class B, EN 55022 Class B, EN 50130 - 4, EN60950

The camera has an Ethernet connection that allows streaming video over an IP network as well as configuration and control of the camera¹. It is possible to stream video and control the camera as it is from the factory, without making any configuration 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.

Once the camera is connected to a network and powered on, the user can choose to use either the FLIR Sensors Manager (FSM) software or a web browser to view the video and control the camera. The FSM software is included with the camera. Refer to the FSM User Manual for details about using the software; the manual is available from the Windows Start menu once the software is installed.

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 only provide limited support in this regard.

2.1 Basic Test and 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 camera 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 a web browser or FSM, prior to making any parameter changes (this step is optional but recommended)
- Step 5 Configure the camera settings, such as IP address, camera date/time, security settings, and video stream parameters, so the camera is compatible with the existing network equipment
- Step 6 Save the configuration changes and restart the server
- Step 7 Connect the camera to the existing network and test the camera
- Step 8 Make a backup of the new configuration

2.2 Camera Bench Test

Since the camera offers both analog video and IP video, and since the camera can be powered by PoE or by a conventional power supply, there are several ways to bench test the camera. It is recommended the installer should test the camera using the same type of connections as the final installation.

Even if using analog video and conventional power in the final installation, it is a good idea to test the IP communications when performing the bench test. If any image adjustments are necessary, they can be done using a web browser over the IP connection, and saved as power-on default settings.

With the camera powered up, analog video can be tested at either the BNC connector or the RCA connector. Connect the camera to a video monitor and confirm the live video is displayed on the monitor.

1. For this chapter, it is assumed the camera will be connected to a network via Ethernet. For installations that use only analog video output, it is not possible to make configuration changes unless an Ethernet connection is also used.

If using a conventional power supply, connect the camera to a network switch with an Ethernet cable, and connect a PC or laptop to the switch also. Use a web browser to access and test the camera as described below, and if necessary make configuration changes prior to installation.

2.3 Web Browser Interface

The FC-Series S camera is shipped with an IP address set to 192.168.250.116. Set the PC or laptop network adapter to a compatible IP address, for example: 192.168.250.1 with a netmask of 255.255.255.0. If you are unsure how to set the IP address on the PC or laptop, refer to section 2.7 “Setting the IP address on a Windows PC” on page 2-17.

Use a web browser to connect to the camera as described below, and confirm it is streaming video. Once the bench test is complete, use the web browser to make configuration changes as needed (for example, set the IP address to an address that is compatible with the existing network). It is also a good idea to run the FSM software and confirm it is working with the camera as expected.

It is possible to log into the camera using one of three User Names: **user**, **expert**, and **admin**. By default all three accounts have the same password: **fliradmin**. The **user** login can be used to do the initial bench test of the camera. The **admin** login must be used to make configuration changes such as setting the IP address.

Log into the Camera Web Page

- Step 1 Open a web browser and enter: `http://192.168.250.116`. The login screen with a picture of the camera will appear.
- Step 2 Enter **user** for the User Name and **fliradmin** for the Password, and click Login.

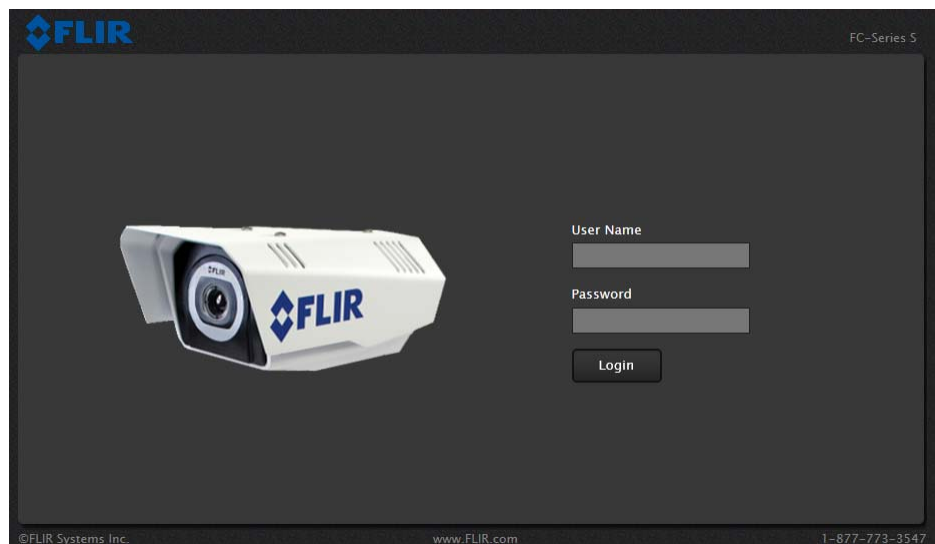


Figure 2-1: Camera Web Page Login Screen

The **Live Video** page will be displayed, with a live image from the camera on the left part of the screen. Next to the FLIR logo along the top of the screen are some menu choices, including **Live Video** (the red text indicates it is selected), **Help** and **Log Off**. On the right side are some control buttons, and in the lower right there is a frame rate selector. This selector allows the user to change the rate at which the frames are displayed in the browser to the user's own web browser only, and does not affect the video streams to other users or to an NVR.

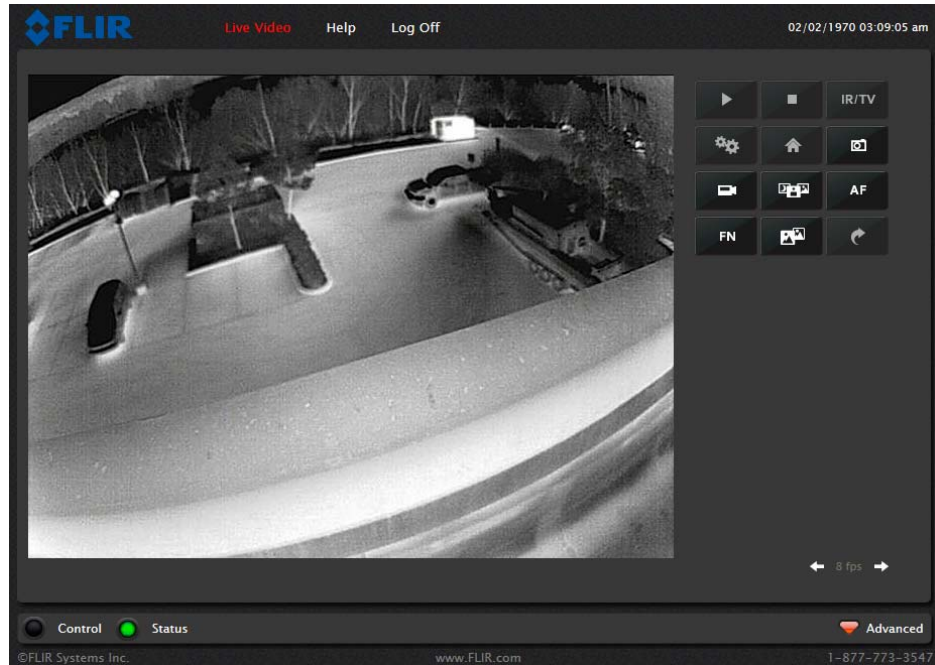
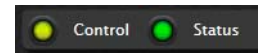


Figure 2-2: Camera Web Page Login Screen

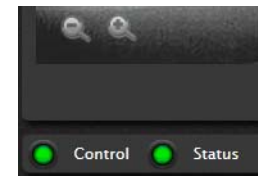
If the live video is not displayed, refer to section 2.6 “Troubleshooting Tips” on page 2-11.

2.3.1 Camera Control and Status

In the lower left of the screen are two indicator “lights”: Control and Status. Initially the Control light is off, as in the image above, indicating the user is not able to control the camera immediately. 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.



A user is able to request control of the camera by clicking on the yellow or black “light”, or simply by sending a command to the camera. For example, move the cursor over the video and select the “Zoom In” control (+) that appears in the lower left of the screen. The Status light may turn off temporarily while waiting for the response from the camera. After a short pause, the Control light should turn green. Observe what happens to the image when the “Zoom In” control is clicked several times. Be patient, there may be a slight delay between each command while the browser waits for a response from the camera.



Note, the zoom state (and other camera settings) can be saved in the IR Setup page ((see section 3.1.6 “Save Settings” for more information). This will allow the camera to retain the desired zoom state (FOV) when the power is cycled.

If a command is sent to the camera when the user does not have control, the command will not be executed, and it is necessary to send the command again once the light is green.

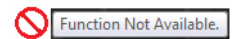
2.3.2 Web Control Panel

The control buttons on the right side of 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 screen tip is displayed.

This same web interface is used with various FLIR thermal cameras - some are fixed, such as the FC-Series S cameras, and some are pan/tilt cameras. As a result, some of the buttons in the control panel which apply only to pan/tilt cameras are disabled.



A disabled button is indicated with a grey color and when the cursor is over a disabled button, the screen tip indicates the function is not available. The disabled buttons correspond to commands that are not used with a fixed camera, but might be used to control a pan/tilt camera with multiple sensors.



The following buttons are enabled:



Save Snapshot

This button allows the user to save an image as a .jpg file



Perform IR NUC Calibration

This button causes the camera to perform a Non-Uniformity Correction operation (refer to the section 2.6.1 "Image freezes momentarily" on page 2-11).



Toggle Scene Preset

This button causes the camera to cycle through 5 different image settings. 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.



Toggle Polarity

This button changes the way various objects are displayed in the image, with hot objects displayed as white and cold objects as black, or vice versa.

2.3.3 Help

At the top of the page, the **Help** menu displays 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 (such as Software Version) on hand.

2.3.4 Log Off

Use the **Log Off** menu entry to disconnect from the camera and stop the display of the video stream.

2.4 Thermal Imaging Overview

When power is applied to the FC-Series S camera, a FLIR splash screen is displayed for less than two seconds, and then the camera outputs the live video image. No operator action or intervention is required and no configuration of the camera is necessary.

The thermal camera makes an image based on temperature differences. In the thermal image, by default the hottest item in the scene appears as white and the coldest item is black, and all other items are represented as a grey scale value between white and black.

It may take some time to get used to the thermal imagery from the camera, especially for someone who only has experience with normal daylight cameras. Having a basic understanding of the differences between thermal and daylight cameras can help with getting the best performance from the thermal camera.

Both thermal and daylight cameras have detectors (pixels) that detect energy. One difference between thermal and daylight cameras has to do with where the energy comes from to create an image. When viewing an image with an ordinary camera, there has to be some source of visible light (something hot, such as the sun or lights) that reflects off the objects in the scene to the camera. The same is true with human eyesight; the vast majority of what people see is based on **reflected** light energy.

On the other hand, the thermal camera detects energy that is **directly radiated** from objects in the scene. Most objects in typical surroundings are not hot enough to radiate visible light, but they easily radiate the type of infrared energy that the thermal camera can detect. Even very cold objects, like ice and snow, radiate this type of energy.

The camera is capable of sensing very small temperature differences, and produces a video image that typically has dramatic contrast in comparison to daylight cameras. This high contrast level from the thermal video enables intelligent video analytic software to perform more reliably.

The performance of the camera will likely vary throughout the day. Right after sunset, objects warmed by the sun will appear warmest. Early in the morning, many of these objects will appear cooler than their surroundings, so be sure to look for subtle differences in the scene, as opposed to just hot targets.

Originally developed for the military, thermal imaging cameras are now deployed in numerous commercial applications where it is impractical or too expensive to use active illumination (lights).



Figure 2-3: Splash Screen



They are perfect for a wide variety of applications including transportation, maritime, security, fire fighting, and medical applications. The cameras often provide improved daytime viewing in environments where traditional video camera performance suffers, such as in shadows or backlit scenes.

The FC-Series S camera is a state-of-the-art thermal imaging system that will provide excellent night visibility and situational awareness, without any form of natural or artificial illumination. The system is easy to use, but it is useful to understand how to interpret what is displayed on the monitor.

While the imagery on the monitor may at first look similar to ordinary black and white daylight video, experience with the camera in varying conditions and seasons will lead to an appreciation of the characteristics that make thermal imaging distinct. A few tips on how to interpret some of the imagery may help you to make the most of your system.

The thermal camera does not sense light like conventional cameras; it senses heat or temperature differences. The camera senses small “differences” in apparent radiation from the objects in view, and displays them as either white (or lighter shades of grey) for warmer objects, and black (or darker shades of grey) for colder objects.

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, a thermal camera does not need an additional active illumination source, and creates video based on directly radiated rather than reflected energy.

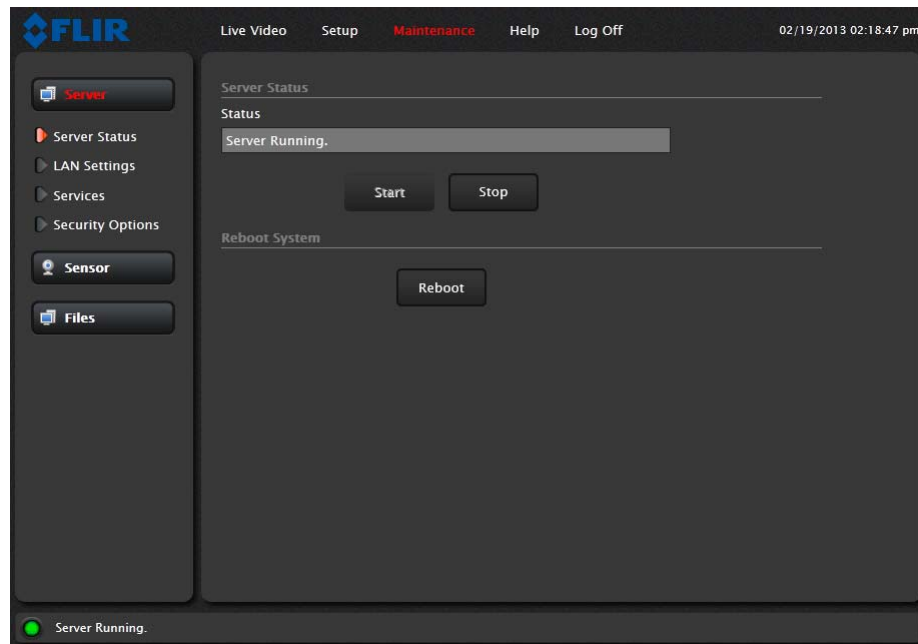
This is why hot objects such as parts on an engines and exhaust pipes appear white, while the sky, puddles of water and other cold objects appear dark (or cool)². Scenes with familiar objects will be easy to interpret with some experience. The camera automatically optimizes the image to provide you with the best contrast in most conditions.

2. By default, the camera represents hot objects as white and cold objects as black. The camera can be set to use the Black Hot polarity setting, which displays hot objects as black and cold objects as white and is effectively the negative of White Hot polarity. See “Toggle Polarity” on page 2-4..

2.5 Basic Camera Configuration

The following procedures describe how to do the most common basic camera configuration steps, such as setting the camera IP address and hostname and changing the user passwords. To make these changes, it is necessary to login using the **admin** user account. Additional configuration options are described after the basic steps are given (refer to [“Advanced Configuration” on page 3-1](#)). For more information on setting or changing other camera parameters refer to the Nexus IP Camera Configuration Guide (FLIR Doc #427-0030-00-28).

When logged in as **admin**, two additional menus appear: **Setup** and **Maintenance**. The IP Address and hostname and related parameters are accessible through the **Maintenance** menu. When it is selected, the following page appears.



2.5.1 Maintenance Menu

Initially, when the **Maintenance** page is selected, the **Server Status** page is displayed. 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.

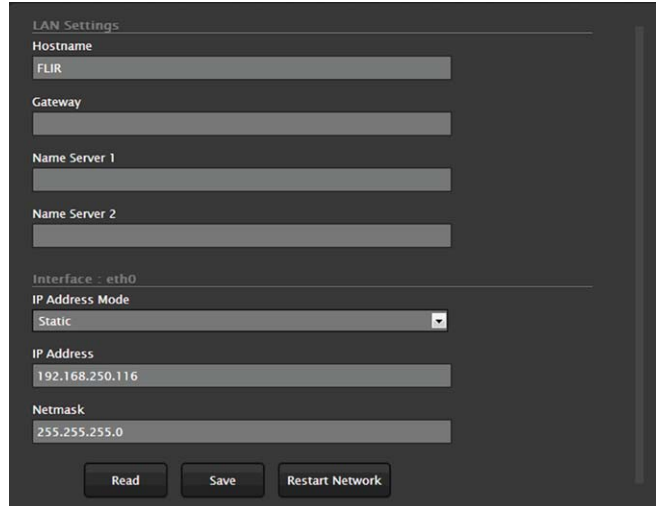
Note, In order to make some configuration changes through the **Maintenance** menu, it is necessary to save the changes, then stop and restart the server to make the changes take effect³.

The basic camera configuration steps are accessed through the **Maintenance** menu, using the **Server** submenu on the left side of the page. The **LAN Settings**, **Services**, and **Security Options** selections are described below. Generally with these settings it is necessary to save the changes to make them effective, but it is not necessary to stop and restart the server.

3. When making configuration changes using the **Setup** page, most of the changes take effect immediately, and it is not necessary to start and stop the server. However it is necessary to save the changes (with the Save Settings button at the bottom of the page) if it is desirable to use the new settings as a default when the camera is powered on.

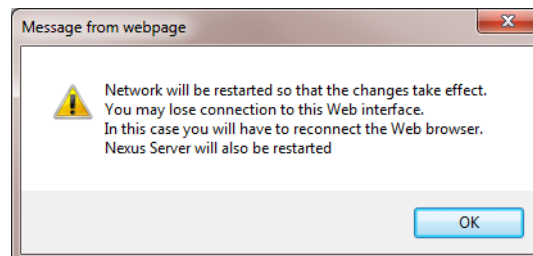
LAN Settings

The LAN Settings page can be used to set the hostname, default gateway, and IP address for the camera. The default IP Address mode is static; the mode can also be set to DHCP.



The screenshot shows the 'LAN Settings' web interface. It includes fields for 'Hostname' (set to 'FLIR'), 'Gateway', 'Name Server 1', and 'Name Server 2'. Below these is a section for 'Interface : eth0' with 'IP Address Mode' set to 'Static' (via a dropdown menu), 'IP Address' set to '192.168.250.116', and 'Netmask' set to '255.255.255.0'. At the bottom are three buttons: 'Read', 'Save', and 'Restart Network'.

When the LAN settings are changed and the Save button is clicked, a pop-up message will appear to indicate the network interface will be restarted.



Once the IP address of the camera is changed, the PC may no longer be on the same network and therefore may not be able to access the camera until the IP address on the PC is changed also. For that reason, you may wish to change the IP address after making other configuration changes.

If the Hostname is changed, the new name may not show up in FSM until the camera is rebooted. To reboot the camera, save any configuration changes, then select Server Status and click the Reboot button.

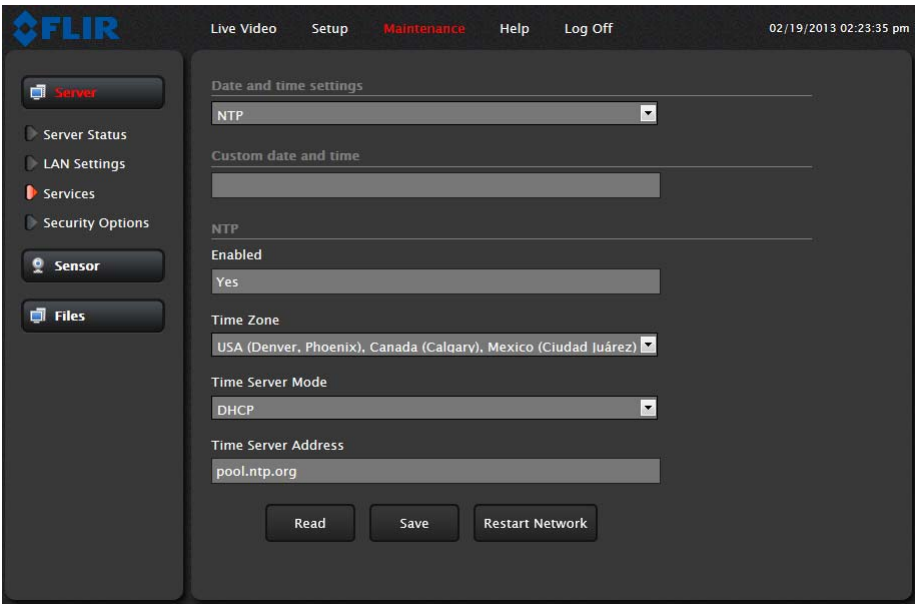
Note

The IP address is temporarily displayed on the video for a short while after the camera boots up. If you are unsure what the camera IP address is set to, it may be useful to reboot the camera and watch for the IP Address information after the camera boots up.

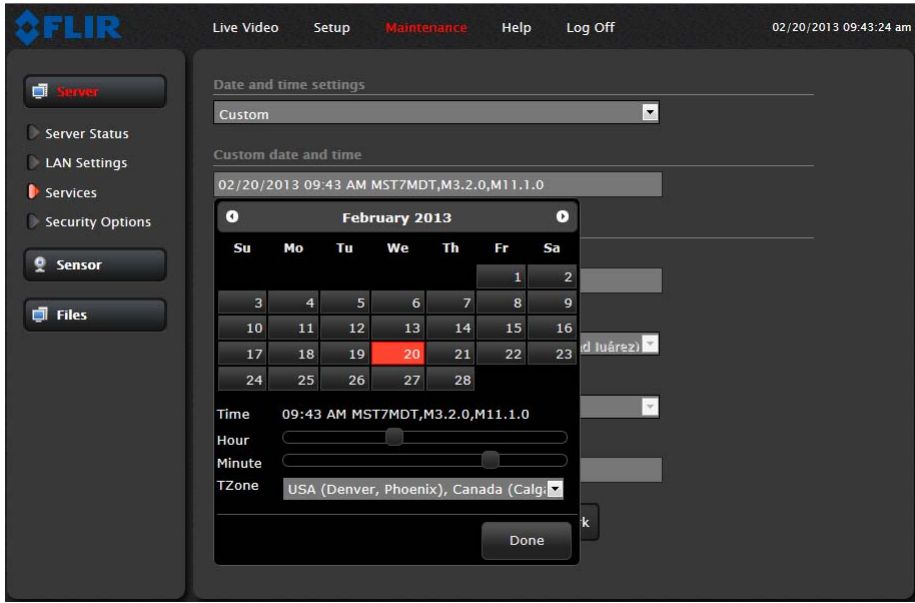
To reset the IP address to the factory default, refer to section 3.6 "Restoring the Factory Network Settings" on page 3-12.

Services (Date and Time settings)

The Services page is used to configure the date and time settings. The date, time, and time zone can be obtained from an NTP server, or can be entered manually. If the NTP mode is selected, the NTP server information can be entered. The NTP server address can be entered as a static address or can be obtained via DHCP.



If the Custom mode is selected, a pop-up window allows the information to be entered manually.



Set the date and time parameters, then select the Save button at the bottom.

Security Options

To maintain security of your systems set passwords for each of the three login accounts.

user —The user account can only use the **Live Video** screen and controls.

expert —The expert account can use the **Live Video** screen and the camera Setup screen.

admin —The admin account can use all screens

After each password is set and confirmed, select the Save button at the bottom (it may be necessary to scroll down the page)..

Note, as an additional security measure, it is possible to limit which computers have access to the web browser interface. Simply add a computer's IP address and click "Add". After all the allowed IP addresses are entered, select the Save button to save the changes.

It is also possible to limit access to the camera from a client program (such as FSM) by IP address. To do so, in the **Maintenance** menu select Sensor, then Networking. Set the "Allow anonymous clients" parameter to No, and then add in the allowed addresses in the Remote Clients list and click Save.

2.6 Troubleshooting Tips

If you need help during the installation process, contact your local FLIR representative or, call 877-773-3547 inside the US. 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. Find out more at the FLIR training web page: <http://www.flir.com/training>.

2.6.1 Image freezes momentarily

By design, the camera image will freeze momentarily on a periodic basis during the Flat Field Correction (FFC) cycle (also known as Non-Uniformity Correction or NUC). Every few minutes, the image will momentarily freeze for a fraction of a second while the camera performs a flat field correction. 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 corner of the screen.

Using FSM, it is possible to adjust the frequency of how often the FFC operation occurs. Using the Advanced Sensor Control, it is possible to change the FFC interval or to disable the automatic FFC entirely by setting it to Manual mode. For the best possible image, it is recommended the factory settings are used.

2.6.2 No video

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 the circuit breaker is set properly. If a fuse was used, be sure the fuse is not blown. If the video cabling is suspected as a possible source of the problem, plug a monitor into the RCA connection inside the camera and determine if it produces an image.

When the camera is powered on, it will do a NUC operation shortly after startup. If you are uncertain if the camera is receiving power, it may be useful to listen to the camera to hear if the click-click of the shutter mechanism can be heard. It may be only be possible to perform this test when the camera is on a work bench rather than in its installed position.

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).

2.6.3 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.

2.6.4 Unable To Communicate Over Ethernet

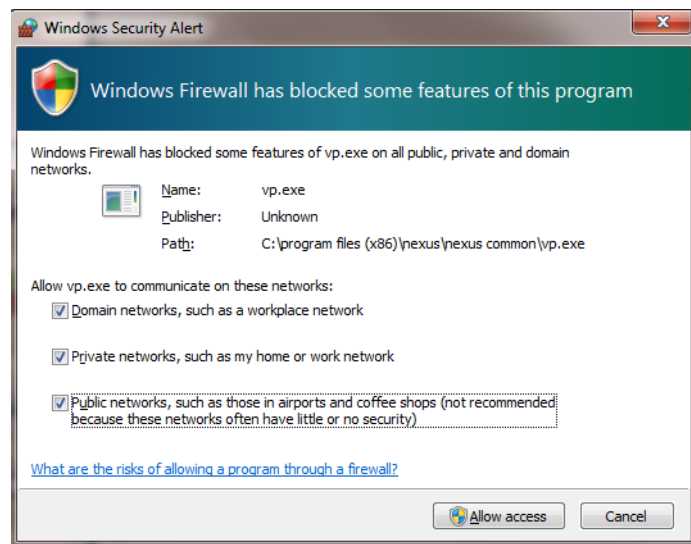
First check to ensure the physical connections are intact and that the camera is powered on and providing analog video to the monitor. When the camera is turned on, confirm the startup information is displayed on the analog monitor after approximately 90 seconds. For example:

S/N: 1234567

IP Addr: 192.168.250.116

Confirm that the IP address for the PC (for example, 192.168.250.1) is on the same network as the camera.

Next determine if Windows Personal Firewall is blocking the packets. You can turn off the firewall or add an exception for the FSM program. Typically when FSM runs for the first time, a pop-up notification may ask for permission to allow the FLIR Sensors Manager (fsm.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.



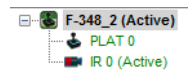
By default the camera will broadcast a “discovery” packet two times per second. When FSM starts up, it listens to the network for the discovery packets. If no cameras are listed in the Discovered Servers list, press the Refresh button. If the list is still empty, it indicates no discovery packets were received. This could be due to a wide variety of problems with the network, the PC, or the camera.

If necessary, use a packet sniffer utility such as Wireshark to capture packets and confirm the packets are being received by the PC from the camera.

2.6.5 Unable to control the camera

If the camera does not respond to commands from FSM (for example, the camera does not zoom when the zoom in button is clicked), the camera may not be the “Active” camera, or you may not have control of the camera. By default FSM will automatically request control of the camera and make it active, but if there are multiple cameras and/or multiple FSM clients, it may be necessary to manually make the camera active and take control of it.

In the Sensors Panel, if the camera is the active sensor, there will be an “(Active)” notification next to the name of the camera. Only one camera or sensor can be active at a time. To make the camera active, right click on the icon to the left of the camera name and select “Set Active”, or simply double-click on the icon.



The icon to the left of the camera name indicates the status of the sensor. The following is a list of the possible icons and the meaning of each one.



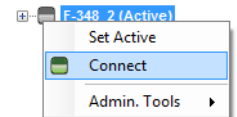
Connected and Controlled

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively “connected” to the FSM client and receiving status updates. The joystick in the icon indicates the user has control of the camera. To release control of the camera, right click on the icon and select “Release Control”.



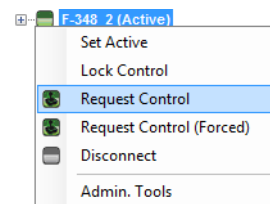
Discovered

This icon indicates the camera has been discovered and added to the list of active servers, but the camera is not actively “connected” to FSM, and therefore FSM is not receiving status updates. To connect to the camera, right click on the icon and select “Connect”. Alternatively, it is possible to double-click the icon to connect.



Connected

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively “connected” to FSM and receiving status updates. To take control of the camera, right click on the icon and select “Request Control”. Alternatively, it is possible to double-click the icon to take control.



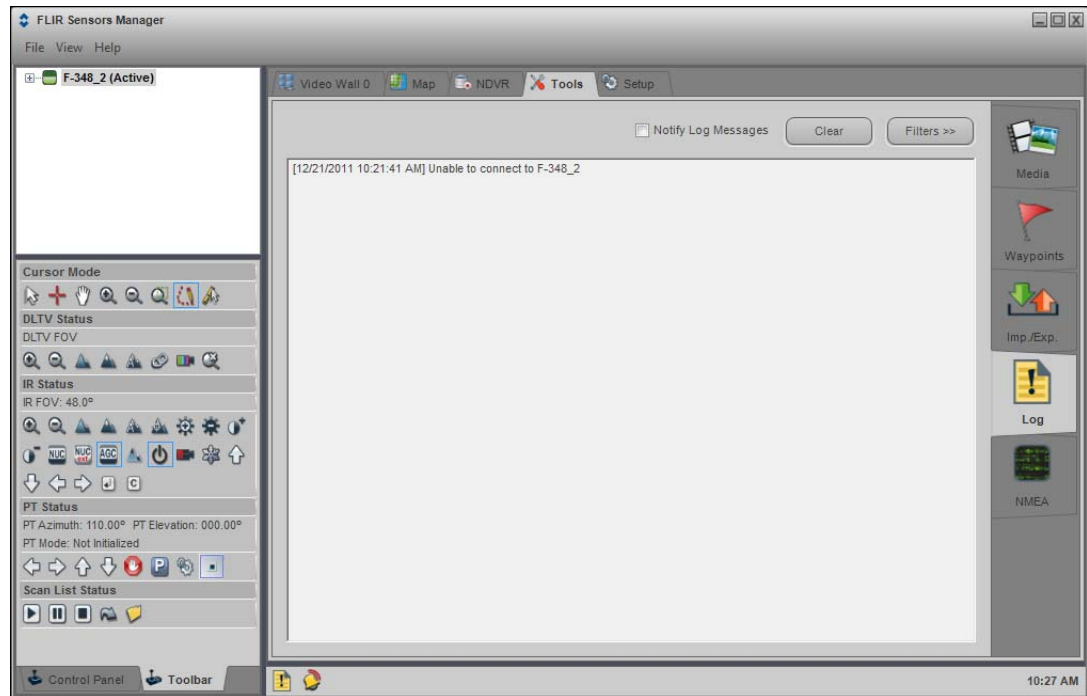
Not Connected

This icon indicates the camera has been discovered and added to the list of active servers, and the camera is actively “connected” to the FSM client and receiving status updates. To connect to the camera, right click on the icon and select “Connect”.

2.6.6 General Errors



In the status bar at the bottom of the screen there may be an indication that an error has occurred. When you position the cursor over the error icon (exclamation mark), the error will be displayed in a temporary pop-up. It is possible to view all the error messages by selecting the Tools tab at the top of the screen, and then select the Log button to the left.



2.6.7 Unable to View Video Stream

If the video stream from the camera is not displayed in FSM, it could be that the packets are blocked by the firewall, or there could be a conflict with video codecs that are installed for other video programs.

When displaying video with FSM for the first time, the Windows Personal Firewall may ask for permission to allow the FLIR Video Player (vp.exe) to communicate on the network. Select the check boxes (domain/private/public) that are appropriate for your network.

If necessary, test to make sure the video from the camera can be viewed by a generic video player such as VLC media player (<http://www.videolan.org/vlc/>). To view the video stream, specify RTSP port 554 and the appropriate stream name such as "ch0". For example:

```
rtsp://192.168.250.116:554/ch0
```

Refer to section 3.4.4 "RTP Settings" on page 3-8 for additional information on RTP and stream names.

2.6.8 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 (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 which can cause unacceptable noise. Use a high-quality video distribution amplifier when splitting the signal to multiple monitors.

2.6.9 Image too dark or too light

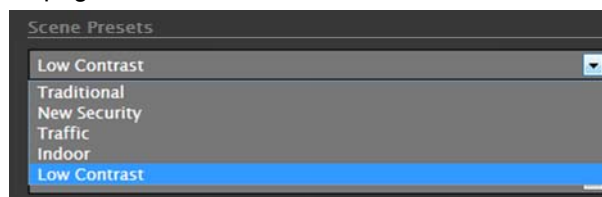
By default the FC-Series S thermal camera uses an Automatic Gain Control (AGC) setting that has proven to be superior for most applications, and the camera will respond to varying conditions automatically. The installer should keep in mind that the sky is quite cold and can strongly affect the overall image. It may be possible to avoid a problem by slightly moving the camera up or down to include (or exclude) items with hot or cold temperatures that influence the overall image. For example, a very cold background (such as the sky) could cause the camera to use a wider temperature range than appropriate.

There are five Scene Presets that use a combination of settings to produce different configurations that could improve the video image for a given set of conditions. The presets can be toggled with the Scene Presets button on the **Live Video** page.



Scene Presets

The presets can also be selected from the Scene Presets in the **Setup** page. Refer to section 3.1 “Thermal Image Setup” on page 3-1



Scene Presets

2.6.10 Eastern or Western Exposure

Once installed, the camera may point 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.

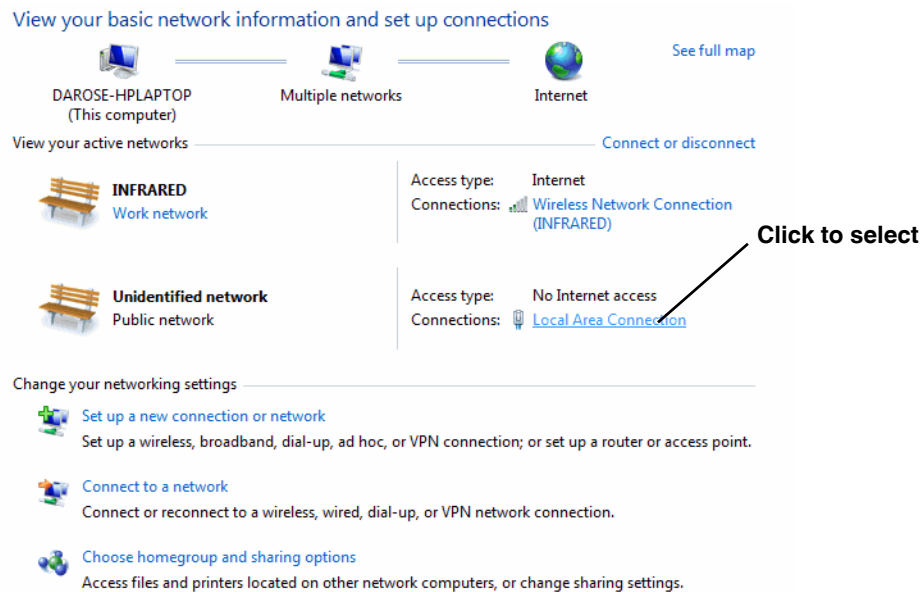


Figure 2-4: Images facing sun from standard camera (left) and thermal camera (right)

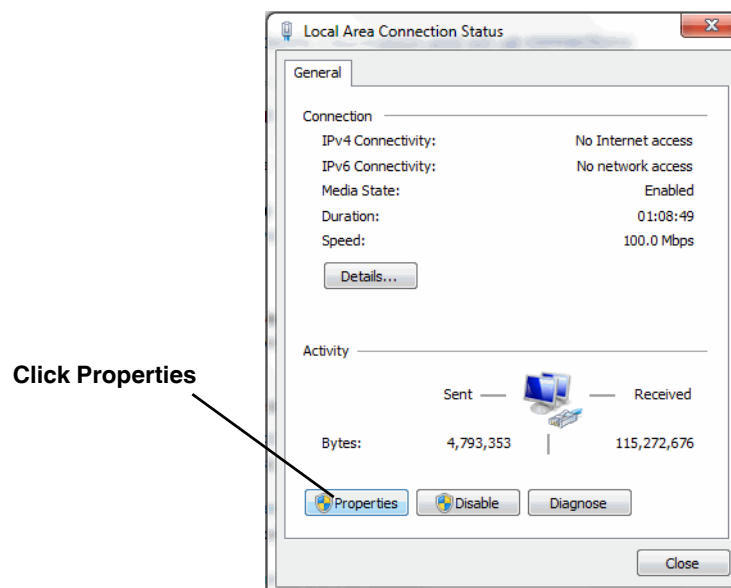
2.7 Setting the IP address on a Windows PC

To set the computer IP address in Windows, first connect the PC to a switch, or connect it to the camera and ensure the camera has power.

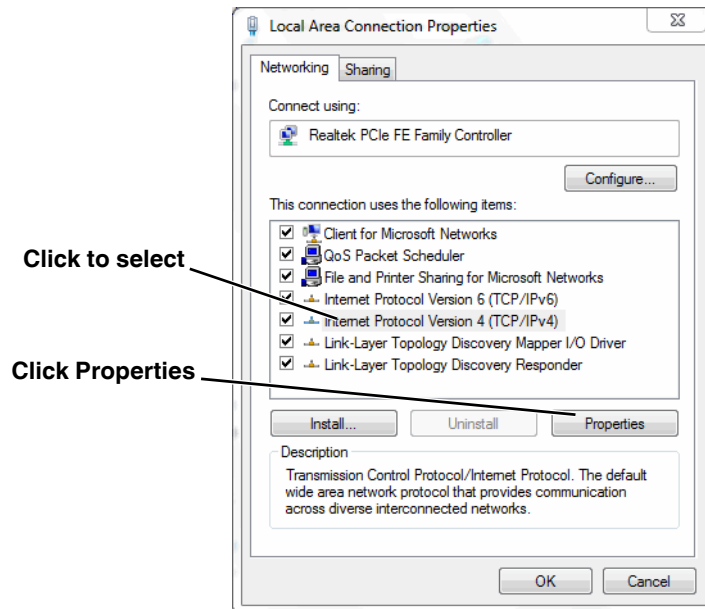
Step 1 With the PC or laptop connected to the switch (or if back-to-back with the camera, with the camera powered on), open the Control Panel, Network and Sharing Center (a Windows 7 example is shown). The connection to the camera should show in your Active Networks.



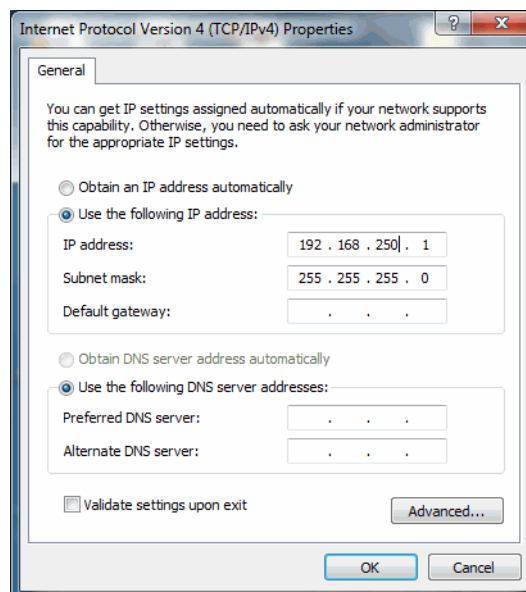
Step 2 Click to select the Local Area Connection then click Properties, as shown at the right.



Step 3 Select Internet Protocol Version 4 (TCP/IPv4) as shown. Then click Properties.



Step 4 Select **Use the following IP address**, then enter 192.168.250.xxx, where xxx is any number between 1-255, other than 116 (the camera default).



Step 5 Set the Subnet mask to 255.255.255.0, then click OK.

In this chapter, additional configuration settings related to the following topics are described:

- Optimizing the thermal image
- Configuring the camera to work with a third-party VMS (ONVIF)
- Enabling On Screen Display (OSD) text
- Setting up the video streams to optimize quality and network performance

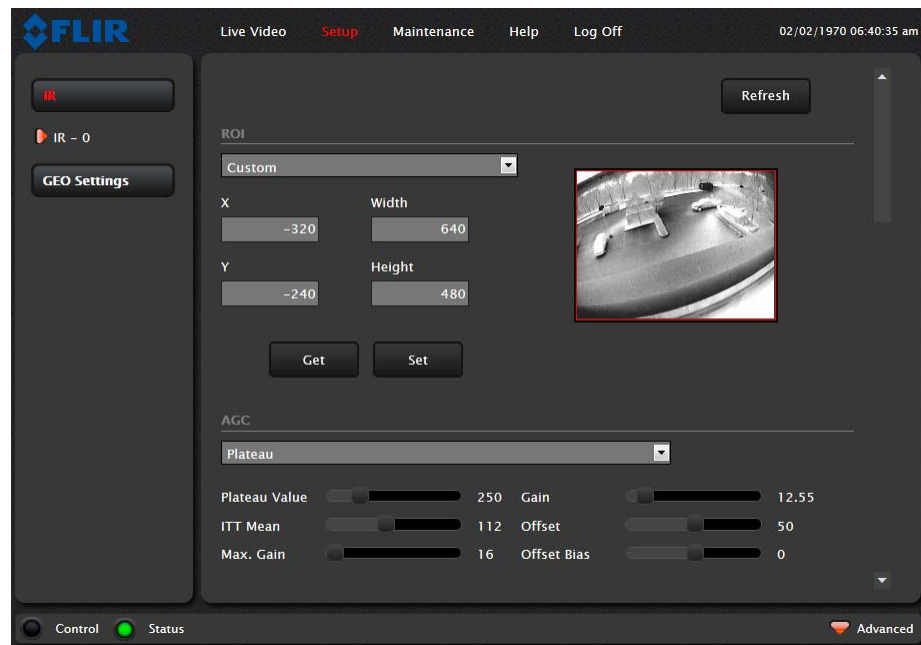
When configuration changes are made with the web browser, the settings are saved to a configuration file. It is a good idea to make a backup of the existing configuration file prior to making changes, and another backup once the changes are finalized. If necessary the camera can be restored to its original factory configuration or one of the saved configurations. For more information, refer to section 3.5 “Configuration File” on page 3-11.

3.1 Thermal Image Setup

In most installations it will not be necessary to change the thermal camera from its default settings. However in some situations, depending on weather, time of day and so on, it may be useful to make changes to the video image to enhance the image by modifying one or more of the parameters.

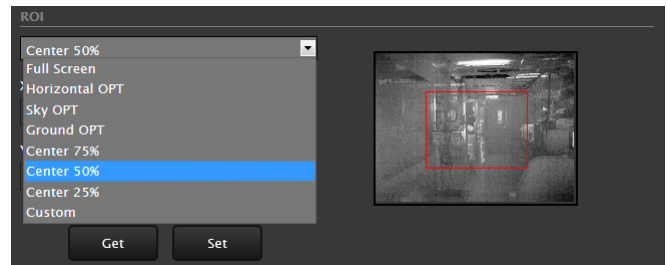
The **Setup** menu has configuration options for making changes to the IR (thermal) camera and for setting the GEO parameters (geo-reference map location used by programs like FSM). The changes made through the **Setup** page have an immediate effect (it is not necessary to stop and restart the server). Note, it is necessary to save the changes if it is desirable to use the new settings at power up (see section 3.1.6 “Save Settings”).

In the **Setup** page, a single JPEG image (a snapshot) is displayed in the upper right-hand corner. To update this image at any time, it is necessary to select the Refresh button. This will cause the entire page to refresh, including the image and all the parameter values (be patient, this may take some time).



3.1.1 ROI

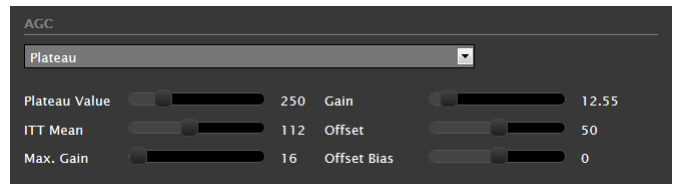
The camera adjustments under the ROI heading allow the user to make changes to the Region Of Interest. The ROI determines what portion of the image is considered by the Automatic Gain Control (AGC) algorithm. By default all of the pixels in the image are considered; in some cases it may provide an improved 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.



3.1.2 AGC

The AGC parameters affect how the overall video image appears. The default Plateau 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.

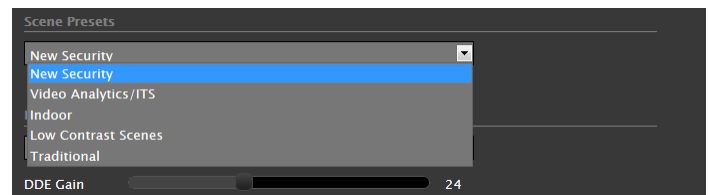
Experiment with different AGC modes to find the settings that work best for the particular installation (it may be best to start with the Scene Presets options, see below). It is always possible to return to the default settings by selecting the Factory Defaults button at the bottom of the page.



With the Plateau mode, the ITT Mean parameter will effect overall brightness, and the Max Gain parameter can generally be used to increase contrast (although it may also increase noise due to gain).

3.1.3 Scene Presets

Each Scene Preset provides a combination of AGC and Digital Detail Enhancement (DDE, see below) parameters that are preferred for certain types of conditions. Select a preset that provides an image that is optimal for the installation.



3.1.4 Digital Detail Enhancement (DDE)

DDE is an image processing technique that enhances details by emphasizing lines and edges.

3.1.5 Flat Field Correction (FFC)

A Flat Field Correction operation can be used to correct for non-uniform responsivity within the pixel array. 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. The camera performs FFC at regular intervals or when the ambient temperature changes, but can also be performed as desired and may cause an overall image improvement. Refer to section 2.6.1 “Image freezes momentarily” on page 2-11.

3.1.6 Save Settings

All of the IR-0 settings in the **Setup** page are dynamic and have an immediate effect, similar to the Advance Sensor Panel of FSM. When the Save Settings button at the bottom of the page is selected, the camera will use the saved settings whenever the power is cycled. To restore the IR camera to the original settings, select the Factory Defaults button and then click on Save Settings.



3.2 Configuration Changes That Require Restart

The following paragraphs describe additional camera configuration options that are used in some installations. For the configuration changes in the remainder of this chapter, it is necessary to save the changes, then stop and restart the server to make the changes effective. Many additional configuration options are available that are not described in this manual. It is recommended you contact FLIR Technical Support if you need information about additional configuration options that are not described in this manual.

After making 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 active and running, and another configuration that is saved (and possibly different than the running configuration).

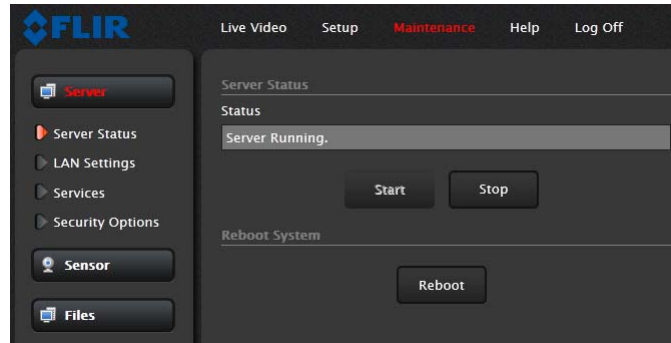
The message at the bottom of the page indicates the saved configuration is different than the active (running) configuration, and it is necessary to restart the server.

A dark gray rectangular box with yellow text.

You must restart the server for the changes to be effective.

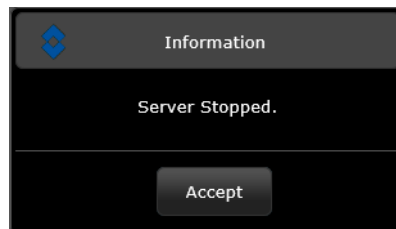
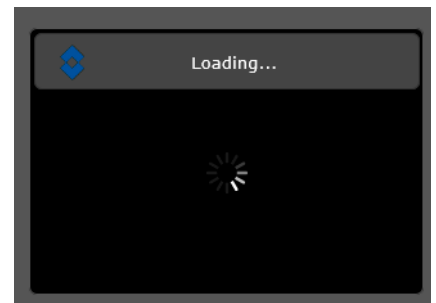
3.3 Restarting the Server

When the **Maintenance** page is first selected, the **Server Status** page is displayed by default. 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. After changes have been saved, click on **Maintenance** to return to the **Server Status** page, then click on the Stop button at the top of the page, and wait for the page to refresh.

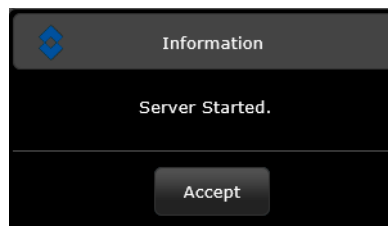


It may take up to 20 seconds or more to stop the server, especially when there are multiple video streams open. Be patient when stopping the server.

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



3.4 Additional Camera Configuration Options

3.4.1 Remote/VMS (ONVIF Interface)

Several types of third-party Video Management System (VMS) systems are supported by FLIR IP cameras. Because these systems tend to evolve and change over time, contact your local FLIR representative or FLIR Technical Support if you have any difficulties or questions about using this feature.

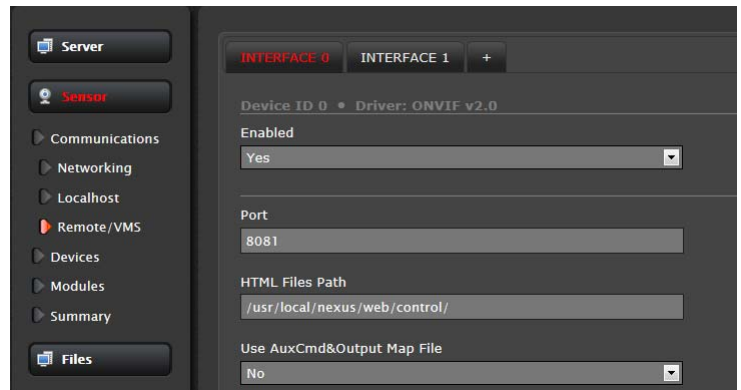
Select the **Remote/VMS** link on the left side of the page to configure the camera to operate with a VMS Interface. By default, the camera is configured with a Remote/VMS interface with ONVIF 2.0 parameters.

The ONVIF (Open Network Video Interface Forum) is an open industry forum for the development of a global standard for the interface of network video products. An

ONVIF-compliant VMS can be used to control a FLIR camera, display video, and, for pan/tilt cameras, access up to 50 pan/tilt presets.

If the camera is to be used with a third-party VMS that is compliant with ONVIF, the parameters can be adjusted (if needed) to work with the VMS. Refer to the VMS documentation to determine what parameter values are needed.

After the interface is configured, scroll down and click on the Save button to save the configuration, and then restart the server.



3.4.2 On Screen Display (OSD)

It may be desirable to display text information (such as the name of the camera or the date/time) as an overlay on the video image. The Sensor > Devices > OSD page is used to turn on and configure the OSD options. The OSD configuration page allows certain camera-related information to be displayed in the analog video and in the IP video streams. It is possible to display the following parameters as an overlay on the video channels: Date, Time, Label, Preset¹.

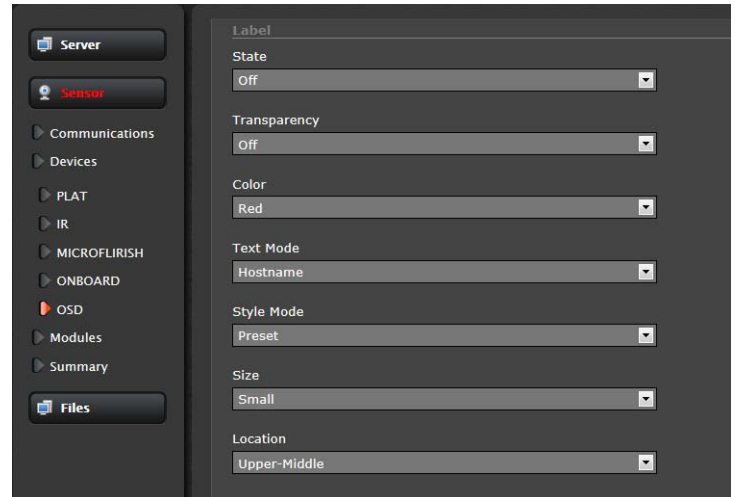
The Label can display the Hostname (as configured on the LAN Settings page) or a custom text string (using the Text Mode parameter).

The appearance of each text string can be controlled with the following parameters:

- State (on or off)
- Transparency (on indicates only the letters are displayed, off indicates the letters are displayed inside an opaque block)
- Color (changes the color of the letters)
- Style Mode (can be Preset, which indicates the information is displayed in certain preset sizes and locations, or Manual, which requires additional size and location settings)
- Size (text size - small, medium or large)
- Location (preset location on the screen where the information will appear)

The Initial System Info parameters control how the initial system information is displayed, such as the IP address.

The OSD text will appear on the IP video stream as well as the analog video output.



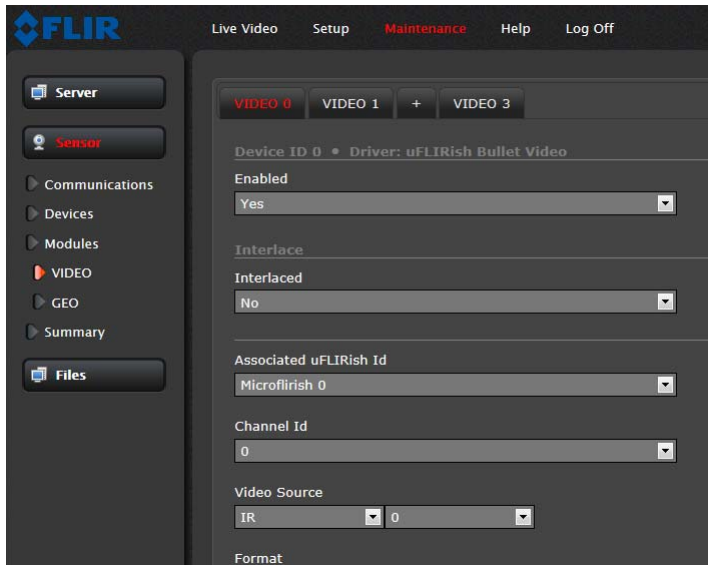
1. The Preset label is generally used with FLIR pan/tilt cameras.

3.4.3 Video Stream Parameters

From the **Maintenance** menu, it is possible to modify the video stream parameters by selecting the **Sensor > Modules > Video** page. Various parameters that affect both image quality and transmission bandwidth are available.

By default, three video streams are enabled for the thermal (IR) camera: Video 0, Video 1, and Video 3. The Video 3 stream is used by the web browser Live Video display. The Video 0 and Video 1 streams are available for viewing from a client program such as FSM, a stand-alone video player, or a third-party VMS.

By default, Video 0 uses H.264 encoding and Video 1 uses MPEG 4 encoding. To modify parameters that affect a particular IP Video stream from the thermal camera, select the appropriate link at the top (for example, Video 0).



The default settings for each video stream provide high-quality, full frame-rate video. In general, for most installations it will not be necessary to modify the default parameters. However in some cases, such as when a video stream is sent over a wireless network, it may be useful to “tune” the video stream to try to reduce the bandwidth requirements. In particular, the **RTP Settings**, **Network Options** and the **Settings** parameters are described below.

There are some challenges with streaming video over an IP network, when compared to other traditional IP applications which are less time-critical, such as email and web browsing. In particular, there are requirements which must be fulfilled to ensure satisfactory video quality in professional security environments. There are many parameters and factors related to network infrastructure, protocols, codecs and so on that can affect the quality and bit rate of a video stream when it is established between the camera and a client.

To enable another video stream (Video 2), select the “+” link and set the Enabled parameter to Yes. Turning on additional video stream could place a higher load on the microprocessor and could lead to poor performance overall if not done properly. If you have problems or questions contact your local FLIR representative or FLIR Technical Support.

The video streaming is done using a protocol generally referred to as Real-time Transport Protocol (RTP), but there are actually many protocols involved, including Real-Time Transport Control Protocol (RTCP) and Real Time Streaming Protocol (RTSP). In the background, a “negotiation” takes place to establish a session between the client (such as FSM, or a third party VMS or video player) and the camera. The ports which form a session are negotiated using a protocol such as RTSP. A client typically requests a video stream using its preferred settings, and the camera can respond with its preferred settings. As a result, many of the details are established dynamically, which may run contrary to network security requirements.

In some networks, the RTP/RTSP traffic is carried (tunnelled) over Hypertext Transfer Protocol (HTTP) as that may allow the traffic to cross network boundaries and firewalls. While this method

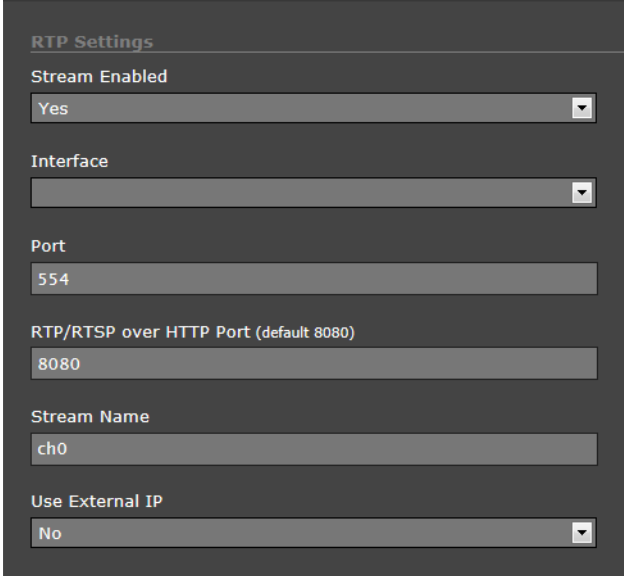
involves more overhead due to encapsulation, it may be necessary for clients to access the video streams when HTTP proxies are used.

3.4.4 RTP Settings

According to the specification, RTP is originated and received on even port numbers and the associated RTCP communication uses the next higher odd port number; the default RTP Port is 554. The Stream Name is used when establishing a session from a client. The default value recognized by FSM for the first stream is ch0; the complete connection string is:
rtsp://192.168.250.116/ch0.

If necessary, this stream name can be used to open a video stream with a third-party video player.

By default the video stream uses the IP address of the camera. If the Use External IP parameter is set to “yes”, an alternate IP address can be entered.



The screenshot shows a configuration panel titled "RTP Settings" with a dark background. It contains several settings, each with a label and a corresponding input field or dropdown menu:

- Stream Enabled**: A dropdown menu with "Yes" selected.
- Interface**: A dropdown menu with an empty field.
- Port**: A text input field containing "554".
- RTP/RTSP over HTTP Port (default 8080)**: A text input field containing "8080".
- Stream Name**: A text input field containing "ch0".
- Use External IP**: A dropdown menu with "No" selected.

Note, always use an even port number for the RTP Port parameter.

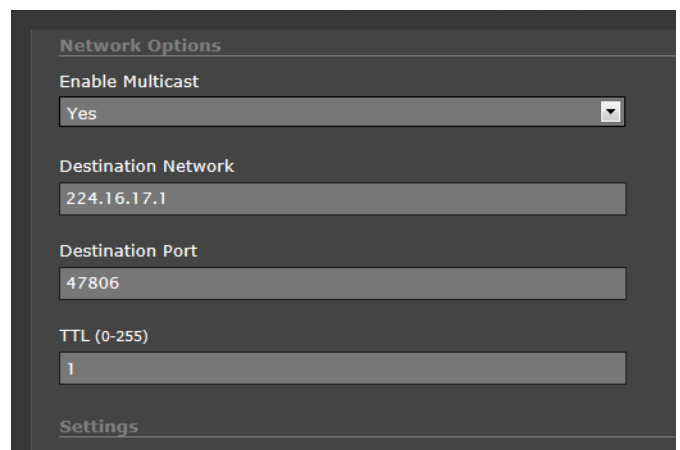
3.4.5 Network Options (Unicast/Multicast)

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 that video stream open (for example, FSM clients, nDVR, and so on). 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 used by more than one client/location, it may be wise to use multicast for more efficient bandwidth usage.

To set the camera to use Multicast, set the Enable Multicast parameter to “yes”, and set the Destination Network address and Destination Port to a unique combination that will not conflict with other IP Video devices on the network (the Destination Port must be an even number).

If more than one camera is providing multicast streams on the network, be sure to configure each stream with a unique multicast Destination Network IP address and Destination Port combination. The destination address on each camera will default to 232.0.1.1 when the Enable Multicast parameter is set to “yes”.



The screenshot shows a configuration window titled "Network Options". It contains four settings:

- Enable Multicast:** A dropdown menu set to "Yes".
- Destination Network:** A text field containing "224.16.17.1".
- Destination Port:** A text field containing "47806".
- TTL (0-255):** A text field containing "1".

At the bottom of the window is a link labeled "Settings".

3.4.6 Settings

The parameters in the Settings section will have a significant impact on the quality and bandwidth requirements of the video stream. In general it is recommended that the default values are used initially, and then individual parameters can be modified and tested incrementally to determine if the bandwidth and quality requirements are met.

For each video stream, the Codec Type options are MPEG4, H.264 or MJPEG. MPEG4 requires the least amount of processing, and MJPEG requires the most.

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 results in lower bandwidth and possibly lower quality.

The screenshot shows a 'Settings' panel with the following parameters and their current values:

- Codec Type:** H.264
- Bit Rate (Kbps):** 3072
- Rate Control:** CVBR
- Quality:** High
- I-Frame Interval (5 - 60):** 25
- Image Size:** NATIVE (640x512)
- Frame Rate (fps):** 25

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

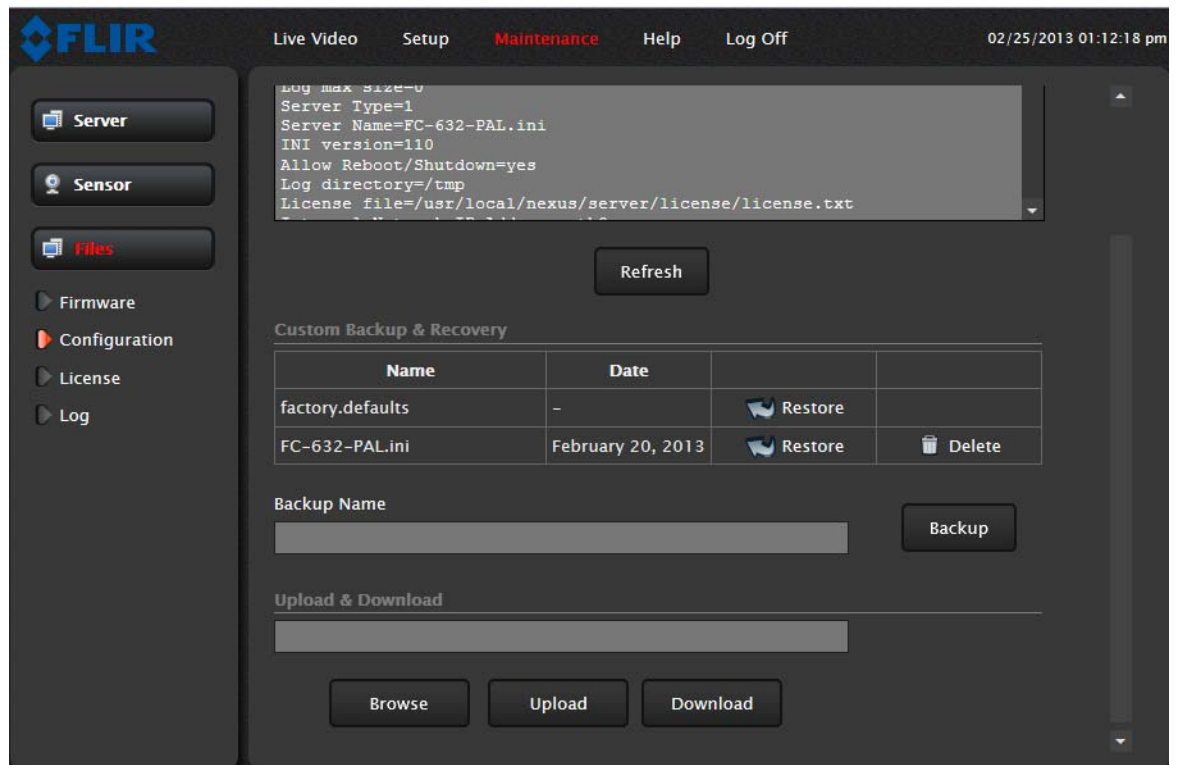
Image Size	NTSC	PAL
D1	720x480	720x576
4CIF	704x480	704x576
VGA	640x480	N/A
CIF	N/A	320x240
SIF	353x240	352x288
QVGA	320x240	N/A
QCIF	N/A	176x144

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.

3.5 Configuration File

The Configuration File web page allows the Nexus Server configuration to be displayed or backed up locally (on the camera). The configuration file can also be downloaded to another computer for backup, or a new configuration file can be uploaded from a computer to the camera.

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



In the Custom Backup & Recovery section, click the Restore link associated with the factory.defaults configuration to restore the camera to its factory settings. This file can not be modified or deleted, so it is always available.

Use the Backup button to make a backup of your final settings. This will make a backup copy of the configuration file and store it locally on the camera.

In the Upload & Download section, the Download Configuration File link can be used to save a copy to a PC for safe keeping. A pop-up window will ask for a file name and destination folder.

The Upload button is used to transfer a configuration file from a PC to the camera.

3.6 Restoring the Factory Network Settings

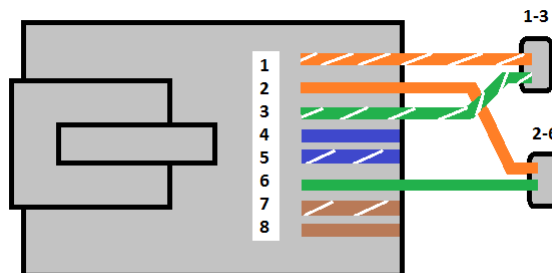
The camera comes configured from the factory with a default IP address (192.168.250.116). In some cases, it may be necessary to restore the network settings of the camera to the original factory settings. If necessary, the camera IP address can be restored to this factory default address by temporarily connecting a loopback device to the Ethernet port during initial power-up (this can be accomplished if the camera uses conventional power rather than PoE). Approximately 30 seconds after power is turned on, the loopback should be removed to allow the camera to finish booting up.

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. This type of device is available commercially (the Smartronix Superlooper Ethernet Loopback Jack and Plug is one example), or it can be easily made with an RJ45 plug, a couple wires, and a crimp tool.



Important Note

The camera will not finish booting up when the loopback is connected to the Ethernet. Approximately 30 seconds after power is turned on, the loopback should be removed to allow the camera to finish booting up.

After the camera boots up, confirm the startup information is displayed on the analog monitor after approximately 90 seconds. For example:

S/N: 1234567

IP Addr: 192.168.250.116



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