PTZ-35x140MS
SR-35x140MS
Installation and Operation Manual

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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: 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 the user's expense.

Shielded cables must be used to connect this device to other devices.

CE **Warning** – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Pelco is a registered trademark of Pelco. Windows is a registered trademark of Microsoft Corporation.

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1.0 WARNINGS AND CAUTIONS

Caution! This guide uses the term **Caution!** to indicate a potentially hazardous situation, which, if not avoided, may result in bodily harm or injury, damage to the camera, or other property damage.

Protect Your Investment

Do not disassemble the camera enclosure. Disassembly can cause permanent damage and will void the warranty.

The camera should be installed by a trained professional according to local codes and industry-standard safe practices.

Proper ESD protocol should be followed while working inside the unit.

The camera is a precision optical instrument and should not be exposed to excessive shock or vibration.

When not in use, put the camera in the Park position to protect the lenses. It is a good idea to avoid pointing the system directly at extremely high-intensity radiation sources, such as the sun, lasers, arc welders, etc. This warning applies whether or not the system is powered.

Great care should be used with your camera's optics. They are delicate and can be damaged by improper cleaning. Only clean the lens in the manner described in section 7.0 Caring for your 35x140MS Thermal Camera.

Legal Considerations

Camera and audio surveillance may be prohibited by laws that vary from country to country. Check the laws in your local region before using this product for surveillance purposes.

Support

If you have questions that are not covered in this manual, or need service, contact FLIR Customer Support at (805) 964-9797 for additional information prior to returning your 35x140MS Thermal Camera. In the US, you can also reach FLIR Customer Support at (888) 747-FLIR (747-3547).

All thermal imaging systems are subject to export control. Please contact FLIR for export compliance information concerning your application or geographic area.

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.

2.0 INTRODUCTION

The PTZ-35x140MS and SR-35x140MS are high-resolution multi-sensor (MS) camera systems designed specifically for the security market for medium- to long-range security applications. Each model includes a sophisticated thermal imaging system that provides excellent night visibility and situational awareness, even in absolute darkness, as well as a standard high resolution low-light video camera[1], integrated into a compact weather enclosure.

Each system includes a versatile, dual field-of-view thermal imaging system called Foveus, a FLIR-patented innovation, which provides a high-resolution thermal image with a 5° view nested inside a wider 20° view. This image presentation concept, derived from the same principles as human vision, offers excellent situational awareness and long range threat detection, simultaneously. Each system has two thermal imagers: a 35mm camera for wide-angle surveillance, and a long-range 140mm camera, and the ability to continuously zoom between the two fields of view.

This thermal imaging system is complimented with a high-resolution daylight camera, providing optimal surveillance regardless of the time of day or lighting conditions. With the touch of a button you can switch between the thermal imager and the daylight / low light camera. The daylight camera provides up to 26x optical zoom. Displaying both the thermal image and the daylight image at the same time is also possible via Ethernet.

Figure 2-1: SR-35x140MS

The SR-35x140MS is used for fixed-mount applications, or it can be integrated with a pan/tilt mechanism. The camera provides crisp, clear thermal imagery in total darkness, light fog or smoke. On the PTZ-35x140MS, this advanced payload is packaged in a precision pan/tilt enclosure that will slew up to 120° per second. Each system provides standard video output (PAL or NTSC format) that works with digital video recording devices, video motion detection software or off-the-shelf video encoders.

Both 35x140MS camera systems have the performance of military-grade camera systems at a fraction of the cost. Security operators can field them as portable stand-alone cameras, or integrate them into a camera network. The cameras provide serial and analog connectivity for existing legacy infrastructures using widely-deployed interface standards. Either system can be integrated into IP Video security infrastructures using TCP/IP standards. The cameras support network operation and control through the Nexus ™ architecture using FLIR Sensors Manager (FSM) software or a third-party VMS. Video can be streamed over TCP/IP using FSM or a third party video player.

[1] The standard video camera is referred to in this manual generally as a daylight camera or DLTV.

The Foveal Concept

The PTZ-35x140MS and SR-35x140MS feature a completely new concept in image presentation based on the foveal vision of the human eye. Foveal vision allows the operator to enjoy a wide angle view for situational awareness while maintaining a high resolution area in the center of the screen for object identification and tracking.

The PTZ-35x140MS and SR-35x140MS accomplish this with two independent thermal cameras and a unique patented image processing technique that provides both the foveal imaging mode as well as a continuous zoom between the wide and narrow fields of view.

The Foveus thermal imagery is provided as continually zoomed video from the wide 20° horizontal field-of-view (from the 35mm lens) to the more narrow 5° field-of-view (from the 140mm lens). The thermal imagery is presented by blending the two thermal images to provide high visual acuity in the critical 5° center area while simultaneously providing medium resolution in the 20° situational awareness zone. This presentation is an application of the design of the human eye, with the foveal region of the retina employing higher sensitivity than the peripheral area, thus the moniker Foveus™.

When the system is zoomed out, the video output comes from the 20° field-of-view and the 5° field-of-view disappears. After zooming in slightly, the wide 5° field-of-view appears as a small inset window in the center. Continuing to zoom in causes the inset window to grow until it fills the video screen, eliminating the wide field-of-view.

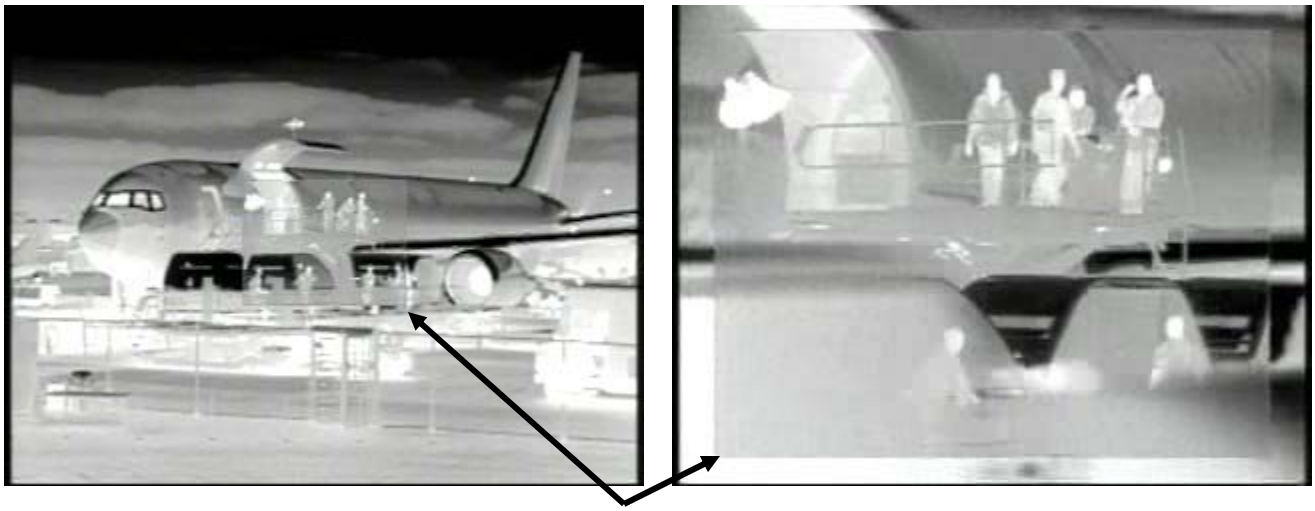


Figure 2-2: Foveal View (note the inset 5° field-of-view in both pictures)

The image on the left shows the wide overall perspective of the 20° field-of-view, and the camera is partially zoomed in to show with the narrower field-of-view. The image on the right shows the camera nearly fully zoomed in, and the 5° field-of-view dominates the image.

The 5° horizontal field-of-view of the 140mm lens provides long range surveillance with high visual acuity of distant targets. The 35mm lens provides a short to medium field-of-view of 20° and is well-suited for short range threat detection in all circumstances. The wide field-of-view allows it to cover a large area and provide excellent situational awareness. And the patented technology of FLIR allows continuous zoom between both fields of view.

2.1 Advantages of Thermal Imaging

The 35x140MS camera is designed for simple, intuitive installation and operation. Each thermal camera is based on FLIR's widely-deployed uncooled microbolometer imaging core. All cameras include FLIR's advanced image processing techniques which deliver excellent contrast regardless of scene dynamics. Unlike other night vision systems that require low amounts of light to generate an image, the 35x140MS thermal imagers need no light at all.

The 35x140MS can be easily integrated with current systems employing daylight cameras. Initial setup of the system includes connecting power supply leads for the input power and BNC cable for monitoring output video (one cable is used for both the thermal and daylight video). A serial cable can be connected to allow control of the camera (pan, tilt, zoom, focus, and so on) and modify camera settings, and an Ethernet port is available for integration into IP networks.

FLIR's powerful thermal security cameras compliment and complete your security camera network. They turn night into day, allowing you to see intruders invisible to the naked eye. Thermal cameras create video images from infrared thermal energy (heat), and perform well at night and day, in good weather and bad.

Figure 2-3 : Daylight camera on left; Thermal image on right

Under some environmental conditions, such as haze, or certain lighting conditions, such as scenes with shadows, you will likely find that the thermal camera may outperform the daylight camera, even during the day. Observe that the image above on the left from an ordinary daylight camera is obscured by fog, while the thermal image on the right provides clear details.

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). It is perfect for wide-area surveillance in critical infrastructure or high-value residence installations where lighting is unwelcome or impractical. The camera also provides improved daytime surveillance in environments where traditional CCTV security camera performance suffers, such as in shadows, backlit scenes or through foliage.

Figure 2-4: Backlit daylight camera on left; thermal image on right

Observe that the setting sun in the backlit image on the left makes it difficult to discern any objects of interest; the thermal image on the right is not affected by the bright sun and therefore provides detail and contrast.

2.2 Camera Enclosures

The PTZ-35x140MS and SR-35x140MS cameras are packaged in environmental enclosures that meet IPX6 test standards. Refer to section 8.0 35x140MS Camera Specifications for additional specifications. The camera's sun shroud around the enclosure helps regulate the camera temperature in direct-sun installations. Each camera uses a lens heater to provide sharp imagery in all temperature and weather conditions, ensuring a clear lens and high-quality infrared video, even in extremely cold environments.

2.3 Camera Control

The 35x140MS cameras have serial communication leads for control of the camera utilizing RS-422 protocol. Users can control the camera using devices that support the Pelco® "D" protocol. The serial control is connected with a standard 9-pin connector (DB9) via the provided System Cable.

The camera can also be attached to an IP network through the Ethernet interface and controlled through the supplied FLIR Sensors Manager software running on your PC. The software allows streaming video and allows multiple users to control and/or monitor the camera.

Either method for remote control can be used to operate the following functions or features:

- Pan/Tilt (PTZ-35x140MS only) and Zoom
- Camera focus
- Toggle analog video output between the thermal camera and the daylight camera
- Selectable Automatic Gain Control (AGC) and Dynamic Detail Enhancement (DDE) settings for optimization of video imagery
- Camera Palette (also known as Polarity) - by default the White Hot palette is used; alternatively the Black Hot palette displays warmer objects as black or dark rather than white or light shades. Additional pseudo color palettes are available using the application software supplied with the camera.
- Other controls specific to the thermal imager (refer to section 6.0 Camera Operation for additional details on controlling the camera

Figure 2-5: White Hot palette on left, Black Hot palette on right

2.4 Package Contents

Refer to the Shipping Check List that is shipped with each camera for a description of the parts and components that are included with the camera. If there is any discrepancy between the list and the contents of your shipment, please contact FLIR Systems Customer Support immediately using the contact information at the front of this manual.

For a list of optional accessories, refer to the FLIR web site: http://www.flir.com/.

3.0 INSTALLATION

General installation information for both 35x140MS cameras is given below. If you have a question regarding installation or operation of your 35x140MS camera, contact FLIR Systems, Inc Customer Support, using the contact information at the front of this manual. Check out our training web site (http://www.flir.com/training/) to get information on courses offered and to learn how you can become a FLIR-authorized Installer.

Caution! Be careful during the installation process so the lenses do not get damaged or dirty. Do not forget to remove the protective adhesive sheet after the installation is complete.

Caution! Proper ESD protocol should be followed while working with the unit.

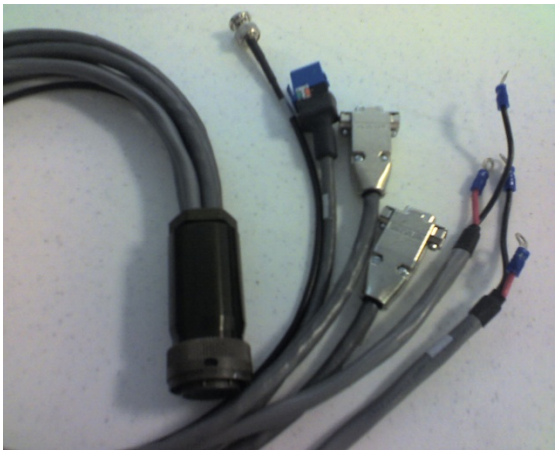
3.1 Installation Overview

Disassembly of the camera is not required for installation. Disassembling the camera can cause permanent damage and will void the warranty.

In most installations, the camera will be connected via a System Cable (P/N 308-0116-02) and a Break-Out Connector Cable (P/N 308-0117-00). The breakout cable provides the following connections (labels given in parentheses):

- BNC for composite video (VIDEO P2)
- RJ45 Ethernet (ETHERNET P5)
- System power with 2 terminal rings (SYS PWR)
- Pan/Tilt power with 2 terminal rings (PT PWR)
- DB9 RS-422 for serial communications (USER P3)
- DB9 Maintenance connection, used for service only (Maintenance P4), with termination plug (termination plug is required)

Each breakout end of the cable (away from the camera) must be protected from the weather.



Important!

When the Break-Out Connector Cable is used with the optional 40 ft System Cable, connect the Ethernet to a switch or router using a twisted pair cable that does not exceed 2 meters.

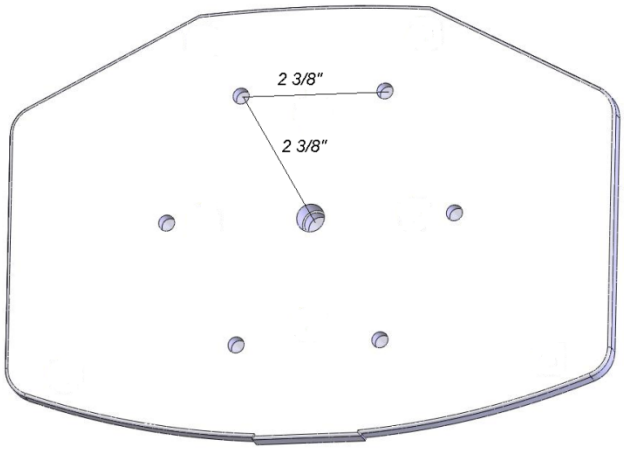
Optional Accessories

For installation purposes, the following optional accessories are available.

- 40 ft System Cable 308-0116-02
- 24VAC Power Supply 206-0004-01
- Joystick 223-0017-00

3.2 Camera Mounting

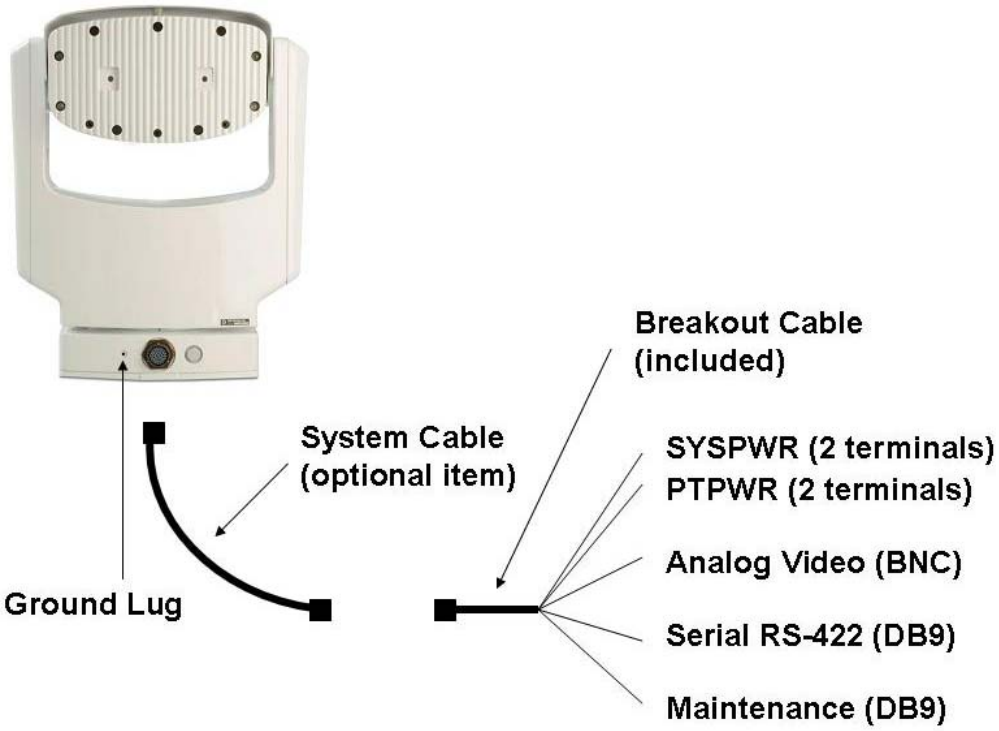
Firmly secure the camera to a designated frame or structure capable of supporting the camera, using the mounting pattern shown below. For the PTZ-35x140MS, be sure to allow for device travel by providing a clearance cylinder of 15.5” (39.37cm) diameter and 22” (55.88cm) height.



Mounting the SR-35x140MS camera is accomplished using the six 1/4-20 tripod mount holes or the single 3/8-16 central mount hole on the underside of the enclosure foot. The dimensions of the camera mounting foot are provided in section 8.0 35x140MS Camera Specifications for reference.

The SR-35x140MS enclosure can be mounted to a wall mount, ceiling or pedestal mount, or a pan/tilt mechanism on a wall or ceiling. Refer to the manufacturer’s documentation accompanying the fixed or pan/tilt mount for more information regarding installation and mounting.

3.3 Camera Connections



Connect the sealed System Cable to the connection on the camera base shown above. Then attach the other end of the System Cable to the Break-Out Connector Cable. The far end of the breakout cable must be protected from the weather.

Ground Connection

The 35x140MS cameras have grounding and surge protection to provide limited immunity from high current transients that can occur in installations subject to electrical storms and/or nearby lightning events. **In order to ensure CE and FCC compliance as well as to protect against these high current events**, installers are required to provide an Earth connection to a specific connection on the camera (the ground lug indicated above). Note: a ground connection to the exterior of the camera (for example, to the mounting foot) is insufficient.

Caution! The camera must be installed according to industry-standard practices and local electrical codes. Failure to properly connect the enclosure and the electrical interface board to ground could result in damage to the camera and possible bodily injury.

Input Power

The 35x140MS cameras operate on 24Volts (nominal) power, AC or DC. The camera has separate power connections for the pan/tilt mechanism and the rest of the system. Provide either 24+/-10% VAC rms (50/60Hz) or 24+/-10% VDC directly to the connections labeled “PTPWR” and “SYSPWR” on the break-out cable.

Optional Power Supply

The connections labeled “PTPWR” and “SYSPWR” on the break-out cable can be directly connected to the optional power supply. Connect the black leads to COM and the red leads to 24V. Next, adjust the AC Input switch to either 115VAC (standard for US) or 230VAC (standard for Europe) and apply power to the power supply.

Fuse Protection

The optional power supply system is fuse-protected against over-voltage conditions. A blown fuse is an indication either that the circuit has been overloaded or that a short circuit has occurred somewhere in the circuit. A wiring problem may be placing too much of a load on the circuit if a fuse blows after plugging in or turning on the camera. Before replacing the fuse it is important to identify what has caused it to fail.

Prior to changing a fuse, turn off the electrical circuit or completely disconnect the camera. Make certain that no dangerous condition exists before restoring power. Replace the fuse with a fuse that is of the same rating and proper for the circuit. Never use anything other than a fuse of proper rating.

Caution! Failure to disconnect power to the camera while replacing a fuse could result in accidental injury or death.

Analog Video Output

For analog video output, plug a standard BNC cable to the connection labeled “VIDEO P2” on the break-out cable.

The analog video signal is accessed via a standard coaxial cable BNC connector and meets the requirements of NTSC or PAL video standards, depending on the configuration ordered. The analog video signal is intended to drive video coaxial cable and is designed to transmit a 75 ohm load with minimum signal loss. Excessive signal loss and reflection occurs if cable rated for other than 75 ohms is used. 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.

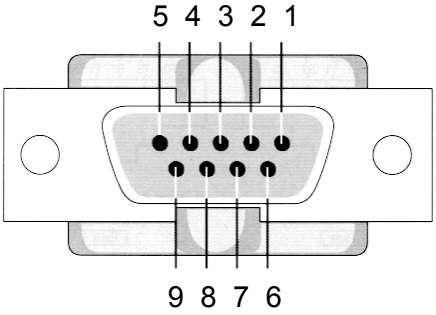
In video security systems, camera signals must travel from the camera to the monitor. Proper termination of cables is essential to a system's reliable performance. The end point of any video cable run must be terminated in 75 ohms. Usually, the cable run will end at the monitor, which will ensure that this requirement is met.

Ethernet Connection

If you intend to use the FLIR Sensors Manager Software for video streaming and/or remote control of the device, attach a standard CAT5 cable (not to exceed 2 meters) to the connection labeled “ETHERNET P5” on the break-out cable. Connect the other end of the cable to a hub, switch or other Ethernet device.

Serial control

If you intend to use the Pelco “D” protocol interface for remote control of the device, attach a standard DB9 RS-422 cable to the connection labeled “USER P3” on the break-out pigtail. Connect the other end of the RS-422 cable to an available port on a remote control device such as a Pelco KBD300A. Note - the pins for receive and transmit signals are relative to the camera and must be swapped on the controller device. That is, the transmit signals from the camera must go to the receive pins on the remote control device on the other end, and vice versa. The connector pin designations are shown below:



RS-422 DB9 “USER P3”		
COM 1 Tx A (-)	Signal transmit	Pin 2
COM 1 Rx B (+)	Signal receive	Pin 3
COM GND		Pin 4 & 6
COM 1 Tx B (+)	Signal transmit	Pin 7
COM 1 Rx A (-)	Signal receive	Pin 8

3.4 Software Installation

Install the FLIR Sensors Manager (FSM) software on your PC. The software installation procedure and the PC hardware and software prerequisites are described in the release notes file provided on the CD.

For detailed information about using FSM, refer to the FSM Users Manual. A .pdf copy of the manual is installed with the software and can be accessed from the Windows Programs menu (Start > All Programs > FLIR Sensors Manager).

3.5 Configuration and Control

There are various settings available to the installer/integrator in order to communicate with the existing equipment and/or to optimize image quality for particular applications. These initial settings are often typically set at the time of installation and are accessible using a web browser over the Ethernet interface.

In addition to these initial configuration settings, the cameras have features that are controlled during ongoing operation in the field at any time, such as electronically controlled focus. These features can also be controlled through the IP interface and/or through the serial interface. When both modes of communication (serial and IP) are used, the commands issued over the serial interface have precedence over the IP commands. For example, if a keyboard/joystick is connected to the serial interface and a user moves the joystick, the serial interface will take control of the camera, and if someone is using FSM to operate the camera, that person will temporarily lose control of the camera. Once the keyboard/joystick is idle and no longer issuing commands, it will be possible for the FSM user to take control of the camera again. Refer to the FSM User Manual for more information regarding camera control.

4.0 VERIFY CAMERA OPERATION

Prior to installing the camera in its final location, use a bench test to verify camera operation and, if necessary, configure the camera for the local network.

Power and analog video

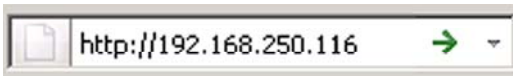
Connect the power to the camera as described above. Connect the video cable from the camera to a display/monitor. Turn on the camera and verify that video is displayed on the monitor.

If serial communications is used, 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 camera serial interface to operate with the other serial device. For more information, refer to section 5.2 Serial Communications for more details.

Verify IP Communications

As shipped from the factory, the camera has an IP address of 192.168.250.116 with a netmask of 255.255.255.0. Configure a laptop or PC with another IP address from this network (for example, 192.168.250.1). Connect the camera and the laptop to the same Ethernet switch (or back-to-back with an Ethernet crossover cable).

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



The browser should display the Login screen with an image of a PTZ 35x140MS camera. If the Login screen appears, then you have established IP communications with the camera.

It is not necessary to log in and make changes with the Web Configuration tool right away. Refer to the following chapter for more information regarding camera configuration. At this time, it is recommended a bench test of the camera should be performed with the FLIR Sensors Manager software using the factory configuration and the default IP address.

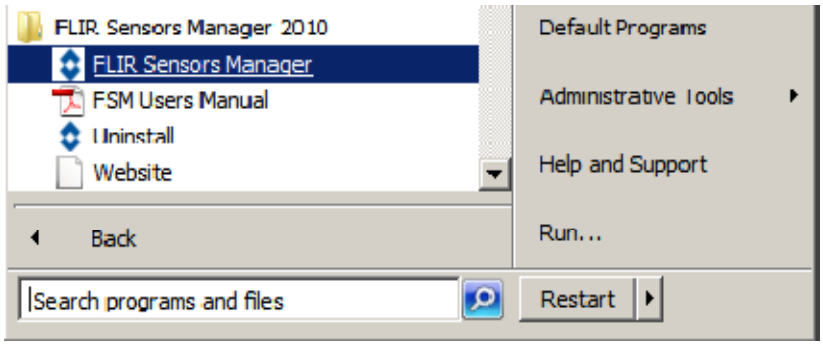
4.1 Bench Test Using FLIR Sensors Manager (FSM)

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.

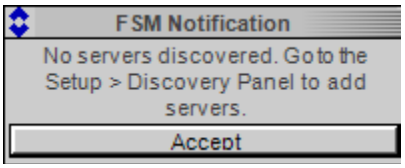
Running FSM

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 2010 > FLIR Sensors Manager.



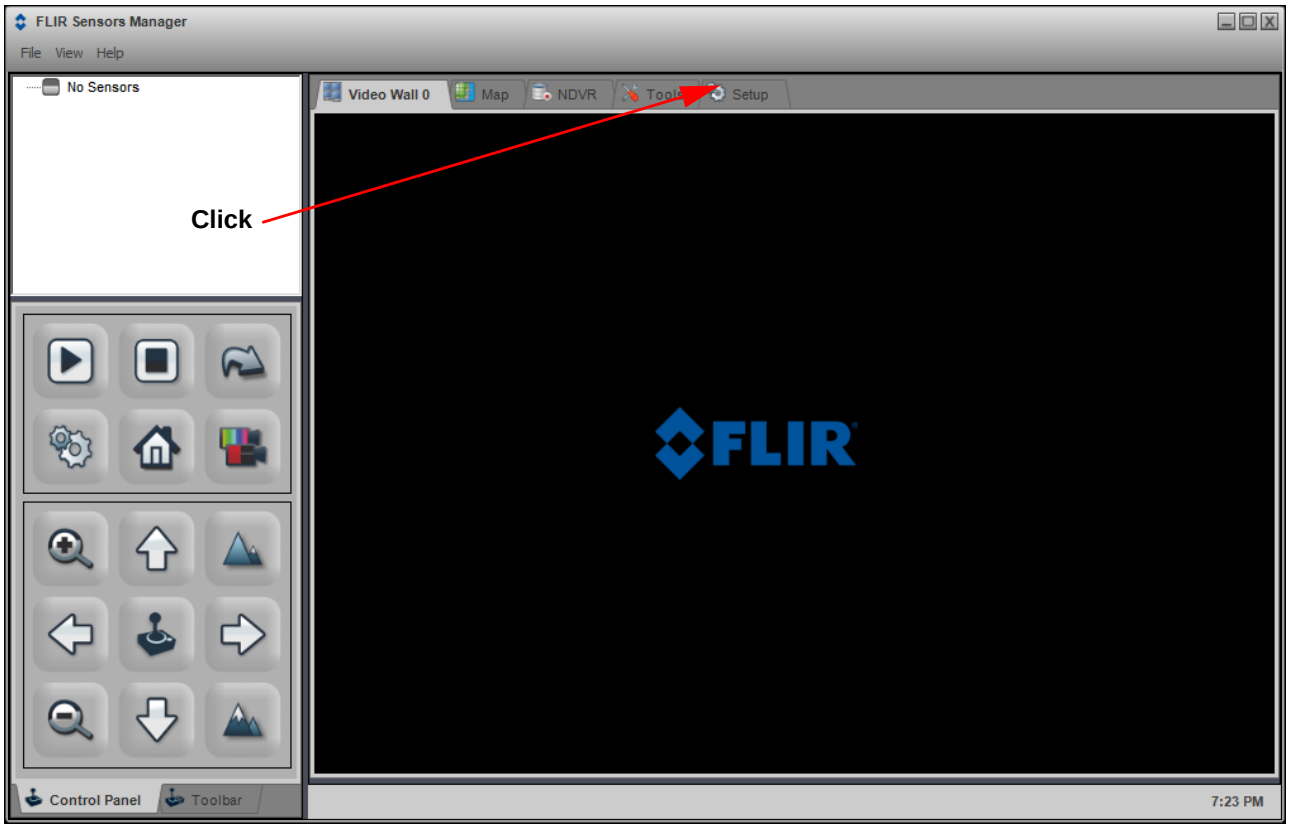
Initially the FLIR Sensors Manager splash screen will be displayed. The software version may be different than the version displayed below.

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

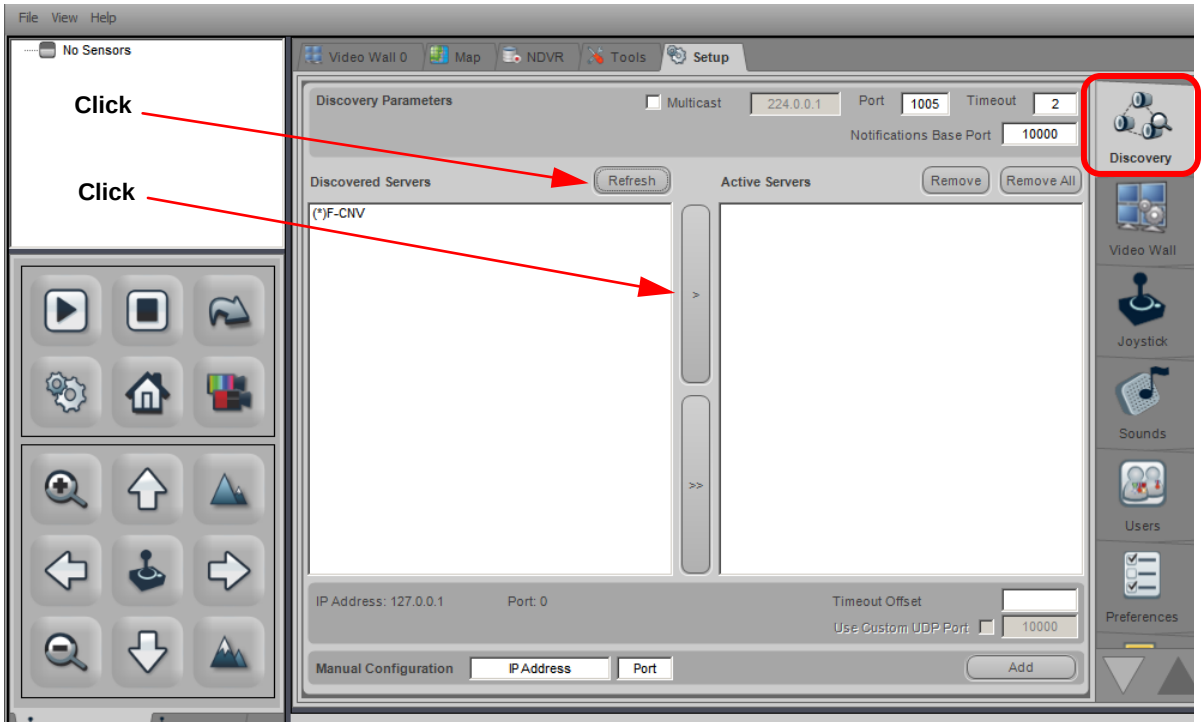


The FLIR Sensors Manager uses a “client/server” architecture. The FSM software is considered a client, and the cameras are considered servers or sensors. The Sensors Panel indicates no sensors have been discovered and added to the list of Active Sensors.

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



If necessary, click on the Discovery tab along the right side of the window. When the Discovery Panel is displayed, click Refresh.

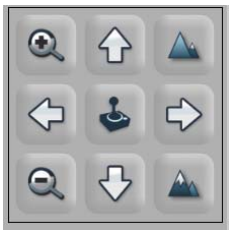


The FLIR camera will appear in the list of Discovered Servers. The asterisk in parenthesis "(*)" indicates the camera has not been added to the list of Active Servers on the right.

Click on the center bar ">" to move the camera over to the list of Active Servers on the right. Once the camera has been added to the list of Active Servers, you can click on the Video Wall 0 tab at the top of the screen.

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

Select the Video Wall 0 tab and confirm that video is streamed to the monitor. Confirm it is possible to control the camera using the zoom controls. For example, click on the zoom button (magnifying glass with +), and the video will zoom in. Once operation of the camera has been confirmed, the camera can be configured to an IP address that matches the installation network.



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.

5.0 CAMERA CONFIGURATION

This chapter describes the basic configuration of the 35X140 MS cameras.

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 the network would require 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-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 through software using a web browser; refer to section 5.2 Serial Communications for more details.

For a camera installed in an IP network, the camera will commonly be controlled over the Ethernet network 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.

Not all parameter settings are described in this manual. If you need help during the configuration process, contact your local FLIR service representative or, call 877-773-3547 inside the US.

5.1 Web Configuration Overview

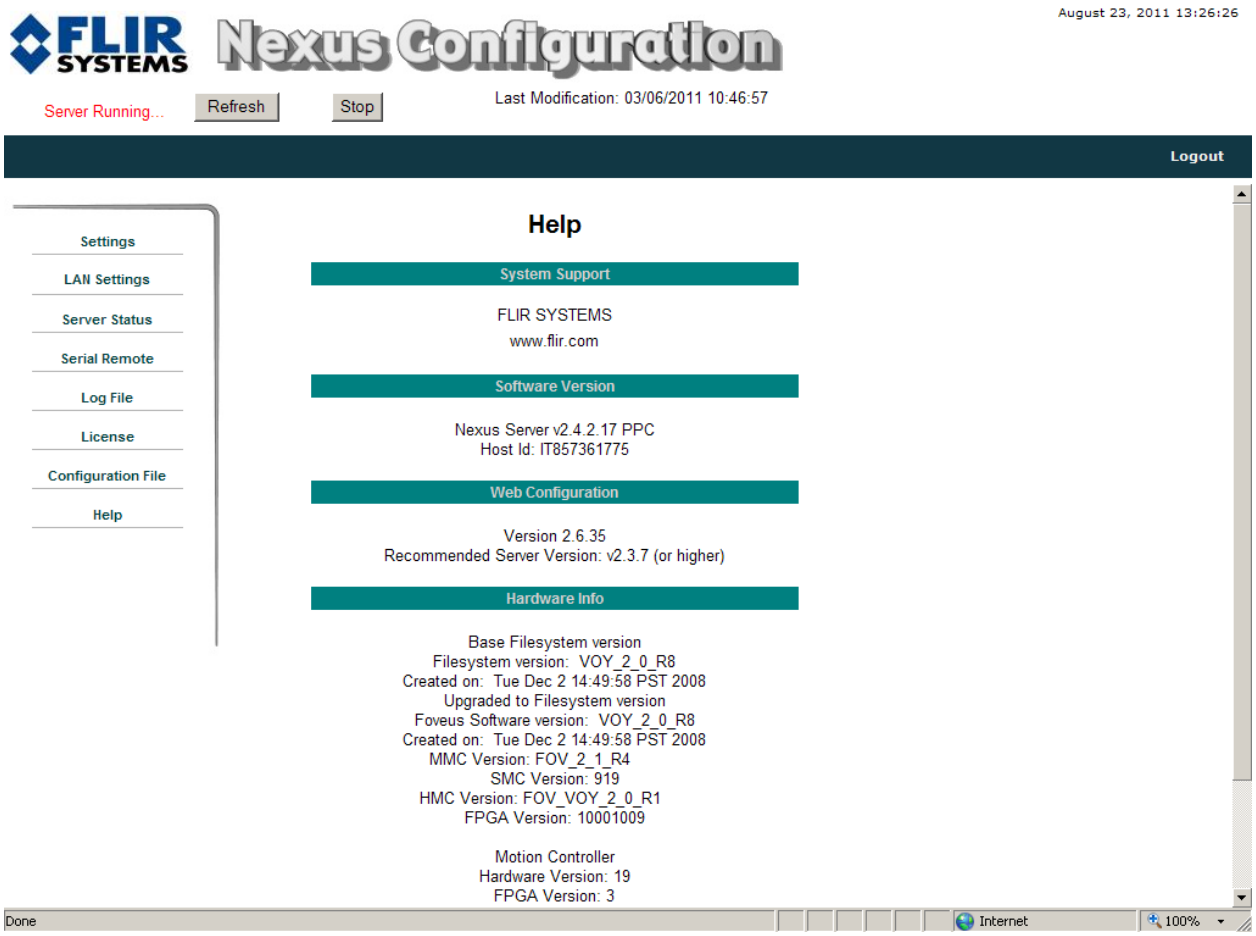
It is possible to use a web browser to connect to the camera and make configuration changes, and this section provides a brief overview of how to use the Web Configuration tool. First familiarize yourself with the information in this section, and then refer to the IP Communications Quick Guide for information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

Web Configurator Login

Once you are able to use a web browser to connect to the camera, the login screen will appear; 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, if you have not already done so. Refer to section 4.1 Bench Test Using FLIR Sensors Manager (FSM).

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



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".

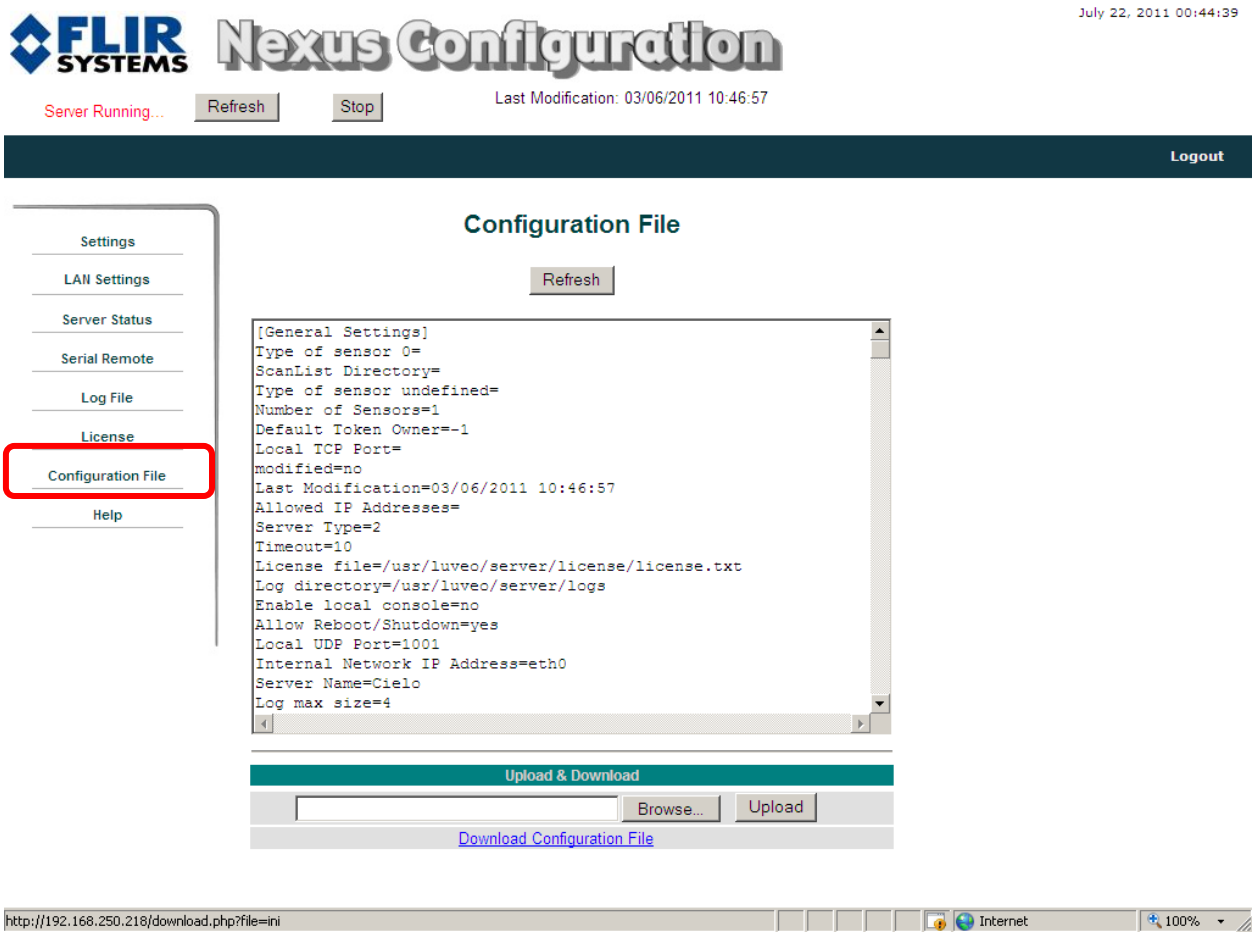
Restarting the Server

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.

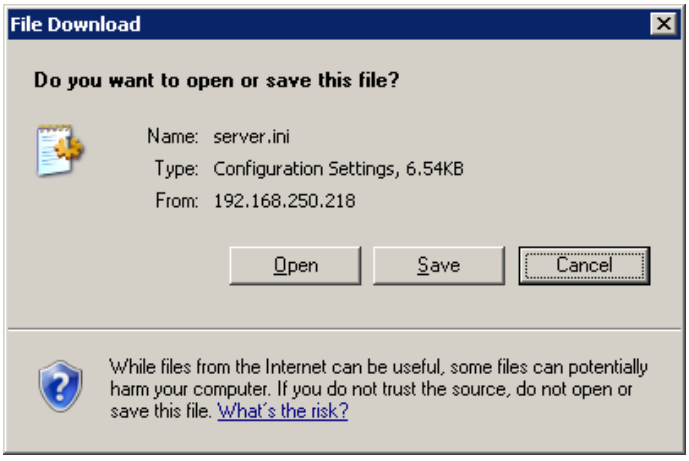
Click on the Start button to restart the server, and when the page refreshes, the status will again show as "Server Running…". The Start button will be replaced by a Stop button when the startup procedure has completed.

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.

In order to save the configuration file, select the **Configuration File** link on the left side fo the page. Then click on the Download Configuration File hyperlink at the bottom of the page.



When the following dialog box appears, select Save and save the file to the PC.



IP Communications

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).

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 Configuration tool, be sure you are familiar with the information in section 5.1 Web Configuration Overview.

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.

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:

1. Connect the Ethernet port to an IP network that is isolated from the existing network (for example, a standalone switch)
2. Connect a PC or laptop to the same network
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)
4. Perform a bench test of the camera using FSM, prior to making any parameter changes (this step is optional but recommended)
5. Open a web browser, enter http://192.168.250.116 in the address bar and press Enter to connect to the camera
6. Configure the IP LAN settings and video streaming parameters to be compatible with the existing network
7. Save the configuration changes and restart the server
8. Connect the camera to the existing network and test the camera
9. Make a backup of the configuration

Accessing the Web Configuration tool

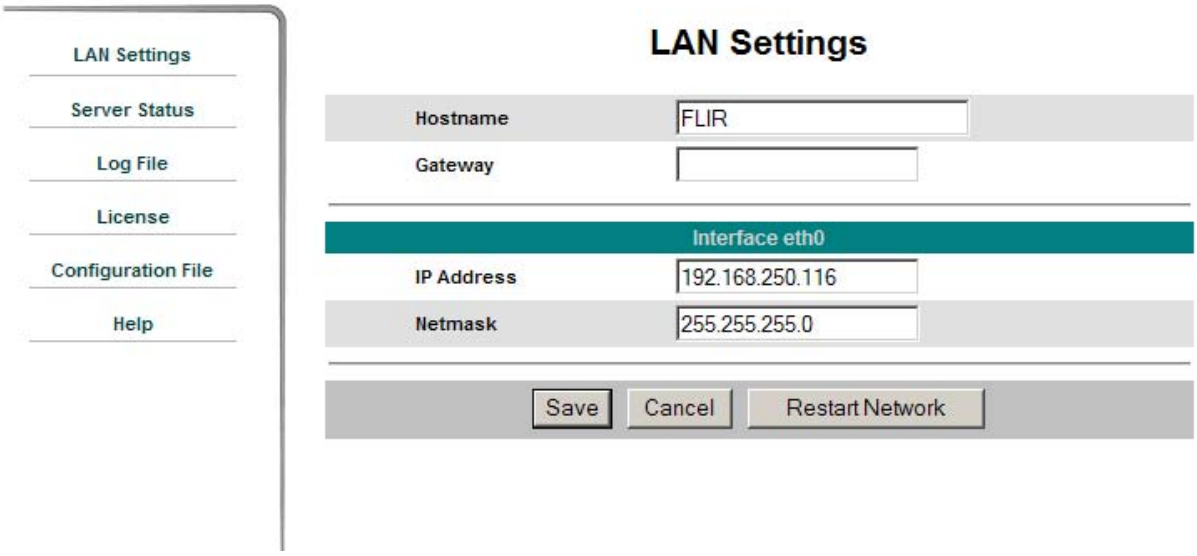
To make configuration changes with software, use a web browser to connect with the camera. If the IP address of the camera is known, you can type the IP address into the browser. As shipped from the factory, the camera has an IP address of 192.168.250.116 with a netmask of 255.255.255.0.

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.

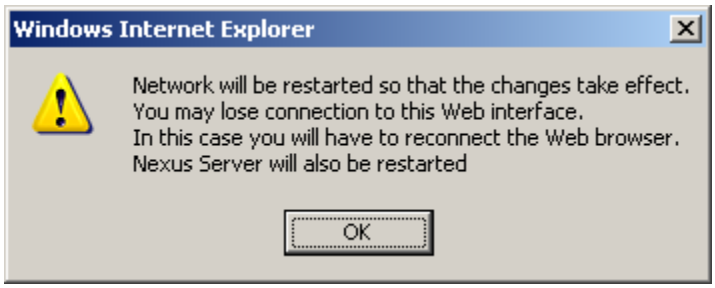
Select Login as Basic User, or type "basic" as the User and click on Login (there is no password for the Basic user). Initially, the Help screen will be displayed.

LAN Settings

To configure the IP interface, select the LAN Settings link on the left side of the screen.



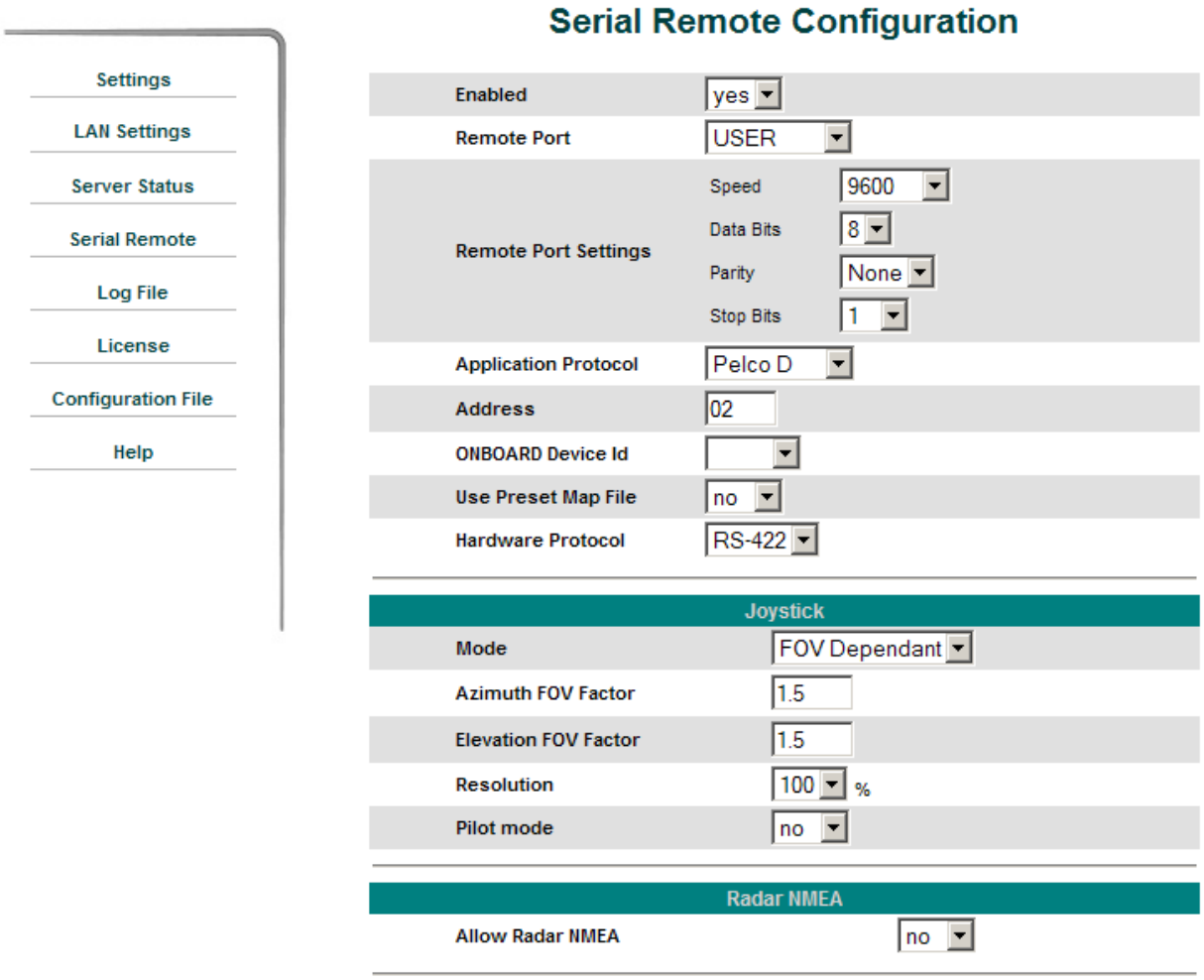
Configure the desired Hostname, Gateway, IP Address and Netmask of the camera and then click on the Save button. In FSM, the Hostname will appear as the name of the sensor. The following message will appear:



If the IP address for the camera was changed, the web browser will not be connected to the camera anymore (it will still be trying to communicate to the old IP address). To re-establish communications with the camera, type the new IP address in the address bar of the browser.

5.2 Serial Communications

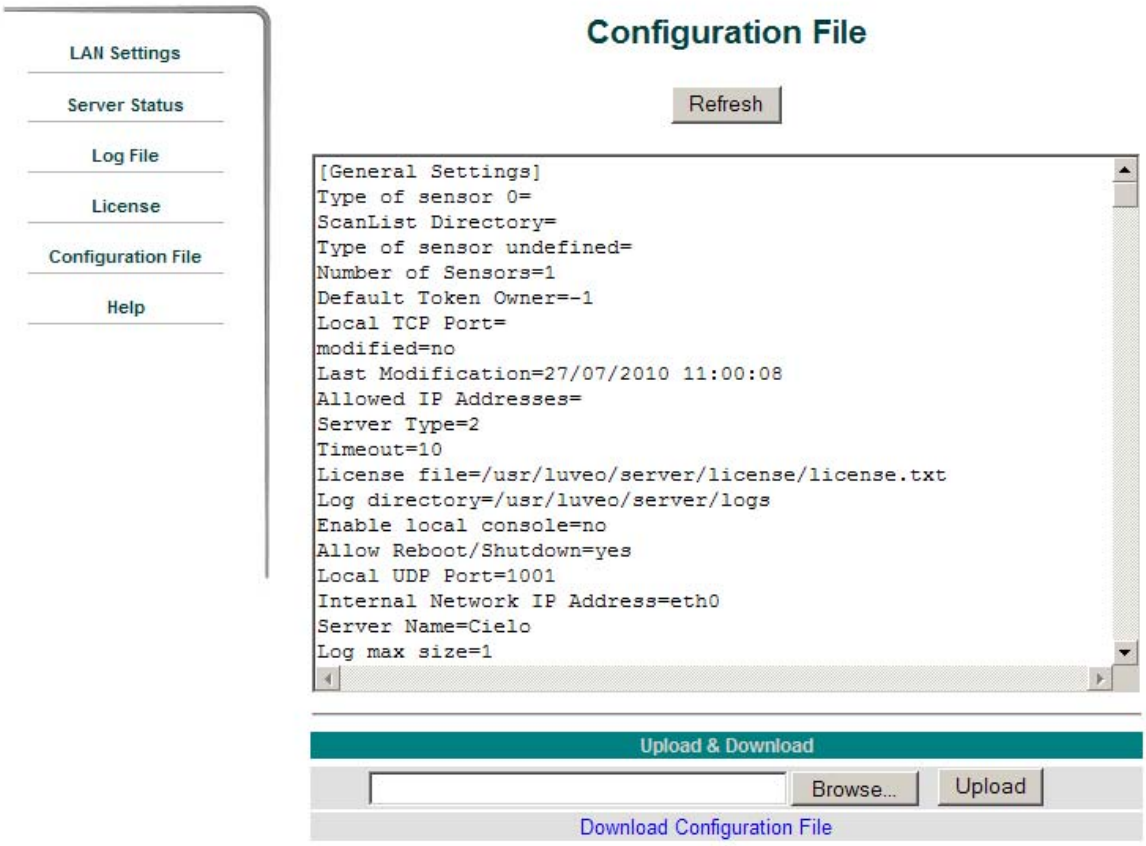
For serial communications, it is necessary to select the Serial Remote link to set the communications parameters such as the hardware protocol (signaling standard RS-232 or RS-422), baud rate, number of stop bits, parity and so on. It is also necessary to select the application protocol and the camera address.



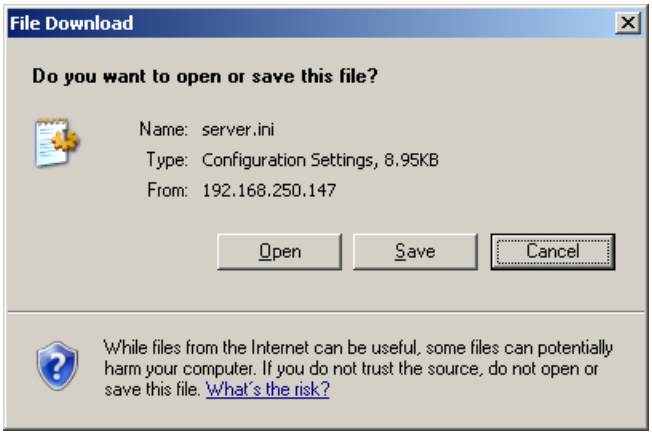
Once the parameters have been set, click on the Save button at the bottom of the page, and then Stop and Start the server.

5.3 Configuration File

When you are finished making the configuration changes, you may wish to back up your configuration file. It can be saved on the camera, and/or to a PC or laptop. Select the Configuration File link on the left side of the screen, and the saved configuration file will be displayed.



You can save a backup of the configuration to your PC or laptop. At the bottom of the page click on the Download Configuration File link. The following window will allow you to save the server.ini file to a location of your choice.



6.0 CAMERA OPERATION

6.1 Thermal Imaging

The 35x140MS camera is a state-of-the-art thermal imaging system that will provide you with excellent night visibility and situational awareness, without any form of natural or artificial illumination. The 35x140MS camera is easy to use, but you should take a moment to carefully read this section so you fully understand how to interpret what you are seeing on your display and how to use the controls.

While the imagery you will see on the monitor may at first look similar to ordinary black and white daylight video, as you get familiar with the camera you will appreciate the characteristics that make thermal imaging distinct. A few tips on how to interpret some of the imagery will help you to make the most of your system.

The thermal imager inside the camera does not sense light like conventional cameras; it senses heat or temperature differences. As you experiment with the system during daylight and nighttime operation, you will notice differences in the picture quality; this is normal. The camera senses small “differences” in apparent radiation from the objects in view, and, in **white hot** mode, displays them as either white (or lighter shades of gray) for warmer objects, and black (or darker shades of gray) for colder objects.

Your 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 imaging camera does not need an additional active illumination source and images based on directly radiated rather than reflected energy.

This is why you will see hot objects such as exhaust stacks or vehicle engines that appear white (or black, or red depending on the video image mode selected), while the puddles of water and other cold objects appear dark (or cool). 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.

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

6.2 Flat Field Correction (FFC)

Periodically 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. Through the software user interface, the frequency of the FFC can be modified.

6.3 Pelco “D” Control

The cameras can be controlled using the Pelco “D” protocol. For example a Pelco Universal Keyboard (for example KBD300A) can be connected to the serial port P3. An example of the user commands for use with the KBD300A is shown in section 10.0 User Controls for KBD300A.

Note: The baud rate for the Pelco Keyboard must be set to 2400 and the Pelco device id must be correct. Both the baud rate and the Pelco device id of the camera may be changed using the Web Configurator which can be accessed using an web browser such as Microsoft Internet Explorer. For additional information contact FLIR Systems support.

6.4 Pelco "D" Command List

For use with a Pelco KBD300A, refer also to the User Controls at the end of the manual.

PTZ-35x140 Function	KBD300	Pelco "D" Packet	Pelco "D" Response
Pan/Tilt Drive	Up	FF 01 00 08 VV WW CK	FF 01 00 CK
	Down	FF 01 00 10 VV WW CK	FF 01 00 CK
	Left	FF 01 00 04 VV WW CK	FF 01 00 CK
	Right	FF 01 00 02 VV WW CK	FF 01 00 CK
	UpLeft	FF 01 00 0C VV WW CK	FF 01 00 CK
	UpRight	FF 01 00 0A VV WW CK	FF 01 00 CK
	DownLeft	FF 01 00 14 VV WW CK	FF 01 00 CK
	DownRight	FF 01 00 12 VV WW CK	FF 01 00 CK
	Stop	FF 01 00 00 VV WW CK	FF 01 00 CK
Increments Focus closer	Near button	FF 01 01 00 00 00 02	FF 01 00 02
Increments Focus farther	Far button	FF 01 00 80 00 00 81	FF 01 00 81
Zoom In or Decreases FoV	CW Joystick	FF 01 00 20 00 00 21	FF 01 00 21
Zoom Out or Increases FoV	CCW Joystick	FF 01 00 40 00 00 41	FF 01 00 41
IR Polarity to Black Hot	1, Aux On	FF 01 00 09 00 01 0B	FF 01 00 0B
IR Polarity to White Hot	1, Aux Off	FF 01 00 0B 00 01 0D	FF 01 00 0D
Active Camera DLTV	2, Aux On	FF 01 00 09 00 02 0C	FF 01 00 0C
Active Camera IR	2, Aux Off	FF 01 00 0B 00 02 0E	FF 01 00 0E
Toggle: Plateau Values	3, Aux On	FF 01 00 09 00 03 0D	FF 01 00 0D
Toggle: AGC Type	3, Aux Off	FF 01 00 0B 00 03 0F	FF 01 00 0F
AutoFocus	4, Aux On	FF 01 00 09 00 04 0E	FF 01 00 0E
IR FFC	4, Aux Off	FF 01 00 0B 00 04 10	FF 01 00 10
Toggle: LUT Palette	5, Aux Off	FF 01 00 0B 00 05 11	FF 01 00 11
Toggle: AGC ROI	6, Aux On	FF 01 00 09 00 06 10	FF 01 00 10
Toggle: Max Gain Value	7, Aux Off	FF 01 00 0B 00 07 11	FF 01 00 11

7.0 CARING FOR YOUR 35X140MS THERMAL CAMERA

Caution! Do not attempt to service the camera or make modifications to the camera core or electronics for any reason. Doing so can cause permanent damage and will void the warranty.

Your 35x140MS camera images through a lens that is made from material that is transparent to long-wave infrared energy. This lens is designed for the harsh outdoor environment and has a coating for durability, but may require occasional cleaning. FLIR Systems Inc. suggests that you clean the lens when image quality degradation is noticed or excessive contaminant build-up is seen on the lens.

The camera housing has a durable coating and the rugged protective window is designed to withstand normal cleaning. Rinse the camera housing with low pressure fresh water to keep it clean. If the front window of the camera gets water spots, wipe it with a clean soft cotton cloth dampened with fresh water. If the window requires further cleaning, use a soft moist cotton-based cloth with isopropyl alcohol or dish soap.

Do not use abrasive materials, such as paper or scrub brushes as this will possibly damage the lens by scratching it. Only clean the lens when you can visually see contamination on the surface.

7.1 Temperature

The 35x140MS camera has an operating temperature range of -32 to 55°C. Choose an installation location so that the camera is not subject to temperature extremes that exceed this range. Do not expose the camera to direct sun without the sun shroud installed.

7.2 Maintenance

If you have a problem with your thermal camera, do not attempt to repair it yourself. The 35x140MS camera core is a sealed unit and can not be opened or serviced in the field. Consult your installation dealer or FLIR Systems Inc. for repair information.

Lens Cleaning

Materials:

- Optical-grade tissue (e.g. Edmund Industrial Optics P/N 52105 or any similar product)
- Pure water (de-ionized or other)
- Isopropyl alcohol (IPA)

Saturate a piece of the lens tissue with the water and drape it over the lens. Let the surface tension of the water pull the tissue onto the lens surface and then drag the tissue across the lens surface. Repeat several times with different pieces of tissue.

Repeat the same step using IPA instead of water. Drag the final piece of tissue over the lens several times to prevent pooling, which could leave a residue behind.

7.3 Troubleshooting Problems

Video not displayed on monitor

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 engaged but the camera still does not produce an image, ensure that power has been properly applied to the camera and the fuse is not blown. If the camera still does not produce an image, have an authorized service representative make the appropriate repairs.

Noisy image

A noisy image is usually attributed to a cable problem (too short or inferior quality) or the cable is picking up electromagnetic interference (EMI) from another device. Although coax cable has built-in losses, the longer and smaller the cable is, 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 currently plaguing video security systems as a whole.

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 be careful to match the cable to the environment (indoor or outdoor).

Image out of focus

The cameras have an electronically controlled focus mechanism for use during ongoing operation. This focus mechanism is controlled through the serial interface or Nexus .

The wide angle lens (35mm) has a fixed-focus lens (focused at infinity at the factory) and the lens focus is not field-adjustable.

Each camera has a minimum focus distance, as listed in section 8.0 35x140MS Camera Specifications). An out-of-focus object may be too close to the camera and within the minimum focus distance.

Image too dark or too light

By default the 35x140MS cameras use an Automatic Gain Control (AGC) setting that has proven to be superior for most applications, but a particular installation may require an adjustment to the AGC settings. For example, a very cold background (such as the sky) could cause the camera to use a wider range than appropriate. Refer to section 3.5 Configuration and Control for information about how to make adjustments to the image generated by the camera.

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.

Image freezes

By design, the camera image will freeze momentarily on a periodic basis during the Flat Field Correction (FFC) cycle. It is possible to change the interval used for FFC; refer to section 6.2 Flat Field Correction (FFC).

8.0 35X140MS CAMERA SPECIFICATIONS

Feature	SR-35x140MS	PTZ-35x140MS
Weight	15 lb. (6.8 kg)	45 lbs (20.4 Kg)
Dimensions	Refer to detailed drawings below in the following section	
FPA size (HxV)	320x240	
Sensor type	Uncooled Microbolometer	
Spectral range	7.5 to 13µm	
Pixel pitch	38 microns	
Input power range	24 VDC ±10 % 24 VAC ±10 %	Voltages as measured at the input to the electrical interface board.
Nominal / Peak Power Req.	<12W nominal / <19W peak, 150W with heaters	<70W nominal / <130W peak, 270W with heaters
Operating Temp. Range	-32°C to 55°C (-25°F to 131°F)	
Storage Temperature	-50° to 85°C	
Lens Heater	Thermostat controlled	
Analog video	NTSC or PAL (EIA-170 or CCIR 624, respectively).	
Thermal Camera focus	Motorized focus mechanism (140mm lens only)	
Serial remote interface	RS-422	
User Control	Via devices supporting Pelco-D protocol or Windows-based application program (FLIR Sensors Manager software)	
Connector Style	MIL-C-26482 Series 1	

Note: These specifications are subject to change without notice.

Pan/Tilt Specifications:

	Pan	Tilt
Motion Range (°)	Continuous	± 60
Angular Velocity (°/sec.)	1.0 to 120	1.0 to 120
Resolution (°)	< 0.01	< 0.01
Accuracy (°)	<0.1, 2 sigma	<0.1, 2 sigma
Settling time (seconds)	< 0.25	< 0.25

Visible Camera Specifications:

- Array >740,000 pixels (PAL) and >630,000 pixels (NTSC)
- FOV Horizontal 42°-1.6°, Optical

- Focus Automatic
- Iris Automatic
- Shutter Automatic
- Balance Automatic
- IR cut filter Automatic
- Image Stabilization
- Digital Zoom
- Spectral Response 400 to 750 nm with IR cut filter

Infrared Camera Specifications:

	Wide FOV 20° 35mm	Narrow FOV 5° 140mm
Focal Plane Array	Uncooled µbolometer	Uncooled µbolometer
Format	320 x 240	320 x 240
Pixel Size	38µm	38µm
Aperture	f/1.4	f/1.4
Field-of-view	20° HFOV x 15° VFOV	5° HFOV x 3.7° VFOV
Focus	Athermalized	One touch Auto Focus
Temporal NEdT	≤65 mK	≤65 mK

8.1 Environmental Requirements

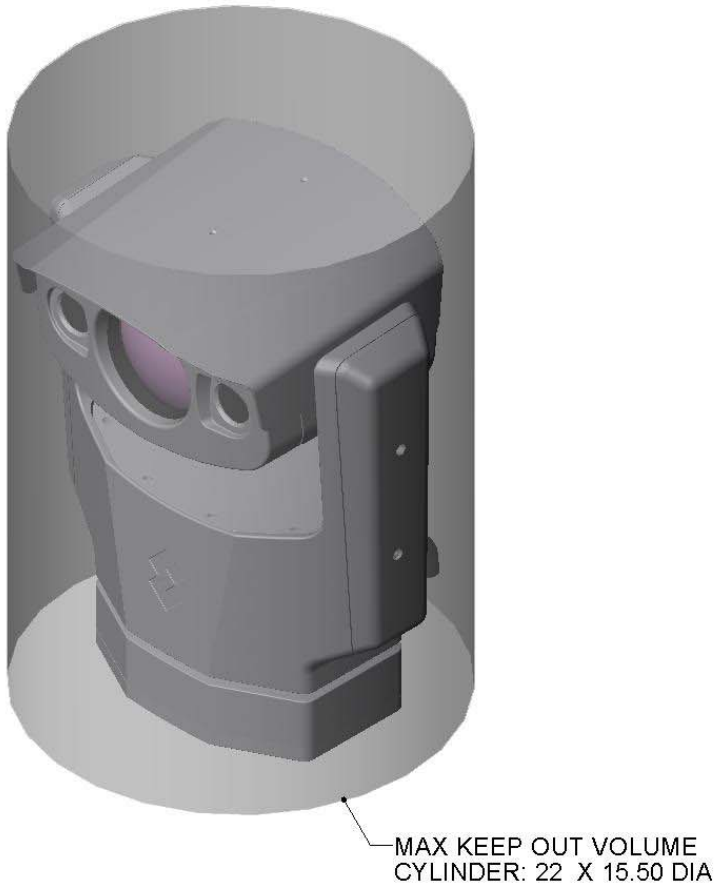
Caution: Sustained storage at high-temperature will degrade vacuum life of the camera core.

- Storage Temperature -50ºC to +85ºC
- Operating Temperature -32ºC to + 55ºC
- Moisture IPX6
- Sand/Dust MIL-STD-810E, Method 510.3, procedure II
- Vibration MIL-STD-810E, Method 514.4
- Shock (transportation) 30g, 11 msec.
- EMI/EMC
  - CE Class A
  - FCC
- Solar Thermal Loading MIL-STD-810E, Method 505.3, procedure I, paragraph 1 3.2.b1
- External Icing MIL-STD-810E, Method 521.1, 6 mm ice thickness

Note: These specifications are subject to change without notice. Contact FLIR Systems customer support for additional information.

8.2 PTZ-35x140 PHYSICAL Dimensions

The following figures show a dimensioned drawing of the PTZ-35x140MS.
Remember to firmly secure unit and allow for device travel.



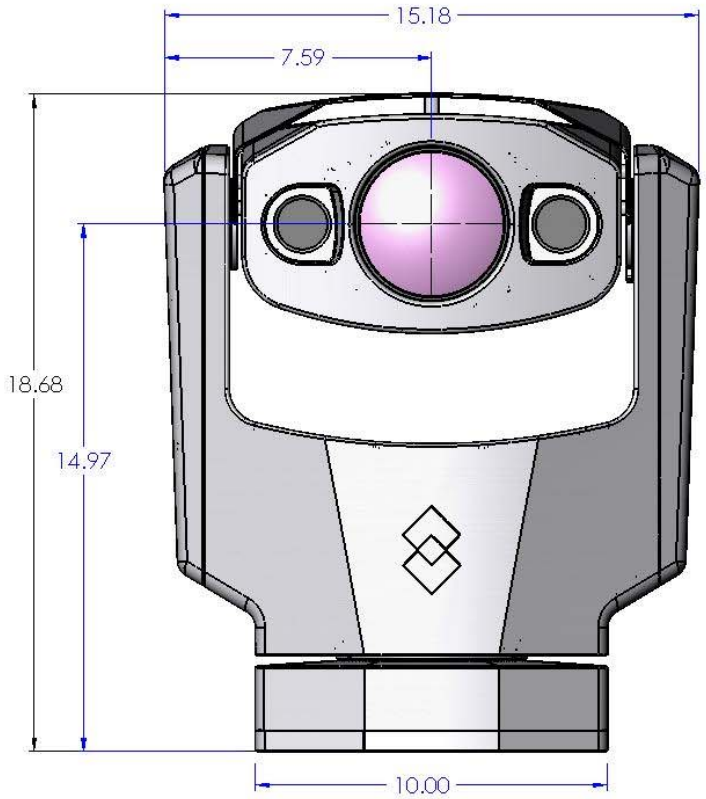


Figure 8-1: PTZ-35x140MS Dimension Drawing (inches)

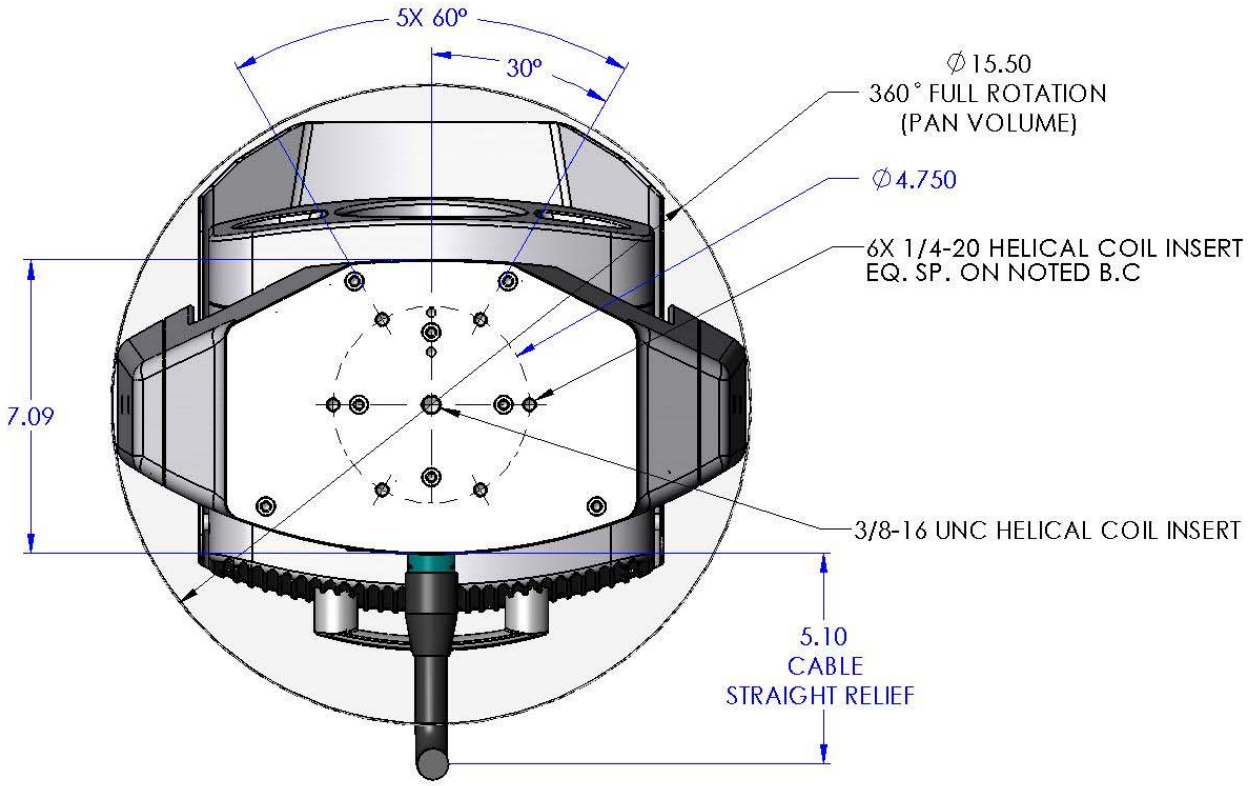


Figure 8-2: PTZ-35x140MS Dimension Drawing w/ hole pattern (inches)

SR-35x140MS Physical Dimensions

The following figures show a dimensioned drawing of the SR-35x140MS.

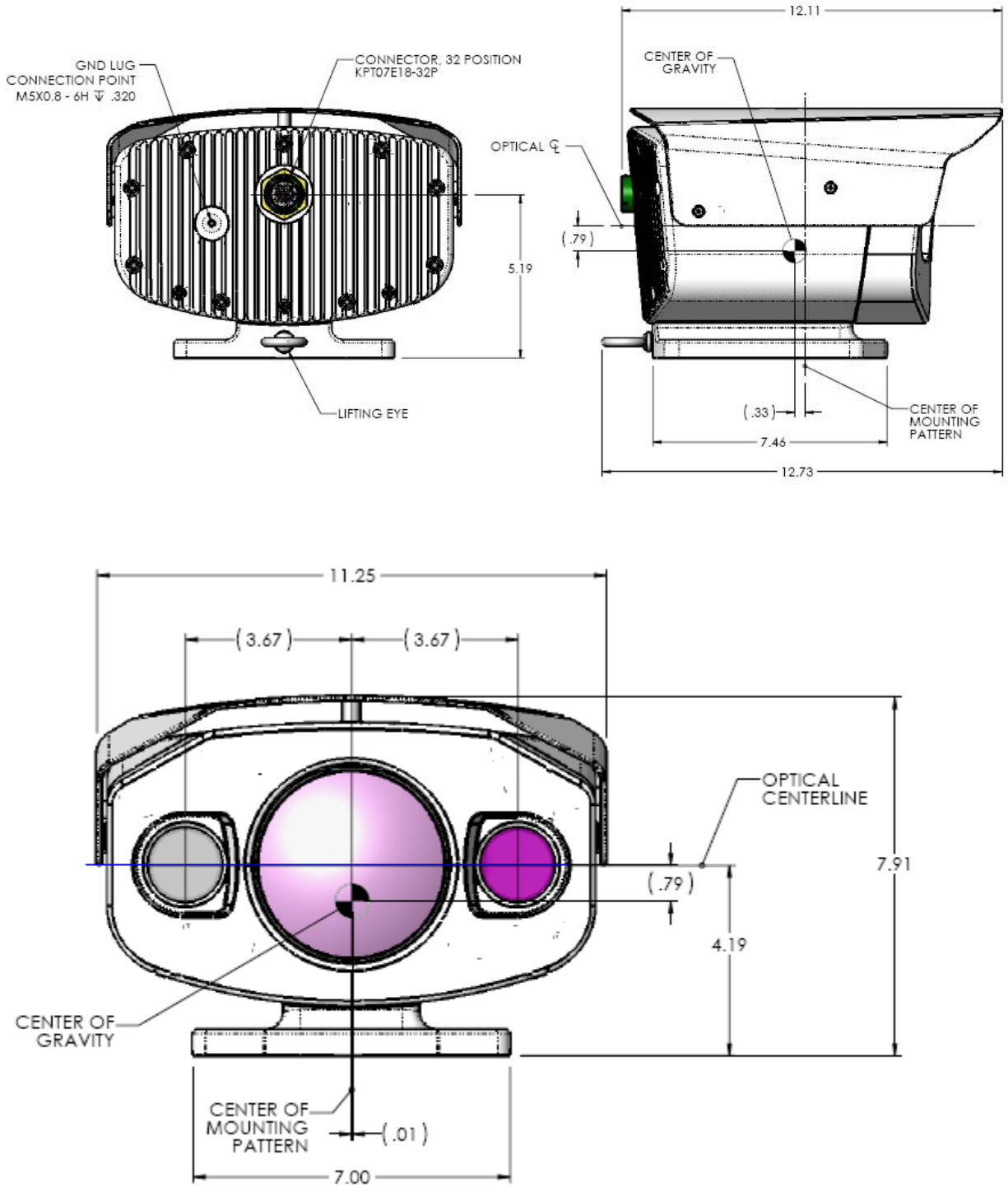
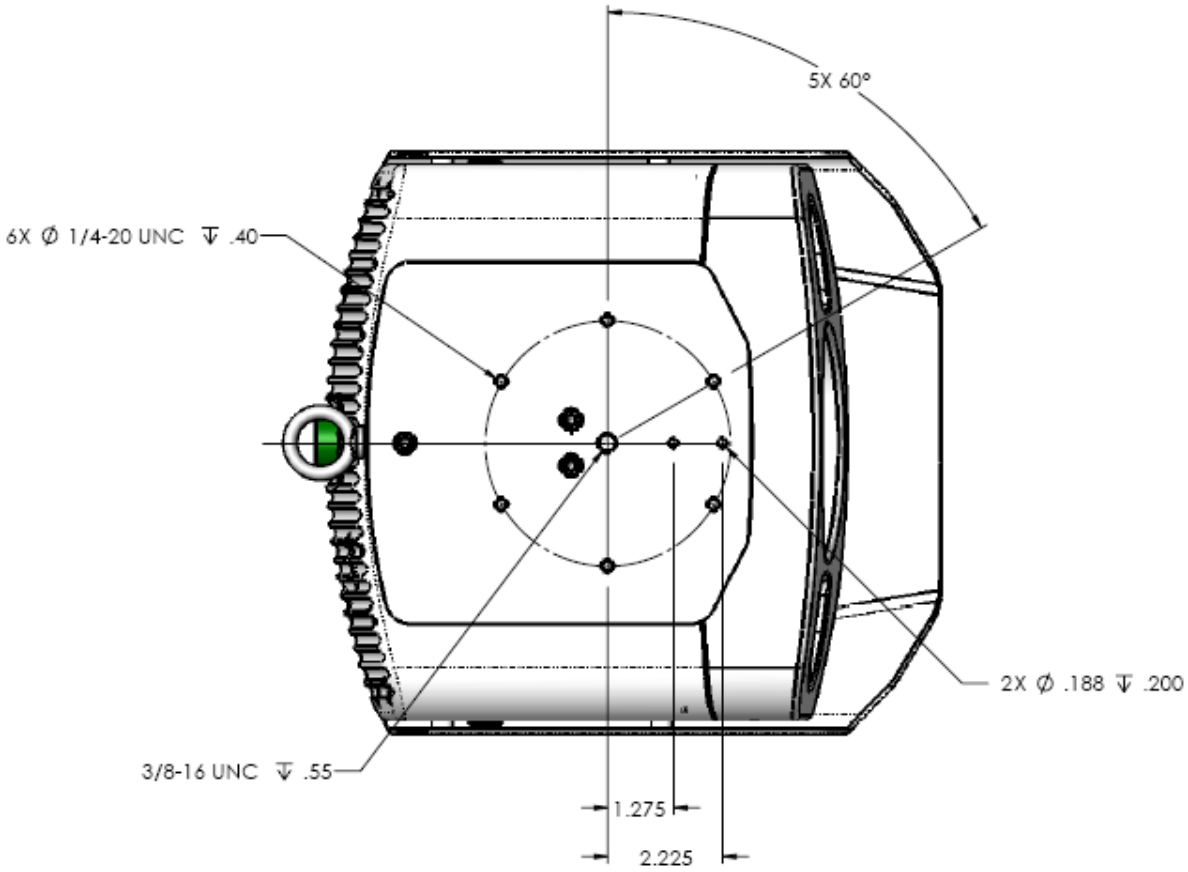
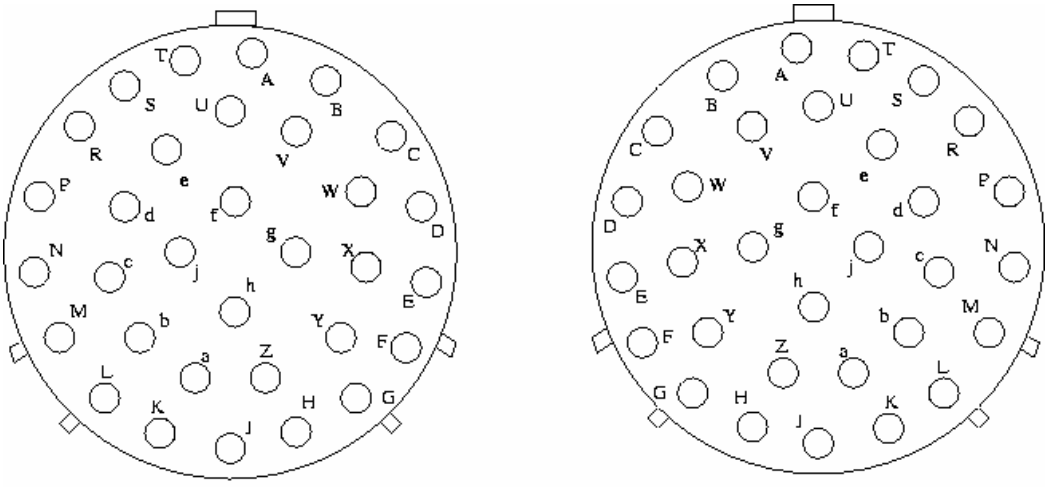


Figure 8-3: SR-35x140MS Dimension Drawing (inches)



8.3 System Interface Cable Connector

The PTZ-35x140MS and SR-35x140MS use an electrical-mechanical engagement connection that requires only one integrated cable to interface with the sensor. An optional interface cable is available. It is 12.2 meters (40 ft) long and is terminated with a MIL-C-26482 Series 1 Connector.



Interface cable connector front view (Male) Chassis connector front view (Female)

Figure 8-4: PTZ/SR-35x140MS Interface Cable Connector

System Interface Cable Pin Designations

Function	Pin	Signal Name	Function	Pin	Signal Name
Power	j	Power In +	Comms P3	M	Tx(+) RS-422 (COM1)
	f	Power In +	(USER)	N	Rx(+) RS-422 (COM1)
	g	Power In +		c	GND RS-422 (COM1)
	W	Power In +		P	Tx (-) RS-422 (COM1)
	b	Power In -		R	Rx (-) RS-422 (COM1)
	h	Power In -	Comms P4	U	Maintenance COM2
	Z	Power In -	(MAINT)	S	Maintenance COM2
	a	Power In -		V	Maintenance COM2
Ethernet	D	Rx+ (RJ45 3)		A	Maintenance COM2
	E	Rx- (RJ45 6)		T	Maintenance COM2
	F	Tx- (RJ45 2)	Video	J	Video Out Center
	G	Tx+ (RJ45 1)		K	Video Out Shield
Drain	X	Shield/connector shell			

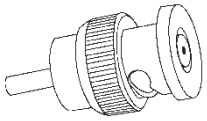
MIL-C-26482 Series 1	
Shell Size	18
Insert Arrangement	32
Finish	Olive drab chromate over cadmium
Contacts	Pines
Shell Style	Cable plug
Insert Position	Keyring

Break-Out Connector Cable

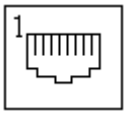
The PTZ-35x140™ also includes a break-out cable that connects to the system interface cable with single terminal connectors. The break-out cable has the MIL-C-26482 Series 1 Connector on one end and 4 pig-tail connectors and power leads as follows:

Figure 8-5: Break-Out Connector Cable

1. Four terminal ring leads for power: Input voltage range: 24 VDC ±10 % or 24 VAC ±10 % rms (50/60Hz). Nominal static power consumption is <50W. For DC connections, the red leads are positive and the black are common ground
2. One BNC video connector is used for both IR and DLTV video. Analog video can be toggled using either the Pelco “D” commands or selected using the FLIR Sensors Manager.



3. One RJ45 connector is for Ethernet communication and streaming MPEG4 video. The Ethernet connection for use with the Nexus provides both communications and streaming video.



Two DB9 connectors are used for communication via RS-422 with the connector labeled “P3” and the other is for maintenance labeled “P4”. The protocol on “P3” is 422/Pelco “D”.

9.0 DOCUMENT HISTORY

Revision	Date	Comments
100	Jan 2007	Initial Release
110	Aug 2007	Minor additions and corrections
120	Nov 2008	Added information regarding SR model, changed overall format to match other Security cameras
130	Dec 2010	Corrected serial cable pin out labels; corrected EAR level to level 1; added clarification of location of ground lug Added WEEE label and information
140	Aug 2011	Added Ethernet pinouts to system cable Corrected DB-9 pin numbering in Section 3.8 Serial Control Added FCC Regulatory information Removed references to Nexus Console software Added information regarding installation and use of FSM

10.0 USER CONTROLS FOR KBD300A

To start, enter the Pelco Address then press CAM

Keystrokes	Function	Toggle Values (default to first value)
Near button	Focus Near	
Far button	Focus Far	
CW Joystick	Zoom In	Increments from Wide to Tele
CCW Joystick	Zoom Out	Increments from Tele to Wide
1, Aux On	IR Polarity to Black Hot	
1, Aux Off	IR Polarity to White Hot	
2, Aux On	Set DLTV as active	For both commands and video
2, Aux Off	Set IR as active	For both commands and video
3, Aux On	Toggle: Plateau Values	
3, Aux Off	Toggle: AGC Type	
4, Aux On	Autofocus	One shot Autofocus
4, Aux Off	IR FFC	Internal calibration
5, Aux Off	Toggle: LUT Palette	White, Black
6, Aux On	Toggle: DDE Gain	Dynamic Detail Enhancement
6, Aux Off	Toggle: AGC ROI	Full, Horizon, Sky, Ground, Center
7, Aux Off	Toggle: Max Gain Values	

Note: the appropriate camera must be active to use associated camera functions.

