FLIR VUE™

User's Guide

FLIR® | The World's Sixth Sense™

FLIR SYSTEMS, INC.

Thermal Imaging Overview

The FLIR Vue camera is a state-of-the-art thermal imaging system. The system is easy to use, but it is useful to understand how to interpret what is displayed on the monitor.

The FLIR Vue camera does not produce images from visible light like the human eye does. The camera relies on the fact that all objects, even very cold objects like ice, emit thermal (heat) energy in the portion of the spectrum that the camera can see, the long wave infrared (LWIR). Unlike a visible-light camera, the FLIR Vue camera produces images based on radiated rather than reflected energy.

Because there is no color in heat images, these "temperatures" are processed by Automatic Gain Control (AGC) into a maximum of 256 "shades of gray" to display as a thermal video image. Since the imaging system is sensitive enough to distinguish many more than 256 different temperatures, each "shade of gray" represents a range of temperatures. The AGC Scene Presets provide control over how the original thermal image is processed. See Scene Presets.

FLIR offers a selection of training courses to help you to get the best performance and value from your FLIR Vue camera. You can find out more at the FLIR training Web page: http://www.infraredtraining.com.

This guide shows how easy it is to get the plug-and-play FLIR Vue connected, running, and mounted. The camera does not have an on or off switch. When power is applied, infrared (IR) video will be shown in less than five seconds.
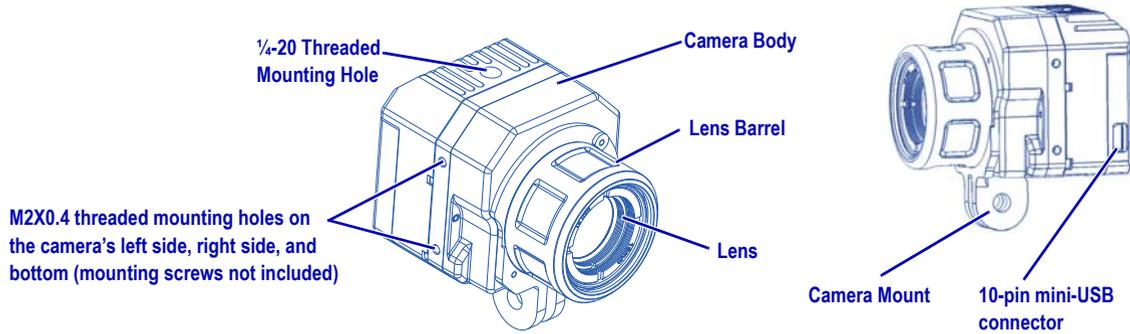
Caution on powering FLIR Vue:

*   **FLIR Vue does not have over-voltage or reverse polarity protection.** Only use a filtered, regulated 5 Vdc power source with the FLIR Vue! Applying more than 6 Vdc or reversing polarity will damage the camera and void the warranty.

What's in the Box?

FLIR Vue comes with the following components:

- FLIR Vue thermal camera with camera mount.

¼-20 Threaded Mounting Hole

Camera Body

Lens Barrel

M2X0.4 threaded mounting holes on the camera's left side, right side, and bottom (mounting screws not included)

Lens

Camera Mount

10-pin mini-USB connector

- Bench Cable—for connecting FLIR Vue to a computer USB port and a video monitor for testing and configuring camera options.

Connect to Video Monitor

Connect to Camera 10-pin mini-USB port

Connect to Computer USB port
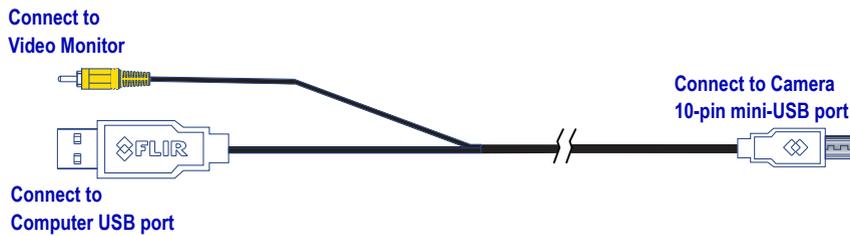
Mounting FLIR Vue

FLIR Vue has a variety of mounting options.

Screw a standard tripod ¼-20 bolt into the threaded insert located on the top surface of the camera. Do not exceed 6.35 mm [0.25 in] maximum depth or warranty will be void.

¼-20 Insert
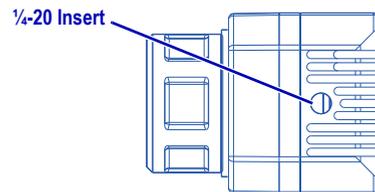
FLIR Vue has two threaded mounting holes on each side, as well as on the camera bottom.

These threaded holes, 24 mm (0.945 in) apart accept M2x0.4 screws (not included). Do not exceed 4.0 mm [0.157 in] maximum depth or warranty is void.

Side and Bottom Mounting Holes
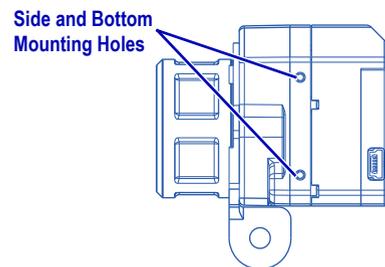
Camera Mount

The included Camera Mount allows using standard action camera mounts. If a different mounting option will be used, it can be removed using the following steps:
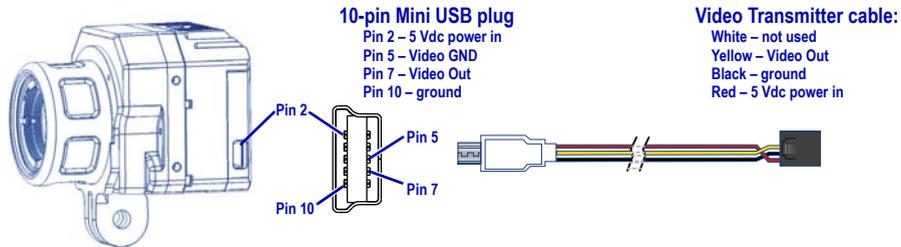

Unscrew the Lens Nut   **Slide the Camera Mount off**   **Screw the Lens Nut back on**

When installing the Camera Mount, be sure to engage the two alignment pins with the corresponding holes on the camera body.

## Connecting and Powering the FLIR Vue

FLIR Vue is compatible with common 10-pin mini-USB cables that are used to provide power to, and get video from, a camera mounted on a small unmanned aerial system (sUAS).

A couple of examples are shown below.

A number of vendors sell cables compatible with video transmitters which supply the 5 Vdc, 500 mA power the FLIR Vue needs. Connect the video transmitter per the manufacturer's instructions.

10-pin Mini USB plug
Pin 2 – 5 Vdc power in
Pin 5 – Video GND
Pin 7 – Video Out
Pin 10 – ground

Video Transmitter cable:
White – not used
Yellow – Video Out
Black – ground
Red – 5 Vdc power in

Another example of a compatible cable which provides discrete connectors for power and video is shown below.

Discrete Power/Video connectors

Video Out
Video GND

5 Vdc power in
Power ground
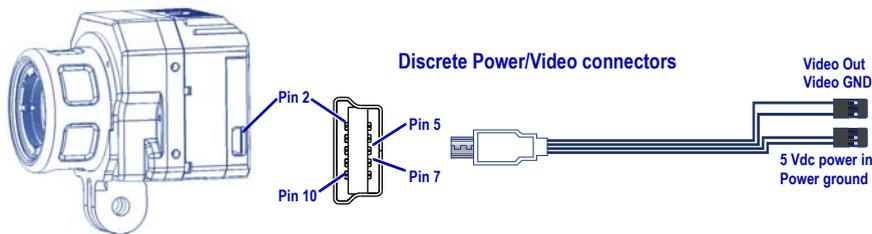
Installing the FLIR sUAS Camera Controller GUI

Follow the instructions for downloading the Camera Controller GUI from the FLIR website: www.flir.com/flirvue. Scroll down to the "DOWNLOAD THE GUI" link; fill in and submit the form to receive an email with a download link.

1. Extract the files using WinZip or other software.

2. Open the directory with the extracted files and double-click **setup.exe**.

3. When the primary installation is completed, a message will prompt to install Silicon Laboratories drivers. This is necessary for using a USB connection to the camera.
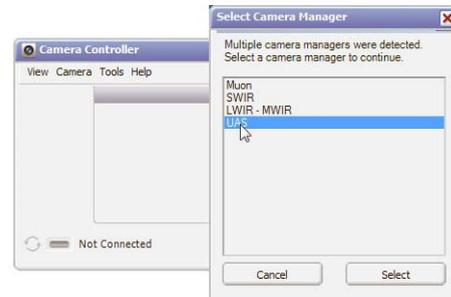
Connecting to the FLIR sUAS Camera Controller GUI

When power is applied, the FLIR Vue camera will provide video output without any additional setup or configuration. Use the sUAS GUI to fine tune the configuration for specific operating scenarios. The camera should be connected and powered before starting the sUAS GUI.

1. Using the Bench cable, connect the FLIR Vue to the USB port on the computer and a video monitor. When powered on, the FLIR flash screen will appear while the camera boots and then infrared video will be displayed.

2. To start the program go to: **Start→All Programs→FLIR Systems→Camera Controller GUI**. The first time the GUI is started, select the camera type at the prompt.

3. Choose **Camera→Connect**
    If the camera does not connect automatically, choose to display the connection wizard and follow the prompts.

FLIR sUAS Camera Controller GUI

The sUAS Camera Controller screen is divided into two sections:

- Camera Setup—These functions, described below, provide for orientation options, video format, zoom, colorization, and recovery to factory or power up settings.
- Video Performance—Select an Automatic Gain Control (AGC) **Scene Preset** depending on the anticipated imaging subject and environment. The default **Region of Interest** (ROI) is set to exclude open sky from the AGC adjustments. The sky is very cold which skews the AGC into settings for a much colder scene than may be desired.
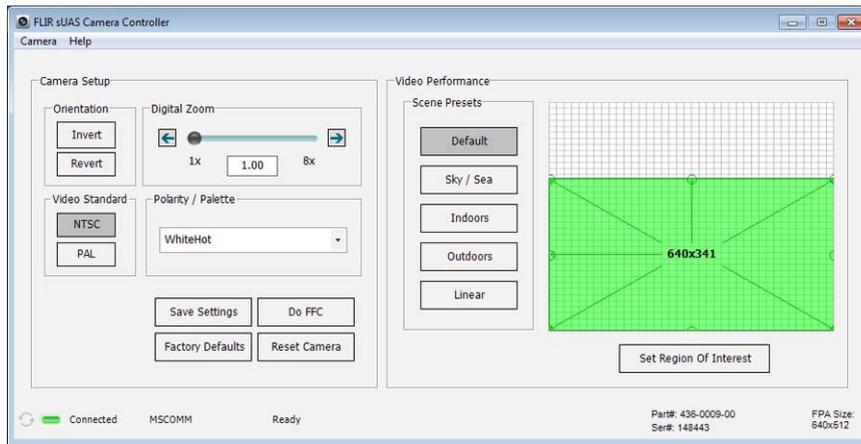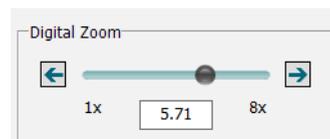

Camera Setup

- **Orientation**

   Invert—Use this function to flip the video image vertically. If the camera is mounted upside down, use both Invert and Revert.

   Revert—Use this function to flip the video image horizontally. If the camera is mounted to provide a rear view mirror image use Revert.

- **Video Standard**—FLIR Vue can output video in either NTSC or PAL format. The video standard must match the video monitor or video recording devices.

- **Digital Zoom**—FLIR Vue can be set to any digital zoom setting up to 8x.

- **Camera Setup buttons**

    Save Settings—Save all of the current settings of the camera to be used during a power up or software reset.

    Factory Defaults—Return all camera settings to the initial values set at the factory.

    Do FFC—manually initiates a flat field correction (FFC) that updates the pixel calibration to improve image quality. An internal shutter is closed (a click can be heard) behind the lens to provide a uniform temperature to all pixels. FFC is also performed automatically, based on elapsed time and during changes in temperature.

    Reset Camera—Causes a reboot of the camera software.
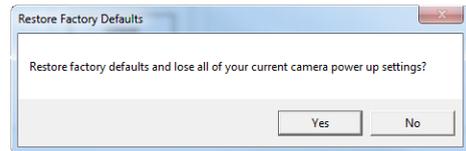
- **Polarity / Palette**

    WhiteHot and **BlackHot** are the primary palettes used in thermal imaging. The image has been described as containing 256 "shades of gray" each representing a different temperature range present in the scene. A variety of color palettes may provide better contrast when viewed with the naked eye, under certain conditions. Different color palettes can provide very different results in the image. Their appeal is based on personal preference.

    InstAlert and **Arctic** are special purpose search palettes that emphasize the high or low temperature ranges. **InstAlert** shows high ranges in red-orange shades, lower ranges in gray. Useful for searching for animals obscured by dark or camouflage. **Arctic** shows low ranges in blue shades, higher ranges in gray. Useful for searching for cold areas in a hot scene.
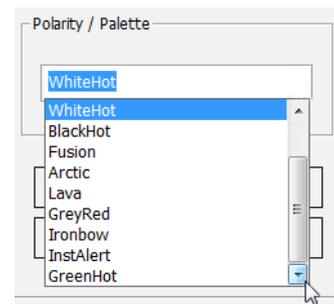
Video Performance

- **Scene Presets**

Each Scene Preset provides a combination of Automatic Gain Control (AGC) settings which have been optimized by FLIR Systems to provide the best image for each particular application. In most cases these Scene Presets will be all the camera setup required. These settings may appear as changes in brightness, sharpness and contrast, although in IR imaging the effects are quite different and change over time and scene temperature.

Scene Presets

Default
Sky / Sea
Indoors
Outdoors
Linear

- **Region of Interest**

The region of interest (ROI) is the portion of the scene used by the AGC to calculate the AGC settings. The default ROI, shown below, makes the assumption that the camera is mounted looking forward so that some of the sky will be in the scene. The sky is generally very cold and uniform, not radiating heat. In this case the ROI includes only the lower portion of the scene, the ground, which will have more contrasting radiated heat, areas of different temperatures.

1. Change size and location.

640x341

230x231

2. Set Region of Interest.

Set Region Of Interest

Set Region Of Interest
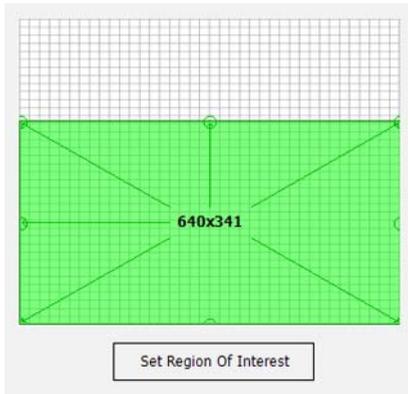
Default ROI—The AGC will use scene settings that maximize the contrast of heat radiation on the ground without including the large area of cold sky. Higher temperature object in the upper portion of the scene will still be seen, but will not cause changes to the AGC settings.
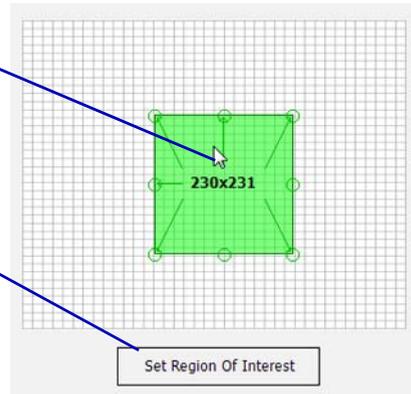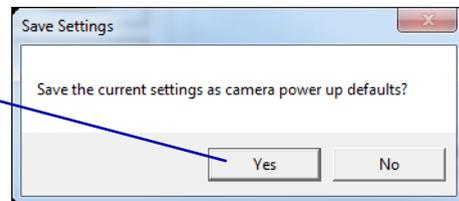
Use the bubbles on the corners or sides of the highlighted ROI and drag to change the size; drag in the center to reposition the region. When finished, click the Set Region of Interest button, then Save Settings.

3. Save Settings

4. Confirm

Save Settings   Do FFC

Factory Defaults   Reset Camera

Save Settings

Save the current settings as camera power up defaults?

Yes   No

FLIR Vue Specifications

Overview		
Thermal Imager	Uncooled VOx Microbolometer	
Resolution	640x512	336x256
Lens Options	9 mm; 69° x 56° 13 mm; 45° x 37° 19 mm; 32° x 26°	6.8 mm; 45° x 35° 9 mm; 35° x 27° 13 mm; 25° x 19°
Spectral Band	7.5 µm - 13.5 µm	
Full Frame Rates	30 Hz (NTSC); 25 Hz (PAL) US only, not for Export	
Exportable Frame Rates	7.5 Hz (NTSC); 8.3 Hz (PAL)	
Physical Attributes		
Size	2.26" x 1.75" (57.4 mm x 44.5 mm) (including lens)	
Weight	3.25 oz to 4.0 oz (92.1 g to 113.4 g) configuration dependent	
Image Processing & Display Controls		
Image Optimization for sUAS	Yes	
Digital Detail Enhancement	Yes - Adjustable in GUI	
Invertable Image	Yes - Adjustable in GUI	
Polarity Control (BlackHot/WhiteHot) and Color Palettes	Yes - Adjustable in GUI	
Power		
Input Supply Voltage	4.0 Vdc to 6.0 Vdc	
Power Dissipation, steady state (max 2.5 W during shutter event of approximately 0.5 seconds)	<1.2 W	<1.0 W
Environmental		
Operating Temperature Range	-20 °C to +50 °C	
Non-Operating Temperature Range	-55 °C to +95 °C	
Operational Altitude	+40,000 feet	

CARE OF FLIR Vue

• Only power FLIR Vue with a regulated 5 Vdc power source. Using more than 6 Vdc will damage the camera and void the warranty.

• Do not touch the lens. If the lens gets dirty, a light dusting of air should dislodge any dust particles. If the lens is still noticeably dirty, use 75% Isopropyl alcohol and lens tissue. Use a light wiping motions with a fresh section of lens tissue with each swipe so as not to drag dust or dirt particles back over the lens surface

• FLIR Vue is neither water nor dust resistant. Care for it as you would any valuable piece of electronics equipment.