



# EAN-USB3 Vision Cameras

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Exports: [Export Summary Sheet](#)

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 **CAUTION:** Alerts to a potential hazard that may result in personal injury, or an unsafe practice that causes damage to the equipment if not avoided.

 **IMPORTANT:** Identifies crucial information that is important to setup and configuration procedures.

 *Used to emphasize points or remind the user of something. Supplementary information that aids in the use or understanding of the equipment or subject that is not critical to system use.*



## 1 Overview

USB3 Vision is an [interface standard](#) for industrial high-performance cameras based on the USB 3.0 standard. This document describes how to configure the 4000-OEM to receive video from USB3 Vision cameras through the J8 USB 3.0 (Type-C) port.

For USB Video Class (UVC) webcams and other USB video class devices see [EAN-USB-Video-Class-Cameras](#).

*Before configuring the camera, it is important to know the type of USB camera being used. Check the camera specification supplied by the manufacturer to determine the camera type.*

### 1.1 Additional Support Documentation

Additional Engineering Application Notes (EANs) can be found on the [Documentation](#) page of the SightLine Applications website.

The Panel Plus User Guide provides a complete overview of settings and dialog windows. It can be accessed from the Help menu of the [Panel Plus](#) application.

The Interface Command and Control ([IDD](#)) describes the native communications protocol used by the SightLine Applications product line. The IDD is also available as a PDF download on the [Software Downloads](#) page.

### 1.2 SightLine Software Requirements

The 4000-OEM requires firmware 3.00.xx and higher.

**IMPORTANT:** The Panel Plus software version should match the firmware version running on the board. Firmware and Panel Plus software versions are available on the [Software Download](#) page.

### 1.3 Third Party Software

[Tera Term](#) (recommended) or [PuTTY](#): Terminal emulator programs used for debug output, or to issue commands on SightLine hardware.

[Aravis Project](#): Linux utilities used for USB3 Vision cameras. For software versions 3.4.x and below use `arv-tool-0.6`. For software versions 3.5.x and above use `arv-tool-0.8`.

## 2 Safe Device Handling

- CAUTION:** To prevent damage to hardware boards, disconnect all input power to OEMs and adapter boards before connecting or disconnecting cables including all FFC, FPC, KEL, HDMI, MIPI, and round wire (Molex) cables.
- CAUTION:** To prevent damage to hardware boards, use a conductive wrist strap attached to a good earth ground. Before picking up an ESD sensitive electronic component, discharge built up static by touching a grounded bare metal surface or approved antistatic mat.



### 3 4000-OEM USB Overview

The J8 USB 3.0 (Type-C) port on the 4000-OEM supports USB3 Vision cameras. The 4000-OEM only supports dual USB cameras. This camera will appear as either *CAM 2* or *CAM 3*.

**ⓘ IMPORTANT:** The USB port (J8) should not be connected directly to a PC. This port cannot be used for serial command and control directly.

**📄** *USB 5V output can source 900mA max. 5V is also used for J9 connected MIPI interface boards and combined maximum is 1.2A.*

**⚠ CAUTION:** Do NOT connect an external 5V power source to the USB-C connector! Damage to the OEM may occur.

The 4000-OEM USB J8 port can also be used to connect to USB webcams and other USB devices. See [EAN-USB-Video-Class-Cameras](#) for more information.

- Webcams
- GPS devices
- USB to RS-232 converters
- USB hubs
- Human Machine Interfaces (HMI) such as keyboards
- USB storage devices

**📄** *Not all these devices are accessible from VideoTrack but should connect and enumerate in the Linux OS. These devices can then be used by custom applications hosted on the processor.*

#### 3.1 Connector J7: Debug only

A USB 2.0 port is exposed on connector J7 and should only be used for serial debugging. This is not a serial port that can be used for command and control. It cannot be repurposed by another application on the 4000-OEM.

### 4 4000-OEM USB Camera Bench Setup

#### USB adapters:

- SLA-CAB-TC2USB (USB C to USB 3.0 Type-A Adapter) / camera specific USB 3.0 cable: Connects the USB-C port (J8) on the 4000-OEM to USB3 Vision cameras.

#### Cable connections:

- SLA-CAB-0403: Connects to J4 on 4000-OEM board. Provides an RJ45 Ethernet connection.
- SLA-CAB-1504 / SLA-PWR-B12V-36W (110-250VAC input / 12VDC output): Connects to J50 on the 4000-OEM board.

#### Power and network connectivity LEDs:

A green light (D1) on the 4000-OEM board indicates that all boards are powered on. An amber light (D5) verifies network connection.

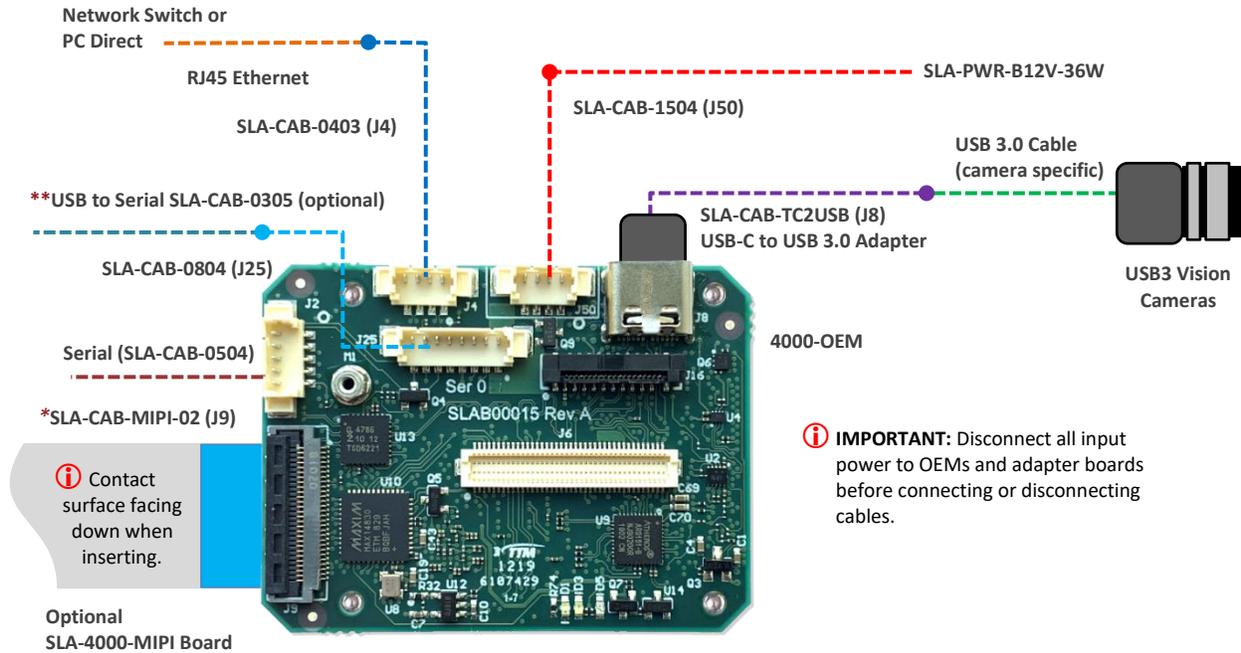


Figure 1: 4000-OEM USB Camera Bench Setup

\*SLA-CAB-MIPI-02 FFC cable must be connected correctly. See the [FFC cable](#) instructions before connecting the SLA-4000-MIPI board.

\*\*SLA-CAB-0305 can connect to SLA-CAB-0804 to facilitate a PC/USB connection to serial port 0 on the 4000-OEM. See the [Serial Communications](#) section in the [EAN-Startup-Guide-4000-OEM](#) for more information.

Additional non-USB cameras can be connected to the 4000-OEM on J6 and using the [SLA-4000-MIPI board](#) on J9. See the [ICD-3000-4000 Adapter Boards](#) for more information.

## 5 Configuration Settings Overview

This section covers the basic camera configuration settings in Panel Plus for the 4000-OEM video processing board.

See the [EAN-Startup Guide 4000-OEM](#) for connection and video streaming instructions.

For compatibility questions regarding specific camera models contact [Support](#).

Before connecting with the Panel Plus software, the OEM board should be powered up and connected through:

- a network switch or directly to the host PC (preferred) or,
- Direct serial connection (for troubleshooting or if a network connection cannot be established).

**IMPORTANT:** This procedure assumes that the customer has read the OEM startup guide and has a basic understanding of the following fundamentals:

- Completed a functional connection between the SightLine video processing board and Panel Plus application.
- Familiar with Panel Plus controls.
- Successfully streamed video in Panel Plus.

For help with basic connection and streaming fundamentals contact [Support](#).



## 5.1 Acquisition Settings

1. From the main menu in Panel Plus go to *Configure » Acquisition Settings*.
2. In the *Camera Index* drop-down menu select *Cam 2* or *Cam 3*.
3. In the *Camera Type* drop-down menu select *USB3 Vision*.

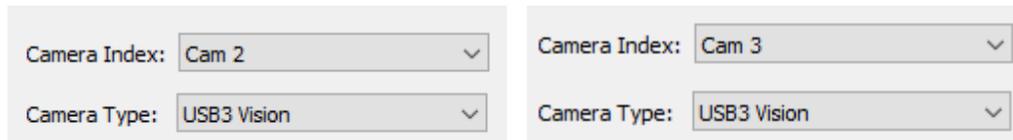


Figure 2: Camera Index and Camera Type - USB3 Vision Cameras

4. If available, use the *Auto Fill* drop-down menu in the *Acquisition Settings* dialog to automatically populate the relevant fields with the correct settings.

The settings can also be manually entered as shown in the [camera configuration table](#).

**IMPORTANT:** If the camera is not available in Panel Plus *Auto Fill* see the [Camera Discovery](#) section to verify and modify camera resolutions, formats and frame rates that are available for a selected camera.

For information about acquisition fields in Panel Plus see [EAN-Digital Video Configuration](#).

**IMPORTANT:** Save parameters and reset the board when changing parameters. Cycle system power when changing resolution.

If video does not display, try saving and activating the settings again. Check the encoding settings on the *Compress* tab and review the network addresses for the destination video.

## 6 Camera Discovery

See the basic [camera configuration table](#) for validated USB3 Vision cameras. For compatibility questions regarding specific camera models contact [Support](#).

This section describes how to determine camera resolutions, formats, and frame rates that are available for USB3 Vision cameras that are not preconfigured in Panel Plus *Auto Fill*.

**IMPORTANT:** These steps should be completed before configuring the camera through Panel Plus or the discovery commands will fail.

Use [Tera Term](#) (recommended) or another SSH client to connect to the OEM board.

For USB3 Vision cameras use the [Aravis Project](#) tools

For software versions 3.4.x and below use `arv-tool-0.6`. For software versions 3.5.x and above use version `arv-tool-0.8`.

1. Establish an SSH session to the OEM hardware with Tera Term.
2. Discover the camera. From the SD> prompt type:
  - 3.4.x and below: `arv-tool-0.6`
  - 3.5.x and below: `arv-tool-0.8`



3. Tera Term displays the device name. In this example the device manufacturer and the device serial number.

```
SD> arv-tool-0.6
FLIR-0119E709 <USB3>

#lsroot e ~
SD> █
```

Figure 3: Discover the Camera

If the above command does not show the connected camera type continue to the next section.

## 6.1 Alternative Camera Discover Method

1. From the SD> prompt type:

```
lsusb
```

Find the device and bus number. In this example it is *Bus 002* and *Device 002*.

```
SD> lsusb
Bus 002 Device 002: ID 1e10:4000 Point Grey Research, Inc.
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Figure 4: Find Device and Bus Number

2. From the SD> prompt type:

```
lsusb -D /dev/bus/usb/<<bus #>>/<<device #>>
```

Find the value for idVendor. In this example it is *0x1e10*.

```
SD> lsusb -D /dev/bus/usb/002/002
Device: ID 1e10:4000 Point Grey Research, Inc.
Device Descriptor:
  bLength                18
  bDescriptorType        1
  bcdUSB                  3.10
  hDeviceClass            239 Miscellaneous Device
  hDeviceSubClass         2
  hDeviceProtocol         1 Interface Association
  bMaxPacketSize0        9
  idVendor                0x1e10 Point Grey Research, Inc.
  idProduct               0x4000
  bcdDevice               0.00
  iManufacturer           1 FLIR
  iProduct                2 Blackfly S BFS-U3-120S4C
  iSerial                 3 0119E709
```

Figure 5: Find idVendor Value

3. Add the following line to this file: `/etc/udev/rules.d/aravis.rules` (see [Appendix A](#))

```
SUBSYSTEM=="usb", ATTRS {idVendor}=="<<idVendor from lsusb>>",
MODE=="0666", TAG+="uaccess", TAG+="udev-acl"
```

4. From the main menu in Panel Plus » *Parameters* » *Save to Board*.
5. Main menu » *Reset* » *Board*.



6. To verify that the device is enabled, from the SD> prompt type:

3.4.x and below: `arv-tool-0.6`

3.5.x and above: `arv-tool-0.8`

## 7 Advanced Configuration Options

The *Acquisition Settings* dialog can be used to select:

- Image resolution - *Height, Width*
- Camera image format - *Gray, YUV, Bayer*
- *Bit Depth*

The software looks for a compatible format that the camera can support that matches the selection in *Acquisition Settings*. The column order in [Table 1](#) (from left to right) is the order that the software queries the camera for a matching supported format.

**Table 1: Acquisition Settings and Camera Format**

Input Type	Bit Depth	ARV_PIXEL_FORMAT (In Order)
Gray Scale	10	MONO_10
Gray Scale	else if > 8	MONO_16
Gray Scale	8	MONO_8
Bayer	12	BAYER_RG_12
Bayer	else	BAYER_RG_8 BAYER_BG_8 BAYER_GB_8 YUV_422_YUYV_PACKED CUSTOM_YUV_422_YUYV_PACKED BGR_8_PACKED
G8 16 Bit	x	MONO_16
YUV Color	x	YUV_422_YUYV_PACKED CUSTOM_YUV_422_YUYV_PACKED FORMAT_BGR_8_PACKED BAYER_RG_8 BAYER_BG_8 BAYER_GB_8

### 7.1 Optional Supported Formats

For optional supported formats see [SetAcquisitionParameters \(0x37\)](#) in the [IDD](#).

In the *Acquisition Settings Options* field, enter the format options in lower case. Use comma separated values, e.g., `fmt=yuyv,fps=30`.

Make sure the selected values are in the formats shown after completing the steps shown in the [Camera Discovery](#) section.

**Figure 6: Optional Formats**



## 7.2 Camera Passthrough Options

USB3 Vision cameras do not have the same control paradigm as most other block cameras. To send custom commands to the camera the USB3Vision Passthrough dialog window in Panel Plus can be used, main menu » *File* » *USB3 Vision Passthrough*.

When the camera is connected to VideoTrack, available features can be accessed using the [Usb3VisionFeature \(0xA6\)](#) command. This command assumes a camera index, which must be set for the USB3 Vision camera.

The index must be set to the same index as the USB3 Vision camera is configured on.

Enumeration types are accessed with the string type by passing the label of the requested enumeration entry in the *Feature Value* field shown in [Figure 7](#). Integer and float types are passed in as strings. Values that do not parse to valid floats or integers are set to *0*.

For Boolean types, the first character of the value string is checked. If the character is *0* the feature is set to false, if it set to *1* it is true.

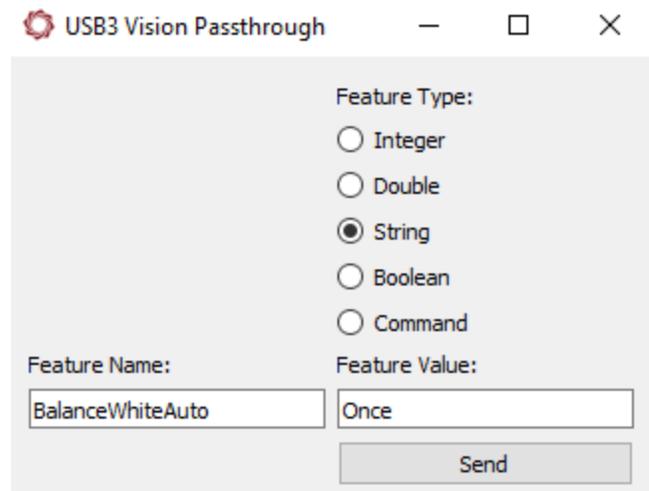


Figure 7: USB3 Vision Passthrough Dialog

Changing features that affect the frame size received from the camera will break the connection between VT and the camera. Set up frame size using Acquisition Settings in Panel Plus.

Changing features that affect framerate, may impact performance.

## 7.3 Common USB3 Vision Features

Table 2: Common USB3 Vision Features

Feature Name	Feature Type	R/W	Values (Units)
SensorWidth	Integer	R	-
SensorHeight	Integer	R	-
ExposureTime	Double	R/W	>=0 (us)
ExposureAuto	String	R/W	Off, Once, Continuous
GainSelector	String	R/W	All, Red, Green, Blue, ...*
Gain	Double	R/W	Device-specific
GainAuto	String	R/W	Off, Once, Continuous, ...*
GainAutoBalance	String	R/W	Off, Once, Continuous
DeviceLinkThroughputLimit	Integer	R/W	Bits per second

... \* Contact the camera manufacturer or follow the steps in [Retrieving USB3 Vision Feature List](#) to see all available values.

For more standard features, see the SFNC (Standard Features Naming Convention) document on the [emva website](#). For a complete list of all available camera features, contact the camera manufacturer or see [Retrieving USB3 Vision Feature List](#) section.

Features in the above list or the GenICam SFNC are not guaranteed to be available on all cameras.



### 7.3.1 DeviceLinkThroughputLimit Feature

This setting is necessary to get a smooth continuous capture from certain USB3 Vision cameras. Default values for this parameter are included in the auto fill settings for the Basler Dart and Allied Vision cameras. See [camera compatibility table](#) and search for *DeviceLink* to see the cameras affected.

*These values are camera resolution dependent. If the settings are too low or too high, it can result in missing frames or low frame rate. This parameter is necessary in cameras with a small output pixel buffer. There are some cameras that do not require this parameter, e.g., the FLIR Firefly and FLIR Blackfly.*

### 7.4 Retrieving USB3 Vision Feature List

The 4000-OEM is connected to the USB3 Vision camera. To query the camera from the command line VideoTrack must be told not to connect to the camera.

1. In the *Acquisition Settings* dialog in Panel Plus set the *Camera Type* for *Cam 2* to *None*.
2. Save parameters and reboot the system.
3. Establish an SSH session to the OEM hardware with Tera Term.

*Username and password is slroot.*

4. Query the device for a list of all the available features. From the *SD>* prompt type:

3.4.x and below: `arv-tool-0.6 features`

3.5.x and above: `arv-tool-0.8 features`

```
SD> arv-tool-0.6 features
FLIR-0119E709 (USB3)
Category: 'Root'
  Enumeration: 'AcquisitionControl'
    Enumeration: 'AcquisitionMode'
      EnumEntry: 'MultiFrame'
      EnumEntry: 'SingleFrame'
      EnumEntry: 'Continuous'
    Command: 'AcquisitionStart'
    Command: 'AcquisitionStop'
    Integer: 'AcquisitionFrameCount'
    Integer: 'AcquisitionBurstFrameCount'
  Enumeration: 'ExposureMode'
    EnumEntry: 'TriggerWidth'
    EnumEntry: 'Timed'
  Float: 'ExposureTime'
  Enumeration: 'ExposureAuto'
    EnumEntry: 'Continuous'
    EnumEntry: 'Once'
    EnumEntry: 'Off'
  Float: 'AcquisitionFrameRate'
```

Figure 8: Device Query for Features

5. Save the output feature list for reference.
6. In the *Acquisition Settings* dialog, set the *Camera Type* for *Cam 2* (or *Cam 3*) to *USB3 Vision* using the prior settings.

#### Acquisition Settings

Camera Index:

Camera Type:

7. Save parameters and reboot the system.



Features in the resulting list can have the following types, which map onto a type in the USB3 Vision passthrough packet.

**Table 3: Feature Type**

Feature Type	USB3 Vision Passthrough Type
Integer	Integer
Float	Double
Enumeration	String
String	String
Boolean	Boolean
Command	Command

For Enumeration types, valid values are displayed as *EnumEntry*.

Command types have no value and cannot be read or written to. Sending a USB3 Vision feature packet with the command type will execute the command.

## 7.5 Querying USB3 Vision Features

In software version 3.4.x and above, feature queries prompt a returned USB3 Vision feature packet. This can be verified in the verbose section in the main Panel Plus window and the *Feature Value* field. Feature information and additional command information can then be viewed by clicking and holding on the received feature packet reply.

When querying for USB3 Vision feature information leave the *Feature Value* field blank.

**Example:** Before modifying the exposure time of a camera, it is important to know the current exposure time to help estimate a good new value. To query the current exposure time of USB3 Vision camera:

1. In the *Feature Name* field enter *ExposureTime*.
2. Select *Double* under *Feature Type*
3. Leave the *Feature Value* field blank.
4. Click send.

**Figure 9: Query USB3 Vision Features**

5. In the verbose window in the main Panel Plus display, verify the following command has been sent and received:
  - *sent:Usb3VisionFeature 51,AC...*
  - *received:Usb3VisionFeature 51,AC...*
6. The current exposure time value will appear in the *Feature Value* field.

An alternate way to see this information is to click and hold on the *received:USB3VisionFeature 51.AC...* command in the verbose window shown in [Figure 10](#).

```
Usb3VisionFeature{cameraIndex=2,
type=1, name={len=12,
str="ExposureTime"},
value={len=11,
str="5000.000000"}}
```

**Figure 10: Verbose Trace Information**



## 7.6 Setting USB3 Vision Features

In software version 3.4.x and above, camera features can be set during system startup using the *Options* field in the *Acquisition Settings* dialog window in Panel Plus. These feature settings will be applied to the camera during boot up prior to the start of capture. Use the following format to enter a feature value into the *Options* field: `<FeatureName>=<FeatureTypeIndicator>;<FeatureValue>`

The feature type indicator is a single character that designates the type of feature to be set.

Table 4: Feature Type Indicator

Feature Type	Feature Type Indicator
Integer	i
Double	f
String	s
Boolean	b

Multiple features can be specified by separating entries with a comma then space. For example, in the *Acquisition Settings* dialog *Options* field shown in Figure 11, this string sets the auto exposure mode to *Off* (enabling manual exposure control), and then sets the exposure time to 10000us.

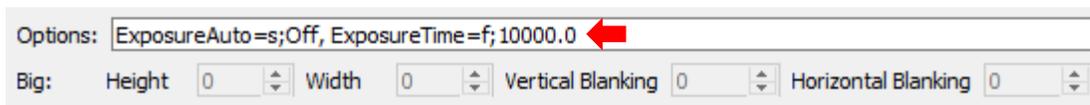


Figure 11: Example - Setting Exposure Time Using the Options Field

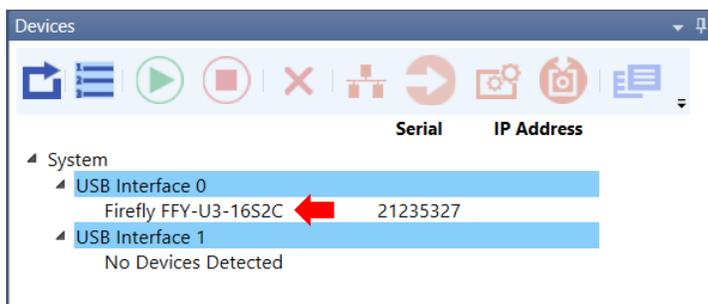
## 8 FLIR FireFly USB Configuration Example

### 8.1 Setting Frame Rate and Pixel Format

The section describes how to set the frame rate and pixel format to be compatible with the 4000-OEM and persist these settings on the camera using the Spinnaker SpinView application from FLIR.

The FireFly S Model (FFY-U3-16S2C-S) is used in this example.

1. Download and install the [Windows Spinnaker SDK](#) from FLIR.
2. Connect the FireFLY camera to a USB port on a PC.
3. Run the SpinView application. Select the camera.



4. Go to the *Settings* tab select *Acquisition Frame Rate Enable* and *Acquisition On Boot Enable*. This will set the camera to run at startup.
5. Set the *Exposure Time*. In this example the *Exposure time* was set to ~32000 uSec to get a frame time of ~30 fps. This may be different depending on the camera.

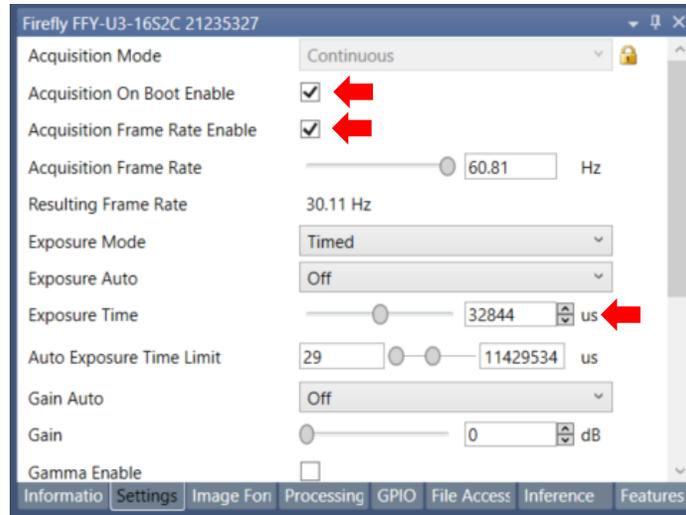
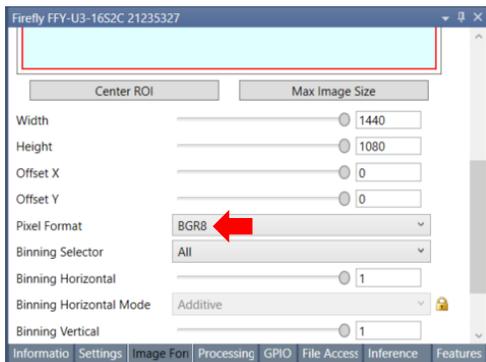


Figure 12: Set Exposure Time - SpinView Application

6. From the *Devices* main menu click the stop button to stop the video from streaming.



7. From the *Image Format* tab set the *Pixel Format* to *BGR8*.



8. Click the *Save Camera Setting Profile* button to persist the settings to the camera.



9. Click the *Start Streaming Device* button to ensure the video is streaming correctly.





## 8.2 Acquisition Settings

In Panel Plus *Acquisition Settings* use *Cam 2* for *Camera Index*. For *Camera Type* use *USB3 Vision* for *Camera Type*.

In the *Acquisition Settings* dialog, select the FireFly USB camera model in the *Auto Fill* drop-down menu. This automatically populates the relevant fields with the correct settings.

The settings can also be manually entered as shown in the [camera configuration table](#).

In the *Video Output* section of the *Connect* tab be sure to select *CAM 2* as the *Command Camera* when using *SightLine* video processing tools.

## 9 Troubleshooting

<p><b>Video issues:</b></p> <ul style="list-style-type: none"> <li>• Video is not showing false color.</li> <li>• Video is saturated or does not look as good as the FLIR Boson application.</li> <li>• Some FLIR format commands do not change the video.</li> </ul>	<p>Default capture is raw gray scale. In the <i>Acquisition Settings</i> dialog, change the image format using the <i>Options</i> field: <i>fmt=Nv12</i>.</p>
---	---

To verify device is connected and enumerated.

1. Apply power to the board.
2. Use Tera Term to establish an SSH session to the OEM board.
3. From the `root@sla-alip:~#` prompt type: `lsusb`

```
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 002: ID 044d:072d HD Pro Webcam (Camera is detected)
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

Figure 13: Verify Device Connected and Enumerated

To verify serial -  
(`/dev/ttyACM0`)

1. List the available serial devices. From the `root@sla-alip:~#` prompt type:  
`ls /dev/tty*`

```
root@sla-alip:~# ls /dev/tty*
/dev/ttyS5      /dev/ttyS6     /dev/ttyMAX13  /dev/ttypb
/dev/ttyS6      /dev/ttyACM0   /dev/ttySM0    /dev/ttypc
/dev/ttyS7      /dev/ttyMAX00  /dev/tty0      /dev/ttypd
/dev/ttyS8      /dev/ttyMAX01  /dev/tty1      /dev/ttype
/dev/ttyS9      /dev/ttyMAX02  /dev/tty2      /dev/ttypf
/dev/tty6       /dev/ttyMAX03  /dev/tty3      /dev/ttyS0
/dev/tty60      /dev/ttyMAX04  /dev/tty4      /dev/ttyS1
/dev/tty61      /dev/ttyMAX05  /dev/tty5      /dev/ttyS2
/dev/tty62      /dev/ttyMAX06  /dev/tty6      /dev/ttyS3
/dev/tty63      /dev/ttyMAX07  /dev/tty7      /dev/ttyS4
/dev/tty7       /dev/ttyMAX08  /dev/tty8      /dev/ttyS5
/dev/tty8       /dev/ttyMAX09  /dev/tty9      /dev/ttyS6
/dev/tty9       /dev/ttyMAX10  /dev/ttya      /dev/ttyS7
/dev/tty9       /dev/ttyMAX11  /dev/ttya      /dev/ttyS8
/dev/tty9       /dev/ttyMAX12  /dev/ttya      /dev/ttyS9
```

`/dev/ttyS0` is a representational link to `/dev/ttyACM0` that is automatically configured by a `udev` rule.



(Troubleshooting continued)

To verify the `/etc/udev/rules.d/rename-cdc-acm.rules` file exists.

Verify the contents of `rename-cdc-acm.rules` matches the following:

```
KERNEL=="ttyACM*", SYMLINK+="ttySL0"
```

```

#lsroot @ ~
SD> cat /etc/udev/rules.d/rename-cdc-acm.rules
# create symbolic links to a CDC ACM device
KERNEL=="ttyACM*", SYMLINK+="ttySL0"
KERNEL=="ttyUSB*", SYMLINK+="ttySL1"

```

 The UDEV rule maps newly connected devices by matching the `ttyACM*` string to the new `ttySL0` device.

To verify video -  
(`/dev/videoN`)

From the `root@sla-alip:~#` prompt type:

```
ls/dev/video*
```

The camera should list as a video device.

```

SD> ls /dev/video*
/dev/video0 /dev/video10 /dev/video3 /dev/video5 /dev/video7 /dev/video9
/dev/video1 /dev/video2 /dev/video4 /dev/video6 /dev/video8

```

No Video, video quality is bad, video artifacts.

Connect the camera to a Windows desktop and test the camera using the Windows camera app. If any issues exist when the camera is connected to a Windows desktop and 4000-OEM, the issue may be the camera.

If using a USB-C to USB 3.0 adapter, unplug the adapter from the 4000-OEM USB-C input. Turn it over and then plug it back in.

Check multiple input modes.

If the camera supports multiple output formats, it can be valuable to test all available formats for changes in performance and video quality. Follow the steps in the [Camera Discovery](#) section to list available formats for this device.

Verify cables support the USB camera.

Verify that all the cables or adapters used to connect the camera to the 4000-OEM support the USB camera being used. If an adapter or hub that only supports USB 2.0 is used with a USB 3.0 camera, the camera will not reach full framerate. Verify that the USB 3.0 camera can reach USB 3.0 speeds by ensuring the camera is on the same bus as the USB 3.0 root hub.

1. Apply power to the board.
2. Use Tera Term to establish an SSH session to the OEM board.
3. From the `root@sla-alip:~#` prompt type: `lsusb`

```

Bus 002 Device 004: ID 155a:1515 HD Pro Webcam
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub

```

Figure 14: Verify USB Cable Support

Video flickering in ELP camera configuration.

Check the connection quality of the USB cable to the camera.

The ELP camera has a default framerate of <30fps. In the Acquisition Settings dialog window make to use `fmt=YUYV,fps=60` in the *Options* field.



(Troubleshooting continued)

Color artifacts in Kayeton camera configuration.



Set *False Color* to *White Hot* from the *Enhance* tab in Panel Plus.

Alternately, in the *Acquisition Settings* dialog window, configure the camera for 480x640 out shown in [Figure 15](#).

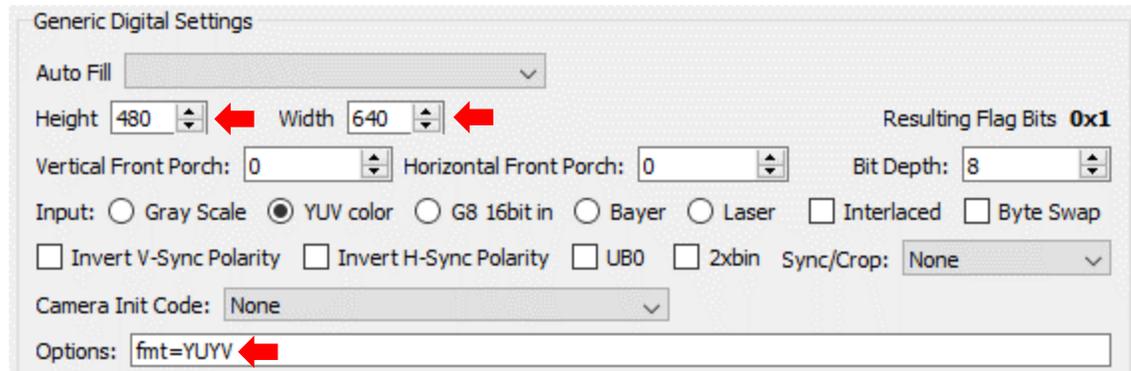


Figure 15: Kayeton 480 x 640 Camera Configuration

USB3Vision low frame rate after software reset.

Power cycle the OEM board and camera.

## 9.1 Questions and Additional Support

For questions and additional support, please contact [SightLine Support](#). Additional support documentation and Engineering Application Notes (EANs) can be found on the Support pages of the SightLine Applications [website](#).

## Appendix A: Updating UDEV Rules - USB3 Vision Cameras

From Linux:

1. Establish and SSH session to the target hardware.
2. Use *nano* to edit the Aravis rules file:

```
SD> nano /etc/udev/rules.d/aravis.rules
```

```
GNU nano 3.2 /etc/udev/rules.d/aravis.rules
# Basler
SUBSYSTEM=="usb", ATTRS{idVendor}=="2676", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
# The Imaging Source
SUBSYSTEM=="usb", ATTRS{idVendor}=="199e", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
# Point Grey Research
SUBSYSTEM=="usb", ATTRS{idVendor}=="1e10", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
# Smartek Vision
SUBSYSTEM=="usb", ATTRS{idVendor}=="2479", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
# <<INSERT COMPANY NAME HERE>>
#SUBSYSTEM=="usb", ATTRS {idVendor}=="<<insert vendor ID here>>", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
```

3. Remove the # symbol to uncomment the *SUBSYSTEM* line.
4. Replace <<insert vendor ID here>> with the vendor ID that was discovered using the [Alternative Camera Discover Method](#).



- CTRL+O to save the file. CTRL+X to exit.

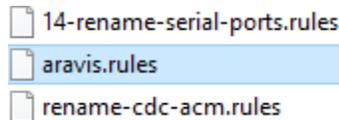


- Reboot the target hardware to apply the new udev rules.

Alternately *vi* can also be used to edit the file.

#### From the PC:

- Navigate to SLA-4000 Upgrade Utility folder at at `C:\Program Files (x86)\SightLine Applications\SLA-4000 Upgrade Utility 3.xx.xx`.
- From this folder navigate to `firmware\release\root\etc\udev\rules.d`.
- Use Notepad++ or similar application to open and edit the `aravis.rules` file. Notepad++ ensures that Carriage Return/Line Feed (CRLF) rules are preserved.



- Replace `<<insert vendor ID here>>` with the vendor ID that was discovered using the [Alternative Camera Discover Method](#).

```

1 # Basler
2 SUBSYSTEM=="usb", ATTRS{idVendor}=="2676", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
3 # The Imaging Source
4 SUBSYSTEM=="usb", ATTRS{idVendor}=="199e", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
5 # Point Grey Research
6 SUBSYSTEM=="usb", ATTRS{idVendor}=="1e10", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
7 # Smartek Vision
8 SUBSYSTEM=="usb", ATTRS{idVendor}=="2479", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
9 <<INSERT MANUFACTURER NAME HERE>>
10 #SUBSYSTEM=="usb", ATTRS{idVendor}=="<<insert vendor ID here>>", MODE=="0666", TAG+="uaccess", TAG+="udev-ac1"
11

```

Figure A1: aravis.rules File in Notepad++

- Save the file.
- To apply the file, use an FTP client to upload it up the target hardware, or use the SLA-4000 Upgrade Utility to update the firmware.

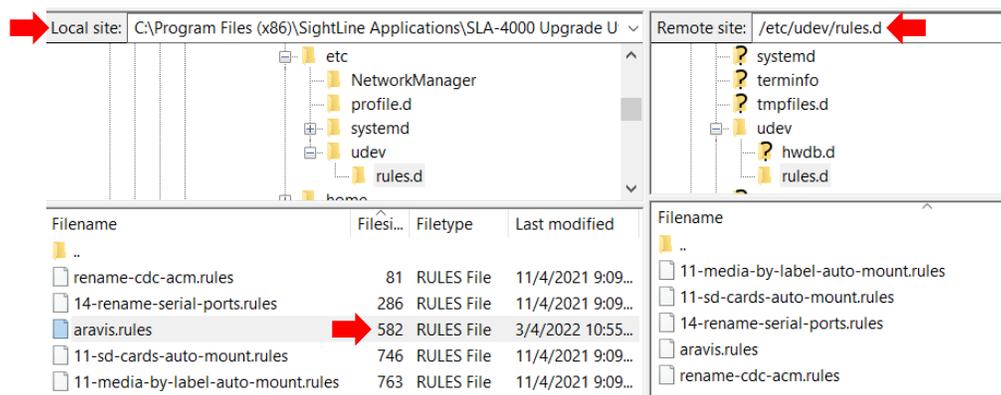


Figure A2: FTP File Upload



## Appendix B: 4000-OEM Dual USB Camera Limitations and Troubleshooting

In 3.5.x software and above Cam2 and Cam3 can both be configured for USB cameras, but have the following are limitations:

- Both Cam2 and Cam3 cannot have a width greater than 1280 or a height greater than 720.
- When USB 2.0 cameras are used for Cam2 and Cam3, there is a bandwidth limitation of 480Mbps resulting in unexpected framerates.

 *Some USB cameras that output video in a YUYV format, exceed the required bandwidth limitation and may not be compatible with a dual USB camera configuration.*

### Framerate troubleshooting:

With both cameras connected to the 4000-OEM, start video track. If the following error message displayed in the terminal window:

```
FATAL: VIDIOC_STREAMON returned error -1  
VIDIOC_STREAMON: No space left on device
```

Try lowering the framerate of each camera using the following steps:

1. Panel Plus main menu » *Configure* » *Acquisition Settings*.
2. From the *Camera Index* drop-down menu select the index for one of the connected cameras.
3. In the Options field enter *fps=* followed by the new framerate, e.g., *fps=24*.
4. Click *Apply*.
5. Repeat the above steps for each camera. The video feed should display.
6. If video is still not displaying, see if the error message was output to video track in the terminal window.
7. If the error message persists, try lowering the resolution of one or both cameras:
  - a. Panel Plus main menu » *Configure* » *Acquisition Settings*.
  - b. From the *Camera Index* drop-down menu select the index for one of the connected cameras.
  - c. Enter a resolution in the *Height* and *Width* fields.
  - d. Click *Apply*. The video feed should display.
8. If the same error message persists, try swapping one or both cameras for a different camera.
9. Reboot the 4000-OEM.
10. In an SSH connection verify that */dev/video14* and */dev/video15* devices have been created by executing *ls -l /dev/video\**.
11. If they have not been created, try disconnecting and reconnecting the video devices, and/or rebooting the 4000-OEM again.