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IMAGING

# VisionPro CVB Driver Documentation

## Summary

This document describes how to use the Cognex VisionPro® Common Vision Blox Acquisition Adapter. This is a high performance driver, with which VisionPro® can acquire images from every Common Vision Blox compliant image acquisition device.

The driver supports VisionPro® 32Bit and VisionPro® 64Bit.

2017-12-07

# Copyright

# Vision Pro CVB Driver Manual

## Content

**Vision Pro CVB Driver Manual**

# 1 Requirements and Components

■ **Required Software:**

- o Cognex Vision Pro 7.2. or higher (32Bit or 64Bit)
- o Common Vision Blox 11.0 or higher (32Bit or 64Bit)
- o One of the following licenses:
    - ▪ CVB Image Manager
    - ▪ CVB CameraSuite over a GigE Vision or USB3 Vision Camera purchased from Stemmer Imaging
    - ▪ Free CVB Trial License: Request a license using the CVB Management Console

■ **Components:**

- o "Vision Pro CVB Driver" contains the files
    - ▪ VisionProCVBDriver.dll
    - ▪ VisionProCVBDriver.ini
    - ▪ ReleaseNotes.txt
    - ▪ VisionProCVBDriverDocumentation.pdf

## 2   Licensing  the VisionPro CVB Driver

**One of the following licenses is required:**

- CVB Image Manager
- Free CVB CameraSuite over a GigE Vision or USB3 Vision Camera purchased from Stemmer Imaging
- Free CVB Trial License: Request a license with the CVB Management Console

**Why is a License for this driver needed?**

The VisionPro CVB driver is based on the Common Vision Blox Image Manager, which is developed by Stemmer Imaging.

The Image Manager is the core of Common Vision Blox with which you can acquire images from a variety of highly optimized drivers for most market leading frame grabbers and other image acquisition hardware with fast access to image data. These drivers are free of charge, but the Image Manager has to be licensed.

Nevertheless if you purchased a GigE Vision or USB3 Vision Camera from Stemmer Imaging the CVB CameraSuite License is included which allows the usage of the VisionPro CVB Driver without extra costs.

### 2.1   CVB Image Manager

If you have a CVB Dongle connected to the System, the VisionPro CVB driver is licensed automatically.

All types of CVB Licenses are supported.

### 2.2   CVB CameraSuite

If you have an image acquisition device (e.g. a GigE Vision camera) that has been supplied with a *CVB CameraSuite Activation Code*, it can be used to activate the Common Vision Blox CameraSuite functionality. This license allows the usage of the Sherlock CVB Driver without extra costs. Please use the *CVB Management Console* to activate your license.

### 2.3   Free CVB Trial License

If you want to test the VisionPro CVB driver, you can generate a 30 day trial license over the *CVB Management Console.*

Open the Licensing\ Node Locked task and follow the instructions.

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# 3 Getting started

This chapter describes what has to be done to acquire an image with the VisionPro CVB Driver of your device in Cognex VisionPro®.

## 3.1 Install the necessary software

To be able to acquire images from your device the necessary CVB  VIN-Driver has to be installed on your system. This can be done with the CVB Installation medium or download the driver on our website:

http://www.commonvisionblox.com/en/download/

The driver for GigE Vision compliant Cameras (GenICam.vin) is installed by default and it is not necessary to install it separately.

If needed install the acquisition SDK and device driver provided by the device manufacturer. Refer to the CVB User Guide for your hardware to know if this step is necessary. If installed the User Guide can be found in the Start menu (Start -> Programs -> STEMMER IMAGING -> Common Vision Blox -> Documentation -> Hardware).

## 3.2 Configure the CVB VIN-Driver

There is no common way how to configure the image acquisition hardware. It depends on what hardware you are using. Please read the Quickstart of the *CVB User Guide* for your hardware (Start -> Programs -> STEMMER IMAGING -> Common Vision Blox -> Documentation -> Hardware) in order to configure your camera and/or frame grabber.

For GigE Vision compliant Cameras use the GenICam Browser to configure your devices.
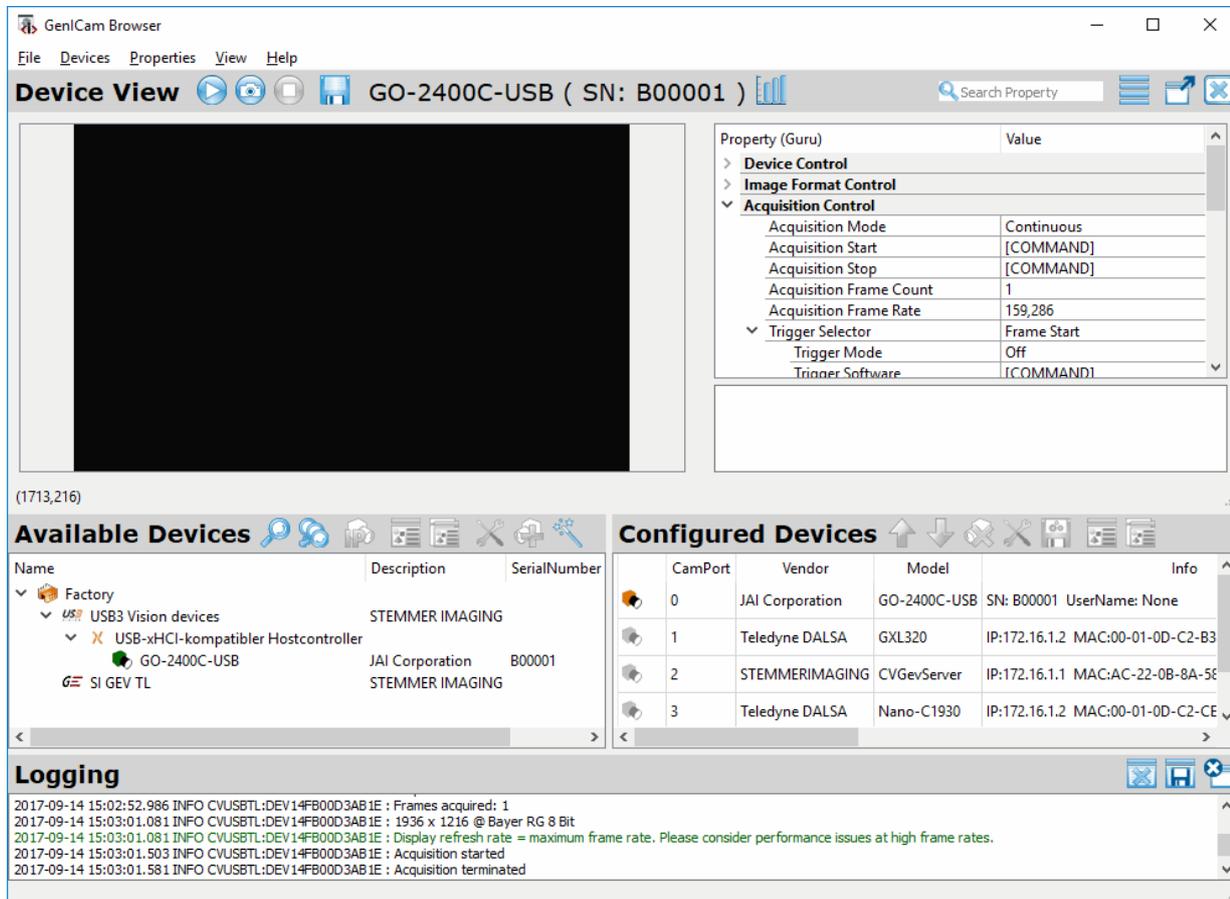
## 3.3 Acquire image with CVB

Before trying to get images in VisionPro® check if you get an image in our Common Vision Blox Viewer.

(Start -> Programs -> STEMMER IMAGING -> Common Vision Blox).

Open it and load the installed VIN-Driver (e.g. %CVB%\Drivers\GenICam.vin).

## 3.4 Configure the VisionPro CVB Driver

Open the VisionProCVBDriver.ini file which is located in the CVB driver configuration folder. To get to this folder open the file explorer and type %CVBDATA%Drivers in the address field. On Windows 7 Systems this is located in the hidden folder *C:\ProgramData\* (e.g.: *C:\ProgramData\STEMMER IMAGING\Common Vision Blox\Drivers\VisionProCVBDriver.ini*)

Change the default settings to the needed VIN-Driver. More information about the VisionProCVBDriver.ini file can be found in the next Chapter (VisionProCVBDriver .ini Configuration).

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## 3.5 Start VisionPro®

Now everything is configured and you are ready to start the VisionPro® QuickBuild.

Keep in mind that VisionPro® QuickBuild has to be started with administrative privileges to be able to see the VisionPro CVB Driver. This is a limitation which comes from the adapter concept used by Cognex VisionPro®.

When started open the Image Source and select Camera. In the "Image Acquisition Device/Frame Grabber" drop down box you can see the devices available over the VisionPro CVB Driver with the prefex

**Device: CVB::**
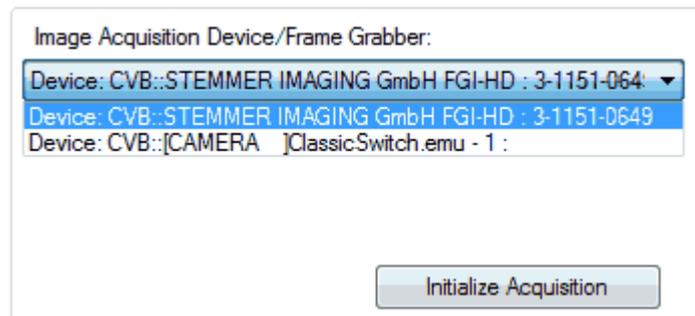
# 4 VisionProCVBDriver .ini Configuration

The VisionPro CVB Driver uses the VisionProCVBDriver.ini file where all cameras have to be configured. The file is located in the %CVBData%\Drivers directory.

The rows starting with a '#' are just for documentation and do not take effect on the configuration.

## 4.1 Configure Cameras

The important entries of the VisionProCVBDriver.ini should look like this:

```
[Camera0]
Driver = %CVB%\Tutorial\ClassicSwitch.emu

[Camera1]
Driver = %CVB%\Tutorial\ClassicSwitch.emu
```

Each camera section begins with `[CameraN]`, where N is the index of the camera, starting with 0. For every camera you have to load the desired driver (*.vin) with the command Driver = 'path', e.g. `Driver = %CVB%\Drivers\GenICam.vin` for the GeniCam driver.

There are some example configurations in the bottom of the ini file or in this document the chapter Example Configurations

## 4.2 Parameters

This chapter describes all parameters of the VisionProCVBDriver.ini file which are available for every camera section.

### 4.2.1 Driver

```
Driver = %CVB%\Tutorial\ClassicSwitch.emu
```

This specifies the driver, which is loaded with the configured camera. Every driver or image source, which is supported by Common Vision Blox, is supported by the VisionPro CVB driver as well.

Additional information about the listed drivers below can be found in the Common Vision Blox Online Help under Image Manager->CVB Technology->Good To Know->Supported File Formats.

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**VIN-Driver (*.vin )**

The Video Interface (VIN) file format is used for all Common Vision Blox drivers

**Emulation Files (*.emu)**

An EMU file is a simple text file defining a number of images to be loaded. Of course all images must have the same size and the same number of planes. It behaves as a vin-file so that it can be used to emulate Common Vision Blox drivers.

**Video Files (*.avi/ *.wmv / *.mpg)**

This driver enables access to DirectShow compatible video files. Among the supported file types are **AVI, WMV** and **MPEG** formats, but effectively the selection of compatible file formats depends on the codecs installed on your system (for example after installing the free DivX codec on your machine, this driver is also able to playback DivX encoded video streams). As a general rule of thumb, most video formats that can be replayed using Microsoft Media Player can also be used with this driver.

**Graphic File Formats  (e.g. *.bmp)**

Common Vision Blox supports several standard and non-standard image file formats:

- **BMP** (*.bmp)
- **TIFF** (*.tif, *.tiff, *.xif)
- **JPEG** (*.jpg, *.jpeg, *.jpe, *.jif, *.jfif, *.thm)
- **JPEG2000** (*.j2k, *.jp2, *.jp2k, *.jpc, *.jpx)

## 4.2.2  CameraPort

```
CameraPort = 0
```

Specifies the Camera Port of the driver. If more than one camera uses the same driver, the driver can be loaded several times. Then the `CameraPort` parameter specifies, which camera of the available cameras has to be used.

Example:

Two GenICam GigE cameras are connected to the system. The GeniCam driver %CVB%\Drivers\GenICam.vin is loaded for `[Camera0]` and `[Camera1]`.

In `[Camera0]` `CameraPort` is set to 0.

In `[Camera1]` `CameraPort` is set to 1.

Look into [Two GigE-Cameras](#) for an example configuration.

### 4.2.3 Board

```
Board = 0
```

If more than one image acquisition device of the same type is installed in the same system the same driver can be loaded several times. Then the board parameter specifies which board of the available image acquisition devices has to be used.

The `Board` parameter may also be needed for Firewire and USB cameras.

Look into [Four CL-Cameras on 2 Dalsa X64 CL-Express boards](#) for an example configuration.

### 4.2.4 TriggerSelector

```
TriggerSelector = MultiFrame
```

Only the GenICam.vin driver uses the TriggerSelector parameter.

The VisionPro® CVB Driver changes TriggerMode and TriggerSource automatically. By default, it uses the TriggerSelector "FrameStart". If another Selector value should be used it can be configured with the TriggerSelector parameter.

### 4.2.5 TriggerSource

```
TriggerSource = Line1
```

Only the GenICam.vin driver uses the TriggerSource parameter.

The VisionPro® CVB Driver changes TriggerMode and TriggerSource automatically. By default, it reads out the TriggerSource value during initialization of the driver and uses this value for external trigger. For software trigger, this feature is changed to "Software" automatically. The driver resets the value to the initial value while unloading.

If you want to set a specific value and do not want to worry about the value in the camera, you can use the TriggerSource parameter to set the trigger source, which is used for external trigger.

### 4.2.6 SetShutterIDDeviceControlID

```
SetShutterIDeviceControlID = 0x00000104
```

If available the Exposure parameter in VisionPro® tries to use GenICam, to set the exposure time of the camera. If GenICam is not available, it sets the exposure time over CVB IDeviceControl with the ID 0x00000104. On some drivers, the ID for setting the exposure time is different to the default ID. Then you can use this parameter to change the ID which is used.

To find out the correct ID for your driver, please read [IDeviceControl](#).

### 4.2.7 SetBrightnessIDeviceControlID

```
SetBrightnessIDeviceControlID = 0x00000100
```

If available the Brightness parameter in VisionPro® tries to use GenICam to set the gain of the camera. If GenICam is not available, it sets the gain over CVB IDeviceControl with the ID 0x00000100. On some drivers, the ID for setting the gain is different to the default ID. Then you can use this parameter to change the ID which is used.

To find out the correct ID for your driver, please read IDeviceControl.

### 4.2.8 GainScalingFactor

```
GainScalingFactor = 100
```

The default ScalingFactor for the Gain value (brightness) in Vision Pro is 100. The range of the brightness value in Vision Pro is [0.0-1.0]. With this parameter the default value can be changed so that the available range of the gain value in the camera fits better to the range of the brightness value.

Example: With the GainScalingFactor set to 100 the range of the gain is [0 – 100].

### 4.2.9 MapTo8BitWindowStart

```
MapTo8BitWindowStart = 0
```

```
MapTo8BitWindowStartR = 0
```

```
MapTo8BitWindowStartG = 0
```

```
MapTo8BitWindowStartB = 0
```

This parameter can be used, if images with more than 8 bit are acquired. Then this parameter is used as the start of the window where the incoming image is mapped to 8Bit.

If you want to have a seperate window start Point for every plane use the MapTo8BitWindowStart[R,G,B] Parameter.

More details about windowing can be found in Support for Images with more than 8Bit

### 4.2.10 MapTo8BitWindowWidth

```
MapTo8BitWindowWidth = 0
```

```
MapTo8BitWindowWidthR = 0
```

```
MapTo8BitWindowWidthG = 0
```

```
MapTo8BitWindowWidthB = 0
```

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This parameter can be used, if images with more than 8 bit are acquired. Then this parameter is used as the width of the window where the incoming image is mapped to 8Bit.

Instead of using the width you can use 8BitMappingWindowEnd.

If you want to have a seperate window width for every plane use the MapTo8BitWindowWidth[R,G,B] Parameter.

More details about windowing can be found in <u>Support for Images with more than 8Bit</u>

## 4.2.11 MapTo8BitWindowEnd

```
MapTo8BitWindowEnd = 0

MapTo8BitWindowEndR = 0
MapTo8BitWindowEndG = 0
MapTo8BitWindowEndB = 0
```

This parameter can be used, if images with more than 8 bit are acquired. Then this parameter is used as the end of the window where the incoming image is mapped to 8Bit.

If you want to have a seperate window end for every plane use the MapTo8BitWindowEnd[R,G,B] Parameter.

Instead of using the end you can use 8BitMappingWindowWidth.

More details about windowing can be found in <u>Support for Images with more than 8Bit</u>

## 4.2.12 ExtractPlane

```
ExtractPlane = 0
```

If set to a plane Index (0:red, 1:green 2:blue) this plane is extracted as mono image from a RGB image. This works also for RGB16Bit (48Bit). ExtractPlane can be compined with MapTo8Bit do get the selected plain as mono8 image from a RGB16Bit image. In this case the Parameters MapTo8BitWindowStart / MapTo8BitWindowEnd / MapTo8BitWindowWidth have to be used. Default value is -1 which means that this feature is not used. If a plane Index is set which is not available this feature will be ignored.

### 4.2.13 GenICamMaxVisibility

`GenICamMaxVisibility = Beginner`

If GenICam features are available they are displayed in the Custom Properties list. Which group of features is displayed can be controlled with the GenICamMaxVisibility parameter.

- `Beginner` : Only features which have the visibility Beginner are displayed.
- `Expert`   : Features with Beginner and expert visibility are displayed.
- `Guru`     : All features are displayed.

The default value is Beginner.

## 4.3　Logging

The Logging parameters influence the way in which the driver logs warnings, errors and additional information.

### 4.3.1　Activate / Deactivate Logging / Change LogLevel

`Logging = warn`

Logging is deactivated if Logging is set to "none". It is enabled if one of the other strings is used which represents the LogLevel off The Logging:

- **none** : Logging is deactivated
- **info** : Warnings errors and information will be logged
- **warn** : Warnings and errors will be logged
- **err** : Only errors will be logged
- **all** : Everything will be logged

### 4.3.2　Logging Destination

`LogDestination = file`

Set the logging destination:

- **file** : log to file. Filename is used from `LogFileName`
- **console** : log to console. Console will be opened automatically
- **trace** : log to trace
- **stdout** : log to stdout

### 4.3.3   Logging File Name

```
LogFileName = %CVBDATA%\Drivers\VisionProCVBDriver.log
```

Filename used when `LogDestination` is set to file

## 4.4   Example Configurations

### 4.4.1   Two GigE-Cameras

```
[Camera0]
Driver = %CVB%\Drivers\GenICam.vin
CameraPort = 0

[Camera1]
Driver= %CVB%\Drivers\GenICam.vin
CameraPort = 1
```

### 4.4.2   One GigE-Camera and One AVT Firewire Camera

```
[Camera0]
Driver = %CVB%\Drivers\GenICam.vin
CameraPort = 0

[Camera1]
Driver = %CVB%\Drivers\cvAVT1394.vin
CameraPort = 0
```

### 4.4.3   Four CL-Cameras on two Dalsa X64 CL-Express frame grabbers

```
[Camera0]
Driver = %CVB%\Drivers\CVX64CLExpress.vin
CameraPort = 0
Board = 0
```

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```
[Camera1]
Driver= %CVB%\Drivers\CVX64CLExpress.vin
CameraPort = 1
Board = 0


[Camera2]
Driver = %CVB%\Drivers\CVX64CLExpress.vin
CameraPort = 0
Board = 1


[Camera3]
Driver= %CVB%\Drivers\CVX64CLExpress.vin
CameraPort = 1
Board = 1
```

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## 5 Driver Parameters in VisionPro®

### 5.1 Settings



### 5.1.1 Exposure

If available the Exposure parameter in VisionPro® tries to use GenICam to set the exposure time of the camera. If GenICam is not available, it sets the exposure time using CVB IDeviceControl with the ID 0x00000104.

On some drivers the ID for setting the exposure time is different to the default ID. Then you have to use the parameter SetShutterIDDeviceControlID in the CVBDrv.ini to change the ID which is used.

To find out the correct ID for your driver, please read IDeviceControl.

### 5.1.2 Brightness

If available the Brightness parameter in VisionPro® tries to use GenICam to set the gain of the camera. If GenICam is not available, it sets the gain using CVB IDeviceControl with the ID 0x00000100.

On some drivers the ID for setting the gain is different to the default ID. In this case please use the parameter SetBrightnessIDeviceControlID to change the ID which is used.

To find out the correct ID for your driver, please read IDeviceControl.

### 5.1.3  Contrast

The Contrast Parameter is not supported by the VisionPro CVB Driver.

## 5.2  Strobe & Trigger

This chapter explains how the different trigger modes are handled in the VisionPro CVB Driver.

### 5.2.1  Manual

In the Manual Trigger mode the selected device will be triggered over SoftwareTrigger.

If GenICam access is available the feature "TriggerMode" is set to "On" and the "TriggerSource" is set to "Software". Otherwise the CVB Trigger Interface (ITrigger) is used to activate the trigger mode to CVC_C_TRIGGER_ASYNCRON.

Then the CVB SoftwareTrigger Interface (ISoftwareTrigger) is used to send a software trigger to the camera when a new image is requested by VisionPro®.

If GenICam access is available but the "TriggerMode" node is not the acquisition is done over the "AcquisitionMode" is changed to "SingleFrame" and the "AcquisitionStop" / "AcquisitionStart" features are used to acquire a new image when requested by VisionPro®.

### 5.2.2  Free Run

In Free Run Mode the Device is configured for a free running setup over the CVB Trigger Interface or GenICam depending on which interfaces are available.

### 5.2.3  Hardware Auto

If GenICam access is available the feature "TriggerMode" is set to "On" and the "TriggerSource" is set to the default value. The default value is read out  from the device when the driver is loaded. Otherwise the CVB Trigger Interface (ITrigger) is used to activate the trigger mode to CVC_C_TRIGGER_ASYNCRON.

### 5.2.4  Hardware Semi-Auto

The Hardware Semi-Auto mode has the same behavior as the Hardware Auto mode.

### 5.2.5 Trigger Low To High

If available over GenICam the "TriggerActivation" feature is set to "RisingEdge" if Trigger Low To High is activatied and to "Falling Edge" if Trigger Low To High is deactivated.

## 5.3 Image Properties

If the image properties are changed the new parameters are set in the selected device over the CVB ImageRect Interface (IImageRect).

Changing the Image Properties stops the acquisition if active. This is necessary because the underlying image buffers have to be reinitialized. The acquisition is started again after the properties are changed.

## 5.4 Imaging Device Feature Access

The feature access functionality from VisionPro® can be used to read, write and execute features of the selected device. If the camera is a GenICam camera it uses the GenICam access.

If GenICam access is not available, the read and write feature functionality can only be used, if the CVB IDeviceControl interface is supported.

### 5.4.1 GenICam

The read,write feature and the execute command need to get a valid GenICam feature name as string. To find out the correct feature name, you can use the CVB GenICam Browser. The Screenshot shows how to read out a feature name by selecting the feature.

# Vision Pro CVB Driver Manual
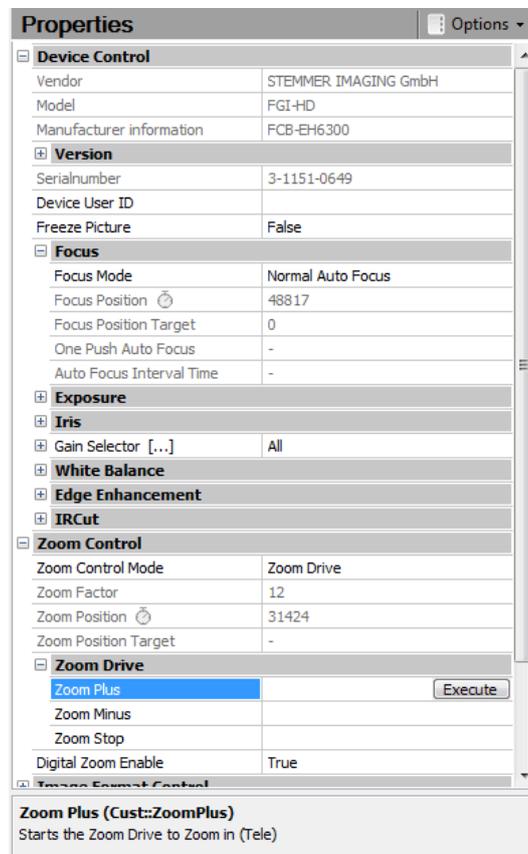


On the bottom of the property grid the Feature name is visible above the description. In this example the Zoom Plus feature which is selected which has the feature name „ZoomPlus".

If „ZoomPlus" is used as feature name and the Execute command is used the Zoom Plus Command will be sent to the device.

The Execute Command can only be used to set boolean features to true which is useful for GenICam command features.

The Read and Write functionality can be used to read and write all other feature types and also the boolean features.

## 5.4.2 CVB IDeviceControl interface

To check if IDeviceControl is available, please have a look at the specific *CVB User Guide for your image acquisition device.* There you can also find a detailed description of the supported commands.

The IDeviceControl interface can be used to access special functionality of a driver. The basic idea is to call a specific driver command by it's command ID and pass arguments or returns for this specific commands into or out of the driver. Each image acquisition device may have it's own list of commands and the

parameters used by the commands. Internaly only the DCStrCommand is used. So if the documentation refers to DCStrCommand or DCBinaryCommand use the DCStrCommand as example.

With the VisionPro CVB Driver you have to use the hex value of the command ID as the feature string. The hex value for every ID can be found in the driver specific header file which is installed with the driver in the `%CVB%\Lib\C` folder. The name of the header file is documented in the specific CVB User Guide for your image acquisition device. Usually it is called iDC_xxxx.h.

As an example, we want to read out the current frame number of a loaded avi file.

First we have to find out the specific header file. The avi driver is a special driver which is integrated in the CVB Image Manager. So we have no specific CVB User Guide. This is integrated in the Common Vision Blox Online Help. In the Chapter *Image Manager ->CVB Technology ->Good To Know -> How to deal with Video files* you can read the detailed description of the supported commands. The specific header file is the iDC_AVI.h.

The Command ID for the frame number looks like this in the header file:

DC_FRAMENUMBER     = 0x00000102

So the hex value of the Command ID which we need as feature name is 102.

## 5.5   Custom Properties
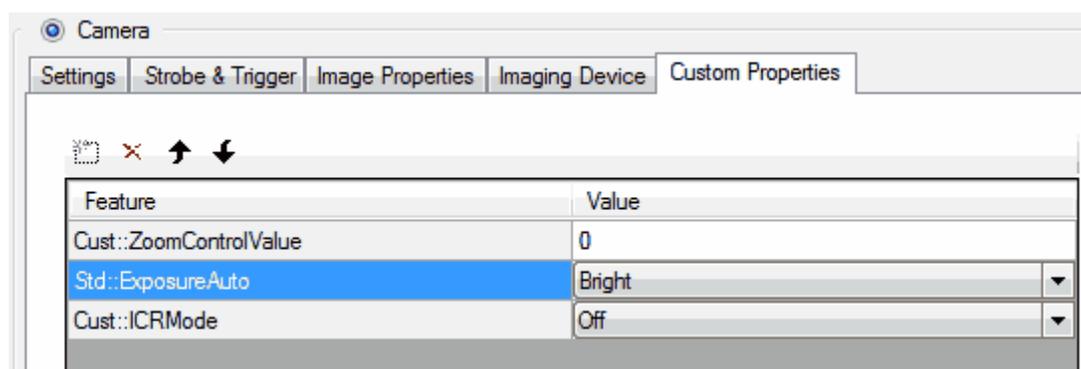


The Custom Properties can be used to display and change GenICam features of the loaded camera.

The available features of the custom properties are filled only once when the camera is initialized.

However, many GenICam features change their writable state depending on other features. Therefor it was necessary to support only features, which are writable at initialization time.

Therefore, it is recommended to use the GenICam Browser to change properties, as it is clearly arranged, much easier to use and changes the state of the features on demand.

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# 6    Additional Information

## 6.1    Performance

If a CVB driver is loaded, the VisionPro CVB driver analyzes the image and uses optimized methods to copy the image. In combination with the highly optimized CVB drivers, you will get the fastest acquisition you can get with your acquisition device.

## 6.2    Support for Images with more than 8Bit

The driver supports images and acquisition devices with 8 to 16Bit.

If desired 16 Bit images can also be mapped to 8 Bit.

For this mapping, the windowing technique is used. Therefore, a window in the range of the available gray values is defined. This window is mapped to the 256 gray values of an 8Bit image.

To define the window 2 parameters are needed in the VisionProCVBDriver.ini file. One is the start of the window (MapTo8BitWindowStart). The gray value, which is defined as window start, is mapped to the gray value zero. The second parameter can either be the window width (MapTo8BitWindowWidth) or the window end (MapTo8BitWindowEnd). The gray value, which is defined as window end, is mapped to the gray value 255. When the width is used the window end is calculated automatically.
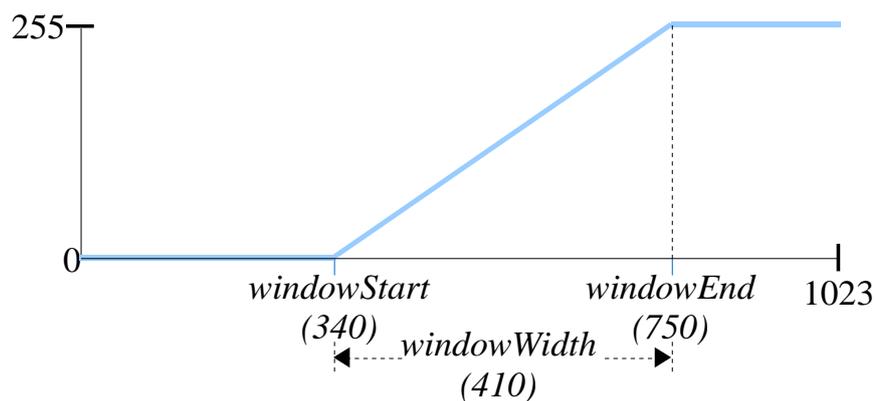
**Mapping a 10Bit Image to 8Bit**

When the window width is exactly 256 no data will be lost within the window. The grayvalues of the source image are mapped 1:1 to the 8Bit image. With this technique it is possible to process the whole range of a 10Bit image (1024 gray values) with four 8Bit Images in VisionPro®.

## 6.3   PoolSize

The default Adapter PoolSize for this Driver is 10000000 as hex value which means 256MB. Depending on the used image size with your device or the buffers used in the VIN-Driver this value may have to be increased.

If it is too small you will get an error message in Vision Pro that the pool size is too low or that a timing error occurred.

Additional information and a description how to set the PoolSize can be found in the Cognex VisionPro® Documentation.

# 7   Additional Documentation

Additional Documentation can be found in the CVB Getting Start Guide or the CVB User Guide for the used image acquisition device (camera or frame grabber).

# 8 Contact and Feedback

We hope that this manual was useful for you and look forward to your feedback. In case of further questions, please do not hesitate to contact our technical support.

Additional information and a lot of valuable details regarding image processing, can also be found on our website.

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