

USB3 VISION CAMERAS

USB Features Reference

V1.0.0

Document at a glance



Read this document carefully

This avoids malfunctions or damage to the camera.

Applied standards

The document describes in alphabetical order the basic and advanced camera controls for Allied Vision USB3 Vision cameras as seen from the Vimba Viewer.

These features comply with:

- USB3 Vision Standard V1.0.1
- GenICam Standard Features Naming Convention V2.2 (SFNC)
- GenICam Transport Layer Standard Features Naming Convention V1.0 (GenTL SFNC)
- GenICam Pixel Format Naming Convention V2.0 (PFNC).



Download applied common standards

For SFNC, GenTL SFNC, and PFNC, see <http://genicam.org>

For USB3 Vision, see <http://www.visiononline.org>



Allied Vision proprietary features

Some features in this document are adapted SFNC features. Some features are proprietary features adding new functions to the features range defined by the SFNC.

Features availability



Availability of transport layer features

Features in the categories *StreamInformation* and *BufferHandlingControl* are not available with any other than the Allied Vision transport layer.



Different features for different camera models

This is the master document for all Allied Vision USB3 Vision camera models. Some features are not available for all camera models.

For particular characteristics, see the corresponding technical manual, Chapter *Camera features available in Vimba*.

What else do you need?

The following downloads provide additional information and software.

Document	Web link
USB camera manuals	https://www.alliedvision.com/en/support/technical-documentation See Additional Documents for your camera.
USB Triggering Concept	https://www.alliedvision.com/en/support/technical-papers-knowledge-base
Software	Web link
Vimba , including Vimba Viewer and Vimba Driver Installer	https://www.alliedvision.com/en/products/software

Table 1: USB3 Vision Features Reference -> Additional downloads overview

Contact us

Connect with Allied Vision by function

<https://www.alliedvision.com/en/meta-header/contact>

Find an Allied Vision office or distributor

<https://www.alliedvision.com/en/about-us/where-we-are>

Email

info@alliedvision.com

support@alliedvision.com

Telephone

EMEA: +49 36428-677-0

The Americas: +1 978-225-2030

Asia-Pacific: +65 6634-9027

China: +86 (21) 64861133

Headquarters

Allied Vision Technologies GmbH

Taschenweg 2a

07646 Stadtroda

Germany

Tel: +49 (0)36428 677-0

Fax: +49 (0)36428 677-28

President/CEO: Frank Grube

Registration Office: AG Jena HRB 208962

Contents

Document at a glance	2
Applied standards	2
Features availability	2
What else do you need?	3
Contact us	4
Document history and conventions	9
Document history	10
Conventions used in this manual	10
Styles	10
Abbreviations	11
Features term use	11
Symbols and notes	11
Features order	12
Selectors	12
Features description scheme	12
Legislation	13
Trademarks	13
Warranty	13
Disclaimer	13
USB3 Vision features description	14
AcquisitionControl	15
AcquisitionAbort	15
AcquisitionFrameCount	15
AcquisitionFrameRate	16
AcquisitionFrameRateMode	16
AcquisitionMode	16
AcquisitionStart	17
AcquisitionStatus[AcquisitionStatusSelector]	17
AcquisitionStatusSelector	17
AcquisitionStop	18
ExposureMode	18
ExposureTime	18
TriggerActivation[TriggerSelector]	18
TriggerDelay[TriggerSelector]	19
TriggerMode[TriggerSelector]	19
TriggerSelector	19
TriggerSoftware[TriggerSelector]	19
TriggerSource[TriggerSelector]	19

AnalogControl	20
BlackLevel[BlackLevelSelector]	20
BlackLevelSelector	20
Gain[GainSelector]	20
GainSelector	20
Gamma	20
BufferHandlingControl	21
MaxDriverBuffersCount	21
StreamAnnounceBufferMinimum	21
StreamAnnouncedBufferCount	21
StreamBufferHandlingMode	21
CorrectionControl	22
Reading the correction settings	23
Reading the data size	23
Deleting the correction settings	24
Writing the correction settings	24
CorrectionMode[CorrectionSelector][CorrectionSetSelector]	25
CorrectionSelector	25
CorrectionSetSelector	25
CorrectionSetDefault[CorrectionSelector]	25
CorrectionInfo (subcategory)	26
CorrectionDataSize[CorrectionSelector][CorrectionSetSelector]	26
CorrectionDescription[CorrectionSelector]	26
CorrectionEntryType[CorrectionSelector]	26
DeviceControl	27
DeviceFamilyName	27
DeviceFirmwareID[DeviceFirmwareIDSelector]	27
DeviceFirmwareIDSelector	27
DeviceFirmwareVersion[DeviceFirmwareVersionSelector]	27
DeviceFirmwareVersionSelector	28
DeviceGenCPVersionMajor	28
DeviceGenCPVersionMinor	28
DeviceIndicatorMode	28
DeviceLinkThroughputLimit	28
DeviceLinkThroughputLimitMode	29
DeviceManufacturerInfo	29
DeviceModelName	29
DeviceReset	29
DeviceSFNCVersionMajor	29
DeviceSFNCVersionMinor	29
DeviceSFNCVersionSubMinor	29
DeviceScanType	30
DeviceSerialNumber	30
DeviceTemperature	30
DeviceTemperatureSelector	30
DeviceUserID	30

DeviceVendorName	30
DeviceVersion	30
Timestamp	31
DigitalIOControl	32
Controlling cameras with an external trigger	32
Cameras as master and slave	33
InputDebounceMode[LineSelector]	34
InputDebounceTime[LineSelector]	34
LineInverter[LineSelector]	34
LineMode[LineSelector]	34
LineSelector	35
LineSource[LineSelector]	35
LineStatus[LineSelector]	36
OutputDurationMode[LineSelector]	36
OutputDurationTime[LineSelector]	36
UserOutputSelector	36
UserOutputValue[UserOutputSelector]	37
FileAccessControl	38
Reading a file	39
Deleting a file	40
Writing a file	41
FileAccessBuffer	42
FileAccessLength[FileSelector][FileOperationSelector]	42
FileAccessOffset[FileSelector][FileOperationSelector]	42
FileOpenMode[FileSelector]	42
FileOperationExecute[FileSelector][FileOperationSelector]	42
FileOperationResult[FileSelector][FileOperationSelector]	43
FileOperationSelector[FileSelector]	43
FileOperationStatus	43
FileProcessStatus[FileSelector][FileOperationSelector]	44
FileSelector	44
FileSize[FileSelector]	44
FileStatus	44
ImageFormatControl	45
Height	45
HeightMax	45
OffsetX	45
OffsetY	45
PixelFormat	46
PixelSize	46
ReverseX	46
SensorHeight	47
SensorWidth	47
Width	47
WidthMax	47

StreamInformation	48
StreamID	48
StreamIsGrabbing	48
StreamType	48
TestControl	48
TestPendingAck	48
TransportLayerControl	49
PayloadSize	49
UserSetControl	49
UserSetDefault	49
UserSetLoad[UserSetSelector]	49
UserSetSave[UserSetSelector]	49
UserSetSelector	50
Index	51

Document history and conventions



This chapter includes:

Document history	10
Conventions used in this manual.....	10

Document history

Version	Date	Remarks
V.1.0.0	06 November 2015	New document release status

Conventions used in this manual

To give this manual an easily understood layout and to emphasize important information, the following typographical styles and symbols are used:

Styles

Style	Function	Example
Emphasis	Programs, or highlighting important things	Emphasis
Publication title	Publication titles	<i>Title</i>
Cross reference	Links inside this document	<u>Link</u>
Web reference	Links to web pages	Link
Output	Outputs from software GUI	Output
Input	Input commands, modes	Input
Feature	Feature names	Feature
Non-SFNC feature	Adapted official features or proprietary Allied Vision features.	proprietary



SFNC compliant features

Features fully compliant with the official standard are not additionally marked.

Adapted SFNC features are marked as **modified SFNC feature**.

Proprietary features are marked as **proprietary**.

For applied standards, see [Applied standards](#) on page 2.

Abbreviations

Abbreviation	Meaning
Bps	Bytes per second
dB	Decibel
DN	Digital number
GenTL SFNC	GenICam Transport Layer Standard Features Naming Convention
Hz	Hertz
μs	Microseconds
ms	Milliseconds
ns	Nanoseconds
R/W	Read and write feature
Rc	Read only feature that is constant
R	Read only feature that may change
s	Seconds

Features term use

For easier reading, USB3 Vision features are just named features in this document.

Symbols and notes



Notice

Avoid material damage



Practical Tip



Further information available online

Features order

Features categories and features are listed in alphabetical order.

Selectors

Some features have multiple instances. For these features, `Selector` features define which instance of the feature is accessed.

Example: the `LineInverter` feature, used to invert internal signal polarity, can be applied to all input and output lines of the camera. The line is selected by the `LineSelector` feature.

The headline for the feature description is `LineInverter [LineSelector]`, according to the C language convention for arrays: a pair of brackets follows the feature name, like in `SelectedFeature [Selector]`.

Features description scheme

Features are described according to the formatting scheme:

Category name

Subcategory

Feature[Selector]

[Type] Access mode/s **Deviation from SFNC**

Range [...]Unit: ...Default: Factory settings

Short feature description, including individual characteristics.

Note: Helpful information.

Value0	Description
Value1	Description
Value2	Description

Legislation

Trademarks

Unless stated otherwise, all trademarks appearing in this document of Allied Vision Technologies are brands protected by law.

Warranty

The information provided by Allied Vision Technologies is supplied without any guarantees or warranty whatsoever, be it specific or implicit. Also, excluded are all implicit warranties concerning the negotiability, the suitability for specific applications or the non-breaking of laws and patents. Even if we assume that the information supplied to us is accurate, errors and inaccuracy may still occur.

Disclaimer

For the latest version of this document, please visit our website. All trademarks are acknowledged as property of their respective owners. Copyright © 2015 Allied Vision Technologies.

Allied Vision Technologies GmbH 11.2015

All rights reserved.

President/CEO: Frank Grube

Tax ID: DE 184383113

Headquarters

Taschenweg 2a

D-07646 Stadtroda, Germany

Tel: +49 (0)36428 677-0

Fax: +49 (0)36428 677-28

Email: info@alliedvision.com

USB3 Vision features description



This chapter includes:

AcquisitionControl	15
AnalogControl	20
BufferHandlingControl	21
CorrectionControl	22
DeviceControl.....	27
DigitalIOControl.....	32
FileAccessControl	38
ImageFormatControl	45
StreamInformation.....	48
TestControl	48
TransportLayerControl	49
UserSetControl	49

**Different features for different camera models**

This is the master document for all Allied Vision USB3 Vision camera models. Some features are not available for all camera models.

To see particular characteristics see the corresponding technical manual, Chapter *Camera features available in Vimba*.

**Selectors do not change feature settings**

A selector determines a feature to be accessed. No feature settings are changed when a selector is set.

**Camera state after reboot**

After reboot the camera comes up in UserSetDefault. At delivery this feature is set to factory settings. To change the state of the camera after reboot, you can define UserSets.

AcquisitionControl

AcquisitionAbort

[Command] (R)/W

Aborts acquisition immediately. This ends the capture without completing the current frame or waiting for a trigger.

Note: If no acquisition is in progress, the command is ignored.

Deviation from the standard: A started exposure will be aborted immediately. If sensor readout is already active, the respective frame will be completed (behavior like AcquisitionStop).

AcquisitionFrameCount

[Integer] R/W

Unit: Frames

Controls the number of frames to acquire in

AcquisitionMode = **MultiFrame**.

AcquisitionFrameRate

[Float] R/W
Unit: Hz

Controls the acquisition rate at which the frames are captured.

Note: TriggerMode [TriggerSelector] for the frame trigger must be set to **OFF**.

Before you can change the value of AcquisitionFrameRate, you must set AcquisitionFrameRateMode to **Basic**.

If AcquisitionFrameRateMode is set to **OFF**, the value shown in AcquisitionFrameRate does not influence the current framerate.

AcquisitionFrameRateMode

[Enumeration] R/W **proprietary**

Determines the behavior of AcquisitionFrameRate.

Note: If the selected ExposureTime is shorter than the maximum allowed by AcquisitionFrameRate, the maximum allowed value is used.

The maximum ExposureTime is also limited by factors such as readout time, camera internal processing, the interface, and DeviceLinkThroughput-Limit.

Off	<u>AcquisitionFrameRate</u> turns frame rate to read only.
Basic	<u>ExposureTime</u> has precedence over <u>AcquisitionFrameRate</u> ; if <u>ExposureTime</u> gets longer than the inverse of <u>AcquisitionFrameRate</u> , this will be allowed.

AcquisitionMode

[Enumeration] R/W

Sets the acquisition mode of the device. It defines mainly the number of frames to capture during an acquisition and the way the acquisition stops.

SingleFrame	One frame is captured.
MultiFrame	Number of frames specified by <u>AcquisitionFrameCount</u> is captured.
Continuous	Frames are captured continuously until stopped with the <u>AcquisitionStop</u> or <u>AcquisitionAbort</u> command.

AcquisitionStart

[Command] (R)/W

Starts the acquisition of the device. The number of frames captured is specified by AcquisitionMode.

Note: In contrast to the SFNC, we normally perform a feature value validation when setting registers; this means before starting acquisition, values do not have to be validated. All features are consistent, you can call AcquisitionStart.

AcquisitionStatus[AcquisitionStatusSelector]

[Boolean] R

Reads the state of the internal acquisition signal selected using AcquisitionStatusSelector.

Note: Vimba Viewer polls the `AcquisitionStatus` every 500 ms. The display in the Vimba Viewer may toggle between **False** and **True**, depending on the selected signal and the current camera state.

False	Selected acquisition signal is not active.
True	Selected acquisition signal is active.

AcquisitionStatusSelector

[Enumeration] R/W

Selects the internal acquisition signal to read using image/payload data over the USB interface.

AcquisitionActive	Device is currently acquiring one or many frames.
AcquisitionTransfer	Device is currently transferring an acquisition of one or many frames.
AcquisitionTriggerWait	Device is currently waiting for an <code>AcquisitionStart</code> trigger.
ExposureActive	Device is currently exposing a frame.
FrameActive	Device is currently capturing a frame.
FrameTriggerWait	Device is currently waiting for a <code>FrameStart</code> trigger.

AcquisitionStop

[Command] (R)/W

Stops acquisition of the device at the end of the current frame. It is mainly used when AcquisitionMode is **Continuous**, but it can be used in any AcquisitionMode.

Note: If the camera is waiting for a trigger, the pending frame will be canceled. If no acquisition is in progress, the command is ignored.

Disabling the running acquisition means that an already running exposure will be finished and all images in the pipeline will be transferred.

ExposureMode

[Enumeration] R/W

Controls the operation mode of the exposure (or shutter).

Timed	Timed exposure. Exposure duration time is set using <u>ExposureTime</u> . Exposure starts with FrameStart .
TriggerWidth	Timed exposure. Exposure duration time is set using width of the current frame or line trigger signal(s) pulse.

Note: If the frame or line TriggerActivation[TriggerSelector] is **RisingEdge** or **LevelHigh**, the camera exposes as long as the trigger is high. If TriggerActivation[TriggerSelector] is **FallingEdge** or **LevelLow**, the camera exposes as long as the trigger is low.

ExposureTime

[Float] R/W

Unit: μ s

Controls the duration of the photosensitive cells assembling.

TriggerActivation[TriggerSelector]

[Enumeration] R/W

Specifies the activation mode of the trigger.

AnyEdge	Trigger is considered valid on the falling or rising edge of the source signal.
FallingEdge	Trigger is considered valid on the falling edge of the source signal.
LevelHigh	Trigger is considered valid when level is high.
LevelLow	Trigger is considered valid when level is low.
RisingEdge	Trigger is considered valid on the rising edge of the source signal.

TriggerDelay[TriggerSelector]

[Float] R/W

Unit: μ s

Specifies the delay to apply after the trigger reception before activating it.

TriggerMode[TriggerSelector]

[Enumeration] R/W

Switches the selected trigger to **On/Off**.

Off	Disables the selected trigger
On	Enables the selected trigger

TriggerSelector

[Enumeration] R/W

Selects the trigger to configure.

AcquisitionStart	Selects AcquisitionStart trigger.
FrameStart	Selects FrameStart trigger.

TriggerSoftware[TriggerSelector]

[Command] (R)/W

Generates an internal trigger. TriggerSource [TriggerSelector] must be set to **Software**.

TriggerSource[TriggerSelector]

[Enumeration] R/W

Specifies the internal signal or physical input line to use as trigger source. The selected trigger must have its TriggerMode [TriggerSelector] set to **On**.

Software	Specifies that the trigger source will be generated by software using the <u>TriggerSoftware [TriggerSelector]</u> command.
Line0 to Line3	Specifies which physical line (or pin) and associated I/O control block to use as external source for the trigger signal.

AnalogControl

BlackLevel[BlackLevelSelector]

[Float] R/W
Unit: DN

Controls the analog black level as DC offset applied to the video signal.

BlackLevelSelector

[Enumeration] R/W

Selects that the BlackLevel [BlackLevelSelector] is controlled for **All** channels.

All BlackLevel will be applied to all channels or taps.

Gain[GainSelector]

[Float] R/W
Unit: dB

Controls the selected gain as an amplification factor applied to the video signal.

GainSelector

[Enumeration] R/W

Selects which gain is controlled by the various Gain features.

All Gain will be applied to all channels or taps.

Gamma

[Float] R/W
Unit: dB

Controls the gamma correction of pixel intensity.

BufferHandlingControl



Features availability for third-party software

- Features in this category are usually not available in the camera features of third-party software that is not based on **Vimba**.
- Features marked as proprietary in this category are not available with any other than the Allied Vision transport layer.

MaxDriverBuffersCount

[Integer] R/W **proprietary**

Controls the maximum number of driver buffers used by the acquisition engine.

StreamAnnounceBufferMinimum

[Integer] Rc

Default: 0

Displays the minimal number of buffers to announce to enable the selected StreamBufferHandlingMode.

Corresponds to the STREAM_INFO_BUF_ANNOUNCE_MIN command of DSGetInfo function.

Note: For Vimba, the value is 0. Vimba buffers can be announced during streaming.

For third-party software, the value is 1, buffers must be announced before starting the streaming.

StreamAnnouncedBufferCount

[Integer] R

Displays the number of announced buffers on this stream (known to the transport layer).

Corresponds to the STREAM_INFO_NUM_ANNOUNCED command of DSGetInfo function.

StreamBufferHandlingMode

[Enumeration] R/(W)

Controls the available acquisition modes of this stream.

Note: Use **Default** value to acquire images with the mean processing time being shorter than acquisition time. (Later GenTL SFNC versions have replaced **Default** by **OldestFirst**.)

No buffer is discarded or overwritten in the output buffer queue. Filled buffers are delivered in the order they were acquired.

Default	In the buffer queue between camera and host, if the number of images exceeds the number of empty buffers, the camera drops new data until empty buffers are available again.
----------------	--

CorrectionControl

This is an Allied Vision **proprietary** category. The `CorrectionControl` feature tree enables access to correction data and settings saved in the camera.

To read from or write to the camera, `FileAccessControl` is used. The SFNC describes most included features in detail.

The following flow charts provide an example how to organize file operations. In the example, UserSet data are to be written for the first time. Factory settings are used as base information to be edited.

- [Reading the correction settings](#) on page 23
- [Reading the data size](#) on page 23
- [Deleting the correction settings](#) on page 24
- [Writing the correction settings](#) on page 24



Read-Delete-Write

Before writing new data:

- Read previous data to the PC and store it for recovery.
- Delete data from RAM.



Keep factory correction settings untouched

On delivery, factory data for `DefectPixelCorrection` and `FixedPatternNoiseCorrection` are saved as **Factory** settings.

Before editing DefectPixelCorrection, store the factory settings. This way, in case of an error, you can reset correction settings to factory settings.



Be extremely careful when writing correction settings

When you have replaced correction settings you cannot return to the previous settings. Read the following description carefully.

Reading the correction settings

The following example shows correction settings being read from the camera to the host PC for the Defect pixel correction (DPC).

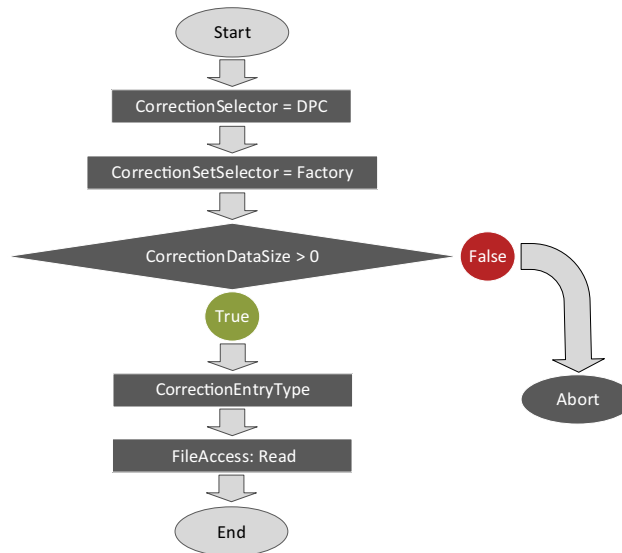


Figure 1: CorrectionControl -> Reading factory settings from the camera

Reading the data size

The following example shows the `CorrectionDataSizeMaxLimit` for the DPC being read from the camera. The value is camera specific.

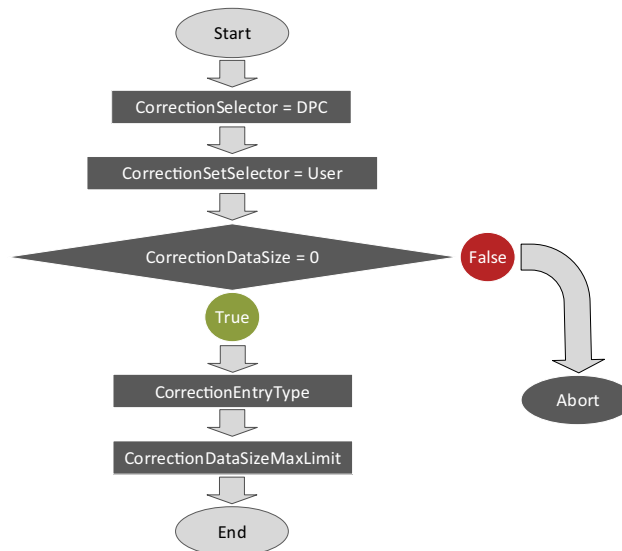


Figure 2: CorrectionControl -> Reading the CorrectionDataSizeMaxLimit

Deleting the correction settings

The following example shows the correction data for DPC being deleted to prepare writing new data to the camera.

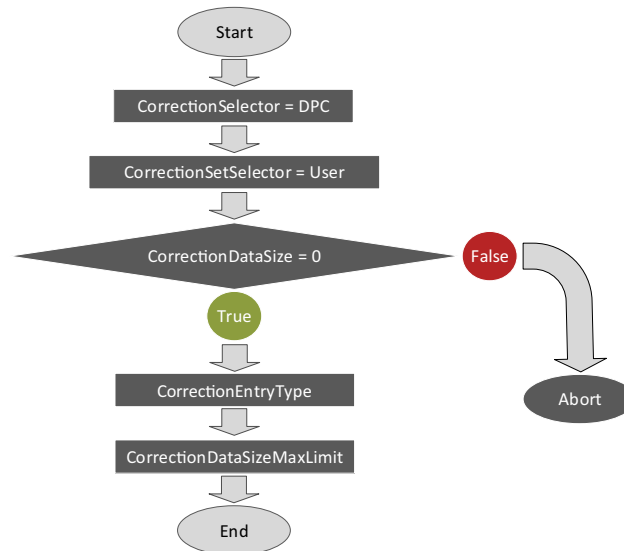


Figure 3: CorrectionControl ->Deleting the correction settings

Writing the correction settings

The following example shows the correction data for DPC being written to the camera.

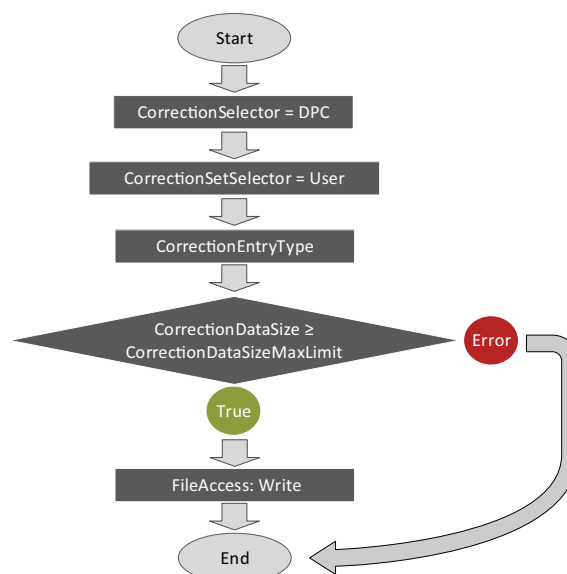


Figure 4: CorrectionControl -> Writing the correction settings

CorrectionMode[CorrectionSelector][CorrectionSetSelector]

[Enumeration] **proprietary**

Defines if the selected correction is active.

Note: This feature is disabled if no correction data is found in the camera memory.

Off	Selected correction is inactive.
On	Selected correction is active.

CorrectionSelector

[Enumeration] **proprietary**

Selects the correction type.

DefectPixelCorrection	Selects DefectPixelCorrection.
FixedPatternNoiseCorrection	Selects FixedPatternNoiseCorrection.

CorrectionSetSelector

[Enumeration] **proprietary**

Default: Factory

Defines which correction settings are used.

Factory	Selects the correction set stored by the manufacturer.
User	Selects the correction set created by the user.

CorrectionSetDefault[CorrectionSelector]

[Enumeration] **proprietary**

Default: Factory

Defines the default CorrectionSet used when the device is reset.

Note: This default setting is independent from the UserSetDefault feature.

Factory	Selects the correction set stored by the manufacturer.
User	Selects the correction set created by the user.

CorrectionInfo (subcategory)

This Allied Vision **proprietary** subcategory defines information about the selected correction type.

CorrectionDataSize[CorrectionSelector][CorrectionSetSelector]

[Integer] R **proprietary**

Unit: [Byte]

Displays the current size of the correction data that is stored inside the camera.

CorrectionDescription[CorrectionSelector]

[String] R **proprietary**

Displays information about the selected correction.

CorrectionEntryType[CorrectionSelector]

[Enumeration] R **proprietary**

Displays the correction type variant used inside the camera.

2	CorrectionEntryType2 is active.
----------	---------------------------------

DeviceControl

DeviceFamilyName

[String] Rc

Identifies the product family of the device.

DeviceFirmwareID[DeviceFirmwareIDSelector]

[String] Rc **proprietary**

Displays the ID of the camera, depending on the settings of the DeviceFirmwareIDSelector.

DeviceFirmwareIDSelector

[Enumeration] Rc **proprietary**

Selects the ID given back by the DeviceFirmwareID[DeviceFirmwareIDSelector].

Current	Displays the active firmware ID.
Supported	Displays all allowed firmware IDs.

DeviceFirmwareVersion[DeviceFirmwareVersionSelector]

[String] Rc

Displays the version of the camera firmware depending on the settings of the DeviceFirmwareVersionSelector.



Checking consistency of a firmware update

A firmware update is executed in multiple files. On the camera, with each file received, all the firmware files are checked for consistency.

As long as not all the files have a consistent version number, the `DeviceFirmwareVersion` outputs 0.0.0. When all the files have been transferred successfully, the firmware version is displayed.

DeviceFirmwareVersionSelector

[Enumeration] R **proprietary**

Selects the version given back by the DeviceFirmwareVersion[DeviceFirmwareVersionSelector].

Note: To avoid the following, apply a firmware update according to the instructions only. In an **inconsistent state of the programmed firmware**, after the next restart of the camera, the camera falls back into **Bootloader Mode**.

In this case, please contact support@alliedvision.com.

Current	Displays the active firmware version.
Programmed	Displays the firmware version after the next restart of the camera.

DeviceGenCPVersionMajor

[Integer] Rc

Displays the major version of the GenCP protocol supported by the device.

DeviceGenCPVersionMinor

[Integer] Rc

Displays the minor version of the GenCP protocol supported by the device.

DeviceIndicatorMode

[Enumeration] R/W

Controls the behavior of the indicators (such as LEDs) showing the status of the device.

Active	Device's indicators are active showing their respective status.
ErrorStatus	Device's indicators are inactive unless an error occurs.
Inactive	Device's indicators are inactive (off).

DeviceLinkThroughputLimit

[Integer] R/(W)

Unit: Bps

Limits the maximum bandwidth of the data that will be streamed out by the device on the selected link. In order to control the peak bandwidth, delays will be uniformly inserted between transport layer packets.

Note: Any transport layer specific bandwidth control should be kept in sync with this control as much as possible.

DeviceLinkThroughputLimitMode

[Enumeration] R/W

Controls if DeviceLinkThroughputLimit is active.

When disabled, lower level transport layer specific features are expected to control the throughput. **When enabled**, DeviceLinkThroughputLimit controls the overall throughput.

Off	Disables DeviceLinkThroughputLimit.
On	Enables DeviceLinkThroughputLimit.

DeviceManufacturerInfo

[String] Rc

Displays manufacturer information about the device.

DeviceModelName

[String] Rc

Displays the model of the device.

DeviceReset

[Command] W

Resets the device to its power up state.

Note: After reset, the device must be rediscovered.

DeviceSFNCVersionMajor

[Integer] Rc

Displays the major version of the Standard Features Naming Convention that was used to create the device's GenICam XML.

DeviceSFNCVersionMinor

[Integer] Rc

Displays the minor version of the Standard Features Naming Convention that was used to create the device's GenICam XML.

DeviceSFNCVersionSubMinor

[Integer] Rc

Displays the sub minor version of the Standard Features Naming Convention that was used to create the device's GenICam XML.

DeviceScanType

[Enumeration] R

Displays the scan type of the sensor of the device.

Areascan	Using the sensor in area mode (not in line mode).
-----------------	---

DeviceSerialNumber

[String] Rc

Identifies the device's serial number. This string is a unique identifier of the device.

DeviceTemperature

[Float] R

Unit: °C

Displays the device temperature measured at the location selected by DeviceTemperatureSelector.

DeviceTemperatureSelector

[Enumeration] R/W

Selects the location within the device where temperature is measured.

Mainboard	Selects measuring the mainboard temperature.
------------------	--

DeviceUserID

[String] R/W

Range [max 64 characters]

Controls a user-programmable device identifier.

DeviceVendorName

[String] Rc

Identifies the name of the device manufacturer.

DeviceVersion

[String] Rc

Range [max 64 Bytes]

Displays the version of the device as a string, consisting of custom build number, major version, minor version, and patch version of the camera firmware, divided by periods.

Timestamp

[Integer] R

Unit: ns

Displays the current value of the device timestamp counter.

DigitalIOControl

The DigitalIOControl feature tree controls the input of external signals to the camera and the output of camera signals to external devices. The following flow charts show I/O control settings for the typical use cases:

- [Controlling cameras with an external trigger](#)
- [Cameras as master and slave](#)

Controlling cameras with an external trigger

In the example, an external signal is used as FrameStart trigger. I/Os need no [LineMode \[LineSelector\]](#) settings. Set GPIOs to input or output as desired.

Optional settings

[TriggerActivation \[TriggerSelector\]](#) selects, for example, the rising edge of the signal as trigger.

[LineInverter \[LineSelector\]](#) enables to set a common logic level as active signal for all in and outputs.

[InputDebounceMode \[LineSelector\]](#) enables to filter the accepted signal by its length defined by [InputDebounceTime \[LineSelector\]](#).

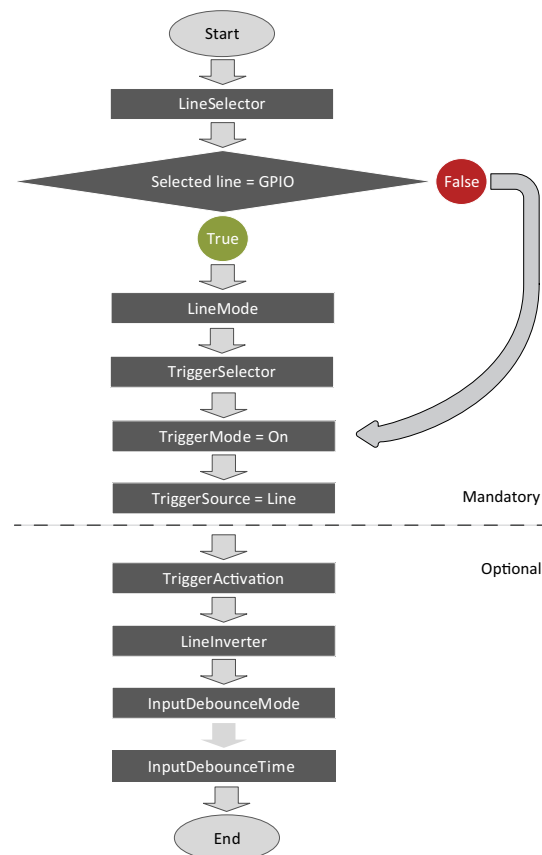


Figure 5: DigitalIOControl -> Settings to control the camera with an external signal

Cameras as master and slave

For simultaneous exposure, instead of signaling cameras individually, cameras can be signaled as daisy chain with master and slave cameras.

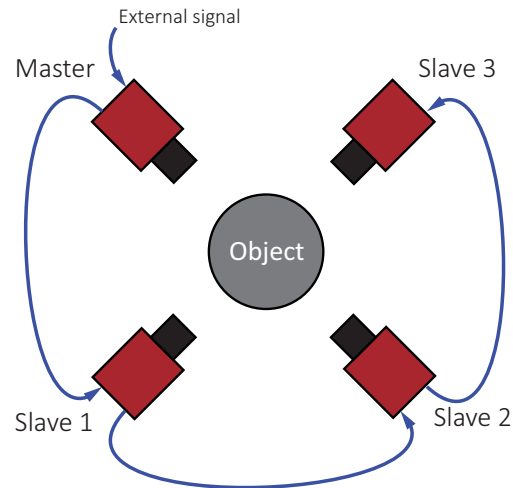


Figure 6: DigitalIOControl -> Master and slave cameras

Master camera settings

In the example, when the master camera is exposing it signals the slave cameras.

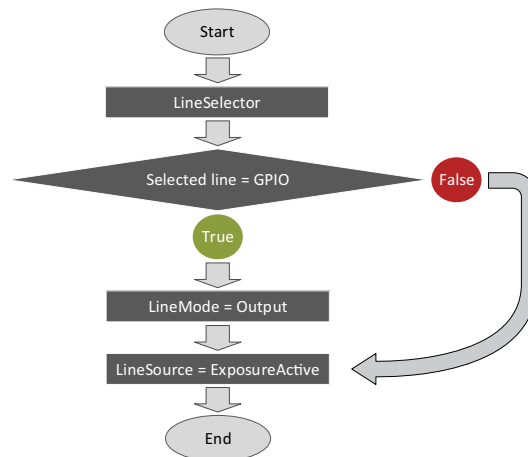


Figure 7: DigitalIOControl -> Settings to control the camera with an external signal

Slave camera settings

The slave cameras are controlled as shown in [Controlling cameras with an external trigger](#) on page 32.

InputDebounceMode[LineSelector]

[Boolean] R/W **proprietary**

Switches the debounce function for a particular input line to **On/OFF**. If a line is configured as output (dedicated or selectable), this feature has no effect.

OFF	Signals of any length are accepted/valid for the I/Os.
On	Only signals are accepted for the I/Os that have a length defined in <u>InputDebounceTime[LineSelector]</u> .

InputDebounceTime[LineSelector]

[Float]R/W **proprietary**

Unit: μ s

Sets the minimum time for a glitched input signal to be definite before it is accepted.

Note: If a line is configured as output (dedicated or selectable), this feature has no effect.

LineInverter[LineSelector]

[Boolean] R/W

Controls the inversion of the signal of the selected input or output line.

False	Line signal is not inverted.
True	Line signal is inverted.

LineMode[LineSelector]

[Enumeration] R/W

Controls if the physical Line is used to input or output a signal.

Note: When a line supports input and output mode, the default state is **Input** to avoid damage to camera and peripheral electronics.

Input	The selected physical line is used to input an electrical signal.
Output	The selected physical line is used to output an electrical signal.

LineSelector

[Enumeration] R/W

Selects the physical line (or pin) of the external device connector or which virtual line of the transport layer to configure.

Note: When a line is selected, all other line features will be applied to the line's associated I/O control block and will condition the resulting input or output signal.

Line0	Selects physical Line0 and the associated I/O control block.
Line1	Selects physical Line1 and the associated I/O control block.
Line2	Selects physical Line2 and the associated I/O control block.
Line3	Selects physical Line3 and the associated I/O control block.

LineSource[LineSelector]

[Enumeration] R/W **modified SFNC feature**

Proprietary **values** are formatted **red**.

Selects which internal acquisition or I/O source signal to output on the selected line.

Note: LineMode [LineSelector] must be set to **Output**.

The **UserOutput** can be used to loop a signal from the host through the camera to another device.

Off	Line output is disabled (Tri-State).
AcquisitionActive	Device is currently acquiring one or many frames.
AcquisitionTriggerWait	Device is currently waiting for an AcquisitionStart trigger.
ExposureActive	Device is currently exposing a frame.
FrameActive	Device is currently exposing a frame or reading out from the sensor.
FrameTriggerWait	Device is currently waiting for a FrameStart trigger.
ReadoutActive	Device is currently reading out from the sensor.
Stream0TransferActive	Image data is transferred over the USB interface. For this transfer the logical channel Stream0 is used. The SFNC defines the ability of multiple streams using multiple channels.
UserOutput0	Bit state of UserOutput0, defined by its current <u>UserOutputValue [UserOutputSelector]</u>
UserOutput1	Bit state of UserOutput1, defined by its current <u>UserOutputValue [UserOutputSelector]</u>
UserOutput2	Bit state of UserOutput2, defined by its current <u>UserOutputValue [UserOutputSelector]</u>
UserOutput3	Bit state of UserOutput3, defined by its current <u>UserOutputValue [UserOutputSelector]</u>

LineStatus[LineSelector]

[Boolean] R

Returns the current status of the selected input or output line.

False	Level of the line signal is low.
True	Level of the line signal is high.

OutputDurationMode[LineSelector]

[Enumeration] R/W **proprietary**

Switches OutputDurationTime [LineSelector] for a particular output line to **On/Off**.

Note: If a line is configured as input (dedicated or selectable), this feature has no effect.

Off	OutputDurationTime is disabled.
On	OutputDurationTime is enabled.

OutputDurationTime[LineSelector]

[Float] R/W **proprietary**

Unit: μ s

Specifies the minimum time a signal is provided at the output line. This feature may be used for internal signals that are active for a very short time frame (such as a single clock cycle).

Note: If a line is configured as input (dedicated or selectable), this feature has no effect.

UserOutputSelector

[Enumeration] R/W

Selects which bit of the UserOutput register will be set by UserOutputValue [UserOutputSelector].

UserOutput0	Selects the bit 0 of the UserOutput register.
UserOutput1	Selects the bit 1 of the UserOutput register.
UserOutput2	Selects the bit 2 of the UserOutput register.
UserOutput3	Selects the bit 3 of the UserOutput register.

UserOutputValue[UserOutputSelector]

[Boolean] R/W

Controls the value of the bit selected by UserOutputSelector.

Note: If a line is configured as input (dedicated or selectable), writing this feature has no effect.

This feature has an effect only on features set up with LineSource[LineSelector]= **UserOutputX**.

False	Feature is disabled.
True	Feature is enabled.

FileAccessControl

The `FileAccessControl` feature tree enables access to data and settings saved in the camera. The SFNC describes all included features in detail. The following flow charts show general examples how to organize file operations.

- [Reading a file](#) on page 39
- [Deleting a file](#) on page 40
- [Writing a file](#) on page 41



Read-Delete-Write

Before writing new data:

- Read previous data to the PC and store it for recovery.
- Delete data from RAM.



Keep factory correction settings untouched

On delivery, factory data for `DefectPixelCorrection` and `FixedPatternNoiseCorrection` are saved as **Factory** settings.

Before editing DefectPixelCorrection, store the factory settings. This way, in case of an error, you can reset correction settings to factory settings.



Use Vimba Viewer to ease software coding for camera controls

Features in this category are shown in **Vimba Viewer** for completeness, not for using them.

Therefore, we recommend to execute `FileAccessControl` using tools, such as the Firmware Updater.

To get an overview, see coding examples in **Vimba**.



The camera closes the file after timeout

Setting `FileOperationSelector[FileSelector] = Open` is followed by a 5 s timeout. The timeout is restarted with each `FileOperationExecute[FileSelector][FileOperationSelector]`. After timeout, the camera automatically returns to `FileOperationSelector = Closed`.

Reading a file

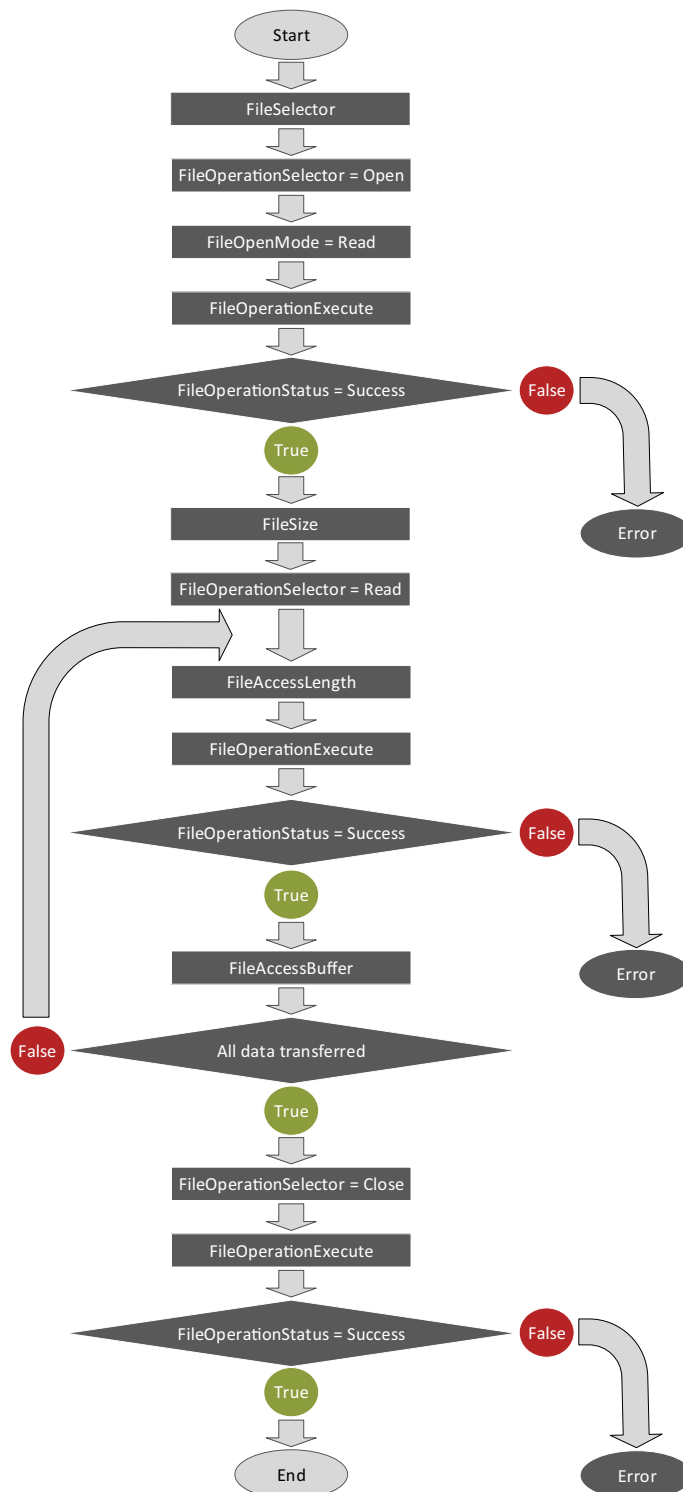


Figure 8: FileAccess -> Reading a file

Deleting a file

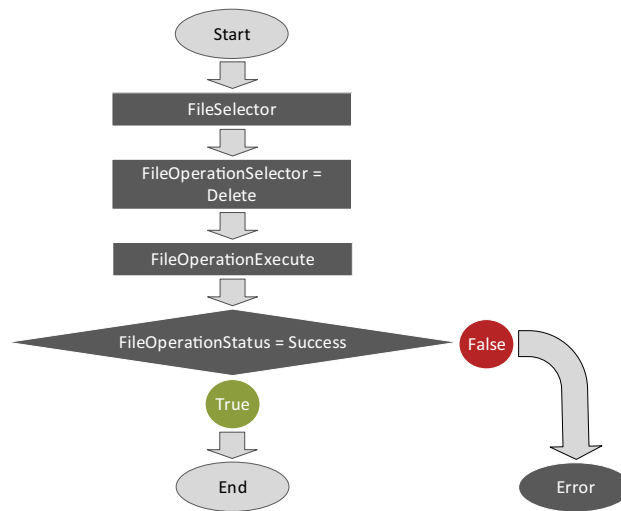


Figure 9: FileAccess -> Deleting a file

Writing a file

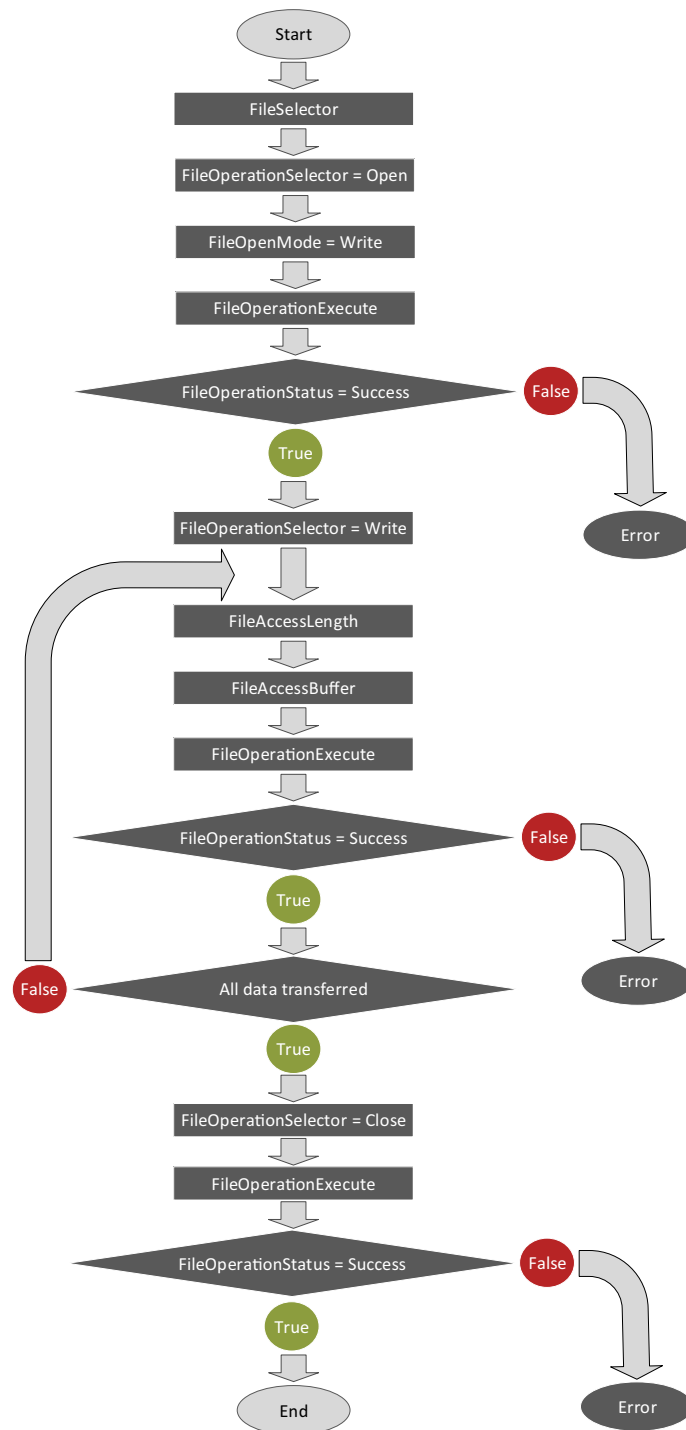


Figure 10: FileAccess -> Writing a file

FileAccessBuffer

[DataRaw] R/(W)

Controls the intermediate access buffer for the exchange of data between the device file storage and the application.

Note: For write operation, `FileAccessBuffer` must be written with the target data first.

For read operation, data can be read from the `FileAccessBuffer` after the read operation has been executed.

`FileOperationExecute[FileSelector][FileOperationSelector]` controls the effective data transfer.

Click here to open	Input field to enter data
---------------------------	---------------------------

FileAccessLength[FileSelector][FileOperationSelector]

[Integer] R/W

Unit: bytes

Controls the number of bytes transferred between the device file storage and the `FileAccessBuffer`.

Note: This feature is available only when `FileOperationSelector[FileSelector]` is set to **Read** or **Write**.

FileAccessOffset[FileSelector][FileOperationSelector]

[Integer] R/(W)

Unit: bytes

Controls the offset of the mapping between the device file storage and the `FileAccessBuffer`.

FileOpenMode[FileSelector]

[Enumeration] R/W

Selects the access mode in which a file is opened in the device.

Read	Value to select read-only open mode.
Write	Value to select write-only open mode.

FileOperationExecute[FileSelector][FileOperationSelector]

[Command] (R)/W

Executes the operation selected by `FileOperationSelector[FileSelector]` for the selected file.

FileOperationResult[FileSelector][FileOperationSelector]

[Integer] R

Displays the file operation result. For read or write operations, the number of successfully read/written bytes is returned.

FileOperationSelector[FileSelector]

[Enumeration] R/W

Selects the target operation for the selected file in the device. This operation is executed when FileOperationExecute [FileSelector] [FileOperationSelector] is called.

Close	Closes the file selected by <u>FileSelector</u> in the device.
Delete	Deletes the file selected by <u>FileSelector</u> in the device. Note that deleting a device file should not remove the associated <u>FileSelector</u> entry to allow future operation on this file.
Open	Opens the file selected by <u>FileSelector</u> in the device. The access mode in which the file is opened is selected by <u>FileOpenMode [FileSelector]</u> .
Read	Reads <u>FileAccessLength [FileSelector] [FileOperationSelector]</u> bytes from the device storage at the file relative offset <u>FileAccessOffset [FileSelector] [FileOperationSelector]</u> into <u>FileAccessBuffer</u> .
Write	Writes <u>FileAccessLength [FileSelector] [FileOperationSelector]</u> bytes taken from the <u>FileAccessBuffer</u> into the device storage at the file relative offset <u>FileAccessOffset [FileSelector] [FileOperationSelector]</u> .

FileOperationStatus

[Enumeration] R

Displays the file operation execution status.

Success	File operation was successful.
----------------	--------------------------------

FileProcessStatus[FileSelector][FileOperationSelector]

[Enumeration] R **proprietary**

Default: None

Displays the status of files processing during a file access to the host, saving time and data traffic.

None	No action by the host is required, either because no file is being processed or because file processing is executed properly.
UpdateNotRequired	The resident file version is current. Therefore, no update is needed.

FileSelector

[Enumeration] R/W

Selects the target file in the device.

Note: UserData are stored in the camera's UserData memory.

Firmware	Selects firmware.
DefectPixelCorrection	Selects Defect pixel correction.
FixedPatternNoiseCorrection	Selects Fixed pattern noise correction.
UserData	Selects UserData.

FileSize[FileSelector]

[Integer] R

Unit: bytes

Displays the size of the selected file in bytes.

FileStatus

[Enumeration] R **proprietary**

Represents the status of the selected file.

Open	Selected file is open.
Closed	Selected file is closed.

ImageFormatControl

Height

[Integer] R/W
Unit: Pixels

Controls the height of the image provided by the device used for Region of interest (ROI).

Note: This dimension is calculated after vertical binning, decimation or any other function changing the vertical dimension of the image.

For other ROI settings concerning image height, see [HeightMax](#) and [OffsetY](#).

HeightMax

[Integer] R
Unit: Pixels

Displays the maximum height of the image.

Note: This dimension is calculated after vertical binning, decimation or any other function changing the vertical dimension of the image.

For other ROI settings concerning image height, see [Height](#) and [OffsetY](#).

OffsetX

[Integer] R/W
Unit: Pixels

Controls the horizontal offset from the origin to the Region of interest (ROI).

OffsetY

[Integer] R/W
Unit: Pixels

Controls the vertical offset from the origin to the Region of interest (ROI).

PixelFormat

[Enumeration] R/(W)

Controls the format of the pixels provided by the device.



Download PFNC standard

For GenICam Pixel Format Naming Convention (PFNC) see:

<http://www.visiononline.org>

Mono8	Mono8 unpacked according to AIA Pixel Format Naming Convention.
Mono10	Mono10 unpacked according to AIA Pixel Format Naming Convention.
Mono10p	Mono10 packed according to AIA Pixel Format Naming Convention.
Mono12	Mono12 unpacked according to AIA Pixel Format Naming Convention.
Mono12p	Mono12 packed according to AIA Pixel Format Naming Convention.

PixelFormatSize

[Enumeration] R

Despite the name, this feature returns the bit depth of the current `PixelFormat`.

Note: This may be useful when controlling the `BlackLevel` [`BlackLevelSelector`] if the values of the enumeration (hence the register values) correspond directly to the bit depth.

Bpp8	bit depth per pixel is 8 bit.
Bpp10	bit depth per pixel is 10 bit.
Bpp12	bit depth per pixel is 12 bit.

ReverseX

[Boolean] R/W

Flips the image horizontally.

Note: Region of interest (ROI) is applied after the flipping.

False	Image is not flipped horizontally.
True	Image is flipped horizontally.

SensorHeight

[Integer] Rc

Unit: Pixels

Displays the effective height of the sensor.

SensorWidth

[Integer] Rc

Unit: Pixels

Displays the effective width of the sensor.

Width

[Integer] R/W

Unit: Pixels

Controls the width of the image provided by the device for Region of interest (ROI).

Note: This dimension is calculated after horizontal binning, decimation or any other function changing the horizontal dimension of the image.

For other ROI settings concerning image height, see [WidthMax](#) and [OffsetX](#).

WidthMax

[Integer] R

Unit: Pixels

Displays the maximum width of the image.

Note: This dimension is calculated after horizontal binning, decimation or any other function changing the horizontal dimension of the image.

For other ROI settings concerning image height, see [Width](#) and [OffsetX](#).

StreamInformation



Features availability for third-party software

- Features in this category are usually not available in the camera features of third-party software that is not based on **Vimba**.
- Features marked as proprietary in this category are not available with any other than the Allied Vision transport layer.

StreamID

[String] R

Displays the device unique ID for the stream, for instance a Globally unique identifier (GUID).

StreamIsGrabbing

[Boolean] R

Indicates whether the acquisition engine is started or not.

False	Acquisition engine is not started.
True	Acquisition engine is started.

StreamType

[Enumeration] R

Displays the transport layer type of the data stream.

USB3	USB3 Vision type is active.
-------------	-----------------------------

TestControl

TestPendingAck

[Integer] R/W

Values: ≥ 0 Unit: ms

Tests the device's pending acknowledge feature. When this feature is written, the device waits the time period corresponding to the value of `TestPendingAck` before acknowledging the write.

Note: For writing this feature, the device must use a pending acknowledge during the completion of this request if its duration exceeds the maximum device response time.

When read, the device returns the current feature value within the defined time. However, communications with the host can exceed this time.

TransportLayerControl

PayloadSize

[Integer] R
Unit: bytes

Displays the number of bytes transferred for each image on the stream channel. This is the total size of data payload for a data block.

UserSetControl



UserSetDefault and trigger settings

When you save a UserSet including trigger settings, consider that after restart, the camera expects a trigger before you can receive an image.

UserSetDefault

[Enumeration] R/W

Selects the UserSet to be loaded by default when the device is reset.

Note: In **Default** value, the device boots with the default factory settings for continuous acquisition.

Default	Selects the factory settings UserSet.
UserSet1	Selects UserSet1.
UserSet2	Selects UserSet2.
UserSet3	Selects UserSet3.
UserSet4	Selects UserSet4.

UserSetLoad[UserSetSelector]

[Command] (R)/W

Loads the UserSet specified by UserSetSelector to the device to enable it.

UserSetSave[UserSetSelector]

[Command] (R)/W

Saves the UserSet specified by UserSetSelector to the non-volatile memory of the device.

UserSetSelector

[Enumeration] R/W

Selects the UserSet to be loaded, saved, or configured.

<i>Default</i>	Selects the factory settings UserSet, read only.
<i>UserSet1</i>	Selects UserSet1.
<i>UserSet2</i>	Selects UserSet2.
<i>UserSet3</i>	Selects UserSet3.
<i>UserSet4</i>	Selects UserSet4.

Index

A

abbreviations	11
AcquisitionAbort	15
AcquisitionControl, category	15
AcquisitionFrameCount	15
AcquisitionFrameRate	16
AcquisitionFrameRateMode	16
AcquisitionMode	16
AcquisitionStart	17
AcquisitionStatus	17
AcquisitionStatusSelector	17
AcquisitionStop	18
AIA Pixel Format Naming Convention	2
AnalogControl, category	20

B

BlackLevel	20
BlackLevelSelector	20
Bps, legend	11
BufferHandlingControl, category	21

C

camera manual download	3
contact Allied Vision	4
conventions	10
copyright	13
CorrectionControl	22
CorrectionControl, category	22
CorrectionDataSize	26
CorrectionDescription	26
CorrectionEntryType	26
CorrectionInfo (subcategory)	26
CorrectionInfo, subcategory	26
CorrectionMode	25
CorrectionSelector	25
CorrectionSetDefault	25
CorrectionSetSelector	25

D

dB, legend	11
DeviceControl (category)	27
DeviceControl, category	27
DeviceFamilyName	27
DeviceFirmwareID	27
DeviceFirmwareIDSelector	27
DeviceFirmwareVersion	27

DeviceFirmwareVersionSelector	28
DeviceGenCPVersionMajor	28
DeviceGenCPVersionMinor	28
DeviceIndicatorMode	28
DeviceLinkThroughputLimit	28
DeviceLinkThroughputLimitMode	29
DeviceManufacturerInfo	29
DeviceModelName	29
DeviceReset	29
DeviceScanType	30
DeviceSerialNumber	30
DeviceSFNCVersionMajor	29
DeviceSFNCVersionMinor	29
DeviceSFNCVersionSubMinor	29
DeviceTemperature	30
DeviceTemperatureSelector	30
DeviceUserID	30
DeviceVendorName	30
DeviceVersion	30
DigitalIOControl, category	32
DN, legend	11
document	
conventions	10
history	10
styles	10
downloads	
additional documents	3
standards applied	2
USB accessories information	3
Vimba	3

E

ExposureMode	18
ExposureTime	18

F

features	
proprietary features	2
FileAccessBuffer	42
FileAccessControl, category	38
FileAccessLength	42
FileAccessOffset	42
FileOpenMode	42
FileOperationExecute	42
FileOperationResult	43
FileOperationSelector	43
FileOperationStatus	43, 44
FileSelector	44
FileSize	44
FileStatus	44

G		S	
Gain	20	s, legend	11
GainSelector	20	Selectors	12
Gamma	20	SensorHeight	47
GenICam SFNC	2	SensorWidth	47
GenTL SFNC	2	SFNC	2
		slave camera	33
H		software download	3
Height	45	standards applied	2
HeightMax	45	StreamAnnounceBufferMinimum	21
Hz, legend	11	StreamAnnouncedBufferCount	21
		StreamBufferHandlingMode	21
I		StreamID	48
ImageFormatControl, category	45	StreamInformation, category	48
InputDebounceMode	34	StreamIsGrabbing	48
InputDebounceTime	34	StreamType	48
		styles	10
L		support, contact Allied Vision	4
legislation	13	symbols use	11
LineInverter	34		
LineMode	34	T	
LineSelector	35	TestControl, category	48
LineSource	35	TestControl, catory	48
LineStatus	36	TestPendingAck	48
		Timestamp	31
M		trademarks	13
master camera	33	TransportLayerControl, category	49
MaxDriverBuffersCount	21	TriggerActivation	18
ms, legend	11	TriggerDelay	19
		triggering download	3
N		TriggerMode	19
notes use	11	TriggerSelector	19
ns, legend	11	TriggerSoftware	19
		TriggerSource	19
O			
OffsetX	45	U	
OffsetY	45	USB accessories	
OutputDurationMode	36	download	3
OutputDurationTime	36	UserOutputSelector	36
		UserOutputValue	37
P		UserSetControl, category	49
PayloadSize	49	UserSetDefault	49
PFNC	2	UserSetLoad	49
PixelFormat	46	UserSetSave	49
PixelSize	46	UserSetSelector	50
proprietary features	2		
		V	
R		Vimba download	3
R, legend	11	Vimba downloads	3
R/W, legend	11		
Rc, legend	11		
ReverseX	46		

W	
warranty	13
Width	47
WidthMax	47
Z	
μs, legend	11