SICK Vision Reference

SICK
Sensor Intelligence.

Contents

1 Preface

Introduction

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2 Welcome

The Vision Reference contains the features of the SFNC standard supported by SICK Vision cameras, as well as manufacturer-dependent features.

You should first read the following chapters to get an overview on the supported features and to use your camera in its full performance range.

This feature reference describes the features of the firmware version 2.0 for SICK Vision cameras.

Feature availability
The Vision Reference describes all available features. Depending on your specific camera model, not all features may be supported.

2.1 Applied standards

The features described in this document comply with:

- GenICam Standard Features Naming Convention (SFNC) version 2.4
- GenICam Pixel Format Naming Convention (PFNC) version 2.1
- GenICam Transport Layer Standard Features Naming Convention (GenTL SFNC) version 1.0

More information can be found under https://www.emva.org/standards-technology/genicam/.

2.2 Open source - sources

mbed TLS

Copyright © 2006-2015, ARM Limited, All Rights Reserved
The camera firmware uses the mbed TLS library under the Apache license, version 2.0
(http://www.apache.org/licenses).

3 Reference conventions

The following typographic styles and symbols are used for easy orientation in the Vision Reference and to highlight important information.

3.1 Styles

Style	Utilization	Example
Bold	Feature names	Maximum limit of **ExposureTime**.
Quotation marks	Values and signal names	**CounterStatus** changes to "CounterCompleted"...
Capitalized	Signal levels	... and "CounterActive" signal is set to LOW.
Colored and underlined	Link	**TriggerSource** must be set to "Software".

3.2 Symbols

Practical hints help to better understand the camera's features and functions, and to make better use of it.

Important or specific instructions that are related to product safety. Follow these instructions to avoid camera destruction.

4 Acquisition Control

This chapter contains the descriptions of all supported features from the Acquisition Control category.

- Define the acquisition mode, the frame rate and start or stop an acquisition.

- Set the exposure mode and time.

- Control all trigger related features for a trigger-controlled acquisition.

Name	AcquisitionControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

4.1 Acquisition Frame Count

Number of images to acquire in "MultiFrame" **AcquisitionMode**.

Name	AcquisitionFrameCount
Category	AcquisitionControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 1 Increment: 1
Standard	SFNC

4.2 Acquisition Frame Rate

Controls the acquisition rate (in hertz) at which the images are captured.

> If you increase **ExposureTime** and its new value is not applicable with the value of **AcquisitionFrameRate**, the frame rate will be reduced automatically. If you decrease **ExposureTime** again, the frame rate stays low and must be manually increased to the desired value.

Name	AcquisitionFrameRate
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	Hz
Visibility	Beginner

Values	Camera specific
Standard	SFNC

4.3 Acquisition Line Rate

Controls the acquisition rate (in hertz) at which the lines of an image are captured.

The **TriggerMode** of the "LineStart" trigger must be "Off".

Name	AcquisitionLineRate
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	Hz
Visibility	Beginner
Values	Camera specific
Standard	SFNC

> ℹ️ This feature is only available with the **SensorOperationMode** "Linescan".

4.4 Acquisition Mode

Sets the acquisition mode of the camera. It defines the number of images to capture during an acquisition.

Name	AcquisitionMode
Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	SingleFrame MultiFrame Continuous
Standard	SFNC

Values description

- SingleFrame: One image is captured.

- MultiFrame: The number of images specified by **AcquisitionFrameCount** is captured.

- Continuous: Images are captured until stopped with the **AcquisitionStop** command.

> ℹ️ The access changes to read-only during an acquisition.

4.5 Acquisition Start

Starts the acquisition of the camera. The number of captured images is specified by **AcquisitionMode**.

Name	AcquisitionStart
Category	AcquisitionControl
Interface	Command
Access	Write
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

4.6 Acquisition Stop

Stops the acquisition of the camera at the end of the current image. It is mainly used when **AcquisitionMode** is "Continuous" but can be used in any acquisition mode.

Name	AcquisitionStop
Category	AcquisitionControl
Interface	Command
Access	Write
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

4.7 Exposure Auto

Sets the automatic exposure control when **ExposureMode** is "Timed". Neither **AcquisitionFrameRate** nor **Gain** settings are changed. **ExposureAuto** can be combined with **GainAuto**.

Name	ExposureAuto
Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off Once Continuous
Standard	SFNC

Values description

- Off: Exposure duration is user controlled using **ExposureTime**.

- Once: Exposure duration is adapted once by the camera. Once it has converged, it returns to the "Off" state.

- Continuous: Exposure duration is constantly adapted by the camera to maximize the dynamic range.

This feature is not available with the **SensorOperationMode** "Linescan".

4.8 Exposure Mode

Sets the exposure mode automatically depending on the trigger mode.

Name	ExposureMode
Category	AcquisitionControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Beginner
Values	Timed TriggerControlled
Standard	SFNC

Values description

- Timed: Timed exposure. The exposure time is set using the **ExposureTime** or **ExposureAuto** features. The exposure starts with the "ExposureStart"or "LineStart" trigger signal.

- TriggerControlled: Uses one or more trigger signals to control the exposure. See "ExposureStart" and "ExposureEnd" of the **TriggerSelector** feature.

4.9 Exposure Time

Sets the exposure time when **ExposureMode** is "Timed" and **ExposureAuto** is "Off". This function controls the duration where the photosensitive cells are exposed to light.

If you increase **ExposureTime** and its new value is not applicable with the value of **AcquisitionFrameRate**, the frame rate will be reduced automatically. If you decrease **ExposureTime** again, the frame rate stays low and must be manually increased to the desired value.

Name	ExposureTime
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Beginner

Values	≥ 0
	Increment: Sensor specific
Standard	SFNC

4.10 Sensor Shutter Mode

Returns the shutter mode of the camera.

Name	SensorShutterMode
Category	AcquisitionControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Guru
Values	Global
	Rolling
	GlobalReset
Standard	SFNC

Values description

- Global: The shutter opens and closes at the same time for all pixels. All pixels have the same exposure time and the exposure of all pixels starts simultaneously.

- Rolling: The shutter opens and closes sequentially for the pixel lines. All pixels have the same exposure time but the exposure of the pixel lines starts sequentially.

- GlobalReset: The shutter opens at the same time for all pixels but ends in a sequential manner. The exposure of alle pixels starts simultaneously but each pixel line has a different exposure time.

4.11 Trigger Activation

Specifies the activation mode of the trigger.

Name	TriggerActivation[TriggerSelector]
Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	RisingEdge
	FallingEdge
	AnyEdge
	LevelHigh
	LevelLow
Standard	SFNC

Values description

- RisingEdge: Specifies that the trigger is considered valid on the rising edge of the source signal.

- FallingEdge: Specifies that the trigger is considered valid on the falling edge of the source signal.

- AnyEdge: Specifies that the trigger is considered valid on the falling and/or rising edge of the source signal.

- LevelHigh: Specifies that the trigger is considered valid as long as the level of the source signal is HIGH.

- LevelLow: Specifies that the trigger is considered valid as long as the level of the source signal is LOW.

The access changes to read-only during an acquisition.

4.12 Trigger Controlled Exposure Time Max

Maximum limit of **ExposureTime** when **ExposureMode** is "TriggerControlled". When a trigger on "ExposureEnd" is active but is not received in time, the exposure of the image is stopped after **TriggerControlledExposureTimeMax**.

Name	TriggerControlledExposureTimeMax
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Guru
Values	Camera specific
Standard	SICK

4.13 Trigger Controlled Exposure Time Min

Minimum limit of **ExposureTime** when **ExposureMode** is "TriggerControlled". When a trigger on "ExposureEnd" is active but is received too early, the exposure of the image is stopped after **TriggerControlledExposureTimeMin**. For sensors with overlapping image acquisition, the overlap of the images is limited by **TriggerControlledExposureTimeMin**.

Name	TriggerControlledExposureTimeMin
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Guru
Values	Camera specific
Standard	SICK

4.14 Trigger Delay

Specifies the delay between the reception of the trigger signal and the trigger activation.

Name	TriggerDelay[TriggerSelector]
Category	AcquisitionControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Beginner
Values	0 … 16777215 Increment: 1
Standard	SFNC

The access changes to read-only during an acquisition.

4.15 Trigger Divider

If **TriggerDivider** is set to a value x > 1, only every xth source signal will activate the trigger.

Using **TriggerDivider** can be useful for source signals with high frequency. It reduces the signal to the desired frequency for acquisition. A typical example is an encoder.

Name	TriggerDivider[TriggerSelector]
Category	AcquisitionControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	1 … 64 Increment 1
Standard	SFNC

The access changes to read-only during an acquisition.

4.16 Trigger Mode

Controls if the selected trigger is active.

Name	TriggerMode[TriggerSelector]

Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off On
Standard	SFNC

Values description

- Off: Disables the selected trigger.

- On: Enables the selected trigger.

> The access changes to read-only during an acquisition.

4.17 Trigger Selector

Selects the type of trigger to configure.

Name	TriggerSelector
Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	AcquisitionStart AcquisitionEnd ExposureStart ExposureEnd FrameStart LineStart
Standard	SFNC

Values description

- AcquisitionStart: Selects a trigger that starts the acquisition of one or more images according to **AcquisitionMode**.

- AcquisitionEnd: Selects a trigger that ends the acquisition of one or more images according to **AcquisitionMode**.

- ExposureStart: Selects a trigger controlling the start of the exposure of one image.

- ExposureEnd: Selects a trigger controlling the end of the exposure of one image.

- FrameStart: Selects a trigger starting the capture of one image.

- LineStart: Selects a trigger starting the capture of one line of an image (mainly used in linescan mode).

The **TriggerSelector** is limited to the values "LineStart" and "FrameStart" in the **SensorOperationMode** "Linescan".

4.18 Trigger Software

Generates an internal trigger. **TriggerSource** must be set to "Software".

Name	TriggerSoftware[TriggerSelector]
Category	AcquisitionControl
Interface	Command
Access	Write
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

4.19 Trigger Source

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

Name	TriggerSource[TriggerSelector]
Category	AcquisitionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Software Line0 Line1 Line2 Line3 UserOutput0 UserOutput1 UserOutput2 UserOutput3 Counter0Start Counter1Start Counter0End Counter1End Timer0Start Timer1Start Timer0End Timer1End

	PWM0 Counter0Active Counter1Active Timer0Active Timer1Active
Standard	SFNC

> The General Purpose I/O (Line2, Line3) is not potential-free and has no protective circuit. Faulty wiring (overvoltage, undervoltage) could cause damage to the electronics.

> The trigger input (Line0) is galvanically isolated using an optocoupler to protect the camera and the PC against surges. Only DC voltages may be applied to the digital input. For interpreting the trigger signal, either the rising or the falling edge can be used.

Values description

- Software: Specifies that the trigger source will be generated by software using the **TriggerSoftware** command.

- Line0, Line1: Specifies which physical line (or pin) to use as external source for the trigger signal.

- Line2, Line3: General Purpose I/O that can be used as input or output. To configure the line as input, change **LineMode** to "Input". To configure the line as output, change **LineMode** to "Output".

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: Specifies which user output to use as internal source for the trigger.

- Counter0Start, Counter1Start, Counter0End, Counter1End: Specifies which counter signal to use as internal source for the trigger.

- Timer0Start, Timer1Start, Timer0End, Timer1End: Specifies which timer signal to use as internal source for the trigger.

- PWM0: Specifies that the trigger source will be generated by "PWM0".

- Counter0Active, Counter1Active: Specifies which CounterActive signal to use as internal source for the trigger.

- Timer0Active, Timer1Active: Specifies which TimerActive signal to use as internal source for the trigger.

> The access changes to read-only during an acquisition.

5 Device Control

This chapter contains the descriptions of all supported features from the category Device Control.

These features provide general information and control of the camera and its sensor. This is mainly used to identify the camera during the and to obtain information about the sensor resolution.

Name	DeviceControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

5.1 Device Boot Status

Returns the current boot status.

Name	DeviceBootStatus
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	OK WatchdogReboot
Standard	SICK

Values description

- OK: Booting the camera was successful.

- WatchdogReboot: Camera reboot after watchdog error. This error occurs if a feature has not reacted within the watchdog timeout (approx. 30 s).

5.2 Device Clock Frequency

Returns the frequency of the clock selected in **DeviceClockSelector**.

Name	DeviceClockFrequency[DeviceClockSelector]
Category	DeviceControl
Interface	Float
Access	Read
Unit	Hz
Visibility	Expert

Values	> 0
Standard	SFNC

5.3 Device Clock Selector

Returns the source for **DeviceClockFrequency**.

Name	DeviceClockSelector
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Sensor
Standard	SFNC

Values description

- Sensor: Clock frequency of the image sensor of the camera.

5.4 Device Family Name

Identifier of the product family of the camera.

Name	DeviceFamilyName
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	Camera specific
Standard	SFNC

5.5 Device Firmware Version

Firmware version of the camera.

Name	DeviceFirmwareVersion
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	Firmware specific
Standard	SFNC

5.6 Device Link Acquisition Frame Rate Limit

Returns the maximum **AcquisitionFrameRate** that can be reached with the bandwidth defined by **DeviceLinkThroughputLimit**.

Name	DeviceLinkAcquisitionFrameRateLimit
Category	DeviceControl
Interface	Float
Access	Read
Unit	Hz
Visibility	Expert
Values	≥ 0
Standard	SICK

5.7 Device Link Calculated Throughput

Returns the calculated bandwidth of the data that would be streamed out by the camera with the current settings. The real bandwidth is limited by **DeviceLinkThroughputLimit**.

Name	DeviceLinkCalculatedThroughput
Category	DeviceControl
Interface	Integer
Access	Read
Unit	Bps
Visibility	Expert
Values	Camera specific
Standard	SICK

5.8 Device Link Command Timeout

Indicates the command timeout for the connection to the camera. This corresponds to the maximum response time of the camera when a command is sent.

Name	DeviceLinkCommandTimeout
Category	DeviceControl
Interface	Float
Access	Read
Unit	µs
Visibility	Guru
Values	> 0
Standard	SFNC

5.9 Device Link Heartbeat Mode

Activates or deactivates the heartbeat of the link.

Name	DeviceLinkHeartbeatMode
Category	DeviceControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	On Off
Standard	SFNC

Values description

- On: Enables the heartbeat of the link.

- Off: Disables the heartbeat of the link.

5.10 Device Link Heartbeat Timeout

Controls the current heartbeat timeout of the link.

Name	DeviceLinkHeartbeatTimeout
Category	DeviceControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Guru
Values	> 0
Standard	SFNC

> The access changes to read-only during an acquisition.

5.11 Device Link Throughput Limit

Limits the maximum bandwidth of data sent from the camera. A corresponding delay between the stream channel packets is calculated, which is then used as the **GevSCPD** value.

> Using **DeviceLinkThroughputLimit** is the recommended way to control your bandwidth. The unit in bytes per second allows a quite precise and intuitive control of the data throughput. By entering a throughput limit, the camera firmware calculates the required packet delays **GevSCPD** and the maximum possible frame rate (**DeviceLinkAcquisitionFrameRateLimit**), which can be reached with the current throughput limit. In addition, the calculated throughput

(**DeviceLinkCalculatedThroughput**) provides information about the theoretic bandwidth of the device, which would be used without the restriction.

Name	DeviceLinkThroughputLimit
Category	DeviceControl
Interface	Integer
Access	Read/Write
Unit	Bps
Visibility	Expert
Values	≥ 0
Standard	SFNC

The access changes to read-only during an acquisition.

5.12 Device Manufacturer Info

Manufacturer information about the camera.

Name	DeviceManufacturerInfo
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	Camera specific
Standard	SFNC

5.13 Device Model Name

Name of the camera model.

Name	DeviceModelName
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	Camera specific
Standard	SFNC

5.14 Device Optical Filter Type

Returns the optical filter type of the camera.

Name	DeviceOpticalFilterType
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	None GL DL HQ Unknown
Standard	SICK

Values description

- None: No optical filter.

- GL: Glas filter for dirt protection.

- DL: Daylight-cut filter.

- HQ: IR cut-off filter for high quality color rendering.

- Unknown: Unknown optical filter type.

5.15 Device Reset

Resets the camera to its power-up state. After reset, the camera must be rediscovered.

Name	DeviceReset
Category	DeviceControl
Interface	Command
Access	Write
Unit	-
Visibility	Guru
Values	-
Standard	SFNC

5.16 Device Scan Type

Defines the current scan type of the camera.

Name	DeviceScanType
Category	DeviceControl
Interface	Enumeration

Access	Read
Unit	-
Visibility	Expert
Values	Areascan Linescan
Standard	SFNC

Values description

- Areascan: The image acquisition takes place simultaneously on all sensor lines (2D image acquisition).

- Linescan: The image acquisition takes place line by line one after the other. The image output is 2D.

5.17 Device Serial Number

Returns the serial number of the camera. This string is a unique identifier of the camera.

Name	DeviceSerialNumber
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

5.18 Device SFNC Version Major

Major version of the Standard Features Naming Convention that was used to create the GenICam XML of the camera.

Name	DeviceSFNCVersionMajor
Category	DeviceControl
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	> 0
Standard	SFNC

5.19 Device SFNC Version Minor

Minor version of the Standard Features Naming Convention that was used to create the GenICam XML of the camera.

Name	DeviceSFNCVersionMinor

Category	DeviceControl
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

5.20 Device SFNC Version Sub Minor

Sub minor version of the Standard Features Naming Convention that was used to create the GenICam XML of the camera.

Name	DeviceSFNCVersionSubMinor
Category	DeviceControl
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

5.21 Device Stream Channel Endianness

Defines the byte order of multi-byte pixel data for the stream.

Name	DeviceStreamChannelEndianness
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Guru
Values	Big Little
Standard	SFNC

Values description

- Big: Stream channel data is big-endian. This means that the most signifikant byte is sent first.

- Little: Stream channel data is little-endian. This means that the least signifikant byte is sent first.

5.22 Device Stream Channel Packet Size

Specifies the size of a stream packet that is sent by the camera.

Name	DeviceStreamChannelPacketSize
Category	DeviceControl
Interface	Integer
Access	Read/Write
Unit	Bytes
Visibility	Expert
Values	> 0
Standard	SFNC

The access changes to read-only during an acquisition.

5.23 Device Temperature

Camera temperature in degrees Celsius (°C). It is measured at the location selected by **DeviceTemperatureSelector**.

Name	DeviceTemperature[DeviceTemperatureSelector]
Category	DeviceControl
Interface	float
Access	Read
Unit	°C
Visibility	Expert
Values	Camera specific
Standard	SFNC

5.24 Device Temperature Selector

Selects the location within the camera, where the temperature is measured.

Name	DeviceTemperatureSelector
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Mainboard
Standard	SFNC

Values description

- Mainboard: Temperature of the camera's mainboard.

5.25 Device User ID

User-defined camera name.

Name	DeviceUserID
Category	DeviceControl
Interface	String
Access	Read/Write
Unit	-
Visibility	Beginner
Values	User-defined string with max. 15 characters.
Standard	SFNC

5.26 Device Vendor Name

Returns the camera's vendor name.

Name	DeviceVendorName
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	Camera specific
Standard	SFNC

5.27 Device Version

The version of the remote device model.

Name	DeviceVersion
Category	DeviceControl
Interface	String
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

5.28 Sensor Operation Mode

Specifies the operation mode of the sensor. The **SensorOperationMode** is changed via **UserSetSelector**.

Name	SensorOperationMode
Category	DeviceControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Default Linescan LinescanSensor LongExposure
Standard	SICK

Values description

- Default: Recommended sensor settings for standard applications.

- Linescan: Sensor settings for linescan applications.

- LinescanSensor: Native sensor linescan mode.

- LongExposure: Sensor settings optimized for image acquisition with long exposures.

6 Analog Control

This chapter contains the descriptions of all supported features from the category Analog Control.

The functions in this chapter describe how to control the analog properties of an image such as black level, gain and gamma.

Name	AnalogControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

6.1 Black Level

Controls the analog black level for the selected bit depth. The BlackLevel is an offset that applies to all pixel values. Changing the **PixelFormat** to a different bit depth, the value and range of **BlackLevel** will be adapted to the new format automatically.

BlackLevel is only available for some monochrome cameras.

Name	BlackLevel[BlackLevelSelector]
Category	AnalogControl
Interface	Float
Access	Read/Write
Unit	DN
Visibility	Expert
Values	≥ 0
Standard	SFNC

6.2 Black Level Selector

Returns which **BlackLevel** is controlled by the black level features.

Changing the **PixelFormat** to a different bit depth, the value of **BlackLevelSelector** will be adapted to the new format automatically.

BlackLevelSelector is only available for some monochrome cameras.

Name	BlackLevelSelector
Category	AnalogControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Beginner
Values	All8Bit All10Bit All12Bit All14Bit All16Bit
Standard	SFNC

Values description

- All8Bit: **BlackLevel** will be applied to all channels scaled to 8-bit pixel format.

- All10Bit: **BlackLevel** will be applied to all channels scaled to 10-bit pixel format.

- All12Bit: **BlackLevel** will be applied to all channels scaled to 12-bit pixel format.

- All14Bit: **BlackLevel** will be applied to all channels scaled to 14-bit pixel format.

- All16Bit: **BlackLevel** will be applied to all channels scaled to 16-bit pixel format.

6.3 Gain

Gain is an amplification factor applied to all pixel values. Select the channel to be amplified in the **GainSelector**. Increasing gain, the image will appear brighter. For best image quality, it is recommended to use small gain values and to increase **ExposureTime** instead. The gain step width depends on the sensor. For automatic gain control, use **GainAuto**.

> *i* For manually adjusting the white balance for color cameras, select a color gain with **GainSelector** and change the **Gain** value.

> *i* If your camera supports "AnalogAllSource" gain, the **Gain** for that feature might also accept values < 1, depending on the sensor.

Name	Gain[GainSelector]
Category	AnalogControl
Interface	Float
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

6.4 Gain Auto

Sets the automatic gain control. Neither **AcquisitionFrameRate** nor **ExposureTime** settings are changed. **GainAuto** can be combined with **ExposureAuto**.

GainAuto modifies "AnalogAll" gain, if the sensor supports it. Otherwise "DigitalAll" gain is used.

Name	GainAuto[GainSelector]
Category	AnalogControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off Once Continuous
Standard	SFNC

Values description

- Off: **GainAuto** is disabled. The user-defined control of the gain is possible with the **Gain** command.

- Once: **Gain** is automatically adjusted once by the camera. Once it has converged, it automatically returns to the "Off" state.

- Continuous: **Gain** is constantly adjusted by the camera.

> This feature is not available with the **SensorOperationMode** "Linescan".

6.5 Gain Selector

Selects the gain to be configured.

> The gains supported by a camera depend on the sensor and may differ. Typically, color cameras either support digital or analog color gains.

Name	GainSelector
Category	AnalogControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	AnalogAllSource AnalogAll AnalogRed AnalogGreen

	AnalogBlue DigitalAll DigitalRed DigitalGreen DigitalBlue
Standard	SFNC

Values description

- AnalogAllSource: **Gain** will be applied to the analog source gain affecting all channels. The source gain defines the operating point for the camera and can differ for short exposure and long exposure applications.

- AnalogAll: **Gain** will be applied to all analog channels.

- AnalogRed: **Gain** will be applied to the red analog channel.

- AnalogGreen: **Gain** will be applied to the green analog channel.

- AnalogBlue: **Gain** will be applied to the blue analog channel.

- DigitalAll: **Gain** will be applied to all digital channels.

- DigitalRed: **Gain** will be applied to the red digital channel.

- DigitalGreen: **Gain** will be applied to the green digital channel.

- DigitalBlue: **Gain** will be applied to the blue digital channel.

6.6 Gamma

Controls the gamma correction of pixel intensity.

> Gamma correction is disabled when the LUT is enabled by setting **LUTEnable** to "True" .

Name	Gamma
Category	AnalogControl
Interface	Float
Access	Read/Write
Unit	-
Visibility	Beginner
Values	0.3 ... 3 Increment: 0.05
Standard	SFNC

Values description

- Gamma > 1 increases image brightness.
- Gamma < 1 decreases image brightness.

7 LUT Control

This chapter contains all supported features related to the lookup table (LUT).

With a lookup table it is easy to apply characteristic curves to digital images. A LUT is a table which assigns an output value to every possible input value.

- To activate or deactivate a LUT, select it with **LUTSelector** and activate or deactivate it with **LUTEnable**.

- To use predefined LUTs, you can simply select the desired LUT with **LUTPresetSelector** and load it with **LUTPresetLoad**.

- To change LUT values manually, use the features **LUTIndex** and **LUTValue**.

Name	LUTControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

7.1 LUT Enable

Activates the LUT selected by **LUTSelector**.

i If a LUT is active, gamma correction is disabled. When disabling LUT, the previous gamma correction is restored.

Name	LUTEnable[LUTSelector]
Category	LUTControl
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Expert
Values	True False
Standard	SFNC

Values description

- True: Activates the selected LUT.

- False: Deactivates the selected LUT.

7.2 LUT Index

Selects an index to access the corresponding entry in the LUT selected by **LUTSelector**. The LUT has 64 intervals with a control point at the beginning of each interval. The 64 intervals are uniformly distributed in the 12-bit range. The control points are: 0, 64, 128 ... 4032

Name	LUTIndex[LUTSelector]
Category	LUTControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Guru
Values	0 ... 63 Increment: 1
Standard	SFNC

7.3 LUT Preset Load

Loads a LUT preset defined by **LUTPresetSelector** and applies it to the LUT selected by **LUTSelector**.

Name	LUTPresetLoad[LUTSelector]
Category	LUTControl
Interface	Command
Access	Write
Unit	-
Visibility	Expert
Values	-
Standard	SICK

7.4 LUT Preset Selector

Selects one of the available LUT presets.

To activate the function, load it via **LUTPresetLoad**.

Name	LUTPresetSelector[LUTSelector]
Category	LUTControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert

Values	Identity Inverse Binarize DigitalGain2 EnhancedContrast
Standard	SICK

Values description

- Identity: The values are not changed.

- Inverse: All colors are inverted.

- Binarize: Reduces the colors to black and white and for color cameras to fully-saturated colors. There can be intermediate values in the transition interval.

- DigitalGain2: Multiplies all color values by 2. Values that are too high are clipped.

- EnhancedContrast: Enhances the contrast by darkening the shadows and brightening up the lights.
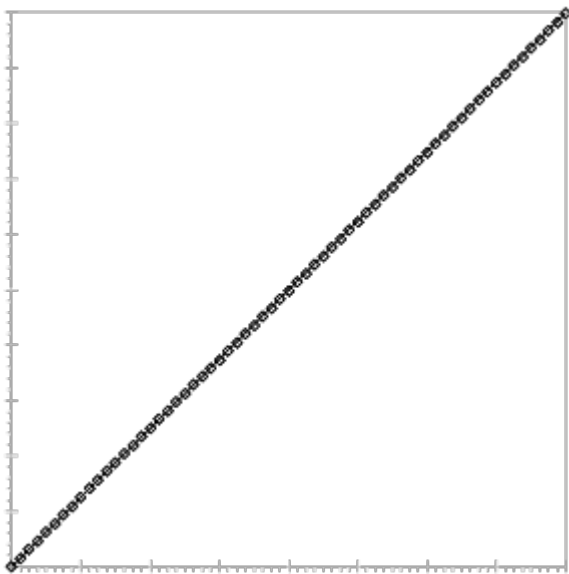
Fig. 1: Sample LUT curve for "Identity"
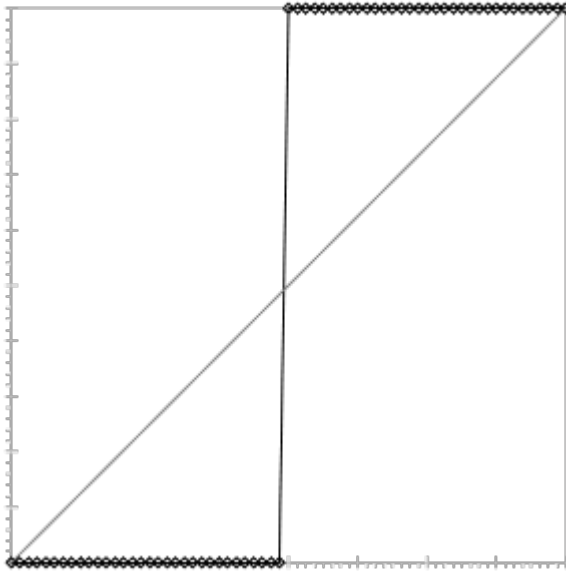
Fig. 2: Sample LUT curve for "Binarize"
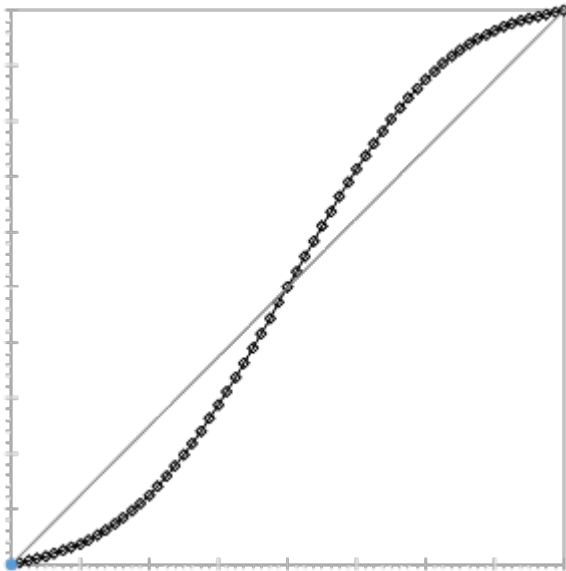
Fig. 3: Sample LUT curve for "EnhancedContrast"
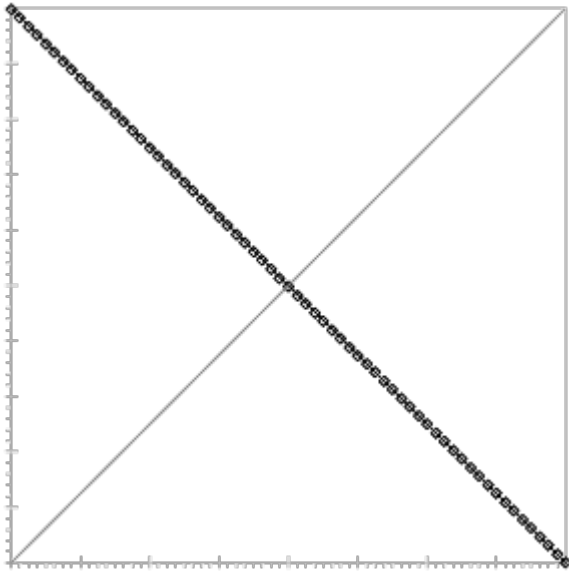
Fig. 4: Sample LUT curve for "Inverse"
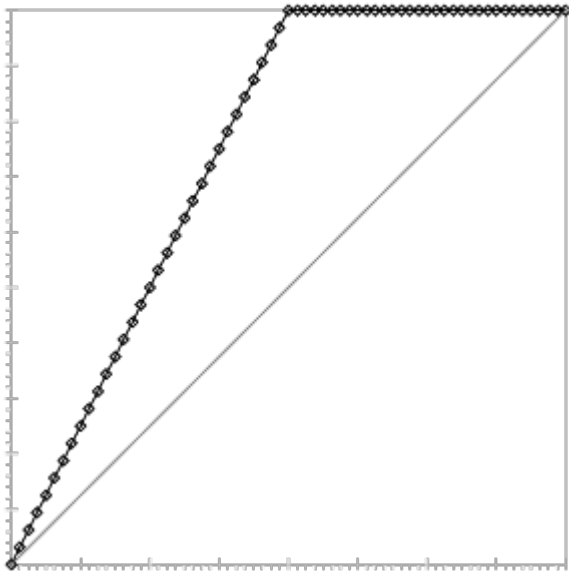
Fig. 5: Sample LUT curve for "DigitalGain2"

7.5 LUT Selector

Selects which LUT to control.

Name	LUTSelector
Category	LUTControl
Interface	Enumeration
Access	Read/Write
Unit	-

Visibility	Expert
Values	Raw
Standard	SFNC

Values description

- Raw: Calculation on raw values.

7.6 LUT Value

Controls the i'th value of the LUT selected by **LUTSelector**, at the position i defined by **LUTIndex**. Values in 12 bits.

Name	LUTValue[LUTSelector][LUTIndex]
Category	LUTControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Guru
Values	0 … 4095 Increment: 1
Standard	SFNC

8 Counter and Timer Control

This chapter contains the descriptions of all supported features from the category Counter and Timer Control.

The counter is a tool that increments its value on each occurance of a signal or event.

Typical examples for counters are:

- Frame or image counter: counts the number of images that have been captured.
- Trigger counter: counts the signals received on an I/O line for triggering the image capture.
- Trigger missed counter: counts the number of signals for image capture that could not be processed.
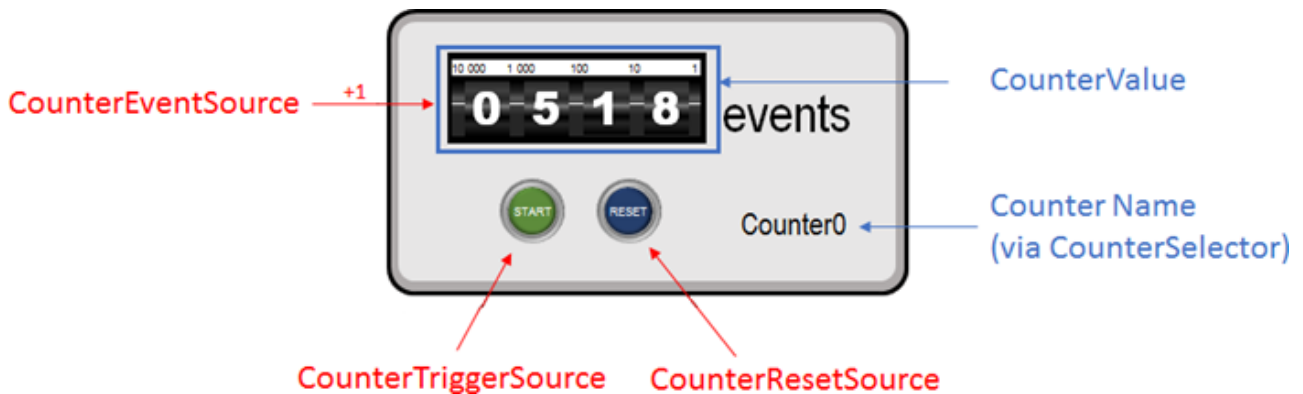
Fig. 6: Counter

With timers, the camera can time and delay operations for a specific period.

Typical examples for timers are:

- Out signal with duration: after an event, e.g. a missed image capture trigger, the camera emits an out signal on line 1 for a duration of 10 ms.
- Out signal with delay: after an event, e.g. a missed image capture trigger, the camera waits 500 ms before emitting an out signal on line 1.

Timers can also measure the time that passes between two events.
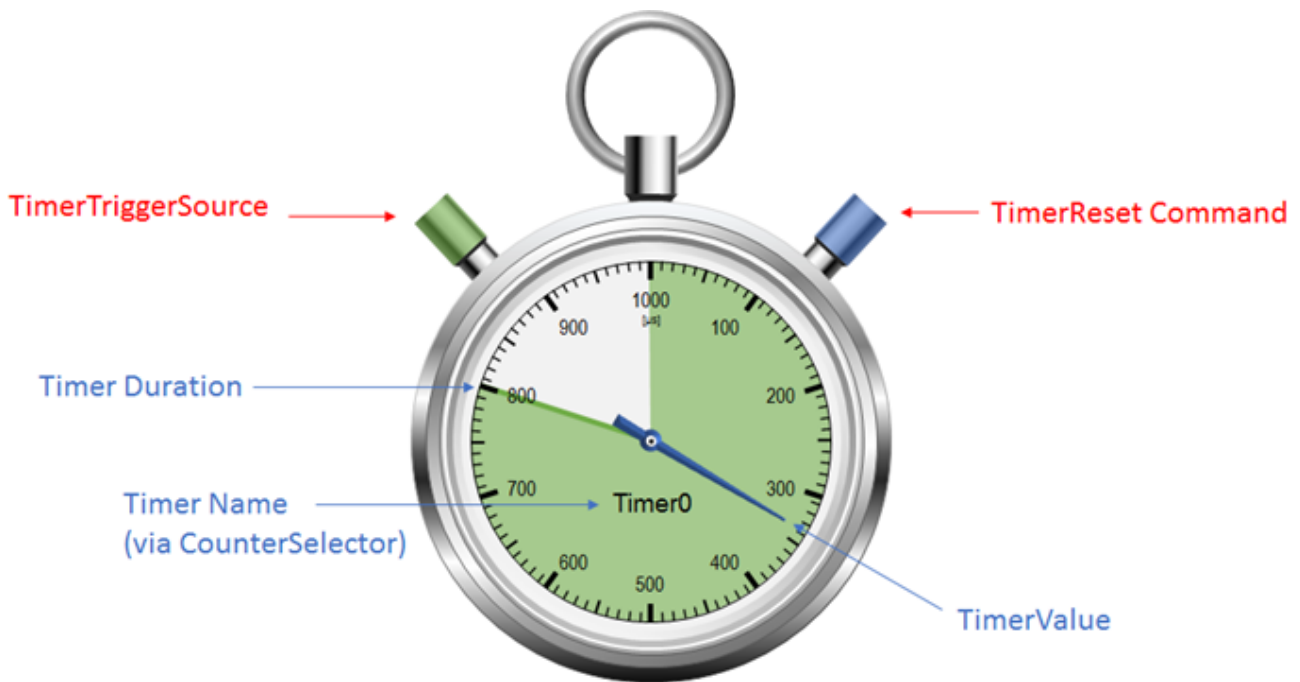
Fig. 7: Timer

Name	CounterAndTimerControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

8.1 Counter Duration

Sets the number of events (duration) before the counter stops counting. The event for incrementing the counter is defined by **CounterEventSource**. When the counter reaches the **CounterDuration** value, it stops counting. At the same time, a "CounterEnd" signal is generated, the **CounterStatus** changes to "CounterCompleted" and the "CounterActive" signal is set to LOW.

Name	CounterDuration[CounterSelector]
Category	CounterAndTimerControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert

Values	0 … 167777215
	Increment: 1
Standard	SFNC

8.2 Counter Event Activation

Specifies the activation mode of the **CounterEventSource** signal.

> (i) Select the value of the **CounterEventSource** before choosing the value of the **CounterEventActivation**.

Name	CounterEventActivation[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	RisingEdge
	FallingEdge
	AnyEdge
Standard	SFNC

Values description

- RisingEdge: Counts on the rising edge of the **CounterEventSource** signal.

- FallingEdge: Counts on the falling edge of the **CounterEventSource** signal.

- AnyEdge: Counts on the falling and rising edge of the **CounterEventSource** signal.

8.3 Counter Event Source

Selects the internal signal or physical input line that will be the source to increment the counter.

Name	CounterEventSource[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off
	AcquisitionTrigger
	AcquisitionTriggerMissed
	AcquisitionStart
	AcquisitionEnd
	LineTrigger
	LineTriggerMissed

| | ExposureStart
ExposureEnd
Line0
Line1
Line2
Line3
Counter0Start
Counter1Start
Counter0End
Counter1End
Timer0Start
Timer1Start
Timer0End
Timer1End
ExposureTrigger
ExposureTriggerMissed
ReadOutStart
ReadOutEnd |
| Standard | SFNC |

Values description

- Off: Disables the counter.

- AcquisitionTrigger: The counter counts the number of "AcquisitionStart" trigger signals.

- AcquisitionTriggerMissed: The counter counts the number of missed "AcquisitionStart" trigger signals.

- AcquisitionStart: The counter counts the number of acquisition starts.

- AcquisitionEnd: The counter counts the number of acquisition stops.

- LineTrigger: The counter counts the number of "LineStart" trigger signals. Only available in **SensorOperationMode** "Linescan".

- LineTriggerMissed: The counter counts the number of missed "LineStart" trigger signals. Only available in **SensorOperationMode** "Linescan".

- ExposureStart: The counter counts the number of exposure starts.

- ExposureEnd: The counter counts the number of exposure stops.

- Line0, Line1, Line2, Line3: The counter counts the specified transitions on the chosen I/O line.

- Counter0Start, Counter1Start: The counter counts the number of "CounterStart" signals on the selected counter signal.

- Counter0End, Counter1End: The counter counts the number of "CounterEnd" signals on the selected counter signal.

- Timer0Start, Timer1Start: The counter counts the number of "TimerStart" signals on the selected timer.

- Timer0End, Timer1End: The counter counts the number of "TimerEnd" signals on the selected timer.

- ExposureTrigger: The counter counts the number of "ExposureStart" trigger signals.

- ExposureTriggerMissed: The counter counts the number of missed "ExposureStart" trigger signals.

- ReadOutStart: The counter counts the number of "ReadOutStart" signals.

- ReadOutEnd: The counter counts the number of "ReadOutEnd" signals.

8.4 Counter Reset

Does a software reset of the selected counter. The **CounterStatus** changes to "CounterTriggerWait". If no counter trigger is active (**CounterTriggerSource** = "Off"), the counter starts counting events immediately after the reset and the **CounterStatus** changes to "CounterActive". CounterReset can be used to reset the counter independently from the **CounterResetSource**. To disable the counter temporarily, set **CounterEventSource** to "Off".

Note that the value of the counter at time of reset is automatically latched and reflected in **CounterValueAtReset**.

Name	CounterReset[CounterSelector]
Category	CounterAndTimerControl
Interface	Command
Access	Write
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

8.5 Counter Reset Activation

Specifies the activation mode of the **CounterResetSource** signal.

Not all activation values are available with all sources. Make sure that you specify the **CounterResetSource** before choosing a **CounterResetActivation**.

Name	CounterResetActivation[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	RisingEdge FallingEdge AnyEdge
Standard	SFNC

Values description

- RisingEdge: Resets the counter on the rising edge of the **CounterResetSource** signal.

- FallingEdge: Resets the counter on the falling edge of the **CounterResetSource** signal.

- AnyEdge: Resets the counter on the falling and rising edge of the **CounterResetSource** signal.

8.6 Counter Reset Source

Selects the internal signal or physical input line that will be the source to reset the counter. The **CounterStatus** changes to "CounterTriggerWait".

This source also starts the counter if **CounterTriggerSource** is "Off". Then the **CounterStatus** directly changes to "CounterActive".

> Note that the value of the counter at time of reset is automatically latched and reflected in **CounterValueAtReset**.

Name	CounterResetSource[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off CounterTrigger AcquisitionTrigger AcquisitionTriggerMissed AcquisitionStart AcquisitionEnd LineTrigger LineTriggerMissed ExposureStart ExposureEnd Line0 Line1 Line2 Line3 UserOutput0 UserOutput1 UserOutput2 UserOutput3 Counter0Start Counter1Start Counter0End Counter1End Timer0Start Timer1Start Timer0End Timer1End ExposureTrigger ExposureTriggerMissed ReadOutStart ReadOutEnd
Standard	SFNC

Values description

- Off: Disables the CounterResetSource.

- CounterTrigger: The counter resets with the reception of a trigger on the **CounterTriggerSource**.

- AcquisitionTrigger: The counter resets with the reception of the "AcquisitionStart" trigger.

- AcquisitionTriggerMissed: The counter resets with the reception of a missed "AcquisitionStart" trigger.

- AcquisitionStart: The counter resets when an acquisition starts.

- AcquisitionEnd: The counter resets when an acquisition stops.

- LineTrigger: The counter resets with the reception of the "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- LineTriggerMissed: The counter resets with the reception of the missed "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- ExposureStart: The counter resets when an exposure starts.

- ExposureEnd: The counter resets when an exposure stops.

- Line0: The counter is reset by "Line0" (trigger input).

- Line1: The counter is reset by "Line1" (flash output).

- Line2: The counter is reset by "Line2" (GPIO 1).

- Line3: The counter is reset by "Line3" (GPIO 2).

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: The counter is reset by the selected "UserOutput".

- Counter0Start, Counter1Start: The counter resets with the reception of the selected "CounterStart" signal.

- Counter0End, Counter1End: The counter resets with the reception of the selected "CounterEnd" signal.

- Timer0Start, Timer1Start: The counter resets with the reception of the selected "TimerStart" signal.

- Timer0End, Timer1End: The counter resets with the reception of the selected "TimerEnd" signal.

- ExposureTrigger: The counter resets with the reception of the "ExposureStart" trigger signal.

- ExposureTriggerMissed: The counter resets with the reception of a missed "ExposureStart" trigger signal.

- ReadOutStart: The counter resets with the reception of the "ReadOutStart" signal.

- ReadOutEnd: The counter resets with the reception of the "ReadOutEnd" signal.

8.7 Counter Selector

Selects which counter to configure.

Name	CounterSelector
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Counter0 Counter1

Standard	SFNC

Values description

- Counter0: Selects counter 0.
- Counter1: Selects counter 1.

8.8 Counter Status

Returns the current status of the counter.

Name	CounterStatus[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	CounterIdle CounterTriggerWait CounterActive CounterCompleted CounterOverflow
Standard	SFNC

Values description

- CounterIdle: The counter is disabled. To enable the counter, perform a counter reset.
- CounterTriggerWait: The counter is waiting to be started by a trigger on **CounterTriggerSource** or by the **CounterReset** command.
- CounterActive: The counter is counting for the specified **CounterDuration**.
- CounterCompleted: The counter has reached the **CounterDuration** count and is disabled. To enable the counter again, perform a counter reset.
- CounterOverflow: The counter has reached its maximum possible count.

8.9 Counter Trigger Activation

Specifies the activation mode of the **CounterTriggerSource** signal.

> Make sure that you specify the **CounterTriggerSource** before choosing a **CounterTriggerActivation** because not all activation values are available with all sources.

Name	CounterTriggerActivation[CounterSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write

Unit	-
Visibility	Expert
Values	RisingEdge FallingEdge AnyEdge LevelHigh LevelLow
Standard	SFNC

Values description

- RisingEdge: Starts the counter on the rising edge of the **CounterTriggerSource** signal.

- FallingEdge: Starts the counter on the falling edge of the **CounterTriggerSource** signal.

- AnyEdge: Starts the counter on the falling and rising edge of the **CounterTriggerSource** signal.

- LevelHigh: The counter counts as long as the level of the **CounterTriggerSource** signal is HIGH.

- LevelLow: The counter counts as long as the level of the **CounterTriggerSource** signal is LOW.

> The activation modes "LevelHigh" and "LevelLow" are recommended only for **CounterTriggerSource** "Line" 0, 1, 2, 3 or "UserOutput" 0, 1, 2, 3.

8.10 Counter Trigger Source

Selects the internal signal or physical input line that will be the source to start the counter.

> To start the counter, it must be reset first, either by the command **CounterReset** or by a signal on **CounterResetSource**. If you want to automatically reset the counter when starting it, choose **CounterResetSource** = "CounterTrigger".

> If a counter has the **CounterStatus** "CounterIdle" and its **CounterEventSource** is not "Off", you have to perform a **CounterReset**.

Name	CounterTriggerSource[CounterTriggerSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off AcquisitionTrigger AcquisitionTriggerMissed AcquisitionStart AcquisitionEnd LineTrigger

	LineTriggerMissed ExposureStart ExposureEnd Line0 Line1 Line2 Line3 UserOutput0 UserOutput1 UserOutput2 UserOutput3 Counter0Start Counter1Start Counter0End Counter1End Timer0Start Timer1Start Timer0End Timer1End ExposureTrigger ExposureTriggerMissed ReadOutStart ReadOutEnd
Standard	SFNC

Values description

- Off: Disables the counter trigger.

- AcquisitionTrigger: The counter starts with the reception of an "AcquisitionStart" trigger signal.

- AcquisitionTriggerMissed: The counter starts with the reception of the missed "AcquisitionStart" trigger signal.

- AcquisitionStart: The counter starts when an acquisition starts.

- AcquisitionEnd: The counter starts when an acquisition stops.

- LineTrigger: The counter starts with the reception of the "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- LineTriggerMissed: The counter starts with the reception a missed "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- ExposureStart: The counter starts when an exposure starts.

- ExposureEnd: The counter starts when an exposure stops.

- Line0: The counter is started by "Line0" (trigger input).

- Line1: The counter is started by "Line1" (flash output).

- Line2: The counter is started by "Line2" (GPIO 1).

- Line3: The counter is started by "Line3" (GPIO 2).

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: The counter is started by the selected "UserOutput".

- Counter0Start, Counter1Start: The counter starts with the reception of the selected "CounterStart" signal.

- Counter0End, Counter1End: The counter starts with the reception of the selected "CounterEnd" signal.

- Timer0Start, Timer1Start: The counter starts with the reception of the selected "TimerStart" signal.

- Timer0End, Timer1End: The counter starts with the reception of the selected "TimerEnd" signal.

- ExposureTrigger: The counter starts with the reception of the "ExposureStart" trigger signal.

- ExposureTriggerMissed: The counter starts with the reception of a missed "ExposureStart" trigger signal.

- ReadOutStart: The counter starts with the reception of the "ReadOutStart" signal.

- ReadOutEnd: The counter starts with the reception of the "ReadOutEnd" signal.

8.11 Counter Value

Reads or writes the current value of the selected counter.

Writing to **CounterValue** is typically used to set the start value.

Name	CounterValue[CounterSelector]
Category	CounterAndTimerControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	0 … 16777215 Increment: 1
Standard	SFNC

8.12 Counter Value At Reset

Reads the value of the selected counter at the time of its reset by the **CounterResetSource** or by the **CounterReset** command. **CounterValueAtReset** represents the last counter value latched before resetting the counter.

Name	CounterValueAtReset[CounterSelector]
Category	CounterAndTimerControl
Interface	Integer
Access	Read
Unit	-
Visibility	Expert
Values	≥ 0
Standard	SFNC

8.13 Timer Delay

Sets the delay to apply at the reception of a **TimerTriggerSource** signal before starting the timer.

Name	TimerDelay[TimerSelector]
Category	CounterAndTimerControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Expert
Values	0 ... 16777215 Increment: 1
Standard	SFNC

8.14 Timer Duration

Sets the duration for which the timer is counting. When the timer reaches the TimerDuration value, it stops counting. At the same time, a "TimerEnd" signal is generated, the **TimerStatus** changes to "TimerCompleted" and the "TimerActive" signal is set to LOW.

> If you want to record the duration of an operation, e.g. the **ExposureTime** (if **ExposureMode** is set to "TriggerControlled"), you should set the **TimerDuration** to its maximum value.

Name	TimerDuration[TimerSelector]
Category	CounterAndTimerControl
Interface	Float
Access	Read/Write
Unit	µs
Visibility	Expert
Values	0 ... 167777215 Increment: 1
Standard	SFNC

8.15 Timer Reset

Does a software reset of the selected timer.

Name	TimerReset[TimerSelector]
Category	CounterAndTimerControl
Interface	Command
Access	Write
Unit	-
Visibility	Expert

Values	-
Standard	SFNC

8.16 Timer Selector

Selects the timer to be configured.

Name	TimerSelector
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Timer0 Timer1
Standard	SFNC

Values description

- Timer0: Selects Timer 0.

- Timer1: Selects Timer 1.

8.17 Timer Status

Returns the current status of the timer.

Name	TimerStatus[TimerSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	TimerIdle TimerTriggerWait TimerActive TimerCompleted
Standard	SFNC

Values description

- TimerIdle: The timer is not activated. To enable the timer, choose a **TimerTriggerSource** different than "Off".

- TimerTriggerWait: The timer is waiting to be started by a trigger on **TimerTriggerSource**.

- TimerActive: The timer is counting for the specified **TimerDuration** or as long as the **TimerTriggerActivation** is valid ("LevelHigh" or "LevelLow").

- TimerCompleted: The timer has reached the **TimerDuration**.

8.18 Timer Trigger Activation

Specifies the activation mode of the **TimerTriggerSource** signal.

> Make sure that you specify the **TimerTriggerSource** before choosing a **TimerTriggerActivation** because not all activation values are available with all sources.

Name	TimerTriggerActivation[TimerSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	RisingEdge FallingEdge AnyEdge LevelHigh LevelLow
Standard	SFNC

Values description

- RisingEdge: Starts the timer on the rising edge of the **TimerTriggerSource** signal.

- FallingEdge: Starts the timer on the falling edge of the **TimerTriggerSource** signal.

- AnyEdge: Starts the timer on the falling and rising edge of the **TimerTriggerSource** signal.

- LevelHigh: The timer runs as long as the level of the **TimerTriggerSource** signal is HIGH.

- LevelLow: The timer runs as long as the level of the **TimerTriggerSource** signal is LOW.

8.19 Timer Trigger Source

Selects the internal signal or physical input line that will be the source to start the timer.

Name	TimerTriggerSource[TimerSelector]
Category	CounterAndTimerControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off AcquisitionTrigger AcquisitionTriggerMissed AcquisitionStart AcquisitionEnd LineTrigger LineTriggerMissed

	ExposureStart ExposureEnd Line0 Line1 Line2 Line3 UserOutput0 UserOutput1 UserOutput2 UserOutput3 Counter0Start Counter1Start Counter0End Counter1End Timer0Start Timer1Start Timer0End Timer1End ExposureTrigger ExposureTriggerMissed ReadOutStart ReadOutEnd
Standard	SFNC

Values description

- Off: Disables the timer trigger.

- AcquisitionTrigger: The timer starts with the reception of the "AcquisitionStart" trigger signal.

- AcquisitionTriggerMissed: The timer starts with the reception of a missed "AcquisitionStart" trigger signals.

- AcquisitionStart: The timer starts when an acquisition starts.

- AcquisitionEnd: The timer starts when an acquisition stops.

- LineTrigger: The timer starts with the reception of the "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- LineTriggerMissed:The timer starts with the reception of a missed "LineStart" trigger signal. Only available in **SensorOperationMode** "Linescan".

- ExposureStart: The timer starts when an exposure starts.

- ExposureEnd: The timer starts when an exposure stops.

- Line0 (trigger input), Line1 (flash output), Line2 (GPIO 1), Line3 (GPIO 2): The timer is started by the chosen I/O line.

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: The timer is started by the selected "UserOutput".

- Counter0Start, Counter1Start: The timer starts with the reception of the selected "CounterStart" signal.

- Counter0End, Counter1End: The timer starts with the reception of the selected "CounterEnd" signal.

- Timer0Start, Timer1Start: The timer starts with the reception of the selected "TimerStart" signal.

- Timer0End, Timer1End: The timer starts with the reception of the selected "TimerEnd" signal.

- ExposureTrigger: The timer starts with the reception of the "ExposureStart" trigger signal.

- ExposureTriggerMissed: The timer starts with the reception of a missed "ExposureStart" trigger signal.

- ReadOutStart: The timer starts with the reception of the "ReadOutStart" signal.

- ReadOutEnd: The timer starts with the reception of the "ReadOutEnd" signal.

8.20 Timer Value

Reads the current value of the selected timer.

Name	TimerValue[TimerSelector]
Category	CounterAndTimerControl
Interface	Float
Access	Read
Unit	µs
Visibility	Expert
Values	0 … 167777215 Increment: 1
Standard	SFNC

9 Test Control

This chapter contains the descriptions of all supported features from the category TestControl.

Name	TestControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Guru
Values	-
Standard	SFNC

9.1 Test Event Generate

Generates a test event.

Name	TestEventGenerate
Category	TestControl
Interface	Command
Access	Write
Unit	-
Visibility	Guru
Values	-
Standard	SFNC

9.2 Test Pending Ack

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

> ⓘ   This feature is only available when **GevGVCPPendingAck** is enabled.

Name	TestPendingAck
Category	TestControl
Interface	Integer
Access	Read/Write
Unit	ms
Visibility	Guru
Values	0 … 10000 Increment: 1
Standard	SFNC

10 Transfer Control

This chapter contains the descriptions of all supported features from the category Transfer Control.

The listed features control the transmission of the data acquired by the camera.

Name	TransferControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

10.1 Transfer Control Mode

Selects the control method for the transfers.

Name	TransferControlMode
Category	TransferControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Automatic
Standard	SFNC

Values description

- Automatic: The transfer flow control mechanism is controlled automatically. The transfer features are controlled by the acquisition features.

10.2 Transfer Queue Current Block Count

Returns the number of blocks currently in the transfer queue.

Name	TransferQueueCurrentBlockCount
Category	TransferControl
Interface	Integer
Access	Read
Unit	-
Visibility	Expert
Values	≥ 0
Standard	SFNC

10.3 Transfer Queue Max Block Count

Controls the maximum number of data blocks that can be stored in the block queue of the selected stream.

Name	TransferQueueMaxBlockCount
Category	TransferControl
Interface	Integer
Access	Read
Unit	-
Visibility	Expert
Values	> 0
Standard	SFNC

11 GigE Vision

This chapter contains the descriptions of all supported features from the GigE Vision category.

These features are GigE Vision specific functions of the transport layer.

Name	GigEVision
Category	TransportLayerControl
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

11.1 Gev MAC Address

MAC address of the camera.

Name	GevMACAddress
Category	GigEVision
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	Camera specific
Standard	SFNC

11.2 Gev Current IP Configuration Persistent IP

Controls if the IP address of the camera is persistent or dynamically assigned.

Name	GevCurrentIPConfigurationPersistentIP
Category	GigEVision
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Beginner
Values	True False
Standard	SFNC

Values description

- True: The IP address of the camera is persistent as specified in **GevCurrentIPAddress**.

- False: The IP address of the camera is dynamically assigned.

ℹ   The access changes to read-only during an acquisition.

11.3 Gev Current IP Configuration LLA

Controls the activation of the link local address IP.

Name	GevCurrentIPConfigurationLLA
Category	GigEVision
Interface	Boolean
Access	Read
Unit	-
Visibility	Beginner
Values	True
Standard	SFNC

Values description

- True: Activates the link local address IP

11.4 Gev Current IP Configuration DHCP

Controls the activation of the dynamic host configuration protocol IP.

Name	GevCurrentIPConfigurationDHCP
Category	GigEVision
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Beginner
Values	True False
Standard	SFNC

Values description

- True: Activates DHCP.
- False: Deactivates DHCP.

ℹ   The access changes to read-only during an acquisition.

11.5 Gev Current IP Address

Returns the IP address of the camera.

Name	GevCurrentIPAddress
Category	GigEVision
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

11.6 Gev Current Subnet Mask

Returns the subnet mask.

Name	GevCurrentSubnetMask
Category	GigEVision
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

11.7 Gev Current Default Gateway

Returns the default gateway IP address.

Name	GevCurrentDefaultGateway
Category	GigEVision
Interface	Integer
Access	Read
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

11.8 Gev Persistent IP Address

Controls the persistent IP address of the camera. It is only used when the camera boots with persistent IP enabled by **GevCurrentIPConfigurationPersistentIP**.

Name	GevPersistentIPAddress

Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

The access changes to read-only during an acquisition.

11.9 Gev Persistent Subnet Mask

Controls the persistent subnet mask associated with the persistent IP address of the camera. It is only used when the camera boots with persistent IP enabled by **GevCurrentIPConfigurationPersistentIP**.

Name	GevPersistentSubnetMask
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

The access changes to read-only during an acquisition.

11.10 Gev Persistent Default Gateway

Controls the persistent default gateway for the link to the camera. It is only used when the camera boots with persistent IP enabled by **GevCurrentIPConfigurationPersistentIP**.

Name	GevPersistentDefaultGateway
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

> The access changes to read-only during an acquisition.

11.11 Gev SCDA

Controls the destination IP address to which the camera is connected.

Name	GevSCDA
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Guru
Values	≥ 0
Standard	SFNC

> The access changes to read-only during an acquisition.

11.12 Gev GVCP Pending Ack

Enables the generation of PENDING_ACK.

Name	GevGVCPPendingAck
Category	GigEVision
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Guru
Values	True False
Standard	SFNC

Values description

- True: Enables the generation of PENDING_ACK.
- False: Disables the generation of PENDING_ACK.

11.13 Gev SCP Host Port

Controls the port of the selected channel to which a GVSP transmitter must send data stream or the port from which a GVSP receiver may receive data stream.

Name	GevSCPHostPort
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Guru
Values	≥ 0
Standard	SFNC

Values description

- Setting the value to 0 closes the stream channel.

The access changes to read-only during an acquisition.

11.14 Gev SCPD

Controls the stream channel packet delay. The unit is GEV timestamp counter ticks.

GevSCPD creates a delay between two packets that are sent over the stream channel. This increases the transmission time of the data and reduces the bandwidth. Manually adapting **GevSCPD** is not very straightforward. It is recommended to use **DeviceLinkThroughputLimit** instead.

Name	GevSCPD
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	≥ 0
Standard	SFNC

The access changes to read-only during an acquisition.

11.15 Gev SCPS Packet Size

Specifies the size of a stream packet that is sent on the stream channel. The unit of the packet size is bytes.

> This GigE Vision specific feature corresponds to **DeviceStreamChannelPacketSize** and should be kept in sync with it.

Name	GevSCPSPacketSize
Category	GigEVision
Interface	Integer
Access	Read/Write
Unit	Bytes
Visibility	Expert
Values	> 0
Standard	SFNC

> The access changes to read-only during an acquisition.

12 Brightness Auto Control

This chapter contains the descriptions of all supported features from the category Brightness Auto Control.

These features offer extended control over the automatic brightness features **ExposureAuto** and **GainAuto**.

- **BrightnessAutoExposureTimeLimitMode**, **BrightnessAutoExposureTimeMin** and **BrightnessAutoExposureTimeMax** allow to precisely define the allowed range of the exposure time for automatic adjustments, when **ExposureAuto** is active.

- **BrightnessAutoGainLimitMode**, **BrightnessAutoGainMin** and **BrightnessAutoGainMax** allow to precisely define the allowed range for gain for automatic adjustments, when **GainAuto** is active.

- With the features **BrightnessAutoPercentile**, **BrightnessAutoTarget** and **BrightnessAutoTargetTolerance** the algorithms of the automatic brightness features are adapted. This way, the camera image is kept brighter or darker - depending on your application.

Name	BrightnessAutoControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SICK

12.1 Brightness Auto Exposure Time Limit Mode

Enables or disables the limits for **BrightnessAutoExposureTimeMin** and **BrightnessAutoExposureTimeMax**. When **ExposureAuto** is active, the exposure time can vary within these limits.

Name	BrightnessAutoExposureTimeLimitMode
Category	BrigthnessAutoControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off On
Standard	SICK

Values description

- Off: Disables **BrightnessAutoExposureTimeMin** and **BrightnessAutoExposureTimeMax**. The range of the exposure time is only limited by sensor properties and **AcquisitionFrameRate**.

- On: Enables **BrightnessAutoExposureTimeMin** and **BrightnessAutoExposureTimeMax**. The range of the exposure time is limited by **BrightnessAutoExposureTimeMin** and **BrightnessAutoExposureTimeMax**.

12.2 Brightness Auto Exposure Time Max

Maximum limit of the exposure time when **ExposureAuto** is enabled and **BrightnessAutoExposureTimeLimitMode** is "On". When brightness auto features are active, the upper range of the exposure time will be limited by BrightnessAutoExposureTimeMax, even if the frame rate would allow for longer exposure.

Name	BrightnessAutoExposureTimeMax
Category	BrightnessAutoControl
Interface	Float
Access	Read
Unit	µs
Visibility	Expert
Values	≥ 0
Standard	SICK

12.3 Brightness Auto Exposure Time Min

Minimum limit of the exposure time when **ExposureAuto** is enabled and **BrightnessAutoExposureTimeLimitMode** is "On".

It is recommended to keep BrightnessAutoExposureTimeMin on its minimum value.

Name	BrightnessAutoExposureTimeMin
Category	BrightnessAutoControl
Interface	Float
Access	Read
Unit	µs
Visibility	Expert
Values	≥ 0
Standard	SICK

12.4 Brightness Auto Frame Rate Limit Mode

Controls how the **AcquisitionFrameRate** is limited when a brightness auto feature is active.

The **AcquisitionFrameRate** is always fixed if **ExposureAuto** or **GainAuto** are active. This way, your application will always deliver a constant frame rate, even if the illumination changes.

Name	BrightnessAutoFrameRateLimitMode
Category	BrightnessAutoControl
Interface	Enumeration

Access	Read/Write
Unit	-
Visibility	Expert
Values	Fixed
Standard	SICK

Values description

- Fixed: Keeps **AcquisitionFrameRate** fixed when a brightness auto feature is active.

12.5 Brightness Auto Gain Limit Mode

Enables or disables the limits for **BrightnessAutoGainMin** and **BrightnessAutoGainMax**. When **GainAuto** is active, the gain can vary within these limits.

Name	BrightnessAutoGainLimitMode
Category	BrightnessAutoControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off On
Standard	SICK

Values description

- Off: Disables **BrightnessAutoGainMin** and **BrightnessAutoGainMax**.
  The range of gain is only limited by sensor properties.

- On: Enables **BrightnessAutoGainMin** and **BrightnessAutoGainMax**.
  The range of gain is limited by **BrightnessAutoGainMin** and **BrightnessAutoGainMax**.

12.6 Brightness Auto Gain Max

Maximum limit of gain when **GainAuto** is enabled and **BrightnessAutoGainLimitMode** is "On".

Name	BrightnessAutoGainMax
Category	BrightnessAutoControl
Interface	Float
Access	Read
Unit	-
Visibility	Expert
Values	≥ 1
Standard	SICK

12.7 Brightness Auto Gain Min

Minimum limit of gain when **GainAuto** is enabled and **BrightnessAutoGainLimitMode** is "On".

> It is recommended to keep BrightnessAutoGainMin on its minimum value.

Name	BrightnessAutoGainMin
Category	BrightnessAutoControl
Interface	Float
Access	Read
Unit	-
Visibility	Expert
Values	≥ 1
Standard	SICK

12.8 Brightness Auto Percentile

Defines the percentage of pixels that must be brighter than **BrightnessAutoTarget**. BrightnessAutoPercentile is a parameter for brightness auto features like **ExposureAuto** and **GainAuto**.

> Increasing BrightnessAutoPercentile results in darker images, decreasing its value results in brighter images. If BrightnessAutoPercentile is set to its minimum and **BrightnessAutoTarget** to a high value, it behaves similar to a peak white algorithm.

Name	BrightnessAutoPercentile
Category	BrightnessAutoControl
Interface	Float
Access	Read/Write
Unit	%
Visibility	Expert
Values	0 … 100
Standard	SICK

12.9 Brightness Auto Target

Sets the target value for brightness auto features like **ExposureAuto** and **GainAuto**. The percentage of pixels, that must be brighter than BrightnessAutoTarget, is defined in **BrightnessAutoPercentile**.

> Increasing **BrightnessAutoTarget** results in brighter images, decreasing its value results in darker images. If **BrightnessAutoTarget** is set to a high value and **BrightnessAutoPercentile** is set to its minimum, it behaves similar to a peak white algorithm.

> It is not recommended to push **BrightnessAutoTarget** to its limits. Keep distance from the limits, i.e. use "250" instead of "255", or "5" instead of "0".

Name	BrightnessAutoTarget
Category	BrightnessAutoControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	> 0
Standard	SICK

Values description

The value of **BrightnessAutoTarget** relates to the current **PixelFormat**. Changing the **PixelFormat** will automatically adapt the value of **BrightnessAutoTarget**.

Example:

- PixelFormat: "Mono8"
  > BrightnessAutoTarget: "150"

- PixelFormat: "Mono10"
  > BrightnessAutoTarget: "600"

- PixelFormat: "Mono12"
  → BrightnessAutoTarget: "2400"

12.10 Brightness Auto Target Tolerance

Tolerance (in 8 bits) for **BrightnessAutoTarget**. Defines an acceptance interval that surrounds **BrightnessAutoTarget**. If the brightness auto algorithm reaches a value within this acceptance interval, the algorithm has converged.

Name	BrightnessAutoTargetTolerance
Category	BrightnessAutoControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Guru
Values	1 … 32 Increment: 1
Standard	SICK

13 PWM Control

This chapter contains the descriptions of all supported features from the category PWM Control.
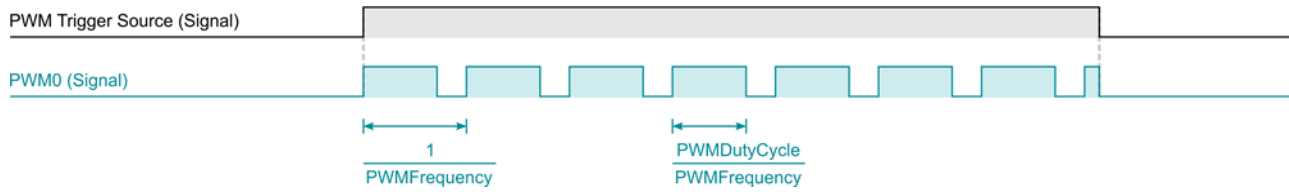
Fig. 8: Pulse-width modulation

Name	PWMControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SICK

13.1 PWM Duty Cylce

Specifies the duty cycle of the PWM. Defines the fraction of one pulse (in %) in which the PWM signal is HIGH.

Name	PWMDutyCycle
Category	PWMControl
Interface	Integer
Access	Read/Write
Unit	%
Visibility	Beginner
Values	0 … 100 Increment: 1
Standard	SICK

13.2 PWM Frequency

Specifies the frequency of the PWM pulse signal. The unit of the frequency is Hz.

Name	PWMFrequency
Category	PWMControl
Interface	Float
Access	Read/Write
Unit	Hz
Visibility	Beginner

Values	5 ... 100000 Increment: 0.01
Standard	SICK

13.3 PWM Selector

Selects which pulse width modulation module to configure.

Name	PWMSelector
Category	PWMControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	PWM0
Standard	SICK

Values description

- PWM0: Selects the "PWM0".

13.4 PWM Trigger Activation

Specifies the activation mode of the **PWMTriggerSource** signal.

Name	PWMTriggerActivation
Category	PWMControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	LevelHigh LevelLow
Standard	SICK

Values description

- LevelHigh: Specifies that the trigger is considered valid as long as the level of the **PWMTriggerSource** signal is HIGH.

- LevelLow: Specifies that the trigger is considered valid as long as the level of the **PWMTriggerSource** signal is LOW.

13.5 PWM Trigger Source

Selects the internal signal or physical input line that will be the source to start the PWM.

> ℹ️ On default, the PWM is active as long as the signal is HIGH. Changing the **PWMTriggerActivation** to "LevelLow", the PWM is active as long as the signal is LOW.

Name	PWMTriggerSource
Category	PWMControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off AcquisitionActive FrameActive ExposureActive UserOutput0 UserOutput1 UserOutput2 UserOutput3 Counter0Active Counter1Active Timer0Active Timer1Active Line0 Line1 Line2 Line3
Standard	SICK

Values description

- Off: Disables the PWM.

- AcquisitionActive: PWM is active as long as the camera acquires images.

- FrameActive: The PWM is active during the exposure of one image. Only available in **SensorOperationMode** "Linescan".

- ExposureActive: PWM is active during the exposure of images.

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: PWM is active while the chosen "UserOutput" is set to "True".

- Counter0Active, Counter1Active: PWM is active while the chosen counter is counting.

- Timer0Active, Timer1Active: PWM is active while the chosen timer is counting.

- Line0, Line1, Line2, Line3: PWM is active while the signal on the chosen line is HIGH.

14 Image Format Control

This chapter contains the descriptions of all supported features from the category Image Format Control.

The features in this chapter control and read image size and format. They are also used to capture and display image data.

- Features to reduce resolution and thus to optimize the cameras bandwidth are **BinningHorizontal**, **BinningVertical**, **DecimationHorizontal** and **DecimationVertical**.

- Transferring only a part of the complete camera image can be realized by defining a region of interest (ROI) with **Height**, **Width**, **OffsetX** and **OffsetY**.

- For controlling the color format and bit depth of the camera use **PixelFormat**.

- Additionally, this chapter also describes some sensor information features like **HeightMax**, **WidthMax**, **SensorHeight**, **SensorWidth**, **PixelSize**, **SensorPixelHeight**, **SensorPixelWidth**, **PixelColorFilter** and **SensorName**.

Name	ImageFormatControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

14.1 Binning Horizontal

This function combines pixels horizontally. This reduces the horizontal resolution (width) of the image by the specified horizontal binning factor.

> Note that for some camera models **BinningHorizontal** can only be set along with **BinningVertical**.

Name	BinningHorizontal[BinningSelector]
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	> 0
Standard	SFNC

Values description

- A value of 1 indicates that horizontal binning is not active.

> *i* This feature is not available with the **SensorOperationMode** "Linescan".

14.2 Binning Selector

Returns which binning engine is controlled by the **BinningHorizontal** and **BinningVertical** features.

Name	BinningSelector
Category	ImageFormatControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Sensor
Standard	SFNC

Values description

- Sensor: Selected features control the sensor binning.

14.3 Binning Vertical

This function combines pixels vertically. This reduces the vertical resolution (height) of the image by the specified vertical binning factor.

> *i* Note that for some camera models **BinningVertical** binning can only be set along with **BinningHorizontal**.

Name	BinningVertical[BinningSelector]
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	> 0
Standard	SFNC

Values description

- A value of 1 indicates that vertical binning is not active.

> *i* This feature is not available with the **SensorOperationMode** "Linescan".

14.4 Decimation Horizontal

Horizontal sub-sampling of the image. This reduces the horizontal resolution (width) of the image by the specified horizontal decimation factor.

Name	DecimationHorizontal
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	> 0
Standard	SFNC

14.5 Decimation Vertical

Vertical sub-sampling of the image. This reduces the vertical resolution (height) of the image by the specified vertical decimation factor.

Name	DecimationVertical
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	> 0
Standard	SFNC

This feature is not available with the **SensorOperationMode** "Linescan".

14.6 Height

Image height in pixels.

Name	Height
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	px
Visibility	Beginner
Values	> 0
Standard	SFNC

> ℹ️ The access changes to read-only during an acquisition.

14.7 Height Max

Maximum image height in pixels.

> ℹ️ **HeightMax** is calculated after vertical binning, decimation, or any other function changing the vertical dimension of the image.

Name	HeightMax
Category	ImageFormatControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	Camera specific
Standard	SFNC

14.8 Image Format Control Flags

Returns the status of binning and decimation features.

Name	ImageFormatControlFlags
Category	ImageFormatControl
Interface	Integer
Access	Read
Unit	-
Visibility	Guru
Values	≥ 0
Standard	SICK

14.9 Offset X

Horizontal offset in pixels from the origin to the region of interest.

Name	OffsetX
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	px
Visibility	Beginner

Values	≥ 0
Standard	SFNC

> ℹ️ **OffsetX** can only be greater than "0" if **Width** < **WidthMax**.

> ℹ️ The access changes to read-only during an acquisition.

14.10 Offset Y

Vertical offset in pixels from the origin to the region of interest.

Name	OffsetY
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Beginner
Values	≥ 0
Standard	SFNC

> ℹ️ **OffsetY** can only be greater than "0" if **Height** < **HeightMax**.

> ℹ️ The access changes to read-only during an acquisition.

14.11 Pixel Color Filter

Type of color filter that is applied to the image.

Name	PixelColorFilter
Category	ImageFormatControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	None BayerRG

	BayerGB BayerGR BayerBG
Standard	SFNC

Values description

- None: No color filter.

- BayerRG: Bayer filter where red is the first color and green is the second color of the first row.

- BayerGB: Bayer filter where green is the first color and blue is the second color of the first row.

- BayerGR: Bayer filter where green is the first color and red is the second color of the first row.

- BayerBG: Bayer filter where blue is the first color and green is the second color of the first row.

14.12 Pixel Format

Format of the image pixels. It represents all the information provided by **PixelSize** and **PixelColorFilter** combined in a single feature.

Name	PixelFormat
Category	ImageFormatControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Mono8 Mono10 Mono12 Mono10p Mono12p BayerRG8 BayerRG10 BayerRG12 BayerRG10p BayerRG12p RGB8 RGB10p32 BGR8 BGR10p32
Standard	SFNC

Values description

- Mono8: Monochrome, with an image size of 8 bits per pixel.

- Mono10: Monochrome, with an image size of 10 bits per pixel, unpacked.

- Mono12: Monochrome, with an image size of 12 bits per pixel, unpacked.

- Mono10p: Monochrome, with an image size of 10 bits per pixel, packed.

- Mono12p: Monochrome, with an image size of 12 bits per pixel, packed.

- BayerRG8: Bayer red green filter, with an image size of 8 bits per pixel.

- BayerRG10: Bayer red green filter, with an image size of 10 bits per pixel, unpacked.

- BayerRG12: Bayer red green filter, with an image size of 12 bits per pixel, unpacked.

- BayerRG10p: Bayer red green filter, with an image size of 10 bits per pixel, packed.

- BayerRG12p: Bayer red green filter, with an image size of 12 bits per pixel, packed.

- RGB8: Red, green, blue, with an image size of 8 bits per pixel.

- RGB10p32: Red, green, blue, 10 bits packed at an image size of 32 bits per pixel.

- BGR8: Blue, green, red, with an image size of 8 bits per pixel.

- BGR10p32: Blue, green, red, 10 bits packed at an image size of 32 bits per pixel.

> Debayered PixelFormats "RGB8", "RGB10p32", "BGR8" and "BGR10p32" are not available in the **SensorOperationMode** "Linescan".

> Some pixel formats might not be supported if you are using third party software. Make sure that your selected pixel format is supported.

14.13 Pixel Size

Total size in bits of a pixel.

Name	PixelSize
Category	ImageFormatControl
Interface	Enumeration
Access	Read/Write
Unit	bit
Visibility	Expert
Values	Bpp1 Bpp2 Bpp4 Bpp8 Bpp10 Bpp12 Bpp14 Bpp16 Bpp24 Bpp30 Bpp32 Bpp36 Bpp48 Bpp64

Standard	SFNC

Values description

- Bpp1: 1 bit per pixel.
- Bpp2: 2 bits per pixel.
- Bpp4: 4 bits per pixel.
- Bpp8: 8 bits per pixel.
- Bpp10: 10 bits per pixel.
- Bpp12: 12 bits per pixel.
- Bpp14: 14 bits per pixel.
- Bpp16: 16 bits per pixel.
- Bpp24: 24 bits per pixel.
- Bpp30: 30 bits per pixel.
- Bpp32: 32 bits per pixel.
- Bpp36: 36 bits per pixel.
- Bpp48: 48 bits per pixel.
- Bpp64: 64 bits per pixel.

14.14 Sensor Height

Effective height of the sensor in pixels.

Name	SensorHeight
Category	ImageFormatControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	Camera specific
Standard	SFNC

14.15 Sensor Name

Returns the product name of the imaging sensor.

Name	SensorName
Category	ImageFormatControl
Interface	String
Access	Read
Unit	-
Visibility	Guru

Values	Camera specific
Standard	SFNC

14.16 Sensor Pixel Height

Returns the physical pixel size in y direction. The unit of the size is micrometer (µm).

Name	SensorPixelHeight
Category	ImageFormatControl
Interface	Float
Access	Read
Unit	µm
Visibility	Guru
Values	Camera specific
Standard	SFNC

14.17 Sensor Pixel Width

Returns the physical pixel size in x direction. The unit of the size is micrometer (µm).

Name	SensorPixelWidth
Category	ImageFormatControl
Interface	Float
Access	Read
Unit	µm
Visibility	Guru
Values	Camera specific
Standard	SICK

14.18 Sensor Width

Effective width of the sensor in pixels.

Name	SensorWidth
Category	ImageFormatControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	Camera specific
Standard	SFNC

14.19 Test Pattern

Selects the type of test pattern that is generated by the camera as image source.

> If your camera has color gains > 1, some images might appear colored instead of gray. To see the true test image, you should display the RAW image data instead of a debayered RGB image representation.

Name	TestPattern
Category	ImageFormatControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off Black(FPGA) Chessboard(FPGA) ColorStripe(FPGA) Framecount(FPGA) Grayscale(FPGA) VerticalGrayscale(FPGA) White(FPGA) GreyHorizontalRamp GreyDiagonalRampMoving SequencePattern1 SequencePattern2
Standard	SFNC

Values description

- Off: No test pattern is generated. The image acquired by the sensor is displayed.

- Black(FPGA): The FPGA generates a black test image.

- Chessboard(FPGA): The FPGA generates a test image with alternating pixels from zero intensity and maximum intensity.

- ColorStripe(FPGA): The FPGA generates a color stripe test image.

- Framecount(FPGA): The FPGA generates a homogeneous test image that starts with zero intensity and gets brighter with each frame. When maximum intensity is reached the sequence starts again.

- Grayscale(FPGA): The FPGA generates a test image with a horizontal gradient. The gradient starts at zero intensity on the left side and reaches the maximum intensity on the right side.

- VerticalGrayscale(FPGA): The FPGA generates a test image with a vertical gradient. The gradient starts at zero intensity at the top of the image and reaches the maximum intensity at the bottom of the image.

- White(FPGA): The FPGA generates a white test image.

- ColorStripe(FPGA): The FPGA generates a color stripe test image.

The following test patterns are sensor specific and may vary depending on the sensor.

- GreyHorizontalRamp: The sensor generates a test image with a horizontal gradient. The gradient starts at zero intensity and reaches the maximum intensity in a horizontal direction.
- GreyVerticalRamp: The sensor generates a test image with a vertical gradient. The gradient starts at zero intensity and reaches the maximum intensity in a vertical direction.
- GreyDiagonalRamp: The sensor generates a test image with a diagonal gradient. The gradient starts at zero intensity and reaches the maximum intensity in a diagonal direction.
- GreyDiagonalRampMoving: The sensor generates a test image with a moving diagonal gradient. The gradient starts at zero intensity and reaches the maximum intensity in a diagonal direction. The ramp moves across the image.
- SequencePattern1: The sensor generates a test image with defined sequential pixel values.
- SequencePattern2: The sensor generates a test image with defined sequential pixel values.

14.20 Width

Image width in pixels.

Name	Width
Category	ImageFormatControl
Interface	Integer
Access	Read/Write
Unit	px
Visibility	Beginner
Values	> 0
Standard	SFNC

The access changes to read-only during an acquisition.

14.21 Width Max

Maximum image width in pixels.

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

Name	WidthMax
Category	ImageFormatControl
Interface	Integer

Access	Read
Unit	px
Visibility	Expert
Values	Camera specific
Standard	SFNC

15 Digital I/O Control

This chapter contains the descriptions of all supported features from the category Digital I/O Control.

The features in this chapter control the general input and output signals of the camera. This includes static signals such as user configurable input or output bits.

Name	DigitalIOControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

15.1 Line Format

Returns the current electrical format of the selected physical input or output line.

Name	LineFormat[LineSelector]
Category	DigitalIOControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	TriState OptoCoupled LVTTL
Standard	SFNC

Values description

- TriState: The line is currently in Tri-State mode (not driven).

- OptoCoupled: The line is galvanically isolated using an optocoupler to protect the camera and the PC against surges. Only DC voltages may be applied to the physical lines or pins.

- LVTTL: The line is currently accepting or sending LVTTL level signals.

15.2 Line Inverter

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

Name	LineInverter[LineSelector]
Category	DigitalIOControl
Interface	Boolean
Access	Read/Write

Unit	-
Visibility	Expert
Values	False True
Standard	SFNC

Values description

- False: The line signal is not inverted.

- True: The line signal is inverted.

15.3 Line Mode

Controls if the physical line is used as input or output.

Name	LineMode[LineSelector]
Category	DigitalIOControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Input Output
Standard	SFNC

Values description

- Input: The selected physical line is used as input.

- Output: The selected physical line is used as output.

15.4 Line Selector

Selects the physical line (or pin) of the external device connector to configure.

Name	LineSelector
Category	DigitalIOControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Line0 Line1 Line2 Line3
Standard	SFNC

The General Purpose I/O (Line2, Line3) is not potential-free and has no protective circuit. Faulty wiring (overvoltage, undervoltage) could cause damage to the electronics.

"Line0" and "Line1" are galvanically isolated using an optocoupler to protect the camera and the PC against surges. Only DC voltages may be applied to the physical lines or pins.

Values description

- Line0: Physical input line that e.g. serves as trigger input (**LineMode** = "Input" only).
- Line1: Physical output line that e.g. serves as flash output (**LineMode** = "Output" only).
- Line2, Line3: General purpose I/O (Line2=GPIO1, Line3=GPIO2) that can be used as input or output. To configure the line as input, change **LineMode** to "Input". To configure the line as output, change **LineMode** to "Output".

15.5 Line Source

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

LineSource is only applied when **LineMode** is set to "Output".

Name	LineSource[LineSelector]
Category	DigitalIOControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	Off UserOutput0 UserOutput1 UserOutput2 UserOutput3 AcquisitionActive FrameActive ExposureActive Counter0Active Counter1Active Timer0Active Timer1Active PWM0 ReadOutActive
Standard	SFNC

Values description

- Off : Line output is disabled.

- UserOutput0, UserOutput1, UserOutput2, UserOutput3: The current **UserOutputValue** of the chosen user output.

- AcquisitionActive: The camera is currently acquiring images.

- FrameActive: The camera is currently capturing one image. Only available in **SensorOperationMode** "Linescan".

- ExposureActive: The camera is exposing an image.

- Counter0Active, Counter1Active: The chosen counter is active.

- Timer0Active, Timer1Active: The chosen timer is active.

- PWM0: The PWM output.

- ReadOutActive: The camera is currently doing a sensor readout of an image.

15.6 Line Status

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

Name	LineStatus[LineSelector]
Category	DigitalIOControl
Interface	Boolean
Access	Read
Unit	-
Visibility	Expert
Values	True False
Standard	SFNC

Values description

- True: The level of the line signal is HIGH.

- False: The level of the line signal is LOW.

15.7 Line Status All

Returns the current status of all available line signals. The status is written in a single bitfield.

Name	LineStatusAll
Category	DigitalIOControl
Interface	Integer
Access	Read
Unit	-
Visibility	Expert
Values	≥ 0

Standard	SFNC

15.8 User Output Selector

Selects which bit of the user output register will be set by **UserOutputValue**.

Name	UserOutputSelector
Category	DigitalIOControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	UserOutput0 UserOutput1 UserOutput2 UserOutput3
Standard	SFNC

Values description

- UserOutput0: Selects the bit 0 of the user ouput register.

- UserOutput1: Selects the bit 1 of the user ouput register.

- UserOutput2: Selects the bit 2 of the user ouput register.

- UserOutput3: Selects the bit 3 of the user ouput register.

15.9 User Output Value

Sets the value of the bit selected by **UserOutputSelector**.

Name	UserOutputValue[UserOutputSelector]
Category	DigitalIOControl
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Expert
Values	True False
Standard	SFNC

Values description

- True: The value of the bit is set to 1 (True).

- False: The value of the bit is set to 0 (False).

15.10 User Output Value All

Sets all user output values at once. It is subject to the **UserOutputValueAllMask**.

Name	UserOutputValueAll
Category	DigitalIOControl
Interface	Integer
Access	Read/Write
Unit	-
Visibility	Expert
Values	Camera specific
Standard	SFNC

> If you set **UserOutputValueAll** to "0xE" (binary 1110) and **UserOutputValueAllMask** is ≥ "0xF", the value of "UserOutput0" will be set to "False" and the values of "UserOutput1", "UserOutput2" and "UserOutput3" will be set to "True".

Hex	Binary	UserOutput3	UserOutput2	UserOutput1	UserOutput0
0x0	0000	0	0	0	0
0x1	0001	0	0	0	1
0x2	0010	0	0	1	0
0x3	0011	0	0	1	1
0x4	0100	0	1	0	0
0x5	0101	0	1	0	1
0x6	0110	0	1	1	0
0x7	0111	0	1	1	1
0x8	1000	1	0	0	0
0x9	1001	1	0	0	1
0xA	1010	1	0	1	0
0xB	1011	1	0	1	1
0xC	1100	1	1	0	0
0xD	1101	1	1	0	1
0xE	1110	1	1	1	0
0xF	1111	1	1	1	1

15.11 User Output Value All Mask

Sets the write mask for **UserOutputValueAll** before writing the user output values. Only those bits of **UserOutputValueAll** are changed whose corresponding bit in the mask is set to 1.

Name	UserOutputValueAllMask
Category	DigitalIOControl
Interface	Integer

Access	Read/Write
Unit	-
Visibility	Expert
Values	Camera specific
Standard	SFNC

> If you set the **UserOutputValueAllMask** to "0xE" (binary: 1110), all values of **UserOutputValueAll** will be written except the value for "UserOutput0".

Hex	Binary	UserOutput3	UserOutput2	UserOutput1	UserOutput0
0x0	0000	0	0	0	0
0x1	0001	0	0	0	1
0x2	0010	0	0	1	0
0x3	0011	0	0	1	1
0x4	0100	0	1	0	0
0x5	0101	0	1	0	1
0x6	0110	0	1	1	0
0x7	0111	0	1	1	1
0x8	1000	1	0	0	0
0x9	1001	1	0	0	1
0xA	1010	1	0	1	0
0xB	1011	1	0	1	1
0xC	1100	1	1	0	0
0xD	1101	1	1	0	1
0xE	1110	1	1	1	0
0xF	1111	1	1	1	1

16 Chunk Data Control

This chapter contains the descriptions of all supported features from the category Chunk Data Control.

These features define and control chunks, which are selected data blocks that are treated as a transport unit.

With chunks you can attach additional information to the image data. These information, e.g. **ExposureTime** or **Gain**, are included in the payload of the image.

Name	ChunkDataControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Expert
Values	-
Standard	SFNC

16.1 Chunk Enable

Enables the inclusion of the selected chunk data in the payload of the image.

> With **ChunkEnable** and **ChunkSelector** you can control which information should be included in the chunk data. To activate chunk data, you must set **ChunkModeActive** to "True".

> Chunk data can only be enabled, when the "ExposureStart" trigger is active.

Name	ChunkEnable[ChunkSelector]
Category	ChunkDataControl
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Expert
Values	True False
Standard	SFNC

Values description

- True: Enables the selected chunk.
- False: Disables the selected chunk.

16.2 Chunk Exposure Time

Returns the exposure time of the image included in the payload.

Name	ChunkExposureTime
Category	ChunkDataControl
Interface	Float
Access	Read
Unit	µs
Visibility	Expert
Values	≥ 0
Standard	SFNC

16.3 Chunk Gain

Returns the selected gain of the image included in the payload.

Name	ChunkGain[ChunkGainSelector]
Category	ChunkDataControl
Interface	Float
Access	Read
Unit	-
Visibility	Expert
Values	Camera specific
Standard	SFNC

16.4 Chunk Gain Selector

Controls, which gain is selected for **ChunkGain**.

Name	ChunkGainSelector
Category	ChunkDataControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	AnalogAll DigitalAll
Standard	SFNC

Values description

- AnalogAll: Selects the "AnalogAll" gain.
- DigitalAll: Selects the "DigitalAll" gain.

16.5 Chunk Height

Returns the **Height** of the image included in the payload.

Name	ChunkHeight
Category	ChunkDataControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	> 0
Standard	SFNC

16.6 Chunk Mode Active

Activates the inclusion of the chunk data in the payload of the image.

> **ⓘ** **ChunkModeActive** can only be enabled, when the "<u>ExposureStart</u>" trigger is active.

Name	ChunkModeActive
Category	ChunkDataControl
Interface	Boolean
Access	Read/Write
Unit	-
Visibility	Expert
Values	True False
Standard	SFNC

Values description

- True: Chunk data is included in the payload of the image.

- False: Chunk data is not included in the payload of the image.

16.7 Chunk Offset X

Returns the **OffsetX** of the image included in the payload.

Name	ChunkOffsetX
Category	ChunkDataControl
Interface	Integer
Access	Read
Unit	px

Visibility	Expert
Values	≥ 0
Standard	SFNC

16.8 Chunk Offset Y

Returns the **OffsetY** of the image included in the payload.

Name	ChunkOffsetY
Category	ChunkDataControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	≥ 0
Standard	SFNC

16.9 Chunk Pixel Format

Returns the **PixelFormat** of the image included in the payload.

Name	ChunkPixelFormat
Category	ChunkDataControl
Interface	Enumeration
Access	Read
Unit	-
Visibility	Expert
Values	Mono8 Mono10 Mono12 Mono10p Mono12p BayerRG8 BayerRG10 BayerRG12 BayerRG10p BayerRG12p RGB8 RGB10p32 BGR8 BGR10p32
Standard	SFNC

Values description

- Mono8: Monochrome, with an image size of 8 bits per pixel.

- Mono10: Monochrome, with an image size of 10 bits per pixel, unpacked.

- Mono12: Monochrome, with an image size of 12 bits per pixel, unpacked.

- Mono10p: Monochrome, with an image size of 10 bits per pixel, packed.

- Mono12p: Monochrome, with an image size of 12 bits per pixel, packed.

- BayerRG8: Bayer red green filter, with an image size of 8 bits per pixel.

- BayerRG10: Bayer red green filter, with an image size of 10 bits per pixel, unpacked.

- BayerRG12: Bayer red green filter, with an image size of 12 bits per pixel, unpacked.

- BayerRG10p: Bayer red green filter, with an image size of 10 bits per pixel, packed.

- BayerRG12p: Bayer red green filter, with an image size of 12 bits per pixel, packed.

- RGB8: Red, green, blue, with an image size of 8 bits per pixel.

- RGB10p32: Red, green, blue, 10 bits packed at an image size of 32 bits per pixel.

- BGR8: Blue, green, red, with an image size of 8 bits per pixel.

- BGR10p32: Blue, green, red, 10 bits packed at an image size of 32 bits per pixel.

16.10 Chunk Selector

Selects which chunk to enable or control.

Name	ChunkSelector
Category	ChunkDataControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	OffsetX OffsetY Width Height PixelFormat ExposureTime Gain
Standard	SFNC

Values description

- OffsetX: Selects **OffsetX** as chunk.

- OffsetY: Selects **OffsetY** as chunk.

- Width: Selects **Width** as chunk.

- Height: Selects **Height** as chunk.

- PixelFormat: Selects **PixelFormat** as chunk.

- ExposureTime: Selects the exposure time as chunk.

- Gain: Selects the gain as chunk.

16.11 Chunk Width

Returns the **Width** of the image included in the payload.

Name	ChunkWidth
Category	ChunkDataControl
Interface	Integer
Access	Read
Unit	px
Visibility	Expert
Values	> 0
Standard	SFNC

17 Image Correction Control

This chapter contains the descriptions of all supported features from the category Image Correction Control.

Name	ImageCorrectionControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SICK

17.1 Color Correction Matrix

Sets the matrix for color correction.

> ℹ Color correction can be enabled or disabled using **ColorCorrectionMode**.

Name	ColorCorrectionMatrix
Category	ImageCorrectionControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Expert
Values	HQ
Standard	SICK

Values description

- HQ: Predefined color correction matrix for IR cut-off filter for high quality color rendering (HQ filter).

17.2 Color Correction Mode

Controls if the color correction is active. If color correction is active, the **ColorCorrectionMatrix** is used to enhance color rendering.

> ℹ Color correction is only available if the selected **PixelFormat** is a debayered format.

Name	ColorCorrectionMode
Category	ImageCorrectionControl

Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Off On
Standard	SICK

Values description

- Off: Disables color correction.

- On: Enables color correction.

18 Transport Layer Control

This chapter contains the descriptions of all generic supported features from the category Transport Layer Control.

Name	TransportLayerControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

18.1 Payload Size

Provides the number of bytes transferred for each image or chunk on the stream channel. This includes any end-of-line, end-of-frame statistics or other stamp data. This is the total size of data payload for a data block.

Name	PayloadSize
Category	TransportLayerControl
Interface	Integer
Access	Read
Unit	Byte
Visibility	Expert
Values	≥ 0
Standard	SFNC

19 User Set Control

This chapter contains the descriptions of all supported features from the category User Set Control.

It describes the features for global control of the camera settings. The features allow loading and saving factory settings as well as user-defined settings.

Predefined user sets allow to switch between different operation modes like "Linescan" or "LongExposure".

Name	UserSetControl
Category	Root
Interface	Category
Access	Read
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

> The following camera settings are not saved in the user sets:
> - **DeviceUserID**
> - Any settings from the **GigEVision** category.
> - Any settings from the **LUTControl** category.

> User-defined UserSets (UserSet0 and UserSet1) are not imported in the case of a firmware update. If you use user-defined UserSets, make sure that you can set up them again after the firmware update.

19.1 User Set Default

Defines which user set has to be loaded and activated by default when the device is reset.

> If "Default" is selected, the camera will boot with the default settings and makes sure that the continuous acquisition is ready to be used.

Name	UserSetDefault
Category	UserSetControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Default Linescan LinescanHighSpeed LongExposure UserSet0 UserSet1

Standard	SFNC

Values description

- Default: The user set "Default" is loaded and activated when the device is reset.

- Linescan: The user set "Linescan" is loaded and activated when the device is reset.

- LinescanHighSpeed: The user set "LinescanHighSpeed" is loaded and activated when the device is reset.

- LongExposure: The user set "LongExposure" is loaded and activated when the device is reset.

- UserSet0: The user set "UserSet0" is loaded and activated when the device is reset.

- UserSet1: The user set "UserSet1" is loaded and activated when the device is reset.

19.2 User Set Load

Loads the user set that is specified by **UserSetSelector** to the camera and activates it.

Name	UserSetLoad
Category	UserSetControl
Interface	Command
Access	Write
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

The access changes to not-available during an acquisition. The access to user-defined user sets ("UserSet0" and "UserSet1") is only available when camera settings have been saved to the user sets via **UserSetSave**.

19.3 User Set Save

Saves the camera parameters into the user defined user set that is specified by **UserSetSelector**.

Name	UserSetSave
Category	UserSetControl
Interface	Command
Access	Write
Unit	-
Visibility	Beginner
Values	-
Standard	SFNC

The access changes to not-available during an acquisition. And the access changes to not-available if a predefined user set, e.g. "Default" or "Linescan" is specified by **UserSetSelector**.

19.4 User Set Selector

Selects the user set that has to be loaded, saved or configured. User sets do include the LUT settings.

Name	UserSetSelector
Category	UserSetControl
Interface	Enumeration
Access	Read/Write
Unit	-
Visibility	Beginner
Values	Default Linescan LinescanHighSpeed LongExposure UserSet0 UserSet1
Standard	SFNC

Values description

- Default: Selects the default setting. Loading the user set "Default" guarantees a state where a continuous acquisition is started that uses only the mandatory features. It is compatible with the most applications.
  > Sets the **SensorOperationMode** to "Default".

- Linescan: Selects the "Linescan" user set. It is the optimized setting for line scan mode without line loss. The exposure time is set to its minimum. Onboard Debayering is not available. The scan line is vertically centered and the default image height is set to 1024. The **SensorHeight** defines the height of the scan line and is set to "1" for mono cameras and "2" for color cameras.
  > Sets the **SensorOperationMode** to "Linescan".

- LinescanHighSpeed: Selects the "LinescanHighSpeed" user set. It is the speed optimized setting for line scan mode and only available for mono cameras. Lines may be lost between two frames. The exposure time is set to its minimum. Onboard Debayering is not available. The scan line is vertically centered and the default image height is set to 1024. The **SensorHeight** defines the height of the scan line and is set to "1"
  > Sets the **SensorOperationMode** to "LinescanSensor".

- LongExposure: Selects the "LongExposure" user set. It is the optimized setting for long exposure mode. The **PixelFormat** is set to a bit depth higher than 8 bit, if available, and the source gain of the sensor is adjusted.
  > Sets the **SensorOperationMode** to "LongExposure".

- UserSet0: Selects the user defined setting "UserSet0".

- UserSet1: Selects the user defined setting "UserSet1".

Loading a user set can affect the availability and behavior of multiple camera features.
The following parameters are only available if a user set for **SensorOperationMode** "Linescan" has been loaded:

- "LineTrigger" and "LineTriggerMissed" signals as source for timers and counters at the features **TimerTriggerSource**, **CounterTriggerSource**, **CounterEventSource** and **CounterResetSource**.
- "FrameActive" as source for the PWM and output lines at the features **PWMTriggerSource** and **LineSource**.
- **AcquisitionLineRate** for acquisitions with untriggered lines.
- **TriggerSelector** values "LineStart" and "FrameStart".

The **SensorOperationMode** "Linescan" is subject to the following restrictions:

- **ExposureAuto** and **GainAuto** are not available.
- **BinningHorizontal** and **BinningVertical** are not available.
- **DecimationVertical** is not available.
- Debayered **PixelFormats** "RGB8", "BGR8", "RGB10p32" and "BGR10p32" are not available.
- **TriggerSelector** is limited to the values "LineStart" and "FrameStart".

20 Glossary

Bpp: Bits per pixel

DC: Direct current

DHCP: Dynamic host configuration protocol

DN: Digital Number

GVSP: GigE Vision Stream Protocol

LUT: Lookup table

LVTTL: Low-voltage TTL (LVTTL) is a special form of transistor-transistor logic in which the supply voltage is reduced from 5 V to 3.3 V.

PENDING_ACK: Some Transport Layer Protocols might support that the device responds (within the DeviceLinkCommandTimeout period) that the completion of a particularly long command will be delayed by a specific amount of time. This notion is generally known as a "Pending Acknowledge" command.

PWM: Pulse-width modulation

SCPD: Stream channel packet delay

SFNC: Standard features naming convention

TL: Transport layer

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