CHROMASENS

Offline User Manual for allPIXA neo Version 1.1.0

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Safety

Safety instructions

- Operate the device only in a faultless and safe condition.
- Modifications and extensions to the device are only permitted if the prior written consent of Chromasens GmbH is obtained.
- Comply with the ambient conditions described in this manual.
- During operation do not touch the hot surface of the device.
- During operation do not use detergents on the device.

Meaning of the signal words, safety signs and graphical symbols

Signal words

The following signal words are used in this manual:

Signal word	Meaning, consequences if not prevented
DANGER	Warns of an imminent hazardous situation which results in death or serious injury.
WARNING	Warns of a potential hazardous situation, which could result in death or serious injury.
CAUTION	Warns of a potential hazardous situation, which could result in minor or moderate injury.
NOTICE	Warns of a hazardous situation, which can result in material damage or environmental damage.

Safety signs and graphical symbols

The following safety signs and graphical symbols are used:

Sign	Meaning
	Warning of dangerous electrical voltage
	Warning of falling items
	Warning of hot surface
	Warning of potential damage to the device
	Indicates that electrical and electronic equipment should not be disposed with normal garbage at the end of its working life.

Personnel requirements

Untrained person

The untrained person has been instructed by the operating company or an authorised representative of the operating company (qualified personnel) about the tasks assigned to him and the possible dangers in case of improper behaviour. The untrained person has been instructed about the protective measures and the operating tasks. The untrained person has sufficient knowledge of the national language, both written and spoken.

Qualified personnel

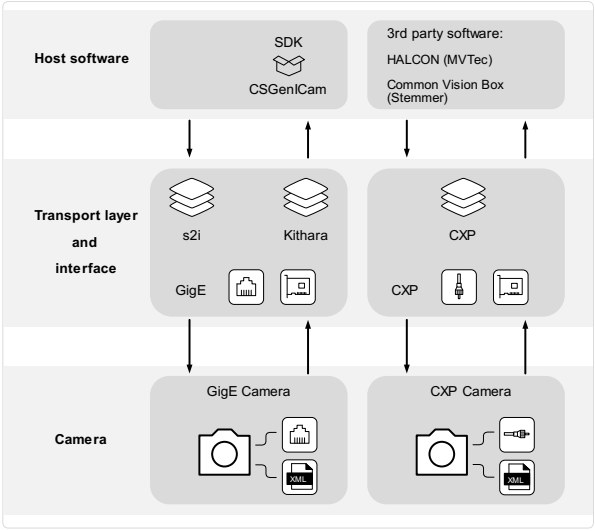
Qualified personnel are persons who, due to their professional training, knowledge and experience as well as knowledge of the relevant standards and regulations, carry out the work assigned to them, assess it and independently recognize possible dangers independently. The person knows the operating instructions of the machine. Skilled personnel are mechanics, electricians and technicians.

Assignment of the tasks

Task	Untrained person	Qualified personnel
Installation	Prohibited	Allowed
Programming	Prohibited	Allowed
Calibration	Prohibited	Allowed
Testing	Prohibited	Allowed
Cleaning	Allowed	Allowed
Repairing	Prohibited	Prohibited

Overview

The cameras offer CMOS performance with CCD image quality. There are line rates possible of up to 300 kHz.
The cameras fulfill the GenICam standard communication protocol. You can set up the camera, browse and adjust parameters with every tool that fulfills the GenICam standard. The provided Chromasens GCT software is available for Windows and Linux.



Scheme of the communication between a host and the camera

Firmware and software version

This documentation refers to the following version:

Camera: Packet 1.1.0

Feature reference

For detailed information on camera controls refer to the feature reference. It describes the standard and advanced camera control.

Make sure that you always refer to the feature reference that matches the used firmware version.

Software GCT

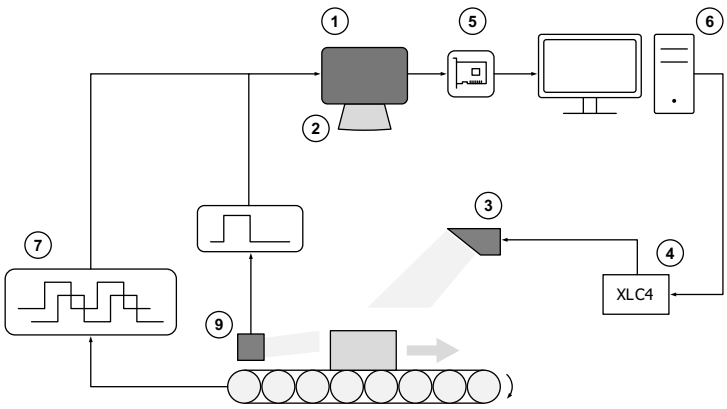
Refer to the GCT documentation for the following information:

- Installation and use
- Configuration of the PC depending on the camera interface

Intended use

- The device is designed for machines and systems which are used for commercial and industrial applications.
- The device is designed for contactless optical detection of primarily two dimensional objects.
- The device may only be connected or used as described in this manual.
- Do not use the device in safety relevant control circuits and potentially explosive environment.

Line scan system



1	Line scan camera: Scans the image line by line and communicates with the PC.	**2**	Optical system: Lenses and mounts
3	Illumination: Lights up the information carrier/scan area.	**4**	Illumination controller: Controls and monitors the illumination unit.
5	Cables and suitable network card or frame grabber in the PC: The image data are sent to a PC.	**6**	PC: The PC performs subsequent processing of the image data and can optionally control the illumination system.
7	Speed detection: The speed of the object/conveyor belt can be detected by an optional incremental encoder. The encoder can be connected to the camera.	**8**	Conveying unit: Moves the scanned object.
9	Frame trigger: A light barrier can be used to detect the object and start the image acquisition on time. The frame trigger can be connected to the camera.		

Overview

The allPIXA neo line scan cameras are available with the GigE interface and the CXP interface. The available sensor resolutions are 4k and 6k. The cameras support color and mono.
The rating plate is located on the rear of the camera. It shows the sensor resolution and the serial number.

Available cameras

Camera	Order number	Interface	Sensor type
allPIXA neo 4k 10GigE Mono	CP000660-04K-77-M1-A1	GigE	Mono
allPIXA neo 4k 10GigE Color	CP000660-04K-77-C1-A1	GigE	Color + Mono
allPIXA neo 6k 10GigE Mono	CP000660-06K-77-M1-A1	GigE	Mono
allPIXA neo 6k 10GigE Color	CP000660-06K-77-C1-A1	GigE	Color + Mono
allPIXA neo 6k 10GigE Color-NIR	CP000660-06K-77-C2-A1	GigE	Color + NIR
allPIXA neo 4k CXP Mono (on request)	CP000660-04K-44-M1-A1	CXP	Mono
allPIXA neo 4k CXP Color	CP000660-04K-44-C1-A1	CXP	Color + Mono
allPIXA neo 6k CXP Mono (on request)	CP000660-06K-44-M1-A1	CXP	Mono
allPIXA neo 6k CXP Color	CP000660-06K-44-C1-A1	CXP	Color + Mono
allPIXA neo 6k CXP Color-NIR	CP000660-06K-44-C2-A1	CXP	Color + NIR

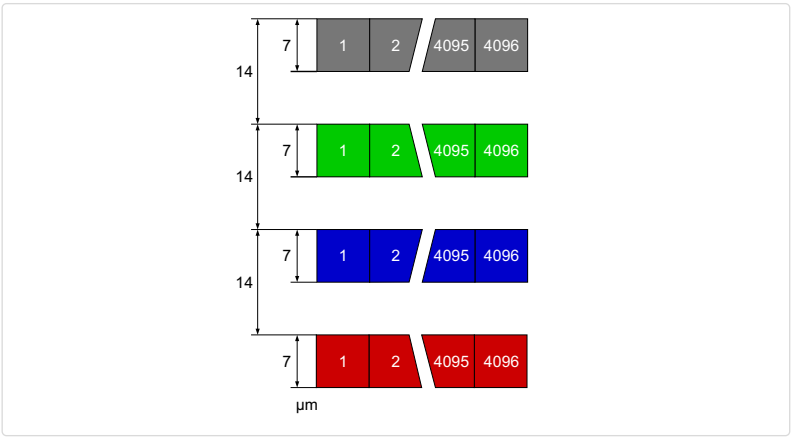
allPIXA neo 4k GigE

Camera specifications

Sensor	CMOS
Pixel size	7 µm × 7 µm
Line spacing	7 µm between M-G & G-B & B-R
Spectral sensitivity	400 nm – 960 nm
Resolution	4096 × 4 lines
Full well capacity	10 ke⁻ and 40 ke⁻
Video output	Single 10 GigE, GigE Vision® 2.0 compliant
Data format	3 × 8/10/12 Bit color **or** 1 × 8/10/12 Bit mono **or** 4 × 8/10/12 RGB + Mono
Trigger Mode	Frame Start / Frame Active / Frame Burst Start / Line Start / External Encoder
Video output port	RJ45 (10GBase-T)
Digital I/O port	External I/O (15 pin HD D-Sub, male)
Power supply	PoE (Power over Ethernet) or digital I/O port: 12 – 24V DC ± 10 %; 0.5 A @ 24 V
Debugging port	-
Lens mount / adapter	M42 × 1 mm / F-Mount, TFL
Housing dimensions	62 mm × 62 mm × 62 mm
Weight	0,35 kg
Temperature during operation	0 °C – 60 °C; 32 °F – 140 °F
Humidity during operation	
Temperature during transport and storage	-20 °C – +85 °C; -4 °F – +185 °F
Protection category	IP50
Certifications	CE, RoHS
General ambient conditions	
Transport	IEC 721-3-3:IE33
Operation	IEC 721-3-3:IE21
Storage	IEC 721-3-3:IE11

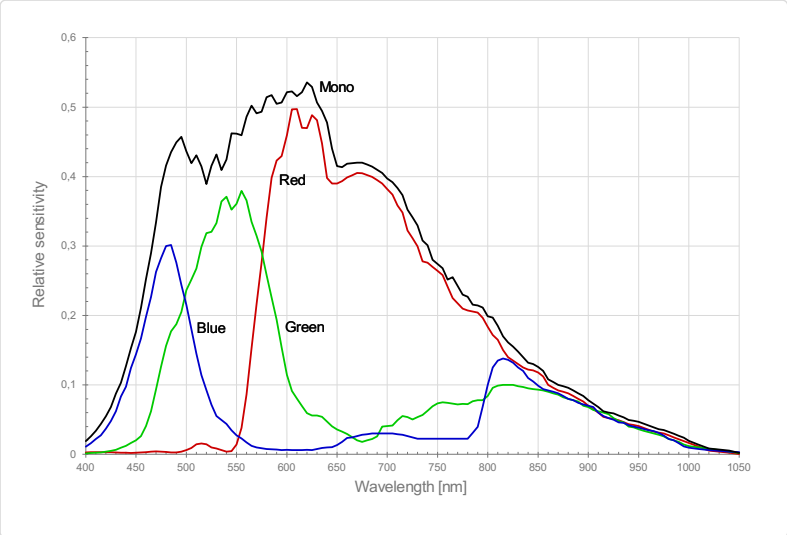
Line scan sensor

Sensor pixel arrangement



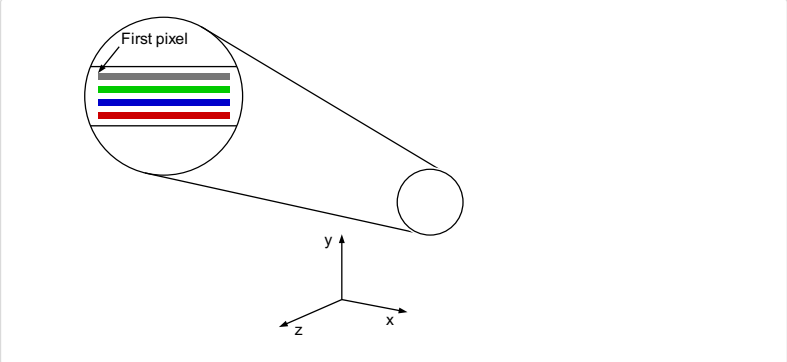
Sensor line spacing and pixel arrangement of the 4k sensor

Spectral sensitivity



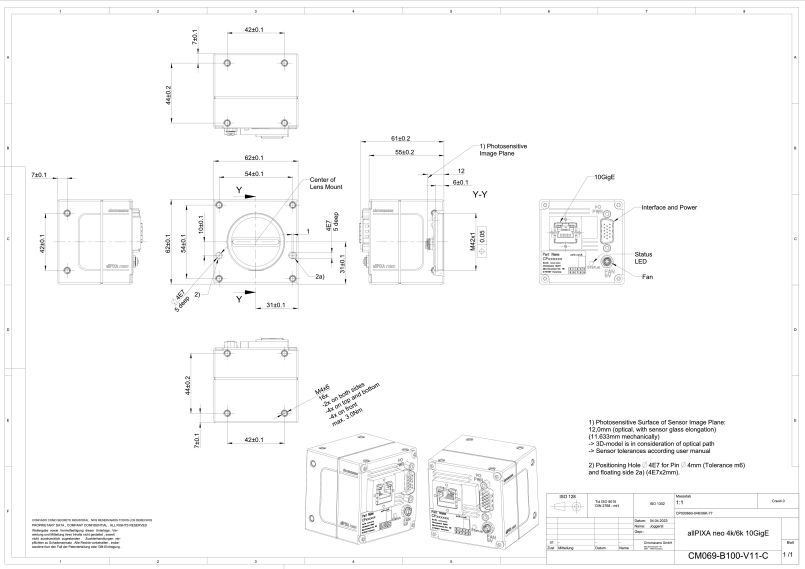
Measured relative sensitivity of the color and the mono sensor

Sensor alignment and orientation



Alignment and orientation of the 4k sensor: Color + Mono

Mechanical dimensions



Dimensional drawing of the allPIXA neo 4k/6k 10GigE

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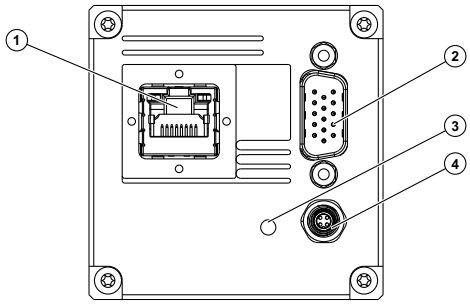
Download dimensional drawing of the allPIXA neo 4k/6k 10GigE

Interface specification



1	Video output port 10GigE (RJ45) and power supply	**2**	Digital I/O port and power supply
3	Status LED	**4**	Connector for additional fan

Line rate

Configuration (8 bit)	Line rate
Mono	270 kHz
RGB	90 kHz
RGB + Mono (NIR)	70 kHz

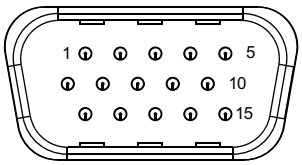
Power supply

You can either use Power over Ethernet (PoE) or the power supply of the external digital I/O port.

Digital I/O port

The following connector is required for the digital I/O port:

- 15 pin HD D-Sub (female)



Pin allocation D-Sub connector (male) of the camera

You can configure the digital I/O port as RS422 or as single-ended input or output. It is also possible to configure one output as RS422 and the other output as single-ended.

RS422 configuration

Pin	Line definition for RS422 configuration	Signal RS422	Configuration proposal
1	Line 1	In1+	Encoder Source A, Line Start
2		In1–	Encoder Source A\, Line Start\
3	Line 2	In2+	Encoder Source B, Fame Start, Frame Active
4		In2–	Encoder Source B\, Fame Start\, Frame Active\
5	GND (Signals)		Signals Ground
6	Line 3	In3+/Out3+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7		In3–/Out3–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output3-
8	Line 4	In4+/Out4+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+, MS-In+
9		In4–/Out4–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output4-, MS-In-
10	GND (PWR)		Camera Power Ground
11	Line 5	Out5+	User Output5+, MS-Out+
12		Out5–	User Output5-, MS-Out-
13	Line 6	Out6+	User Output6+
14			User Output6-
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

Single-Ended (SE) configuration

The input threshold voltage can be configured globally to 3.3 V, 5 V, 12 V and 24 V. The Maximum input voltage is 28 V.

Pin	Line definition for Single-Ended configuration	Signal Single-Ended	Configuration proposal
1	Line 1	In1 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source A, Line Start
2	--	--	--
3	Line 2	In2 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source B, Fame Start, Frame Active
4	--	--	--
5	GND (Signals)		Signals Ground
6	Line 3	In3 (3.3 V, 5 V, 12 V, 24 V) Out3 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7	--	--	--
8	Line 4	In4 (3.3 V, 5 V, 12 V,24 V) Out4 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+
9	--	--	--
10	GND (PWR)		Camera Power Ground
11	Line 5	In5 (3.3 V) Out5 (3.3 V)	LED Flash Out 3, User Output5
12	Line 7	In7 (3.3 V) Out7 (3.3 V)	LED Flash Out 2, User Output7
13	Line 6	In6 (3.3 V) Out6 (3.3 V)	LED Flash Out 0, User Output6
14	Line 8	In8 (3.3 V) Out8 (3.3 V)	LED Flash Out 1, User Output8
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

LED status indicator

Color code	Behavior	Description
	Off	No power supply or the input voltage is out of range.
	Blue continuous	The device is OK and provides image data. Between image gaps the LED is off.
	Green continuous	The device is in power-up mode.
	Green blinking	The device is OK and ready.
	Yellow continuous	Warning-state: The device is operational.
	Red continuous	Error-state: The device is not operational.

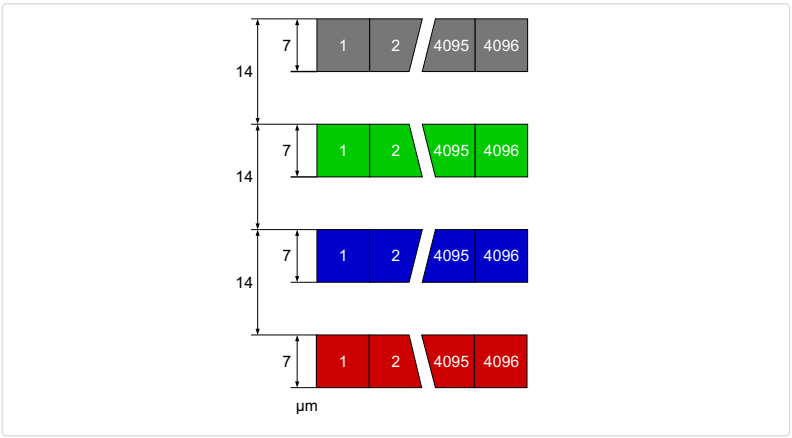
allPIXA neo 4k CXP

Camera specifications

Sensor	CMOS
Pixel size	7 µm × 7 µm
Line spacing	7 µm between M-G & G-B & B-R
Spectral sensitivity	400 nm – 960 nm
Resolution	4096 × 4 lines
Full well capacity	10 ke⁻ and 40 ke⁻
Video output	2 × CoaXPress 2.0
Data format	3 × 8/10/12 Bit color **or** 1 × 8/10/12 Bit mono **or** 4 × 8/10/12 RGB + Mono
Trigger Mode	Frame Start / Frame Active / Frame Burst Start / Line Start / External Encoder
Video output port	2 × CXP-12 Micro-BNC
Digital I/O port	External I/O (15 pin HD D-Sub, male)
Power supply	PoC (Power over CoaXPress) or digital I/O port: 12 – 24V DC ± 10 %; 0.5 A @ 24 V
Debugging port	-
Lens mount / adapter	M42 × 1 mm / F-Mount, TFL
Housing dimensions	62 mm × 62 mm × 62 mm
Weight	0,35 kg
Temperature during operation	0 °C – 60 °C; 32 °F – 140 °F
Humidity during operation	
Temperature during transport and storage	-20 °C – +85 °C; -4 °F – +185 °F
Protection category	IP50
Certifications	CE, RoHS
General ambient conditions	
Transport	IEC 721-3-3:IE33
Operation	IEC 721-3-3:IE21
Storage	IEC 721-3-3:IE11

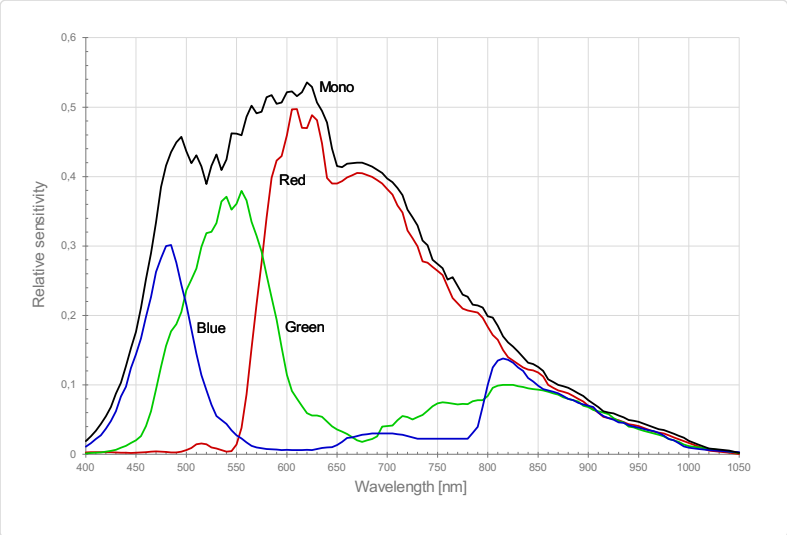
Line scan sensor

Sensor pixel arrangement



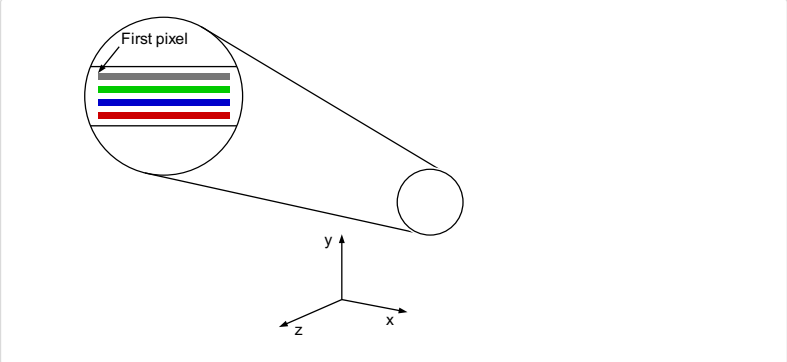
Sensor line spacing and pixel arrangement of the 4k sensor

Spectral sensitivity



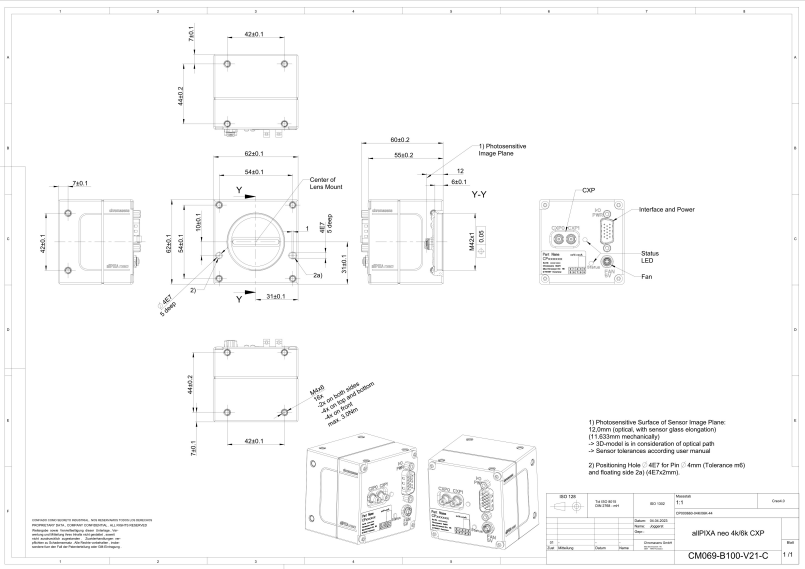
Measured relative sensitivity of the color and the mono sensor

Sensor alignment and orientation



Alignment and orientation of the 4k sensor: Color + Mono

Mechanical dimensions



Dimensional drawing of the allPIXA neo 4k/6k CXP

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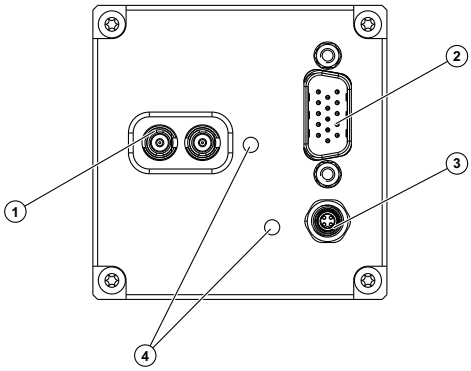
Download dimensional drawing of the allPIXA neo 4k/6k CXP

Interface specification



1	Video output port (2 × CoaXPress 2.0) and power supply	**2**	Digital I/O port and power supply
3	Connector for additional fan	**4**	Status LED

Line rate

Configuration (8 bit)	Line rate
Mono	300 kHz
RGB	105 kHz
RGB + Mono (NIR)	80 kHz

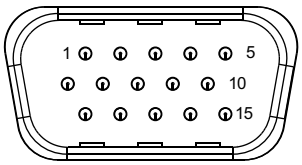
Power supply

You can either use Power over CoaXPress (PoC) or the power supply of the external digital I/O port.

Digital I/O port

The following connector is required for the digital I/O port:

- 15 pin HD D-Sub (female)



Pin allocation D-Sub connector (male) of the camera

You can configure the digital I/O port as RS422 or as single-ended input or output. It is also possible to configure one output as RS422 and the other output as single-ended.

RS422 configuration

Pin	Line definition for RS422 configuration	Signal RS422	Configuration proposal
1	Line 1	In1+	Encoder Source A, Line Start
2		In1–	Encoder Source A\, Line Start\
3	Line 2	In2+	Encoder Source B, Fame Start, Frame Active
4		In2–	Encoder Source B\, Fame Start\, Frame Active\
5	GND (Signals)		Signals Ground
6	Line 3	In3+/Out3+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7		In3–/Out3–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output3-
8	Line 4	In4+/Out4+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+, MS-In+
9		In4–/Out4–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output4-, MS-In-
10	GND (PWR)		Camera Power Ground
11	Line 5	Out5+	User Output5+, MS-Out+
12		Out5–	User Output5-, MS-Out-
13	Line 6	Out6+	User Output6+
14			User Output6-
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

Single-Ended (SE) configuration

The input threshold voltage can be configured globally to 3.3 V, 5 V, 12 V and 24 V. The Maximum input voltage is 28 V.

Pin	Line definition for Single-Ended configuration	Signal Single-Ended	Configuration proposal
1	Line 1	In1 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source A, Line Start
2	--	--	--
3	Line 2	In2 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source B, Fame Start, Frame Active
4	--	--	--
5	GND (Signals)		Signals Ground
6	Line 3	In3 (3.3 V, 5 V, 12 V, 24 V) Out3 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7	--	--	--
8	Line 4	In4 (3.3 V, 5 V, 12 V,24 V) Out4 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+
9	--	--	--
10	GND (PWR)		Camera Power Ground
11	Line 5	In5 (3.3 V) Out5 (3.3 V)	LED Flash Out 3, User Output5
12	Line 7	In7 (3.3 V) Out7 (3.3 V)	LED Flash Out 2, User Output7
13	Line 6	In6 (3.3 V) Out6 (3.3 V)	LED Flash Out 0, User Output6
14	Line 8	In8 (3.3 V) Out8 (3.3 V)	LED Flash Out 1, User Output8
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

LED status indicator

Color code	Behaviour	Description
	Off	No power supply or the input voltage is out of range.
	Solid orange	The system is booting.
	Flash_1_1red	The device is powered but not connected (not applicable to a device reliant on PoCXP power).
	AlternateFlash_12_5 green/orange; shown for a minimum of 1s even if connection detection is faster	The Connection detection is in progress, PoCXP is active.
	Flash_12_5 orange; shown for a minimum of 1s even if connection detection is faster	The Connection detection is in progress, PoCXP is not in use.
	AlternateFlash_0_5 red/green	The device/host is incompatible, PoCXP is active.
	AlternateFlash_0_5 red/orange	The device/host is incompatible, PoCXP is not in use.
	Solid red	PoCXP is over-current (host only).
	Solid green	The device/host is connected, but no data is transferred.
	Flash_1_ orange	The device/host is connected, waiting for event (e.g. trigger).
	Flash_12_5 green	The device/host is connected, data is being transferred.
	500ms red pulse	Error during data transfer (e.g. CRC error, single-bit error) is detected. In case of multiple errors, there shall be at least two green Flash_12_5 pulses, before the next error is indicated.
	AlternateFlash_0_5 green/orange	A connection test packet is being sent.
	AlternateFlash_0_5 red/green/orange	The compliance test mode is enabled (device only).
	Flash_12_5 red	A system error (e.g. internal error) ocurred.

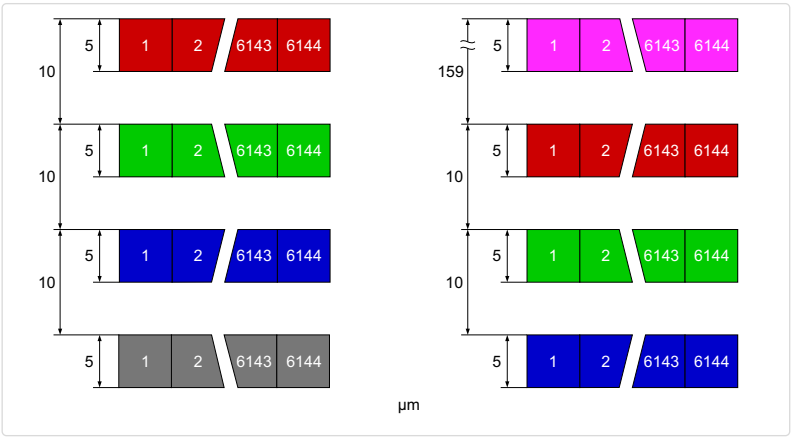
allPIXA neo 6k GigE

Camera specifications

Sensor	CMOS
Pixel size	5 µm × 5 µm
Line spacing	5 µm between R-G & G-B & B-M, for NIR 195 µm between NIR-R
Spectral sensitivity	400 nm – 960 nm
Resolution	6144 × 4 lines
Full well capacity	10 ke⁻ and 40 ke⁻
Video output	Single 10 GigE, GigE Vision® 2.0 compliant
Data format	3 × 8/10/12 Bit color **or** 1 × 8/10/12 Bit mono **or** 4 × 8/10/12 RGB + Mono
Trigger Mode	Frame Start / Frame Active / Frame Burst Start / Line Start / External Encoder
Video output port	RJ45 (10GBase-T)
Digital I/O port	External I/O (15 pin HD D-Sub, male)
Power supply	PoE (Power over Ethernet) or digital I/O port: 12 – 24V DC ± 10 %; 0.5 A @ 24 V
Debugging port	-
Lens mount / adapter	M42 × 1 mm / F-Mount, TFL
Housing dimensions	62 mm × 62 mm × 62 mm
Weight	0,35 kg
Temperature during operation	0 °C – 60 °C; 32 °F – 140 °F
Humidity during operation	
Temperature during transport and storage	-20 °C – +85 °C; -4 °F – +185 °F
Protection category	IP50
Certifications	CE, RoHS
General ambient conditions	
Transport	IEC 721-3-3:IE33
Operation	IEC 721-3-3:IE21
Storage	IEC 721-3-3:IE11

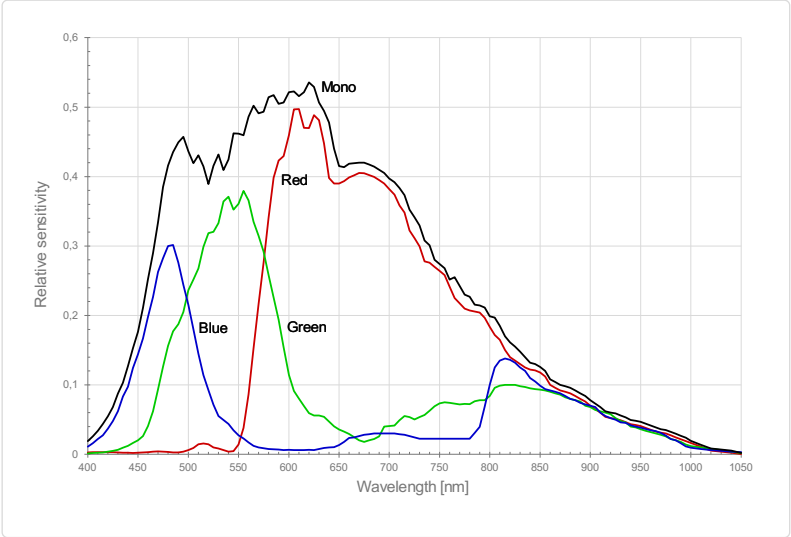
Line scan sensor

Sensor pixel arrangement

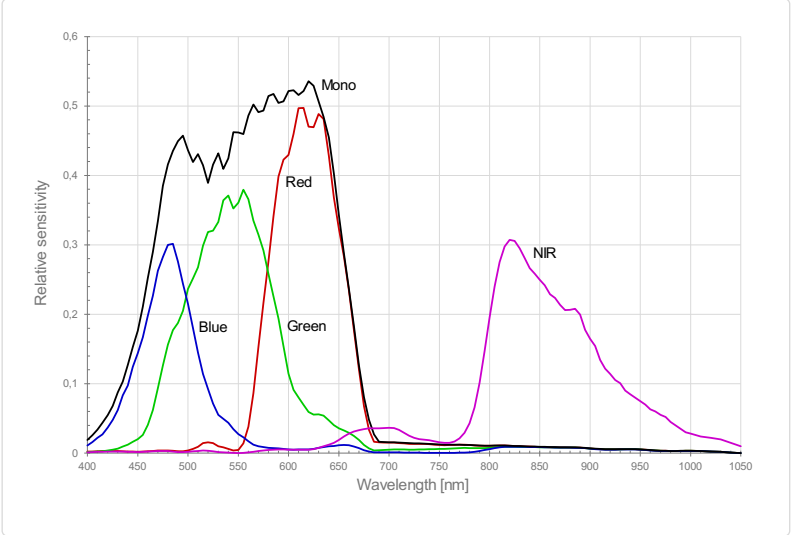


Left: Sensor line spacing and pixel arrangement of the 6k sensor
Right: Sensor line spacing and pixel arrangement of the 6k sensor with NIR

Spectral sensitivity

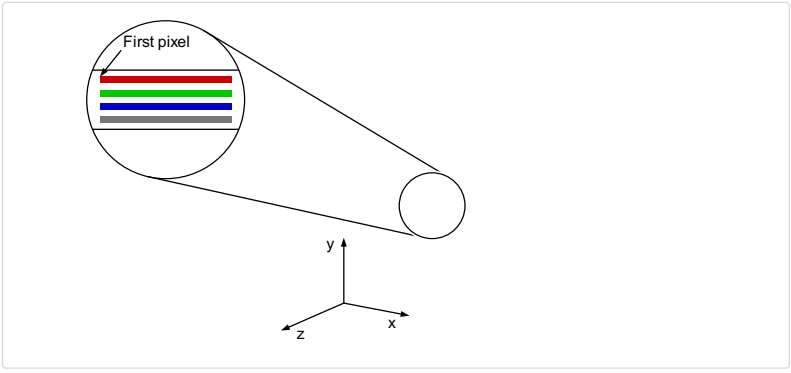


Measured relative sensitivity of the color and the mono sensor

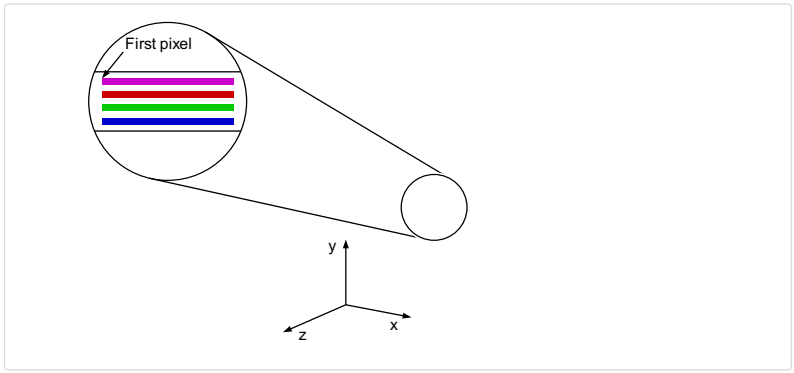


Measured relative spectral sensitivity of the 6k sensor with NIR

Sensor alignment and orientation

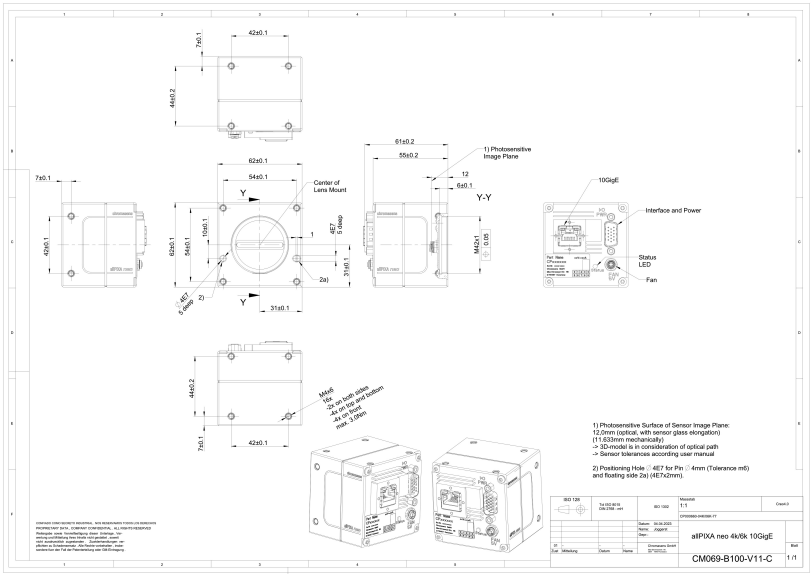


Alignment and orientation of the 6k sensor: Color + Mono



Alignment and orientation of the 6k sensor: Color + NIR

Mechanical dimensions



Dimensional drawing of the allPIXA neo 4k/6k 10GigE

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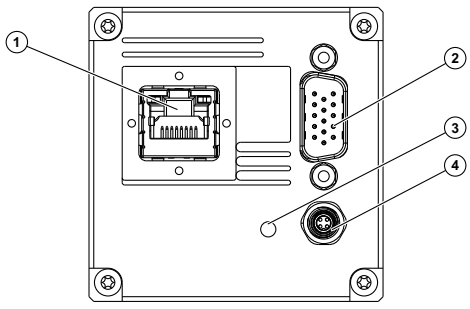
Download dimensional drawing of the allPIXA neo 4k/6k 10GigE

Interface specification



1	Video output port 10GigE (RJ45) and power supply	**2**	Digital I/O port and power supply
3	Status LED	**4**	Connector for additional fan

Line rate

Configuration (8 bit)	Line rate
Mono	180 kHz
RGB	58 kHz
RGB + Mono (NIR)	45 kHz

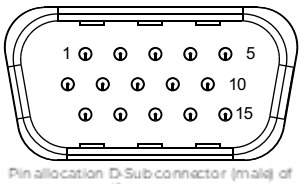
Power supply

You can either use Power over Ethernet (PoE) or the power supply of the external digital I/O port.

Digital I/O port

The following connector is required for the digital I/O port:

- 15 pin HD D-Sub (female)



Pin allocation D-Sub connector (male) of the camera

You can configure the digital I/O port as RS422 or as single-ended input or output. It is also possible to configure one output as RS422 and the other output as single-ended.

RS422 configuration

Pin	Line definition for RS422 configuration	Signal RS422	Configuration proposal
1	Line 1	In1+	Encoder Source A, Line Start
2		In1–	Encoder Source A\, Line Start\
3	Line 2	In2+	Encoder Source B, Fame Start, Frame Active
4		In2–	Encoder Source B\, Fame Start\, Frame Active\
5	GND (Signals)		Signals Ground
6	Line 3	In3+/Out3+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7		In3–/Out3–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output3-
8	Line 4	In4+/Out4+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+, MS-In+
9		In4–/Out4–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output4-, MS-In-
10	GND (PWR)		Camera Power Ground
11	Line 5	Out5+	User Output5+, MS-Out+
12		Out5–	User Output5-, MS-Out-
13	Line 6	Out6+	User Output6+
14			User Output6-
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

Single-Ended (SE) configuration

The input threshold voltage can be configured globally to 3.3 V, 5 V, 12 V and 24 V. The Maximum input voltage is 28 V.

Pin	Line definition for Single-Ended configuration	Signal Single-Ended	Configuration proposal
1	Line 1	In1 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source A, Line Start
2	--	--	--
3	Line 2	In2 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source B, Fame Start, Frame Active
4	--	--	--
5	GND (Signals)		Signals Ground
6	Line 3	In3 (3.3 V, 5 V, 12 V, 24 V) Out3 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7	--	--	--
8	Line 4	In4 (3.3 V, 5 V, 12 V,24 V) Out4 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+
9	--	--	--
10	GND (PWR)		Camera Power Ground
11	Line 5	In5 (3.3 V) Out5 (3.3 V)	LED Flash Out 3, User Output5
12	Line 7	In7 (3.3 V) Out7 (3.3 V)	LED Flash Out 2, User Output7
13	Line 6	In6 (3.3 V) Out6 (3.3 V)	LED Flash Out 0, User Output6
14	Line 8	In8 (3.3 V) Out8 (3.3 V)	LED Flash Out 1, User Output8
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

LED status indicator

Color code	Behavior	Description
	Off	No power supply or the input voltage is out of range.
	Blue continuous	The device is OK and provides image data. Between image gaps the LED is off.
	Green continuous	The device is in power-up mode.
	Green blinking	The device is OK and ready.
	Yellow continuous	Warning-state: The device is operational.
	Red continuous	Error-state: The device is not operational.

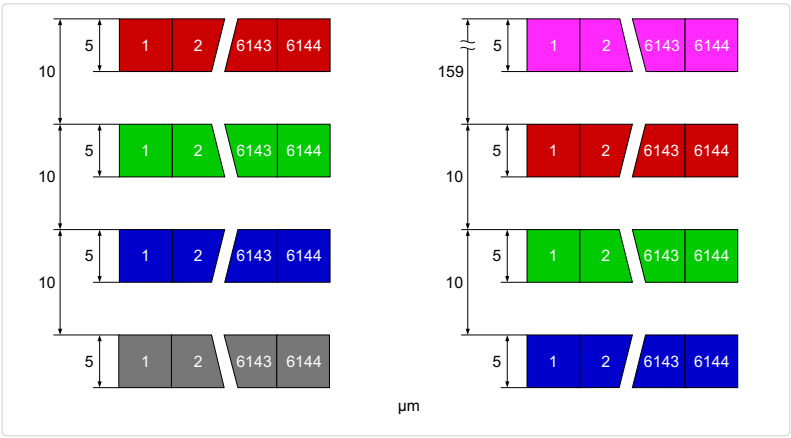
allPIXA neo 6k CXP

Camera specifications

Sensor	CMOS
Pixel size	5 µm × 5 µm
Line spacing	5 µm between R-G & G-B & B-M, for NIR 195 µm between NIR-R
Spectral sensitivity	400 nm – 960 nm
Resolution	6144 × 4 lines
Full well capacity	10 ke⁻ and 40 ke⁻
Video output	2 × CoaXPress 2.0
Data format	3 × 8/10/12 Bit color **or** 1 × 8/10/12 Bit mono **or** 4 × 8/10/12 RGB + Mono
Trigger Mode	Frame Start / Frame Active / Frame Burst Start / Line Start / External Encoder
Video output port	2 × CXP-12 Micro-BNC
Digital I/O port	External I/O (15 pin HD D-Sub, male)
Power supply	PoC (Power over CoaXPress) or digital I/O port: 12 – 24V DC ± 10 %; 0.5 A @ 24 V
Debugging port	-
Lens mount / adapter	M42 × 1 mm / F-Mount, TFL
Housing dimensions	62 mm × 62 mm × 62 mm
Weight	0,35 kg
Temperature during operation	0 °C – 60 °C; 32 °F – 140 °F
Humidity during operation	
Temperature during transport and storage	-20 °C – +85 °C; -4 °F – +185 °F
Protection category	IP50
Certifications	CE, RoHS
General ambient conditions	
Transport	IEC 721-3-3:IE33
Operation	IEC 721-3-3:IE21
Storage	IEC 721-3-3:IE11

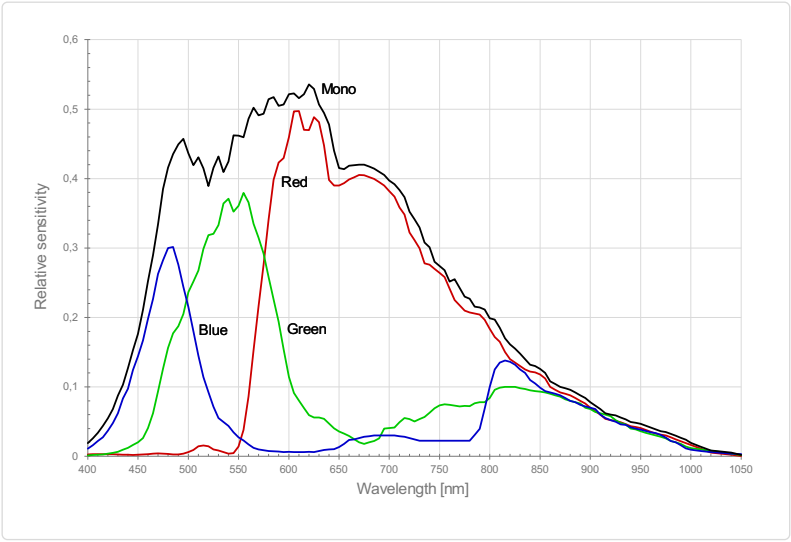
Line scan sensor

Sensor pixel arrangement

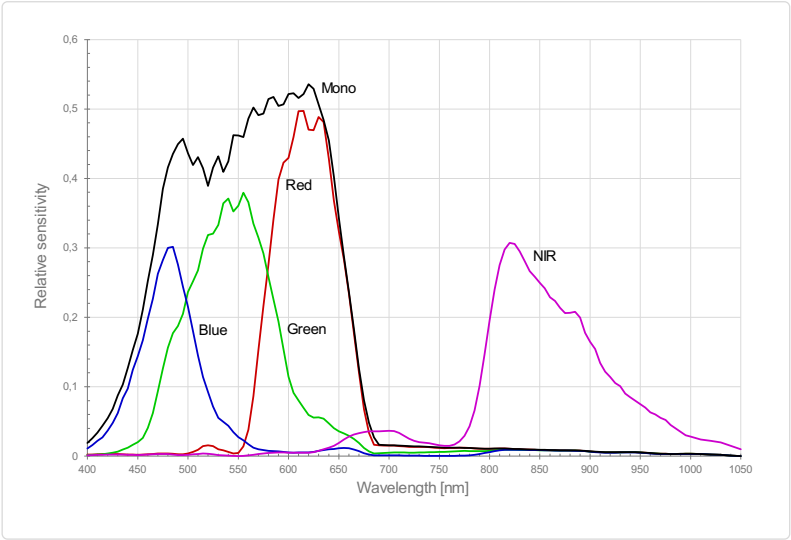


Left: Sensor line spacing and pixel arrangement of the 6k sensor
Right: Sensor line spacing and pixel arrangement of the 6k sensor with NIR

Spectral sensitivity

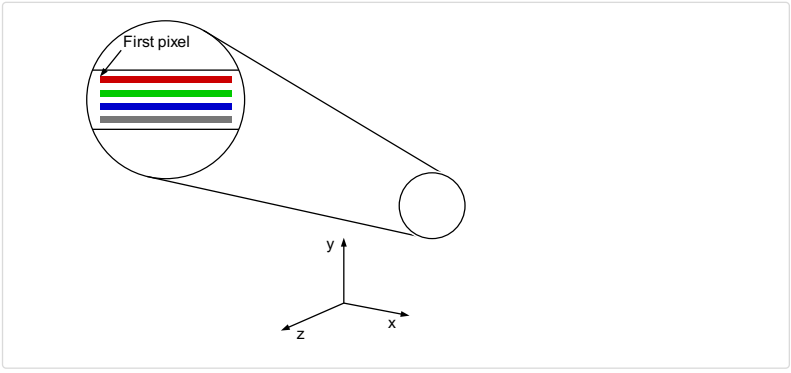


Measured relative sensitivity of the color and the mono sensor

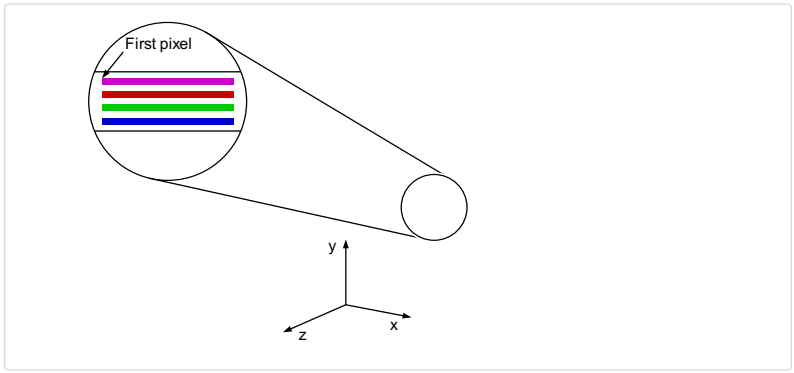


Measured relative spectral sensitivity of the 6k sensor with NIR

Sensor alignment and orientation

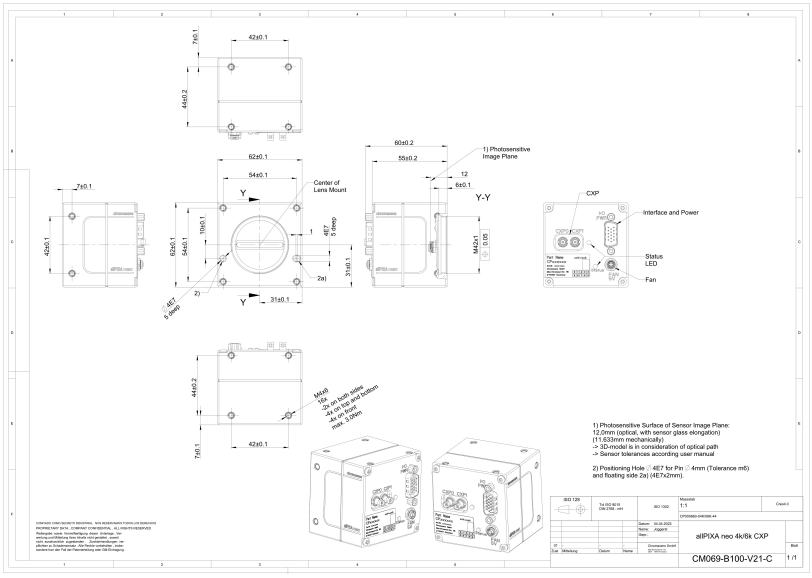


Alignment and orientation of the 6k sensor: Color + Mono



Alignment and orientation of the 6k sensor: Color + NIR

Mechanical dimensions

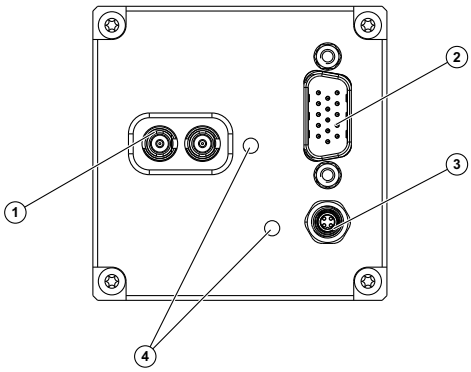


Dimensional drawing of the allPIXA neo 4k/6k CXP

Download as pdf-file

Download dimensional drawing of the allPIXA neo 4k/6k CXP

Interface specification



1	Video output port (2 × CoaXPress 2.0) and power supply	**2**	Digital I/O port and power supply
3	Connector for additional fan	**4**	Status LED

Line rate

Configuration (8 bit)	Line rate
Mono	240 kHz
RGB	80 kHz
RGB + Mono (NIR)	60 kHz

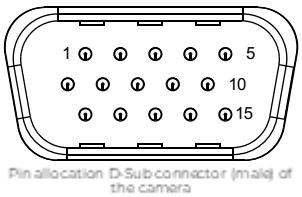
Power supply

You can either use Power over CoaXPress (PoC) or the power supply of the external digital I/O port.

Digital I/O port

The following connector is required for the digital I/O port:

- 15 pin HD D-Sub (female)



Pin allocation D-Sub connector (male) of the camera

You can configure the digital I/O port as RS422 or as single-ended input or output. It is also possible to configure one output as RS422 and the other output as single-ended.

RS422 configuration

Pin	Line definition for RS422 configuration	Signal RS422	Configuration proposal
1	Line 1	In1+	Encoder Source A, Line Start
2		In1–	Encoder Source A\, Line Start\
3	Line 2	In2+	Encoder Source B, Fame Start, Frame Active
4		In2–	Encoder Source B\, Fame Start\, Frame Active\
5	GND (Signals)		Signals Ground
6	Line 3	In3+/Out3+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7		In3–/Out3–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output3-
8	Line 4	In4+/Out4+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+, MS-In+
9		In4–/Out4–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output4-, MS-In-
10	GND (PWR)		Camera Power Ground
11	Line 5	Out5+	User Output5+, MS-Out+
12		Out5–	User Output5-, MS-Out-
13	Line 6	Out6+	User Output6+
14			User Output6-
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

Single-Ended (SE) configuration

The input threshold voltage can be configured globally to 3.3 V, 5 V, 12 V and 24 V. The Maximum input voltage is 28 V.

Pin	Line definition for Single-Ended configuration	Signal Single-Ended	Configuration proposal
1	Line 1	In1 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source A, Line Start
2	--	--	--
3	Line 2	In2 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source B, Fame Start, Frame Active
4	--	--	--
5	GND (Signals)		Signals Ground
6	Line 3	In3 (3.3 V, 5 V, 12 V, 24 V) Out3 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7	--	--	--
8	Line 4	In4 (3.3 V, 5 V, 12 V,24 V) Out4 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+
9	--	--	--
10	GND (PWR)		Camera Power Ground
11	Line 5	In5 (3.3 V) Out5 (3.3 V)	LED Flash Out 3, User Output5
12	Line 7	In7 (3.3 V) Out7 (3.3 V)	LED Flash Out 2, User Output7
13	Line 6	In6 (3.3 V) Out6 (3.3 V)	LED Flash Out 0, User Output6
14	Line 8	In8 (3.3 V) Out8 (3.3 V)	LED Flash Out 1, User Output8
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

LED status indicator

Color code	Behaviour	Description
	Off	No power supply or the input voltage is out of range.
	Solid orange	The system is booting.
	Flash_1_1red	The device is powered but not connected (not applicable to a device reliant on PoCXP power).
	AlternateFlash_12_5 green/orange; shown for a minimum of 1s even if connection detection is faster	The Connection detection is in progress, PoCXP is active.
	Flash_12_5 orange; shown for a minimum of 1s even if connection detection is faster	The Connection detection is in progress, PoCXP is not in use.
	AlternateFlash_0_5 red/green	The device/host is incompatible, PoCXP is active.
	AlternateFlash_0_5 red/orange	The device/host is incompatible, PoCXP is not in use.
	Solid red	PoCXP is over-current (host only).
	Solid green	The device/host is connected, but no data is transferred.
	Flash_1_ orange	The device/host is connected, waiting for event (e.g. trigger).
	Flash_12_5 green	The device/host is connected, data is being transferred.
	500ms red pulse	Error during data transfer (e.g. CRC error, single-bit error) is detected. In case of multiple errors, there shall be at least two green Flash_12_5 pulses, before the next error is indicated.
	AlternateFlash_0_5 green/orange	A connection test packet is being sent.
	AlternateFlash_0_5 red/green/orange	The compliance test mode is enabled (device only).
	Flash_12_5 red	A system error (e.g. internal error) ocurred.

Unboxing

Check your device upon delivery to ensure that it is undamaged and complete.

The packaging includes the following items:

- Camera
- Information sheet

Additionally ordered and supplied accessories

- Lens adapters, extension rings, lenses, and other accessories are not included in the standard scope of delivery. These items must be ordered separately as accessories.
- Check additionally ordered accessories for completeness and for damage, which may have occurred during transport.

Mechanical installation

	WARNING
	During lifting and setting down the device can fall and lead to injuries.
	Use foot protection.

Prepare the camera and lens

1. Select the correct lens and accessories to operate your camera in the desired environment.
2. Install the lens and adapters. For a detailed description of lens and mount installation, follow the Chromasens Camera Configurator.
3. Mount the optional cooling kit if necessary.

Thermal link and cooling

The camera operates within the defined housing temperature range of . If this range is exceeded, use cooling kits.
For more information on cooling kits and fans, see Cooling kits and fans (heat sink).

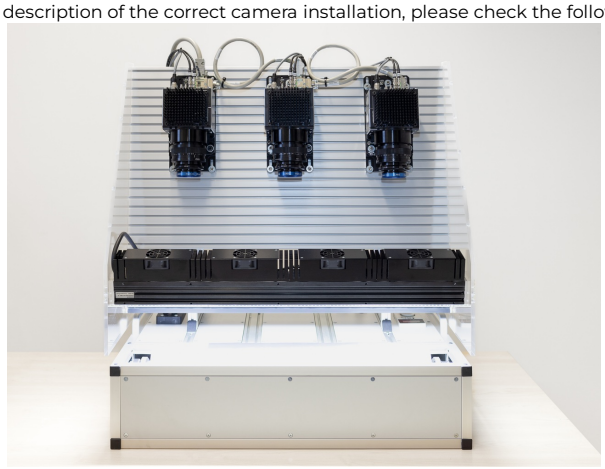
Adjust and install your illumination

It is recommended to use a Chromasens Corona II illumination.
Follow the instructions of the Corona II manual for correct installation.

Download
https://chromasens.de/de/corona-downloads

Install the camera in your system

Adjust the sensor line horizontally to the transport direction. The camera has to look perpendicular to the inspection area. For a detailed description of the correct camera installation, please check the following chapter.

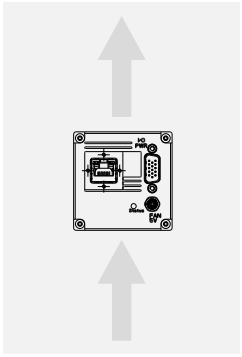


Mounting

The camera housing provides various mounting options. For information about the exact mechanical dimensions refer to specification of your camera model.

Scan Direction

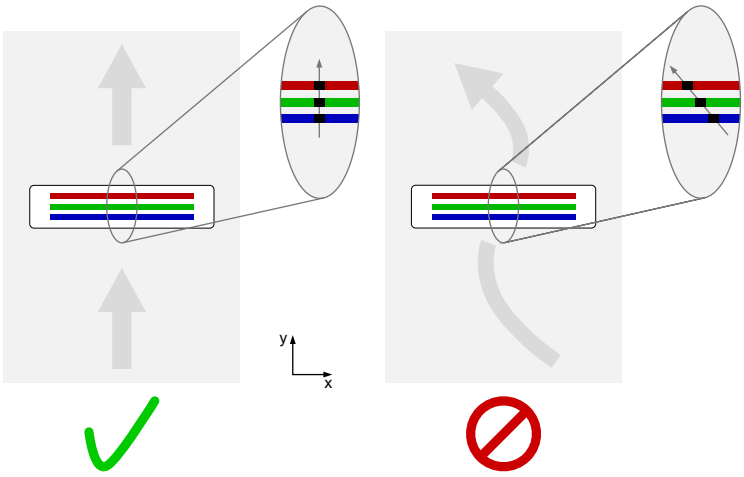
The following image shows the scan direction *Forward* of the allPIXA neo camera.



Scan direction: Forward

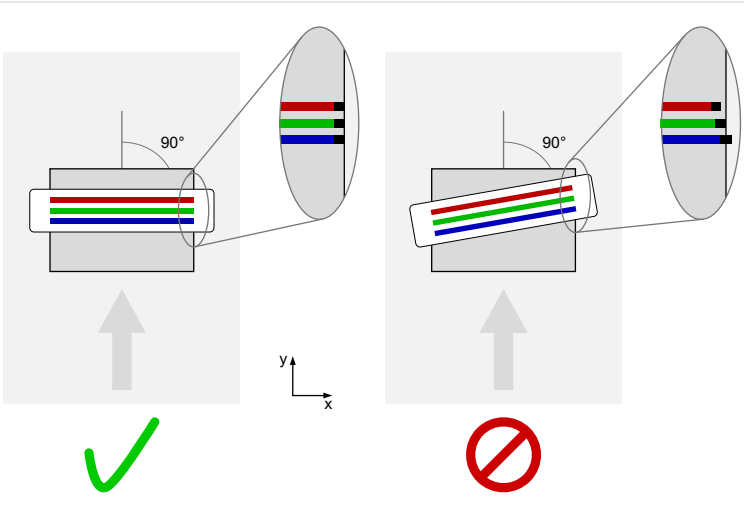
Conveyor belt tracking

The conveyor belt on which the object is transported must run absolutely straight as shown in the following graphic. Misalignment can cause image artifacts.



Perpendicularity of the sensor to the direction of transport

Align the camera at a right angle (perpendicularly) to the transport direction as shown in the following graphic. Misalignment can cause chromatic aberration in the image.

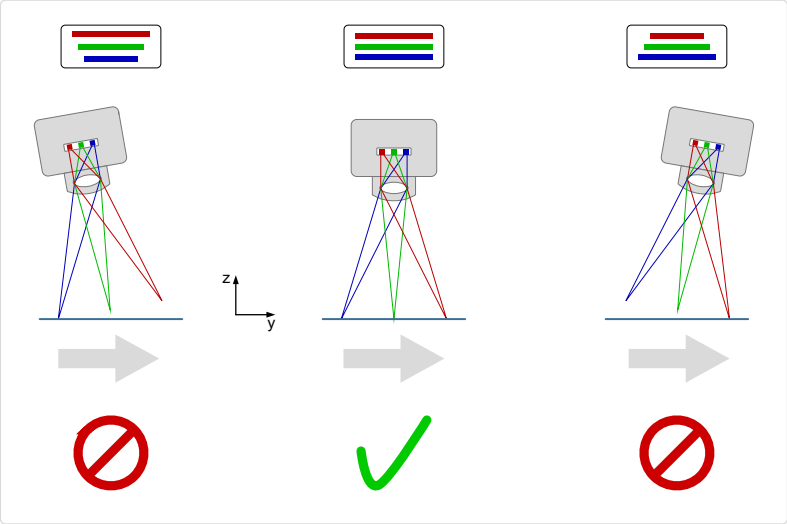


Rotation around the longitudinal axis of the sensor

NOTE

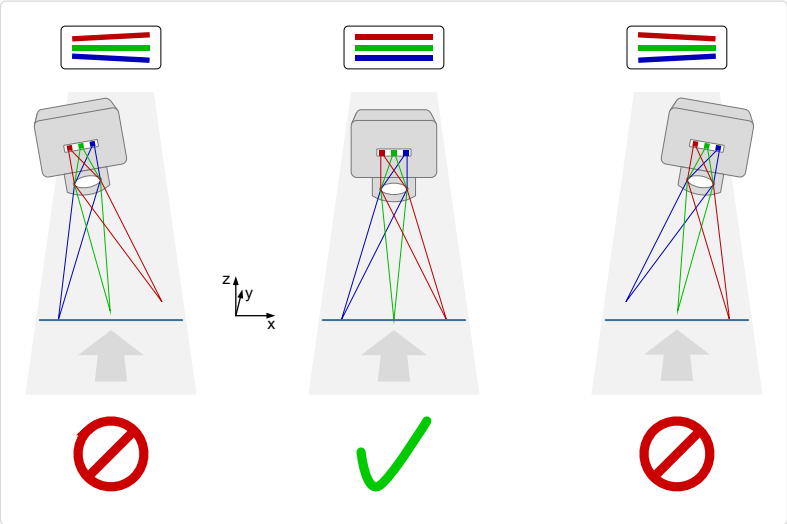
If you are willing to use this installation method please contact **chromasens support** for further information.

Make sure that the longitudinal axis of the camera is parallel to the transport direction as shown in the following graphic. Misalignment can cause scale change and chromatic aberration in the image.



Rotation around the transverse axis of the sensor

The transverse axis of the camera must run parallel to the transport direction as shown in the following graphic. Misalignment can cause scale change and chromatic aberration in the image.



Electrical installation

GigE interface

The 10 GigE connectors permit to use (direct attach) copper cables with lengths of up to 30 m (10BASE-T). A cable with the minimum specification of CAT6a must be used.

Network adapter

To establish a 10 GigE connection a network adapter with a 10 GigE RJ45 input must be installed and configured on the PC. The installation of the network adapter is explained in the GCT documentation. For more information, see Installation GigE.
For more information about the tested network adapters and the transceivers, see Tested Network adapters and Transceivers.

Cabling

	WARNING
	Electric shock due to improper connection to a power supply.
	Use a 12 V – 24 V DC power supply. When using the digital I/O port as a power supply ensure the correct polarity.

1. Connect the video output port.
2. Connect the digital I/O port.

Option 1: Power over Ethernet (PoE)

1. Plug the Ethernet cable into the Power/PoE port (PoEOUT) of the PoE injector and into the video output port (RJ45) of your camera.
2. Connect another Ethernet cable to the Ethernet/data (DataIN) port of the injector and your network card.

Option 2: Power supply of the digital I/O port

To set up the wiring refer to section Digital I/O port.
Note the permitted input voltages:

	Nominal	Minimum	Maximum
Permitted voltages	24 V	12 V	28 V

CXP interface

The interface allows you to connect two CXP cables. Micro BNC (for CXP12) connectors for the camera and suitable connectors for the frame grabber are required. The maximum cable length is 35 m.

Frame grabber

To establish a CXP connection a frame grabber must be installed and configured on the PC. Refer to the manual of your frame grabber.
For more information about the tested frame grabbers, see Tested frame grabbers.

Cabling

	WARNING
	Electric shock due to improper connection to a power supply.
	Use a 12 V – 24 V DC power supply. When using the digital I/O port as a power supply ensure the correct polarity.

1. Connect the video output port.
2. Connect the digital I/O port.

Option 1: Power over CoaXPress (PoC)

To use the power-over-CXP function two connections are needed.

Option 2: Power supply of the digital I/O port

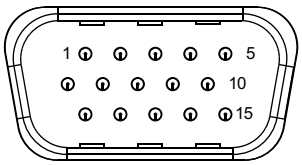
To set up the wiring refer to section Digital I/O port.
Note the permitted input voltages:

	Nominal	Minimum	Maximum
Permitted voltages	24 V	12 V	28 V

Digital I/O port

The following connector is required for the digital I/O port:

- 15 pin HD D-Sub (female)



Pin allocation D-Sub connector (male) of the camera

You can configure the digital I/O port as RS422 or as single-ended input or output. It is also possible to configure one output as RS422 and the other output as single-ended.

RS422 configuration

Pin	Line definition for RS422 configuration	Signal RS422	Configuration proposal
1	Line 1	In1+	Encoder Source A, Line Start
2		In1–	Encoder Source A\, Line Start\
3	Line 2	In2+	Encoder Source B, Fame Start, Frame Active
4		In2–	Encoder Source B\, Fame Start\, Frame Active\
5	GND (Signals)		Signals Ground
6	Line 3	In3+/Out3+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7		In3–/Out3–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output3-
8	Line 4	In4+/Out4+	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+, MS-In+
9		In4–/Out4–	Encoder Source A\, Fame Start\, Frame Active\, Line Start\, User Output4-, MS-In-
10	GND (PWR)		Camera Power Ground
11	Line 5	Out5+	User Output5+, MS-Out+
12		Out5–	User Output5-, MS-Out-
13	Line 6	Out6+	User Output6+
14			User Output6-
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

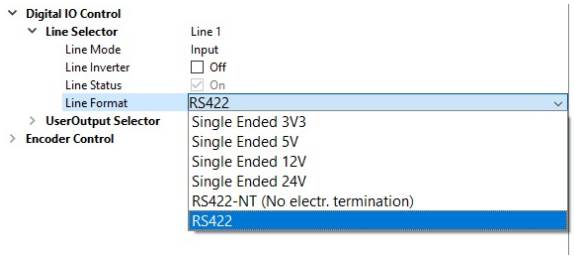
Single-Ended (SE) configuration

The input threshold voltage can be configured globally to 3.3 V, 5 V, 12 V and 24 V. The Maximum input voltage is 28 V.

Pin	Line definition for Single-Ended configuration	Signal Single-Ended	Configuration proposal
1	Line 1	In1 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source A, Line Start
2	--	--	--
3	Line 2	In2 (3.3 V, 5 V, 12 V, 24 V)	Encoder Source B, Fame Start, Frame Active
4	--	--	--
5	GND (Signals)		Signals Ground
6	Line 3	In3 (3.3 V, 5 V, 12 V, 24 V) Out3 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output3+
7	--	--	--
8	Line 4	In4 (3.3 V, 5 V, 12 V,24 V) Out4 (3.3 V)	Encoder Source A, Fame Start, Frame Active, Line Start, User Output4+
9	--	--	--
10	GND (PWR)		Camera Power Ground
11	Line 5	In5 (3.3 V) Out5 (3.3 V)	LED Flash Out 3, User Output5
12	Line 7	In7 (3.3 V) Out7 (3.3 V)	LED Flash Out 2, User Output7
13	Line 6	In6 (3.3 V) Out6 (3.3 V)	LED Flash Out 0, User Output6
14	Line 8	In8 (3.3 V) Out8 (3.3 V)	LED Flash Out 1, User Output8
15	Vcc (PWR)		Camera Power DC +12 V – +24 V

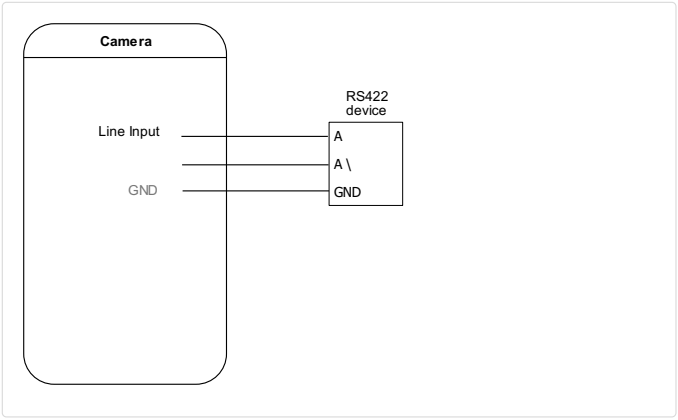
Configure the I/O's

The IO Ports can be configured in GCT.

1. Connect and open the camera in GCT	
2. Navigate to *Camera Features*, *Digital IO Control*	
3. Select the Line in the *Line Selector*	
4. Open the Drop-down menu and change the **Line Format**	

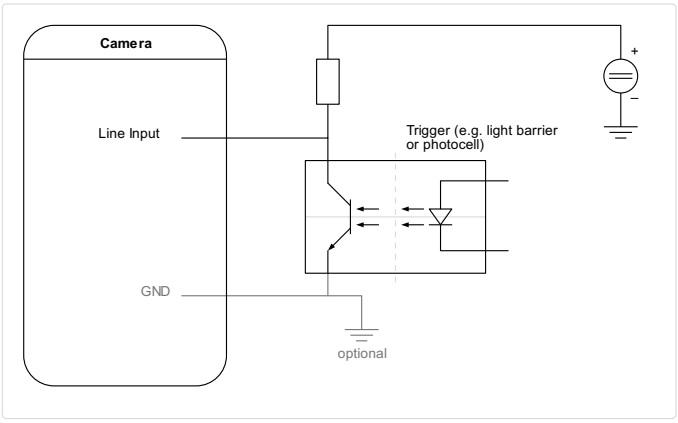
Circuit Diagrams

RS422 configuration

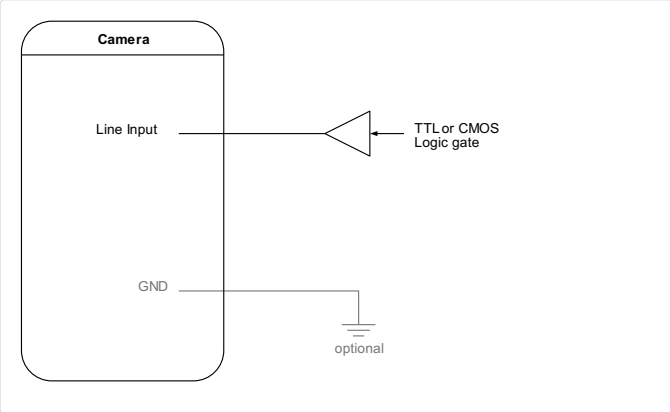


External circuit: RS422 device

Single-Ended configuration



External circuit Optocoupler



External circuit: TTL or CMOS logic gate

Power supply

To set up the wiring refer to section Digital I/O port.
Note the permitted input voltages:

	Nominal	Minimum	Maximum
Permitted voltages	24 V	12 V	28 V

The input current is 0.5 A @ 24 V.

Software installation and configuration

We recommend using the Chromasens GCT tool to acquire the first images. For information about the installation and use of GCT, refer to the GCT documentation.

1. Connect your camera to the PC.
2. Turn on the camera.

The installation and configuration of your PC are described in the GCT documentation.

Starter-Kit

The Starter-Kit for allPIXA neo provides all relevant components to set up a test system, acquire the first images, and evaluate the camera. This instruction helps you to acquire the first images in your development environment.

Unboxing

The Starter-Kit provides the following components:

Part Number	Quantity	Description
CP000660-X-X-X	1	allPIXA neo line scan camera
CC03304	1	Network card, BroadcomP210TP - 2 x 10GBASE-T PCIe NIC
CP000722-X	1	Trigger cable
CC03344-5.0	2	Ethernet cable Cat6a
CC03335	1	Power over Ethernet Injector (PoE Injector)
CP000662	1	allPIXA neo F-Mount adapter
CP000667	1	allPIXA neo Fan Cooling

Getting Started

1. Unpack the camera and the components	
2. Install the network card into your computer	
3. Download and install the drivers of your network card	Network adapters and transceivers
4. Connect the camera with the PoE injector and the PC	**Note** It must be ensured that the camera does not become too hot. Therefore, it should be operated with a cooler or in an environment that dissipates the heat. Electrical installation
5. Install GCT	Installation GigE
6. Acquire the first image	Acquire the first image

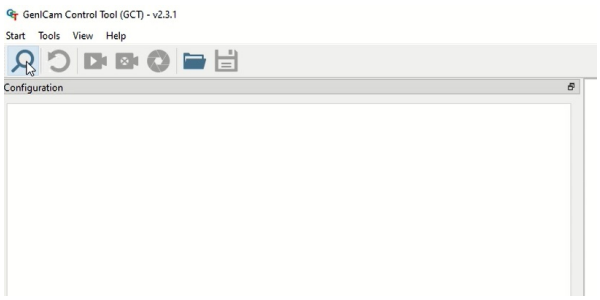
Further Steps

1. Install the camera in your system	Mechanical installation
2. Setup your Trigger	Electrical installation
3. Perform the camera image calibration steps	Camera image calibration

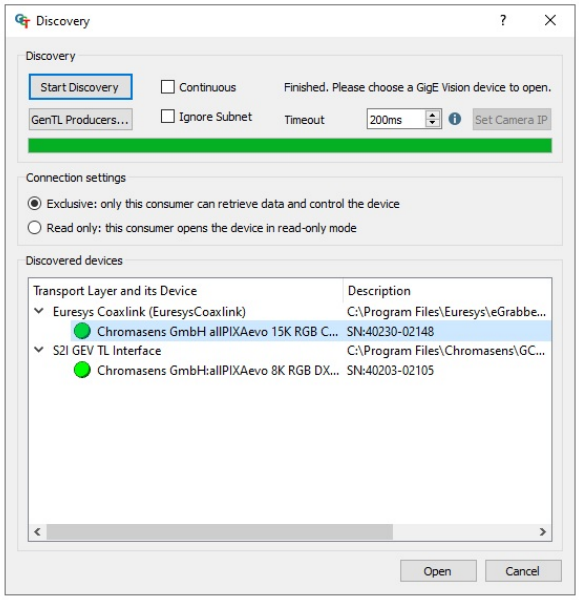
Acquire the first image

Connect the camera

1. Open GCT2.
2. Click on the **magnifying glass icon**.

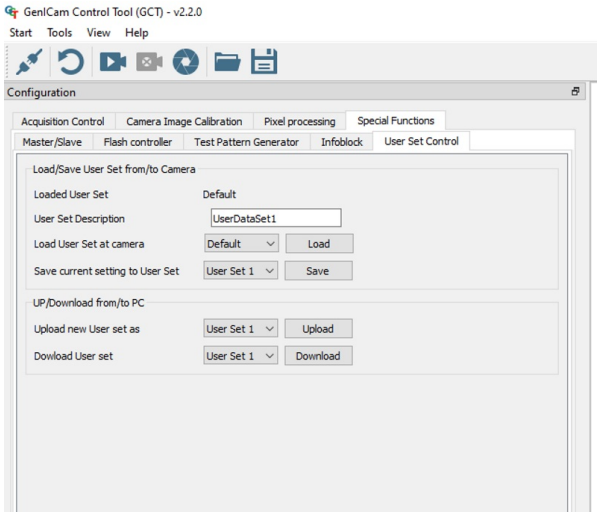


3. In the Discovery window click **Start Discovery**.
4. Select your camera and click **Open**.

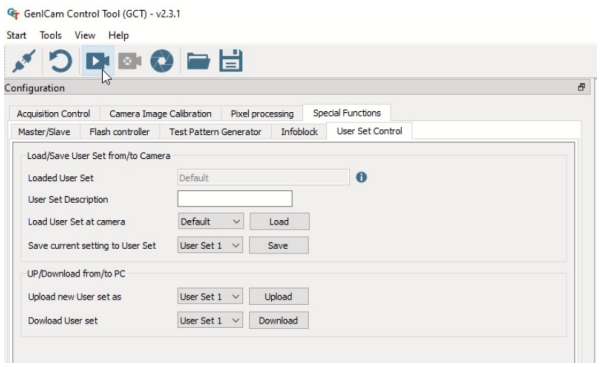


Load the default user set

1. In the Configuration window navigate to *Special Functions → User Set Control*.
2. Click **Load**.



Acquire an image

Click on the **camera sign** to acquire the first image.	

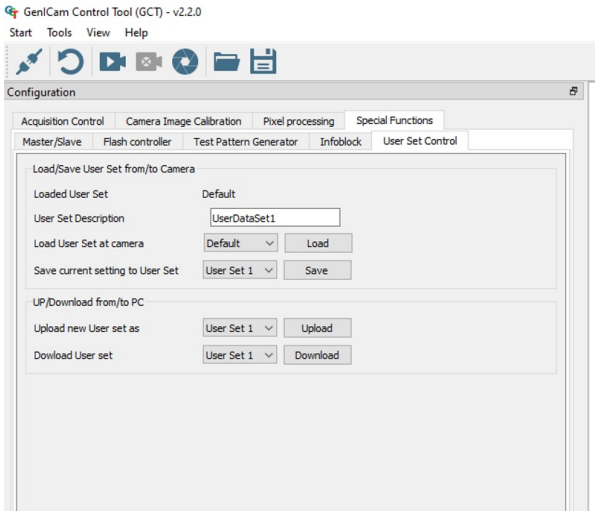
Video description

Click here to download a video

Acquire a test pattern

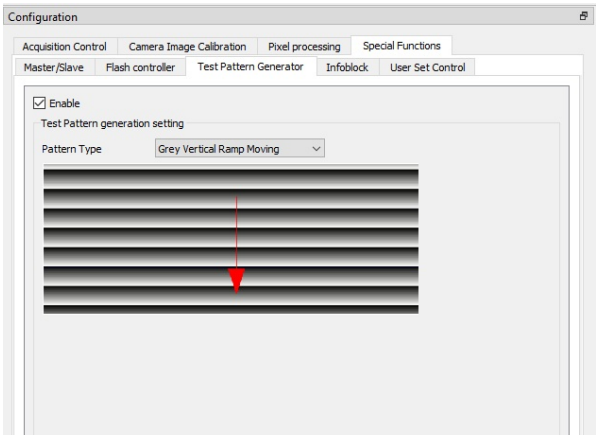
Load the default user set

1. In the Configuration window navigate to *Special Functions → User Set Control*.
2. Click **Load**.



Generate a test pattern

1. In the Configuration window navigate to *Special Functions → Test Pattern Generator*.
2. Select the **Enable** checkbox.



Compare the template to the generated image

1. Aquire an image.
2. Compare the template to the generated image.
3. Disable the test pattern if it matches with the generated image.

Video description

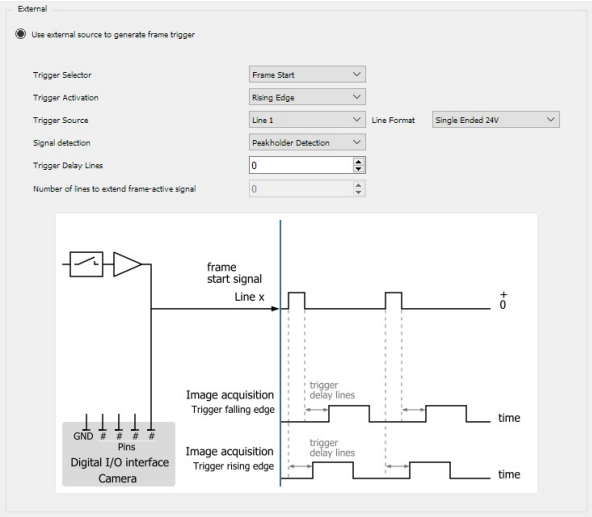
Click here to download a video

Acquire images with frame and line trigger

Set up the frame trigger

1. In the Configuration window navigate to *Acquisition Control* → *Frame Trigger*.
2. Set up the frame trigger.

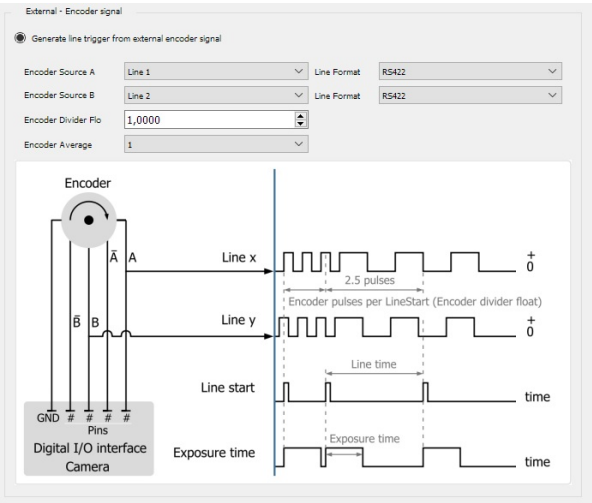
Refer to Set a frame trigger.



Set up the line trigger

1. In the Configuration window navigate to *Acquisition Control* → *Line Trigger*.
2. Set up the line trigger.
3. Acquire an image.

Check your cabling if you do not receive an image.
Refer to Set a line trigger.



Introduction

To ensure a correct image calibration follow the articles in order.
Begin with *Perform white balancing* and end with *Check the image quality*.

Exposure optimization of camera and light

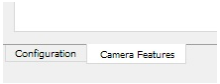
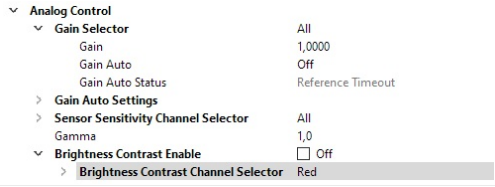
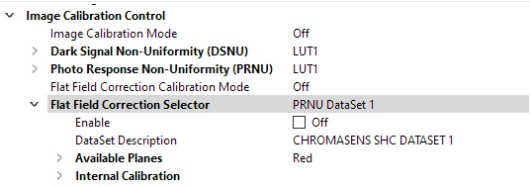
> **NOTE: Finding camera and illumination parameter**
>
> This method of finding a starting point for a standard camera and illumination system. The operating point may have to be determined iteratively (requirement of the application).

At the beginning of the calibration process, the brightness of the camera output image must be in a reasonable range. Otherwise, the white balancing will most likely fail or the result quality will be poor. White balancing is an automatic camera gain adjustment algorithm. It sets the gains (amplification factors) for the single color channels in a way, that the brightness of the color channels equals the defined target brightness level for a given object. However, to achieve the best image quality these gains should be always kept as low as possible (In the best case between 1 and 2). To achieve a brightness level of 200DN@8bit with an amplification factor <2, the brightness of the single color channels must be >100DN@8bit for the default gain of 1. It should be mentioned again that a factor of less than 2 is preferable but not required and often not possible.

Camera Parameter

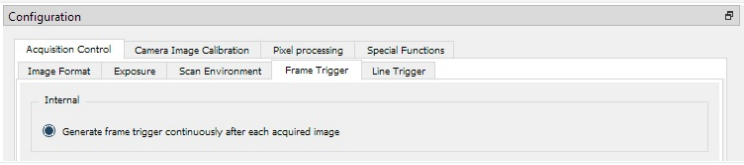
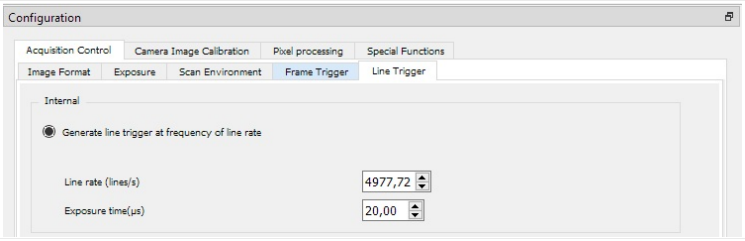
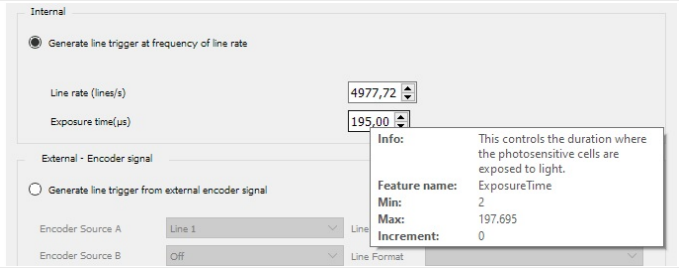
Before starting, set the following parameter.

> **NOTE**
>
> You can also load the “Default” user set.

1. In *GCT* navigate to *Camera features*	
2. Navigate to *Analog Control*	
3. Set **Gain selector** to **all** 4. Set **Gain = 1.00**	
5. Set **Gamma = 1.00**	
6. Set **Brightness Contrast Enable** to **Off**	
7. Navigate to *Image Calibration*	
8. In *Flat Field Correction Selector* set **PRNU DataSet 1, PRNU DataSet 2, DSNU DataSet1, DSNU DataSet2** to **Off**	

Exposure time

> **NOTE**
>
> Always set the exposure time as high as possible. The exposure time is limited by the line time. There are 2 cases for the line time.

Case 1: Freerun	
1. Navigate to *Aquisition Control → Frame Trigger* 2. Set to **Internal**	
3. Navigate to *Line Trigger* 4. Set to **Internal**	
5. Set the **Exposure time** as close as possible to the line time 6. Hover with the Courser over the *Exposure time* Parameter	

Case 2: Line trigger mode	
1. Set your **Line trigger**	
2. a, Calculate the expected Line Time	Transport speed / Optical resolution in transport direction
2. b, Alternative, Measure the line time	Measure the **line time** 1. Navigate to **Trigger selector → Line Start** 2. Start your **Linear stage** or **conveyor belt** 3. **Read** the parameter **Line Time (Measured)** **Trigger Selector** Line Start Trigger Mode On Trigger Source Encoder 0 Trigger Activation Rising Edge Trigger Divider 1 Line Time (Measured) 200,91 us
3. Evaluate the Configuration	1. Navigate to **Trigger Selector → Line Start** 2. Start your **Linear Stage** or **Conveyor belt** 3. **Read** the parameter **Line Trigger Status** **Trigger Selector** Line Start Trigger Mode On Trigger Source Encoder 0 Trigger Activation Rising Edge Trigger Divider 1 Line Time (Measured) 200,91 us Line Trigger Status Speed To High If the Status is *Speed to High* your exposure time is too high

Sensor Sensitivity

NOTE

“SensorSensitivity” is a GenIcam parameter to change the analog amplification and the full well capacity of the sensor. It is better to have a high sensor sensitivity than high gains since the amplification is earlier in the camera signal processing chain. Therefore, fewer sources of noise are amplified. However, a high sensor sensitivity nevertheless increases the noise of the resulting image.

1. Navigate to **Analog Control**	
2. Set the *Sensor Sensitivity Channel Selector* to **All** 3. The *Sensor Sensitivity* = **0** is the high full well and a low sensitivity	**Analog Control** **Gain Selector** All **Gain Auto Settings** **Sensor Sensitivity Channel Selector** All Sensor Sensitivity 1

Lens aperture

NOTE

Choosing the lens f-stop is always a compromise between the available amount of light and depth of field. Reducing the f-number by one step (e.g. from f/8 to f/5.6) doubles the amount of light of increases the DOF.

Chromasens approch

This is a Chromasens approch, it does not fit to all setups

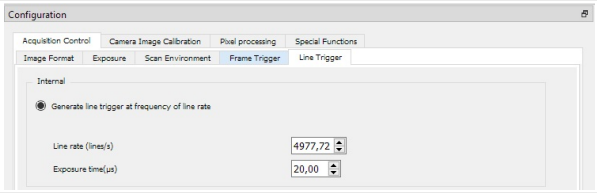
- Start as a starting point f = 5.6
- If a higher depth of field is required set f = 8.0 (half amout of light)

Illumination

Alignment

NOTE

Always mount the illumination regarding the mechanical specifications. Especially for strongly focused illuminations (darkfield C and B focus), it is recommended to fine-tune the alignment.
It's important to start with a well-aligned illumination to avoid wasting light.

1. Place a white reference under the camera	
2. Set the exposure time and line time	
3. Enable the histogram view in GCT	
4. Start the image acquisition	
5. Turn on the illumination	
6. Rotate the corona illumination until the histogram shows the maximum values **Note** If the peak of the histogram is close to 255 DN@8bit, reduce illumination current or sensor sensitivity.	

Click here to download a video

Current

NOTE

For the image quality in terms of image noise, it is beneficial to use a high illumination current. However, a high illumination current also has disadvantages caused by the high temperature of the light source.

- Reduces the lifetime of the LEDs.
- Can harm the scanned object.
- Causes heat inducted turbulences which can locally distort the image which is disadvantageous for high precision measurement tasks.
- Can lead to overheating of the illumination if it is not cooled actively.

1. Set the illumination current and switch the light on	For a passive cooling, start with 600 mA For an active cooling, start with 1200 mA
2. Navigate to GCT and enable the horizontal lineplot	
3. Set the exposure time, line time and start the image acquisition	
4. Change the illumination current until you get a signal in the lineplot between 100 and 200 DN@8bit	

Perform white balancing

The adjustment of a camera system is an iterative process. It might be necessary to do the white balancing step twice.

NOTE: The white reference must be clean and in the focusing plane of the camera.

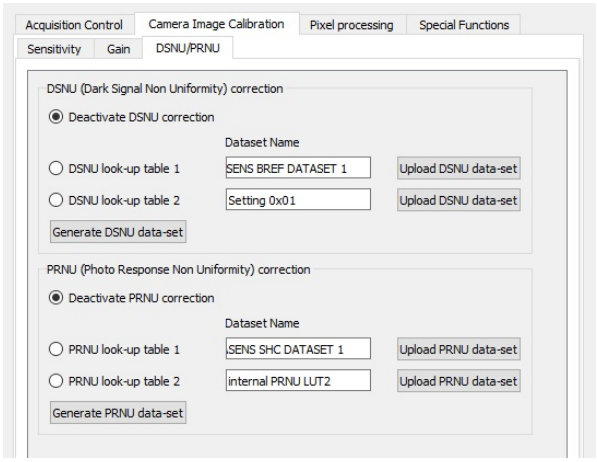
Use a professional white reference, e.g. a clean white ceramic or plastic material.
For the best result use a moving white reference to diminish the effects on any optical variations in the white reference.

Prepare your system

1. Place a white reference under the camera.
2. Set the lens aperture f-stop on the camera lens.
3. Load the default user set.
4. Set the maximum exposure time.
5. Set the line time.
6. Switch on the illumination and set the light current.

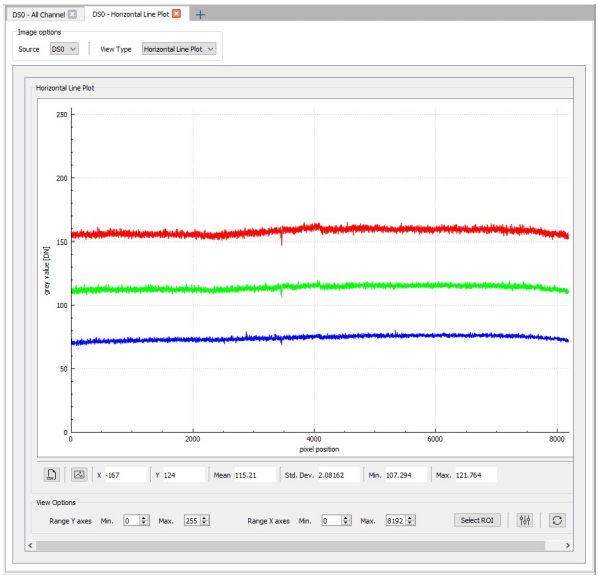
Deactivate DSNU and PRNU correction

7. In the Configuration window navigate to *Camera Image Calibration → DSNU/PRNU*.
8. Select the **Deactivate DSNU correction** checkbox.
9. Select the **Deactivate PRNU correction** checkbox.



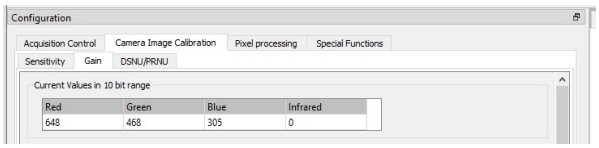
Configure the gain settings

1. Click on the **plus sign** in the right window to add a new tab.
2. Select **Horizontal Line Plot**.
3. **Start Image acquisition**



3. In the Configuration window navigate to *Camera Image Calibration → Gain*.

The current values in the 10 bit range are displayed.



4. Select the **Enable** checkbox in *Automatic gain control settings*.
5. Set the reference mark position and size:
   Below *ROI for automatic gain control* set the values for **Offset X**, **Offset Y**, **Width** and **Height**.

   HINT

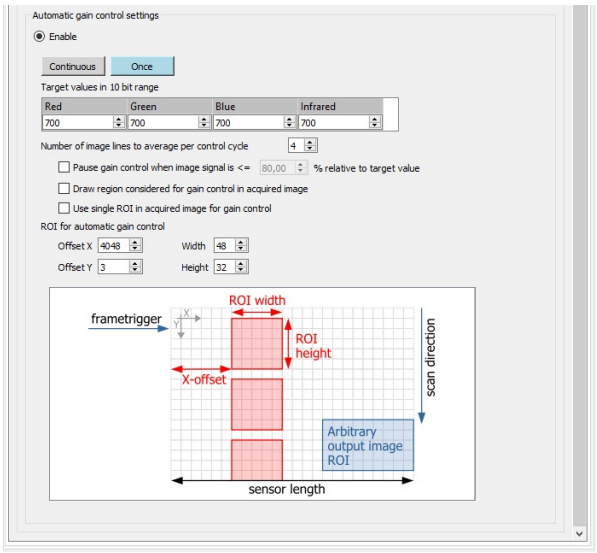
   To control the position in images you can temporarily select the **Visible feature**.

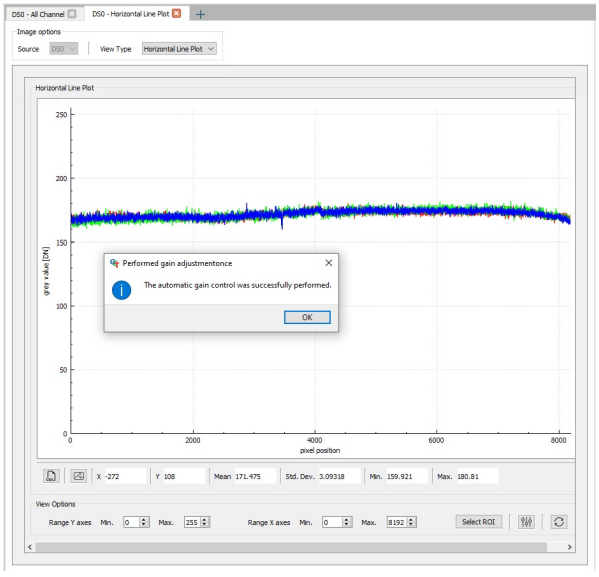
6. Make sure that the reference mark position is at the brightest region of the image (at the center).
7. Set the target white reference values:
   Below *Target values in 10 bit range* set the values for **Red**, **Green**, **Blue** and **Infrared**.

   NOTE

   The target values should be between 800 – 880 to get values between 200 – 220 in the horizontal line plot.

8. Click on **Once** in *Automatic gain control settings*.





The camera performs a white balancing with the current settings.
After successful balancing *Gain Auto Status* returns **Control Successful**.

NOTE: If the white balancing was not successful, you have the following options:

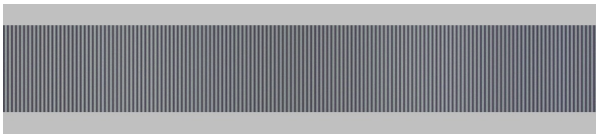
- Modify the exposure time
- Modify the illumination current
- Modify the f-stop of your lens
- Modify the sensor sensitivity

NOTE: Repeat the white balancing in the following cases

If you change the f-stop of the camera lens or the setting of the illumination repeat the white balancing.

Adjust the lens

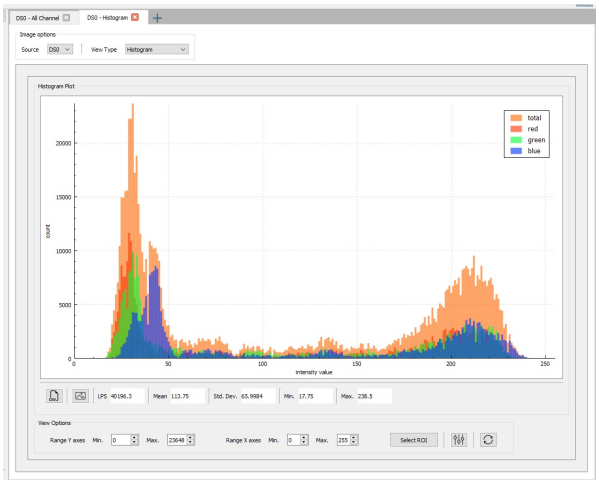
1. Place a line pattern target under the camera.
2. Acquire an image which looks like this.



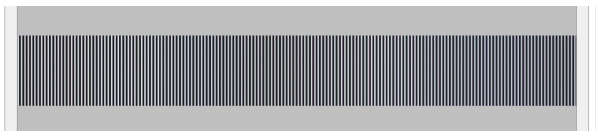
3. Click on the **plus sign** in the right window to add a new tab.
4. Select **Histogram**.

The values of intensity are spread between 60 – 170.

5. Adjust the lens to achieve the values spread in the whole spectrum.



The image of the line pattern has a high contrast.



Create a black-reference (DSNU)

Create a black-reference with DSNU.

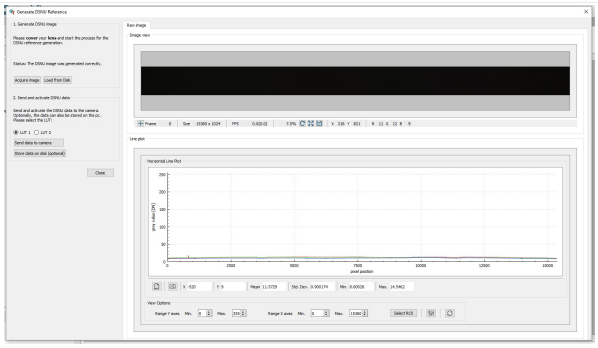
1. Switch off the illumination.
2. Cover the lens with a black or dark piece of cardboard or plastic.
   No light may reach the sensor.

3. In the *menu bar* navigate to *Tools* → *Calibration*.
4. Click **Generate DSNU Reference**.

The *Generate DSNU Reference* wizard opens.

5. Click **Acquire image** to generate the DSNU directly from the camera
   or
   click **Load from Disk** to load an image from the hard drive.

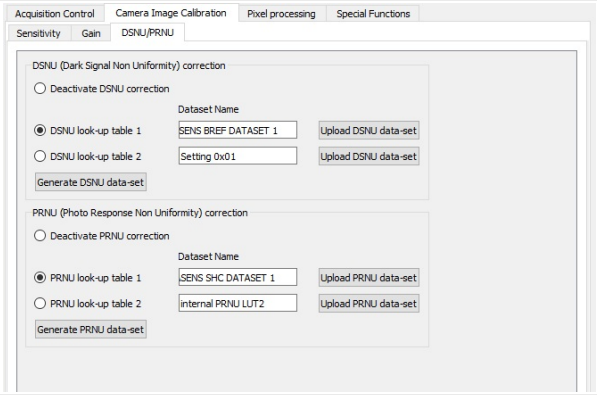
> **NOTE: Load from Disk**
> Make sure that the image has been taken with active image calibration mode by using the wizard.



The raw image and the line plot of the image is displayed.
Send the calculated DSNU to the camera:

6. Select **LUT 1** or **LUT 2**.
7. Click **Send data to camera**.

8. In the Configuration window navigate to *Camera Image Calibration* → *DSNU/PRNU*.
9. Make sure that DSNU is enabled.



Create a shading-reference (PRNU)

Calculation of PRNU

The following equation describes the calculation of the PRNU
$Calibrated_{Image}$ = (Raw_{Image} - DSNU) / PRNU

PRNU = ($PRNU_{Image}$-DSNU)/$Target_{Value}$

$Calibrated_{Image}$ = Camera output with applied DSNU and PRNU

Raw_{Image} = Camera output image without any correction

$Target_{Value}$ = Target Value of PRNU, default value is 255

$PRNU_{Image}$ = Acquired image of the white-reference

PRNU = Photo response non-uniformity

DSNU = Dark signal non-uniformity

Standard PRNU reference generating

Create a shading-reference with PRNU.

1. Place a moving white target.
   If using a stationary target, place it slightly out of focus.

Acquire an image:

2. In the toolbar click **Acquire a single frame**
   or
   click **Start grabbing**, wait until an image ist displayed,
   click **Stop grabbing**.

3. In the *menu bar* navigate to *Tools* → *Calibration*.
4. Click **Generate PRNU Reference**.

The *Generate PRNU Reference* wizard opens.

5. Click **Acquire image** to generate the PRNU directly from the camera
   or
   click **Load from Disk** to load an image from the hard drive.

> **NOTE: Load from Disk**
> Make sure that the image has been taken with active image calibration mode by using the wizard.

The raw image and the line plot of the image is displayed.

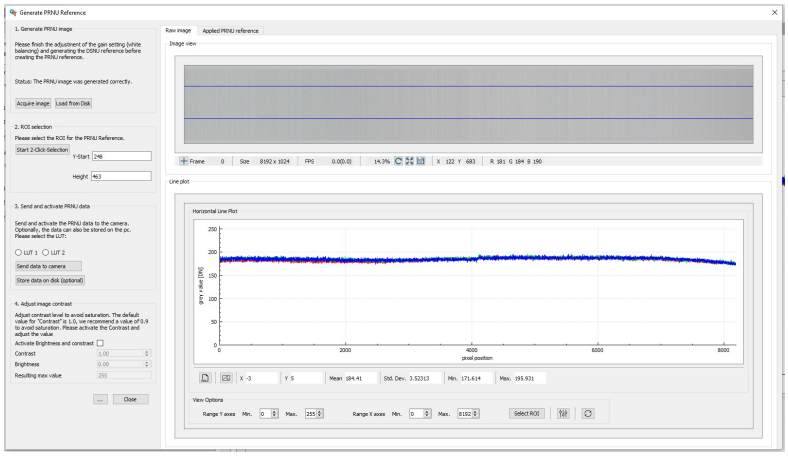
6. Click **Start 2-Click-Selection**.
7. Click **on the image** to select the ROI.

Send the calculated PRNU to the camera:

8. Select **LUT 1** or **LUT 2**.
9. Click **Send data to camera**.

Activate brightness and contrast:

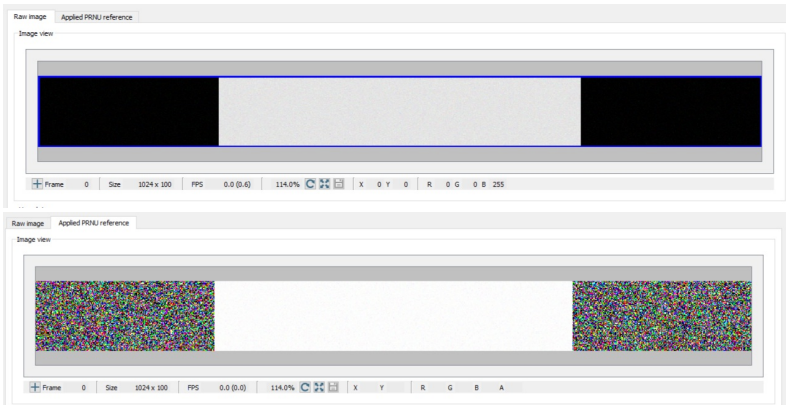
10. Select the **Activate Brightness and contrast** checkbox.
11. Set the contrast to 0.9.



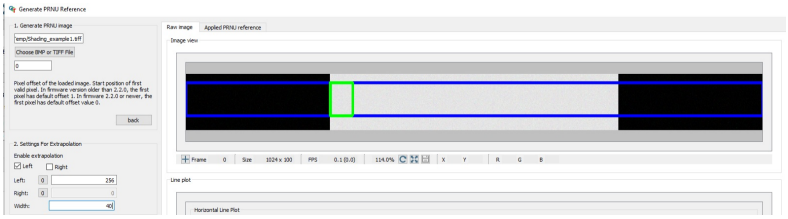
Extrapolation function

If the white reference does not cover the entire FOV, the extrapolation function can be used to generate it. In this case, a straight line is fitted to the gradient. Therefore follow the description below.

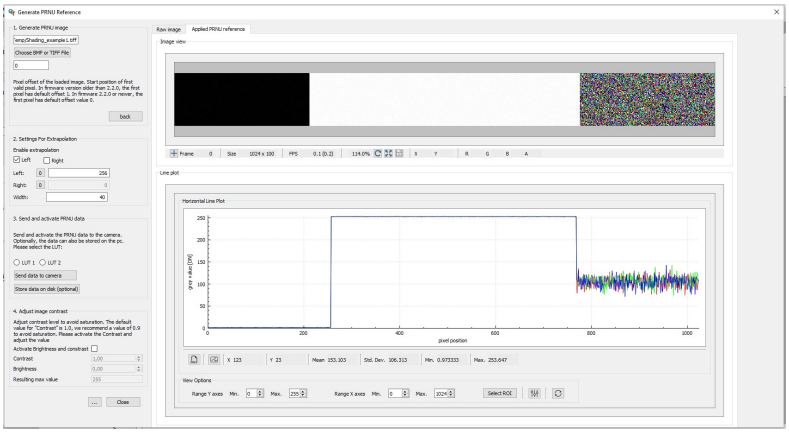
On the right side, you can see the *raw image* and the *Applied PRNU reference* without the extrapolation function.
In the area with low image content, the *Applied PRNU reference* shows some artifacts.



1. Select the ROI, by using the **Start-2-Click-Selection**.
2. Press the button with the **three dots** on the bottom.
3. **Enable** your option, in this example the left extrapolation.
4. Select the **start position** of your extrapolation. The width defines the area where the extrapolation is created. From the start position to column 0, the extrapolation is applied.



5. Check the applied PRNU in the ***Applied PRNU*** *reference* tab.



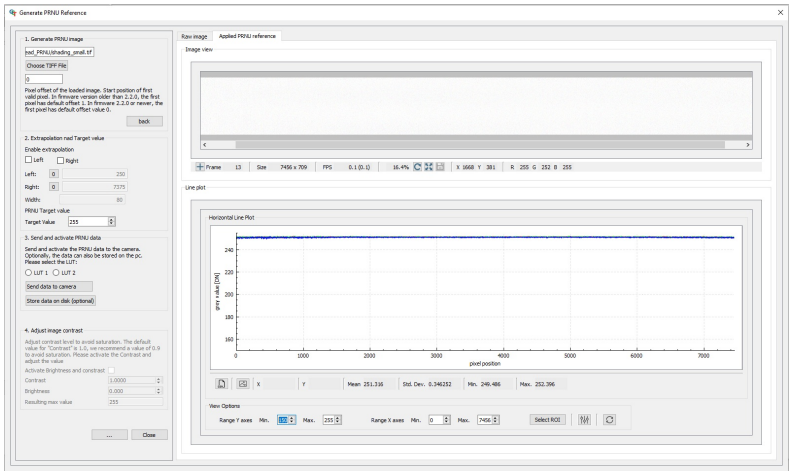
Target Value

The Target Value limits the maximum intensity of your $Calibrated_{Image}$.

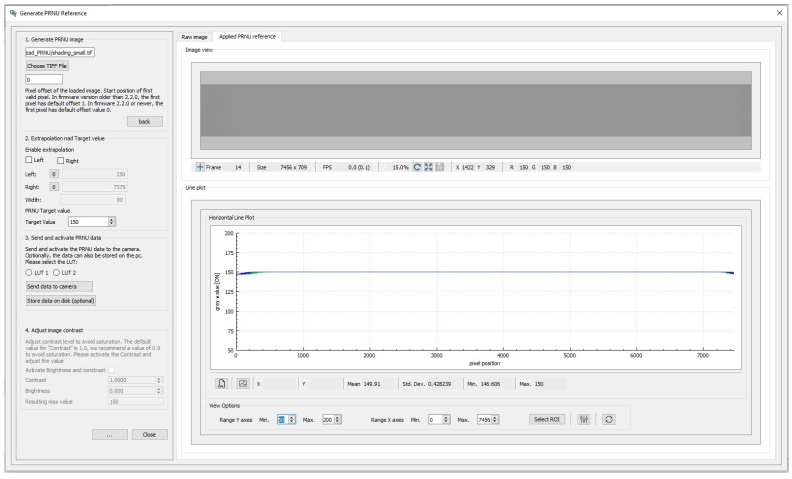
Note

Make sure that the Values of your $PRNU_{Image}$ are smaller than your $Target_{Value}$

1. Press the button with the **three dots** on the bottom.

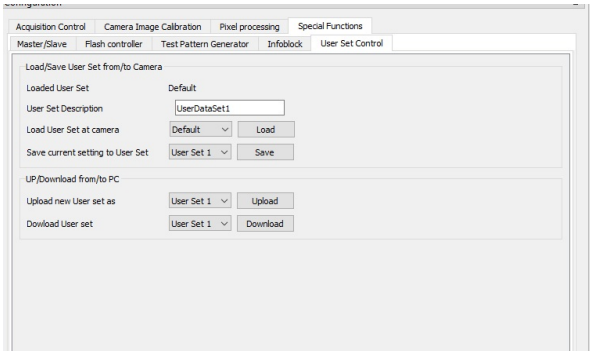


2. Change the **Target Value**.
3. Check the applied PRNU in the ***Applied PRNU*** *reference* tab.

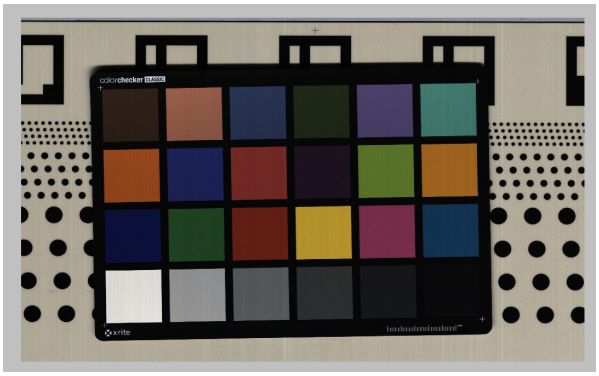
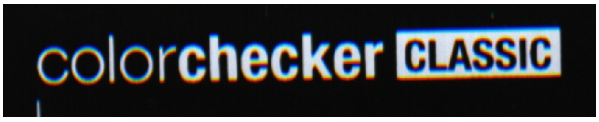
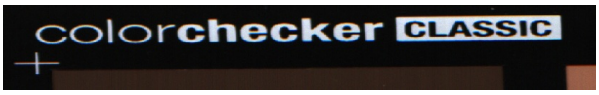
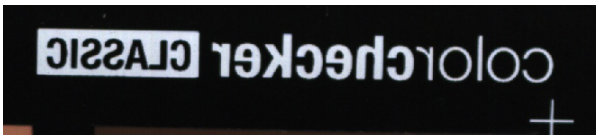
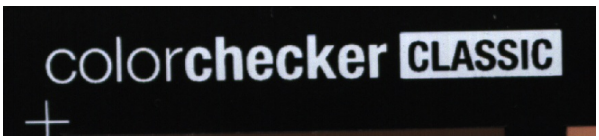


Save the setting

1. In the Configuration window navigate to *Special Functions → User Set Control*.
2. In *Save current setting to User Set* choose **User Set 1**.
   The default user setting is always User Set 1.
3. Click **Save**.



Check the image quality

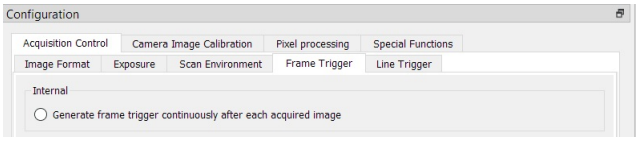
1. Place an image target under the camera, e.g. a colorchecker classic. 2. Acquire an image. 3. Analyze the image: If the image is covered with vertical stripes you may have not used a **moving shading reference**.	
4. If the image has color shifts check the **scan direction**.	
5. If the image is compressed in transport direction adapt the **encoder divider float value** or **the acquisition line rate**.	
6. If the image is shown mirror-inverted, use the **ReserveX parameter**.	
This is an example of a good image quality.	

Set a frame trigger

Internal frame trigger

The internal frame trigger provides a continuous signal after each acquired image.

1. In the Configuration window navigate to *Acquisition Control → Frame Trigger*.
2. Below *Internal* select the **Generate frame trigger continuously after each acquired image** checkbox.



Internal frame trigger

Alternatively, you can set the internal frame trigger in the **camera feature tree** by executing the following steps:

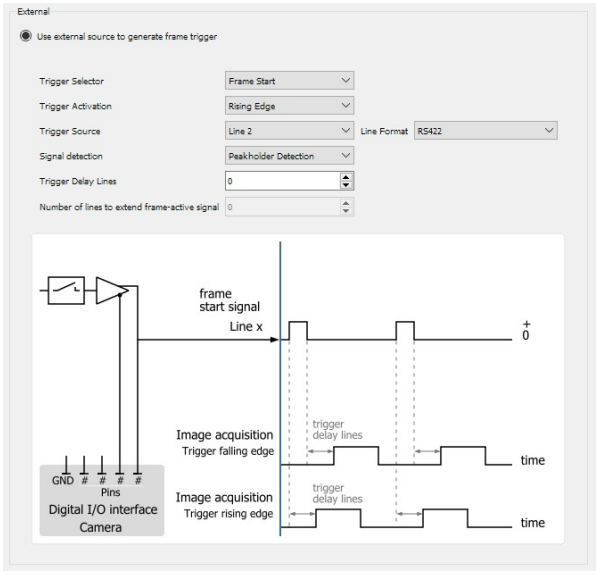
Step	Feature name	Value
1	Trigger Selector	FrameActive
2	Trigger Mode	Off
3	Trigger Selector	FrameStart
4	Trigger Mode	Off
5	Trigger Selector	LineStart
6	Trigger Mode	Off

External frame trigger

The external frame trigger can be provided by a light barrier.

1. In the Configuration window navigate to *Acquisition Control → Frame Trigger*.
2. Below *External* select the **Use external source to generate frame trigger** checkbox.

1. In *Trigger Selector* select the desired activation mode.
2. In *Trigger Activation* select the desired trigger activation mode.
3. In *Trigger Source* select the desired input Line.
4. In *Line Format* select the electrical input signal.
5. In *Signal detection* select the detection mode.
6. In *Trigger Delay Lines* input the delay of the trigger in lines.



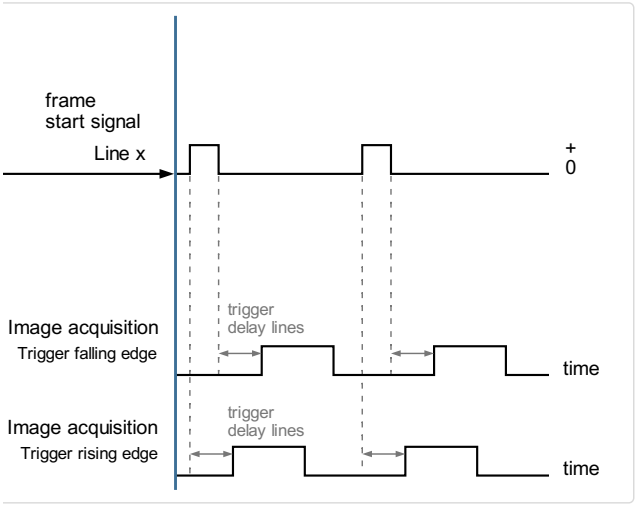
Alternatively, you can set the external frame trigger in the **camera feature tree** by executing the following steps:

Step	Feature name	Value
1	TriggerSelector	FrameStart, FrameActive or FrameBurstStart
	TriggerMode	On
2	TriggerSource	e.g. Line 3 **or** Line 4
3	TriggerActivation	Level high/level low, rising edge **or** falling edge
4	TriggerDelayLines	<number of lines>
5	TriggerSignalDetectionMode	Peakholder Detection, Debouncing 4 clocks, Debouncing 4 lines, Debouncing 60 lines
5	Digital I/O Line Selector	select the Trigger Source
6	Line Format	open the Drop-down menu and change the Line Format to your input signal

Trigger Selector

Frame start

The *Input signal activation → Frame start* triggers the image acquisition after the *Trigger delay lines* and depending on the *Trigger signal detection mode* configuration for the duration of the image height setting. One frame trigger creates one image with a constant image height.



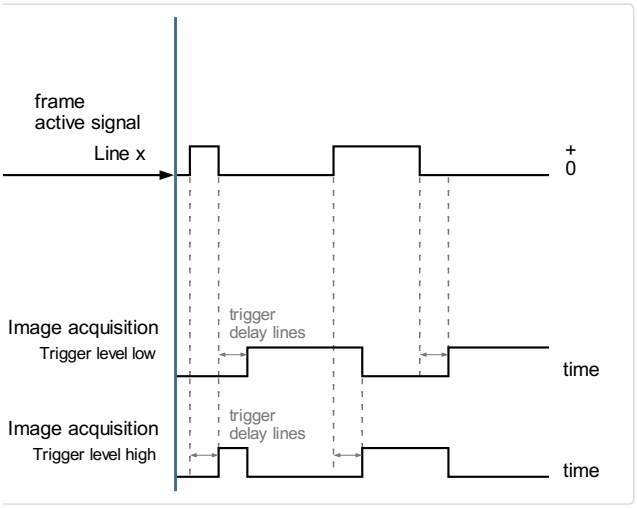
Input signal activation: Framestart

Frame active

Note

This configuration is only for the GigE Version available. CxP does not support this configuration.

The *Input signal activation → Frame active* triggers the image acquisition after the *Trigger delay lines* and depending on the *Trigger signal detection mode* configuration for the duration of the Trigger signal. One Frame trigger creates one image with the length of the frame active signal.



Input signal activation: Frame active

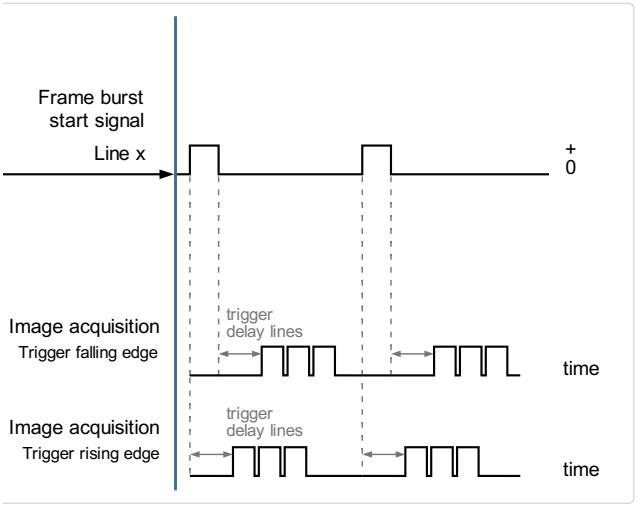
Frame burst start

Note

In *Frame burst start* mode the camera acquires multiple gapless images.

The *Input signal activation → Frame burst start* triggers the image acquisition after the *Trigger delay lines* and depending on the *Trigger signal detection mode* configuration for multiple times the duration of the image height setting. One frame burst creates multiple images with a constant image height.

The number of acquired images is set under *Acquisistion Control → Acquisistion Burst Frame Count.*

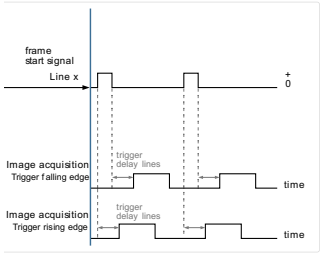
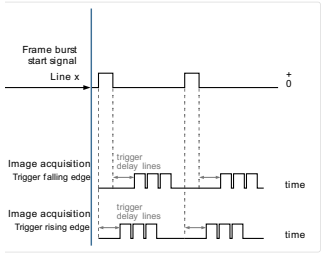
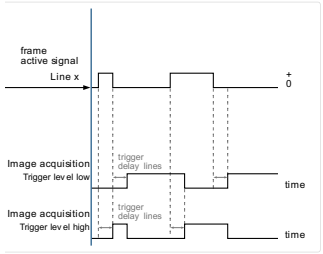


Input signal activation: Frameburst

Trigger activation

The *TriggerActivation* specifies the activation mode of the trigger.

Name	Description	Notes
RisingEdge	Specifies that the trigger is considered valid on the rising edge of the source signal.	This enum entry is valid and available only for LineStart or **FrameStart** or **FrameBurstStart**
FallingEdge	Specifies that the trigger is considered valid on the falling edge of the source signal.	This enum entry is valid and available only for **FrameStart** or **FrameBurstStart**
LevelHigh	Specifies that the trigger is considered valid if the level of the source signal is high.	This enum entry is valid and available only for **FrameActive**
LevelLow	Specifies that the trigger is considered valid if the level of the source signal is low.	This enum entry is valid and available only for **FrameActive**

Frame Start	Frame Burst Start	Frame Active
		

Trigger Source

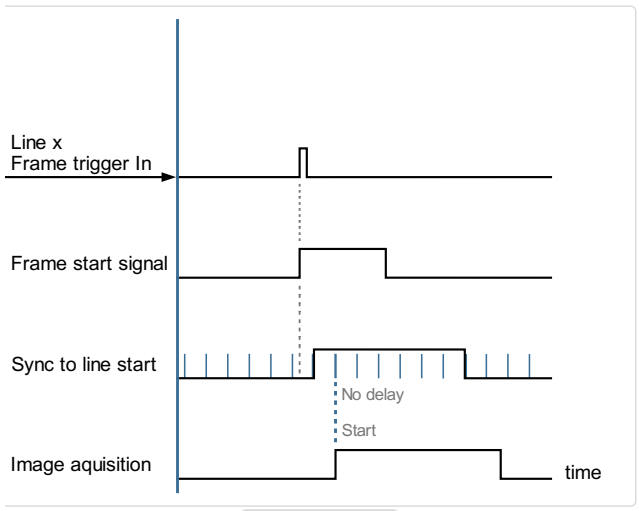
The *TriggerSource* specifies the input line to use as a trigger source, please refer to the electrical installation.

Trigger signal detection mode

The camera supports four different Trigger signal detection modes. This configuration parameter defines the signal debouncing of the frame trigger input signal.
To set the *Trigger signal detection* navigate to the **camera feature tree → Acquisition control → Trigger selector** the following four options are available:

PeakholderDetection

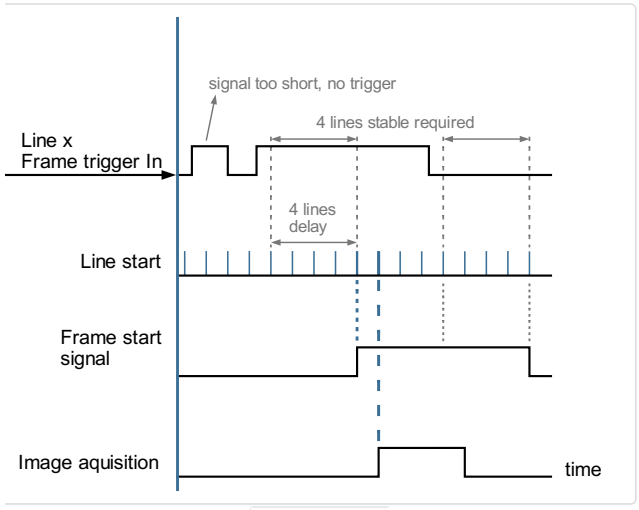
The *Trigger signal detection mode → PeakholderDetection* detects every small input signal and starts the image acquisition immediately.



PeakholderDetection

Debouncing4Lines

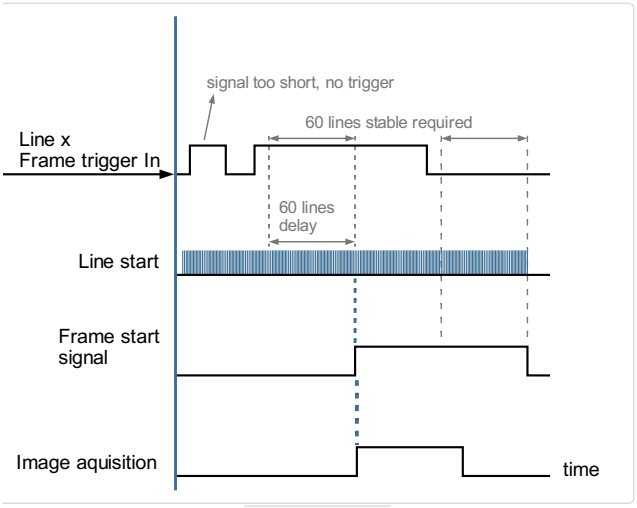
The *Trigger signal detection mode → Debouncing4Lines* requires a 4-line stable trigger input signal, this leads to an image delay of 4 lines.



Debouncing4Lines

Debouncing60Lines

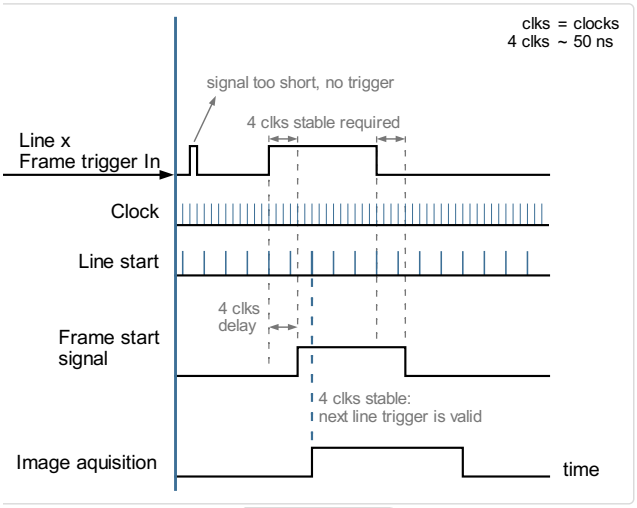
The *Trigger signal detection mode → Debouncing60Lines* requires a 60 line stable trigger input signal, leading to an image delay of 60 lines.



Debouncing60Lines

Debouncing4Clocks (not recommended)

The *Trigger signal detection mode → Debouncing4Clocks* requires a 4 clocks (clks) stable trigger input signal, leading to an image delay of 4 clocks.



Debouncing4Clocks

Trigger Delay Lines

Specifies the delay in the number of lines to apply after the trigger reception before activating it.

Line Format

The *Digital IO Control → Line Selector → Line Format* controls the electrical format of the selected physical input. For the specific electrical format, please refer to the electrical installation.

Name	Description
NoConnect	The line is not connected.
SingleEnded_3V3	The line is single ended input or output for 3.3V. Input signals less than 1.5V are considered as level low, signals higher than 1.5V as level high.
SingleEnded_5	The line is single ended input for 5.0V or output for 3.3V. Input signals less than 2.5V are considered as level low, signals higher than 2.5V as level high.
SingleEnded_12V	The line is single ended input for 12.0V or output for 3.3V. Input signals less than 5.0V are considered as level low, signals higher than 5.0V as level high.
SingleEnded_24V	The line is single ended input for 24.0V or output for 3.3V. Input signals less than 5.0V are considered as level low, signals higher than 5.0V as level high.
RS422_NoTerm	The line is currently accepting or sending RS422 level signals with no electrical termination.
RS422	The line is currently accepting or sending RS422 level signals.
Misc	The line is a special one.

Set a line trigger

Internal line trigger

The internal line trigger provides a continuous signal in the frequency of the *Acquisition Line Rate*.

1. In the Configuration window navigate to *Acquisition Control → Line Trigger*.
2. Below *Internal* select the **Generate line trigger at frequency of line rate** checkbox.

Alternatively, you can set the internal line trigger in the **camera feature tree** by executing the following step:

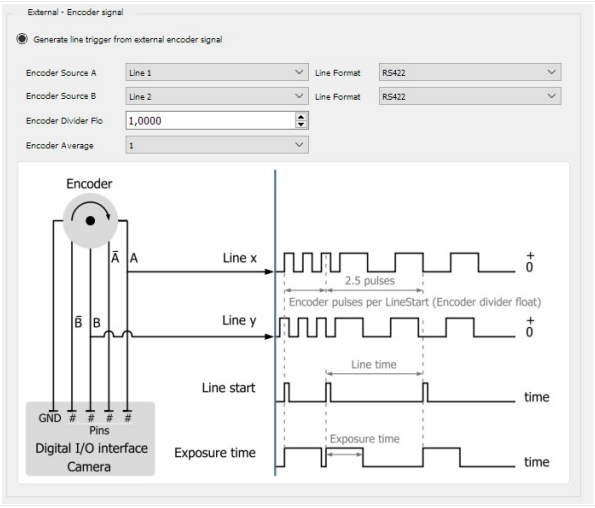
Step	Feature name	Value
1	Trigger Selector	LineStart
	Trigger Mode	Off

External line trigger

The external line trigger can be provided by an encoder signal or a signal generator. Refer to trigger selector.

1. In the Configuration window navigate to *Acquisition Control → Line Trigger*.
2. Below *External* select the **Generate line trigger from external encoder signal** checkbox.

1. In *Encoder Source A* and *B* select the desired input Line. Refer to electrical installation.
2. In *Line Format* select the electrical input signal. Refer to electrical installation.
3. In *Encoder Divider float* input the number of encoder impulses to generate one *LineStart* signal. Refer to Encoder divider float.
4. In *Encoder Average* input the number of averaged input signals.



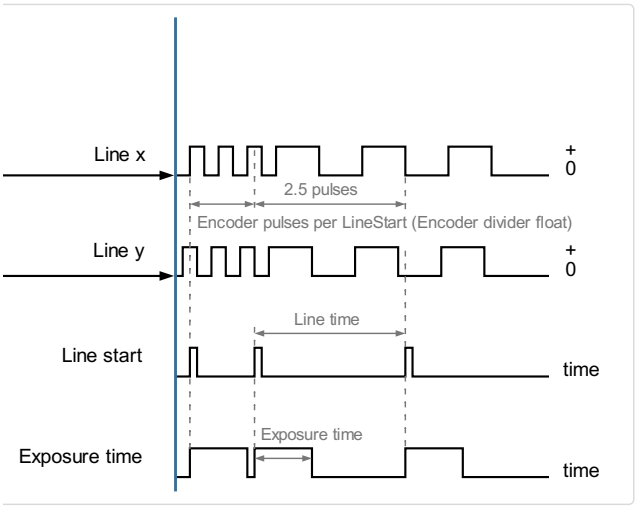
Alternatively, you can set the external line trigger in the **camera feature tree** by executing the following steps:

Step	Feature name	Value
1	TriggerSelector	LineStart
	TriggerMode	On
2	TriggerSource	Encoder0 **or** Line1 **or** Line3 **or** Line4
3	EncoderSelector	Encoder0
4	EncoderSource A	Line1
5	EncoderSource B	Line2
6	EncoderDividerFloat	0.05 – 255
7	EncoderAverage	0-16
8	Digital I/O Line Selector	select the Trigger Source
9	Line Format	open the drop-down menu and change the Line Format to your input signal

Trigger Source

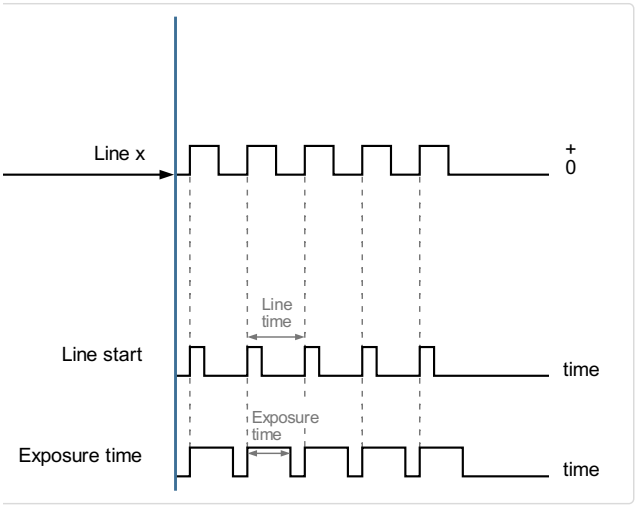
Encoder0

The *Trigger Source Encoder0* triggers the *LineStart* of the image acquisition. A certain number of encoder (Encoder divider float) impulses creates one *LineStart* signal.



Line

The *Trigger Source Line* triggers the *LineStart* of the image acquisition. Each impulse generates one *LineStart* signal.



Encoder divider float

An encoder typically does not have an integer ratio to the camera resolution. Arbitrary ratios of encoder pulses per sensor line are possible, for example, 2.25. The value range is 0.05 – 255 pulses per line.

Example:

- Linear Stage with a tread pitch of 1 mm
- Encoder with a resolution of 1000 Impulses per turnaround (I/U) → 1 Impuls per µm
- Optical lateral Camera resolution of 10 µm

Encoder divider float = Optical resolution x encoder transport resolution = 10 µm x 1 I/µm = 10 I

Set up communication to the XLC4 controller

Switching the illumination on and off via the camera

The following section describes how to connect the camera to the LED Control Unit XCL4 to switch the illumination ON and OFF via the frame active signal. The configuration is used to automatically turn ON the illumination as a frame acquisition is started and turn OFF the illumination after the acquisition.

Wiring

Note

You need a electrical grounding (protective earth) for your camera and LED Control Unit XLC4.
Therfore connect the housing of your camera and LED Control Unit XLC4 housing to your electrical ground.
Also connect the power supply input X4 Pin 3 and 4 of your LED Control Unit XLC4 to your electrical ground.

Connect the following pins of the LED Control Unit XCL4 (connector X6) to the digital I/O port (15 pin HD D-Sub) of the camera.

Step	LED Control Unit XLC4 (Connector X6)	Camera (15 pin HD D-Sub)
1	PIN 1 (Signal)	PIN 11 or 12,13,14
2	PIN 6 (GND)	PIN 5 (GND)

Configure the LED Control Unit XLC4

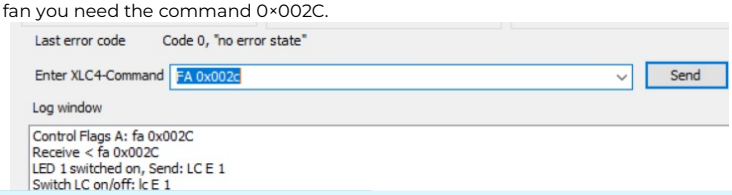
Control Flad A

The configuration of the Control Flag A of the LED Control Unit XLC4 is done with the FA command. You need to add the 0×0020 to your current configuration and send it with the XLC4 commander software to your controller. Refer to the LED Control Unit XLC4 Manual Page 101.

ControlFlagA (HexChar)	reserved	reserved	EnableON	CheckFan	ActVO	ActSW	Internal use	Service	Notes
0x0000	0	0	0	0	0	0	0	0	ON disabled, no FAN control or external cooling device control
0x0004	0	0	0	0	0	1	0	0	ON disabled, Standard mode with cooling device at SW1-SW2
0x0008	0	0	0	0	1	0	0	0	ON disabled, Standard mode with Fan at VOUT
0x000C	0	0	0	0	1	1	0	0	ON disabled, VOUT and SW1-SW2 active for cooling device
0x0020	0	0	1	0	0	0	0	0	Switching XLC4 with ON-Input - no cooling device connected
0x0024	0	0	1	0	0	1	0	0	Switching XLC4 with ON-Input - cooling device at SW1-SW2
0x0028	0	0	1	0	1	0	0	0	Switching XLC4 with ON-Input - Fan at VOUT
0x002C	0	0	1	0	1	1	0	0	Switching XLC4 with ON-Input - VOUT and SW1-SW2 active for cooling device
0x0018	0	0	x	1	1	x	0	0	Activating the fan monitoring functions

Corona II + LED-Control Unit XLC4-1 Page 101

Example: If you also using a fan you need the command 0×002C.



Note

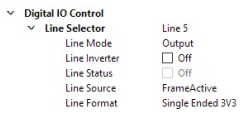
After a FA command of the LED Control Unit XLC4 you need to power cycle the controler.

Command MO (set operation mode)

The configuration of the operation mode of the LED Control Unit XLC4 is done with the MO command. You need to set the *Command Mode* in your controller, therefore send the command *MO 1* with the XLC4 commander software to your controller. Refer to the LED Control Unit XLC4 Manual Page 97.

Configure the camera

To configure the camera set the following parameter in the camera feature tree.

1. In the feature tree navigate to *Digital IO Control*	
2. Set the corresponding Signal Line which you are connected between the camera and controller (for example Line 5)	
3. Set *Line Selector* to *Line5* 4. Set *Line Mode* to *Output* 5. Set *Line Source* to *Frame Active* 6. Set *Line Format to Single Ended 3V3*	

Set the color transformation

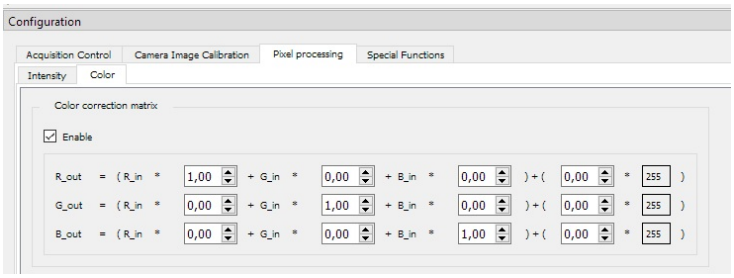
Set Color to Color (CCM)

The color transformation, or color correction matrix (CCM) can be used to apply a 3×3 or 3×4 correction matrix to the acquired image (Examples @8bit).

$$\begin{bmatrix} R_{out} \\ G_{out} \\ B_{out} \end{bmatrix} = \begin{bmatrix} Gain_{00} Gain_{01} Gain_{02} \\ Gain_{10} Gain_{11} Gain_{12} \\ Gain_{20} Gain_{21} Gain_{22} \end{bmatrix} \times \begin{bmatrix} R_{in} \\ G_{in} \\ B_{in} \end{bmatrix} + \begin{bmatrix} Offset_0 \times 255 \\ Offset_1 \times 255 \\ Offset_3 \times 255 \end{bmatrix}$$

Configuration widget

1. In the configuration window navigate to *Pixel processing → Color.*
2. Below *Color correction matrix* select the **Enable** checkbox.
3. The CCM can be changed by making **adjustments** in the spin boxes.



Feature tree

Step	Feature name	Value
1	*Navigate to* **Color Transformation Control**	
2	*Select* **Color Transformation Selector**	*Set* **Color to Color**
3	*Navigate to* **Color Transformation Enable**	*Set* **On**
4	*Select the* **Color Transformation Value Selector**	Gain00... Gain33 Offset0...Offset3
5	*Set your value in* **Color Transformation Value**	

Create a black-reference (DSNU)

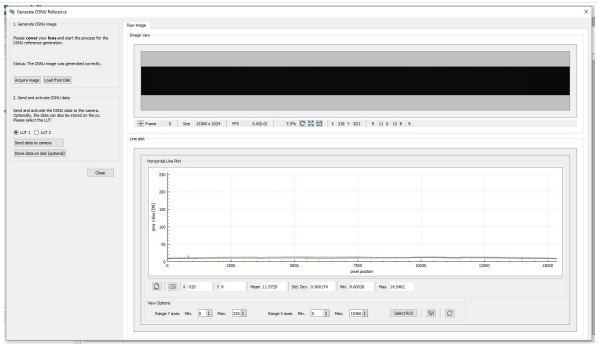
Create a black-reference with DSNU.

1. Switch off the illumination.
2. Cover the lens with a black or dark piece of cardboard or plastic.
   No light may reach the sensor.
3. In the *menu bar* navigate to *Tools* → *Calibration*.
4. Click **Generate DSNU Reference**.

The *Generate DSNU Reference* wizard opens.

5. Click **Acquire image** to generate the DSNU directly from the camera
   or
   click **Load from Disk** to load an image from the hard drive.

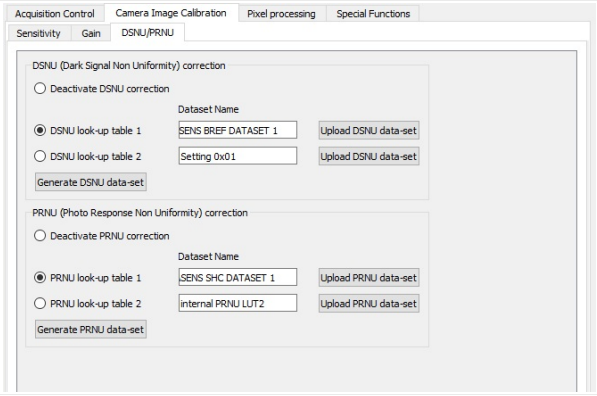
> **NOTE: Load from Disk**
> Make sure that the image has been taken with active image calibration mode by using the wizard.



The raw image and the line plot of the image is displayed.
Send the calculated DSNU to the camera:

6. Select **LUT 1** or **LUT 2**.
7. Click **Send data to camera**.

8. In the Configuration window navigate to *Camera Image Calibration* → *DSNU/PRNU*.
9. Make sure that DSNU is enabled.



Create a shading-reference (PRNU)

Calculation of PRNU

The following equation describes the calculation of the PRNU
$Calibrated_{Image}$ = (Raw_{Image} - DSNU) / PRNU

PRNU = ($PRNU_{Image}$-DSNU)/$Target_{Value}$

$Calibrated_{Image}$ = Camera output with applied DSNU and PRNU

Raw_{Image} = Camera output image without any correction

$Target_{Value}$ = Target Value of PRNU, default value is 255

$PRNU_{Image}$ = Acquired image of the white-reference

PRNU = Photo response non-uniformity

DSNU = Dark signal non-uniformity

Standard PRNU reference generating

Create a shading-reference with PRNU.

1. Place a moving white target.
   If using a stationary target, place it slightly out of focus.

Acquire an image:

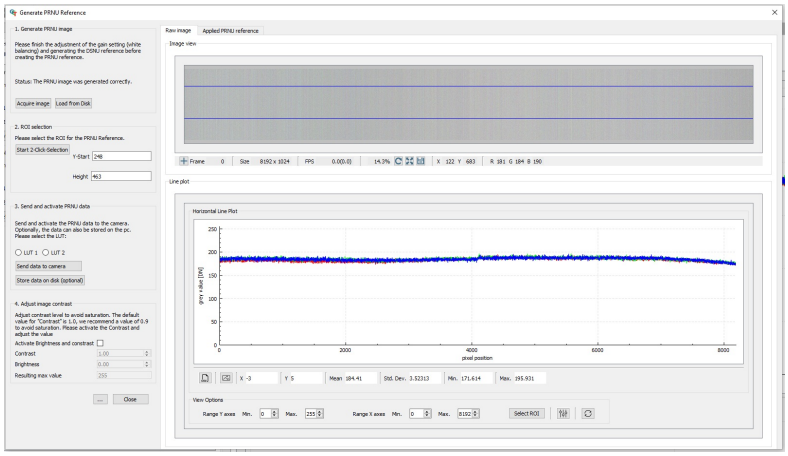
2. In the toolbar click **Acquire a single frame**
   or
   click **Start grabbing**, wait until an image ist displayed,
   click **Stop grabbing**.

3. In the *menu bar* navigate to *Tools* → *Calibration*.
4. Click **Generate PRNU Reference**.

The *Generate PRNU Reference* wizard opens.

5. Click **Acquire image** to generate the PRNU directly from the camera
   or
   click **Load from Disk** to load an image from the hard drive.

> **NOTE: Load from Disk**
> Make sure that the image has been taken with active image calibration mode by using the wizard.



The raw image and the line plot of the image is displayed.

6. Click **Start 2-Click-Selection**.
7. Click **on the image** to select the ROI.

Send the calculated PRNU to the camera:

8. Select **LUT 1** or **LUT 2**.
9. Click **Send data to camera**.

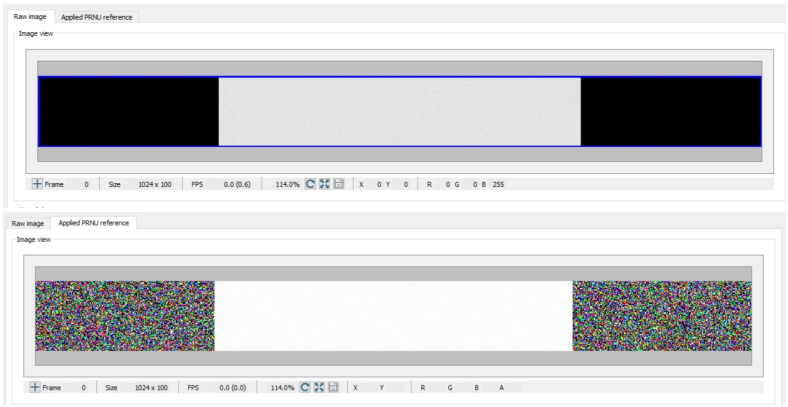
Activate brightness and contrast:

10. Select the **Activate Brightness and contrast** checkbox.
11. Set the contrast to 0.9.

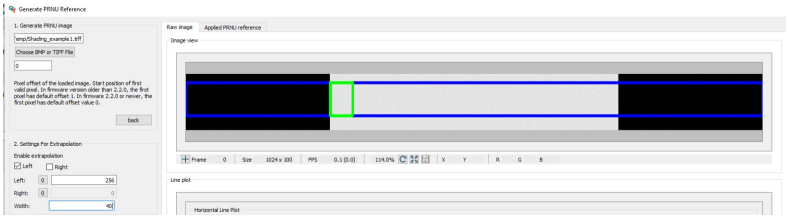
Extrapolation function

If the white reference does not cover the entire FOV, the extrapolation function can be used to generate it. In this case, a straight line is fitted to the gradient. Therefore follow the description below.

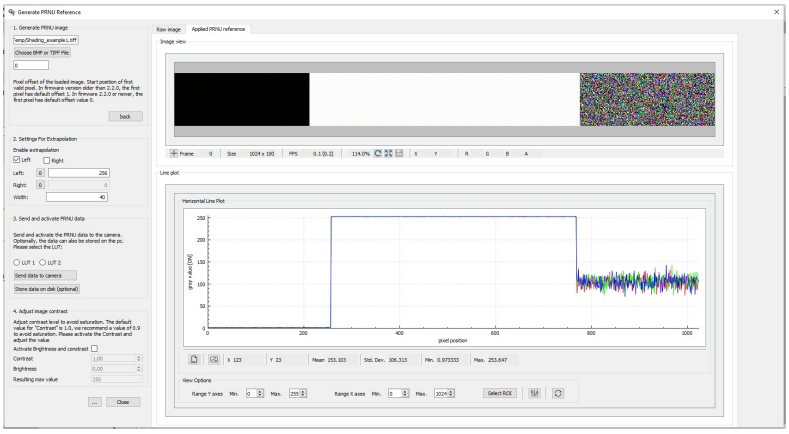
On the right side, you can see the *raw image* and the *Applied PRNU reference* without the extrapolation function.
In the area with low image content, the *Applied PRNU reference* shows some artifacts.



1. Select the ROI, by using the **Start-2-Click-Selection**.
2. Press the button with the **three dots** on the bottom.
3. **Enable** your option, in this example the left extrapolation.
4. Select the **start position** of your extrapolation. The width defines the area where the extrapolation is created. From the start position to column 0, the extrapolation is applied.



5. Check the applied PRNU in the ***Applied PRNU*** *reference* tab.



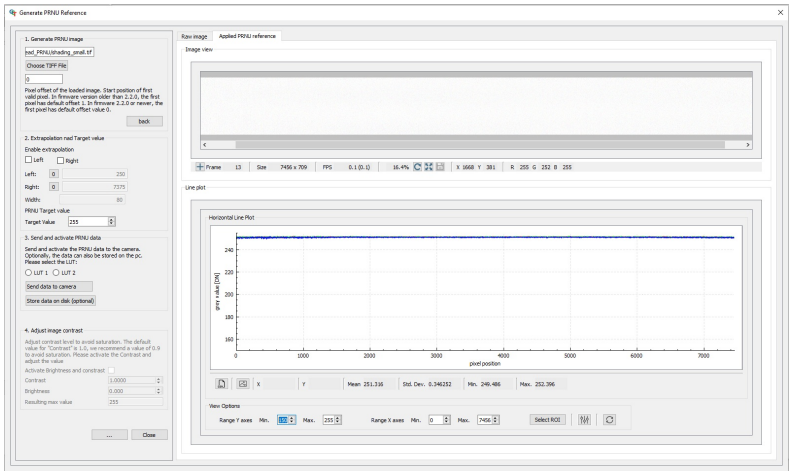
Target Value

The Target Value limits the maximum intensity of your $Calibrated_{Image}$.

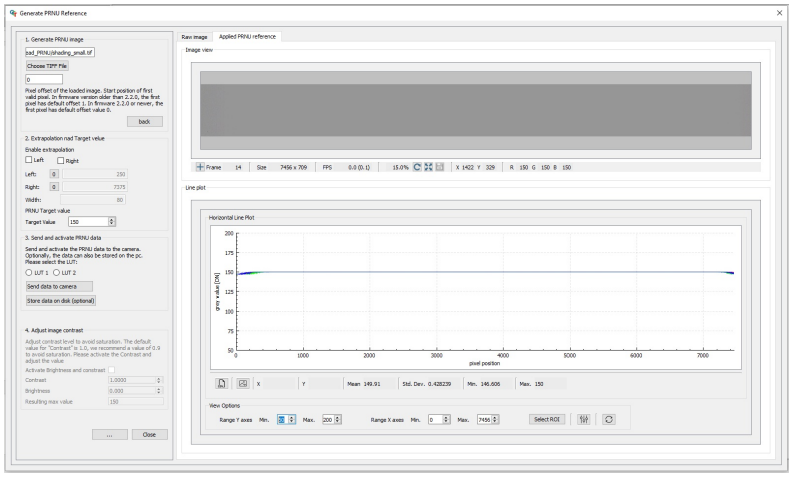
Note

Make sure that the Values of your $PRNU_{Image}$ are smaller than your $Target_{Value}$

1. Press the button with the **three dots** on the bottom.



2. Change the **Target Value**.
3. Check the applied PRNU in the ***Applied PRNU*** *reference* tab.

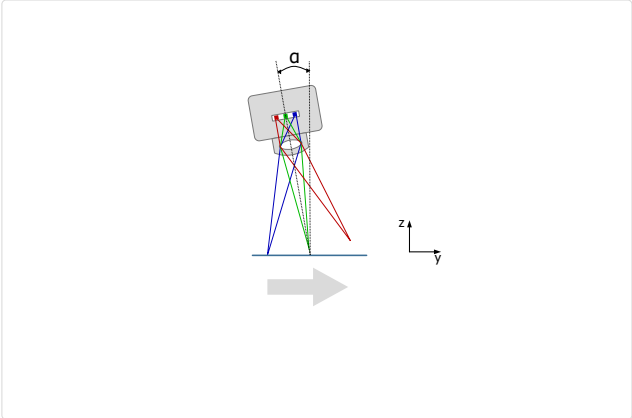


Adjust the camera arrangement

Line Distance (ImageCalibrationLineDistance)

What is line distance?

allPIXA color linescan cameras have 3 color lines (RGB) to provide the best possible image quality. Therefore, a real sensor value is available for each pixel in all 3 color channels, no demosaicing with the resulting loss of resolution is necessary.
All lines are physically arranged at different positions on the sensor. This results in a shift of the 3 color channels in the raw image. All allPIXA cameras provide an internal correction function for this physically caused effect.



Setting up the parameters

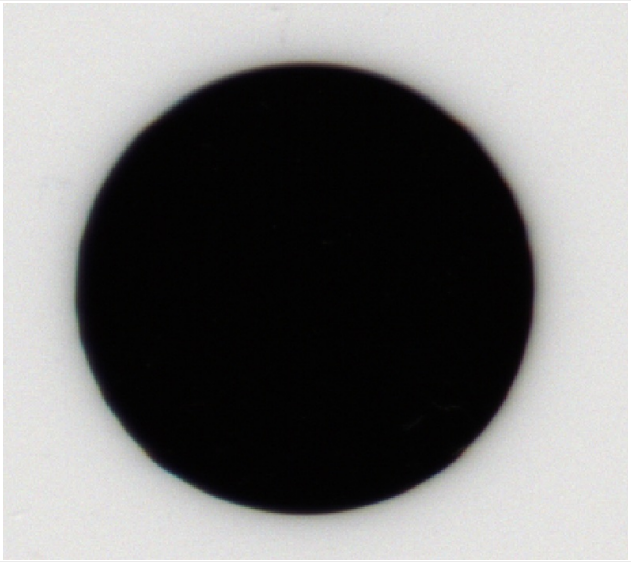
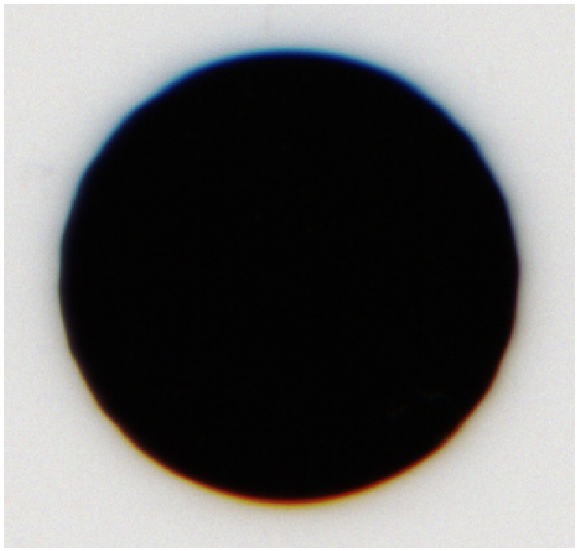
In a standard setup where the camera is aligned perpendicular to the object and the resolution in the sensor direction equals the resolution in the transport direction, the Line Distance parameter is 2.

Step	Description
1. Calculate the *LineDistance* parameter	$\text{Line distance} = \frac{\text{Transport Resolution (dpi)} \times 2}{\text{Optical Resolution (dpi)} \times \cos(\alpha)}$ or $\text{Line distance} = \frac{\text{Optical Pixel Size}\left(\frac{\text{mm}}{\text{pixel}}\right) \times 2}{\text{Transport Pixel Size}\left(\frac{\text{mm}}{\text{pixel}}\right) \times \cos(\alpha)}$
2. Navigate in the feature tree to *Image Calibration Control → Camera Arrangement*	
3. Set the *LineDistance* parameter *ImageCalibrationLineDistance*	
4. There are different options available to set the transport direction with the parameter *ScanDirectionSource* and *ScanDirection*	

Effect of the Line Distance parameter

NOTE

An incorrect ScanDirection also produces a subpixel shift or colored fringes.

With correct *LineDistance (subpixel compensation)*	Without correct *LineDistance (subpixel compensation)*
	

Scan Direction Source

The camera has various options for automatically detection the scanning direction. The configuration can be done in the **camera feature tree** by executing the following steps:

Step	Description
1. Navigate in the feature tree to *Image Calibration Control → Camera Arrangement*	
2. Set the *ScanDirectionSource*	**Internal**: Specifies internal scanning direction source **Line3**: Specifies scanning direction source by the level of Line3 **Encoder0**: Specifies scanning direction source by Encoder0, therefore EncoderSourceA and EncoderSourceB must be connected.

Scan Direction

With the **Scan Direction** parameter the camera is able to control the processing of the output. It depends on the camera sensor and the mounting position. The configuration can be done in the **camerea feature tree** by executing the following steps:

Step	Description
1. Navigate in the feature tree to *Image Calibration Control → Camera Arrangement*	
2. Set the *ScanDirection*	**Forward:** Specified the forward scanning direction, for example RGB output. **Backward:** Specified the backward scanning direction, for example BGR output.

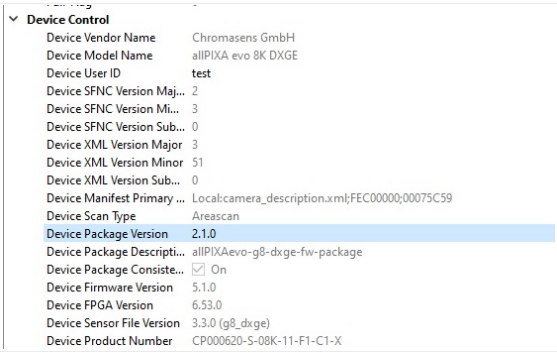
Update the firmware

NOTICE
Irreparable damage to the camera
If the camera ist powered down during firmware update it may get into a non-functional state. Recovery may not be possible.

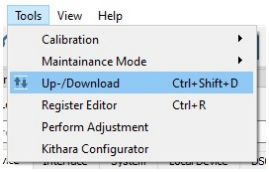
Update your firmware only to change camera functions or fix known bugs.
Any firmware update may not only add new features to a camera or fix known issues. It may also replace previous features or change camera characteristics. See firmware release notes for details.

1. Download firmware from the Chromasens website or use the firmware file provided by Chromasens.

2. Note the **Device Package Version** of the currently installed firmware displayed in the *Device Control feature* group.

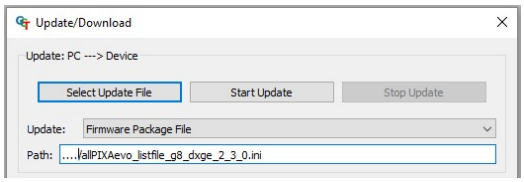


3. In the *menu bar* navigate to *Tools*.
4. Click **Up-/Download**or use the hotkey **Ctrl+Shift+D**.



The *Update/Download* wizard opens.

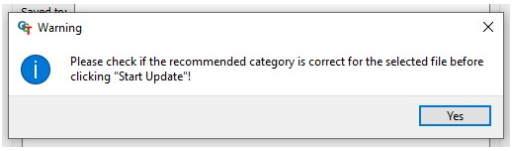
5. Click **Select Update File** and select the *Firmware Package file* to upload and click **Open.**



> **NOTE: Firmware Package file**
> For allPIXA evo select the allPIXAevo_listfile_.....ini file.
> For allPIXA neo select the allPIXAneo_listfile_.....ini file.

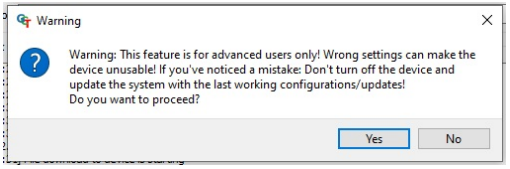
GCT shows a warning message.

6. Check if the *Update* field shows the *Firmware Package file* type.
7. Click **Start Update**.



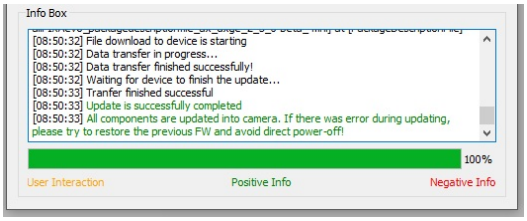
GCT shows a warning message.

8. Click **Yes** to start the Upload.



> **NOTE: Time for Update**
> Depending on the file size, firmware upload may take up to several minutes.

9. Check the text in the Info Box: If the update was successful, it contains a green confirmation message “Update is successfully completed”.



> **NOTE: Update Status**
> If the update was unsuccessful, do not switch off the camera, try to restore the previous state by uploading the correct file for the previously selected file type.

10. Power Cycle and Reconnect the camera

> **NOTE: Power Cycle**
> It is recommended to disconnect the power supply for 30 seconds.

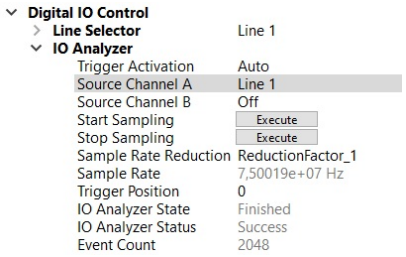
11. Check the **Device Package Version** in the *Device Control feature* group to make sure that the camera successfully booted with the new firmware.

Click here to download a video

IO Analyzer

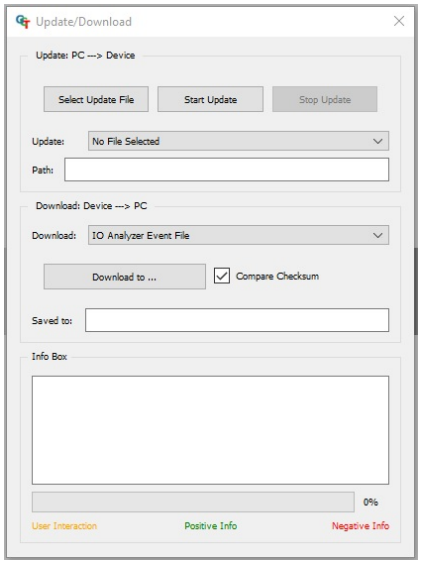
The IO Analyzer allows you to sample the IO input signal of the camera. In a case where you have problems with the input signal, for example with the frame trigger, you can use the IO Analyzer to scan the signals.

Setup and scan the IO Analyzer

1. Connect the IO's of the camera. 2. Start the camera and open GCT.	
3. Navigate to *Digital IO Control, IO Analyzer* .	
4. Set the Trigger Activation to **Auto** (default). 5. Select the Input Source.	
6. To start the sampling, enable the external **Input Source**,in this example, it is Line1 which is in the Encoder mode. 7. Press the **Execute** button of the Start sampling. 8. After a few seconds you can stop the sampling by clicking the **Execute** button of the Stop sampling.	

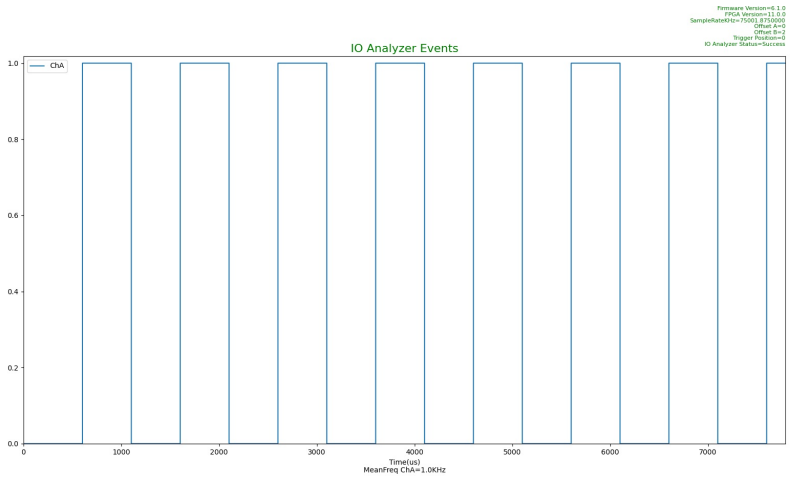
Read out the IO Analyzer data

The data of the *IO Analyzer* are stored in the camera and can be read out via the *Up/Download* dialog.

1. Navigate to *Tool* and click **Up-/Download**.	
2. In the area *Download: Device ---> PC,* select in the drop-down menu the **IO Analyzer Event File** and press **Download to**.	
3. Store the file on your PC, use a *.csv* suffix.	

Analyze the IO Analyzer data

The output of the *IO Analyzer is a CSV* file. You can either read in Excel or you can use the following Python script.
The Output of the Python script is a Plot with the signals and the calculated mean frequency.



Output of the Python script

Bash Copy

```
DisplayIOAnalyzerEvent.py -f YOUR_PATH\pathLog.csv

DisplayIOAnalyzerEvent.py -h
usage: DisplayIOAnalyzerEvent.py [-h] [-f F] [-s S] [-e E]

optional arguments:
  -h, --help  show this help message and exit
  -f F        -f This is the path to the io analyzer event file to display(Mandatory)
  -s S        -s This is the start time of the plot in us(Optional)
  -e E        -e This is the end time of the plot in us(Optional)
```

DisplayIOAnalyzerEvent.py

Overview

Release 1.1.0 - (December 2023)

Camera	New features
allPIXA neo 4k 10GigE Color	DeviceLogLevel, Change Exposure time during grabbing, Extended gain range
allPIXA neo 4k 10GigE Mono	DeviceLogLevel, Change Exposure time during grabbing, Extended gain range
allPIXA neo 6k 10GigE Color	DeviceLogLevel, Change Exposure time during grabbing, Extended gain range
allPIXA neo 6k 10GigE Color	DeviceLogLevel, Change Exposure time during grabbing, Extended gain range
allPIXA neo 6k 10GigE Color - NIR	DeviceLogLevel, Change Exposure time during grabbing, Extended gain range

Release 1.0.0 - (November 2023)

Camera	New features
allPIXA neo 4k 10GigE Color	Init version
allPIXA neo 6k 10GigE Color	Init version
allPIXA neo 6k 10GigE Color - NIR	Init version

Camera Firmware 1.1.0

Feature Reference

The corresponding Feature reference to the camera firmware version **1.1.0** is version **6.4.0.**

Your browser does not support PDF.click here to download

Firmware download

https://chromasens.de/en/allpixa-neo

Release Notes

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Troubleshooting

Status LED	Possible cause	Device error code	Action
It does **not** turn **green** immediately after switching on the power supply.	The fuse has been tripped due to an incorrect input voltage.	–	1. Switch off the power supply. 2. Contact service.
Yellow	The internal temperature is above the defined warning limit.	DEV_CTRL_WARNING_ TEMPERATURE_TOO_HIGH	Decrease ambient temperature and improve cooling.
Red	The internal temperature has reached the defined error limit.	DEV_CTRL_ERROR_ TEMPERATURE_TOO_HIGH	The camera automatically switches to safety mode and indicates an image with a pin stripe test pattern on a black background. 1. Switch off the power supply and let the camera cool down. 2. Check the ambient conditions (0 °C – 60 °C; 32 °F – 140 °F) and improve cooling. 3. Switch on the power supply.

Maintenance and disposal

Safety instructions

- Only technicians of Chromasens GmbH are permitted to open or slacken screws or housing sections of the device.
- Before carrying out any work on the device disconnect the power supply.
- To avoid the risk of fire let other devices such as radiators, heaters or lightning equipment cool down first.
- Necessary repairs may only be carried out by Chromasens GmbH.

	CAUTION
	The device can heat up to 60 °C.
	Do not touch the hot surface. Let the device cool down before carrying out any work on it.

Cleaning

During operation of the device, particles such as dust etc. may be settled on the lens. These deposits affect the quality of the optical image and the function of the device negatively.

Cleaning intervals

Specify regular cleaning intervals depending on your ambient conditions and the degree of soiling.

Cleaning procedure

1. Disconnect the power supply.
2. Let the device cool down. Wait at least 30 minutes.
3. Wipe all surfaces with a soft and lint-free cloth, starting with the lens. The use of isopropanol ist optional, refer to the manufacturer's manual.
4. Inspect the device to ensure that cleaning was effective and repeat if necessary.

Repair

In case of damages to the device refer to Chromasens GmbH.

Disposal

	This product is an electronic device. Please dispose this product in accordance with your local regulations. Contact your local government office for details about environmentally safe recycling.