# CHROMASENS

**Offline User Manual for allPIXA evo Version 1.0.0**

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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.

## 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 |

# About this instruction manual

This instruction manual provides the necessary information for safe and efficient use of the product throughout its life cycle.

**Representational tools**

- Font markup **bold**: clickable areas in the software GCT.
- Font markup *italic*: windows and views to navigate to in the software GCT.

The instructions and descriptions for using the camera are based on the inhouse software GCT.

## History

### Version 1.0.0

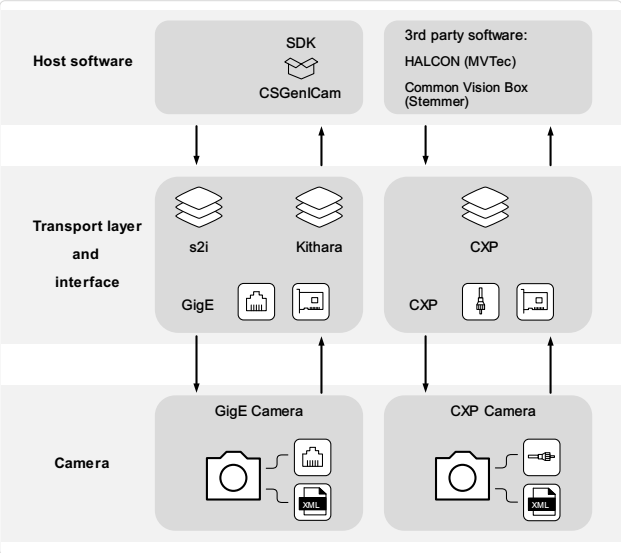
Initial version of this Documentation, July 2023.

## Offline version

# Overview

The cameras offer CMOS performance with CCD image quality. The multi-line CMOS sensor features TDI options for color or mono at high speed. There are line rates possible of up to 100 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 software and the camera

## Firmware and software version

This documentation refers to the following version:

Camera: Packet 2.2.0

# 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

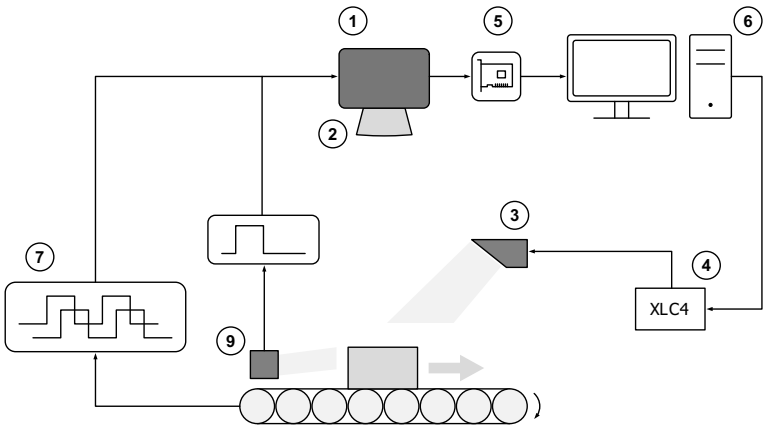
Refer to the GCT documentation for the following information:

- 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 evo line scan cameras are available with the DXGE interface and the CXP interface. Three different positions of the interface are available. The available sensor resolutions are 8k, 10k and 15k. All cameras support color and mono.

The rating plate is located on the rear of the camera. It shows the camera resolution and the serial number.

## Available cameras

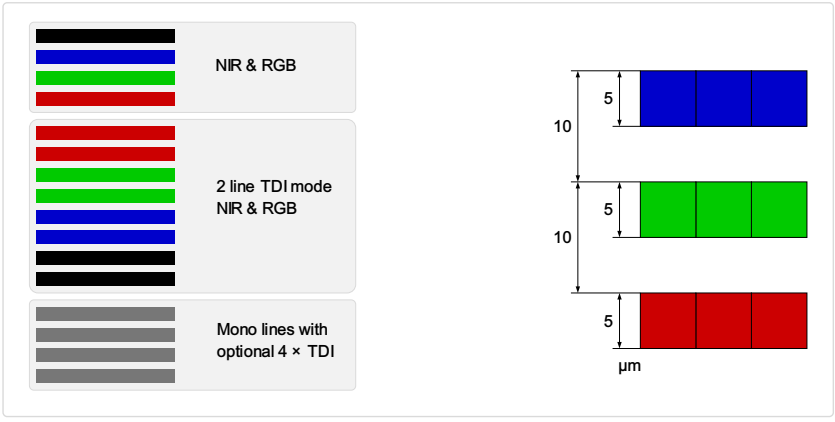
| Camera | Order number | Interface | Interface position | Color space |
|---|---|---|---|---|
| allPIXA evo 8k DXGE X | CP000620-S-08K-11-F1-C1-X | DXGE | X | Color |
| allPIXA evo 8k DXGE Mono TDI X | CP000620-S-08K-11-F1-M-X | DXGE | X | Mono |
| allPIXA evo 10k DXGE Color X | CP000620-S-10K-11-F1-C1-X | DXGE | X | Color |
| allPIXA evo 10k DXGE Mono X | CP000620-S-10K-11-F1-M-X | DXGE | X | Mono |
| allPIXA evo 15k DXGE Color X | CP000620-S-15K-11-F1-C1-X | DXGE | X | Color |
| allPIXA evo 15k DXGE Mono X | CP000620-S-15K-11-F1-M-X | DXGE | X | Mono |
| allPIXA evo 8k CXP Z | CP000620-S-08K-33-F1-C1-Z | CXP | Z | Color |
| allPIXA evo 8k CXP Y | CP000620-S-08K-33-F1-C1-Y | CXP | Y | Color |
| allPIXA evo 8k Mono TDI Z | CP000620-S-08K-33-F1-M-Z | CXP | Z | Mono |
| allPIXA evo 8k Mono TDI Y | CP000620-S-08K-33-F1-M-Y | CXP | Y | Mono |
| allPIXA evo 10k CXP Color Z | CP000620-S-10K-33-F1-C1-Z | CXP | Z | Color |
| allPIXA evo 10k CXP Color Y | CP000620-S-10K-33-F1-C1-Y | CXP | Y | Color |
| allPIXA evo 10k CXP Mono Z | CP000620-S-10K-33-F1-M-Z | CXP | Z | Mono |
| allPIXA evo 10k CXP Mono Y | CP000620-S-10K-33-F1-M-Y | CXP | Y | Mono |
| allPIXA evo 15k CXP Color Z | CP000620-S-15K-33-F1-C1-Z | CXP | Z | Color |
| allPIXA evo 15k CXP Color Z | CP000620-S-15K-33-F1-C1-Y | CXP | Y | Color |
| allPIXA evo 15k CXP Mono Z | CP000620-S-15K-33-F1-M-Z | CXP | Z | Mono |
| allPIXA evo 15k CXP Mono Y | CP000620-S-15K-33-F1-M-Y | CXP | Y | Mono |

# allPIXA evo 8k DXGE

## Camera specifications

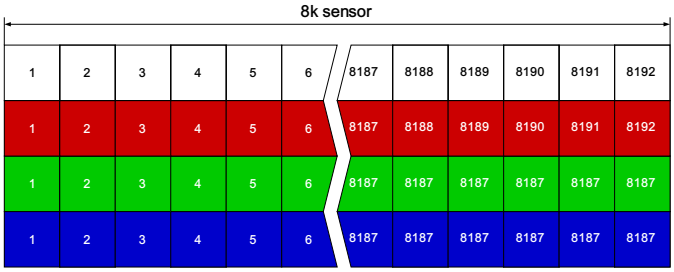
| | |
|---|---|
| Sensor | CMOS line scan sensor, 16 lines (RGB, NIR-pass & mono) |
| Pixel size | 5.0 µm × 5.0 µm |
| Line spacing | 10 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 8192 × 4 lines (16 lines available) |
| Video output | Single/Dual 10GigE, GigE Vision® 2.0 compliant |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono **or**<br>4 × 8/10/12 RGB + NIR |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 2 × SFP+ |
| Interface position | X |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 20 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M72 × 0.75 |
| Housing dimensions | 102 mm × 76 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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



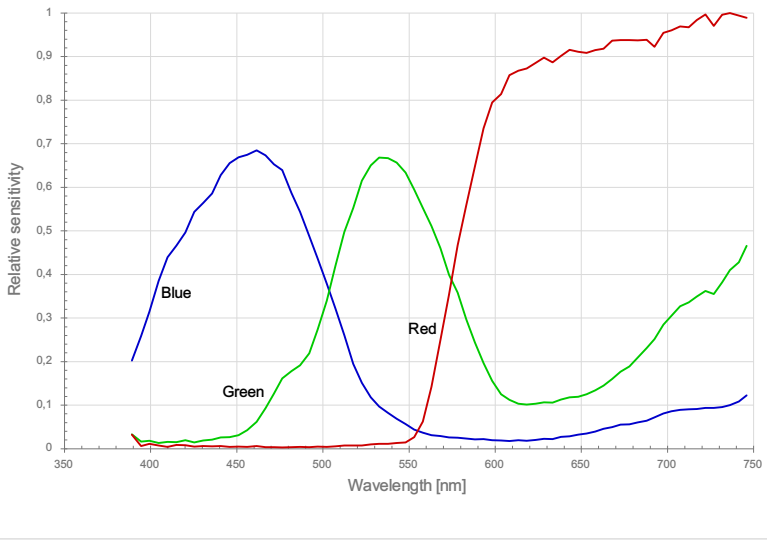

The three different read modes and the sensor line spacing

## Sensor pixel arrangement

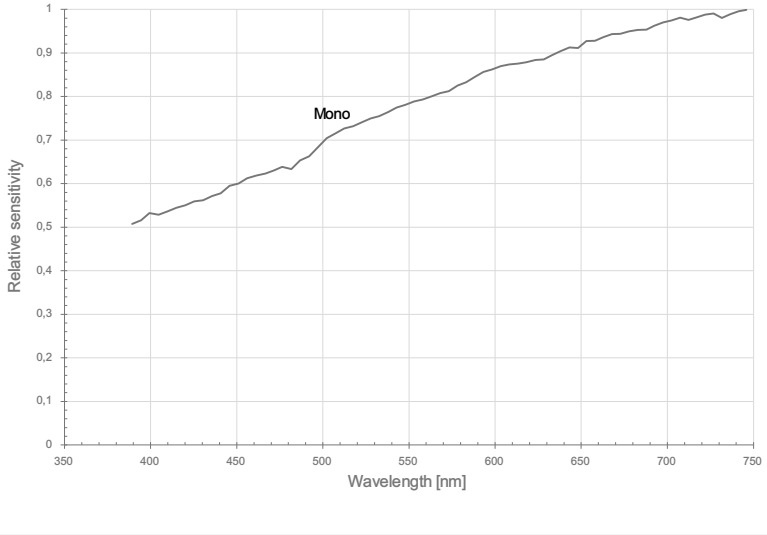



Sensor pixel arrangement

## Spectral sensitivity

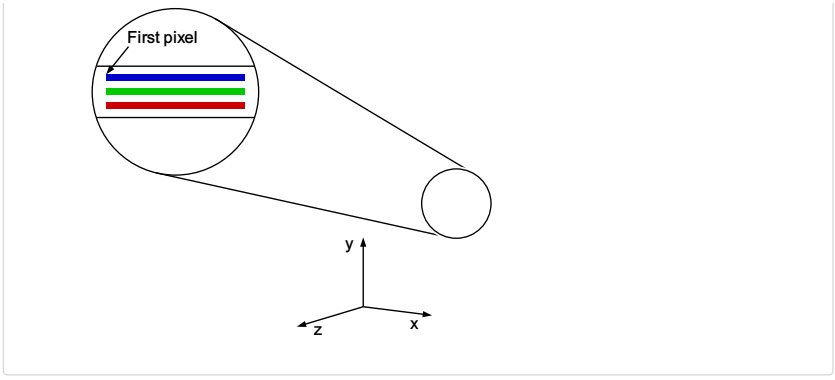



Measured relative spectral sensitivity of the 8k sensor - color




Measured relative spectral sensitivity of the 8k sensor - mono

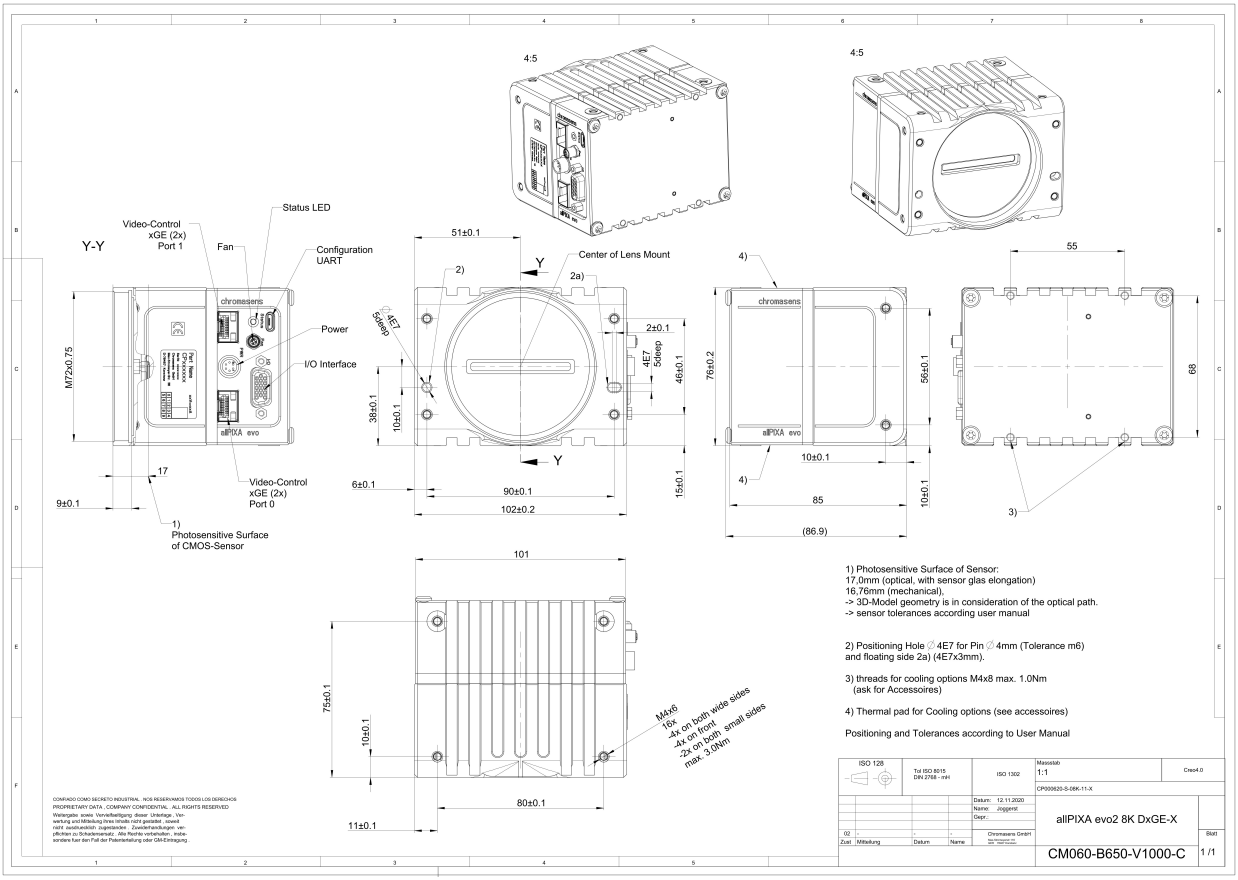
## Sensor alignment and orientation




Alignment and orientation of the 8k sensor

| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1°<br>Z: < ± 0.1° |
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 0.7 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.35 mm |

## Mechanical dimensions

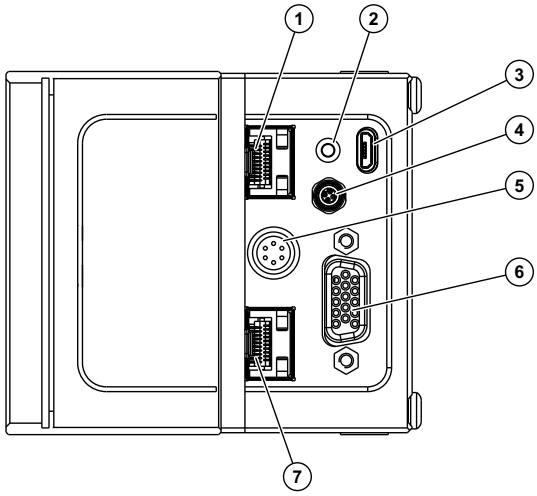



Dimensional drawing of the allPIXA evo 8k DXGE – interface position X

**Download as pdf-file**

**Download dimensional drawing of the allPIXA evo 8k DXGE – interface position X**

# Interface specification




| | | | |
|---|---|---|---|
| **1** | Video output SFP+ Port 1 (10GigE) | **2** | Status LED |
| **3** | Debugging port | **4** | Connector for additional fan |
| **5** | Power supply | **6** | Digital I/O port |
| **7** | Video output SFP+ Port 2 (10GigE) | | |

### Line rate

| Configuration | Single 10 GigE | Dual 10 GigE |
|---|---|---|
| RGB8: 8,192 × 3 pixel | 47.9 kHz | 90.1 kHz |
| RGB10: 8,192 × 3 pixel | 24.2 kHz | 43.2 kHz |
| RGB12: 8,192 × 3 pixel | 24.2 kHz | 43.2 kHz |
| | | |
| RGBa8: 8,192 × 4 pixel | 36.8 kHz | 68.2 kHz |
| RGBa10: 8,192 × 4 pixel | 18.1 kHz | 32.5 kHz |
| RGBa12: 8,192 × 4 pixel | 18.1 kHz | 32.5 kHz |
| | | |
| Mono8: 8,192 × 1 pixel | 100.0 kHz | 100.0 kHz |
| Mono10: 8,192 × 1 pixel | 71.3 kHz | 100.0 kHz |
| Mono12: 8,192 × 1 pixel | 71.3 kHz | 100.0 kHz |

### Power supply

The following connector is required for the power supply cable:

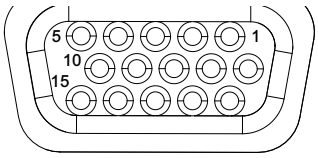
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

### Digital I/O port

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

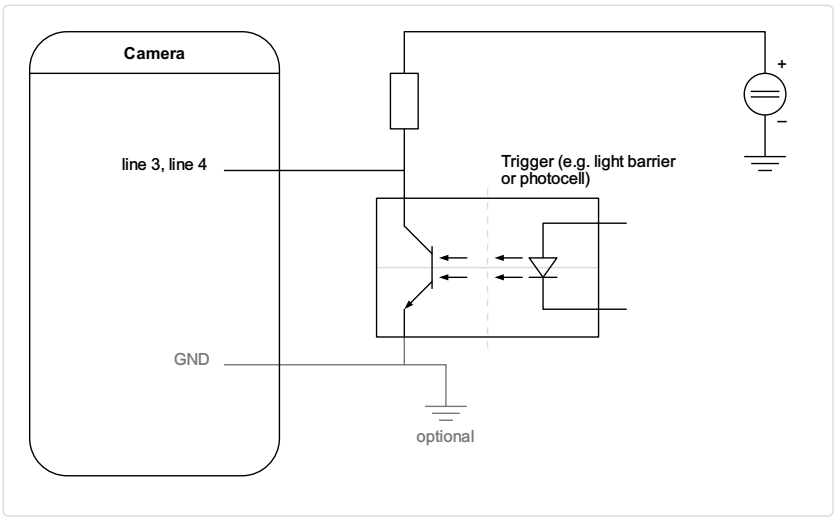
- 15-pin HD D-Sub (male)



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

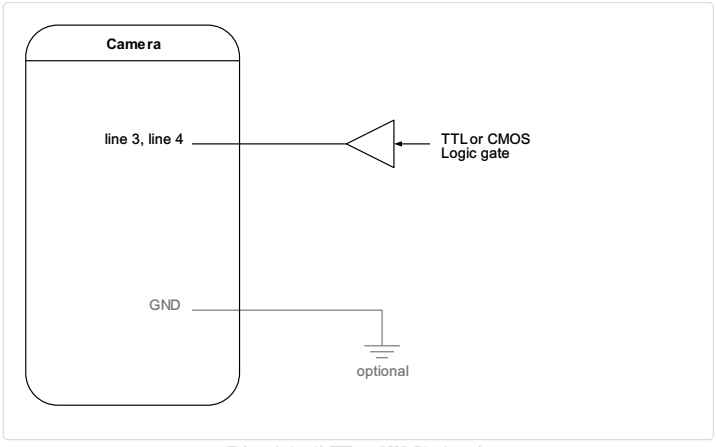
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.



External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.



External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## LED status indicator

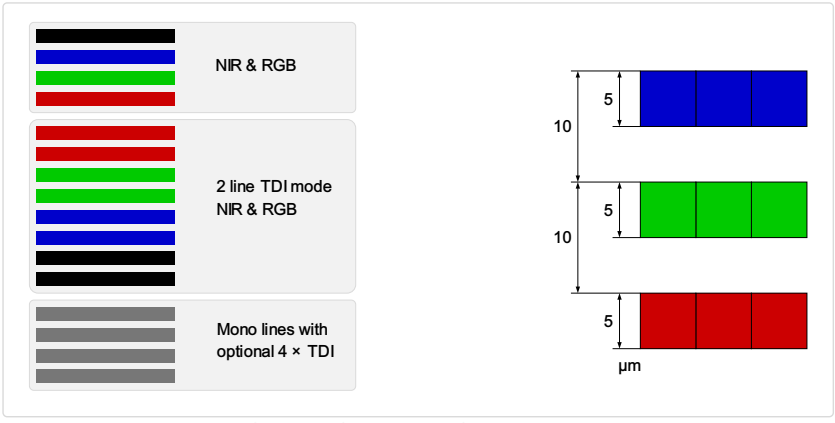
| Color code | Behaviour | Description |
|---|---|---|
|  | Off | No power supply or the input voltage is out of range. |
|  | Blue continuous | The device is OK and provides image data. |
|  | Green continuous | The device is in power-up mode. |
|  | Green blinking | The device is OK and ready. |
|  | Green/Blue alternative | The device is OK and provides image data frequently, based on a trigger signal. |
|  | Yellow continuous | Warning-state: The device is operational. |
|  | Red continuous | Error-state: The device is not operational. |

# allPIXA evo 8k CXP

## Camera specifications

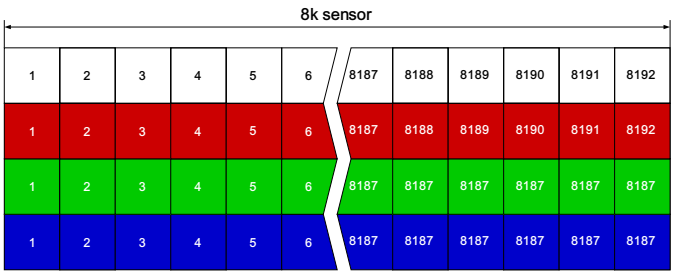
| | |
|---|---|
| Sensor | CMOS line scan sensor, 16 lines (RGB, NIR-pass & mono) |
| Pixel size | 5.0 µm × 5.0 µm |
| Line spacing | 10 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 8192 × 4 lines (16 lines available) |
| Video output | 4 × CoaXPress 2.0 |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono **or**<br>4 × 8/10/12 RGB + NIR |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 4 × Micro-BNC |
| Interface position | Y, Z |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 20 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M72 × 0.75 |
| Housing dimensions | 102 mm × 76 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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



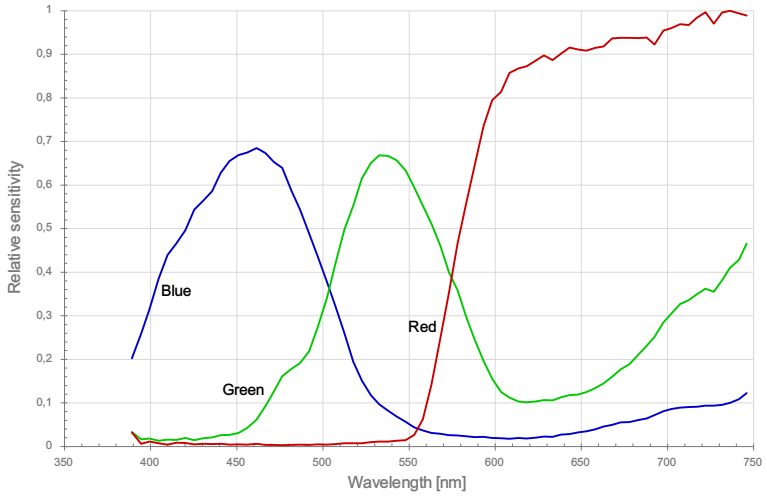

The three different read modes and the sensor line spacing

### Sensor pixel arrangement

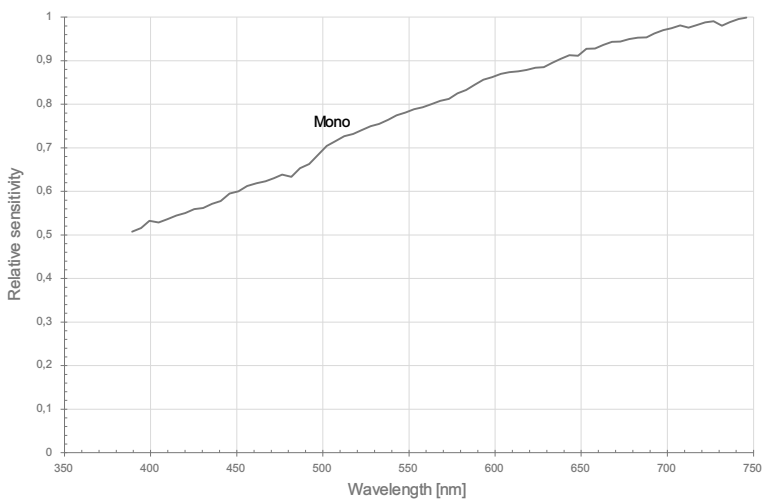



Sensor pixel arrangement

## Spectral sensitivity

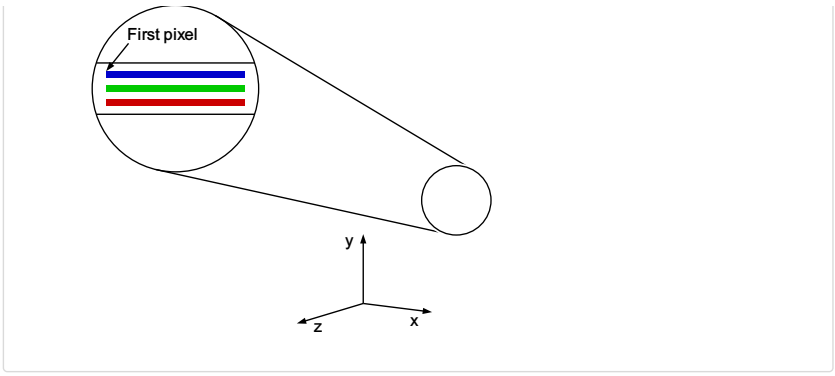



Measured relative spectral sensitivity of the 8k sensor - color




Measured relative spectral sensitivity of the 8k sensor - mono

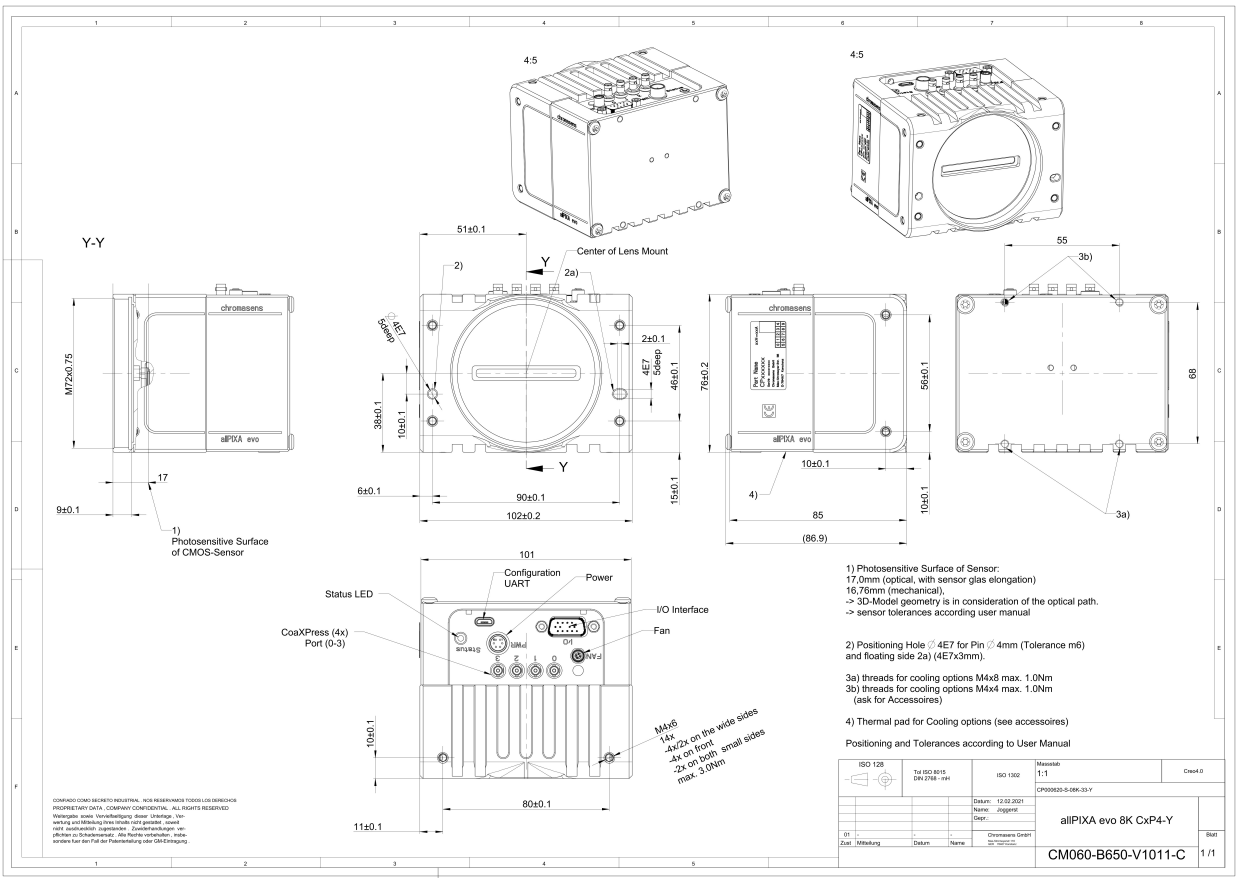
## Sensor alignment and orientation



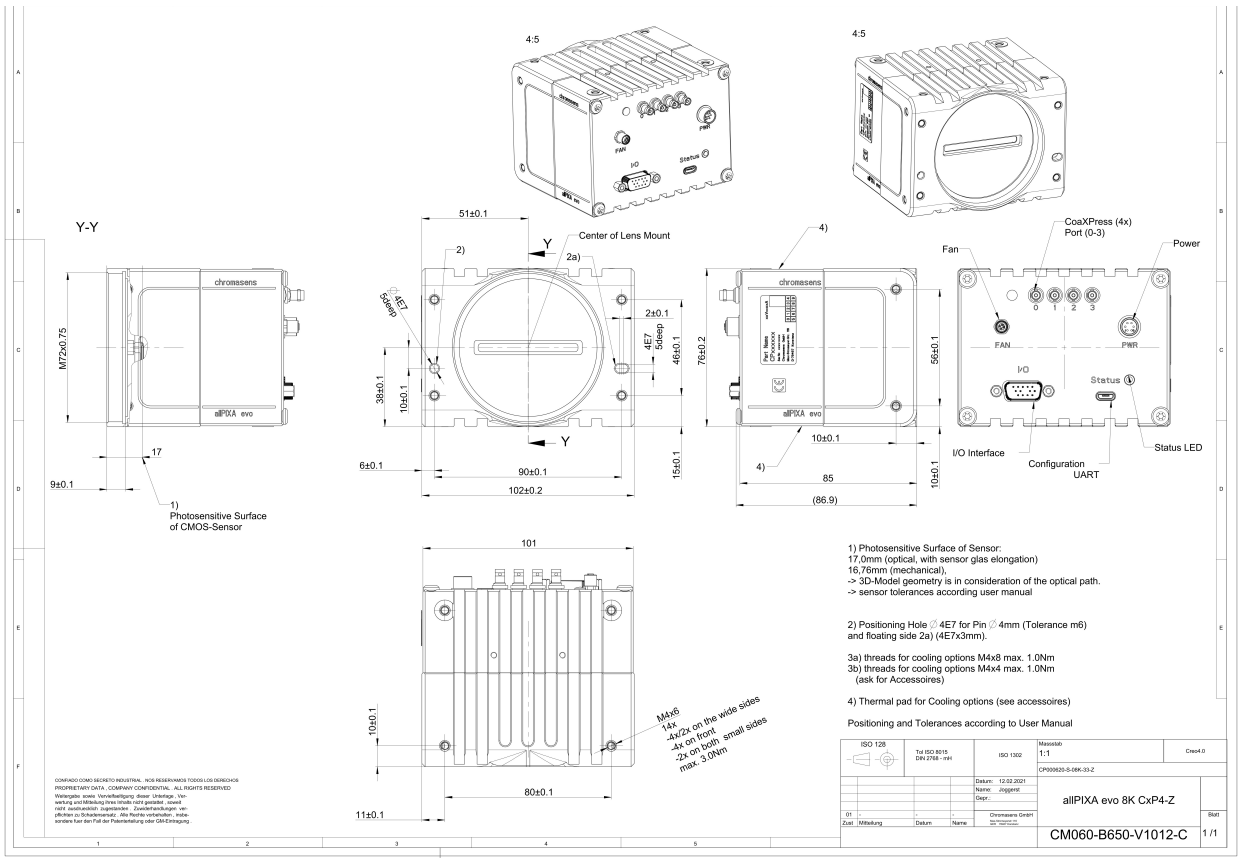

Alignment and orientation of the 8k sensor

| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1°<br>Z: < ± 0.1° |
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 0.7 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.35 mm |

## Mechanical dimensions




Dimensional drawing of the allPIXA evo 8k CXP – Interface position Y




Dimensional drawing of the allPIXA evo 8k CXP – interface position Z

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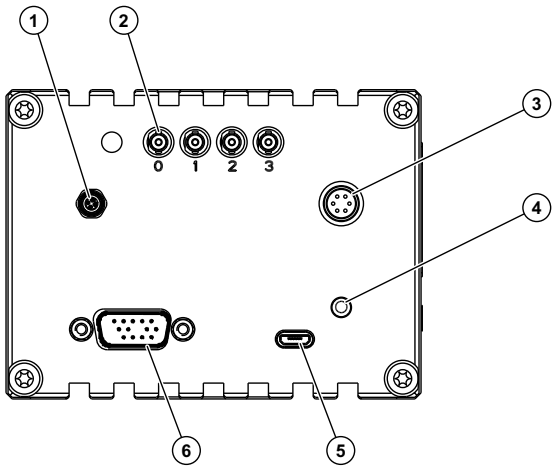
[Download dimensional drawing of the allPIXA evo 8k CXP – interface position Y]
[Download dimensional drawing of the allPIXA evo 8k CXP interface position Z]

## Interface specification




| | | | |
|---|---|---|---|
| **1** | Connector for additional fan | **2** | Video output (4 × CoaXPress 2.0) |
| **3** | Power supply | **4** | Status LED |
| **5** | Debugging port | **6** | Digital I/O port |

### Line rate

| | CXP 12 one port (CXP12_X1) | CXP 12 two ports (CXP12_X2) | CXP 12 four ports (CXP12_X4) |
|---|---|---|---|
| RGB8: 8,192 × 3 pixel | 43.2 kHz | 90.1 kHz | 100.0 kHz |
| RGB10: 8,192 × 3 pixel | 20.7 kHz | 32.5 kHz | 90.1 kHz |

| | | | |
|---|---|---|---|
| RGB12: 8,192 × 3 pixel | 20.7 kHz | 32.5 kHz | 90.1 kHz |
| | | | |
| RGBa8: 8,192 × 4 pixel | 32.5 kHz | 68.2 kHz | 100.0 kHz |
| RGBa10: 8,192 × 4 pixel | 15.6 kHz | 32.5 kHz | 68.2 kHz |
| RGBa12: 8,192 × 4 pixel | 15.6 kHz | 32.5 kHz | 68.2 kHz |
| | | | |
| Mono8: 8,192 × 1 pixel | 100.0 kHz | 100.0 kHz | 100.0 kHz |
| Mono10: 8,192 × 1 pixel | 65.0 kHz | 100.0 kHz | 100.0 kHz |
| Mono12: 8,192 × pixel | 65.0 kHz | 100.0 kHz | 100.0 kHz |

## Power supply

The following connector is required for the power supply cable:

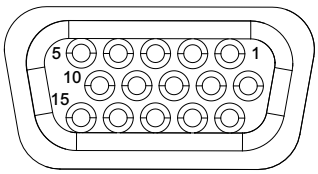
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

## Digital I/O port

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

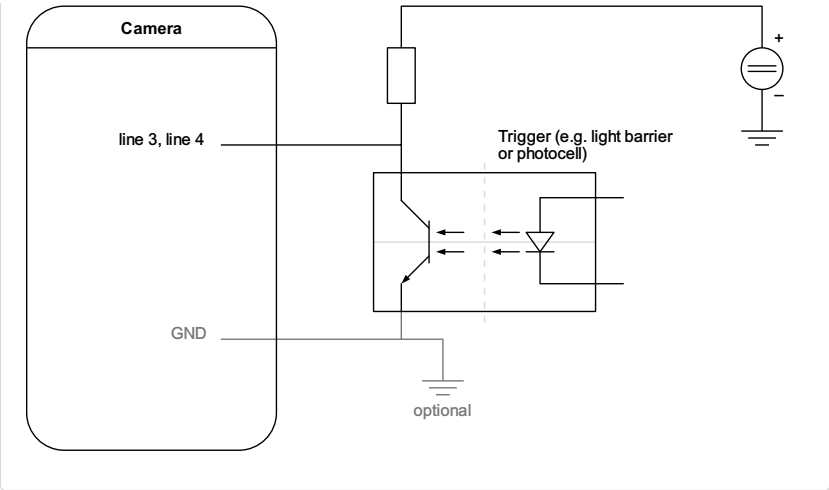
- 15-pin HD D-Sub (male)



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

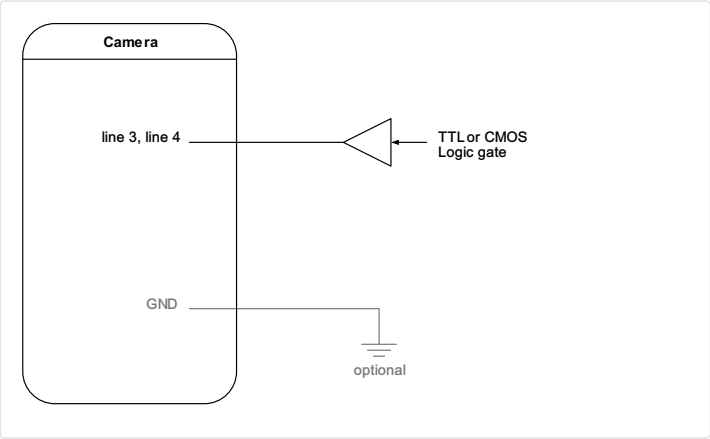
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## 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. |

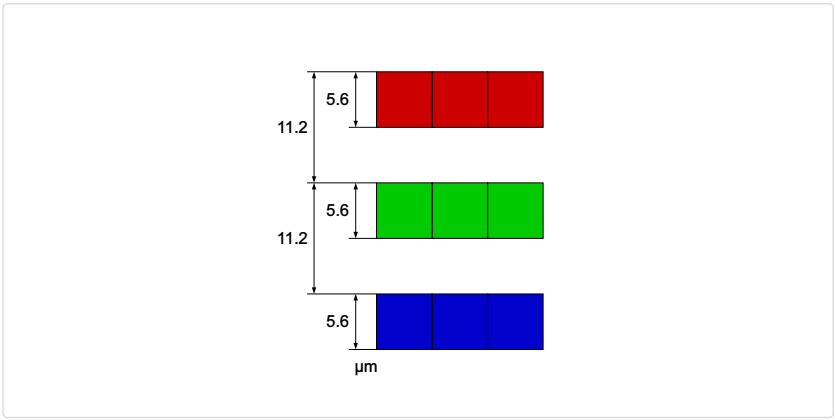
| | | |
|---|---|---|
|  | | |
|  | Flash_1_1red | The device is powered but not connected (not applicable to a device reliant on PoCXP power). |
|  | AlternateFlash_12_5 green/orange; shown for a minimum of 1s even if connection detection is faster | The Connection detection is in progress, PoCXP is 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.<br>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 evo 10k DXGE

## Camera specifications

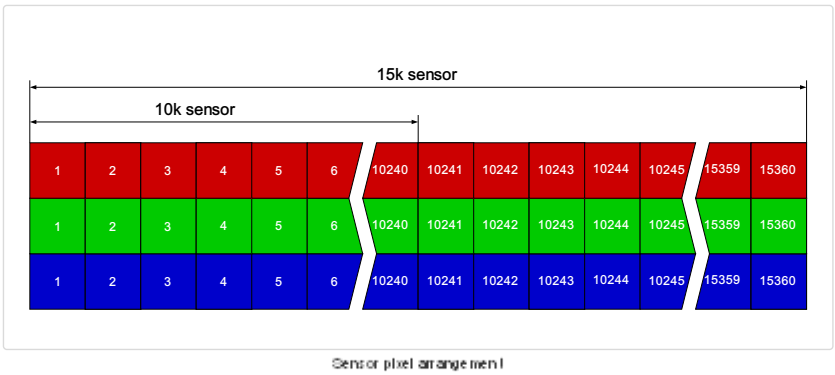
| | |
|---|---|
| Sensor | Tri-linear CMOS color line sensor |
| Pixel size | 5.6 µm × 5.6 µm |
| Line spacing | 11.2 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 10240 pixels × 3 lines |
| Video output | Single/Dual 10GigE, GigE Vision® 2.0 compliant |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 2 × SFP+ |
| Interface position | X |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 10 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M72 × 0.75 |
| Housing dimensions | 102 mm × 76 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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



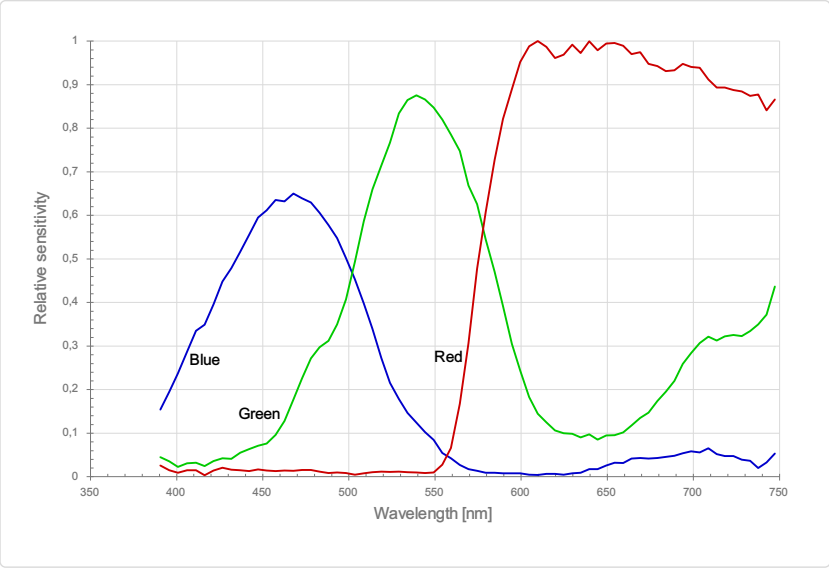

Sensor line spacing

## Sensor pixel arrangement

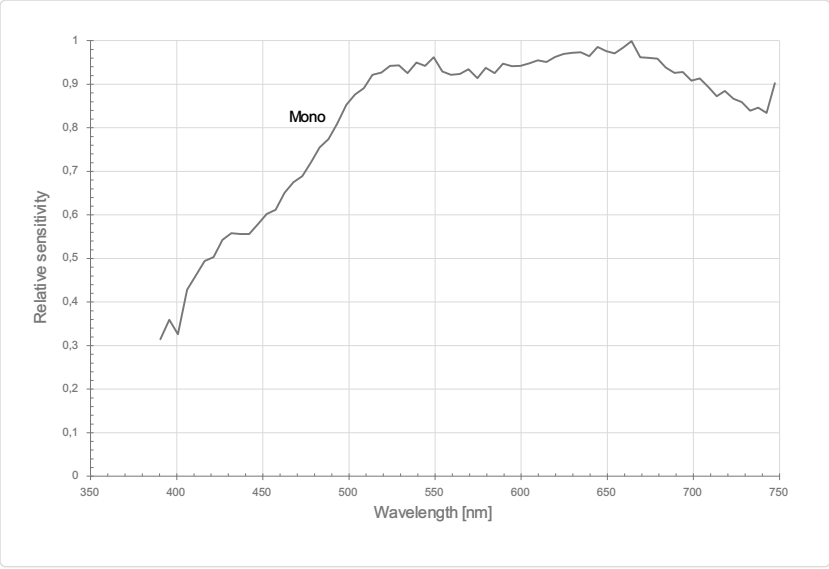



Sensor pixel arrangement

## Spectral sensitivity

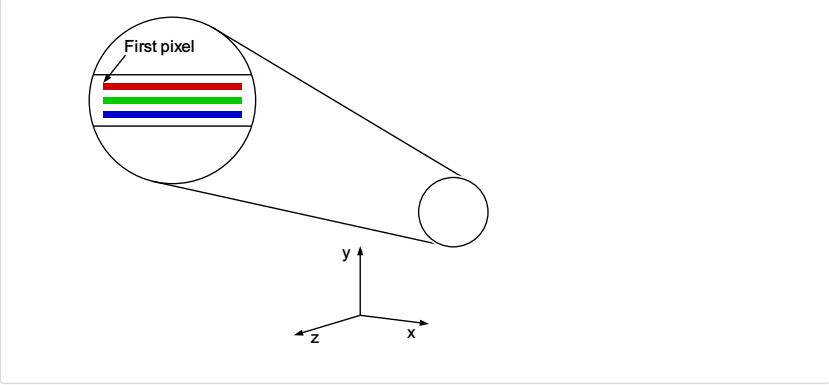



Measured relative spectral sensitivity of the 10k and 15k sensor - color




Measured relative spectral sensitivity of the 10k and 15k sensor - mono

## Sensor alignment and orientation

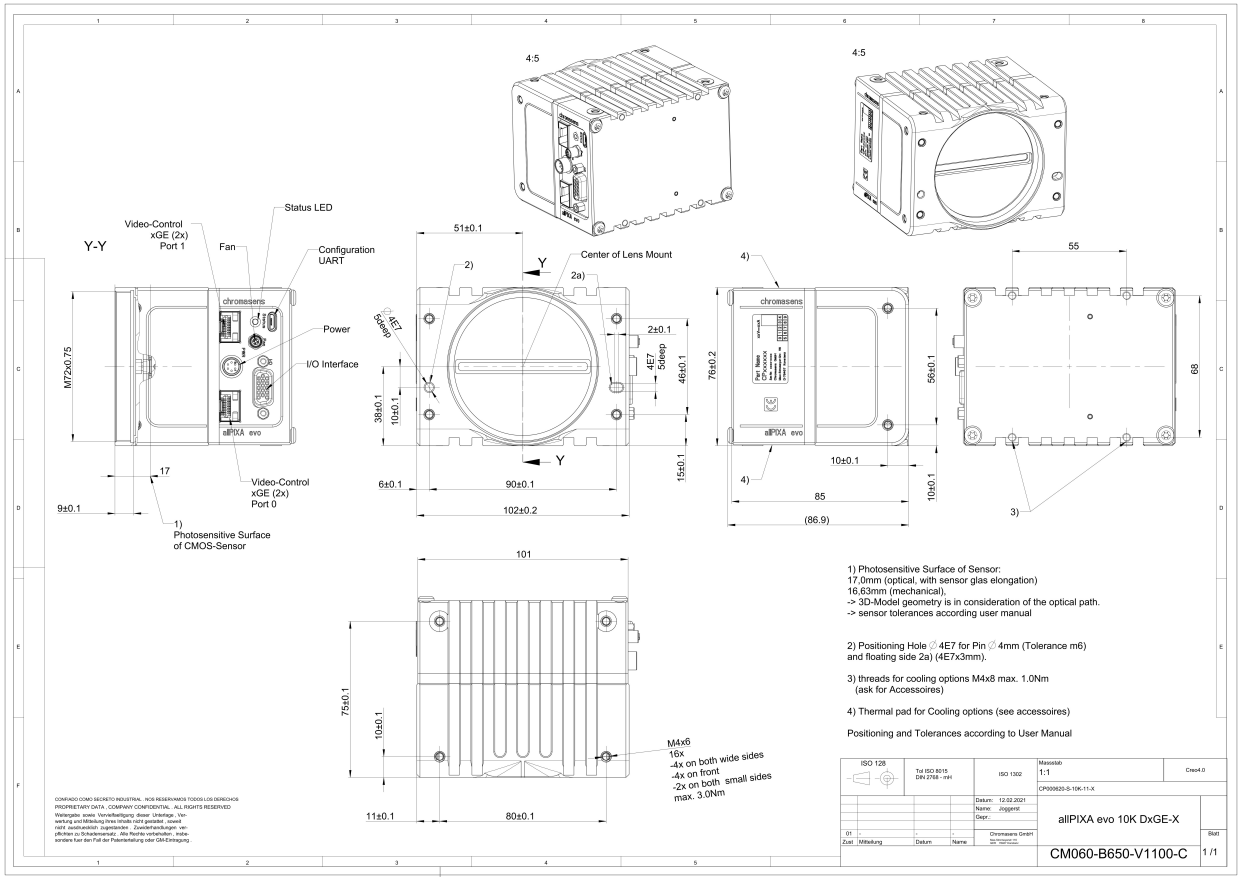



Alignment and orientation of the 10k sensor

| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1° |

| | |
|---|---|
| Sensor rotation alignment | Z: < ± 0.1° |
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 1.1 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.55 mm |

## Mechanical dimensions




Dimensional drawing of the allPIXA evo 10k DXGE – interface position X

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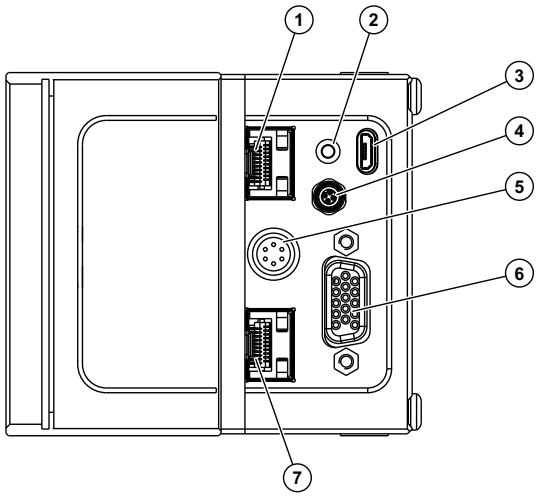
**Download dimensional drawing of the allPIXA evo 10k DXGE – interface position X**

## Interface specification




| | | | |
|---|---|---|---|
| 1 | Video output SFP+ Port 1 (10GigE) | 2 | Status LED |

| | | | |
|---|---|---|---|
| **3** | Debugging port | **4** | Connector for additional fan |
| **5** | Power supply | **6** | Digital I/O port |
| **7** | Video output SFP+ Port 2 (10GigE) | | |

### Line rate

| Configuration | Single 10 GigE | Dual 10 GigE |
|---|---|---|
| RGB8: 10,240 × 3 pixel | 38.5 kHz | 68.4 kHz |
| RGB10: 10,240 × 3 pixel | 19.3 kHz | 34.7 kHz |
| RGB12: 10,240 × 3 pixel | 19.3 kHz | 37.7 kHz |
| | | |
| Mono8: 10,240 × 1 pixel | 68.4 kHz | 68.4 kHz |
| Mono10: 10,240 × 1 pixel | 57.4 kHz | 68.4 kHz |
| Mono12: 10,240 × 1 pixel | 57.4 kHz | 68.4 kHz |

### Power supply

The following connector is required for the power supply cable:

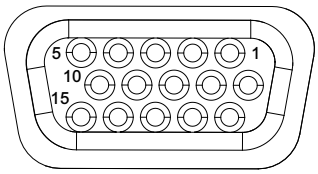
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

### Digital I/O port

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

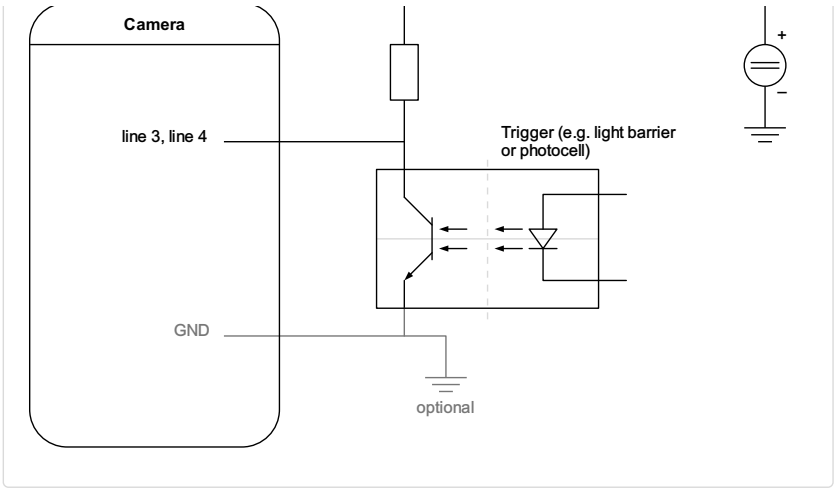
- 15-pin HD D-Sub (male)



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

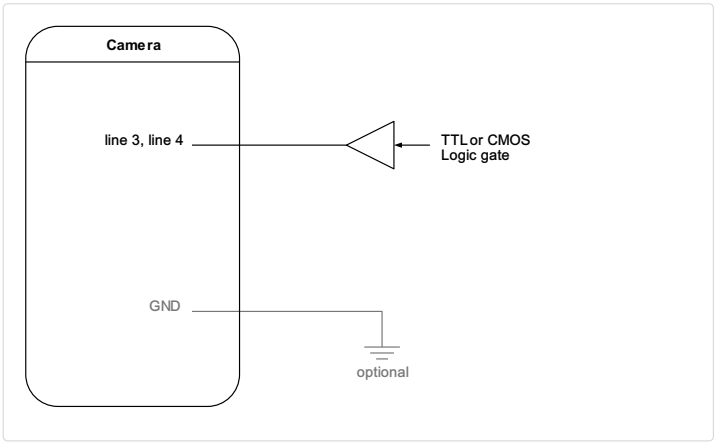
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## LED status indicator

| Color code | Behaviour | Description |
|---|---|---|
| | Off | No power supply or the input voltage is out of range. |
| | Blue continuous | The device is OK and provides image data. |

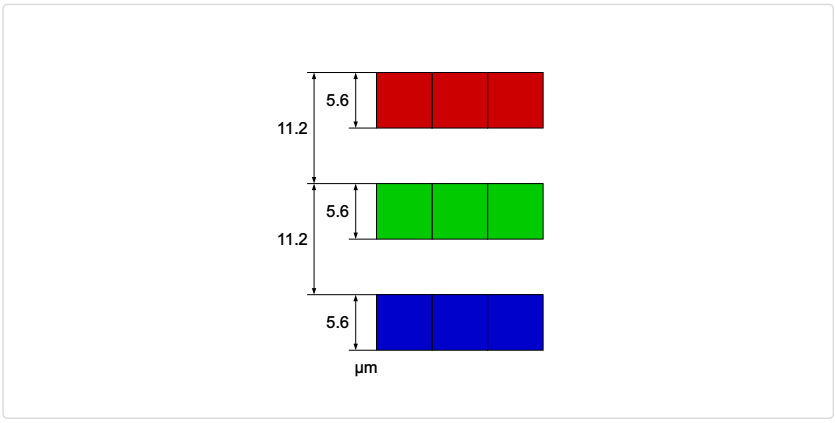
| | | |
|---|---|---|
|  | | |
|  | Green continuous | The device is in power-up mode. |
|  | Green blinking | The device is OK and ready. |
|  | Green/Blue alternative | The device is OK and provides image data frequently, based on a trigger signal. |
|  | Yellow continuous | Warning-state: The device is operational. |
|  | Red continuous | Error-state: The device is not operational. |

# allPIXA evo 10k CXP

## Camera specifications

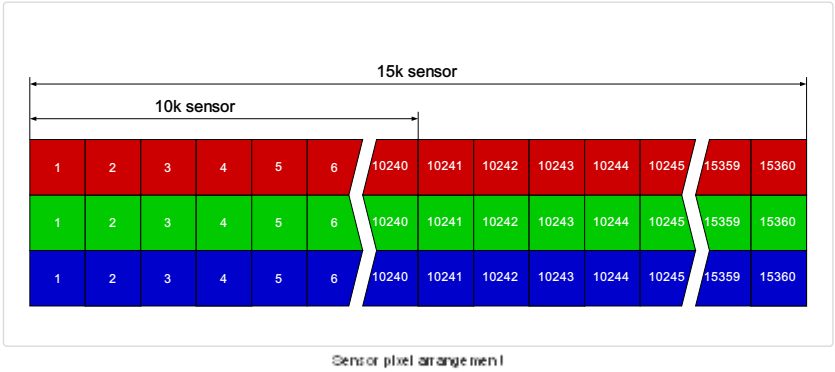
| | |
|---|---|
| Sensor | Tri-linear CMOS color line sensor |
| Pixel size | 5.6 µm × 5.6 µm |
| Line spacing | 11.2 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 10240 pixels × 3 lines |
| Video output | 4 × CoaXPress 2.0 |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 4 × Micro-BNC |
| Interface position | Y, Z |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 10 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M72 × 0.75 |
| Housing dimensions | 102 mm × 76 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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



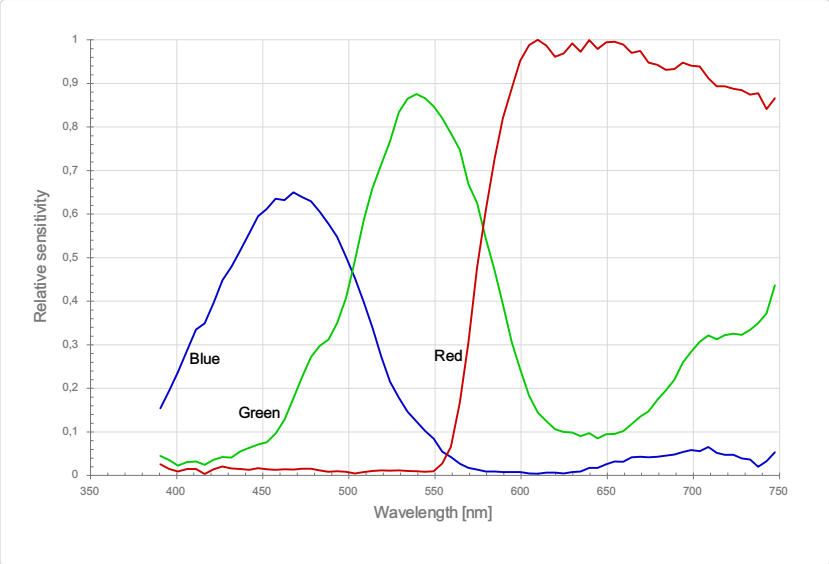

Sensor line spacing

## Sensor pixel arrangement

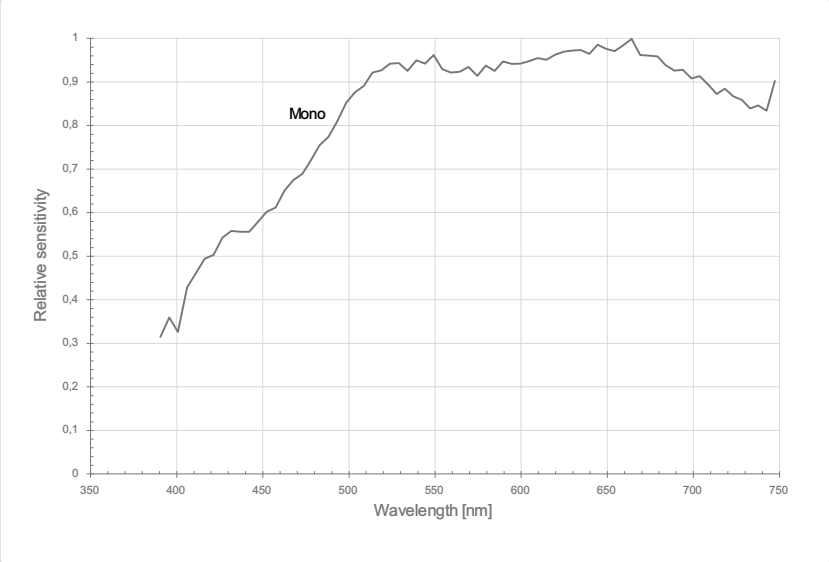



Sensor pixel arrangement

## Spectral sensitivity

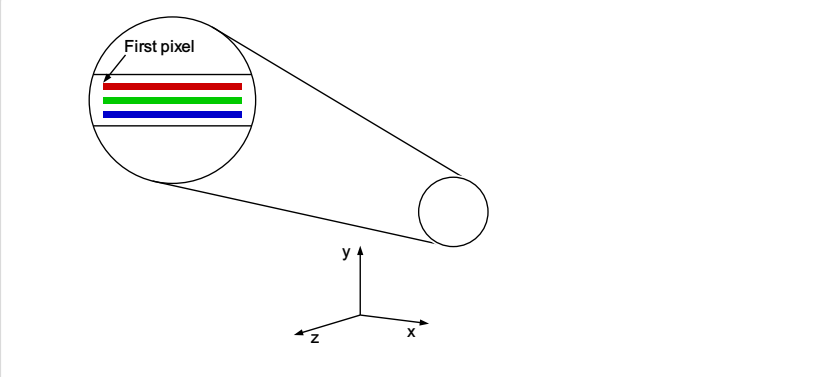



Measured relative spectral sensitivity of the 10k and 15k sensor - color




Measured relative spectral sensitivity of the 10k and 15k sensor - mono

## Sensor alignment and orientation

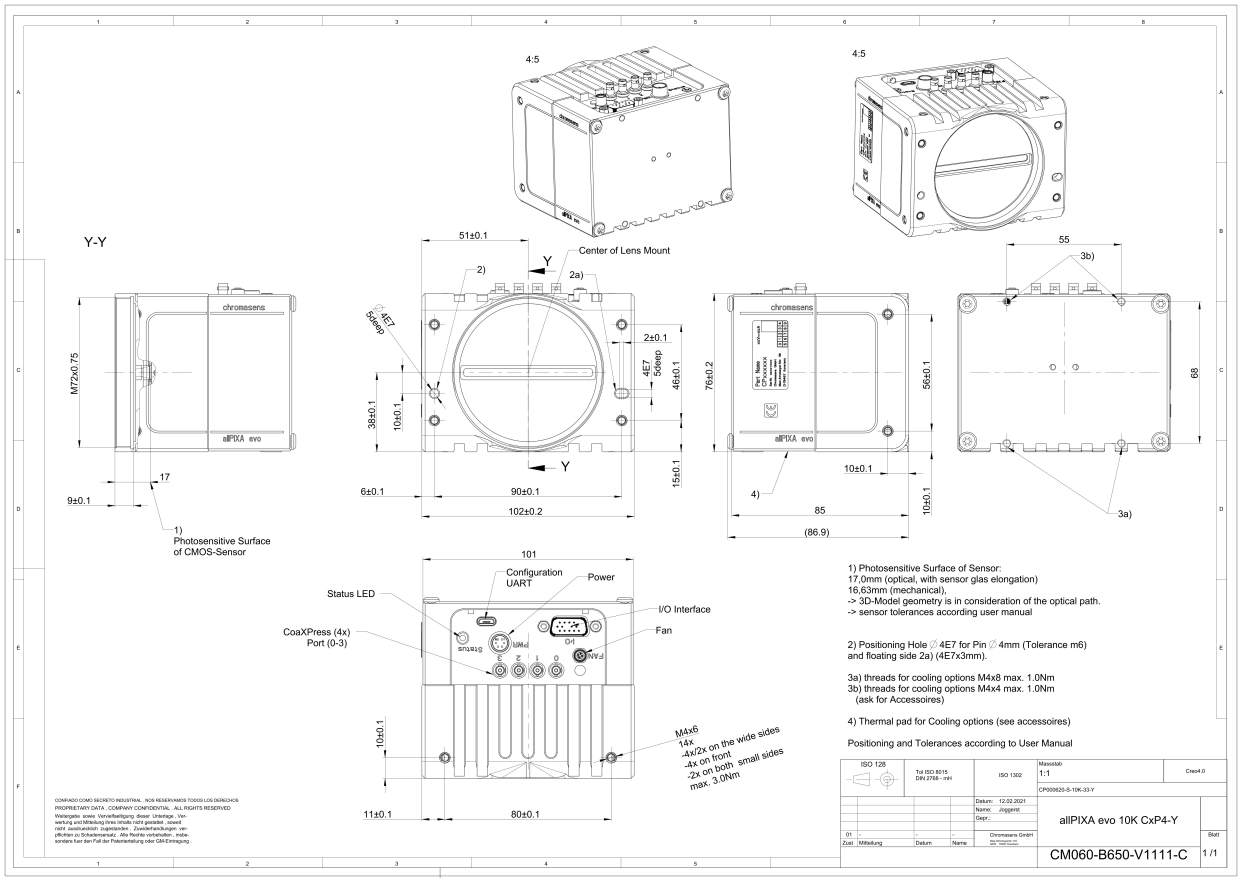



Alignment and orientation of the 10k sensor

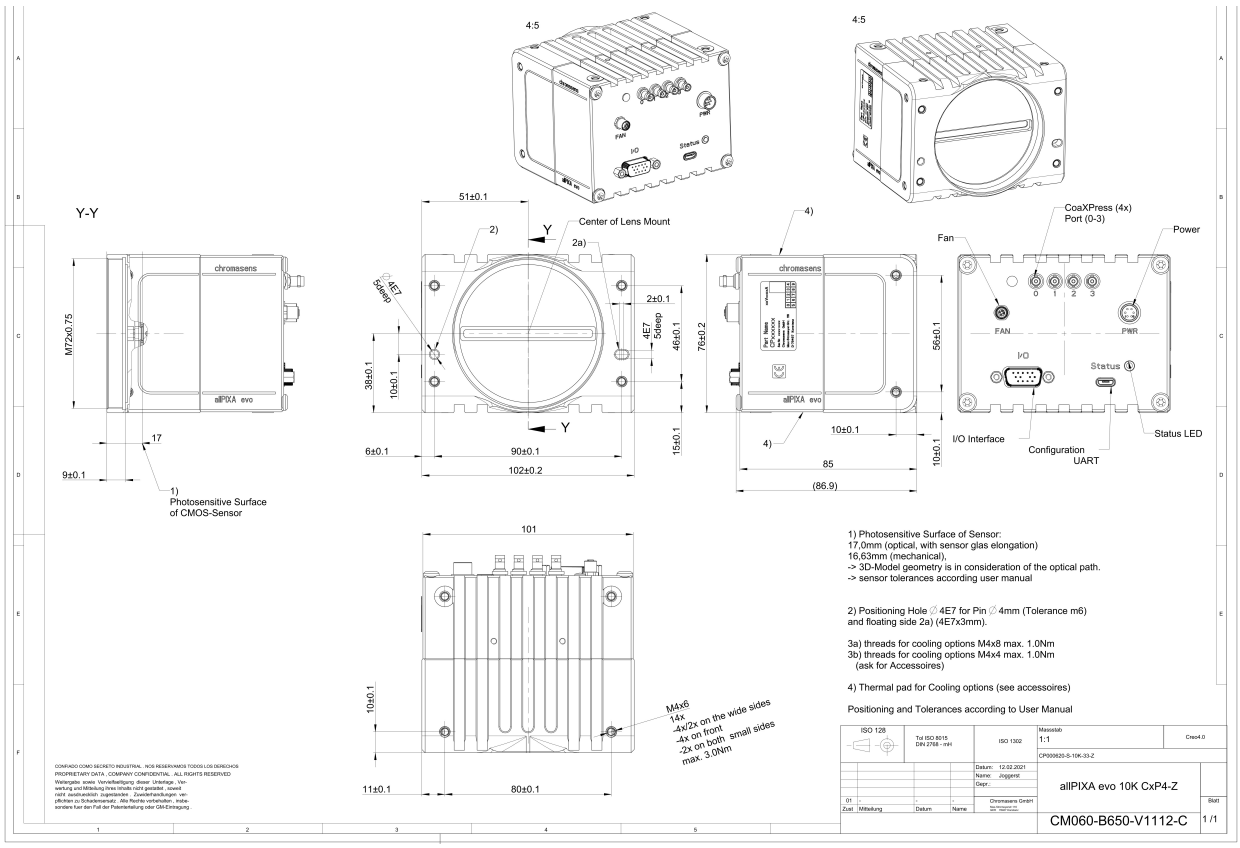
| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1° |

| | |
|---|---|
| | Z: < ± 0.1 |
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 1.1 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.55 mm |

## Mechanical dimensions




Dimensional drawing of the allPIXA evo 10k CXP – Interface position Y




Dimensional drawing of the allPIXA evo 10k CXP – interface position Z

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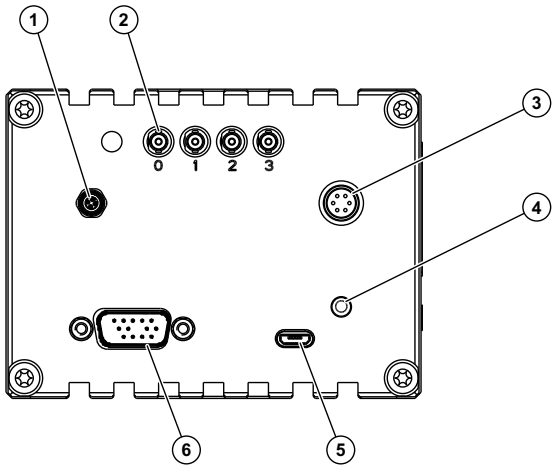
[Download dimensional drawing of the allPIXA evo 10k CXP – interface position Y]

[Download dimensional drawing of the allPIXA evo 10k CXP interface position Z]

## Interface specification




| | | | |
|---|---|---|---|
| **1** | Connector for additional fan | **2** | Video output (4 × CoaXPress 2.0) |
| **3** | Power supply | **4** | Status LED |
| **5** | Debugging port | **6** | Digital I/O port |

### Line rate

| | CXP 12 one port (CXP12_X1) | CXP 12 two ports (CXP12_X2) | CXP 12 four ports (CXP12_X4) |
|---|---|---|---|
| RGB8: 10,240 × 3 pixel | 37.7 kHz | 68.4 kHz | 68,4 kHz |
| RGB10: 10,240 × 3 pixel | 16.4 kHz | 34.7 kHz | 68,4 kHz |

| | | | |
|---|---|---|---|
| RGB12: 10,240 × 3 pixel | 16.4 kHz | 34.7 kHz | 68.4 kHz |
| | | | |
| Mono8: 10,240 × 1 pixel | 68.4 kHz | 68.4 kHz | 68.4 kHz |
| Mono10: 10,240 × 1 pixel | 52.2 kHz | 68.4 kHz | 68.4 kHz |
| Mono12: 10,240 × 1 pixel | 52.2 kHz | 68.4 kHz | 68.4 kHz |

## Power supply

The following connector is required for the power supply cable:

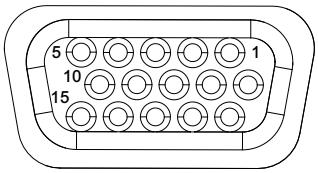
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

## Digital I/O port

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

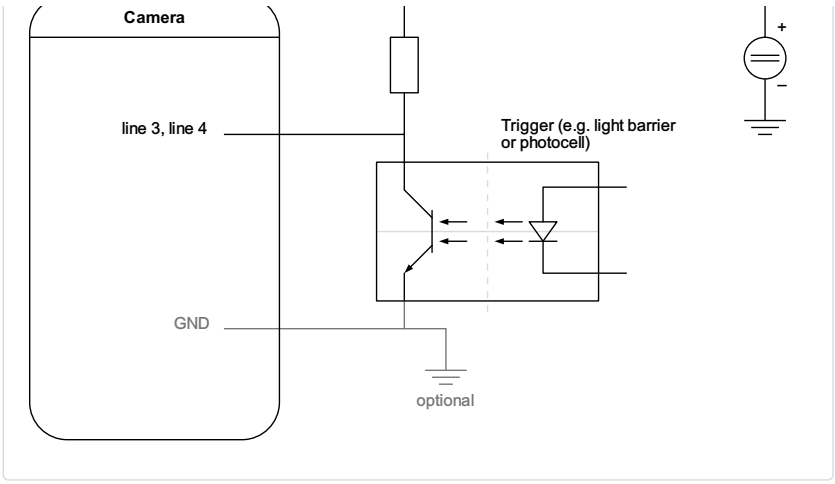
- 15-pin HD D-Sub (male)



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

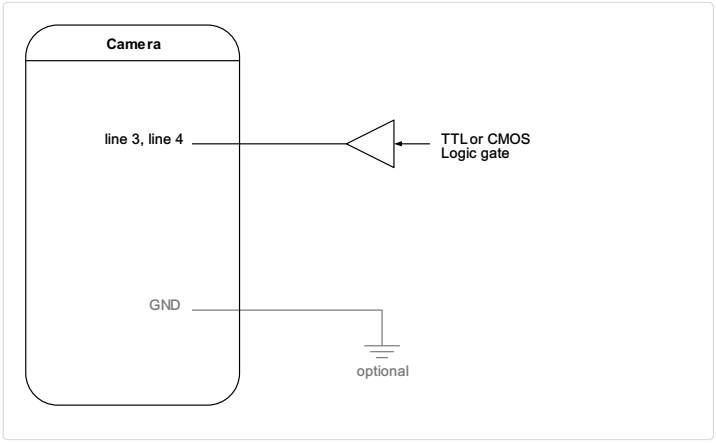
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## 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. |

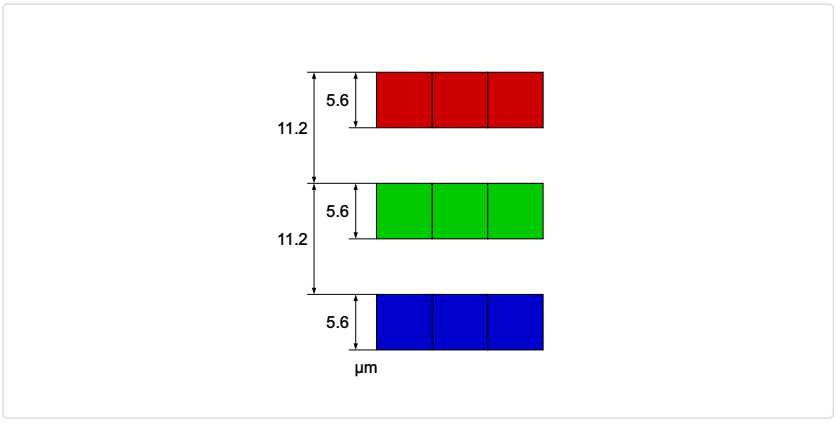
| | | |
|---|---|---|
|  | | |
|  | Flash_1_1red | The device is powered but not connected (not applicable to a device reliant on PoCXP power). |
|  | AlternateFlash_12_5 green/orange; shown for a minimum of 1s even if connection detection is faster | The Connection detection is in progress, PoCXP is 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.<br>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 evo 15k DXGE

## Camera specifications

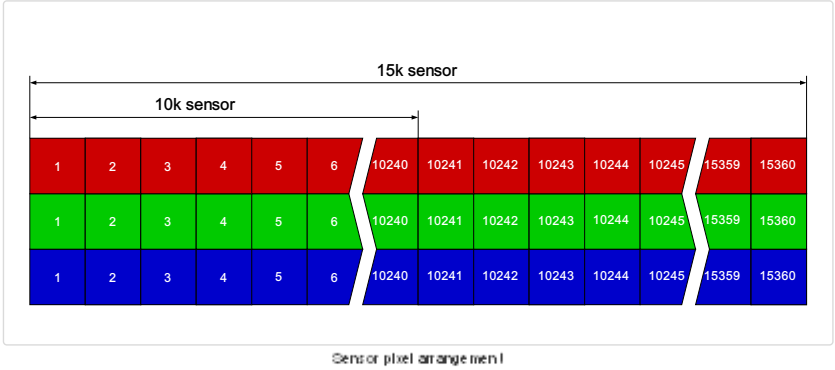
| | |
|---|---|
| Sensor | Tri-linear CMOS color line sensor |
| Pixel size | 5.6 µm × 5.6 µm |
| Line spacing | 11.2 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 15360 pixels × 3 lines |
| Video output | Single/Dual 10GigE, GigE Vision® 2.0 compliant |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 2 × SFP+ |
| Interface position | X |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 10 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M95 × 1.00 |
| Housing dimensions | 102 mm × 101 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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 line spacing

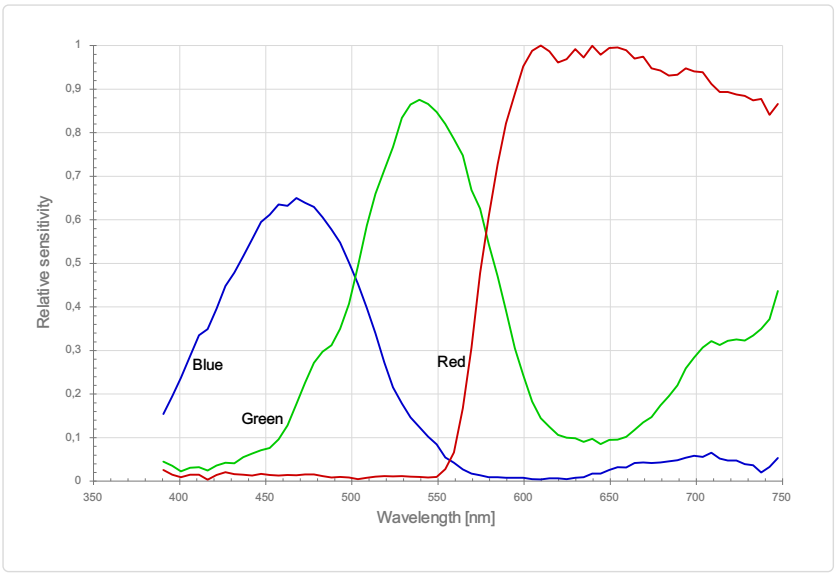
### Sensor pixel arrangement



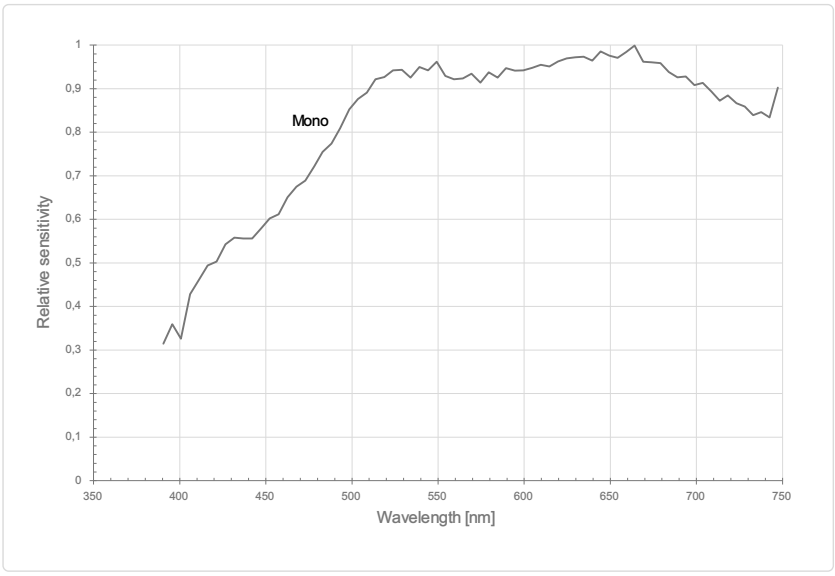

Sensor pixel arrangement

### Spectral sensitivity

### Spectral sensitivity

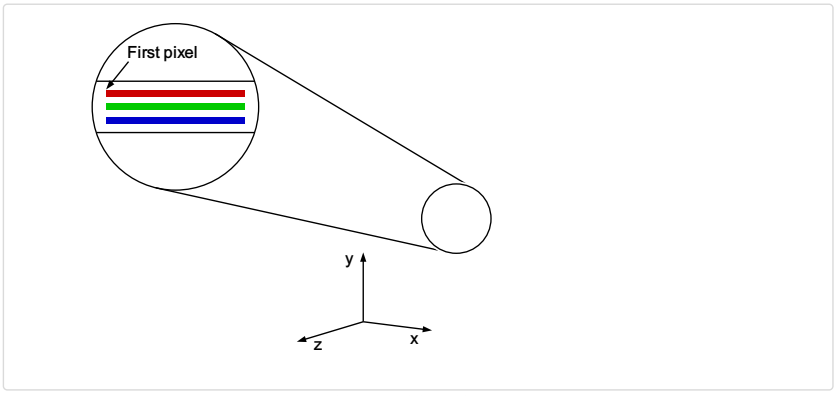



Measured relative spectral sensitivity of the 10k and 15k sensor - color




Measured relative spectral sensitivity of the 10k and 15k sensor - mono

### Sensor alignment and orientation

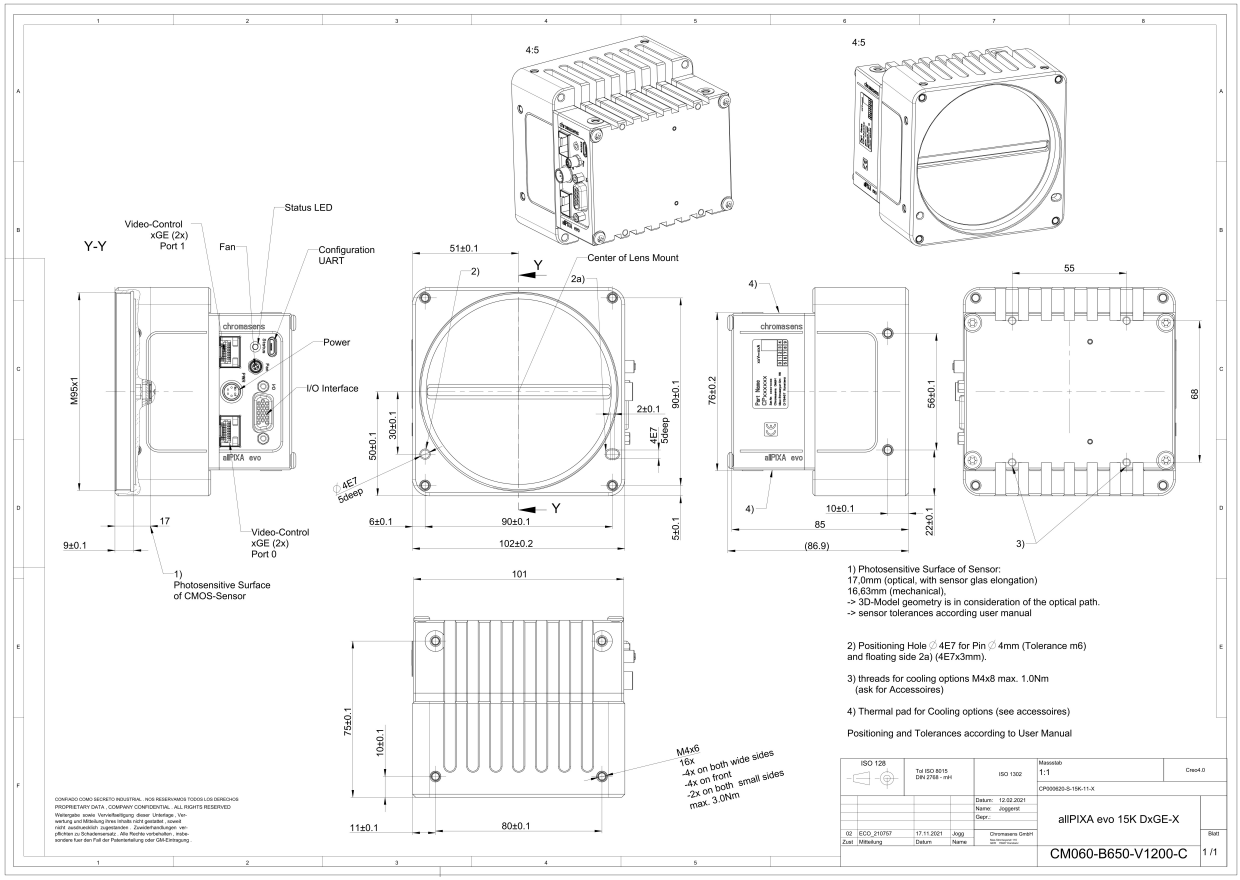



Alignment and orientation of the 15k sensor

| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1°<br>Z: < ± 0.1° |

| | |
|---|---|
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 1.1 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.55 mm |

## Mechanical dimensions

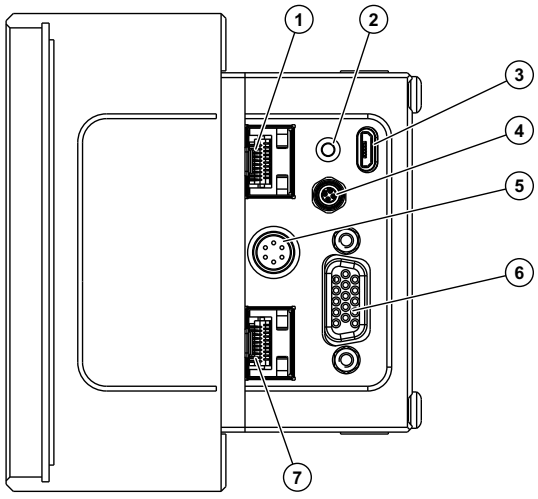



Dimensional drawing of the allPIXA evo 15k DXGE – interface position X

**Download as pdf-file**

**Download dimensional drawing of the allPIXA evo 15k DXGE – interface position X**

## Interface specification




| | | | |
|---|---|---|---|
| **1** | Video output SFP+ Port 1 (10GigE) | **2** | Status LED |
| **3** | Debugging port | **4** | Connector for additional fan |

| | | | |
|---|---|---|---|
| 3 | Debugging port | 4 | Connector for additional fan |
| 5 | Power supply | 6 | Digital I/O port |
| 7 | Video output SFP+ Port 2 (10GigE) | | |

### Line rate

| Configuration | Single 10 GigE | Dual 10 GigE |
|---|---|---|
| RGB8: 15,360 × 3 pixel | 25.8 kHz | 48.8 kHz |
| RGB10: 15,360 × 3 pixel | 12.9 kHz | 23.3 kHz |
| RGB12: 15,360 × 3 pixel | 12.9 kHz | 23.3 kHz |
| | | |
| Mono8: 15,360 × 1 pixel | 68.4 kHz | 68.4 kHz |
| Mono10: 15,360 × 1 pixel | 38.5 kHz | 68.4 kHz |
| Mono12: 15,360 × 1 pixel | 38.5 kHz | 68.4 kHz |

### Power supply

The following connector is required for the power supply cable:

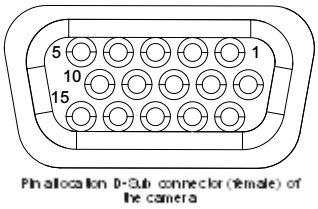
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

### Digital I/O port

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

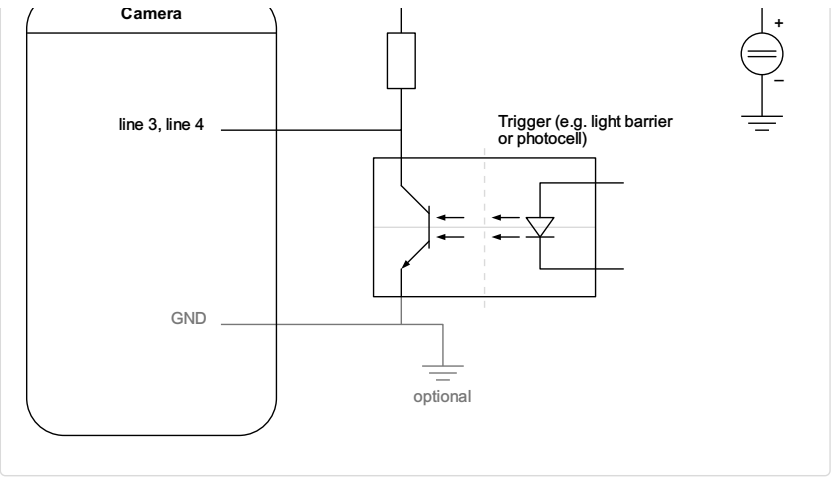
- 15-pin HD D-Sub (male)



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

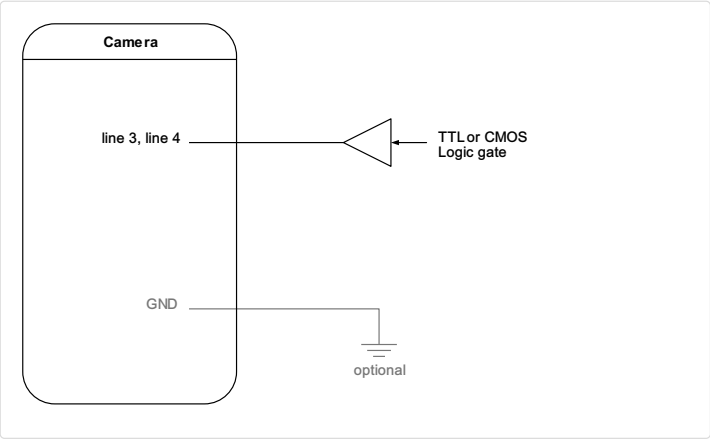
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## LED status indicator

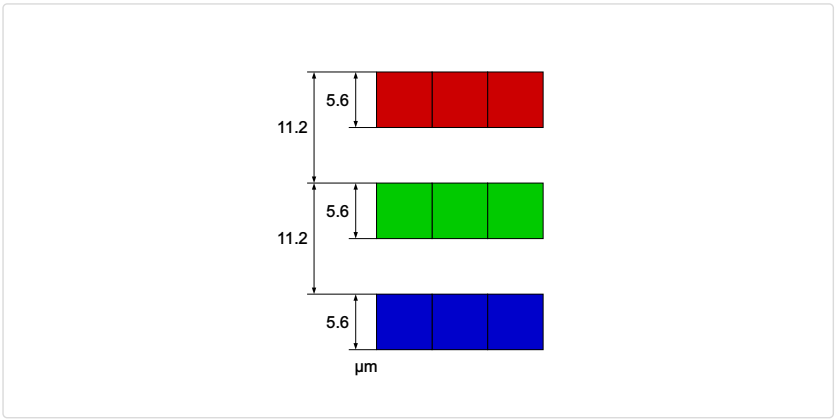
| Color code | Behaviour | Description |
|---|---|---|
| | Off | No power supply or the input voltage is out of range. |
| | Blue continuous | The device is OK and provides image data. |

| | | |
|---|---|---|
| | | |
|  | Green continuous | The device is in power-up mode. |
|  | Green blinking | The device is OK and ready. |
|  | Green/Blue alternative | The device is OK and provides image data frequently, based on a trigger signal. |
|  | Yellow continuous | Warning-state: The device is operational. |
|  | Red continuous | Error-state: The device is not operational. |

## Camera specifications

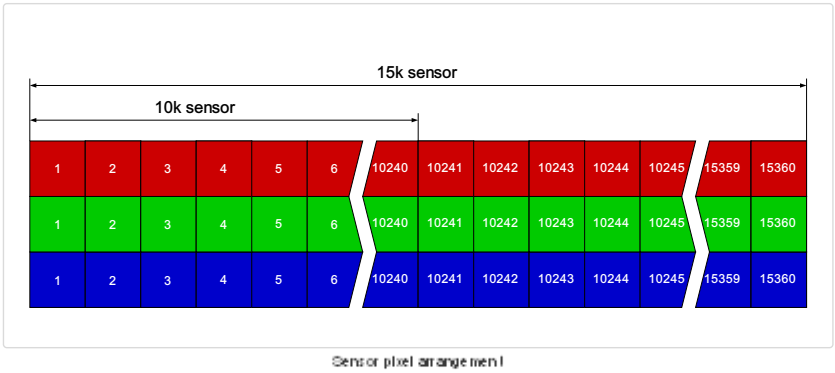
| | |
|---|---|
| Sensor | Tri-linear CMOS color line sensor |
| Pixel size | 5.6 µm × 5.6 µm |
| Line spacing | 11.2 µm between R-G & G-B |
| Spectral sensitivity | 360 nm – 960 nm |
| Resolution | 15360 pixels × 3 lines |
| Video output | 4 × CoaXPress 2.0 |
| Data format | 3 × 8/10/12 Bit color **or**<br>1 × 8/10/12 Bit mono |
| Trigger Mode | Frame Start / Frame Active / Line Start<br>External trigger Line trigger / Encoder and Frame trigger |
| Interface | 4 × Micro-BNC |
| Interface position | Y, Z |
| Digital I/O port | External I/O (15 pin HD D-Sub, fem.) |
| Power supply | 6 pin Hirose, male<br>12 V – 24 V DC ± 10 %; 1 A @ 24 V |
| Debugging port | USB 2.0 (Micro USB) |
| Camera mount | M95 × 1.00 |
| Housing dimensions | 102 mm × 101 mm × 82 mm (W × H × D) |
| Weight | 0.9 kg |
| Temperature during operation | 0 °C – 60 °C; 32 °F – 140 °F |
| Humidity during operation | 20 % – 85 % relative air humidity, non condensing |
| 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



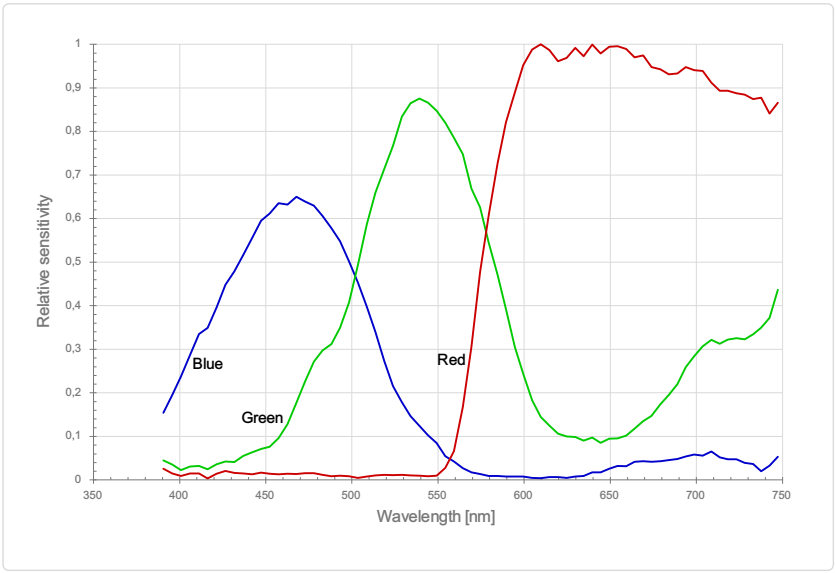

Sensor line spacing

### Sensor pixel arrangement

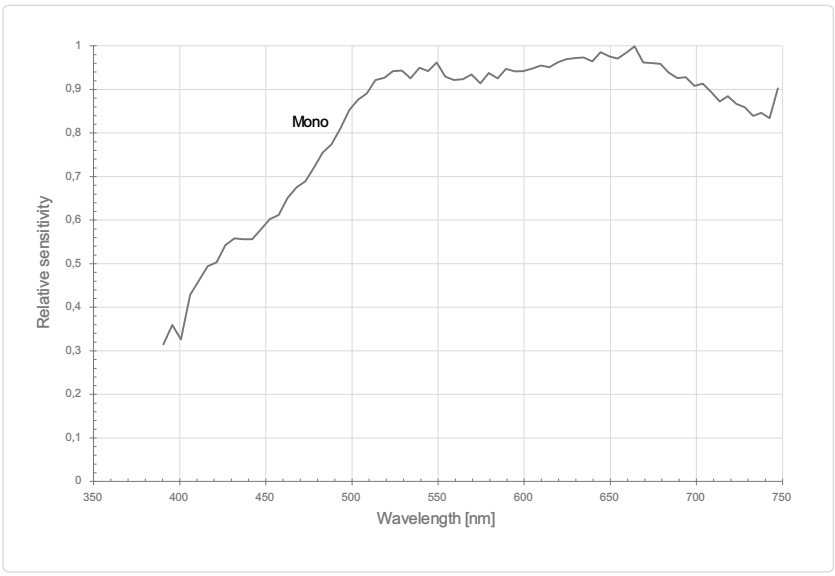



Sensor pixel arrangement

### Spectral sensitivity

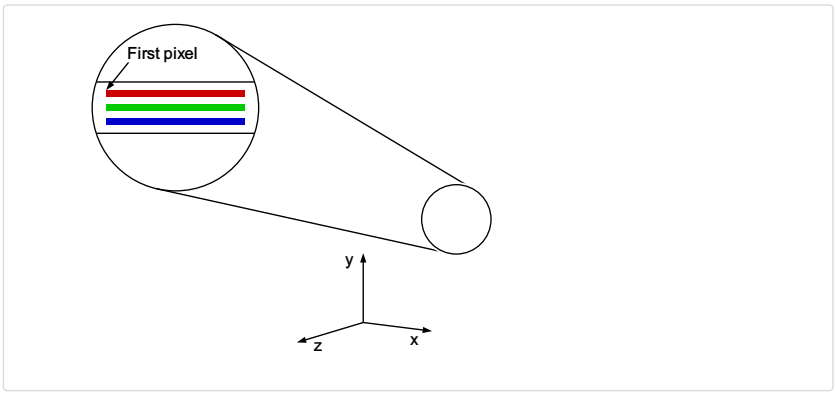



Measured relative spectral sensitivity of the 10k and 15k sensor - color




Measured relative spectral sensitivity of the 10k and 15k sensor - mono

## Sensor alignment and orientation

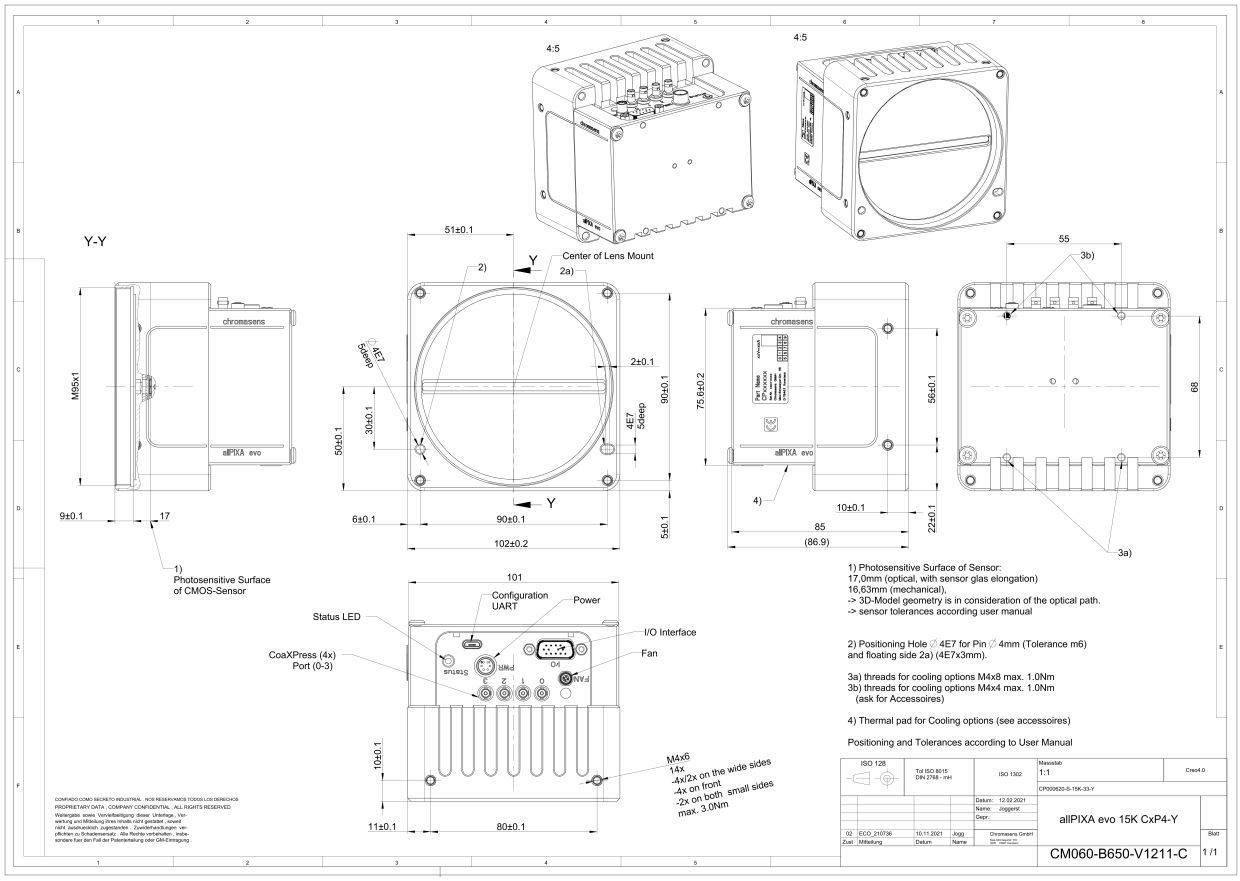



Alignment and orientation of the 15k sensor

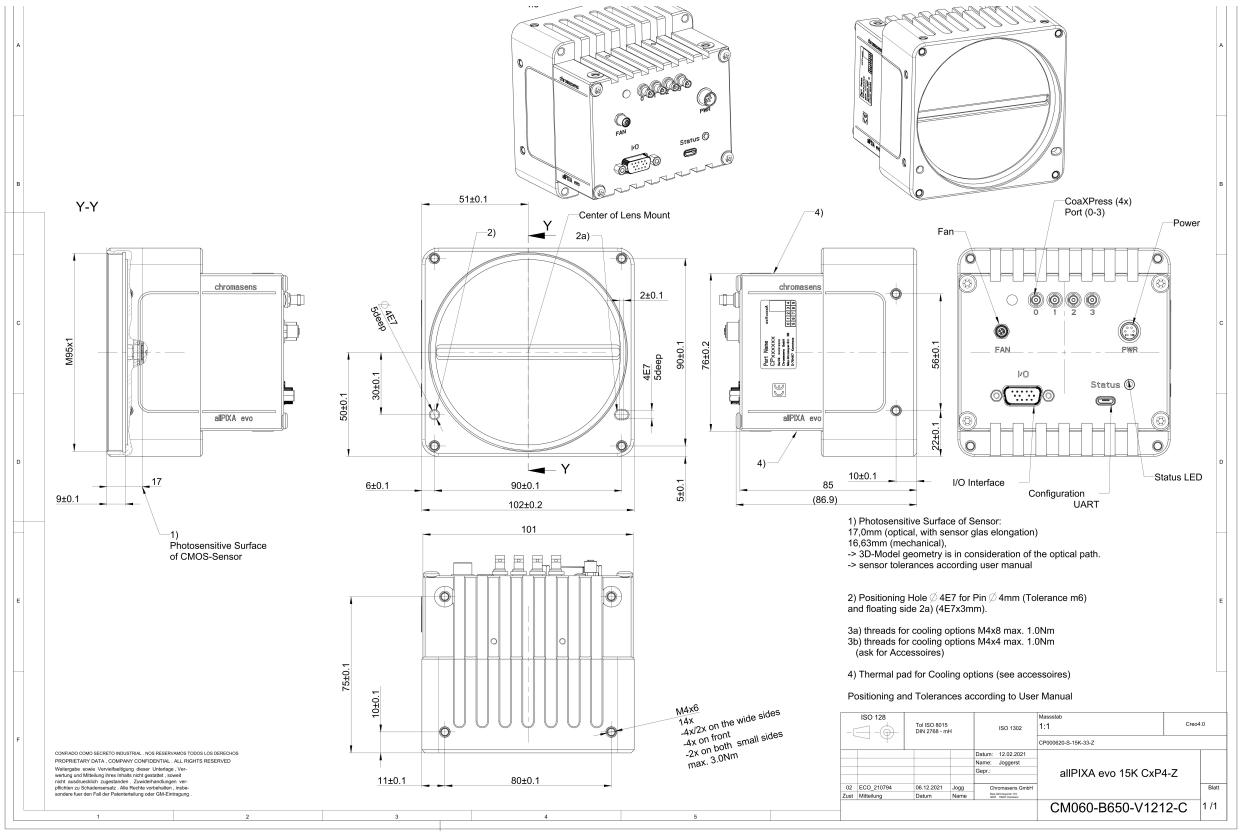
| Feature | Value |
|---|---|
| First pixel | Left side |
| Sensor position alignment | X: < ± 100 µm<br>Y: < ± 100 µm<br>Y: < ± 100 µm |
| Sensor rotation alignment | Y: < ± 0.1°<br>Z: < ± 0.1° |

| | |
|---|---|
| Planarity of the sensor interface | < ± 0.5 µm |
| Sensor window thickness | 1.1 mm |
| Refraction index | 1.5 |
| Optical path extension | 0.55 mm |

## Mechanical dimensions




Dimensional drawing of the allPIXA evo 15k CXP – Interface position Y




Dimensional drawing of the allPIXA evo 15k CXP – interface position Z

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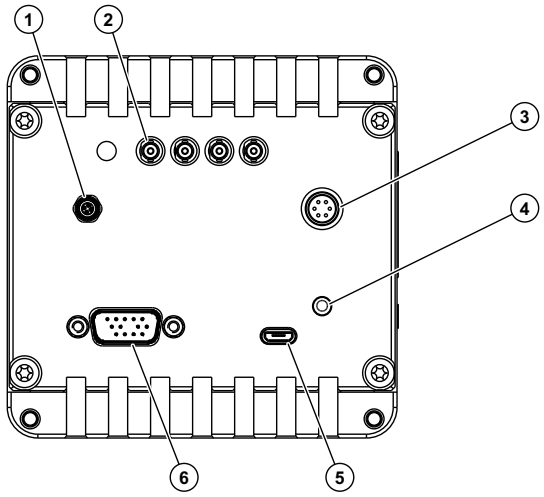
[Download dimensional drawing of the allPIXA evo 15k CXP – interface position Y]

[Download dimensional drawing of the allPIXA evo 15k CXP interface position Z]

## Interface specification




| | | | |
|---|---|---|---|
| **1** | Connector for additional fan | **2** | Video output (4 × CoaXPress 2.0) |
| **3** | Power supply | **4** | Status LED |
| **5** | Debugging port | **6** | Digital I/O port |

### Line rate

| | CXP 12 one port (CXP12_X1) | CXP 12 two ports (CXP12_X2) | CXP 12 four ports (CXP12_X4) |
|---|---|---|---|
| RGB8: 15,360 × 3 pixel | 23.3 kHz | 48.6 kHz | 68,4 kHz |
| RGB10: 15,360 × 3 pixel | 11.1 kHz | 23.2 kHz | 48.8 kHz |
| RGB12: 15,360 × 3 pixel | 11.1 kHz | 23.2 kHz | 48.8 kHz |

| | | | |
|---|---|---|---|
| Mono8: 15,360 × 1 pixel | 68.4 kHz | 68.4 kHz | 68.4 kHz |
| Mono10: 15,360 × 1 pixel | 35.0 kHz | 68.4 kHz | 68.4 kHz |
| Mono12: 15,360 × 1 pixel | 35.0 kHz | 68.4 kHz | 68.4 kHz |

### Power supply

The following connector is required for the power supply cable:

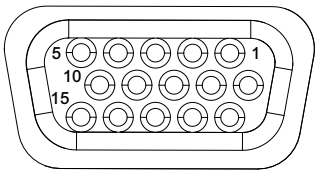
- Manufacturer: Hirose
- Article no.: HR10A-7P-6S female

| | Pin | Description |
|---|---|---|
|  Pin allocation of the power supply port | 1 | Power +24 V |
| | 2 | Power +24 V |
| | 3 | Not connected |
| | 4 | Not connected |
| | 5 | Ground |
| | 6 | Ground |

### Digital I/O port

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

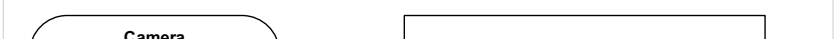
- 15-pin HD D-Sub (male)

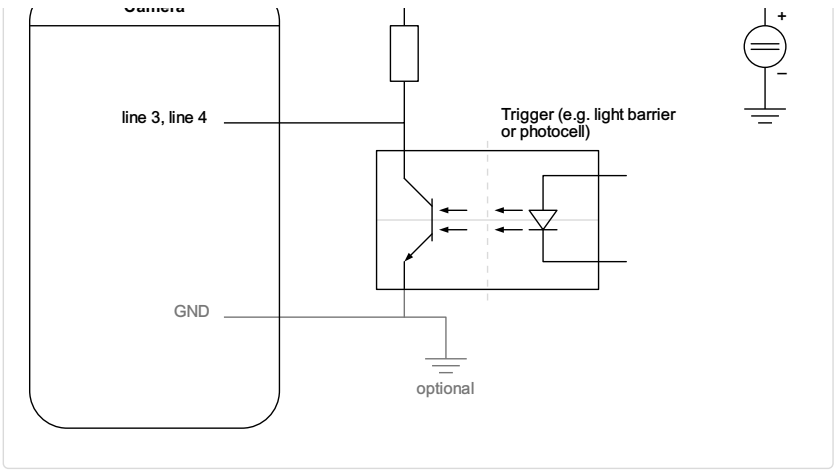


Pin allocation D-Sub connector (female) of the camera

| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

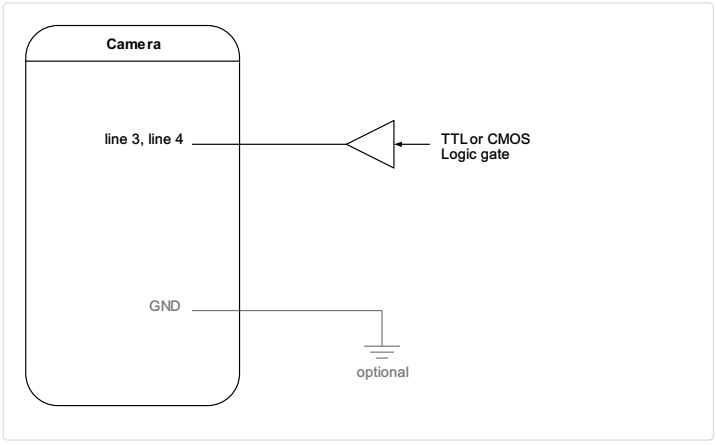
The following diagram shows an example of an external circuit with an optocoupler.






External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

### LVCMOS and RS422 levels

| I/O standard | V_IL | | V_IH | | V_OL | V_OH |
|---|---|---|---|---|---|---|
| | V_min | V_max | V_min | V_max | V_max | V_min |
| LVCMOS | –0.5 | 0.7 | 1.7 | 3.6 | 0.4 | 2.1 |
| RS422 | –6 | 0.8 | 2 | 6 | - | - |

**NOTICE**

**Non compliance may cause irreparable damages to the device.**

The maximum input level of the LVCMOS is 3.6 V.
Use a level converter if necessary (e.g. 74 LVC14).

## Micro USB

The Micro-USB connection is currently used for debugging information.

## 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.<br>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
- Licence dongle for Kithara TL (only for DXGE version)
- 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.

### 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

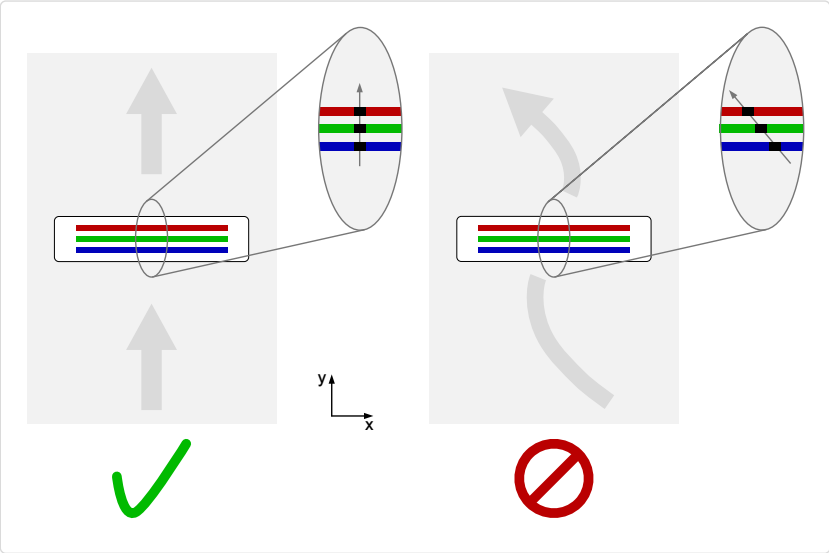
Adjust the sensor line horizontally to the transport direction. The camera has to look perpendicular to the inspection area. For a detailed description of the correct camera installation, please check the following chapter.

### Mounting

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

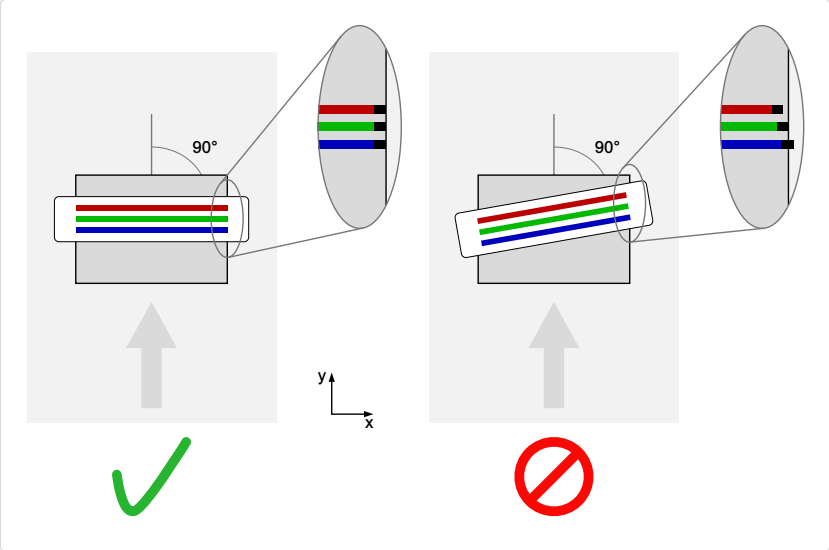
### Conveyor belt tracking

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.

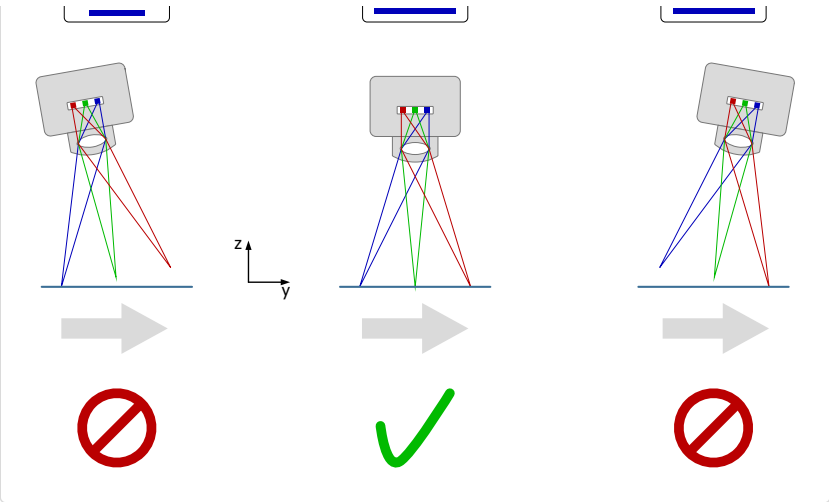



### Rotation around the longitudinal axis of the sensor

**NOTE**

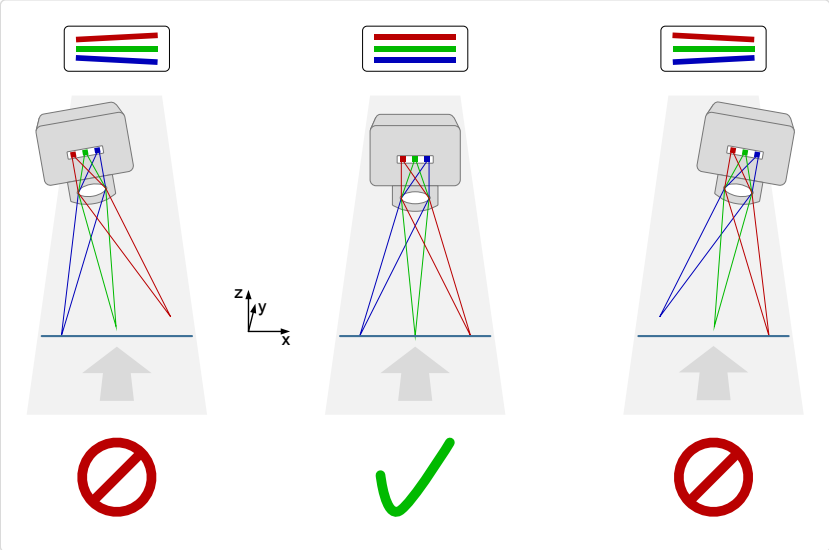
If you are willing to use this installation method please contact **chromasens support** for further information.

Make sure that the longitudinal axis of the allPIXA evo 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.



To establish a DXGE connection a network adapter with one or two 10 GigE SFP+ inputs must be installed and configured on the PC.

## SFP+ 10 GigE connectors and cables

The SFP+ 10 GigE connectors permit to use (direct attach) copper cables or optical fiber cables with lengths of up to 400 m (10GBASE-SR).

- Use a single port for data rates up to 10 Gbit/s.
- For higher data rates connect both ports using Link Aggregation.

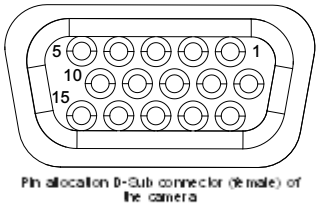
**Note**

For more information about the tested Network adapters and the transceiver, see **Tested Network adapters and Transceivers**

### Cabling

| | |
|---|---|
| | **DANGER** |
| | **Electric shock due to improper connection to a power supply.** |
| | Use a 24 V DC power supply. |

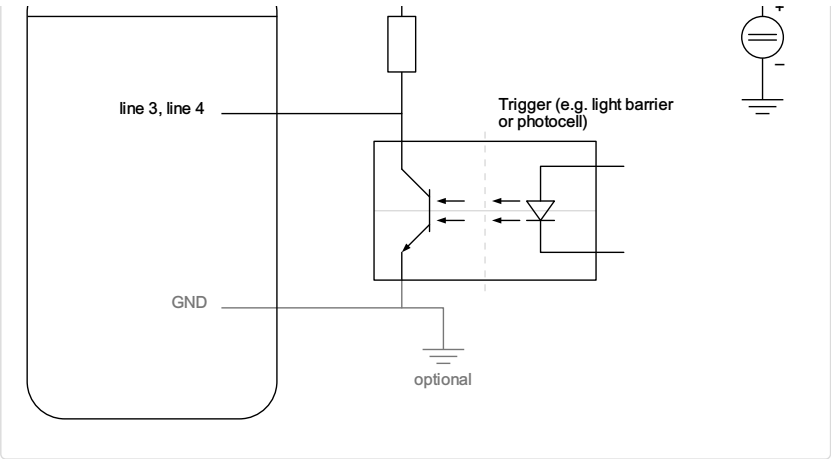
1. Connect one or both SFP+ ports.
2. Connect the digital I/O port.



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

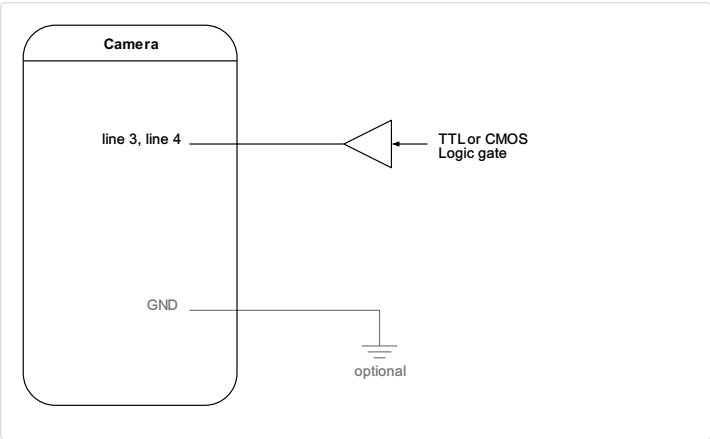
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

3. Connect the power supply.


Pin allocation of the power supply port

| Pin | Description |
|---|---|
| 1 | Power +24 V |
| 2 | Power +24 V |
| 3 | Not connected |
| 4 | Not connected |
| 5 | Ground |
| 6 | Ground |

## Installation of the Network adapter

**NOTE**

The installation of the Network adapters is explained in the GCT documentation. For more information, see **Installation GigE**

**NOTE**

For more information about the tested Network adapters and the transceiver, see **Tested Network adapters and Transceivers**

## 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).

The interface allows you to connect up to four CXP cables.

## CoaXPress connectors and 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. To use the power-over-CXP function two connections are needed.

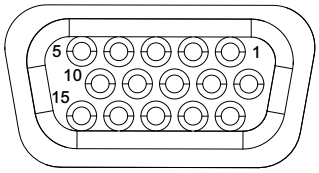
### Cabling

| | |
|---|---|
| | **DANGER** |
| | **Electric shock due to improper connection to a power supply.** |
| | Use a 24 V DC power supply. |

1. Connect port 0 (master port) of the Micro-BNC port.

   **NOTE**
   For the maximum line rate connect all four ports.

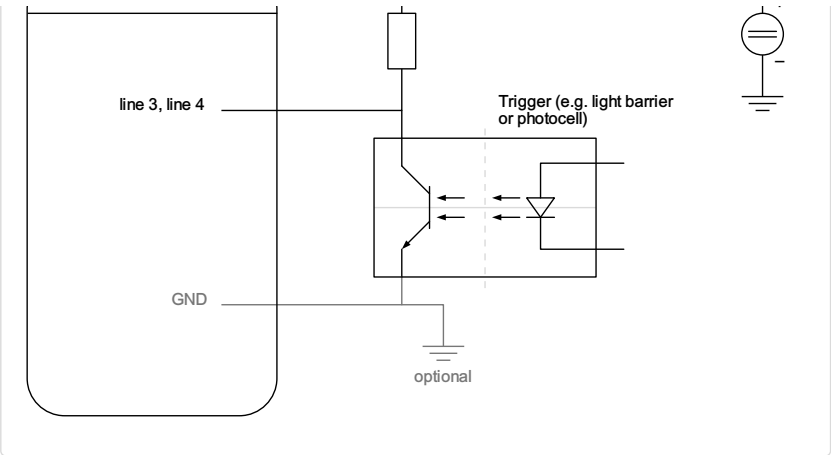
2. Connect the digital I/O port.



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

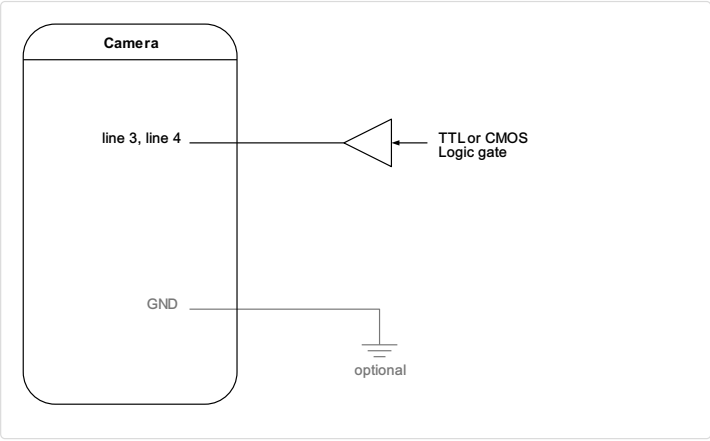
| Pin | GenICam | Signal | Level | In/Out | Example/Remark |
|---|---|---|---|---|---|
| 1 | Line 1 | Enc0_InP (+) | RS 422 | Differential input | Encoder0 or LineTrigger |
| 2 | Line 2 | Enc1_InP (+) | RS 422 | Differential input | Encoder1 or Frametrigger |
| 3 | Line 3 | IO_0P | LVCMOS | Input | single-ended |
| 4 | - | RT | RS 485 | - | - |
| 5 | Line 5 | IO_2P | LVCMOS | Out | LED-Out1 |
| 6 | Line 1 | Enc0_InN (-) | RS 422 | Differential input | Encoder0 |
| 7 | Line 2 | Enc1_InN (-) | RS 422 | Differential input | Encoder1 |
| 8 | Line 4 | IO_1N | LVCMOS | Input single-ended | Trigger or Master-Slave Cascaded |
| 9 | - | RTN | RS 485 | Out | To LightController XLC4 |
| 10 | Line 6 | IO_3 | LVCMOS | Out | LED-Out2 |
| 11 | - | GND | - | GND | - |
| 12 | Line 7 | IO_4_SDA | LVCMOS | Out | LED-Out3 |
| 13 | - | GND | GND | - | - |
| 14 | Line 9 | Master/Slave | LVCMOS | Bi-directional | Master/Slave |
| 15 | Line 8 | IO_5_SCL | LVCMOS | Out | LED-Out4 |

The following diagram shows an example of an external circuit with an optocoupler.




External circuit: Optocoupler

The following diagram shows an example of an external circuit with a TTL or CMOS logic gate.




External circuit: TTL or CMOS logic gate

3. Connect the power supply **or** connect port 0 and port 1 of the Micro-BNC port to use the power-over-CXP function.


Pin allocation of the power supply port

| Pin | Description |
|---|---|
| 1 | Power +24 V |
| 2 | Power +24 V |
| 3 | Not connected |
| 4 | Not connected |
| 5 | Ground |
| 6 | Ground |

## Installation of frame grabber

Please refer to the manual of the frame grabber.

**NOTE**

You can find a list of tested grabbers and their properties in the GCT manual. For more information, see **Tested frame grabbers**.

## Thermal link and cooling

The camera operates within the defined housing temperature range of 0 °C to 60 °C.
If this range is exceeded, use cooling kits.

For more information on cooling kits and fans, see Cooling kits and fans (heat sink).

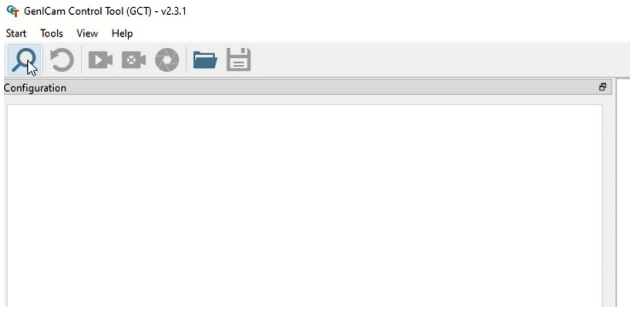
We recommend using the Chromasens GCT tool to acquire the first images. For information about the installation and use of GCT, refer to the GCT documentation.

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

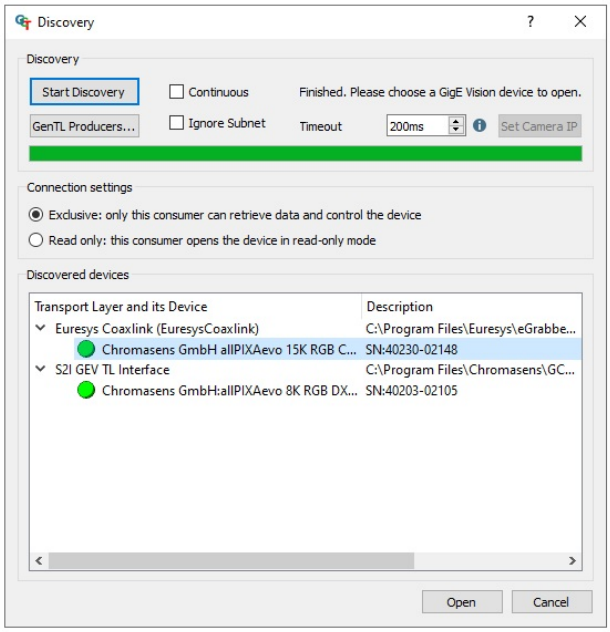
The installation and configuration of your PC are described in the GCT documentation.

## Connect the camera

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

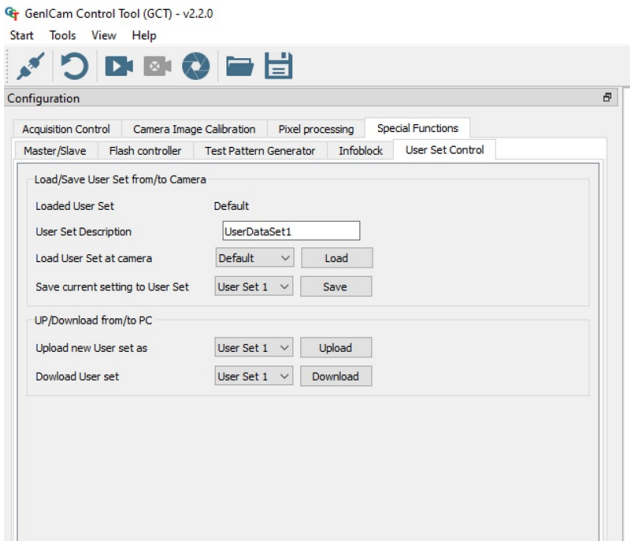



3. In the Discovery window click **Start Discovery**.
4. Select your camera and click **Open**.



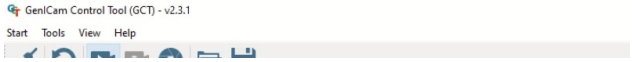

## Load the default user set

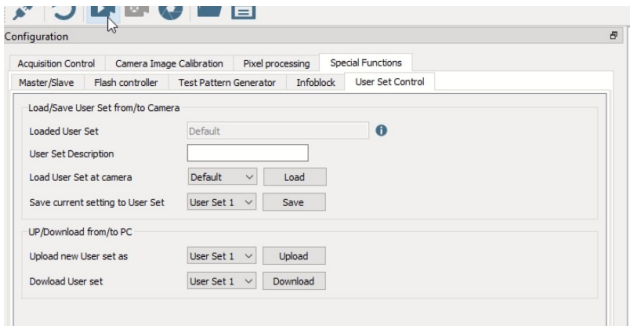
1. In the Configuration window navigate to *Special Functions → User Set Control*.
2. Click **Load**.




## Acquire an image

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



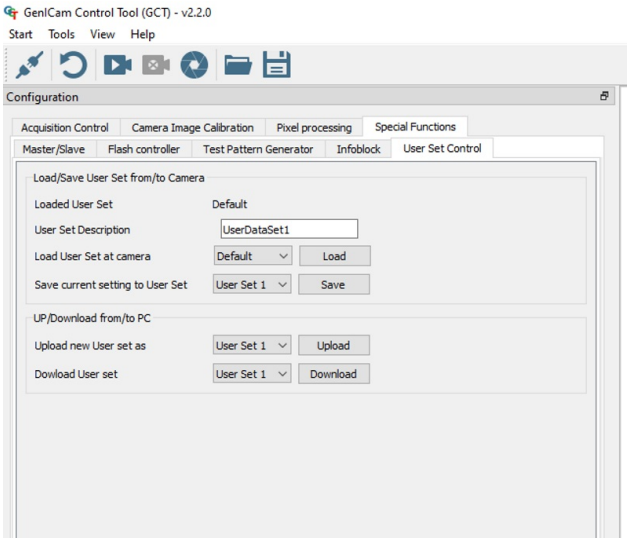



### Video description

## Acquire a test pattern

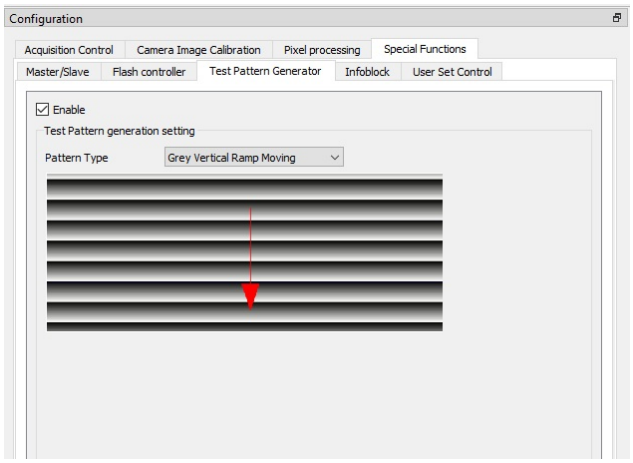
### Load the default user set

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

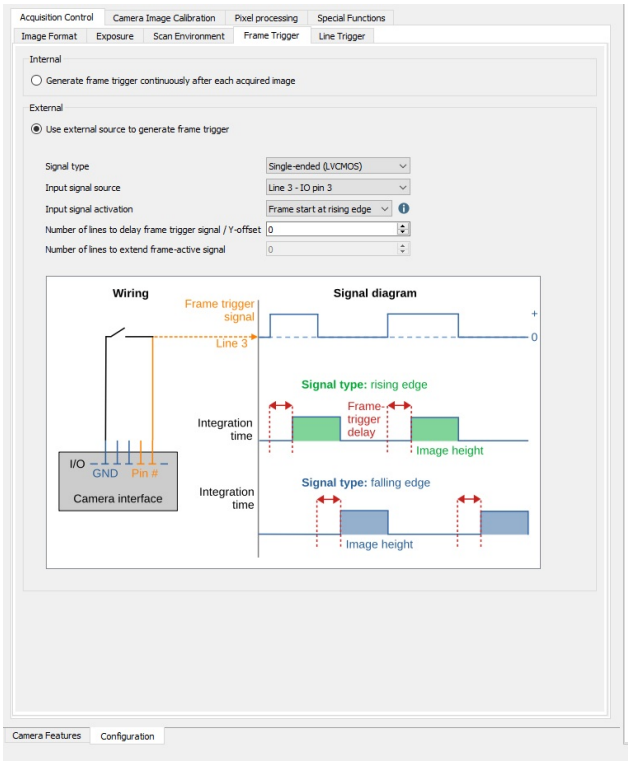
1. Aquire an image.
2. Compare the template to the generated image.
3. Disable the test pattern if it matches with the generated image.

### Video description

## Acquire images with frame and line trigger

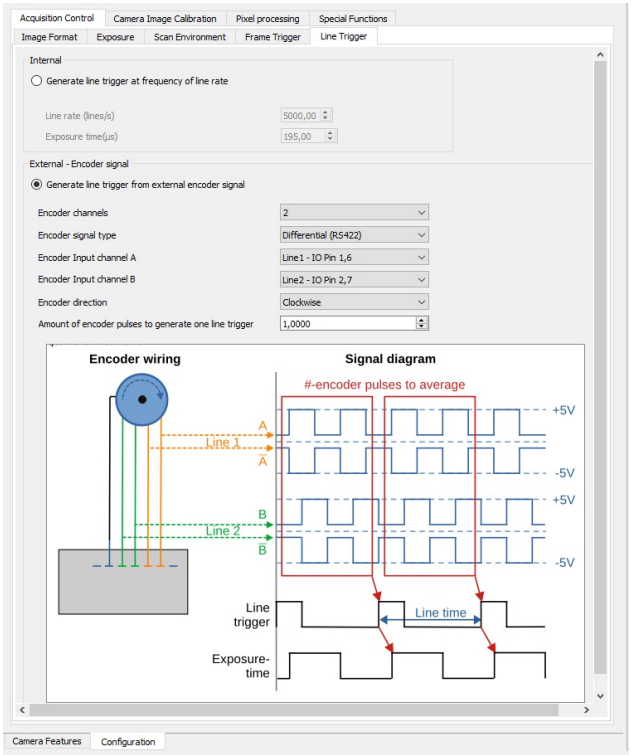
## Setup the frame trigger

1. In the Configuration window navigate to *Acquisition Control → Frame Trigger*.
2. Setup the frame trigger.
   Refer to the feature reference guide.




## Setup the line trigger

1. In the Configuration window navigate to *Acquisition Control → Line Trigger*.
2. Setup the line trigger.
   Refer to feature reference guide.
3. Aquire an image.
   Check your cabling if you do not receive an image.




# Introduction

To ensure a correct image calibration follow the articles in order.

Begin with *Perform white balancing* and end with *Check the image quality*.

## 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.

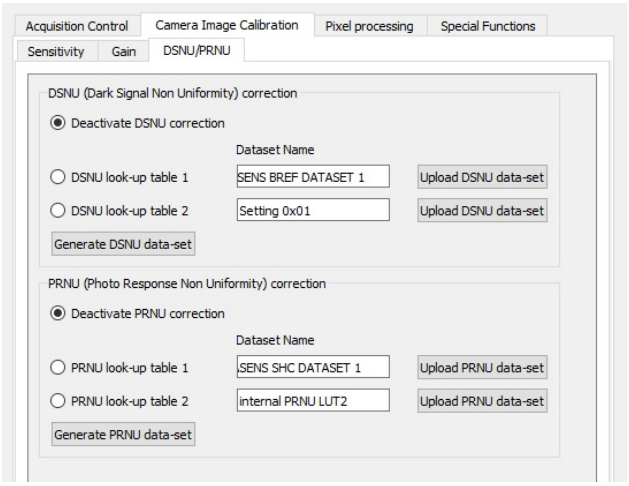
For the best result use a moving white reference to diminish the effects on any optical variations in the white reference.

## 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.

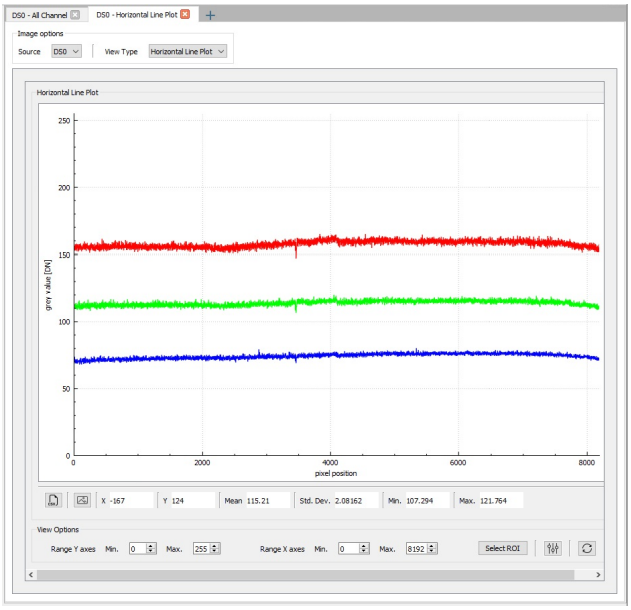
**Deactivate DSNU and PRNU correction**

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

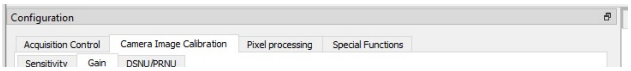



## Configure the gain settings

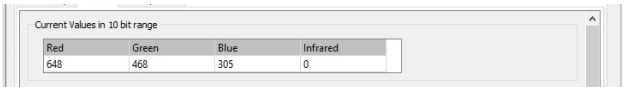
1. Click on the **plus sign** in the right window to add a new tab.
2. Select **Horizontal Line Plot**.




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



The current values in the 10 bit range are displayed.



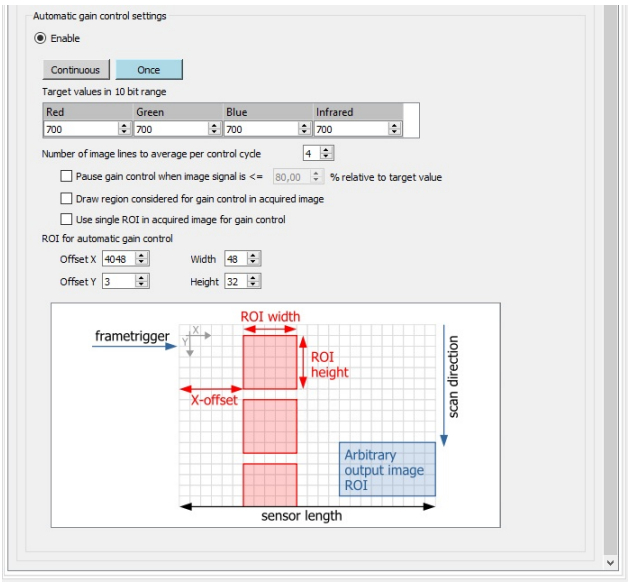

4. Select the **Enable** checkbox in *Automatic gain control settings*.
5. Set the reference mark position and size: Below *ROI for automatic gain control* set the values for **Offset X**, **Offset Y**, **Width** and **Height**.

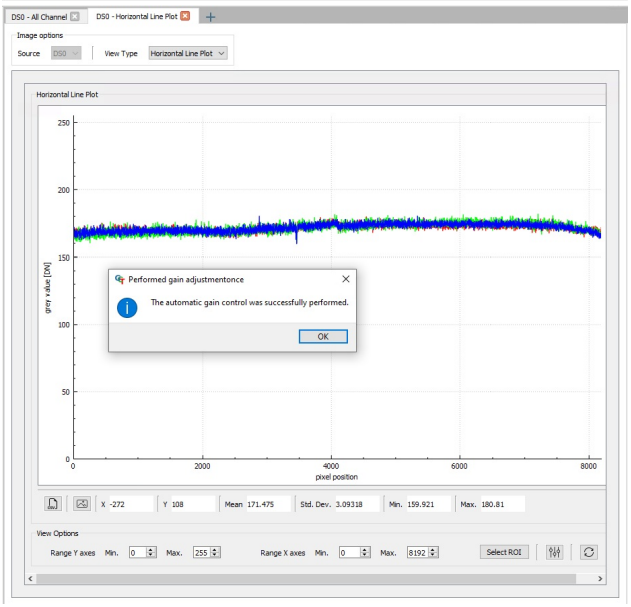
> **HINT**
> To control the position in images you can temporarily select the **Visible feature**.

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.

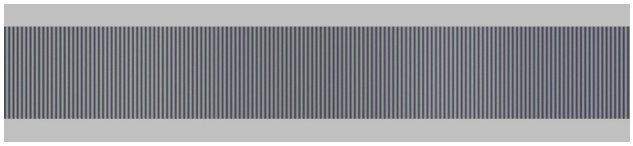
After successful balancing *Gain Auto Status* returns **Control Successful**.

If an error occurs modify the sensor sensitivity.

> **NOTE: Repeate 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

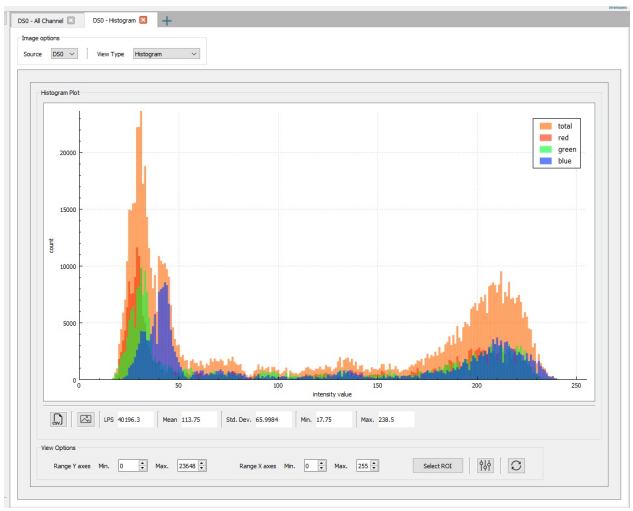
1. Place a line pattern target under the camera.
2. Acquire an image which looks like this.



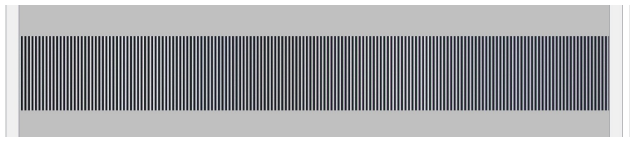
3. Click on the **plus sign** in the right window to add a new tab.
4. Select **Histogram**.

The values are spread between 60 – 170 DN.


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.

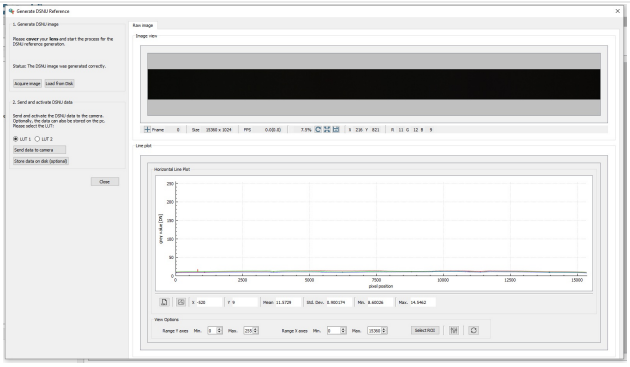
1. Switch off the illumination.
2. Cover the lens with a black or dark piece of cardboard or plastic.
   No light may reach the sensor.

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.

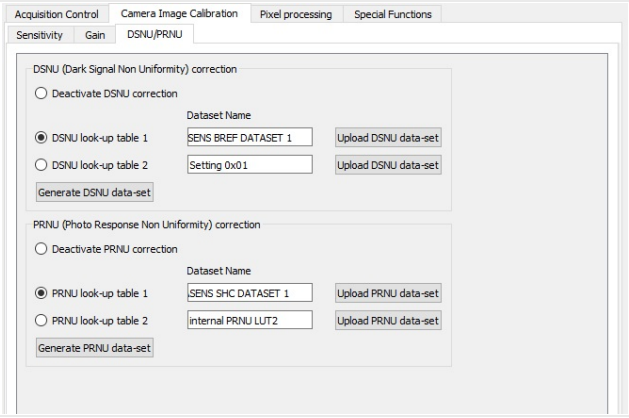


The raw image and the line plot of the image is displayed.

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)

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:

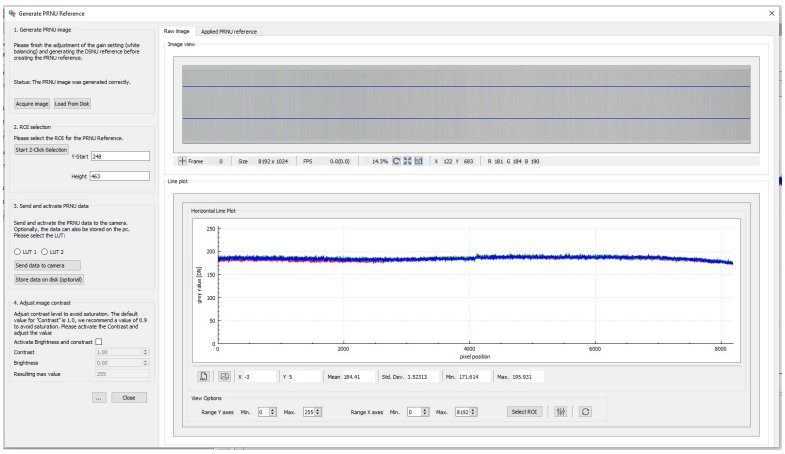
2. In the toolbar click **Acquire a single frame**
   **or**
   click **Start grabbing**, wait until an image ist displayed,
   click **Stop grabbing**.

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:

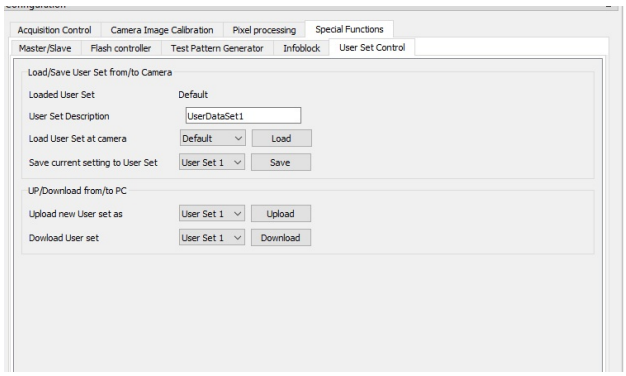
8. Select **LUT 1** or **LUT 2**.
9. Click **Send data to camera**.

Activate brightness and contrast:

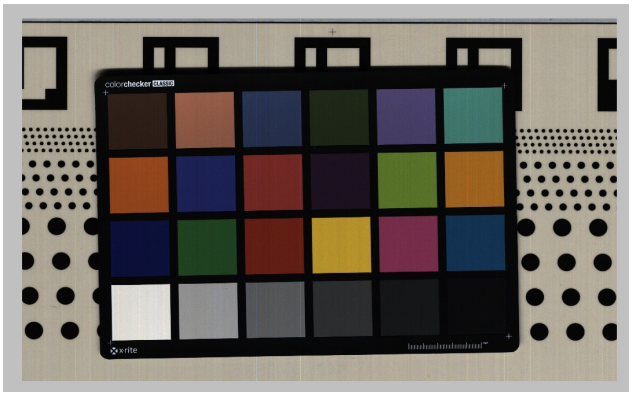
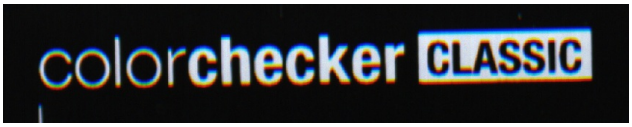
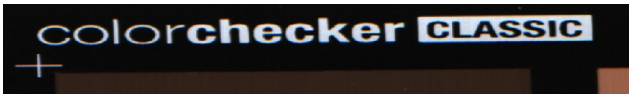
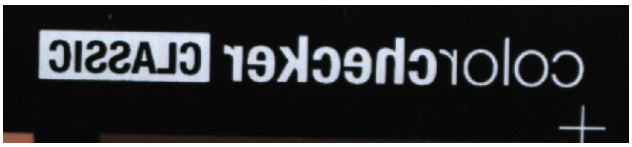
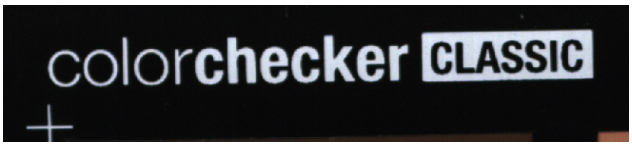
10. Select the **Activate Brightness and contrast** checkbox.
11. Set the **Contrast** to 0.9.

## Safe 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

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

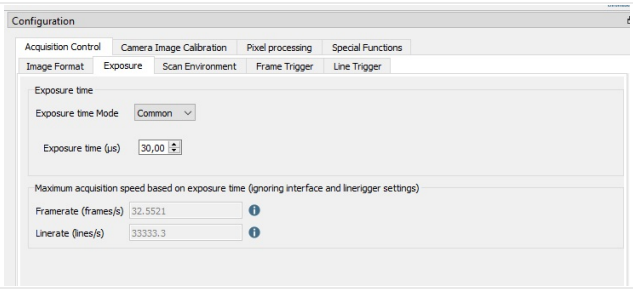
## Set exposure time

In the Configuration window navigate to *Acquisition Control → Exposure*.

### 8k sensor

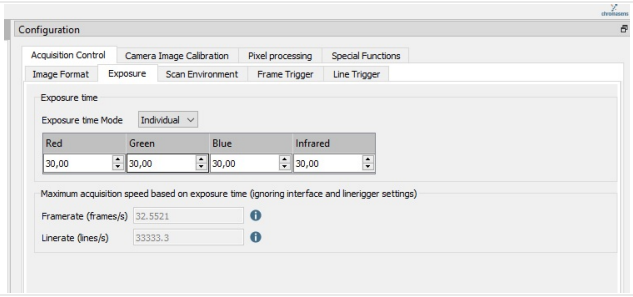
### Common exposure time

1. In *Exposure time mode* select **Common**.
2. Set one exposure time for all sensor lines.




### Individual exposure time

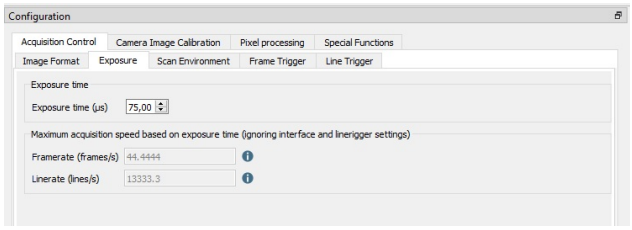
1. In *Exposure time mode* select **Individual**.
2. Set an individual exposure time for each sensor line.




### 15k and 10k sensor

### Common exposure time

The 15k and 10k sensor only supports one common exposure time.




## 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.

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.

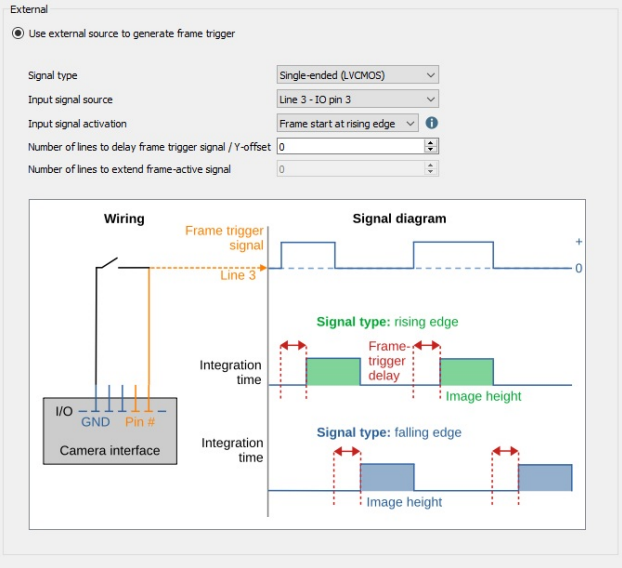
1. In the Configuration window navigate to *Acquisition Control → Frame Trigger*.
2. Below *External* select the **Use external source to generate frame trigger** checkbox.

## Signal type: Single-ended (LVCMOS)

1. In *Signal type* select **Single-ended (LVCMOS)**.

The single-ended frame trigger configuration is done on line 3 and line 4.

2. In *Input signal activation* select the desired trigger activation mode. Refer to Input signal activation: Frame start and Input signal activation: Frame active.

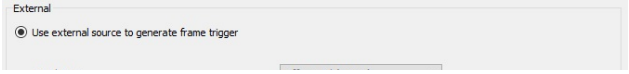



Alternatively you can set the single-ended external frame trigger in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | TriggerSelector | FrameActive **or** FrameStart |
| | TriggerMode | On |
| 2 | TriggerSource | e.g. Line 3 **or** Line 4 |
| 3 | TriggerActivation | Level high/level low,<br>rising edge **or** falling edge |
| 4 | TriggerDelayLines | <number of lines> |
| 5 | TriggerSignalDetectionMode | Peakholder Detection,<br>Debouncing 4 clocks,<br>Debouncing 4 lines,<br>Debouncing 60 lines |

## Signal type: Differential (RS422)

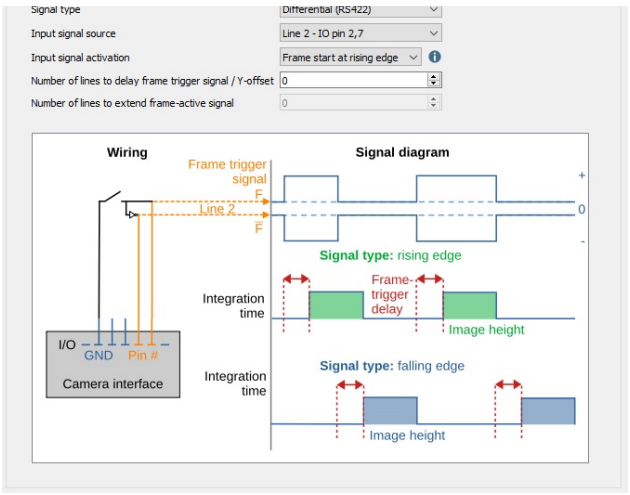
1. In *Signal type* select **Differential (RS422)**.




The differential frame trigger configuration is done on

line 2.

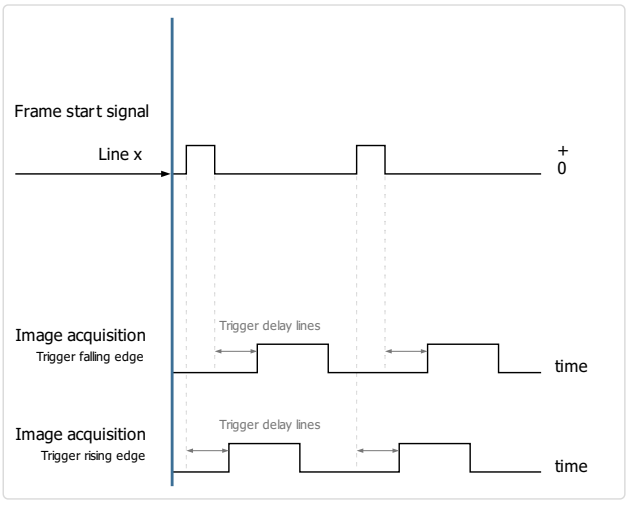
2. In *Input signal activation* select the desired trigger activation mode. Refer to Input signal activation: Frame start and Input signal activation: Frame active.



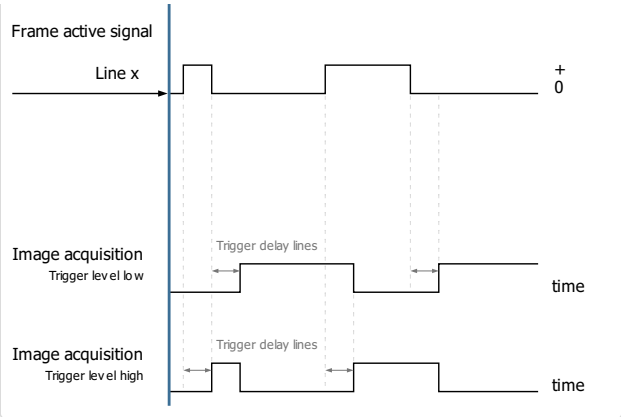

Alternatively you can set the differential external frame trigger in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | TriggerSelector | FrameActive **or** FrameStart |
| | TriggerMode | On |
| 2 | TriggerSource | e.g. Line 2 |
| 3 | TriggerActivation | Level high **or** level low,<br>rising edge **or** falling edge |
| 4 | TriggerDelayLines | <number of lines> |
| 5 | TriggerSignalDetectionMode | Peakholder Detection,<br>Debouncing 4 clocks,<br>Debouncing 4 lines,<br>Debouncing 60 lines |

### Input signal activation: Frame start




### Input signal activation: Frame active




### Trigger signal detection

| Name | Description |
|---|---|
| PeakholderDetection (peakholder 15 lines) | Peakholder 15 lines |
| Debouncing4Clocks | Debouncing 4 clocks |
| Debouncing4Lines | Debouncing 4 lines |
| Debouncing60Lines | Debouncing 60 lines |

## Set a line trigger

## Internal line trigger

The internal line trigger provides a continuous signal in the frequency of the exposure time.

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

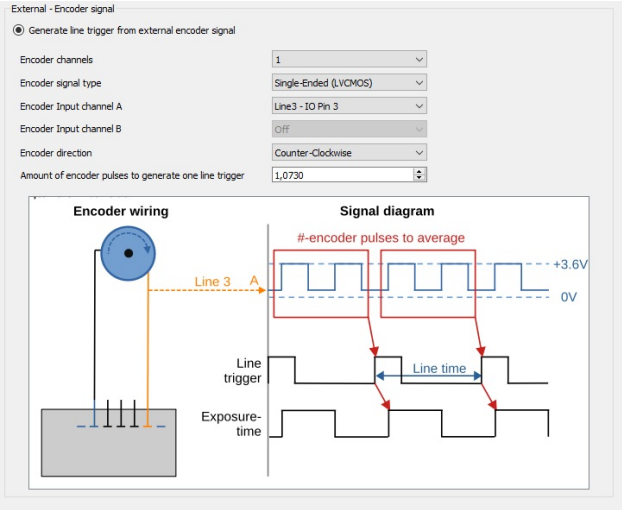
The external line trigger can be provided by an encoder signal.

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

## Signal type: Single-ended (LVCMOS)

1. In *Encoder signal type* select **Single-ended (LVCMOS)**.
2. In *Encoder Input channel A* select **Line3 – IO Pin 3**.

The single-ended line trigger configuration is done on line 3 and line 4.

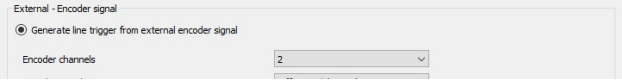



Alternatively you can set the external single-ended line trigger in the **camera feature tree** by executing the following steps:

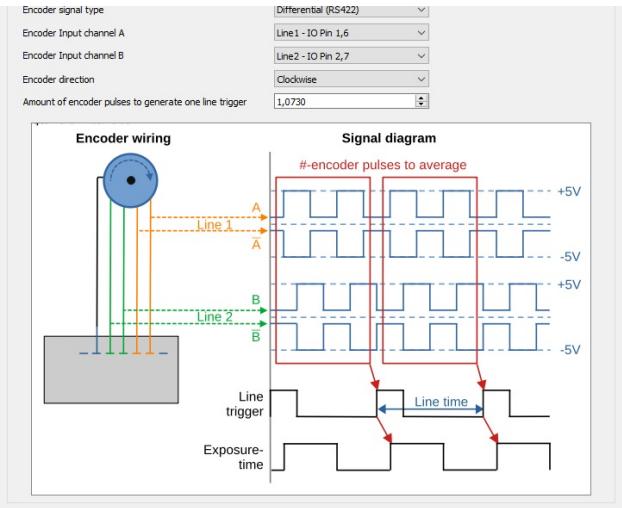
| Step | Feature name | Value |
|---|---|---|
| 1 | TriggerSelector | LineStart |
| | TriggerMode | On |
| 2 | TriggerSource | Encoder0<br>**or** Line1<br>**or** Line3<br>**or** Line4 |
| 3 | EncoderSelector | Encoder0 |
| 4 | EncoderSource A | Line1 |
| 5 | EncoderSource B | Line2 |
| 6 | EncoderDividerFloat | 0.05 – 255 |
| 7 | Encoder | FourPhase |

## Signal type: Differential (RS422)

1. In *Encoder signal type* select **Differential (RS422)**.
2. In *Encoder Input channel A* select **Line1**



– IO Pin 1,6.
3. In *Encoder Input channel B* select **Line2 – IO Pin 2,7**.




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

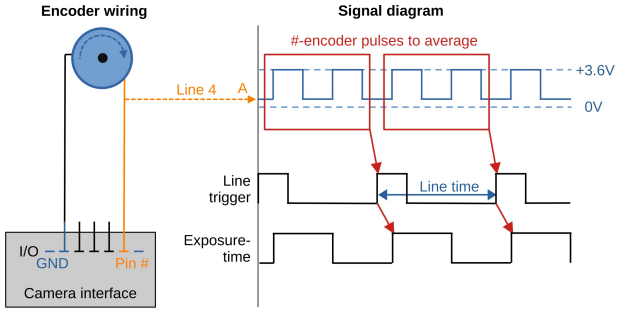
| Step | Feature name | Value |
|---|---|---|
| 1 | TriggerSelector | LineStart |
| | TriggerMode | On |
| 2 | TriggerSource | Encoder0<br>**or** Line1<br>**or** Line3<br>**or** Line4 |
| 3 | EncoderSelector | Encoder0 |
| 4 | EncoderSource A | Line1 |
| 5 | EncoderSource B | Line2 |
| 6 | EncoderDividerFloat | 0.05 – 255 |
| 7 | Encoder | FourPhase |

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.

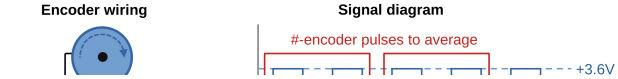
If the number of pulses per line is **greater than 255**:

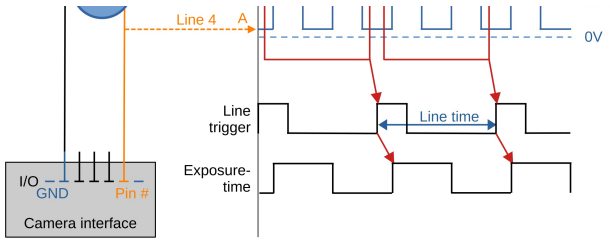
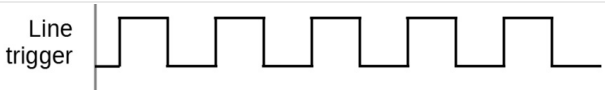
1. In the Configuration window navigate to *Acquisition Control → Trigger Selector*.
2. Set *Trigger Divider* and *Encoder Divider Float* to the desired values.
   E.g. for 320 pulses per line set *Trigger Divider* to **2** and *Encoder Divider Float* to **160.0**.

## Configurations of the external line trigger

| Trigger selector | Line start |
|---|---|
| Signal from the line trigger |  |



| | |
|---|---|
| |  |

| | |
|---|---|
| Trigger source: Encoder 0 |  |
| Trigger source:<br>Line1, Line3, Line4 |  |

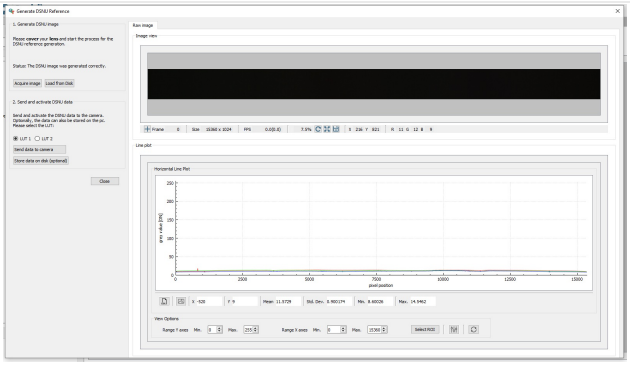
## Create a black-reference (DSNU)

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.

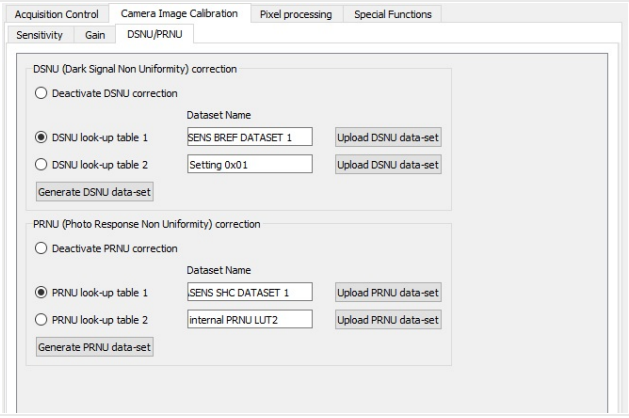
> **NOTE: Load from Disk**
> Make sure that the image has been taken with active image calibration mode by using the wizard.

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)

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:

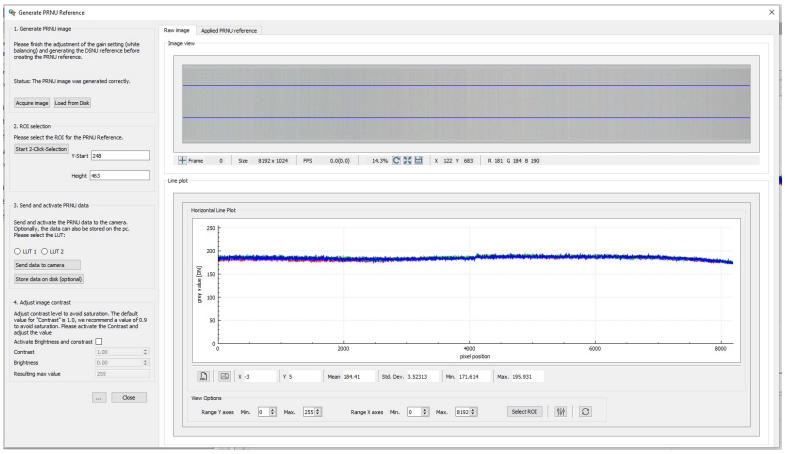
2. In the toolbar click **Acquire a single frame**
   **or**
   click **Start grabbing**, wait until an image ist displayed,
   click **Stop grabbing**.

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.

## Updating the firmware

**NOTICE**

**Irreparable damage to the camera**

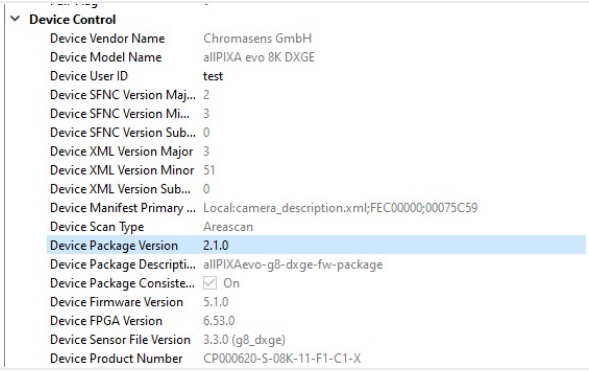
If the camera ist powered down during firmware update it may get into a non-functional state. Recovery may not be possible.

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.

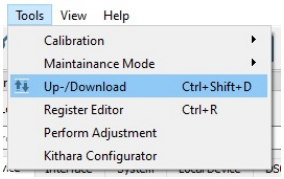
1. Download firmware from the Chromasens website or use the firmware file provided by Chromasens.

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

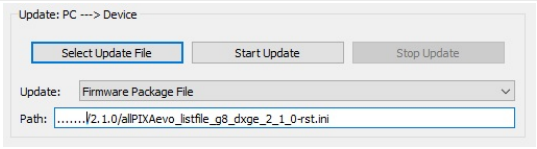



3. In the *menu bar* navigate to *Tools*.

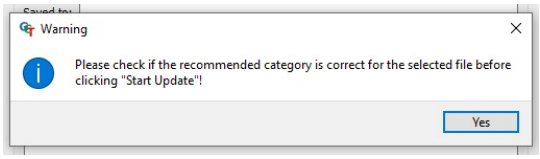
4. Click **Up-/Download** or use the hotkey **Ctrl+D**.



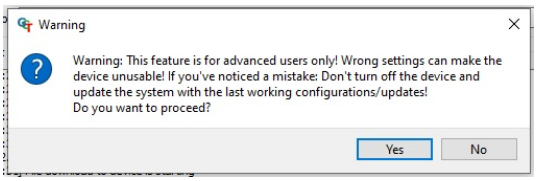

The *Update/Download* wizard opens.
4. Click **Select Update File** and select the *Firmware Package file* to upload and click **Open**.




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

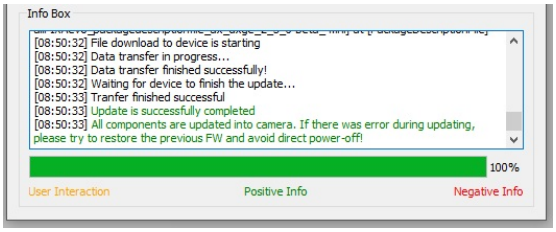



5. GCT shows a warning message.
6. Check if the *Update* field shows the *Firmware Package file* type.
7. Click **Start Update**.
8. GCT shows a warning message.
9. Click **Yes** to start the Upload.




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

10. 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.

11. Reconnect and Restart the camera

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

## Adjust the sensor sensitivity

By default the sensor is used for full-well capacity to achieve maximum sensitivity. This results in a higher signal-to-noise ratio (SNR). To decrease SNR and to improve image quality reduce the sensitivity.

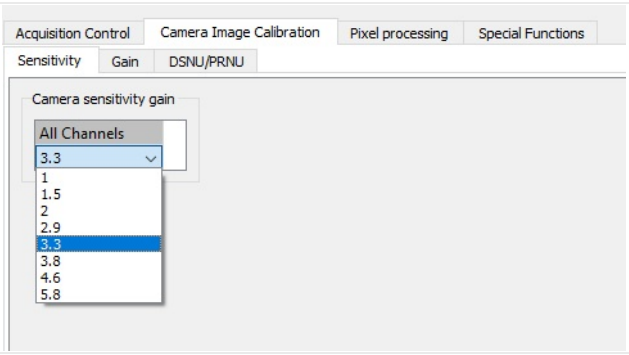
**NOTE**

When modifying the sensor sensitivity the shading reference and black reference data become invalid.

1. Deactivate shading and black reference.
2. Create new data sets for shading and black reference.

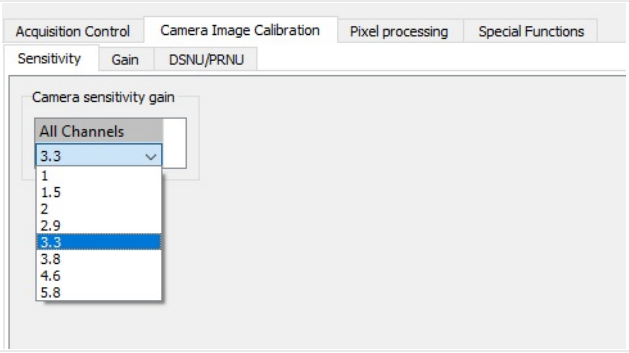
## Low speed of the inspected object and good illumination

1. In the Configuration window navigate to *Camera Image Calibration → Sensitivity*.
2. Below *Camera sensitivity gain* select **a low sensitivity gain**:
   Achieve the highest dynamic range for areas with high contrast (completely dark to absolutely reflective).
   → E.g. pin inspection in electrical connectors.




## High speed of the inspected flat object and bad illumination

1. In the Configuration window navigate to *Camera Image Calibration → Sensitivity*.
2. Below *Camera sensitivity gain* select **a high sensitivity gain**:
   Achieve a good image quality for flat objects.
   → E.g. solar cell, web or wafer inspection.




## Sensitivity values

### 8k sensor

| Sensitivity | Description | Full-well capacity |
|---|---|---|
| 0 | Low sensitivity for optimal SNR | – |
| 1 | Measured value | 13 ke |
| 2 | – | – |
| 3 | – | – |
| 4 | – | – |
| 5 | – | – |
| 6 | – | – |
| 7 | Maximum sensitivity | – |

ke: kilo-electrons

### 10k and 15k sensor

| Sensitivity | Description | Full-well capacity |
|---|---|---|
| 0 | Low sensitivity for optimal SNR | 40 ke |
| 1 | Medium sensitivity / high SNR | 20 ke |
| 2 | Maximum sensitivity / standard SNR | 10 ke |

ke: kilo-electrons

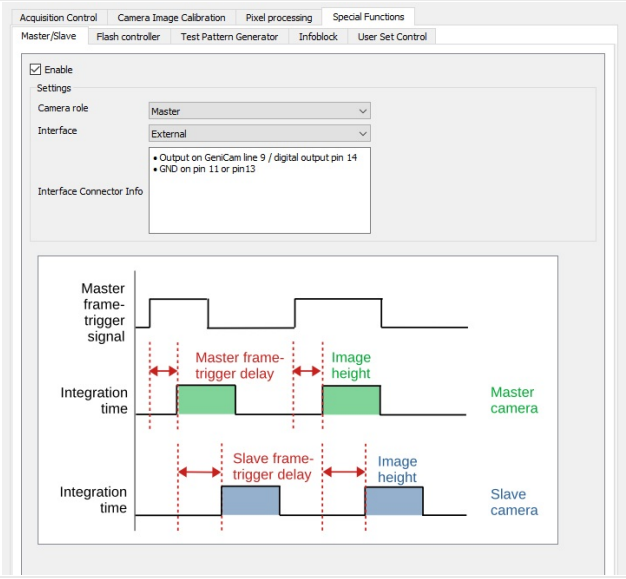
## Synchronize the cameras: Master slave operation

The master slave mode synchronizes a master camera with several slave cameras.

The frame trigger and line trigger are only connected to the master camera. The trigger information and additional timing signals are transferred to the slave cameras via the master-slave interface. All cameras run with exactly the same timing for lines and optional frames.

## Set up the master camera

1. In the Configuration window navigate to *Special Functions → Master/Slave*.
2. Select the **Enable** checkbox.
3. In *Camera role* select the defined camera as **Master**.
4. In *Interface* select **External**.

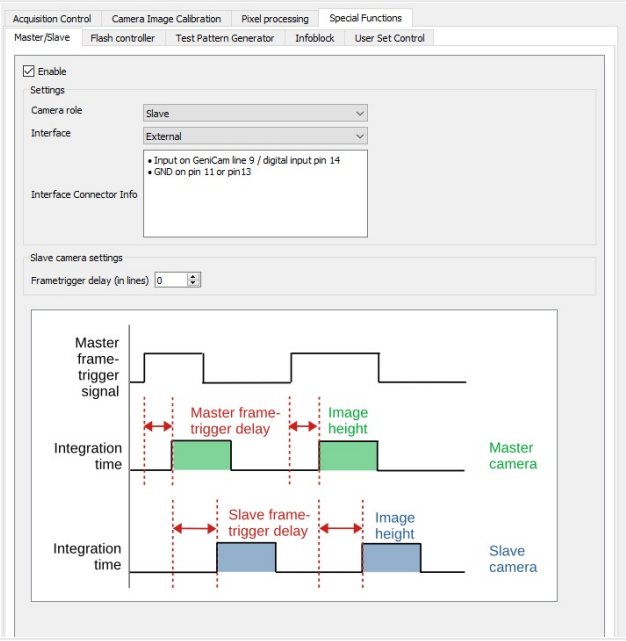



Alternatively you can set the camera as the master camera in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | Master Slave Mode | Master |
| 2 | Master Slave Interface | External |
| 3 | Maste Slave Interface Enable | On |

## Set up the slave camera

1. In the Configuration window navigate to *Special Functions → Master/Slave*.
2. Select the **Enable** checkbox.
3. In *Camera role* select the defined camera as **Slave**.
4. In *Interface* select **External**.
5. As an option in *Slave camera settings* set the **frame trigger delay**.




Alternatively you can set the camera as the slave camera in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | Master Slave Mode | Slave |
| 2 | Master Slave Interface | External |
| 3 | Maste Slave Interface Enable | On |
| 4 | Master Slave Delay Lines | <number of lines for delay> |

## Connect master and slave camera

The master/slave interface consists of a single timing signal for standard setup.

Use suitable Chromasens cables:

| Cable type | Order number |
|---|---|
| Master Slave Hub cable allPIXA evo (0.5m and 1.0m) | CP000715 |
| Trigger Cable allPIXA evo (5m) | CP000716 |

The connection is established through the digital I/O interface.

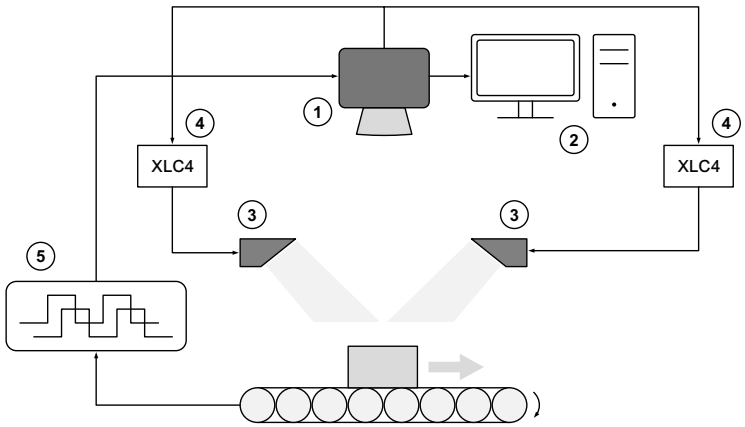
1. Connect **pin 14 (line 9)** of the master camera to **pin 8 (line 4)** of the slave camera.
2. Connect **pin 13 (GND)** of the master camera to **pin 13 (GND)** of the slave camera.

# Configure the multi-channel flash control

The camera can be used to trigger up to four different flash controller channels synchronized to their line acquisition. You can acquire several images with different illumination colors simultaneously in a single scan using line-multiplexing. The camera starts a complete LED pattern sequence after each line trigger or after a sequence time in free-running mode.

## The multi flash setup

The setup contains two Corona II illuminations which are controlled by the camera.




| | | | |
|---|---|---|---|
| **1** | Line scan camera: scans the image line by line and communicates with the PC. | **2** | PC: performs subsequent processing of the image data and can control the illumination system. |
| **3** | Illumination: lights up the scan area. | **4** | Illumination controller: controls and monitors the illumination unit. |
| **5** | Speed detection: the encoder detects the speed of the conveyor belt and communicates with the camera. | | |

## Connect the camera with the XLC4 controller

Any flash controller compatible to the electrical and timing specifications of the camera output interface can be synchronized. For best compatibility use the Chromasens illumination controller XLC4 (CP000411) illuminations from the Corona II product line.

Refer to the XLC4 controller manual.

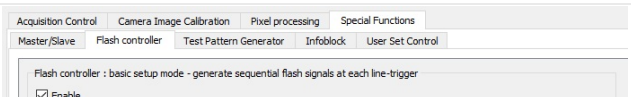
## Set up the flash controller

The camera provides up to four different outputs which can be operated individually to control flash controllers. Several flash outputs can be individually configured.

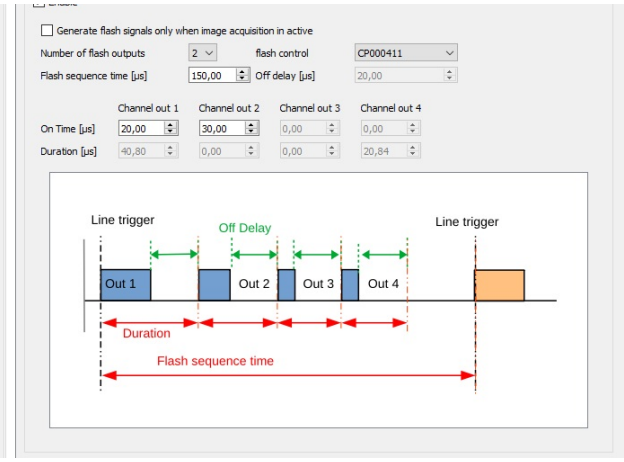
## Flash controller: basic mode

The basic mode is a sequential flash with up to four channels.

1. In the *Configuration window* navigate to *Special Functions → Flash Controller*.
2. Below *Flash controller: basic setup mode* select the **Enable** checkbox.



3. Adjust the parameters to your needs.



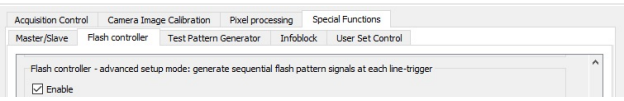

Alternatively you can set up the basic flash controller in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | Led Flash Control<br>Led Flash Enable | ON |
| 2 | Led Flash Number of Pattern | <number of Pattern> |
| 3 | Led Flash Pattern Selector | Led Flash Pattern <1> |
| 4 | Out1 on Time | <on time in µs> |
| 5 | Pattern of Delay | <delay time in µs> |
| 6 | Led Flash Pattern Selector | Led Flash Pattern <n> |
| 7 | Out-n on Time | <on time in µs> |
| 8 | Pattern of Delay | <delay time in µs> |
| 9 | Flash frame control | – |
| 10 | Led Flash sequence time | – |

## Flash controller: advanced mode

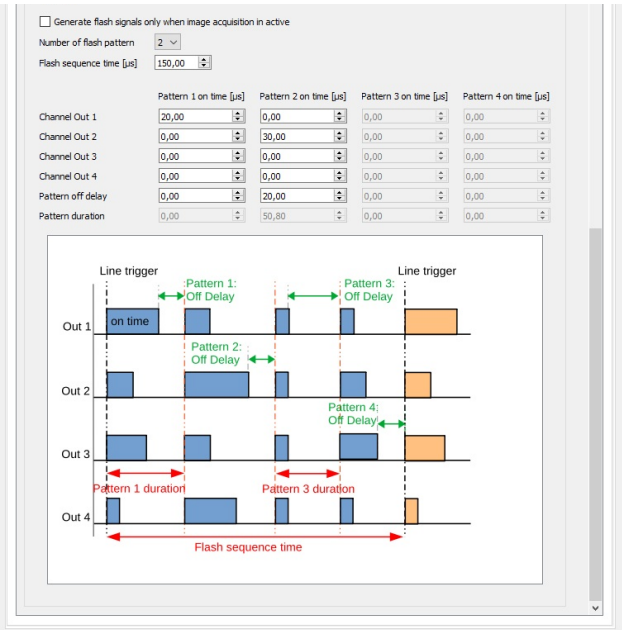
The advanced mode is a sequential flash with up to four channels and four patterns for each channel. The patterns are executed in a sequence. The sequence is repeated as long as scanning or triggering is active.

1. In the *Configuration window* navigate to *Special Functions → Flash Controller*.
2. Scroll down to *Flash controller - advanced setup mode*.



3. Below *Flash controller - advanced setup mode* select the **Enable** checkbox.
4. Adjust the parameters to your needs.

In this example two flash patterns are selected. The duration for each line pattern is set individually. All output channels are used.

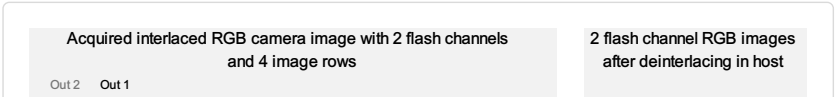


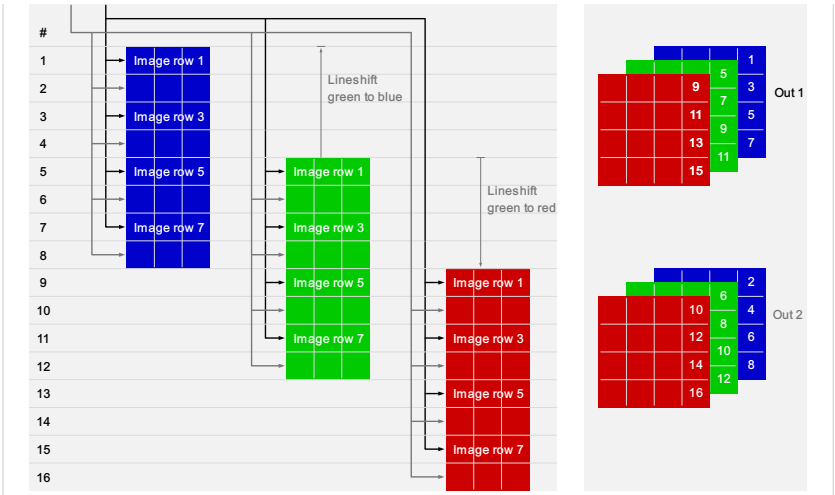

Alternatively you can set up the advanced flash controller in the **camera feature tree** by executing the following steps:

| Step | Feature name | Value |
|---|---|---|
| 1 | Led Flash Control<br>Led Flash Enable | ON |
| 2 | Led Flash Number of Pattern | <number of Pattern> |
| 3 | Led Flash Pattern Selector | Led Flash Pattern <1> |
| 4 | Out1 – 4 on Time | <on time in µs> |
| 5 | Pattern of Delay | <delay time in µs> |
| 6 | Led Flash Pattern Selector | Led Flash Pattern <n> |
| 7 | Out1 – 4 on Time | <on time in µs> |
| 8 | Pattern of Delay | <delay time in µs> |
| 9 | Flash frame control | – |
| 10 | Led Flash sequence time | – |

## Deinterlace the image

The following image shows how to separate the flash channels on an example of two flash channels.






## Read first line info block

## Decoding of the first line info block

| Pixel | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Line 0 | Marker | Serial number | | | | Marker | Image count | | Exposure time | | Marker | Line time | | | Encoder clocks | | | | Error code | | Time stamp | | | Marker |

## Serial number

### Structure

The serial number consists of two parts.

| SN first part | | SN second part | |
|---|---|---|---|
| Byte 3 | Byte 2 | Byte 1 | Byte 0 |
| $P_{x1}$ | $P_{x2}$ | $P_{x3}$ | $P_{x4}$ |

### Decoding

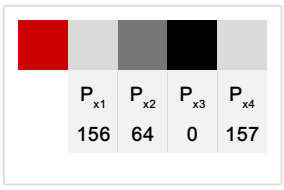
The decoding of the serial number is:

- The first part of the serial number $S_1 = P_{x1} \times 256 + P_{x2}$
- The second part of the serial number $S_2 = P_{x3} \times 256 + P_{x4}$

**Example**

$S_1 = 156 \times 256 + 64 = 40000$

$S_2 = 0 \times 256 + 157 = 157$




Example: decoding of SN: 40000-00157

## Image count

### Structure

| Image count | |
|---|---|
| Byte 1 | Byte 0 |
| $P_{x6}$ | $P_{x7}$ |

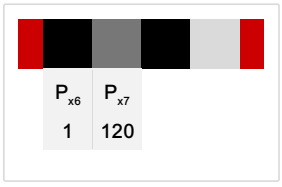
### Decoding

The decoding of the Image count is:

- $I_C = P_{X6} \times 256 + P_{X7}$

**Example**

$I_c = 1 \times 256 + 120 = 376$




Example: Image count 376

## Exposure time

### Structure

| Exposure time clocks | |
|---|---|
| Byte 1 | Byte 0 |
| $P_{x8}$ | $P_{x9}$ |

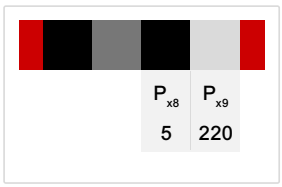
## Decoding

The decoding of the Exposure time is:

- $E_t = ( P_{X8} \times 256 + P_{X9} ) / f_a$
- $f_a$ (10k and 15k) = 50 Mhz
- $f_a$ (8k) = 80 Mhz

**Example**

$E_t = ( 5 \times 256 + 220 ) / 50 = 50$ µs



Example: Decoding of exposure time

## Line time

### Structure

| Line time clocks | | |
|---|---|---|
| Byte 2 | Byte 1 | Byte 0 |
| $P_{x11}$ | $P_{x12}$ | $P_{x13}$ |

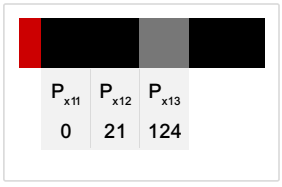
## Decoding

The decoding of the Line time is:

- $L_t = ( P_{X11} \times 2^{16} + P_{X12} \times 2^8 + P_{X13} ) / 100$

**Example**

$L_t = ( 0 \times 2^{16} + 21 \times 2^8 + 124 ) / 100 = 55$ µs



Example : Decoding of line time

## Encoder clocks

### Structure

| Encoder clocks | | | |
|---|---|---|---|
| Byte 3 | Byte 2 | Byte 1 | Byte 0 |
| $P_{x14}$ | $P_{x15}$ | $P_{x16}$ | $P_{x17}$ |

## Decoding

The decoding of the encoder clocks is:

- $E_c = P_{X14} \times 2^{32} + P_{X15} \times 2^{16} + P_{X16} \times 2^8 + P_{X17}$

## Time stamp

### Structure

### Structure

| Time [s] | | Time [¼ ms] |
|---|---|---|
| Byte 2 | Byte 1 | Byte 0 |
| $P_{x19}$ | $P_{x20}$ | $P_{x21}$ |

### Decoding

The decoding of the time stamp is:

- $T_s = ( P_{X19} \times 2^{16} + P_{X20} \times 2^8 + P_{X21} ) / 4$

## Read each line info block

## Decoding of the each line info block

| Pixel | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Red | Marker | Error code | Speed2high | Encoder clocks | Next line position | Time stamp | Unsupported | Unsupported | Unsupported | Marker |
| Green | Continuous line count | Line count | Line time | | | | | | | |
| Blue | | | | | | | | | | |

## Continuous line count

### Structure

| | Continuous line count | |
|---|---|---|
| – | Byte 1 | Byte 0 |
| $Px_{0Red}$ | $P_{x0Green}$ | $P_{x0Blue}$ |

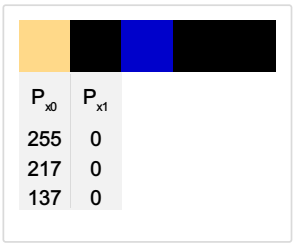
### Decoding

The decoding of the continuous line count is:

- $C_{lc} = P_{x0Green} \times 256 + P_{x0Blue}$

**Example**

$C_{lc} = 217 \times 256 + 127 = 55679$




Example: Decoding of continuous line count

## Line count

### Structure

| | Line count | |
|---|---|---|
| – | Byte 1 | Byte 0 |
| $Px_{1Red}$ | $P_{x1Green}$ | $P_{x1Blue}$ |

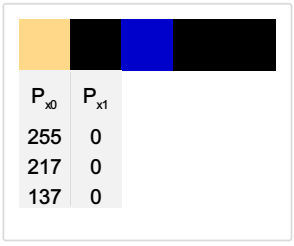
### Decoding

The decoding of the line count is:

- $L_c = P_{x1Green} \times 256 + P_{10Blue}$

**Example**

$L_c = 0 \times 256 + 0 = 0$




Example: Decoding of line count

## Speed to high

### Structure

### Structure

| Speed2high | – |
|---|---|
| Bit 7 | Bit 6 – Bit 0 |
| $P_{x2Red}$ | |

## Line time

### Structure

| | Line time clocks | | |
|---|---|---|---|
| Bit 7 – Bit 4 | Bit 3 – Bit 0 | Byte 1 | Byte 0 |
| $P_{x2Red}$ | | $P_{x2Green}$ | $P_{x2Blue}$ |

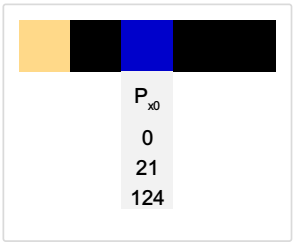
### Decoding

The decoding of the line time is:

- $L_t = (P_{x2Red} \times 2^{16} + P_{x2Green} \times 2^8 + P_{x2Blue}) / 100$

**Example**

$L_t = (0 \times 2^{16} + 21 \times 2^8 + 124) / 100 = 55\ \mu s$




Example : Decoding of line time

## Encoder clocks

### Structure

| Encoder clocks | | |
|---|---|---|
| Byte 2 | Byte 1 | Byte 0 |
| $P_{x3Red}$ | $P_{x3Green}$ | $P_{x3Blue}$ |

### Decoding

The decoding of the encoder clocks is:

- $E_c = P_{x3Red} \times 2^{16} + P_{x3Green} \times 2^8 + P_{x3Blue}$

## Next line trigger position

### Structure

| Next lt pos raw | | |
|---|---|---|
| Byte 2 | Byte 1 | Byte 0 |
| $P_{x4Red}$ | $P_{x4Green}$ | $P_{x4Blue}$ |

### Decoding

The decoding of the encoder clocks is:

- $N_{LP} = (P_{x4Red} \times 2^{16} + P_{x4Red} \times 2^8 + P_{x4Blue}) / 256$

## Time stamp

### Structure

| Time [s] | | Time [¼ ms] |
|---|---|---|

| Byte 2 | Byte 1 | Byte 0 |
| --- | --- | --- |
| $P_{x5Red}$ | $P_{x5Green}$ | $P_{x5Blue}$ |

### Decoding

The decoding of the time stamp is:

- $T_S = ( P_{x5Red} \times 2^{16} + P_{x5Greeb} \times 2^8 + P_{x5Blue} ) / 4$

## Overview

### Release 2.2.0 (Mai 2023)

| Camera | New features |
|---|---|
| **allPIXA evo 8k DXGE** | FrameBurstStart |
| **allPIXA evo 8k CXP** | FrameBurstStart<br>Trigger over CXP, LinkTrigger0 and LinkTrigger1 |
| **allPIXA evo 10k DXGE** | Release skipped |
| **allPIXA evo 10k CXP** | Release skipped |
| **allPIXA evo 15k DXGE** | Release skipped |
| **allPIXA evo 15k CXP** | Release skipped |

## Camera Firmware 2.2.0

### Feature Reference

The corresponding Feature reference to the camera firmware version **2.2.0** is version **6.0.0**.

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### allPIXA evo 8k DXGE

### Firmware download

https://chromasens.de/de/allpixa-evo-dxge-downloads

### Release Note

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### allPIXA evo 8k CXP

### Firmware download

https://chromasens.de/de/allpixa-evo-cxp-downloads

### Release Note

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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.<br>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.<br><br>1. Switch off the power supply and let the camera cool down.<br>2. Check the ambient conditions (0 °C – 60 °C; 32 °F – 140 °F) and improve cooling.<br>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. |

## 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.
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.<br>Please dispose this product in accordance with your local regulations. Contact your local government office for details about environmentally safe recycling. |