Allied Vision

GigE Vision & Camera Link SWIR Cameras

Goldeye G/CL

User Guide

V4.7.5

FW 05.04.b71da924

Note: Lenses are not part of this product.

Allied Vision Technologies GmbH // Taschenweg 2a, 07646 Stadtroda, Germany

2025-Jul-31

Quick links

- Goldeye G/CL cameras at a glance on page 15
- Contact us on page 17
- Contents on page 18

Read before use

EN - English

Safety

Before using the camera, read these safety instructions. Observe the warnings at all times. Use the camera only as stated in the Intended use on page 42.

CAUTION

Risk of burns

A camera in operation can reach temperature levels which could cause burns.

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Intended use

Intended use of Allied Vision product is the integration into vision systems by professionals. All Allied Vision product is sold in a B2B setting.

DA - Dansk

Sikkerhed

Læs sikkerhedsanvisningerne, før kameraet bruges. Overhold alle advarsler. Brug kun kameraet som anført i Intended use på side 42.

FORSIGTIG

Forbrændingsfare

Når kameraet bruges, kan det blive meget varmt og forårsage forbrændinger.

FORSIGTIG

Kvæstelser, hvis kameraet eller linser falder ned

Falder kameraet eller linsen ned, kan dette forårsage kvæstelser.

FORSIGTIG

Fare for snitsår på linsemodulets skarpe kanter

Linsemodulets gevind kan have skarpe kanter.

Tilsigtet brug

Allied Vision produktets tilsigtede brug er en indbygning i et visionssystem, udført af fagfolk. Alle Allied Vision produkter sælges i B2B.

DE - Deutsch

Sicherheit

Bevor Sie die Kamera benutzen, lesen Sie diese Sicherheitshinweise. Beachten Sie diese Hinweise immer. Verwenden Sie die Kamera nur wie beschrieben in Intended use auf Seite 42.

VORSICHT

Gefahr von Verbrennungen

Im Betrieb kann die Kamera Temperaturen erreichen, die zu Verbrennungen führen.

VORSICHT

Verletzung durch fallende Kameras oder Objektive

Eine fallende Kamera oder ein fallendes Objektiv kann Verletzungen verursachen.

VORSICHT

Schnitte durch scharfkantige Objektivgewinde

Objektivgewinde können scharfe Kanten haben.

Bestimmungsgemäßer Gebrauch

Allied Vision Produkte sind bestimmt für die Integration in Bildverarbeitungs-systeme durch Fachpersonal. Alle Allied Vision Produkte werden in einer B2B-Umgebung verkauft.

ES - Español

Seguridad

Antes de utilizar la cámara lea estas instrucciones de seguridad. Observe las advertencias en todo momento. Utilice la cámara solo tal y como se estipula en el Intended use en la página 42.

ATENCIÓN

Riesgo de quemaduras

Una cámara en funcionamiento puede alcanzar temperaturas que podrían provocar quemaduras.

ATENCIÓN

Lesiones en caso de que las cámaras o las lentes se caigan

Si una cámara o una lente se cae puede provocar lesiones.

ATENCIÓN

Riesgo de cortes debido a los bordes afilados del objetivo

Las roscas de los objetivos pueden tener bordes afilados.

Uso previsto

El uso previsto del producto Allied Vision es la integración en el sistema de visión por parte de profesionales. Todos los productos Allied Vision se venden dentro de una relación B2B.

FI - Suomi

Turvallisuus

Lue nämä turvallisuusohjeet ennen kameran käyttöä. Noudata varoituksia joka hetki. Käytä kameraa ainoastaan kohdassa Intended use sivulla 42 kuvatulla tavalla.

HUOMIO

Palovammojen vaara

Käytössä olevan kameran saavuttamat lämpötilatasot voivat aiheuttaa palovammoja.

HUOMIO

Putoavien kameroiden tai linssien aiheuttamat vammat

Putoava kamera tai linssi voi aiheuttaa vammoja.

HUOMIO

Linssien kiinnikkeiden terävien reunojen aiheuttamien viiltovammojen vaara

Linssin kiinnikkeiden kierteiden reunat voivat olla teräviä.

Käyttötarkoitus

Allied Vision-tuotteen käyttötarkoitus on integrointi kuvajärjestelmiin ammattilaisten toimesta. Kaikki Allied Vision-tuotteet myydään B2B-ympäristössä.

FR - Français

Sécurité

Veuillez lire ces consignes de sécurité avant d’utiliser la caméra. Respectez continuellement les avertissements. Utilisez la caméra uniquement comme indiqué sous Intended use, page 42.

ATTENTION

Risque de brûlures

Une caméra en service peut atteindre des niveaux de température susceptibles d’entraîner des brûlures.

ATTENTION

Blessures en cas de chute de caméras ou d’objectifs

La chute d’une caméra ou d’un objectif peut entraîner des blessures.

ATTENTION

Risque de coupures sur les bords tranchants des montures d’objectif

Les filetages des montures d’objectif peuvent présenter des bords tranchants.

Utilisation prévue

L’utilisation prévue du produit Allied Vision est son intégration dans des systèmes de vision par le soin de professionnels. Tout produit Allied Vision est vendu dans un cadre B2B.

עברית - HE

בטיחות

לפני השימוש במצלמה, עליך לקרוא את הוראות הביטחון האלו. עליך לממש הוראות ביטחון אלו תמיד.
השימוש במצלמה הוא רק לפי מה שכתוב ב"כוונת השימוש" (Intended use) בעמוד 42.

זהירות

סכנת כוויה

בזמן הפעלת המצלמה עלולותטמפרטורות גבוהות לעלות, שיכולות לגרום לכוויות.

זהירות

פציעה מנפילת מצלמות או עדשות

מצלמה או עדשה שנופלות עלולות לגרום לפציעה.

זהירות

סכנה להחתך מתבריג חד של העדשה

תבריג תושבת העדשה עלול להיות חד עד כדי פציעה.

שימוש מיועד

מוצרי AlliedVision מיועדים לשילוב במערכות ממוחשבת לעיבוד צילומים ע"י אנשי מקצוע.
כל מוצרי AlliedVision נמכרים לשימוש בסביבת B2B.

IT - Italiano

Sicurezza

Leggere queste istruzioni per la sicurezza prima di utilizzare la telecamera. Osservare sempre tutte le avvertenze. Utilizzare la telecamera come descritto alla sezione Intended use a pagina 42.

ATTENZIONE

Pericolo di ustioni

Durante il funzionamento una telecamera può raggiungere temperature elevate che possono essere causa di ustioni.

ATTENZIONE

Lesioni dovute alla caduta di telecamere o lenti

La caduta di una telecamera o di una lente può causare delle lesioni.

ATTENZIONE

Pericolo di tagliarsi sui bordi affilati degli attacchi della lente

I bordi della filettatura dell’attacco della lente possono essere affilati.

Uso previsto

Il prodotto Allied Vision è concepito per essere integrato in sistemi di monitoraggio in campo professionale. Tutti i prodotti Allied Vision sono venduti in uno scenario B2B.

JA – 日本語

安全性

本カメラを使用する前に、この安全の手引きをお読みください。常に、警告事項を守ってください。必ず、Intended use 42 ページの通りに、本カメラを使用してください。

注意

やけどの危険性

作動中のカメラは、やけどを引き起こす温度まで熱くなる恐れがあります。

注意

カメラまたはレンズの落下によるけが

カメラまたはレンズが落下すると、けがをする恐れがあります。

注意

レンズマウントの鋭利な端部で切り傷の危険性

レンズマウントのギザギザの部分が鋭利である可能性があります。

用途

Allied Vision製品は、専門家が視覚装置に統合することを意図したものです。すべてのAllied Vision製品は、企業間取り引き用に販売されています。

NL - Nederlands

Veiligheid

Lees deze veiligheidsinstructies voordat u de camera gaat gebruiken. Neem deze waarschuwingen altijd in acht. Gebruik de camera uitsluitend, zoals aangegeven in het Intended use op pagina 42.

VOORZICHTIG

Risico van verbranding

Een camera die gebruikt wordt, kan temperatuurwaarden bereiken die brandwonden kunnen veroorzaken.

VOORZICHTIG

Letsel door vallende camera's of lenzen

Een vallende camera of lens kan letsel veroorzaken.

VOORZICHTIG

Risico van snijwonden door scherpe randen van lensbevestigingen

Het schroefdraad van de lensbevestiging kan scherpe randen hebben.

Beoogd gebruik

Het beoogde gebruik van het Allied Vision-product is de integratie in optische systemen door professionals. Alle Allied Vision-producten worden verkocht in de B2B-markt.

NO - Norsk

Sikkerhet

Les disse sikkerhetsinstruksene før du bruker kameraet. Følg advarslene til en hver tid. Bruk kun kameraet i samsvar med Intended use på side 42.

FORSIKTIG

Risiko for brannskader

Et kamera i bruk kan nå temperaturnivåer som kan forårsake brannskader.

FORSIKTIG

Skade ved fallende kameraer eller linser

Et fallende kamera eller en fallende linse kan forårsake skade.

FORSIKTIG

Risiko for kutt fra skarpe kanter på linsefester

Sporene på linsefestet kan ha skarpe kanter.

Tiltenkt bruk

Den tiltenkte bruken av Allied Vision-produktet er integrering i visjonssystemer av profesjonelle. Alle Allied Vision-produkter selges i en forretning til forretning-situasjon.

SV - Svenska

Säkerhet

Läs igenom säkerhetsinstruktionerna innan du använder kameran. Var hela tiden särskilt uppmärksam på varningarna. Använd enbart kameran på det sätt som anges i Intended use på sida 42.

VARNING

Risk för brännskada

En kamera i drift kan komma upp i temperaturer som kan orsaka brännskador.

VARNING

Risk för skador från fallande kameror eller objektiv

Fallande kameror eller objektiv kan förorsaka skador.

VARNING

Risk för skärsår från vassa kanter på objektivfattningar

Objektivets gängor kan ha vassa kanter.

Avsedd användning

Den avsedda användningen av Allied Vision-produkter är integrering i visionssystem av fackmän. Samtliga Allied Vision-produkter säljs i en B2B-miljö.

ZH - 简体中文版

安全需知

使用本相机前，请阅读本安全说明书。请务必遵守相关警告 和 Intended use 于第 42 页 .

注意事项

烫伤风险

相机操作过程中温度可能上升并导致烫伤风险。

注意事项

相机或者镜头跌落造成伤害

相机或者镜头可能会跌落并造成伤害。

注意事项

镜头接口的锐利边缘划伤风险

镜头接口螺纹边缘可能较为锐利。

预期用途

Allied Vision 产品的预期用途是由专业人士整合到视觉系统中。所有 Allied Vision 的产品均通过 B2B 渠道销售。

Goldeye G/CL cameras at a glance

This chapter includes:

Overview

Read this document carefully

Learn to avoid damage to your Goldeye and to use it most safely and efficiently.

The **Goldeye G/CL User Guide** provides the technical specifications and operating principle of Goldeye cameras. This includes feature overview, dimensions, pixel formats, I/O definition, image processing, with SWIR-specific data processing, as well as bandwidth and ROI frame rates. Please note:

Topic	Details
Smooth camera operation	See Compliance, safety, and intended use on page 39 for safe and effective use.
Vimba and Vimba X	• Goldeye G models are supported by **Vimba X**. • Goldeye CL models are supported by **Vimba**. **Vimba X** does not include a Camera Link transport layer.
Camera naming and labels	• Goldeye cameras are grouped in housing types called **Industrial Design** or **Scientific Design**. See Industrial Design and Scientific Design on page 35. • Goldeye G/CL-030/130 VSWIR TEC1 are named Goldeye G/CL-030/130 **T1** on product labels and in all regulatory related documentation. See Naming on product labels on page 37.

Scope of delivery

Your Goldeye camera is delivered with the following components:

- Goldeye camera
- Download Instructions for First Camera Operation

What else do you need?

Document or software	Link
Goldeye G/CL Features Reference, Modular Concept, STEP files	www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation
Vimba (X) SDK for Windows, Linux, and Linux/ARM, including viewer, firmware updater and driver installer for Windows	**Goldeye G**: www.alliedvision.com/en/products/software/vimba-x-sdk **Goldeye CL**: www.alliedvision.com/en/products/vimba-sdk
Accessories, such as interface cables and cards, power and I/O cables, power supplies, lenses, and heat sinks	www.alliedvision.com/en/products/accessories
Warranty duration, sensor warranty	www.alliedvision.com/en/support/warranty

Table 1: Additional resources

Contact us

Website, email

General
www.alliedvision.com/en/contact
info@alliedvision.com

Distribution partners
www.alliedvision.com/en/avt-locations/avt-distributors

Support
www.alliedvision.com/en/support
www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma

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Contents

Document history and conventions

This chapter includes:

Document history

Version	Date	Remarks
V4.7.5	2025-Jul-31	**Firmware version**: 05.04.b71da924 • After the latest software release, **Goldeye G** is supported by Vimba X. Therefore, related contents were changed from Vimba to Vimba X. **Goldeye CL** is supported by Vimba, **not** by Vimba X. • Updated information in Accessories on page 219. • Updated contents in GigE status LEDs on page 265. • Applied editorial changes.
V4.7.4	2025-Jul-16	**Firmware version**: 05.04.b71da924 • Removed UKCA logo from Compliance notifications on page 40. • Updated Table 217: Goldeye G > GigE status LEDs on page 265 and Table 218: Goldeye CL > Camera Link status LED on page 267. • Aligned the voltage unit from V to VDC. • Applied editorial changes.
V4.7.3	2025-May-14	**Firmware version**: 05.04.b71da924 • Added “SWIR” and “VSWIR” to model names. • Removed contents for ISO 13485 and updated definitions for Intended use on page 42. • Renamed the Product Safety section to How to avoid product damage on page 44. • Corrected the acceleration value in IEC 60068-2-6: Sinusoidal vibration on page 49. • Added the safety note RCG models: Damage to the sensor on page 46. • Added temperature values for models with RCG (Removed Cover Glass) sensor options in Specifications (GigE models) on page 52 and Specifications (CL models) on page 117. • Added a warning message for RCG models in Temperature control on page 306. • Applied editorial changes.
V4.7.2	2024-Nov-07	**Firmware version**: 05.04.b71da924 • Updated drawing in Image data flow on page 291. • Corrected typos.

Table 2: Document history (sheet 1 of 7)

Version	Date	Remarks
V4.7.1	2024-Sep-05	**Release: Firmware version**: 05.04.b71da924 Corrected data for the housings of Goldeye G/CL-034 TEC2 models: • Overview in Industrial Design and Scientific Design on page 35 • Specifications in Goldeye G-034 SWIR TEC2 on page 97 and Goldeye CL-034 SWIR TEC2 on page 163 • Drawings in Technical drawings (GigE models) on page 182 and Technical drawings (CL models) on page 194 • Lens mount adapters: Ordering on page 205 • Specifications in Lenses and filters on page 210 • Instructions in Using lens mounts and filters on page 253.
V4.7.0	2024-Aug-14	**Release: Firmware version**: 05.04.b71da924 • Updated addresses in Contact us on page 17. • Updated contents for Industrial Design and Scientific Design on page 35 and references to this naming in the user guide. • Updated Specifications on page 47: - **New models:** Goldeye G/CL-034 TEC2. - Updated QE curves for Goldeye G/CL-008 TEC1 and G/CL-008 Cool TEC1 models. - Updated QE curve for Goldeye G/CL-034 TEC1. - Added Mono16 pixel format to Goldeye G/CL-008 and G/CL034. - Changed reference temperature values for maximum exposure time from +25 °C to +20 °C for G/CL-032 TEC1, G/CL-033 TEC1, and G/CL-034 TEC1. • Restructured contents in: - Specifications of lens mount adapters on page 204 - Lenses and filters on page 210 - Using lens mounts and filters on page 253. • Separated between Type 1 and Type 2 for C-Mount adapters in Lens mount adapters: Specifications on page 205 and Lens mount adapters: Maximum protrusion on page 205 for better overview. • Added Sensor and mount dimensions on page 207. • Updated contents in IP settings on page 231. • Corrected the description for Decimation on page 295. Applied editorial changes.
V4.6.2	2023-Apr-27	**Release: Firmware version**: 04.06.3ceb8e29 • Firmware version 04.06.3ceb8e29 fixes 3 bugs observed in firmware version 04.04.77cd2f3e, but does not introduce new features or changes. Therefore, data has not been changed between this and the previous version of this user guide. • Added a note about this in Overview on page 16. • Reverted changes for Vimba X, because some advanced Goldeye features are not supported. Therefore, Vimba is recommended.

Table 2: Document history (sheet 2 of 7)

Version	Date	Remarks
V4.6.1	2023-Mar-27	**Firmware version**: 04.04.77cd2f3e • Updated diagrams for relative QE with Goldeye G/CL-030 TEC1 and G/CL-130 TEC1 models in Specifications on page 47. • Updated contents for Vimba X with Goldeye G cameras.
V4.6.0	2023-Jan-26	**Release: Firmware version**: 04.04.77cd2f3e • Added note that lenses are not part of the product. • Updated Hebrew contents in Read before use on page 2. • Updated safety notes in Compliance, safety, and intended use on page 39 and warning messages in the other chapters of this user guide. • Updated data for Goldeye G/CL 008 TEC1 and Goldeye G/CL-008 TEC1 Cool models in Specifications on page 47: - Imaging performance values - Added 10-bit and Mono12p pixel formats • **New models:** Goldeye G/CL-008 XSWIR 1.9 TEC2 and Goldeye G/CL-008 XSWIR 2.2 TEC2. • Adjusted data for Goldeye G/CL-034 TEC1 and Goldeye G/CL-034 XSWIR models in Specifications on page 47: - Sensor size values - Added Mono12p pixel format • Added Camera feature availability on page 209. • Added Focal length vs. field of view on page 211. • Updated Firmware update on page 322. • Applied editorial changes.
V4.5.4	2022-Oct-27	**Firmware version**: 03.06.49d19afc Corrected QE curves for Goldeye G-034 XSWIR 2.2 TEC2 on page 106 and Goldeye CL-034 XSWIR 2.2 TEC2 on page 172.
V4.5.3	2022-Oct-21	**Firmware version**: 03.06.49d19afc • Corrected minimum spectral range values and updated QE curves for Goldeye G-034 XSWIR 1.9 TEC2 on page 101, Goldeye G-034 XSWIR 2.2 TEC2 on page 106, Goldeye CL-034 XSWIR 1.9 TEC2 on page 167, and Goldeye CL-034 XSWIR 2.2 TEC2 on page 172. • Applied editorial changes.
V4.5.2	2022-Oct-05	**Firmware version**: 03.06.49d19afc Corrected Temporal dark noise (Gain1) values for Goldeye G-034 XSWIR 2.2 TEC2 on page 106 and Goldeye CL-034 XSWIR 2.2 TEC2 on page 172.

Table 2: Document history (sheet 3 of 7)

Version	Date	Remarks
V4.5.1	2022-Oct-04	**Release: Firmware version**: 03.06.49d19afc • Added Hebrew contents to Read before use on page 2. • Updated data in Specifications on page 47: - Added 10-bit pixel formats for Goldeye G/CL-034 TEC1 - Goldeye G/CL-034 XSWIR 1.9 TEC2 - Goldeye G/CL-034 XSWIR 2.2 TEC2 • Added data for Goldeye G/CL-034 XSWIR 1.9/2.2 TEC2 at various places. • Corrected values for temperature setpoints in Goldeye G-008 SWIR TEC1 on page 52,Goldeye CL-030 VSWIR TEC1 on page 136, Goldeye CL-032 SWIR Cool TEC2 on page 146, and in Goldeye CL-130 VSWIR TEC1 on page 177. • Applied editorial changes.
V4.5.0	2022-Jun-14	**Firmware version**: 02.26.38494 • **New models:** Added preliminary data for Goldeye G/CL-034 XSWIR 1.9 TEC2 and Goldeye G/CL-034 XSWIR 2.2 TEC2. • Reorganized contents in Temperature control on page 306. • Editorial changes.
V4.4.2	2022-Mar-08	**Release: Firmware version**: 02.26.38494 • Added values for exposure time ranges in `UltraShort` mode for Goldeye G/CL-030 TEC1 and G/CL-130 TEC1 models in Specifications on page 47. • Added separate frame rates for different acquisition modes in the specifications table for Goldeye G-130 VSWIR TEC1 on page 111. • Added values for Trigger latencies and jitter on page 288 with G/CL-030 TEC1 and G/CL-130 TEC1 models. • Added Vertical ROI and Horizontal ROI to the Image data flow on page 291.
V4.4.1	2022-Jan-21	**Firmware version**: 02.24.37527 Corrected descriptions for the ROI frame rate calculations for Goldeye G-130 VSWIR TEC1 on page 111 and for Goldeye CL-130 VSWIR TEC1 on page 177.
V4.4.0	2021-Nov-25	**Release: Firmware version**: 02.24.37527 • **New models:** Goldeye CL-030 TEC1 and CL-130 TEC1 • Updated diagrams from absolute QE to relative QE for G-030 TEC1 and G-130 TEC1 models. • Added Goldeye G/CL-030 TEC1 and G/CL-130 TEC1 to contents in Additional heating for selected models on page 310. • Added feature descriptions for black level, gain, and decimation in Image processing on page 294. • Added Value changes by feature interdependencies on page 305.

Table 2: Document history (sheet 4 of 7)

Version	Date	Remarks
V4.4.0	2021-Nov-25	**Firmware version**: 02.22.35663 • Updated feature description for binning in Image processing on page 294. • Editorial changes.
V4.3.2	2021-Aug-13	**Firmware version**: 02.22.35663 • Added icon for compliance with UKCA in Compliance notifications on page 40. • Editorial changes.
V4.3.1	2021-Jul-22	**Firmware version**: 02.22.35663 Editorial changes.
V4.3.0	2021-Jul-07	**Release: Firmware version**: 02.22.35663 • **New models:** Goldeye G-030 TEC1 and G-130 TEC1 • Updated contents for Mounting the camera on page 226 (for CL accordingly). • Added contents about Adjusting the C-Mount on page 224. • Added contents about Replacing filters on models with fixed C-Mount adapter on page 226. • Added contents about Filters with C-Mount adapter Type 2 on page 224. • Updated contents in Contrast control on page 300. • Editorial changes.
V4.2.0	2020-Aug-12	**Release: Firmware version**: 02.20.29870 • **New models:** Goldeye CL-034 TEC1 and G-034 TEC1 • Added Read before use on page 2 • Added Your safety on page 43 • Added How to avoid product damage on page 44 • Updated power supply order codes • Updated Installing the camera (GigE) on page 225 • Updated Installing the camera (CL) on page 237 • Editorial updates
V4.1.6	2019-Sep-05	**Firmware version**: 02.18.20213 Editorial revision to improve usability
V4.1.5	2019-Jul-09	**Firmware version**: 02.18.20213 • Extended description of TID correction. • Updated Spectral Sensitivity plots. • Editorial changes.
V4.1.4	2019-Apr-30	**Firmware version**: 02.18.20213 • Specifications: Included three Gain levels of Goldeye G/CL-033 TEC1 and TECless models. • Upgraded the description of optical filters.

Table 2: Document history (sheet 5 of 7)

Version	Date	Remarks
V4.1.3	2019-Mar-15	**Firmware version**: 02.18.20213 • Specifications: Updated power consumption data. • Specifications: Added standards used for successful shock and vibration testing. • Specifications: Added Gain factor to Image and Performance table. • Accessories: Updated accessories tables.
V4.1.3	2019-Mar-15	**Firmware version**: 02.18.20213 • Temperature control: Added section Recommended Environment for Goldeye TECless. • Temperature control: Extended the section Neutralization of the Temperature Influence. • Minor editorial changes.
V4.1.2	2018-Sep-12	**Firmware version**: 02.18.20213 • Added link to application note Using the Goldeye G/CL LUT for image processing. • Updated contact information. • Updated installation information.
V4.1.1	2018-Jul-26	Applied several editorial corrections.
V4.1.0	2018-May-08	**Release: Firmware version**: 02.18.20213 • Added functions to models Goldeye G/CL-008 TEC1 and G/CL-008 Cool TEC1: - Modified temperature readout with increased precision (reduced `T_readout` noise). - Ability to heat the sensor in a new mode. - New feature `SensorTemperatureTargetSetpoint` that allows to hold one sensor temperature over a very wide range of conditions.
V4.0.0	2018-Mar-20	**Release: Firmware version**: 02.16.19998 • **New models:** Goldeye CL-008 Cool TEC1, G-008 Cool TEC1, CL-032 Cool TEC2, CL-033 TECless, G-033 TECless. • **Editorial changes:** - Improved pin assignment description of 12-pin Hirose connector, added Hirose pin number to I/O block diagrams. - Added the TEC level to each model name throughout the document; also added detailed description of model naming. - Included the Installation Manual for both GigE and CL models into the Technical Manual.
V3.3.0	2017-Jun-14	**Release: Firmware version**: 02.14.19002 • Added automatic contrast functionality. • Added TID correction. • Updated formulas for maximum frame rate. • Applied multiple small changes.

Table 2: Document history (sheet 6 of 7)

Version	Date	Remarks
V3.2.0	2016-Dec-01	**Firmware version**: 02.12.17558 • Included multiple minor updates. • Applied result of language check. • Restructured technical data and specifications .
V3.1.2	2016-Nov-17	**Firmware version**: 02.12.17558 Corrected drawing of the Goldeye G-032 Cool power connector pin assignment.
V3.1.1	2016-Aug-25	**Firmware version**: 02.12.17558 Corrected formulas for frame rate calculation of Goldeye CL-032, CL-033.
V3.1.0	2016-Jun-30	**Release: Firmware version**: 02.12.17558 • Added automatic exposure functionality. • Added capability to change CL timing parameters including clock frequency.
V3.0.0	2016-Feb-29	**Release: Firmware version**: 2.10.16613 **New models**: Goldeye CL-008, CL-032, CL-033.
V2.0.0	2015-Aug-24	**Release: Firmware version**: 02.08.15169 • **New model**: Goldeye G-008 • Complete implementation of new corporate layout. • Introduction of look-up table and binning into the firmware.
V1.3.0	2015-Mar-20	**Release: Firmware version**: 02.06.06 • **New model**: Goldeye G-033. • Extended the description of image corrections.
V1.2.0	2014-Nov-07	• Updated to new brand name and new brand logo.
V1.1.0	2014-Oct-24	**Release: Firmware** version: 02.04.04 • **New model**: Goldeye G-032 Cool TEC2 • Introduction of automatic non-uniformity correction. • Introduced new Resolution and ROI chapter.
V1.0.0	2014-Jul-11	**Release: Firmware** version 02.02.02 • **New camera family**, first model: Goldeye G-032 • First release of the document.

Table 2: Document history (sheet 7 of 7)

Manual conventions

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

Typographic styles

Style (example)	Function
Emphasis	Programs, or highlighting important things.
Feature names	GigE features names are displayed as monospaced text.
Feature options	Features options and register's options that are selectable by the user are displayed as monospaced italicized text.
UI Element	Text that is displayed, or output, by the system for the user, like parts of the GUI, dialog boxes, buttons, menus, important information, windows titles.
Web Reference	References to other documents or webpages, like web links, hypertext links, emails, but also cross references, that include a link the user can follow by clicking.

Table 3: Typographic styles

Symbols and notes

CAUTION

Risk of burns

Precautions are described

CAUTION

Injury by falling cameras or lenses

Precautions are described

CAUTION

Risk of cuts by sharp edges of lens mounts

Precautions are described

NOTICE

Material damage

Precautions are described.

NOTICE

Material damage by electrostatic discharge (ESD)

Precautions as described.

Avoiding malfunctions

Precautions are described.

Practical tip

Additional information helps to understand or ease handling the camera.

Additional information

Web address or reference to an external source with more information is shown.

Industrial Design and Scientific Design

Goldeye models are available in two general housing types:

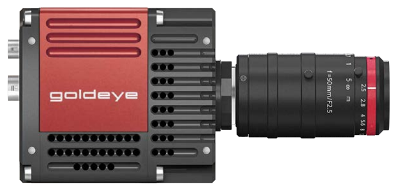
Models	Industrial Design	Scientific Design
		
Models	G/CL-008 SWIR TEC1, G/CL-032 SWIR TEC1, G/CL-033 SWIR TEC1, G/CL-033 SWIR TECless, G/CL-034 SWIR TEC1	G/CL-008 SWIR Cool TEC1, G/CL-032 SWIR Cool TEC2
Size	78 mm × 55 mm × 55 mm	90 mm × 80 mm × 80 mm
Mount options	C-Mount (adapter Type 1*), F-Mount, M42-Mount	C-Mount (adapter Type 1*), F-Mount, M42-Mount
Fan	No	Yes
Nitrogen chamber	No	Yes
Temperature control	TEC1, TEC2, or TECless	TEC1 or TEC2
		
Models	G/CL-030 VSWIR TEC1, G/CL-130 VSWIR TEC1	G/CL-008 XSWIR TEC2, G/CL-034 SWIR TEC2, G/CL-034 XSWIR TEC2
Size	78 mm × 55 mm × 55 mm	90 mm × 80 mm × 80 mm
Mount options	C-Mount (adapter Type 2*)	C-Mount (adapter Type 2*)
Fan	No	Yes
Nitrogen chamber	No	No
Temperature control	TEC1	TEC2
* See Lens mount adapters by model on page 204.		

Table 4: Industrial Design and Scientific Design

This user guides relates to Industrial design and Scientific Housing for better orientation.

Model naming

In addition to family name and model name, the full designation of Goldeye models can express the temperature control or the housing as well.

Goldeye models are equipped with various active and passive temperature control devices, for example a Cool housing, or a TEC2, TEC1 or TECless sensor. These devices are not optional. Also, they are not combinable like a modular design. When present, each of them constitutes a different Goldeye model. Therefore, they reflect in the naming or name affix of the model.

Name affix for temperature control

Goldeye models that are equipped with the same sensor may be available with different temperature controls. To make an unambiguous distinction possible, the temperature control is denoted in the model name.

Name affix	Description
TEC1	Single-stage thermo-electric temperature control
TEC2	Dual-stage thermo-electric cooling
TECless	No thermo-electric cooling available

Table 5: Distinction between Goldeye models with various TEC stages

See TEC1, TEC2, TECless on page 308 for more information.

Different models using the same sensor

Sometimes, the same sensor is integrated in different camera models to fulfill the requirements of various applications.

Goldeye G-032 models are available as:

- TEC1: Single-stage temperature control
- Cool TEC2: Dual-stage temperature control with fan cooling and Nitrogen chamber.

Goldeye CL-033 models are available as:

- TEC1: Single-stage temperature control
- TECless: Passive camera cooling.

Naming on product labels

On the label of Goldeye G/CL-030/130 VSWIR TEC1 cameras with single-stage thermo- electric cooling (TEC1), only T1 is displayed (see Figure 1), as this is the official product name used in all regulatory related documentation.

Nevertheless, for convenience and to ease understanding for customers, **TEC1 is used instead of T1** in this manual and all marketing related documentation, such as data sheets, brochures, and website information.

Figure 1: Goldeye G-130 VSWIR TEC1 labels > Shipping box (left), camera (right)

Acronyms and terms

The following table provides a list of acronyms and terms used in this document.

Acronym or term	Description
ADC	Analog-to-digital converter
AIA	Automated Imaging Association
AOI	Area of interest
BC	Background correction
Bps	Bytes/s
CL	Camera Link
DPC	Defect pixel correction
DSNU	Dark signal non-uniformity
EMVA	European Machine Vision Association
ESD	Electrostatic discharge
FPA	Focal plane array, mostly equivalent to **sensor**
GigE	Gigabit Ethernet
GND	Ground (power)
GPIO	General purpose input and output
GVSP	GigE Vision Streaming Protocol
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
ITR	Integrate then read mode used for triggering

Table 6: Acronyms and terms used in this document (sheet 1 of 2)

Acronym or term	Description
IWR	Integrate while read mode used for triggering
kΩ	Kiloohm
LUT	Look-up table
MSDS	Material safety data sheet
N.a.	Not applicable (abbreviation in tables)
NIC	Network interface card
NUC	Non-uniformity correction
PoE	Power over Ethernet
PRNU	Photo response non-uniformity
PSE	Power sourcing equipment
QE	Quantum efficiency
ROI	Region of interest
SDK	Software Development Kit
Sensor	Image sensor, mostly equivalent to **FPA**
SWIR	Short-wave infrared (900 to 1700 nm, see **VSWIR** and **XSWIR**)
TEC1	Single-stage thermo electric cooling
TEC2	Dual-stage thermo-electric cooling
TECless	No thermo-electric cooling element
TTL I/O	Transistor-transistor logic input/output
TxD and RxD	Transmit and receive
VSWIR	Visible and short-wave infrared (400 to 1700 nm, see **SWIR**)
XSWIR	Extended short-wave infrared (1100 to 1900 nm or 1100 to 2200 nm, see **SWIR**)

Table 6: Acronyms and terms used in this document (sheet 2 of 2)

Compliance, safety, and intended use

§

This chapter includes:

Compliance notifications

National regulations on disposal must be followed.

For customers in the US

Class B digital device

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference does not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

We caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Supplier Declaration of Conformity

Goldeye G/CL cameras comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Party issuing Supplier's Declaration of Conformity

Allied Vision Technologies GmbH
Taschenweg 2a
07646 Stadtroda, Germany
T// +49 (36428) 677-106
quality@alliedvision.com

Responsible party - US contact information

Allied Vision Technologies, Inc.
102 Pickering Way – Suite 502
Exton, PA 19341, USA
T// +1 978 225 2030

Note: changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

For customers in Canada

This apparatus complies with the Class B limits for radio noise emissions set out in the Radio Interference Regulations.

CAN ICES-3 (B) / NMB-3 (B)

Pour utilisateurs au Canada

Cet appareil est conforme aux normes classe B pour bruits radioélectriques, spécifiées dans le Règlement sur le brouillage radioélectrique.

CAN ICES-3 (B) / NMB-3 (B)

Avoid electromagnetic interferences

For all power and interface connections, only use shielded cables or cables recommended by Allied Vision.

Intended use

Allied Vision’s objective is the development, design, production, maintenance, servicing and distribution of digital cameras and components for image processing. We are offering standard products as well as customized solutions.

Intended use of Allied Vision product is the integration into Vision systems by professionals. All Allied Vision product is sold in a B2B setting.

Unless expressly agreed otherwise, we design, manufacture, and supply in accordance with the standards of the machine vision industry.

In the event of requirements going beyond this, the customer must:

- Notify us of the special use for each model before the first order is placed so that the models in question can be separated out from the standard processes using their own part numbers, and
- Conclude a quality assurance agreement with us prior to purchasing, to define its requirements in a legally secure manner.

This may require a surcharge, as our prices are very tightly tailored to standard requirements.

Copyright and trademarks

Your safety

This section informs about issues related to your personal safety. Descriptions explain how to avoid hazards and operate Goldeye G/CL cameras safely.

Handling lens mounts

The lens mount thread has sharp edges. Be careful these edges do not cut your skin when mounting or unmounting lenses.

Handling hot cameras

If you hold the camera in your hands during operation, your skin may get hurt. If you touch the camera when it is heated up, we recommend wearing protective gloves.

Providing optimum heat dissipation

Operation outside the allowed temperature range can damage the camera. For best performance and to protect the camera from damage, keep the housing temperature in the specified operating temperature range.

Observe the following:

- To avoid camera crashes, operate the camera with a lens or lens adapter attached only.
- For maximum heat dissipation, affix the camera to a heat sink, using the mounting holes.
- Use mounting base and heat sink with large surface areas.
- Use a mounting base with a high thermal conductivity.
- Reduce ambient temperature. For example, in an outdoor application with direct sunlight, provide shading by an enclosure.
- Provide ventilation or other active cooling of camera, mounting base, and heat sink.

Camera mounting

Goldeye G/CL cameras must be mounted using the mounting threads. If vibration is higher than specified, cameras can disconnect from the mounting. Falling cameras can hurt you. To avoid personal injury:

- Mount the camera according to the instructions in the installation chapters.
- Ensure, shock and vibration do not exceed the specified range as specified in the specifications chapter.
- For heavy or long lenses, use a lens support and apply tests.

How to avoid product damage

To prevent material damage, read the following to understand how to safely handle and operate the camera.

Electrical connections

ESD

ESD is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

- Unpacking: Remove the camera from its anti-static packaging only when your body is grounded.
- Workplace: Use a static-safe workplace with static-dissipative mat and air ionization.
- Wrist strap: Wear a static-dissipative wrist strap to ground your body.
- Clothing: Wear ESD-protective clothing. Keep components away from your body and clothing. Even if you are wearing a wrist strap, your body is grounded but your clothes are not.

Cable connections

Camera Link does not support Hot Plugging, such as GigE or USB interfaces. Therefore, Goldeye CL cameras and the connected peripherals can be damaged if they are connected or disconnected improperly.

Always connect Goldeye CL cameras in the following order:

1. Connect the Camera Link cable.
2. Connect the power supply. Use only power supplies offered by Allied vision or ensure that third party equipment fulfills to the power specifications of your Goldeye CL model.

Consequently, disconnect Goldeye CL in the following order:

1. Disconnect the power supply.
2. Disconnect the Camera Link cable.

Provide sufficient strain relief for all cable connections to avoid short circuits and malfunctions.

For all power connections, use only shielded cables to avoid electromagnetic interference.

Camera power

Operating the camera beyond the specified range damages the camera.

Cameras can be powered using the I/O connector at an input range of 12 to 24 VDC, using a limited power source (LPS), according to IEC 62368-1 with maximum 2.0 A. The camera is not intended to be connected to a DC distribution network.

Alternatively, cameras can be powered over Ethernet. However, power consumption and heat generation are higher than with external power, using the I/O connector.

- Make sure that PoE power sourcing equipment is at least compliant to IEEE 802.3af/at.
- Only use power supplies that meet the insulation requirement according to PELV or SELV. For details, please refer to IEC 61140.
- If using external power supplies by third-party manufacturers, observe polarity to avoid damage to the camera electronics.

Optical components

Provide the following conditions to keep dirt and droplets out of the optical system of camera and lens:

- Dust-free environment
- Low relative humidity
- No condensation.

When camera or lens are stored:

- Cover the lens mount with a protection foil or cap.
- Cover front and back lens with caps.

Sensor

Sensors are sensitive to excessive radiation: focused sunlight, UV light, lasers, and X-rays can damage the sensor. Dirt and scratches can damage the sensor as well.

Goldeye G/CL cameras do not need additional cleaning. Cameras are cleaned before shipping. Incorrect cleaning can damage the sensor or the optical filter. Therefore, only clean optical components as instructed in Cleaning optical components on page 325.

Protect the optical filter and the sensor from dirt, because dirt becomes more visible the closer it gets to the sensor, and keep the back lens clean. Hold the camera with the lens mount facing the ground to keep dirt out of the lens mount.

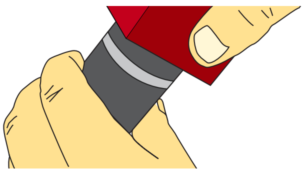


Figure 2: Holding the camera with the lens mount facing the ground

RCG models: Damage to the sensor

Selected Goldeye G/CL models are available with RCG (Removed Cover Glass) sensor option. For these models, condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below:

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Lenses

The sensor, optical filter, lens, or camera electronics can be damaged if a lens exceeding **maximum protrusion** is mounted to the camera. Use lenses with a maximum protrusion within camera specifications.

Specifications

This chapter includes:

Applied standards

Camera Link standard (CL models)

Camera Link is a communication interface for vision applications that reduces time and costs necessary for support. Goldeye CL cameras are compliant with the Camera Link V2.0 standard. Goldeye CL cameras work with standard frame grabbers and cables.

GenICam

GenICam is the command structure for the GigE Vision camera control. GenICam is administered by the European Machine Vision Association.

GenICam establishes a common camera control interface so that third-party software can communicate with cameras from various manufacturers without customization. It is incorporated as part of the GigE Vision standard.

GenCP

The camera is to be controlled using the GenICam GenCP Generic Control Protocol. GenCP is packet based and it uses a virtual 64-bit address space that contains all control registers of the camera.

Standard document downloads

You can find document downloads for GenCP and other EMVA standards at www.emva.org.

GigE Vision (GigE models)

GigE Vision is an interface standard for digital machine vision cameras, developed and maintained by the Automated Imaging Association. It is built on the Gigabit Ethernet communication protocol and widely supported in the industrial imaging industry.

IP class

Equipped with a lens as intended, Goldeye G/CL cameras comply with

- IP40 class for **all cameras except Cool** models
- IP20 class for **Cool models only**

according to IEC 60529.

Shock and vibration

Goldeye G/CL cameras were successfully tested for compliance with:

- IEC 60068-2-6, Sinusoidal vibration testing
- IEC 60068-2-27, Non-repetitive shock testing
- IEC 60068-2-27, Repetitive shock testing
- IEC 60068-2-64, Random vibration testing

Cameras were inspected before and after the tests. All tests were passed successfully:

Condition	Passed
Mechanics	• The camera housings showed no deformations. • The connections between camera components had not come loose. • The sensor position was within the specified tolerances of a new camera.
Camera behavior	Camera functionalities were not affected, no deviations occurred.
Image streaming	Images were streamed without errors.

Table 7: Conditions for passed tests

The conditions for cameras and lenses were the same for all tests. Solid aluminum tubes were used to represent real lenses:

Parameter	Value
Lens dummy length	45 mm
Lens dummy mass	140 g

Table 8: Conditions for lenses

IEC 60068-2-6: Sinusoidal vibration

Frequency	Acceleration	Displacement	Tolerances	
10 Hz	Not applicable	1.5 mm	-10%	10%
58.1 Hz	Not applicable	1.5 mm		
500 Hz	20 *g*(1)	Not applicable		

(1) *g* = Gravity of earth

Table 9: Frequency, acceleration, and displacement for IEC 60068-2-6 tests

Parameter	Value
Axis(1)	x, y, z
Sweep rate	1 oct/min
Sweep duration per axis [hh:mm:ss]	03:45:40
Number of sweeps	40

(1) For technical reasons, all three axes were tested in a shaker in the upright position without a sliding table.

Table 10: Other parameters for IEC 60068-2-6 tests

IEC 60068-2-27: Shock

Parameter	Value
Axis	x, y, z
Acceleration	50 $g^{(1)}$
Number of shocks per axis	3
Duration per axis	11 ms
Waveform	Half sine
[1] g = Gravity of earth	

Table 11: Parameters for IEC 60068-2-27 tests, non-repetitive

Parameter	Value
Axis	x, y, z
Acceleration	25 $g^{(1)}$
Number of shocks per axis	500
Duration per axis	6 ms
Waveform	Half sine
[1] g = Gravity of earth	

Table 12: Parameters for IEC 60068-2-27 tests, repetitive

IEC 60068-2-64: Random vibration

Frequency	Acceleration[1]
5 Hz to 500 Hz [1]	0.05 $g^2/_{Hz}$
[1] g = Gravity of earth	

Table 13: Frequency and acceleration for IEC 60068-2-64 tests

Parameter	Value
Axis	x, y, z
Acceleration RMS (Sigma)	4.9 $g^{(1)}$
Duration per axis [hh:mm:ss]	00:30:00
[1] g = Gravity of earth	

Table 14: Other parameters for IEC 60068-2-64 tests

Maximum and ROI frame rates

Frame rate values in this chapter apply to a setup using:

- Mono8 pixel format
- 115 MBps bandwidth.

If bandwidth is reduced by using `DeviceLinkThroughputLimit` or if pixel formats with a higher bit depth are used, frame rates are decreased.

To achieve maximum frame rates...

... for different formats, you may have to change the GigE streaming features, particularly to adjust the GigE packet size. Observe:

- Smaller packets may be advantageous if using small ROIs
- Larger packets may be advantageous if using larger ROIs

Frame rates and temperature control

The following table displays a summary of the key sensor specifications of all Goldeye models. For more detailed information about temperature control in Goldeye cameras, refer to the section on Temperature control on page 306.

	Sensor type	Resolution	Frame rate	Cooling type	Heating support	Min. ΔT
Goldeye SWIR models						
G/CL-008 SWIR TEC1	InGaAs	320 × 256	344 fps	TEC1	Yes	20K
G/CL-008 SWIR Cool TEC1		320 × 256	344 fps	TEC1	Yes	30K
G/CL-032 SWIR TEC1		636 × 508	100 fps	TEC1	Cooling only	30K
G/CL-032 SWIR Cool TEC2		636 × 508	100 fps	TEC2	Cooling only	60K
G/CL-033 SWIR TEC1		640 × 512	301 fps	TEC1	Cooling only	25K
G/CL-033 SWIR TECless		640 × 512	301 fps	N.a.		
G/CL-034 SWIR TEC1		636 × 508	303 fps	TEC1	Cooling only	25k
G/CL-034 SWIR TEC2		636 × 508	303 fps	TEC2	Cooling only	60K
Goldeye VSWIR models						
G/CL-030 VSWIR TEC1	InGaAs	656 × 520	234 fps	TEC1	Cooling only	25K
G/CL-130 VSWIR TEC1		1280 × 1024	94 fps	TEC1	Cooling only	25K
Goldeye XSWIR models						
G/CL-008 XSWIR TEC2	InGaAs	320 × 256	344 fps	TEC2	Cooling only	60K
G/CL-034 XSWIR TEC2		636 × 508	303 fps	TEC2	Cooling only	60K

Table 15: Frame rates and temperature control specifications by model

Specifications (GigE models)

Goldeye G-008 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	880 ke^{-}/s [1]
Temporal dark noise (Gain0)	1.6 ke^{-} [1]
Temporal dark noise (Gain1)	210 e^{-} [1]
Saturation capacity (Gain0)	5.0 Me^{-} [1]
Saturation capacity (Gain1)	170 ke^{-} [1]
Dynamic range (Gain0)	70 dB [1]
Dynamic range (Gain1)	60 dB [1]
Pixel operability	>99.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 200 ms [2]
Temperature control	Single-stage thermo-electric cooling and heating (TEC1)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at +25 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of +25 °C. Even longer exposures can be set, but the image quality may deteriorate

Table 16: Goldeye G-008 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 17: Goldeye G-008 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 18: Goldeye G-008 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	320 g
Mass, with C-Mount adapter	340 g
Mass, with F-Mount adapter	390 g
Mass, with M42-Mount adapter	360 g

Table 19: Goldeye G-008 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +25 °C (default and calibrated) • +20 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 5 W (12 VDC) • 6.5 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +25 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 20: Goldeye G-008 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

For Goldeye G/CL-008 SWIR TEC1 cameras with RCG (Removed Cover Glass) sensor option, condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

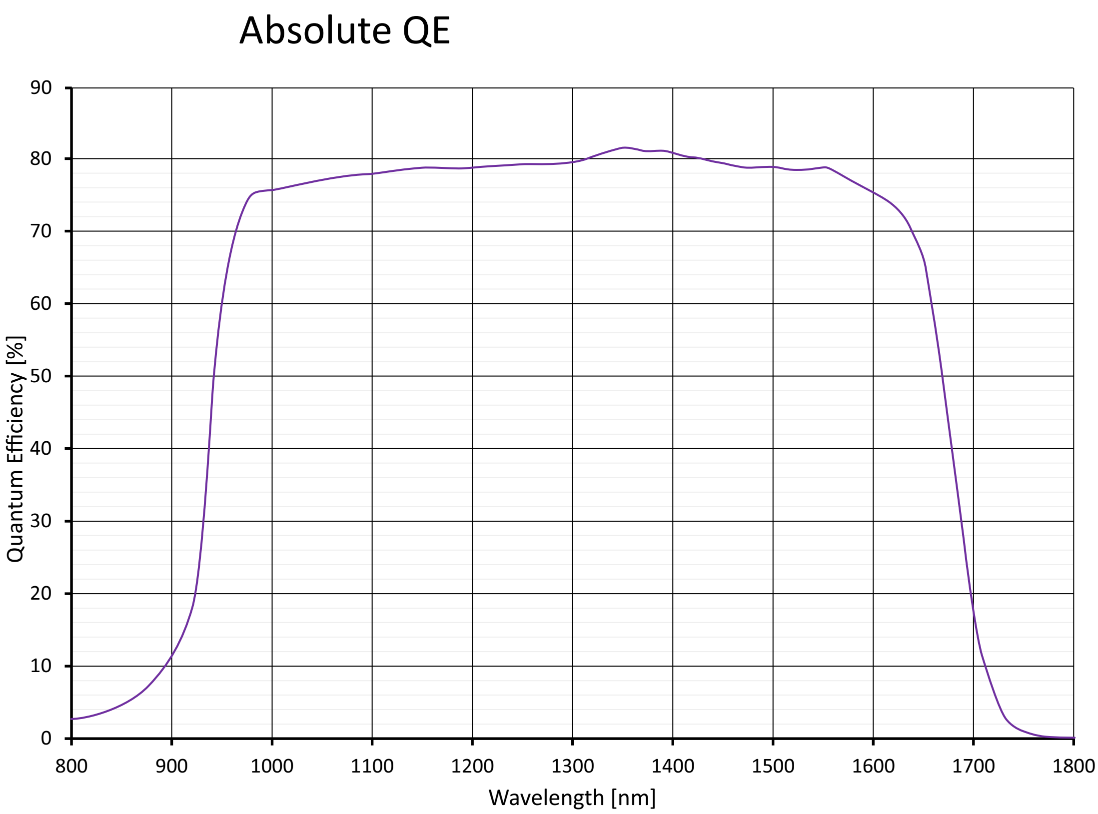


Figure 3: Goldeye G-008 SWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-008 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{10,000,000}{\left[(V+2)\times\left(\frac{H}{4}+32\right)\right]+171}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 8.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 2.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 1: Maximum frame rate for Goldeye G-008 SWIR TEC1

Examples for maximum frame rates with Goldeye G-008 SWIR TEC1 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Remarks**	**Maximum frame rate [fps]**
320	256	Sensor full resolution	344
320	240	QVGA	366
160	120	QQVGA	1117
128	32	(None)	4273
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	≥ 12345

Table 21: Goldeye G-008 SWIR TEC1 resolution and frame rates

Goldeye G-008 SWIR Cool TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	260 ke$^-$/s [1]
Temporal dark noise (Gain0)	1.6 ke$^-$ [1]
Temporal dark noise (Gain1)	210 e$^-$ [1]
Saturation capacity (Gain0)	5.0 Me$^-$ [1]
Saturation capacity (Gain1)	170 ke$^-$ [1]
Dynamic range (Gain0)	70 dB [1]
Dynamic range (Gain1)	60 dB [1]
Pixel operability	>99.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 1250 ms [2]
Temperature control	Single-stage thermo-electric cooling and heating (TEC1)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at +5 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of +5 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 22: Goldeye G-008 SWIR Cool TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 23: Goldeye G-008 SWIR Cool TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 24: Goldeye G-008 SWIR Cool TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mounts	• C-Mount • F-Mount and M42-Mount available on request
Mass, body only, without adapter	770 g
Mass, with C-Mount adapter	790 g
Mass, with F-Mount adapter	840 g
Mass, with M42-Mount adapter	810 g

Table 25: Goldeye G-008 SWIR Cool TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +5 °C (default and calibrated) • -5 °C, +10 °C, +20 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.7 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 4.9 W (12 VDC) • 6.6 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +5 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 26: Goldeye G-008 SWIR Cool TEC1 operating conditions

Absolute QE

Figure 4: Goldeye G-008 SWIR Cool TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-008 SWIR Cool TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\mathrm{FrameRate} = \frac{10,000,000}{\left[(V+2)\times\left(\frac{H}{4}+32\right)\right]+171}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 8.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 2.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 2: Maximum frame rate for Goldeye G-008 SWIR Cool TEC1

Examples for maximum frame rates with Goldeye G-008 SWIR Cool TEC1 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Format name**	**Maximum frame rate [fps]**
320	256	Sensor full resolution	344
320	240	QVGA	366
160	120	QQVGA	1117
128	32	(None)	4273
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	≥ 12345

Table 27: Goldeye G-008 SWIR Cool TEC1 resolution and frame rates

Goldeye G-008 XSWIR 1.9 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1100 nm to 1900 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	1.2 Me^-/s [1]
Temporal dark noise (Gain0)	1.8 ke^- [1]
Temporal dark noise (Gain1)	200 e^- [1]
Saturation capacity (Gain0)	5.0 Me^- [1]
Saturation capacity (Gain1)	140 ke^- [1]
Dynamic range (Gain0)	68 dB [1]
Dynamic range (Gain1)	57 dB [1]
Pixel operability	>98.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 30 ms [2]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 28: Goldeye G-008 XSWIR 1.9 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 29: Goldeye G-008 XSWIR 1.9 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 30: Goldeye G-008 XSWIR 1.9 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 31: Goldeye G-008 XSWIR 1.9 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30°C (default and calibrated) • -20 °C (calibrated) • -10 °C, 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 20 W (12 VDC) • <21 W (PoE)
Typical power consumption, without cooling	• 5 W (12 VDC) • 7 W (PoE)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 32: Goldeye G-008 XSWIR 1.9 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

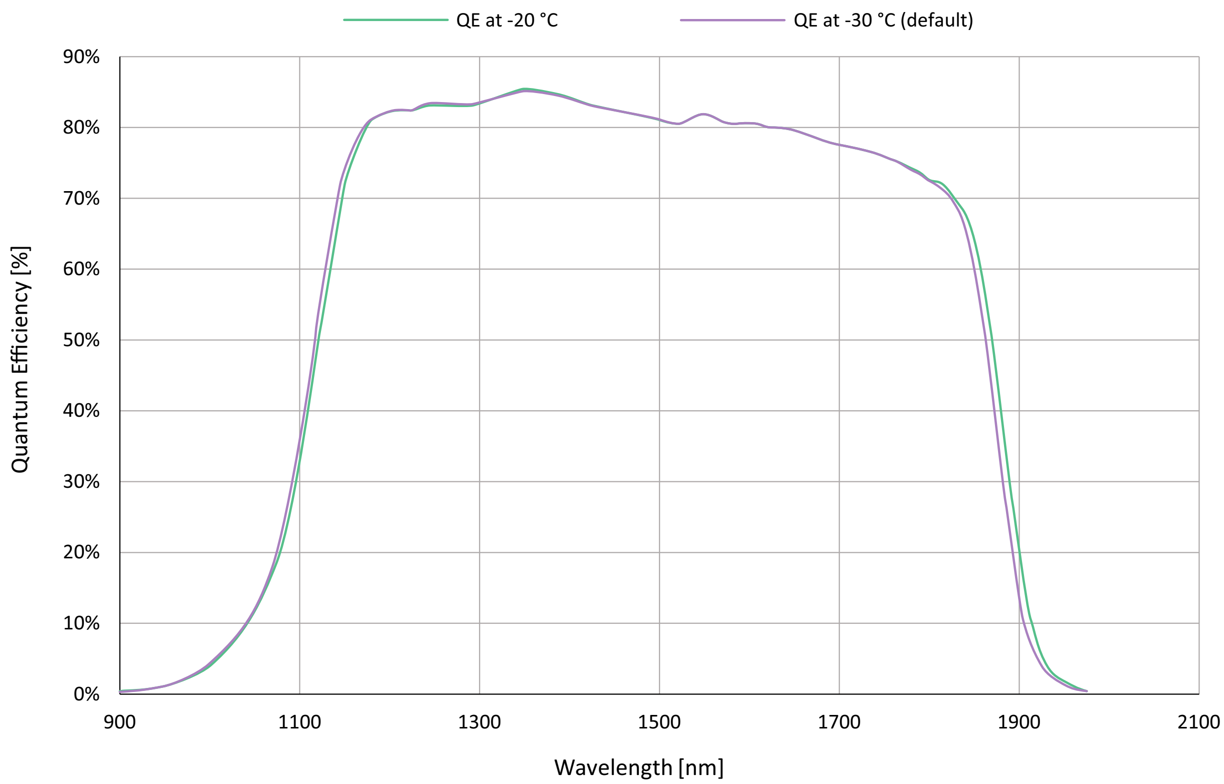


Figure 5: Goldeye G-008 XSWIR 1.9 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye G-008 XSWIR 1.9 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\mathrm{FrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 3: Maximum frame rate for Goldeye G-008 XSWIR 1.9 TEC2

Examples for maximum frame rates with Goldeye G-008 XSWIR 1.9 TEC2 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Remarks**	**Maximum frame rate [fps]**
320	256	Sensor full resolution	344
320	240	QVGA	366
160	120	QQVGA	1117
128	32	(None)	4260
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	≥ 4482 [1] 12345 [2]

[1] Measurement Parameters: `ExposureTime` = 6µs, `IntegrationMode` = *`IWR`*, `DevicethroughputLimit` =115000000 (default value), all other settings are default.

[2] Only for `AcquisitionMode` = *`Recorder`*, `DeviceLinkThroughputLimitMode` = *`Off`*, `ExposureTime` = 6µs, `IntegrationMode` = *`IWR`*

Table 33: Goldeye G-008 XSWIR 1.9 TEC2 resolution and frame rates

Goldeye G-008 XSWIR 2.2 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1200 nm to 2200 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	15.3 Me^-/s [1]
Temporal dark noise (Gain0)	2.5 ke^- [1]
Temporal dark noise (Gain1)	200 e^- [1]
Saturation capacity (Gain0)	5.0 Me^- [1]
Saturation capacity (Gain1)	110 ke^- [1]
Dynamic range (Gain0)	68 dB [1]
Dynamic range (Gain1)	57 dB [1]
Pixel operability	>98.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 7 ms [2]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1485 nm LED illumination. Stated values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 34: Goldeye G-008 XSWIR 2.2 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 35: Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 36: Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 37: Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C, 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 21 W (12 VDC) • <23 W (PoE)
Typical power consumption, without cooling	• 7 W (12 VDC) • 9 W (PoE)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 38: Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

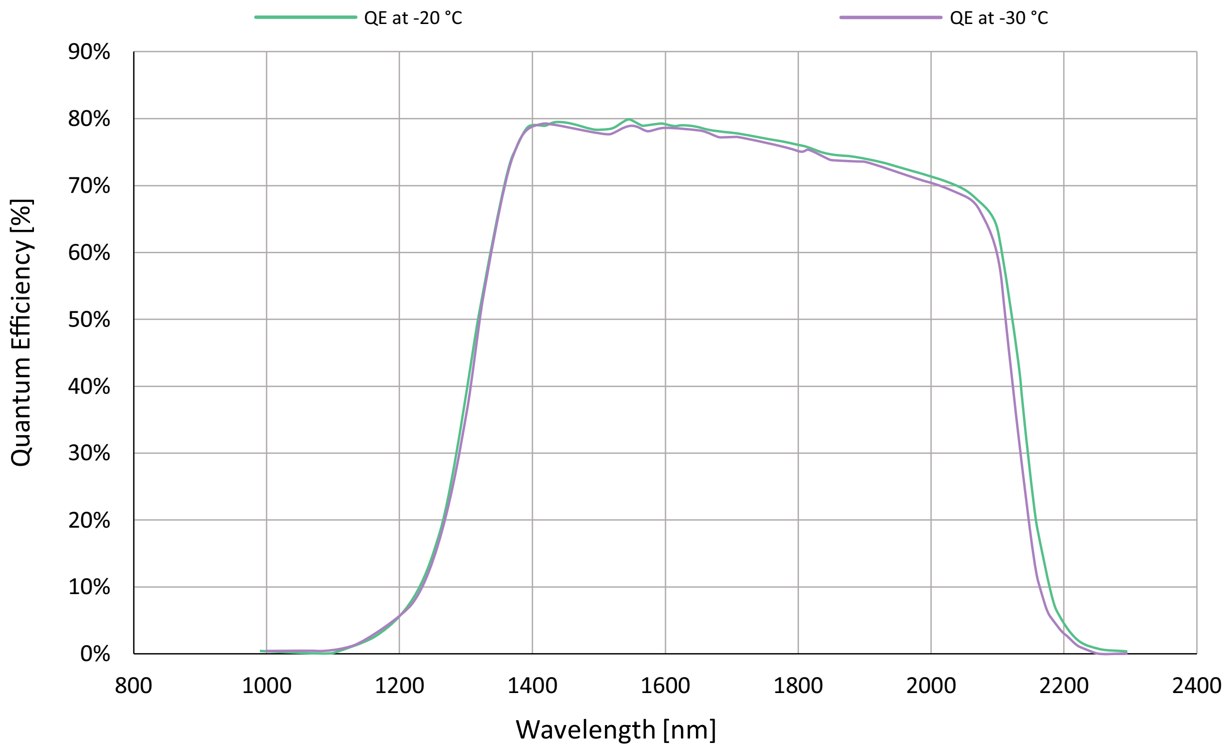


Figure 6: Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye G-008 XSWIR 2.2 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 4: Maximum frame rate for Goldeye G-008 XSWIR 2.2 TEC2

Examples for maximum frame rates with Goldeye G-008 XSWIR 2.2 TEC2 XSWIR 1.9 TEC2 for common resolutions are listed in the following table..

Resolution			
Width	**Height**	**Remarks**	**Maximum frame rate [fps]**
320	256	Sensor full resolution	344
320	240	QVGA	366
160	120	QQVGA	1117
128	32	(None)	4260
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	≥ 4482 [1] 12345 [2]

[1] Measurement Parameters: `ExposureTime` = 6µs, `IntegrationMode` = *`IWR`*, `DevicethroughputLimit` =115000000 (default value), all other settings are default.

[2] Only for `AcquisitionMode` = *`Recorder`*, `DeviceLinkThroughputLimitMode` = *`Off`*, `ExposureTime` = 6µs, `IntegrationMode` = *`IWR`*

Table 39: Goldeye G-008 XSWIR 2.2 TEC2 resolution and frame rates

Goldeye G-030 VSWIR TEC1

Imaging and performance

Parameter	Values
Sensor model	Sony IMX991 SenSWIR
Sensor type	InGaAs FPA
Sensor format	Type 1/4 (4.1 mm diagonal)
Shutter type	Global shutter
Spectral range	400 nm to 1700 nm
Resolution (H × V)	656 × 520
Pixel size	5 µm × 5 µm
Sensor size (effective)	3.28 mm × 2.6 mm
Dark current (at +20 °C sensor temperature)	4.8 ke^-/s
Temporal dark noise (0 dB)	250 e^-
Temporal dark noise (18 dB)	210 e^-
Saturation capacity (0 dB)	165 ke^-
Saturation capacity (18 dB)	17.2 ke^-
Dynamic range (0 dB)	56.4 dB
Dynamic range (18 dB)	38.2 dB
Pixel operability	>99.5%
Exposure time	16 µs to 200 ms[1] (Normal[2]) | 3 µs to 7 µs (Ultrashort[2])
Maximum frame rate at full resolution	234 fps
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (0 dB), 7.9 (18 dB)
A/D converter	12-bit
Image buffer size	256 MB
Stream hold capacity	370 frames at full resolution

[1]Maximum exposure value given is valid for 0 dB and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

[2] Values for `ExposureRangeMode` = *`Normal`* or *`Ultrashort`*

Table 40: Goldeye G-030 VSWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 12-bit
Pixel formats	Mono8, Mono12, Mono12Packed

Table 41: Goldeye G-030 VSWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 42: Goldeye G-030 VSWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	78 mm × 55 mm × 55 mm
Lens mount	C-Mount
Mass, including lens mount	340 g

Table 43: Goldeye G-030 VSWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 5.6 W (12 VDC) • 7.2 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 44: Goldeye G-030 VSWIR TEC1 operating conditions

Absolute QE

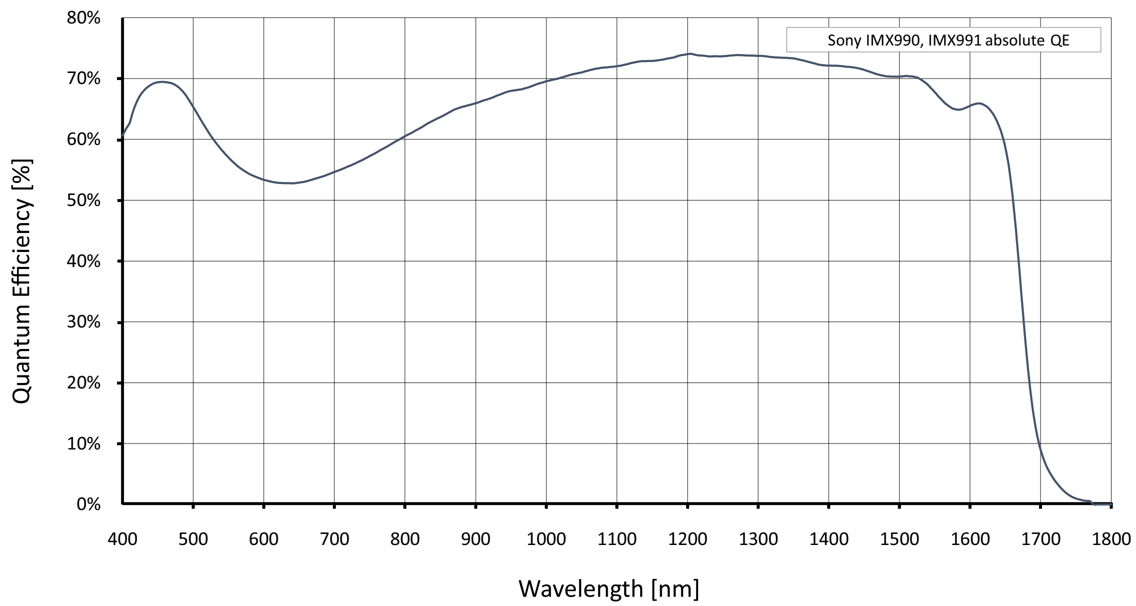


Figure 7: Goldeye G-030 VSWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-030 VSWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\mathrm{SensorFrameRate} = \frac{PF}{V + 36}$$

PF	Pixel format factor • Mono8: 130208.33 • Mono12: 75604.84 • Mono12p: 75604.84
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 8.

When using the formula, please consider the following:

- The formula serves as a rough estimation.
- Valid for IntegrateWhileRead-Mode only.
- ROI minimum width and height are 8 pixels.
- Exposure time may reduce the frame rate.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 5: Maximum frame rate for Goldeye G-030 VSWIR TEC1

Examples for maximum frame rates with Goldeye G-030 VSWIR TEC1 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Format name**	**Maximum frame rate [fps]**
656	520	Sensor full resolution	234
640	480	VGA	252
320	240	QVGA	471
160	120	QQVGA	834
656	260	Maximum × half	439
656	8	Maximum × minimum	2959
8	520	Minimum × maximum	234
8	8	Minimum × minimum	2959

Table 45: Goldeye G-030 VSWIR TEC1 resolution and frame rates

Goldeye G-032 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	25 µm × 25 µm
Sensor size (effective)	15.9 mm × 12.7 mm
Dark current (at +20 °C sensor temperature)	380 ke$^-$/s
Temporal dark noise (Gain0)	400 e$^-$
Temporal dark noise (Gain1)	170 e$^-$
Saturation capacity (Gain0)	1.9 Me$^-$
Saturation capacity (Gain1)	39 ke$^-$
Dynamic range (Gain0)	73 dB
Dynamic range (Gain1)	47 dB
Pixel operability	>99.5%
Exposure time	6 µs to 200 ms [1]
Maximum frame rate at full resolution	100 fps
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 50 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	397 frames at full resolution

[1] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 46: Goldeye G-032 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 14-bit
Pixel formats	Mono8, Mono12, Mono12Packed, Mono14

Table 47: Goldeye G-032 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 48: Goldeye G-032 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	350 g
Mass, with C-Mount adapter	370 g
Mass, with F-Mount adapter	420 g
Mass, with M42-Mount adapter	390 g

Table 49: Goldeye G-032 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 5 W (12 VDC) • 6.5 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Models with RCG (Removed Cover Glass) sensor option:
+20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable

Table 50: Goldeye G-032 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-pro-g5-documentation.

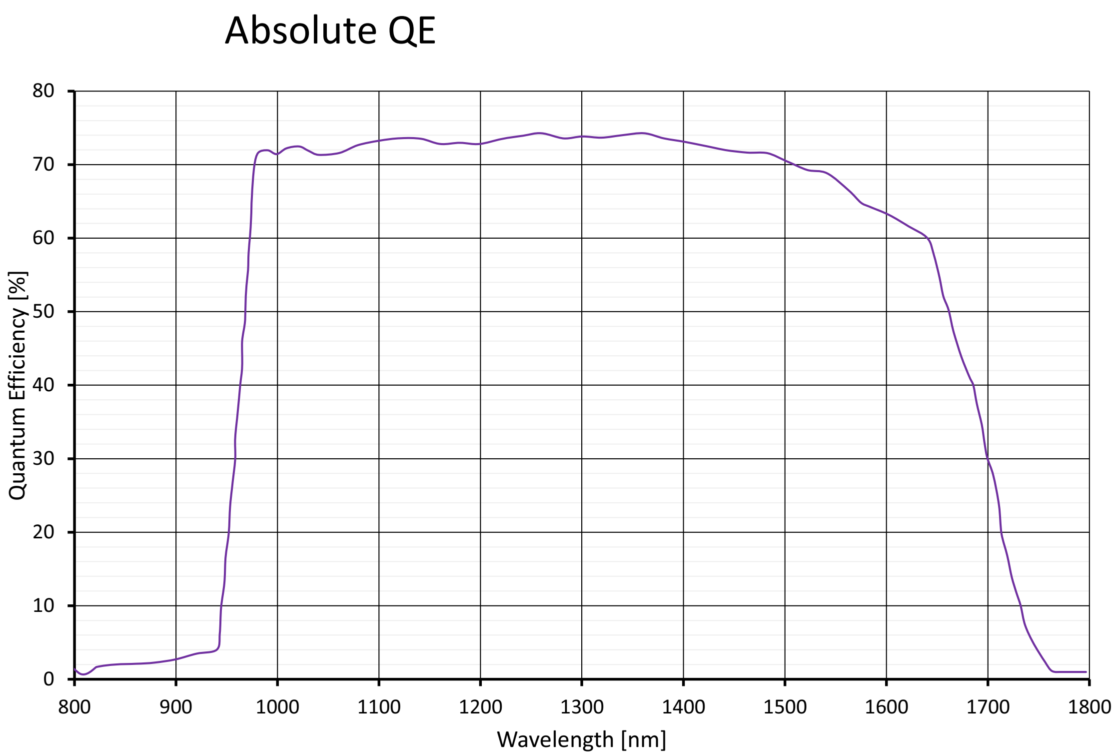


Figure 8: Goldeye G-032 SWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-032 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{10{,}000{,}000}{\left[(V+4) \times \left(\frac{H}{4} + 32\right)\right] + 131}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 16.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 6: Maximum frame rate for Goldeye G-032 SWIR TEC1

Examples for maximum frame rates with Goldeye G-032 SWIR TEC1 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Format name**	**Maximum frame rate [fps]**
636	508	Sensor full resolution	100
636	480	Approx. matches VGA format	107
320	240	QVGA	351
160	120	QQVGA	1047
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	11123

Table 51: Goldeye G-032 SWIR TEC1 resolution and frame rates

Goldeye G-032 SWIR Cool TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	25 µm × 25 µm
Sensor size (effective)	15.9 mm × 12.7 mm
Dark current (at -20 °C sensor temperature)	30 ke$^-$/s
Temporal dark noise (Gain0)	400 e$^-$
Temporal dark noise (Gain1)	170 e$^-$
Saturation capacity (Gain0)	1.9 Me$^-$
Saturation capacity (Gain1)	39 ke$^-$
Dynamic range (Gain0)	73 dB
Dynamic range (Gain1)	47 dB
Pixel operability	>99.5%
Exposure time	6 µs to 1250 ms [1]
Maximum frame rate at full resolution	100 fps
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 50 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	397 frames at full resolution

[1] Maximum exposure value given is valid for Gain0 and sensor temperature of -20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 52: Goldeye G-032 SWIR Cool TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 14-bit
Pixel formats	Mono8, Mono12, Mono12Packed, Mono14

Table 53: Goldeye G-032 SWIR Cool TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 54: Goldeye G-032 SWIR Cool TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	790 g
Mass, with C-Mount adapter	810 g
Mass, with F-Mount adapter	860 g
Mass, with M42-Mount adapter	830 g

Table 55: Goldeye G-032 SWIR Cool TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -20 °C (default and calibrated) • -5 °C, +10 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 19 W (12 VDC) • 22 W (PoE+)
Typical power consumption, without cooling	• 6 W (12 VDC) • 8 W (PoE+)
[1] Even though the first temperature setpoint is pre-configured to -20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 56: Goldeye G-032 SWIR Cool TEC2 operating conditions

Absolute QE

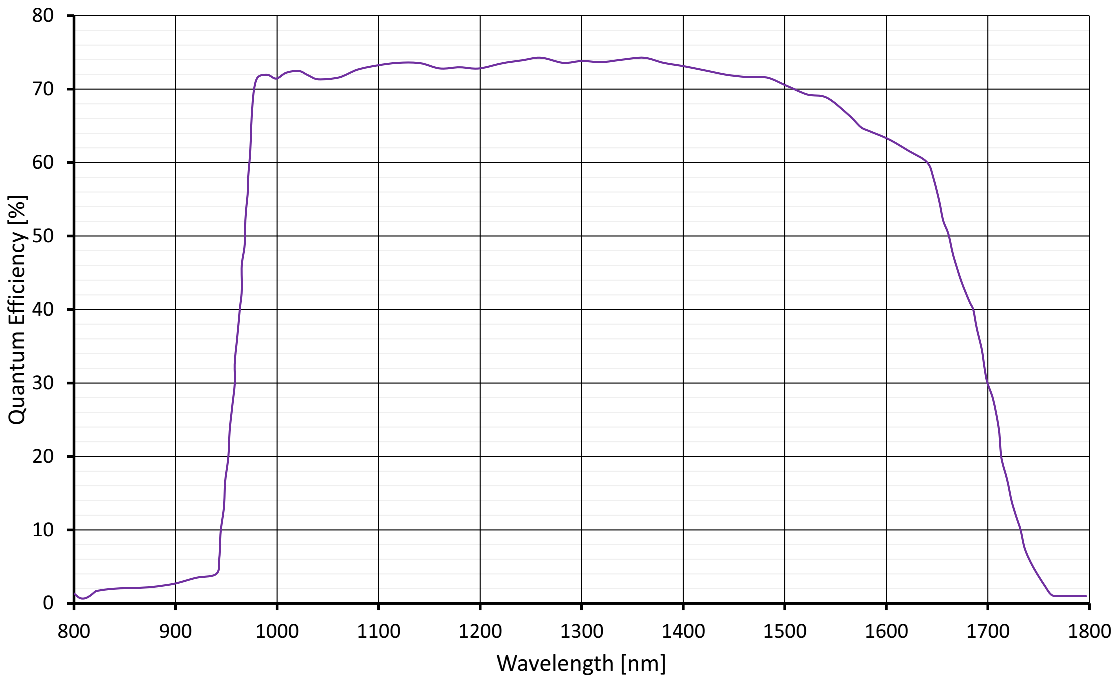


Figure 9: Goldeye G-032 SWIR Cool TEC2 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-032 SWIR Cool TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{10,000,000}{\left[(V+4) \times \left(\frac{H}{4} + 32\right)\right] + 131}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 16.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 7: Maximum frame rate for Goldeye G-032 SWIR Cool TEC2

Examples for maximum frame rates with Goldeye G-032 SWIR Cool TEC2 for common resolutions are listed in the following table.

Resolution			
Width	**Height**	**Format name**	**Maximum frame rate [fps]**
636	508	Sensor full resolution	100
636	480	Approx. matches VGA format	107
320	240	QVGA	351
160	120	QQVGA	1047
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	11123

Table 57: Goldeye G-032 SWIR Cool TEC2 resolution and frame rates

Goldeye G-033 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	640 × 512
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	110 ke⁻/s [1]
Temporal dark noise (Gain0)	390 e⁻ [1, 2]
Temporal dark noise (Gain1)	53 e⁻ [1, 2]
Temporal dark noise (Gain2)	32 e⁻ [1, 2]
Saturation capacity (Gain0)	1.2 Me⁻ [1, 2]
Saturation capacity (Gain1)	84.8 ke⁻ [1, 2]
Saturation capacity (Gain2)	25 ke⁻ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5% [1, 2]
Maximum frame rate at full resolution	301 fps (8-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at 20 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 58: Goldeye G-033 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 14-bit
Pixel formats	Mono8, Mono12, Mono12Packed, Mono14

Table 59: Goldeye G-033 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 60: Goldeye G-033 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	350 g
Mass, with C-Mount adapter	370 g
Mass, with F-Mount adapter	430 g
Mass, with M42-Mount adapter	390 g

Table 61: Goldeye G-033 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 6.3W (12 VDC) • 8 W (PoE)
[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 62: Goldeye G-033 SWIR TEC1 operating conditions

Absolute QE

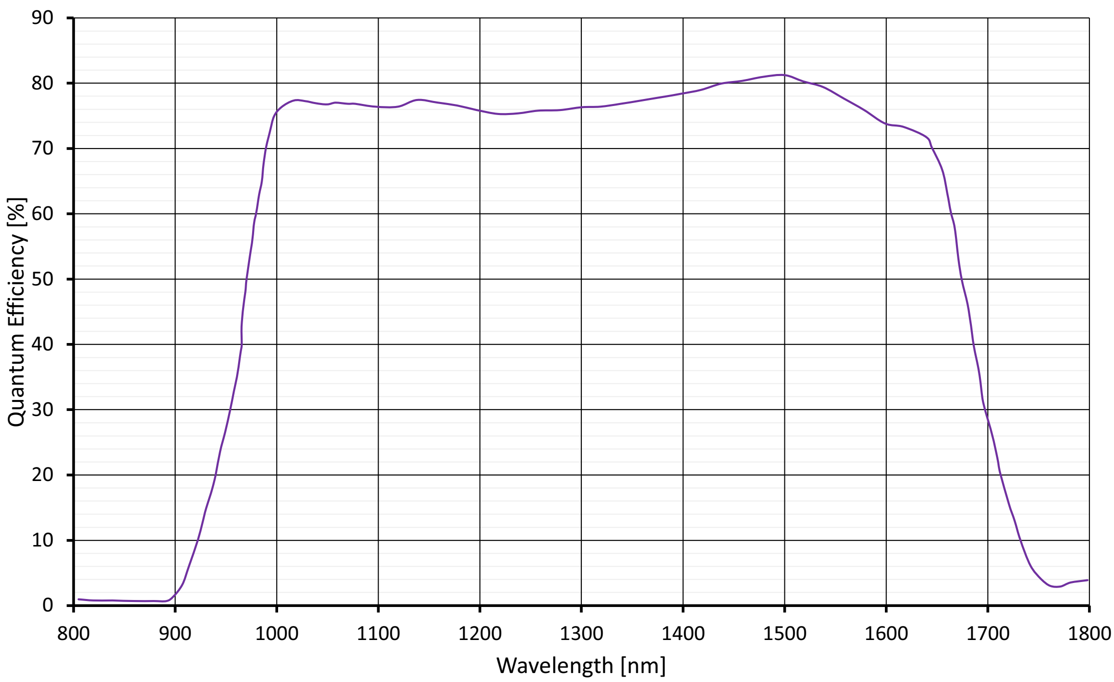


Figure 10: Goldeye G-033 SWIR TEC1 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye G-033 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18{,}000{,}000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 8: Maximum frame rate for Goldeye G-033 SWIR TEC1

Examples for maximum frame rates with Goldeye G-033 SWIR TEC1 for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
640	512	Sensor full resolution	301	(8-bit)
640	480	VGA	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 63: Goldeye G-033 SWIR TEC1 resolution and frame rates

Goldeye G-033 SWIR TECless

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	640 × 512
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current (at +45 °C sensor temperature)	430 ke^-/s [1]
Temporal dark noise (Gain0)	390 e^- [1, 2]
Temporal dark noise (Gain1)	53 e^- [1, 2]
Temporal dark noise (Gain2)	32 e^- [1, 2]
Saturation capacity (Gain0)	1.2 Me^- [1, 2]
Saturation capacity (Gain1)	84.8 ke^- [1, 2]
Saturation capacity (Gain2)	25 ke^- [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5%
Maximum frame rate at full resolution	301 fps (in 8-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Without thermo-electric cooling (TECless)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at +45 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +45 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 64: Goldeye G-033 SWIR TECless imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 14-bit
Pixel formats	Mono8, Mono12, Mono12Packed, Mono14

Table 65: Goldeye G-033 SWIR TECless output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 66: Goldeye G-033 SWIR TECless GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	• C-Mount • F-Mount and M42-Mount available on request
Mass, body only, without adapter	330 g
Mass, with C-Mount adapter	350 g
Mass, with F-Mount adapter	400 g
Mass, with M42-Mount adapter	370 g

Table 67: Goldeye G-033 SWIR TECless mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints	Not applicable to TECless models.
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 6.0 W (12 VDC) • <7.5 W (PoE)
Typical power consumption	• 6.0 W (12 VDC) • 6.0 W (PoE)

Table 68: Goldeye G-033 SWIR TECless operating conditions

Absolute QE

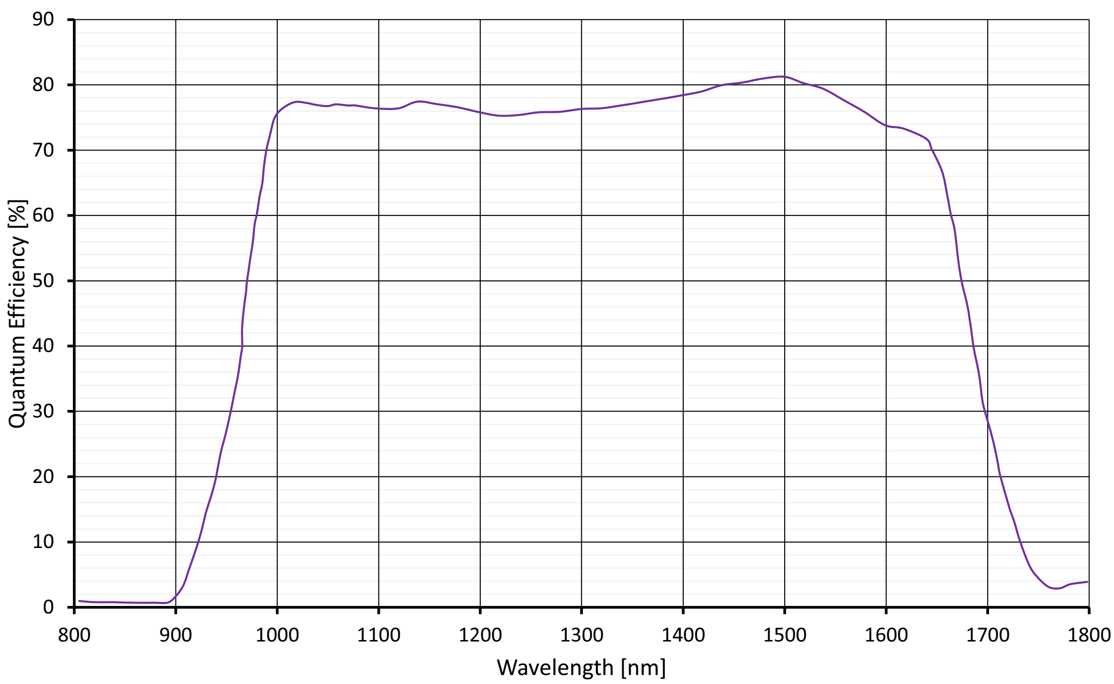


Figure 11: Goldeye G-033 SWIR TECless absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye G-033 SWIR TECless is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 9: Maximum frame rate for Goldeye G-033 SWIR TECless

Examples for maximum frame rates with Goldeye G-033 SWIR TECless for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
640	512	Sensor full resolution	301	(8-bit)
640	480	VGA	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 69: Goldeye G-033 SWIR TECless resolution and frame rates

Goldeye G-034 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	49 ke^-/s [1]
Temporal dark noise (Gain0)	390 e^- [1, 2]
Temporal dark noise (Gain1)	53 e^- [1, 2]
Temporal dark noise (Gain2)	32 e^- [1, 2]
Saturation capacity (Gain0)	1.2 Me^- [1, 2]
Saturation capacity (Gain1)	84.8 ke^- [1, 2]
Saturation capacity (Gain2)	25 ke^- [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at 20 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 70: Goldeye G-034 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 71: Goldeye G-034 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 72: Goldeye G-034 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	350 g
Mass, with C-Mount adapter	370 g
Mass, with F-Mount adapter	430 g
Mass, with M42-Mount adapter	390 g

Table 73: Goldeye G-034 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 6.3 W (12 VDC) • 8 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Models with RCG (Removed Cover Glass) sensor option:
+20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable

Table 74: Goldeye G-034 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

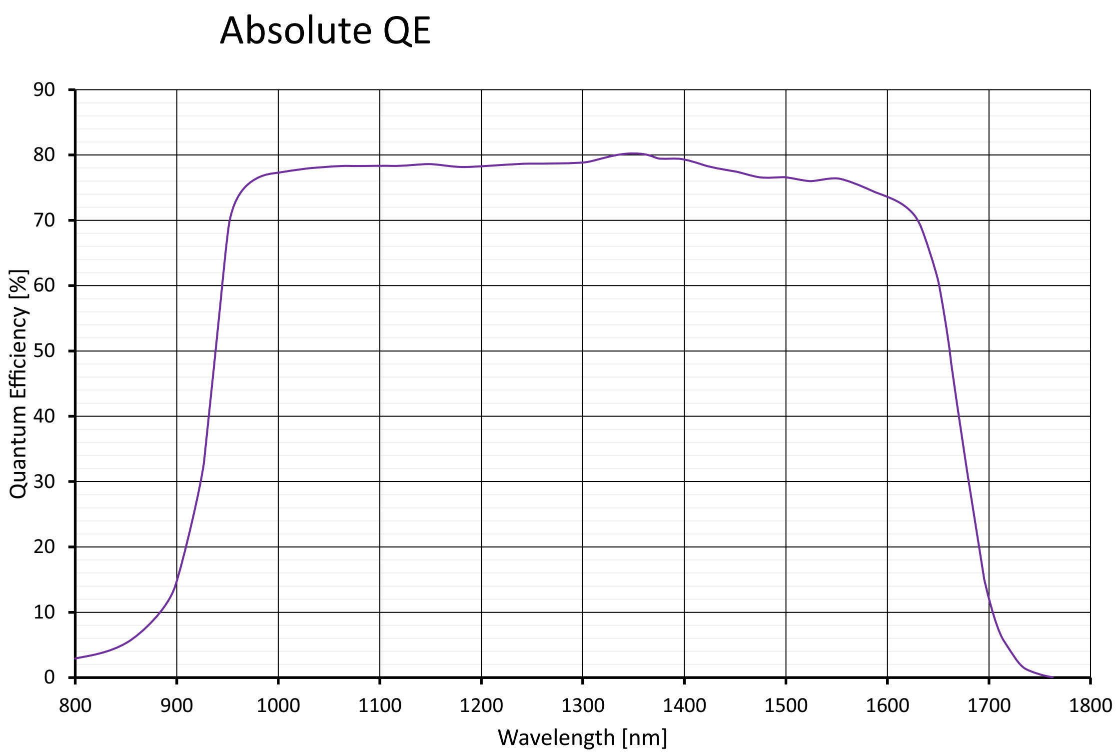


Figure 12: Goldeye G-034 SWIR TEC1 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye G-034 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 10: Maximum frame rate for Goldeye G-034 SWIR TEC1

Examples for maximum frame rates with Goldeye G-034 SWIR TEC1 for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
636	508	Sensor full resolution	303	(8-bit)
636	480	Approx. matches VGA format	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 75: Goldeye G-034 SWIR TEC1 resolution and frame rates

Goldeye G-034 SWIR TEC2

Imaging and performance

Measurement values

Actual values for dark current and temporal dark noise partly depend on the ambient temperature of your application.

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	26 ke⁻/s [1]
Temporal dark noise (Gain0)	390 e⁻ [1, 2]
Temporal dark noise (Gain1)	53 e⁻ [1, 2]
Temporal dark noise (Gain2)	32 e⁻ [1, 2]
Saturation capacity (Gain0)	1.2 Me⁻ [1, 2]
Saturation capacity (Gain1)	84.8 ke⁻ [1, 2]
Saturation capacity (Gain2)	25 ke⁻ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit pixel format)
Exposure time	1 µs to 10 s [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 76: Goldeye G-034 SWIR TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 77: Goldeye G-034 SWIR TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 78: Goldeye G-034 SWIR TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 79: Goldeye G-034 SWIR TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 21 W (12 VDC) • <23 W (PoE)
Typical power consumption, without cooling	• 7 W (12 VDC) • 9 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 80: Goldeye G-034 SWIR TEC2 operating conditions

Absolute QE

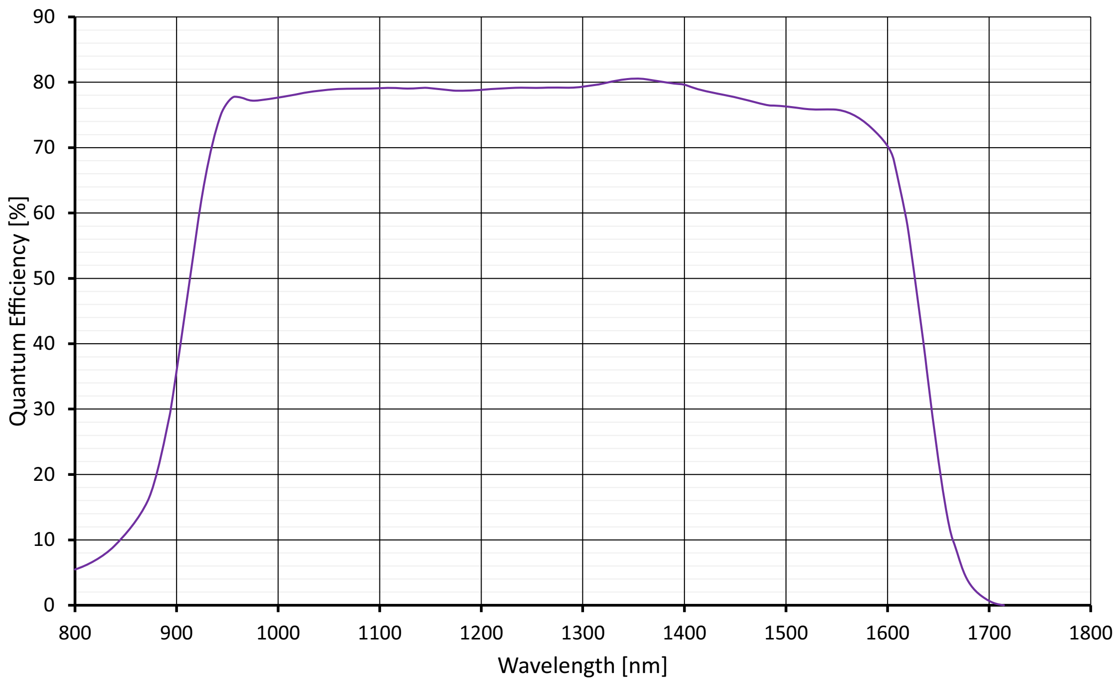


Figure 13: Goldeye G-034 SWIR TEC2 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye G-034 SWIR TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 11: Maximum frame rate for Goldeye G-034 SWIR TEC2

Examples for maximum frame rates with Goldeye G-034 SWIR TEC2 for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
636	508	Sensor full resolution	303	(8-bit)
636	480	Approx. matches VGA format	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 81: Goldeye G-034 SWIR TEC2 resolution and frame rates

Goldeye G-034 XSWIR 1.9 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1100 nm to 1900 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	140 ke⁻/s [1]
Temporal dark noise (Gain0)	434 e⁻ [1, 2]
Temporal dark noise (Gain1)	40 e⁻ [1, 2]
Temporal dark noise (Gain2)	15 e⁻ [1, 2]
Saturation capacity (Gain0)	1.3 Me⁻ [1, 2]
Saturation capacity (Gain1)	66 ke⁻ [1, 2]
Saturation capacity (Gain2)	18 ke⁻ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	61 dB [1, 2]
Pixel operability	>98.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit pixel format)
Exposure time	1 µs to 20 ms [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 82: Goldeye G-034 XSWIR 1.9 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 83: Goldeye G-034 XSWIR 1.9 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 84: Goldeye G-034 XSWIR 1.9 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 85: Goldeye G-034 XSWIR 1.9 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 21 W (12 VDC) • <23 W (PoE)
Typical power consumption, without cooling	• 7 W (12 VDC) • 9 W (PoE)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 86: Goldeye G-034 XSWIR 1.9 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

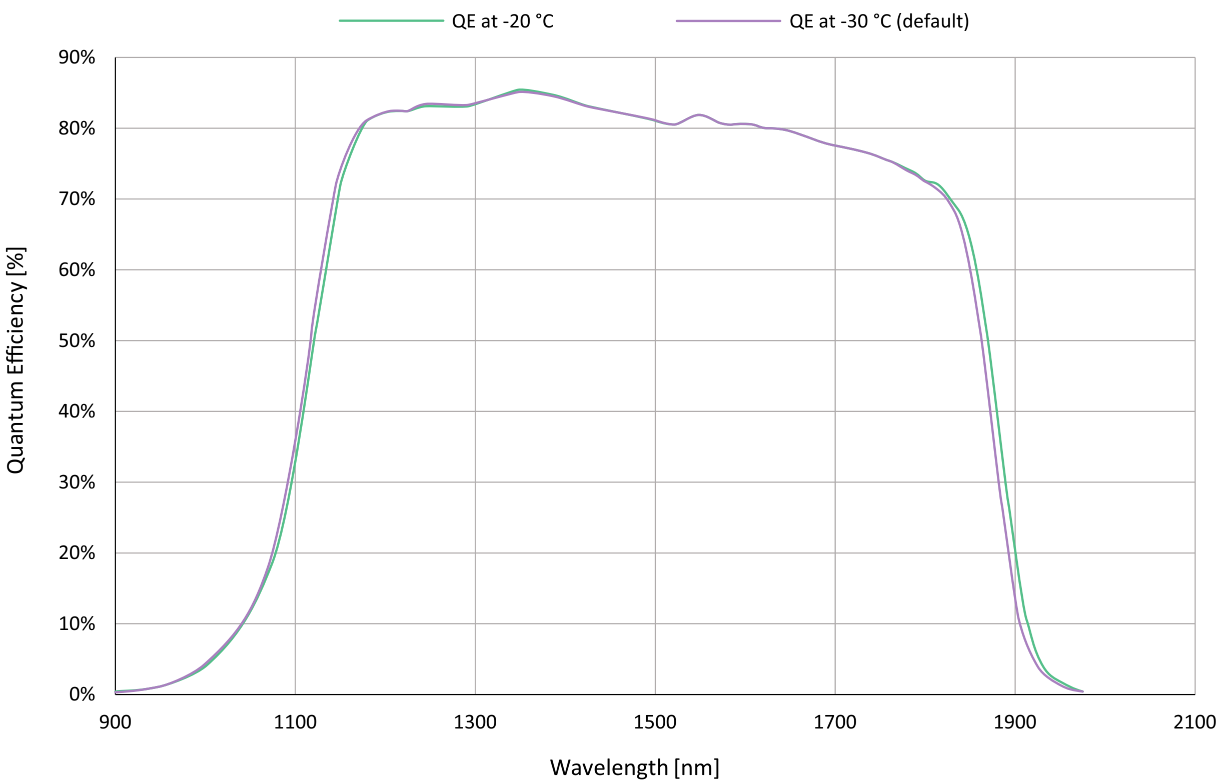


Figure 14: Goldeye G-034 XSWIR 1.9 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye G-034 XSWIR 1.9 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 12: Maximum frame rate for Goldeye G-034 XSWIR 1.9 TEC2

Examples for maximum frame rates with Goldeye G-034 XSWIR 1.9 TEC2 for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
636	508	Sensor full resolution	303	(8-bit)
636	480	Approx. matches VGA format	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 87: Goldeye G-034 XSWIR 1.9 TEC2 resolution and frame rates

Goldeye G-034 XSWIR 2.2 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1200 nm to 2200 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	820 ke⁻/s [1]
Temporal dark noise (Gain0)	452 e⁻ [1, 2]
Temporal dark noise (Gain1)	134 e⁻ [1, 2]
Temporal dark noise (Gain2)	58 e⁻ [1, 2]
Saturation capacity (Gain0)	1.16 Me⁻ [1, 2]
Saturation capacity (Gain1)	73 ke⁻ [1, 2]
Saturation capacity (Gain2)	25 ke⁻ [1, 2]
Dynamic range (Gain0)	68 dB [1, 2]
Dynamic range (Gain1)	54 dB [1, 2]
Dynamic range (Gain2)	52 dB [1, 2]
Pixel operability	>98.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit pixel format)
Exposure time	1 µs to 10 ms [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1485 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 88: Goldeye G-034 XSWIR 2.2 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 16-bit
Pixel formats	Mono8, Mono10, Mono10p, Mono10Packed, Mono12, Mono12p, Mono12Packed, Mono14, Mono16

Table 89: Goldeye G-034 XSWIR 2.2 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 90: Goldeye G-034 XSWIR 2.2 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 91: Goldeye G-034 XSWIR 2.2 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE+ (IEEE 802.3at Type 2 Class 4)
Maximum power consumption	• 21 W (12 VDC) • <23 W (PoE)
Typical power consumption, without cooling	• 7 W (12 VDC) • 9 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 92: Goldeye G-034 XSWIR 2.2 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

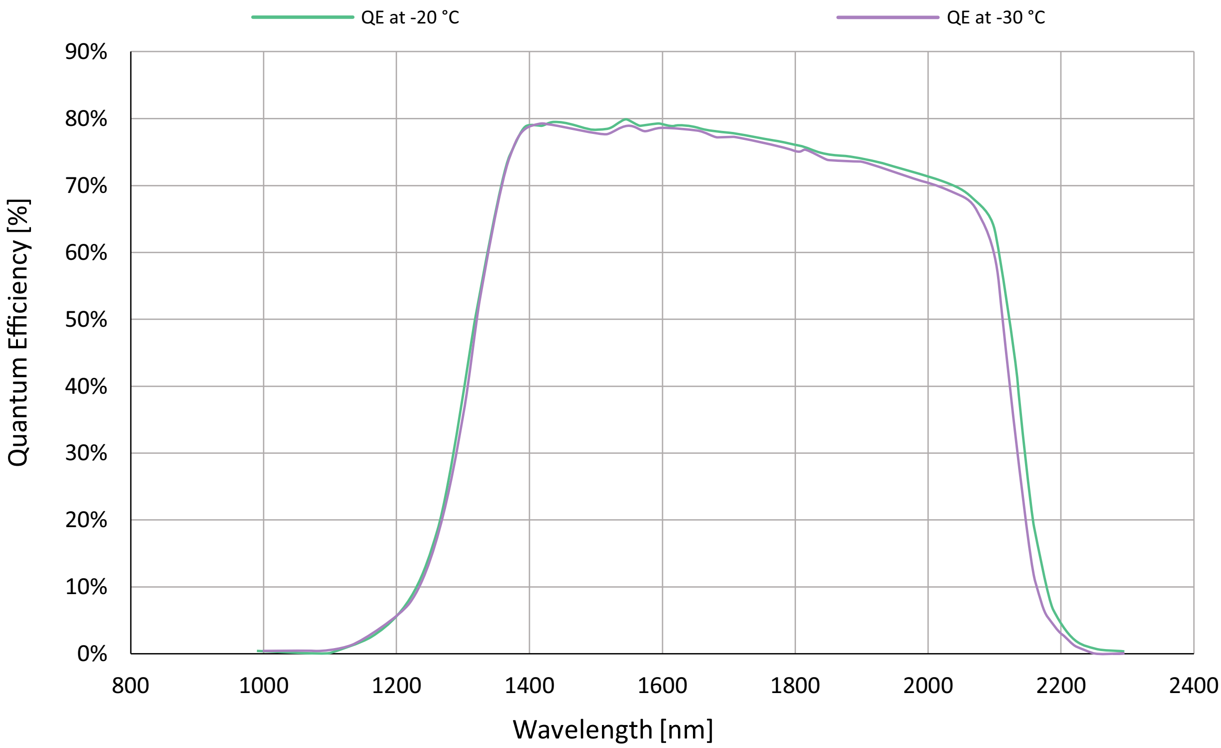


Figure 15: Goldeye G-034 XSWIR 2.2 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye G-034 XSWIR 2.2 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{FrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ **32.** For H always use the value rounded up to the next multiple of multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 4. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 13: Maximum frame rate for Goldeye G-034 XSWIR 2.2 TEC2

Examples for maximum frame rates with Goldeye G-034 XSWIR 2.2 TEC2 for common resolutions are listed in the following table.

Resolution				
Width	**Height**	**Format name**	**Maximum frame rate [fps] (Pixel format)**	
636	508	Sensor full resolution	303	(8-bit)
636	480	Approx. matches VGA format	321	(8-bit)
320	240	QVGA	968	(8-bit)
160	120	QQVGA	2557	(8-bit or 12-bit)
≤ 128	≤ 24	For all resolutions smaller than this, the frame rate remains the same.	>11627	(8-bit)

Table 93: Goldeye G-034 XSWIR 2.2 TEC2 resolution and frame rates

Goldeye G-130 VSWIR TEC1

Imaging and performance

Parameter	Values
Sensor model	Sony IMX990 SenSWIR
Sensor type	InGaAs FPA
Sensor format	Type 1/2 (8.2 mm diagonal)
Shutter type	Global shutter
Spectral range	400 nm to 1700 nm
Resolution (H × V)	1280 × 1024
Pixel size	5 µm × 5 µm
Sensor size (effective)	6.4 mm × 5.12 mm
Dark current (at +20 °C sensor temperature)	4.8 ke^-/s
Temporal dark noise (0 dB)	250 e^-
Temporal dark noise (18 dB)	210 e^-
Saturation capacity (0 dB)	165 ke^-
Saturation capacity (18 dB)	17.2 ke^-
Dynamic range (0 dB)	56.4 dB
Dynamic range (18 dB)	38.2 dB
Pixel operability	>99.5%
Exposure time	18 µs to 200 ms[1] (Normal[2]) | 3 µs to 7 µs (Ultrashort[2])
Maximum frame rate at full resolution	84 fps (Continuous[3]) | 94 fps (Recorder[3])
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (0 dB), 7.9 (18 dB)
A/D converter	12-bit
Image buffer size	256 MB
Stream hold capacity	95 frames at full resolution

[1] Maximum exposure value given is valid for 0 dB and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

[2] Values for `ExposureRangeMode` = *`Normal`* or *`Ultrashort`*

[3] Values for `AcquisitionMode` = *`Continuous`* or *`Recorder`*

Table 94: Goldeye G-130 VSWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	GigE Vision (based on IEEE 802.3 1000BASE-T)
Bit depth	8-bit to 12-bit
Pixel formats	Mono8, Mono12, Mono12Packed

Table 95: Goldeye G-130 VSWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output

Table 96: Goldeye G-130 VSWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	78 mm × 55 mm × 55 mm
Lens mount	C-Mount
Mass, including lens mount	340 g

Table 97: Goldeye G-130 VSWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	• 10.8 to 30.0 VDC • PoE (IEEE 802.3at Type 1 Class 0)
Maximum power consumption	• 10.8 W (12 VDC) • <12.95 W (PoE)
Typical power consumption, without cooling	• 6.1 W (12 VDC) • 7.4 W (PoE)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Models with RCG (Removed Cover Glass) sensor option:
+20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable

Table 98: Goldeye G-130 VSWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***`Manual`*** (default), avoid using ***`Auto`*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

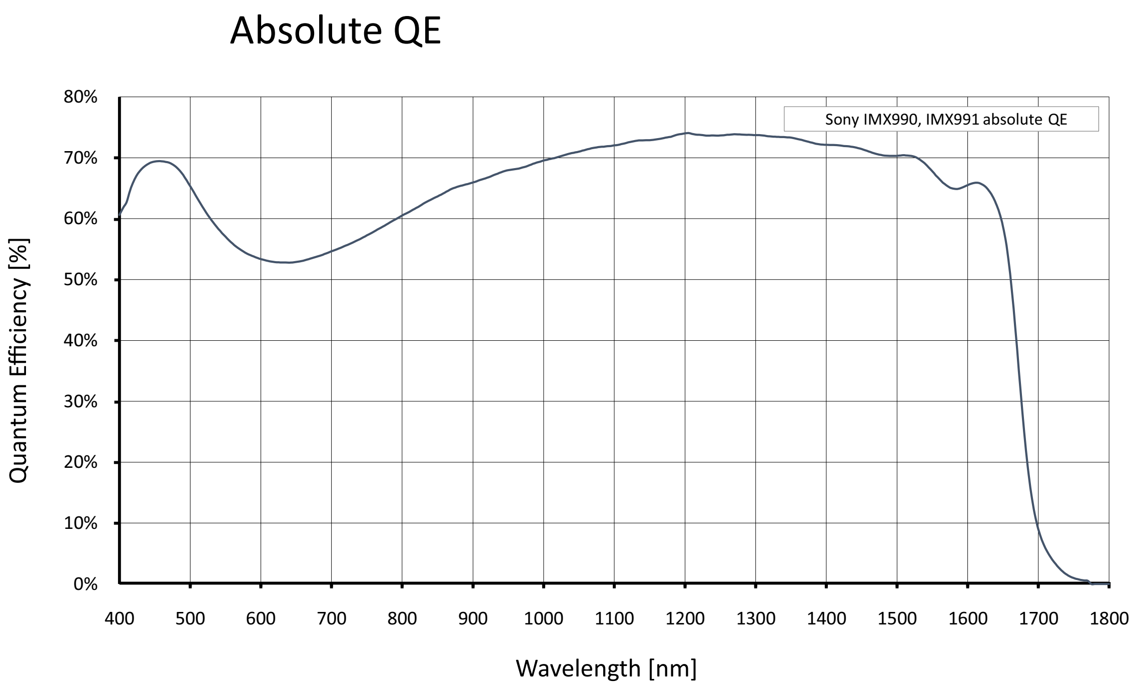


Figure 16: Goldeye G-130 VSWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye G-130 VSWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$SensorFrameRate = \frac{PF}{V + 36}$$	
$$GigEFrameRate = \frac{BWx0{,}96}{VxHxBPP}$$	
	FrameRate = MIN (SensorFrameRate, GigEFrameRate)
BPP	Bytes per pixel factor • Mono8: 1 • Mono12: 2 • Mono12p: 1.5
BW	Bandwidth, defined by DeviceThrouputLimit, typical: 115,000,000 Bps
H	ROI: vertical resolution (height). The formula is valid if H ≥ 8. For H always use the value rounded up to the next multiple of 8.
PF	Pixel format factor • Mono8: 99734.04 • Mono12: 75604.84 • Mono12p: 75604.84
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 8.
When using the formula, please consider the following: • The formula serves as a rough estimation. • Valid for IntegrateWhileRead-Mode only. • ROI minimum width and height are 8 pixels. • Exposure time may reduce the frame rate. • Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.	

Formula 14: Maximum frame rate for Goldeye G-130 VSWIR TEC1

Examples for maximum frame rates with Goldeye G-130 VSWIR TEC1 for common resolutions are listed in the following table.

Resolution			Maximum frame rate [fps]	
Width	Height	Format name	Sensor[1]	GigE[2]
1280	1024	Sensor full resolution, matches SXGA format	94	84
1280	720	HD 720	131	119
1024	768	XGA	124	
800	600	SVGA	156	
640	480	VGA	193	
320	240	QVGA	361	
160	120	QQVGA	639	
1280	512	Maximum × half	181	168
1280	8	Maximum × minimum	2266	
8	512	Minimum × maximum	179	
8	8	Minimum × minimum	2266	
[1]For `AcquisitionMode` = ***`Recorder`***				
[2]For DeviceThroughputLimit = 115 000 000 Bps (115 MBps)				

Table 99: Goldeye G-130 VSWIR TEC1 resolution and frame rates

Specifications (CL models)

Goldeye CL-008 SWIR TEC1

Imaging and performance

Parameter	**Values**
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	880 ke^-/s [1]
Temporal dark noise (Gain0)	1.6 ke^- [1]
Temporal dark noise (Gain1)	210 e^- [1]
Saturation capacity (Gain0)	5.0 Me^- [1]
Saturation capacity (Gain1)	170 ke^- [1]
Dynamic range (Gain0)	70 dB [1]
Dynamic range (Gain1)	60 dB [1]
Pixel operability	>99.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 200 ms [2]
Temperature control	Single-stage thermo-electric cooling and heating (TEC1)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at +25 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of +25 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 100: Goldeye CL-008 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 101: Goldeye CL-008 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 102: Goldeye CL-008 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, without adapter	300 g
Mass, with C-Mount adapter	320 g
Mass, with F-Mount adapter	370 g
Mass, with M42-Mount adapter	340 g

Table 103: Goldeye CL-008 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +25 °C (default and calibrated) • +20 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	10 W (12 VDC)
Typical power consumption, without cooling	4.5 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to +25 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 104: Goldeye CL-008 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

For Goldeye G/CL-008 SWIR TEC1 cameras with RCG (Removed Cover Glass) sensor option, condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to *`Manual`* (default), avoid using *`Auto`* mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

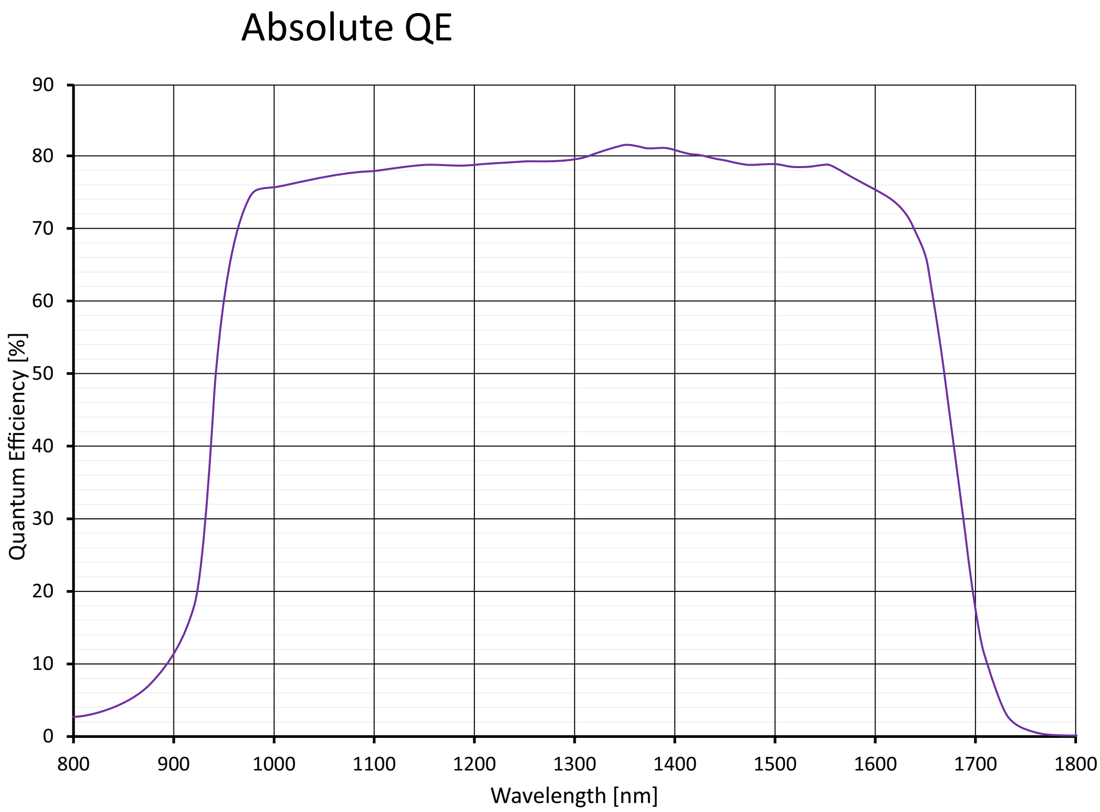


Figure 17: Goldeye CL-008 SWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-008 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula..

$$\mathrm{SensorFrameRate} = \frac{10,000,000}{\left[(V+2) \times \left(\frac{H}{4} + 32\right)\right] + 171}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 8.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 2.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\mathrm{CameraLinkFrameRate} = \frac{\mathrm{ClFrequency}}{\left[\max((3 \times H + 32), A) + \left(\frac{H}{\mathrm{Taps}} + B\right)(V-1) + \left(\frac{H}{\mathrm{Taps}}\right) + C + D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\mathrm{FrameRate} = \min(\mathrm{SensorFrameRate}, \mathrm{CameraLinkFrameRate})$$

Formula 15: Maximum frame rate for Goldeye CL-008 SWIR TEC1

Examples for maximum frame rates with Goldeye CL-008 SWIR TEC1:

Resolution		**25 MHz**		**40 MHz**	
Width	**Height**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**
320	256	344	274	344	344
320	240	366	292	366	366
160	120	1117	1059	1117	1117
128	32	4273	4273	4273	4273
128	8	12345	12345	12345	12345

Table 105: Goldeye CL-008 SWIR TEC1 frame rates by clock frequency

Goldeye CL-008 SWIR Cool TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	260 ke$^-$/s [1]
Temporal dark noise (Gain0)	1.6 ke$^-$ [1]
Temporal dark noise (Gain1)	210 e$^-$ [1]
Saturation capacity (Gain0)	5.0 Me$^-$ [1]
Saturation capacity (Gain1)	170 ke$^-$ [1]
Dynamic range (Gain0)	70 dB [1]
Dynamic range (Gain1)	60 dB [1]
Pixel operability	>99.5% [1]
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 1250 ms [2]
Temperature control	Single-stage thermo-electric cooling and heating (TEC1)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at +5 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of +5 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 106: Goldeye CL-008 SWIR Cool TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 107: Goldeye CL-008 SWIR Cool TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 108: Goldeye CL-008 SWIR Cool TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mounts	• C-Mount • F-Mount and M42-Mount available on request
Mass, without adapter	740 g
Mass, with C-Mount adapter	760 g
Mass, with F-Mount adapter	820 g
Mass, with M42-Mount adapter	780 g

Table 109: Goldeye CL-008 SWIR Cool TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +5 °C (default and calibrated) • -5 °C, +10 °C, +20 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	10.5 W (12 VDC)
Typical power consumption, without cooling	5.0 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to +5 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 110: Goldeye CL-008 SWIR Cool TEC1 operating conditions

Absolute QE

Figure 18: Goldeye CL-008 SWIR Cool TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-008 SWIR Cool TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{10,000,000}{\left[(V+2)\times\left(\frac{H}{4}+32\right)\right]+171}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 8.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 2.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32), A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate}, \text{CameraLinkFrameRate})$$

Formula 16: Maximum frame rate for Goldeye CL-008 SWIR Cool TEC1

Examples for maximum frame rates with Goldeye CL-008 SWIR Cool TEC1:

Resolution		25 MHz		40 MHz	
Width	**Height**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**
320	256	344	274	344	344
320	240	366	292	366	366
160	120	1117	1059	1117	1117
128	32	4273	4273	4273	4273
128	8	12345	12345	12345	12345

Table 111: Goldeye CL-008 SWIR Cool TEC1 ROI frame rates by clock frequency

Goldeye CL-008 XSWIR 1.9 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1100 nm to 1900 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	1.2 Me^{-}/s [1]
Temporal dark noise (Gain0)	1.8 ke^{-} [1]
Temporal dark noise (Gain1)	200 e^{-} [1]
Saturation capacity (Gain0)	5.0 Me^{-} [1]
Saturation capacity (Gain1)	140 ke^{-} [1]
Dynamic range (Gain0)	68 dB [1]
Dynamic range (Gain1)	57 dB [1]
Pixel operability	>98.5%
Maximum frame rate at full resolution	344 fps
Exposure time	6 µs to 30 ms [2]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1200 nm LED illumination. Stated values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 112: Goldeye CL-008 XSWIR 1.9 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 113: Goldeye CL-008 XSWIR 1.9 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 114: Goldeye CL-008 XSWIR 1.9 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	730 g

Table 115: Goldeye CL-008 XSWIR 1.9 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30°C (default and calibrated) • -20 °C (calibrated) • -10 °C, 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	20 W (12 VDC)
Typical power consumption, without cooling	5 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 116: Goldeye CL-008 XSWIR 1.9 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

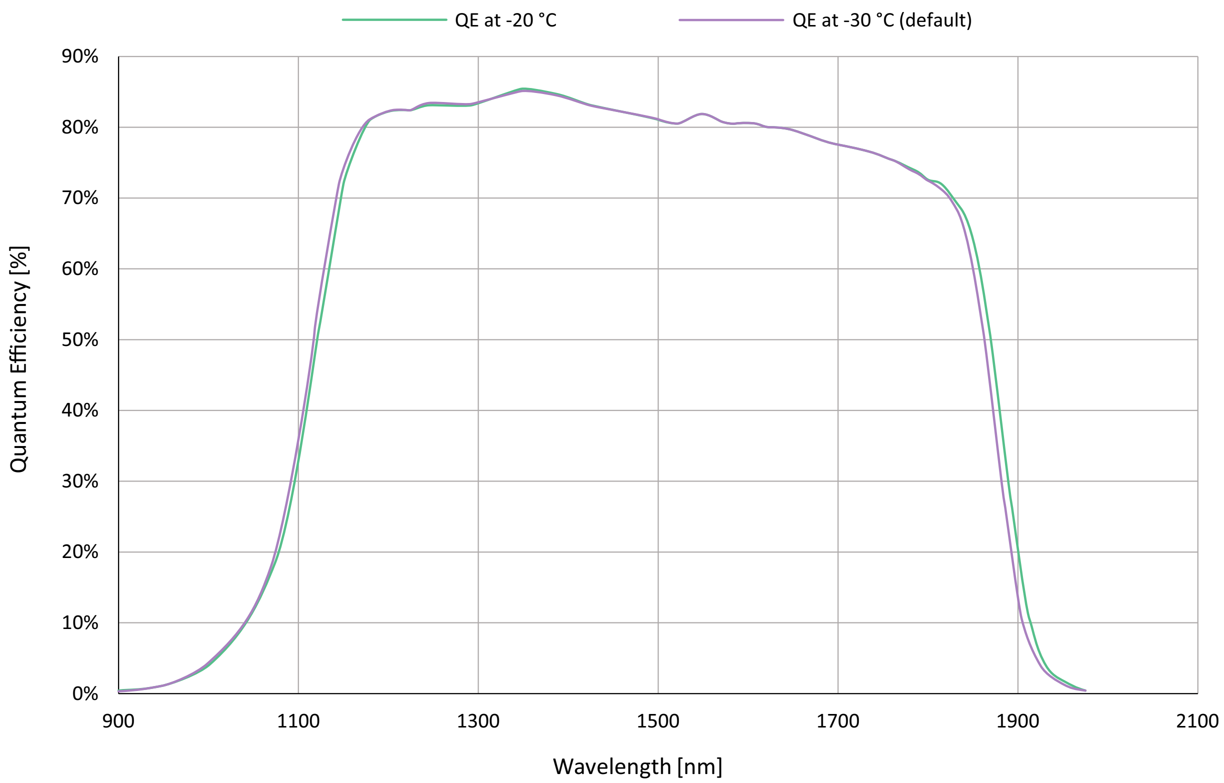


Figure 19: Goldeye CL-008 XSWIR 1.9 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye CL-008 XSWIR 1.9 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3 \times H + 32), A) + \left(\frac{H}{\text{Taps}} + B\right)(V-1) + \left(\frac{H}{\text{Taps}}\right) + C + D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate}, \text{CameraLinkFrameRate})$$

Formula 17: Maximum frame rate for Goldeye CL-008 XSWIR 1.9 TEC2

Examples for maximum frame rates with Goldeye CL-008 XSWIR 1.9 TEC2:

Resolution		25 MHz		40 MHz	
Width	**Height**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**
320	256	344	270	344	344
320	240	366	288	366	366
160	120	1117	1035	1117	1117
128	32	4273	4140	4260	4260
128	8	12345	12000	11149	11800

Table 117: Goldeye CL-008 XSWIR 1.9 TEC2 ROI frame rates by clock frequency

Goldeye CL-008 XSWIR 2.2 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1200 nm to 2200 nm
Resolution (H × V)	320 × 256
Pixel size	30 µm × 30 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	15.3 Me^{-}/s [1]
Temporal dark noise (Gain0)	2.5 ke^{-} [1]
Temporal dark noise (Gain1)	200 e^{-} [1]
Saturation capacity (Gain0)	5.0 Me^{-} [1]
Saturation capacity (Gain1)	110 ke^{-} [1]
Dynamic range (Gain0)	68 dB [1]
Dynamic range (Gain1)	57 dB [1]
Pixel operability	>98.5%
Maximum frame rate at full resolution	64 dB [1]
Exposure time	6 µs to 7 ms [2]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 15 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	1524 frames at full resolution

[1] Typical values that were determined similar to EMVA 1288 v4.0 (Linear model) under 1485 nm LED illumination. Stated values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 118: Goldeye CL-008 XSWIR 2.2 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 119: Goldeye CL-008 XSWIR 2.2 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 120: Goldeye CL-008 XSWIR 2.2 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	730 g

Table 121: Goldeye CL-008 XSWIR 2.2 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C, 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	20 W (12 VDC)
Typical power consumption, without cooling	5 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 122: Goldeye CL-008 XSWIR 2.2 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

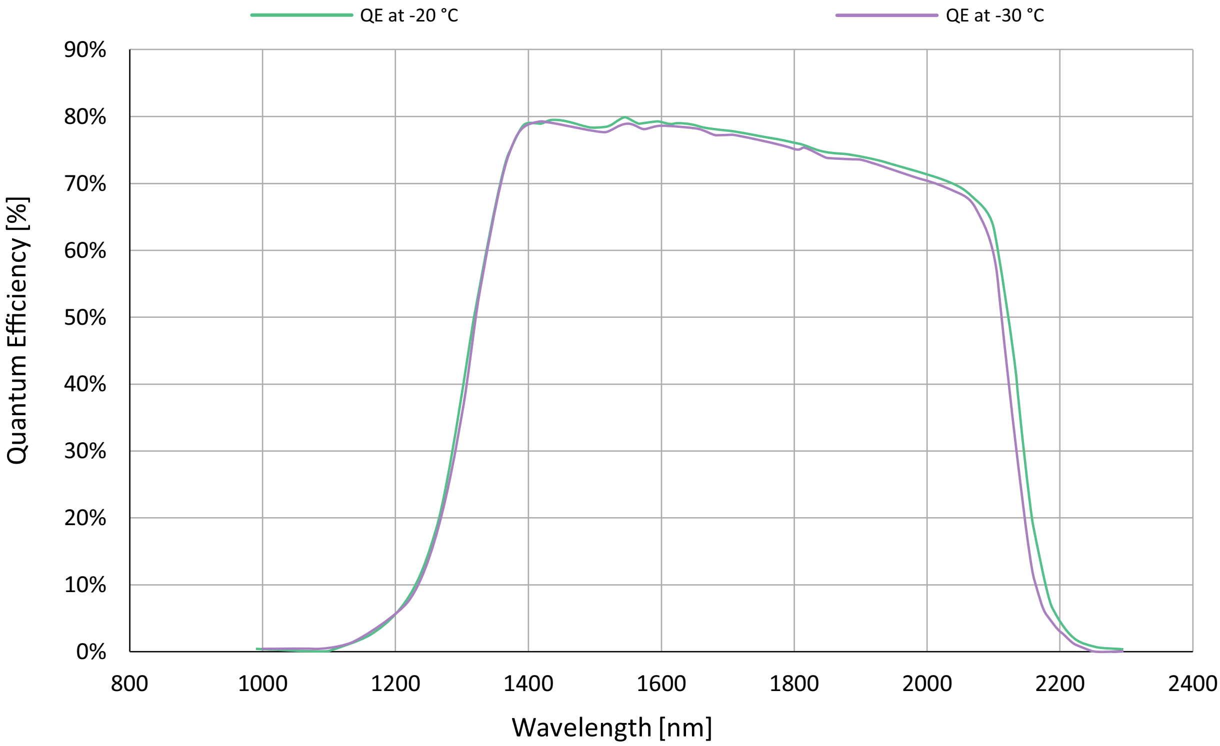


Figure 20: Goldeye CL-008 XSWIR 2.2 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye CL-008 XSWIR 2.2 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32), A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate}, \text{CameraLinkFrameRate})$$

Formula 18: Maximum frame rate for Goldeye CL-008 XSWIR 2.2 TEC2

Examples for maximum frame rates with Goldeye CL-008 XSWIR 2.2 TEC2:

Resolution		**25 MHz**		**40 MHz**	
Width	**Height**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**	**Mono8/12, 2 Taps**	**Mono14, 1 Tap**
320	256	344	270	344	344
320	240	366	288	366	366
160	120	1117	1035	1117	1117
128	32	4273	4140	4260	4260
128	8	12345	12000	11149	11800

Table 123: Goldeye CL-008 XSWIR 2.2 TEC2 ROI frame rates by clock frequency

Goldeye CL-030 VSWIR TEC1

Imaging and performance

Parameter	Values
Sensor model	Sony IMX991 SenSWIR
Sensor type	InGaAs FPA
Sensor format	Type 1/4 (4.1 mm diagonal)
Shutter type	Global shutter
Spectral range	400 nm to 1700 nm
Resolution (H × V)	656 × 520
Pixel size	5 µm × 5 µm
Sensor size (effective)	3.28 mm × 2.6 mm
Dark current (at +20 °C sensor temperature)	4.8 ke^-/s
Temporal dark noise (0 dB)	250 e^-
Temporal dark noise (18 dB)	210 e^-
Saturation capacity (0 dB)	165 ke^-
Saturation capacity (18 dB)	17.2 ke^-
Dynamic range (0 dB)	56.4 dB
Dynamic range (18 dB)	38.2 dB
Pixel operability	>99.5%
Exposure time	16 µs to 200 ms[1] (Normal[2]) | 3 µs to 7 µs (Ultrashort[2])
Maximum frame rate at full resolution	234 fps
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (0 dB), 7.9 (18 dB)
A/D converter	12-bit
Image buffer size	256 MB
Stream hold capacity	370 frames at full resolution
[1]Maximum exposure value given is valid for 0 dB and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate. [2] Values for `ExposureRangeMode` = *`Normal`* or *`Ultrashort`*	

Table 124: Goldeye CL-030 VSWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 12-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 125: Goldeye CL-030 VSWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1 - CC4

Table 126: Goldeye CL-030 VSWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	78 mm × 55 mm × 55 mm
Lens mount	C-Mount
Mass, including lens mount	330 g

Table 127: Goldeye CL-030 VSWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	11.8 W (12 VDC)
Typical power consumption, without cooling	5.4 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 128: Goldeye CL-030 VSWIR TEC1 operating conditions

Absolute QE

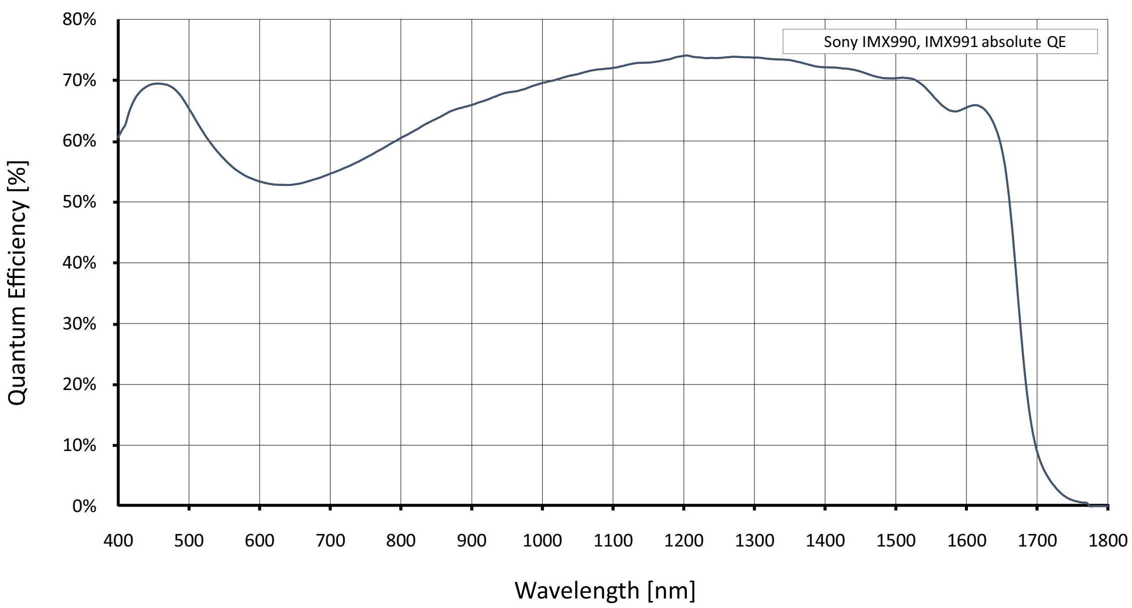


Figure 21: Goldeye CL-030 VSWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-030 VSWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\mathrm{SensorFrameRate} = \frac{PF}{V + 36}$$

PF	Pixel format factor • Mono8: 130208.33 • Mono12: 75604.84 • Mono12p: 75604.84
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 8.

When using the formula, please consider the following:

- The formula serves as a rough estimation.
- Valid for IntegrateWhileRead-Mode only.
- ROI minimum width and height are 8 pixels.
- Exposure time may reduce the frame rate.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 19: Maximum frame rate for Goldeye CL-030 VSWIR TEC1

ROI frame rates with different setups

Examples for maximum frame rates with Goldeye CL-030 VSWIR TEC1 for common resolutions, are listed in the following tables.

Resolution		Mono8 (2 Taps)			Mono8 (1 Tap)		
Width	Height	25 MHz	55 MHz	85 MHz	25 MHz	55 MHz	85 MHz
656	520	120	234	234	66	145	224
640	480	132	252	252	73	160	248
320	240	447	471	471	265	471	471
160	120	834	834	834	834	834	834
656	264	231	433	433	128	282	433
656	8	2958	2958	2958	2469	2958	2958
8	520	234	234	234	234	234	234
8	8	2958	2958	2958	2958	2958	2958

Table 129: Goldeye CL-030 VSWIR TEC1 ROI fps by clock frequency for Mono8

Resolution		Mono12 (2 Taps)			Mono12 (1 Tap)		
Width	Height	25 MHz	55 MHz	85 MHz	25 MHz	55 MHz	85 MHz
656	520	120	135	135	66	135	135
640	480	132	146	146	73	146	146
320	240	273	273	273	265	273	273
160	120	484	484	484	484	484	484
656	264	231	251	251	128	251	251
656	8	1718	1718	1718	1718	1718	1718
8	520	135	135	135	135	135	135
8	8	1718	1718	1718	1718	1718	1718

Table 130: Goldeye CL-030 VSWIR TEC1 ROI fps by clock frequency for Mono12

Goldeye CL-032 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	25 µm × 25 µm
Sensor size (effective)	15.9 mm × 12.7 mm
Dark current (at +20 °C sensor temperature)	380 ke^-/s
Temporal dark noise (Gain0)	400 e^-
Temporal dark noise (Gain1)	170 e^-
Saturation capacity (Gain0)	1.9 Me^-
Saturation capacity (Gain1)	39 ke^-
Dynamic range (Gain0)	73 dB
Dynamic range (Gain1)	47 dB
Pixel operability	>99.5%
Exposure time	6 µs to 200 ms [1]
Maximum frame rate at full resolution	100 fps
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 50 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	397 frames at full resolution

[1] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 131: Goldeye CL-032 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 14-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12, Mono14 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 132: Goldeye CL-032 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1 - CC4

Table 133: Goldeye CL-032 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	320 g
Mass, with C-Mount adapter	340 g
Mass, with F-Mount adapter	400 g
Mass, with M42-Mount adapter	360 g

Table 134: Goldeye CL-032 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	10 W (12 VDC)
Typical power consumption, without cooling	4.5 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments. Models with RCG (Removed Cover Glass) sensor option: +20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable	

Table 135: Goldeye CL-032 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

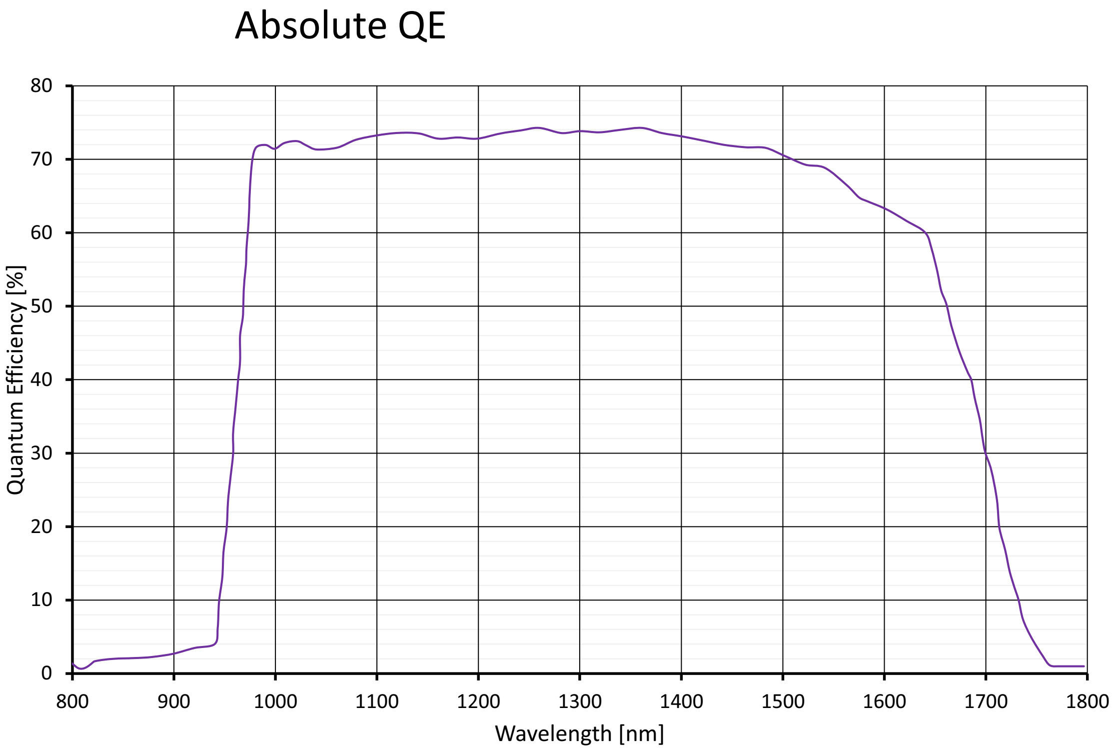


Figure 22: Goldeye CL-032 SWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-032 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{10,000,000}{\left[(V+4)\times\left(\frac{H}{4}+32\right)\right]+131}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 16.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32),A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate},\text{CameraLinkFrameRate})$$

Formula 20: Maximum frame rate for Goldeye CL-032 SWIR TEC1

Examples for maximum frame rates with Goldeye CL-032 SWIR TEC1:

Resolution		Mono8, Mono12 (2 Taps)		Mono14 (1Tap)	
Width	**Height**	**25 MHz**	**40 MHz**	**25 MHZ**	**40 MHz**
636	508	100	100	73	100
636	480	107	107	77	107
320	240	351	351	292	351
160	120	1047	1047	1047	1047
128	32	3507	3507	3507	3507
128	8	8264	8264	8264	8264

Table 136: Goldeye CL-032 SWIR TEC1 ROI frame rates by clock frequency

Goldeye CL-032 SWIR Cool TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	25 µm × 25 µm
Sensor size (effective)	15.9 mm × 12.7 mm
Dark current (at -20 °C sensor temperature)	30 ke$^-$/s
Temporal dark noise (Gain0)	400 e$^-$
Temporal dark noise (Gain1)	170 e$^-$
Saturation capacity (Gain0)	1.9 Me$^-$
Saturation capacity (Gain1)	39 ke$^-$
Dynamic range (Gain0)	73 dB
Dynamic range (Gain1)	47 dB
Pixel operability	>99.5%
Exposure time	6 µs to 1250 ms [1]
Maximum frame rate at full resolution	100 fps
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 50 (Gain1)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	397 frames at full resolution

[1] Maximum exposure value given is valid for Gain0 and sensor temperature of -20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 137: Goldeye CL-032 SWIR Cool TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 14-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12, Mono14 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 138: Goldeye CL-032 SWIR Cool TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1 - CC4

Table 139: Goldeye CL-032 SWIR Cool TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mounts	• C-Mount • F-Mount and M42-Mount available on request
Mass, body only, without adapter	760 g
Mass, with C-Mount adapter	780 g
Mass, with F-Mount adapter	840 g
Mass, with M42-Mount adapter	800 g

Table 140: Goldeye CL-032 SWIR Cool TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -20 °C (default and calibrated) • -5 °C, +10 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements	10.8 V to 10.8 VDC
Maximum power consumption	19 W (12 VDC)
Typical power consumption, without cooling	5.5 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to -20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 141: Goldeye CL-032 SWIR Cool TEC2 operating conditions

Absolute QE

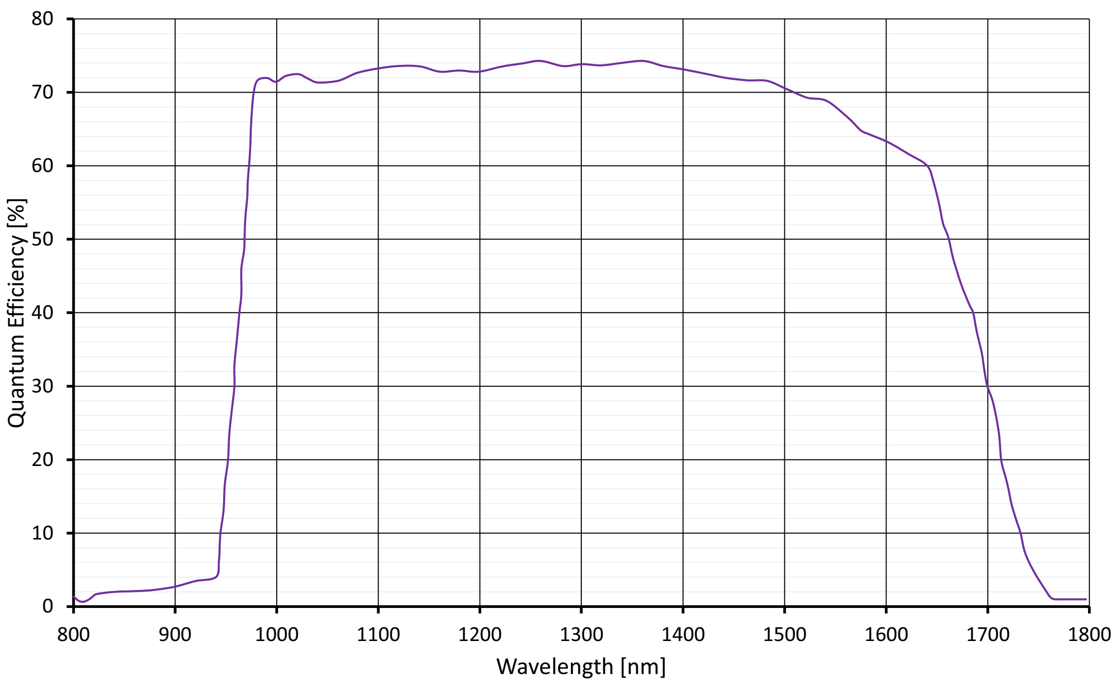


Figure 23: Goldeye CL-032 SWIR Cool TEC2 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-032 SWIR Cool TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\mathrm{SensorFrameRate} = \frac{10,000,000}{\left[(V+4) \times \left(\frac{H}{4} + 32\right)\right] + 131}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 16.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\mathrm{CameraLinkFrameRate} = \frac{\mathrm{ClFrequency}}{\left[\max((3 \times H + 32), A) + \left(\frac{H}{\mathrm{Taps}} + B\right)(V-1) + \left(\frac{H}{\mathrm{Taps}}\right) + C + D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\mathrm{FrameRate} = \min(\mathrm{SensorFrameRate}, \mathrm{CameraLinkFrameRate})$$

Formula 21: Maximum frame rate for Goldeye CL-032 SWIR Cool TEC2

Examples for maximum frame rates with Goldeye CL-032 SWIR Cool TEC2:

Resolution			
Width	**Height**	**Remarks**	**Maximum frame rate [fps]**
636	508	Sensor full resolution	100
636	480	Approx. matches VGA format	107
320	240	QVGA	351
160	120	QQVGA	1047
≤ 128	≤ 8	For all resolutions smaller than this, the frame rate remains the same.	11123

Table 142: Goldeye CL-032 SWIR Cool TEC2 ROI frame rates by clock frequency

Goldeye CL-033 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	640 × 512
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current	110 ke$^-$/s [1]
Temporal dark noise (Gain0)	390 e$^-$ [1, 2]
Temporal dark noise (Gain1)	53 e$^-$ [1, 2]
Temporal dark noise (Gain2)	32 e$^-$ [1, 2]
Saturation capacity (Gain0)	1.2 Me$^-$ [1, 2]
Saturation capacity (Gain1)	84.8 ke$^-$ [1, 2]
Saturation capacity (Gain2)	25 ke$^-$ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5%
Maximum frame rate at full resolution	301 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at +20 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 143: Goldeye CL-033 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 14-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12, Mono14 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 144: Goldeye CL-033 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1 - CC4

Table 145: Goldeye CL-033 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mount	C-Mount, F-Mount, M42-Mount available
Mass, body only, without adapter	330 g
Mass, with C-Mount adapter	350 g
Mass, with F-Mount adapter	400 g
Mass, with M42-Mount adapter	370 g

Table 146: Goldeye CL-033 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements	10.8 VDC to 30.0 VDC
Maximum power consumption	11.8 W (12 VDC)
Typical power consumption, without cooling	6.3 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 147: Goldeye CL-033 SWIR TEC1 operating conditions

Absolute QE

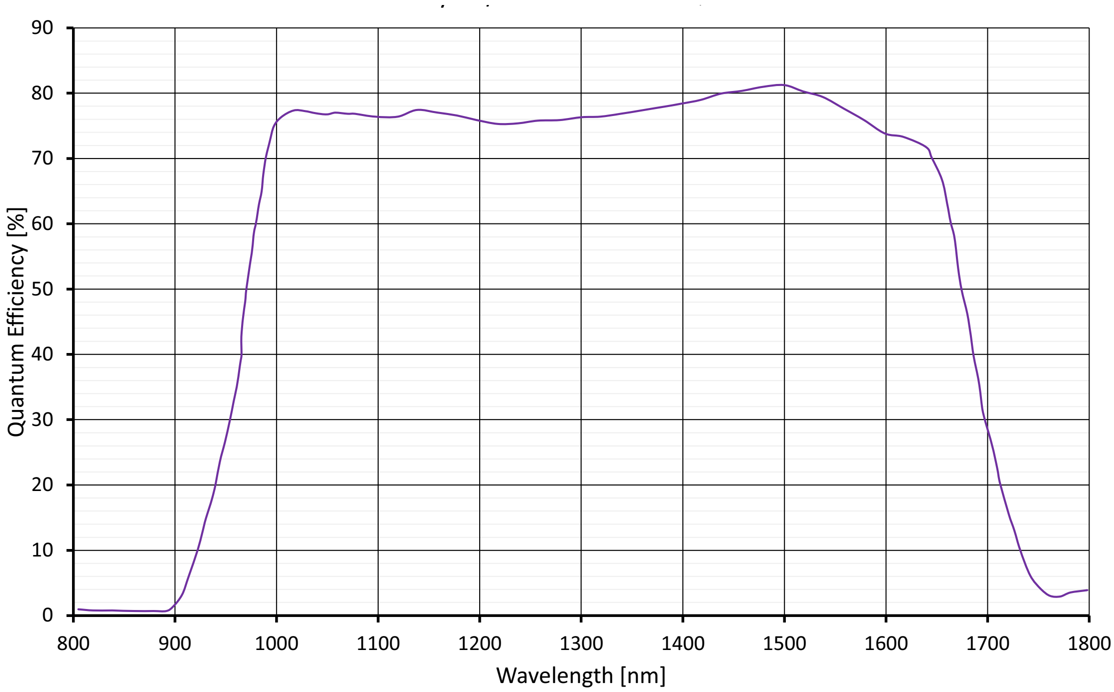


Figure 24: Goldeye CL-033 SWIR TEC1 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye CL-033 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32),A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate},\text{CameraLinkFrameRate})$$

Formula 22: Maximum frame rate for Goldeye CL-033 SWIR TEC1

Examples for maximum frame rates with Goldeye CL-033 SWIR TEC1:

Resolution		Mono8, Mono12 (2 Taps)			Mono14 (1Tap)		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
640	512	125	276	301	68	151	234
640	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 148: Goldeye CL-033 SWIR TEC1 ROI frame rates by clock frequency

Goldeye CL-033 SWIR TECless

Imaging and performance

Parameter	**Values**
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	640 × 512
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.6 mm × 7.68 mm
Dark current (at +45 °C sensor temperature)	430 ke⁻/s [1]
Temporal dark noise (Gain0)	390 e⁻ [1, 2]
Temporal dark noise (Gain1)	53 e⁻ [1, 2]
Temporal dark noise (Gain2)	32 e⁻ [1, 2]
Saturation capacity (Gain0)	1.2 Me⁻ [1, 2]
Saturation capacity (Gain1)	84.8 ke⁻ [1, 2]
Saturation capacity (Gain2)	25 ke⁻ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5%
Maximum frame rate at full resolution	301 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Without thermo-electric cooling (TECless)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at +45 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +45 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 149: Goldeye CL-033 SWIR TECless imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 14-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12, Mono14 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 150: Goldeye CL-033 SWIR TECless output

GPIO

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1 - CC4

Table 151: Goldeye CL-033 SWIR TECless GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	• C-Mount • F-Mount and M42-Mount available on request
Mass, body only, without adapter	300 g
Mass, with C-Mount adapter	320 g
Mass, with F-Mount adapter	370 g
Mass, with M42-Mount adapter	340 g

Table 152: Goldeye CL-033 SWIR TECless mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints	Not applicable to TECless models.
Relative humidity	10% to 95%, non-condensing
Power requirements	10.8 VDC to 30.0 VDC
Maximum power consumption	6.0 W (12 VDC)
Typical power consumption	6.0 W (12 VDC)

Table 153: Goldeye CL-033 SWIR TECless operating conditions

Absolute QE

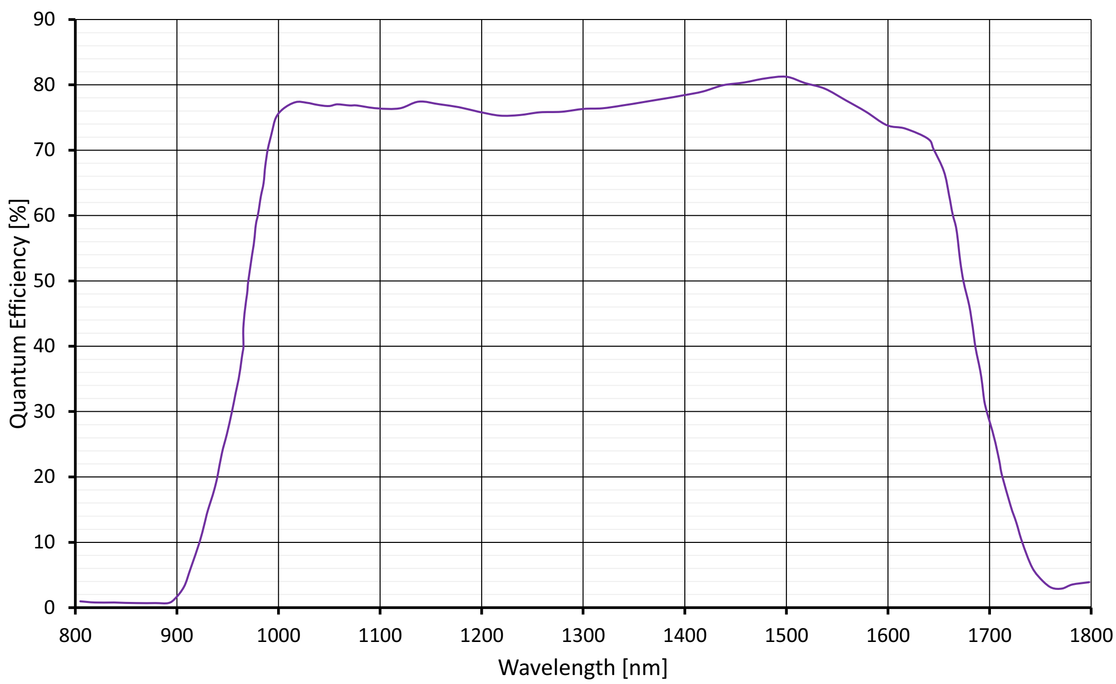


Figure 25: Goldeye CL-033 SWIR TECless absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye CL-033 SWIR TECless is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3 \times H + 32), A) + \left(\frac{H}{\text{Taps}} + B\right)(V-1) + \left(\frac{H}{\text{Taps}}\right) + C + D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate}, \text{CameraLinkFrameRate})$$

Formula 23: Maximum frame rate for Goldeye CL-033 SWIR TECless

Examples for maximum frame rates with Goldeye CL-033 SWIR TECless:

Resolution		**Mono8, Mono12 (2 Taps)**			**Mono14 (1Tap)**		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
640	512	125	276	301	68	151	234
640	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 154: Goldeye CL-033 SWIR TECless ROI frame rates by clock frequency

Goldeye CL-034 SWIR TEC1

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	49 ke$^-$/s [1]
Temporal dark noise (Gain0)	390 e$^-$ [1, 2]
Temporal dark noise (Gain1)	53 e$^-$ [1, 2]
Temporal dark noise (Gain2)	32 e$^-$ [1, 2]
Saturation capacity (Gain0)	1.2 Me$^-$ [1, 2]
Saturation capacity (Gain1)	84.8 ke$^-$ [1, 2]
Saturation capacity (Gain2)	25 ke$^-$ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5%
Maximum frame rate at full resolution	303 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 200 ms [3]
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at +20 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 155: Goldeye CL-034 SWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 156: Goldeye CL-034 SWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 157: Goldeye CL-034 SWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	78 mm × 55 mm × 55 mm
Lens mounts	C-Mount, F-Mount, M42-Mount
Mass, body only, without adapter	330 g
Mass, with C-Mount adapter	350 g
Mass, with F-Mount adapter	400 g
Mass, with M42-Mount adapter	370 g

Table 158: Goldeye CL-034 SWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	11.8 W (12 VDC)
Typical power consumption, without cooling	6.3 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments. Models with RCG (Removed Cover Glass) sensor option: +20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable	

Table 159: Goldeye CL-034 SWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

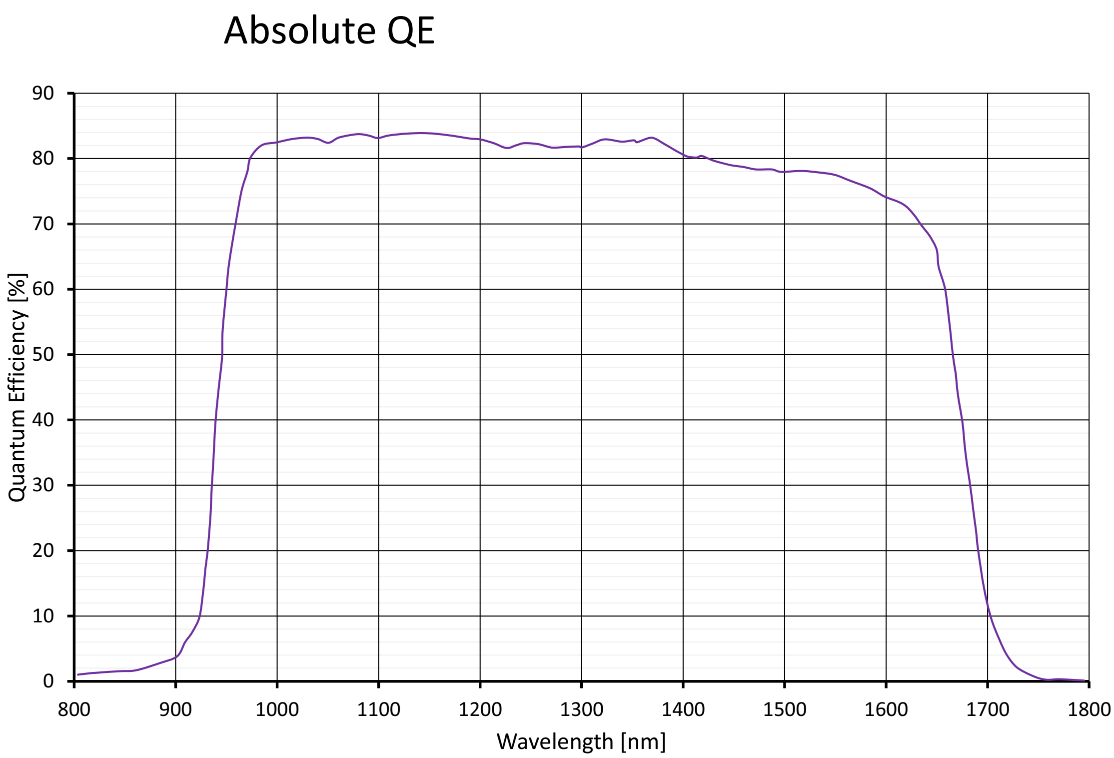


Figure 26: Goldeye CL-034 SWIR TEC1 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye CL-034 SWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\mathrm{SensorFrameRate} = \frac{18,000,000}{\left[(V+1) \times \left(\frac{H}{8} + 36\right)\right] + 254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\mathrm{CameraLinkFrameRate} = \frac{\mathrm{ClFrequency}}{\left[\max((3 \times H + 32), A) + \left(\frac{H}{\mathrm{Taps}} + B\right)(V - 1) + \left(\frac{H}{\mathrm{Taps}}\right) + C + D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\mathrm{FrameRate} = \min(\mathrm{SensorFrameRate}, \mathrm{CameraLinkFrameRate})$$

Formula 24: Maximum frame rate for Goldeye CL-034 SWIR TEC1

Examples for maximum frame rates with Goldeye CL-034 SWIR TEC1:

Resolution		**Mono8, Mono12 (2 Taps)**			**Mono14 (1Tap)**		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
636	508	125	276	303	68	151	234
636	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 160: Goldeye CL-034 SWIR TEC1 ROI frame rates by clock frequency

Goldeye CL-034 SWIR TEC2

Imaging and performance

Measurement values

Actual values for dark current and temporal dark noise partly depend on the ambient temperature of your application.

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	900 nm to 1700 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	26 ke⁻/s [1]
Temporal dark noise (Gain0)	390 e⁻ [1, 2]
Temporal dark noise (Gain1)	53 e⁻ [1, 2]
Temporal dark noise (Gain2)	32 e⁻ [1, 2]
Saturation capacity (Gain0)	1.2 Me⁻ [1, 2]
Saturation capacity (Gain1)	84.8 ke⁻ [1, 2]
Saturation capacity (Gain2)	25 ke⁻ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	59 dB [1, 2]
Pixel operability	>99.5%
Maximum frame rate at full resolution	303 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 10 s [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 161: Goldeye CL-034 SWIR TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 162: Goldeye CL-034 SWIR TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 163: Goldeye CL-034 SWIR TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 164: Goldeye CL-034 SWIR TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	21 W (12 VDC)
Typical power consumption, without cooling	7 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 165: Goldeye CL-034 SWIR TEC2 operating conditions

Absolute QE

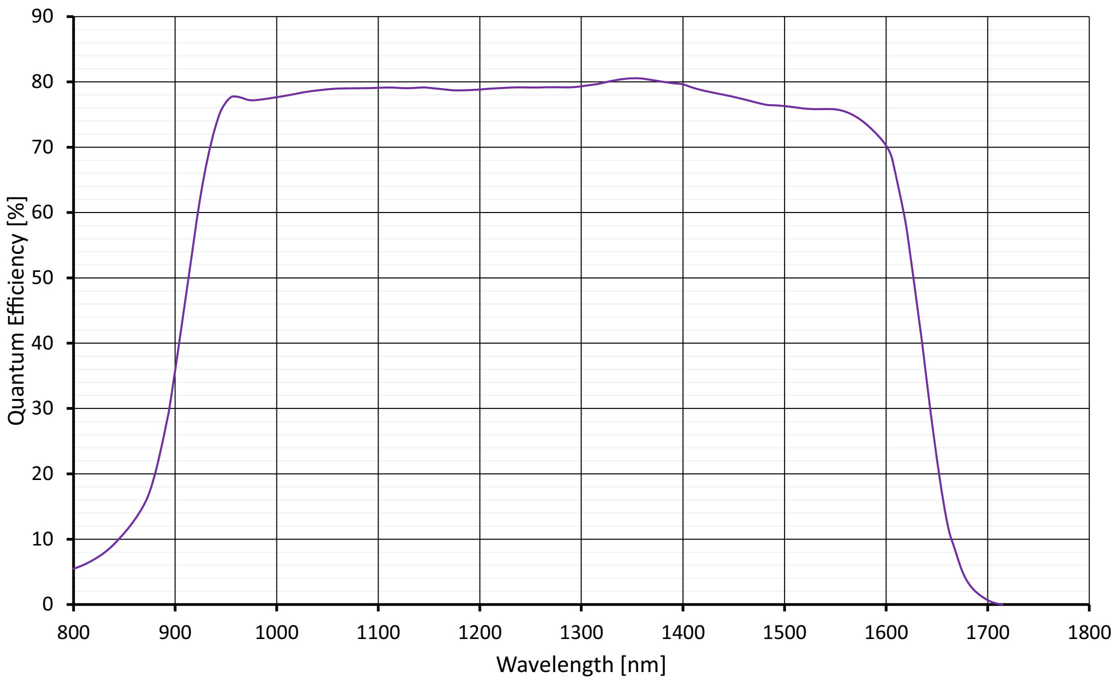


Figure 27: Goldeye CL-034 SWIR TEC2 absolute QE

Resolution and ROI frame rate

The maximum frame rate for Goldeye CL-034 SWIR TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32),A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate},\text{CameraLinkFrameRate})$$

Formula 25: Maximum frame rate for Goldeye CL-034 SWIR TEC2

Examples for maximum frame rates with Goldeye CL-034 SWIR TEC2:

Resolution		**Mono8, Mono12 (2 Taps)**			**Mono14 (1Tap)**		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
636	508	125	276	303	68	151	234
636	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 166: Goldeye CL-034 SWIR TEC2 ROI frame rates by clock frequency

Goldeye CL-034 XSWIR 1.9 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1100 nm to 1900 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	140 ke$^-$/s [1]
Temporal dark noise (Gain0)	434 e$^-$ [1, 2]
Temporal dark noise (Gain1)	40 e$^-$ [1, 2]
Temporal dark noise (Gain2)	15 e$^-$ [1, 2]
Saturation capacity (Gain0)	1.3 Me$^-$ [1, 2]
Saturation capacity (Gain1)	66 ke$^-$ [1, 2]
Saturation capacity (Gain2)	18 ke$^-$ [1, 2]
Dynamic range (Gain0)	69 dB [1, 2]
Dynamic range (Gain1)	64 dB [1, 2]
Dynamic range (Gain2)	61 dB [1, 2]
Pixel operability	>98.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 20 ms [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1200 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 167: Goldeye CL-034 XSWIR 1.9 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 168: Goldeye CL-034 XSWIR 1.9 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 169: Goldeye CL-034 XSWIR 1.9 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 170: Goldeye CL-034 XSWIR 1.9 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	21 W (12 VDC)
Typical power consumption, without cooling	7 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Table 171: Goldeye CL-034 XSWIR 1.9 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

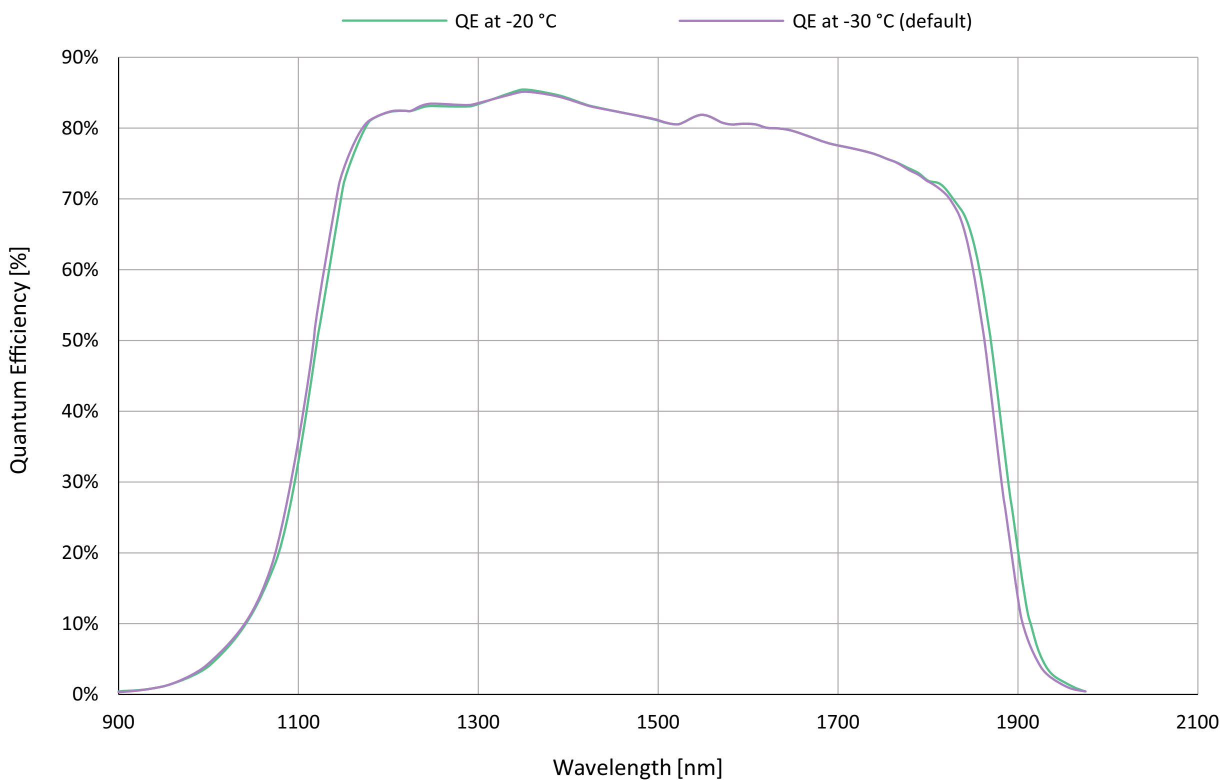


Figure 28: Goldeye CL-034 XSWIR 1.9 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye CL-034 XSWIR 1.9 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32),A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate},\text{CameraLinkFrameRate})$$

Formula 26: Maximum frame rate for Goldeye CL-034 XSWIR 1.9 TEC2

Examples for maximum frame rates with Goldeye CL-034 XSWIR 1.9 TEC2:

Resolution		Mono8, Mono12 (2 Taps)			Mono14 (1Tap)		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
636	508	125	276	303	68	151	234
636	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 172: Goldeye CL-034 XSWIR 1.9 TEC2 ROI frame rates by clock frequency

Goldeye CL-034 XSWIR 2.2 TEC2

Imaging and performance

Parameter	Values
Sensor	InGaAs, progressive scan, electronic full frame shutter
Sensor type	InGaAs FPA
Spectral range	1200 nm to 2200 nm
Resolution (H × V)	636 × 508
Pixel size	15 µm × 15 µm
Sensor size (effective)	9.54 mm × 7.62 mm
Dark current	820 ke^-/s [1]
Temporal dark noise (Gain0)	452 e^- [1, 2]
Temporal dark noise (Gain1)	134 e^- [1, 2]
Temporal dark noise (Gain2)	58 e^- [1, 2]
Saturation capacity (Gain0)	1.16 Me^- [1, 2]
Saturation capacity (Gain1)	73 ke^- [1, 2]
Saturation capacity (Gain2)	25 ke^- [1, 2]
Dynamic range (Gain0)	68 dB [1, 2]
Dynamic range (Gain1)	54 dB [1, 2]
Dynamic range (Gain2)	52 dB [1, 2]
Pixel operability	>98.5% [1, 2]
Maximum frame rate at full resolution	303 fps (8-bit and 12-bit pixel format)
Exposure time	1 µs to 10 ms [3]
Temperature control	Dual-stage thermo-electric cooling (TEC2)
Analog gain factor	1 (Gain0), 14 (Gain1), 45 (Gain2)
A/D converter	14-bit
Image buffer size	256 MB
Stream hold capacity	392 frames at full resolution

[1] Typical values that are determined similar to EMVA 1288 under 1485 nm LED illumination. Given values are mean values of multiple different measurements at -30 °C sensor temperature, if not stated otherwise.

[2] Measured with CDS delay of 12 µs.

[3] Maximum exposure value given is valid for Gain0 and sensor temperature of -30 °C. Even longer exposures can be set, but the image quality may deteriorate.

Table 173: Goldeye CL-034 XSWIR 2.2 TEC2 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 85 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 16-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono10, Mono12, Mono14, Mono16 • Tap geometry 1X2 1Y: Mono8, Mono10, Mono12

Table 174: Goldeye CL-034 XSWIR 2.2 TEC2 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 175: Goldeye CL-034 XSWIR 2.2 TEC2 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	90 mm × 80 mm × 80 mm
Lens mount	C-Mount
Mass, including lens mount	740 g

Table 176: Goldeye CL-034 XSWIR 2.2 TEC2 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• -30 °C (default and calibrated) • -20 °C, -10 °C (calibrated) • 0 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	21 W (12 VDC)
Typical power consumption, without cooling	7 W (12 VDC)
[1] Even though the first temperature setpoint is pre-configured to -30 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.	

Table 177: Goldeye CL-034 XSWIR 2.2 TEC2 operating conditions

Absolute QE

Quantum efficiency for various sensor temperature values

The following curves relate to a sensor temperatures of -20 °C and -30 °C default, the sensitivity is slightly shifted to lower wave lengths, but the range is maintained. With increased sensor temperatures, the QE curve is slightly shifted to longer wavelengths, and for lower temperatures it is shifted to shorter wavelengths.

See the corresponding application note at www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-G-CL_AppNote_Temperature-Influence-on-Image-Quality_en.pdf.

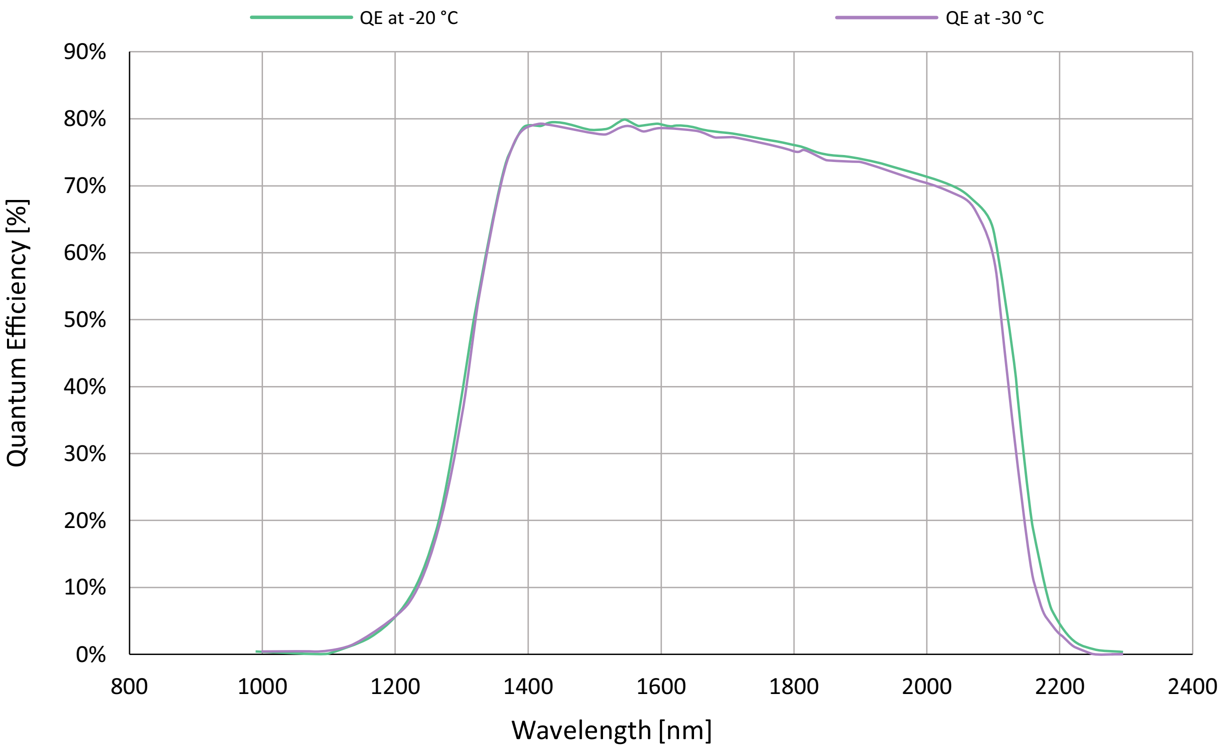


Figure 29: Goldeye CL-034 XSWIR 2.2 TEC2 absolute QE

Resolution and ROI frame rate

Values when using MultiRegions features

When the camera is operated using more than a single ROI, values in this section may not be reached.

The maximum frame rate for Goldeye CL-034 XSWIR 2.2 TEC2 is determined by the ROI size. Calculate the maximum frame rate using the following formulas.

$$\text{SensorFrameRate} = \frac{18,000,000}{\left[(V+1)\times\left(\frac{H}{8}+36\right)\right]+254}$$

H	ROI: horizontal resolution (width). The formula is valid if H ≥ 128. For H always use the value rounded up to the next multiple of 32.
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 4.

When using the formula, please consider the following:

- Round the denominator up or down to the next full µs.
- Minimum ROI width is 8 pixels, minimum ROI height is 4 pixels.
- The formula generally outputs very exact values, however when the ROI approaches its minimum size, the accuracy decreases by some degree.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

$$\text{CameraLinkFrameRate} = \frac{\text{ClFrequency}}{\left[\max((3\times H+32), A)+\left(\frac{H}{\text{Taps}}+B\right)(V-1)+\left(\frac{H}{\text{Taps}}\right)+C+D\right]}$$

A = ClMinFValToLValDelay) | B = ClLValToLValDelay | C = ClLValToFValDelay | D = ClMinFValToFValDelay

$$\text{FrameRate} = \min(\text{SensorFrameRate},\text{CameraLinkFrameRate})$$

Formula 27: Maximum frame rate for Goldeye CL-034 XSWIR 2.2 TEC2

Examples for maximum frame rates with Goldeye CL-034 XSWIR 2.2 TEC2:

Resolution		Mono8, Mono12 (2 Taps)			Mono14 (1Tap)		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
636	508	125	276	303	68	151	234
636	480	134	295	321	73	161	250
320	256	428	251	909	251	553	855
320	240	456	268	968	268	590	912
160	120	1404	912	2557	912	2004	2557
128	32	5524	3802	9174	3802	8333	9174
128	8	17241	12658	25000	12658	25000	25000

Table 178: Goldeye CL-034 XSWIR 2.2 TEC2 ROI frame rates by clock frequency

Goldeye CL-130 VSWIR TEC1

Imaging and performance

Parameter	**Values**
Sensor model	Sony IMX990 SenSWIR
Sensor type	InGaAs
Sensor format	Type 1/2 (8.2 mm diagonal)
Shutter type	Global shutter
Spectral range	400 nm to 1700 nm
Resolution (H × V)	1280 × 1024
Pixel size	5 µm × 5 µm
Sensor size (effective)	6.4 mm × 5.12 mm
Dark current (at +20 °C sensor temperature)	4.8 ke$^-$/s
Temporal dark noise (0 dB)	250 e$^-$
Temporal dark noise (18 dB)	210 e$^-$
Saturation capacity (0 dB)	165 ke$^-$
Saturation capacity (18 dB)	17.2 ke$^-$
Dynamic range (0 dB)	56.4 dB
Dynamic range (18 dB)	38.2 dB
Pixel operability	>99.5%
Exposure time	18 µs to 200 ms[1] (Normal[2]) | 3 µs to 7 µs (Ultrashort[2])
Maximum frame rate at full resolution	94 fps
Temperature control	Single-stage thermo-electric cooling (TEC1)
Analog gain factor	1 (0 dB), 7.9 (18 dB)
A/D converter	12-bit
Image buffer size	256 MB
Stream hold capacity	95 frames at full resolution

[1] Maximum exposure value given is valid for 0 dB and sensor temperature of +20 °C. Even longer exposures can be set, but the image quality may deteriorate.

[2] Values for `ExposureRangeMode` = *`Normal`* or *`Ultrashort`*

Table 179: Goldeye CL-130 VSWIR TEC1 imaging and performance

Output

Parameter	Values
Digital interface	Camera Link Base, up to 2 taps, 40 MHz, SDR-26 connector, Serial Control Channel
Bit depth	8-bit to 12-bit
Pixel formats	• Tap geometry 1X 1Y: Mono8, Mono12 • Tap geometry 1X2 1Y: Mono8, Mono12

Table 180: Goldeye CL-130 VSWIR TEC1 output

GPIOs

Parameter	Values
Opto-isolated I/Os	1 input, 2 outputs
RS232	up to 115,200 bits per second, 8N1 (adjustable)
LVTTL I/Os	1 input, 1 output
LVDS inputs	CC1- CC4

Table 181: Goldeye CL-130 VSWIR TEC1 GPIOs

Mechanics

Parameter	Values
Body dimensions (L × W × H) without lens mount adapter	78 mm × 55 mm × 55 mm
Lens mount	C-Mount
Mass, including lens mount	330 g

Table 182: Goldeye CL-130 VSWIR TEC1 mechanics

Operating conditions

Parameter	Values
Operating temperature	-20 °C to +55 °C (housing)
Storage temperature	-30 °C to +70 °C (ambient)
Sensor cooling temperature, setpoints [1]	• +20 °C (default and calibrated) • +5 °C, +35 °C, +50 °C (uncalibrated) • User-configurable
Relative humidity	10% to 95%, non-condensing
Power requirements (DC)	10.8 to 30.0 VDC
Maximum power consumption	11.8 W (12 VDC)
Typical power consumption, without cooling	5.4 W (12 VDC)

[1] Even though the first temperature setpoint is pre-configured to +20 °C, it is possible to set it to other temperature values. Observe that condensation may occur if the sensor temperature is lower than the ambient temperature, especially in humid environments.

Models with RCG (Removed Cover Glass) sensor option:
+20 °C (default and calibrated), +35 °C, +50 °C (uncalibrated), user-configurable

Table 183: Goldeye CL-130 VSWIR TEC1 operating conditions

NOTICE

RCG models: Damage to the sensor

Condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***Manual*** (default), avoid using ***Auto*** mode.
- Set all values for `SensorTemperatureSetpointValue`.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

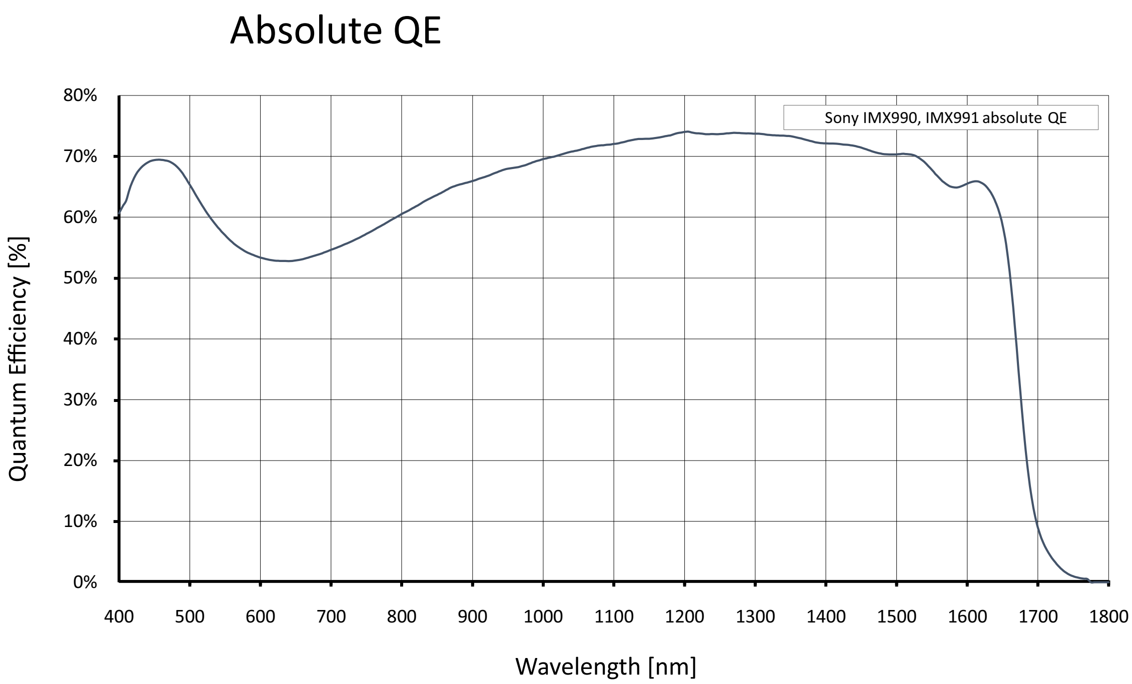


Figure 30: Goldeye CL-130 VSWIR TEC1 absolute QE

Resolution and ROI frame rates

The maximum frame rate for Goldeye CL-130 VSWIR TEC1 is determined by the ROI size. Calculate the maximum frame rate using the following formula.

$$\text{SensorFrameRate} = \frac{PF}{V + 36}$$

	FrameRate = MIN (SensorFrameRate, GigEFrameRate)
PF	Pixel format factor • Mono8: 99734.04 • Mono12: 75604.84 • Mono12p: 75604.84
V	ROI: vertical resolution (height). The formula is valid if V ≥ 8. For V always use the value rounded up to the next multiple of 8.

When using the formula, please consider the following:

- The formula serves as a rough estimation.
- Valid for IntegrateWhileRead-Mode only.
- ROI minimum width and height are 8 pixels.
- Exposure time may reduce the frame rate.
- Computational limitations of the host and image capture software may prevent the camera from achieving maximum frame rates.

Formula 28: Maximum frame rate for Goldeye CL-130 VSWIR TEC1

ROI frame rates with different setups

Examples for maximum frame rates with Goldeye CL-130 VSWIR TEC1 for common resolutions are listed in the following tables.

Resolution		Mono8 (2 Taps)			Mono8 (1 Tap)		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
1280	1024	34	75	94	18	39	61
1280	720	48	106	131	25	56	87
1024	768	55	122	124	29	65	100
800	600	88	156	156	47	105	156
640	480	132	193	193	73	160	193
320	240	361	361	361	265	361	361
160	120	638	638	638	638	638	638
1280	512	67	149	181	35	78	122
1280	8	1763	2262	2262	1293	2262	2262
8	1024	94	94	94	94	94z	94
8	8	2262	2262	2262	2262	2262	2262

Table 184: Goldeye CL-130 VSWIR TEC1 ROI frame rates by clock frequency and number of taps for Mono8

Resolution		Mono12 (2 Taps)			Mono12 (1 Tap)		
Width	**Height**	**25 MHz**	**55 MHz**	**85 MHz**	**25 MHz**	**55 MHz**	**85 MHz**
1280	1024	34	71	71	18	39	61
1280	720	48	100	100	25	56	87
1024	768	55	94	94	29	65	94
800	600	88	118	118	47	105	118
640	480	132	146	146	73	146	146
320	240	273	273	273	265	273	273
160	120	484	484	484	484	484	484
1280	512	67	137	122	35	78	122
1280	8	1718	1718	1718	1293	1718	1718
8	1024	71	71	71	71	71	71
8	8	1718	1718	1718	1718	1718	1718

Table 185: Goldeye CL-130 VSWIR TEC1 ROI frame rates by clock frequency and number of taps for Mono12

Technical drawings (GigE models)

Model overview

You can find drawings for the corresponding models on pages:

Goldeye model	Mount adapters			
	C-Mount Type 1	C-Mount Type 2	F-Mount	M42-Mount
Goldeye G-008 SWIR TEC1	185	N.a.	186	187
Goldeye G-008 SWIR Cool TEC1	191	N.a.	192	193
Goldeye G-008 1.9/2.2 XSWIR TEC2	N.a.	184	N.a.	
Goldeye G-030 VSWIR TEC1	N.a.	183	N.a.	
Goldeye G-032 SWIR TEC1	185	N.a.	186	187
Goldeye G-032 SWIR Cool TEC2	191	N.a.	192	193
Goldeye G-033 SWIR TEC1	185	N.a.	186	187
Goldeye G-033 SWIR TECless	185	N.a.	186	187
Goldeye G-034 SWIR TEC1	188	N.a.	189	190
Goldeye G-034 SWIR TEC2	N.a.	184	N.a.	
Goldeye G-034 1.9/2.2 XSWIR TEC2	N.a.	184	N.a.	
Goldeye G-130 VSWIR TEC1	N.a.	183	N.a.	
N.a. = Not applicable				

Table 186: Technical drawings by Goldeye G model

Availability of lens mount adapters

See Lens mount adapters by model on page 204 for C-Mount adapters Type 1 and Type 2, F-Mount adapters, and M42-Mount adapters.

Goldeye G-030 VSWIR TEC1, -130 VSWIR TEC1: C-Mount adapter Type 2

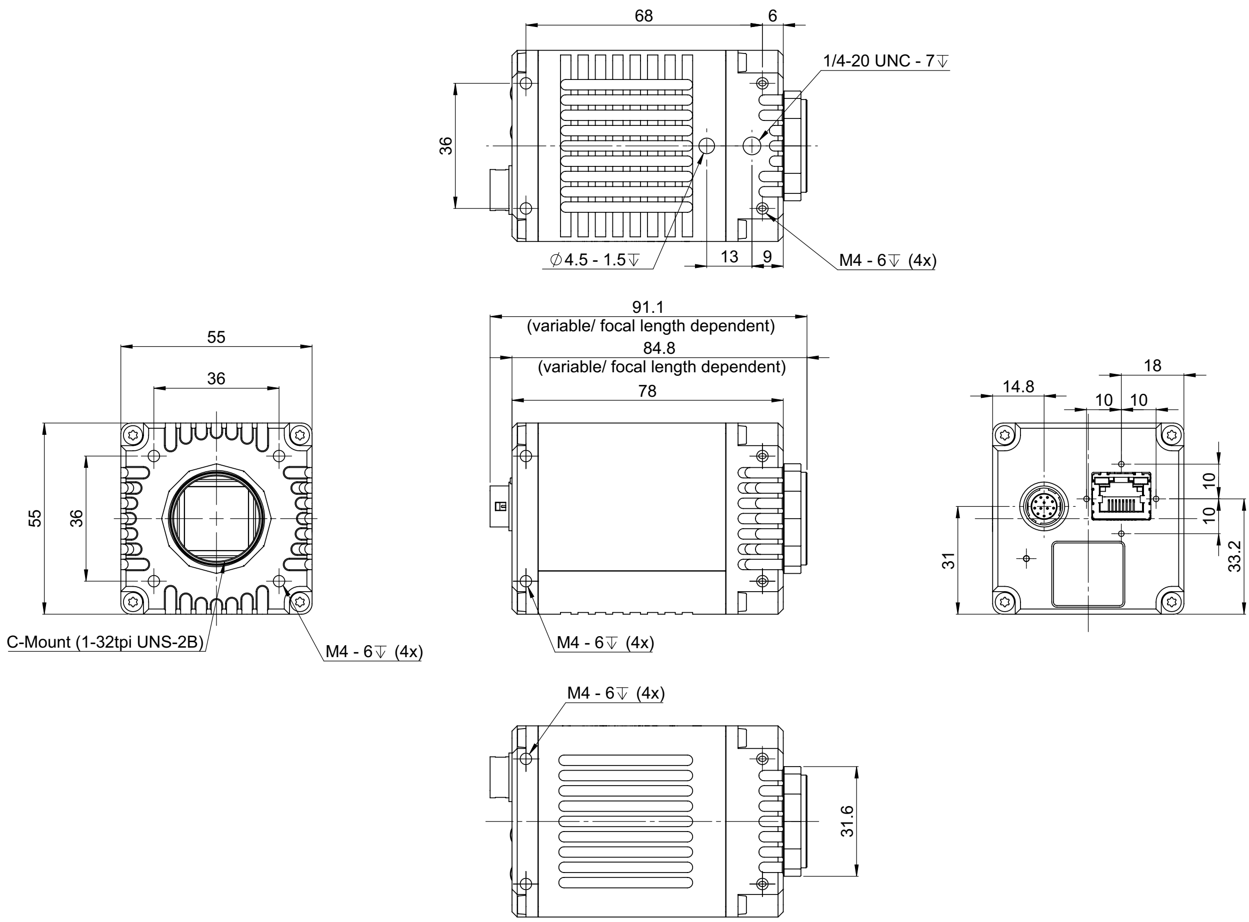


Figure 31: Goldeye G-030 VSWIR TEC1, -130 VSWIR TEC1 with C-Mount adapter Type 2

Goldeye G-008/-034 XSWIR 1.9/2.2 TEC2, -034 SWIR TEC2: C-Mount adapter Type 2

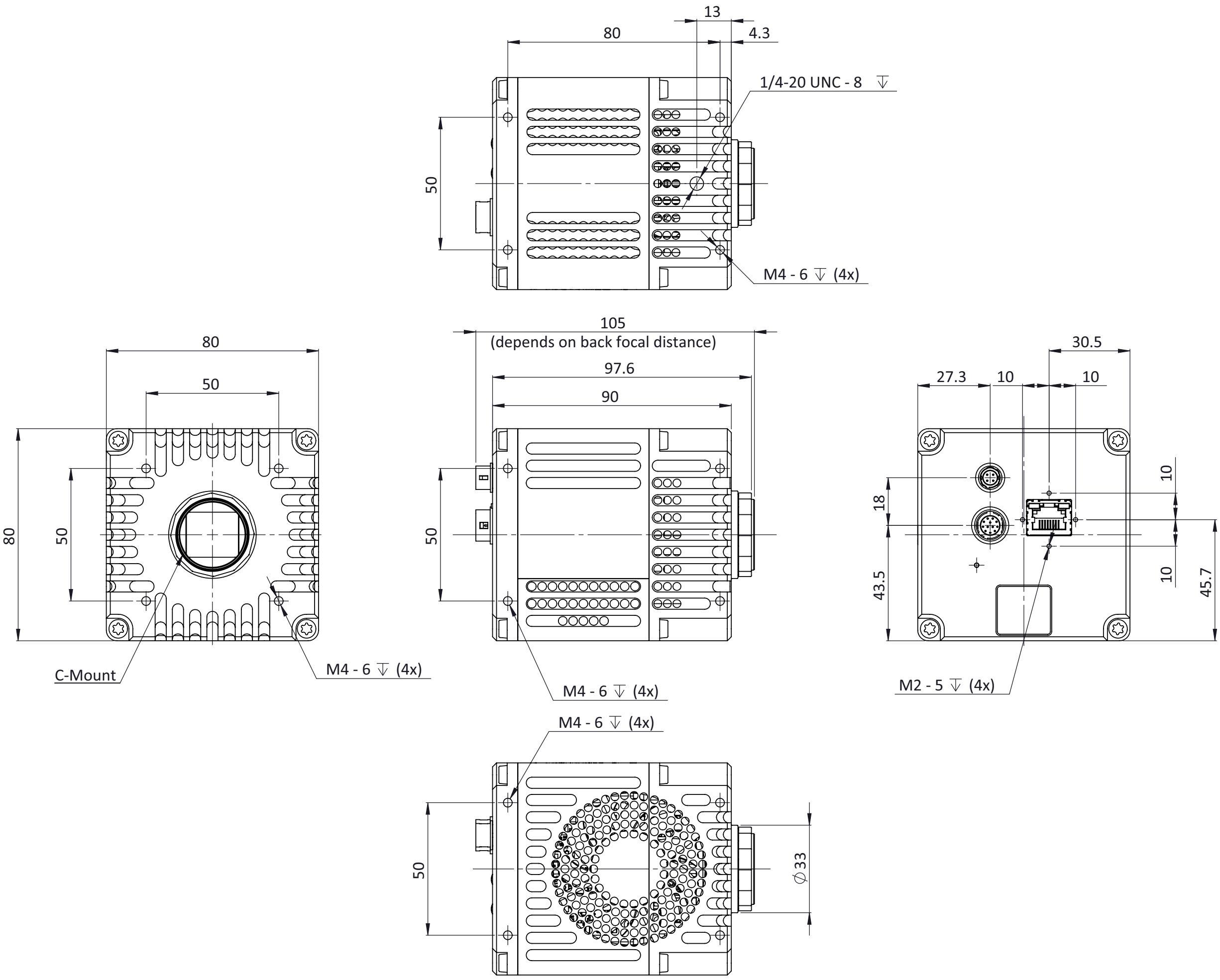


Figure 32: Goldeye G-008 XSWIR 1.9/2.2 TEC2, -034 SWIR TEC2, -034 XSWIR 1.9/2.2 TEC2 with C-Mount adapter Type 2

Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: C-Mount adapter Type 1

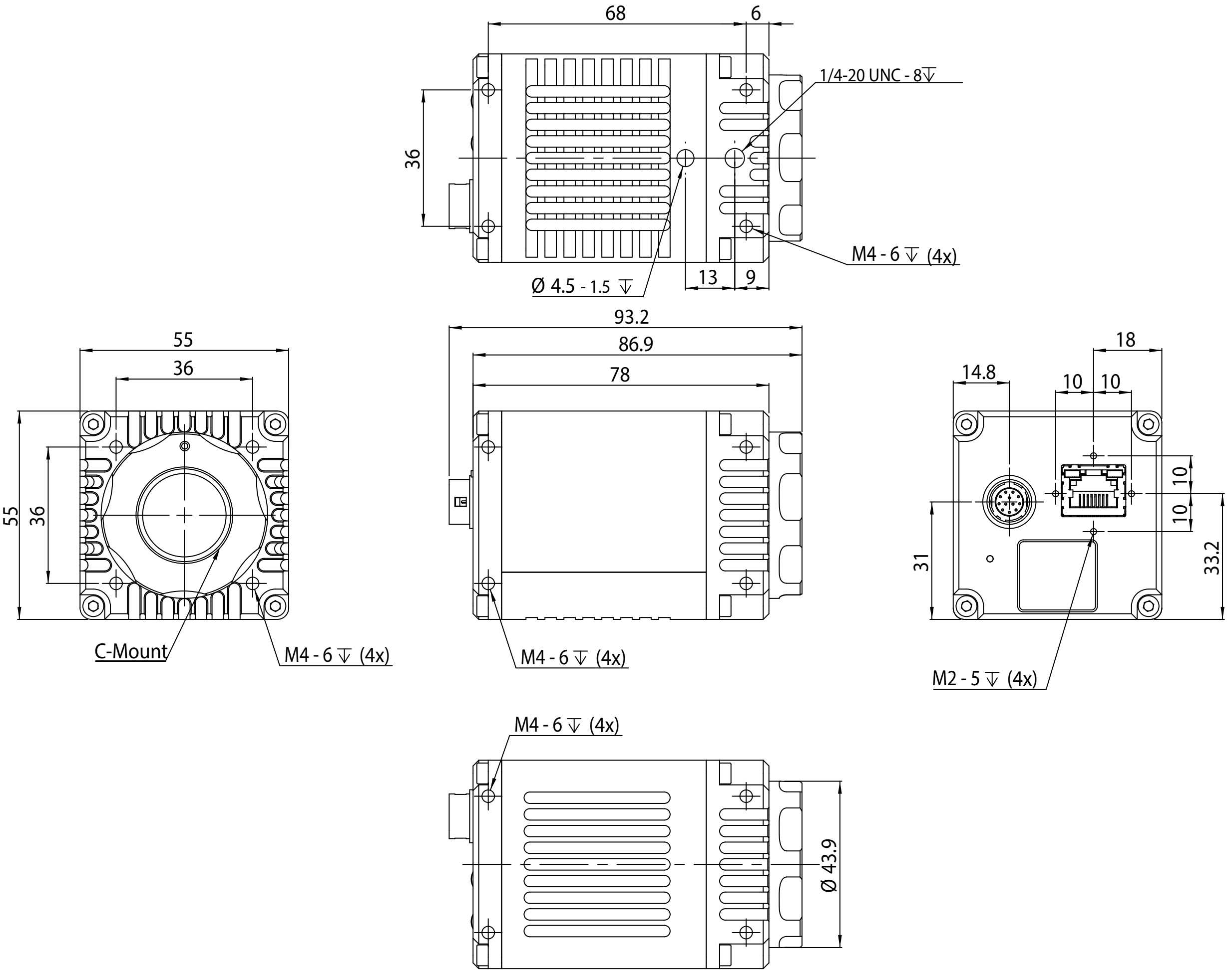


Figure 33: Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with C-Mount adapter Type 1

Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: F-Mount adapter

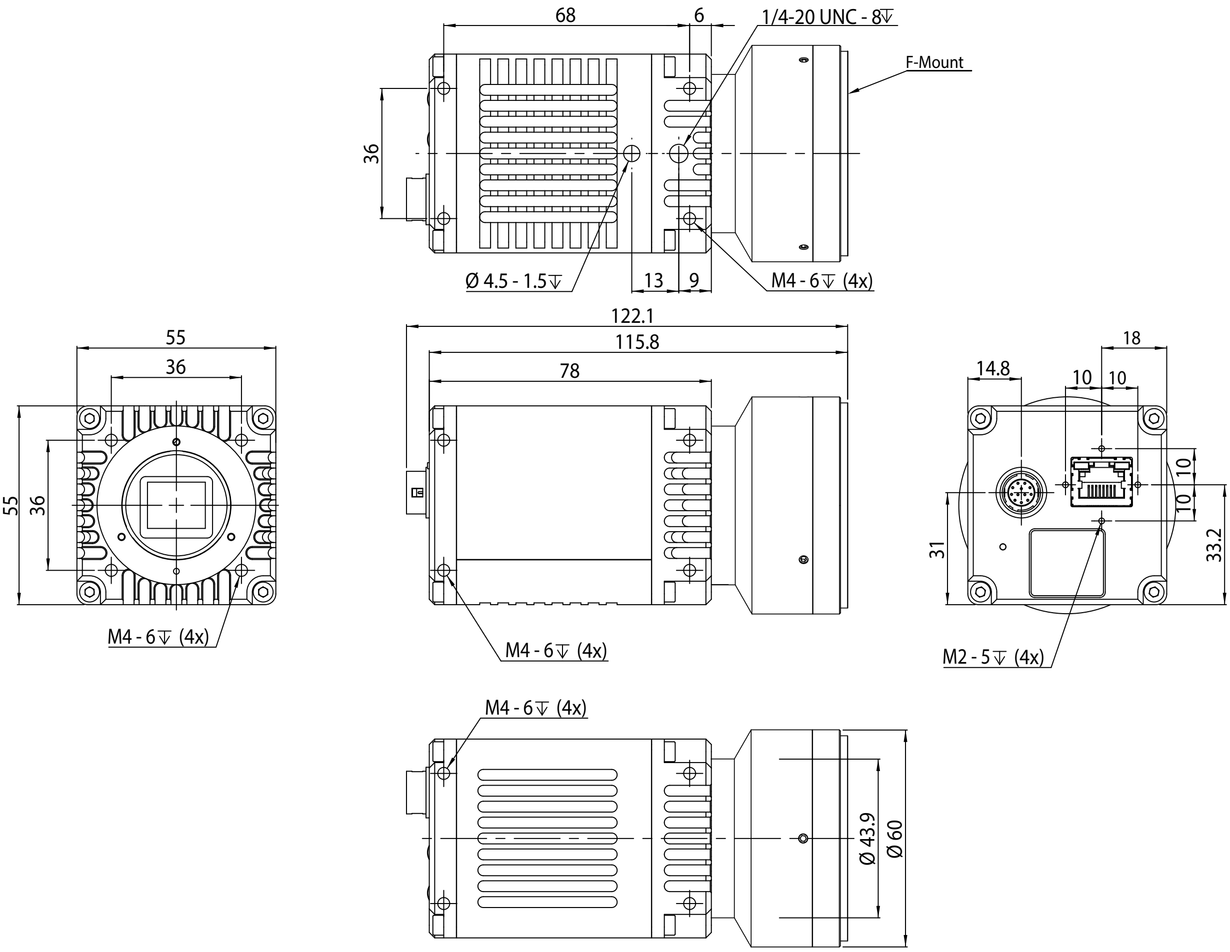


Figure 34: Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with F-Mount adapter

Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: M42-Mount adapter

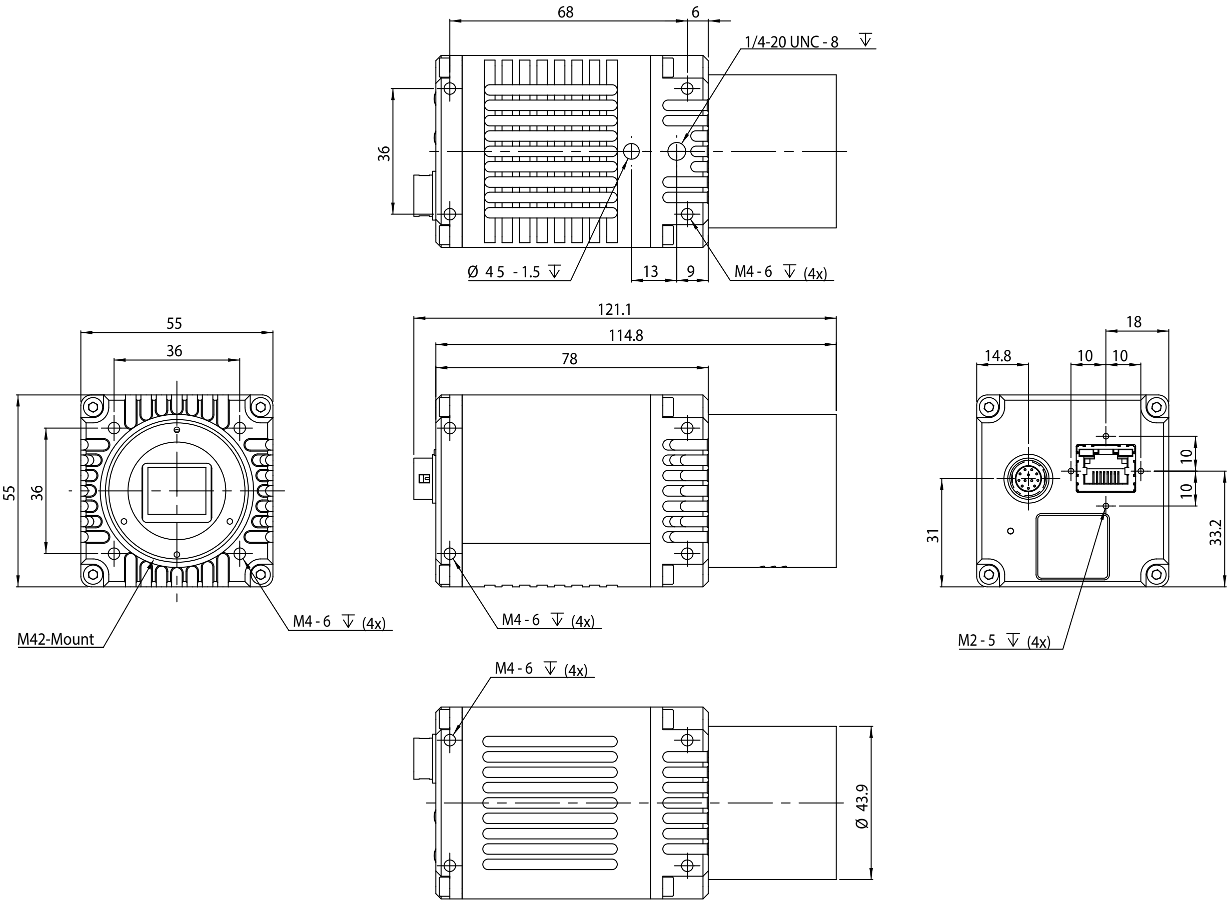


Figure 35: Goldeye G-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with M42-Mount adapter

Goldeye G-034 SWIR TEC1: C-Mount adapter Type 1

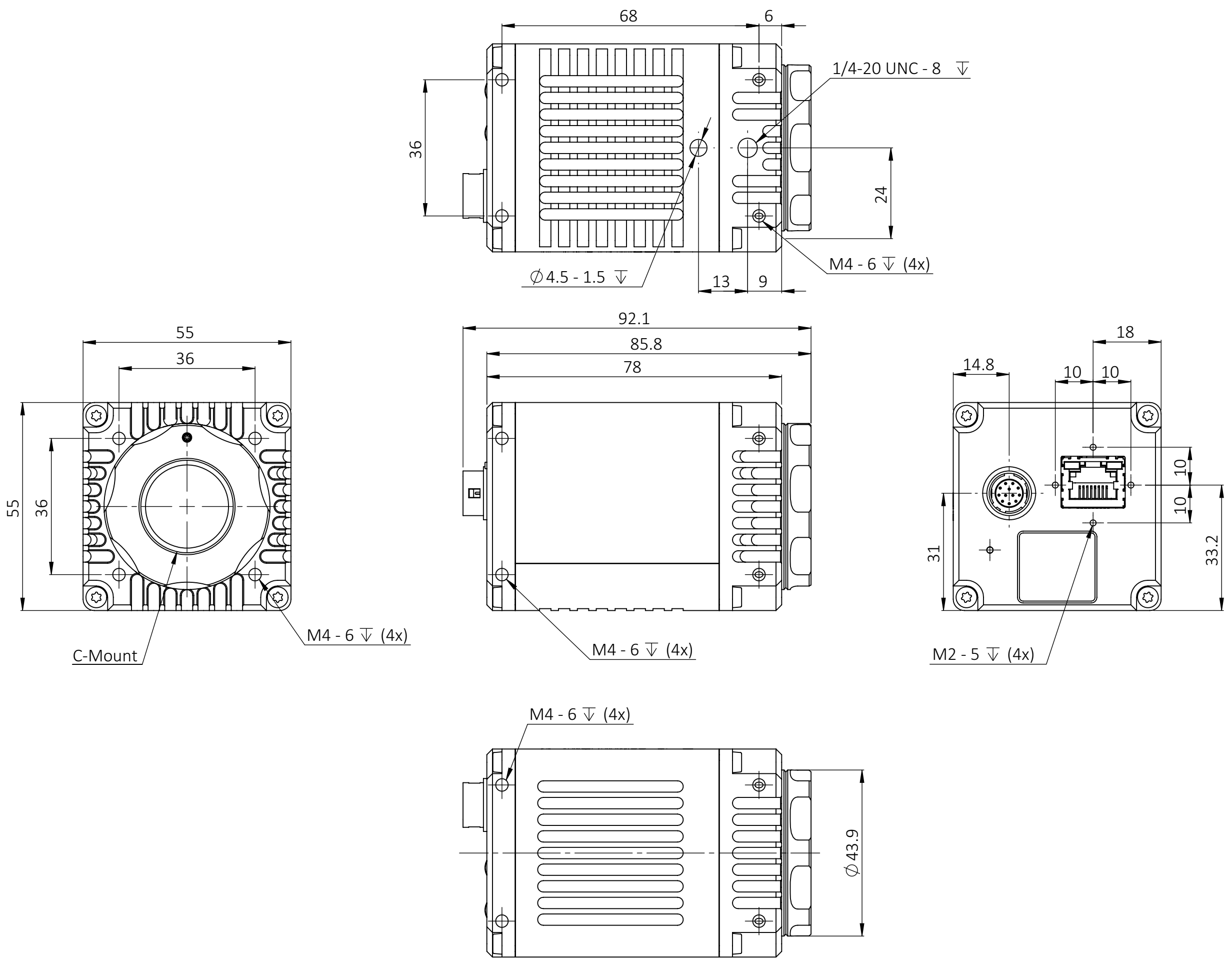


Figure 36: Goldeye G-034 SWIR TEC1 with C-Mount adapter Type 1

Goldeye G-034 SWIR TEC1: F-Mount adapter

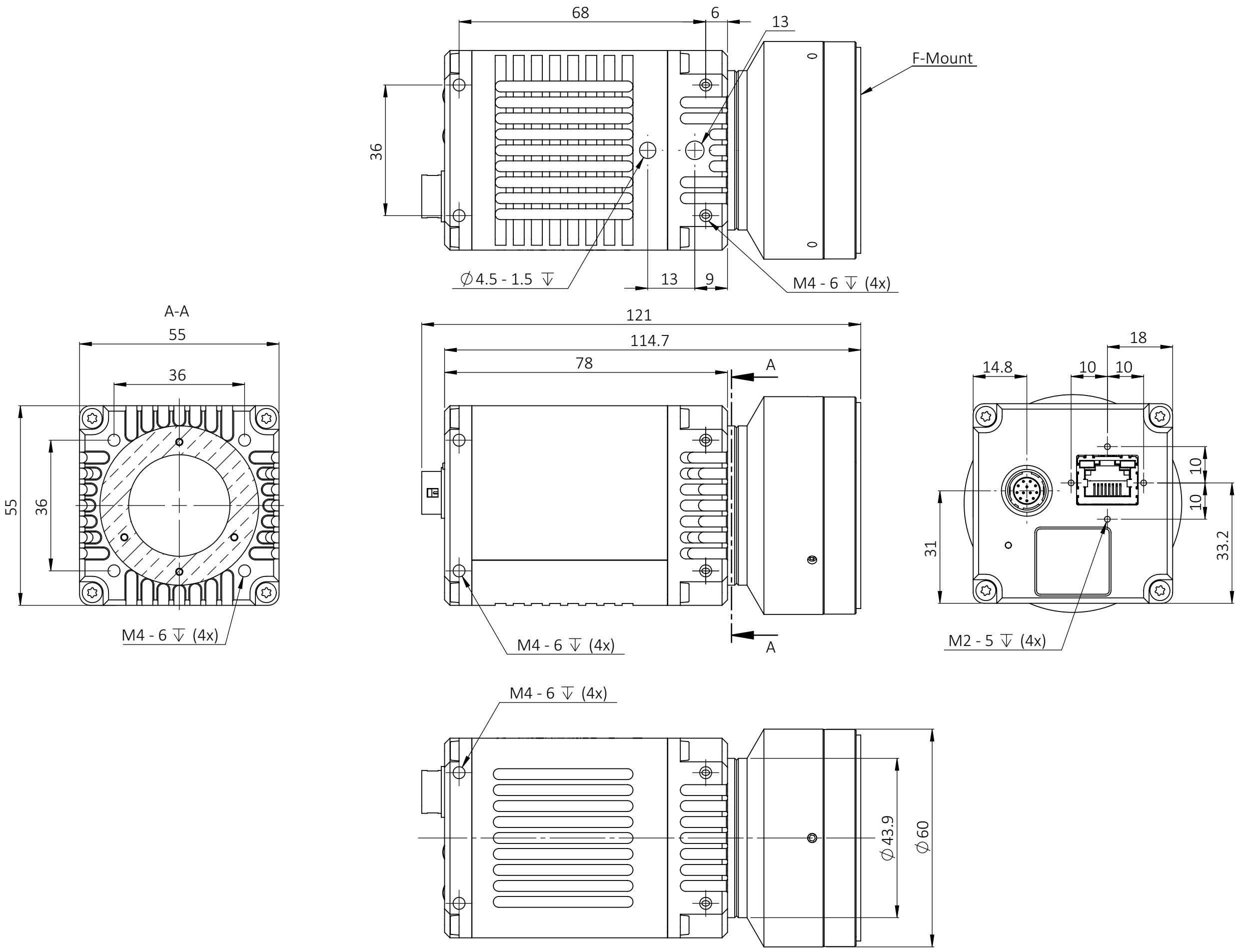


Figure 37: Goldeye G-034 SWIR TEC1 with F-Mount adapter

Goldeye G-034 SWIR TEC1: M42-Mount adapter

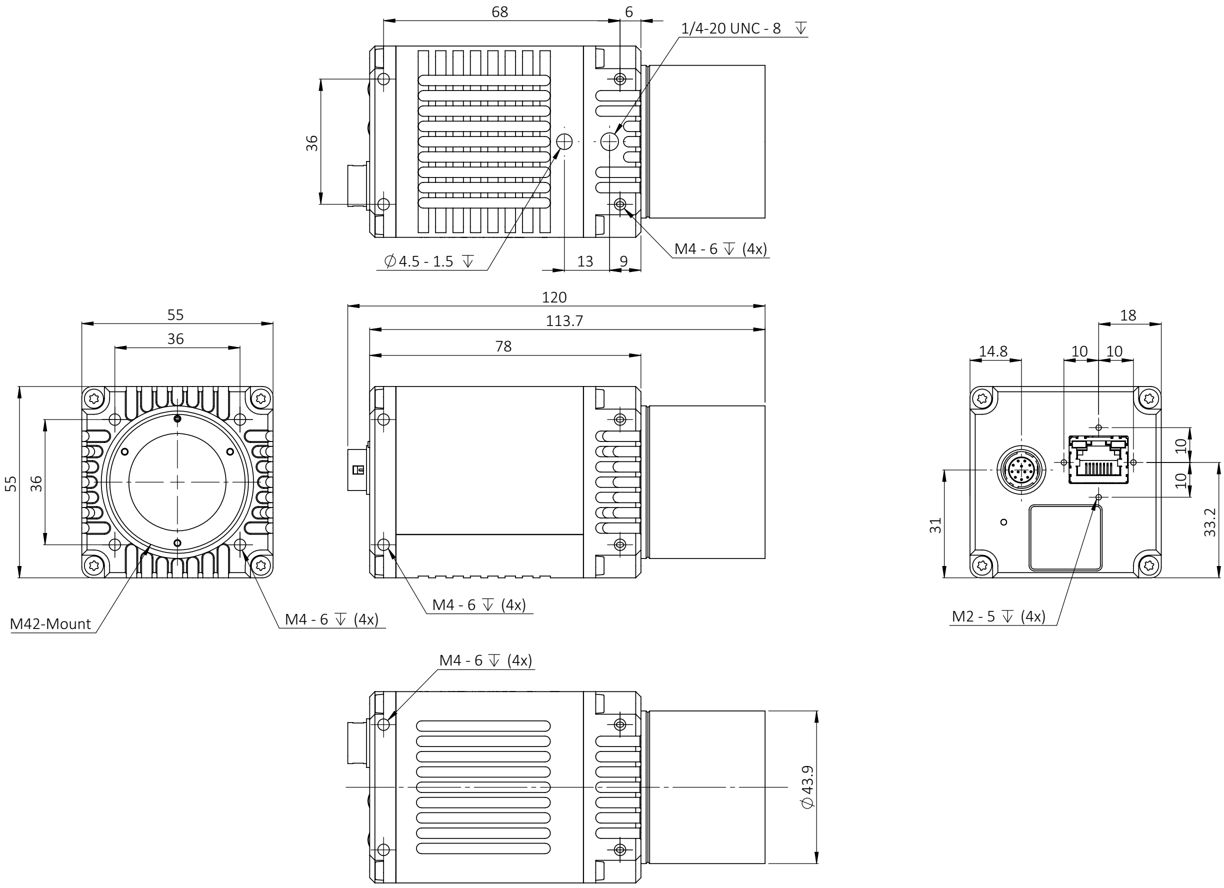


Figure 38: Goldeye G-034 SWIR TEC1 with M42-Mount adapter

Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2: C-Mount adapter Type 1

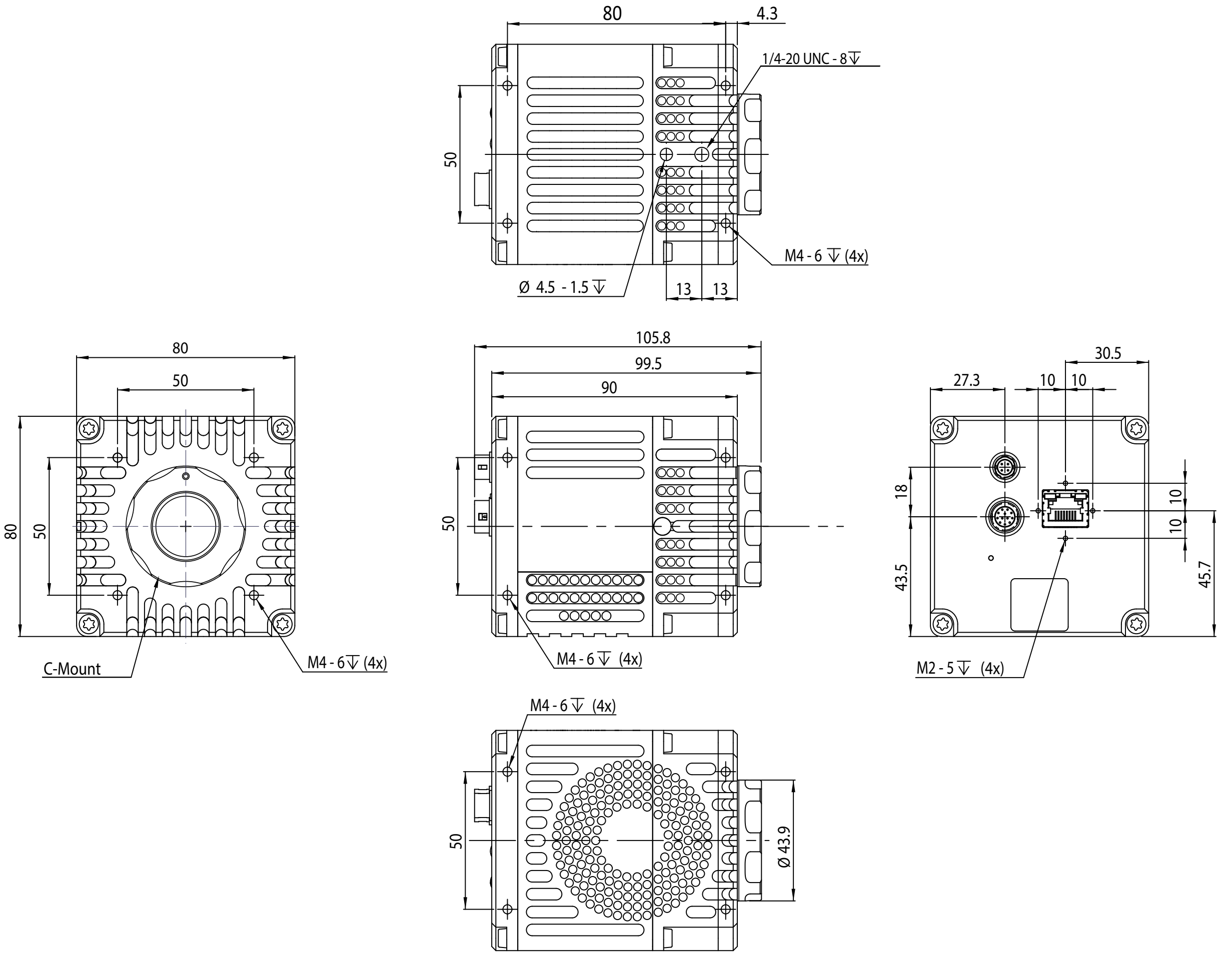


Figure 39: Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2 with C-Mount adapter Type 1

Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2: F-Mount adapter

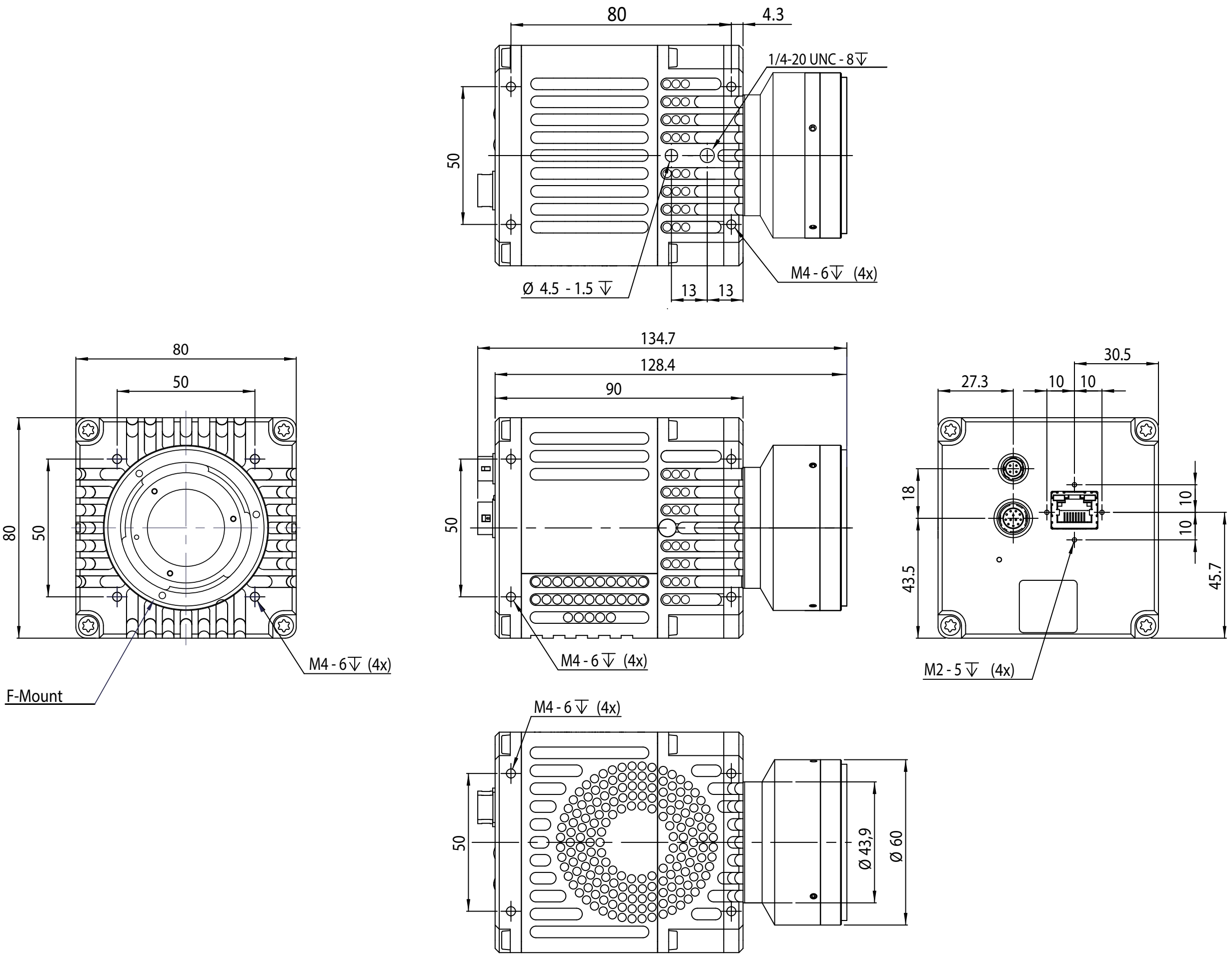


Figure 40: Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2 with F-Mount adapter

Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2: M42-Mount adapter

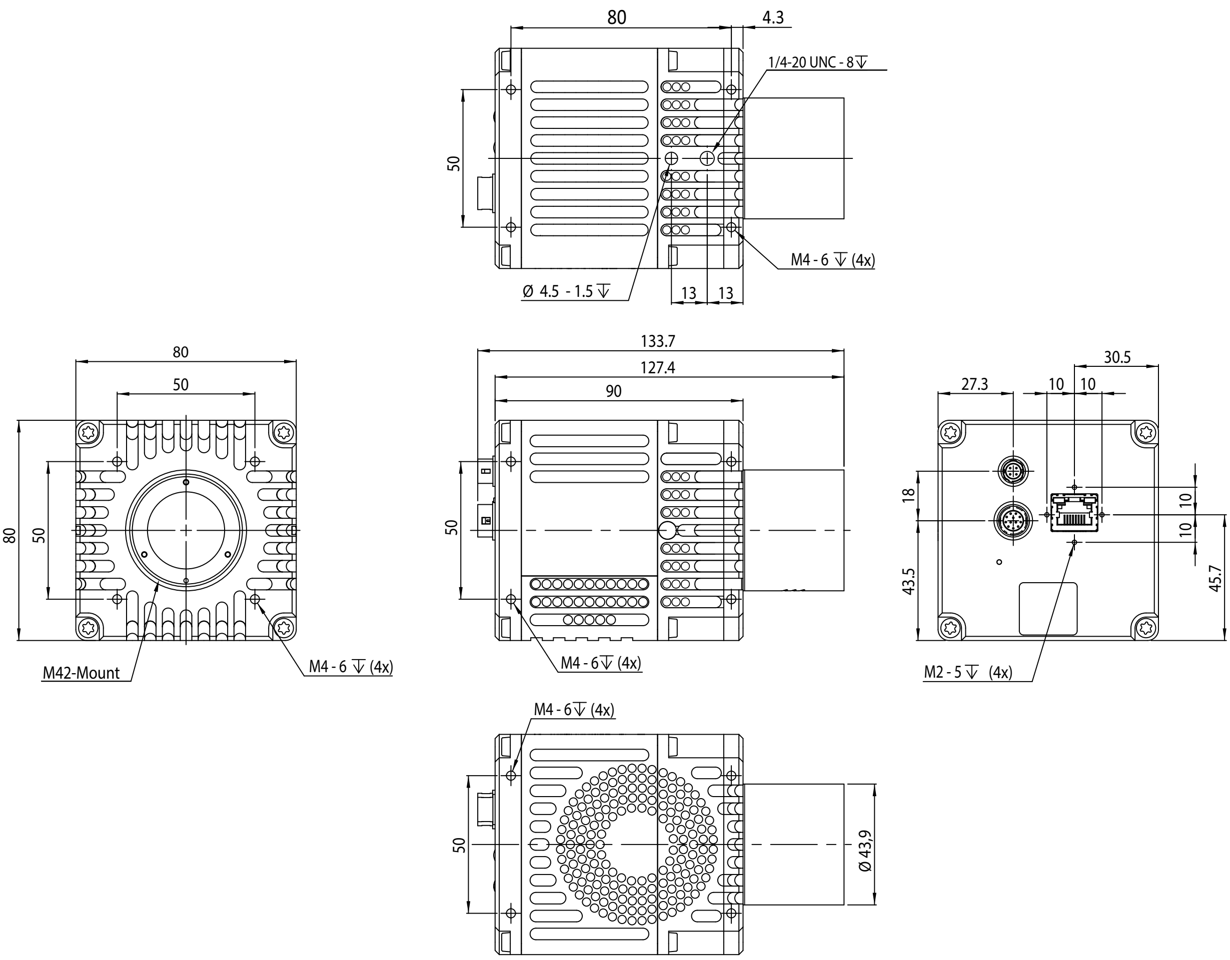


Figure 41: Goldeye G-008 SWIR Cool TEC1, -032 SWIR Cool TEC2 with M42-Mount adapter

Technical drawings (CL models)

Model overview

You can find drawings for the corresponding models on pages:

Goldeye model	Mount adapters			
	C-Mount Type 1	C-Mount Type 2	F-Mount	M42-Mount
Goldeye CL-008 SWIR TEC1	197	N.a.	198	199
Goldeye CL-008 SWIR Cool TEC1	203	N.a.	On request	
Goldeye CL-008 XSWIR 1.9/2.2 TEC2	N.a.	196	N.a.	
Goldeye CL-030 VSWIR TEC1	N.a.	195	N.a.	
Goldeye CL-032 SWIR TEC1	197	N.a.	198	199
Goldeye CL-032 SWIR Cool TEC2	203	N.a.	On request	
Goldeye CL-033 SWIR TEC1	197	N.a.	198	199
Goldeye CL-033 SWIR TECless	197	N.a.	198	199
Goldeye CL-034 SWIR TEC1	200	N.a.	201	202
Goldeye CL-034 SWIR TEC2	N.a.	196	N.a.	
Goldeye CL-034 XSWIR 1.9/2.2 TEC2	N.a.	196	N.a.	
Goldeye CL-130 VSWIR TEC1	N.a.	195	N.a.	
N.a. = Not applicable				

Table 187: Technical drawings by Goldeye CL model

Availability of lens mount adapters

See Lens mount adapters by model on page 204 for C-Mount adapters Type 1 and Type 2, F-Mount adapters, and M42-Mount adapters.

Goldeye CL-030 VSWIR TEC1, -130 VSWIR TEC1: C-Mount adapter Type 2

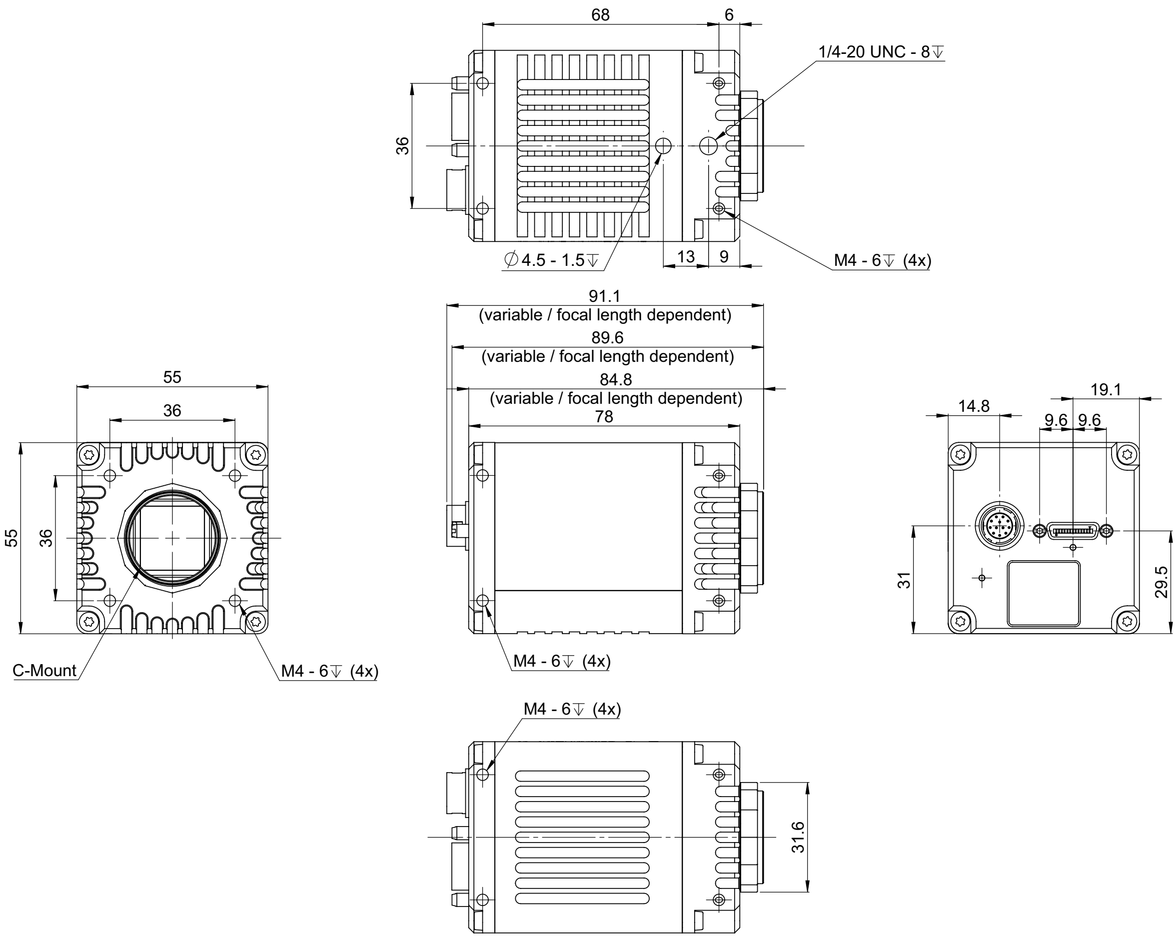


Figure 42: Goldeye CL-030 VSWIR TEC1, -130 VSWIR TEC1 with C-Mount adapter Type 2

Goldeye CL-008/-034 XSWIR 1.9/2.2 TEC2, -034 SWIR TEC2: C-Mount adapter Type 2

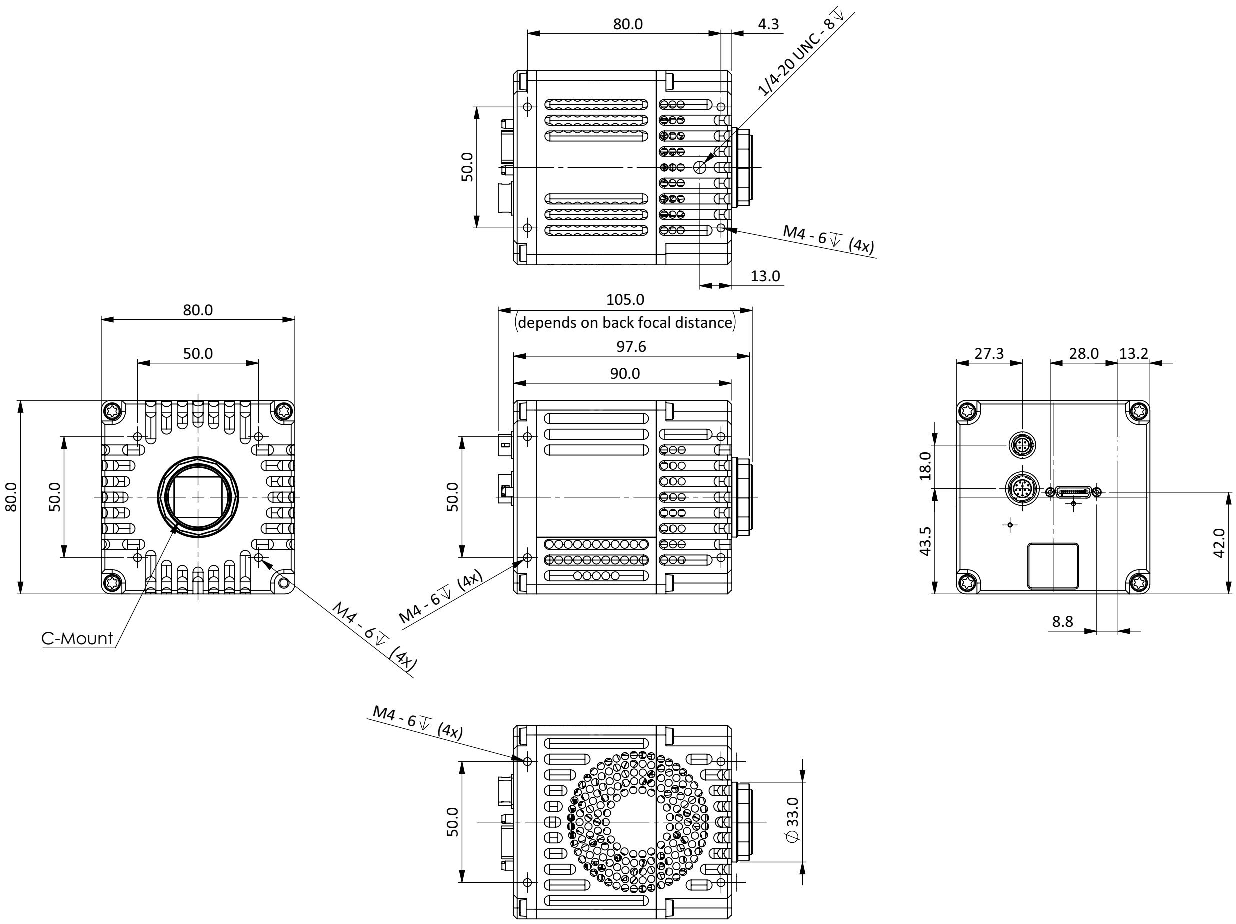


Figure 43: Goldeye CL-008 XSWIR 1.9/2.2 TEC2, -034 SWIR TEC2, -034 XSWIR 1.9/2.2 TEC2 with C-Mount adapter Type 2

Availability

Goldeye CL-008 XSWIR 1.9/2.2 TEC2, CL-034 XSWIR 1.9/2.2 TEC2

Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: C-Mount adapter Type 1

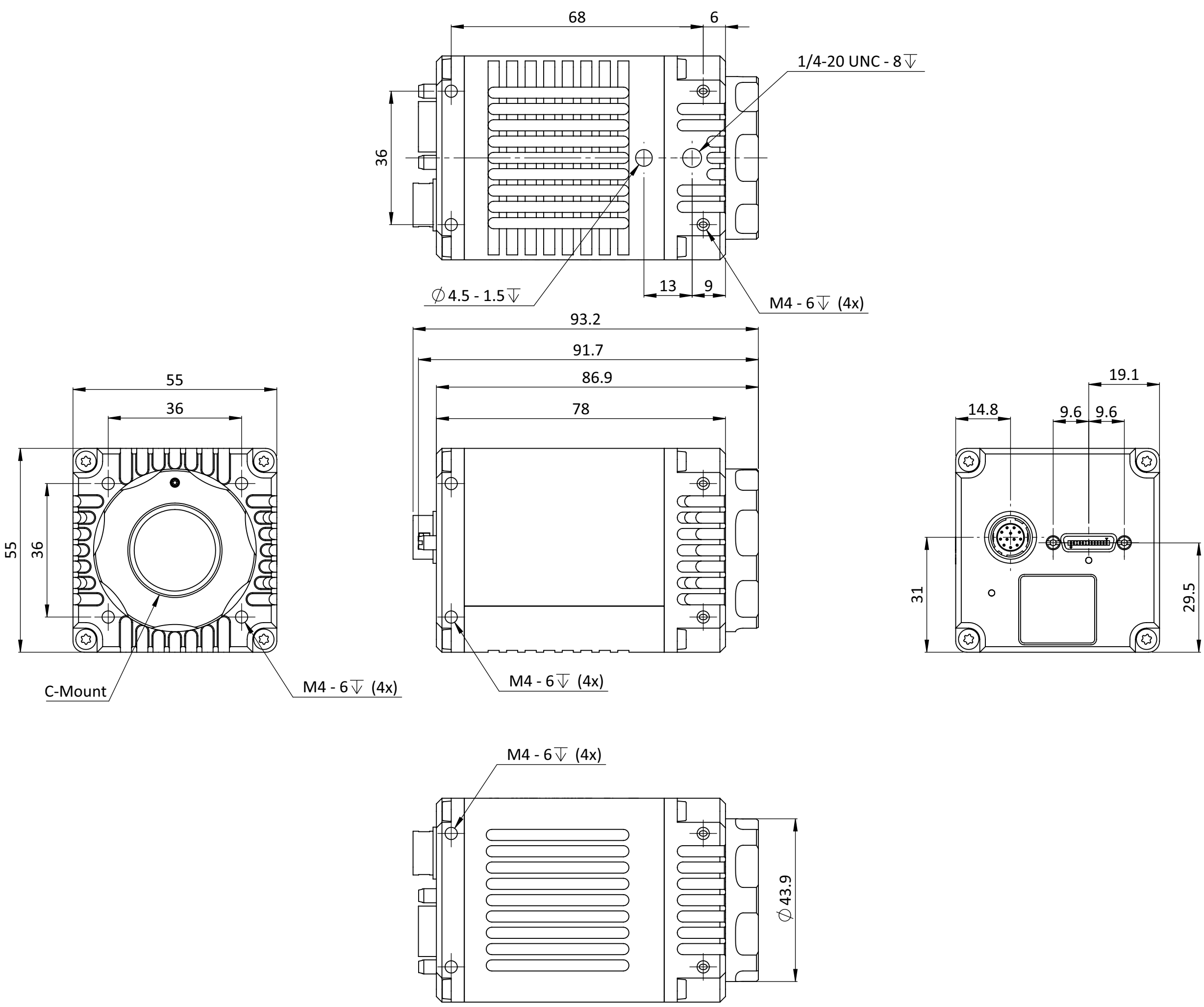


Figure 44: Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with C-Mount adapter Type 1

Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: F-Mount adapter

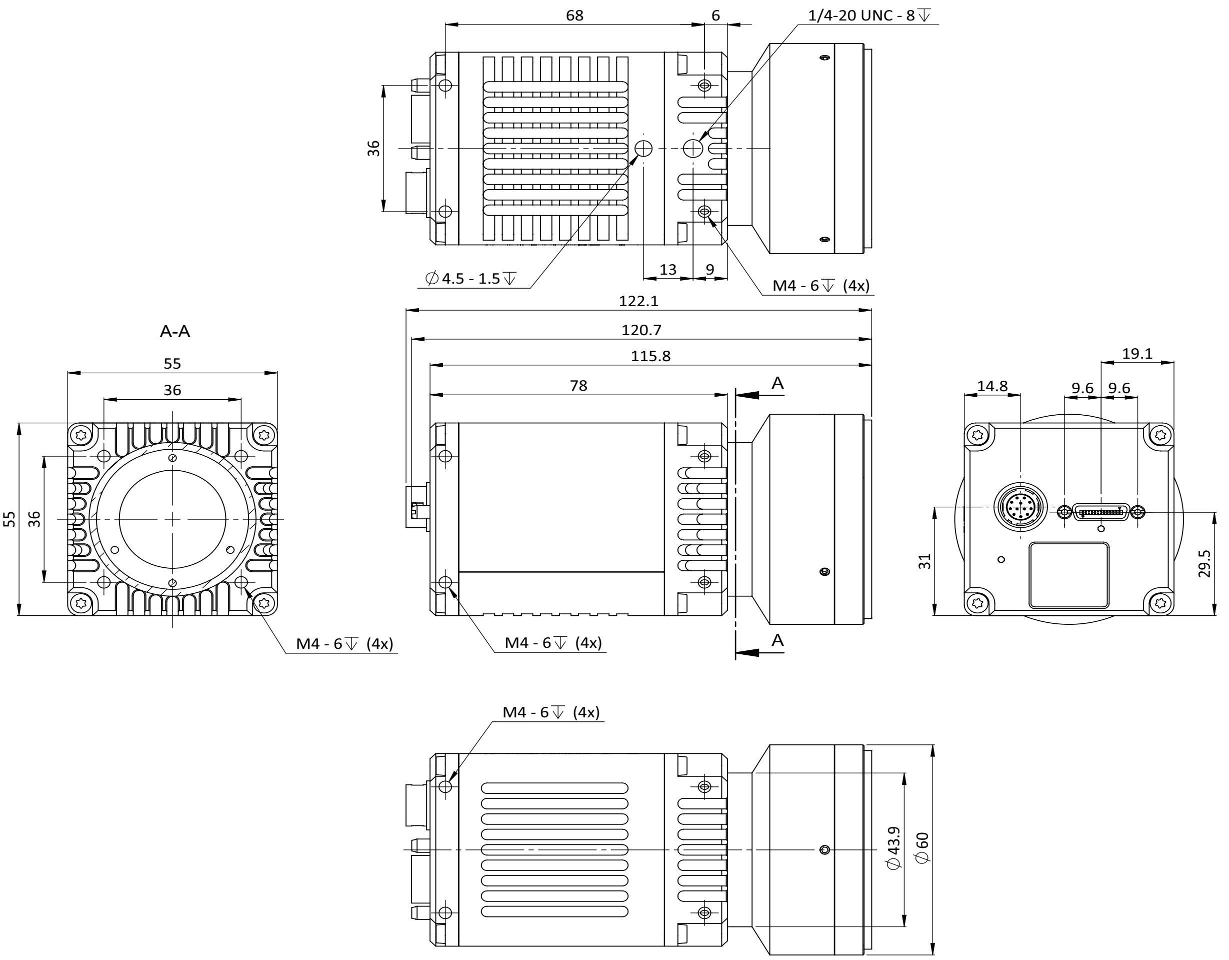


Figure 45: Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with F-Mount adapter

Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless: M42-Mount adapter

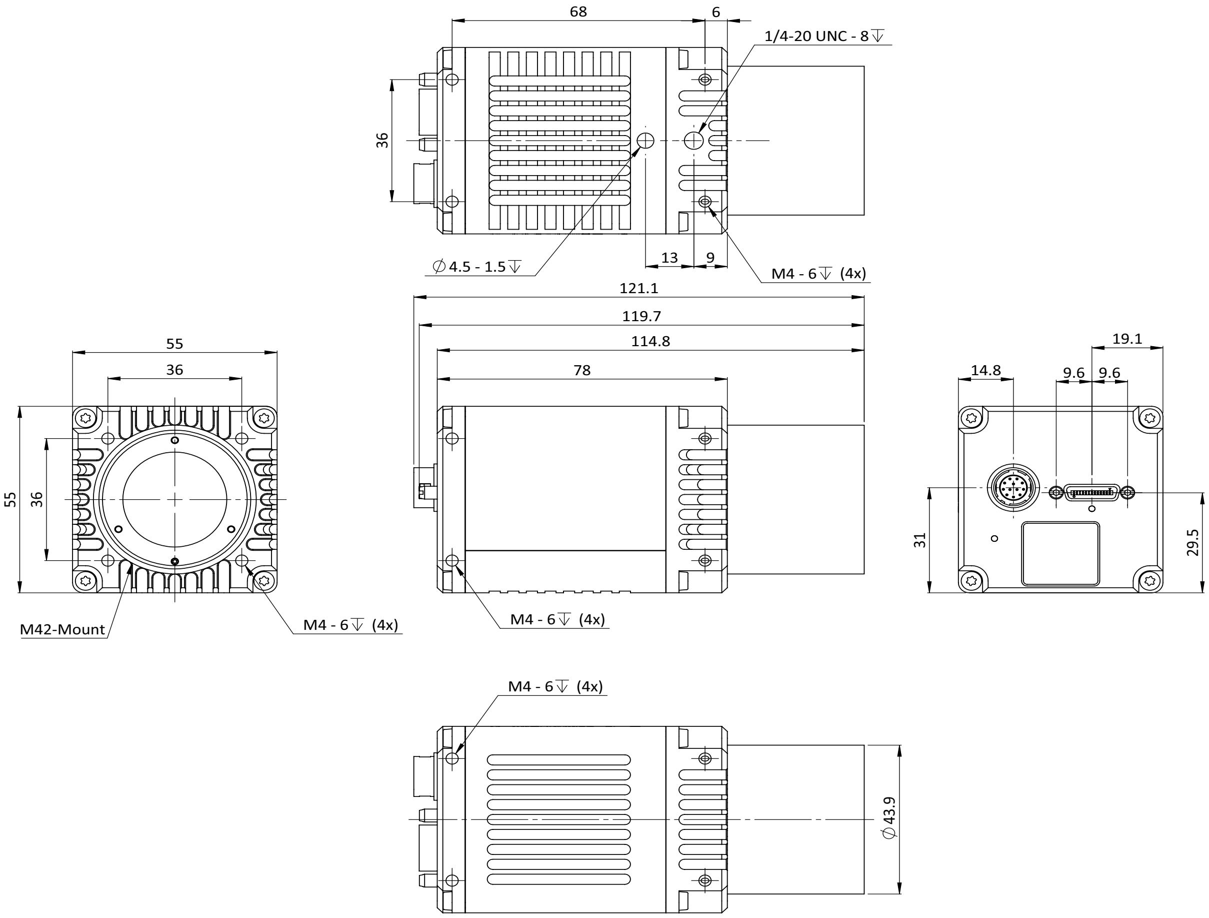


Figure 46: Goldeye CL-008 SWIR TEC1, -032 SWIR TEC1, -033 SWIR TEC1/TECless with M42-Mount adapter

Goldeye CL-034 SWIR TEC1: C-Mount adapter Type 1

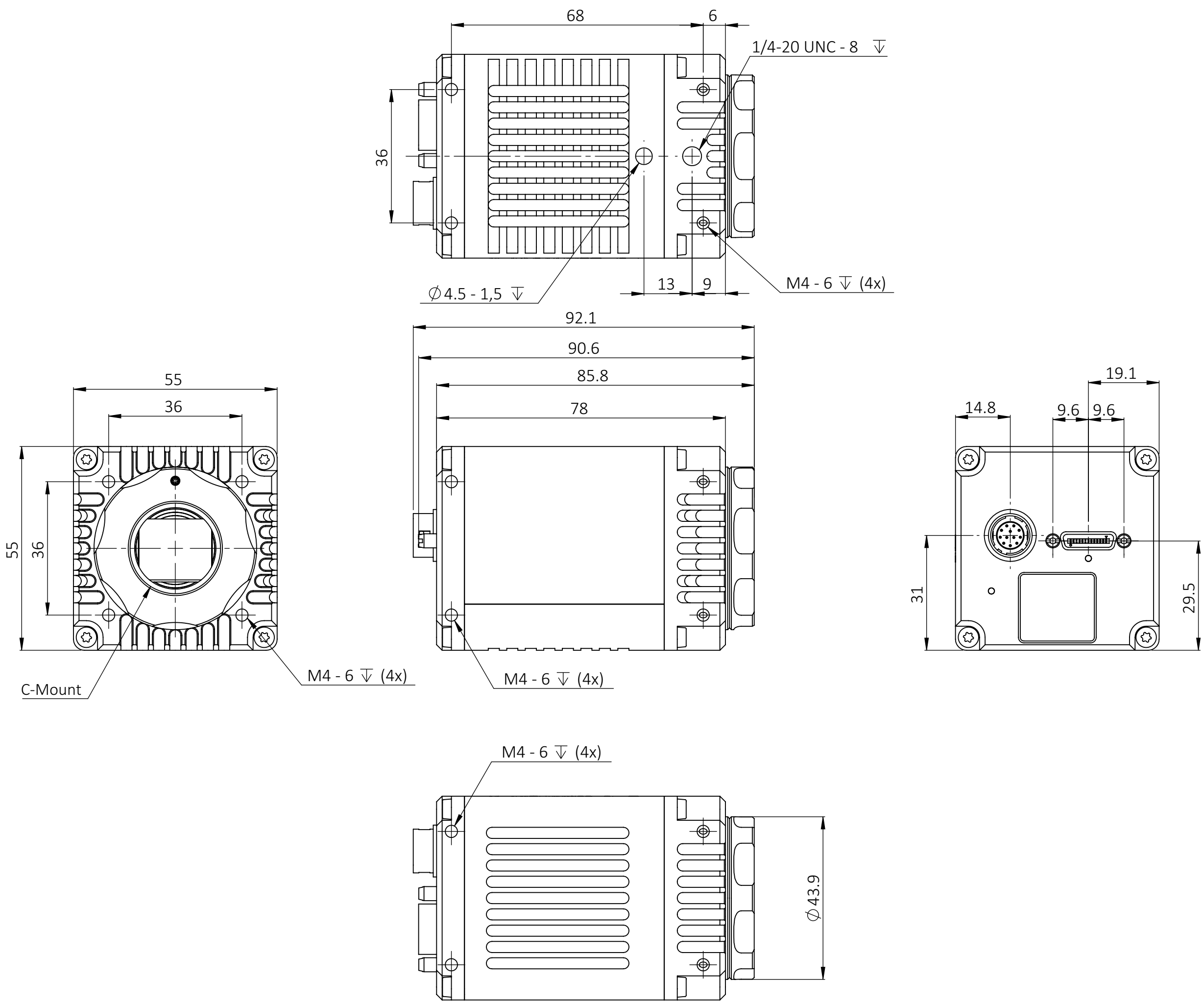


Figure 47: Goldeye CL-034 SWIR TEC1 with C-Mount adapter Type 1

Goldeye CL-034 SWIR TEC1: F-Mount adapter

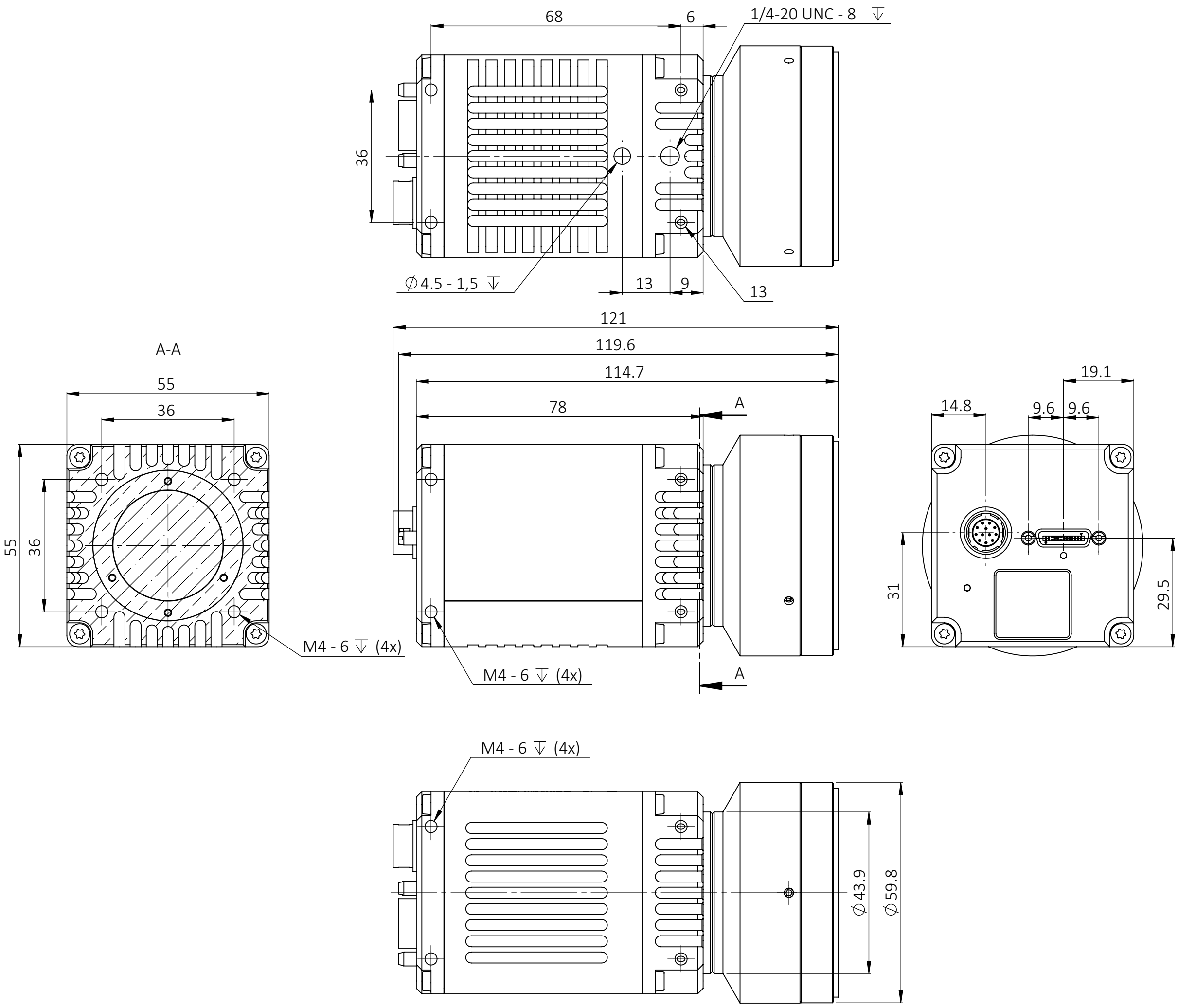


Figure 48: Goldeye CL-034 SWIR TEC1 with F-Mount adapter

Goldeye CL-034 SWIR TEC1: M42-Mount adapter

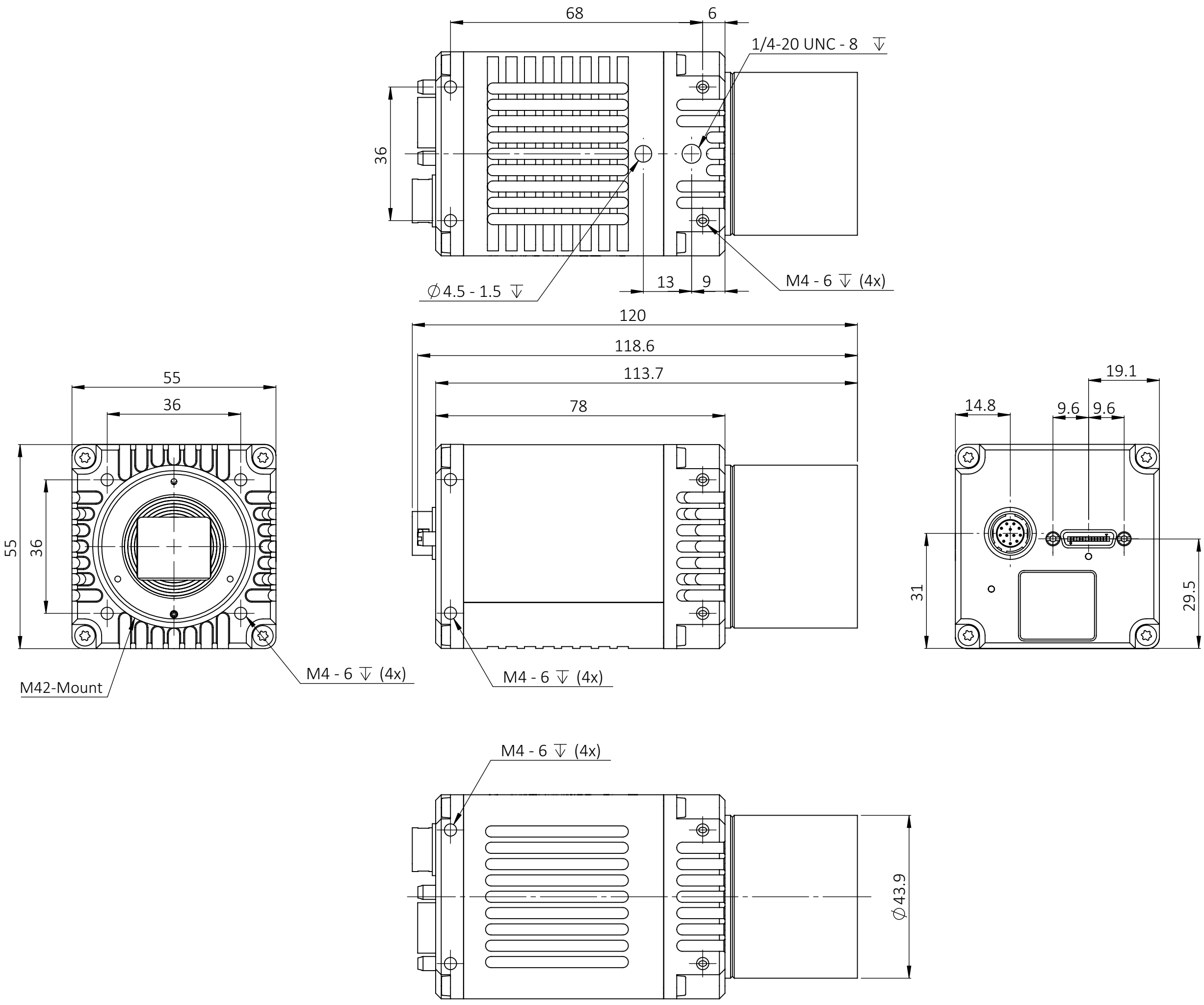


Figure 49: Goldeye CL-034 SWIR TEC1 dimensions with M42-Mount adapter

Goldeye CL-008 SWIR Cool TEC1, -032 SWIR Cool TEC2: C-Mount adapter Type 1

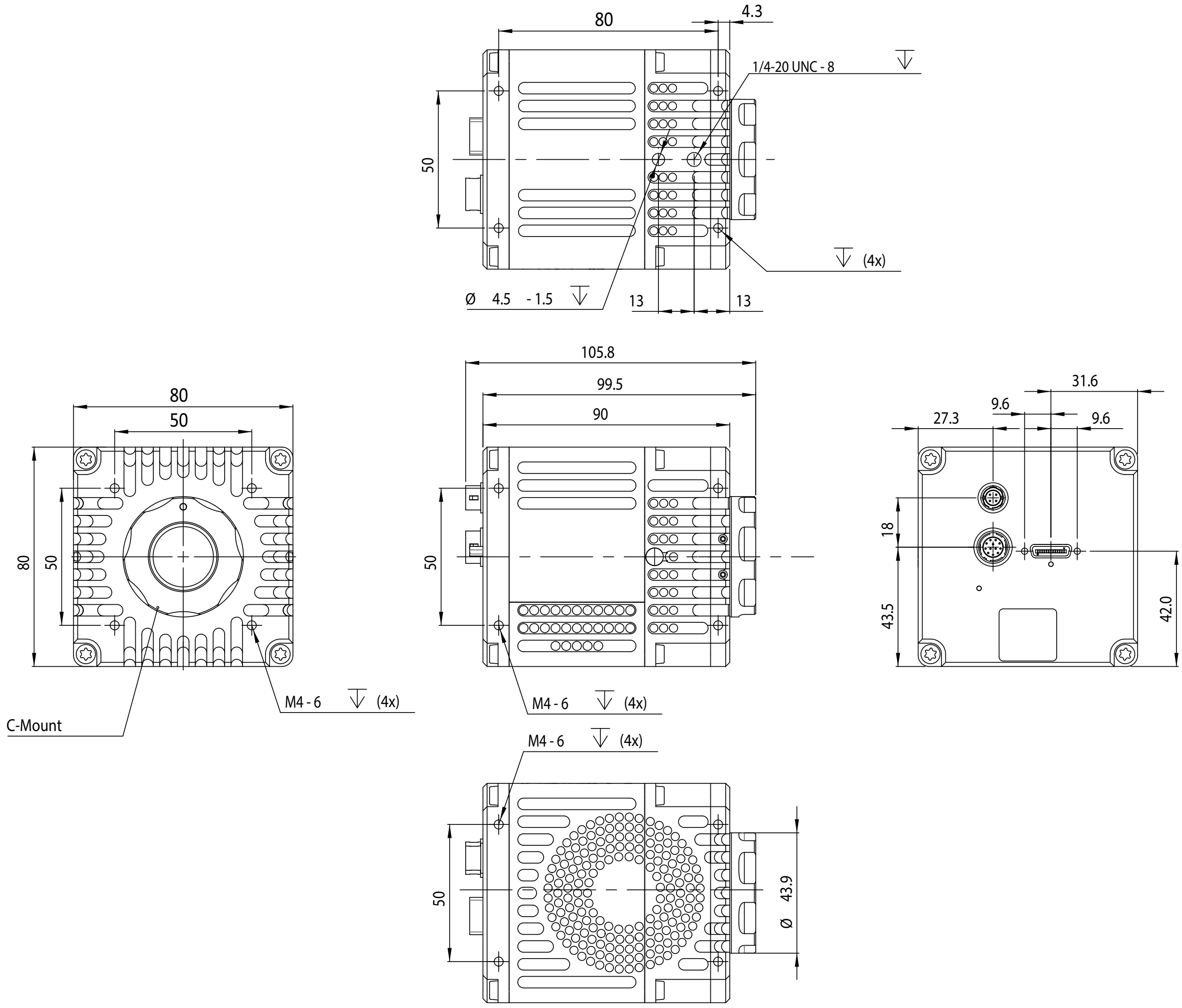


Figure 50: Goldeye CL-008 SWIR Cool TEC1, -032 SWIR Cool TEC2 with C-Mount adapter Type 1

Specifications of lens mount adapters

Lens mount adapters by model

Some Goldeye G/CL models are equipped with a C-Mount adapter by default. Other Goldeye G/CL models are available with separate lens adapters for C-Mount and F-Mount, fitting into the M42-Mount of the camera front flange. To avoid damage to the camera by lens protrusion, a separate lens adapter for M42-Mount is offered for these models as well. See Table 188.

For readily assembled mount adapters with special-purpose optical filter, see Bandpass filter 1450 nm (water filter) on page 223.

Goldeye models	C-Mount	F-Mount	M42-Mount	Filter recess
Goldeye G/CL-008 SWIR TEC1, Goldeye G/CL-008 SWIR Cool TEC1 Goldeye G/CL-032 SWIR TEC1, Goldeye G/CL-032 SWIR Cool TEC2 Goldeye G/CL-033 SWIR TEC1, Goldeye G/CL-033 SWIR TECless Goldeye G/CL-034 SWIR TEC1	✓ **Type 1**	✓	✓	✓
Goldeye G/CL-008 XSWIR 1.9/2.2 TEC2 Goldeye G/CL-030 VSWIR TEC1 Goldeye G/CL-034 SWIR TEC2 Goldeye G/CL-034 XSWIR 1.9/2.2 TEC2 Goldeye G/CL-130 VSWIR TEC1	✓ **Type 2**	—	—	—

Table 188: Lens mount adapters by model

Type 1 and Type 2 for C-Mount adapters

These adapters support standard C-Mount lenses. Type 1 and 2 is used in this document to separate between additional options for lens mounts and filters.

Lens mount adapters: Specifications

Parameter	C-Mount adapter (Type 1)[1]	C-Mount adapter (Type 2)[1]	F-Mount adapter	M42-Mount adapter
Suitable optical filter, diameter	25.0 to 25.5 mm	Filters with C-Mount ring	29.5 to 30.1 mm	29.5to 30.1 mm
Suitable optical filter, thickness	Maximum 2.5 mm[(2)]	Depending on the filter	2.0 to 2.5 mm	2.0 to 2.5 mm
Max. protrusion with filter	6.6 mm	11.0 mm minus filter [(3)] 11.7 mm minus filter [(4)]	35.1 mm[(5)]	34.1 mm[(6)]

[1] See Lens mount adapters by model on page 204 for supported models.

[2] Goldeye G/CL-034: Max. 2.0 mm

[3] Goldeye G/CL-008 XSWIR 1.9/2.2 TEC2,-034 SWIR TEC2,-034 XSWIR 1.9/2.2 TEC2

[4] Goldeye G/CL-030 VSWIR TEC1,-130 VSWIR TEC1

[5] Goldeye G/CL-034: Maximum protrusion with filter is 34.0 mm.

[6] Goldeye G/CL-034: Maximum protrusion with filter is 34.8 mm with a filter diameter of up to 33.0 mm.

Table 189: Specifications of mount adapters

Lens mount adapters: Maximum protrusion

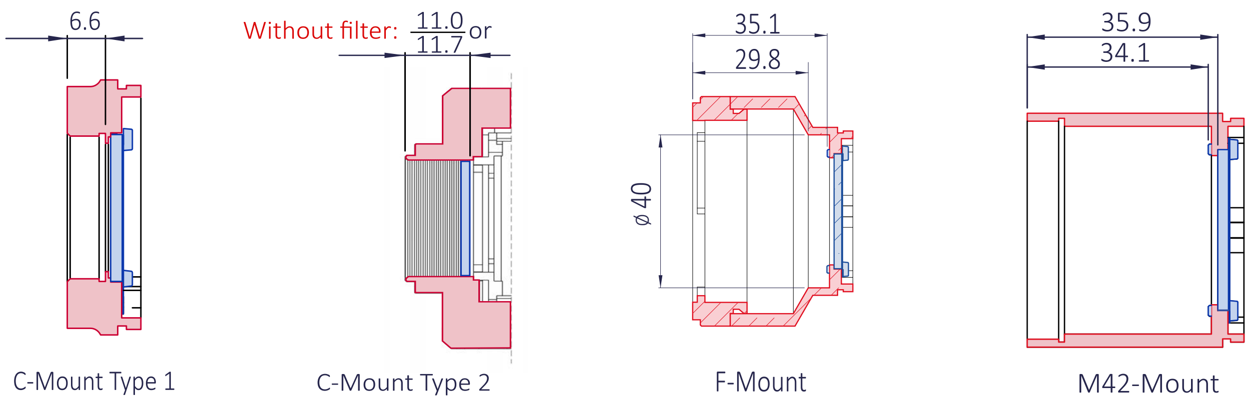


Figure 51: Adapters (red) with filters (blue) and maximum protrusion

Lens mount adapters: Ordering

Availability of lens mount adapters

See Lens mount adapters by model on page 204 for C-Mount adapters Type 1 and Type 2, F-Mount adapters, and M42-Mount adapters.

C-Mount adapter Type 1

Product code	Supported models	Description	Optical filter
1068100	G/CL-008 SWIR, G/CL-032 SWIR, G/CL-033 SWIR	Adapter from M42 to C-Mount	Without optical filter support
1068200	G/CL-034 SWIR TEC1	Adapter from M42 to C-Mount	Without optical filter support
1068800	Models with C-Mount adapter Type 1	Filter mounting set for Goldeye G/CL C-Mount adapter Type 1	Filter support including filter retaining ring, fixtures, tool

Table 190: C-Mount adapter Type 1 and product codes

C-Mount adapter Type 2

These models are equipped with C-Mount adapter Type 2 by default:
Goldeye G/CL-008 XSWIR 1.9/2.2 TEC2, -030/130 VSWIR TEC1,
-034 SWIR/XSWIR TEC2.

No additional adapters or filter recesses are offered.

F-Mount adapters

Product code	Supported models	Description	Optical filter
1068101	G/CL-008 SWIR, G/CL-032 SWIR, G/CL-033 SWIR	Adapter from M42 to F-Mount	Without optical filter support
1068201	G/CL-034 SWIR TEC1	Adapter from M42 to F-Mount	Without optical filter support
1068801	All models, **except for**: G/CL-008 XSWIR 1.9/2.2 TEC2, G/CL-030/130 VSWIR TEC1, G/CL-034 SWIR/XSWIR TEC2	Filter mounting set for Goldeye G/CL F-Mount adapter	Filter support including filter retaining ring, fixtures, tool

Table 191: F-Mount adapter and product codes

M42-Mount adapters

Product code	Supported models	Description	Optical filter
1068103	G/CL-008 SWIR, G/CL-032 SWIR, G/CL-033 SWIR	Adapter from M42 to M42-Mount	Without optical filter support
1068203	G/CL-034 SWIR TEC1	Adapter from M42 to M42-Mount	Without optical filter support
1068801	All models, **except for**: G/CL-008 XSWIR 1.9/2.2 TEC2, G/CL-030/130 VSWIR TEC1, G/CL-034 SWIR/XSWIR TEC2	Filter mounting set for Goldeye G/CL M42-Mount adapter	Filter support including filter retaining ring, fixtures, tool

Table 192: M42-Mount adapter and product codes

Sensor and mount dimensions

Figure 52 shows a schematic view of dimensions between sensor surface, sensor cover glass, and front flange of the camera housing. Table 193 on page 207 shows the corresponding values by Goldeye model.

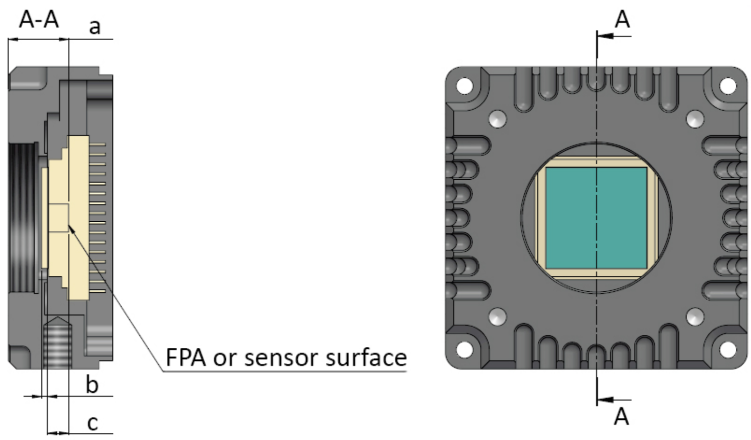


Figure 52: Sensor and mount dimensions (schematic view)

Goldeye model	C-Mount flange focal distance[1]	a Distance sensor[2] to front surface of front flange	b Thickness of sensor cover glass	c Distance FPA[2] to sensor cover glass
G/CL-008 SWIR TEC1	17.35 mm	8.48 mm	0.55 mm	0.17 mm
G/CL-008 SWIR Cool TEC1	17.35 mm	8.55 mm	0.55 mm	0.17 mm
G/CL-008 XSWIR TEC2	17.35 mm	8.05 mm	0.43 mm	0.82 mm
G/CL-030 VSWIR TEC1	17.793 mm	10.97 mm	1.1 mm	3.83 mm
G/CL-032 SWIR TEC2	17.35 mm	8.48 mm	0.43 mm	0.47 mm
G/CL-032 SWIR Cool TEC2	17.35 mm	8.48 mm	0.43 mm	0.47 mm
G/CL-033 SWIR TEC1	17.59 mm	8.72 mm	1 mm	0.44 mm
G/CL-033 SWIR TECless	17.28 mm	8.41 mm	0.55 mm	0.75 mm
G/CL-034 SWIR TEC1	17.35 mm	9.58 mm	0.43 mm	2.42 mm
G/CL-034 SWIR TEC2	17.35 mm	8.05 mm	0.43 mm	0.82 mm
G/CL-034 XSWIR TEC2	17.35 mm	8.05 mm	0.43 mm	0.82 mm
G/CL-130 VSWIR TEC1	17.793 mm	10.97 mm	1.1 mm	3.83 mm
[1]Without filter | [2]Active surface				

Table 193: Sensor and mount dimensions by Goldeye model

Sensor position accuracy

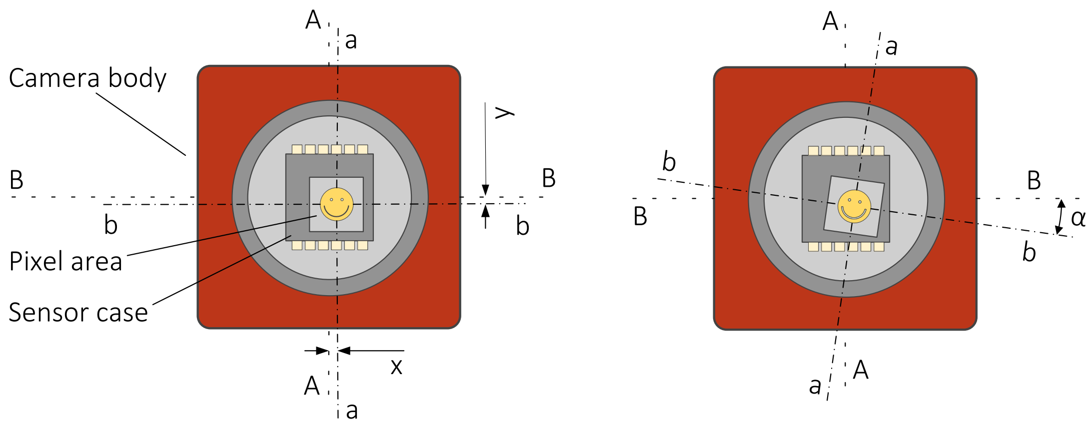


Figure 53: Sensor position accuracy (schematics)

The following table defines the manufacturing accuracy for sensor positioning.

Criteria	Subject	Properties
Alignment method		Optical alignment of the photosensitive sensor area into the camera front module (lens mount front flange)
Reference Points	Sensor	Center of the pixel area (photo sensitive cells)
	Camera	Center of the lens mount
Accuracy	x/y-axis [1]	±150 µm (sensor shift)
	z	+0 µm to -200 µm (optical back focal length)
	α[1]	±0.5 deg (sensor rotation as the deviation from the parallel to the camera bottom)
[1] X/Y- tolerances between the C-Mount hole and the pixel area may be higher.		

Table 194: Sensor position accuracy criteria

Camera feature availability

Goldeye G/CL cameras support a number of standard and extended features. The following tables compare the availability of selected features by model.

Feature descriptions

Goldeye G/CL Features Reference: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation

Image control	Supported models
Auto contrast	All
Auto exposure	All
Background correction	All
Binning	All
Black level	G/CL-030/130 VSWIR
Decimation	G/CL-030/130 VSWIR
DPC (defect pixel correction)	All
Look up table (LUT)	All
Multiple ROIs (regions of interest)	G/CL-008 SWIR/XSWIR, G/CL-030/130 VSWIR, G/CL-034 SWIR/XSWIR
NUC (non-uniformity correction)	All
ROI (region of interest)	All
Ultra short exposure mode	G/CL-030/130 VSWIR

Table 195: Image control features by Goldeye G/CL model

Camera control	Supported models
Acquisition frame rate	All
Bandwidth control (`DeviceLinkThroughputLimit`)	Goldeye G models only
Event channel	All
Firmware update in the field	All
I/O and trigger control	All
Image chunk data	All
Stream hold	All
User sets	All

Table 196: Camera control features by Goldeye G/CL model

Temperature control	Supported models
Temperature management by TEC	All, except for TECless models
Temperature status indicator	All, except for TECless models

Table 197: Temperature control features by Goldeye G/CL model

Lenses and filters

This chapter includes:

About this chapter

This section presents tables that list selected fields of view (FOV) depending on sensor size, distance, and focal length of the lens.

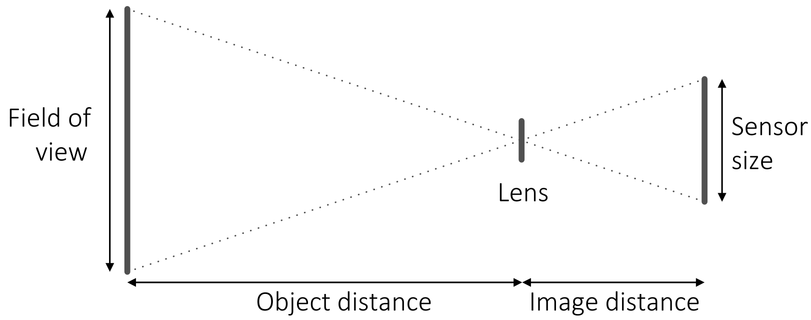


Figure 54: Parameters used in tables for focal length versus FOV

Parameters in tables

The distance to the object is measured from the first principal the plane of the lens to the object. For some lenses, manufacturers do not define the principal plane position. Production spread causes tolerances for all values, including actual focal lengths. Calculations apply for image reproduction without distortion. Therefore, values do not apply for fisheye lenses.

Please ask your Allied Vision Sales representative in case you need more information.

Optical vignetting with certain lenses

Lenses with short focal lengths may show optical vignetting at the edges of the image. Microlenses on the sensor pixels can increase the effect.

For demanding applications, we suggest testing camera and lens to find a suitable setup. If you have questions, please contact your Allied Vision Sales representative.

Focal length vs. field of view

Goldeye G/CL-008 SWIR/XSWIR

Values for Goldeye G/CL-008 SWIR/XSWIR with 9.6 mm × 7.68 mm sensors (12.29 mm diagonal):

Focal length [mm]	Field of view (H × V [mm])	
	Object distance = 500 mm	Object distance = 1000 mm
8	590 × 472	1190 × 952
10	470 × 376	950 × 760
12	390 × 312	790 × 632
16	290 × 232	590 × 472
25	182 × 146	374 × 300
35	128 × 102	265 × 212
50	86 × 69	182 × 146

Table 198: Focal length versus field of view for Goldeye G/CL-008 SWIR/XSWIR

Goldeye G/CL-030 VSWIR

Values for Goldeye G/CL-030 VSWIR with 3.28 mm × 2.6 mm sensors (4.19 mm diagonal):

Focal length [mm]	Field of view (H × V [mm])	
	Object distance = 500 mm	Object distance = 1000 mm
6	270 × 214	543 × 431
8	202 × 160	407 × 322
10	161 × 127	325 × 257
12	133 × 106	270 × 214
16	99 × 79	202 × 160
25	62 × 49	128 × 101
35	44 × 35	90 × 72

Table 199: Focal length versus field of view for Goldeye G/CL-030 VSWIR

Goldeye G/CL-032 SWIR

Values for Goldeye G/CL-032 SWIR with 15.9 mm × 12.7 mm sensors (20.35 mm diagonal):

Focal length [mm]	Field of view (H × V [mm])	
	Object distance = 500 mm	Object distance = 1000 mm
16	481 × 384	978 × 781
25	302 × 241	620 × 495
35	211 × 169	438 × 350
50	143 × 114	302 × 241
75	90 × 72	196 × 157
100	64 × 51	143 × 114

Table 200: Focal length versus field of view for Goldeye G/CL-032 SWIR

Goldeye G/CL-033 SWIR

Values for Goldeye G/CL-033 SWIR with 9.6 mm × 7.68 mm sensors (12.29 mm diagonal):

Focal length [mm]	Field of view (H × V [mm])	
	Object distance = 500 mm	Object distance = 1000 mm
8	590 × 472	1190 × 952
10	470 × 376	950 × 760
12	390 × 312	790 × 632
16	290 × 232	590 × 472
25	182 × 146	374 × 300
35	128 × 102	265 × 212
50	86 × 69	182 × 146

Table 201: Focal length versus field of view for Goldeye G/CL-033 SWIR

Goldeye G/CL-034 SWIR/XSWIR

Values for Goldeye G/CL-034 SWIR/XWSIR with 9.54 mm × 7.62 mm sensors (12.21 mm diagonal):

Focal length [mm]	Field of view (H × V [mm])	
	Object distance = 500 mm	Object distance = 1000 mm
8	587 × 469	1183 × 945
10	467 × 373	944 × 754
12	388 × 310	785 × 627
16	289 × 231	587 × 469
25	181 × 145	372 × 297
35	127 × 101	263 × 210
50	86 × 69	181 × 145

Table 202: Focal length versus field of view for Goldeye G/CL-034 SWIR/XSWIR

Goldeye G/CL-130 VSWIR

Values for Goldeye G/CL-130 VSWIR with 6.4 mm × 5.12 mm sensors (8.2 mm diagonal):

Focal length [mm]	Field of view (H × V [mm](	
	Object distance = 500 mm	Object distance = 1000 mm
6	527 × 422	1060 × 848
8	394 × 315	794 × 635
10	314 × 251	634 × 507
12	260 × 208	527 × 422
16	194 × 155	394 × 315
25	122 × 97	250 × 200
35	85 × 68	176 × 141

Table 203: Focal length versus field of view for Goldeye G/CL-130 VSWIR

Filter specifications

Available filters

This chapter informs about different filters that can be used with Goldeye G/CL cameras.

For **available filters**, see Optical filters and accessories on page 223.

The Modular Concept lists a selection of **standard options**:
www.alliedvision.com/fileadmin/content/documents/products/cameras/various/modular-concept/ModularConcept_external.pdf

Please contact your Allied Vision representative for **more options:**
www.alliedvision.com/en/avt-locations/avt-distributors

General terms explained

In general, these types of filters are used to filter visible and invisible wavelengths of various frequencies:

- **Bandpass filters** are translucent for a certain wavelength, rejecting all wavelengths above and below the defined range.
- **Longpass filters** are translucent from a certain wavelength onwards and for all wavelengths above it, thus rejecting all wavelengths below.
- **Visible cut-off filters** are a subset of longpass filters that prevent visible light from passing to the sensor.
- **Shortpass filters** are translucent up to a certain wavelength and for all wavelengths below, thereby rejecting all wavelengths above.
- **Notch** or **band reject filters** are translucent for all wavelengths above and below a defined range, thereby rejecting all wavelengths of that range. A Band Reject filter can be seen as the opposite of a Bandpass filter.

Bandpass filters

The Goldeye responds to wavelengths from about 900 nm to 1700 nm. Using a bandpass filter, it is possible to restrict the complete bandwidth to a certain range of wavelengths. That way, only a certain wavelength band is transmitted, all others are rejected.

The describing characteristics of a bandpass filter are properties like optical density, or spectral profile. The main characteristics, however, are the center wavelength (CWL) together with the bandwidth (full width at half maximum, FWHM) being transmitted. Bandpass filters can cut the transmitted frequencies more or less sharply. Accordingly, the increase or decrease in gain at the edges of the translucent frequency band is more or less steep. This results in certain properties for each bandpass filter, that are defined by the following terms.

Passband

The passband is the band of wavelengths that the filter allows to pass. Generally, the passband refers to the range of wavelengths between the **Cut-on** and **Cut-off** wavelengths. Therefore, most often the passband is described using the central wavelength and the FWHM.

Stopband

The stopband is the range of wavelengths over which unwanted signals are attenuated. Bandpass filters have two stopbands, one above and one below the passband. As a rule, the end of the stopbands is not precisely defined.

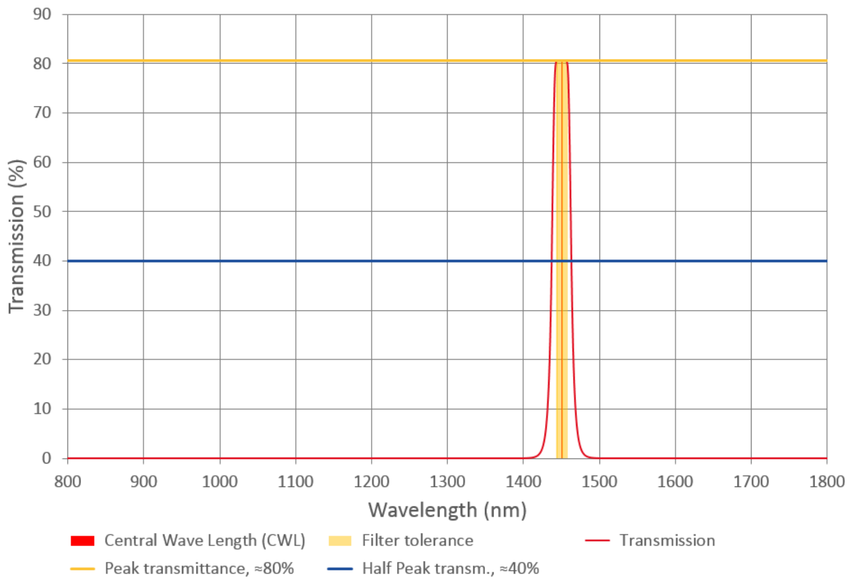


Figure 55: Example of a response curve of a bandpass water filter

CWL (=central wavelength)

The wavelength at the center of the filter's passband. This wavelength is the arithmetical mean of the Cut-on and Cut-off wavelengths.

Cut-on and Cut-off wavelength

The Cut-on wavelength is the wavelength within the transition slope from rejection to pass where the transmittance is at 50% of peak transmittance. The Cut-off wavelength is the wavelength within the transition slope from pass to rejection where the transmittance is at 50% of peak transmittance. The range between both wavelengths is called the **FWHM**.

Peak Transmittance

Also referred to as filter **Transmission Rate**. The peak transmittance describes the maximum amount of light that a filter allows to pass. No filter allows 100% of the light to pass, however, good quality filters allow more light to pass through, thus their transmission rate is closer to 100%. Filters of lower quality appear darker, they transmit only slightly more than 50% of the light.

Tolerance

The range of wavelengths within the passband, equally on both sides of the central wavelength, that provide transmission rates very close to the peak transmittance around the center wavelength.

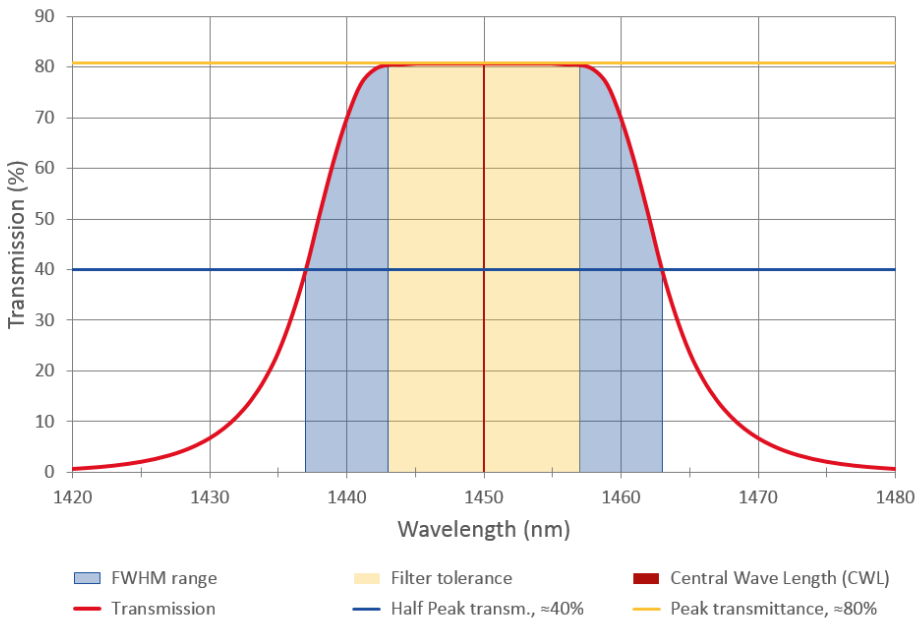


Figure 56: Detail of the water filter pictured in Figure 55*,*
CWL = 1450 nm ±7 nm, FWHM = 26.5 nm

FWHM (Full Width at Half Maximum)

Also called **Half Bandwidth**. Defines the width of the passband of a bandpass filter. It is defined as the range of wavelengths on either side of the CWL where the transmission rate is one half of the peak transmittance or higher.

Half Power Points

Points on both sides of the passband curve of a filter, with a transmission rate that is half of the peak transmittance; the range of wavelengths between these points is called the **FWHM**. The arithmetical mean of the wavelengths of these points is called the **CWL**. The half power points define the **Cut-on** and **Cut-off** wavelengths.

Single and multi band filters

Single band filters provide only one passband.
Multi band filters provide two or more passbands that are separated by a rejection band.

Bandpass filters 1450 nm (water filters)

As an example, the center wavelength of a water filter displayed in Figure 56 is 1450 nm with a tolerance of ±7 nm, and a FWHM bandwidth of 26.5 nm. The maximum transmission of the passband is around 80%. Therefore, the FWHM in this example is defined as the range of frequencies around the CWL where the transmission is 40% or above.

Bandpass filters 1450 nm assembled

See Bandpass filter 1450 nm (water filter) on page 223.

Accessories

This chapter includes:

Website information

You can find suitable accessories for your Goldeye camera on the Allied Vision website: NICs (network interface cards), network switches, Ethernet cables, power supplies and cables, heat sinks, as well as cables for triggering, I/O control, and power. This chapter contains additional information and accessories.

Accessories for Goldeye cameras

- Accessories by Goldeye model: www.alliedvision.com/en/camera-selector
- Accessories overview: www.alliedvision.com/en/products/accessories

Power supply

Goldeye models use different power supplies, see Industrial Design and Scientific Design on page 35:

Goldeye G/CL Industrial Design models

- G/CL-008 SWIR TEC1
- G/CL-030 VSWIR TEC1
- G/CL-032 SWIR TEC1
- G/CL-033 SWIR TEC1/TECless
- G/CL-034 SWIR TEC1
- G/CL-130 VSWIR TEC1

Product code	Description
13869	Power supply 12V DC 24W 12-Pin Hirose Desktop Power Supply 100-240V AC-> 12V 2A DC Hirose 12p without AC power cord

Table 204: Power supply for Goldeye standard models

Goldeye G/CL Scientific Design models

- G/CL-008 SWIR Cool TEC1
- G/CL-008 XSWIR 1.9/2.2 TEC2
- G/CL-032 SWIR Cool TEC2
- G/CL-034 SWIR TEC2
- G/CL-034 XSWIR 1.9/2.2 TEC2

Product code	Description
13867	Power supply 12V DC 24W 4-Pin Hirose Desktop Power Supply 100-240V AC-> 12V 2A DC Hirose 4-pin without AC power cord

Table 205: Power supply for Goldeye Scientific Design models

AC supply cables for power supplies

Product code	Description
13865	AC power cable Length: **1.8** meters EU <-> C13 CEE 7/7 W90 <-> IEC320-C13 for use with IEC320-C14 socket, for power supply 13867 and 13869
13866	AC power cable Length: **1.8** meters US <-> C13 NEMA 5-15P straight <-> IEC320-C13 for use with IEC320-C14 socket, for power supply 13867 and 13869

Table 206: AC supply cables for power supplies

Hirose 4-pin power cables for Goldeye Scientific Design models

See Industrial Design and Scientific Design on page 35.

Product code	Description
1068904	Power cable with Hirose 4-pin female connector to open end Length: **2.0** meters
1068905	Power cable with Hirose 4-pin female connector to open end Length: **3.0** meters
1068906	Power cable with Hirose 4-pin female connector to open end Length: **5.0** meters
1068907	Power cable with Hirose 4-pin female connector to open end Length: **10.0** meters

Table 207: Hirose 4-pin power cables for Goldeye Scientific Design models

12-pin Hirose I/O connector use

The 12-pin Hirose connector supports **only I/O control** for the following models. (The 4-pin Hirose connector is used for power):

- G/CL-008 SWIR Cool TEC1
- G/CL-008 XSWIR 1.9/2.2 TEC2
- G/CL-032 SWIR Cool TEC2
- G/CL-034 SWIR TEC2
- G/CL-034 XSWIR 1.9/2.2 TEC2

The 12-pin Hirose connector supports **I/O control and power supply** for the following models:

- G/CL-008 SWIR TEC1
- G/CL-030 VSWIR TEC1
- G/CL-032 SWIR TEC1
- G/CL-033 SWIR TEC1/TECless
- G/CL-034 SWIR TEC1
- G/CL-130 VSWIR TEC1

Lens mount adapters

Separate lens adapters for various mounts are available for purchase from Allied Vision. These adapters fit into the M42-Mount of the camera front flange.
For readily assembled mount adapters with special-purpose optical filter see Table 210.

Product code	Description
1068100	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR
1068101	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR
1068103	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR
1068200	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-034 SWIR/XSWIR
1068201	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-034 SWIR/XSWIR
1068203	Adapter from M42 to C-Mount without optical filter Goldeye G/CL-034 SWIR/XSWIR

Table 208: Mount adapters for Goldeye Cameras

Optical filters and accessories

NOTICE

Damage to optical filters

Optical filters can easily be scratched and damaged.

Store away unused optical filters carefully.

Filter mounting sets

Availability

Filter mounting sets are available for all Goldeye G/CL models **except for** G/CL-030/130 VSWIR TEC1.

Each optical filter mounting set consists of one filter retaining ring, fixtures, and a fixing tool.

Product code	Description
1068800	C-Mount adapter including filter retaining ring, fixtures, and tool
1068801	F-Mount adapter or M42-Mount adapter, including filter retaining ring, fixtures, and tool

Table 209: Filter mounting sets for Goldeye models

Bandpass filter 1450 nm (water filter)

Availability

Readily assembled mount adapters are available for all Goldeye G/CL models, **except for** G/CL-030/130 VSWIR TEC1.

This bandpass filter has a CWL of 1450 nm and a tolerance of ±7 mm.

The **readily assembled** mount adapters with bandpass filter that are listed in Table 210 have a bandpass filter with a CWL of 1450 nm and FWHM bandwidth of 26.5 nm.

Product code	Goldeye models	Mounting set
1068140	G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR	M42 to C-Mount with 1450 nm bandpass filter
1068141	G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR	M42 to F-Mount with 1450 nm bandpass filter
1068143	G/CL-008 SWIR/XSWIR, G/CL-032 SWIR, G/CL-033 SWIR	M42 to M42-Mount with 1450 nm bandpass filter
1068240	G/CL-034 SWIR/XSWIR	M42 to C-Mount with 1450 nm bandpass filter
1068241	G/CL-034 SWIR/XSWIR	M42 to F-Mount with 1450 nm bandpass filter
1068243	G/CL-034 SWIR/XSWIR	M42 to M42-Mount with 1450 nm bandpass filter

Table 210: Bandpass filters 1450 nm mounting sets

Filters with C-Mount adapter Type 2

C-Mount adapters

See Lens mount adapters by model on page 204 for C-Mount adapters Type 1 and Type 2.

Only for the following models:
Goldeye G/CL-008 XSWIR 1.9/2.2 TEC2, G/CL-030/130 VSWIR TEC1, G/CL-034 SWIR/XSWIR TEC2

Product code	Description
1450	Bandpass filter BP 1450 nm Ø 25.4 mm FWHM: 35 nm | tolerance: ±10 nm
920	Longpass (visible cut-off) LP920-25.4 Ø 25.4 mm

Table 211: Filter for Goldeye models with C-Mount adapter Type 2

Filters for models with C-Mount adapter Type 2

For Bandpass filter BP 1450 and Longpass LP920, see “Spectral transmission of filters” in the Modular Concept at www.alliedvision.com/fileadmin/content/documents/products/cameras/various/modular-concept/ModularConcept_external.pdf.

For other filters, please contact your Allied Vision representative for more options: www.alliedvision.com/en/avt-locations/avt-distributors

Heat sink set

To improve the cooling capability of the temperature-stabilized and TECless Goldeye models, a heat sink set is available that can be mounted to the camera by the customer. Up to four heat sinks can be fitted to one camera.

Product code	Description
1068300	Heat sink set for Goldeye G/CL cameras, including thermal interface pad, fixtures, and mounting tool

Table 212: Heat sink set for Goldeye models

Installing the camera (GigE)

This chapter includes:

Touching hot cameras

CAUTION

Risk of burns

A camera in operation can reach temperature levels which could cause burns.

- Wear protective gloves when you touch a camera that is heated up.
- Ensure proper cooling of the camera.
- See Providing optimum heat dissipation on page 43.

Electrostatic discharge

NOTICE

ESD is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

- Unpacking: Remove the camera from its anti-static packaging only when your body is grounded.
- Workplace: Use a static-safe workplace with static-dissipative mat and air ionization.
- Wrist strap: Wear a static-dissipative wrist strap to ground your body.
- Clothing: Wear ESD-protective clothing. Keep components away from your body and clothing. Even if you are wearing a wrist strap, your body is grounded but your clothes are not.

Mounting the camera

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use all mounting holes of a camera side.
- Always make sure the mounting threads are intact.
- Fasten screws with maximum torque, using the entire thread engagement. For less thread engagement, see Adapting maximum torque values on page 228.
- We recommend you to apply thread locking.
- Use a lens support for heavy lenses.

Mounting Industrial Design models

See Industrial Design and Scientific Design on page 35.

Mounting holes for Goldeye Industrial Design
Except for Goldeye Scientific Design
M4 ↓6.0 ↓7.5
A=M4 | B=0 | C=6.0 | D=7.5

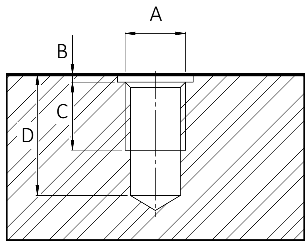


Figure 57: Mounting threads for Industrial Design models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 228.

The camera can be mounted to horizontal or vertical bases, using

- 2 mounting threads for top and bottom mounting
- 4 mounting threads for lateral mounting

The backside has no mounting holes.

1. Mount the camera to the base using suitable M4 screws at 2.7 Nm maximum torque for a thread engagement (C) of 6 mm between screws and mounting threads, see Figure 57. For details, see your model's technical drawings.
2. Continue with Mounting the lens on page 229.

Mounting Scientific Design models

Top, bottom, lateral mounting

See Industrial Design and Scientific Design on page 35.

Mounting holes for Goldeye Scientific Design
Except for front mounting
M4 ↓6.0 ↓8.0
A=M4 | B=0 | C=6.0 | D=8.0

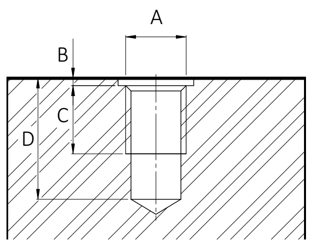


Figure 58: Mounting threads for Scientific Design models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 228.

The camera can be mounted to horizontal or vertical bases, using 4 mounting threads on each side of the camera, except for the back side.

1. Mount the camera to the base using suitable M4 screws at 2.7 Nm maximum torque for a thread engagement (C) of 6 mm between screws and mounting threads, see Figure 58. For details, see your model's technical drawings.
2. Continue with Mounting the lens on page 229.

Front mounting for all models

Mounting holes for all Goldeye models
Front mounting only
M4 ↓7.0 ↓7.0
A=M4 | B=0 | C=7.0 | D=7.0

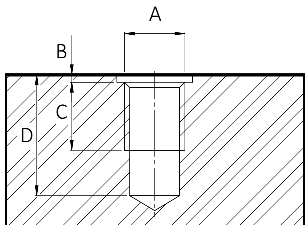


Figure 59: Front mounting threads for all Goldeye models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 228.

The camera can be mounted to horizontal or vertical bases, using four mounting threads on each side of the camera, except for the back side.

1. Mount the camera to the base using suitable M4 screws at 3.4 Nm maximum torque for a thread engagement (C) of 7 mm between screws and mounting threads, see Figure 59. For details, see your model's technical drawings.
2. Continue with Mounting the lens on page 229.

Adapting maximum torque values

The total bolt length composes of the mounting holes length and the height of your mounting base.

For using less than the stated length of thread engagement, calculate maximum torque as follows:

$$\frac{\textbf{Current length of thread engagement}}{\text{Length of thread engagement in table}} \times \text{Torque in table} = \textbf{Current torque}$$

This example relates to Goldeye front mounting for a length of thread engagement of **6 mm** instead of 7 mm: **6 mm** / 7 mm × 3.4 Nm = **2.9 Nm**

Model group	Thread position	Thread type	Total protrusion	Length of thread engagement	Maximum torque
All models	Front mounting	M4	7 mm	7 mm	3.4 Nm
	Front mounting	M4	7 mm	**6 mm**	**2.9 Nm**

Table 213: Adjusting maximum torque values

To ensure that the bolts do not become loose over time, we recommend you to use means for securing bolts, such as screw locking varnish.

1/4” -20 UNC mounting thread

To attach the camera to the common mounting plate of tripods used in photography, a 1/4”-20 UNC mounting thread is located on the camera bottom.

Mounting the lens

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use a lens support for heavy lenses.

CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Be careful when mounting or unmounting lenses.

NOTICE

Damage to the sensor and optical surfaces by dirt and scratches

The image sensor is the most valuable component in Goldeye cameras. The sensor can be permanently damaged if you try to remove dirt from the sensor surface with unsuitable means or if the sensor gets into contact with aggressive agents.

To protect the sensor and the optical path from dirt and droplets, provide the following conditions:

- Dust-free environment
- Low relative humidity
- No condensation.

NOTICE

Damage to the camera by improper cleaning

Goldeye G/CL cameras do not need additional cleaning. Cameras are cleaned before shipping. Incorrect cleaning can damage the sensor or the optical filter.

- Never clean the sensor or the optical filter.
- Protect the optical filter and the sensor from dirt. (Dirt becomes more visible the closer it gets to the sensor.)
- Keep the back lens clean.
- Protect the lens mount by a keep or a lens. Otherwise, hold the camera with the lens mount facing the ground to keep dirt out of the lens mount.
- If you must clean the sensor or filter yourself, see Cleaning optical components on page 325.

NOTICE

Damage to the sensor by focused light and excessive radiation

Protect the sensor from focused sunlight, UV light, lasers, and X-rays.

See Focal length vs. field of view on page 211 to decide on the focal length of the lens for your application.

Suitable lenses

For information on available lenses and accessories for your camera, see www.alliedvision.com/en/products/accessories or contact your Allied Vision Sales representative.

Available lens mounts for Goldeye cameras

For more information on lens mount options, such as C-Mount, F-Mount, and M42-Mount, see the Modular Concept at www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Configuring the host computer

Goldeye G cameras can operate on 100 Megabit or Gigabit speed NICs. To reach the maximum camera frame rate, a Gigabit speed NIC with jumbo packet support is required.

If your host computer has an available Ethernet port, this can be used with your Goldeye G camera. We recommend that your camera system uses a dedicated Ethernet port not shared with internet or local area networks. If more ports are needed, or your existing NIC is unable to operate at Gigabit Ethernet speeds, installing additional hardware may be required.

- For desktop systems, install a PCI Express bus NIC.
- For laptops, use an expansion slot via a Gigabit Ethernet Express card.

Usage on mixed-use networks (with printers, internet or email, and other devices) is possible but may impact camera performance, for example, frame rate. Check with your IT administrator if required for network configuration.

For a list of Ethernet adapters available for purchase from Allied Vision, please contact Allied Vision sales representative or your local Allied Vision distribution partner.

Compatible interface slot

Verify that there is an available and compatible interface slot on the host computer before purchasing the desired NIC.

Installing the NIC driver

Install the network card driver from your network card manufacturer. If no installation application is provided, update the driver manually.

To update the driver manually

1. Click the **Start** icon and select **Control Panel** in the menu.
2. Click **View by Large Icons** and select **Device Manager** in the list.
3. Under **Network Adapters**, locate the Ethernet NIC, right-click the entry, and select **Update Driver Software** in the menu.
4. Select the **Search automatically for updated driver software or Browse my computer for driver software**.
5. Click **Close** after the driver has been installed.

IP settings

After the initial NIC hardware installation, connect the NIC directly to the camera. The default configuration assigns an IP address automatically using the LLA (Link-Local Address) range of 169.254.xxx.xxx or an address defined by the DHCP (Dynamic Host Configuration Protocol) server, if present. This setup is a typical solution for single-camera operation or multiple cameras connected to the same NIC.

If you are going to operate multiple cameras on different networks, you can use the following configuration as a template.

All network devices (such as NICs, hubs or GigE cameras) require unique IP addresses. But connected devices must share the same address space. In the example shown in Table 214, 3 cameras are connected to a common host PC, using 2 separate NICs. The address space for NIC 1 is 192.168.**100**, for NIC 2 it is 192.168.**101**:

Device	IP address	Subnet mask	Default gateway
NIC 1	192.168.100.1	255.255.255.0	Blank
Camera 1 connected to NIC 1	192.168.100.2	255.255.255.0	Blank
NIC 2	192.168.101.1	255.255.255.0	Blank
Camera 2 connected to NIC 2	192.168.101.2	255.255.255.0	Blank
Camera 3 connected to NIC 2	192.168.101.3	255.255.255.0	Blank

Table 214: Static IP addresses for NICs and connected cameras

Optimizing system performance

The NIC should be adjusted to improve system performance when using a GigE Vision camera. This performance is related to minimizing CPU usage and dropped or resent packets.

Edit the NIC driver properties according to the values in the following table. The names and availability of the properties listed may vary depending on NIC manufacturer and model.

Property	Value
Packet size or maximum transmission unit	8228 bytes or larger
Interrupt moderation	Enable
Interrupt moderation rate	Extreme
Receive buffers	Maximum value configurable
Transmit buffers	256 bytes

Table 215: Network interface card driver settings

Default packet size

The default packet size of Goldeye G cameras is 8228 bytes. The host NIC needs to support a packet size of equal or larger size to stream from the camera.

NIC settings

The NIC settings may also vary depending on your system configuration and the NIC manufacturer.

For desktop systems, use a PCI Express bus NIC. For laptops, use an expansion slot via an ExpressCard®.

Enabling jumbo packets

The properties listed for the NIC may include either **Jumbo Packet** or **Jumbo Frames** depending on the manufacturer. If neither is listed under properties, your network card may not support this feature. You must use a NIC that supports Jumbo Frames or Jumbo Packets.

To enable jumbo packets

1. Click the **Start** icon and select **Control Panel** in the menu.
2. Click **View by Large Icons** and select **Device Manager** in the list.
3. Under **Network Adapters**, locate the Ethernet NIC, right-click the entry, and select **Properties** in the menu.
4. Select the **Advanced** tab.
5. Select the property **Jumbo Packet** and set the value to 9014 Bytes.
6. Click **OK** to save the settings.

Support by various Gigabit Ethernet cards

The settings list in the advanced adapter settings may vary between various types and brands of Gigabit Ethernet network cards (NICs). Common expressions are Jumbo Frames or Jumbo Packet.

If Jumbo Frames or Jumbo Packet does not appear in this list, your NIC may not support it. Without this capability, you may not be able to achieve the full performance of the camera. Higher frame rates can increase the power consumption. See Specifications (GigE models) on page 52 for details.

Connecting camera and host computer

After you have installed **Vimba X Viewer** or a third-party application to your host computer, connect your Goldeye G camera via a CAT5e or higher rated Ethernet cable to connect the camera to the NIC. Crossover cabling is not required but does work. The camera has circuitry to determine if a crossover cable is being used.

Avoiding dropped frames

Unsuitable GigE cables may not sustain peak interface bandwidth; leading to lost connectivity or dropped frames coming from the camera.

Use CAT5e or higher rated Ethernet cables.

If your camera is not PoE powered, connect the Hirose cable to power the camera. Goldeye G cameras are GigE Vision v1.2 compliant. This means they are compatible with third-party software that offers a GigE Vision driver.

Powering up the camera

A camera power adapter for each Goldeye G camera is available from Allied Vision. See the Specifications chapter for connector definition and voltage specifications.

NOTICE

Damage to the camera by unsuitable power supplies

- Verify all external connections in terms of voltage levels, power requirements, voltage polarity before powering the device.
- Use only DC power supplies with insulated housings.
- **PoE+** for G-008 XSWIR TEC2, G-032 SWIR Cool TEC2, G-034 SWIR TEC2, G-034 XSWIR TEC2: IEEE 802.3at Type 2 Class 4 compliant PoE power sourcing equipment devices such as switches, injectors, or NICs
- **PoE** for all other Goldeye models: IEEE 802.3at Type 1 Class 0 compliant PoE power sourcing equipment devices such as switches, injectors, or NICs

Available power supplies by Allied Vision

The following power supplies and power cables are available:

- 13867 Desktop power supply Goldeye G/CL Scientific Design
- 13869 Desktop power supply Goldeye G Industrial Design
- 13866 AC power cable, 1.8 m, US to C13
- 13865 AC power cable, 1.8 m, EU to C13

See Power supply on page 220.

NOTICE

Damage to the camera by exceeding the specified environmental conditions

- Operate Goldeye cameras only under conditions defined in Specifications (GigE models) on page 52.
- Ensure to maintain the operating temperature specified in Specifications (GigE models) on page 52.
- For heat dissipation, see Providing optimum heat dissipation on page 43.

Maximum length of I/O cables

The camera is not intended to be connected to a DC distribution network. The maximum length for I/O cables must not exceed 30 meters.

To power up the camera, plug the 12-pin Hirose connector into the camera and wait for the boot phase to complete. For Scientific Design models, use the 4-pin Hirose connector. The boot phase is indicated by a steady flashing of the Ethernet status LEDs.

Hardware Selection

Cameras powered by both the Hirose I/O port and the Gigabit Ethernet port use the power provided by Hirose I/O port only.

Powering the camera via PoE

Note the following when using PoE accessories with PoE-capable GigE cameras:

- **PoE+** for G-008 XSWIR TEC2, G-032 SWIR Cool TEC2, G-034 SWIR TEC2, G-034 XSWIR TEC2: IEEE 802.3at Type 2 Class 4 compliant PoE power sourcing equipment devices such as switches, injectors, or NICs
- **PoE** for all other Goldeye models: IEEE 802.3at Type 1 Class 0 compliant PoE power sourcing equipment devices such as switches, injectors, or NICs
- Ensure that your PSE provides data over all four pairs.
- If the PSE uses only two out of four pairs for data, operation is limited to 10/100 Mbps. This translates to lower frame rates.
- If the PSE uses all four pairs for data, operation is in Gigabit (1000 Mbps) mode. Therefore, allowing you to achieve the maximum possible frame rate.

Software for your Goldeye G camera

Goldeye G cameras work with the following software options:
- **Vimba X Viewer** or **Vimba X SDK**
- Third-party software solutions

Allied Vision software

Software packages provided by Allied Vision contain such as:
- Drivers
- SDK for camera control and image acquisition
- Examples based on the provided APIs of the SDK
- Documentation and release notes
- Viewer application to operate and configure the cameras

Vimba X is Allied Vision's GenICam-based SDK with transport layers for all Allied Vision cameras with GigE Vision, USB3 Vision, IEEE 1394, and Camera Link (CL) interface. **Vimba X** runs on Windows, Linux, and Linux for ARM. You can port your source code from Windows to Linux or cross-compile from a Linux PC to an embedded system.

Vimba X provides APIs for C, C++, and .NET. Users who quickly want to develop a straightforward application love the simplicity of the C API or the .NET API.

Advanced users with high demands appreciate the C++ API, which is designed as a highly efficient and sophisticated API for advanced object-oriented programming including the STL (standard template library), shared pointers, and interface classes.

Vimba X includes programming examples in C, C++, and C# and an extensive user documentation.

Vimba X download

Download **Vimba X SDK** from www.alliedvision.com/en/products/software/vimba-x-sdk.

After installing, documentation is located under `\Program Files\Allied Vision\Vimba X`.

Third-party software

Above software provided by Allied Vision, other GigE Vision standard compliant third-party software options are available. In general, third-party software provides increased functionality such as image processing and video recording.

GenICam-based third-party software automatically connects with the transport layers of **Vimba X**. Additionally, the separate **Vimba X Cognex Adapter** supports **Cognex VisionPro**.

Acquiring a first image

After configuring the host PC, the camera parameters must be set to establish the connection with best performance. After that, launch the camera in **Vimba X Viewer**:

1. Power up the camera. Booting has been finished when the Ethernet Status LEDs stops blinking.
2. Launch **Vimba X Viewer**. The **Detected Cameras** list appears after a few seconds, depending on the number of cameras connected to the PC.
3. Select your camera from **Detected Cameras** list. A new camera window opens.

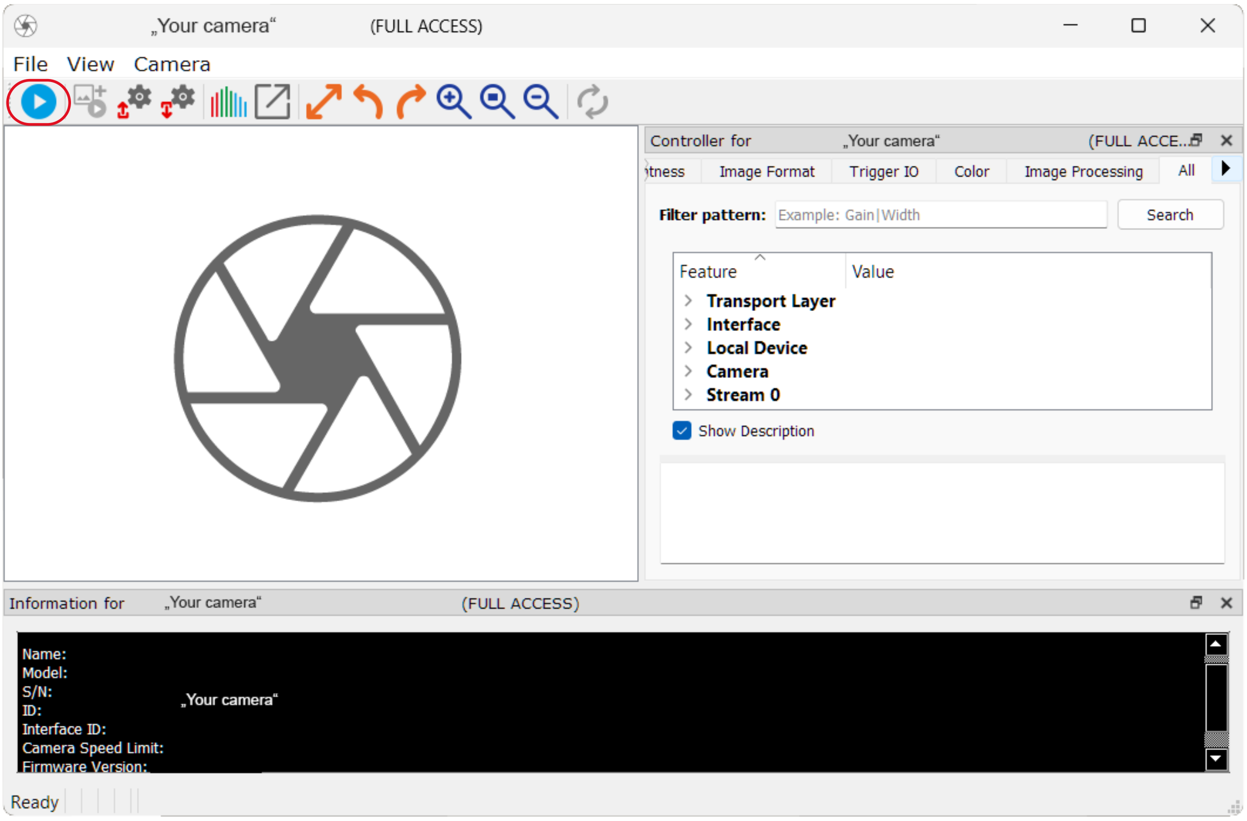


Figure 60: Vimba X Viewer

To start continuous image acquisition with default camera settings, click the **freerun** button in the viewer toolbar. To stop the acquisition, click it again.

Is the camera powered?

If you cannot reach the camera, check the GigE status LED at the GigE port on the backside of the camera. Once the camera is booted, the green LED remains active as long as the camera is connected to power. See GigE status LEDs on page 265 for details.

Installing the camera (CL)

This chapter includes:

Touching hot cameras

CAUTION

Risk of burns

A camera in operation can reach temperature levels which could cause burns.

- Wear protective gloves when you touch a camera that is heated up.
- Ensure proper cooling of the camera.
- See Providing optimum heat dissipation on page 43.

Electrostatic discharge

NOTICE

ESD is dangerous for electronic devices, especially when tools or hands get in contact with connectors. We recommend measures to avoid damage by ESD:

- Unpacking: Remove the camera from its anti-static packaging only when your body is grounded.
- Workplace: Use a static-safe workplace with static-dissipative mat and air ionization.
- Wrist strap: Wear a static-dissipative wrist strap to ground your body.
- Clothing: Wear ESD-protective clothing. Keep components away from your body and clothing. Even if you are wearing a wrist strap, your body is grounded but your clothes are not.

Mounting the camera

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use all mounting holes of a camera side.
- Always make sure the mounting threads are intact.
- Fasten screws with maximum torque, using the entire thread engagement. For less thread engagement, see Adapting maximum torque values on page 240.
- We recommend you to apply thread locking.
- Use a lens support for heavy lenses.

Mounting Industrial Design models

(See Industrial Design and Scientific Design on page 35.)

Mounting holes for Goldeye Industrial Design
Except for Goldeye Scientific Design
M4 ↓6.0 ↓7.5
A=M4 | B=0 | C=6.0 | D=7.5

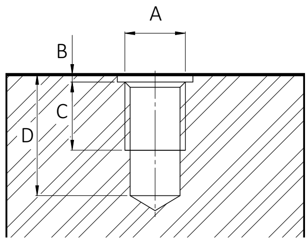


Figure 61: Mounting threads for Industrial Design models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 240.

The camera can be mounted to horizontal or vertical bases, using

- 2 mounting threads for top and bottom mounting
- 4 mounting threads for lateral mounting

The backside has no mounting holes.

1. Mount the camera to the base using suitable M4 screws at 2.7 Nm maximum torque for a thread engagement (C) of 6 mm between screws and mounting threads, see Figure 61. For details, see your model's technical drawings.
2. Continue with Mounting the lens on page 241.

Mounting Scientific Design models

(See Industrial Design and Scientific Design on page 35.)

Top, bottom, lateral mounting

Mounting holes for Goldeye Scientific Design
Except for front mounting
M4 ↓6.0 ↓8.0
A=M4 | B=0 | C=6.0 | D=8.0

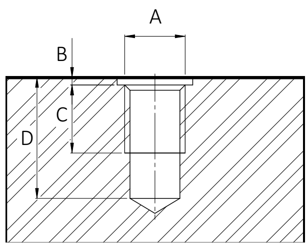


Figure 62: Mounting threads for Scientific Design models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 240.

The camera can be mounted to horizontal or vertical bases, using 4 mounting threads on each side of the camera, except for the back side.

1. Mount the camera to the base using suitable M4 screws at 2.7 Nm maximum torque for a thread engagement (C) of 6 mm between screws and mounting threads, see Figure 62. For details, see your model's technical drawings.
2. Continue with Mounting the lens on page 241.

Front mounting for all models

Mounting holes for all Goldeye models
Front mounting only
M4 ↓7.0 ↓7.0
A=M4 | B=0 | C=7.0 | D=7.0

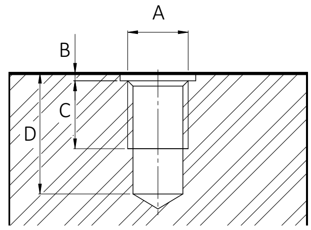


Figure 63: Front mounting threads for all Goldeye models

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 240.

The camera can be mounted to horizontal or vertical bases, using four mounting threads on each side of the camera, except for the back side.

1. Mount the camera to the base using suitable M4 screws at 3.4 Nm maximum torque for a thread engagement (C) of 7 mm between screws and mounting threads, see Figure 63. For details, see your model’s technical drawings.
2. Continue with Mounting the lens on page 241.

Adapting maximum torque values

The total bolt length composes of the mounting holes length and the height of your mounting base.

For using less than the stated length of thread engagement, calculate maximum torque as follows:

$$\frac{\text{Current length of thread engagement}}{\text{Length of thread engagement in table}} \times \text{Torque in table} = \text{Current torque}$$

This example relates to Goldeye front mounting for a length of thread engagement of **6 mm** instead of 7 mm:
6 mm / 7 mm × 3.4 Nm = **2.9 Nm**

Model group	Thread position	Thread type	Total protrusion	Length of thread engagement	Maximum torque
All models	Front mounting	M4	7 mm	7 mm	3.4 Nm
	Front mounting	M4	7 mm	**6 mm**	**2.9 Nm**

Table 216: Adjusting maximum torque values

To ensure that the bolts do not become loose over time, we recommend you to use means for securing bolts, such as screw locking varnish.

1/4” -20 UNC mounting thread

To attach the camera to the common mounting plate of tripods used in photography, a 1/4”-20 UNC mounting thread is located on the camera bottom.

Mounting the lens

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of cameras and lenses, especially for dynamic applications.
- Mount cameras as described in the instructions.
- Use a lens support for heavy lenses.

CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Be careful when mounting or unmounting lenses.

NOTICE

Damage to the sensor and optical surfaces by dirt and scratches

The image sensor is the most valuable component in Goldeye cameras. The sensor can be permanently damaged if you try to remove dirt from the sensor surface with unsuitable means or if the sensor gets into contact with aggressive agents.

To protect the sensor and the optical path from dirt and droplets, provide the following conditions:

- Dust-free environment
- Low relative humidity
- No condensation.

NOTICE

Damage to the camera by improper cleaning

Goldeye G/CL cameras do not need additional cleaning. Cameras are cleaned before shipping. Incorrect cleaning can damage the sensor or the optical filter.

- Never clean the sensor or the optical filter.
- Protect the optical filter and the sensor from dirt. (Dirt becomes more visible the closer it gets to the sensor.)
- Keep the back lens clean.
- Protect the lens mount by a keep or a lens. Otherwise, hold the camera with the lens mount facing the ground to keep dirt out of the lens mount.
- If you must clean the sensor or filter yourself, see Cleaning optical components on page 325.

NOTICE

Damage to the sensor by focused light and excessive radiation

Protect the sensor from focused sunlight, UV light, lasers, and X-rays.

See Focal length vs. field of view on page 211 to decide on the focal length of the lens for your application.

Suitable lenses

For information on available lenses and accessories for your camera, see www.alliedvision.com/en/products/accessories or contact your Allied Vision Sales representative.

Available lens mounts for Goldeye cameras

For more information on lens mount options, such as C-Mount, F-Mount, and M42-Mount, see the Modular Concept at www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Installing PC hardware and software

Frame grabbers

Almost every frame grabber compatible to Camera Link Base can be used to operate a Goldeye CL camera.

Application Note: Usage of frame grabbers with Goldeye CL cameras

Refer to this application note for detailed requirements:
www.alliedvision.com/fileadmin/content/documents/products/cameras/Goldeye_2/appnote/Goldeye-Framegrabber_AppNote_en.pdf.

Installing a frame grabber

For the installation of a frame grabber, the computer must meet the minimum system requirements of the frame grabber.

Find the requirements in the technical manual of the frame grabber.

Refer also to the frame grabber installation manual provided by the manufacturer regarding installation details.

Installing frame grabber software

Read the frame grabber software installation guide provided by the frame grabber manufacturer.

More information about frame grabbers:

For more information about compatibility of various frame grabber models and system installation, refer to the application note Usage of Frame grabbers with Goldeye CL Cameras at: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Installing camera software

This section presents instructions for software installation specific to Windows 7. Goldeye CL cameras can be operated under later versions of Windows as well. Allied Vision offers **Vimba** as the main SDK for its CL cameras.

To install the **Vimba SDK** plus corresponding **Vimba Viewer**, read Installing Vimba Viewer on Windows on page 243.

Note that there is no Linux support for Camera Link with **Vimba**.

Frame grabber configuration files

Some frame grabber applications use configuration files for a certain camera. If you need configuration files, please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Installing Vimba Viewer on Windows

You can install the **Vimba Viewer** on Windows 7, Windows 8.1, and Windows 10. For installing, follow these steps:

Step 1: To start the installation, run the corresponding installer.

Step 2: Select an installation level suitable for you.

Step 3: Click **Start**. The installer will guide you through the installation process.

Connecting camera and host computer

After you have installed **Vimba Viewer** or a third-party application to your host computer, connect your Goldeye CL camera via Camera Link cable with an SDR-26 connector for the camera side.

For information on the required connector type for the frame grabber (MDR-26 or SDR-26), refer to the frame grabber manual.

Supported frame grabbers

You can find recommendations in the Frame Grabbers for Goldeye CL Cameras application note at www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Goldeye CL cameras work with the following software options:

- **Vimba Viewer** or **Vimba SDK**
- Third-party software solutions

To acquire images, the frame grabber SDK must be used.

Powering up the camera

NOTICE

Damage to the camera and connected peripherals by high inrush current

Camera Link does not support Hot Plugging, such as GigE or USB interfaces. Therefore, Goldeye CL cameras and the connected peripherals can be damaged if they are connected or disconnected improperly.

Always connect Goldeye CL cameras in the following order:

1. Connect the Camera Link cable.
2. Connect the power supply. Use only power supplies offered by Allied vision or ensure that third party equipment fulfills to the power specifications of your Goldeye CL model.

Consequently, disconnect Goldeye CL in the following order:

1. Disconnect the power supply.
2. Disconnect the Camera Link cable.

NOTICE

Damage to the camera by unsuitable power supplies

- Verify all external connections in terms of voltage levels, power requirements, voltage polarity before powering the device.
- Use only DC power supplies with insulated housings.

Available power supplies by Allied Vision

The following power supplies and power cables are available:

- 13867 Desktop power supply Goldeye G/CL Scientific Design
- 13869 Desktop power supply Goldeye CL Industrial Design
- 13866 AC power cable, 1.8 m, US to C13
- 13865 AC power cable, 1.8 m, EU to C13

See Power supply on page 220.

NOTICE

Damage to the camera by exceeding the specified environmental conditions

- Operate Goldeye cameras only under conditions defined in Specifications (GigE models) on page 52.
- Ensure to maintain the operating temperature specified in Specifications (GigE models) on page 52.
- For heat dissipation, see Providing optimum heat dissipation on page 43.

Maximum length of I/O cables

The camera is not intended to be connected to a DC distribution network. The maximum length for I/O cables must not exceed 30 meters.

The boot phase is indicated by a steady flashing of the Camera Link status LED.

Camera control and image viewing

Configuring your camera

After the host PC is configured, it is necessary to configure the parameters in the camera to establish the connection with best performance.

Allied Vision software

Allied Vision software packages contain the following components:

- Drivers
- SDK for camera control and image acquisition
- Examples based on the provided APIs of the SDK
- Documentation and release notes
- Viewer application to operate and configure the cameras

Vimba is Allied Vision's GenICam-based SDK with transport layers for all Allied Vision cameras with GigE Vision, USB3 Vision, IEEE 1394, and Camera Link interface. **Vimba** runs on Windows, Linux, and Linux for ARM. You can port your source code from Windows to Linux or cross-compile from a Linux PC to an embedded system.

Vimba provides APIs for C, C++, and .NET. Users who quickly want to develop a straightforward application love the simplicity of the C API or the .NET API.

Advanced users with high demands appreciate the C++ API, which is designed as a highly efficient and sophisticated API for advanced object-oriented programming including the STL (standard template library), shared pointers, and interface classes.

Vimba includes programming examples in C, C++, and C# and an extensive user documentation.

Vimba Viewer documentation

Vimba Viewer documentation is included with the software download. After **Vimba Viewer** is installed on your host computer, documentation is located under `\Program Files\Allied Vision\Vimba_[version]`.

Third-party software

Alternatively to the software provided by Allied Vision, third-party software options offer increased functionality for such as image processing and video recording.

GenICam-based third-party software automatically connects with the **Vimba**'s transport layers. Additionally, **Vimba** includes the **Cognex Adapter** for **VisionPro**.

Vimba with frame grabber specific viewer

Overview

Vimba offers a GenTL compatible configuration transport layer to access a GenCP compatible Camera Link camera. This transport layer offers access to all camera features and is used to setup and control a camera. **Vimba Viewer** is used as control application only. Images of the camera are grabbed via the viewer application that comes with the frame grabber software installation.

The following figure shows the corresponding block diagram.

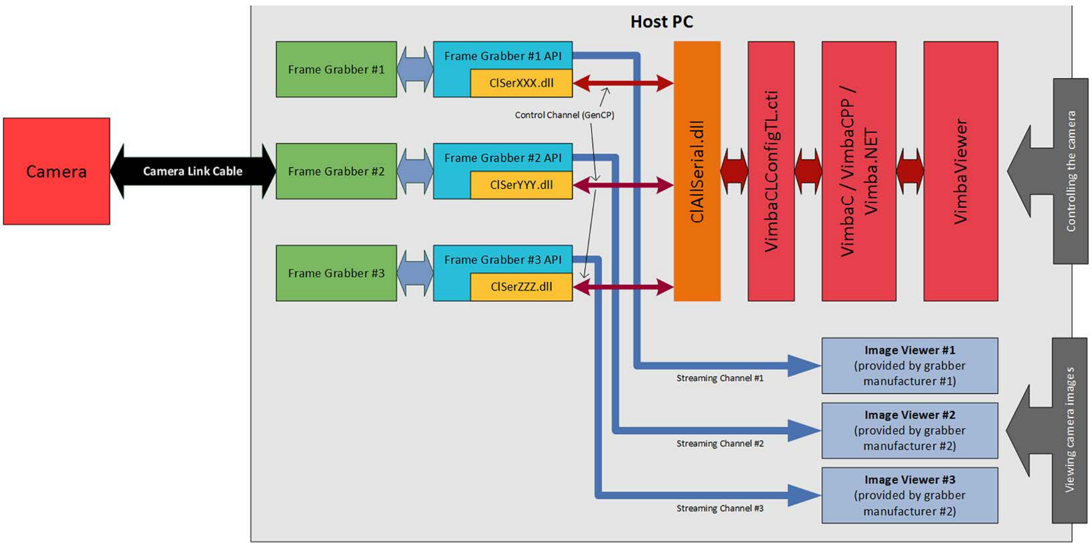


Figure 64: Vimba Config TL > Block diagram

Adjusting the transfer speed for your frame grabber

Not all frame grabbers support the same maximum data transfer speed. Therefore, the default bit rate with **Vimba** for Camera Link is set to the **minimum bit rate of 9600 bits per second**.

If your frame grabber supports a higher bit rate, we recommend increasing the bit rate in **Vimba** to this value.

Observe when changing the transfer speed

- Always change the bit rate using **Vimba**. If the bit rate is changed in the camera, the camera can to stop working and require a restart.
- The steps outlined are applicable for **Vimba**, not for any frame grabber SDK.

To increase the bit rate, follow these steps:

Step 1: Open the file VimbaCLConfigTL.xml in...

- C:\Program Files\Allied Vision\Vimba_[version]\VimbaCLConfigTL\bin**Win32**
- C:\Program Files\Allied Vision\Vimba_[version]\VimbaCLConfigTL\bin**Win64**

These XML files include the modifiable settings, by default the bit rate is specified as follows:

```
<DefaultBaudRate>9600</DefaultBaudRate>
```

Set this number to the highest bit rate supported by your frame grabber, the highest possible value is `912600` bits per second.
Save the file and close.

Step 2: Restart **Vimba** and restart the Goldeye CL camera.

Result: All operations requiring data exchange, especially a firmware update, increase significantly in speed.

Launching Vimba Viewer

1. Power up the camera and wait until the Camera Link Status LED stops blinking. This indicates booting is completed.
2. Launch **Vimba Viewer.** It may take a few seconds until the camera is shown in the **`Detected Cameras`** list, depending on the number of cameras connected to the PC and the number of installed frame grabbers.

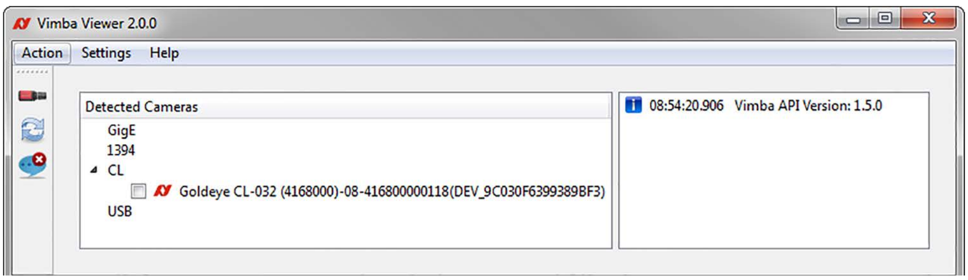


Figure 65: Vimba Viewer > Detected Cameras window

If the camera does not appear after some time, check the following:

- Is the camera connected to the correct grabber port? If the frame grabber has two Camera Link connectors it should be connected to port 1.
- Has the camera been powered up and booted completely before the **Vimba Viewer** was started? The boot process is indicated by a 1 Hz green-red flashing of the Camera Link status LED. After booting has been finished the LED stays green. It starts flickering in one of the following cases.
  - serial communication is taking place
  - images are transferred to the host

3. Select the desired camera from **`Detected Cameras`** list.
4. A new camera window appears, as shown in Figure 66 on page 248. This camera window consists of the following components:
   - Viewer toolbar: controls to customize the live camera view
   - Controller window: shows camera controls
   - Information window: displays camera and event information
   - Camera stats: Statistical information
5. Launch the viewing application provided by frame grabber manufacturer.

No Plug and Play mechanism

Camera Link has no plug and play mechanism. New cameras are not detected in **Vimba Viewer** if connected to the frame grabber during start (= after loading the transport layer) of **Vimba Viewer**. The same applies if a camera is removed after it has been opened. So, the **`Refresh`** button in the **Vimba Viewer** has no effect.

The transport layer is for controlling the camera only. Therefore, **Vimba Viewer** does not show a live image and or histogram. Image display and analysis is done via applications provided by the frame grabber manufacturer.

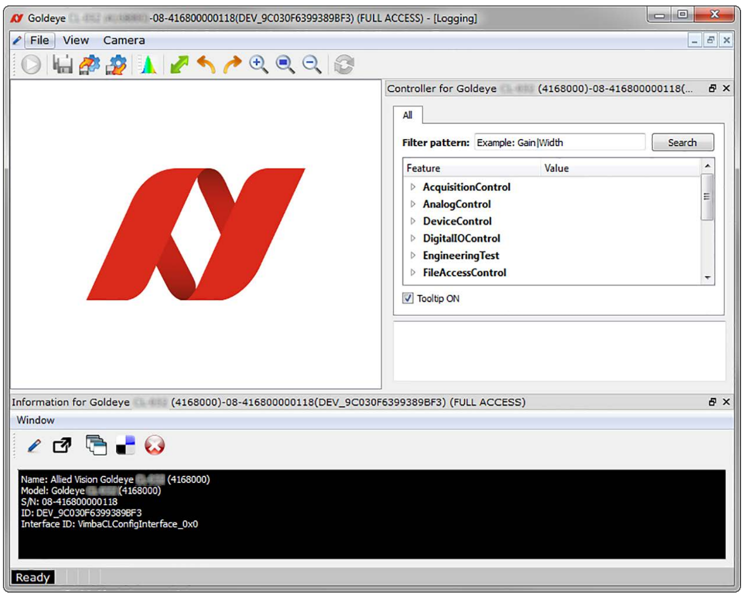


Figure 66: Vimba Viewer window

Dockable layout

The camera window supports a fully dockable layout that allows user to customize their workspace.

If components are missing in camera window

If any of the components of the camera window are missing, then do the following:

- Right-click on menu or toolbar
- Select the missing component

Adjusting camera controls: Controller window

The controller window is displayed in the top right section of the **Vimba Viewer** window, refer to Figure 66 on page 248. It is used to configure the camera frame rate, exposure time, pixel format, and much more. A detailed explanation of camera controls is available in the Goldeye G/CL Features Reference.

Grabbing images

To grab images, use the viewer application provided by the frame grabber manufacturer. It is necessary to configure the viewer application regarding the incoming image format of the camera. We suggest for best practice:

1. Set `Width`, `Height`, and `PixelFormat` of the camera in the **Vimba Viewer** controller window.
2. Configure the equivalent parameters of the incoming image format for the frame grabber with the frame grabber viewing application identically.
3. Start and stop acquisition with `AcquisitionStart` and `AcquisitionStop`.

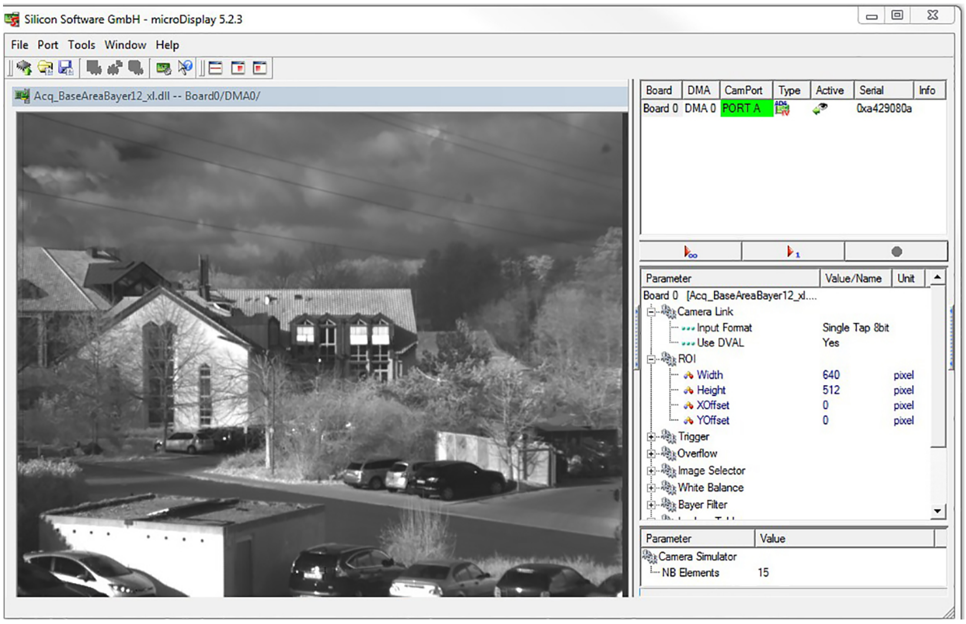


Figure 67: Example frame grabber viewer application

Grabber configuration files

You can adjust the image parameters within the application or via an external grabber configuration file, depending of the used frame grabber.

Refer to the frame grabber documentation for more information on parameter adjustment.

To obtain frame grabber configuration files, contact visit www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Camera information: Information window

The information window is displayed in the bottom section of the **Vimba Viewer** window, see Figure 70 on page 251. It consists of the functionalities as described.

To open the Logging window, click the logging icon, shown left. The logging window provides camera identifying information including the serial and ID number.

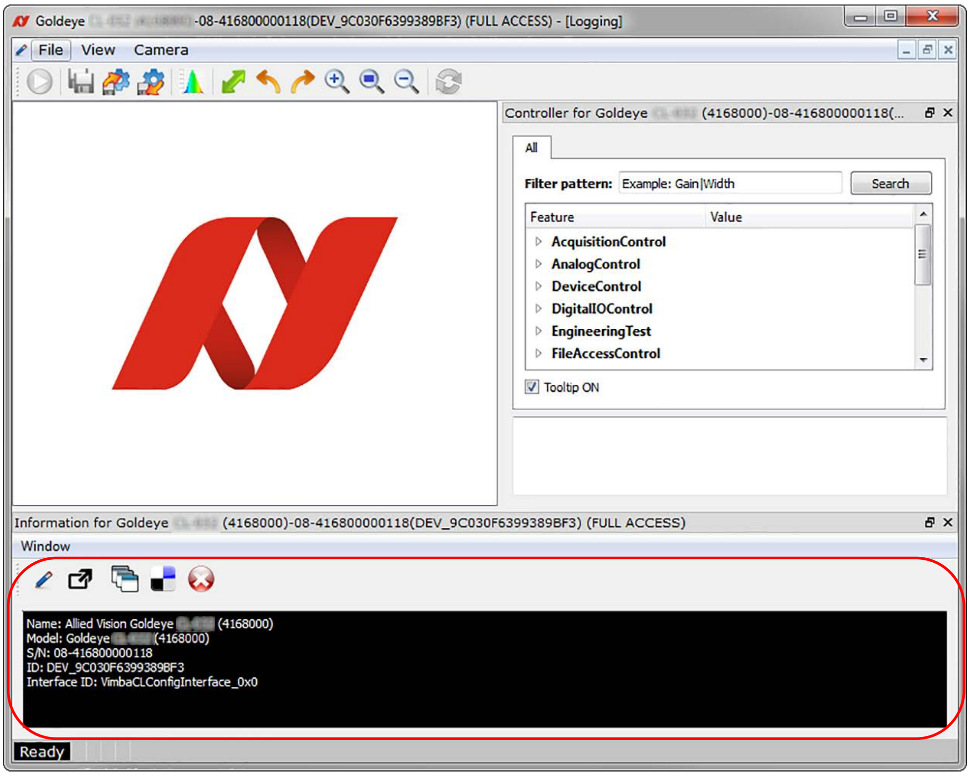


Figure 68: Vimba Viewer's logging pane

Using a custom application

It is possible to access the Goldeye CL camera without using the **Vimba** configuration transport layer. In this case, the custom application must open the COM port of the grabber via the clallserial.dll (or clserXXX.dll) to establish a communication channel between the host and the camera. The protocol used for communication with the camera is GenICam GenCP.

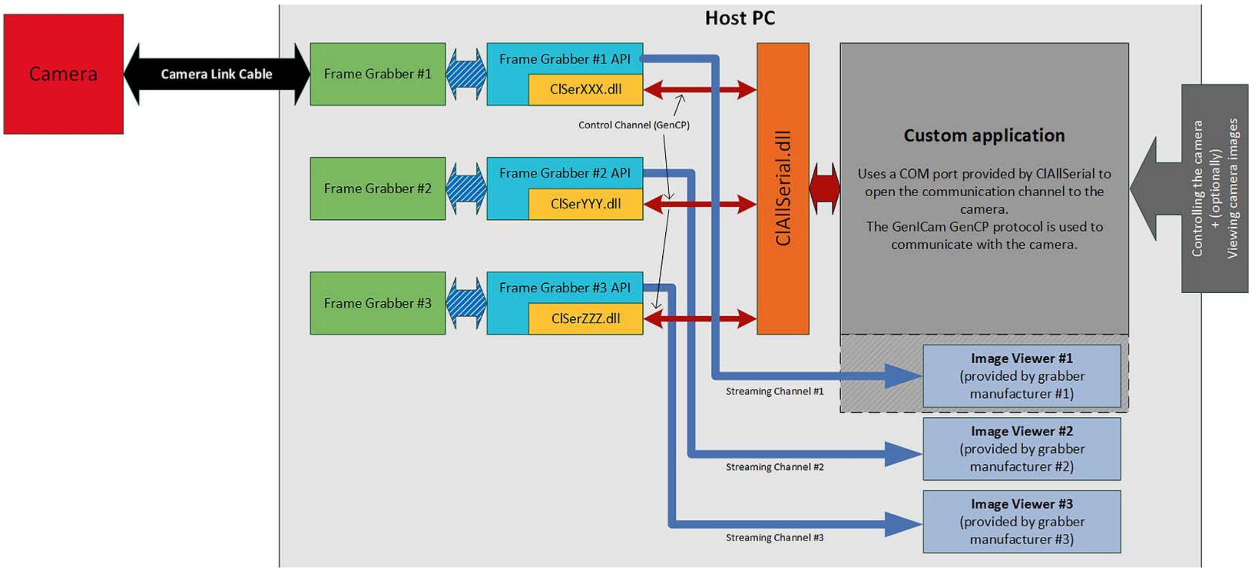


Figure 69: Custom GenCP application block diagram

Applicable standards

- The Camera Link Specification V2.0. You can download it from the AIA website: www.visiononline.org/vision-standards-details.cfm?type=6
- The GenICam GenCP V1.1. You can download it from the EMVA website: www.emva.org/standards-technology/genicam/genicam-downloads/

Using frame grabber transport layer

If you are using the transport layer provided by the manufacturer of the frame grabber, adjusting camera features and grabbing images is handled via an application from the frame grabber manufacturer.

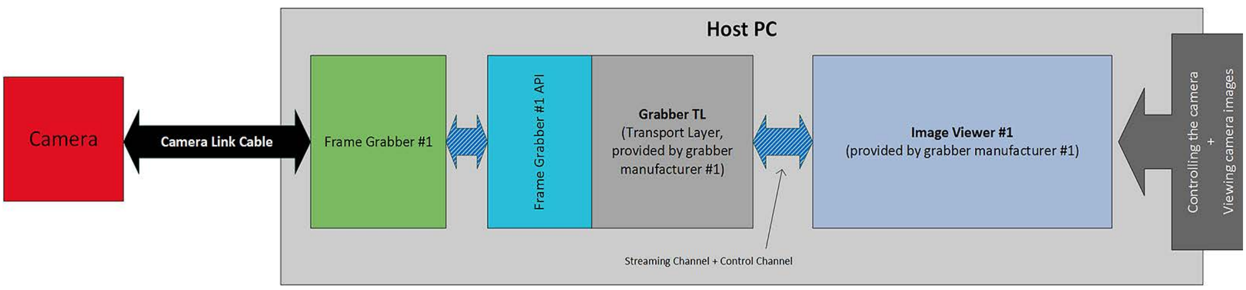


Figure 70: Frame grabber transport layer block diagram

Troubleshooting

Is the camera getting power?

Check the Camera Link status LED underneath the Camera Link port on the backside of the camera. If the camera is connected to power, the LED displays a steady green color.

Is the camera powered, but not detected in viewer?

- **Is the camera connected to the correct grabber port?**
  If the frame grabber has two Camera Link connectors, it should be connected to port 1.
  If the frame grabber has two Camera Link connectors, it does not necessarily mean that it is a DUAL-BASE grabber. Refer to the frame grabber manual for more information.
- **Has the camera been powered up and booted completely before the Vimba Viewer was started?**
  During the boot process, the Camera Link status LED under the Camera Link port flashes with 1 Hertz in green-red. After booting has been finished, the LED stays green.

Note that no Plug and Play mechanism is available with Camera Link. If a camera is attached to the frame grabber after the transport layer is loaded (during start of **Vimba Viewer**), the new camera will not be detected. If a camera is removed after it has been opened it can also not be detected.

Is the camera listed in viewer, but images cannot be acquired?

- Compare the incoming image format of the frame grabber with the parameters set in the camera. Verify that width, height, and pixel format expected by the frame grabber are equal at the camera side.
- Check if the frame grabber tap configuration is the same as the camera tap configuration (`DeviceTapGeometry`).

Using lens mounts and filters

This chapter includes:

Available lens mount adapters

See Lens mount adapters by model on page 204 for C-Mount adapters Type 1 and Type 2, F-Mount adapters, and M42-Mount adapters.

Changing lens mount adapters

The lens adapter is screwed onto the M42 thread of the camera body. To exchange it with a different adapter, unscrew it and screw on the other adapter.

For consistent image quality, we recommend using only Allied Vision lens adapters.

Take special care when removing filter

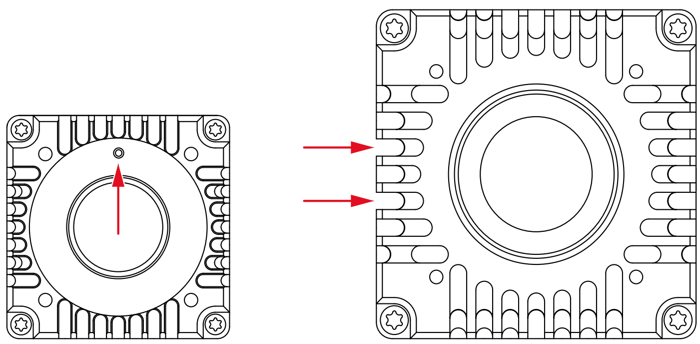
- Removing the filter from the camera requires special care.
- Ask your distribution partner for assistance if you are not confident with the procedure.
- To avoid contamination, never touch optical surfaces with bare hands.

NOTICE

Damage to the camera

Mount adapters for Goldeye cameras are secured with locking screws, see Figure 71. These locking screws must be loosened before removing mount adapters.

- Loosen the locking screws before removing mount adapters.
- Only use your hands to screw mount adapters on or off.
- Fasten the locking screws after attaching mount adapters.



Industrial Design

Scientific Design

Figure 71: Position of safety screws on mount adapters for Goldeye G/CL

Changing filters in C-Mount adapters Type 1

C-Mount adapters

- Difference between C-Mount adapters Type 1 and Type 2: See Lens mount adapters by model on page 204 for
- C-Mount adapter Type 2: See Using C-Mount adapter Type 2 on page 259

If the C-Mount adapter has an optical filter fitted, it is possible to change the filter. (See Bandpass filter 1450 nm (water filter) on page 223 for more details on mount adapters with pre-fitted filters.)

To change the filter of the C-Mount lens adapter, follow the instructions outlined in Figure 72.

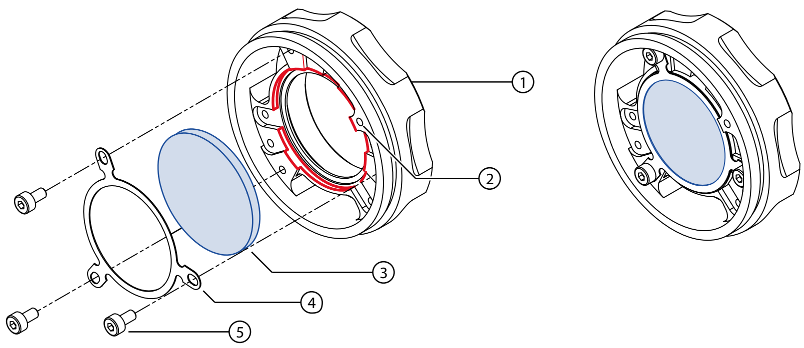


Figure 72: Changing the filter in the C-Mount adapter

Do not remove the adapter if a lens is mounted to the adapter. Ensure there is no lens mounted to the adapter.

Removing the adapter from the camera

Unscrew the adapter (1) from the camera:

- Loosen the locking screw (2, shown from back of adapter) on the outside of the mount adapter. See Figure 71 on page 254 for the position of the locking screws.
- Use a 1.3 mm hex key for **Goldeye G/CL-008 SWIR Cool TEC1, G/CL-032 SWIR Cool TEC2** models.
- Use a 0.9 mm hex key for **all other models**.
- To avoid penetration of foreign substances into the camera, ensure that the front flange is covered with a dust cap. See Avoiding the necessity of camera cleaning on page 326.

Removing the filter from the mount adapter

On the back side of the mount, loosen the three cylinder bolts (5) of the filter fixing ring (4), using a Torx T6 tool.

1. Remove the fixing ring.
2. Remove the existing filter (3) from the adapter.

Installing a filter into the mount adapter

1. Insert the new filter into the matching recess:
   - See Figure 72 on page 255 (blue = filter, red = filter recess).
   - See Table 189: Specifications of mount adapters on page 205 for dimensions of suitable filters.
2. Reinsert the fixing ring into the adapter.
3. Fix the ring with the three cylinder bolts. Note there are three sets of threads to suit filters of different thicknesses:
   - Tighten the bolts with a maximum torque of 0.25 Nm.

Attaching the mount to Industrial Design models

1. Screw the adapter into the camera.
2. Tighten the locking screw with a maximum torque of 0.1 Nm.

Attaching the mount to Scientific Design models

When used with Goldeye Scientific Design models, the mount adapter is secured by two locking screws on the side of the camera. The thread in the mount adapter needs to be closed with a thread plug to avoid light incidence.

To apply the thread plug to a C-Mount adapter, follow the steps outlined in Figure 73.

1. Push the thread plug through the locking thread, from front to back, until the end lines up with the adapters front plane.
2. Cut off the excess length on the backside of the mount adapter with a sharp knife or scissors.

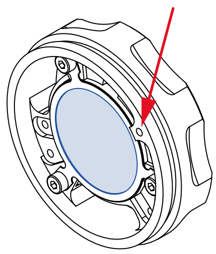


Figure 73: Position to cut off the thread plug on the backside of the mount adapter.

Changing the filter in F-Mount adapters

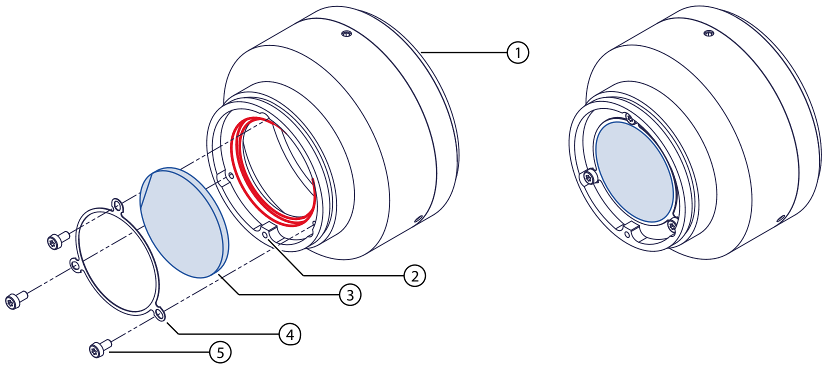


Figure 74: Changing the filter in the F-Mount adapter

If the F-Mount adapter has an optical filter fitted, it is possible to change the optical filter. (See Bandpass filter 1450 nm (water filter) on page 223 for more details on mount adapters with pre-fitted filters.)

To change the filter of the F-Mount lens adapter, follow the instructions outlined.

Removing the adapter from the camera

1. Remove the lens that might be screwed into the F-Mount adapter.
2. Unscrew the adapter (1) from the camera:
   - Loosen the locking screw (2) on the outside of the mount adapter. See Figure 71 on page 254 for the position of the locking screws.
     Use a 1.3 mm hex key for **Goldeye G/CL-008 SWIR Cool TEC1, G/CL-032 SWIR Cool TEC2** models.
     Use a 0.9 mm hex key **for all other models**.
   - To avoid penetration of foreign substances into the camera, ensure that the front flange is covered with a dust cap. See Avoiding the necessity of camera cleaning on page 326.

Removing the filter from the mount adapter

1. On the back side of the mount, loosen the three cylinder bolts (5) of the filter fixing ring (4), using a Torx T6 tool.
2. Remove the fixing ring.
3. Remove the existing optical filter (3) from the adapter.

Installing a optical filter into the mount adapter

1. Insert the new optical filter into the matching recess:
   - See Table 74 on page 257 (blue = filter, red = filter recess).
   - See Table 189: Specifications of mount adapters on page 205 for dimensions of suitable optical filters.
2. Insert the fixing ring into the adapter.
3. Fix the ring with the three cylinder bolts:
   - Tighten the bolts with a maximum torque of 0.25 Nm.

Attaching the mount to the camera

1. Screw the adapter into the camera again.
2. Tighten the locking screw with a maximum torque of 0.1 Nm.

Changing the filter in M42-Mount adapters

To avoid scratching or other damage to optical filters, always store away unused optical filters carefully.

NOTICE

Damage to the sensor

If M42-Mount lenses are screwed directly into the camera when no lens mount adapter is attached, the sensor and the sensor board can be damaged.

Always use the M42-Mount adapter when working with M42-lenses.

If the M42-Mount adapter has an optical filter fitted, it is possible to change it. (See Bandpass filter 1450 nm (water filter) on page 223 for more details on mount adapters with pre-fitted filters.)

To change the filter of the M42-Mount lens adapter, follow the instructions outlined.

Removing the adapter from the camera

1. Remove the lens that might be screwed into the M42-Mount adapter.
2. Unscrew the adapter (1) from the camera:
   - Loosen the locking screw (2, shown from back of adapter) on the outside of the mount adapter. See Figure 71 on page 254 for the position of the locking screws.
     Use a 1.3 mm hex key for **Goldeye G/CL-008 SWIR Cool TEC1, G/CL-032 SWIR Cool TEC2** models.
     Use a 0.9 mm hex key **for all other models**.
   - To avoid penetration of foreign substances into the camera, ensure that the front flange is covered with a dust cap. See Avoiding the necessity of camera cleaning on page 326.

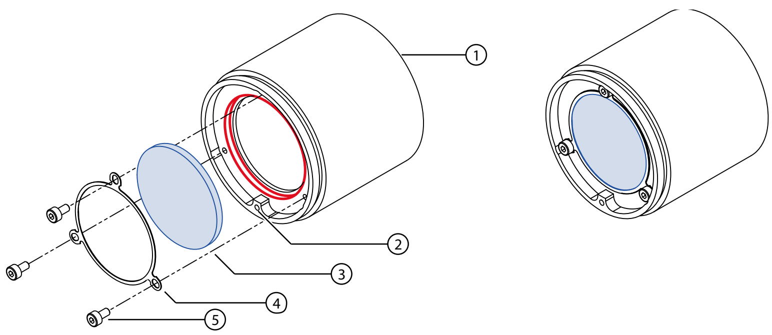


Figure 75: Changing the filter in the M42-Mount adapter

Removing the filter from the mount adapter

1. On the back side of the mount, loosen the three cylinder bolts (5) of the filter fixing ring (4), using a Torx T6 tool.
2. Remove the fixing ring.
3. Remove the existing optical filter (3) from the adapter.

Installing a filter into the mount adapter

1. Insert the new optical filter into the matching recess.
   - See Figure 75 (blue = filter, red = filter recess).
   - See Table 189: Specifications of mount adapters on page 205 for dimensions of suitable optical filters.
2. Insert the fixing ring into the adapter.
3. Fix the ring with the three cylinder bolts.
   - Tighten the bolts with a maximum torque of 0.25 Nm.

Attaching the mount to the camera

1. Screw the adapter into the camera.
2. Tighten the locking screw with a maximum torque of 0.1 Nm.

Using C-Mount adapter Type 2

C-Mount adapters

- Difference between C-Mount adapters Type 1 and Type 2: See Lens mount adapters by model on page 204 for
- C-Mount adapter Type 1: See Changing filters in C-Mount adapters Type 1 on page 255

Only for the following models:
Goldeye G/CL-008 XSWIR TEC2, G/CL-030/130 VSWIR TEC1, G/CL-034 SWIR/XSWIR TEC2

Adjusting the C-Mount

Flange focal distance is the optical distance from the mounting flange to image sensor die. Goldeye cameras with C-Mount are calibrated for a flange focal distance of standard 17.526 mm.

Sometimes the C-Mount must be adjusted; for example, to compensate for C-Mount lenses that deviate from the specified flange focal distance. In this case, follow the instructions in this section.

Preconditions

- Goldeye camera (model range see above) with C-Mount adapter Type 2
- C-Mount lens with a long focal length, or an adjustable zoom lens that can be focused to infinity
- Target at minimum 10 to 15 meters distance with clear structures for easy focusing
- Locking wrench, Allied Vision product code 02-5003A

Contact the Allied Vision Sales team to purchase the hexagonal lens adjustment wrench for C-Mount locking rings of Goldeye cameras (product code 02-5003A).

Part description

Figure 76 shows the C-Mount ring and the tool to loosen and tighten the locking ring. The functionality is the same with Industrial Design and Scientific Design.

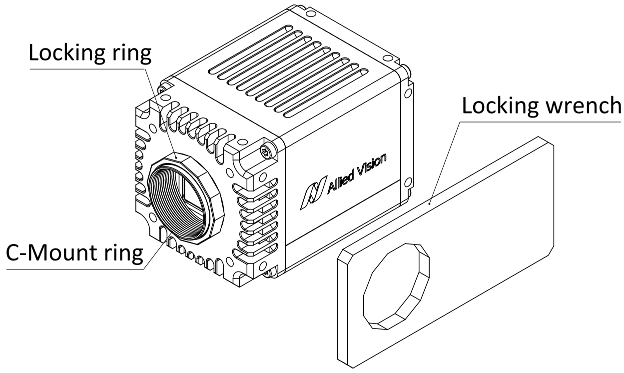


Figure 76: Goldeye camera with C-Mount adapter Type 2 and locking wrench

Instructions

1. Make sure the C-Mount lens is threaded firmly onto the C-Mount ring.
2. Loosen the locking ring. Be careful not to scratch the camera.
3. When the locking ring is loose, unthread the ring a few turns from the camera face.
4. Point the lens towards the target.
5. Set the lens to infinity.
6. Rotate the lens and C-Mount ring in both directions until the image is focused.
7. Tighten the locking ring.
8. Recheck the focus.
9. If focus has been lost, continue with Step 2.
10. If the image is still in focus, you are done.

Replacing filters

Only for the following models:
Goldeye G/CL-008 XSWIR 1.9/2.2 TEC2, G/CL-030/130 VSWIR TEC1,
G/CL-034 SWIR/XSWIR TEC2

Available filters for models with C-Mount adapter Type 2

See Filters with C-Mount adapter Type 2 on page 224. Filters by Allied Vision include a locking wrench to replace filters

Preconditions

- Goldeye camera (model range see above) with C-Mount adapter Type 2
- Suitable filter and wrench.

Part description

Figure 77 shows the wrench to replace filters. The functionality is the same with Industrial Design and Scientific Design.

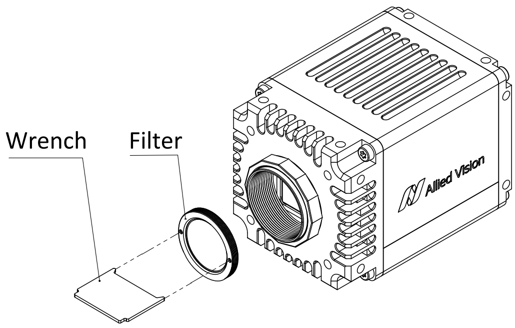


Figure 77: Goldeye camera with C-Mount adapter, filter, and locking wrench

Inserting filters

Keep dust away

We recommend you to hold the camera with the lens mount facing the ground to keep dirt out.

1. Remove the lens or protection cap from the C-Mount.
2. Place the filter on the wrench, with the pins of the wrench fitting into the holes of the filter ring.
3. Holding the filter with the wrench, engage the filter to the C-Mount.
4. Screw the filter clockwise into the C-Mount until you feel resistance.
5. Place a lens or protection cap on the C-Mount to keep dust away.

Removing filters

1. Remove the lens or protection cap from the C-Mount.
2. Insert the pins of the wrench into the holes of the filter ring.
3. Screw the filter counter clockwise out of the C-Mount.
4. Place a lens or protection cap on the C-Mount to keep dust away.
5. Store the filter protected from dust.

Allied Vision

Camera interfaces

This chapter includes:

GigE port, back panel, and status LEDs (GigE)

Gigabit Ethernet port

The Gigabit Ethernet (GigE) port conforms to the IEEE 1000BASE-T standard for Gigabit Ethernet. We recommend using CAT-5e compatible cabling and connectors or better for best performance.

Goldeye G cameras have a GigE interface and work with standard GigE hardware and cables, with cable lengths up to 100 meters.

Back panel

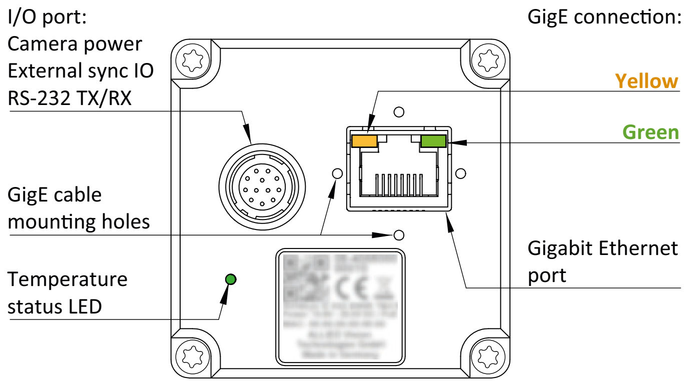


Figure 78: Connection ports and LEDs of Goldeye G Industrial Design models

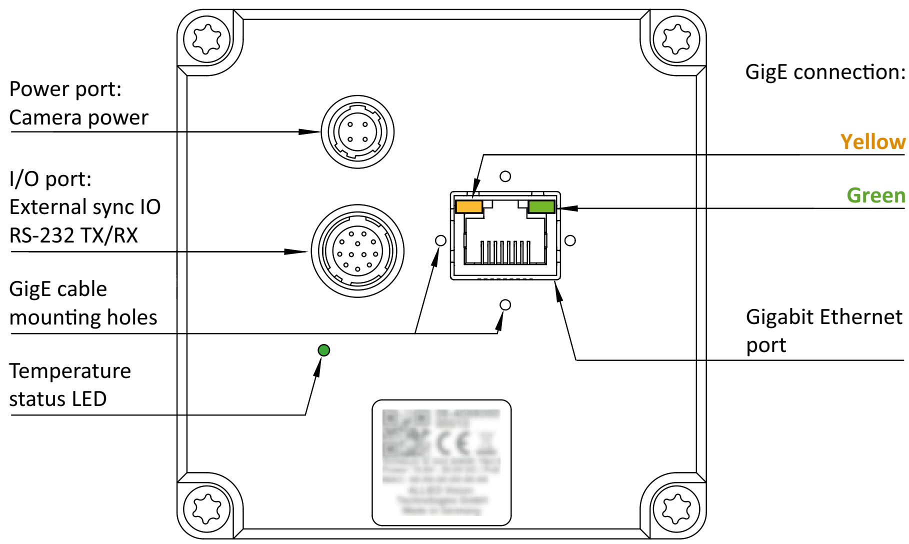


Figure 79: Connection ports and LEDs of Goldeye G Scientific Design models

The Goldeye G has the following LEDs on its rear panel:

- Two LEDs at the RJ45/8P8C port showing the GigE connection status.
- One temperature status LED showing the sensor and camera temperature status.

For detailed explanations on temperature status and temperature management of the Goldeye G/CL, refer to Temperature control on page 306.

GigE status LEDs

LED	LED code	Status
Green	Inactive	The camera is either not powered or not connected to an Ethernet adapter.
Green	Continuous	The camera is ready.
Yellow	Flashing	Ethernet activity
Green Yellow	Flashing synchronously	The camera is booting.
Green Yellow	Flashing alternately	Firmware update in progress. **Do not power cycle the camera!**

Table 217: Goldeye G > GigE status LEDs

Firmware update

See Updating the firmware on page 323 for instructions.

CL port, back panel, and status LED (CL)

Camera Link port

Goldeye CL cameras are equipped with a Camera Link (CL) interface that conforms to the Camera Link V2.0 standard.

Back panel

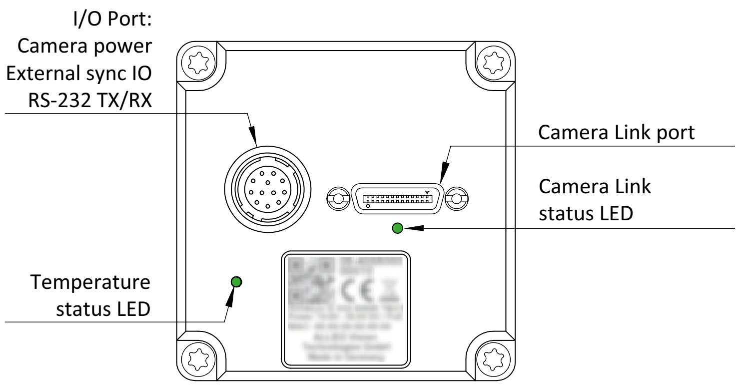


Figure 80: Connection ports and LEDs of Goldeye CL Industrial Design models

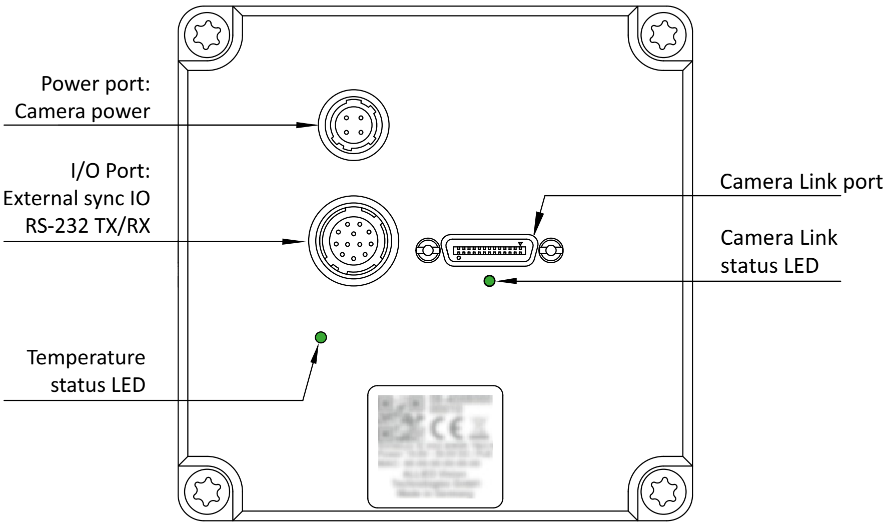


Figure 81: Connection ports and LEDs of a Goldeye CL Scientific Design models

The Goldeye CL has the following LEDs on its rear panel:

- One Camera Link status LED showing the Camera Link connection status.
- One temperature status LED showing the sensor and camera temperature status. See TEC1, TEC2, TECless on page 308 for further explanation.

Camera Link status LED

LED code	Status
Inactive	The camera is not powered.
Continuous	The camera is idle and ready.
1 Hz periodic flashing	The camera is booting.
Non-periodic fast flashing	Image transmission, the LED toggles between red and green. Traffic on the serial control channel: Irregular fast flashing in green and red. (This may cause the LED to appear amber colored.)
1 Hz periodic flashing	Firmware update in progress. **Do not power cycle the camera!**

Table 218: Goldeye CL > Camera Link status LED

Read more about temperature management

For detailed explanations on temperature status and temperature management of the Goldeye G/CL, refer to Temperature control on page 306.

Power supply (GigE and CL models)

Depending on the model, various options are available to provide Goldeye cameras with power. Table 219 lists the options available for all Goldeye models. All Goldeye models do not work in reverse polarity. Refer also to Table 222 on page 271 and Table 224 on page 272 for details of pin assignment for each connector.

Ensure correct power connection

The DC port is not intended to be connected to a DC distribution network.

	Hirose	PoE
Goldeye G models		
G-008 SWIR TEC1 G-030 VSWIR TEC1 G-032 SWIR TEC1 G-033 SWIR TEC1/TECless G-034 SWIR TEC1 G-130 VSWIR TEC1	Through 12-pin Hirose I/O port • Pin 1, External GND • Pin 2, External Power	Through the GigE port by **PoE (IEEE 802.3at Type 1 Class 0)** supported NIC, switch, or injector
G-008 SWIR Cool TEC1	Through 4-pin Hirose power port • All 4 pins are used. • Pin 2 of the 12-pin Hirose I/O port is not used.	Through the GigE port by **PoE (IEEE 802.3at Type 1 Class 0)** supported NIC, switch, or injector
G-008 XSWIR 1.9/2.2 TEC2 G-032 SWIR Cool TEC2 G-034 SWIR TEC2 G-034 XSWIR 1.9/2.2 TEC2	Through 4-pin Hirose power port • All 4 pins are used. • Pin 2 of the 12-pin Hirose I/O port is not used.	Through the GigE port by a **PoE+ (IEEE 802.3at Type 2 Class 4)** supported NIC, switch, or injector
Goldeye CL models		
CL-008 SWIR TEC1 CL-030 VSWIR TEC1 CL-032 SWIR TEC1 CL-033 SWIR TEC1/TECless CL-034 SWIR TEC1 CL-130 VSWIR TEC1	Through 12-pin Hirose I/O port • Pin 1, External GND • Pin 2, External Power	Not applicable
CL-008 SWIR Cool TEC1 CL-008 XSWIR 1.9/2.2 TEC2 CL-032 SWIR Cool TEC2 CL-034 SWIR TEC2 CL-034 XSWIR 1.9/2.2 TEC2	Through 4-pin Hirose power port • All 4 pins are used. • Pin 2 of the 12-pin Hirose I/O port is not used.	Not applicable

Table 219: Differences in power supply between various Goldeye models

Power supply via Hirose connector

Goldeye Industrial Design models (by I/O port)

Use one of the following connections.

- Power supply with Hirose 12-pin connector
- I/O cable with Hirose 12-pin connector in conjunction with a standard power supply adapter

Goldeye Scientific Design models (by power port)

Use one of the following connections:

- Power supply with Hirose 4-pin connector
- Power cable with Hirose 4-pin connector in conjunction with a standard power supply adapter.

You cannot use the Hirose 12-pin I/O connector to supply Goldeye Scientific Design models with power.

Ensure a correct power supply

In case the camera is provided with power via the I/O connector, always ensure that the voltage at the camera input lies in the designated requirement of 10.8 to 30.0 VDC.

Power supply via Gigabit Ethernet (Goldeye G only)

You can supply Goldeye G models with power through the Gigabit Ethernet port by using any standard Power over Ethernet (PoE or PoE+) supported network connection.

The pin assignment of the RJ45/8P8C connector is according to the Ethernet Standard (IEEE 802.3 1000BASE-T), which supports cable lengths of up to 100 meters. All Goldeye G models can obtain power from IEEE 802.3at compliant Power Sourcing Equipment (PSE) devices, such as switches, injectors, or NICs.

If any Hirose connector provides a valid DC voltage to the camera, and the GigE connector is connected via PoE at the same time, the camera obtains power from the Hirose connector only.

Goldeye G models: Minimizing Power consumption

If the camera operates under higher temperature conditions, you should consider powering the camera via the I/O connector instead of PoE, because PoE contributes to the heat build-up inside the camera.

Refer to Specifications (GigE models) on page 52 for details on power consumption.

I/O description (GigE and CL models)

I/O connectors and pin assignment

NOTICE

Damage to the camera by surge

ESD by improper grounding can damage the camera.

Ensure proper grounding.

Avoid electromagnetic interferences

For all power and interface connections, use only shielded cables.

I/Os for Goldeye G/CL cameras use the 12-pin Hirose connector.

I/O types

Non-isolated I/Os

- One non-isolated line-in (3.3 VDC LVTTL, 5 VDC TTL tolerated, see Table 222 on page 271)
- One non-isolated line-out (5 VDC TTL)
- (Camera Link only) Four non-isolated LVDS inputs (CC ports)

Opto-isolated I/Os

- One opto-isolated line-in
- Two opto-isolated line-out
- Maximum isolated power voltage is 30 VDC
- Line-in voltages:
  - V_{in}(low) = 0.0 to 1.0 VDC
  - V_{in}(high) = 3.0 to 24.0 VDC

Trigger cables with 12-pin Hirose connector (overview)

Cable side Hirose connectors (without cable) and I/O cables with Hirose connector are available for purchase from Allied Vision.

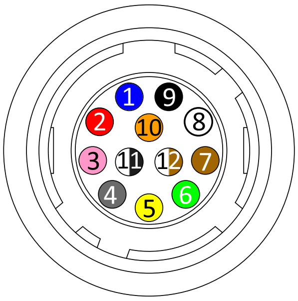
Product code	Description
1068908	Trigger cable In1 BNC LVTTL with Hirose 12-pin connector, 2 m
1068909	Trigger cable In1 BNC LVTTL with Hirose 12-pin connector, 5 m

Table 220: Available trigger cables with Hirose 12-pin connector

The maximum length of I/O cables must not exceed 30 meters.

Pin assignment

Hirose 12-pin connector



I/O definitions
External GND and external power (Pins 1 and 2, for industrial design models)
RxD RS232 and TxD RS232 (Pin 8, Pin 9)
Isolated out power (Pin 10)
In 1- non-isolated (Pin 4)
In 2- opto-isolated (Pin 11)
Out 1- Non-isolated output
Out2, Out3- opto-isolated outputs

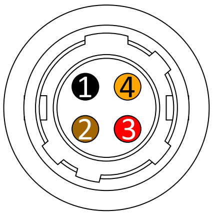
Table 221: 12 pin Hirose connector > View

Pin	Color code	Signal	I/O	Level	Description
1	Blue	External GND	—	GND for RS232 and external power	Ext. ground for RS232, TTL I/Os (and ext. power)
2	Red	External Power [1]	In	10.8 to 30.0 VDC	Power supply [1]
3	Violet	Video Type Auto Iris Out	Out	Not applicable	Video iris
4	Gray	In 1	In	V_{in} (low) 0.0 to 0.8 VDC V_{in} (high) 2.0 to 5.0 VDC	Input 1 non-isolated (LineIn1)
5	Yellow	Out 3	Out	Open emitter, max. 20 mA	Output 3 opto-isolated (LineOut3)
6	Green	Out 1	Out	TTL (5 VDC, max. 20 mA)	Output 1 non-isolated (LineOut1)
7	Brown	Isolated In GND	—	Common GND for opto-isolated inputs	Camera common input ground (In GND)
8	White	RxD RS232	In	RS232	Terminal receive data
9	Black	TxD RS232	Out	RS232	Terminal transmit data
10	Orange	Isolated Out Power	In	Common supply voltage for outputs 3.0 to 30 VDC	External power input for digital outputs (Out V_{CC})
11	White/Black	In 2	In	V_{in} (low) 0.0 to 1.0 VDC V_{in} (high) 3.0 to 24.0 VDC	Input 2 opto-isolated (LineIn2)
12	White/Brown	Out 2	Out	Open emitter, max. 20 mA	Output 2 opto-isolated (LineOut2)

[1] Scientific Design models: External power is supplied by 4-pin Hirose connector only, Pin 2 of the 12-pin connector is not connected.

Table 222: 12 pin Hirose connector > Pin assignment

Hirose 4-pin connector



I/O definitions
External GND and external power (Pin 1 to Pin 4 for Scientific Design models)

Table 223: 4-pin Hirose connector > View

Pin	Color code		Signal	I/O	Level	Description
1	Black		External Power	In	10.8 to 30.0 VDC	External power
2	Brown		External Power	In	10.8 to 30.0 VDC	External power
3	Red		External GND	—	GND external power	External ground for external power
4	Orange		External GND	—	GND external power	External ground for external power

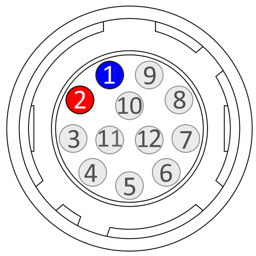
Table 224: 4-pin Hirose connector > Pin assignment

I/O definitions

External GND and external power

Goldeye Industrial Design models

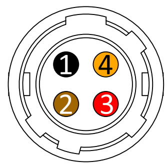
Use pins 1 and 2 of the Hirose 12-pin connector to power the camera:



- G/CL-008 SWIR TEC1
- G/CL-030 VSWIR TEC1
- G/CL-032 SWIR TEC1
- G/CL-033 SWIR TEC1/TECless
- G/CL-034 SWIR TEC1
- G/CL-130 VSWIR TEC1

Goldeye Scientific Design models

Use Pin 1 to Pin 4 of the Hirose 4-pin connector to supply the camera with power:



- G/CL-008 SWIR Cool TEC1
- G/CL-008 XSWIR 1.9/2.2 TEC2
- G/CL-032 SWIR Cool TEC2
- G/CL-034 SWIR TEC2
- G/CL-034 XSWIR 1.9/2.2 TEC2

For more information on power supply refer to GigE status LEDs on page 265.

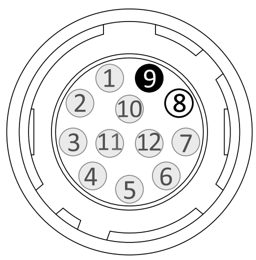
NOTICE

Damage to the camera by exceeding the maximum input voltage

Apply a maximum input voltage of 30 VDC.

RxD RS232 and TxD RS232 (Pin 8, Pin 9)

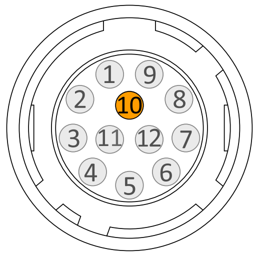
These signals are RS232 compatible. These signals are not optically isolated. Connect RS232 ground to Camera GND to complete the RS232 circuit. Communication takes place at a bandwidth of up to 115,200 bits per second (customer adjustable).



More information on the RS232 interface

For complete RS232 description and usage on GigE cameras, see the application note RS232 Port:
www.alliedvision.com/en/support/faqs-application-notes

Isolated out power (Pin 10)

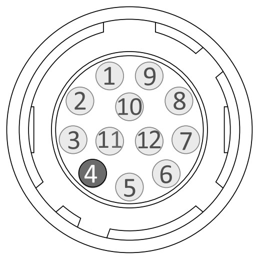


Connect the **Isolated Out Power** to a power source for isolated signals **Out 2** and **Out 3**. The voltage requirement is 3 to 30 VDC. The current requirement for this supply is a function of the optical insulator collector current and the number of outputs used in the system.
Isolated Out Power wiring should be physically close to **Out 2** / **Out 3** wiring to prevent parasitic coupling.

Input signals

Input signals allow the camera to be synchronized to an external event. The camera can be programmed to trigger on the rising edge, falling edge, both edges, or level of the signal. The camera can also be programmed to capture an image at some programmable delay time after the trigger event.

In 1 - non-isolated (Pin 4)

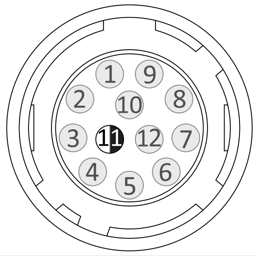


In 1 is not electrically isolated and can be used when environmental noise is inconsequential, and a faster trigger response is required. To complete the trigger circuit, connect trigger ground to External GND.

Trigger signal	Input current
Required trigger signal:	LVTTL (3.3 VDC) TTL (5 VDC) tolerated
Input current to be expected in TTL mode:	3 mA
Input current to be expected in LVTTL mode:	0.3 mA

Table 225: Input 1 trigger signal and input current

In 2 - opto-isolated (Pin 11)



In 2 is optically isolated and can be used in electrically noisy environments to prevent false trigger events. To complete the trigger circuit, connect trigger ground to **Isolated In GND**. Compared to the non-isolated trigger, **In 2** has a longer propagation time.

Trigger signal	Input current
Trigger input voltage: V_{in} (low)	0.0 to 1.0 VDC
Trigger input voltage: V_{in} (high)	3.0 to 24.0 VDC
Input current to be expected	5 mA

Table 226: Input 2 trigger signal and input current

Opto-isolated input block diagram

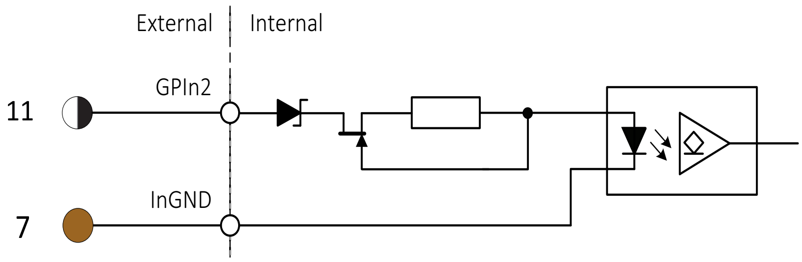


Figure 82: Goldeye G/CL opto-isolated input block diagram

The inputs can be connected directly to the system for voltages up to 24 VDC. An external resistor is not necessary.

Goldeye G/CL opto-isolated input delay and minimum pulse width

The minimum pulse width for all Goldeye G/CL cameras is:

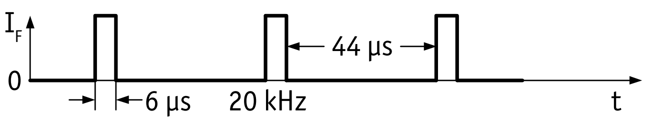


Figure 83: Goldeye G/CL minimum pulse width

Test conditions

The input signal was driven with 3.3 VDC (LVTTL) and no external additional series resistor was used.

CC1 - CC4 (Camera Link only)

The Camera Link signals CC1- CC4 are LVDS (Low-voltage differential signaling) pairs and are located on the SDR-26 connector. They are exclusively controlled by the frame grabber the camera is connected to. For further information refer to the Camera Link standard.

Output signals

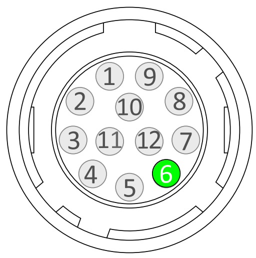
Output signals can be assigned to a variety of internal camera signals via software. They can be configured to active high or active low. The internal camera signals are listed in Table 231 on page 279.

Output signal	Description
Exposing	Indicates when camera is integrating light.
Trigger Ready	Indicates when the camera is ready to accept a trigger signal.
Trigger Input	A relay of the trigger input signal used to “daisy chain” the trigger signal for multiple cameras.
Readout	Valid when the camera is reading out data.
Imaging	Valid when the camera is exposing or reading out.
Strobe	Programmable pulse based on one of the events as listed.
GPO	User programmable binary output.

Figure 84: Goldeye G/CL internal camera signals

Out 1 - Non-isolated output

The **Out 1** (Pin 6) signal is not electrically isolated and can be used when environmental electrical noise is inconsequential, and faster trigger response is required. Connect signal ground to **External GND** to complete the external circuit.



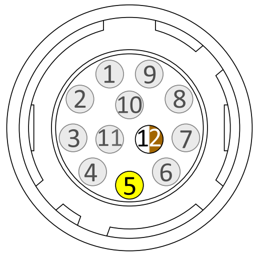
Signal	Output
Output signal	TTL (5 VDC)
Maximum output current	20 mA

Table 227: Output 1 output signal and maximum current

Possible low output voltage

Output voltage may drop **by approximately 2.5 VDC** under full load.

Out2, Out3 - opto-isolated outputs



Out 2 (Pin 12)and **Out 3** (Pin 5) signals are optically isolated and require the user to provide a voltage level at **Isolated Out Power**.

An example of the functional circuit is indicated in Table 85 on page 277.

Signal	Output
Possible voltage source $OutV_{CC}$	3 to 30 VDC
Maximum output current per output	20 mA

Table 228: Output 2/Output 3 voltage source and current per channel

Possible low output voltage

Output voltage may drop **by approximately 2.5 VDC** under full load.

The opto-isolated inputs can be connected directly to the system for voltages up to 24 VDC. An external resistor is not necessary.

Opto-isolated output block diagram

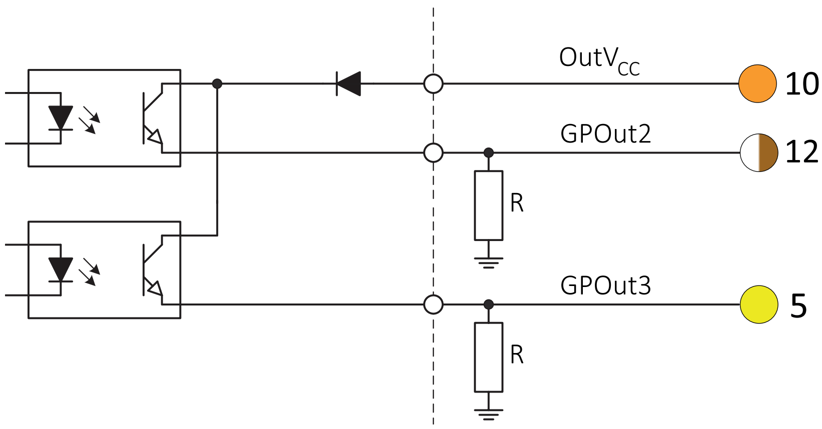


Figure 85: Goldeye G/CL opto-isolated output block diagram

$OutV_{CC}$	Resistor value
5 VDC	1.0 kΩ
12 VDC	2.4 kΩ
24 VDC	4.7 kΩ

Table 229: $OutV_{CC}$ and value of the external resistor

Goldeye G/CL opto-isolated output delay

The output switching times displayed in Figure 86 are applicable to opto-coupled outputs only.

Note that higher external resistor values increase the time values that are listed in Table 230.

Parameter	Value
Delay time	$t_d \approx 1$ µs
Rise time	$t_r \approx 1$ µs
Turn-on time	$t_{on} = t_d + t_r \approx 2$µs
Storage time	$t_s \approx 26$ µs
Fall time	$t_f \approx 21$ µs
Turn-off time	$t_{off} = t_s + t_f \approx 47$ µs

Table 230: Output parameters and values

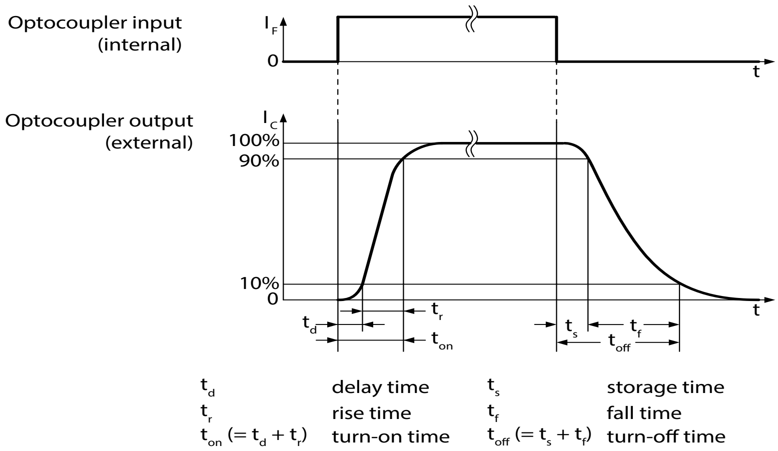


Figure 86: Goldeye G/CL output switching times

Cycle delay

The cycle delay for the Goldeye is as follows:

- $t_{pdLH} < 3.5$ µs
- $t_{pdHL} < 30$ µs

For this reason, we recommend triggering on the rising edge. This ensures the fastest possible reaction time.

Test conditions

- External 2.4 kΩ resistor to GND
- Power input for output ports set to 12 VDC

Control signals

It is possible to configure the I/Os of the camera, using software. The different modes are described on the following pages.

Inputs

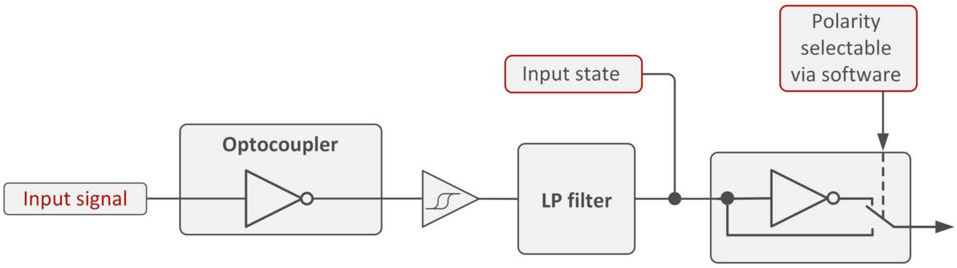


Figure 87: Goldeye G/CL input signal > logical view

I/O pin control

All I/O signals running over the camera I/O connector are controlled by the I/O strobe commands. For more details see the Goldeye G/CL Features Reference.

Outputs

It is possible to configure the output signals, using software. Each of the signals explained in Table 231 can be routed to an output signal through a multiplexer.

Source signal	Description
GPO	Configured to be a general-purpose output, control of which is assigned to LineOutLevels.
AcquisitionTriggerReady	Active when the host application has recognized the camera, and the camera is ready to start acquisition.
FrameTriggerReady	Active when the camera is in a state that accepts the next frame trigger.
FrameTrigger	Active when an image has been initiated to start. This is a camera-internal logic trigger, which is initiated by an external trigger or software trigger event.
Exposing	Active for the duration of sensor exposure.
FrameReadout	Active during frame readout, for example, the transferring of image data from the CCD to camera memory.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Acquiring	Active during an acquisition stream.
LineIn1	Active when there is an external trigger at LineIn1.
LineIn2	Active when there is an external trigger at LineIn2.

Table 231: Goldeye G/CL possible sources for output signals (sheet 1 of 2)

Source signal	Description
Strobe1	The output signal is controlled according to Strobe1 settings.
CC1	**(Camera Link models only)** active if trigger is detected on CC1. The CC1 output acts the same way all other Goldeye outputs do.
CC2	**(Camera Link models only)** active if trigger is detected on CC2. The CC2 output acts the same way all other Goldeye outputs do.
CC3	**(Camera Link models only)** active if trigger is detected on CC3. The CC3 output acts the same way all other Goldeye outputs do.
CC4	**(Camera Link models only)** active if trigger is detected on CC4. The CC4 output acts the same way all other Goldeye outputs do.

Table 231: Goldeye G/CL possible sources for output signals (sheet 2 of 2)

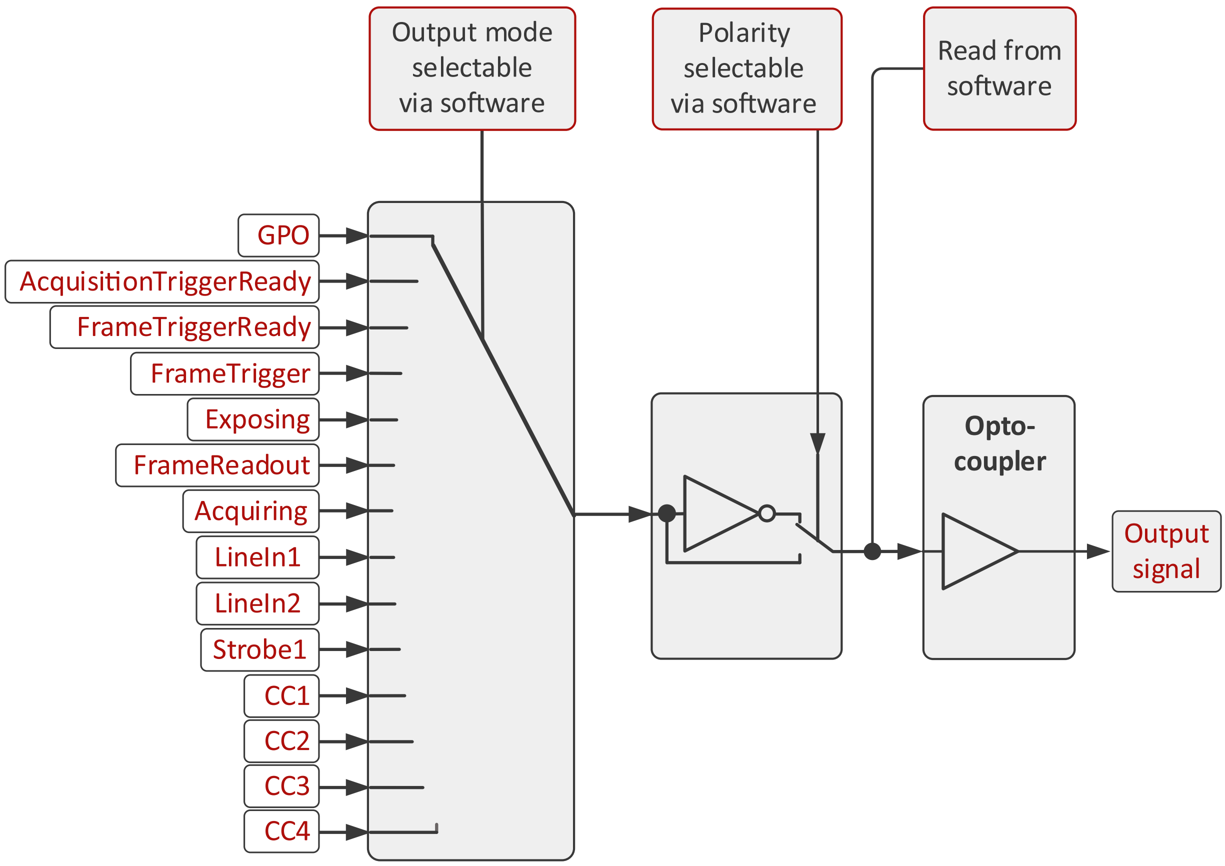


Figure 88: Goldeye G/CL output signal > logical view

Frame grabber requirements (CL)

You can use basically any Camera Link Base compatible frame grabber to operate Goldeye CL cameras. However, the following general aspects should be considered for frame grabber selection:

- The frame grabber needs to support the individual pixel clock frequency of the camera (which may be up to 85 MHz, depending on the model). See also Changing the clock frequency on page 282.
- The frame grabber and the host system need to support the pixel data bandwidth delivered by the camera.

  Depending on model and operation mode, a Camera Link Base camera may be able to output up to approximately 170 million 12-bit pixels per second. Assuming a worst-case scenario of unpacked 16 bits per pixel transfer over the host bus, this results in 340 million bytes per second. This is approximately three times the bandwidth of a Gigabit Ethernet port.
- Host software design and system architecture usually affect frame grabber selection as well, for instance the number of cameras connected to the host, the different types of cameras connected, or the availability of a frame grabber specific GenICam transport layer.
- A high transmission rate support (> 115 200 bits per second) of the Camera Link serial port is recommended to improve responsiveness of host software.

More information about frame grabbers

For more information about compatibility of various frame grabber models and system installation refer to the following sources.

- Installing the camera (CL) on page 237
- The application note Usage of Frame grabbers with Goldeye CL Cameras is available for download on the Allied Vision website: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation

Timing (CL)

All Goldeye CL models provide the possibility to adapt the timing parameters of the camera.

The timing of the data transfer is based on the Camera Link pixel clock frequency as well as on enable signals defined in the Camera Link protocol. Selecting a lower clock frequency and extending the gaps between the FVAL and LVAL enable signals help to avoid bit errors in data transfer. Therefore, it may allow to extend the usual cable length or to use less expensive cables.

Changing the clock frequency

Goldeye CL models support several clock frequencies. Table 232 displays available clock frequencies by model:

Models	Frequency			
	25 MHz	40 MHz	55 MHz	85 MHz
CL-008 SWIR/XSWIR	✓	✓	N.a.	N.a.
CL-030 VSWIR	✓	N.a.	✓	✓
CL-032 SWIR	✓	✓	N.a.	N.a.
CL-033 SWIR	✓	N.a.	✓	✓
CL-034 SWIR/XSWIR	✓	N.a.	✓	✓
CL-130 VSWIR	✓	N.a.	✓	✓

Table 232: Possible clock frequencies with all Goldeye CL camera models.

The clock frequency has an impact on the maximum frame rate, see the frame rate tables in Specifications (CL models) on page 117.

Adjusting the gaps

Besides the Camera Link clock frequency, there are four parameters available that can be used for timing control. These parameters affect the gaps between the FVAL and LVAL signals.

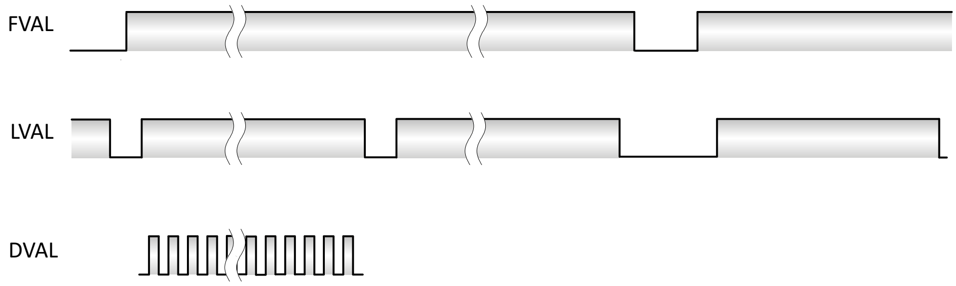


Figure 89: Principle of Camera Link data transfer

Frame Valid (FVAL)

The synchronization signal FVAL is used to indicate the frame transfer phase. When rising, it indicates the start of a new frame transfer phase. When falling, it indicates the end of the frame transfer.

Every frame includes a certain number of lines. All lines transferred during this time slot are valid.

Line Valid (LVAL)

The synchronization signal LVAL is used to indicate a line transfer phase within the current frame transfer. When rising, it indicates the start of a new line transfer phase. When falling, it indicates the end of the line transfer phase.

The LVAL signal is valid only while FVAL is high.

Data Valid (DVAL)

The synchronization signal DVAL is used to indicate a valid pixel within the current line transfer phase. The DVAL bit is high for the transfer of one pixel. When high, it indicates that the pixel is valid. If low, the pixel must be ignored. A pixel is only valid, if all of the FVAL, LVAL and DVAL signals are high.

To make use of the DVAL signal, the frame grabber in use must be able to process it.

Sequential overview

After the start of the data transfer, frames and lines are transferred using the sequence as described.

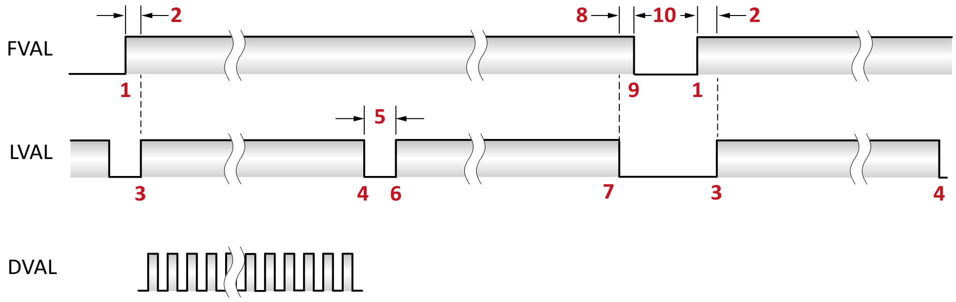


Figure 90: Camera Link data transfer

1. The FVAL signal is set to ***high***, indicating the start of a new frame transfer.
2. A gap occurs before the LVAL signal is set to ***high***.
   The length of this gap is controlled by the **`ClMinFValToLValDelay`** parameter and is given in camera clock cycles.
   The effective length of this gap is equal to either the value of **`ClMinFValToLValDelay`**, or (3 × **`Width`** + 32) clock cycles, whatever is the larger.
3. The LVAL signal is set to ***high***, indicating the start of a new line transfer.
4. The LVAL signal switches back to ***Low***, indicating completion of the line transfer.
5. A gap occurs between two line transfers.
   The length of this gap is controlled by the **`ClLValToLValDelay`** parameter and is given in clock cycles.

Keeping gaps of equal length

If the value for **`ClLValToLValDelay`** is set too small, the camera may not be able to provide the data fast enough. In this case, the camera automatically extends the gap. This may result in line gaps of unequal lengths.

1. The LVAL signal is set to ***high***, indicating the start of a new line transfer.
2. The LVAL signal switches back to ***Low***, indicating transfer of the line is complete.
   If this was not the last line, go to #5.
   If this was the last line, go to #8.
3. A gap occurs after the last line transfer within a frame.
   The length of this gap is controlled by the **`ClLValToFVal`** parameter and is given in clock cycles.
4. FVAL switches back to ***Low***, indicating the transfer of the frame is complete.
5. A gap occurs between two frame transfers.
   The Length of this gap is controlled by the **`ClMinFValToFVal`** parameter and is given in clock cycles.
   Note that this is the minimum delay that must be kept between two frames.
   Go to #1.

Figure 91 shows how gaps between the FVAL and the LVAL signals can be adjusted. The lengths of the gaps can be adjusted using the features listed in Table 233.

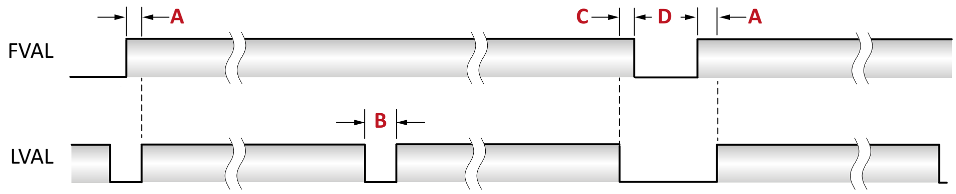


Figure 91: Gaps usable for Goldeye CL timing control

Gap	Description	Length [clock cycles]		
		Min.	Default	Max.
A	Minimum gap between the rising edges of the FVAL signal and the first line's LVAL signal. The real delay may be higher than the value specified with this feature. Feature name: `ClMinFvalToLvalDelay`	*0*	32	*1023*
B	Width of the line gap. Feature name: `ClLvalToLvalDelay`	*1*	64	*1024*
C	Gap between the falling edges of the last lines' LVAL signal and the FVAL signal. Feature name: `ClLvalToFvalDelay`	*0*	32	*1024*
D	Minimum gap from one falling edge to the next rising edge of the FVAL signal. The real value may be higher than the value specified by this feature. Feature name: `ClMinFvalToFvalDelay`	*1*	32	*1024*

Table 233: Gaps usable for Goldeye CL timing control

Starting the acquisition automatically (CL)

To start the acquisition automatically after the camera powers up, do this:

Step 1: Go to the `AcquisitionAutoStartMode` feature and set it to *On*.

Step 2: Select a user set, using the `UserSetSelector` feature.

Step 3: Save the current camera parameters in the selected user set, using the `UserSetSave` feature.

Step 4: To set the selected user set as default user set that will be active after the next start of the camera, activate it using the `UserSetLoad` feature.

Result: Now the camera will start the acquisition automatically after the next power-up.

Triggering

This chapter includes:

Trigger timing diagram

The diagram in Figure 92 explains the trigger concept in general.

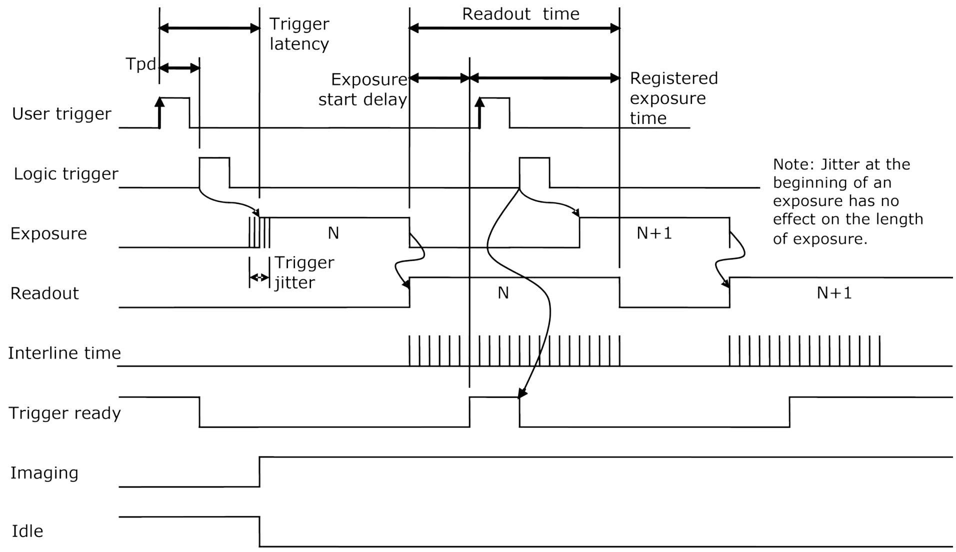


Figure 92: Goldeye G/CL trigger timing diagram

For trigger descriptions on camera control basis see the Allied Vision GigE Camera and Driver Features document.

Trigger definitions

Term	Definition
User trigger	Trigger signal applied by the user (hardware trigger, software trigger).
Logic trigger	Trigger signal seen by the camera internal logic (not visible to the user).
Tpd	Propagation delay between the User trigger and the Logic trigger.
Exposure	High when the camera image sensor is integrating light.
Readout	High when the camera image sensor is reading out data.
Trigger latency	Time delay between the user trigger and the start of exposure.
Trigger jitter	Error in the trigger latency time.
Trigger ready	Indicates to the user that the camera is ready to accept the next trigger.
Registered exposure time	Exposure time value currently stored in the camera memory.
Exposure start delay	Registered Exposure Time subtracted from the Readout time. Exposure start delay indicates when the next exposure cycle can begin such that the exposure end after the current Readout.
Interline time	Time between sensor row readout cycles.
Imaging	High when the camera image sensor is either exposing and/or reading out data.
Idle	High if the camera image sensor is not exposing and/or reading out data.

Table 234: Goldeye G/CL trigger definitions

Best practice

Application notes: Triggering concept for GigE camera (advanced)

For a more detailed description of the trigger concept for advanced users and special scenarios, see www.alliedvision.com/en/support/faqs-application-notes:

- Triggering concept for Allied Vision GigE cameras
- Using ITR and IWR mode to maximize the frame rate of Goldeye cameras.

1. The **user trigger pulse width** should be at least three times the width of the trigger latency.
2. The **end of exposure** always triggers the next Readout.
3. The **end of exposure** must always end after the current Readout.
4. The **start of exposure** must always correspond with the Interline Time if Readout is true.
5. **Exposure start delay** is equal to the Readout time less the Registered Exposure Time.

Trigger latencies and jitter

All models except G/CL-030/130 VSWIR

Triggering during the idle state

To minimize the trigger latency and trigger jitter, the user trigger signal should be applied when Imaging is false and Idle is true. Table 235 shows possible values:

Trigger latency on LineIn1 (TTL)	0.6 µs (max.)
Trigger latency on LineIn2 (opto-isolated)	3.5 µs (max.)
Trigger jitter on both LineIn1 and LineIn2	1 pixel (max.)

Table 235: Trigger timings during the idle state (except G/CL-030/130 VSWIR)

Triggering during the readout state

To achieve the fastest triggering cycle time during which the camera image sensor is exposing and reading out simultaneously, the User trigger signal should be applied as soon as a valid trigger Ready is detected. Table 236 shows possible values:

Trigger latency on LineIn1 (TTL)	1 line (max.) + 0.6 µs (max.)
Trigger latency on LineIn2 (opto-isolated)	1 line (max.) + 3.5 µs (max.)
Trigger jitter on both LineIn1 and LineIn2	1 pixel (max.)

Table 236: Trigger timings during the readout state (except G/CL-030/130 VSWIR)

Goldeye G/CL-030/130 VSWIR TEC1 models

Trigger timings during the idle state and readout state are the same for these models.

Trigger timings for Goldeye G/CL-030 VSWIR TEC1

Values in Table 237:

- Line time for Mono8: 7.7 µs
- Line time for Mono12: 13.25 µs
- Delays can last for 1 line or 2 lines, depending on the conditions.
- +0.6 µs maximum offset = 0 µs to +0.6 µs.

Parameter	**Description**	**Value ranges**	
	Lines + offset	**Mono8**	**Mono12**
Trigger latency on LineIn1 (TTL)	2 lines (max.) +0.6 µs (max.)	7.7 µs to 16.0 µs	13.25 µs to 27.1 µs
Trigger latency on LineIn2 (opto-isolated)	2 lines (max.) +3.5 µs (max.)	7.7 µs to 18.9 µs	13.25 µs to 30.0 µs
Trigger jitter on both LineIn1 and LineIn2	1 line (max.)	7.7 µs	13.25 µs

Table 237: Trigger timings for Goldeye G/CL-030 VSWIR TEC1

Trigger timings for Goldeye G/CL-130 VSWIR TEC1

Values in Table 238:

- Line time for Mono8: 10.05 µs
- Line time for Mono12: 13.25 µs
- Delays can last for 1 line or 2 lines, depending on the conditions.
- +0.6 µs maximum offset = 0 µs to +0.6 µs.

Parameter	**Description**	**Value ranges**	
	Lines + offset	**Mono8**	**Mono12**
Trigger latency on LineIn1 (TTL)	2 lines (max.) +0.6 µs (max.)	10.05 µs to 20.7 µs	13.25 µs to 27.1 µs
Trigger latency on LineIn2 (opto-isolated)	2 lines (max.) +3.5 µs (max.)	10.05 µs to 23.6 µs	13.25 µs to 30.0 µs
Trigger jitter on both LineIn1 and LineIn2	1 line (max.)	10.05 µs	13.25 µs

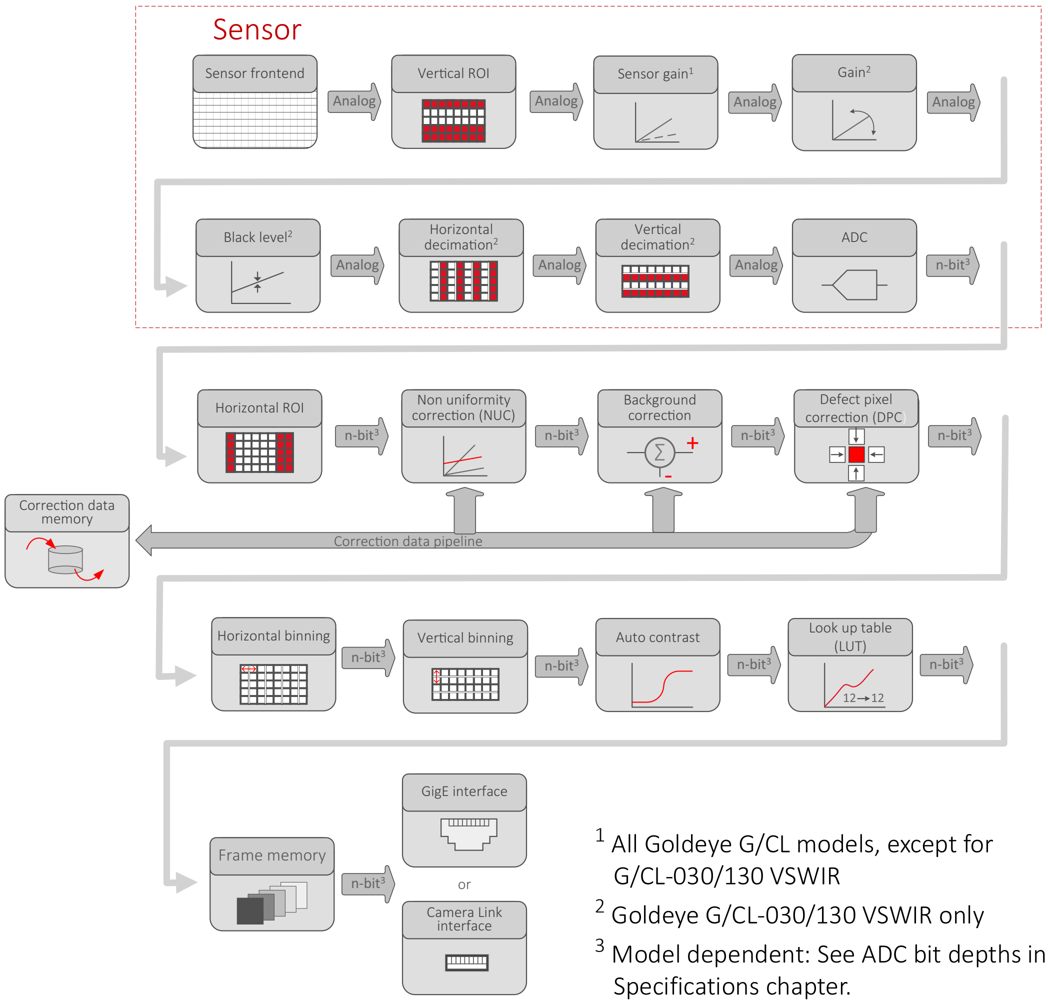
Table 238: Trigger timings for Goldeye G/CL-130 VSWIR TEC1

Image data flow

This chapter includes:

Image data flow

The following block diagram illustrates the flow of image data within the camera. The features of the individual modules are described in detail on the following pages. Note that, depending on firmware version, not all of the modules and features shown in Figure 93 are available.



[1] All Goldeye G/CL models, except for G/CL-030/130 VSWIR
[2] Goldeye G/CL-030/130 VSWIR only
[3] Model dependent: See ADC bit depths in the Specifications chapter.

Figure 93: Goldeye G/CL image data flow

The Goldeye G/CL contains a chain of image processing modules, called the **image processing chain**. The first module (called **Analog Gain**) receives the source signal from the sensor. Each of the subsequent modules receives the output data of the previous module as input.

The behavior of each module is configurable by software via specific features. That way, it is possible to set parameters or operation modes for each module.

Each module passes on the data to the succeeding module. The output of the last module is stored in the frame memory, which in turn passes it on to the GigE or Camera Link interface for output.

Image corrections

The corrections applied to the image are of special relevance within the Goldeye camera. They are applied by the following modules.

- Non-uniformity correction (NUC)
- Background correction (BC)
- Defect pixel correction (DPC)

The corrections need special correction data that must be provided before operating the image processing chain.

Find detailed descriptions of the features and the functionality associated with them in the Goldeye G/CL Features Reference.

Determination and storage of correction data

For each individual camera, specific correction data is determined during the manufacturing process. All necessary correction data is stored within the camera's non-volatile flash memory ex works.

During camera start-up, the available correction data is copied from the flash memory onto the correction data memory for real time access.

From the correction data memory, the correction data is transferred to the individual correction modules. The correction data transfer is synchronized with the transfer of image data from the sensor. A correction module may also write back to the correction data memory, depending on its functionality.

The IR specific image correction modules are described in detail in the following sections.

Non-uniformity correction

Every pixel of an InGaAs sensor possesses its individual amount of dark signal (dark signal non-uniformity, DSNU) and an individual sensitivity for light (photo response non-uniformity, PRNU). Therefore, while exposing, each sensor creates a specific, non-uniform underlying pattern. This pattern can be compensated with help of the non-uniformity correction.

To correct the non-uniformity, correction values for gain and offset of each pixel are determined based on multiple reference images and applied to the actual image. Ideally, after correction no image structure is recognizable.

However, there are various conditions that influence the image quality:

- Analog gain setting
- Sensor temperature
- Exposure time

These conditions need corresponding correction data for best correction quality. Therefore, the camera contains several data sets for a range of conditions.

Because each correction data set is applicable under certain conditions only, the relevant conditions are stored with the data set.

An automated data set selection feature keeps track of the conditions. If any of the parameters changes, the most suitable correction data set is selected automatically. No additional user interaction is necessary.

Set to **Continuous**, this function updates the data set selection for every frame.

Background correction

The background correction is used as an additional correction, based on actual operating conditions, to optimize the result of the NUC.

The correction data for the NUC is factory-provided and based on specific conditions: exposure time, sensor temperature, and sensor gain setting. If the conditions during camera operation are different, non-uniformity correction does not work at best performance.

To compensate for remaining non-uniformity, the live image is corrected with a previously recorded dark image. This image is subtracted from the pre-corrected image to reduce the fixed pattern noise.

To adapt the BC to local conditions, customers acquire their own volatile correction image. It is also possible to shift the offset individually, if needed.

Defect pixel correction

The pixels of InGaAs sensors may show abnormal behavior in one or more of the three characteristics:

- Dark offset
- Photo response
- Dynamic noise

The result is an excessively reduced dynamic range. These pixels are counted as defect pixels.

The value of each defect pixel is replaced by an interpolated value from non-defect neighboring pixels. This way, the image appears without disturbing bright or dark pixels.

Image processing

Feature descriptions

For detailed features descriptions, see the Goldeye G/CL Features Reference at www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

Black level

`BlackLevel` is available only on **Goldeye G/CL-030/130 VSWIR**.
`BlackLevel` controls the DC offset applied to the video signal.

Gain

Goldeye cameras use two different concepts to control the gain level.

Feature	Location	Available values	Unit	Supported models
`Gain`	Camera electronics	0 to 18 dB (float)	Dezibel	Goldeye G/CL-030/130 VSWIR
`SensorGain`	Sensor	1 or 2 gain steps	Factor	All other Goldeye models

Table 239: Comparison between Gain and SensorGain features

Look-up table

The use of a look-up table allows any mapping function in the form
output = f(input)
to be applied to the pixel values at runtime.

The factory setting of Goldeye cameras includes eight preloaded LUT files.

- Four pre-configured LUT files are available. Those files are 14-bit LSB aligned and are named from LUT_000 to LUT_003. The pre-configured files are not changeable in user mode.
- Four user-configurable LUT files are available. Those files are empty and are named from LUT_User_000 to LUT_User_003.

Loading a dataset files into the volatile LUT memory

1. Select the file to be loaded with `LUTDatasetSelector`
2. Select the target LUT with `LUTSelector`
3. Call the command `LUTDatasetLoad`

The LUT will not be loaded if an empty dataset file has been selected.

To avoid temporary invalid image data, we recommend you to do one of the following before executing `LUTDatasetLoad`:

- Stop image acquisition
- Set `LUTEnable` to *`False`*.

Saving a LUT from volatile memory to file

1. Select the LUT to be saved with `LUTSelector`
2. Select the target file with `LUTDatasetSelector`
3. Call the command `LUTDatasetSave.`

To avoid temporary invalid image data, we recommend you to do one of the following before changing the `LUTValue` at several index positions of a LUT:

- Stop image acquisition
- Set `LUTEnable` to *`False`*.

Binning

Binning reduces the image resolution by merging the gray values of adjacent pixels, but based on the full ROI.

Different binning modes:

- *`Sum`* increases the sensitivity.
- *`Average`* can be used to reduce noise.

In all Goldeye cameras, digital binning is applied after the Background Correction. Background Correction can be used to reduce the background level to enable higher binning values.

Decimation

Goldeye G/CL-030/130 VSWIR

Decimation reduces the image resolution by omitting pixels, but based on the full ROI. In Goldeye G/CL-030 and G/CL-130 cameras, decimation is applied in the sensor module before binning.

Automatic image control

Definitions

To properly explain the working principle of automatic image control, the definition of several special terms is clarified first. Refer also to Figure 94 on page 297.

Accounted pixels

Once the outliers are discarded from the calculation, all pixels holding gray values in the middle of the image histogram constitute the Accounted pixels.

Mean value

The average gray value of all accounted pixels. This means that within the accounted pixels range of the image histogram, the same number of accounted pixels is situated to either side of the mean value.

Minimum and maximum

The smallest and the largest gray value of pixels accepted within the number of accounted pixels.

Outliers

Outliers are defined as the brightest and darkest pixels in an image. Usually they originate from defect pixels of the sensor itself.

Small, very bright, or very dark objects in the observed scene can also create outliers. Because very small objects usually do not carry much useful scene information, they can be treated like outliers as well.

In an image histogram, the outliers show on the far-left side (dark pixels) and on the far-right side (bright pixels).

Eliminating outliers

The calculations of all auto level control features, including the automatic exposure operation, may be influenced by outliers in an unwanted way.

The auto level control settings allow for discarding outliers and thus preventing their undesired impact on the auto level control adjustments.

- To exclude the outliers on the dark side of the histogram (left), use the `AutoModeOutliersDark` feature. To include all dark pixels into the calculations, set the feature to `0`.
- To exclude the outliers on the bright side of the histogram (right), use the `AutoModeOutliersBright` feature. To include all bright pixels into the calculations, set the feature to `0`.

The values for both exclusion areas do not need to be equal.

For all the calculations concerning automatic image control, only the pixels not excluded by the outlier settings are considered.

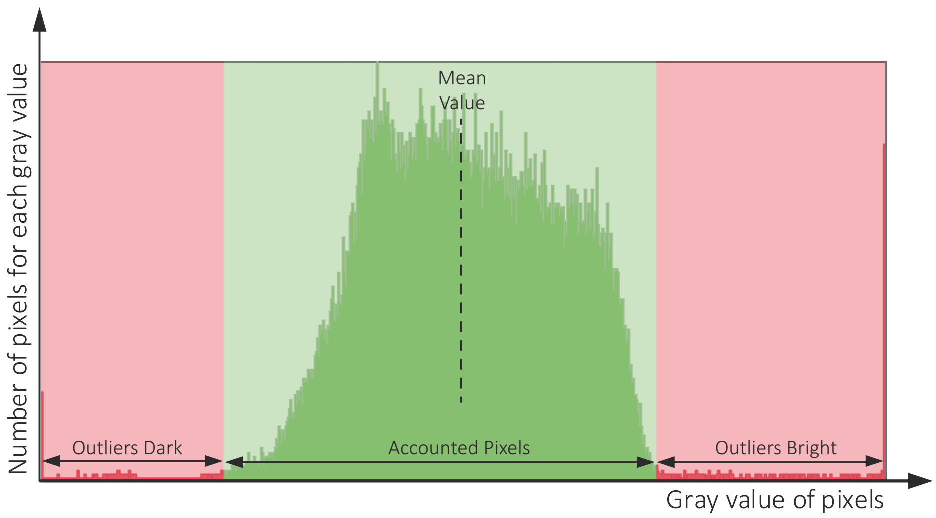


Figure 94: Image histogram showing the ranges of accounted pixels (green), the ranges of the outliers (red) and the mean value.

Selecting an ROI

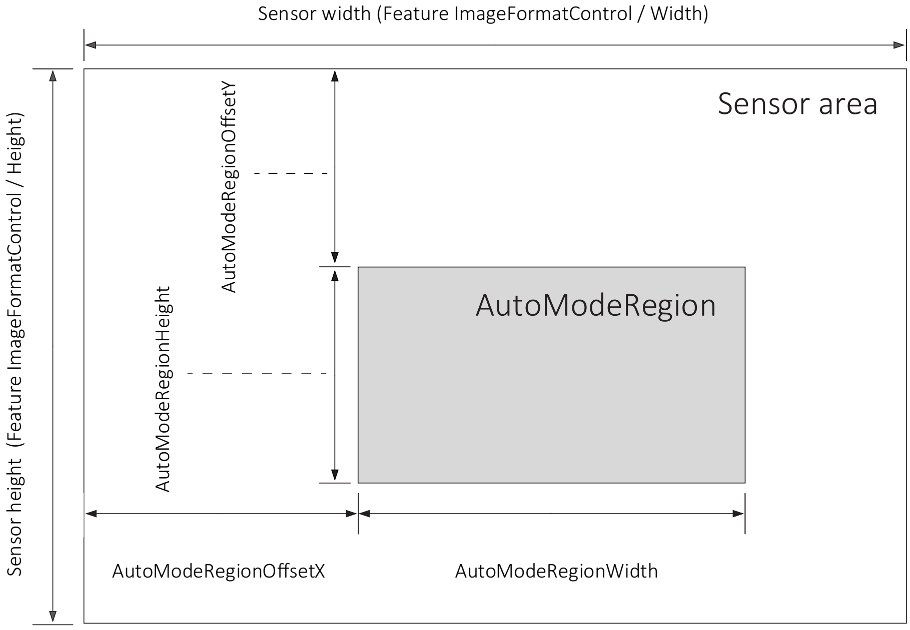


Figure 95: AutoModeRegion features

As for any other auto mode feature, you can use the **`AutoModeRegion`** feature and its sub-features to define the ROI. You may determine the automatic image control based on the whole sensor area or based on a defined ROI.

Marking the defined ROI

It is possible to mark the defined ROI by dimming the area outside the ROI, so the selected area stands out brighter. To do so, set the feature **`AutoModeRegionDimOutside`** to ***On***.

Figure 96: Example for the effect of AutoModeRegionDimOutside. Left: without dimming applied, right: with dimming applied to the outside area.

Automatic exposure control

The exposure of the Goldeye G/CL can be adjusted automatically by applying the relevant auto exposure settings. The adjustment is based on the present signal values of pixels within the image.

By default, the automatic exposure control is switched off, however, it is possible to have the automatic exposure control run in several ways:

- Run it continuously.
- Run it until the required target value is reached, then stop it.

Selecting an algorithm

To automatically determine the optimal exposure of the sensor, a few statistical values need to be calculated first: a mean (average) value, minimum and maximum values. These values are calculated with the help of the histogram of the last captured image.

The camera provides two different behaviors to control auto exposure. Use the settings of the `ExposureAutoAlg` feature to select the desired behavior.

Operating the automatic exposure based on the mean value

Set the `ExposureAutoAlg` feature to *`Mean`*, and set the `ExposureAutoTarget` feature to the desired value.

In this case, the automatic exposure control loop is aimed at keeping the mean value of the image histogram equal to the value set by `ExposureAutoTarget`.

The value for `ExposureAutoTarget` needs to be specified in percentage from the full dynamic range, including the outliers' areas. Higher values of `ExposureAutoTarget` will cause longer exposure times, thus result in brighter images, lower values cause shorter exposure times, thus result in darker images.

If this value is set to 40%, then 40% of all pixels of the image are darker and 60% of all pixels of the image are brighter than this value.

Operating the automatic exposure based on the full range of values

Set the `ExposureAutoAlg` feature to *`FitRange`*. The `ExposureAutoTarget` feature has no influence in this case.

In this case, the automatic exposure control loop regulates the exposure in such a way that the maximum value of the image histogram is kept close to the upper end of the dynamic range of the camera.

Tolerance

If the automatic exposure is calculated for every frame (`ExposureAuto` = *`Continuous`*), most likely there are minuscule adjustments to be applied to each frame. These adjustments may cause certain, though usually insignificant, variations of the image brightness between consecutive frames.

To prevent these adjustments, the feature `ExposureAutoAdjustTol` can be used.

The exposure is adjusted only if the current regulated value deviates from the ideal target value by more than a given percentage.

Slowing down the auto exposure adjustments

By default, the automatic exposure adjustments run at 20% speed[1]. Using the `ExposureAutoRate` feature, you can increase or decrease the automatic exposure adjustments to a fraction of the maximum possible speed. This can be useful for some applications and sensor settings, to prevent the auto exposure control loop from occurring oscillations.

[1]20% as default applies from firmware V02.22.X. Previous versions have this parameter set to 100%.

Contrast control

By default, `Contrast` is disabled. Contrast can be set manually by the user or automatically.

Manual mode

- Values for `ContrastUserInputMin` / `...Max` are set by the user.
- `ContrastAuto=UserWholeImage` and `ContrastAuto=UserModeAutoRegion` are available.

Automatic mode

- Values for `ContrastUserInputMin` / `...Max` are obtained from an internal histogram that is based on the current image data.
- `ContrastAuto=WholeImage` and `ContrastAuto=AutoModeRegion` are available.

Setting Contrast for the whole image or for an ROI

Automatic contrast control uses the input range defined by `ContrastUserInputMin` and `ContrastUserInputMax`. It can be applied:

- To the whole image. The input range of the contrast is automatically determined from the image data.
- To a defined ROI. To apply the automatic contrast to a ROI, use the `AutoModeRegion` features to define the area.

Figure 97: Left: auto contrast applied to ROI, right: auto contrast applied to the whole image.

This formula describes the pixel transfer function to calculate the contrast:

$$\text{pixel\_tmp} = \frac{(\text{pixel\_in} - \text{min\_in}) \times (\texttt{ContrastAutoIntensityMax} - \texttt{ContrastAutoIntensityMin})}{(\text{max\_in} - \text{min\_in})} + \texttt{ContrastAutoIntensityMin}$$

Clipping:

pixel_out = max(min(pixel_tmp, pixeldata_max), 0)

Where

- min_in and max_in are defined by `ContrastUserInputMin` and `ContrastUserMax` in `UserWholeImage` and `UserAutoRegionMode`. In `WholeImage` and `AutoModeRegionMode`, min_in and max_in are calculated automatically from the image data.
- pixel_in and pixel_out refer to the same pixel location in the input and output image of the contrast calculation.

Controlling the intensity of contrast

Using the `ContrastAutoIntensity` features, it is possible to adjust the intensity of contrast applied. Those features represent an upper and lower threshold of contrast intensity. In combination, they act as follows:

- If both features are set to higher values, the affected area of the image turns brighter.
- If both features are set to lower values, the affected area of the image turns darker.
- If the difference between the set values for both features increases, contrast intensity increases (the black and white spots within the affected area are increasing in number).
- If the difference between the set values for both images decreases, contrast intensity decreases (the gray spots within the affected area are increasing in number).
- The image is turned into its negative if `ContrastAutoIntensityMin` is set to a higher value than `ContrastAutoIntensityMax`.

Figure 98: Left: Auto contrast applied to a ROI in the usual way, right: auto contrast with the ContrastAutoIntensity values reversed.

Other image controls

Frame memory

Goldeye cameras capture and transmit each image in consecutive steps. The image is taken, read out from the sensor, digitized, and transmitted to the host computer over the connection used, either Camera Link or Gigabit Ethernet.

For buffering the frames before transmission, a certain amount of RAM is available. The number of frames in the frame memory depends on the defined ROI and the pixel format. Table 240 shows the memory size and the number of frames (StreamHoldCapacity) that can be stored by each model.

Model[1]	**Memory size and frames stored**	**Pixel format and resolution**
G/CL-008 SWIR/XSWIR	256 MB memory: 1524 frames	Mono14, full resolution
G/CL-030 VSWIR	256 MB memory: 370 frames	Mono12, full resolution
G/CL-032 SWIR	256 MB memory: 397 frames	Mono14, full resolution
G/CL-033 SWIR	256 MB memory: 392 frames	Mono14, full resolution
G/CL-034 SWIR/XSWIR	256 MB memory: 392 frames	Mono14, full resolution
G/CL-130 VSWIR	256 MB memory: 95 frames	Mono12, full resolution
[1] Including Cool, TECless, TEC1, or TEC2 where applicable		

Table 240: Typical image memory size

Trigger-induced distortion correction

Background

The trigger-induced distortion (TID) is an image artifact that originates from an influence of the external trigger. The TID occurs only if the two following conditions are met:

- The camera runs in IWR mode.
- The time between the readout of two consecutive frames is smaller than the sum of readout time and exposure time.

Application note: Using ITR and IWR mode

About uding ITR and IWR mode in Goldeye cameras, the application note Using ITR and IWR mode to maximize the frame rate of Goldeye Cameras is available online:

www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation

The TID can cause a vertical line glitch and a horizontal step in brightness. The magnitude of both depends on the camera model and the selected `SensorGain`.

Controlling the trigger-induced distortion

In `DeviceControl` > `SensorBoardSettings` > `TriggerInducedDistortionCorrection`, the `TIDC_Mode` feature provides options to compensate for distortions:

- *`BrightnessStep`*
- *`LineGlitchOnly`*
- *`BothDistortions`* (default)

For high image quality by line glitch correction, ensure a sufficient image width. Otherwise, the line glitch correction is disabled automatically as shown in Table 241:

Goldeye model	**Line glitch correction is enabled:** ROI width	**Line glitch correction is disabled:** ROI width
G/CL-008 SWIR/XSWIR	≥ 154	≤ 152
G/CL-030 VSWIR	Not applicable	
G/CL-032 SWIR	≥ 304	≤ 302
G/CL-033 SWIR	≥ 290	≤ 288
G/CL-034 SWIR/XSWIR	≥ 290	≤ 288
G/CL-130 VWSIR	Not applicable	

Table 241: Activation and deactivation of the TIDC depending on ROI width

Value changes by feature interdependencies

The conversion between time and clock cycles affects control values. Features for pixel format, bandwidth, ROI, exposure time, and triggering are related to each other. Changing values for one feature can change values for another feature. For example, frame rates can be reduced when `PixelFormat` is changed subsequently. Figure 99 shows the interdependencies.

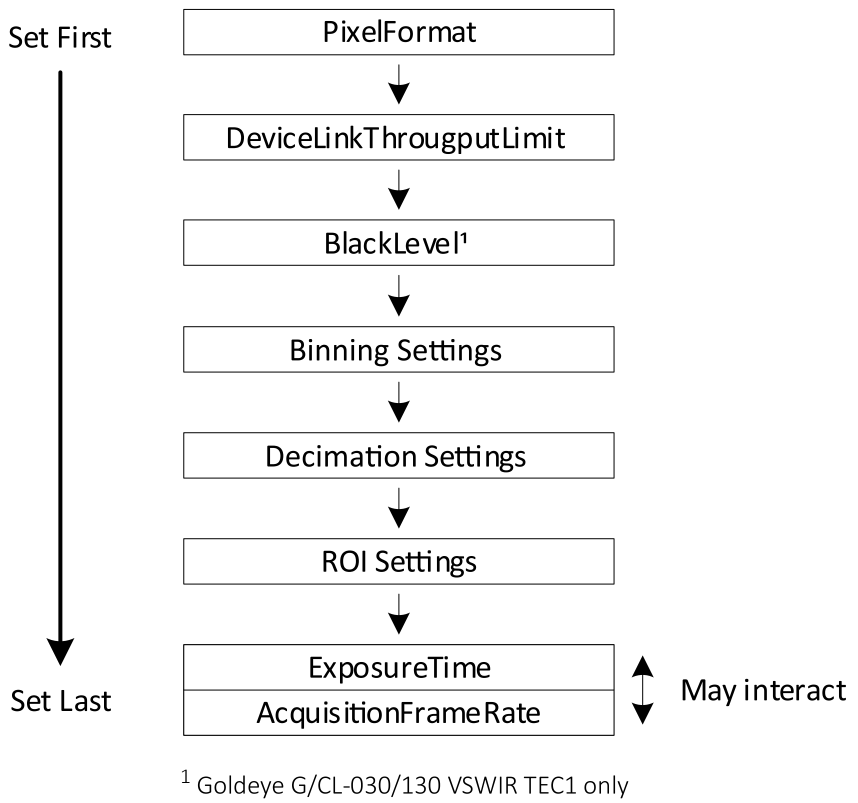


Figure 99: Interdependencies between features

Effects for the interdependent features

Changing one control's value affects other control's values, such as:

If: `Height` value is changed.
Then: Other values may be affected, such as for `AcquisitionFrameRate` and `ExposureTime`.

We recommend you to consider:

- The more features you adjust, the more current values deviate from previously set values.
- The same effects that apply to `ExposureTime`, also apply to `AutoExposure`.
- To avoid readjustments, apply settings in the order shown in Figure 99.

Temperature control

This chapter includes:

Precautions

CAUTION

Risk of burns

The camera housing may heat up during operation. Touching the camera with bare hands may lead to injuries.

Wear protective gloves when touching a heated-up camera during operation. Also, use proper heat dissipation methods to keep the camera as cool as possible.

NOTICE

RCG models: Damage to the sensor

For Goldeye G/CL-008 SWIR TEC1 cameras with RCG (Removed Cover Glass) sensor option, condensation can cause short circuits on the sensor.

- During operation, avoid condensation of humidity on the sensor.
- Set the `SensorTemperatureSetpointMode` feature to ***`Manual`*** (default), avoid using ***`Auto`*** mode.
- Set all values for `SensorTemperatureSetpointValue` carefully.
- Observe the description in the Handling Cameras with RCG and TCG Options application note, see the note below.

Temperature control on RCG models

To avoid damage to the sensor, read the description in the Handling Cameras with RCG and TCG Options application note: www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation.

How temperature affects the sensor

During operation, the electronics heat up the camera interior and housing. InGaAs sensors are affected by temperature in two ways:

1. Absolute level of sensor temperature
   An increase in sensor temperature reduces the image quality, because:
   - An increased sensor temperature increases the dark current of the FPA's photo-diodes, thus decreasing the dynamic range of the camera. As a rule of thumb, a temperature increase of 8 Kelvin doubles the dark current. The dark current produces additional offset and noise, especially at longer exposure times, which causes a decrease in image contrast.
   - The spectral sensitivity may change: A difference in temperature may cause the sensitivity curve to drift or to become slightly narrower.
   - Certain components of the InGaAs sensor are prone to temperature drift. A drop in temperature causes a shift of the spectral sensitivity of 25 nanometers toward the lower wavelengths.
2. Fluctuation of sensor temperature
   If the temperature influence on the sensor remains constant, the image quality is high. To achieve this, TEC1 and TEC2 stablilize the sensor temperature at one of several defined temperature setpoints.
   For the Goldeye stabilized and cooled models, three or four setpoints are defined, depending on the camera model.

To optimize image quality, the temperature can be stabilized by:

- Temperature control of the sensor,
- Neutralization of the temperature influence.

This chapter describes how temperature control is realized on Goldeye cameras.

TEC1, TEC2, TECless

Model suffix	Cooling type
TEC1	Single-stage thermo-electric cooling
TEC2	Dual-stage thermo-electric cooling
TECless	Passive camera cooling

Table 242: Temperature control types overview

TEC1

Single-stage thermo-electric cooling (TEC1) is an active cooling technology that keeps the sensor at a stable temperature as low as possible. The Goldeye housing dissipates the heat build-up inside the camera to the environment.

To avoid condensation, the sensor of G/CL-008 Cool TEC1 models is placed inside a Nirogen chamber.

TEC2

Dual-stage thermo-electric cooling (TEC2) allows operating the sensor at a temperature well below ambient temperature. This enables higher image quality even with long exposure times. However, condensation on the sensor is likely to occur with sensor temperatures far below ambient temperatures.

To avoid condensation, the sensor of G/CL-032 Cool TEC2 models is placed inside a Nirogen chamber.

In addition to temperature stabilization, Goldeye Cool cameras are equipped with a fan to actively dissipate the heat that builds up internally. Note that a Cool model does not necessarily have TEC2.

See Neutralization of the temperature influence on page 312 for details.

TECless

Passive cooling (TECless) provides no active temperature stabilization for the sensor. TECless models are especially suitable for environments with a low and stable ambient temperature, or in application scenarios where the influence of temperature on image quality is limited; for example, with exposure times below 10 milliseconds.

Recommended environment for Goldeye TECless

Goldeye TECless models are not equipped with a TEC element, hence the camera does not possess temperature setpoints and cannot stabilize the sensor temperature. Therefore, TECless models are recommended to be run in an environment with stable temperature and humidity.

Their non-uniformity correction sets are calibrated for a sensor temperature of +45 °C, because this is the sensor temperature that most likely is to be expected when the camera is operated at an ambient temperature of 23 °C and a relative humidity of 40 percent.

Warm-up period with TEC1 and TEC2

After switching on the camera, the TEC stabilizes the sensor temperature at the default setpoint, if possible. Optimum image quality is reached within one minute.

Goldeye G/CL-008 SWIR/XSWIR, G/CL-030/130 VSWIR models are also able to heat up the sensor to any temperature within the operating temperature range. See Additional heating for selected models on page 310.

A red flashing temperature status LED indicates the warm-up period.
A steady green temperature status LED indicates the **Stable** temperature state.

Use a heat sink to reduce camera temperature

To improve the cooling capability of the Goldeye stabilized and TECless models, a heat sink set is available that can be mounted to the camera by the customer. Up to four heat sinks can be fitted to one camera.

The heat sink set is available from Allied Vision, product code 1068300.

Application note: Usage of Heat Sinks with Goldeye Cameras

This application note explains the handling of heat sinks with Goldeye cameras and lists additional methods to improve camera cooling:

www.alliedvision.com/en/support/technical-documentation/goldeye-gcl-documentation

Additional heating for selected models

The TEC1 element of a camera usually can only cool the sensor. In addition to that, **Goldeye G/CL-008 SWIR, G/CL-030/130 VSWIR** models use the TEC1 element to heat the sensor. This ability has the following advantages:

- The camera can operate at a sensor temperature that is higher than the ambient or housing temperature.
- When used for low-temperature applications, if the ambient temperature is far below +20 °C, or if the default temperature setpoint has been set high above the ambient temperature, the warm-up period is considerably shortened. Even in ambient temperatures below 0 °C, the camera reaches a stable temperature within one minute.
- The heating capability prevents any variation of the sensitivity curve caused by fluctuation of temperature.

Activating the heating of Goldeye G models

After the heating for **Goldeye G-008 SWIR/XSWIR, G-030/130 VSWIR** has been activated, switching down to a setpoint below the selected setpoint is disabled. The ability to switch to a higher setpoint depends on the `SensorTemperatureSetpointMode` feature:

- If set to *`Auto`*, the camera is able to switch to a higher setpoint, if it exists.
- If set to *`Manual`*, the camera is not able to switch to any other setpoint.

To activate the heating of the camera, follow these steps:

Step 1: Set the `SensorTemperatureTargetSetpoint` feature to the desired target setpoint.

Step 2: Set the `SensorTemperatureControlMode` feature to *`TemperatureControlTarget`*.

Activating the heating of the CL models

After the heating for **Goldeye CL-008 SWIR/XSWIR, CL-030/130 VSWIR** has been activated, switching down to a setpoint below the selected setpoint is disabled. The ability to switch to a higher setpoint, depends on the `RegSensorTemperatureSetpointMode` register:

- If set to *`Auto`*, the camera is able to switch to a higher setpoint, if it exists.
- If set to *`Manual`*, the camera is not able to switch to any other setpoint.

To activate the heating of the camera, follow these steps:

Step 1: Set the `RegSensorTemperatureTargetSetpoint` register to the desired target setpoint.

Step 2: Set the `RegSensorTemperatureControlMode` register to *`TemperatureControlTarget`*.

Reducing power consumption of the camera

Reducing the camera's operating temperature can reduce its typical power consumption significantly for any given temperature setpoint.

The TEC works more efficiently if the temperature difference between the cool side and the warm side of the TEC is decreased.

Unexpected shutdown of Goldeye Cool models

Goldeye Cool cameras are shut off automatically if the specified maximum operating temperature is exceeded. This can happen when the cover fan outlet is blocked.

Enable a free air flow for the fan outlet on the camera top.

Neutralization of the temperature influence

To control the temperature influence on the non-uniformity, the TEC element keeps the sensor temperature at predefined setpoints, preferably the default setpoint.

Temperature setpoints

A set of correction data is applied to the output signal. This correction data set is predetermined for each camera individually and is optimized for the default temperature setpoint. The correction data set is uploaded into the camera during manufacturing.

Models	Setpoint 1	Setpoint 2	Setpoint 3	Setpoint 4
G/CL-008 SWIR TEC1	+20 °C [1]	(Default) +25 °C	+35 °C	+50 °C
G/CL-008 SWIR Cool TEC1	-5 °C	(Default) +5 °C	+10 °C	+20 °C
G/CL-008 XSWIR 1.9/2.2 TEC2	(Default) -30 °C	-20 °C	-10 °C	0 °C
G/CL-030 VSWIR TEC1	+5 °C	(Default) +20 °C	+35 °C	+50 °C
G/CL-032 SWIR TEC1	+5 °C	(Default) +20 °C	+35 °C	+50 °C
G/CL-032 SWIR Cool TEC2	(Default) -20 °C	-5 °C	+10 °C	(N/A)
G/CL-033 SWIR TEC1	+5 °C	(Default) +20 °C	+35 °C	+50 °C
G/CL-033 SWIR TECless	Not applicable to TECless models.			
G/CL-034 SWIR TEC1	+5 °C	(Default) +20 °C	+35 °C	+50 °C
G/CL-034 SWIR TEC2	(Default) -30 °C	-20 °C	-10 °C	0 °C
G/CL-034 XSWIR 1.9/2.2 TEC2	(Default) -30 °C	-20 °C	-10 °C	0 °C
G/CL-130 VSWIR TEC1	+5 °C	(Default) +20 °C	+35 °C	+50 °C
[1] The first temperature setpoint may be set lower than +20 °C. However, if the sensor temperature is lower than the ambient temperature, especially in humid environments, condensation may occur.				

Table 243: Defined temperature setpoints for Goldeye cameras

Achievable temperature difference

The cooling power and heat dissipation capability of the Goldeye is limited. Therefore, the temperature difference (ΔT) achievable by the TEC is limited as well. However, the TEC is capable of achieving a minimum ΔT in all situations. Table 244 displays the achievable ΔT maintained, and the power consumption necessary to achieve that, for each Goldeye TEC model.

The realistically achievable ΔT depends on the environmental conditions. It also depends on the Peltier element and possible heat sinks and heat sources. Heat sources are in particular the camera electronics and the Peltier element itself.

Due to changing environmental conditions, it is not always necessary for the TEC element to maintain the maximum achievable ΔT. On the other hand, particular environmental conditions allow the TEC element to achieve an even higher ΔT.

Note also that the TEC element cools the sensor but dissipates the removed heat into the camera. Therefore, we can indicate a maximum power at the TEC element that removes the heat from the camera under normal operating conditions.

Above that threshold (at more TEC power) the camera overheats due to the power consumption of the TEC element. The value is optimally selected in a critical range.

Models	ΔT achievable between housing and FPA	Maximum power to reach ΔT
G/CL-008 SWIR TEC1	20 K	< 5.5 W
G/CL-008 SWIR Cool TEC1	30 K	< 5.5 W
G/CL-008 XSWIR 1.9/2.2 TEC2	60 K	< 12 W
G/CL-030 VSWIR TEC1	25 K	< 5.5 W
G/CL-032 SWIR TEC1	30 K	< 5.5 W
G/CL-032 SWIR Cool TEC2	60 K	< 12 W
G/CL-033 SWIR TEC1	25 K	< 4 W
G/CL-034 SWIR TEC1	25 K	< 4 W
G/CL-034 SWIR TEC2	60 K	< 12 W
G/CL-034 XSWIR 1.9/2.2 TEC2	60 K	< 12 W
G/CL-130 VSWIR TEC1	25 K	< 5.5 W

Table 244: Cooling limits for Goldeye TEC1 and TEC2 models

Temperature measurement

To control and regulate the internal camera temperature, three temperature sensors are available within the camera. Use the `DeviceTemperatureSelector` feature to select a temperature sensor, as listed in Table 245. The temperature of the selected sensor is displayed with the `DeviceTemperature` feature.

Possible values	Description
Sensor	(Default) Temperature sensor beside the camera sensor.
Sensorboard	Temperature sensor on the sensor board.
Mainboard	Temperature sensor on the main board.

Table 245: DeviceTemperatureSelector values

Switching temperature setpoints

Only the sensor board is switched off

- If the internal temperature exceeds the Alert limit, only the sensor and the cooling is shut down.
- The camera is not powered down.
- You may bring back the camera to normal operation after it is cooled down sufficiently.
- To do so, switch the power supply off and switch it on again.

The Goldeye temperature control allows to switch between setpoints manually or automatically. If set to ***Auto***, the TEC switches up or down to the next setpoint, based on the temperature inside the camera. Note that the TEC does not switch up or down immediately after the next setpoint is reached. The switch only takes place when the temperature has exceeded the setpoint by a few degrees.TECless models do not switch setpoints.

Switching to the higher setpoint

After powering up the camera, at first the camera temperature rises. This is due to heat generation inside the camera, and possibly caused by warm ambient temperature. To keep the sensor temperature constant, the TEC keeps it at a predefined temperature setpoint (see Table 243 on page 312).

The TEC keeps the sensor temperature as long as the difference between sensor temperature and housing temperature does not exceed the predefined ΔT (see Table 244 on page 313).

If the housing temperature keeps rising, the difference between sensor- and housing temperature exceeds the predefined ΔT. The temperature control is no longer able to keep the sensor temperature at the current setpoint. The TEC switches up to the next higher setpoint. The existing NUC data, that is optimized for the default setpoint conditions, is still applied at other setpoints.

Example

The Peltier element of Goldeye G/CL-033 SWIR TEC1 can achieve a ΔT of 25 kelvin. Its default temperature setpoint is set to +20 °C.

If the camera is switched on at an ambient temperature of +8 °C, the TEC cannot cool down the sensor to the default setpoint, because the ambient temperature is below the default setpoint. Therefore, the TEC cools down the sensor to setpoint 1, which is at +5 °C. (See Figure 100 for an illustration of this example.

Note for better understanding: the housing temperature profile is shown in a simplified way that covers the whole temperature range.)

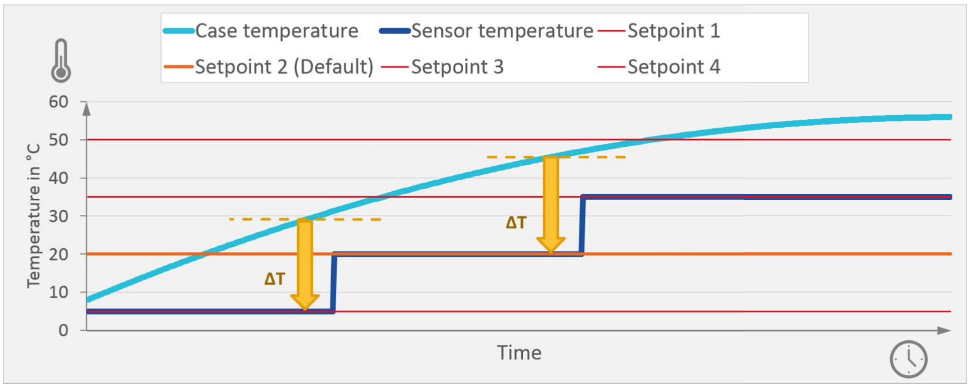


Figure 100: Schematic figure of setpoint switching upwards

The camera then heats up, and the temperature passes setpoint 2. Later it reaches +30 °C, the point that is 25 kelvin above the current setpoint. If the camera temperature continues to rise, the TEC is no longer able to maintain the set temperature. No later than at this point in time, the TEC switches to the next higher setpoint, which in this case is the setpoint 2 at +20 °C.

Switching to the lower setpoint

When the ambient temperature decreases, this causes the temperature of the camera to decrease as well. With further temperature decrease, the sensor temperature can fall below the current setpoint temperature. The TEC might be no longer required to cool the sensor to the adjusted temperature setpoint. If the sensor temperature no longer depends on the TEC cooling only, it becomes unstable.

To avoid temperature instability, the TEC switches down to the next setpoint, before the cooling power is reduced to the critical range at the current sensor temperature.

To keep the current sensor temperature as long as possible, the TEC does not switch down immediately when the Min. ΔT to the next temperature setpoint is reached. These points are marked in green in Figure 101.

Note for better understanding the housing temperature profile is shown in a simplified way that covers the whole temperature range.

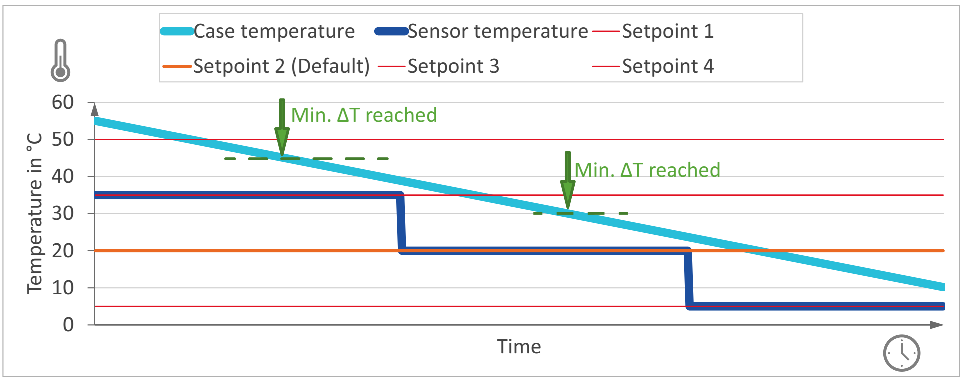


Figure 101: Schematic figure of setpoint switching downwards

Heating and cooling the sensor (G/CL-008 only)

As a special case, Goldeye G/CL-008 models can actively heat up the sensor, enabling the TEC to operate at a sensor temperature that is higher than the housing or ambient temperature.

When heating is enabled, the TEC does not need to switch down to a temperature setpoint that is below the current setpoint. As long as the housing temperature is below the sensor temperature, the TEC keeps heating the sensor.
If required to keep the sensor temperature stable, the TEC automatically switches from heating to cooling, or vice versa.

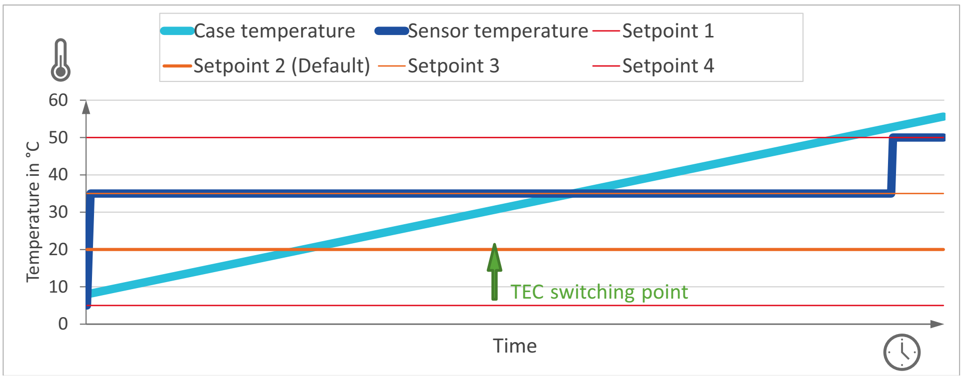


Figure 102: Schematic figure of TEC heating and cooling

During operation, as long as the TEC does not actively cool the sensor, the sensor temperature usually is higher than the housing temperature. So, even if the sensor temperature is below the current temperature setpoint, the TEC might still be required to cool the sensor. The green arrow in Figure 102 shows this situation Note for better understanding the housing temperature profile is shown in a simplified way that covers the whole temperature range.

The ability to switch to a higher setpoint, however, depends on the feature (Reg)`SensorTemperatureSetpointMode`:

- Set to ***`Auto`***, the TEC is able to switch to a higher setpoint, if it exists, as shown in Figure 102.
- Set to ***`Manual`***, the TEC is not able to switch to any other setpoint.

Switching the sensor off

If the internal camera temperature exceeds a preset alert limit, the camera's overheat protection circuit powers down the sensor board. This also includes the sensor cooling.

The Alert state is indicated by a continuous red light of the temperature status LED.

Temperature setpoint settling time

If the setpoint for sensor temperature is switched, the desired temperature is reached approximately half a minute later. During this period, the image quality may be slightly reduced.

Goldeye CL-033 SWIR TEC1 example

This example explains the functionality of the single-stage TEC1. It is shown in Figure 103.

The Goldeye CL-033 SWIR TEC1 has four temperature setpoints:

- +5 °C,
- +20 °C (default)
- +35 °C
- +50 °C

It can achieve a maximum temperature difference of 25 kelvin between housing and sensor.

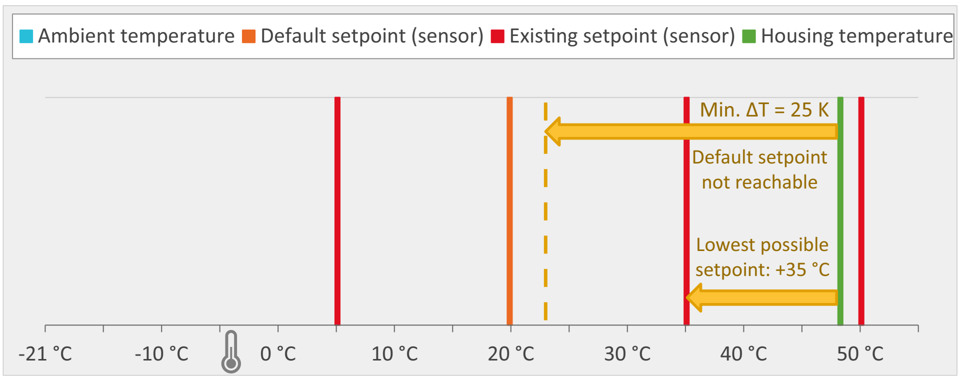


Figure 103: Cooling capabilities of Goldeye TEC1 models (example)

As a result, the CL-033 SWIR TEC1 switches to the lowest setpoint it can reach, which is at +35 °C, and keeps the sensor at that temperature.

For this example, it is assumed that during operation, the housing temperature of a Goldeye CL-033 SWIR TEC1 has leveled at approximately +48 °C. Therefore, the minimum sensor temperature the TEC can reach is +23 °C. It cannot reach the default setpoint at +20 °C.

Goldeye G-032 SWIR Cool TEC2 example

This example explains the functionality of the two-stage TEC2.

The Goldeye G-032 SWIR Cool TEC2 has three temperature setpoints:

- -20 °C (default)
- -5 °C
- +10 °C

It can achieve a maximum temperature difference of 60 kelvin between housing and sensor.

For this example, it is assumed that during operation, the housing temperature of a Goldeye G-032 SWIR Cool TEC2 has leveled at approximately +38 °C.

Because the temperature difference achievable is 60 kelvin, the TEC can reach the default setpoint at -20 °C.

Therefore, the G-032 SWIR Cool TEC2 will switch to the default setpoint at-20 °C and keep the sensor at that temperature.

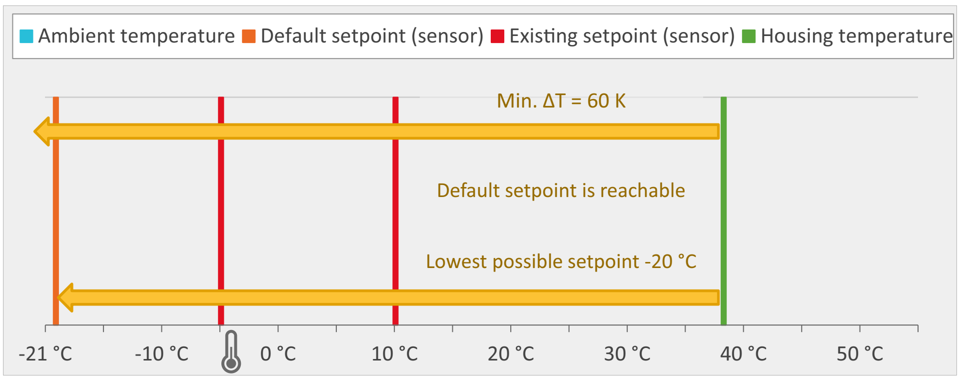


Figure 104: Cooling capabilities of Goldeye TEC2 models (example)

Goldeye G/CL-008 SWIR TEC1 example

This example explains the heat functionality of the single-stage TEC1.

The Goldeye G/CL-008 SWIR TEC1 has four temperature setpoints:

- +20 °C
- +25 °C (default)
- +35 °C
- +50 °C

With cooling, it can achieve a maximum temperature difference of 20 kelvin between housing and sensor.

For this example, it is assumed that the camera is started at an ambient temperature of-5 °C. The camera is supposed to work at a sensor temperature of +35 °C. It is likely that through internal heat-up alone, the camera cannot reach the setpoint at +35 °C.

- If the `TemperatureControlTarget` of the camera is **not** activated, the camera levels the sensor temperature at the low setpoint of +20 °C.
- If the `TemperatureControlTarget` is activated, the camera heats the sensor and levels the temperature at the setpoint of +35 °C.

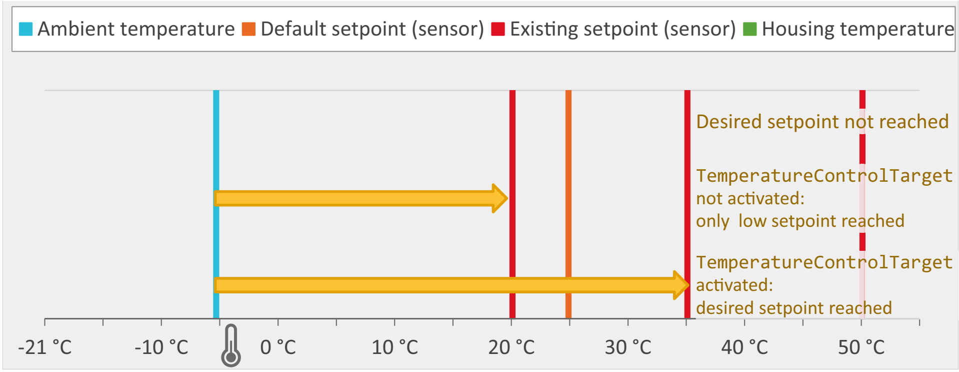


Figure 105: Heating capabilities of Goldeye G/CL-008 models (example)

Operational status

Table 246 explains the operational statuses that are indicated by the temperature status LED on the camera back panel. For TECless cameras, the LED will either remain off, not indicating any TEC status; or it will turn red, indicating overheating.

Use an efficient heat removal device

If the camera has switched to **Alert** status, it is also recommended to provide a more efficient heat sink for the camera housing before resuming operation. However, additional heat dissipation arrangements are always advantageous.

LED code	Status
Off	**Off** There are two cases when the LED remains off: • The TEC is actively switched off, using the feature `SensorTemperatureControlMode`. • The camera is a TECless camera that has no TEC available.
Flashing	**Deviated** The sensor cooler is operating, the defined sensor temperature (setpoint) has not been reached or stabilized yet. This signal is no error signal.
Continuous	**Stable** The temperature is stabilized at one setpoint, the camera operates optimally.
Flashing	**Upper limit** • The sensor cooler operates at its upper power limit. The cooler is not able to keep the set temperature; however, the critical temperature level has not been reached yet. • Under warm ambient temperatures, consider red flashing for an extended period of time as a warning signal: if the camera keeps working under unchanged conditions, an emergency shutdown is likely. • The image correction quality may also deteriorate during this stage.
Flashing	**Lower limit** • The sensor cooler operates below its lower power limit. • Under cold ambient conditions, the cooler may not be required to keep the sensor temperature at the lowest setpoint. • The image correction quality may also deteriorate during this stage.
Continuous	**Alert** • If the internal camera temperature exceeds the defined threshold temperature, the sensor and the critical electronics of the sensor board conduct an emergency shutdown to prevent overheating. This is called the Alert state. It is indicated by the LED continuously glowing red. • In case of Alert, the red color of the LED does not change even if the camera cools down again. • The camera can be restarted only manually by switching the power off and on again. This is possible only after the camera cooled down sufficiently.

Table 246: Temperature status LED

Features for temperature control

Feature names	Register names
DeviceRelativeHumidity DeviceRelativeHumiditySelector	RegRelativeHumidity[ ] RegRelativeHumidityInq...
DeviceTemperature DeviceTemperatureSelector	RegTemperature[ ] RegTemperatureInq...
SensorCoolingPower	RegSensorCoolingPower
SensorTemperatureControlMode	RegSensorTemperatureControlMode
SensorTemperatureControlState	RegSensorTemperatureControlState
SensorTemperatureSetpointActivate	RegSensorTemperatureSetpointActivate
SensorTemperatureSetpointActive	RegSensorTemperatureSetpointActive
SensorTemperatureSetpointMode	RegSensorTemperatureSetpointMode
SensorTemperatureSetpointSelector	RegSensorTemperatureSetpointSelector
SensorTemperatureSetpointValue	RegSensorTemperatureSetpointValue
SensorTemperatureTargetSetpoint	RegSensorTemperatureTargetSetpoint

Table 247: Features and register names for temperature management

Find detailed descriptions of the features controlling the temperature and humidity correction and the functionality associated with them in the Goldeye G/CL Features Reference.

Firmware update

This chapter explains the firmware update for Goldeye G/CL cameras.

Updating the firmware

Added features and product improvements motivate new firmware releases.

1. Get the firmware files from Allied Vision Support.

Firmware files for Goldeye G/CL cameras

The **firmware** for Goldeye G/CL cameras is subject to export limitations. Therefore, it is not available via public download.

To update the firmware of your Goldeye G/CL camera, please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

2. Download and install the corresponding SDK:

Vimba versions and components for download

In the instructions below, the corresponding tools are named with Vimba or Vimba X prefix only where it is necessary. The compatible tools are:

- **Goldeye G: Vimba X SDK** including **Vimba X Firmware Updater** and **Vimba X Viewer.** See www.alliedvision.com/en/products/software/vimba-x-sdk.
- **Goldeye CL: Vimba SDK** including **Vimba Firmware Updater** and **Vimba Viewer.** See www.alliedvision.com/en/products/vimba-sdk.

3. Directly connect the camera to your computer.
   Do not use a shared connection on a switch with other devices.
4. Open your camera in the viewer shown above.

NOTICE

Damage to the camera by destroying the firmware

If the power connection is interrupted while updating the firmware, the camera can come into a dysfunctional state. In this case, the camera cannot be operated and you cannot update the firmware anymore.

- Keep the camera powered until firmware updates are completed and the camera reboot has been completed. (This can take 10 to 30 minutes.)
  - Goldeye CL:
    Ignore the completion message of the Vimba Firmware Updater.
  - Goldeye G:
    Vimba X Firmware Updater reports the status correctly.
- Follow the instructions below.

If the firmware on the camera has been destroyed, please contact the Allied Vision Repair team at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

5. Using the firmware updater, upload the new firmware to your camera.
   During the update, the camera is not shown in the viewer.

LED status while updating the firmware

See GigE status LEDs on page 265 for details.

The **camera LED's** are blinking alternately while:

- The camera writes the new firmware to the permanent storage, replacing the old firmware.
- The camera is restarted to run the new firmware.

6. **Only after the camera has re-appeared in the viewer**:
   Start image acquisition to check the update has been successfully completed.
   Now, the camera can be disconnected from power.

Cleaning optical components

This chapter includes:

Avoiding the necessity of camera cleaning

The best way to keep cameras clean is to avoid penetration of foreign substances into the camera. When (un)mounting lenses or dust caps, hold the camera with the mount opening pointing downwards to avoid contaminants falling on the optical filter or sensor surface. Store cameras and lenses with dust caps on.

Figure 106: Illustration of camera orientation when removing lens or dust cap

Identifying contaminations

Even if contamination particles, such as dust or fluids can be seen on the surface of optical filters or the sensor, the camera image is not necessarily affected because these particles are out of focus.

The contaminations seen in the camera image are situated on the lens, filter, or sensor. Contaminations may develop due to handling or unclean environments.

Figure 107 shows how contaminations on the sensor or on optical components may appear as dark areas, patches, or spots on the image and remain fixed in the preview window while you rotate the camera over the target.

Also, if contaminations are located on the edge of lenses or filters, they may be outside the field of view, and invisible in the image.

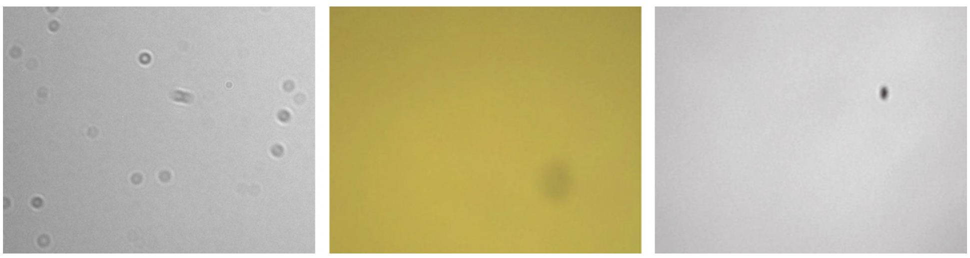


Figure 107: Dust on the filter (left and middle), dust on the sensor (right)

Do not confuse a contamination with a pixel defect, which appears as a distinct point. Particles can lie loose or can be stuck to the optical surface.

Locating contaminations

Before dismounting the lens, determine if the contamination is located on the filter, lens, or sensor. Capture a uniform image with the camera, for example a white sheet of paper. The affected optical surface is identified when optical component in question is moved (rotated) and the dirt follows this movement.

- The **contamination is on the lens** if the contamination moves as well when you rotate only the lens (not the camera).
- The **contamination is on the filter** if the contamination moves when you move the filter window.
- The **contamination is probably on the sensor** if the contamination is on the lens or filter.

Removing optical filters

NOTICE

Damage to the sensor

The sensor can easily be damaged after the lens, lens cap, and filter have been removed.

- Provide the following conditions to keep dirt and droplets out of the optical system of camera:
  - Dust-free environment
  - Low relative humidity
  - No condensation.
- Use only the tools described in the following instructions.

NOTICE

Damage to the optical filter

Optical filters have a soft surface that can easily be scratched.

- Be very careful when you remove the filter from the camera.
- Follow the instructions in Using lens mounts and filters on page 210.
- Only use the tools defined in these instructions.
- Touch filters only at the edges, and with cotton gloves.
- Ask your distribution partner for assistance if you have no previous experience.

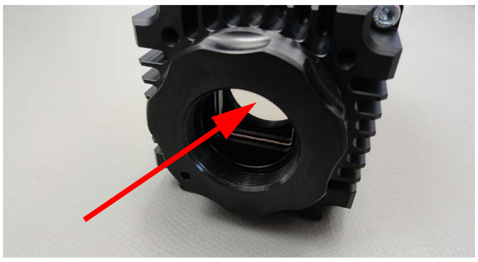


Figure 108: Camera mount without filter, directly exposing the sensor

Cleaning instructions

Damage to the sensor and optical surfaces

Improper cleaning materials can damage filter and sensor surfaces.

- Clean the sensor only if you have the experience. Otherwise, send your Goldeye camera to Allied Vision support for cleaning.
- Allowed cleaning method:
  - Use only lens cleaning tissues that are chemically pure and free from silicones or other additives.
  - Wrap lens cleaning tabs or a lens cleaning tissue around a small piece of plastic.
  - Use only isopropyl alcohol as cleaning liquid.
- The following tools are forbidden!!!
  - Do not use dry swabs or tissue because this can cause scratches.
  - Do not use metal tools.
  - Do not use any disposable cotton cosmetic swabs; they may contain contaminants.
  - Do not use cosmetic cotton.
  - Do not use consumer eyeglass cleaning cloths pretreated with silicone.
  - Do not use fibrous material that may get caught in small gaps.
  - Do not use aggressive cleaners like benzine or spirits because this can damage the surface.

Optical cleaning liquid material safety data sheets

Read the material safety data sheet (MSDS) for the optical cleaning liquid before cleaning your camera and optics. The MSDS provides important information including hazard identification, first aid measures, handling and storage, and PPE.

Carry out all cleaning operations (on lenses, optical filter, and sensor) in a **clean dust-free room**. The optical components are very fragile. Therefore, you must not touch them with your fingers or any hard material.

1. Unplug the camera from any power supply before cleaning.
2. Have the cleaning materials ready before you start the cleaning.

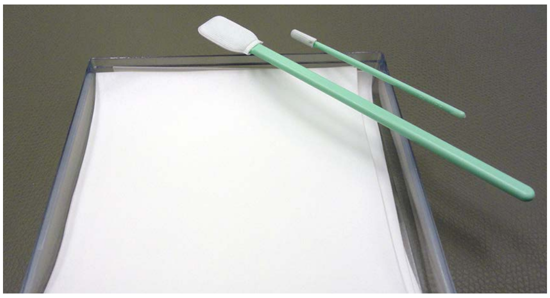


Figure 109: Lens cleaning tissues and cleaning pads

3. Apply a small amount of cleaning liquid to a clean, new lens cleaning pad or tissue.

   The pad or tissue should be moist, not dripping. Hold the camera away from your body to avoid particles like skin flakes from falling onto the sensor. The camera front should point roughly 45 degrees upwards.
4. Wipe the surface in either one of two ways described to ensure any dirt present on the surface be moved to the edge of the surface:
   - With a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on sensor or optical filter avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the optical filter or sensor.
   - With a straight motion across the optical filter or sensor surface from one end to the opposite end.
5. When you've finished cleaning, examine the surface in a bright light. Take an out-of-focus picture of a flat, illuminated surface to see if any dirt or dust remains.
6. If dust spots remain, repeat this procedure once, using new clean lens tissue (as described).

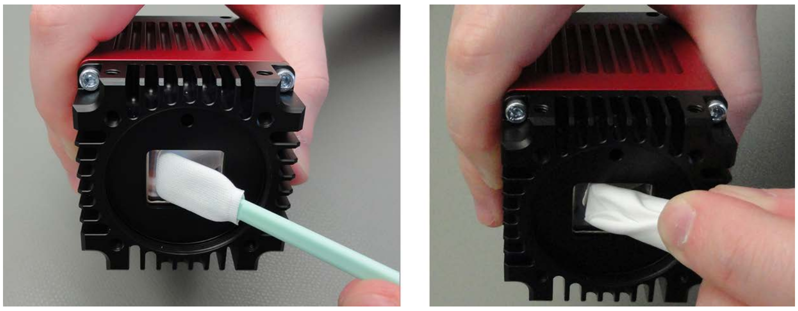


Figure 110: Use of cleaning tab or tissue to clean a sensor

If dust spots remain

If dust spots remain after cleaning twice, contact your Allied Vision distribution partner.

Use of compressed air

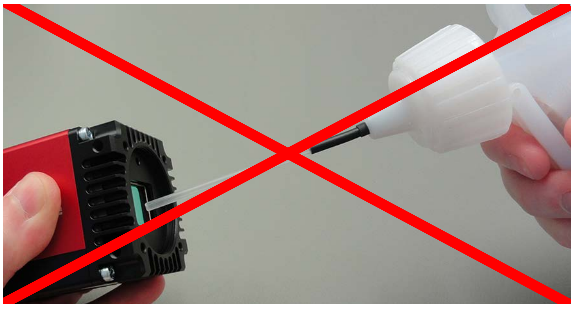


Figure 111: How not to use compressed air

NOTICE

Damage to the sensor and optical surfaces

Pressed air can move parts out of place or blow dirt and small pieces against optical surfaces.

- Never use compressed air to clean a camera.
- If you want to use compressed air despite of all warnings, consider the following:
  - Use an air blower or compressed air only if you are familiar with cleaning a camera with this instrument.
  - Compressed air may blow dust into cameras and lenses.
  - High pressure air may crack the sensor or optical filter you want to clean.
- Therefore, keep the pressure at a moderate strength only:
  - The pressure at the tube should be less than 1 bar.
  - Operating distance: 5 to 30 cm
  - The pressurized air must be dust-filtered and oil-free.
  - Use ionized air only to avoid any static charge. Moreover, using ionized air helps to remove any dirt stuck to the optical component because of static electricity.

Index

Numbered items