Allied Vision



CoaXPress Cameras

Bonito PRO

User Guide

Closed housing Bonito PRO cameras have the **Model ID: E1J** that is used in the DoC (EU declaration of conformity) document.

Note: Lenses are not part of this product.

V1.3.0

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

2026-Nov-03

Quick links

- Bonito PRO cameras at a glance on page 15
- Contact us on page 17
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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 30.



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 30.



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 30.



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 30.



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 30 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 30.



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 30.



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 30.



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 30 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 30.



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 30.



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 30.



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 30 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。

Bonito PRO cameras at a glance



Get an overview of Bonito PRO camera documentation.



Read this document carefully

Learn how to protect your Bonito PRO camera from damage and fully understand its functions.

The Bonito PRO is Allied Vision's high-bandwidth camera series with a CoaXPress interface. Equipped with four DIN 1.0/2.3 connectors the camera is capable to transmit 25 Gbps via quad CXP-6 (6.25 Gbps) high-speed connections. The Bonito PRO features a rugged, fan-less housing design and its powerful feature set make this camera an ideal choice for high-definition imaging applications demanding high-throughput, robustness, and system design-in flexibility.

Scope of delivery

Your Allied Vision camera is delivered with the following components:

- Bonito PRO CXP-6 camera
- Download Instructions for First Camera Operation document

What else do you need?

Content	Link
Bonito PRO Features Reference, camera data sheets, Modular Concept, 3D CAD STEP files	www.alliedvision.com/en/support/technical-documentation/bonito-PRO-documentation
Download the latest firmware and release notes	www.alliedvision.com/en/support/firmware-downloads
JIIA CoaXPress Vision Standard Version 1.1.1	www.Jiia.org/en
EMVA GenICam SFNC Version 2.2	www.emva.org/standards-technology/genicam/genicam-downloads
Camera lenses and accessories	www.alliedvision.com/en/products/accessories

Table 1: Additional resources

Contact us

Quick links

Products
www.alliedvision.com/en/products

Distribution partners
www.alliedvision.com/en/company/where-to-buy

Contact
www.alliedvision.com/en/company/contact-us
Info@alliedvision.com

Support
www.alliedvision.com/en/support

Headquarter

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T// +49 36428 677-230 (Sales)
F// +49 36428 677-28

Worldwide network

www.alliedvision.com/en/company/about-us/locations/office-locations

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Document history and conventions



This chapter includes:

- Document history
- Layout styles and symbols used in this manual
- Acronyms and terms used in this manual

Document history

Version	Date	Remarks
V1.3.0	2026-Nov-03	• Added data for the Model ID on the title page and in Camera identification on page 27. • Updated Contact us on page 17. • Restructured Liability, trademarks, and copyright on page 30. • Renamed previous "Product safety" to Avoiding damage to the product on page 33. • Applied editorial changes.
V1.2.8	2025-Jul-09	• Removed UKCA logo from Compliance notifications on page 27. • Removed contents for ISO 13485 and updated definitions for Intended use on page 30.
V1.2.7	2025-Feb-25	Changes to specifications for Bonito PRO X-2620 series on page 39 and to IR cut filter and protection glass on page 59: • Renamed Type IRC30 IR cut filter to Type IRC 650 interference IR cut filter. • Removed optional Type Schneider 486 IR cut filter.
V1.2.6	2024-Nov-07	• Corrected typos.
V1.2.5	2024-Jul-16	• Updated addresses in Contact us on page 17. • Applied editorial changes.
V1.2.4	2023-Sep-06	• Added IP class in Applied standards on page 36. • Update instructions in Mounting the camera on page 63. • Applied editorial changes.
V1.2.3	2023-Aug-25	• Resolved contradiction for ICES in Compliance notifications on page 27 from Class A to Class B to match CAN ICES-3 (B) / NMB-3 (B).
V1.2.2	2023-Jul-10	Applied editorial changes
V1.2.1	2023-Jan-27	• Added note that lenses are not part of the product. • Updated Hebrew contents in Read before use on page 2.
V1.2.0	2022-Aug-19	• Renamed this document from Technical Manual to User Guide • Added Hebrew contents to Read before use on page 2. • Applied editorial changes
V1.1.3	2021-Dec-08	Applied editorial changes
V1.1.2	2021-Aug-19	• Added icon for compliance with UKCA in Compliance notifications on page 27. • Applied editorial changes
V1.1.1	2021-Jul-06	Applied editorial changes
V1.1.0	2020-Oct-31	• Removed references to discontinued model series: Bonito PRO X-1250. For more information see the Product Change Notification. • Applied editorial changes

Table 2: Document history

Version	Date	Remarks
V1.0.6	2020-Jun-05	• Updated compliance chapter • Updated Installing the camera on page 60 • Added Read before use on page 2 • Added Your safety on page 31 • Added Product safety on page 32 • Updated Compliance notifications on page 27 • Added spectral response plots • Applied editorial changes
V1.0.5	2019-Dec-03	• Corrected Binning Horizontal values • Updated the optical filter plot • Corrected Canadian ICES compliance statement
V1.0.4	2019-Apr-30	• Added trigger latency, jitter, and propagation delay information • Corrected error in firmware update chapter
V1.0.3	2019-Mar-08	• Added Supplier Declaration of Conformity to Compliance and intended use chapter • Added EMC compliance statement to Installation and hardware chapter • Editorial changes • Various improvements and typographic corrections
V1.0.2	2018-Sep-20	• Updated technical drawings to identify the 1/4-20 tripod mount • Added heavy lens load test criteria under Shock and Vibration
V1.0.1	2018-Jul-10	• Updated RoHS statement to include amendment 2015/863/EU • Various minor corrections and enhancements
V1.0.0	2018-May-31	• New manual release status

Table 2: Document history

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.

Table 3: Typographic styles

Style (example)	Function
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.

Acronyms and terms

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

Acronym or term	Description
ADC	Analog-to-digital converter
AIA	Automated Imaging Association
CMOS	Complementary metal-oxide semiconductor
EMVA	European Machine Vision Association
ESD	Electrostatic discharge
FIFO	First-in first-out
GND	Ground (power)
GPO	General purpose output
H × V	Horizontal × Vertical (sensor resolution measurement)
I/O	Input/Output
JIIA	Japan Industrial Imaging Association
LUT	Look-up table
MSDS	Material safety data sheet
NIR	Near Infrared
PA	Planarity adjusted
PoCXP	Power over CoaXPress
QE	Quantum efficiency
ROI	Region of interest
SDK	Software Development Kit
SFNC	Standard Feature Naming Convention

Table 4: Acronyms and terms used in this document

Compliance, safety, and intended use

This chapter includes:

- Camera identification
- Compliance notifications
- Information about intended use of the camera
- Liability, trademarks, and copyright
- Your safety
- Avoiding damage to the product

Camera identification

You can identify your Bonito PRO camera like this:



Figure 1: Shipping box label

The camera's housing is labeled with equivalent information.

Model ID covered by this user guide

The DoC (EU declaration of conformity) document refers to closed housing Bonito PRO cameras with the Model ID: **E1J**.

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 will 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 or 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

Bonito PRO 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.
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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.

Liability, trademarks, and copyright

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Your safety

This section informs about issues related to your personal safety. Descriptions explain how to avoid hazards and operate Bonito PRO 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

Bonito PRO 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 chapter.
- 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.

Lens load

Many of the lens mount styles available such as M42-Mount, F-Mount, and EF-Mount are not designed for high vibration environments with a heavy lens load. We recommend supporting the lens externally in these environments.

Avoiding damage to the product

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

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

Camera power

Operating the camera beyond the specified range damages the camera. Operate the camera only in the range specified in the Specifications chapter.

Cameras can be powered using the I/O connector at an input range of 21.6 to 26.4 VDC, using a limited power source (LPS), according to IEC 62368-1 with maximum 1 A. 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.

Alternatively, cameras can be powered using Power over CoaXPress (PoCXP) by frame grabbers supporting PoCXP. However, power consumption and heat generation are higher than with external power, using the I/O connector.

Make sure that PoCXP 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. Bonito PRO cameras do not need additional cleaning. Cameras are cleaned before shipping. Incorrect cleaning can damage the sensor or the filter. Therefore, never clean the sensor or the filter.

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

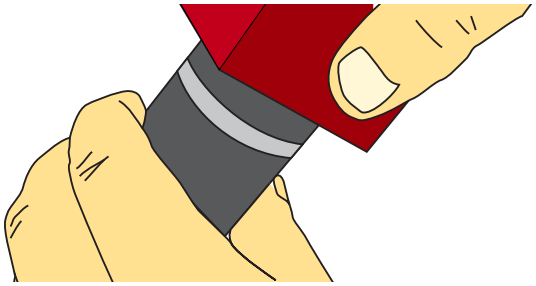


Figure 2: Holding the camera with the lens mount facing the ground

Lenses

Maximum protrusion

The sensor, 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 provides:

- Applied standards
- Technical specifications
- Absolute QE plots
- Spectral response plots
- Resolution and ROI frame rates
- Camera features

Applied standards

JIIA CoaXPress

The JIIA is the Japanese machine vision standards body. The JIIA CoaXPress Technical Committee is responsible for the preparation and maintenance of the CoaXPress Standard.

GenICam™

GenICam is a machine vision standard hosted by the EMVA. The aim of GenICam is to provide a generic configuration interface for cameras and devices independent of the used interface technology. This approach enables proper interoperability between GenICam compliant hardware and software solutions without the need for customization.

The GenICam standard consists of multiple modules that specify tasks to be solved. Allied Vision cameras and software make use of these modules, like the SFNC that standardizes feature names and types via an XML file or the transport layer interface (GenTL) that is used to grab images.

IP class

Equipped with a lens as intended, Bonito PRO cameras comply with IP30 class according to IEC 60529.

Shock and vibration

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

If you need more details, please contact support at www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma.

Notes on specifications

Dimensions and mass

Dimensions include connectors and default lens mount (F-Mount) but not the tripod and lens.

Mass does not include the tripod and lens.

Both dimensions and mass values in the specification tables are for the default configuration of the camera (default housing and lens mount).

Modular options

Bonito PRO cameras can be ordered with several modular options including lens mount and optical filter options. For more information, see the Modular Concept.

Resolution and ROI frame rates

Resolution and ROI frame rates are listed after the specification table. This table includes the resulting frame rate from changing sensor height from full image to 16 lines. Unless otherwise noted, sensors do not give an increase in readout speed with a reduction in width. However, in cases where a camera is limited by frame rate due to bandwidth restrictions, a reduction in width gives a frame rate increase.



Frame rates and readout

Although the sensor is capable of higher frame rates, readout is limited by bandwidth and exposure value. You can improve frame rates with a reduced region of interest and shorter exposure values.

Absolute QE plots

All measurements were done without protection glass or IR cut filter. With protection glass or filters, QE decreases by approximately 10 percent.

The uncertainty in measurement of the QE values is ±10 percent. This is mainly due to uncertainties in the measuring apparatus itself (Ulbricht sphere, optometer). Manufacturing tolerance of the sensor increases overall uncertainty.

ON Semi sensors

The curve in the absolute QE plots shown in this chapter is taken from the sensor manufacturer data sheet.

The information was correct at the time of publishing.

Spectral response plots

The curves in the spectral response plots shown in this chapter were calculated using the absolute QE taken from the sensor data sheet.

Trigger jitter, delay, and propagation delay

The following table provides trigger jitter, trigger delay, and propagation delay values for Bonito PRO cameras.

External trigger input	Trigger delay	Trigger jitter
Non-isolated trigger input[1]	200.5 ns	± 6.5 ns
Opto-isolated trigger input[1]	234.5 ns	± 6.5 ns
Opto-isolated propagation delay (t_{pd})	34 ns	
With exposure start delay with non-isolated input[2]	9.623 µs	± 7.5 ns
With exposure start delay with opto-isolated input[2]	9.653 µs	± 7 ns

[1] Using a three meter long I/O cable for trigger input adds 20 ns to trigger latency and ± 0.5 ns to trigger jitter.

[2] Exposure start delay is the delay within the image sensor. It is the time between the sensor getting the trigger signal and when it starts the exposure.

Table 5: Trigger jitter, delay, and propagation delay

Bonito PRO X-2620 series

The following table provides model series specifications. The values are valid for Bonito PRO X-2620B, X-2620B NIR, and X-2620C models.

Feature	Specification	
	Bonito PRO X-2620B, X-2620B NIR	**Bonito PRO X-2620C**
Sensor model	ON Semi PYTHON 25K (NOIP1SN025KA, NOIP1FN025KA)	ON Semi PYTHON 25K (NOIP1SE025KA)
Resolution (H × V)	5120 (H) × 5120 (V); 26.2 MP	
Sensor type	CMOS	
Shutter mode	Global shutter	
Sensor format	Type APS-H	
Sensor size	32.6 mm diagonal	
Pixel size	4.5 µm × 4.5 µm	
Lens mount (default)	F-Mount	
Lens mount (optional)	EF-Mount PA, F-Mount PA, M42-Mount, M42-Mount PA, M58-Mount, M58-Mount PA	
Optical filter (default)	No optical filter	Type IRC 650 interference IR cut filter
Optical filter (optional)	Type IRC 650 interference IR cut filter, protection glass (ASG)	
Max. frame rate at full resolution	79.7 fps (8-bit) 70.1 fps (10-bit)	
Max. image bit depth	10-bit	
Monochrome pixel formats	Mono8, Mono10	Not applicable
RAW pixel formats	Not applicable	BayerRG8, BayerRG10
Exposure time control	1 µs to 1 s, 1 µs increments	
Gain control	0 to 22 dB	
Binning	Horizontal: 1, 2, 4, 8 columns Vertical: 1, 2, 4, 8 rows	
Decimation X/Y	Horizontal and vertical: 1, 2, 4, 8 factor	
Trigger latency	See Trigger jitter, delay, and propagation delay	
Trigger jitter	See Trigger jitter, delay, and propagation delay	
Propagation delay (t_{pd})	See Trigger jitter, delay, and propagation delay	
TTL (non-isolated) I/Os	1 input, 2 outputs	
Opto-isolated I/Os	1 input, 2 outputs	

Table 6: Bonito PRO X-2620 model series specifications (sheet 1 of 2)

Feature	Specification	
	Bonito PRO X-2620B, X-2620B NIR	Bonito PRO X-2620C
Digital interface	CoaXPress (CXP-6), 4 x DIN 1.0/2.3 type connectors 75 ohm coaxial cable; up to 6.25 Gbps data rate per cable	
Interface standard	CoaXPress Standard Version 1.1.1	
Voltage requirements	24 VDC ± 2.4 VDC, PoCXP	
Power consumption	15.7 W at 24 VDC; 15.7 W PoCXP	
Operating temperature	-20 °C to +70 °C housing temperature (without condensation)	
Storage temperature	-20 °C to +70 °C ambient temperature (without condensation)	
Operating humidity	20 to 80% non-condensing	
Body dimensions (L × W × H)	114.9 × 70 × 70 mm (with F-Mount and connectors)	
Mass (typical)	500 g (depending on lens mount type)	
Temperature monitoring	Available for main board and sensor board. Resolution: 0.031; Accuracy: ±1 degrees Celsius	

Table 6: Bonito PRO X-2620 model series specifications (sheet 2 of 2)

Absolute QE

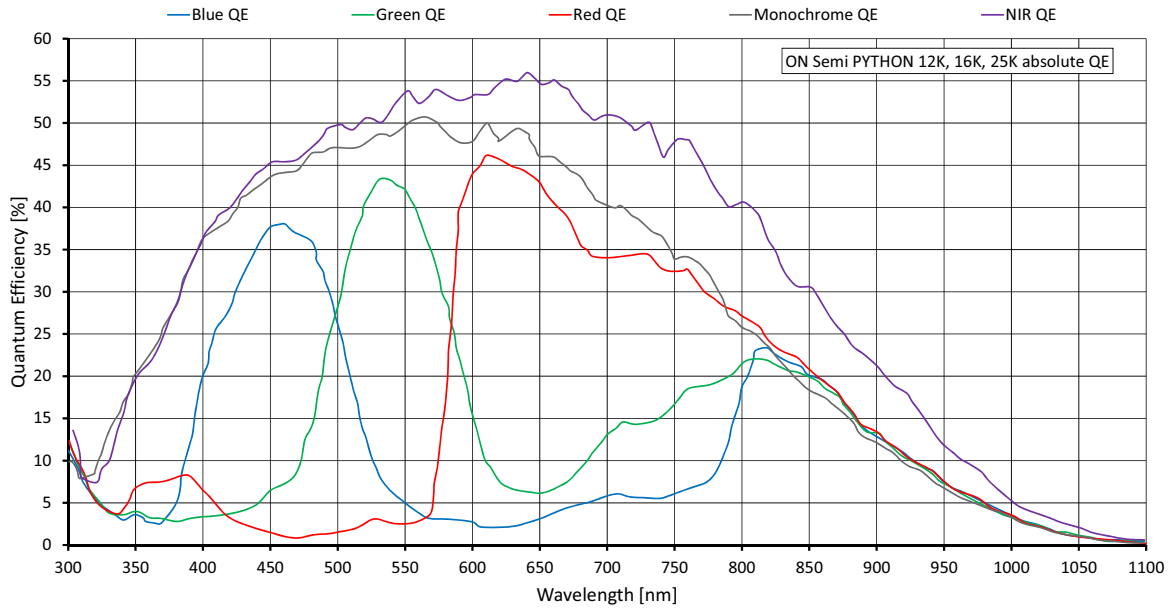


Figure 3: Bonito PRO X-2620 (ON Semi PYTHON 25K) absolute QE

Spectral response

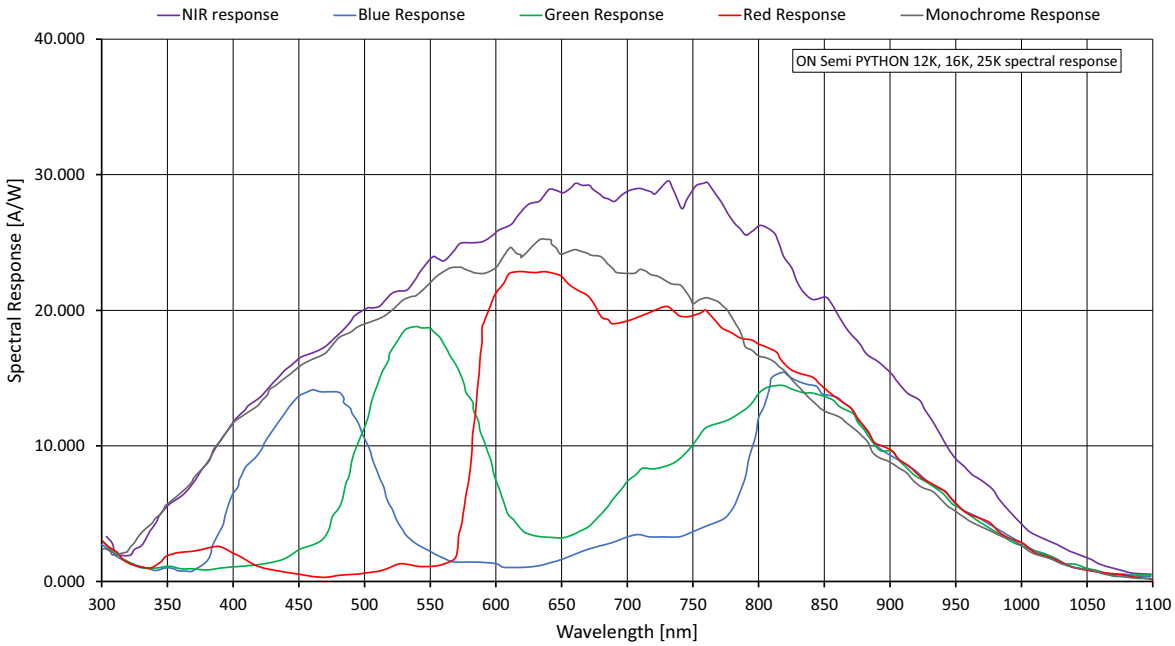


Figure 4: Bonito PRO X-2620 (ON Semi PYTHON 25K) spectral response

ROI frame rates

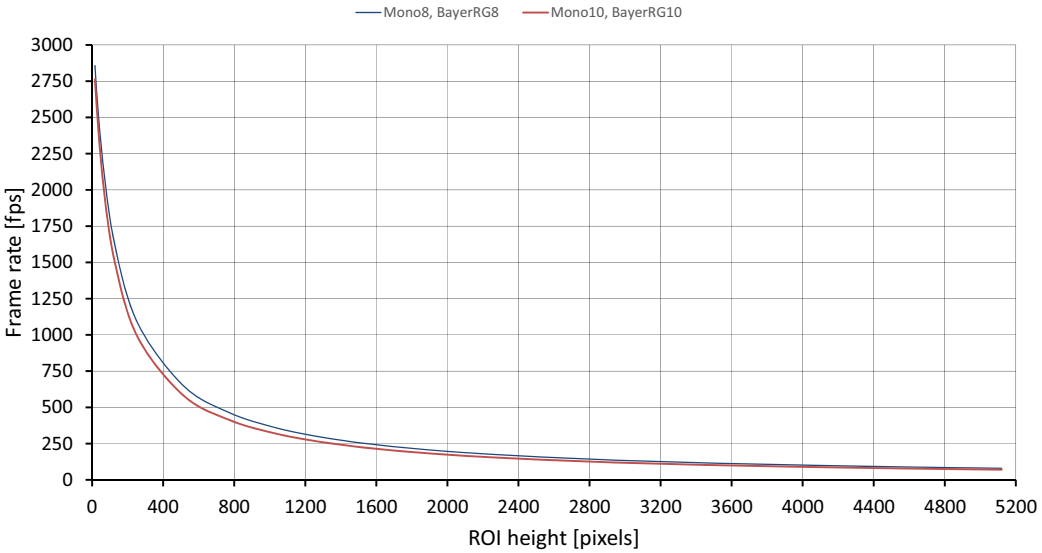


Figure 5: Bonito PRO X-2620 frame rate as a function of ROI height

8-bit pixel formats (Mono8, BayerRG8)

Height	Frame rate (fps)	Height	Frame rate (fps)	Height	Frame rate (fps)
5120	79.7	3072	130.7	1024	362.5
4864	83.8	2816	142.0	768	465.7
4608	88.3	2560	155.5	512	651.4
4352	93.3	2304	171.9	256	1082.2
4096	99.0	2048	192.1	128	1618.1
3840	105.4	1792	217.7	64	2150.5
3584	112.4	1536	251.1	32	2570.6
3328	121.0	1280	296.7	16	2857.1

Table 7: Bonito PRO X-2620 frame rate as a function of ROI height (Width=5120 pixels)

10-bit pixel formats (Mono10, BayerRG10)

Height	Frame rate (fps)	Height	Frame rate (fps)	Height	Frame rate (fps)
5120	70.1	3072	115.1	1024	321.9
4864	73.7	2816	125.2	768	415.1
4608	77.7	2560	137.2	512	584.1
4352	82.2	2304	151.7	256	985.2
4096	87.1	2048	169.6	128	1499.2
3840	92.8	1792	192.4	64	2023.5
3584	99.2	1536	222.2	32	2469.1
3328	106.6	1280	262.9	16	2762.4

Table 8: Bonito PRO X-2620 frame rate as a function of ROI height (Width=5120 pixels)

Camera features

Bonito PRO cameras support a number of standard and extended features. The following table identifies a selection of capabilities and compares the availability of features in Bonito PRO camera models.

For a complete description of individual features, see the Bonito PRO Features Reference.

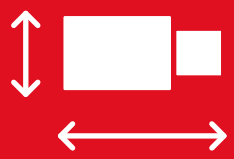
Image optimization features	X-2620
Auto exposure	✓
Auto gain	✓
Auto white balance (color models only)	✓
Binning (horizontal and/or vertical), (sum or average)	✓
Black level	✓
Decimation X/Y	✓
DPC (defect pixel correction)	✓
FPNC (fixed pattern noise correction)	✓
Gamma	✓
3 LUTs (look-up tables)	✓

Table 9: Image optimization features by model

Camera control features	X-2620
EF lens control (order option-18)	✓
I/O and trigger control	✓
Multi-ROI (multiple regions of interest)	✓
Sequencer	✓
Temperature monitoring (main board and sensor board)	✓
Trigger over CoaXPress	✓
User sets	✓

Table 10: Camera control features by model

Mechanical dimensions



This chapter includes:

- Mechanical drawings and dimensions of Bonito PRO housing and mounts
- Flange focal distance
- Sensor position accuracy

Bonito PRO cameras are available with different lens mount options. For more information, see the Modular Concept.

Housing and mounts

F-Mount (default mount)

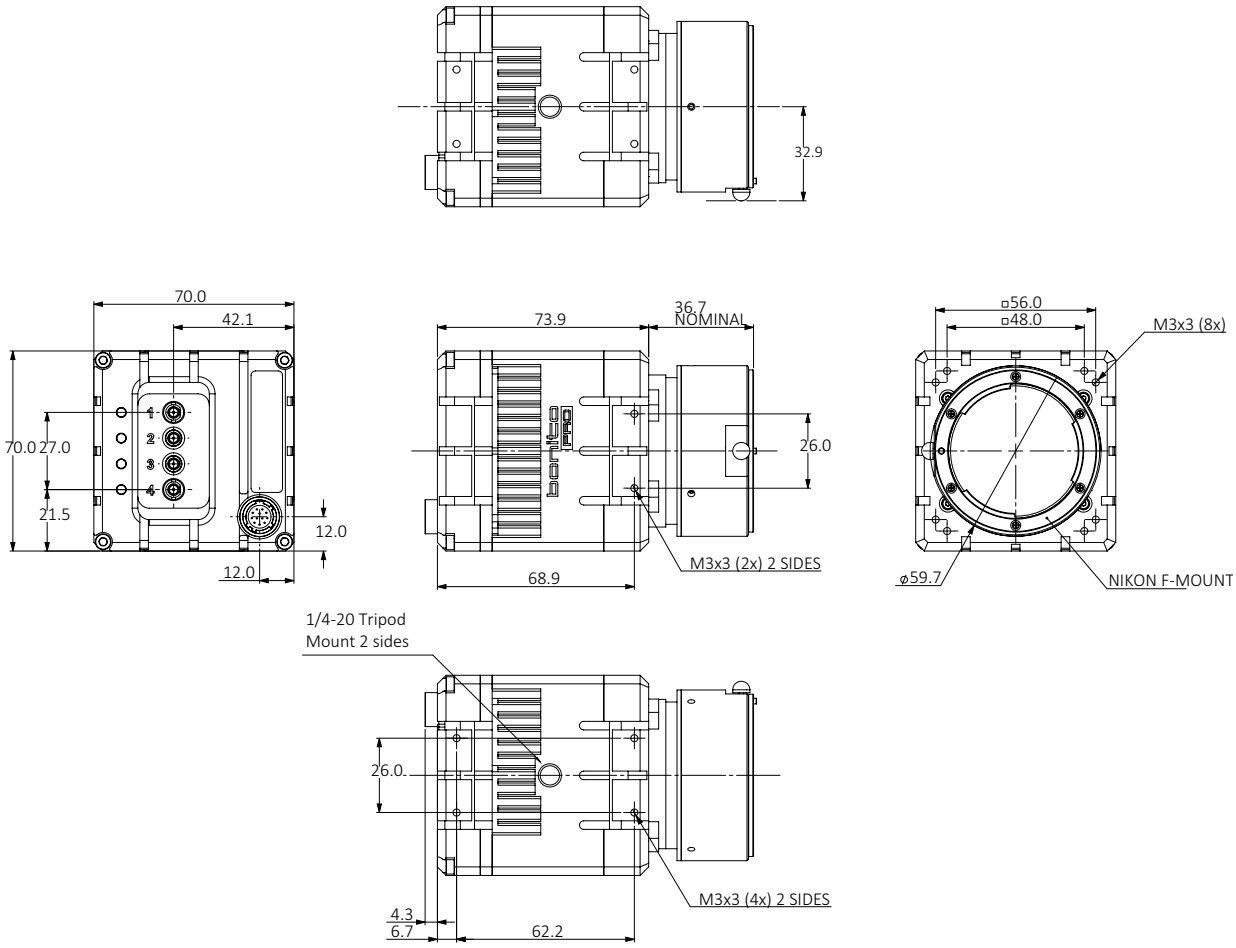


Figure 6: Bonito PRO camera with F-Mount, mechanical dimensions

F-Mount PA

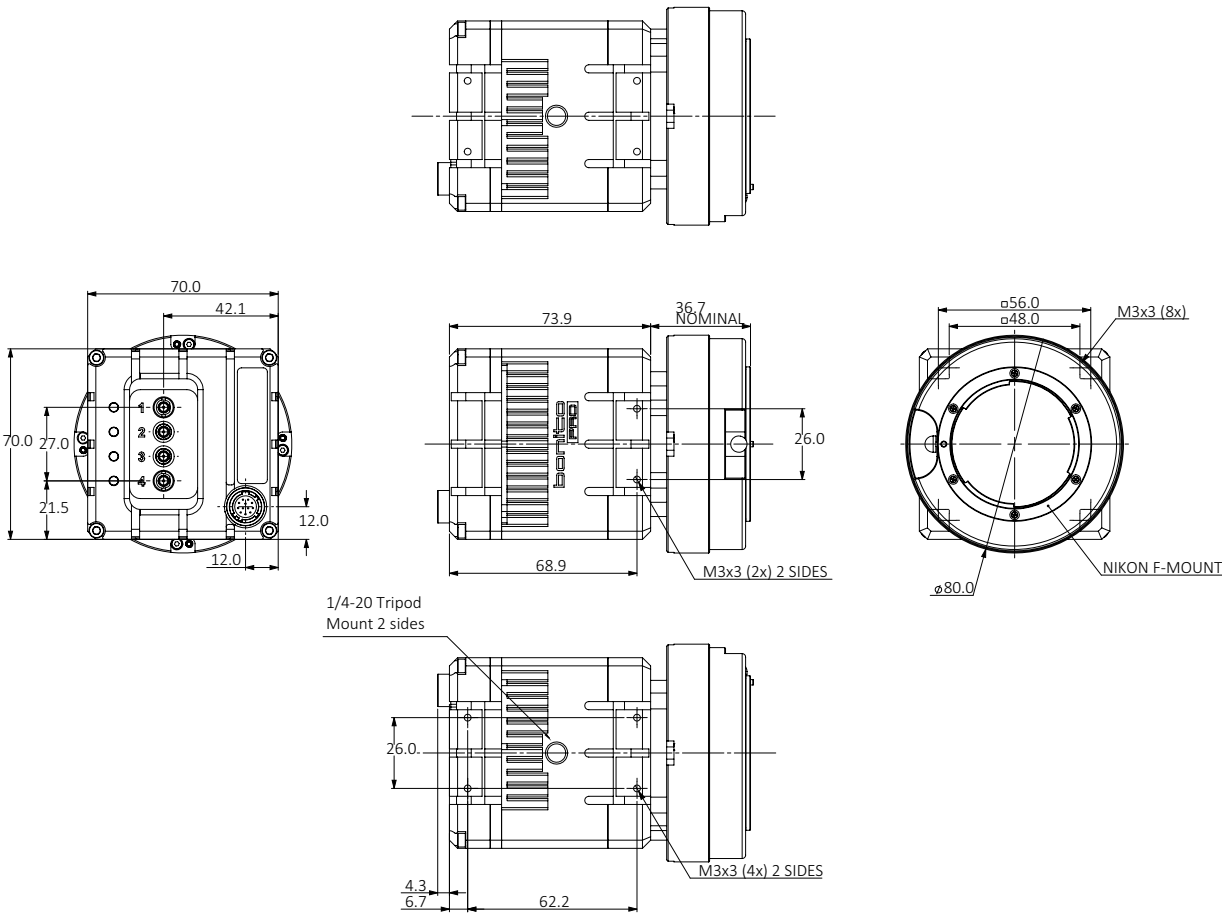


Figure 7: Bonito PRO camera with F-Mount PA, mechanical dimensions

F-Mount PA order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with F-Mount PA option (order code Bonito PRO...-03).

EF-Mount PA

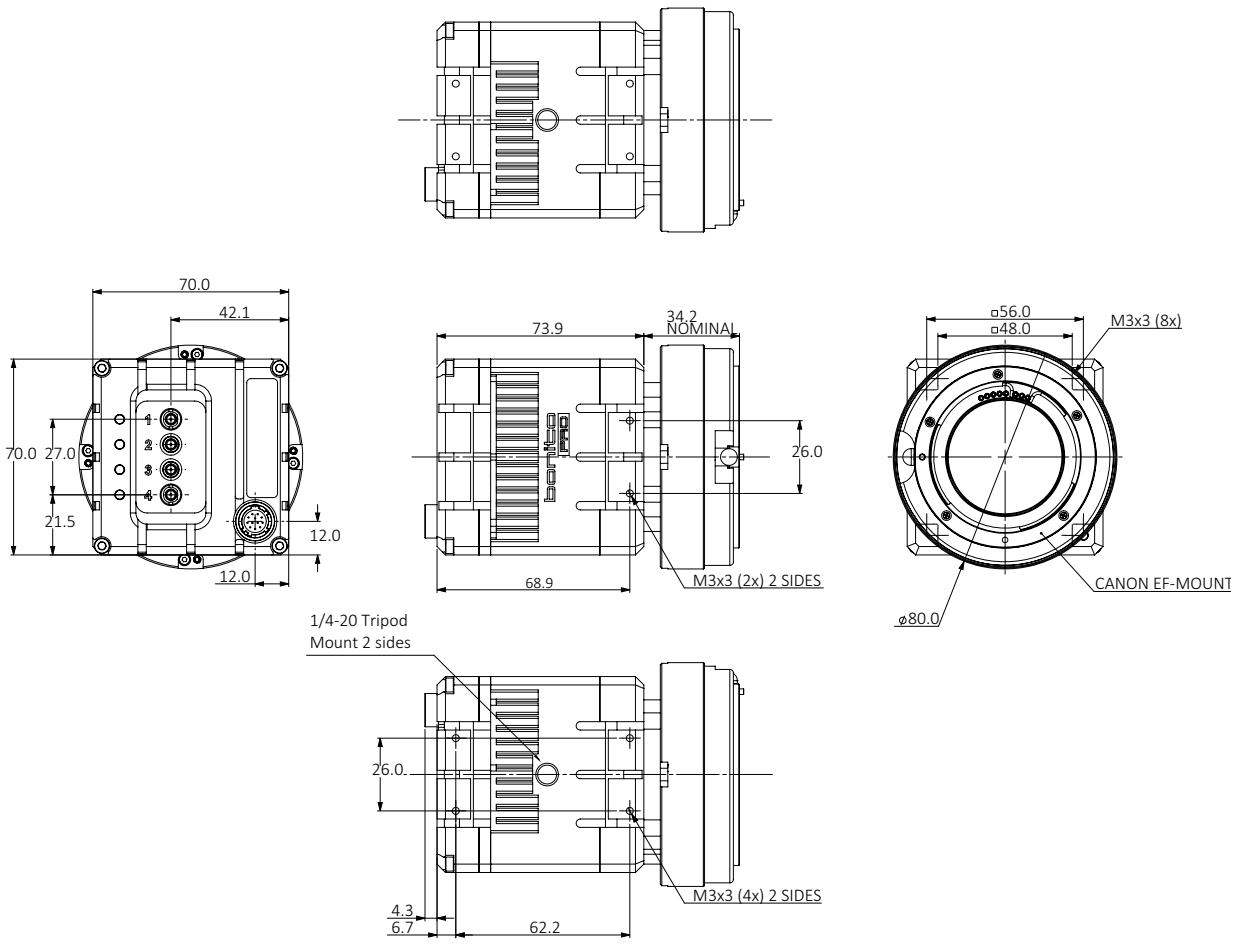


Figure 8: Bonito PRO camera with EF-Mount PA, mechanical dimensions

EF-Mount PA order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with EF-Mount PA option (order code Bonito PRO...-18).

M42-Mount

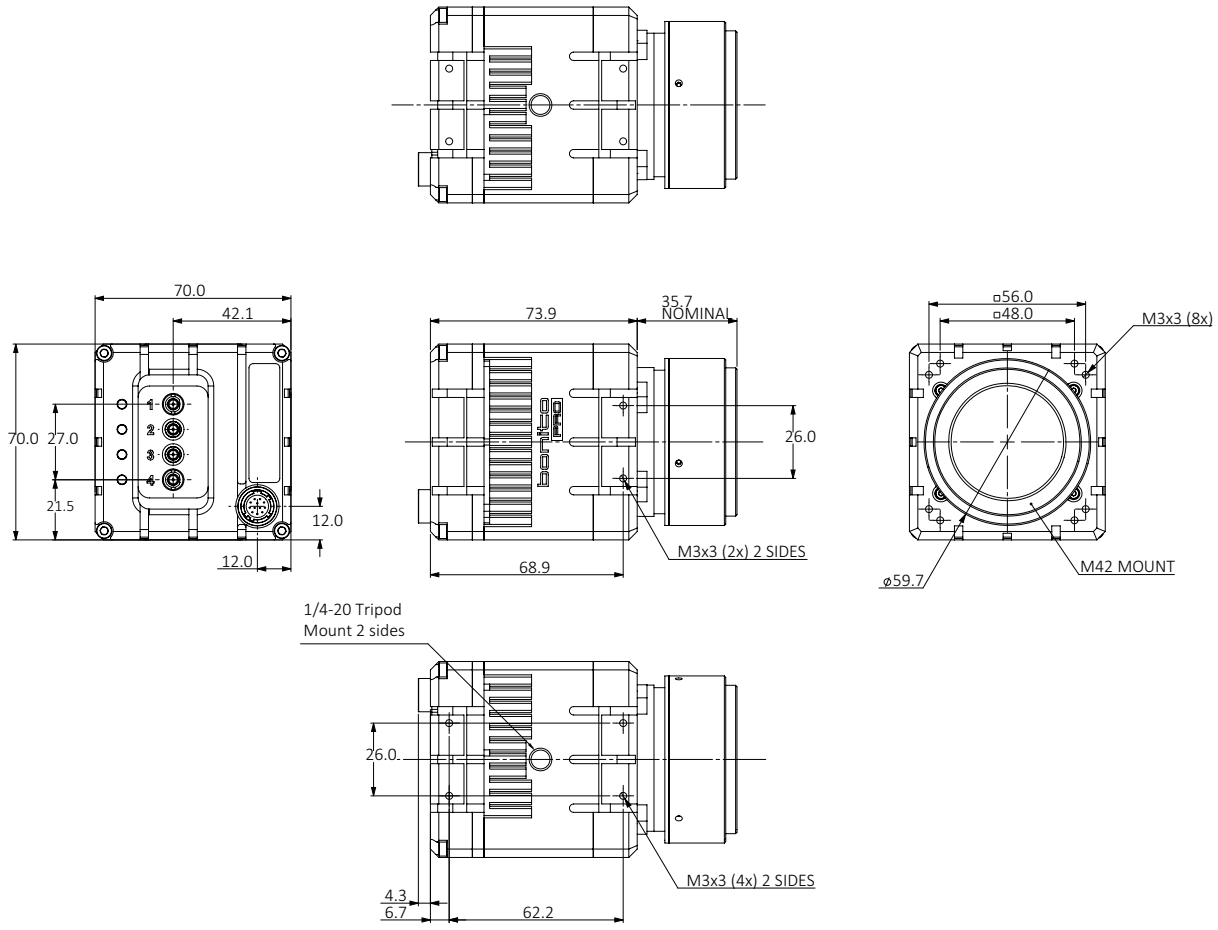


Figure 9: Bonito PRO camera with M42-Mount, mechanical dimensions

M42-Mount order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with M42-Mount option (order code Bonito PRO...-31).

M42-Mount PA

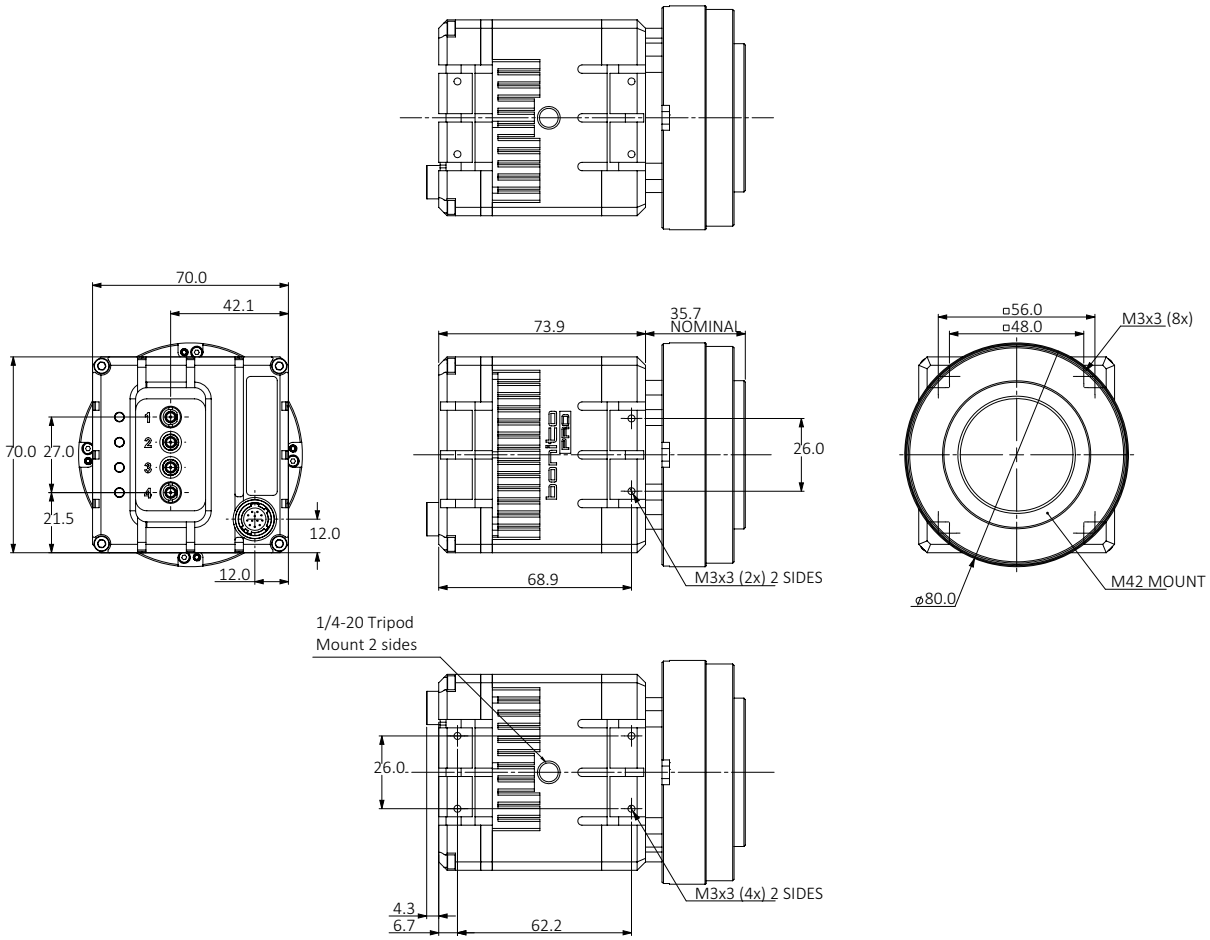


Figure 10: Bonito PRO camera with M42-Mount PA, mechanical dimensions

M42-Mount PA order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with M42-Mount PA option (order code Bonito PRO...-25).

M58-Mount

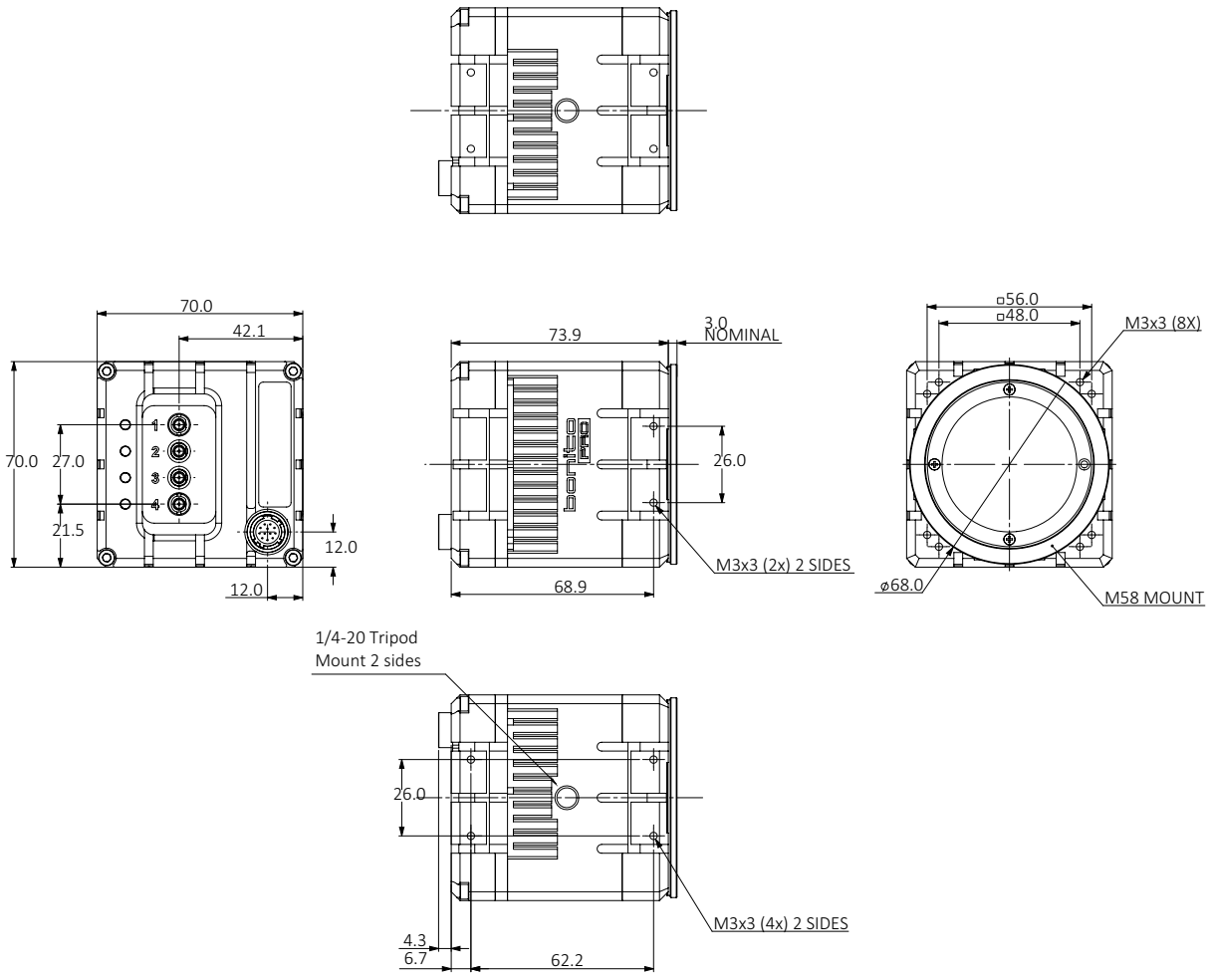


Figure 11: Bonito PRO camera with M58-Mount, mechanical dimensions

M58-Mount order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with M58-Mount option (order code Bonito PRO...-12).

M58-Mount PA

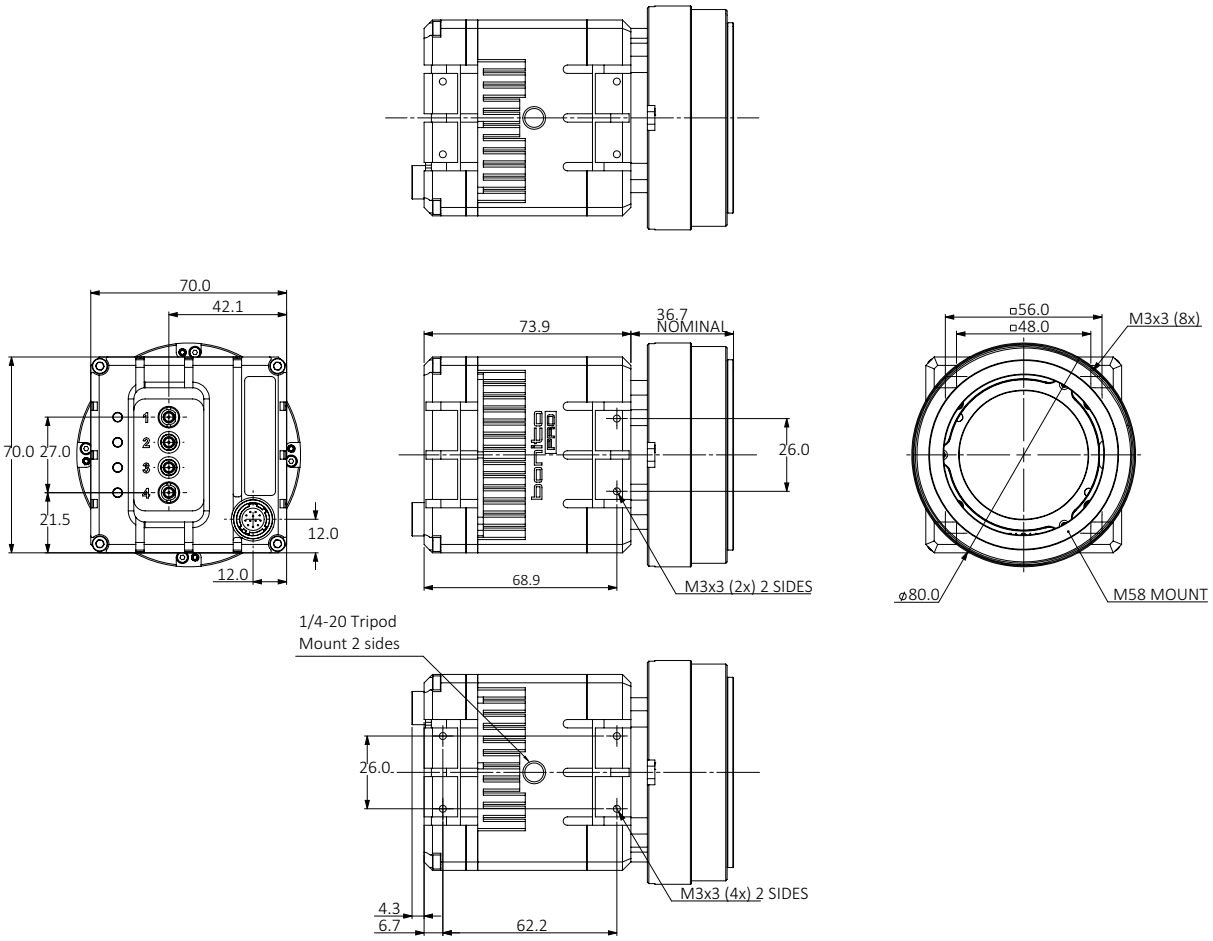


Figure 12: Bonito PRO camera with M58-Mount PA, mechanical dimensions

M58-Mount PA order code

Contact the Allied Vision Sales team to purchase the Bonito PRO series camera with M58-Mount PA option (order code Bonito PRO...-13).

Flange focal distance

F-Mount

Flange focal distance is the optical distance from the mounting flange to image sensor die. Bonito PRO F-Mount cameras are calibrated to a standard 46.50 mm flange focal distance.

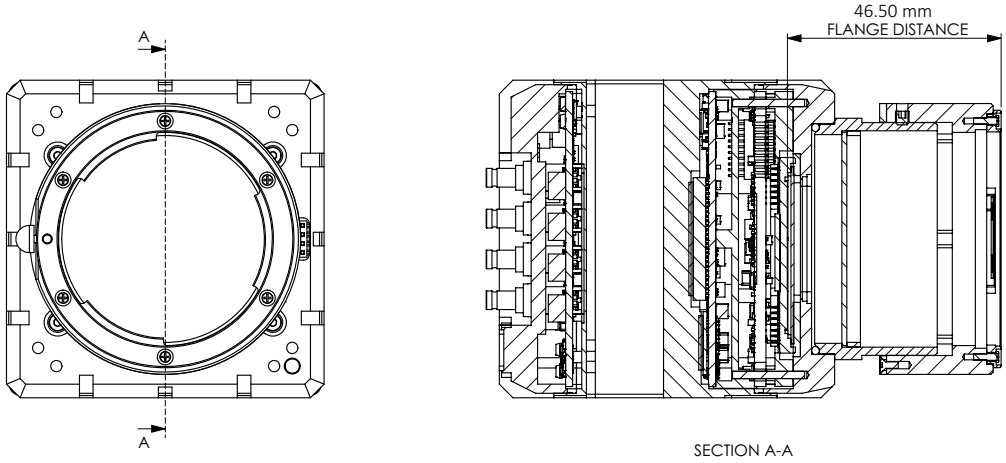


Figure 13: F-Mount flange distance cross section

F-Mount PA

Bonito PRO F-Mount PA cameras are calibrated to a standard 46.50 mm flange focal distance.

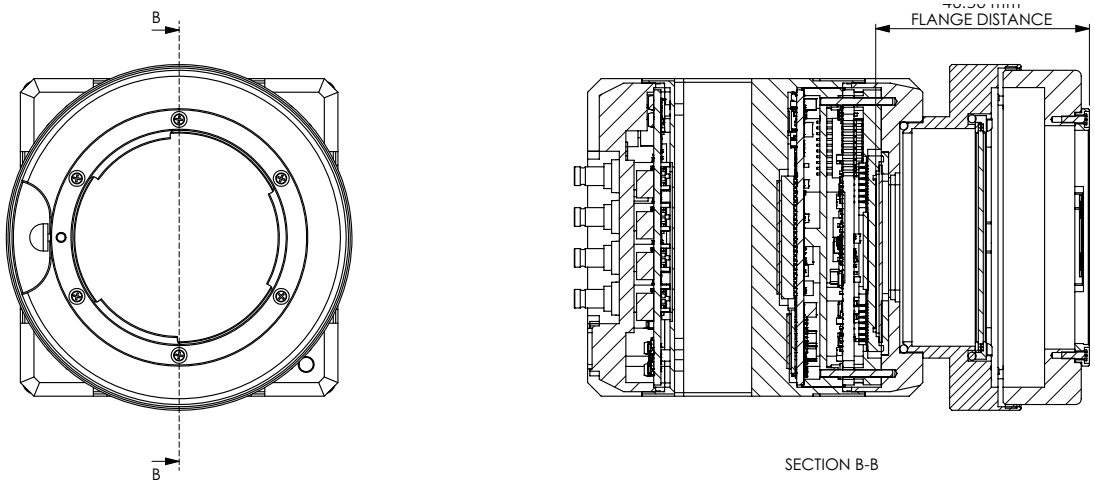


Figure 14: F-Mount PA flange distance cross section

EF-Mount PA

Bonito PRO M58-Mount cameras are calibrated to a standard 44.00 mm flange focal distance.

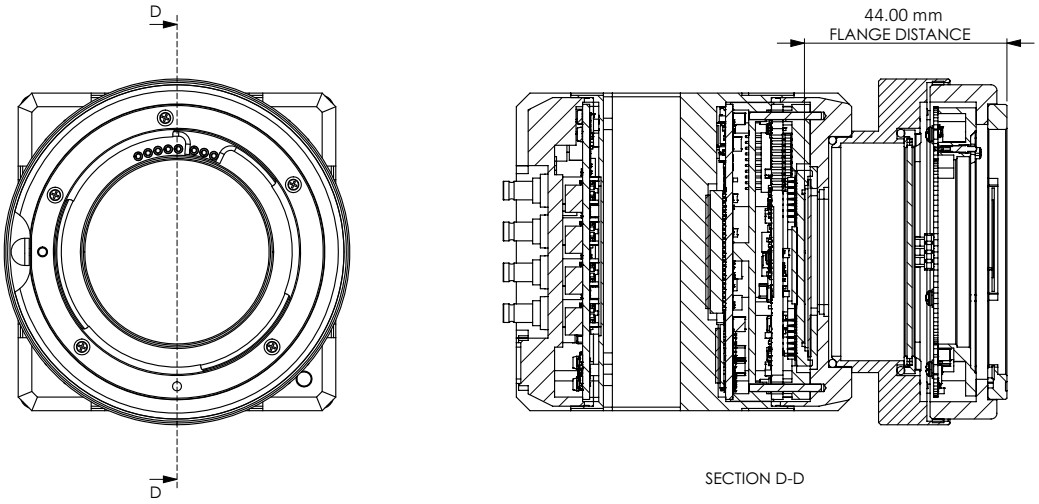


Figure 15: EF-Mount PA flange distance cross section

M42-Mount

Bonito PRO M42-Mount cameras are calibrated to a standard 45.46 mm flange focal distance.

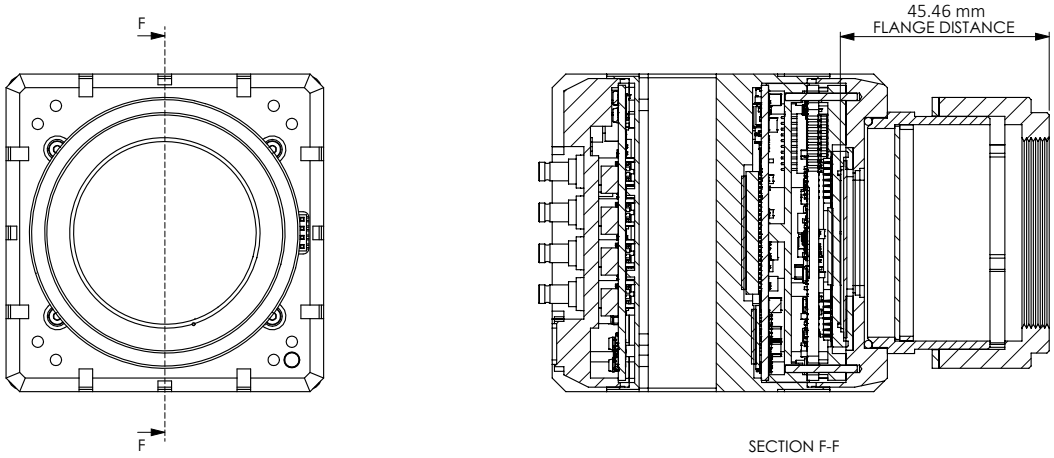


Figure 16: M42-Mount flange distance cross section

M42-Mount PA

Bonito PRO M42-Mount PA cameras are calibrated to a standard 45.46 mm flange focal distance.

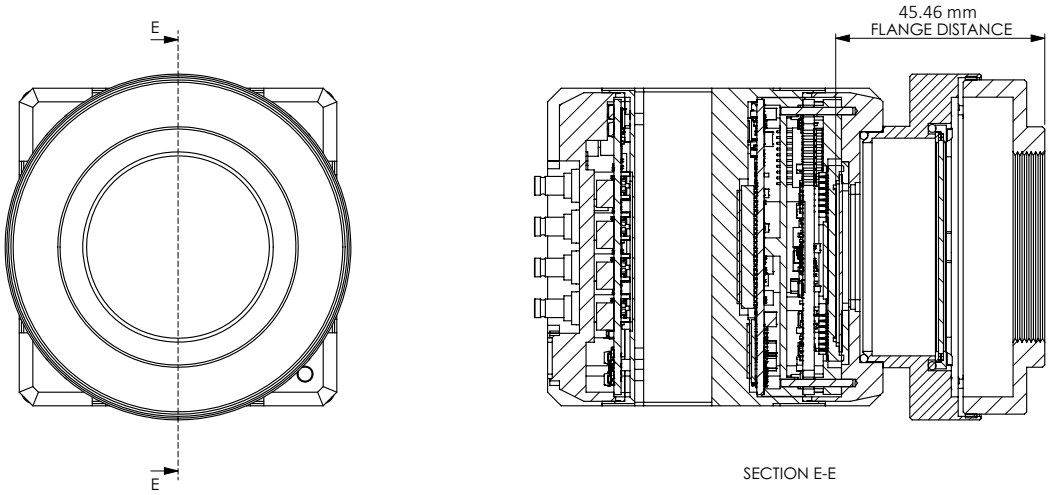


Figure 17: M42-Mount PA flange distance cross section

M58-Mount

Bonito PRO M58-Mount cameras are calibrated to a standard 12.71 mm flange focal distance.

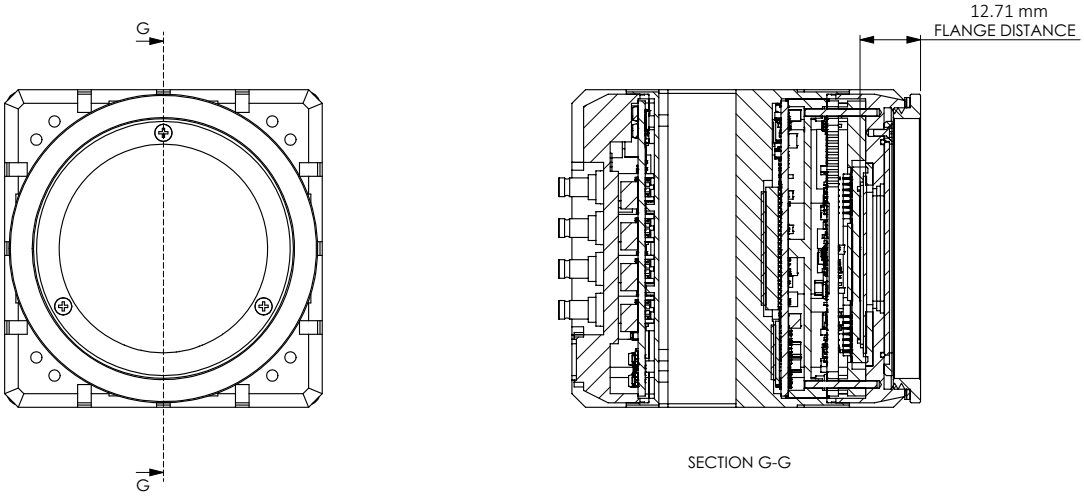


Figure 18: M58-Mount flange distance cross section

M58-Mount PA

Bonito PRO M58-Mount cameras are calibrated to a standard 46.50 mm flange focal distance.

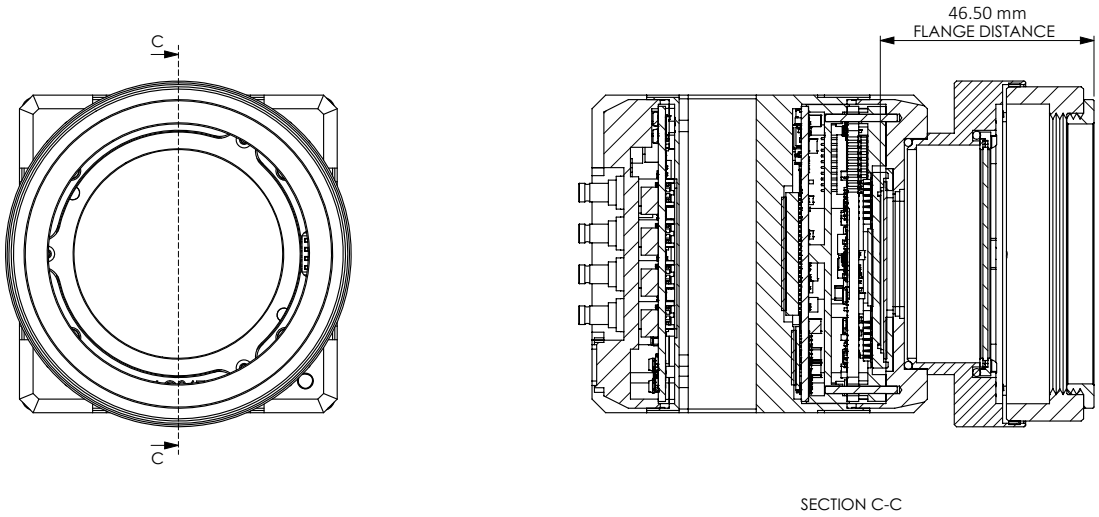


Figure 19: M58-Mount PA flange distance cross section

Adjustment of F-Mount

The F-Mount is adjusted at the factory and should not require adjusting. If for some reason the lens mount requires adjustment, use the following method.

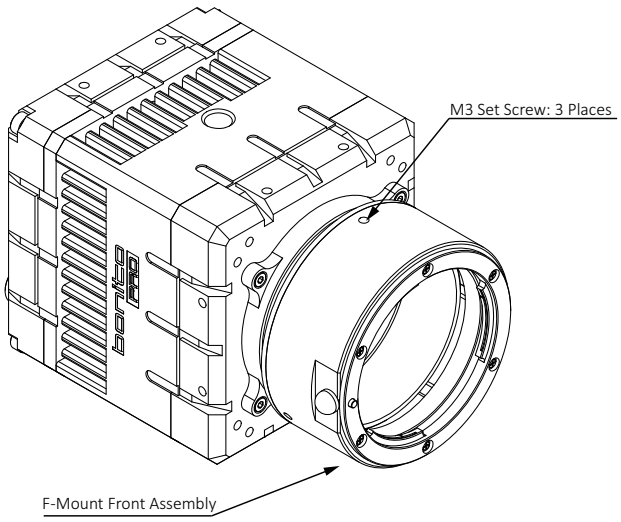


Figure 20: Bonito PRO camera with F-Mount isometric view

Adjusting the F-Mount

Prerequisite: Use an F-Mount compatible lens that allows an infinity focus.

1. Attaching F-Mount compatible lens
   Attach the lens to the camera using a counter-clockwise rotation of about a quarter turn. The lens snaps into place and the lens flange and camera flange mates over the full circumference.
2. Loosening F-Mount front assembly
   Pressing the F-Mount assembly against the camera body, loosen the three set screws with a 1.5 mm hex ball driver.
3. Imaging to infinity
   Set the lens to infinity and image a distant object (10 to 15 meters).
4. Gently move the F-Mount front assembly until focused and lock it in place.

Planarity adjustable mounts

Bonito PRO cameras allow planarity adjustment of the mount relative to the camera sensor. Adjustment can be made for overall flange focal distance (Z distance), and planarity (Z-tilt). The following steps describe Z adjustment using a standard lens and a target. However, measurement tools such as an optical depth micrometer could also be used.

NOTICE

Modifying the factory default adjustment is under the responsibility of the user. Exercise caution when modifying the planarity adjustment. Use a 1.5 mm hex ball driver to loosen the three spring loaded screws, adjust the tilt adjustment screws as required, then secure the screws.

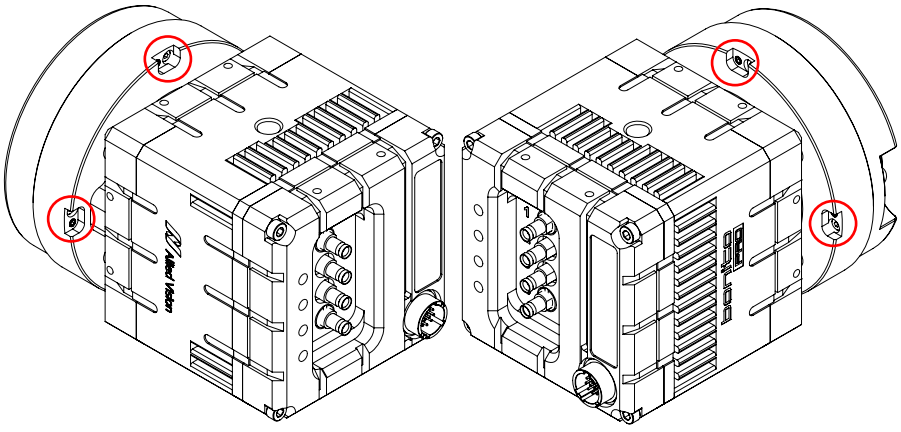


Figure 21: Location of tilt adjustment screws

1. Using a compatible lens, set the lens to infinity and image on a target (10 to 15 meters). Target should highlight focus levels at center image and at the corners of the image. A lens with a long focal length, or adjustable zoom lens, allows more precision for this operation and reduce the overall size of your target.
2. Use a 1.5 mm hex ball head driver to loosen the screws.
   Adjust the three tilt adjustment screws, until all targets are in focus.
3. Tighten the three screws and recheck the focus.

Sensor position accuracy

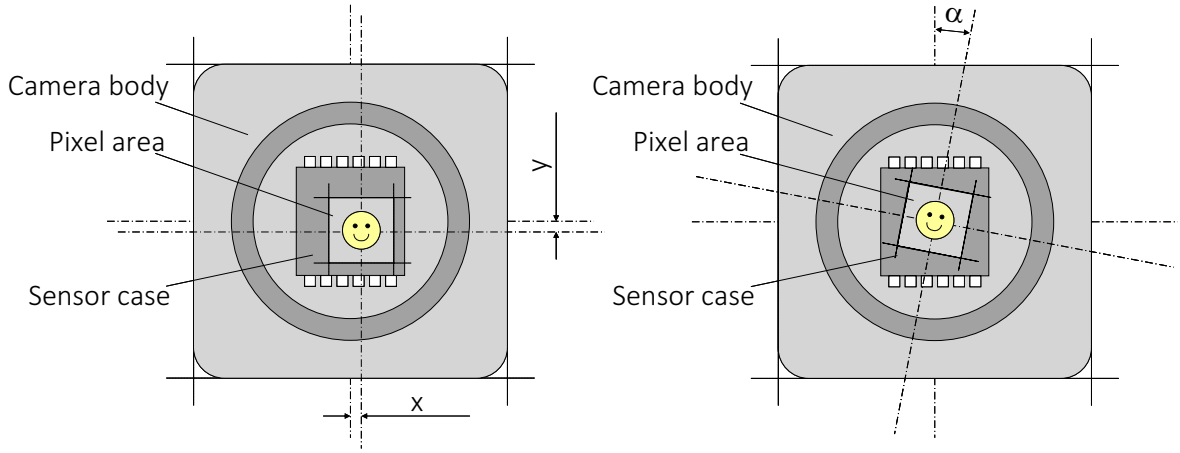


Figure 22: Sensor position accuracy

The following table defines the manufacturing accuracy of fitting sensors into Bonito PRO cameras.

Criteria	Subject	Properties
Reference Point	Sensor	Center of pixel area (photo sensitive cells)
	Camera	Center of camera front flange (outer case edges)
Accuracy	x-axis y-axis	±250 µm (sensor shift)
	z-axis	±10 µm (optical back focal length)
	α	< 1° (sensor rotation)
Alignment method		Optical alignment of photo sensitive sensor area into camera front module (lens mount front flange).

Table 11: Sensor position accuracy criteria

IR cut filter and protection glass

Bonito PRO color models are equipped with an infrared block filter (IR cut filter). This filter prevents infrared light from passing to the sensor. In the absence of an IR cut filter, images are dominated by red and are incapable of being properly color balanced. Monochrome and NIR models do not use an IR cut filter.

The following figure shows the filter transmission for the type IRC 650 interference IR cut filter and protection glass (ASG). Values may vary slightly by filter lot.

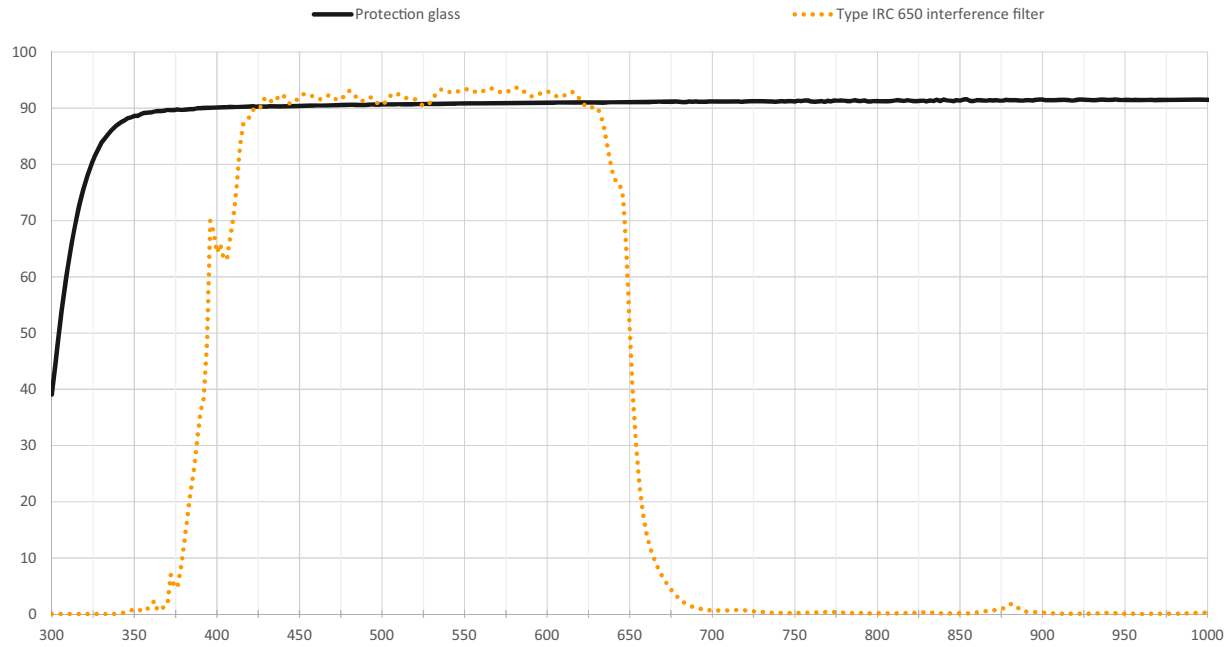


Figure 23: Optical filter transmission (exemplary curves)

Installing the camera



This chapter describes the components required for your vision system including configuring the host computer, frame grabber settings, and connecting your Bonito PRO camera.

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.

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.

Frame grabbers

NOTICE

This installation chapter assumes that you have installed a CoaXPress frame grabber in your computer including the related software.

Recommended frame grabbers

Model tested	Remarks
Euresys Coaxlink Quad G3	PCIe 3.0 four-connection CoaXPress frame grabber, four CoaXPress CXP-6 connections, 2,500 MBps camera bandwidth, PCIe 3.0 (Gen 3) × 4 bus, 3,300 MBps bus bandwidth, PoCXP, Windows drivers
Active Silicon FireBird Quad CXP-6	Quad input CoaXPress frame grabber, four CoaXPress connections each at 6.25 Gbps, Windows support (32-bit and 64-bit), PoCXP

Table 12: Recommended frame grabbers

Not all frame grabbers support all Bonito PRO features.

For a complete list of supported frame grabbers including limitations, see the Hardware Selection for Bonito PRO Cameras application note at

www.alliedvision.com/en/support/faqs-application-notes.

Contact your Allied Vision Sales representative or your local Allied Vision distribution partner for lens recommendations at

www.alliedvision.com/en/about-us/contact-us/contact-sales.

The Euresys Coaxlink Quad G3 frame grabber and GenICam browser were used to create the screenshots in this document.

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.
- 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 64.
- We recommend you to apply thread locking.
- Use a lens support for heavy lenses.



NOTICE

Damage to the mounting threads

Screws above the specified length can damage the threads or bottom plate and reduce the strength of the joint. If you must use longer screws:

- Use spacers, spring lock washers, or internal tooth lock washers to reduce the intrusion depth.

The maximum torque value applies only if the entire thread engagement is used. For other values, see Adapting maximum torque values on page 64. For technical drawings, see Mechanical dimensions on page 45.

- **1/4-20 mounting threads**: As shown in Figure 24, mount the camera to the base using suitable 1/4-20 screws at 5 Nm maximum torque for a thread engagement (C) of 6.0 mm between screws and mounting threads.
- **M3 mounting threads**: As shown in Figure 24, mount the camera to the base using suitable M3 screws at 0.69 Nm maximum torque for a thread engagement (C) of 3.0 mm between screws and mounting threads.

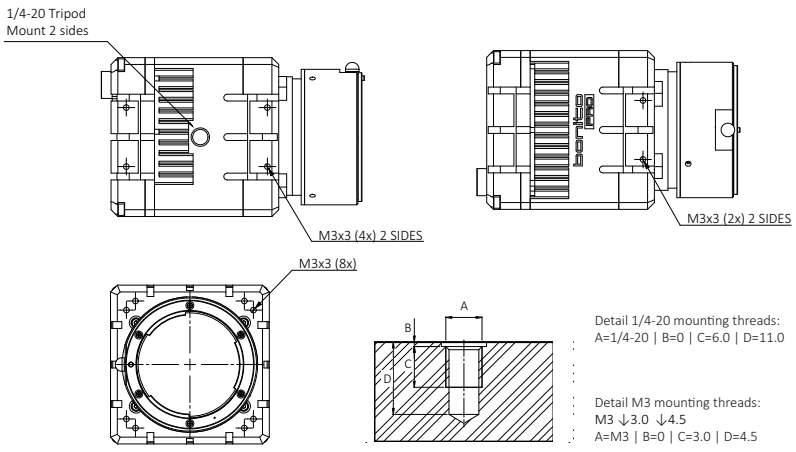


Figure 24: Mounting holes in top, bottom, and sides of camera

Adapting maximum torque values

The total screw length composes of the mounting holes length and the height of your mounting base. For using less than the recommended length of thread engagement, calculate maximum torque as follows:

$$\frac{\text{Current length of thread engagement}}{\text{Length of thread engagement in table}} \times \text{Torque in table} = \text{Current torque}$$

Example for the M3-3 mounting threads for a length of thread engagement of **2.0 mm** instead of 3.0 mm:

2.0 mm / 3.0 mm × 0.69 Nm = **0.46 Nm**

Thread type	Thread type	Length of thread engagement	Maximum torque
M3-3	M3	3.0 mm	0.69 Nm
M3-3	M3	**2.7 mm**	**0.62 Nm**

Table 13: Adjusting maximum torque values

To ensure that the screws do not become loose over time, we recommend you to use means for securing screws, such as screw locking varnish

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

Many of the lens mount styles available such as M42-Mount, F-Mount, and EF-Mount are not designed for high vibration environments with a heavy lens load. We recommend supporting the lens externally in these environments.

NOTICE

As monochrome and NIR models don't have an optical filter, always attach a dust cap when a lens is not attached to minimize the possibility of contaminants falling on the sensor surface.

NOTICE

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

To keep dirt out of the lens mount, hold the camera with the lens mount facing the ground. Keep filter and camera back lens clean, because dirt becomes more visible the closer it gets to the sensor.

NOTICE

Image sensors are sensitive to excessive radiation: focused sunlight, lasers, and X-rays can damage the sensor.

Bonito PRO cameras offer various lens mounts for installing a lens including F-Mount, F-Mount PA, M42-Mount, M42-Mount PA, M58-Mount PA, M58-Mount PA, and Canon EF-Mount PA. Lenses can be purchased directly from Allied Vision or from an Allied Vision distribution partner. Users need to select the desired focal length of the lens and appropriate optical format for the target camera model.

For more information on lens mount options for your Bonito PRO camera, see the Modular Concept. For information on available lenses and accessories for your camera, see the Accessories webpage.

Planarity mounts

NOTICE

Modifying the factory default adjustment is under the responsibility of the user. Exercise caution when modifying the planarity adjustment. Use a 1.5 mm hex ball driver to loosen the three spring loaded screws, adjust the tilt adjustment screws as required, then secure the screws.

Cameras and lens load

We tested a Bonito PRO camera with an EF-Mount PA and a Bonito PRO camera with an F-Mount (non-PA).

Lens simulators

Lens simulators were used to simulate lenses.

Feature	Properties
General description	The lens simulators were made from aluminum.
Length	43 mm, from the lens mount front flange to the front face of the lens simulator.
Center of gravity	20.4 mm, out from the lens mount front flange along the z-axis.
Mass	Approximately 517 grams each.

Table 14: Lens simulators properties



NOTICE

If lenses or stress exceeds the range tested

- For heavier or longer lenses, support both the camera and lens.
- Apply additional tests.

Powering the camera

See the Specifications chapter for connector definition and voltage specifications.



NOTICE

Bonito PRO cameras are powered via the Hirose connector or Power over CoaXPress (PoCXP). PoCXP is implemented for each CoaXPress connector using a host transceiver. When PoCXP is enabled, the host shall supply 21.6 to 24.6 VDC to the CoaXPress connector. The host should be capable of supplying 13 W per cable over the full voltage range.



NOTICE

When powering the camera:

- Use only DC power supplies with insulated cases.
- Do not exceed the wattage as specified in the Specifications chapter.
- For all power connections use only shielded cables to avoid electromagnetic interference.
- Bonito PRO cameras can be powered from either the Hirose I/O port or via PoCXP. Power supplied via Hirose I/O takes priority over power supplied via PoCXP.
- When powering the camera via the Hirose I/O port, use a power supply recommended by Allied Vision



NOTICE

Verify all external connections in terms of voltage levels, power requirements, voltage polarity, and signal integrity prior to powering the device.



NOTICE

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

Observe the following:

- Keep the camera passive cooling fins free of dust and other contaminants.
- For maximum heat dissipation, affix the camera to a heat sink, using the mounting threads.
  - 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.

CXP-6

Bonito PRO cameras stream images at CXP-6 speeds with four connections only.

PoCXP

A frame grabber that supports PoCXP is required providing the camera with required power as per the specifications. Each connection supports up to 13 watts.

Line1 is master

- When connecting the camera to power always connect Line1 last.
- Some frame grabbers require that the master connection is always on line 1 and line 1 is connected to line 1 on the frame grabber.
- As power is provided by all lines, you must disconnect all four cables to power cycle the camera.

Connecting your camera



CoaXPress uses 75 ohm coaxial cable as a physical medium.



The maximum cable length between the Bonito PRO camera and the host computer is dependent on the bit rate and the type of coax cable used. For more information refer to the JIIA CoaXPress Standard Version 1.1.1.

The procedure to obtain the first image from your Bonito PRO camera is dependent on the frame grabber GenICam browser or SDK. The Euresys Coaxlink Quad G3 CXP-6 frame grabber GenICam browser was used to create the screen shots in this document. These screen shots are not representative of every frame grabber GenICam browser.

Follow the steps to connect your camera and obtain the first image:

1. Install the frame grabber in your host computer and configure the frame grabber software including drivers, utilities, and libraries. Ensure the system BIOS version is compatible with the frame grabber. For additional information, see the frame grabber quick start guide or other documentation provided by the manufacturer.

2. Connect your Bonito PRO camera to your frame grabber via four 75 ohm coaxial cables.
3. The camera can by powered via the Hirose I/O port using a compatible power supply or it can be powered via a PoCXP frame grabber.
4. Mount a lens to the camera.
5. Start the frame grabber GenICam browser and wait for the camera to be discovered. When discovered, the Bonito PRO camera is listed under **Remote Devices**.

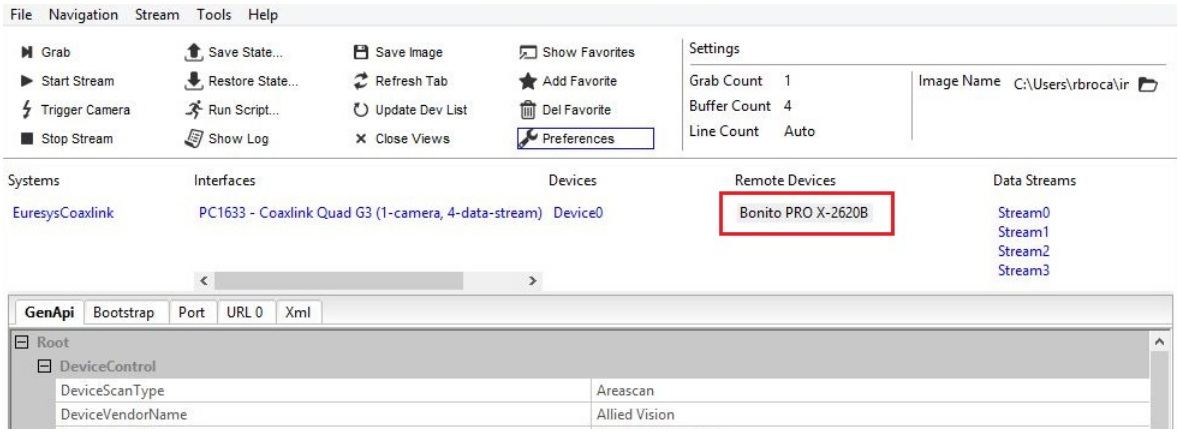


Figure 25: Camera is listed under Remote Devices

6. Double-click the camera name and then click the **GenApi** tab.

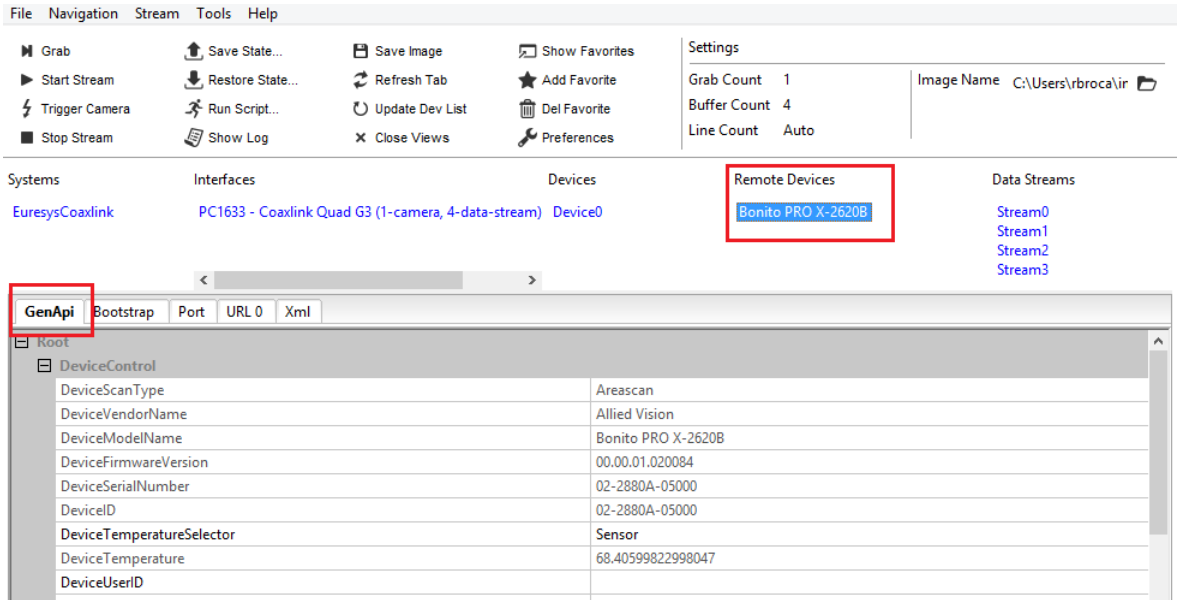


Figure 26: Double-click the camera and GenApi tab

7. Configure camera settings as required.
8. Click the **Start Stream** button to start streaming images.
9. Click the **Stop Stream** button to stop streaming images.

Accessories

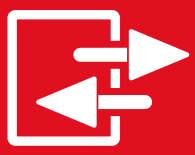
Allied Vision offers a wide range of accessories for the use of Bonito PRO CXP-6 cameras and the easy integration in already existing applications including:

- CXP-6 cables
- Lenses for corresponding sensor sizes and resolutions

Contact your Allied Vision Sales team or your local Allied Vision distribution partner for information on accessories and lens recommendations.

A list of recommended accessories is available on the Allied Vision website. For supported frame grabbers, see the Hardware Selection for Bonito PRO Cameras application note

Camera interfaces



This chapter includes:

- A general description of the inputs and outputs (including trigger features)
- I/O connector pin assignments
- I/O block diagrams
- A general description of trigger rules such as timing diagram and definitions

Back panel

This section provides information on CoaXPress connectors, Hirose IO port, status LEDs, and trigger features.

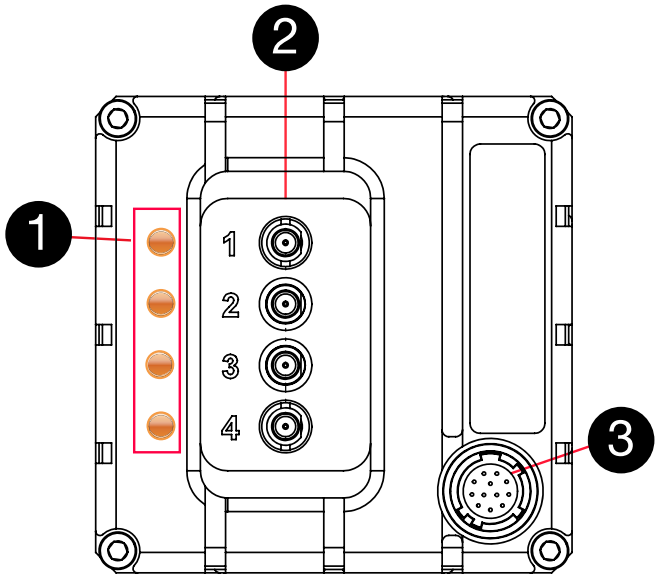


Figure 27: Bonito PRO ports and LEDs

1	Status LEDs
2	4 × 1.0, 2.3 DIN type connectors
3	Hirose I/O port, HR10A-10R-12PB connector

Status LEDs

The color and state of the LEDs has the following meaning.

State	Indication
No power	Off
System booting	Solid orange
Powered, but not connected (not applicable to a device reliant on PoCXP power)	Slow pulse (1 hertz) red
Connection detection in progress, PoCXP active	Fast flash (12.5 hertz) alternate green and orange Shown for a minimum of one second even if the connection detection is faster.
Connection detection in progress, PoCXP not in use	Fast flash (12.5 hertz) orange Shown for a minimum of one second even if the connection detection is faster.
Device or host incompatible, PoCXP active	Slow flash (0.5 hertz) alternate red and green
Device or host incompatible, PoCXP not in use	Slow flash (0.5 hertz) alternate red and orange
Device or host connected, but no data being transferred	Solid green
Device or host connected, waiting for event (for example trigger, exposure pulse)	Slow pulse (1 hertz) orange
Device or host connected, data being transferred	Fast flash (12.5 hertz) green
Error during data transfer (for example CRC error, single bit error detected)	Slow pulse (0.5 hertz), red In case of multiple errors, there shall be at least two green fast flash pulses before the next error is indicated
Connection test packets being sent	Slow flash (0.5 hertz) alternate green and orange
Compliance test mode enabled	Slow flash (0.5 hertz) alternate red then green then orange
System error (for example internal error)	Fast flash (12.5 hertz) red

Table 15: Status of LEDs

CoaXPress interface

The Bonito PRO is powered through the 12-pin Hirose I/O port, or the CXP-6 four DIN 1.0, 2.3 connections by using any standard PoCXP supported frame grabber. The PoCXP interface supports power up to 13 watts per cable.

See the Hardware Selection for Allied Vision Bonito PRO Cameras application note for a list of supported CoaXPress (CXP-6) frame grabbers and cables

Maximum cable length

The maximum cable length between the Bonito PRO camera and the host computer is dependent on the bit rate and the type of coax cable used. For more information refer to the JIIA CoaXPress Standard Version 1.1.1.

CoaXPress physical topology

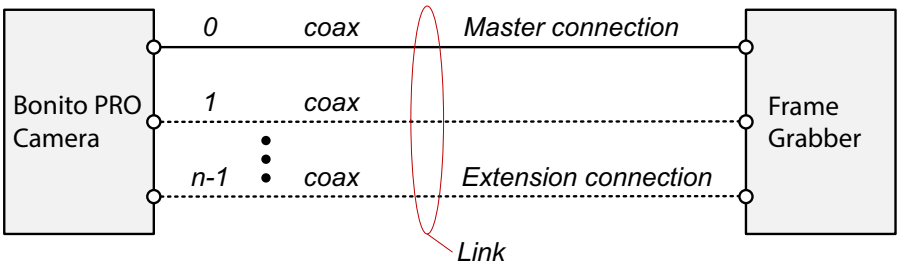


Figure 28: CoaXPress physical topology

Each connection provides the following signaling functions:

- High-speed serial (camera to frame grabber down connection), at up to 6.25 Gbps per line
- Low speed serial (frame grabber to camera up connection), at 20.83 Mbps
- Power (host to device), up to 13 watts.

A dedicated high-speed connection from host to device is allowed for high-speed triggers and camera control. This connection does not support power.

The link protocol defines the transfer of triggers, general purpose I/O, control data and high-speed streaming data over a link.

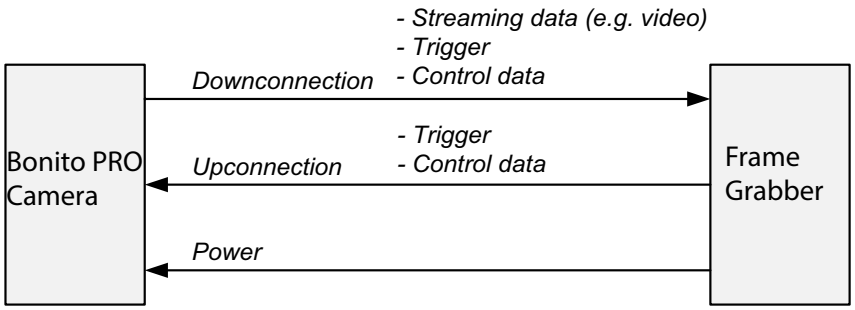


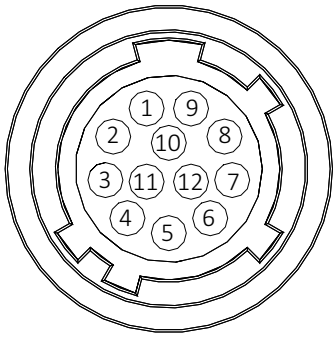
Figure 29: Signaling connections and data flow

Both the up connection and down connection use 8B/10B code. 8B/10B is an industry-standard code that maps 8-bit data to 10-bit data to achieve DC balance on the connection, while also allowing clock recovery by ensuring regular transitions.

Discovery bit rate

The discovery bit rate is CXP-1.

Camera I/O connector pin assignment



Camera side Hirose HR10A-10R-12PB connector					I/O cable color code
Pin	**Signal**	**Direction**	**Level**	**Description**	
1	Camera GND	In	0 VDC	Ground for camera power supply	Blue
2	Camera Power	In	24 VDC ± 2.4 VDC	Camera power supply	Red
3	Out 4	Out	Open emitter maximum 5 mA	Opto-isolated Output 4 (SyncOut4)	Violet
4	In 1	In	LVTTL maximum 3.3 VDC	Non-isolated Input 1 (SyncIn1)	Gray
5	Out 3	Out	Open emitter maximum 5 mA	Opto-isolated Output 3 (SyncOut3)	Yellow
6	Out 1	Out	3.3 VDC LVTTL maximum 50 µA	Non-isolated Output 1 (SyncOut1)	Green
7	Isolated IO GND	In	0 VDC	Isolated input signal ground	Brown
8	RxD RS232	In		Reserved for future use	White
9	TxD RS232	Out		Reserved for future use	Black
10	Isolated Out Power	In	Common VCC for outputs 5 to 24 VDC	Power input for opto-isolated outputs	Orange
11	In 2	In	U_{in}(high) = 5 to 24 VDC U_{in}(low) = 0 to 0.8 VDC	Input 2 opto-isolated (SyncIn2)	White and Black
12	Out 2	Out	3.3 VDC LVTTL maximum 50 µA	Non-isolated Output 2 (SyncOut2)	White and Brown

Table 16: Camera I/O connector pin assignment and cable color coding

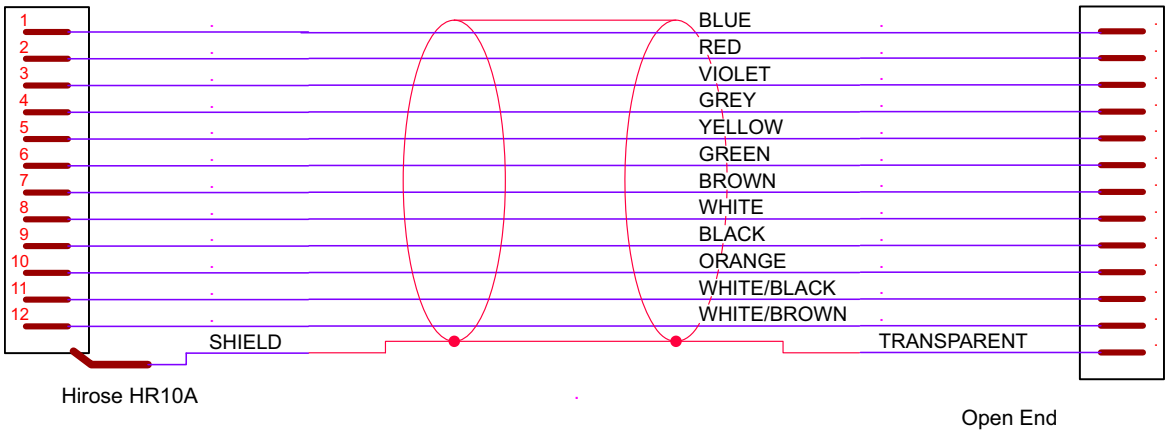


Figure 30: Bonito PRO cable color coding

The General Purpose I/O port uses a Hirose HR10A-10R-12PB connector on the camera side. The mating cable connector is Hirose HR10A-10P-12S.

Hirose connector

The cable side Hirose 12-pin female connector is available for purchase from Allied Vision. Order code: K7600040.

I/O definition

Camera Power

Operating the camera beyond the specified range damages the camera.

Cameras can be powered using the I/O connector (via **Pin 1,** Camera GND and **Pin 2**) at an input range of 21.6 to 26.4 VDC, using a limited power source (LPS), according to IEC 62368-1 with maximum 1 A. The camera is not intended to be connected to a DC distribution network.

Alternatively, cameras can be powered using Power over CoaXPress (PoCXP) by frame grabbers supporting PoCXP. However, power consumption and heat generation are higher than with external power, using the I/O connector.

Cameras powered by both the Hirose I/O port and the CoaXPress interface use the power provided by Hirose I/O port only.

- Make sure that PoCXP 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.

Input triggers

Input triggers 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)

In 1 is not electrically isolated and can be used when environmental noise is insignificant and faster trigger response is required. The required trigger signal is low voltage TTL 3.3 VDC. Tie trigger ground to Camera GND to complete the trigger circuit.



NOTICE

Exceeding 5.1 VDC on **In 1** can permanently damage the camera.

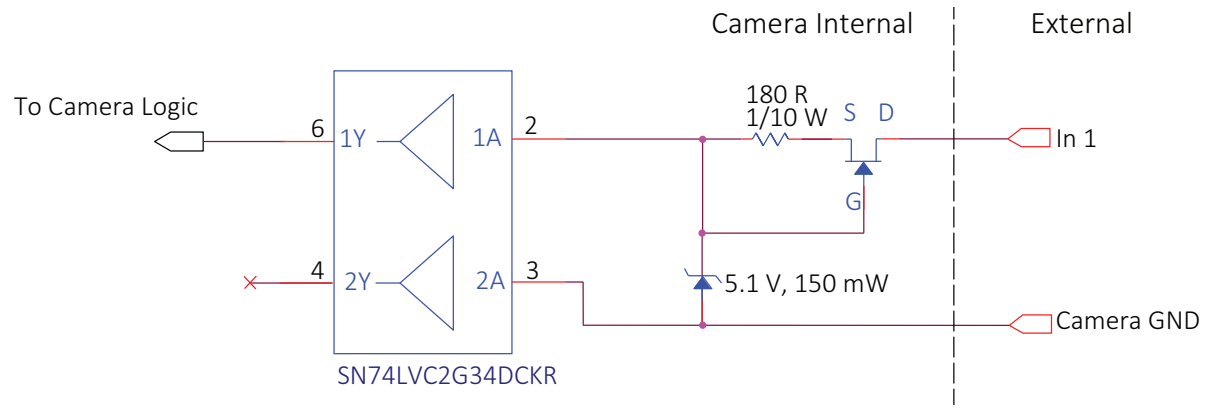


Figure 31: Bonito PRO internal circuit diagram for non-isolated input trigger

In 2 (Opto-isolated)

In 2 is optically isolated and can be used in electrically noisy environments to prevent false trigger events. Tie trigger ground to Isolated IO GND to complete the trigger circuit. Compared to the non-isolated trigger, **In 2** has a longer propagation time. It can be driven from 5 to 24 VDC with a minimum current source of 5 mA.

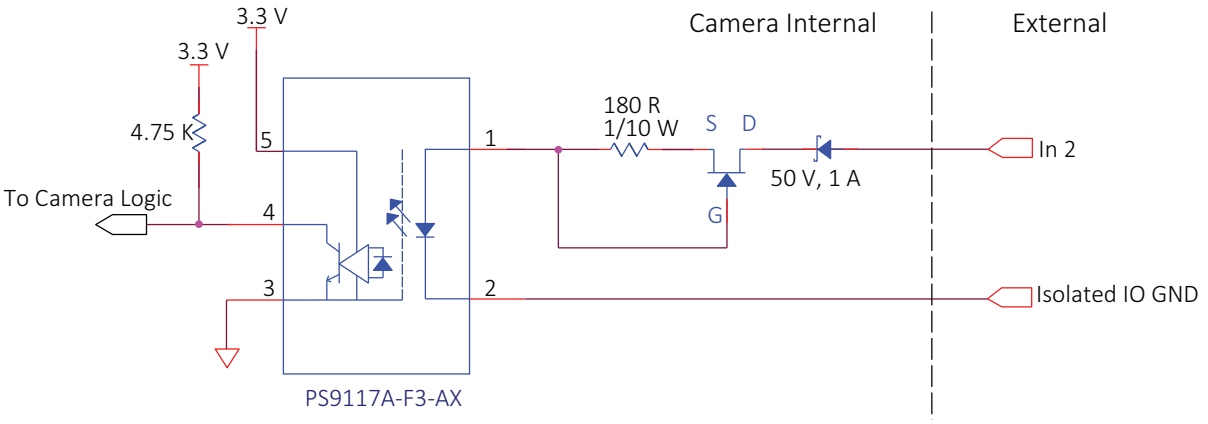


Figure 32: Bonito PRO internal circuit diagram for opto-isolated input trigger

Isolated IO GND

The Isolated IO GND connection provides the user ground reference and return path for **In 2**. It is recommended that the ground wiring be physically close to the **In 2** wiring to prevent parasitic coupling. For example, a good cable design connects **In 2** to one conductor of a twisted pair, Isolated IO GND to the second conductor of the same twisted pair.

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 as follows:

Exposing	Corresponds to 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 camera is reading out data.
Imaging	Valid when camera is exposing or reading out.
Strobe	Programmable pulse based on one of the previously defined events.
GPO	User programmable binary output.

Isolated Out Power

The Isolated Out Power connection provides power for isolated signals **Out 3** and **Out 4**. The voltage requirement is 5 to 24 VDC. The current requirement for this supply is a function of the optical isolator collector current and the number of outputs used in the system. Isolated Out Power wiring should be physically close to **Out 3** or **Out 4** wiring to prevent parasitic coupling.

Out 1 and 2 (Non-isolated)

Out 1 and **Out 2** signals are not electrically isolated and can be used when environmental electrical noise is insignificant and faster trigger response is required. Tie signal ground to Camera GND to complete the external circuit. The output signal is a low voltage TTL, maximum 3.3 VDC. It is not suitable for driving loads in excess of 50 µA.

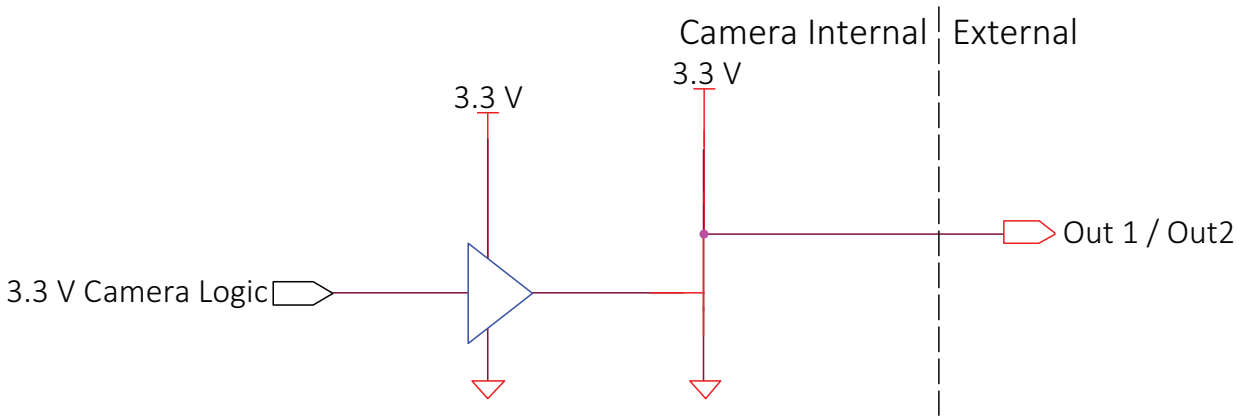


Figure 33: Bonito PRO Out 1 or Out 2 trigger circuit

Out3 and Out4 (Opto-isolated)

Out3 and **Out4** signals are optically isolated and require the user to provide a voltage level, Isolated Out Power. The **Out3, Out4** signal should be grounded by adding an external load resistor as shown in the following figure and table. Isolated Out Power can be configured between 5 to 24 VDC.

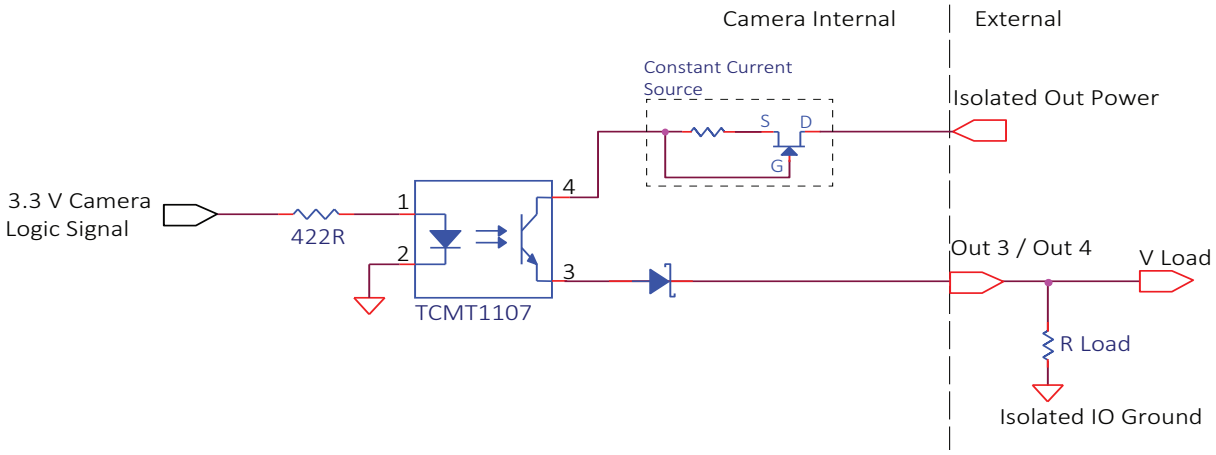


Figure 34: Bonito PRO Out 3 and Out 4 trigger circuit

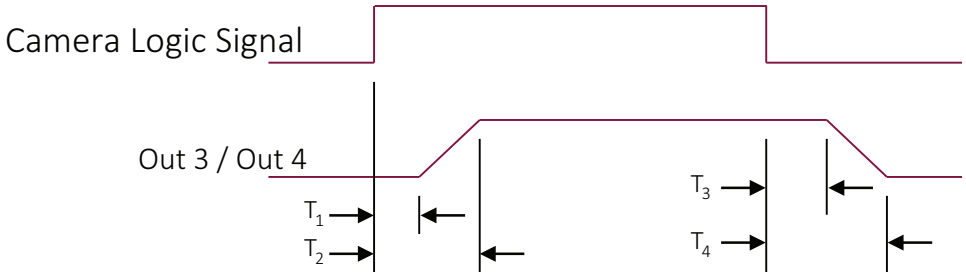


Figure 35: Bonito PRO Out 3 and Out 4 timing diagram

The influence of various Isolated Out Power values and load values on the timing response of the trigger is indicated in the following table. Trigger current, Out ICC, is a function of Isolated Out Power voltage and Load resistor R.

Isolated Out Power	OUT ICC	R Load	V Load	R Power Dissipation	T_1	T_2	T_3	T_4
5 VDC	8 mA	500 Ω	4.2 VDC	35 mW	1.2 µs	5.4 µs	5.6 µs	64 µs
5 VDC	5 mA	2.4 KΩ	4.0 VDC	6.7 mW	1.2 µs	5.4 µs	4.4 µs	34 µs
12 VDC	2.1 mA	5 KΩ	10.4 VDC	21.6 mW	1.2 µs	10 µs	4.0 µs	47 µs
24 VDC	1.8 mA	10 KΩ	18.4 VDC	33.9 mW	1.2 µs	15 µs	3.4 µs	70 µs

Table 17: Bonito PRO trigger circuit values

EF lens control

EF lens control is available for Bonito PRO cameras. EF lens control allows focus and aperture control via host software.

See the Modular Concept for information on lens mount options available with Bonito PRO camera.



NOTICE

Maximum power via PoCXP

The maximum power supplied via PoCXP is 13 watts per cable at a nominal 24 VDC. EF lens power requirements varies from lens to lens; however, typical ratings are in the 3 to 4 watt range.

Operation

1. Connect an EF lens to the camera before powering up the camera.
2. Power up the camera, and open the camera control software.
3. Use `EFLensInitialize` command to initialize the EF lens. This command is automatically executed on power up and when lens is attached to camera.
4. Adjust the focus and aperture using `EFLensFocus` and `EFLensFStop` controls, respectively.
5. If the lens does not operate as expected, see `EFLensState` and `EFLensLastError`. EF lens controls are described further in the `EFLensControl` section of the Bonito PRO Features Reference.

Camera trigger

Trigger timing diagram

The following diagram explains the general trigger concept.

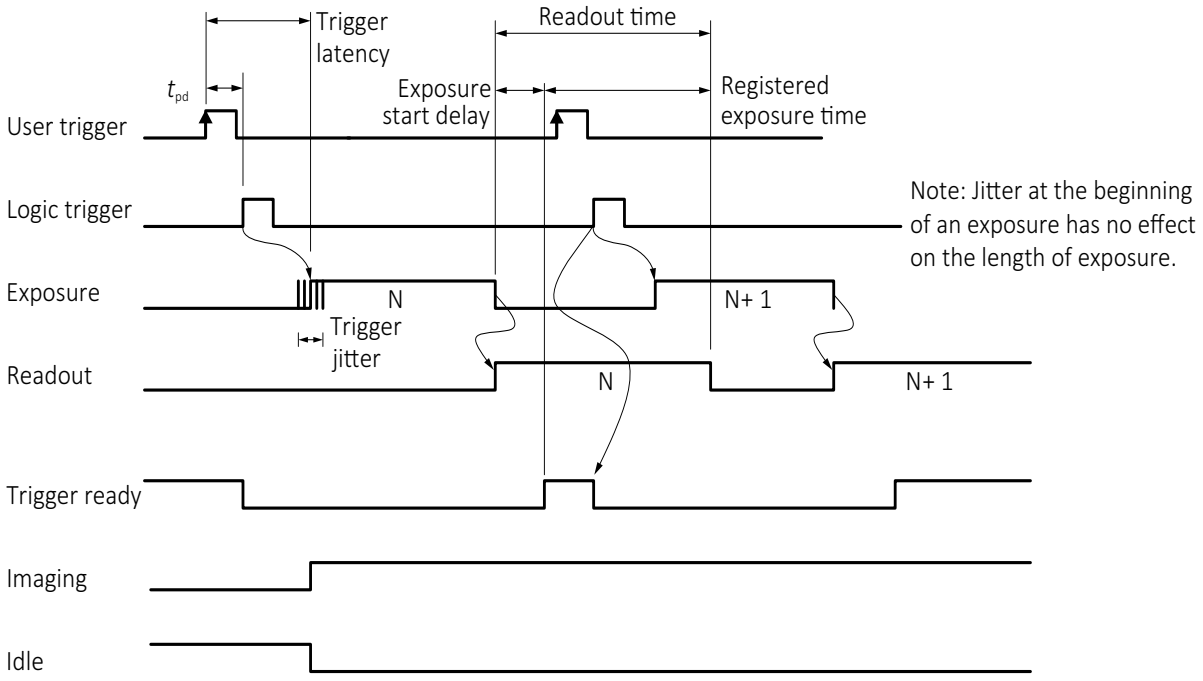


Figure 36: Bonito PRO internal signal timing waveforms

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).
t_{pd}	Propagation delay (t_{pd}) 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	Deviation from the trigger latency time.

Table 18: Explanation of signals in timing diagram (sheet 1 of 2)

Term	Definition
Trigger ready	Indicates to the user that the camera accepts 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 and indicates when the next exposure cycle can begin such that the exposure ends 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 18: Explanation of signals in timing diagram (sheet 2 of 2)

Trigger rules

- The end of exposure always triggers the next Readout.
- The end of exposure must always end after the current Readout.
- The start of exposure must always correspond with the Interline Time if Readout is true.
- Exposure start delay equals the readout time minus the registered Exposure Time.
- The user trigger pulse width should be at least three times the width of the trigger latency as indicated in the Specifications chapter.

Triggering during the idle state

For applications requiring the shortest possible trigger latency and the smallest possible trigger jitter, the user trigger signal should be applied when Imaging is false and Idle is true. In this case, trigger latency and trigger jitter are as indicated in the Specifications chapter.

Triggering during the readout state

For applications requiring the fastest triggering cycle time whereby the camera image sensor is exposing and reading out simultaneously, apply the user trigger signal as soon as a valid trigger ready is detected. In this case, trigger latency and trigger jitter can be up to one row time since Exposure must always begin on an Interline boundary.



For a more detailed description of the trigger concept for advanced users and special scenarios, see the Triggering Concept application note at

www.alliedvision.com/en/support/faqs-application-notes.

Firmware update



This chapter includes instructions on updating the firmware on your Allied Vision Bonito PRO camera.



If new firmware contains a new feature or control, saved camera user sets are invalidated and erased!

Before loading new firmware, backup your current camera settings in the frame grabber SDK.



NOTICE

Do not unplug the CoaXPress cables or camera power supply during the update procedure. We recommend using auxiliary power instead of PoCXP for firmware updates.



Allied Vision does not provide a firmware loader tool, you should perform firmware updates via the frame grabber SDK.

Firmware upgrade overview

1. Get remote port and device node map
2. Collect features for file access
3. Firmware upload via FileAccess
   a. Open the device with your frame grabber SDK
   b. Open the firmware file and load it into an std::vector
   c. Open the firmware camera file
   d. Write the firmware data to the camera
   e. Close camera file
   f. Reboot the camera

Get remote port and device node map

Active Silicon frame grabber code snippet example

```
// Producer and Device handle can be taken from sample application provided by the SDK
CTLProducer *                   m_Producer;
GC::DEV_HANDLE                  m_Device;



GC::PORT_HANDLE                 m_RemotePortHandle;
std::shared_ptr<CPort>          m_RemotePort;
std::shared_ptr<CNodeMapRef>    m_RemoteDeviceMap;

m_Producer->DevGetPort(m_Device, &m_RemotePortHandle);
m_RemotePort = std::make_shared<CPort> (m_RemotePortHandle, m_Producer );
m_RemoteDeviceMap = m_RemotePort->GetNodeMap();
```

Code listing 1: Active Silicon code snippet example

Collect features for FileAccess

Active Silicon frame grabber code snippet example

```
CRegisterPtr            m_FileAccessBuffer;
CEnumerationPtr         m_FileSelector;
CEnumerationPtr         m_FileOpenMode;
CEnumerationPtr         m_FileOperationSelector;
CIntegerPtr             m_FileAccessLength;
CCommandPtr             m_FileOperationExecute;
CIntegerPtr             m_FileOperationResult;
CEnumerationPtr         m_FileOperationStatus;
CEnumerationPtr         m_FileStatus;


m_FileAccessBuffer      = m_RemoteDeviceMap->_GetNode("FileAccessBuffer");
m_FileSelector          = m_RemoteDeviceMap->_GetNode("FileSelector");
m_FileOpenMode          = m_RemoteDeviceMap->_GetNode("FileOpenMode");
m_FileOperationSelector = m_RemoteDeviceMap->_GetNode("FileOperationSelector");
m_FileAccessLength      = m_RemoteDeviceMap->_GetNode("FileAccessLength");
m_FileOperationExecute  = m_RemoteDeviceMap->_GetNode("FileOperationExecute");
m_FileOperationResult   = m_RemoteDeviceMap->_GetNode("FileOperationResult");
m_FileOperationStatus   = m_RemoteDeviceMap->_GetNode("FileOperationStatus");
m_FileStatus            = m_RemoteDeviceMap->_GetNode("FileStatus");
```

Code listing 2: Active Silicon code snippet example

Firmware upload via FileAccess

Step 1: Open the device with your frame grabber SDK

Step 2: Open the firmware file and load it into an std::vector

Step 3: Open the firmware camera file

Euresys frame grabber code snippet example

```
template <typename T>
static bool OpenCameraFile(EGrabber<T> &frameGrabber,const std::string &fileName)
{
    // basically fopen( fileName,"w")
    frameGrabber.setString<RemoteModule>("FileSelector", fileName);
    if( frameGrabber.getString<RemoteModule>("FileStatus") != "Closed")
    {
        CloseCameraFile(frameGrabber, fileName );
    }
    frameGrabber.setString<RemoteModule>("FileOperationSelector","Open");
    frameGrabber.setString<RemoteModule>("FileOpenMode", "Write");
    frameGrabber.execute<RemoteModule>("FileOperationExecute");
    if(     frameGrabber.getString<RemoteModule>("FileOperationStatus") == "Success"
        &&  frameGrabber.getString<RemoteModule>("FileStatus") == "Open")
    {
        return true;
    }
    return false;
}
```

Code listing 3: Euresys code snippet example

Active Silicon frame grabber code snippet example

```
void open(const std::string& fileName, OpenMode mode)
    {
        if( FileStatus() != "Closed")
        {
            close( fileName );
        }
        m_FileSelector->FromString(  fileName.c_str() );
        m_FileOperationSelector->FromString("Open");
        m_FileOpenMode->FromString( toString(mode) );
        m_FileOperationExecute->Execute();
        if( FileStatus() != "Open")
        {
            throw RUNTIME_EXCEPTION( fileName + " could not be opened");
        }
    }
```

Code listing 4: Active Silicon code snippet example

Step 4: Write the firmware data to the camera

Euresys frame grabber code snippet example

```
enum CameraRegister
{
    FileAccessBufferReg = 0x25200,
};

template <typename T>
static bool WriteCameraFile( EGrabber<T> & frameGrabber, const std::vector<char> &data )
{
    std::cout<<"\n";
    const int64_t dataToWrite = static_cast<int64_t>(data.size());
    int64_t maxWriteSize = frameGrabber.getInteger<RemoteModule>("FileAccessLength.Max");
    std::vector<char>::const_iterator dataPos = data.begin();
    frameGrabber.setString<RemoteModule>("FileOperationSelector", "Write");
    int64_t bytesWritten = 0;
    while (dataPos < data.end())
    {
        int writeSize = std::min( maxWriteSize, dataToWrite-bytesWritten);
        frameGrabber.gcWritePortData<RemoteModule>(FileAccessBufferReg,&*dataPos, writeSize);
        frameGrabber.setInteger<RemoteModule>("FileAccessLength",writeSize);
        frameGrabber.execute<RemoteModule>("FileOperationExecute");
        if(     frameGrabber.getInteger<RemoteModule>("FileOperationResult") != writeSize
            ||  frameGrabber.getString<RemoteModule>("FileOperationStatus") != "Success" )
        {
            return false;
        }
        double percentWritten = (100.0* bytesWritten )/ dataToWrite;
        std::cout<<"\r"<<std::fixed<<std::setprecision(2)<<percentWritten<<" %     ";
        bytesWritten +=writeSize;
        dataPos +=writeSize;
    }
    return true;
}
```

Code listing 5: Euresys code snippet example

Active Silicon frame grabber code snippet example

```
void write( const data_vector &data ) const
    {
        std::cout<<"\n";
        const size_t maxWrite = static_cast<size_t>(m_FileAccessLength->GetMax());
        data_vector::const_iterator pos = data.begin();
        size_t sizeData = data.size();
        m_FileOperationSelector->FromString("Write");
        while( pos != data.end() )
        {
            int64_t sizeToWrite = static_cast<int64_t>( std::min( maxWrite,sizeData) );

            m_FileAccessLength->SetValue( sizeToWrite );
            m_FileAccessBuffer->Set(&*pos, sizeToWrite);
            m_FileOperationExecute->Execute();

            pos += sizeToWrite;
            sizeData -=sizeToWrite;
            double percent = 100.0- (sizeData*100.0)/data.size();

            std::cout<<std::fixed<<std::setprecision(2)<<"\r"<<percent<<"%         ";
        }
        std::cout<<"\n";
    }
```

Code listing 6: Active Silicon code snippet example

Step 5: Close camera file

Euresys frame grabber code snippet example

```
    template <typename T>
    static bool CloseCameraFile(EGrabber<T> &frameGrabber, const std::string &fileName)
    {
        // basically fopen( fileName,"w")
        frameGrabber.setString<RemoteModule>("FileSelector", fileName);
        frameGrabber.setString<RemoteModule>("FileOperationSelector", "Close");
        frameGrabber.execute<RemoteModule>("FileOperationExecute");
        if (frameGrabber.getString<RemoteModule>("FileOperationStatus") == "Success"
            &&  frameGrabber.getString<RemoteModule>("FileStatus") == "Closed")
        {
            return true;
        }
        return false;
    }
```

Code listing 7: Euresys code snippet example

Active Silicon frame grabber code snippet example

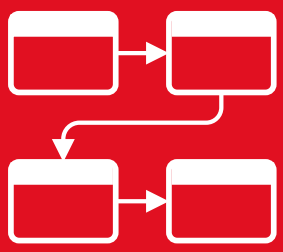
```
void close( const std::string & fileName )
    {
        m_FileSelector->FromString(  fileName.c_str() );
        m_FileOperationSelector->FromString("Close");
        m_FileOperationExecute->Execute();
        if( FileStatus() != "Closed")
        {
            throw RUNTIME_EXCEPTION(fileName + " could not be closed");
        }
```

Code listing 8: Active Silicon code snippet example

Step 6: Reboot the camera

You must always power cycle the camera after a firmware upgrade or downgrade.

Image data flow



This chapter presents diagrams that illustrate data flow and bit resolution of the image data.

For a complete description of individual features, see the Bonito PRO Features Reference.

Bonito PRO image data flow

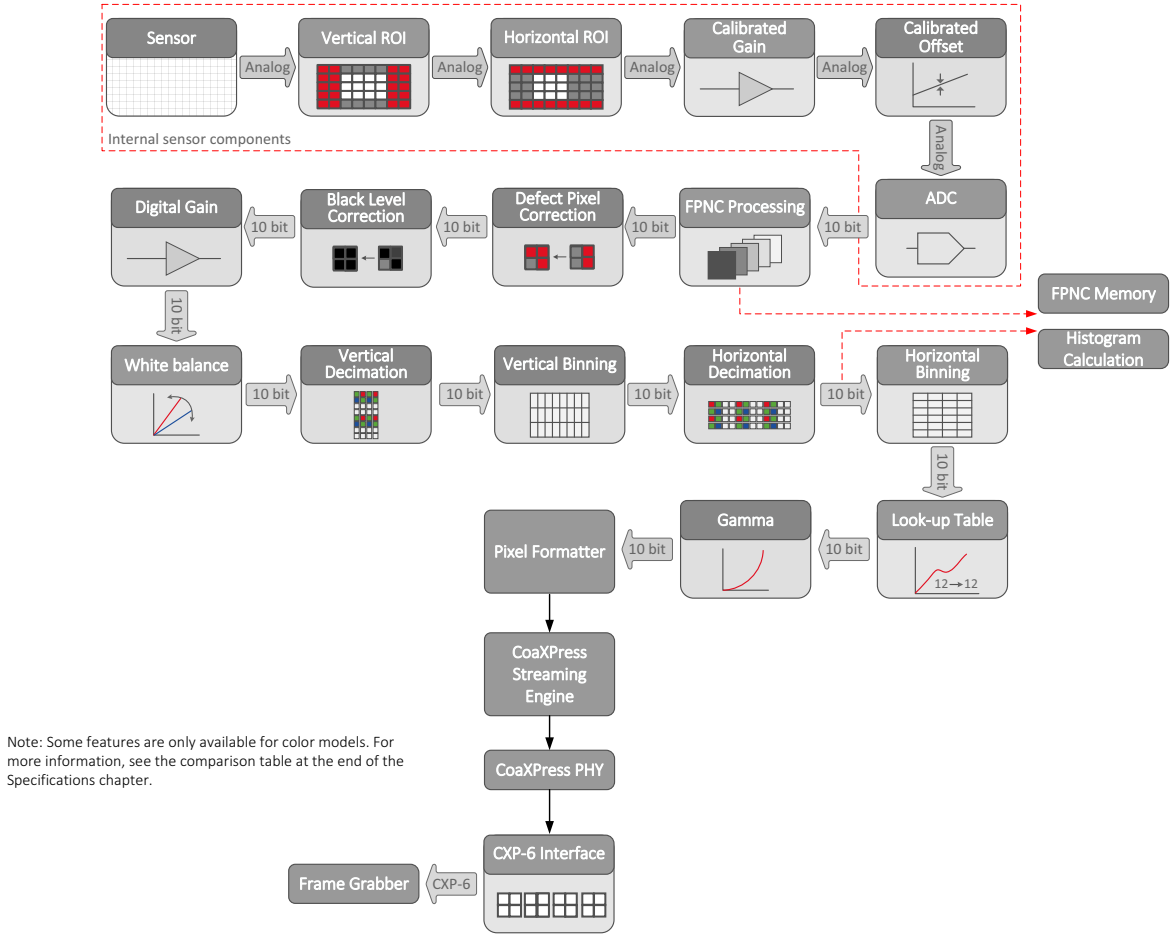
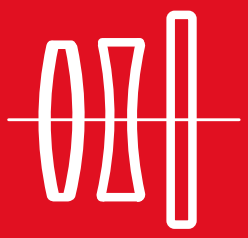


Figure 37: Bonito PRO image data flow

Cleaning optical components



This chapter describes safety instructions and cautions for cleaning lenses, optical filters, or sensors.

Read these instructions before you contact Allied Vision or your Allied Vision distribution partner for assistance.

Contact Allied Vision or your Allied Vision distribution partner if you are not familiar with the procedures described in this chapter.

Keep optical components clean

The best way to ensure the camera remains clean is to avoid penetration of foreign substances into the camera.

When screwing or unscrewing the camera lens or dust cap, hold the camera with the mount opening towards the floor. This minimizes the possibility of any contaminants falling on the glass surface. Always store cameras and lenses with dust-caps on.

Identifying impurities

If you observe any image artifacts in your video preview of your Bonito PRO camera you may have impurities either on the lens, optical filter, or on the sensor protection glass. Every Bonito PRO camera is cleaned prior to sealing and shipment; however, impurities may develop due to handling or unclean environments.

As shown in the following figure, impurities (dust, particles, or fluids) on the sensor or optical components appear as a dark area, patch or spot on the image and remain fixed in the preview window while you rotate the camera over the target.

Do not confuse this with a pixel defect which appears as a distinct point. Particles can either rest loosely or can be more or less stuck to the optical surface.

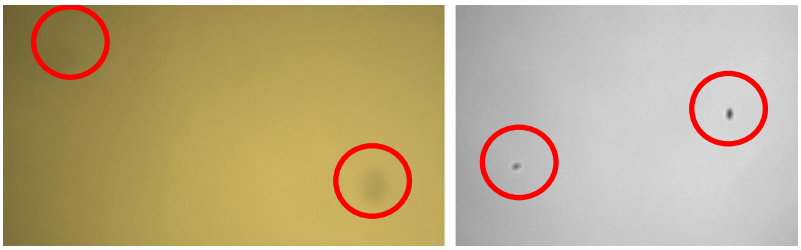


Figure 38: Image with tiny dust on the filter (left) and dust on the sensor (right)

Locating impurities

Before you dismount the lens, you should find out if the impurity is on the filter, lens, or sensor.

1. Start acquiring a uniform image (for example, a white sheet of paper) with the camera.
2. To identify the affected surface, move the suspected optical component and see if the contamination follows this movement.
   a. If you move only the lens (not the camera) and the impurity moves as well, the impurity is on the lens.
   b. If you move the IR cut filter or protection glass window and the impurity moves as well, the impurity is on the filter or protection glass. Carefully remove the filter or protection glass and clean it on both sides using the techniques explained in the next section. If the impurity is neither on the lens nor the IR cut filter or protection glass, it is probably on the sensor.



NOTICE

Removing the optical filter

Do not attempt to remove the camera optical filter for Bonito PRO cameras. Visit www.alliedvision.com/en/about-us/contact-us/technical-support-repair-/-rma for assistance.

Materials for cleaning optical components

Cleaning materials for optical components:

- Optic approved lens cotton, cloth, or tissue that is chemically pure and free from silicones and other additives.
- Optic approved low residue cleaning liquid.



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.



NOTICE

- Dry swabs or tissue may cause scratches.
- Metal tools may cause scratches.
- Disposable cotton cosmetic swabs may contain contaminants harmful to optical glass.
- Cosmetic cotton my cause scratches or get caught in small gaps.
- Consumer eyeglass cleaning cloths may be pretreated with silicone harmful to optical glass.
- Aggressive cleaners like benzine, acetone, or spirits may damage the surface.

Cleaning instructions

Workplace pre-conditions

- Perform all cleaning operations (lenses, optical filter, and sensor) in a dust-free clean-room.
- Avoid touching the optical components with your fingers or any hard material.
- Nitrile cleanroom gloves or powder free latex gloves are recommended to maintain low particulate levels.
- Use an ESD mat to prevent damage from an electrostatic discharge.

Cleaning instructions

1. Unplug the camera from any power supply before cleaning.
2. Apply a small amount of cleaning liquid to a new lens cleaning cotton, cloth, or tissue. The cotton, cloth, or lens tissue should be moist, but not dripping.



3. Hold the camera sensor diagonally upwards. Ensure that the camera is away from your body to prevent particles like skin flakes from falling on the sensor.
4. Wipe the glass surface with a spiral motion from the center to the rim. Normally, several spiral wipes are recommended. Wipe only on glass avoiding contact to metal surfaces, because microscopic dirt could be released and could cause scratches on the glass.
5. When you have finished cleaning, examine the surface in a strong 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 using new clean lens tissue.

Cleaning issues

If you notice that the camera lens or sensor is not clean after attempting to clean twice, or if you have any questions regarding cleaning your camera, contact your Allied Vision distribution partner.

Cleaning with compressed air

Allied Vision does not recommend cleaning Bonito PRO cameras with compressed air.



NOTICE

- Compressed air at high pressure and/or shorter operating distances may push dust into the camera or lens and physically damage the camera, sensor, or optical components.
- Propellant from non-optic approved compressed air products may leave a residue on the camera or lens and may physically damage the camera, sensor, or optical components.
- Compressed air may contain oil or moisture that could contaminate or damage the optical components.
- Use an air blower or compressed air only if you are familiar with cleaning a camera using this method.

If you want to clean your camera with compressed air despite of all the warnings:

- Use an optic approved compressed air product or compressor.
- Use an anti-static ionizer attachment to reduce the risk of static-caused damage.
- Use a filter to remove moisture and oil from the air.
- Use short directed bursts of air to remove impurities.



Compressed air pressure and operating distance

- Keep the compressed air pressure at a moderate strength only. Pressure at the nozzle should be less than 100 kPa.
- Operating distance from the camera should be 5 to 30 cm.