Allied Vision

ALVIUM ACCESSORIES

Cables for Optotune Lenses User Guide

V1.0.0

Quick links

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Read before use

EN - English

Safety

Before using the product, read these safety instructions. Observe the warnings at all times. Use the product only as stated in the Intended use on page 24.

CAUTION

Injuries by focused sunlight

If the sunlight is focused by the lens, eyes or skin can be injured.

CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

CAUTION

Injury by a falling product

The falling product can cause injury.

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 produkt bruges. Overhold alle advarsler. Brug kun produkt som anført i Intended use på side 24.

FORSIGTIG

Skader ved fokuseret sollys

Hvis sollyset fokuseres af linsen, kan øjnene eller huden blive skadet.

FORSIGTIG

Fare for snitsår på linsemodulets skarpe kanter

Linsemodulets gevind kan have skarpe kanter.

FORSIGTIG

Kvæstelser, hvis produkt falder ned

Falder produkt ned, kan dette forårsage kvæstelser.

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 das Produkt benutzen, lesen Sie diese Sicherheitshinweise. Beachten Sie diese Hinweise immer. Verwenden Sie das Produkt nur wie beschrieben in Intended use auf Seite 24.

VORSICHT

Verletzungen durch fokussietes Sonnenlicht

Wird das Sonnenlicht durch das Objektiv gebündelt, können die Augen oder die Haut verletzt werden.

VORSICHT

Schnitte durch scharfkantige Objektivgewinde

Objektivgewinde können scharfe Kanten haben.

VORSICHT

Verletzung durch das fallende Produkt

Das fallende Produkt kann Verletzungen verursachen.

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 el producto lea estas instrucciones de seguridad. Observe las advertencias en todo momento. Utilice el producto solo tal y como se estipula en el Intended use en la página 24.

ATENCIÓN

Lesiones por luz solar focalizada

Si la luz solar es enfocada por la lente, los ojos o la piel pueden resultar dañados.

ATENCIÓN

Riesgo de cortes debido a los bordes afilados del objetivo

Las roscas de los objetivos pueden tener bordes afilados.

ATENCIÓN

Lesiones en caso de que el producto se cae

Si el producto se cae puede provocar lesiones.

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 tuotteen käyttöä. Noudata tuotetta joka hetki. Käytä tuotteen ainoastaan kohdassa Intended use sivulla 24 kuvatulla tavalla.

HUOMIO

Kohdennetun auringonvalon aiheuttamat vammat

Jos linssi keskittää auringonvalon, silmät tai iho voivat vahingoittua.

HUOMIO

Linssien kiinnikkeiden terävien reunojen aiheuttamien viiltovammojen vaara

Linssin kiinnikkeiden kierteiden reunat voivat olla teräviä.

HUOMIO

Putoavan tuotteen aiheuttamat vammat

Putoava tuote voi aiheuttaa vammoja.

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 le produit. Respectez continuellement les avertissements. Utilisez le produit uniquement comme indiqué sous Intended use, page 24.

ATTENTION

Blessures dues à la lumière solaire focalisée

Si la lumière du soleil est focalisée par la lentille, les yeux ou la peau peuvent être blessés.

ATTENTION

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

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

ATTENTION

Blessures en cas de chute du produit

La chute de la produit peut entraîner des blessures.

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.

HE - עברית

בטיחות

לפני השימוש במוצר, 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 24).

זהירות

סכנת פציעה על ידי קרני השמש בנקודת המוקד

עם דרך העדשה מתרכזות קרני השמש, יכולה העין וגם העור להיפגע.

זהירות

סכנה להחתך מתבריג חד של העדשה

תבריג תושבת העדשה עלול להיות חד עד כדי פציעה.

זהירות

פציעה מנפילת המוצר

נפילת המוצר עלולה לגרום לפציעה.

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 il prodotto. Osservare sempre tutte le avvertenze. Utilizzare il prodotto come descritto alla sezione Intended use a pagina 24.

ATTENZIONE

Lesioni da luce solare concentrata

Se la luce solare viene focalizzata dalla lente, gli occhi o la pelle possono subire lesioni.

ATTENZIONE

Pericolo di tagliarsi sui bordi affilati degli attacchi della lente

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

ATTENZIONE

Lesioni dovute alla caduta del prodotto

Il prodotto può causare delle lesioni.

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

本製品を使用する前に、この安全ガイドをお読みください。警告を必ず守ってください。必ず21ページのIntended use 24 ページに従って使用してください。

注意

太陽光の集光による傷害

太陽光がレンズで集光されると、目や皮膚を傷つける可能性があります。

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。

注意

製品の落下によるケガ

本製品が落下すると、けがをするおそれがあります。

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 het product gebruikt. Neem deze waarschuwingen altijd in acht. Gebruik het product uitsluitend, zoals aangegeven in het Intended use op pagina 24.

VOORZICHTIG

Verwondingen door gericht zonlicht

Als het zonlicht door de lens wordt gefocusseerd, kunnen ogen of huid worden verwond.

VOORZICHTIG

Risico van snijwonden door scherpe randen van lensbevestigingen

Het schroefdraad van de lensbevestiging kan scherpe randen hebben.

VOORZICHTIG

Letsel door het vallende product

Het vallende product kan verwondingen veroorzaken.

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 produkt. Følg advarslene til en hver tid. Bruk kun produkt i samsvar med Intended use på side 24.

FORSIKTIG

Skader ved fokusert sollys

Hvis sollyset fokuseres av linsen, kan øyne eller hud bli skadet.

FORSIKTIG

Risiko for kutt fra skarpe kanter på linsefester

Sporene på linsefestet kan ha skarpe kanter.

FORSIKTIG

Skade ved det fallende produktet

Det fallende produktet kan forårsake skade.

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 produkten. Var hela tiden särskilt uppmärksam på varningarna. Använd enbart produkten på det sätt som anges i Intended use på sida 24.

VARNING

Skador orsakade av fokuserat solljus

Om solljuset fokuseras av linsen kan ögonen eller huden skadas.

VARNING

Risk för skärsår från vassa kanter på objektivfattningar

Objektivets gängor kan ha vassa kanter.

VARNING

Risk för skador från fallande produkter

Fallande produkter kan förorsaka skador.

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

在使用产品之前，请阅读这些安全说明。请务必遵守相关警告 和 Intended use 于第 24 页 .

注意事项

阳光集中照射造成的伤害

如果阳光被镜片聚焦，眼睛或皮肤就会受伤。

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。

注意事项

由坠落的产品造成的伤害

产品可能会坠落并造成伤害。

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。

This document at a glance

Get an overview:

Read this document carefully

Learn to use Optotune ELM E-type lenses and lens connection cables with Alvium cameras in the most safe and efficient way and avoid damage to cameras and lenses.

Focus control for Alvium cameras

Focus control and autofocus functions have been introduced for Alvium USB and GigE cameras by firmware V00.15.00, supporting **Optotune ELM E-type** lenses.

Typical state-of-the-art lenses use focusing elements made of glass. To change focus, these elements are moved. Optotune ELM E-type lenses use **Liquid Lenses** as focusing elements. When a voltage is applied, Liquid Lenses change their shape and focal length to adjust the focusing distance. This technology enables focusing in a few milliseconds [ms] only and increases the number and reproducibility of focusing cycles, making Liquid Lenses much faster with a longer life than previous lenses.

In autofocus mode, edges are detected by significant changes in image contrast. You can select between various algorithms to control focus.

Because no standard exists for this technology, observe the voltage levels of the serial port and of the power supply for liquid lenses and Alvium cameras. Follow the instructions in this user guide.

What else do you need?

Download	Link
Accessories, such as Optotune ELM E-type lenses and lens connection cables	www.alliedvision.com/en/company/contact-us/contact-sales-form
User guides for Alvium cameras	www.alliedvision.com/en/support/camera-documentation/area-scan-cameras-documentation
Alvium Features Reference	
Vimba X SDK, including Vimba X Viewer	www.alliedvision.com/en/support/software-downloads/vimba-x-sdk/vimba-x

Table 1: Helpful downloads

Contact us

Website, email

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

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

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

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Contents

Document history and conventions

This chapter includes:

Document history

Version	Date	Remarks
V1.0.0	2026-May-26	Initial version

Table 2: Document history

Conventions used in this user guide

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

Typographical styles

Style	Function
Emphasis	Highlighting important things
Web links and references	Links to webpages and internal cross references

Table 3: Typographical styles

Symbols and notes

CAUTION

General safety message

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.

Practical tip

Additional information helps to understand or ease handling the camera and components

Additional information

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

Intended use and safety

This chapter includes:

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.

Your safety

Threads of the lens and the camera lens mount have sharp edges. Be careful these edges do not cut your skin when handling lenses and lens mounts.

Prevent cameras and lenses from falling:
Ensure proper mounting of cameras and lenses, especially for dynamic applications.

How to avoid product damage

To prevent material damage, read the following to understand risks associated with cable connections for Optotune ELM E-type lenses.

Using lens connection cables

General note

Because no standard exists for this technology, observe the voltage levels of the serial port and of the power supply for liquid lenses and Alvium cameras. Follow the instructions in this user guide.

Strain relief for all cable connections

To protect cameras and connected lenses from malfunctions and damage to electronics by wrong polarity and short circuits, provide sufficient strain relief for all cable connections.

Pin assignment and levels on lens connection cables

If Optotune ELM E-type lenses are operated with incompatible lens connection cables, lenses and cameras can be damaged.

- Observe Connector pin assignment and levels on page 29.
- For Alvium USB cameras with JST I/O connectors, we recommend you to use only lens connection cables by Allied Vision.
- Follow the instructions in Mounting Optotune ELM E-type lenses on page 33.

No hot-plugging for lens connection cables

Optotune ELM E-type lenses and Alvium cameras do not support hot-plugging for lens connection cables. Hot-plugging can destroy these devices by high inrush current. Disconnect power supplies before connecting or disconnecting lenses or cameras.

Ground loops

Unsuitable connections can lead to different potentials between the lens/camera system GND and the environmental shield/chassis GND caused by ground loops. This can damage the connected devices or cause malfunctions.

- Avoid potential differences between the lens/camera housing and GND.
- All wiring must be done by authorized personnel, according to the corresponding technical standards.
- You may mount the lens/camera electrically isolated.
- Read the Avoiding Ground Loops in Vision Systems application note.

More information

See the Avoiding Ground Loops in Vision Systems application note in the download section for your Alvium camera at www.alliedvision.com/en/support/camera-documentation/area-scan-cameras-documentation.

Lens power

Operating Optotune ELM E-type lenses beyond the specified range damages lenses. Lenses are powered using the Hirose HR10G-7R-6SB(73) connector, using a limited power source (LPS), according to IEC 62368-1. For maximum power input of 24 VDC ±5%, see Optotune EML E-Type lenses > Specifications on page 31. The lens or camera are not intended to be connected to a DC distribution network.

Only use power supplies that meet the insulation requirement according to PELV or SELV. For details, please refer to IEC 61140.

Using lenses

Maximum protrusion

If the lens exceeds maximum protrusion, the camera, lens, or electronics can be damaged. Do this to avoid damage:

- Before you mount a lens to a camera, see your camera's specifications for maximum protrusion.
- Use only lenses with a protrusion supported by the corresponding camera.

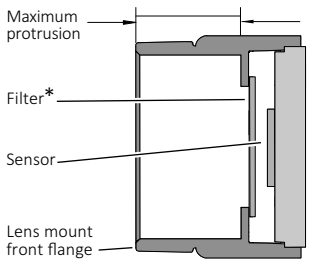


Figure 1: Maximum protrusion

Protecting the sensor

Sensors are sensitive to excessive radiation: Focused sunlight, lasers, and X-rays can damage the sensor. Dirt and scratches can damage the sensor, too.

Protect 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

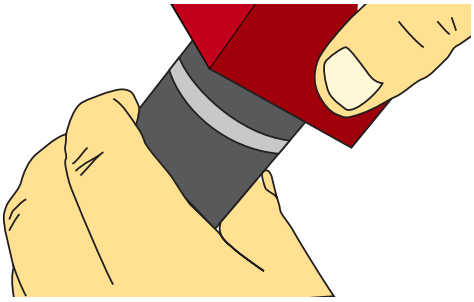


Figure 2: Protecting the sensor from dirt

Copyright and trademarks

Specifications

This chapter includes technical data for two lens series:

Ensure proper connections

NOTICE

Damage to lenses and cameras

If lenses are improperly connected, lenses and cameras can be damaged.

- Observe the warnings in Optotune ELM E-type lenses on page 31.
- Follow the instructions in Mounting Optotune ELM E-type lenses on page 33.

Lens connection cables

These cables can be used to control and power Optotune ELM E-type lenses on Alvium USB and Alvium GigE cameras.

Technical drawing

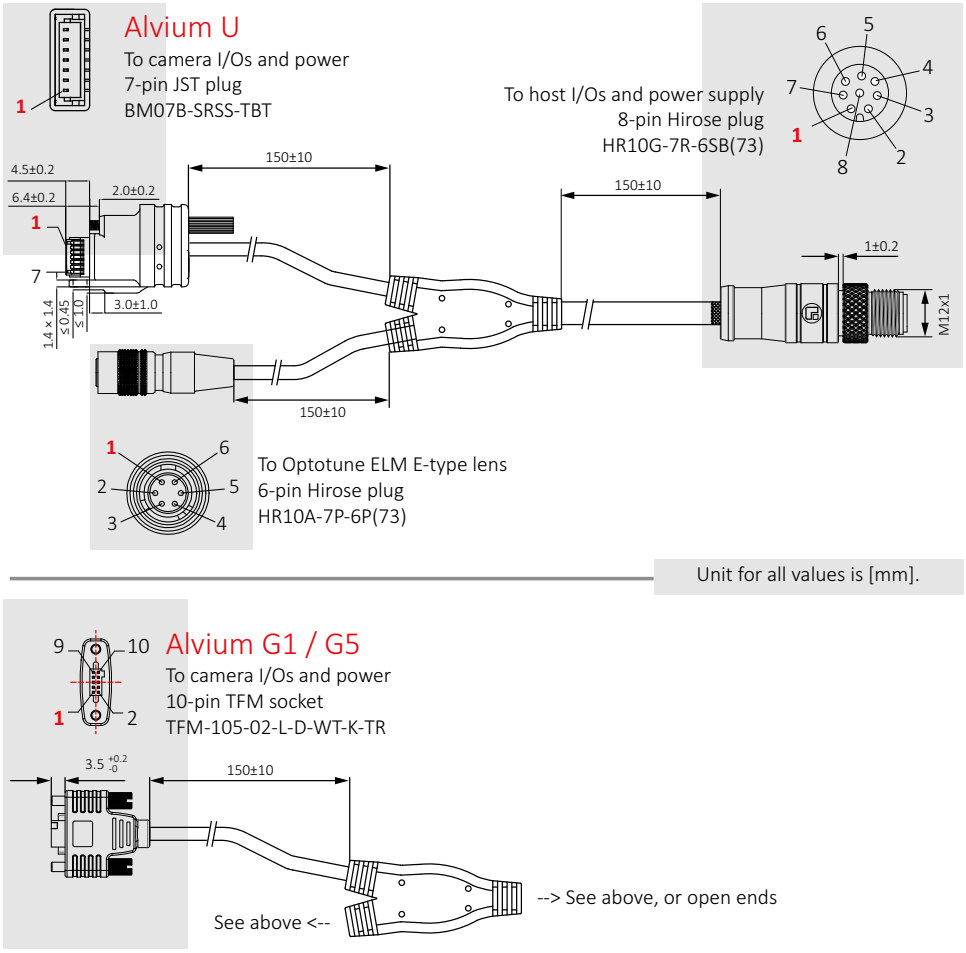


Figure 3: Lens connection cables for Alvium USB and GigE > Technical drawing

Connector pin assignment and levels

To camera I/Os and camera power

See your Alvium camera's user guide.

To Optotune ELM E-type lens

See Optotune ELM E-type lenses on page 31.

To host I/Os and power supply

NOTICE

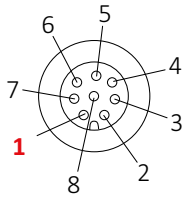
Damage to lenses and cameras

Lenses and cameras can be damaged by improper connections.

Depending on your type of Alvium camera, observe the line numbers and levels.

Alvium USB cameras

The pin numbers for the host connector in Table 5 relate to the 8-pin M12 connector used in lens connection cables by Allied Vision:



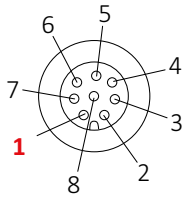
Product code 22840:
Y-Cable JST 7-Pin Plug <-> M12 8-Pin Plug <->
Hirose 6-Pin Plug 0.5 m

Connector pin			Signal		Level
Host	**Camera**	**Lens**	**Camera**	**Lens**	**Level**
1	6	5	GND	GND	0 VDC
2	1	N.a.	VCC-IN	N.a.	5 VDC (±10%)
3	N.a.	6	N.a.	VCC-IN	12 to 24 VDC (tolerance ± 5%)
4	2	N.a.	GPIO0	N.a.	Please see the corresponding user guides.
5	3	N.a.	GPIO1	N.a.	
6	4	4	UART Tx	SDA	
7	5	3	UART Rx	SCL	
8	N.a.				
Shell	Shell		Chassis-GND		0 VDC
N.a. = Line is not connected.					

Table 4: Alvium USB > Connector to host and power supply > Lines and levels

Alvium GigE cameras

The pin numbers for the host connector in Table 5 are an example.



Connector pin			Signal		
Host	**Camera**	**Lens**	**Camera**	**Lens**	**Level**
1	1	5	GND	GND	0 VDC
2	3	N.a.	OPTO-IN-GND	N.a.	0 VDC
3	2	6	VCC-IN	VCC-IN	12 to 24 VDC (tolerance ± 5%)
4	7	4	UART Tx	SDA	Please see the corresponding user guides.
5	8	3	UART Rx	SCL	
6	6	N.a.	GPO2	N.a.	
7	5	N.a.	GPI3	N.a.	
8	4	N.a.	OPTO-OUT-PWR	N.a.	max. 30 VDC
Shell	Shell		Chassis-GND		0 VDC

N.a. = Line is not connected.

Table 5: Alvium GigE > Connector to host and power supply > Lines and levels

Optotune ELM E-type lenses

NOTICE

Damage to lenses and cameras

If lenses are improperly connected, lenses and cameras can be damaged.

- Use only Optotune ELM *E-type* lenses, see Optotune ELM lens types below.
- Use lens connection cables by Allied Vision.
- Observe the Connector pin assignment and levels on page 29.
- Follow the instructions in Mounting Optotune ELM E-type lenses on page 33.

Optotune ELM lens types

Optotune offers lenses with different types of Liquid Lenses, for example:

Product name	Type of Liquid Lens	Connector	Support for Alvium
ELM-12-4.0-18-C	Standard	Hirose plug (male)	Not supported
ELM-12-4.0-18-C**-E**	**E-Type**	Hirose socket (female)	Supported

Table 6: Optotune ELM lens types

These types have different connectors to avoid material damage.
Observe Connector pin assignment and levels on page 29.

Third-party manufacturers offer lenses with included Optotune Liquid lenses that are Standard Type. If these lenses or Optotune Standard-Type lenses are connected, cameras and lenses can be damaged.

Optotune EML *E-Type* lenses > Specifications

More information

These general specifications apply to all Optotune ELM *E-type* lenses, for individual lens specifications, see www.optotune.com.

Property	Value
Connector	Hirose HR10G-7R-6SB
Supply voltage	12 to 24 VDC (tolerance ± 5%)[1] Lenses cannot be operated between 5 and 9 VDC.
Control current	-300 to +300 mA (nominal values)
[1] Optotune EML lenses support a wider range, but not with Alvium.	

Table 7: Optotube ELM E-Type lenses > Main electrical specifications

Connecting Optotune ELM lenses

This chapter includes:

Mounting Optotune ELM *E-type* lenses

1. Disconnect all power supplies.
2. Observe the following notes before you mount lenses to Alvium cameras.

CAUTION

Injury by falling cameras or lenses

A falling camera or lens can cause injury.

- Ensure proper mounting of lenses and cameras, especially for dynamic applications.
- Mount cameras as described in the instructions of the corresponding user guide.
- Use a lens support for heavy lenses.

CAUTION

Risk of cuts by sharp edges of lens mounts

The threads of the lens mount can have sharp edges.

Be careful when mounting or unmounting lenses.

NOTICE

Damage to sensor, optics, or electronics by unsuitable lenses

The sensor, filter, lens, or electronics can be damaged if a lens exceeding maximum protrusion is mounted to the camera.

- Use lenses only up to the specified maximum protrusion as specified in your Alvium camera's user guide.
- Use only Optotune ELM E-type lenses, see Optotune ELM E-type lenses on page 31.

3. Mount the Optotune ELM E-Type lens to your Alvium camera.
4. Continue with Step 1.

Connecting Optotune ELM *E-type* lenses

NOTICE

Damage to lenses and cameras

If lenses are improperly connected, lenses and cameras can be damaged.

- Observe the Connector pin assignment and levels on page 29.
- For Alvium USB cameras with JST I/O connector, we recommend using lens connection cables by Allied Vision.

Malfunctions caused by unsuitable power supplies

Ensure that power supplies match the requirements for Alvium cameras and Optotune lenses.

If the power supply does not provide sufficient power, the setup may appear to be fully functional at first sight. But focus cannot be applied as expected. This is signaled when `OpticControllerStatus` outputs *`NotConnected`*.

1. Observing the warnings above, connect the host-side connection cable to the host system and power supply.
2. Connect the corresponding I/O connector to the camera.
3. Connect the Hirose connector to the lens.
4. Connect camera power.
5. Connect host and lens power.
6. Boot the host and open the camera.
7. Learn about Using the focus control on page 35.

Using the focus control

This chapter includes:

Optotune terms and feature names

Focal Power

The inverse of focal length of the Liquid Lens, measured in Diopters [dpt].

Optic Controller

1. Optotune **driver** that controls the precision current to tune the Liquid Lens (also known as Liquid Crystal).
2. **Electronics unit** in Optotune ELM E-type lenses that transfers the camera's serial output into the precision current to control the shape of the Liquid Lens.

   Note: Optotune also offers lenses without Optic Controller, for example, S-Mount variants. These lenses are not subject of this user guide.

Settling time

The period of time between changes performed by the autofocus algorithm.

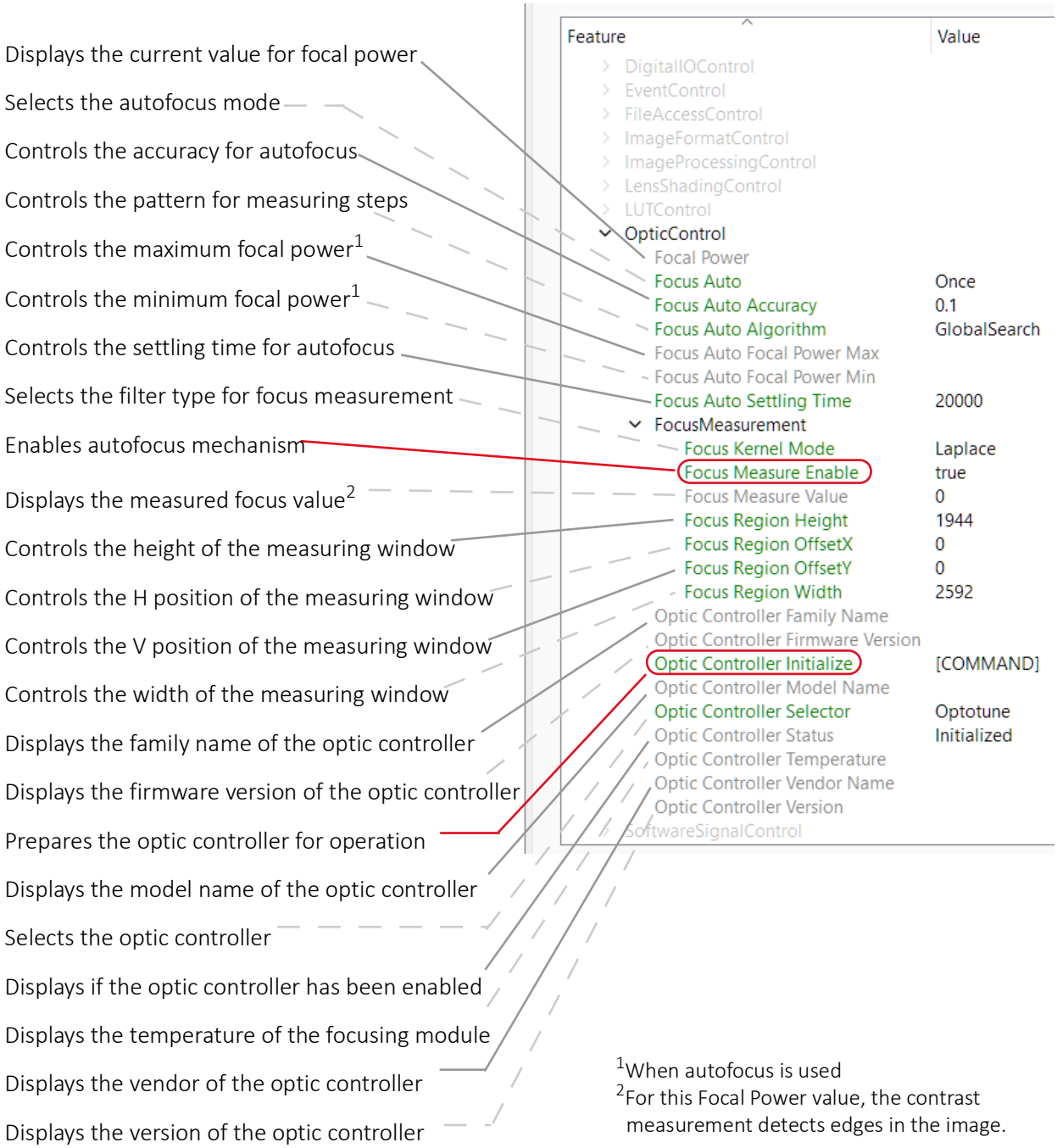
Firmware features use terms in camel case style:
`FocalPower` represents Focal Power.

Firmware features for focus control

See OpticControl features overview on page 37 for descriptions of the firmware features to control the focus.

OpticControl features overview

Table 8 shows how features in the `OpticControl` category are displayed in **Vimba X Viewer**. Red rectangles mark essential settings to enable focus control.
See Preparing OpticControl features to be used on page 38.



[1]When autofocus is used
[2]For this Focal Power value, the contrast measurement detects edges in the image.

Table 8: OpticControl features in VimbaX Viewer

Focusing lenses

Preparing OpticControl features to be used

Basic settings for every setup

Setups described in this document use action steps 1 and 2 described below. Therefore, these action steps are formatted in gray.

1. Set `FocusMeasureEnable` to *`True`*.
2. Execute `OpticControllerInitialize`.
   The value for `FocalPower` continually returns the current Focal Power **setting** in Diopters [dpt].
   `FocusMeasureValue` continually returns the Focal Power value in Diopters [dpt], resulting from the contrast measurement for edge detection.

MF (Manual focus)

To increase the focusing speed, we recommend you to reduce the number of focus steps by reducing the focus range.

1. Set `FocusMeasureEnable` to *`True`*.
2. Execute `OpticControllerInitialize`.
   The value for `FocalPower` continually returns the **current** focus value in Diopters [dpt].
   `FocusMeasureValue` continually returns the **measured** focus value in Diopters [dpt].
3. Set `FocusAuto` to *`Off`*.
4. Change the value for `FocalPower` until the image is sharp.

AF-S (Single autofocus) > Preference on focus accuracy

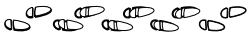
Parameter	Value	Description
AF mode	1 shot	Single AF
User focus range		Full focus range of the lens
Focus step size		Minimum (default)
Focusing speed		Medium
Focusing accuracy		Optimum

Table 9: AF-S (Single AF), preference on focus accuracy

1. Set `FocusMeasureEnable` to *`True`*.
2. Execute `OpticControllerInitialize`.
   The value for `FocalPower` continually returns the **current** focus value in Diopters [dpt].
   `FocusMeasureValue` continually returns the **measured** focus value in Diopters [dpt].
3. Set `FocusAuto` to *`Once`* to set focus one time.
   `FocalPower` is adapted, `FocusAuto` returns to *`Off`* (idle state).

AF-S (Single autofocus) > Preference on trigger speed

Parameter	Value	Description
AF mode	1 shot	Single AF
User focus range		Limited focus range
Focus step size		Adaptive (the algorithm controls the step size)
Focusing speed		Fast
Focusing accuracy		Fair

Table 10: AF-S (Single AF), preference on trigger speed

1. Set `FocusMeasureEnable` to *`True`*.
2. Execute `OpticControllerInitialize`.
   The value for `FocalPower` continually returns the **current** focus value in Diopters [dpt].
   `FocusMeasureValue` continually returns the **measured** focus value in Diopters [dpt].
3. Set `FocusAutoAlgorithm` to *`BETA_AdaptiveStepSize`*.
4. Set `AutoFocalPowerMax` (greater diopter value) for the minimum distance.
5. Set `AutoFocalPowerMin` (smaller diopter value) for the maximum distance.
6. Set `FocusAuto` to *`Once`* to set focus one time.

AF-C (Continuous AF)> Preference on trigger speed

Parameter	Value	Description
AF mode	1 - 2 - 3 ...	Continuous AF
User focus range		Limited focus range
Focus step size		Adaptive (the algorithm controls the step size)
Focusing speed		Fast
Focusing accuracy		Medium

Table 11: AF-C (Continuous AF), preference on trigger speed

1. Set `FocusMeasureEnable` to ***True***.
2. Execute `OpticControllerInitialize`.
   The value for `FocalPower` continually returns the **current** focus value in Diopters [dpt].
   `FocusMeasureValue` continually returns the **measured** focus value in Diopters [dpt].
3. Set `FocusAutoAlgorithm` to ***BETA_AdaptiveStepSize***.
4. Set `AutoFocalPowerMax` (greater diopter value) for the minimum distance.
5. Set `AutoFocalPowerMin` (smaller diopter value) for the maximum distance.
6. Set `FocusAuto` to ***BETA_Continuous*** to update focus settings frequently.
7. Set `FocusAutoSettlingTime` to enable best results:
   a. For the fastest response when the object distance is changing fast, set the value to ***0***.
   b. For optimum focus results, set a higher value (***20000*** is slowest but most accurate).