



ALVIUM ACCESSORIES

Cables for Optotune Lenses User Guide

V1.1.0

**Quick links**

- [This document at a glance](#) on page 15
- [Contact us](#) on page 17
- [Contents](#) on page 18

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 fokussiertes 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 Bildverarbeitungssysteme 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.

עברית - HE

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 מתברג חד של העדשה

תברג תושבת העדשה עלול להיות חד עד כדי פציעה.



זהירות

פציעה מנפילת המוצר

נפילת המוצר עלולה לגרום לפציעה.



שימוש מיועד

מוצרי AlliedVision מיועדים לשילוב במערכות ממוחשבות 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 gefocuseerd, 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:

Focus control for Alvium cameras	16
What else do you need?	16



Read this document carefully

Learn to use Optotune ELM *E-type* lenses with ECC-1C Lens controllers 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 with ECC-1C Lens controllers.

Typical state-of-the-art lenses use focusing elements made of glass. To change focus, these elements are moved. Optotune ELM *E-type* lenses with ECC-1C Lens controllers 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 <i>E-type</i> lenses with ECC-1C Lens controllers 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

Quick links

Productswww.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

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Worldwide network

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

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Document history and conventions



This chapter includes:

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Document history

Version	Date	Remarks
V1.1.0	2026-Jul-31	- Added contents for lens connection cables recommended for Alvium GigE cameras. - Adjusted the naming for compatible lenses to be more accurate: Optotune ELM <i>E-type</i> lenses with ECC-1C Lens controllers. - Applied editorial changes.
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:

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Liability, trademarks, and copyright.....	24
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How to avoid product damage	25

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

Allied Vision has tested the product under the described conditions. The customer assumes all risk of product damage, application compromise or potential failure, and Sales Warranty loss related to deviation from the described conditions. Allied Vision's acknowledgement of such deviations in the customer's modified product or applications does not constitute advice for use. No Warranty is offered or implied by Allied Vision regarding the customer's assumed risk or legal responsibilities with such modified products or applications.

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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 with ECC-1C Lens controllers.

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 with ECC-1C Lens controllers are operated with incompatible lens connection cables, lenses and cameras can be damaged.

- Observe [Connector pin assignment and levels](#) on page 30.
- We recommend you to use only lens connection cables by Allied Vision.
- Follow the instructions in [Mounting Optotune ELM E-type lenses](#) on page 34.

No hot-plugging for lens connection cables

Optotune ELM *E-type* lenses with ECC-1C Lens controllers 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 with ECC-1C Lens controllers 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 $\pm 5\%$, see [Optotune ELM E-Type lenses > Specifications](#) on page 32. 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.

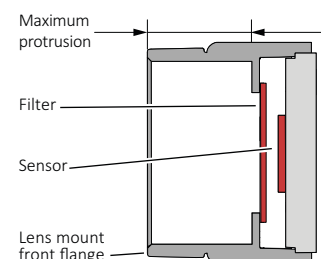


Figure 1: Maximum protrusion

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

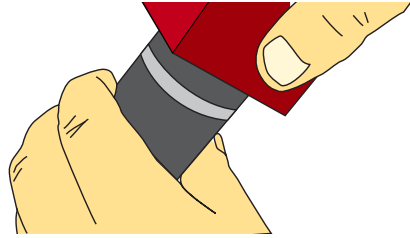


Figure 2: Protecting the sensor from dirt

Specifications



This chapter includes technical data for two lens series:

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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 32.
- Follow the instructions in [Mounting Optotune ELM E-type lenses](#) on page 34.

Lens connection cables

These cables can be used to control and power Optotune ELM *E-type* lenses with ECC-1C Lens controllers on Alvium USB and Alvium GigE cameras.

Technical drawing

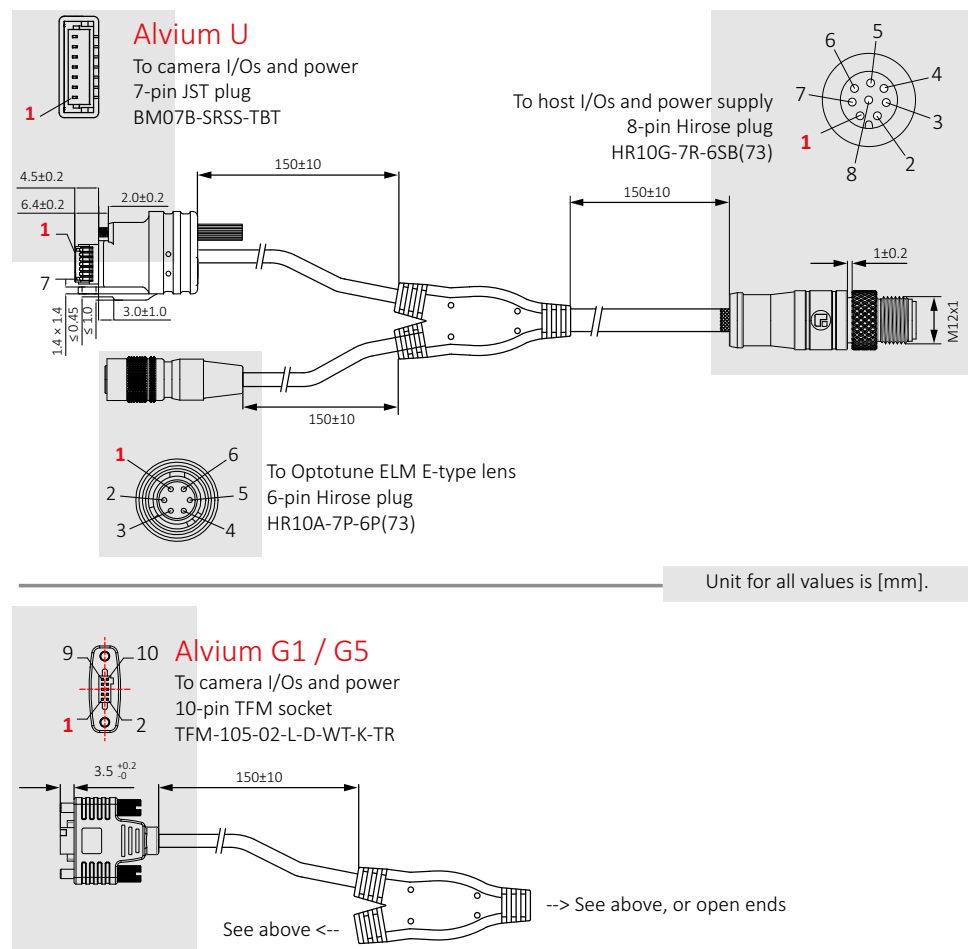


Figure 3: Lens connection cables for Alvium USB and GigE > Technical drawing

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 32.

To host I/Os and power supply



NOTICE

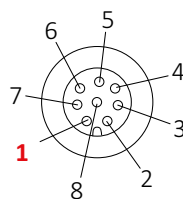
Damage to lenses and cameras

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 7-Pin JST Plug <-> 8-Pin M12 Plug <->

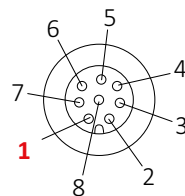
Hirose 6-Pin Plug 0.5 m

Connector pin			Signal		
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](#) relate to the 8-pin M12 connector used in lens connection cables by Allied Vision.



Product code 22839:

Y-Cable 10-Pin TFM Plug <-> 8-Pin M12 Plug <->
6-Pin Hirose Plug 0.5 m

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 with ECC-1C Lens controllers, see [Optotune ELM lens types](#) below.
- Use lens connection cables by Allied Vision.
- Observe the [Connector pin assignment and levels](#) on page 30.
- Follow the instructions in [Mounting Optotune ELM E-type lenses](#) on page 34.

Optotune ELM lens types

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

Product name	Type of Liquid Lens	Type of lens controller	Connector	Support for Alvium
ELM-12-4.0-18-C-E	E-Type	ECC-1C	Hirose socket (female)	Supported
ELM-12-4.0-18-C	Standard	Other	Hirose plug (male)	Not supported

Table 6: Optotune ELM lens types

These types have different connectors to avoid material damage. Observe [Connector pin assignment and levels](#) on page 30.

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 ELM E-Type lenses > Specifications



More information

These general specifications apply to all Optotune ELM E-type lenses with ECC-1C Lens controllers, for individual lens specifications, see www.optotune.com.

Property	Value
Connector	Hirose HR10G-7R-6SB
Supply voltage	12 to 24 VDC (tolerance $\pm 5\%$) 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	34
Connecting Optotune ELM E-type lenses.....	35

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 with ECC-1C Lens controllers, see [Optotune ELM E-type lenses](#) on page 32.

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 30.
- 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 36.

Using the focus control



This chapter includes:

Optotune terms and feature names	37
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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 with ECC-1C Lens controllers 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 38 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 39.

	Feature	Value
	> DigitalIOControl	
	> EventControl	
	> FileAccessControl	
	> ImageFormatControl	
	> ImageProcessingControl	
	> LensShadingControl	
	> LUTControl	
	✓ OpticControl	
Displays the current value for focal power	Focal Power	
Selects the autofocus mode	Focus Auto	Once
Controls the accuracy for autofocus	Focus Auto Accuracy	0.1
Controls the pattern for measuring steps	Focus Auto Algorithm	GlobalSearch
Controls the maximum focal power ¹	Focus Auto Focal Power Max	
Controls the minimum focal power ¹	Focus Auto Focal Power Min	
Controls the settling time for autofocus	Focus Auto Settling Time	20000
Selects the filter type for focus measurement	Focus Kernel Mode	Laplace
Enables autofocus mechanism	Focus Measure Enable	true
Displays the measured focus value ²	Focus Measure Value	0
Controls the height of the measuring window	Focus Region Height	1944
Controls the H position of the measuring window	Focus Region OffsetX	0
Controls the V position of the measuring window	Focus Region OffsetY	0
Controls the width of the measuring window	Focus Region Width	2592
Displays the family name of the optic controller	Optic Controller Family Name	
Displays the firmware version of the optic controller	Optic Controller Firmware Version	
Prepares the optic controller for operation	Optic Controller Initialize	[COMMAND]
Displays the model name of the optic controller	Optic Controller Model Name	
Selects the optic controller	Optic Controller Selector	Optotune
Displays if the optic controller has been enabled	Optic Controller Status	Initialized
Displays the temperature of the focusing module	Optic Controller Temperature	
Displays the vendor of the optic controller	Optic Controller Vendor Name	
Displays the version of the optic controller	Optic Controller Version	
	SoftwareSignalControl	

¹When autofocus is used

²For 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).