

Product Manual

Phantom VEO

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Product Manual for **DaVis 10.2**

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Product specifications and manual contents are subject to change without notification.

Note: the latest version of the manual is available in the download area of our website www.lavision.com. Access requires login with a valid user account.

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1 Safety Precautions

Before working with your **LaVision** system, we recommend to read the following safety precautions. Observing these instructions helps to avoid danger, to reduce repair costs and downtimes, and to increase the reliability and life of your **LaVision** system.

1.1 Laser Safety

If a laser¹ is integrated in your system, it is important that every person working with it has fully read and understood these safety precautions **and** the laser manual of the specific laser/LED.

Lasers included in **LaVision** systems may belong to Class 4 laser devices, which are capable of emitting levels of both visible and invisible radiation that can cause damage to the eyes and skin. It is absolutely necessary that protective eyewear with a sufficiently high optical density be worn at any time when operating the laser. The goggles must protect against all wavelengths that can be emitted, including harmonics. See your laser's manual for further details.

Class 4 laser beams are by definition a safety and fire hazard. The use of controls, adjustments or performance of procedures other than those specified in the **LaVision** manual and the laser manual may result in hazardous radiation exposure.

AVOID EYE AND SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION.
FOLLOW THE INSTRUCTIONS YOU CAN FIND IN THE CORRESPONDING LASER
MANUAL FOR PROPER INSTALLATION AND SAFE OPERATION. USE PROTEC-
TIVE EYEWEAR ALL THE TIME WHEN OPERATING THE LASER.



¹In the following, 'laser' means any kind of laser, in particular Nd:YAG and dye lasers as well as Optical Parametric Oscillators at any wavelength and output energy. Also for high-power LEDs precautions should be taken.

Important instructions for safe laser handling:

- Before operating the laser, contact your laser safety officer.
- Read and understand the instruction manual of the particular type of laser. Take special care with respect to laser emission, high voltage and hazardous gases if in use.
- Declare a controlled access area for laser operation. Limit access to trained people. Never operate the laser in a room where laser light can escape through windows or doors. If possible, cover beam paths to avoid obstacles getting into the beam.
- Provide adequate and proper laser safety goggles to **all** persons present who may be exposed to laser light. The selection of the goggles depends on the energy and the wavelength of the laser beam as well as on the operation conditions. Check the laser's manual for a detailed description.
- While working with lasers do not wear reflective jewelry like watches and rings, as these might cause accidental hazardous reflections.
- Avoid looking at the output beam, even diffuse reflections can be dangerous.
- Operate the laser at the lowest beam intensity possible.
- Avoid blocking the output beam or reflections with any part of the body. Use beam dumps to avoid reflections from the target.
- Wear clothes and gloves which cover arms and hands to avoid skin damage when handling in the optical path. Especially UV radiation can cause skin cancer.

1.2 Seizures Warning



WARNING: HEALTH HAZARD! STROBE LIGHTING CAN TRIGGER SEIZURES! Some people (about 1 in 4000) may have seizures or blackouts triggered by flashing lights or patterns. This may occur when viewing stroboscopic lights or objects illuminated by such devices, even if a seizure has never been previously experienced. Anyone who has had a seizure, loss of awareness, or other symptoms linked to an epileptic condition should consult a doctor

1.3 Camera / Image Intensifier Safety

before operating systems which include flashing lights, strobe lights, or a pulsed or modulated laser.

Stop operating the system immediately and consult a doctor if you have one of the following symptoms:

- convulsions, eye or muscle twitching, loss of awareness, altered vision, involuntary movements, disorientation.

To reduce the likelihood of a seizure when operating a system:

- Do not look directly at flashing light sources or on illuminated objects, e.g. into a strobe light or a flashing LED panel.
- Operate the system in a well-lit room.
- Take frequent breaks in normally illuminated areas.

1.3 Camera / Image Intensifier Safety

The camera integrated in your system is based on a CCD (Charge Coupled Device) or CMOS (Complementary Metal-Oxide Semiconductor) sensor with high resolution and high sensitivity. Optionally your system is equipped with a built-in or external image intensifier.

A LASER BEAM FOCUSED ON THE CHIP OR INTENSIFIER, EITHER DIRECTLY OR BY REFLECTION, CAN CAUSE PERMANENT DAMAGE TO THE CHIP OR INTENSIFIER. ANY LASER POWERFUL ENOUGH TO PRODUCE LOCALIZED HEATING AT THE SURFACE OF THE CHIP OR INTENSIFIER WILL CAUSE DAMAGE EVEN WHEN THE CAMERA OR INTENSIFIER POWER IS OFF. A CHIP OR INTENSIFIER DAMAGED BY LASER LIGHT IS NOT COVERED BY ITS WARRANTY.



Important instructions for safe camera handling:

- Fully read and understand the instruction manual of the specific type of camera.
- Put the protection cap on the camera lens whenever you do not take images, especially when the laser beam is adjusted. Switching off the camera / image intensifier does not protect the chip from damage by laser light.
- Use full resolution of the sensor and always read out the complete chip to have control of the intensity on all areas of the sensor.

- Make sure that no parts of the image are saturated, i.e. the intensity is below maximum gray level (< 4095 counts for a 12-bit camera, < 65535 counts for a 16 bit camera, ...).
- Start measurements with the lowest laser power and a small aperture of the camera lens.
- Increase laser power step by step and check the intensity on the corresponding image. Make sure that the sensor does not run into saturation.
- Bright parts in the experiment, like reflections on walls or big particles, will limit the maximum laser power. Modify the optical arrangement of your setup in order to remove bright reflections from the camera image.

2 Network Interface Card (NIC) Configuration

2.1 GigE network board

This paragraph describes how to connect the Phantom camera to a NIC, such as the Intel i350T4.



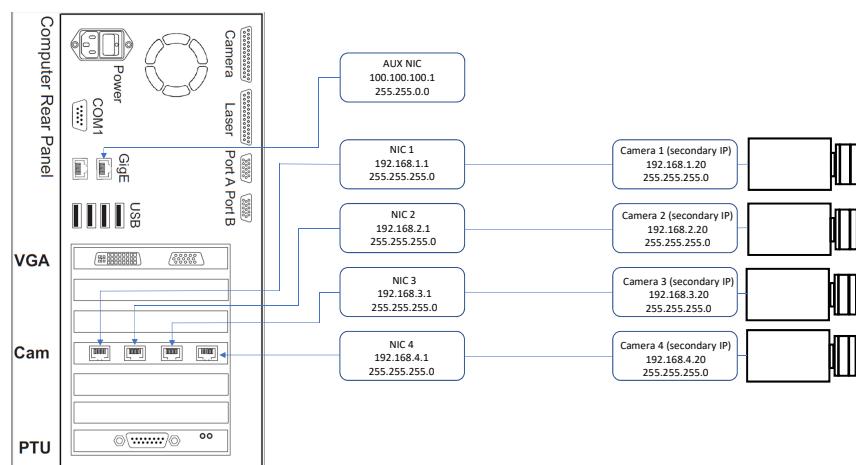
The NIC needs a PCIe v2.1 x4 or faster slot.

After the network card is installed physically into the computer, Windows 10 will install the driver automatically.

The driver can also be found in the driver folder of your **DaVis** installation:
`C:\DaVis\driver\Network Interface Card\Win64`

The network board is used to connect up to four cameras for operation and data transfer.

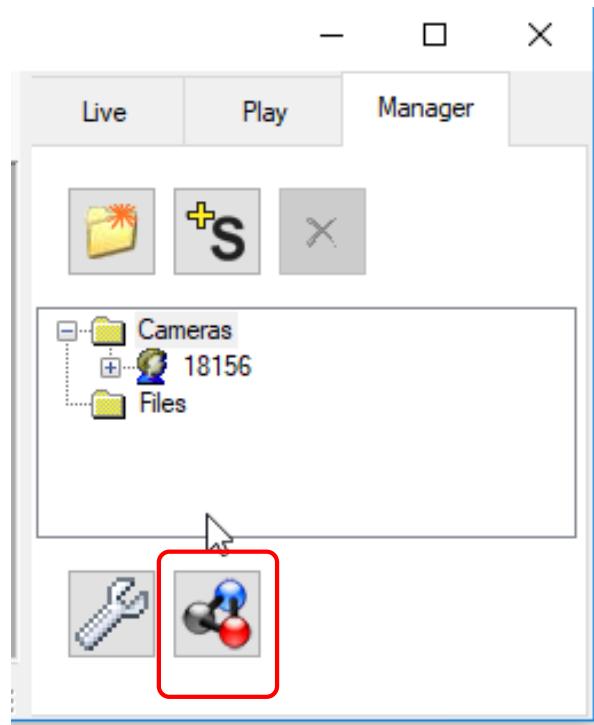
For configuration and service it is highly recommended to use an additional auxiliary network port, e.g. one of the ports of the computer main-board. Eventually the configuration should look as it is shown in the picture (example for a four camera system):



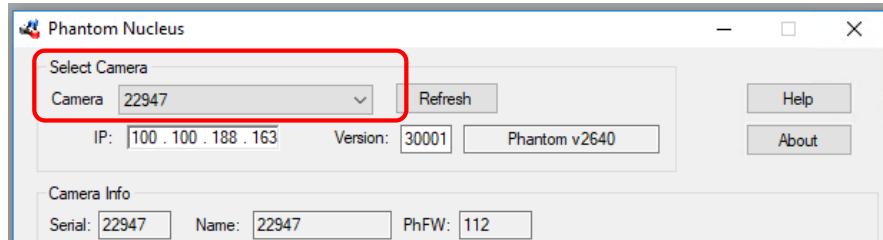
2.1.1 Setting the IP addresses

1. Compare the serial numbers of the cameras, which are printed on the devices. Select the camera with the smallest serial number as camera 1.
2. Connect the ethernet cable of camera 1 to the auxilary NIC port.
3. Set the IP address of the auxilary NIC to

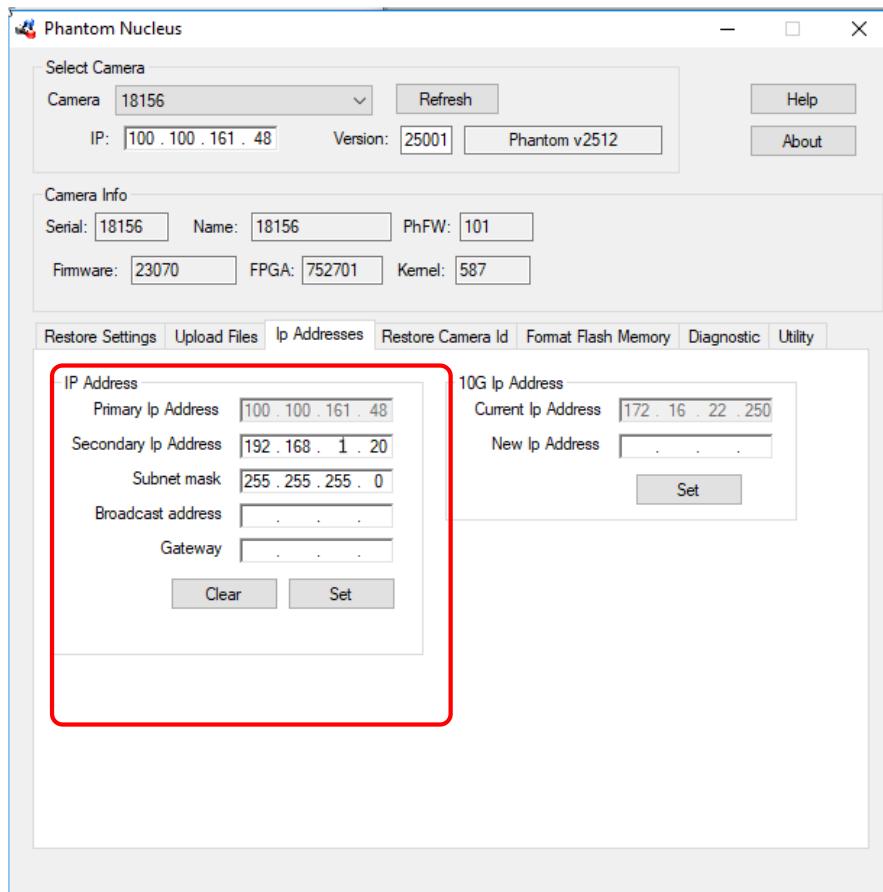
IP address: 100.100.100.1
Subnet mask: 255.255.0.0
4. Start PCC. On the right hand side, click on the Manager card and then on the "Nucleus" icon.



- In **Select camera**, choose the camera serial number, which you will find printed on the device.

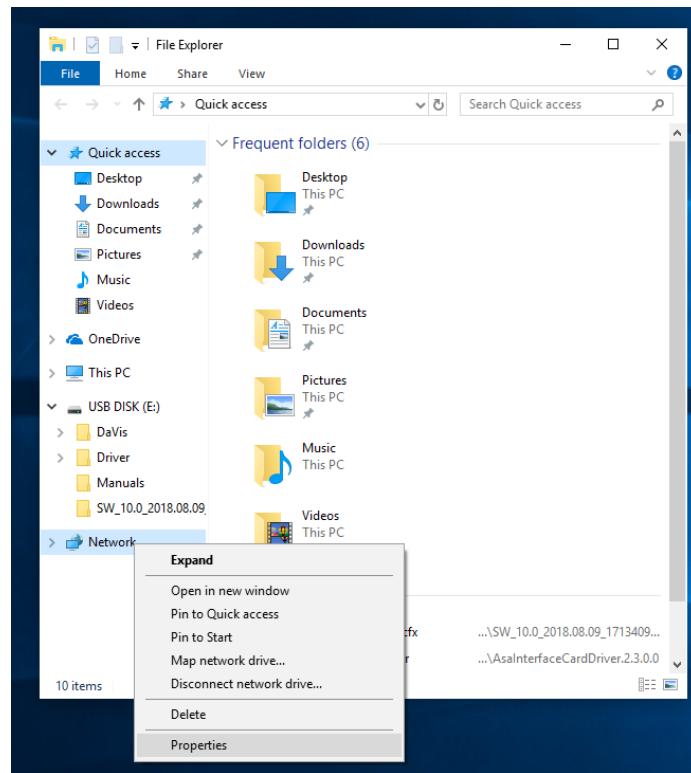


- Set the secondary IP address, please enter 192.168.1.20, and for the Subnet mask, 255.255.255.0 confirm with the **Set** button.

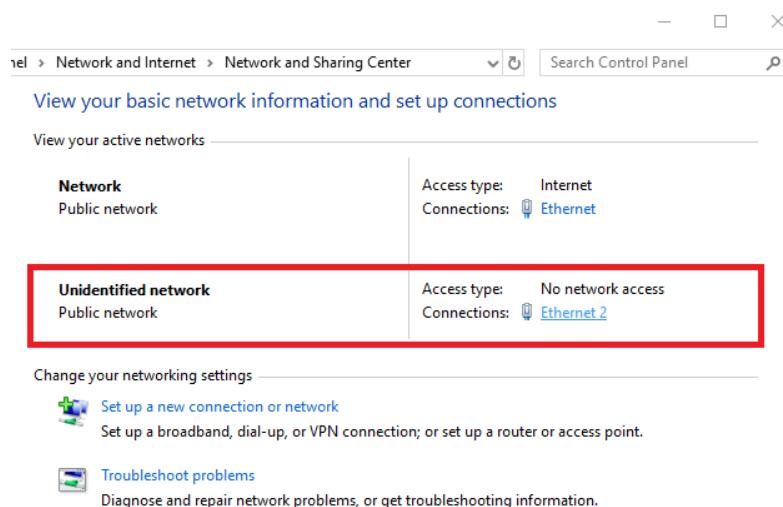


- Disconnect the camera from the auxiliary NIC and connect it to a NIC on the network board.
- Open a file explorer window, do a right click on **Network** and select **Properties**.

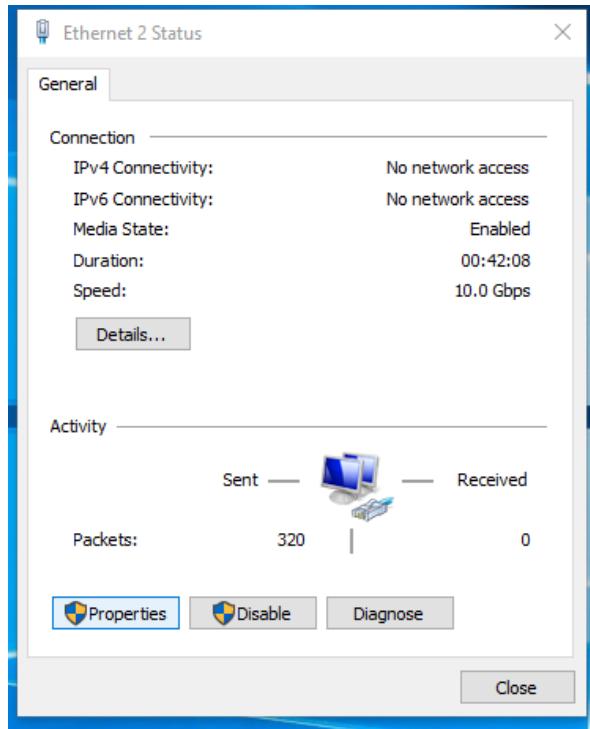
2.1 GigE network board



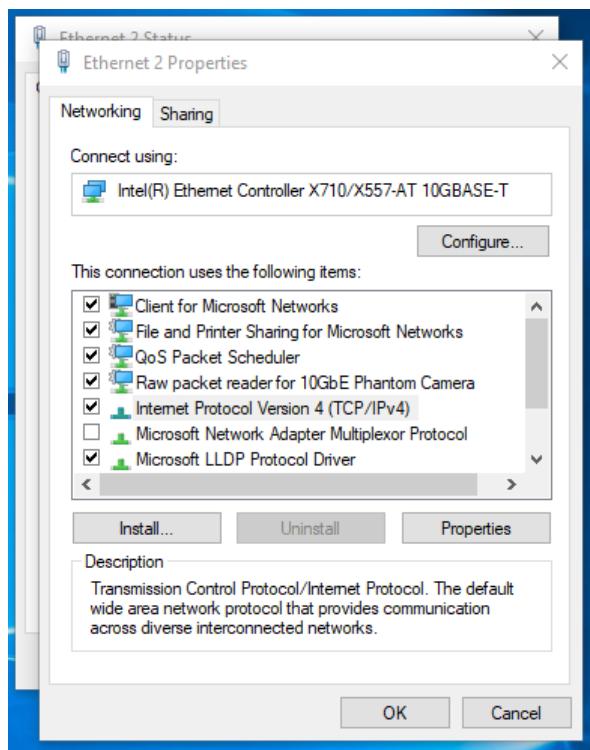
9. You will find an 'unidentified network'. Here, click on the blue highlighted font.



10. In the status view that shows up, click on **Properties**.

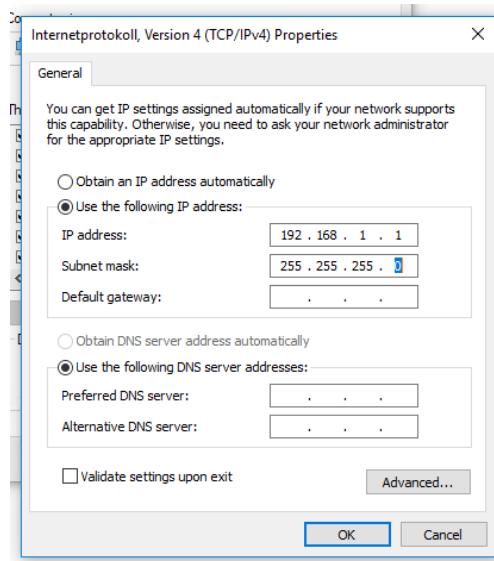


11. Then choose **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.

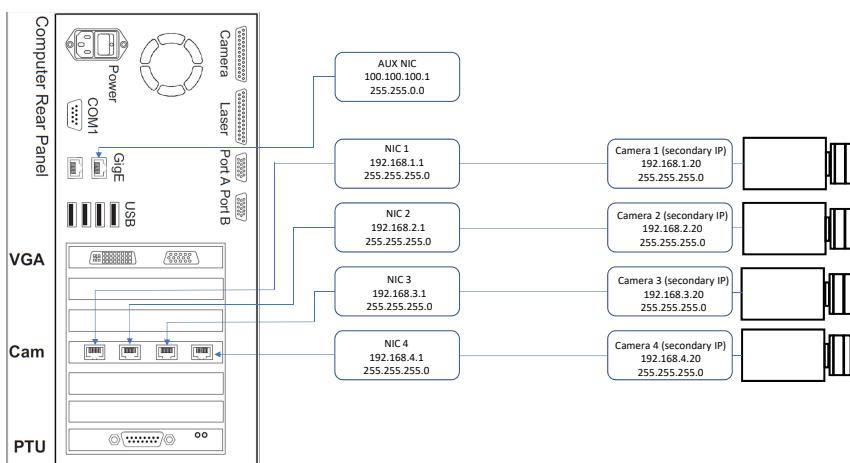


2.1 GigE network board

- Set the properties as shown in the image below (IP address: 192.168.1.1, Subnet mask: 255.255.255.0).



- After setting the values, press **OK** in the "Internet Protocol Version 4 (TCP/IPv4) Properties" and in the 'Properties' window, then close all windows.
- Configure additional cameras and NICs in the same way so that the final configuration is as shown in the picture.



2.2 Setting the 10GigE IP address for the first camera

2.2.1 10GigE network board

This paragraph describes how to connect the Phantom camera to a 10GigE NIC, such as the Intel x710T4.



The NIC needs a PCIe v3.0 x8 or faster slot.

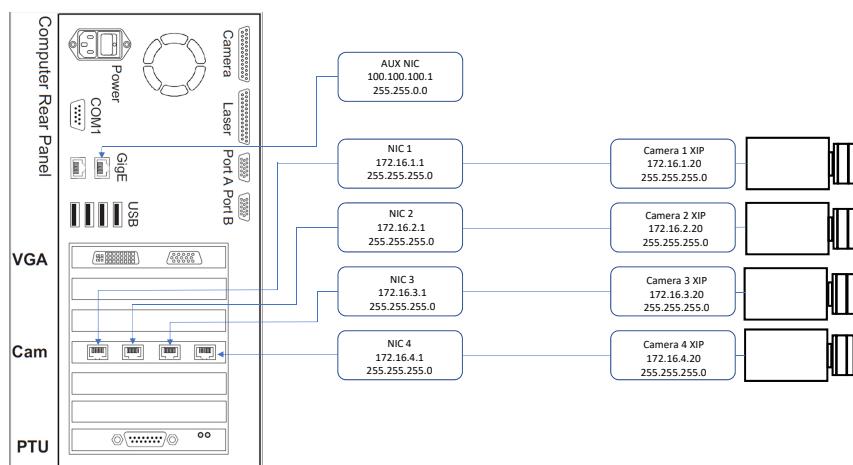
After the network Card is installed physically into the computer, Windows 10 will install the driver automatically.

The driver can also be found in the driver folder of your **DaVis** installation:
`C:\DaVis\driver\Network Interface Card\Win64`.

2.2 Setting the 10GigE IP address for the first camera

The network board is used to connect up to four cameras for operation and data transfer.

For configuration and service it is highly recommended to use an additional auxiliary 1GigE network port, e.g. one of the ports of the computer main-board. Eventually the configuration should look as it is shown in the picture (example for a four camera system):



2.2.2 Installing the 10GigE filter driver

To get optimum data transfer rates, the 10GigE filter driver from the camera vendor has to be installed as well. The driver Ph10g_Setup_v5.exe can be found in the **DaVis** installation folder ...\\DaVis\\driver\\VisionResearch\\. It is an easy click-by-click installation.

After the installation the Raw packet reader for 10GbE Phantom Camera is available and checked in the properties of the network board (see Fig. 2.1).

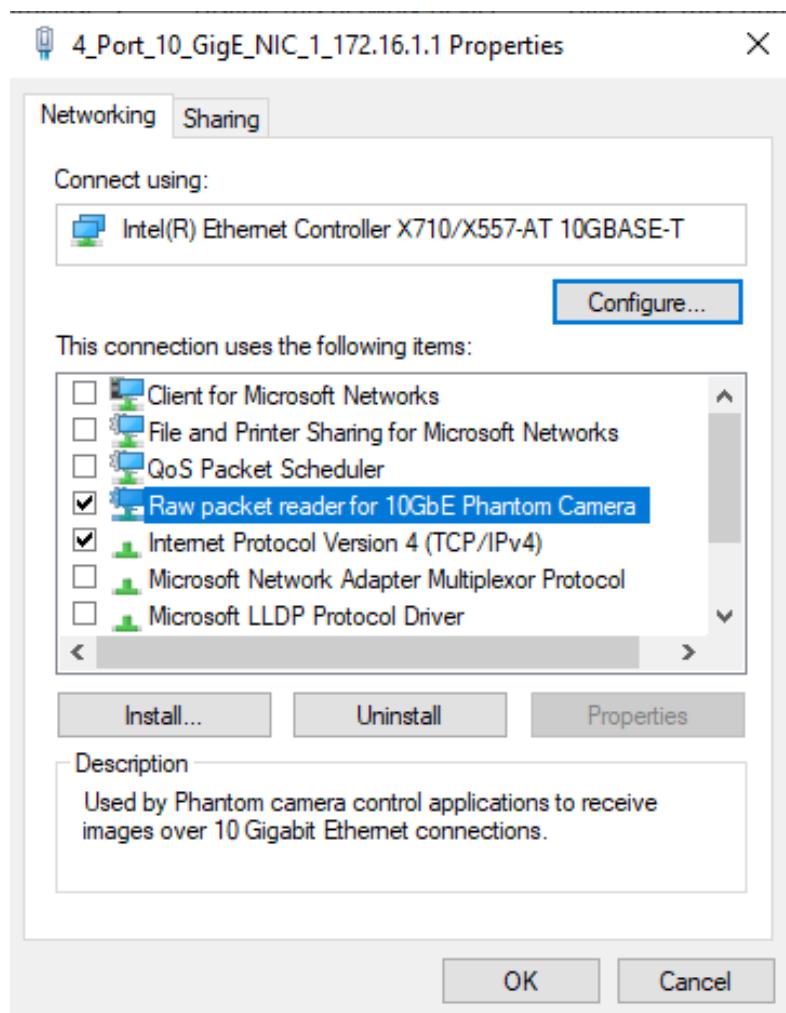


Figure 2.1: The Raw packet reader for 10GbE Phantom Camera is checked in the properties of the network board after successful installation.

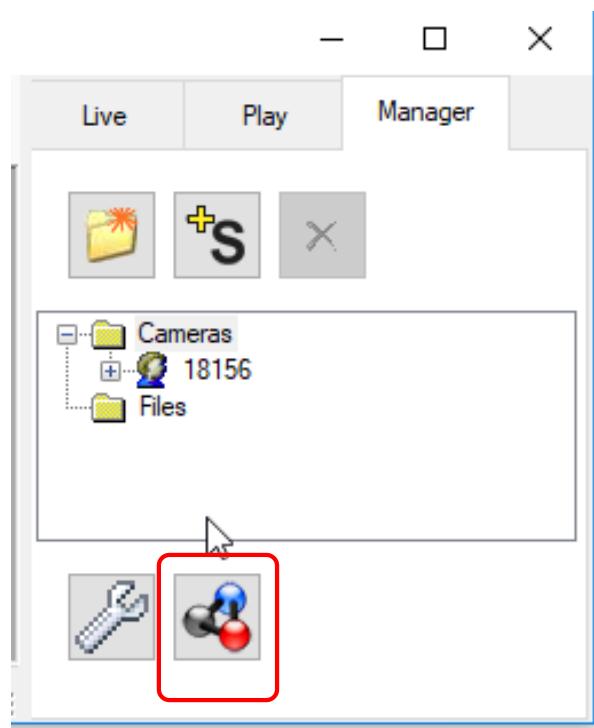
2.2 Setting the 10GigE IP address for the first camera

2.2.3 Setting the IP addresses

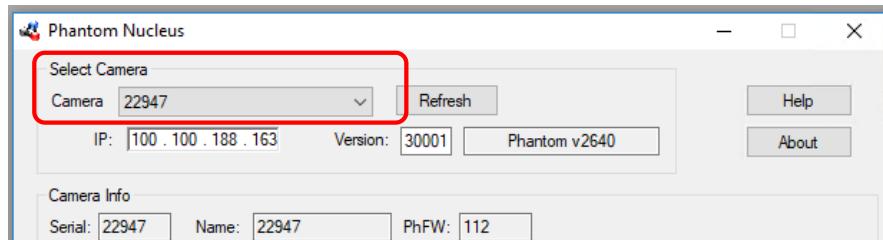
1. Compare the serial numbers of the cameras, which are printed on the devices. Select the camera with the smallest serial number as camera 1.
2. Connect the 1GigE ethernet cable of camera 1 to the auxilary NIC port.
3. Set the IP address of the auxilary NIC to

IP: 100.100.100.1
Subnet mask: 255.255.0.0

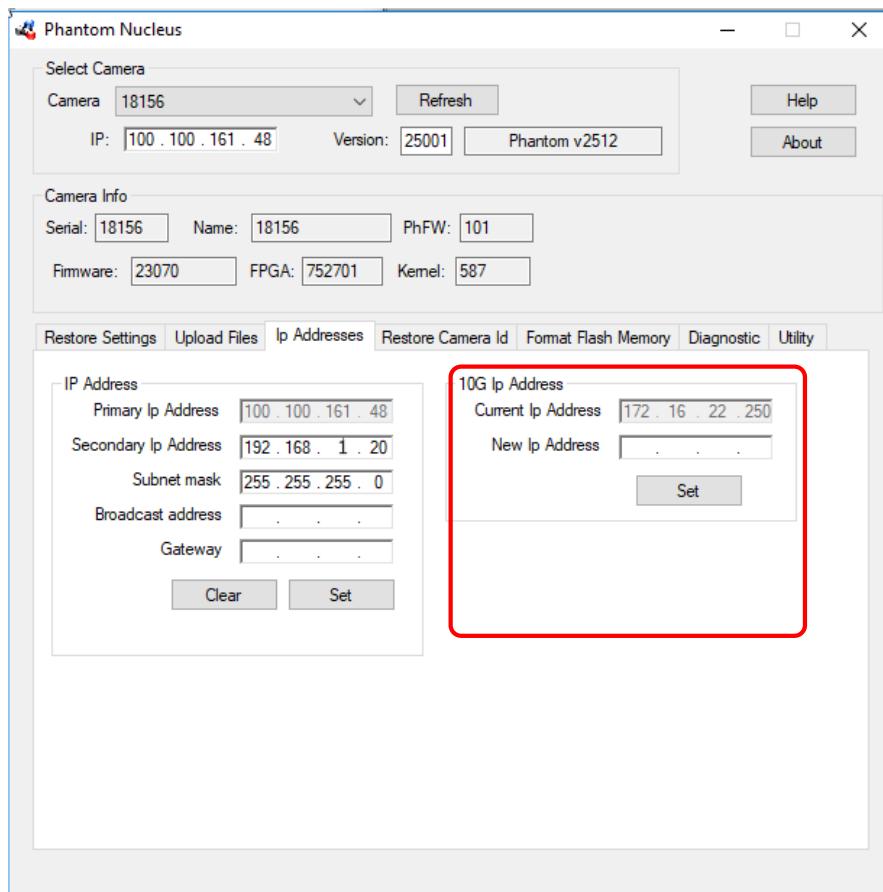
4. Start PCC. On the right hand side, click on the **Manager** card and then on the "Nucleus" symbol.



- In **Select camera**, choose the camera serial number, which you will find printed on the device.

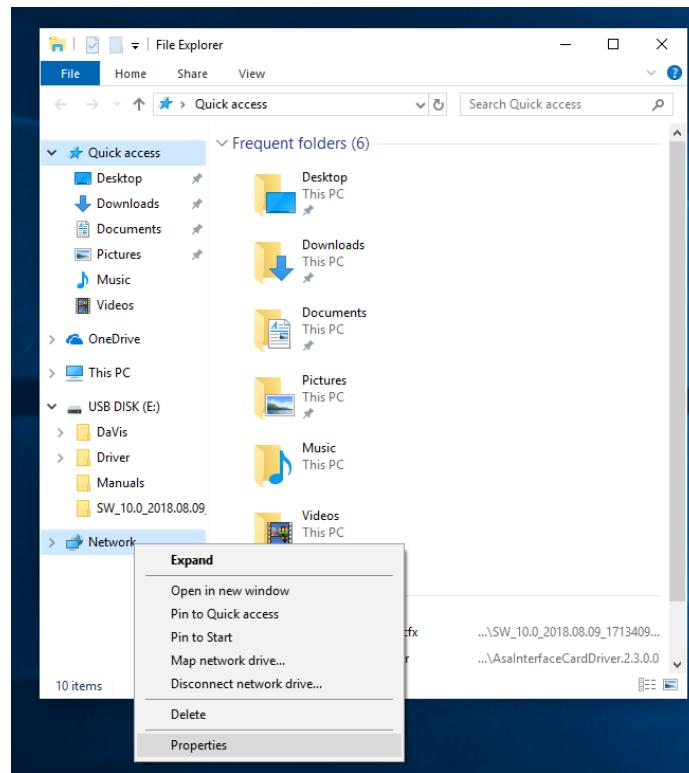


- Set the 10G IP address: Please enter 172.16.1.20 for the new IP address, confirm with the **Set** button.

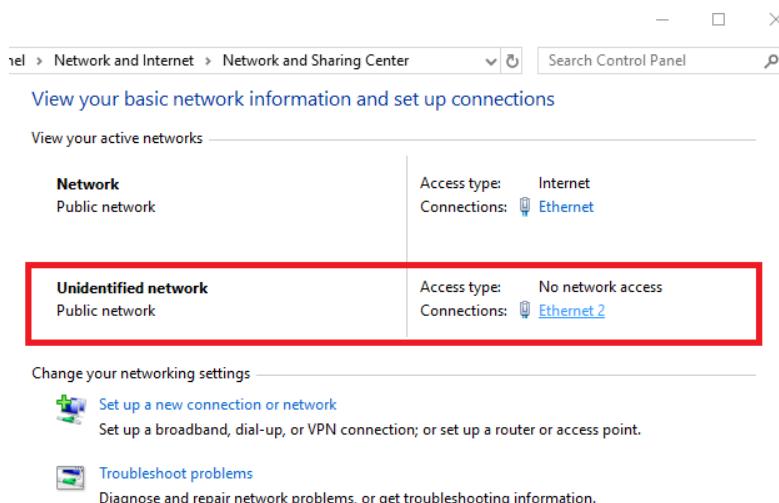


- Disconnect the 1GigE cable from the camera and the auxilary NIC. Connect the camera through the 10GigE port to a NIC on the 10G network board.
- Open a file explorer window, do a right click on **Network** and select **Properties**.

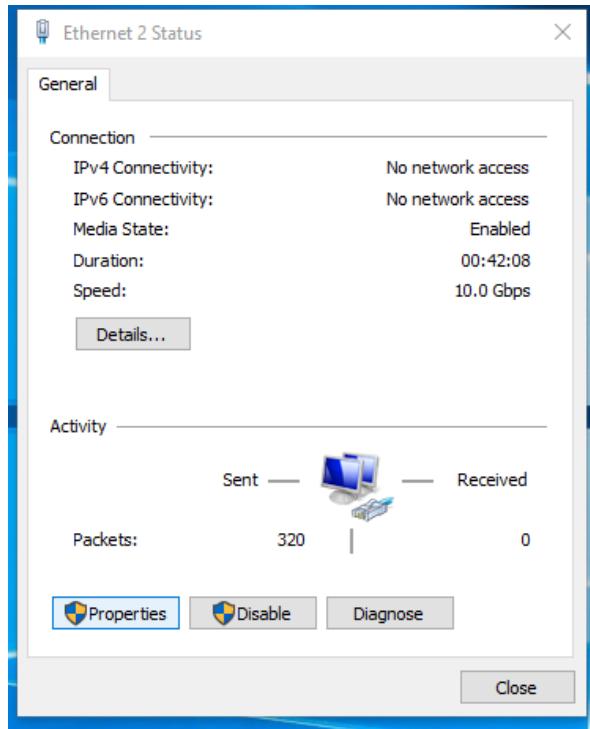
2.2 Setting the 10GigE IP address for the first camera



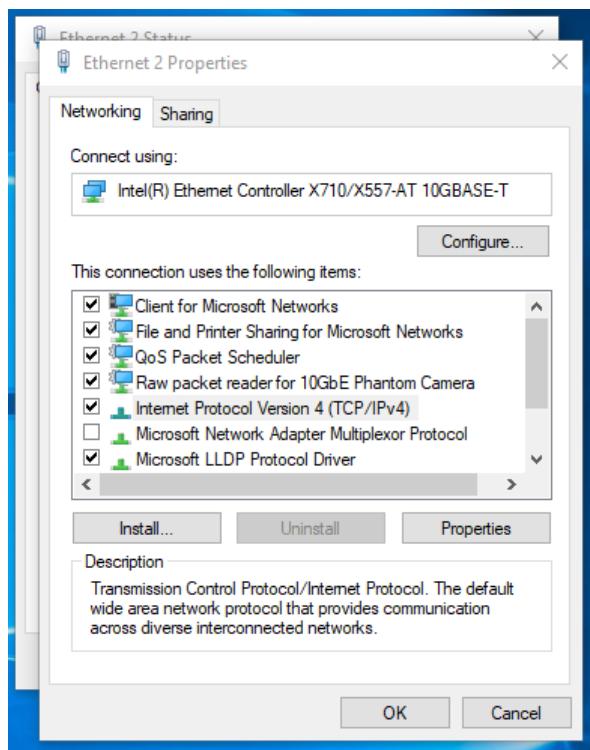
9. You will find an 'unidentified network'. Here, click on the blue highlighted font.



10. In the status view that shows up, click on **Properties**.

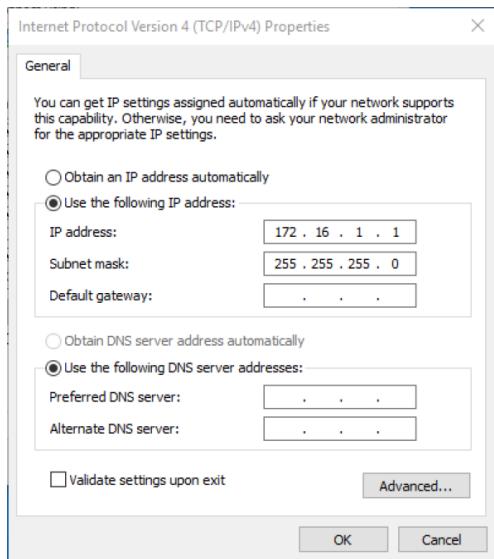


11. Then choose **Internet Protocol Version 4 (TCP/IPv4)** and click **Properties**.

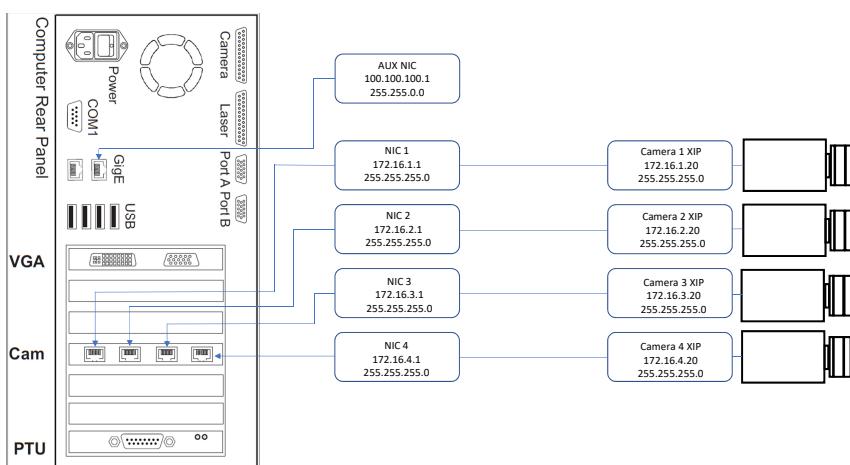


2.2 Setting the 10GigE IP address for the first camera

12. Set the properties as shown in the image below (IP address: 172.16.1.1, Subnet mask: 255.255.255.0).



13. After setting the values, press **OK** in the "Internet Protocol Version 4 (TCP/IPv4) Properties" and in the 'Properties' window, then close all windows.
14. Configure additional cameras and NICs in the same way so that the final configuration is as shown in the picture.



3 Phantom VEO Series

3.1 Important Safety Instructions

All Phantom cameras and peripherals have been designed and produced according to the relevant safety standards.

Although the mechanical design is extremely rugged and stable, the content high-tech micro electronics deserve a careful handling.

3.1.1 General

Do not open the product; there are no user-serviceable parts inside. All maintenance and service work should be performed by qualified service personnel. The cameras are intended to be used in restricted-access areas.

3.1.2 Installation

- Do not expose your cameras and peripherals to excessive heat, moist, or dirt. They are intended to be used in a controlled environment, unless precautions have been taken for outdoor use.
- The cameras and peripherals should only be powered from an appropriate DC power supply that fulfills the local safety and EMC demands or from the appended AC adapter.
- Do not install the camera in a very humid environment or near water.
- Avoid liquids or any foreign object to get into the product.
- The unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed the specified temperature range.
- It is important that ventilation air can move freely around the unit.

3.1.3 Temperature

The Phantom VEO series cameras are designed to operate satisfactorily in an environment with an ambient temperature between -10°C and $+50^{\circ}\text{C}$ (14°F and 122°F). The maximum humidity is 80%, non-condensing, at 5°C .

Applicable Conditions: Since the maximum allowable case temperature is 40°C (104°F) under free-access conditions and 50°C (122°F) under restricted-access conditions, it is recommended to use the record mode only shortly and keep the camera in pre-trigger mode in order to avoid over-temperature.

3.1.4 Storage

Store the camera in a dry location. The storage temperature must be within -25 and $+85^{\circ}\text{C}$ (-13°F and 185°F).

3.1.5 Shipping

When shipping the Phantom cameras and accessories, use the case in which the unit was originally delivered.

3.1.6 Precautions

A laser beam focused on the sensor of a Phantom camera, either directly or by reflection, can cause permanent damage to the sensor. Any laser powerful enough to produce localized heating at the surface of the sensor will cause damage, even if the camera power is off.

A sensor damaged by laser light is NOT covered by warranty.



3.1.7 FCC Declaration Not Obligatory for CE

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.

3.1 Important Safety Instructions

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

3.2 Specifications

| Model | VEO 410L/S | VEO 710L/S | VEO 340L/S | VEO 440L/S | VEO 640L/S |
|------------------------------|-------------------|-------------------|--|-------------------|-------------------|
| Resolution | 1280×800 | 1280×800 | 2560×1600 | 2560×1600 | 2560×1600 |
| Rate / Hz | 5200 | 7400 | 800 | 1100 | 1400 |
| Rate @512x512 / Hz | 14000 | 23500 | 8000 | 11900 | 12000 |
| Min. rate / Hz | 24 | 24 | 24 | 24 | 24 |
| Pixel size / µm | 20 | 20 | 10 | 10 | 10 |
| Sensor format / mm | | | 25.6 x 16 | | |
| Digital output / bit | | | 12 | | |
| Memory / GB | | | 18, 36, 72 | | |
| Interface | | | GigE (VEO xxxL: RJ45, VEO xxxS: 8-pin Fisher) | | |
| Dimensions / cm ³ | | | VEO xxxL: 12.7×12.7×12.7, VEO xxxS: 12.7×14×12.7 | | |
| Weight / kg | | | 2.5 | | |
| Operating temperature / °C | | | -10 – +50 | | |
| Power requirements / V DC | | | 18 – 32 | | |
| Lens mount | | | F-mount, c-mount and M42 optional | | |

| Model | VEO-E 310L | VEO-E 340L |
|------------------------------|------------------------------------|-------------------|
| Resolution | 1280×800 | 2560×1600 |
| Rate / Hz | 3200 | 800 |
| Rate @512x512 / Hz | 11500 | 9250 |
| Min. rate / Hz | 24 | 24 |
| Pixel size / µm | 20 | 10 |
| Sensor format / mm | 25.6 x 16 | |
| Digital output / bit | 12 | |
| Memory / GB | 18, 36 | |
| Interface | GigE | |
| Dimensions / cm ³ | 12.7×12.7×11.1 | |
| Weight / kg | 1.8 | |
| Operating temperature / °C | -10 – +50 | |
| Power requirements / V DC | 16 – 32 | |
| Lens mount | F-mount, c-mount, and M42 optional | |

3.3 Spectral Response Curves

| Model | VEO4k590L/S | VEO4k990L/S |
|--|--------------------------------|--------------------|
| Resolution | 4096×2304 | 4096×2304 |
| Rate / Hz | 540 | 938 |
| Rate @2048x1080 / Hz | 1140 | 1970 |
| Min. rate / Hz | 24 | 24 |
| Pixel size / μm | 6.75 | 6.75 |
| Sensor format / mm | 27.6×15.5 | |
| Digital output / bit | 12 | |
| Memory / GB | 36, 72 | |
| Interface | GigE (RJ45), 10GigE (optional) | |
| Dimensions / cm^3 | $12.7 \times 12.7 \times 15$ | |
| Weight / kg | 2.5 | |
| Operating temperature / $^{\circ}\text{C}$ | -10 – +50 | |
| Power requirements / V DC | 16 – 32 | |
| Lens mount | F-mount | |

3.3 Spectral Response Curves

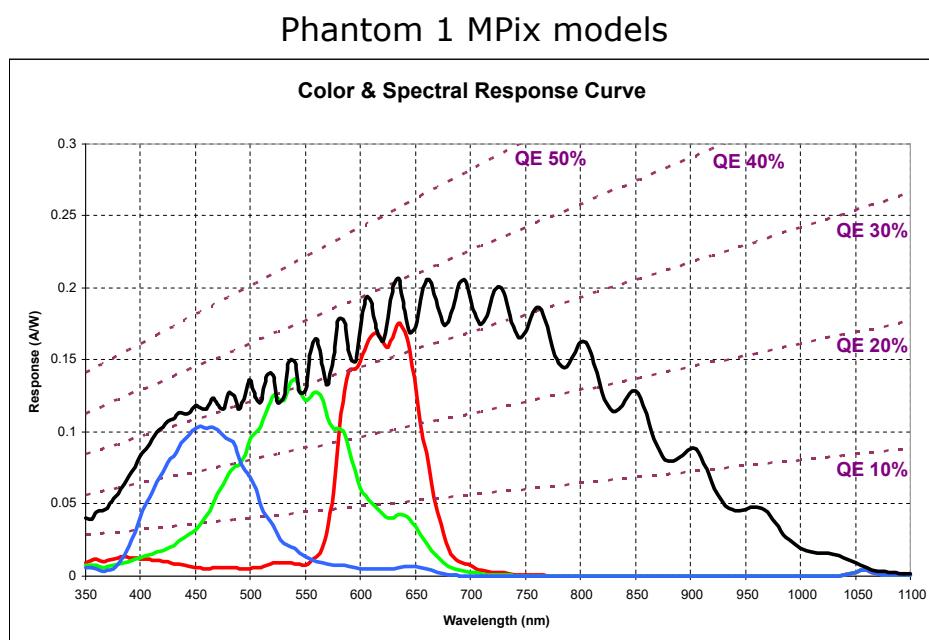


Figure 3.1: Spectral response curve for VEO 1MPix models

Phantom 4MPix models

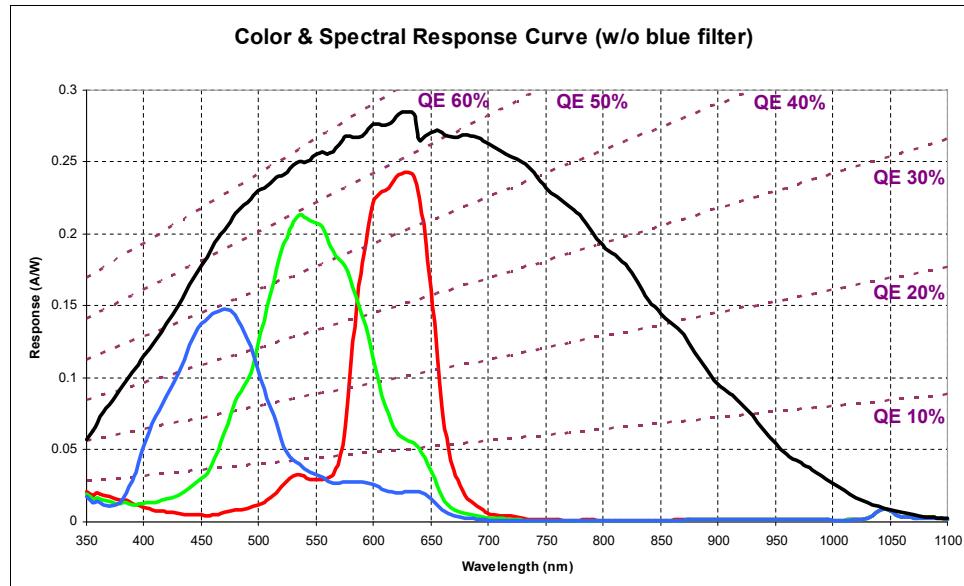


Figure 3.2: Spectral response curve for VEO 4MPix models

Phantom VEO4K

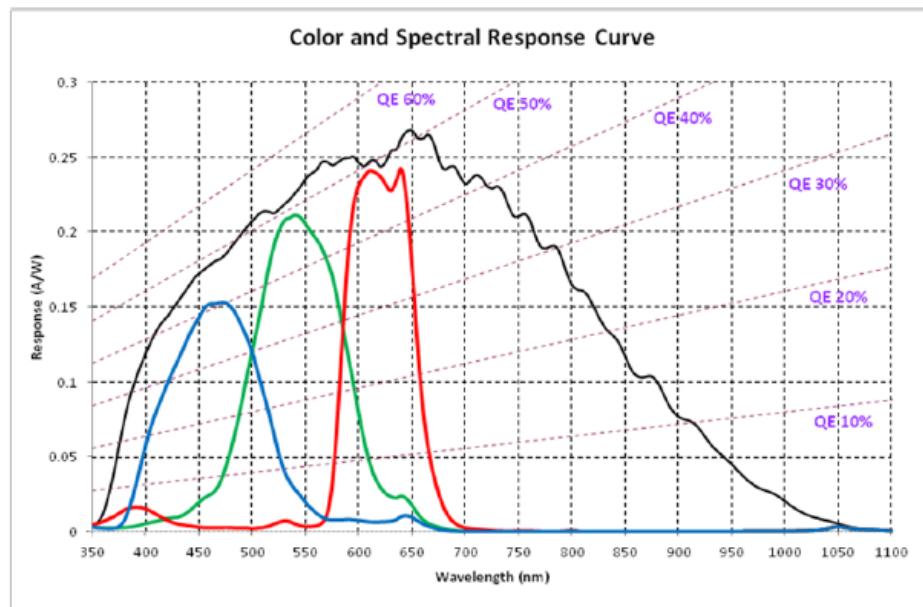


Figure 3.3: Spectral response curve for VEO4K

3.4 Dimensions

3.4 Dimensions

3.4.1 Phantom VEO S Series Dimensions

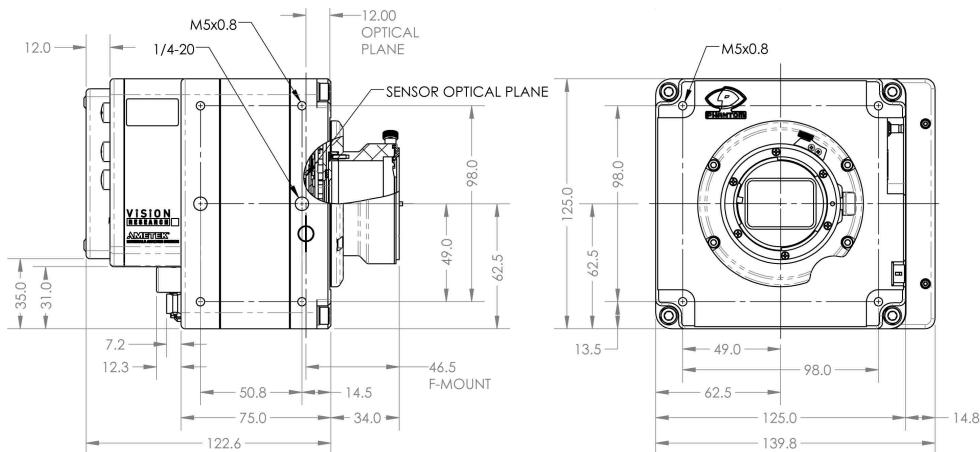


Figure 3.4: Right-side and front view

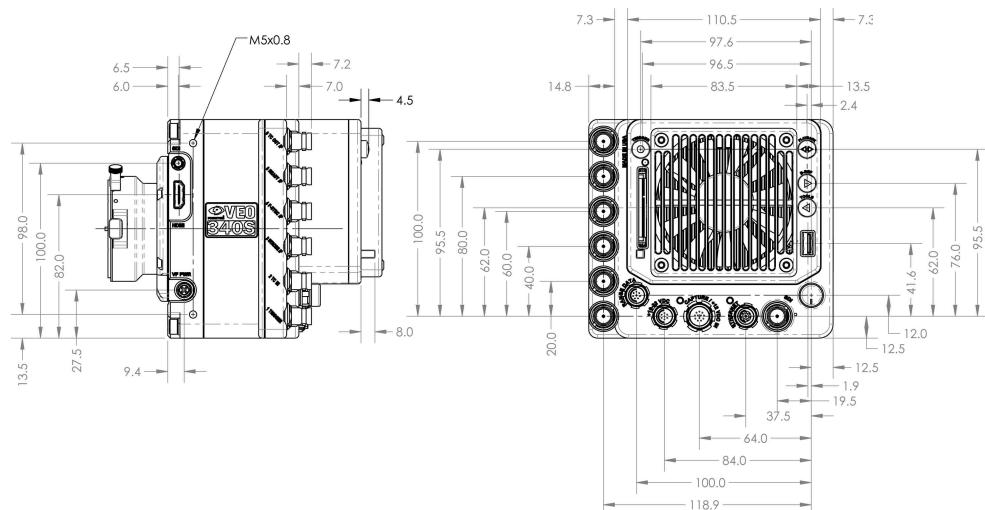


Figure 3.5: Left-side and rear view

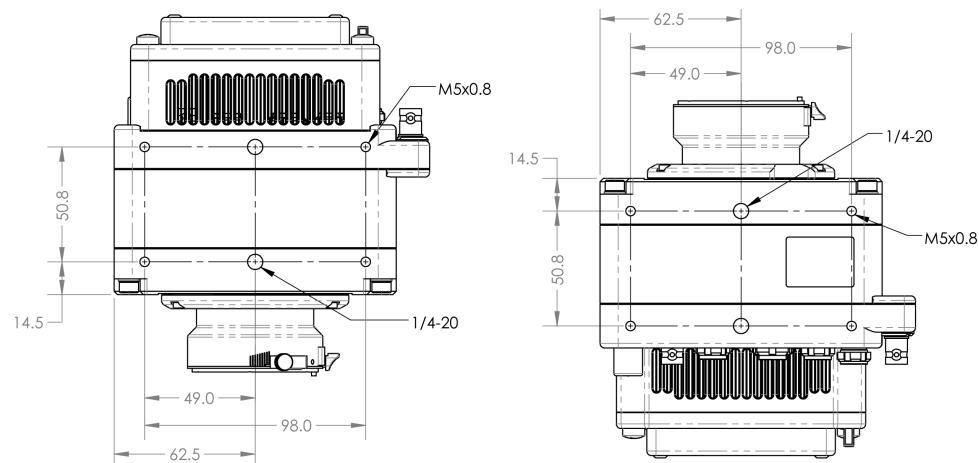


Figure 3.6: Top and bottom view

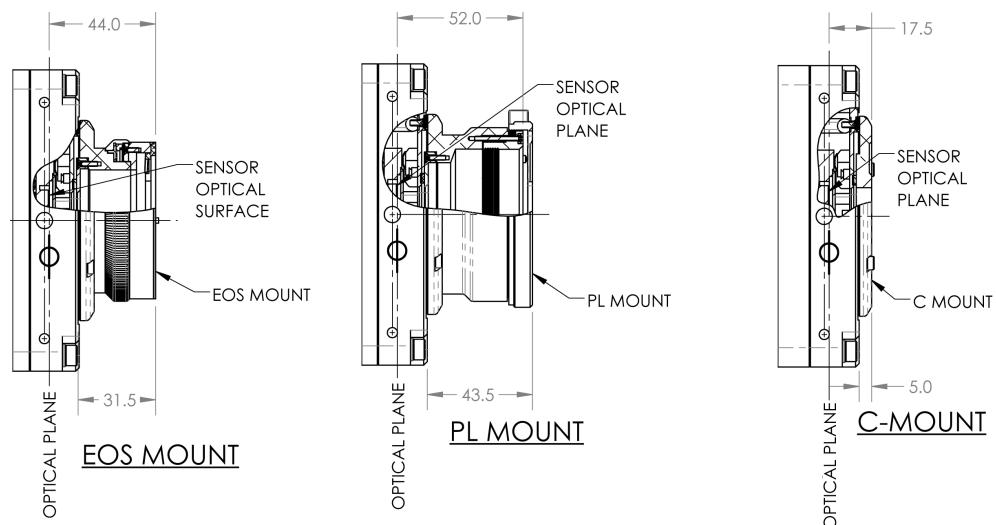


Figure 3.7: Mounts

3.4 Dimensions

3.4.2 Phantom VEO L Series Dimensions

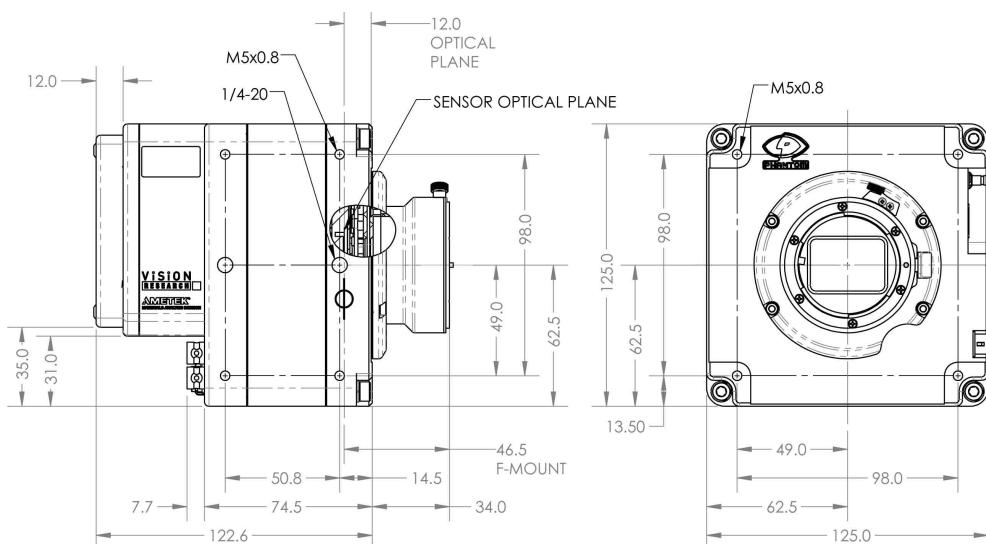


Figure 3.8: Right-side and front view

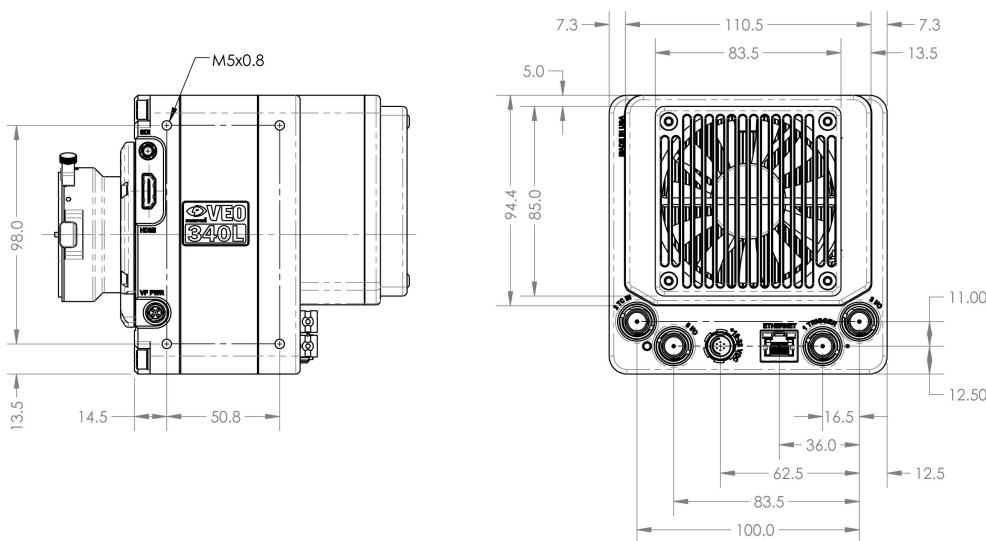


Figure 3.9: Left-side and rear view

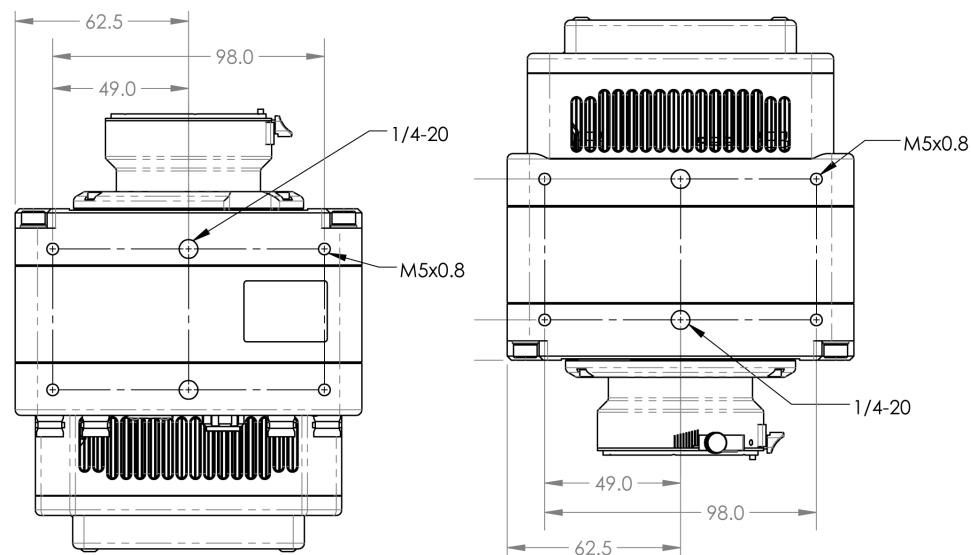


Figure 3.10: Top and bottom view

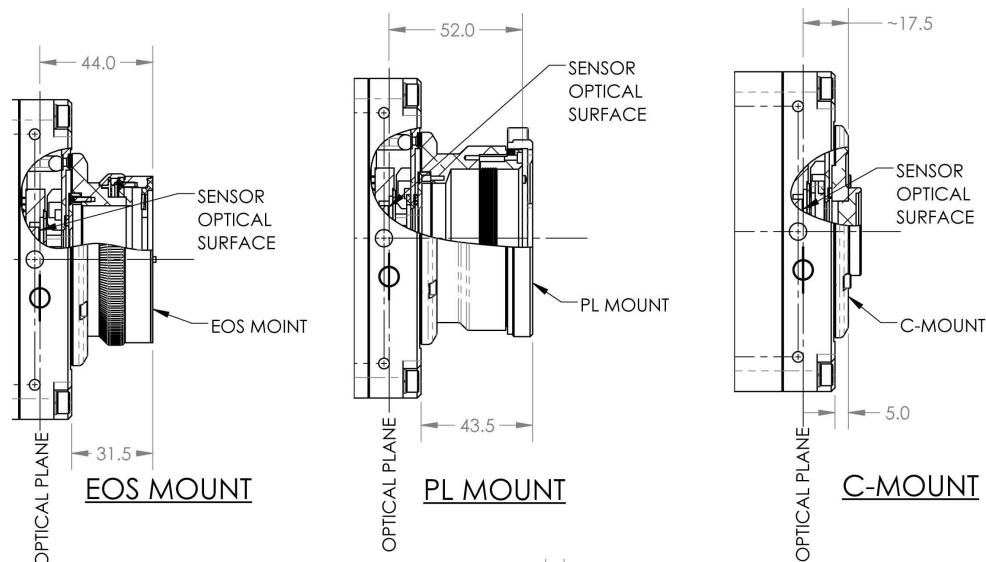


Figure 3.11: Mounts

3.4 Dimensions

3.4.3 Phantom VEO-E Series Dimensions

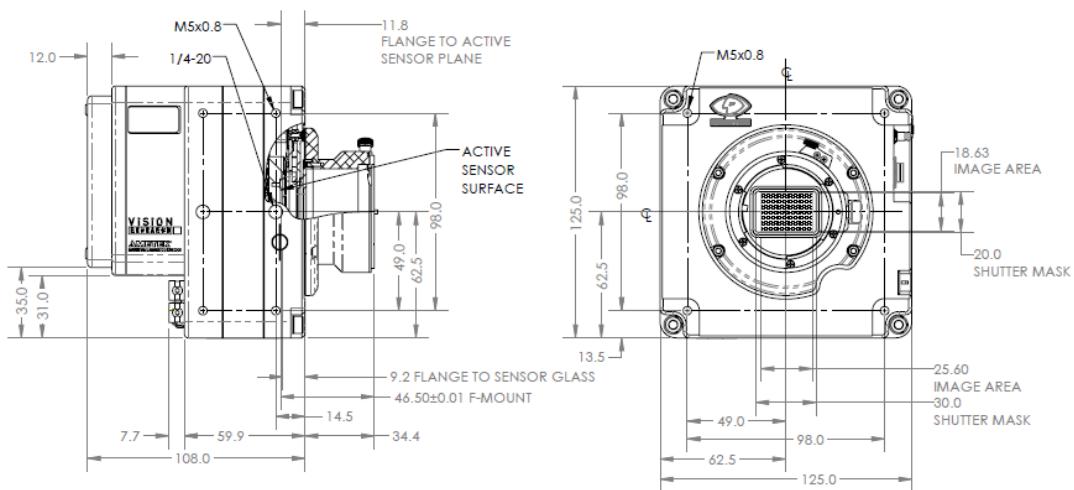


Figure 3.12: Right-side and front view

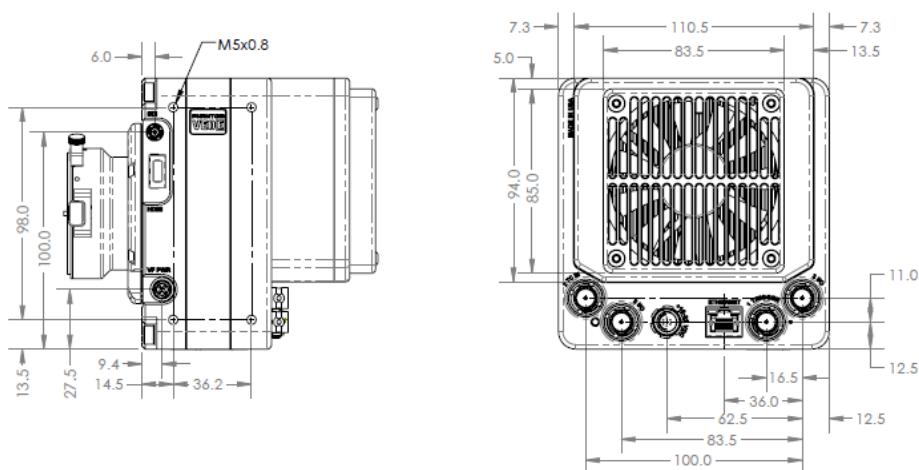


Figure 3.13: Left-side and rear view

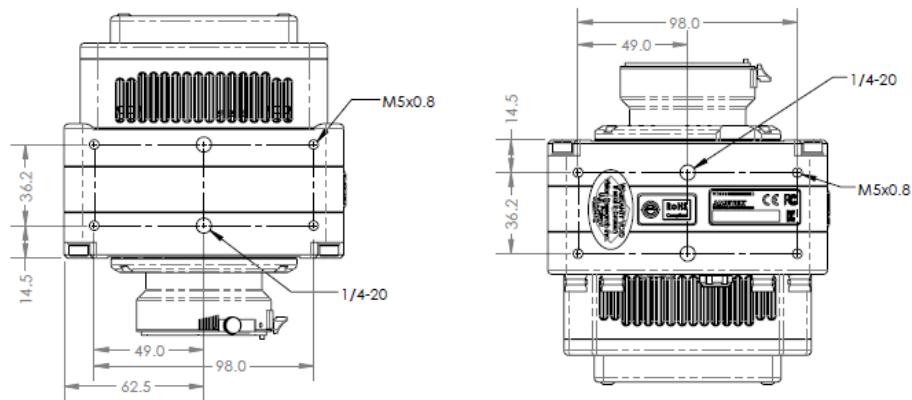


Figure 3.14: Top and bottom view

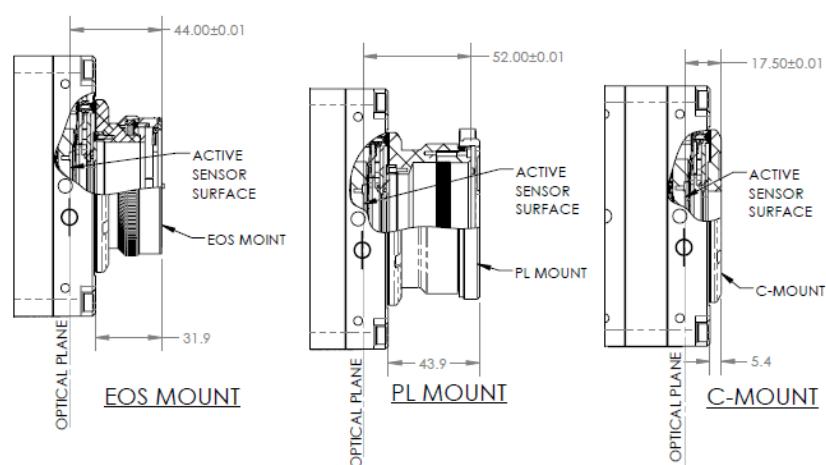


Figure 3.15: Mounts

3.4 Dimensions

3.4.4 Phantom VEO 4K-S Series Dimensions

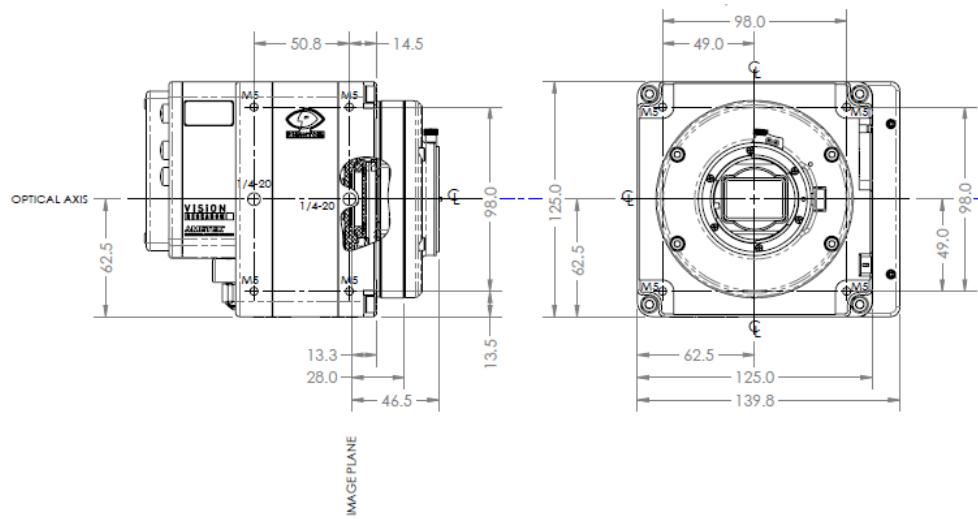


Figure 3.16: Right-side and front view

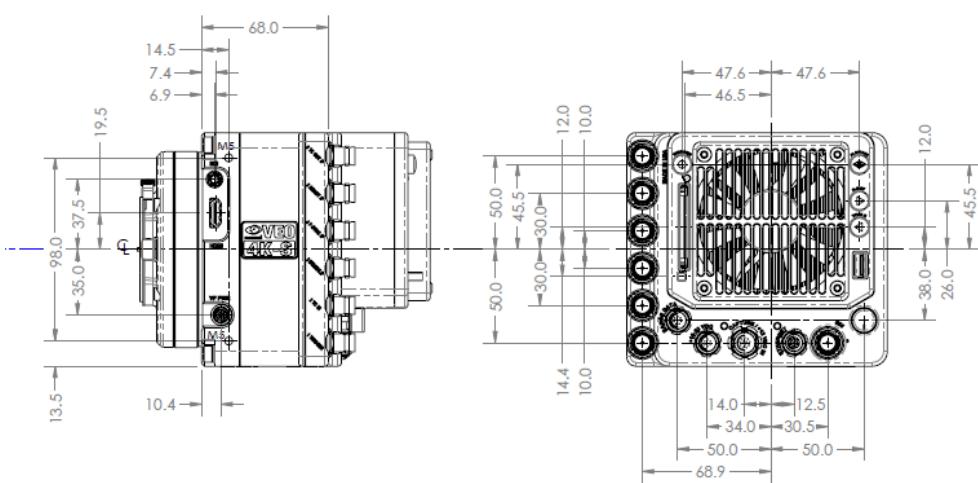


Figure 3.17: Left-side and rear view

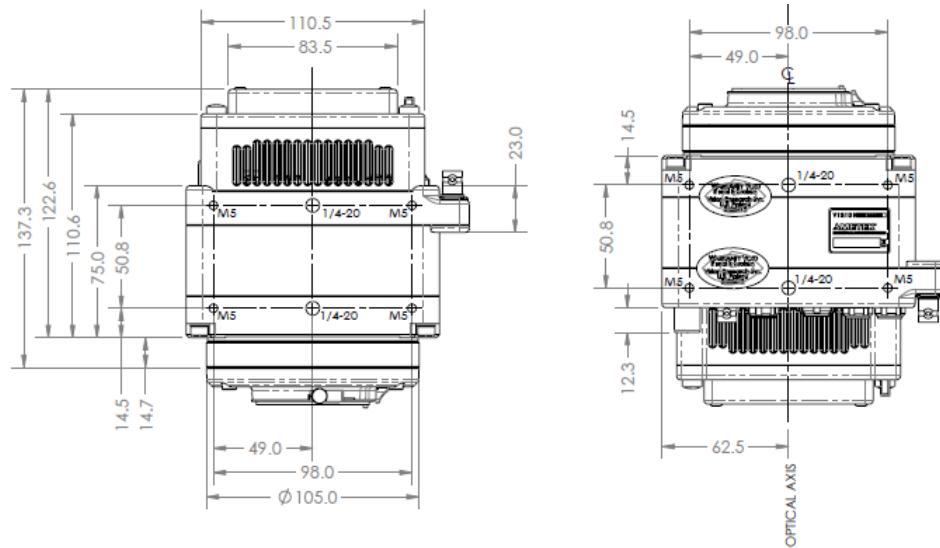


Figure 3.18: Top and bottom view

3.4.5 Phantom VEO 4K-L Series Dimensions

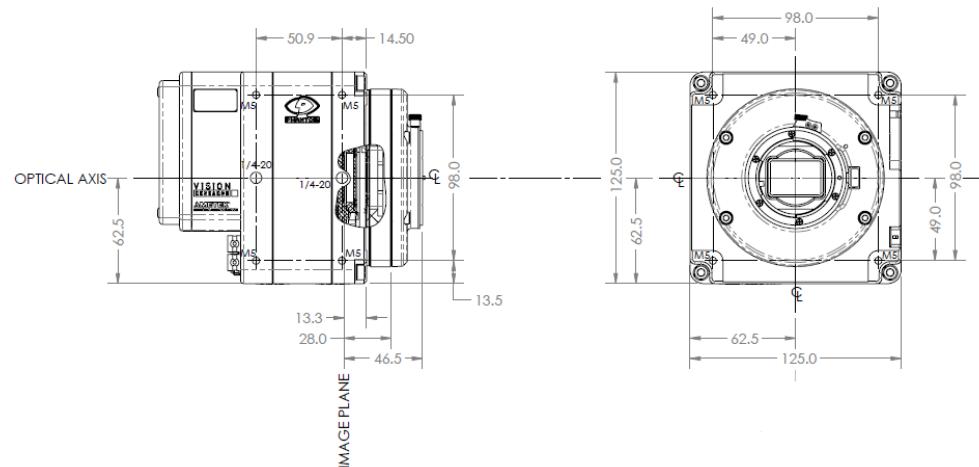


Figure 3.19: Right-side and front view

3.4 Dimensions

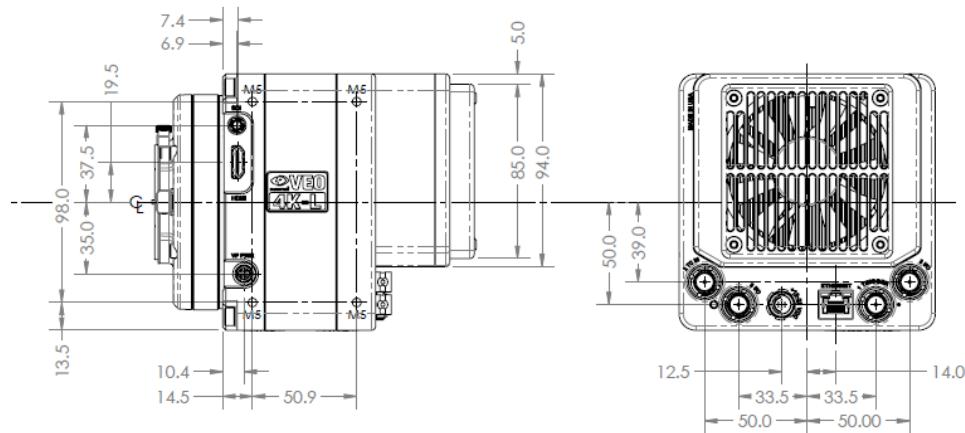


Figure 3.20: Left-side and rear view

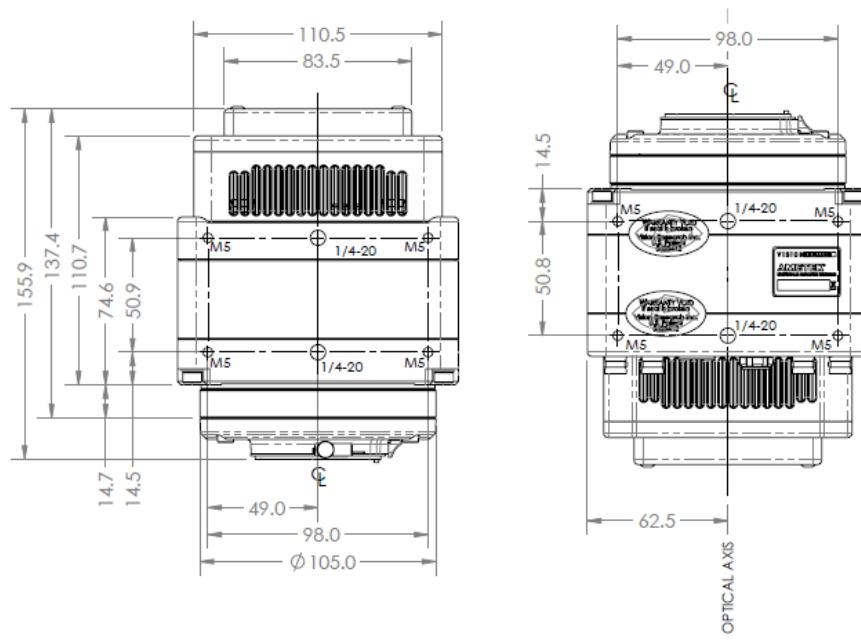


Figure 3.21: Top and bottom view

3.4.6 42 Mount for VEO, VEO-E and VEO-k Models

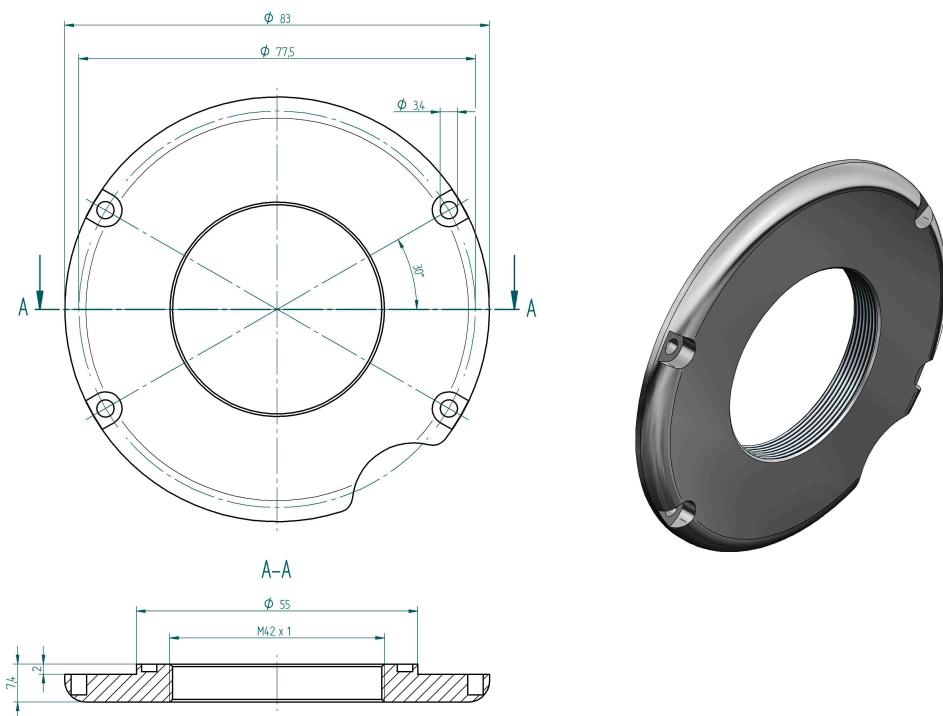


Figure 3.22: 42 mount for VEO and VEO-E models



Figure 3.23: 42 mount for VEO 4-k models

4 Phantom Wiring

4.1 Installing the Network Interface Board

Note: Normally you do not need to install any cards or boards in your delivered computer. The system is shipped with these components already installed. However during transportation these interface boards may become dislodged from their PC slots.

Caution: Before touching the PC interface boards make sure you have not accumulated static charges. A discharge may destroy the sensitive electronics and voids any guarantee.

Insert the network interface card in a free PCI-X slot of your computer and then secure with the screw to the PC housing. Make sure the board does not contact any electrical conducting parts (housing, other boards, wires or chillers).

4.2 Cabling and Connections

4.2.1 Wiring with One Phantom Camera

Connect the following cables to get the system ready to work (see fig. 4.1 for Phantom VEO xxxL, 4.2 for Phantom VEO xxS):

- Plug in the Image camera connector 1007820 to the **Camera** terminal on the PTU X HS rear panel.
- For VEO xxxL, connect the **Image Clock 1** line of the camera connector 1007820 to the 3 I/O (P3/F-Sync) input on the back panel of the camera.
For VEO xxS, connect the **Image Clock 1** line of the camera connector 1007820 to the P4/F-sync input on the back panel of the camera.

- Connect the **Trigger 1** line of the Camera connector 1007820 to the Trigger input on the back panel of the camera.
- Connect the Dongle (software license) to a USB port.
- Plug in the power supplies.
- Switch on all devices: Switch on the camera first, then wait 30 seconds before switching on the computer!

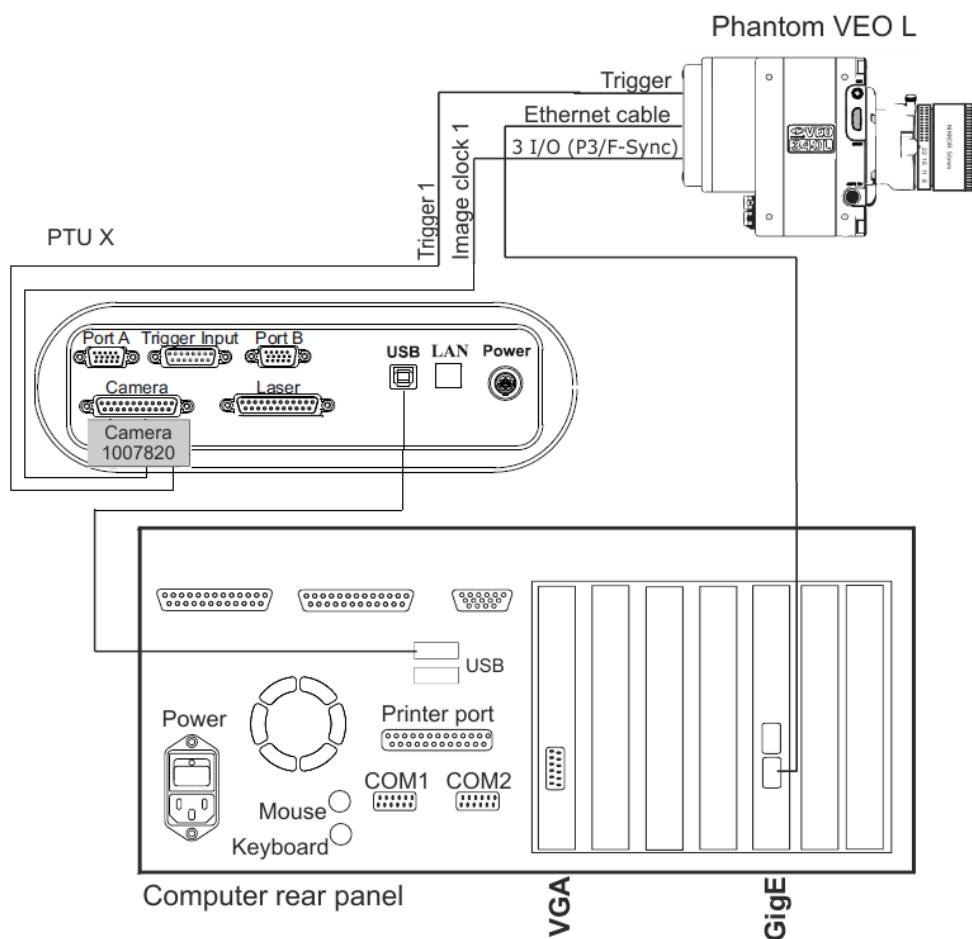


Figure 4.1: Wiring of a Phantom VEO xxxL camera system

4.2 Cabling and Connections

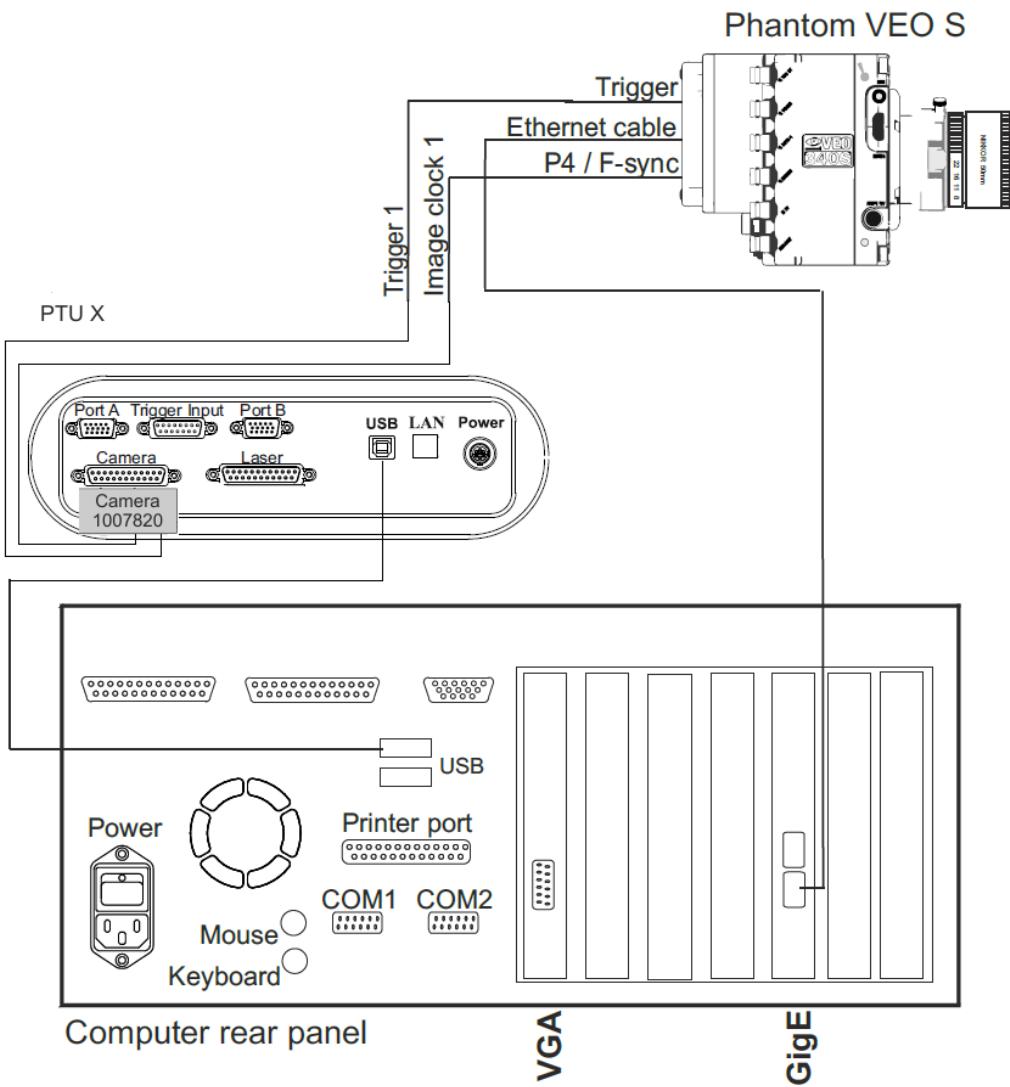


Figure 4.2: Wiring of a Phantom VEO xxxS camera system

4.2.2 Wiring with Two Phantom Cameras

Connect the following cables to get the system ready to work:

- Plug in the camera connector 1007820 to the **Camera** terminal on the PTU X HS rear panel.

- For the VEO xxxL, connect the **Image Clock 1** line of the camera connector 1007820 to the 3 I/O (P3/F-Sync) input on the back panel of camera 1.

For the VEO xxxS, connect the **Image Clock 1** line of the camera connector 1007820 to the P4/F-sync input input on the back panel of camera 1.

- For VEO xxxL, connect the **Image Clock 2** line of the camera connector 1007820 to the 3 I/O (P3/F-Sync) input on the back panel of camera 2.

For VEO xxxS, connect the **Image Clock 2** line of the camera connector 1007820 to the P4/F-sync input on the back panel of camera 2.

- Connect the **Trigger 1** line of the Camera connector 1007820 to the Trigger input on the back panel of camera 1.

- Connect **Trigger 2** line of the camera connector 1007820 to the trigger input on the back panel of camera 2.

- Connect the Dongle (software license) to a USB port.

- Plug in the power supplies.

- Switch on all devices. Switch on the camera first, then wait 30 seconds before switching on the computer!

4.2 Cabling and Connections

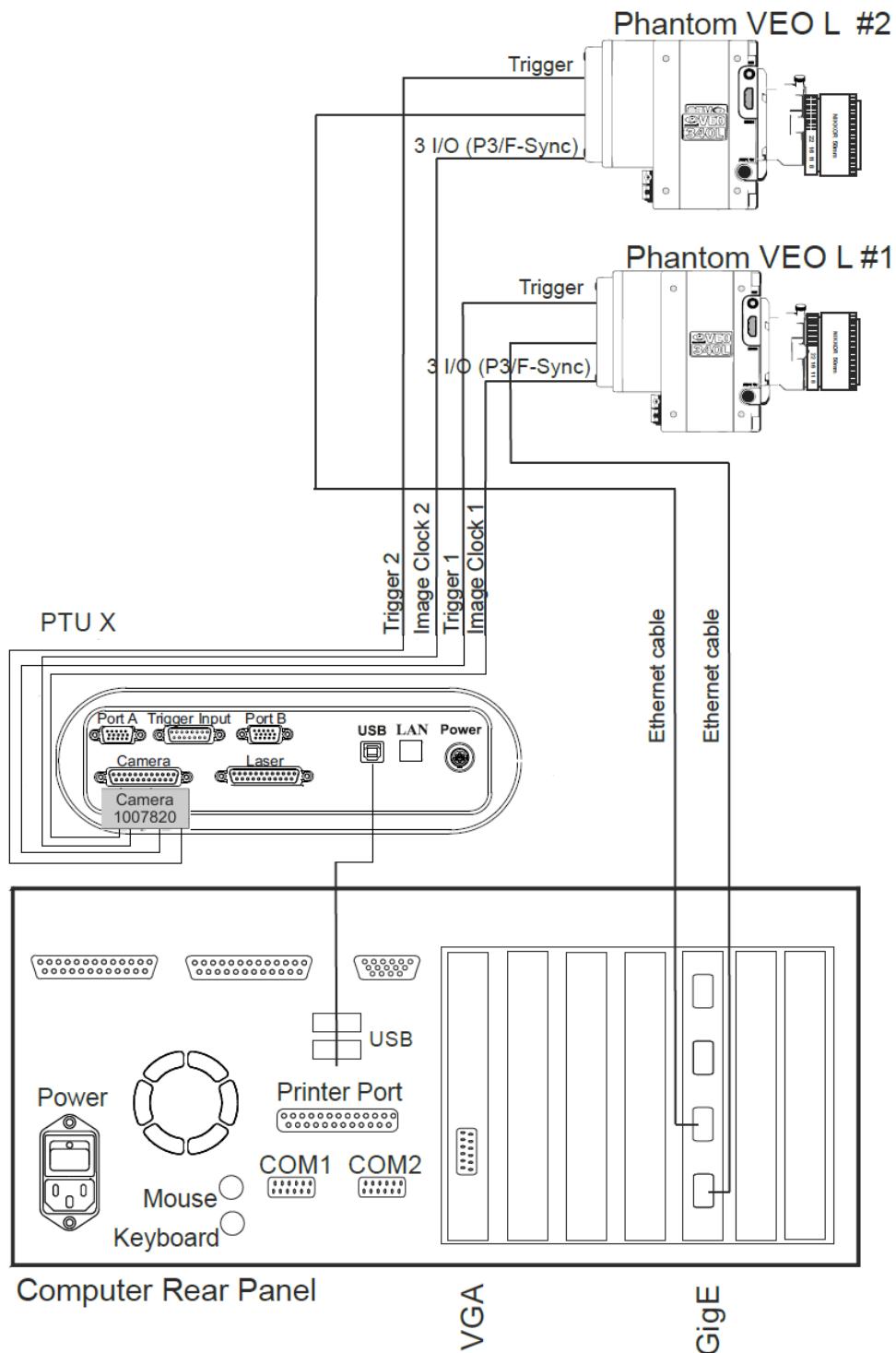


Figure 4.3: Wiring of a Phantom camera system with two VEO L cameras.

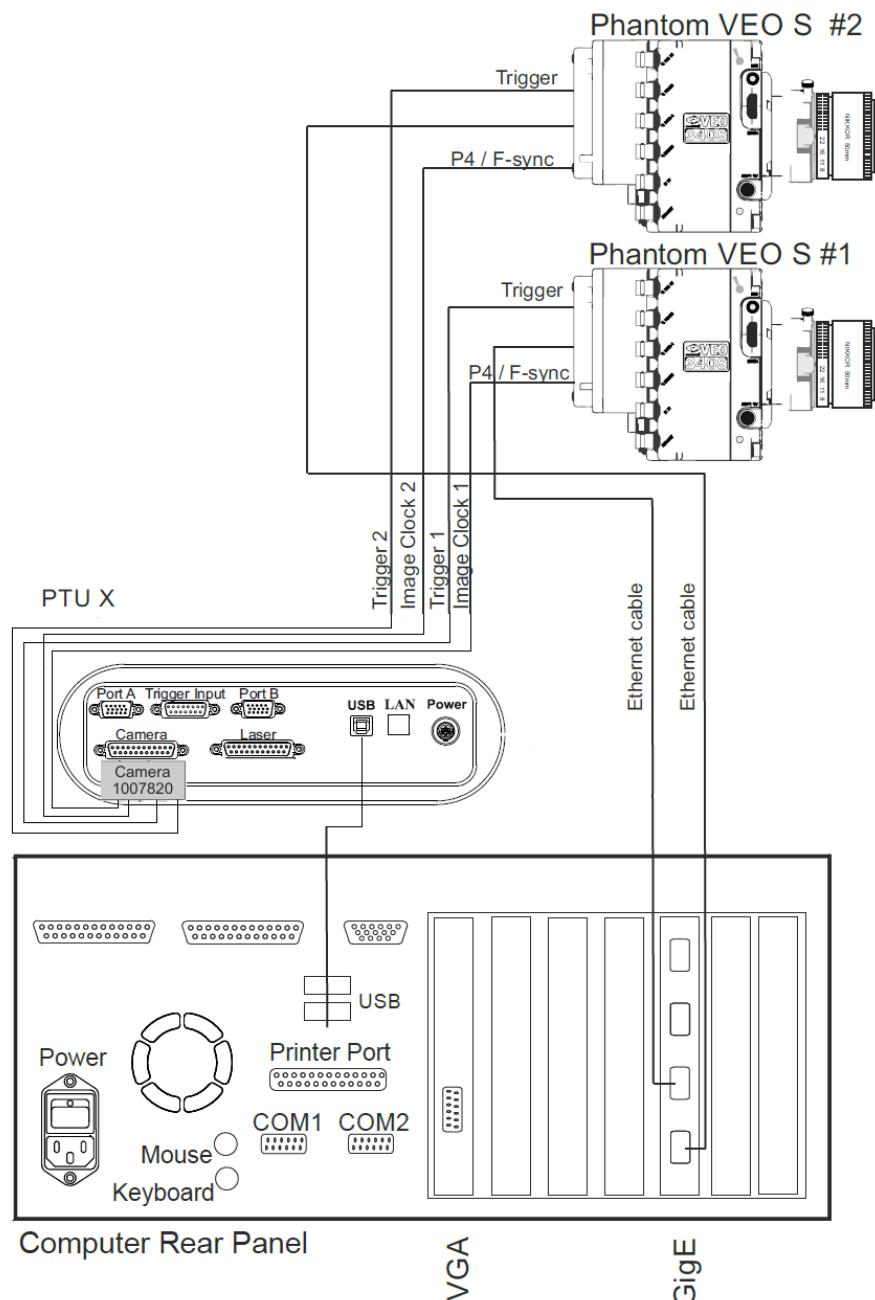


Figure 4.4: Wiring of a Phantom camera system with two VEO S cameras.

5 DaVis Hardware Setup



Note:

The settings in the **Hardware Setup** dialog are entered by **LaVision** application specialists during production or installation of your system. These values should not be changed by the end user. Changing parameters may cause a malfunction of the system.

To be controlled on remote by **DaVis**, the camera needs to be added as a device to the **DaVis Hardware Setup** dialog. Additionally, the camera needs to be provided with trigger signals that are synchronized with other devices, e.g. an external trigger from the experiment or a trigger signal to a light source for illumination. Therefore a camera in a **LaVision** system is always used with a Programmable Timing Unit (PTU). Please make sure that the PTU is also initialized in the **DaVis** hardware setup. For further details on the Programmable Timing Unit please refer to the PTU manual (#1008606).

You can open the **Hardware Setup** dialog (Fig. 5.1) after start of the **DaVis** software by a click on the **Setup** icon (see margin) in the toolbar.

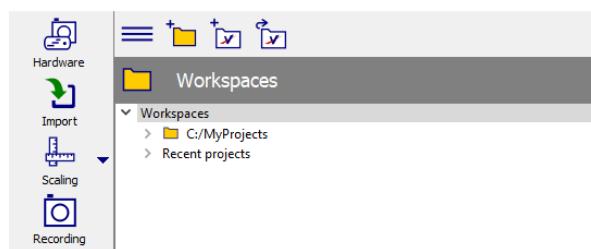


Figure 5.1: Opening the **DaVis Hardware Setup**

If the software is not preconfigured or is installed as a generic version (without using your configuration file), the **Hardware Setup** appears as in Fig. 5.2). Else, continue with section 5.1.

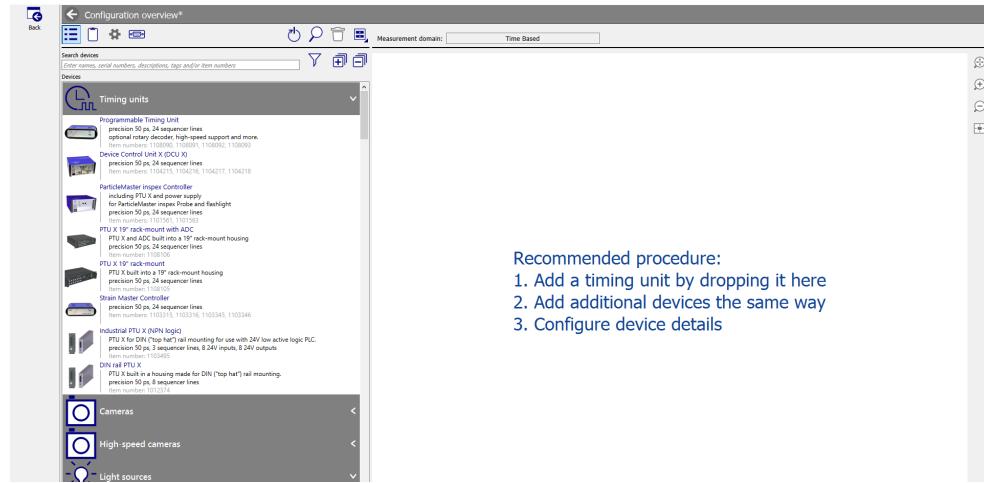


Figure 5.2: The **Configuration overview** of the **Hardware Setup** dialog without preconfigured software: Filter the **Devices** list for a PTU and drag and drop the item into the configuration window.

On the left side you see a list of supported devices; on the right, the window showing your actual hardware configuration, which is empty in the shown case. You can configure your systems setup by dragging items from the left list and dropping them into the configuration area on the right.

First, add a PTU X by dragging and dropping the PTU X item into the configuration window as indicated by the arrow in Fig. 5.2. Select your measurement type (high-speed or low-speed).

Now your hardware setup looks as in Fig. 5.3.

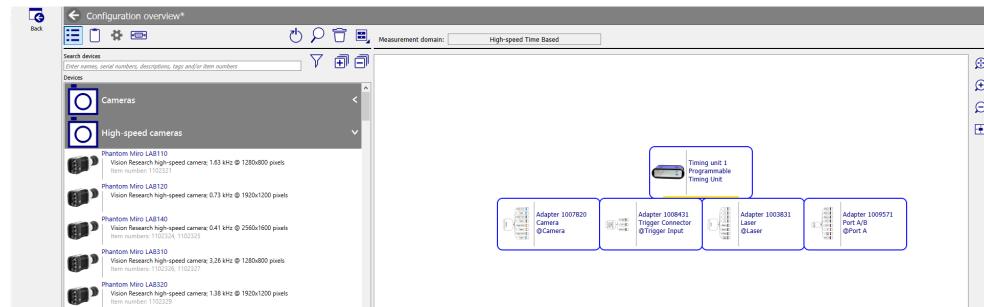


Figure 5.3: The **Configuration overview** after adding a PTU to the configuration

The PTU will update its firmware if necessary on initialisation of the system.

5.1 Adding the camera

5.1 Adding the camera

Next, you need to add your camera. Use the filter **①** by typing e.g. veo to reduce the selection. Drag and drop the corresponding camera into the configuration area at the right.

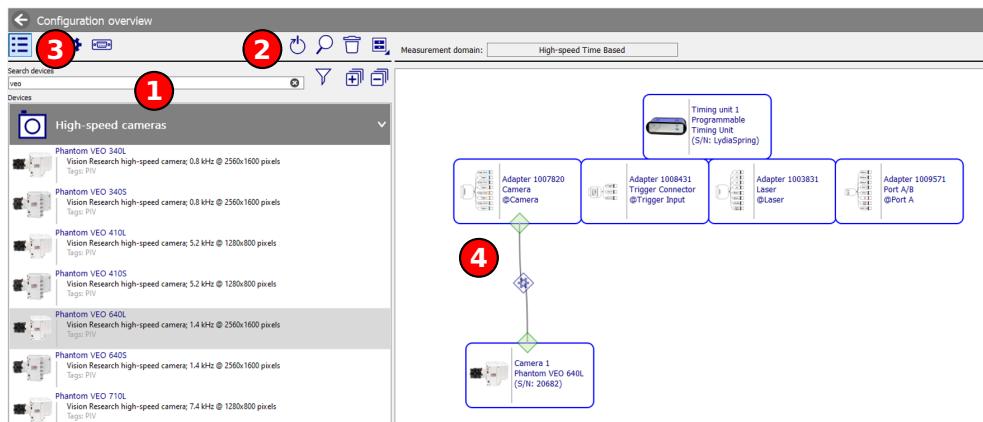


Figure 5.4: In the **Configuration overview** of the **Hardware Setup** dialog, filter the **Devices** list for the camera you have connected, then drag and drop the according item into the configuration window.

You need to select the camera you have connected, which may differ from the camera mentioned as an example in the figures in this section.

Fig. 5.4 shows the configuration window after dropping one camera. The connecting lines between the camera and the connection adapter of the PTU are placed automatically.

Press the **Initialize** button **②** (see margin) after all connected cameras are dropped to the configuration window. Make sure the cameras are connected and switched on.

To see or edit the configuration details, click on the **cogwheel** button at the toolbar **③** or at the connection lines **④** (see margin). The dialog in Fig. 5.5 opens.



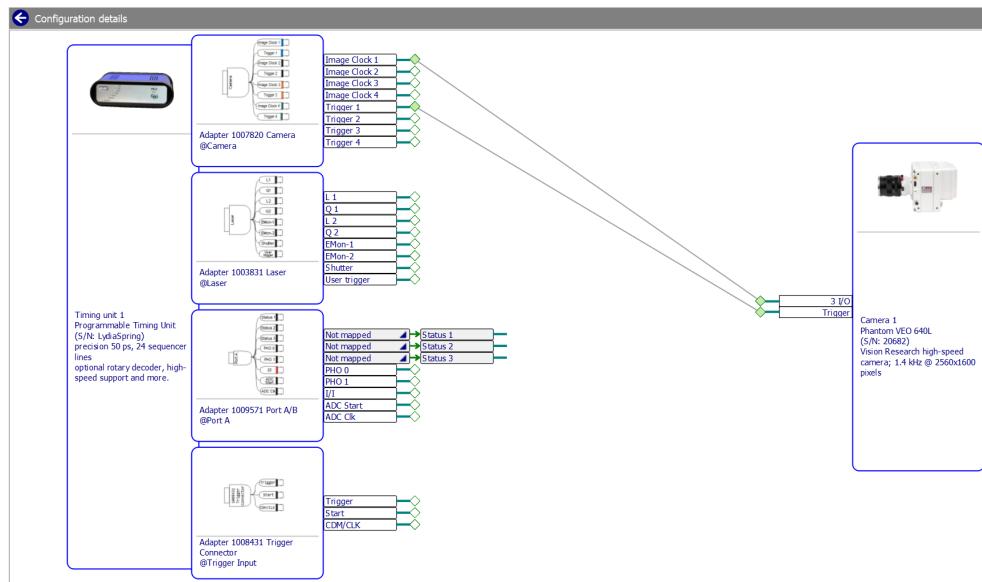


Figure 5.5: The Configuration details of a connection line

Click on the arrows below the device on the right to change between the devices to see the trigger line connection of each device. Make sure the electrical connections have been made identical to the configuration shown here.

The detailed settings of each device can be edited by clicking on the cogwheel which appears hovering over the device item with your mouse. For each device connected, this **Edit Device Settings** dialog is accessible from the configuration window or the configuration details window.

The details settings of the PTU contain the definition of the timing of each device connected. Please refer to the PTU manual (#1008606) if you wish to modify the default.

5.2 Edit device settings of the camera

The settings of the camera can be changed in the **Edit Device** dialog (Fig. 5.7). This can be accessed by clicking on the cogwheel which appears when you move the mouse cursor over the camera item, either in the **Configuration details** window (Fig. 5.5) or in the **Configuration overview** window (Fig. 5.6).



5.2 Edit device settings of the camera

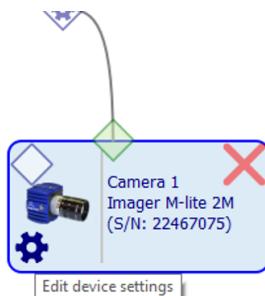


Figure 5.6: Hovering over an item and clicking on the cogwheel symbol opens the **Edit Device Settings** dialog.

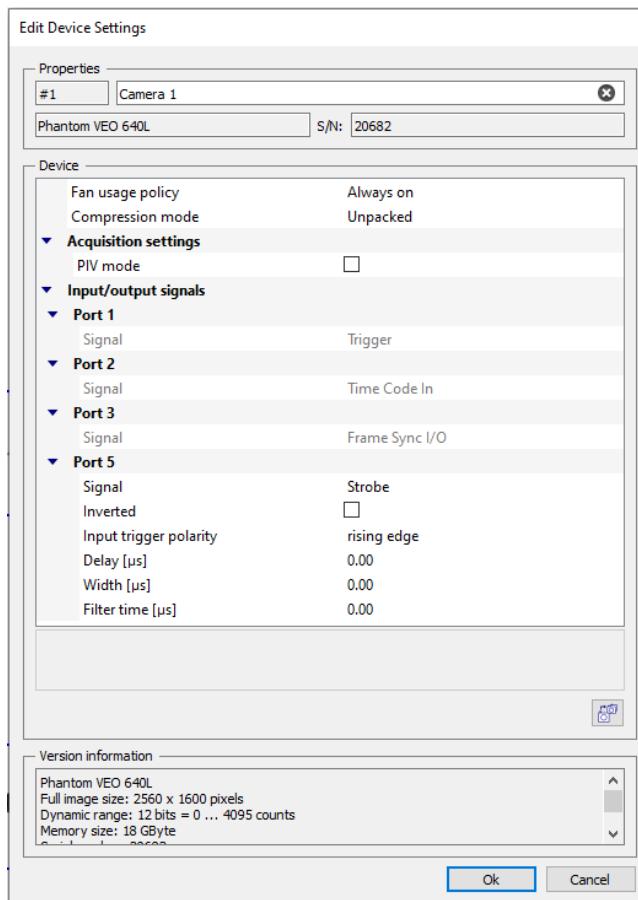


Figure 5.7: The **Edit Device Settings** dialog

The name of the camera – here "camera1" – can be changed in the **Properties** section. The alias you type in here will appear in all **DaVis** dialogs as the name of this device. The camera type and the serial number S/N are displayed as well.

The parameters (settings) of the camera can be read or changed in the corresponding section.

Fan usage policy:

Always on (default): The camera fans stay on during the recording.

Off during recording: The fans are switched off before the recording, and on again after the recording is finished. Fan-induced vibrations can be avoided with this option.

Compression mode:

Unpacked (default): The images are stored as 12-bit data.

10 bit packed: The images are stored with 10 bit per pixel.

PIV mode: If activated, the electronic shutter (exposure control) is switched off to allow the shortest possible PIV *dt*. In single-frame recording, the exposure time is automatically set to the maximum value (1 / rate) and cannot be changed. In double-frame recording, the "shutter off" mode allows the shortest possible PIV dts. Please check the table of specifications (section 3.2) for the values for the cameras.

Input/output signals: The number of ports and possible choices depends on the camera model. The "Strobe output" e.g. reflects the exposure time of the sensor (low active). Note: The output is the electric signal. The optical response of the sensor can be different.

Version information: Detailed information about the camera like the memory size, serial number and firmware version is displayed here.



After setting the parameters, use the **Initialize** button for initialization.

Click **Close** to return to the **Project Manager** dialog.

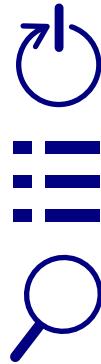
5.3 Change the assignment of the cameras to the image frames

If you wish to change the order of the cameras, i.e., the assignment to the frames in the display, please follow the procedure below:

1. Delete all cameras.

5.3 Change the assignment of the cameras to the image frames

2. Click the **Initialize** button (see margin). A message will appear.
3. Switch back from the message section to the Devices list by clicking the **Show device** button (see margin).
4. Now click the **Find existing devices** button (see margin).
5. Select the camera family you have connected. If you select all, the search for connected devices will take long.
6. Click the **Scan** button.
7. Click **Close** when the scan has finished.
8. Now you see a list of the connected cameras with its serial numbers.
9. Drag and drop the cameras in the order you want them to appear in the frames.
10. Press the **Initialize** button again.



6 Recording

In the following chapter the handling of the different camera operation modes and parameters for image acquisition are described.

More details on the use of the **Recording** dialog in general as well as details on the different timing options for external random cyclic events, the comprehensive options on automated scanning and recording can be found in the **DaVis** manual 1003001_DaVis_D10.0.pdf.

Enter the **Recording** dialog by a click on the **Recording** icon in the toolbar.

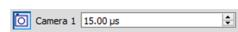


Figure 6.1

In the **Devices** section (Fig. 6.1) the camera appears with the name you specified in the camera properties in the hardware setup (chapter 5). In this case 'Camera 1'.

6.1 Exposure Time and Mode

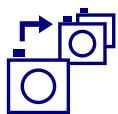
Here you enter the exposure time of the camera sensor. Typically, you will use this feature in single-frame mode to adjust the brightness of the image depending on your ambient or continuous light conditions. If you are using a short pulsed light source choose the minimum or a short exposure time. Using a light source initialized in the **DaVis** hardware setup the exposure time is set always longer than the length of the light pulse in use.



For some cameras you can edit the exposure time also in double-frame mode. In this case the entered value changes the first frame. The second frame is fixed and approximately equal to the inverse of the maximum repetition rate of the camera. If the edit box is grayed out, the camera doesn't support a change in the double-frame mode. In this case the exposure time of the first frame is identical to the second frame.

The exposure time is automatically increased but never decreased. Type in '0' to set the exposure time to its minimum. This minimum depends on camera type and operation mode of the camera in the sense described above.

Change between the exposure modes single and double frame if supported by the type of camera. The double-frame mode is an exposure mode used for PIV. A double-pulsed light source is automatically synchronized to illuminate the first frame with the first light pulse and the second frame with the second light pulse, respectively.



If you have more than one camera, you can use this button to copy the exposure time and mode to all other cameras.

6.2 Intensity Calibration

The Phantom camera has a calibration function (current session reference) that corrects the non-uniformity in output of each pixel based on black level. For the best result of recording it is strongly recommended that whenever you change framing parameters such as frame rate, exposure time, etc., you carry out the calibration of the camera before starting a recording.



Figure 6.2

The default setting is that the intensity calibration is performed at the desired frequency that is specified in the Timing widget.

6.3 Area of Interest (AOI)

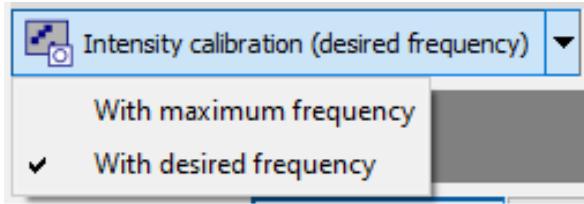


Figure 6.3

In case of external image clock the intensity calibration might perform better if the option "with maximum frequency is selected".

The intensity calibration button turns yellow to indicate the a new calibration should be performed. This happens if the image rate, AOI or exposure time is changed. After intensity calibration the button turns back to gray colour again.

6.3 Area of Interest (AOI)

The button is active only if the **live view**  is switched on. Pressing it will open a new window designed to set the AOI interactively.

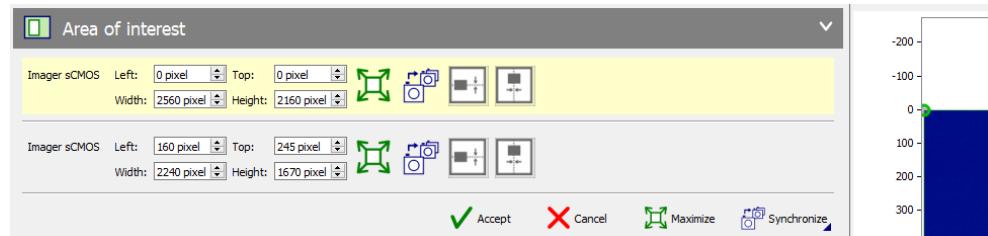
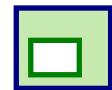


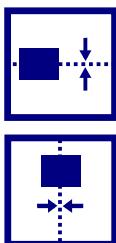
Figure 6.4

- If you have more than one camera, the active camera can be selected by the frame slider under the camera display. The adjusted AOI can be copied to all cameras by pressing the button .
- Setting the AOI by mouse:

Click and hold one of the green colored rings in the corner of the camera window and move them to the desired position.

- Setting the AOI using the edit boxes:

Top left corner, width and height can be edit to define the size and position of the AOI.



- Shape and position of the AOI:

The AOI is always rectangular. Depending on the camera type the AOI can be set at any position, only in certain steps in X and Y direction where the AOI coordinate will get the closest allowed position or only centered. If the camera supports centered AOI only the button to center the AOI in X and Y are grayed out.

To set the full sensor size click on the **Maximize** button.



Note:

Using a reduced AOI can be dangerous if you use a laser light source for illumination. Any reflections on an area outside the selected AOI may not be noticed. For applications that use a laser light source we strongly recommend to use always the maximum size of the chip.

6.4 Device Details



Pressing this button will open the **Device Details** dialog.

6.4.1 Camera Settings

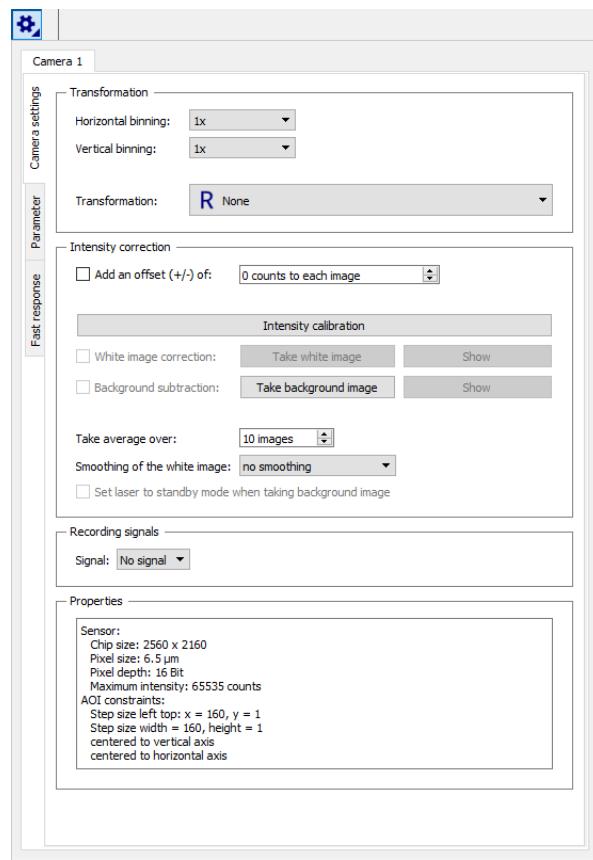


Figure 6.5

Transformation

Binning Binning means to sum up the counts of a specified number of pixel and read as one intensity of an 'enlarged pixel'. Hardware binning is applied as far as the camera supports it. Furthermore binning is done by software. Hardware binning sums up the counts before digitization of the image and leads to an increase of sensitivity. With software binning the summation of the counts is done after digitalization and will result in a higher dynamic range.

The binning factors must be set separately in the horizontal (x) and vertical (y) direction.

An equal binning factor for the x and y direction is most common since only then the aspect ratio is kept.

Only certain cameras support hardware binning. All sensors with cmos or scmos technology don't support hardware binning.

 **Note:**

When binning is used the spatial resolution decreases. Accurate PIV or strain measurement requires the highest possible resolution and so binning should be switched off for PIV and strain!

Transformation Operations like rotations and (crossover) mirroring can be applied during camera image live mode and storage to disk. They can be used to turn the image in a comfortable orientation if the camera is mounted e.g. up-side-down or looking through a mirror.

 **Note:**

Applying these operations might slow down the recording rate in disk recording mode! If you need to keep maximum recording rate you should use the RAM recording mode or switch the transformation off. All transformation operations are available in the processing dialog after recording.

 **Note:**

Some applications like Stereo PIV requires a spatial calibration. Make sure you use the same transformation settings for the calibration procedure and the recording during your experiment!

Intensity Correction

The operations are applied to the images during camera image live mode and storage to disk if they are selected.

Add an offset (+/-) Can be used to add or subtract a specified value of counts (greylevels) to or from the raw image.

Intensity Calibration The Phantom camera has a calibration function (current session reference) that corrects the non-uniformity in output of each pixel based on black level. For the best result of recording it is strongly recommended that whenever you change framing parameters such as frame rate, exposure time, etc., you carry out the calibration of the camera before starting a recording. See the section "Intensity calibration" for further details.

Background Subtraction A background image can be generated and will be stored as the average taken over the specified amount of images. With the checkbox "Set laser to standby.." you choose if the connected light source should illuminate during taking the background image. Once the background image is taken the checkbox "background subtraction" can be activated. Subtracting a background is necessary for applications like LiF and others. The recording of your experiment contains beside the desired signal a couple of noise sources. Noise like the fix pattern noise of the camera, ambient light, diffused or scattered light from your experimental light source (laser) can be collected in the background image and subtracted from the images of your experiment.

White Image Correction Once you have the background subtraction activated you can take a white image (as the average taken over the specified amount of images) and apply the white image correction by activating the corresponding checkbox. This correction is used to reduce vignette effects or illumination inhomogeneity. The recording of such white image is often experimentally complicated since it requires a spatially homogeneous distributed signal contribution.

The correction is performed via division of each acquired image with the normalized white image.

The smoothing of the white image is applied in order to de-noising it from spatially high frequency fluctuations.

 **Note:**

Applying these operations might slow down the recording rate in disk recording mode! If you need to keep maximum recording rate you should use the RAM recording mode or switch the intensity correction options off. All operations are available in the processing dialog after recording.

Recording Signals

Some **DaVis** project types, such as LIF, require the selection of the type of recorded signal. This could be, e.g., the LIF signal or the background illumination.

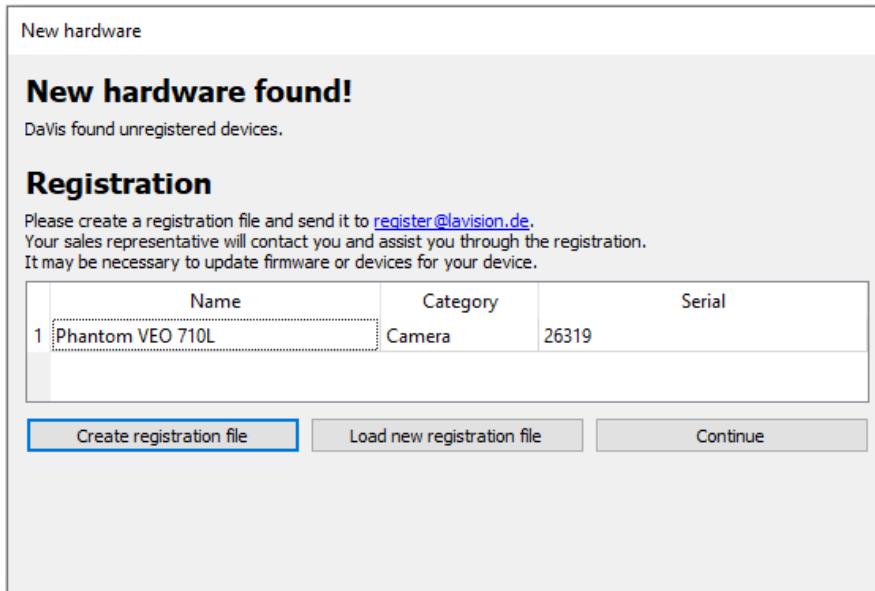
6.4.2 Camera Parameter

The **Camera Parameter** card shows the camera parameters identical to the ones in the hardware setup window. See the hardware setup chapter of this manual for details.

7 Troubleshooting

7.1 Camera Serial Number Not Registered

The support of the Phantom camera in **DaVis** is protected by its serial number. If the serial number is not registered at **LaVision**, the camera will not be initialized and supported in **DaVis**. In this case you will obtain a corresponding message at the startup of **DaVis** or after first access to this camera:



The dialog displays the camera name and the serial number. Click 'create registration file' and send the registration file to **LaVision** by email. If you receive the registration file back from **LaVision** it can be loaded by clicking 'Load new registration file'. If the 'Continue' button is clicked the dialog is closed and any non-registered device will be simulated.



7.2 Camera Cannot Be Initialized by DaVis

If the camera cannot be detected by **DaVis**, check the following:

- Is the camera turned on and ready?
- Is the IP address NIC set correctly? See chapter 2 for details of the NIC configuration.
- Is the Windows Firewall disabled or **DaVis** added as an exception?



Note

After **DaVis** update, the executable file of the new installation has to be added as exception.

7.3 Camera Shows No Live Images on Take/Grab

Check the wiring: Is the output Image Clock 1 (Image Clock 2 for camera 2...) connected to the F-sync input (P3/F-sync for VEO xxxL, P4/F-sync for VEO xxxS) on the back panel of the camera 1?

7.4 Reset the Camera to Factory Default

Resetting the camera to factory default can solve issues like the following:

- Camera cannot be controlled from **DaVis**,
- Camera images show bad pixels,
- Memory of the camera is not correctly displayed in **DaVis**.

7.4 Reset the Camera to Factory Default

Procedure to reset the camera via PCC:

1. Connect the Phantom camera to the control PC via the ethernet connection.
2. Power on the camera and wait for the camera to completely boot.
3. Power on the control PC and wait for Windows to completely boot.
4. Start the PCC software.
5. Go to the **Manager** tab and start **Phantom Nucleus**.
6. Select the serial number of the camera you want to reset and click **Reload Factory Settings** (Fig. 7.1).

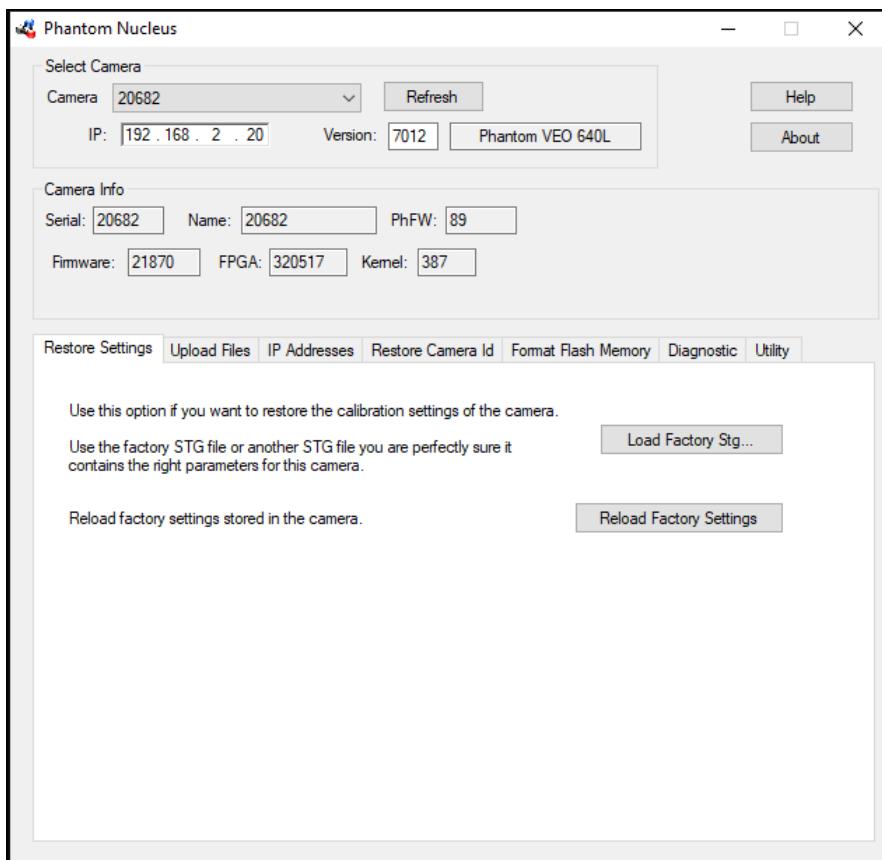


Figure 7.1

Alternative procedure to reset the camera:

1. Connect the Phantom camera to the control PC via the ethernet connection.
2. Power on the camera and wait for the camera to completely boot.
3. Power on the control PC and wait for Windows to completely boot.
4. Left-click the Windows **Start** button.
 - Open the Windows Command Prompt:
 - From the Windows Start Menu, select **Run** (usually this located on the bottom right side).
 - In the Run program, locate the field labelled **Open** and type in: **cmd**
 - Click the **OK** button. At this point the Windows command line interface will open.
 - Open the Windows Command Prompt for Windows Vista and 7:
 - From the Windows Start Menu, select Control Panel
 - Select 'Programs and Features'
 - Select 'Turn Windows features on or off'
 - Check the 'Telnet Client' box.
 - Press the **OK** button.
 - From the Windows Start Menu, type "cmd" in the search bar
 - Click the 'cmd.exe' link from the list of the search results.
 - At this point the Windows command line interface will open.
5. In the Windows command line interface, type: `telnet <Camera IP Address> 7115`
 - <Camera IP address> must be replaced with the camera's IP address. This information can be found on the IP decal on the bottom panel of the camera.
 - Example (fig.7.2): if the camera's IP address is: 100.100.100.44, one would type: `telnet 100.100.100.44 7115`.

7.4 Reset the Camera to Factory Default

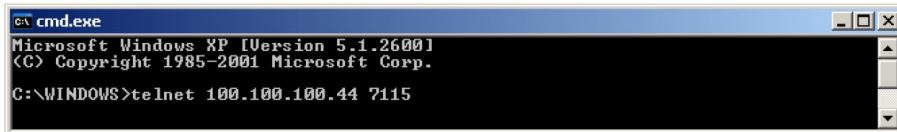


Figure 7.2: Telnet command

6. Press the 'Enter' button.
7. Press the 'Enter' button again.
8. Type the following command: **iload** (fig. 7.3)



Figure 7.3: iload command

9. Press the 'Enter' button.
 - If the **iload** procedure is successful, you will see the message "OK!" (fig. 7.4).

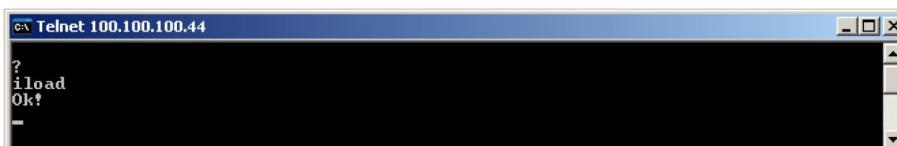


Figure 7.4: Successful iload message

- If the **iload** procedure is unsuccessful, you will see the message: "ERR: factory defaults load failed" (fig. 7.5). In this case, repeat steps 5-9.

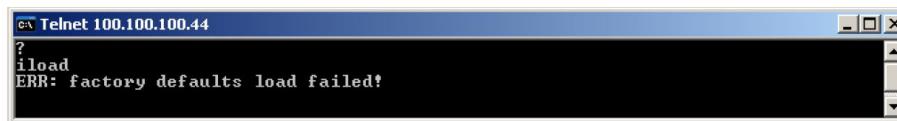


Figure 7.5: Unsuccessful iload error message

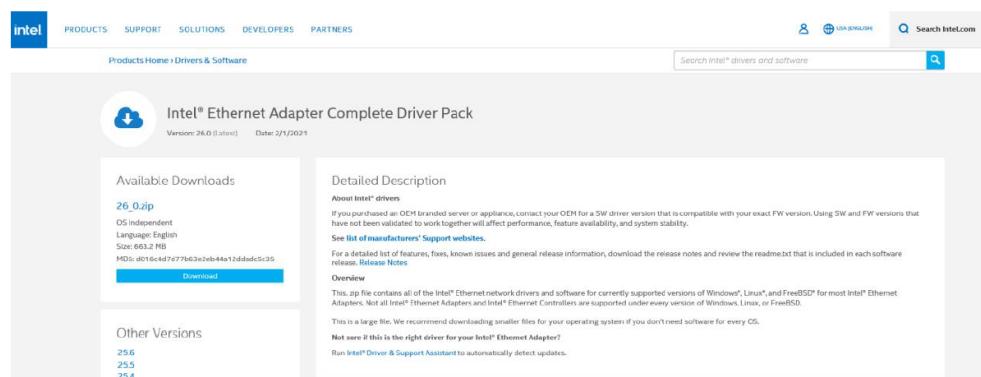
10. If the **iload** is successful, close the command line interface and reboot the camera. The camera settings are now restored to the original factory defaults.

7.5 Firmware Update for Intel x710-t4 10GigE boards

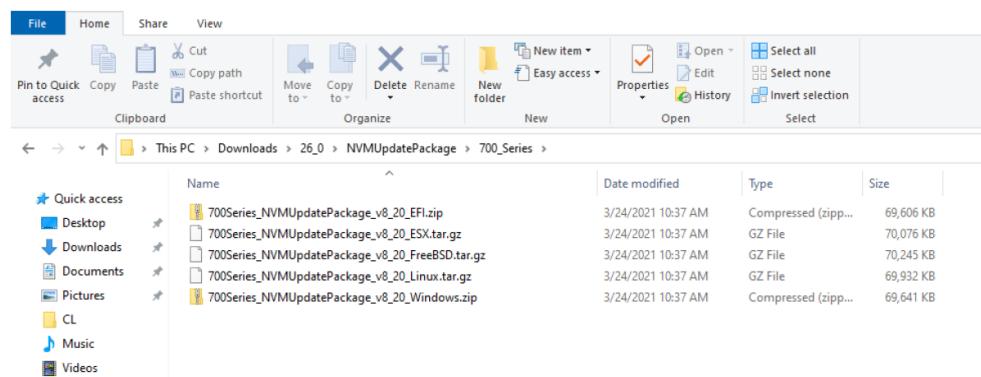
In case of connection and communication issues with the camera via 10GigE connection the network board firmware might require an update.

For the firmware update please follow this procedure:

Download the Intel driver package 26_0:



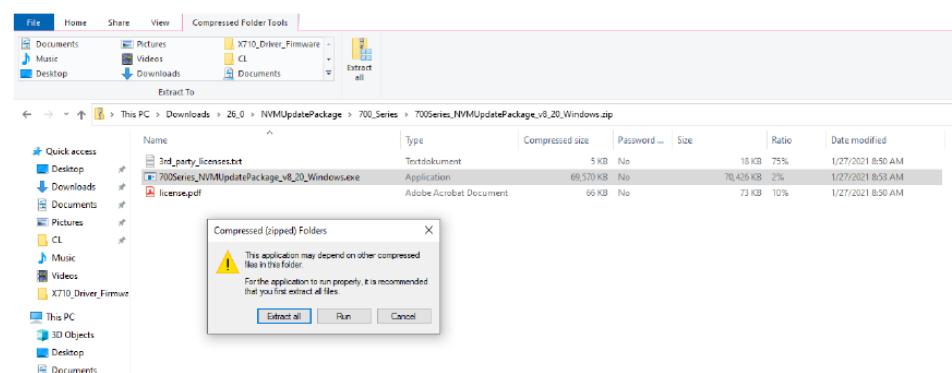
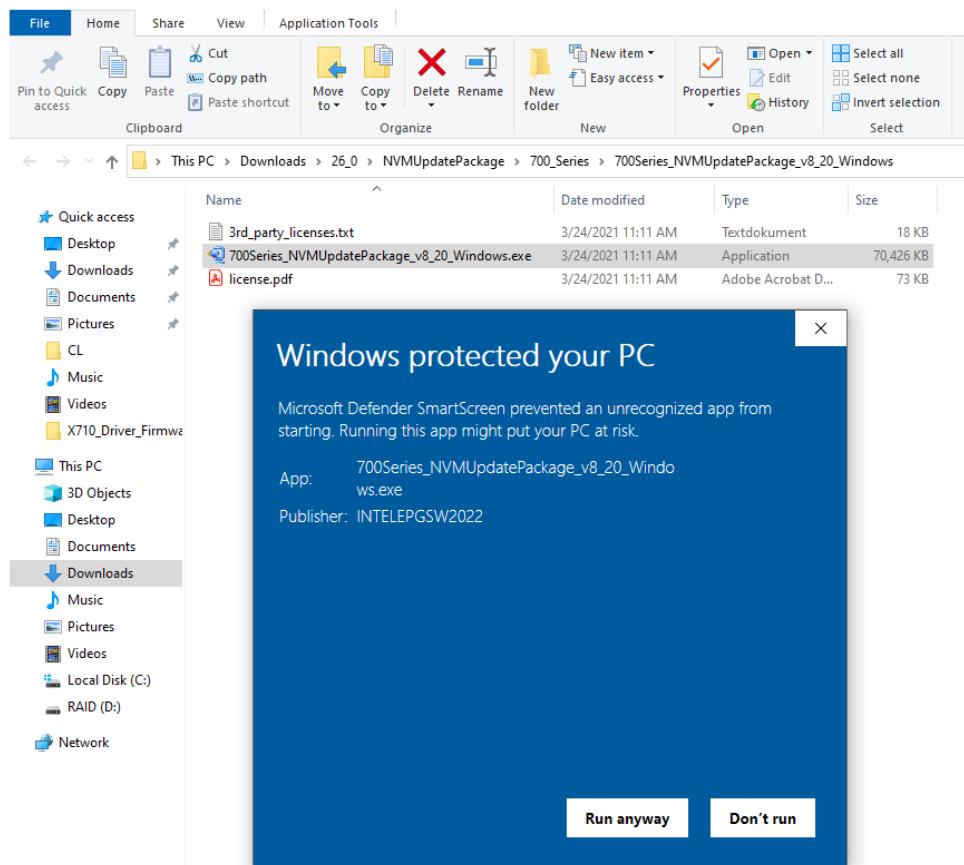
Unzip the folder:

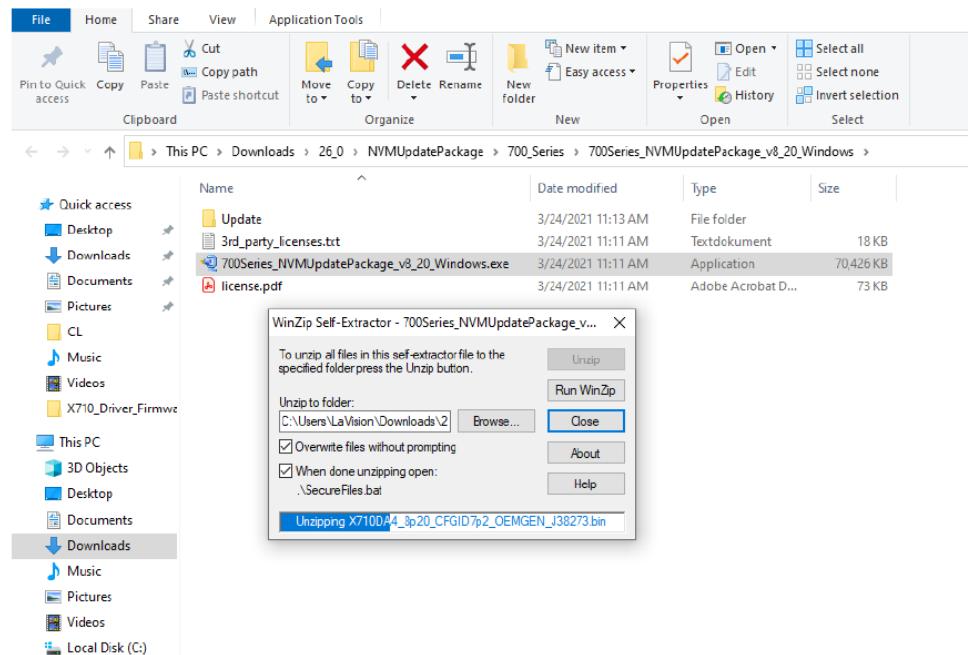


Navigate to 26_0_NVMUpdatePackage_700_Series,
unzip 700Series_NVMUpdatePackage_v8_20_Windows.zip
and run 700Series_NVMUpdatePackage_v8_20_Windows.exe.

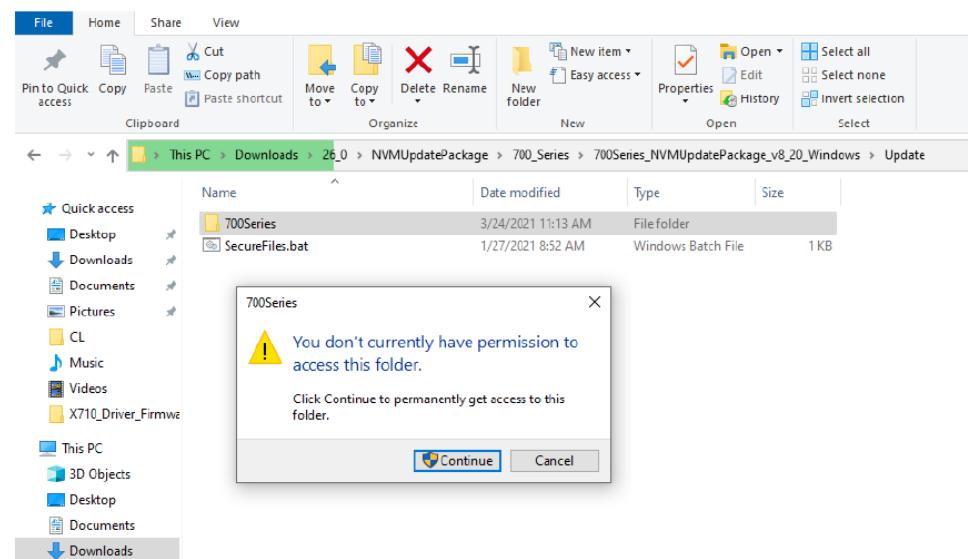
This extracts another folder.

7.5 Firmware Update for Intel x710-t4 10GigE boards



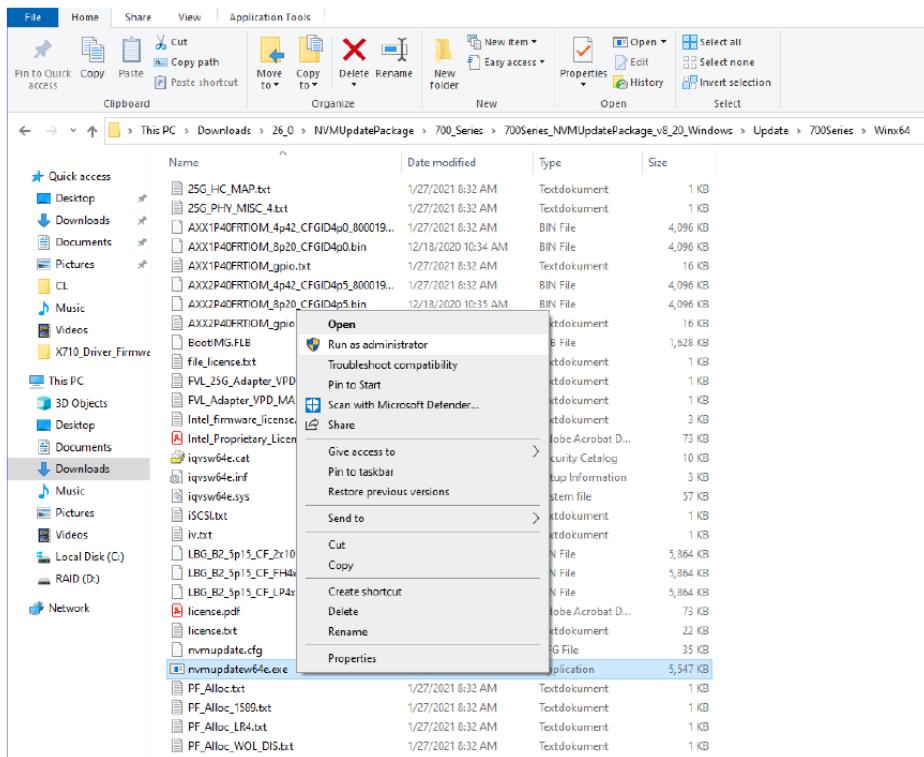


Navigate to the folder where you extracted the files (click "continue" to enter it):



7.5 Firmware Update for Intel x710-t4 10GigE boards

Run nvmupdate64e.exe as administrator:



A list of detected network boards is displayed. For each board the status is visible (Update available or Update not available):

```

C:\Users\LaVision\Downloads\26_0\NVMUpdatePackage\700_Series\700Series_NVMUpdatePackage_v8_20_Windows\Update\700Series\Winx64\nvmup...
Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.35.57.4
Copyright (C) 2013 - 2021 Intel Corporation.

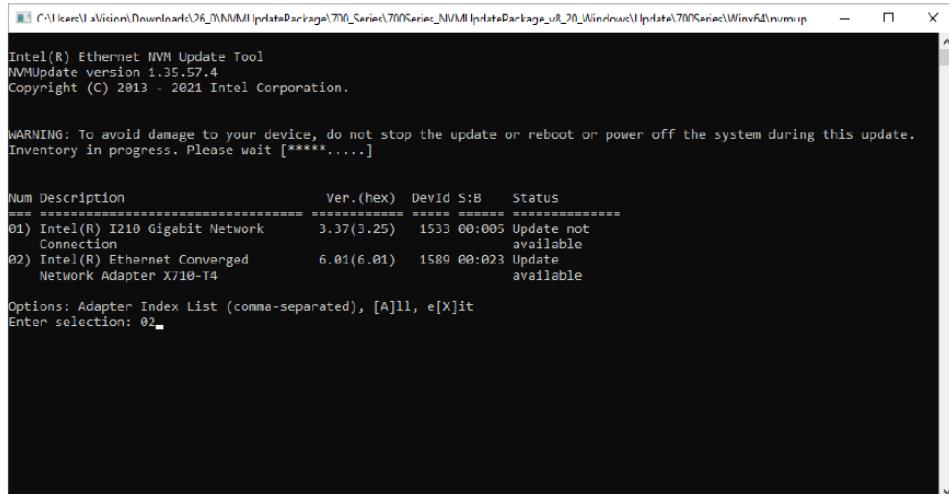
WARNING: To avoid damage to your device, do not stop the update or reboot or power off the system during this update.
Inventory in progress. Please wait [*****....]

Num Description           Ver.(hex) DevId SIB   Status
--- -----
01) Intel(R) I210 Gigabit Network    3.37(3.25) 1533 00:005 Update not
                                         Connection          available
02) Intel(R) Ethernet Converged     6.01(6.01)  1589 00:023 Update
                                         Network Adapter X710-T4      available

Options: Adapter Index List (comma-separated), [A]ll, e[X]it
Enter selection:

```

Select the board you want to update:



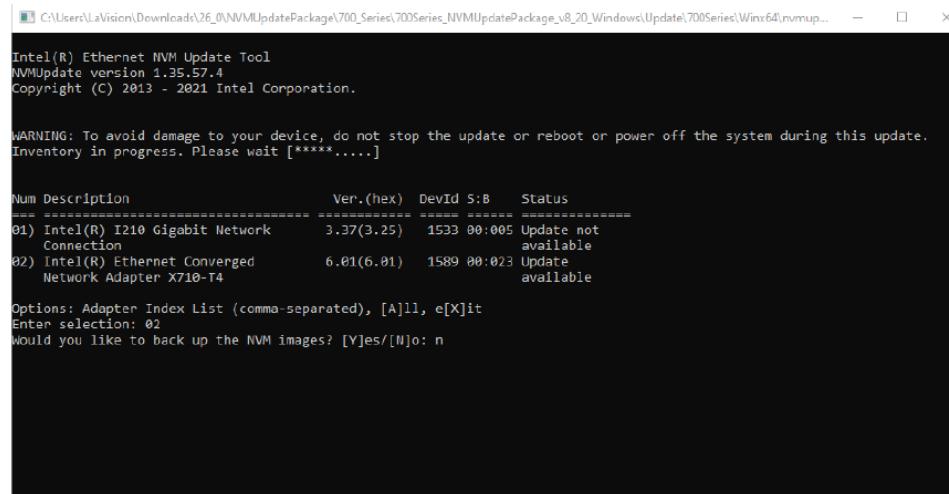
Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.35.57.4
Copyright (C) 2013 - 2021 Intel Corporation.

WARNING: To avoid damage to your device, do not stop the update or reboot or power off the system during this update.
Inventory in progress. Please wait [*****....]

| Num | Description | Ver.(hex) | DevId S:B | Status |
|-----|---|------------|-------------|----------------------|
| 01) | Intel(R) I210 Gigabit Network Connection | 3.37(3.25) | 1533 00:005 | Update not available |
| 02) | Intel(R) Ethernet Converged Network Adapter X710-T4 | 6.01(6.01) | 1589 00:023 | Update available |

Options: Adapter Index List (comma-separated), [A]ll, e[X]it
Enter selection: 02

Select if you want to keep a backup the NVM image:



Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.35.57.4
Copyright (C) 2013 - 2021 Intel Corporation.

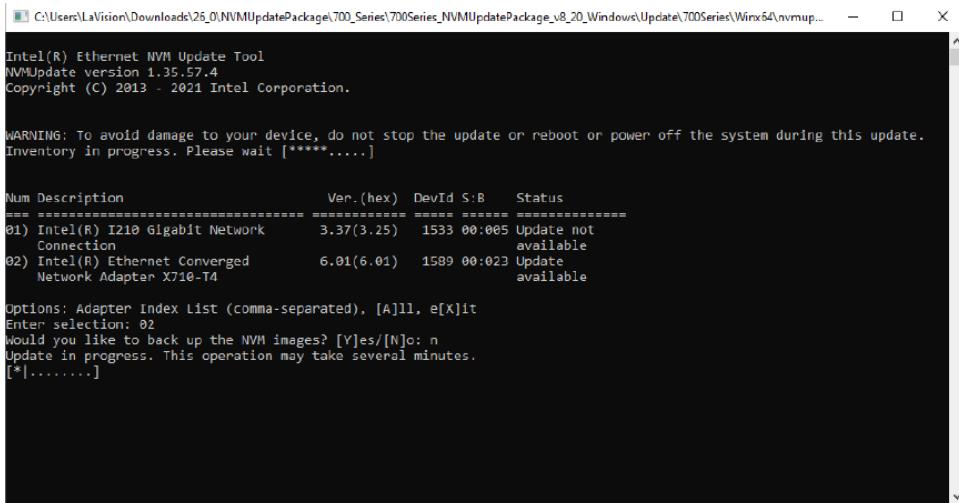
WARNING: To avoid damage to your device, do not stop the update or reboot or power off the system during this update.
Inventory in progress. Please wait [*****....]

| Num | Description | Ver.(hex) | DevId S:B | Status |
|-----|---|------------|-------------|----------------------|
| 01) | Intel(R) I210 Gigabit Network Connection | 3.37(3.25) | 1533 00:005 | Update not available |
| 02) | Intel(R) Ethernet Converged Network Adapter X710-T4 | 6.01(6.01) | 1589 00:023 | Update available |

Options: Adapter Index List (comma-separated), [A]ll, e[X]it
Enter selection: 02
would you like to back up the NVM images? [Y]es/[N]o: n

7.5 Firmware Update for Intel x710-t4 10GigE boards

Wait until the update is finished:



```

C:\Users\LaVision\Downloads\26_0\NVMUpdatePackage\700_Series\700Series_NVMUpdatePackage_v8_20_Windows\Update\700Series\Winx64\nvmup...
Intel(R) Ethernet NVM Update Tool
NVMUpdate version 1.35.57.4
Copyright (C) 2013 - 2021 Intel Corporation.

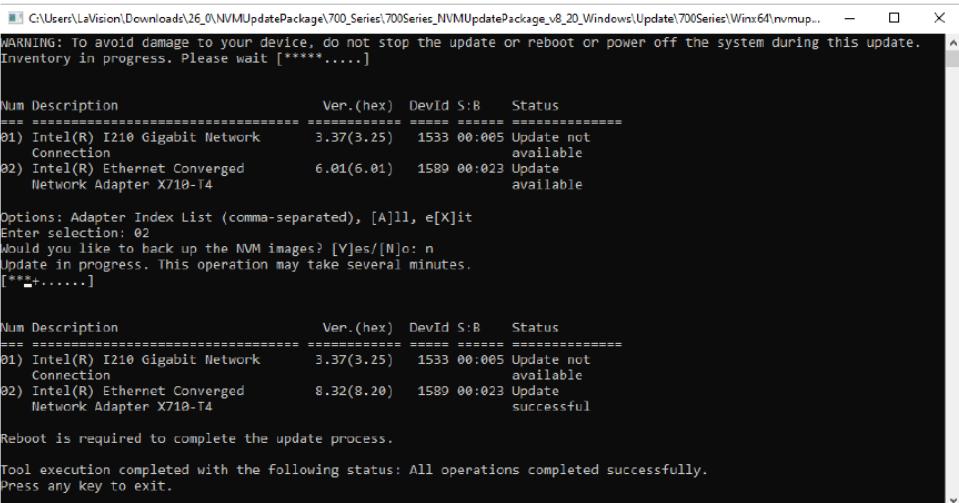
WARNING: To avoid damage to your device, do not stop the update or reboot or power off the system during this update.
Inventory in progress. Please wait [*****....]

Num Description          Ver.(hex) DevId S:B   Status
== ====== ====== ====== ====== =====
01) Intel(R) I210 Gigabit Network      3.37(3.25) 1533 00:005 Update not
Connection                           available
02) Intel(R) Ethernet Converged       6.01(6.01)  1589 00:023 Update
Network Adapter X710-T4                  available

Options: Adapter Index List (comma-separated), [A]ll, e[X]it
Enter selection: 02
Would you like to back up the NVM images? [Y]es/[N]o: n
Update in progress. This operation may take several minutes.
[*|.....]

```

After the update press any key to continue:



```

C:\Users\LaVision\Downloads\26_0\NVMUpdatePackage\700_Series\700Series_NVMUpdatePackage_v8_20_Windows\Update\700Series\Winx64\nvmup...
WARNING: To avoid damage to your device, do not stop the update or reboot or power off the system during this update.
Inventory in progress. Please wait [*****....]

Num Description          Ver.(hex) DevId S:B   Status
== ====== ====== ====== ====== =====
01) Intel(R) I210 Gigabit Network      3.37(3.25) 1533 00:005 Update not
Connection                           available
02) Intel(R) Ethernet Converged       6.01(6.01)  1589 00:023 Update
Network Adapter X710-T4                  available

Options: Adapter Index List (comma-separated), [A]ll, e[X]it
Enter selection: 02
Would you like to back up the NVM images? [Y]es/[N]o: n
Update in progress. This operation may take several minutes.
[**|.....]

Num Description          Ver.(hex) DevId S:B   Status
== ====== ====== ====== ====== =====
01) Intel(R) I210 Gigabit Network      3.37(3.25) 1533 00:005 Update not
Connection                           available
02) Intel(R) Ethernet Converged       8.32(8.20)  1589 00:023 Update
Network Adapter X710-T4                  successful

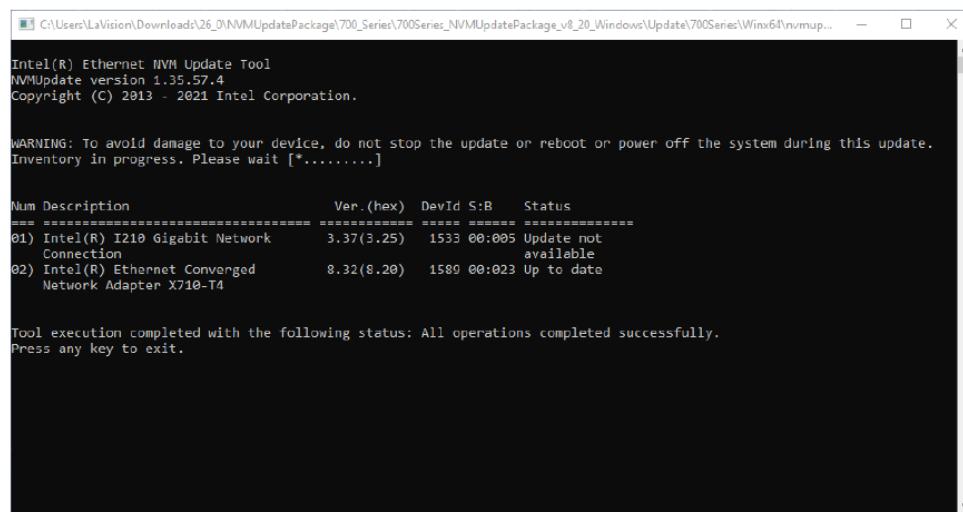
Reboot is required to complete the update process.

Tool execution completed with the following status: All operations completed successfully.
Press any key to exit.

```

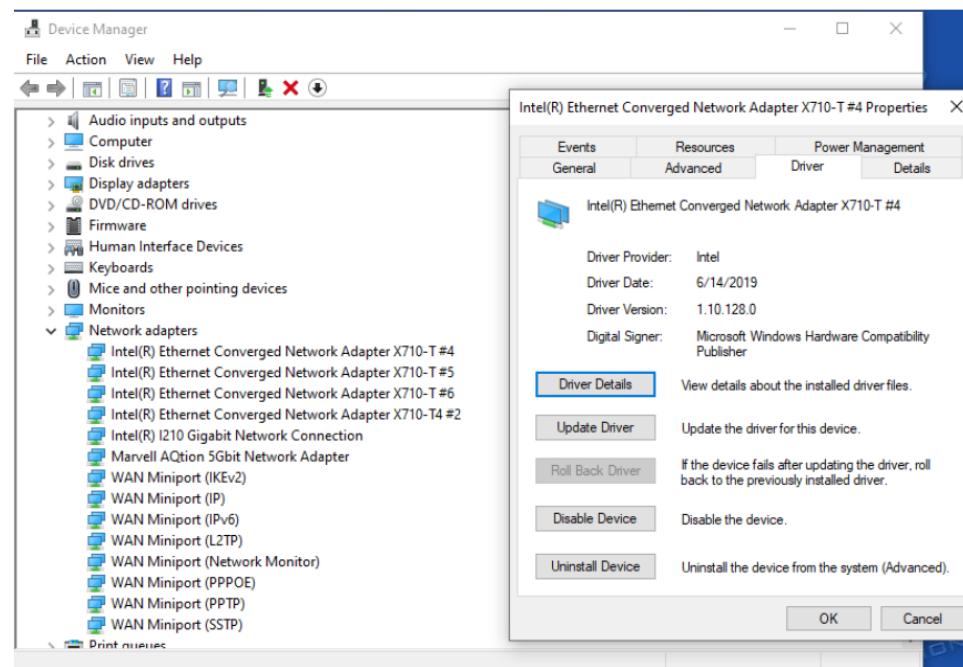
Shut down the PC, disconnect from main power and restart.

To confirm that the update was successful run `nvmupdate64e.exe` as administrator again:



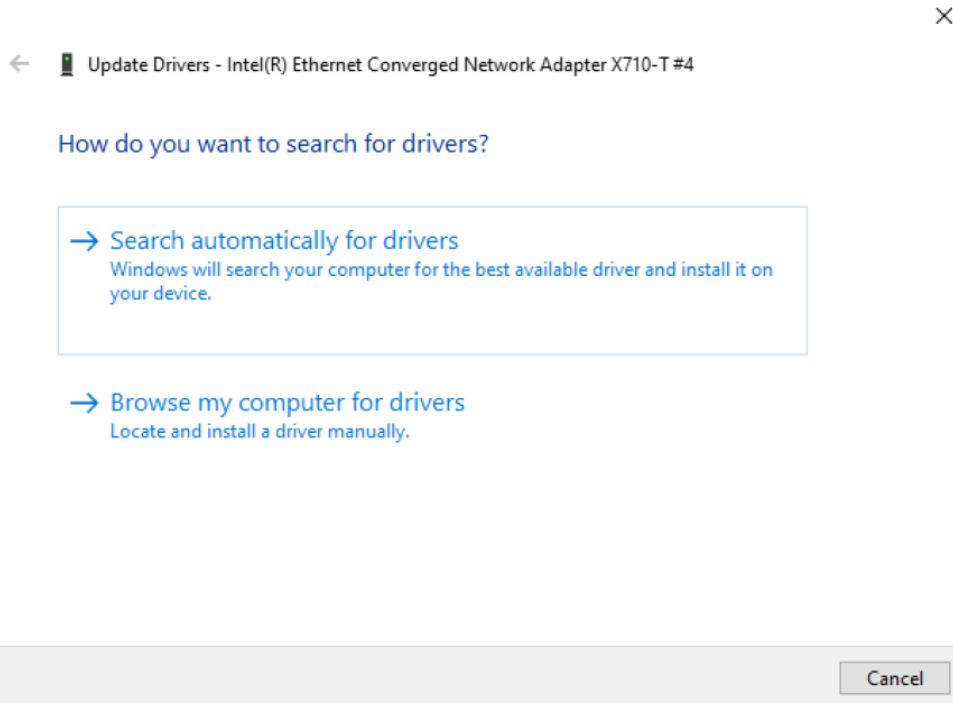
All boards should be up to date.

Open the device manager and Update the driver:

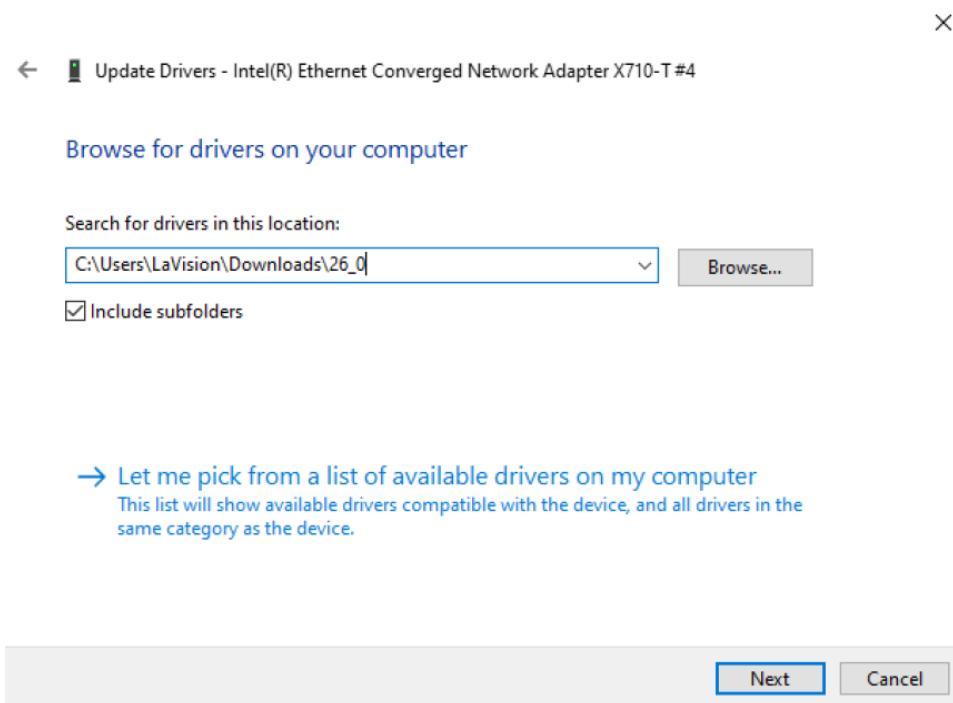


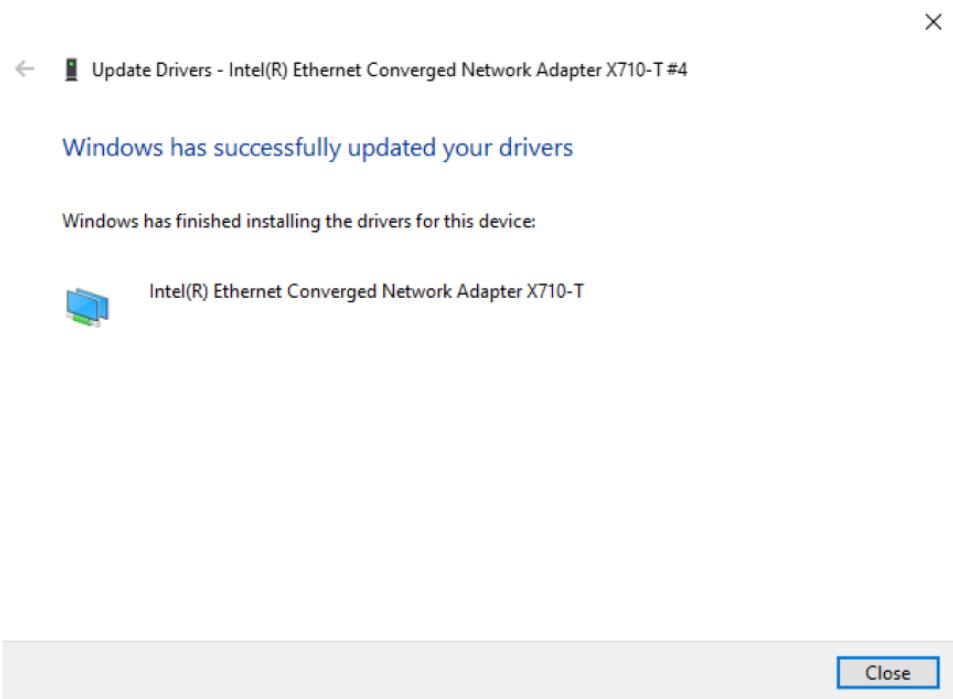
7.5 Firmware Update for Intel x710-t4 10GigE boards

Select "browse my computer for drivers":



Navigate to the 26_0 folder:





Repeat this for all ports of the network board.

8 Support

If you have a technical problem or a question regarding hardware or software which is not adequately addressed in the documentation, please contact your local representative or **LaVision** service directly.

You can contact service at **LaVision** GmbH by:

e-mail: **service@lavision.de**
phone: **+49 551 9004 229**

Alternatively, you may submit your problem using the **Support Request Form** in the **Support** section of the **LaVision** website www.lavision.com.

In order to speed up your request, please include the following information:

- The order number of your system (see section 8.1).
- The number of the used dongle (see section 8.1).
- A short description of the problem.
- The **LaVision** service file (see section 8.2).
- Some logfiles if you have a reproducible software problem (see section 8.3).
- Information on the Windows operating system and service pack used on the corresponding computer.

8.1 Order and Dongle Number

To be able to find information on the delivered hardware components and customer details in the **LaVision** database, your order number is required. This number can be found in the toolbar menu **Extras – About** or on the original **DaVis** installation medium (see Fig. 8.1).

In the **About DaVis** dialog you find the dongle number and order number information. The **Version ID** is the build number of the **DaVis** version, shown on top of the dialog.

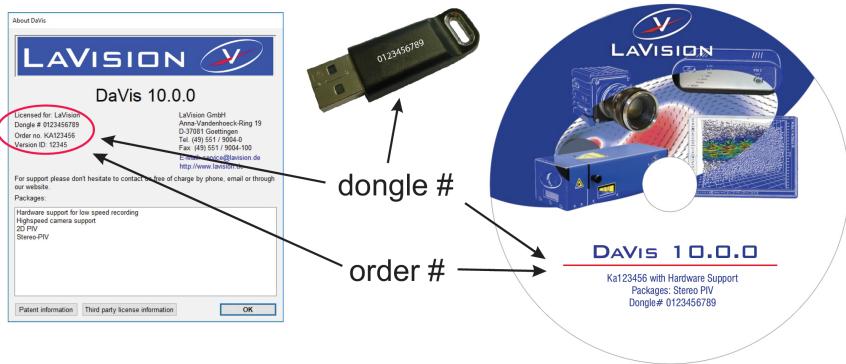


Figure 8.1: Dongle and order no. in **Extras - About** and on the installation DVD.

The dongle number is required to exclude possible license problems. This number is printed on the hardware key as well. The dongle number and the order number can also be found on the original **DaVis** install medium.

Please include the order number and/or the dongle number in your service requests.

8.2 LaVision Service File

In order to be able to reproduce a software problem, it could be essential to know the exact hardware setup and software parameters in **DaVis**. All currently used parameters and all error messages that have been shown since the last **DaVis** start can be extracted using the toolbar menu **Extras - Service - Create service file for LaVision support**.

After you have selected this menu, the system will write all values for the relevant variables into a **LSFX** file. This file will also contain the current settings of the hardware setup, acquisition setup and processing operation lists. The procedure will take some seconds!

The **LSFX** file will be written automatically to a folder selected by the user and the Windows explorer opens at the end with this folder. The name of the file contains the order number and dongle number that is extracted from your software (**#ordernumber_donglenumber.lsfx**). Send the **LSFX** file as attachment to your email together with the description of your problem to service@lavision.de.

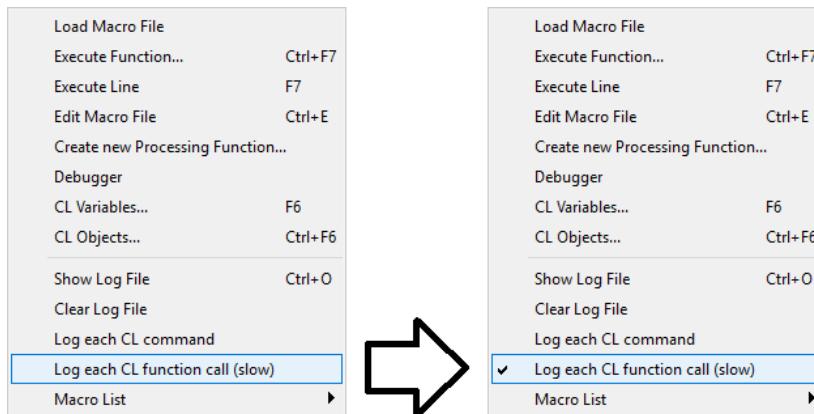
8.3 Log File

During startup of **DaVis**, some log files with names like LOG_<date>_<time>.txt are generated in the **DaVis** subdirectory Users/<name>/log. The name contains date and time of the **DaVis** startup, e.g., LOG_170615_150343.txt.

DaVis holds the last ten log files and removes older ones automatically.

If you have a reproducible software problem in **DaVis**, please send the complete log folder together with your email. These files contain all functions you have called and all error messages that have been displayed after you activated the log. Please proceed as follows:

1. Start **DaVis** and use the toolbar menu **Extras – Macro – Clear Log file**.
2. Enable the **Log each CL function call (slow)** entry in the menu. This feature is active if you see a flag at the left side of the entry. Every time you click on this entry, its status is changed.

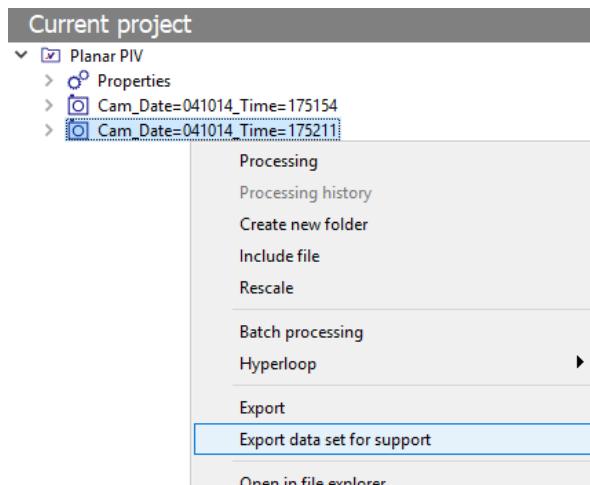


3. Try to reproduce your problem, e.g., until an error message is displayed.
4. A log file has been generated in the **DaVis** main directory. Send this text file attached to your email.
5. Disable mode **Log each CL function call (slow)**. This function is deactivated if you do not see a flag next to the entry.

8.4 Export Data Set for Support

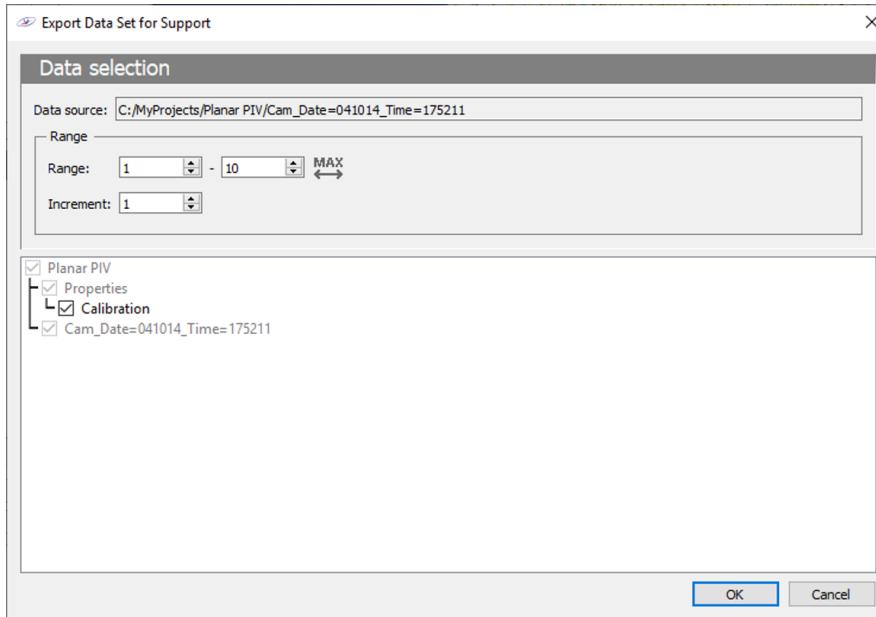
Some problems can only be reproduced using images or data that contain particular information or artifacts. For error analysis, it can be necessary to provide exemplary data that need to be extracted from the corresponding project.

Depending on the project type, the number of cameras used, and the error, it can be necessary to provide the corresponding calibration (spatial, temperature, etc.) and derivative data as well. A convenient way to extract the data from the project is the **Export data set for support** option, which you can select by right-clicking on the corresponding data set in the tree view of the **Project manager**.

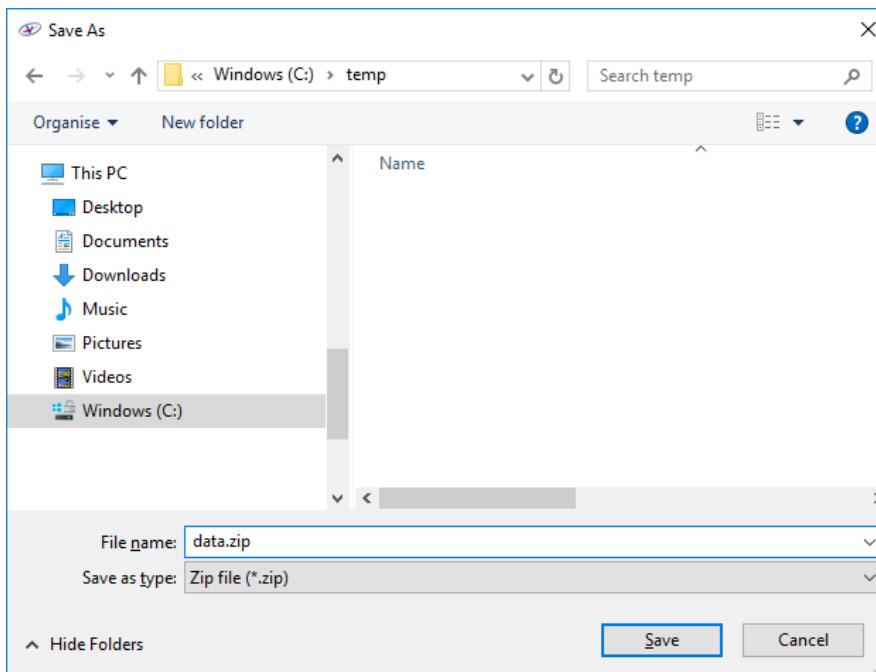


In the **Export data set for support** dialog, specify the range of data which you would like to extract from the data source by entering the range (i.e., first and last image). If a calibration is available in the project, this will be added by default. You have the option to deselect this part if it is not relevant.

8.4 Export Data Set for Support



After clicking the **OK** button, you need to specify location and file name for the zip file that contains the selected data.



DaVis will ask to open the containing folder or to send an email to service@lavision.de.

Note: Files with a size of more than 20 MB should not be sent by email.
LaVision can provide a link for uploading data via file drop. Please contact service@lavision.de for details.

8.5 Shipment of Defective Items

If any item needs to be returned to **LaVision** GmbH for service or repair, please contact the **LaVision** service to obtain a **RMA** (Return Material Authorization) number together with an RMA form. This will list all items with SN and a short description of the problem. Place the RMA form in the box with the item(s) being returned. Return the authorized item(s) according to the shipping instructions.

Shipping instructions:

- Be sure to obtain an RMA number and RMA form.
- Add the signed RMA form to the shipping documents.
- Ship only the items that are authorized.
- Use the original boxes to avoid damages during transportation.
- **Remove cooling water from the laser!**
- **Use antistatic bags for computer boards!**
- Ship returned items to:

LaVision GmbH
Anna-Vandenhoeck-Ring 19
37081 Göttingen
GERMANY

Note: Shipments received by **LaVision** without an RMA number may be refused.



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