DS-CAM 600

DEWESoft®

TECHNICAL REFERENCE MANUAL

DS-CAM-600 V21-3

1. Table of contents

2. About this document

2.1. Legend

The following symbols and formats will be used throughout the document.

Important
It gives you important information about the subject.
Please read carefully!

Hint
It gives you a hint or provides additional information about a subject.

Example
It gives you an example of a specific subject.

3. Key features

The DS-CAM-600 is a high-speed Gigabit-Ethernet camera with following key data:

- Up to 600 FPS @ VGA (640x480) or 333 FPS @ 2048 x 1088
- Real-time data streaming with full resolution
- Monochrome (DS-CAM-600m), color (DS-CAM-600c) and color waterproof (DS-CAM-600cw) version
- Power-over-Ethernet (PoE)
- Real-time JPEG compression
- Auto-white balance
- Triggered and free-run synchronization modes
- Adjustable shutter time
- Standard C-mount lens mounting
- Small compact form factor
- Rugged aluminium housing (high shock and vibration resistance)

The camera supports the high-performance industrial standard “GigE Vision”. The standard introduced in 2006 provides a framework for transmitting high-speed video and related control over Ethernet networks.

The benefits of the GigE Vision protocol are:

- High speed data transfer rates up to 1GBit/s (based on 1000Base-T),
- Connectible to every standard GigE Ethernet port,
- Cable lengths up to 100m.

DewesoftX® uses OptoStream SDK for communication with cameras that support GigE Vision standard.

Important
For best performance we recommend using a Core i5 CPU or higher performance and at least 4 GB RAM and internal SSD for storing data.

3.1. System Requirements

- 1 Gigabit-Ethernet port
- High-performance PC (Core i5 CPU or better recommended, 4 GB RAM and high performance SSD storage disc)
- DewesoftX®
- The latest OptoStream SDK
- Dewesoft GigE driver (cdv)

4. Technical data

4.1. Specification

DS-CAM-600	
Color option	
Color	✓
Monochrome	✓
Color waterproof	✓
Optical specifications	
Image sensor	CMOSIS CMV2000 2E5M1PP
Sensor type	CMOS
Resolution	Up to 2048x1088
FPS	331 FPS @ 2048x1088 334 FPS @ 2048x1080 591 FPS @ 800x600 733 FPS @ 640x480
Sensor size	2/3'' (12.7 mm diagonal)
Pixel size (in µm)	5.5 x 5.5
Dynamic range	60 dB
Shutter	Electronic Global Shutter
Shutter time	210 ns - 90 s
Autp-white balance	Color (DS-CAM-600c): ✓ Monochrome (DS-CAM-600m): X Waterproof (DS-CAM-600cw): ✓
Picture compression	JPEG
Mechanical specifications	
Operating temperature	0 .. +50°C
Operating humidity	25% - 80% (non-condensing)
Dimensions	94 (H) x 54 (W) x 65.5 (D) mm 3.70 (H) x 2.13 (W) x 2.22 (D) in
Lens mount	C-mount
Connectors	Gigabit Ethernet: RJ45, L00B4f

Conformity	CE EN55022, class A EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-6 FCC Part 15, class A RoHS GigE Vision 1.2
Power specifications	
Supply voltage	Power-over-Ethernet (42-57V)
Power-over-Ethernet	✓
Power consumption	6 W

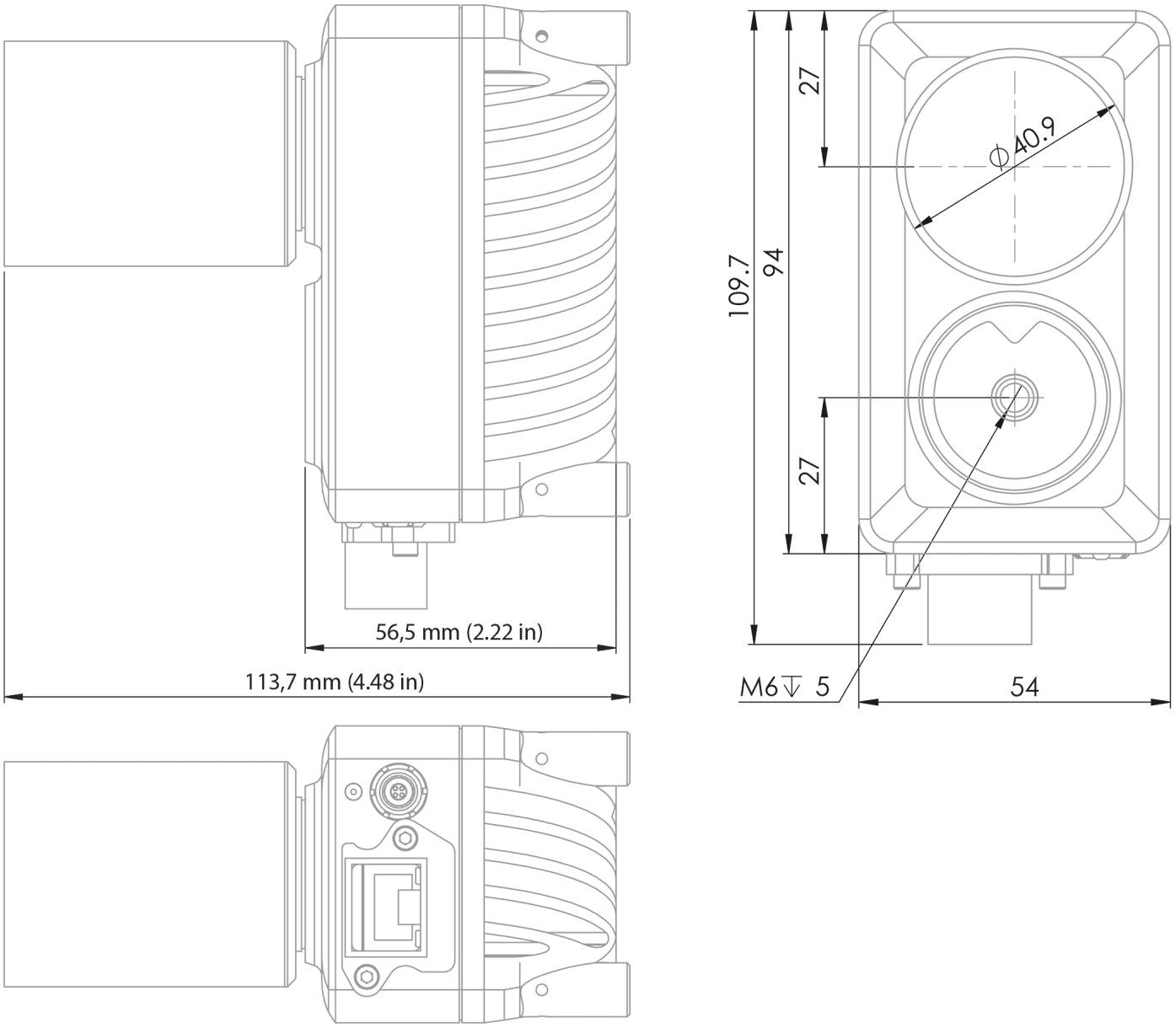

Illustration 1: Technical drawing of DS-CAM-600

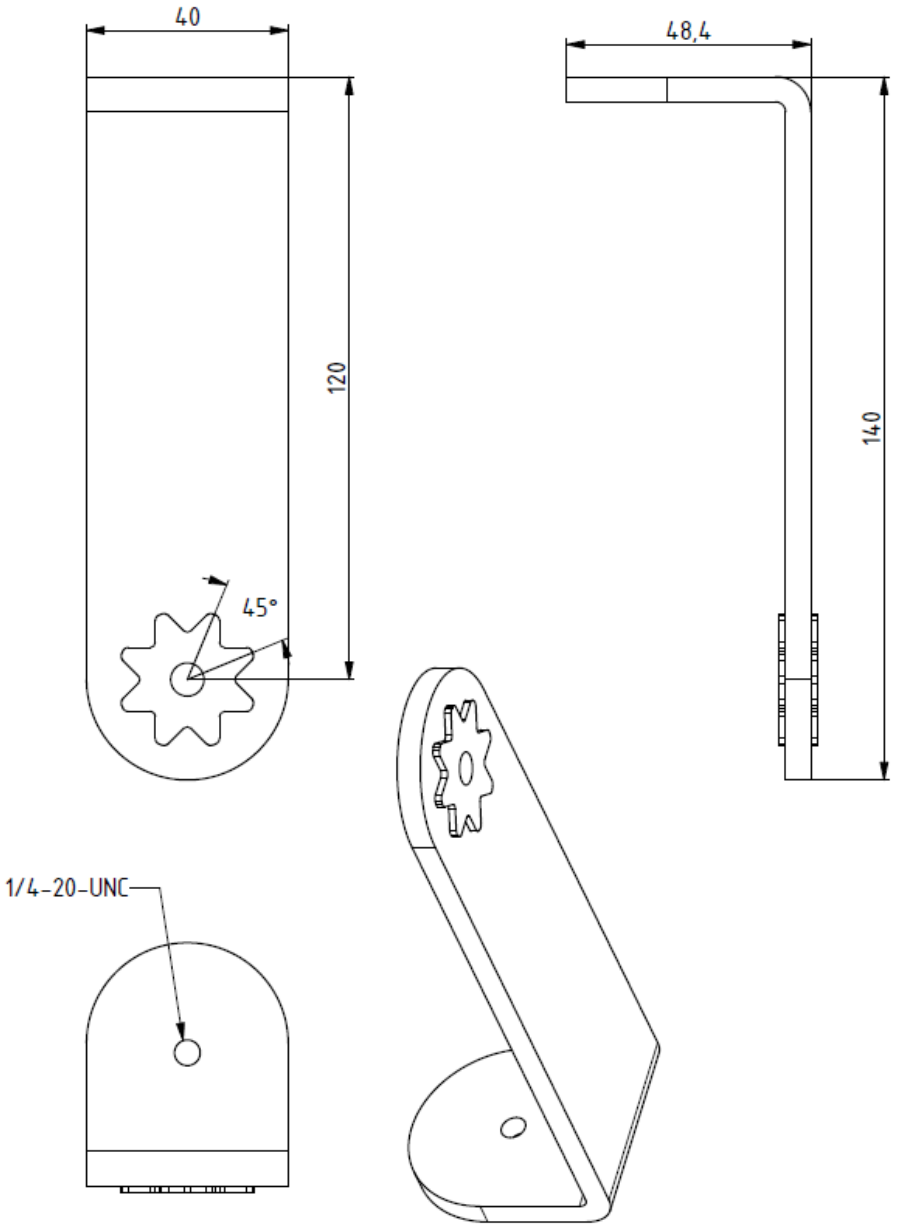

Illustration 2: L holder for camera mounting.

4.2. Scope of supply

4.2.1. DS-CAM-600 camera versions

The table below describes different variations of DS-CAM-600

Type	Usage
DS-CAM-600c	Color
DS-CAM-600cw	Color waterproof
DS-CAM-600m	Monochrome

4.2.2. DS-CAM-600 Accessories

Type	Usage
LENS-AZURE-1614MM	Azure 1614MM C-MOUNT lens
MOUNT-VERTICAL	L holder for perpendicular camera mounting with 1x 1/4-20 UNC thread
CABLE-L00B4m-L00B4m-3m	Sync cable for camera synchronization
CABLE-UTP-CAT.6-1M	RJ45 CAT 6 cable, for data transfer to PC
Cable-CAT. 5E-SF-UTP-IP67-5m	Ethernet cable for PoE and data. IP67 connector at camera side.
POE-LAN-POWER-ADAPTER	PoE (Power over Ethernet) adapter with EURO cable
CASE_XTRABAG 300	Carrying bag

Illustration 2: Scope of supply for DS-CAM-600c. Scope of supply for the waterproof version has ruggedized chassis and waterproof connector types.

4.3. Connections

4.3.1. Connectors and pinout

On the backside of the camera there are two connectors. One for the trigger input (4 pin 0B size lemo -called “IO connector”) and the second one for the data transfer (standard RJ45 ethernet connector).

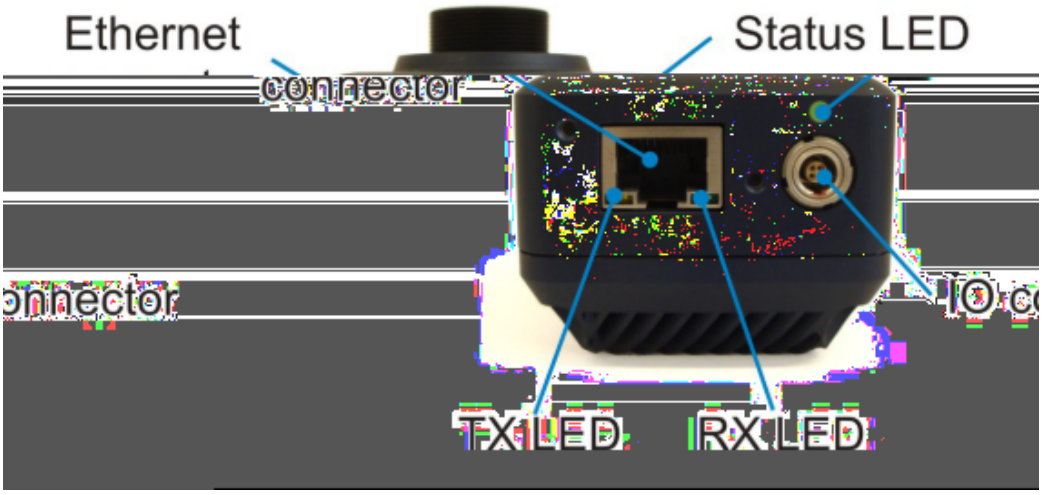

Illustration 2: Connectors on DS-CAM-600

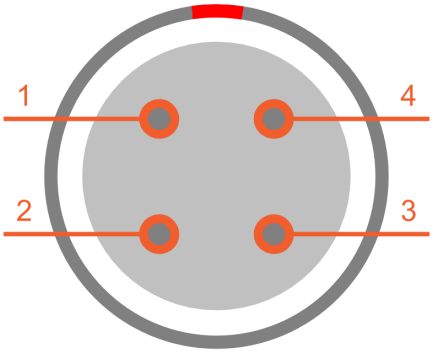

Illustration 3: IO connector pin-out (4-pin LEMO female)

Pin	Name	Description
1	-	Do not use
2	-	Do not use
3	CLK	
4	GND	

Interface connector: EEG.00.304.CLL
Mating connector: FGG.00.304.CLAD27Z

Hint
Pin 3 and pin 4 are used for clocking the camera. Pins 1 and 2 are reserved for synching multiple Dewesoft instruments!

4.3.2. SIRIUS® connection example

The picture below shows a typical camera connection with SIRIUS® (the top slice) and SIRIUS-SBOX (the bottom slice) instrument is shown..

The camera has to be powered by RJ45 - PoE (Power over Ethernet), therefore a Power injector is required (Gigabit-LAN port of computer → PoE injector → camera).

The second cable (L00B4m-L00B4m-xM) provides the trigger. It is connected to the SYNC port of the SIRIUS® slice and IO connector on the DS-CAM-600. With this connection the camera frames will be in perfect sync with the analog data acquired by DewesoftX®.

Hint

Even if the camera is connected, synching to other SIRIUS® devices is still possible, because there are different pins used on the Sync-Connector for triggering/synching (see also IO connector pinout).

Illustration 4: SIRIUS S-BOX with SIRIUS® slice on top, connected to the DS-CAM-600 (PoE injector in between)

4.3.3. KRYPTON® connection example

The picture below of a typical camera connection with KRYPTON® device, SYNC Junction and KRYPTON-CPU is shown.

The camera has to be powered by RJ45 - PoE (Power over Ethernet), therefore a Power injector is required (Gigabit-LAN port of computer → PoE injector → camera).
The second cable (L00B4m-L00B4m-xM) provides the trigger. It is connected to the SYNC port of the SYNC Junction and IO connector on the DS-CAM-600. With this connection the camera frames will be in perfect sync with the analog data acquired by DewesoftX® running on the Krypton CPU.

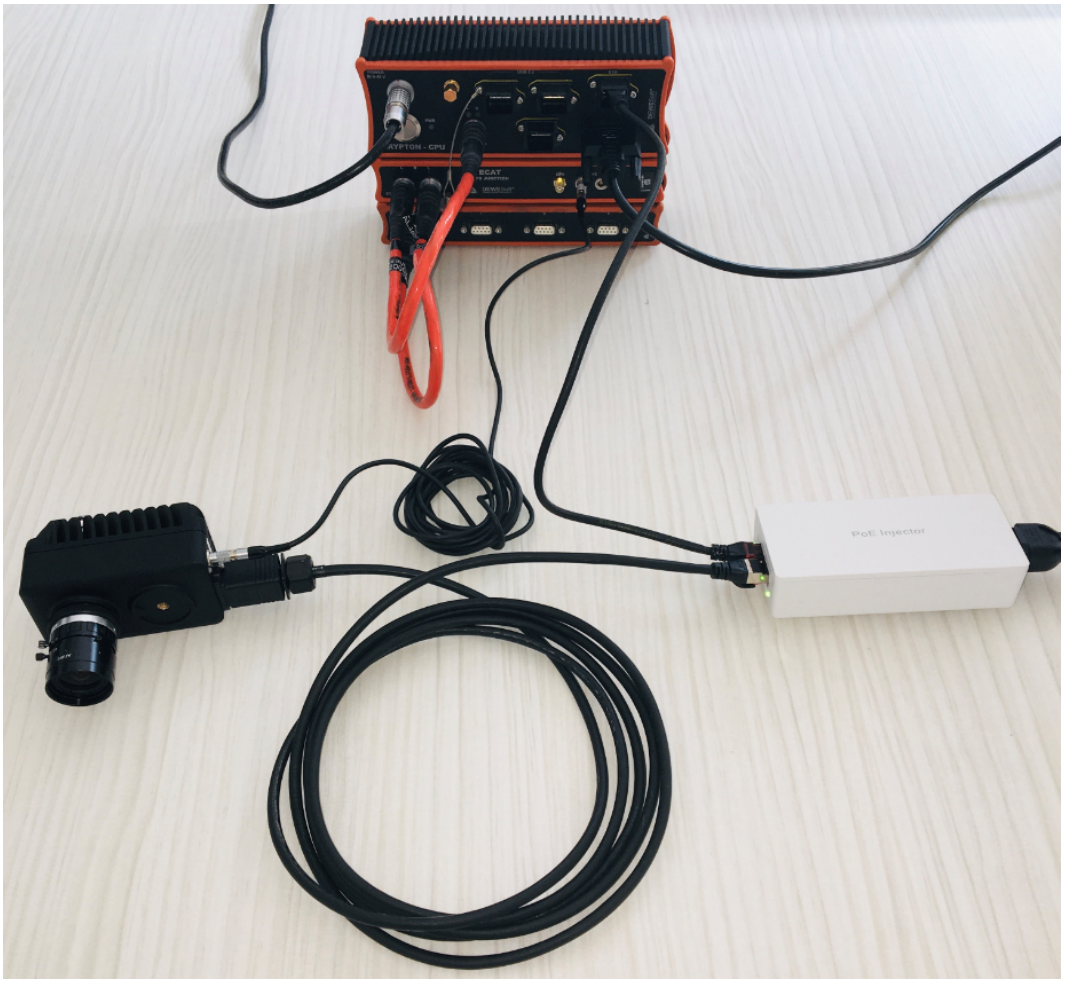

Illustration 5: KRYPTON® 3xSTG with Sync Junction and Krypton CPU on top, connected to the DS-CAM-600 (PoE injector in between)

Hint

Even if the camera is connected, synching to other Dewesoft devices is still possible, because there are different pins used on the Sync-Connector for triggering/synching (see also IO connector pinout).

4.4. Resolutions / Framerates

Sensor type	CMV2000
Active pixels	2048 x 1088

STANDARD RESOLUTIONS

Resolution	Active pixels	MAX. FRAME RATE
Full frame 2.2M	2048 x 1088	331 FPS
2K	2048 x 1088	334 FPS
HD 1080	1920 x 1080	334 FPS
SXGA	1280 x 1024	352 FPS
XGA	1024 x 768	466 FPS
HD 720	1280 x 720	495 FPS
SVGA	800 x 600	591 FPS
PAL	768 x 576	615 FPS
WVGA	752 x 480	733 FPS
VGA	640 x 480	733 FPS
QVGA	320 x 240	1405 FPS

Hint
Results (FPS) should be considered only as approximate MAX values. It depends on the system performance (CPU, JPEG compression, harddisk). We recommend to test cameras with your setup at about 0.8*max_FPS and higher to find where corrupted image, frame loss or buffer overrun will occur.

5. Installation

5.1. DewesoftX® full installer

For DewesoftX® all the drivers come with the full installer, if you select the option “GigE camera driver” during installation. To check if the drivers are installed, go to Options → Installed extensions and see if the checkbox “GigE” is visible. If not, execute the full installer again, choose the Modify option and enable the checkbox of GigE camera.

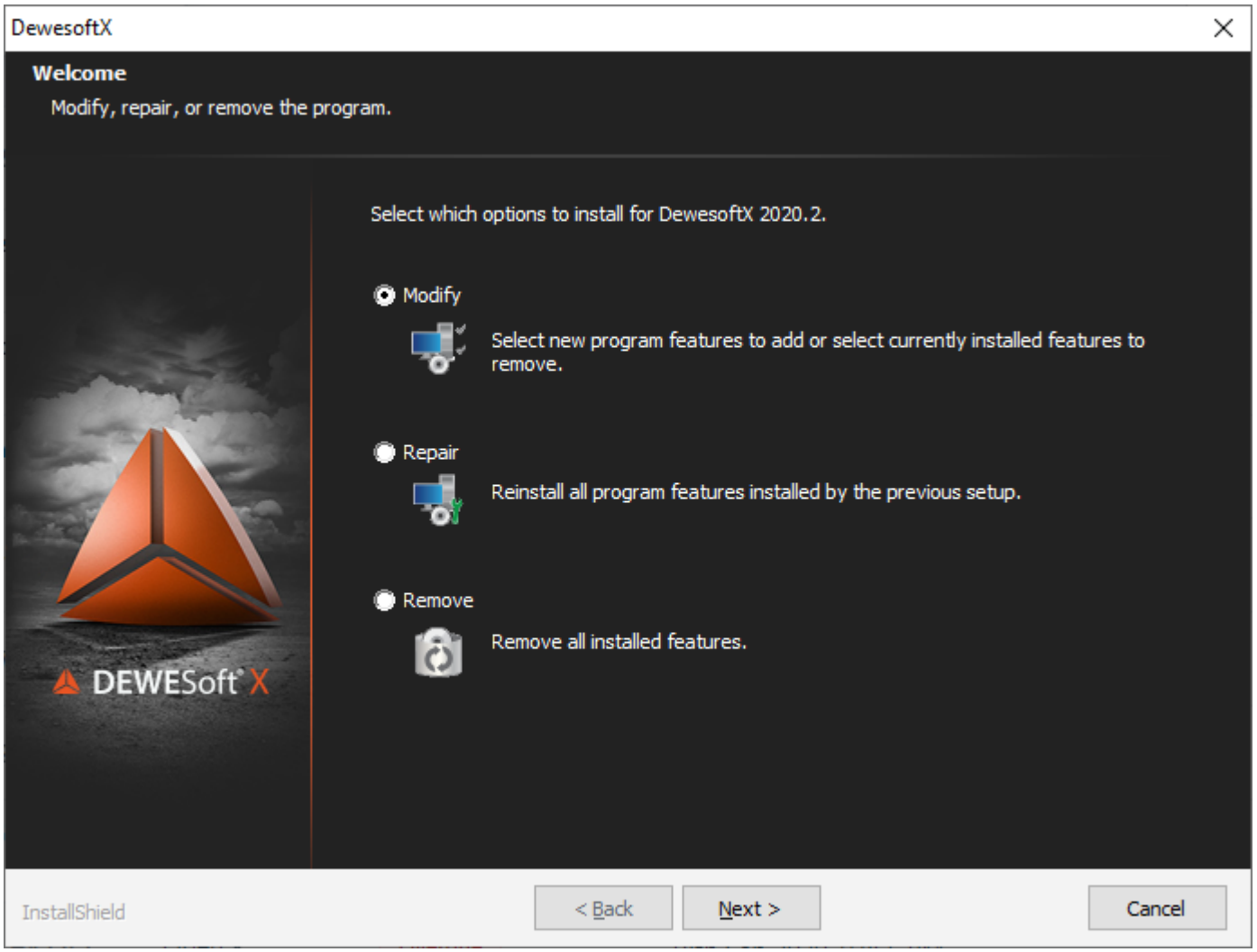

Illustration 6: Installation

The last DewesoftX® full installer can be downloaded here:
https://download.dewesoft.com/list/dewesoftx

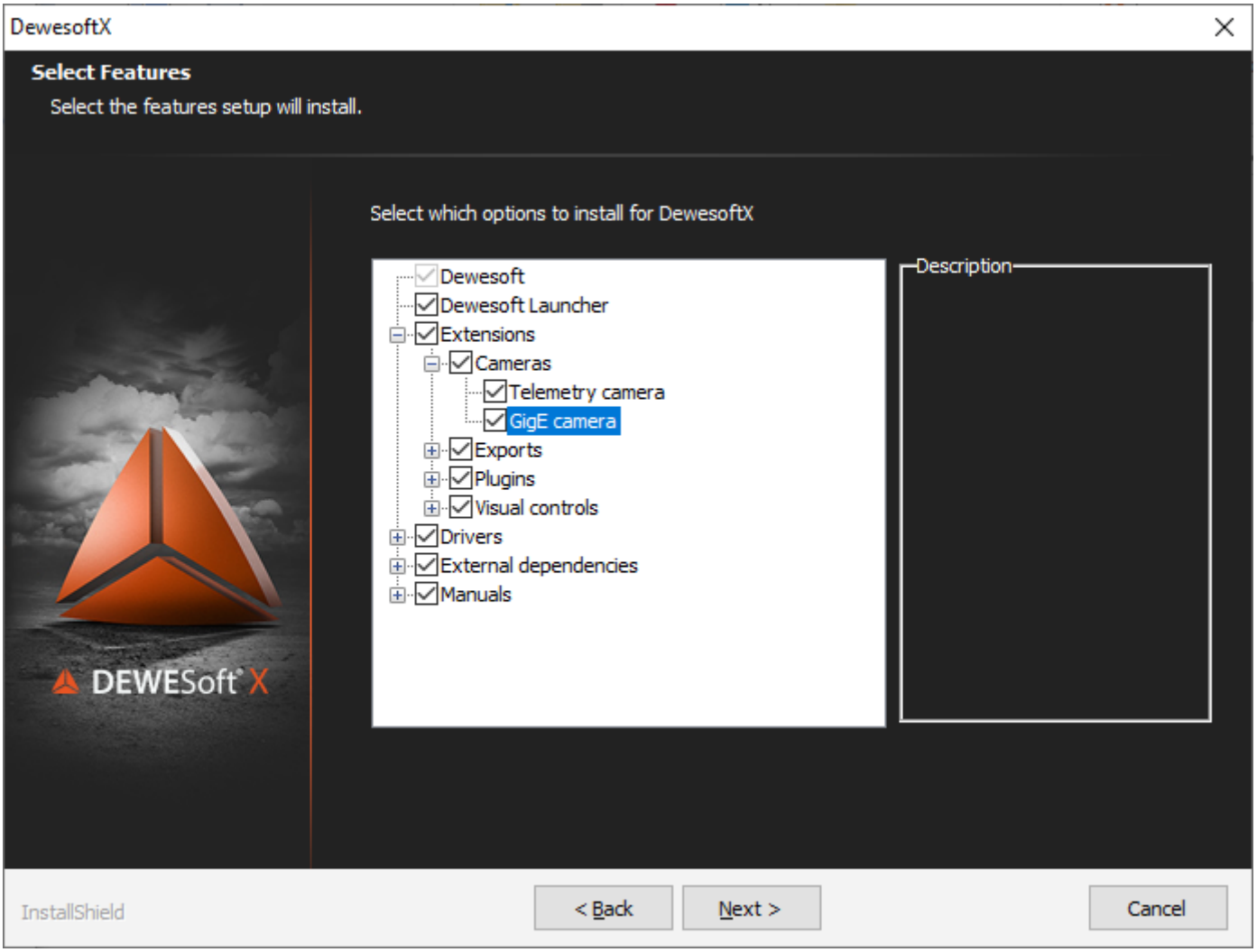

Illustration 7: Installing GigE camera driver

5.2. Manual installation

5.2.1. Required files

OptoStream SDK for GigE Vision

- Go to https://download.dewesoft.com/list/plugins/ and download GigE package
- It includes the latest OptoStream SDK and Dewesoft driver for GigE Vision.

DewesoftX®

- Available from https://download.dewesoft.com/list/dewesoftx

Hint

You need to be logged into the Dewesoft website to download the latest development versions of DewesoftX®.

5.2.2. Step-by-step instruction

1st step: Install OptoMotive_OptoStreamSDK
Note that you must be an administrator, not just a user with admin rights! Restart the PC after installation is complete. After reboot be sure that “OptoStream GEM Filter Driver” is installed (picture 1) under Local area Connection Properties.

Hint
Note that “Filter Driver” filters out all packets that are not GigE on hardware level, so the camera will work much faster than without the filter.

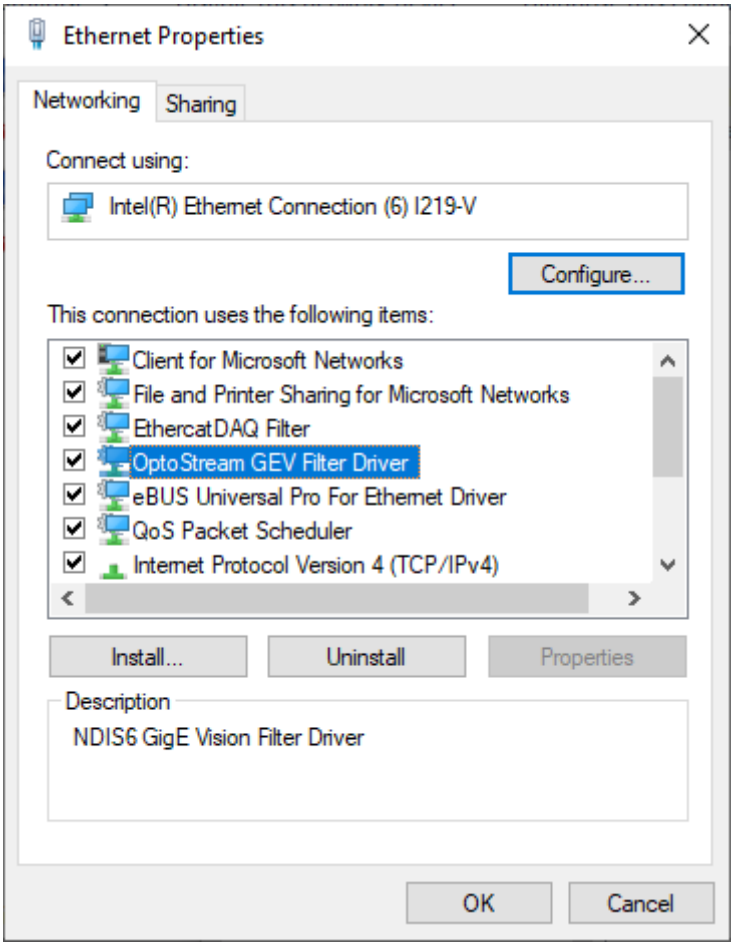

Illustration 8: Installed OptoStreamViewer GEV Filter Driver.

2nd step: Connect camera to PC via Ethernet cable and PoE Power Injector in between

3rd step: Assigning IP address to camera

The DS-CAM-600 supports DHCP, so just set your computer's IP address to automatic and wait until the IP is assigned. To test if the camera is working you can run OptoStreamViewer. By right-clicking on the camera model you can also set IP to fix, if you prefer.

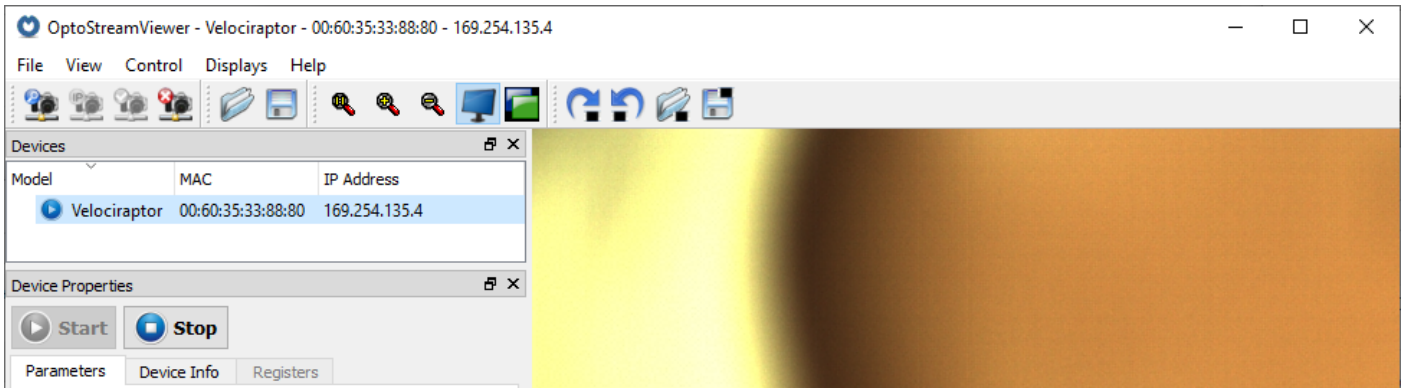

Illustration 9: OK, cameras can be used, close the OptoStreamViewer and start DewesoftX®.

Important

Avoid using OptoStreamViewer and DewesoftX® in parallel.

4th step

To enable the camera in DewesoftX® copy the file “GigECamera.cdv” into the Dewesoft Addons folder, usually located in “C:\DewesoftX\Bin64\Addons64\GigeCam”.

5th step

Run the "Dewesoft DCOM Registration” to register the plugin.

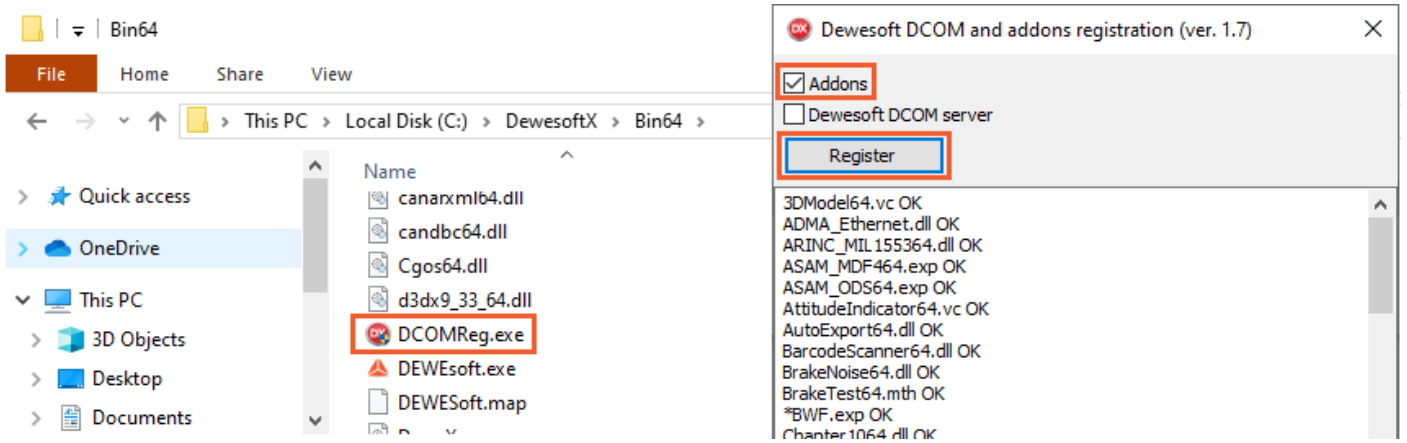

Illustration 10: OK, cameras can be used, close the OptoStreamViewer and start DewesoftX®

6th step

Start DewesoftX® and go to Options → Settings → Analog. For triggered mode (DewesoftX® is clocking the camera), check if your device (such as DEWE-43 for example) is set to Automatic or Clock/Trigger:

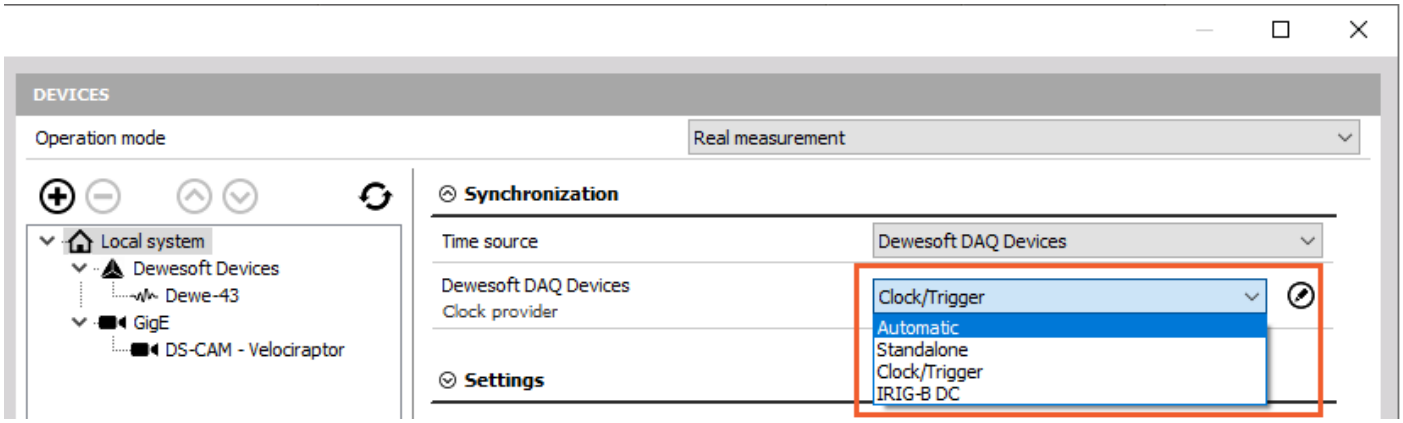

Illustration 11: Options → Settings: Set device to Automatic (Standalone) or Clock/Trigger

7th step

Go to the GigE tab and set “Use trigger”.

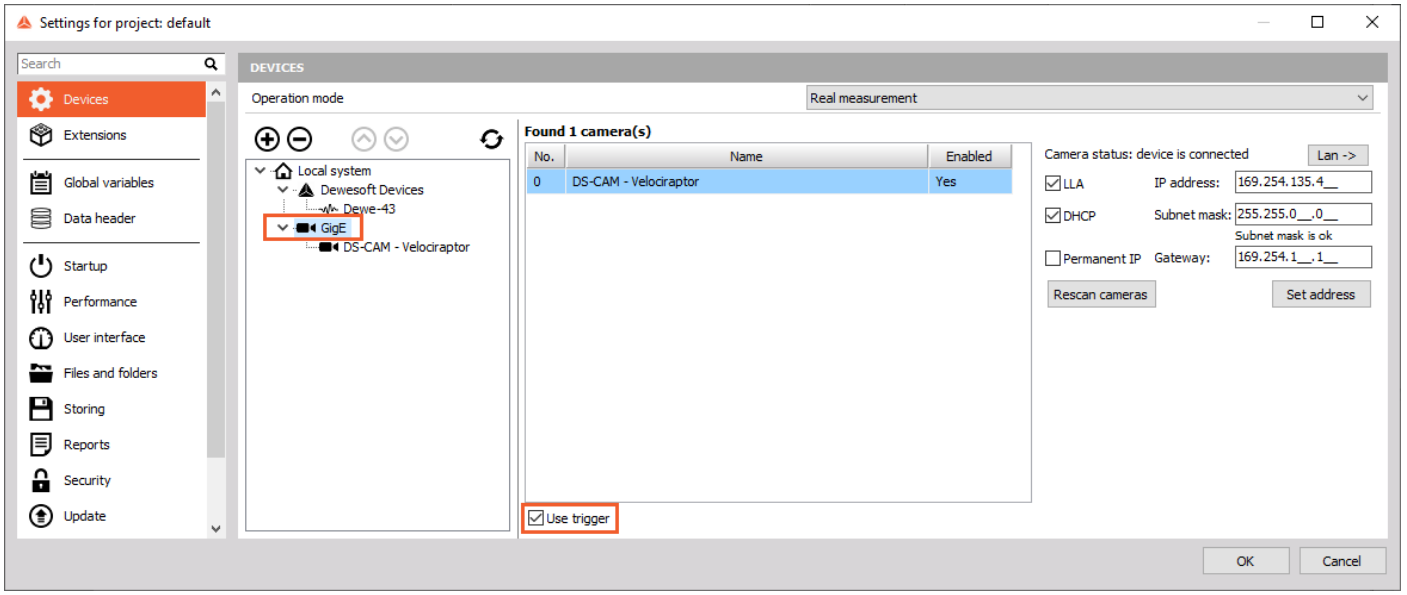

Illustration 12: DewesoftX® hardware setup, add GigE.

“File format” should be set to “DVI” which is uncompressed DewesoftX® video format. The CPU will not have enough power to additionally do the “live” compression. Depending on the measurement duration, the video file can get very big. For compression after the measurement set the appropriate compressor in “AVI file type for compression”. We recommend downloading the XVID codec. In Analysis mode you can then select your datafile and click “AVI compress”.

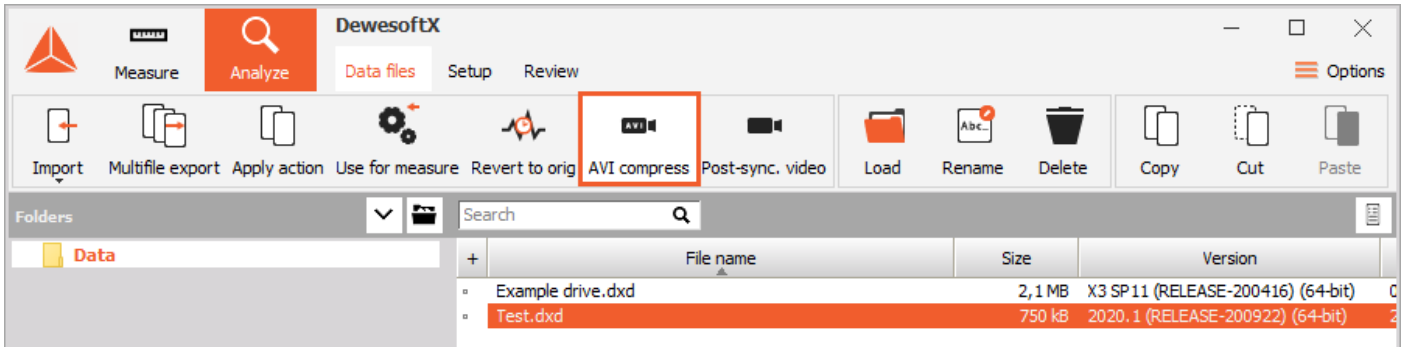

Illustration 13: AVI compress after measurement

8th step

Go to Ch. Setup, click the Video tab, click the Unused button to enable the video channel.

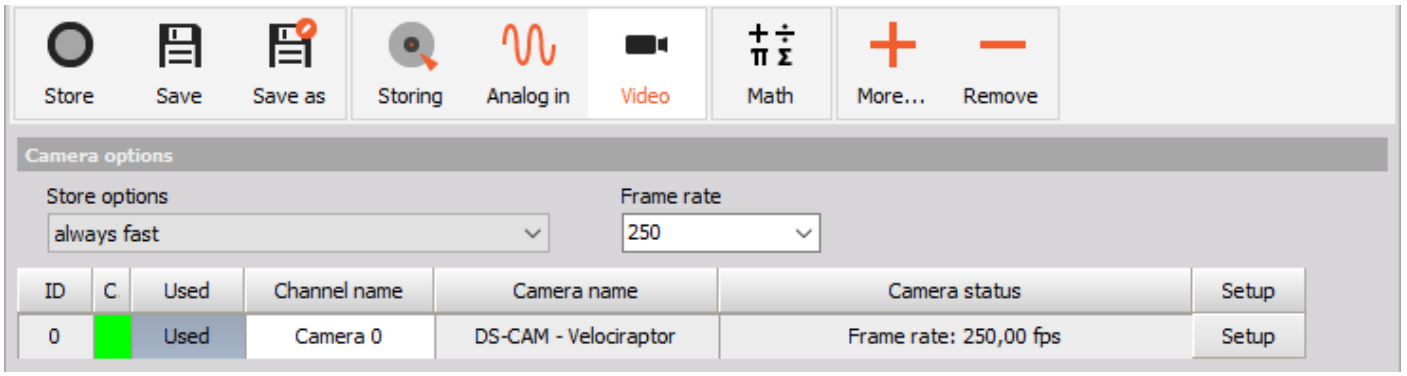

Illustration 14: DewesoftX® Channel setup → add Video

Hint

Ensure the firmware version of Dewesoft hardware is up to date, otherwise follow the instructions of how to do it in the Updating firmware article.

9th step

Enter the channel setup. By now, already a picture should be shown.

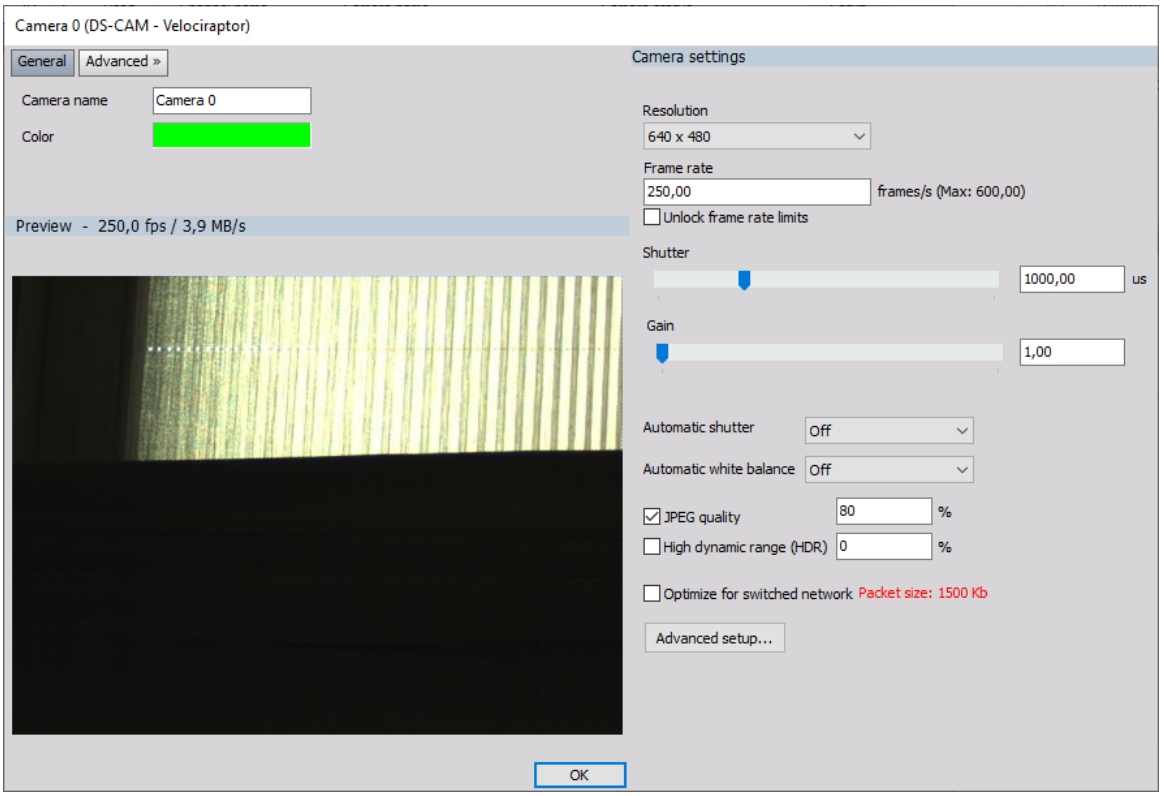

Illustration 15: DewesoftX® video channel setup

- The shutter bar determines the light exposure duration (brightness).
- If the light is too dark, use the gain bar to increase brightness by software.
- The JPEG quality is inversely to the compression. 80% means good quality, low compression.

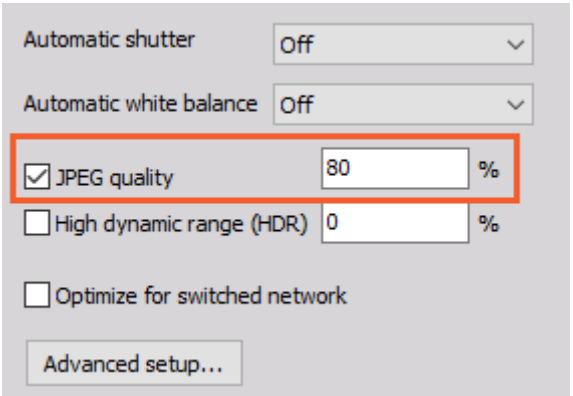

Illustration 16: Poor and good picture quality

- With the HDR option you are able to increase the dynamic from 60 up to 120dB if you have an image with low dynamic range (e.g. only light grey and dark grey shapes).
- To improve the performance if using the camera on an Ethernet switch, use “Optimize for switched network”

- Use the “Advanced Setup”, if you want to change specific parameters of the camera, such as the custom resolution and AOI, area of interest, for instance.

Hint
If you change the frame rate, after typing the value, the input field gets a yellow color; confirm the value by pressing the Enter key.

6. Troubleshooting guide

GigE checkbox in Settings is missing

Go to My Computer and click System properties → Advanced system settings → Advanced tab → Environment Variables → System variables → select Path → Edit.

Make the following changes:

- %OPTOSTREAM_SDK_PATH%\bin
- %GENICAM_ROOT_V2_4_ARCH%\bin\Windows
- %GENICAM_ROOT_V2_4_ARCH%\bin\Windows \GenApi\Generic

Save and reset Windows. Path correctness can be checked by GetEnvironmentVariable('PATH');

No picture shown, “No frames received” error

If you receive the error “NO FRAMES RECEIVED”, check: •

- Is the Trigger/Sync cable connected?
- Try decreasing the Shutter value
- Check in Settings if the DewesoftUSB device is set to Clock/Trigger or Automatic (Standalone)
- Disable Trigger in hardware setup and check if it’s working in free-run mode (This could potentially be a cable problem. Swap in new cables and try again)

Camera not found (not in OptoStreamViewer, not in DewesoftX®)

- Check if the status LED on the camera is green, booting takes ABOUT 1 MINUTE!
- If using a GigE-Switch with PoE ports, ensure output power is sufficient, check status LED during operation
- Check Windows Firewall settings

Camera not found (not found in DewesoftX®; yellow mark in OptoStreamViewer)

Not able to use the cameras. Please wait a little bit (until IP is assigned). If that does not help, ensure the computer's network IP is set to automatic, as the camera supports DHCP.

Further troubleshooting, most probably the computer and the camera are not in the same subnet.

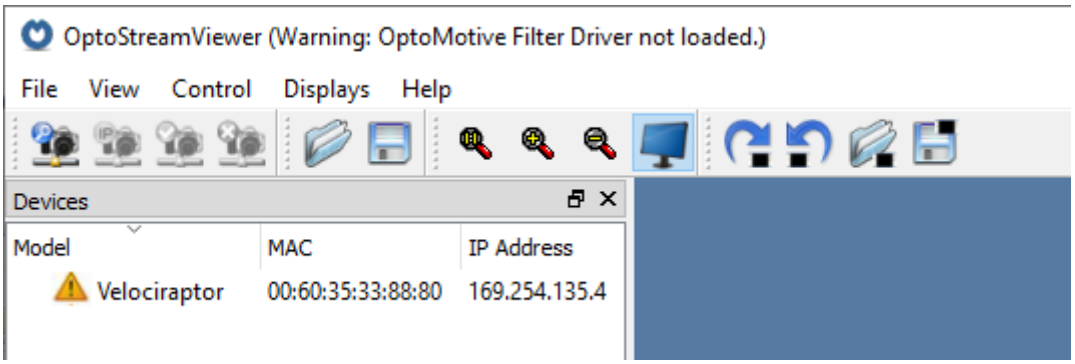

Illustration 16: IP address problem

Important
You should avoid using OptoStreamViewer and DewesoftX® in parallel. If the cameras are found, close DewesoftX® restart OptoStreamViewer.

Change IP address of the camera

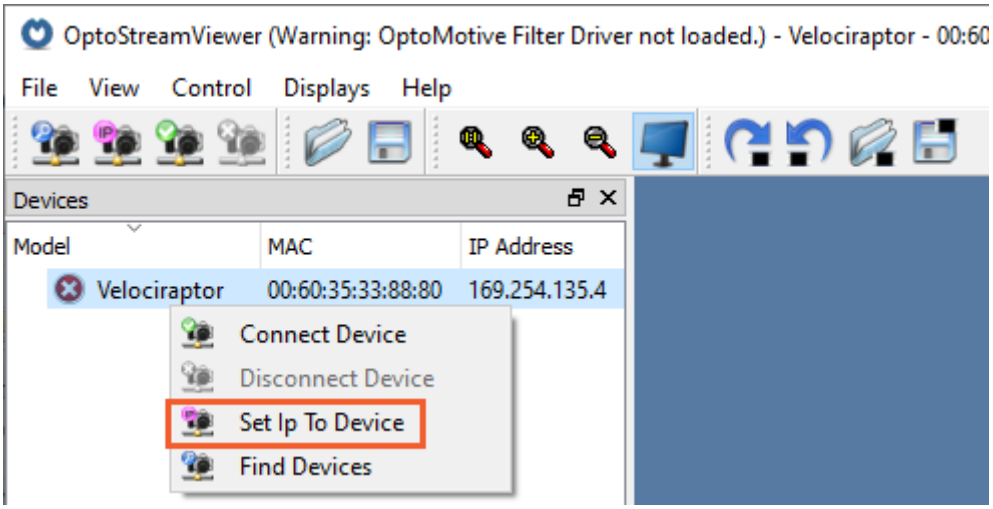

Illustration 17: Change IP address of the camera

If you manually change the IP address, please use the same subnet as the computer, example:

PC: 169.254.135.5, **Subnet 255.255.255.0**

Camera: 169.254.135.4, **Subnet 255.255.255.0**

The IP is ok, if the cameras are found with a red mark (see Illustration above), close OptoStreamViewer and start DewesoftX®.

GigEVision client does not start, error message when starting

Troubleshoot this using the following steps: Check if the operating system of your computer is 32bit or 64bit.

Copy the 64-bit dlls (otherwise take the ones from the 32bit directories) from

C:\Program Files\OptoMotive\OptoStreamSDK\bin\Win64 and

C:\Program Files\OptoMotive\OptoStreamSDK\GenICam_v2_4\bin\Win64_x64 to

\Windows\system32 (respectively \Windows\SysWOW64)

Then start the OptoStreamViewer from C:\Program Files\OptoMotive\OptoStreamSDK\bin\Win64

Cameras not working in DewesoftX®

If you followed the step-by-step installation procedure, but still the camera is not working in DewesoftX®, you can try to copy the used dlls manually:

Copy the 32-bit dlls from

C:\Program Files\OptoMotive\OptoStreamSDKbin\Win32

and

C:\Program Files\OptoMotive\OptoStreamSDK\GenICam_v2_4\bin\Win32_i86

to

Dewesoft's Addons folder.

Then restart DewesoftX®.

Performance improvements (e.g. in case of frames lost or buffer overrun)

A loss of a few frames during a measurement is normal, due to collisions on the Ethernet network.

Here are some useful hints to improve the performance:

- Do not operate the camera in a fully loaded network (e.g. office computers). Just use direct connection or one switch (with no additional participants).
- Disable all anti-virus, firewall, indexing and synchronization programs running in background.
- Verify that the PC has a Gigabit-Ethernet network card, not only 100Mbit/s.
    - Check this in Device Manager tools
- Verify that the LAN cable being used between the camera and the PC is at least CAT5 quality. For longer cable lengths CAT6 cable should be used for optimal performance.

- For this camera, the best quality can be achieved by using a powerful CPU.
- Try to decrease the JPEG compression (e.g. from 80 down to 50%)
- Use the Windows resource monitor (can be found in Task manager) to check for bottlenecks.
    - Check CPU and RAM
- For optimal performance we recommend enabling “Jumbo” frames on your PC network card. “Jumbo” frames are Ethernet packets larger than 1500 bytes. This way less CPU time is spent for data reception therefore increasing performance and minimizing data loss. (Control panel → network and internet → view network status and tasks (network and sharing center) → change adapter settings → right-mouse-click on LAN connection → Properties → Configure → Advanced → Jumbo Frame → set to highest value (e.g. 9kB MTU))
- Also an overloaded DewesoftX® setup (many displays, e.g. high resolution FFT instruments) will take system power. Try at first only with camera video instruments.
- Press <Ctrl>+<Shift>+<P> in DewesoftX® Measure mode. On the right side the performance monitor will appear. Watch the Cam video buffer. It should stay stable at low values.

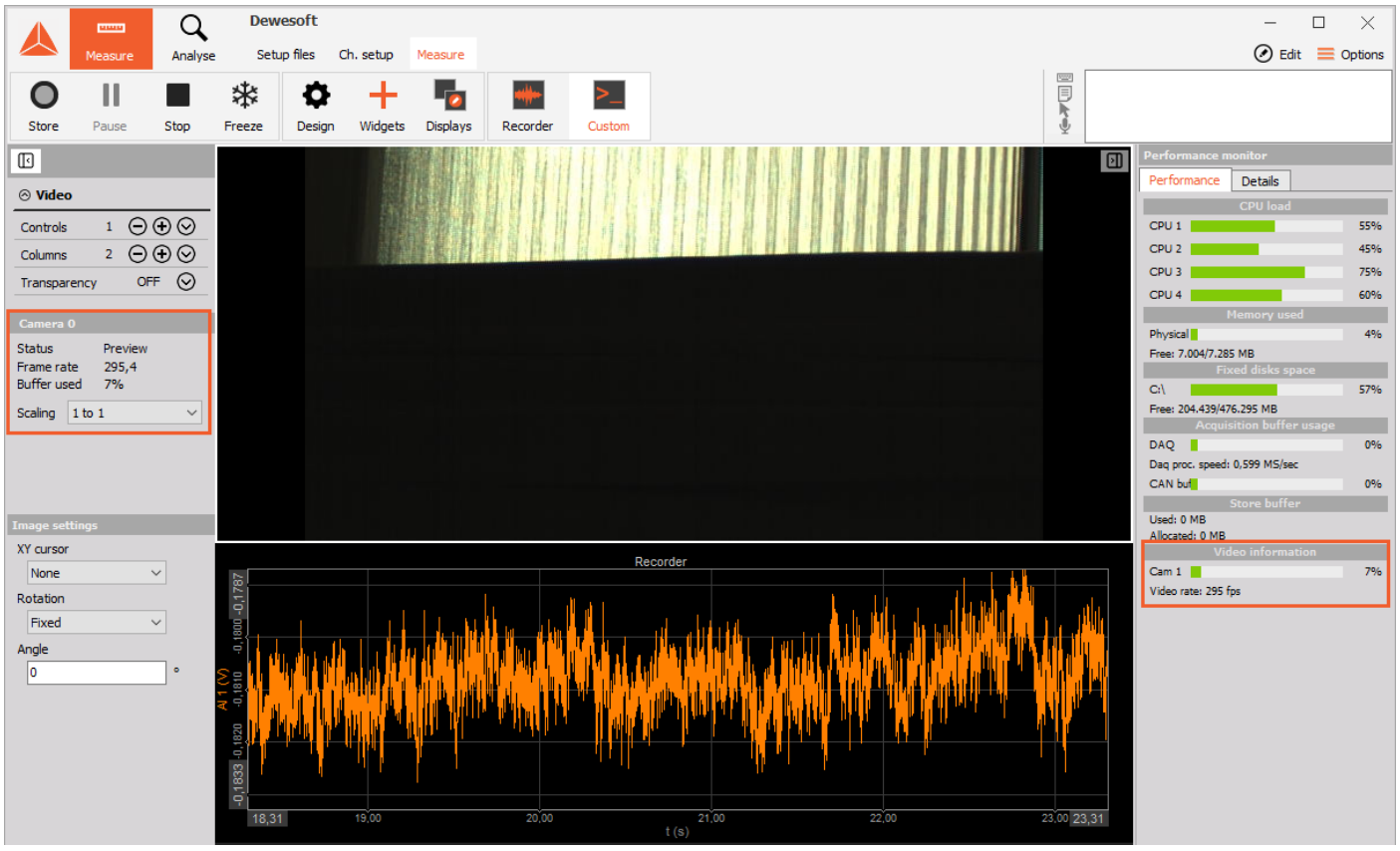

Illustration 18: DewesoftX® Performance monitor

6.1. Reference list

(a) Velociraptor HS: https://www.optomotive.com/category/velociraptor-hs

(b) SIRIUS® Technical manual:
https://download.dewesoft.com/download-file/dewesoft-sirius-manual-enpdf

7. Warranty information

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The copy of the specific warranty terms applicable to your Dewesoft product and replacement parts can be obtained from your local sales and service office. To find a local dealer for your country, please visit https://dewesoft.com/support/distributors.

7.1. Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your Dewesoft data acquisition system is delivered, it is calibrated. Detailed calibration reports for your Dewesoft system can be requested. We retain them for at least one year, after system delivery.

7.2. Support

Dewesoft has a team of people ready to assist you if you have any questions or any technical difficulties regarding the system. For any support please contact your local distributor first or Dewesoft directly.

Dewesoft d.o.o.
Gabrsko 11a
1420 Trbovlje Slovenia

Europe Tel.: +386 356 25 300
Web: http://www.dewesoft.com
The telephone hotline is available Monday to Friday from 07:00 to 16:00 CET (GMT +1:00)

7.3. Service/repair

The team of Dewesoft also performs any kinds of repairs to your system to assure a safe and proper operation in the future. For information regarding service and repairs please contact your local distributor first or Dewesoft directly on https://dewesoft.com/support/rma-service.

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Version 2.0.0, Revision 217 Released 2015 Last changed: 23. July 2018 at 16:54.

7.6. Copyright

7.8. Trademarks

We take pride in our products and we take care that all key products and technologies are registered as trademarks all over the world. The Dewesoft name is a registered trademark. Product families (KRYPTON, SIRIUS, DSI, DS-NET) and technologies (DualCoreADC, SuperCounter, GrandView) are registered trademarks as well. When used as the logo or as part of any graphic material, the registered trademark sign is used as a part of the logo. When used in text representing the company, product or technology name, the ® sign is not used. The Dewesoft triangle logo is a registered trademark but the ® sign is not used in the visual representation of the triangle logo.

8. Safety instructions

Your safety is our primary concern! Please be safe!

8.1. Safety symbols in the manual

Warning
Calls attention to a procedure, practice, or condition that could cause the body injury or death

Caution
Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

8.2. General Safety Instructions

Warning

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Dewesoft d.o.o. assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as an option and will not be shipped as standard parts.

8.2.1. Environmental Considerations

Information about the environmental impact of the product.

8.2.2. Product End-of-Life Handling

Observe the following guidelines when recycling a Dewesoft system:

8.2.3. System and Components Recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at its end of life! Please recycle this product in an appropriate way to avoid unnecessary pollution of the environment and to keep natural resources.

This symbol indicates that this system complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the Dewesoft web site www.dewesoft.com

Restriction of Hazardous Substances
This product has been classified as Monitoring and Control equipment and is outside the scope of the 2002/95/EC RoHS Directive. However, we take care of our environment and the product is lead-free.

8.2.4. General safety and hazard warnings for all Dewesoft systems

Safety of the operator and the unit depend on following these rules.

- Use this system under the terms of the specifications only to avoid any possible danger.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- DO NOT touch internal wiring!
- DO NOT use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- You may not connect higher voltages than rated to any connectors.
- The power cable and connector serve as Power-Breaker. The cable must not exceed 3 meters, the disconnect function must be possible without tools.
- Maintenance must be executed by qualified staff only.
- During the use of the system, it might be possible to access other parts of a more comprehensive system. Please read and follow the safety instructions provided in the manuals of all other components regarding warning and security advice for using the system.
- With this product, only use the power cable delivered or defined for the host country.
- DO NOT connect or disconnect sensors, probes or test leads, as these parts are connected to a voltage supply unit.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non-interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals.

- Please note the characteristics and indicators on the system to avoid fire or electric shocks. Before connecting the system, please read the corresponding specifications in the product manual carefully.
- The inputs must not, unless otherwise noted (CATx identification), be connected to the main circuit of category II, III and IV.
- The power cord separates the system from the power supply. Do not block the power cord, since it has to be accessible for the users.
- DO NOT use the system if equipment covers or shields are removed.
- If you assume the system is damaged, get it examined by authorized personnel only.
- Adverse environmental conditions are Moisture or high humidity Dust, flammable gases, fumes or dissolver Thunderstorm or thunderstorm conditions (except assembly PNA) Electrostatic fields, etc.
- The measurement category can be adjusted depending on module configuration.
- Any other use than described above may damage your system and is attended with dangers like short-circuiting, fire or electric shocks.
- The whole system must not be changed, rebuilt or opened.
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until the safe operation can be verified by service-trained personnel. If necessary, return the product to Dewesoft sales and service office for service and repair to ensure that safety features are maintained.
- If you assume a more riskless use is not provided anymore, the system has to be rendered inoperative and should be protected against inadvertent operation. It is assumed that a more riskless operation is not possible anymore if the system is damaged obviously or causes strange noises. the system does not work anymore. The system has been exposed to long storage in adverse environments. the system has been exposed to heavy shipment strain.
- Warranty void if damages caused by disregarding this manual. For consequential damages, NO liability will be assumed!
- Warranty void if damage to property or persons caused by improper use or disregarding the safety instructions.
- Unauthorized changing or rebuilding the system is prohibited due to safety and permission reasons (CE).
- Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not be covered!
- Only fuses of the specified type and nominal current may be used. The use of patched fuses is prohibited.
- Prevent using metal bare wires! Risk of short circuit and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy over-voltage). An advanced range of application under certain conditions is allowed with therefore designed products only. For details please refer to the specifications.
- Make sure that your hands, shoes, clothes, the floor, the system or measuring leads, integrated circuits and so on, are dry.
- DO NOT use the system in rooms with flammable gases, fumes or dust or in adverse environmental conditions.
- Avoid operation in the immediate vicinity of high magnetic or electromagnetic fields, transmitting antennas or high-frequency generators, for exact values please refer to enclosed specifications.

- Use measurement leads or measurement accessories aligned with the specification of the system only. Fire hazard in case of overload!
- Do not switch on the system after transporting it from a cold into a warm room and vice versa. The thereby created condensation may damage your system. Acclimatise the system unpowered to room temperature.
- Do not disassemble the system! There is a high risk of getting a perilous electric shock. Capacitors still might be charged, even if the system has been removed from the power supply.
- The electrical installations and equipment in industrial facilities must be observed by the security regulations and insurance institutions.
- The use of the measuring system in schools and other training facilities must be observed by skilled personnel.
- The measuring systems are not designed for use in humans and animals.
- Please contact a professional if you have doubts about the method of operation, safety or the connection of the system.
- Please be careful with the product. Shocks, hits and dropping it from already- lower level may damage your system.
- Please also consider the detailed technical reference manual as well as the security advice of the connected systems.
- This product has left the factory in safety-related flawlessness and in proper condition. In order to maintain this condition and guarantee safety use, the user has to consider the security advice and warnings in this manual.

EN 61326-3-1:2008
IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1.

Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family standard, IEC 61326-3-1.

Devices and systems according to IEC 61508 or IEC 61511 which are considered as “operationally well-tried”, are excluded from the scope of IEC 61326-3-1.

Fire-alarm and safety-alarm systems, intended for the protection of buildings, are excluded from the scope of IEC 61326-3-1.

9. Documentation Version

Doc-Version	Date [dd.mm.yyyy]	Notes
1.0.0	23.02.2013	Initial revision
V20-1	23.9.2020	New template and new screenshots.
V20-2	12.10.2020	SDK versions is changed to OptoStream SDK
V21-1	11.1.2021	Temporarily deleted chapter
V21-2	10.05.2021	Updated standard resolutions table
V21-3	26.11.2021	4.1. Specification • Modified to 591 FPS @ 800x600