

THE MEASURABLE DIFFERENCE.



DEWETRON

▼

OXYGEN TRAINING > VIDEO SUPPORT





- > Webcam Support
- > GigE Camera Setup
- > Alvium Camera Setup
- > Frame Counter channel
- > External video synchronization
- > Sync Options
- > Data playback speed adjustment
- > Save measurement screen to video



WEBCAM SETUP

Connect the webcam to the PC and (re)start OXYGEN

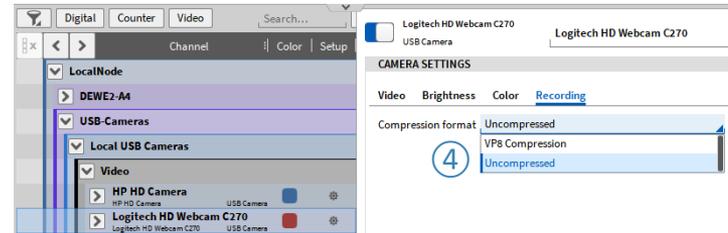
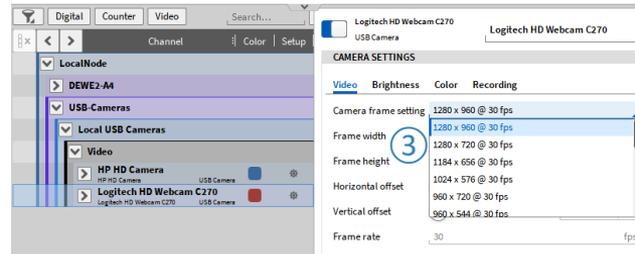
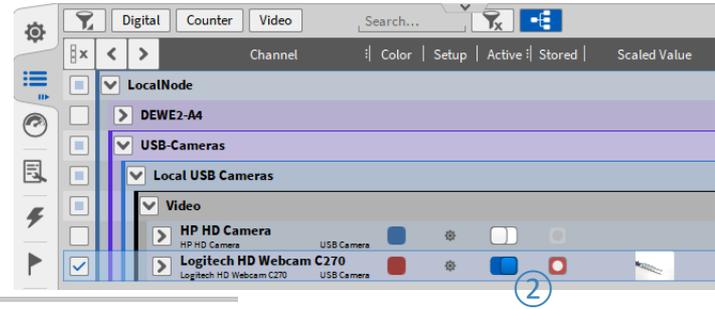
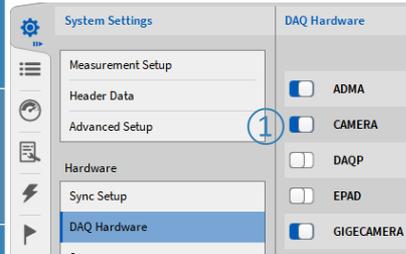
① Enable CAMERA in DAQ Hardware menu and restart OXYGEN if not already activated

② Go to the Channel List and enable the camera for DAQ and Recording

③ The resolution could be adjusted in the Camera Settings

④ The data could be stored to mkv-format (compressed) or dmv-format (uncompressed)

Please note that the video data will not be stored into the OXYGEN dmd-file but in a separate video data file (.mkv or *.dmv)*





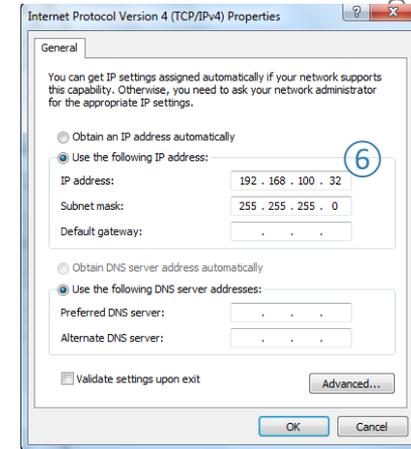
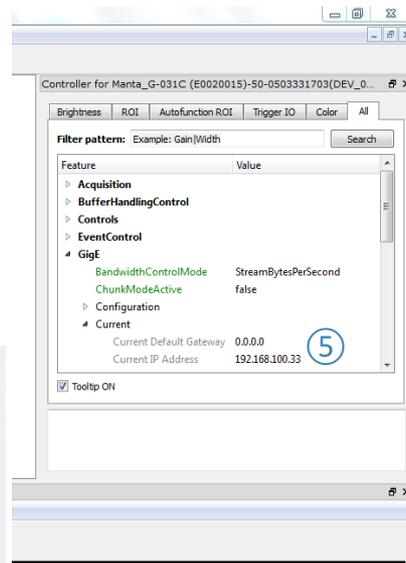
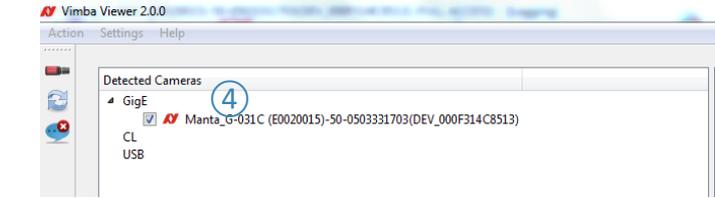
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GIGE CAMERA SETUP - INSTALLATION

Connect the GIGE camera to the PC

- To install the drivers, execute the file *Vimba_v2.0_Windows.exe* and confirm the execution
- Select the *Vimba Applications* and press *Start*
- After installation is finished, press *Exit*
- A system restart is recommended
- Open the *Vimba Viewer*. The connected camera will show up in the *Detected Cameras* section
- Check the camera's IP address which can be found in *All > GigE > Current > Current IP Address*
- Set the IP address of the network port the camera is connected to a static IP address within the same subnet range *192.168.100.xxx*





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GIGE CAMERA SETUP - OXYGEN

- 1 Enable *GIGECAMERA* in DAQ Hardware menu and restart OXYGEN if not already activated
- 2 Go to the *Video* section and enable the camera
- 3 If the camera shall be used in freerun mode (frame update not triggered by OXYGEN), select *Fixed Frame Rate* and select the desired *Frame Rate* below

The screenshot displays the OXYGEN software interface. The top panel shows 'System Settings' and 'DAQ Hardware'. Under 'DAQ Hardware', the 'GIGECAMERA' option is checked and marked with a circled '1'. Below this, the 'Video' section is visible, showing a 'Video Channels' list with 'Camera 50-0503331703' selected and marked with a circled '2'. The 'CAMERA SETTINGS' panel on the right shows 'Trigger Mode' set to 'Fixed Frame Rate' (marked with a circled '3') and 'Frame Rate' set to '50'.

If multiple cameras are activated at the same time, they share the network bandwidth. If the bandwidth is not enough OXYGEN will display a warning and the user needs to limit the frame rate.



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GIGE CAMERA SETUP - OXYGEN

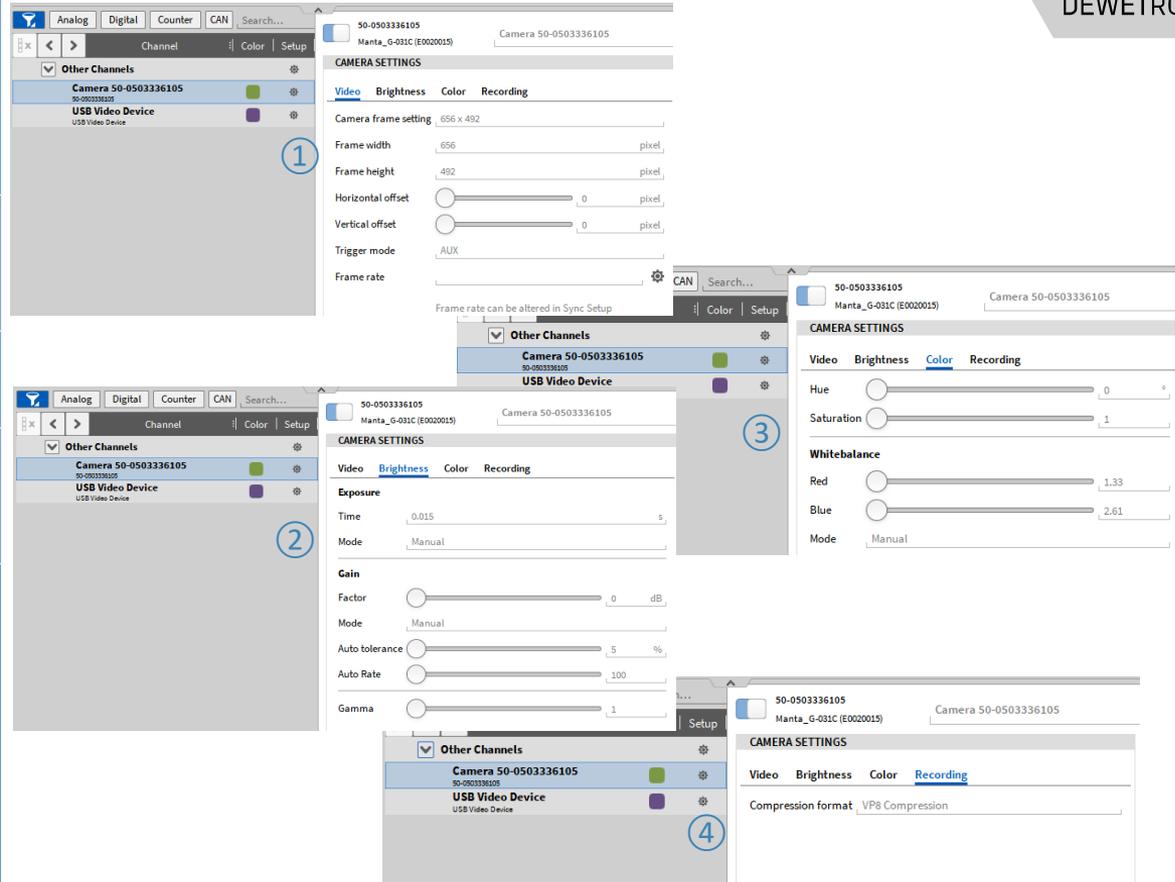
- ① If the frame update of the camera shall be triggered by OXYGEN, select AUX
 - ② For triggering the camera by OXYGEN a TRION-BASE, TRION-TIMING or TRION-VGPS board is required. These boards have an AUX connector which can be configured to provide a LVTL signal for triggering the cameras. Proper cables are typically provided by DEWETRON.
 - ③ For configuring the AUX output, press the Gear button to open the *Sync Setup*
 - ④ Enable the *Frequency (AUX)* output
 - ⑤ Select the proper *Frequency* which will equal your camera frame rate
 - ⑥ Select *StartEdge Rising* which means that the camera frame is update every time the signal has a rising edge.
- Synchronization to falling edges is not supported.

The image shows a multi-part software interface for configuring a camera. At the top, a 'CAMERA SETTINGS' window is open for 'Camera 50-0503331703'. The 'Trigger Mode' is set to 'AUX' (indicated by a circled 1). A gear icon (3) is used to access the 'Sync Setup' window. Below this, a photograph of the hardware shows the 'AUX' connector (2) on a TRION board. The 'Sync Setup' window shows 'Auto setup' checked and 'Frequency (AUX)' selected. The 'SYNCHRONISATION OUTPUT' section shows 'Frequency (AUX)' (4) set to 50 Hz (5) with 'StartEdge' set to 'Rising' (6). The background shows a list of video channels, including 'Camera 50-05...1703 RcvdCNT'.



GIGE CAMERA SETUP – CAMERA SETTINGS

- 1 The frame size (width and height), Horizontal and vertical offset can be adjusted in the Video section of the Camera settings as well as the Trigger mode.
- 2 Exposure and Gain settings of the camera can be edited in the Brightness section of the Camera Settings
- 3 Color settings can be edited in the Color section of the Camera Settings
- 4 The data could be stored to mkv-format (H.264 or VP8 compression) or dmv-format (uncompressed)



Please note that the video data will not be stored into the OXYGEN dmd-file but in a separate video data file (.mkv or *.dmv)*

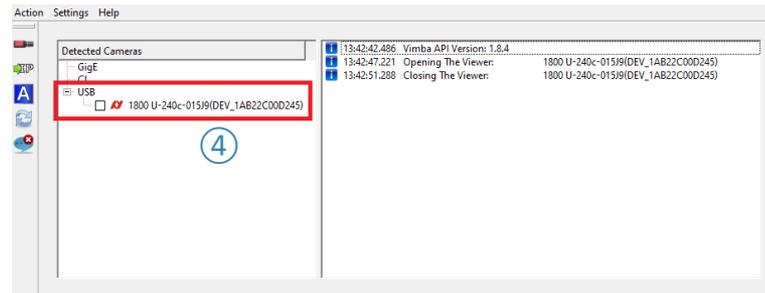


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ALVIUM CAMERA SETUP - INSTALLATION

Connect the Alviium camera to the PC

- 1 To install the drivers, execute the file *Vimba_v5.0_Windows.exe* and confirm the execution
 - 2 Select the *Vimba Applications* and press *Start*
 - 3 After installation is finished, press *Exit*
 - 4 A system restart is recommended
- 4 Open the *Vimba Viewer*. The connected camera will show up in the *Detected Cameras* section

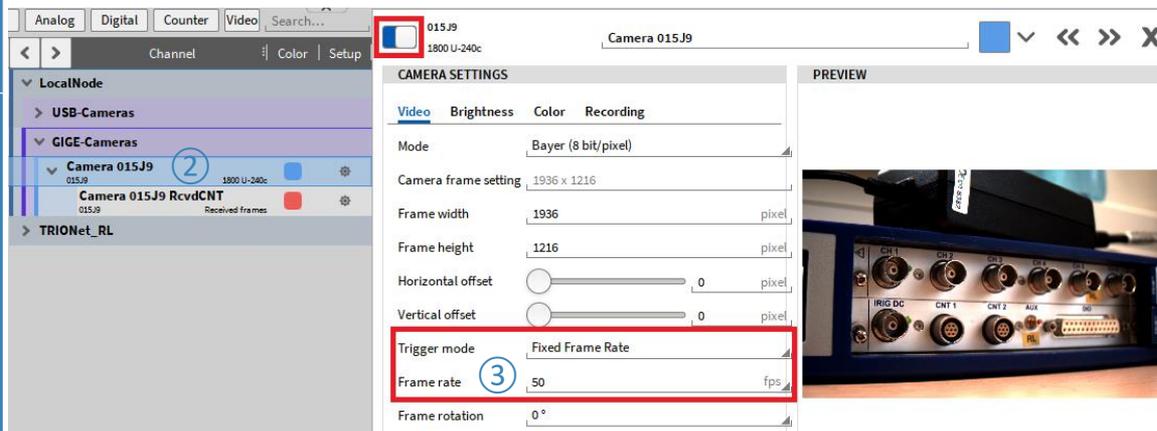
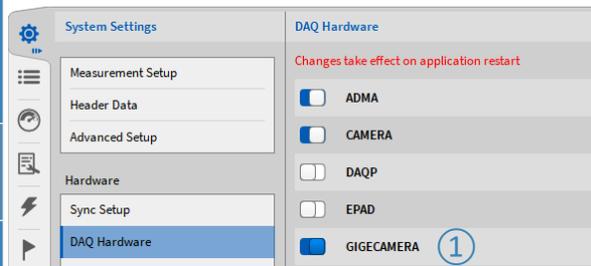




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ALVIUM CAMERA SETUP - OXYGEN

- 1 Enable *GIGECAMERA* in DAQ Hardware menu and restart OXYGEN if not already activated
- 2 Go to the *Video* section and enable the camera
- 3 If the camera shall be used in freerun mode (frame update not triggered by OXYGEN), select *Fixed Frame Rate* and select the desired *Frame Rate* below



If multiple cameras are activated at the same time, they share the network bandwidth. If the bandwidth is not enough OXYGEN will display a warning and the user needs to limit the frame rate.



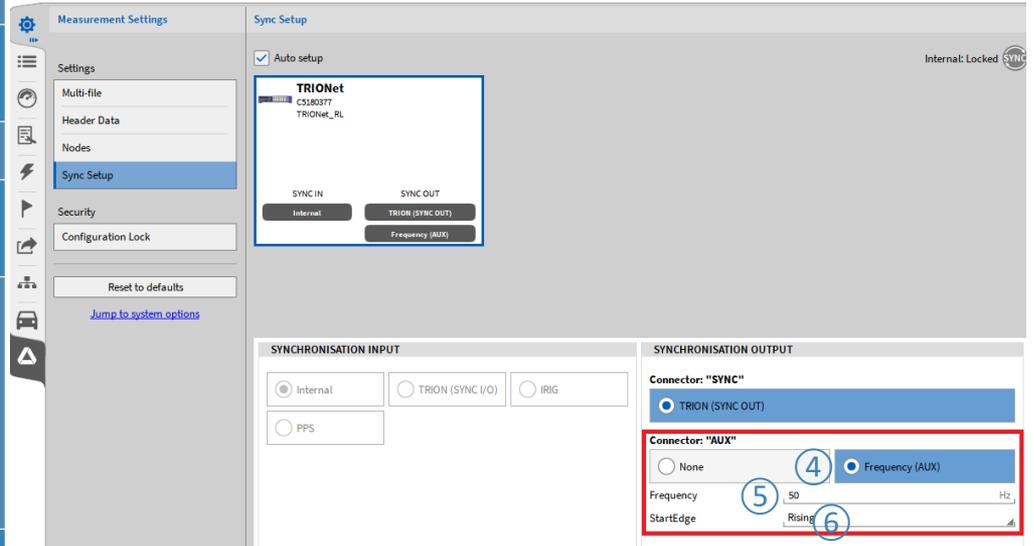
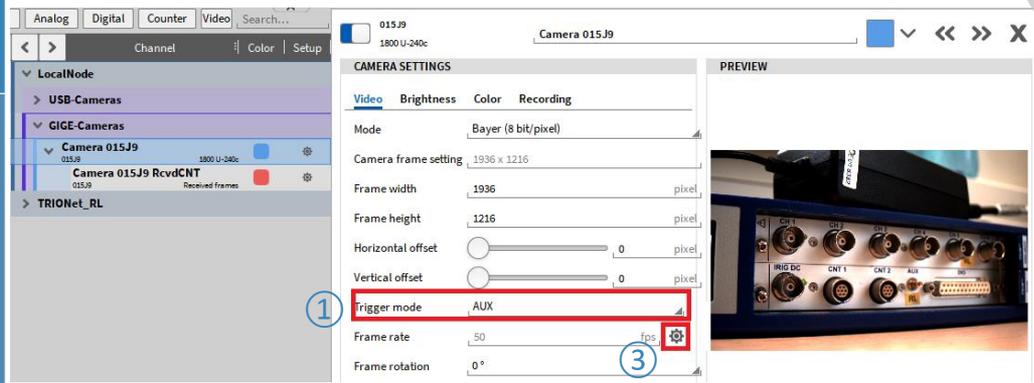
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ALVIUM CAMERA SETUP - OXYGEN

- ① If the frame update of the camera shall be triggered by OXYGEN, select AUX
 - ② For triggering the camera by OXYGEN a TRION-BASE, TRION-TIMING or TRION-VGPS board is required. These boards have an AUX connector which can be configured to provide a LVTL signal for triggering the cameras. Proper cables are typically provided by DEWETRON.
 - ③ For configuring the AUX output, press the Gear button to open the *Sync Setup*
 - ④ Enable the *Frequency (AUX)* output
 - ⑤ Select the proper *Frequency* which will equal your camera frame rate
 - ⑥ Select *StartEdge Rising* which means that the camera frame is update every time the signal has a rising edge.
- Synchronization to falling edges is not supported.





GIGE CAMERA SETUP – CAMERA SETTINGS

- ① The video transmission mode, frame size (width and height), Horizontal and vertical offset can be adjusted in the Video section of the Camera settings as well as the Trigger mode.
- ② Exposure and Gain settings of the camera can be edited in the Brightness section of the Camera Settings
- ③ Color settings can be edited in the Color section of the Camera Settings
- ④ The data could be stored to mkv-format (H.264 or VP8 compression) or dmv-format (uncompressed)

Please note that the video data will not be stored into the OXYGEN dmd-file but in a separate video data file (.mkv or *.dmv)*

CAMERA SETTINGS

Video **Brightness** Color Recording

Mode ① Bayer (8 bit/pixel)

Camera frame setting 1936 x 1216

Frame width 1936 pixel

Frame height 1216 pixel

Horizontal offset 0 pixel

Vertical offset 0 pixel

Trigger mode Fixed Frame Rate

Frame rate 50 fps

Frame rotation 0°

CAMERA SETTINGS

Video Brightness **Color** Recording

Hue 0

Saturation 1

Whitebalance ③

Red 2.35498047

Blue 2.10009766

Mode Manual Once

CAMERA SETTINGS

Video **Brightness** Color Recording

Exposure ②

Time 0.017827556 s

Mode Automatic Once

Gain

Factor 0 dB

Mode Manual Once

Gamma 1

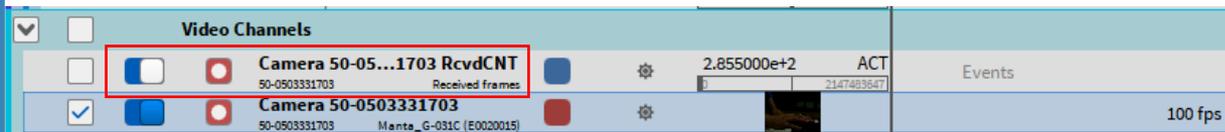
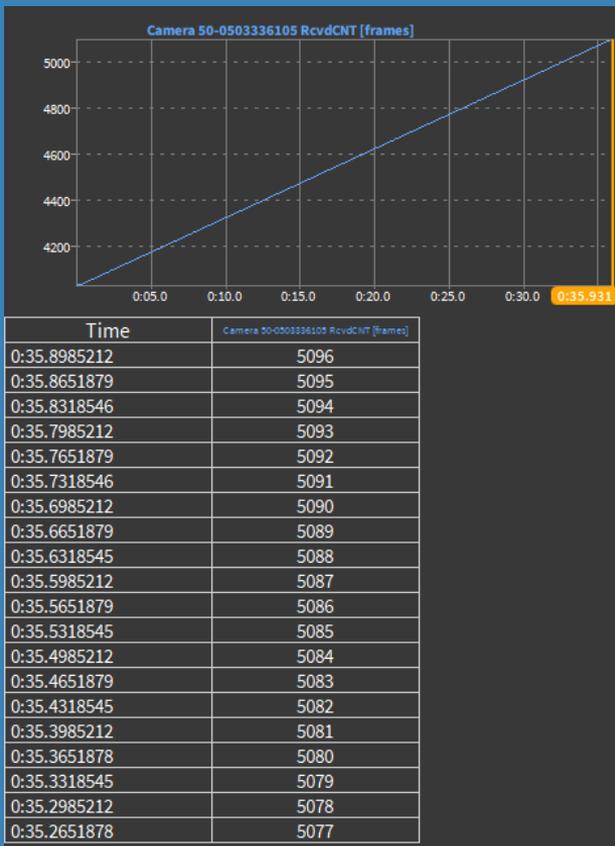
CAMERA SETTINGS

Video Brightness Color **Recording** ④

Compression format H.264 Compression



FRAME COUNTER CHANNEL



For each camera there exists a counter channel that counts the number of received frames since acquisition start. The channel has the same name as the respective camera with *RcvdCNT* appended. In order to activate the counter, you need to activate the channel (the channel is not activated automatically).

This channel increases by one every time a new frame is received by OXYGEN from the camera. The instant of time when the frame is updated is stored as well and can be displayed in a table instrument or if the frame counter is visualized in a Recorder.

Thus, the information when the camera frame is updated, is available in this channel. In case the camera is running with a fixed frame rate, the instant of time the frame is updated is determined by the camera itself.

In case, the camera is running in AUX mode and is triggered by OXYGEN, the instant of time the frame is updated is determined by OXYGEN.

WEBCAM VS GIGE CAMERA



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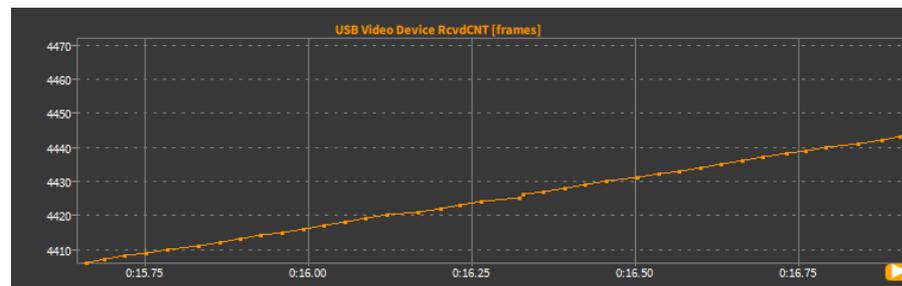
Webcam:

- > Data transmission over USB
- > Fixed frame rate, not editable by the user
- > Stochastic frame update
- > Only free run mode

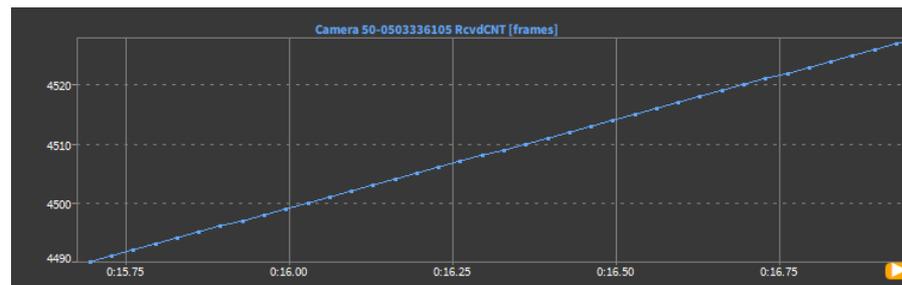
GigE camera:

- > Data transmission over LAN
- > Frame rate editable by the user
- > Deterministic frame update
- > Possibility to trigger frame update by OXYGEN

Webcam frame update:



GIGE camera frame update:



EXTERNAL VIDEO SYNC – SYNC OPTIONS



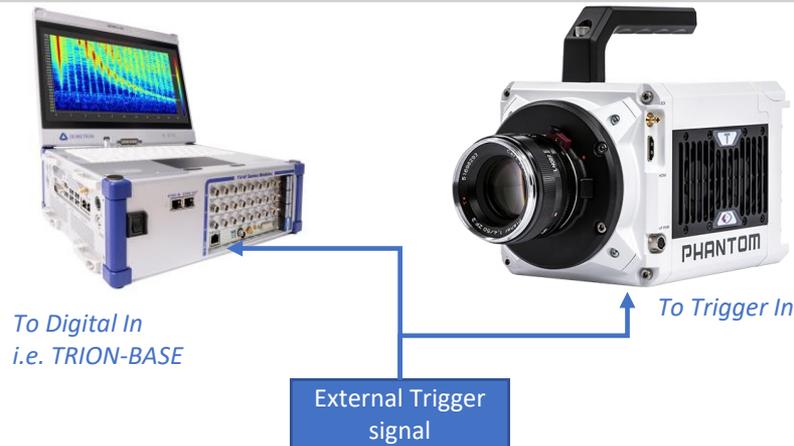
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Since OXYGEN R5.5 it is possible to load and synchronize external video files into an OXYGEN data file (dmd-file). This might be required when video is captured in parallel to the data recording with a 3rd party video capturing software of a camera that is not natively supported in OXYGEN.

Supported Formats:

- AVI (uncompressed)
- MKV (VP8 and h264)
- MP4 (h264)



Description:

An external signal / device is used to trigger the recording start of DAQ system and camera. The signal is normally a TTL signal with a rising edge to initiate the recording start. Modern highspeed cameras provide trigger signal input. The DAQ system requires a digital signal input to acquire the signal and trigger the recording state. Analog inputs could be used as well.

Advantage:

- Parallel recording start of camera and DAQ system without any latencies
- Easy synchronization of sensor data and video data
- No manual recording start on any device required

Disadvantage:

- Separate hardware required for generating the trigger signal

EXTERNAL VIDEO SYNC – SYNC OPTIONS CONT'D



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Description:

The camera generates a TTL signal with rising edge at recording start which is forwarded to the DAQ system via the Trigger output of the camera. Modern highspeed cameras provide a trigger signal for triggering the recording state of 3rd party hardware. The DAQ system requires a digital signal input for acquiring the signal and triggering the recording state. Analog inputs could be used as well.

Advantage:

- Parallel recording start of camera and DAQ system without any latencies
- Easy synchronization of sensor data and video data
- No separate hardware required for generating the trigger signal

Disadvantage:

- Recording must be started manually for the camera

EXTERNAL VIDEO SYNC – SYNC OPTIONS CONT'D



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Description:

The DAQ system generates a TTL signal with Rising edge at recording start which is forwarded to the camera via a digital output of the DAQ system. Modern highspeed cameras provide a trigger signal input. The operating system of the DAQ system will cause a delay between the DAQ system's recording start and the instant of time the digital output is physically set to high which results in the recording start of the camera. This delay can be measured by recording the Digital Out channel. In real-life, a delay in the msec-range between DAQ system recording start and camera recording start will occur which can be compensated while loading the video into OXYGEN for post processing.

Advantage:

- No separate hardware required for generating the trigger signal
- Recording start of the DAQ system could be triggered

Disadvantage:

- Deterministic latency between recording start of camera and DAQ system caused by the operating system
- Latency needs to be compensated while loading and post processing the video

EXTERNAL VIDEO SYNC – SYNC OPTIONS CONT'D



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Manual Rec Start



Manual Rec Start

Description:

Recording is started manually both on the DAQ system and the camera.

Advantage:

- No separate hardware required for generating the trigger signal
- No wiring between camera and DAQ system required

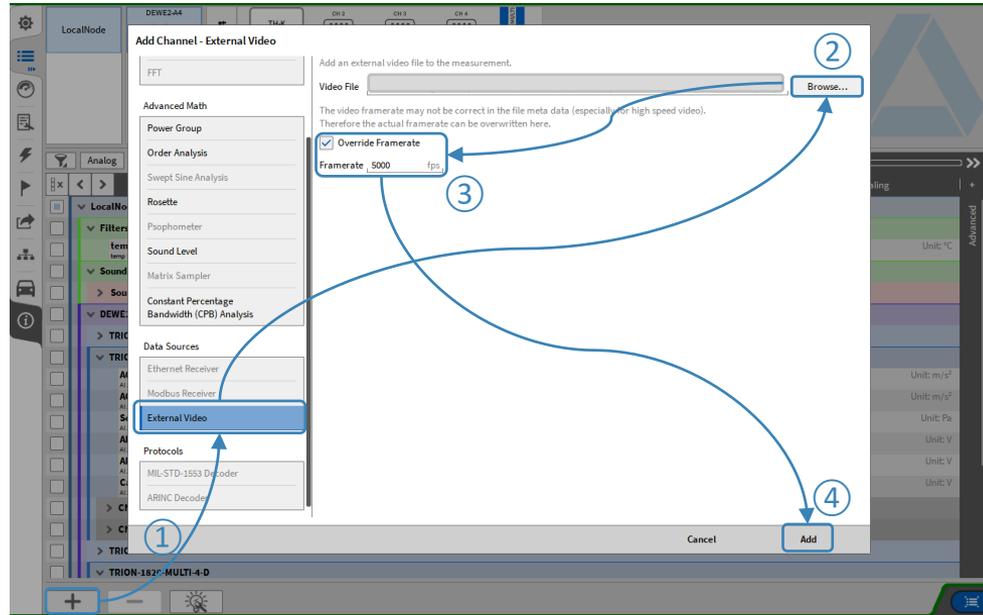
Disadvantage:

- Stochastic latency between recording start of camera and DAQ system caused by the operating system
- Latency needs to be determined empirically and compensated while loading and post processing the video



EXTERNAL VIDEO SYNC – VIDEO SELECTION

- 1 To load an external video, go to the Channel List, press the + Button and select *External Video*
- 2 Click on *Browse...* to select the video file
- 3 Enter the native recording frame rate of the video
- 4 Press *Add* to create a new video channel



- Supported Formats:
- AVI (uncompressed)
 - MKV (VP8 and h264)
 - MP4 (h264)



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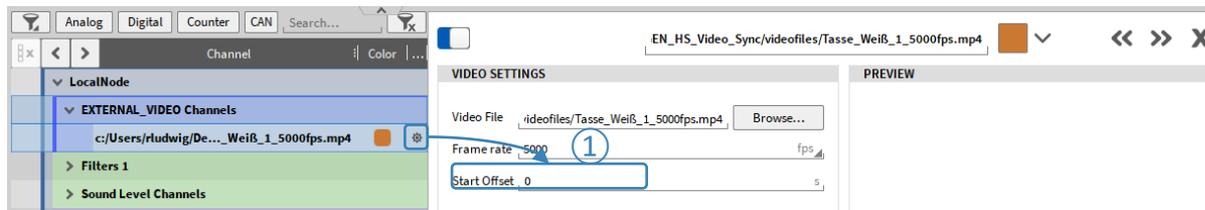
EXTERNAL VIDEO SYNC – SYNCHRONIZATION

① If the time difference of the recording start between the OXYGEN data file and the video data file is known, it can be entered in *Start Offset* available in the video's channel setup.

Positive offset denotes that OXYGEN data recording was started first and video data recording second.

Negative offset denotes that video data recording was started first and OXYGEN data recording second.

As the recording start of the OXYGEN data file and the video data file is most likely not the same, the timeline of the video data needs to be aligned to the OXYGEN data file.



EXTERNAL VIDEO SYNC – SYNCHRONIZATION CONT'D



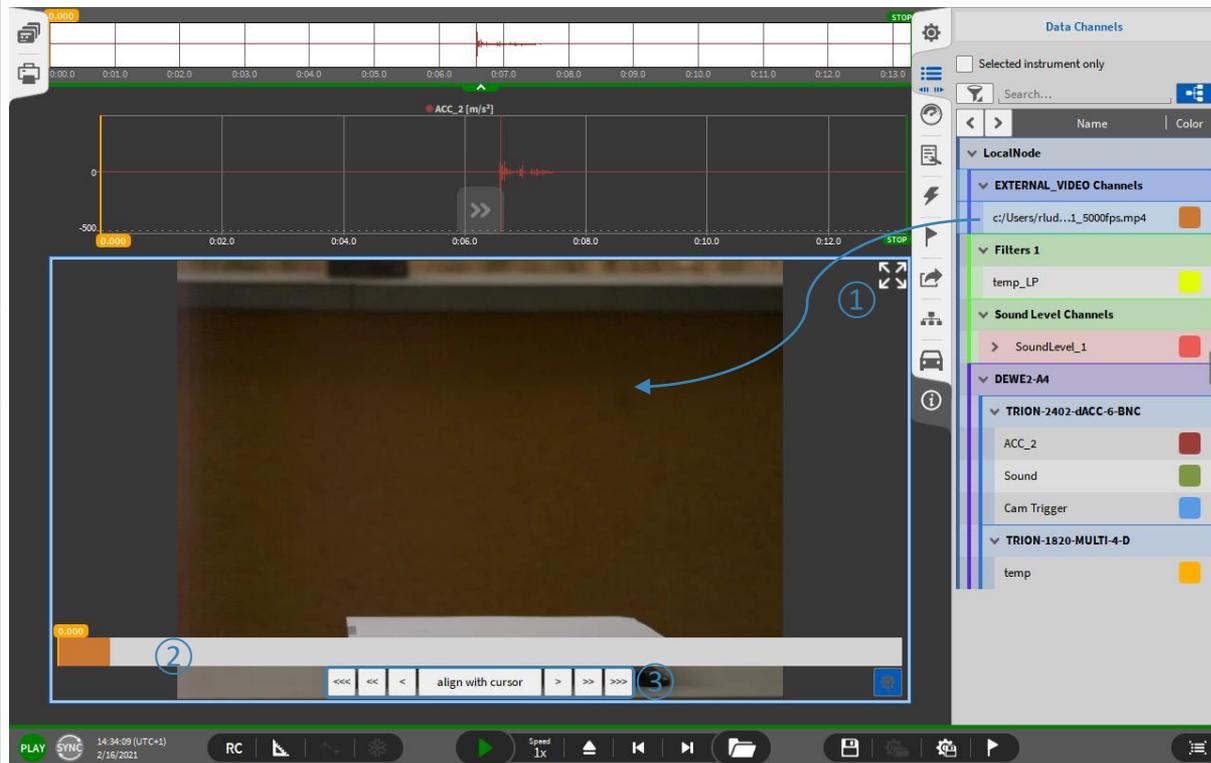
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① If the time difference of the recording start between the OXYGEN data file and the video data file is not known, the timeline can be aligned manually.

Go to the measurement screen and drop the external video channel to the measurement screen. This will create a video instrument including the video

② The timebar shows the actual position of the video within the OXYGEN data file

③ The buttons <<<, <<, < align with cursor, >>>, >>, > can be used to change the position of the video within the data file
<<< Move the video +1 frame
<< Move the video +10 frames
< Move the video +100 frames
Align with cursor: Move video start to actual cursor position
> Move the video -1 frame
>> Move the video -10 frames
>>> Move the video -100 frames





EXTERNAL VIDEO SYNC – SYNCHRONIZATION CONT'D

- ① Use the Recorder to move the orange cursor to the reference event for data synchronization
 - ② Press *align with cursor* to move the video start to the orange cursor position for a rough time adjustment
 - ③ For fine time adjustments, use the <<<,<<,< & >,>>,>>> buttons to align the time line
 - ④ When finished, the timebar can be hidden
 - ⑤ The absolute time offset can also be seen in the video's channel setup
 - ⑥ The settings can be saved to the data file
- Please note that only the file path to the video is stored to the OXYGEN data file but not the video itself*

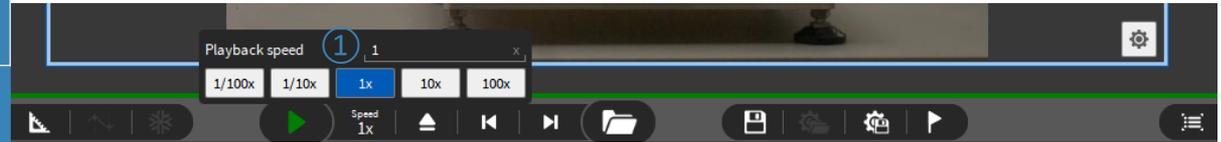
The screenshot illustrates the synchronization process in the DEWETRON software. At the top, a graph shows acceleration data (ACC_2 [m/s²]) with a red waveform and an orange vertical cursor at 6.576 seconds, marked with a circled '1'. Below the graph, a video player shows a scene with a white cup. The video's timebar is visible, with the 'align with cursor' button highlighted by a circled '2'. To the right, a zoomed-in view of the video player shows the 'align with cursor' button and navigation controls, with a circled '3' and '4'. At the bottom, the channel list shows 'EXTERNAL_VIDEO Channels' with a selected channel 'c:/Users/rudwig/De..._WeiB_1_5000fps.mp4'. The 'VIDEO SETTINGS' panel is open, showing 'Video File' as 'videofiles/Tasse_W', 'Frame rate' as '5000', and 'Start Offset' as '6.34437873', with a circled '5' next to the 'Start Offset' field. A circled '6' is also present near the bottom right of the interface.

PLAYBACK SPEED ADJUSTMENT



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① For detailed analysis of correlation between video and measurement data, the data playback speed can be adjusted



- > *Pre-Selection from 100x to 1/100x is available*
- > *Individual playback speed is available as well*
- > *Please be aware that Audio Replay is not working in case the playback speed is not 1x*



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SAVE MEASUREMENT SCREEN TO VIDEO

- 1 Expand the Screens menu to the full screen to enter the *Save screen as video* menu
- 2 Select the desired measurement screen for exporting
- 3 It is possible to export either the entire measurement or only the time region of a selected recorder
- 4 The playback speed for the exported video file can be within 0.1 ... to 100 %
- 5 A relative , absolute or no timestamp can be displayed in the upper right corner of the exported video
- 6 Select the export video resolution
- 7 Select the export video frame rate from 10 ... 100 fps
- 8 Select dark or light screen background for the export video
- 9 Generate the video and select the export path

START 8.378 STOP

Screens

SAVE SCREEN AS VIDEO

Selected Screen

1 2

Time Settings 3

Entire measurement

Region of selected recorder

Playback speed 1 4 %

Time label None 5

Video Settings

Video resolution 1920x1080 6

Video frames 30 7 fps

Options

Colors Light 8

Video duration: 1328.18s, 39845 frames

Generate video... 9