



Automotive
Energy & Power Analysis
Field Service
Environmental
Research & Development

Photron FASTCAM
User Manual

V 3.0



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1. Installation

The Photron camera works as DEWESoft video hardware. To use it in DEWESoft, first install Photron drivers and Photron FASTCAM Viewer (PFV) and then copy the following files into the DEWESoft Addons folder (e.g. D:\DEWESoft7\Bin\V7_0\Addons):

- Photron.cdv,
- Photron.ini
- Photron DLLs (D1024PCI.dll, DAPXRS.dll, DMC1.dll, DMH4.dll, DSA1.dll, GEthLib.dll, IGETHER.dll, IPCI.dll, PDCLIB.dll)

When copying is finished, Photron FastCAM will appear in Hardware setup.

After this, copy sensor calibration files of each camera into DEWESoft Addons folder. These files can be found on the Image Setup CD-ROM, which came together with camera and are unique for each camera. They have gdf extension and are named like (e.g. for FastCam 1024PCI with SN: 145509164):

- PixelGainData_Default_1024PCI_1455_0009_0164.gdf
- shadingdata_1024pci_1455_0009_0164.gdf

If you do not have these files, camera sensors can be calibrated later in DEWESoft camera Setup.

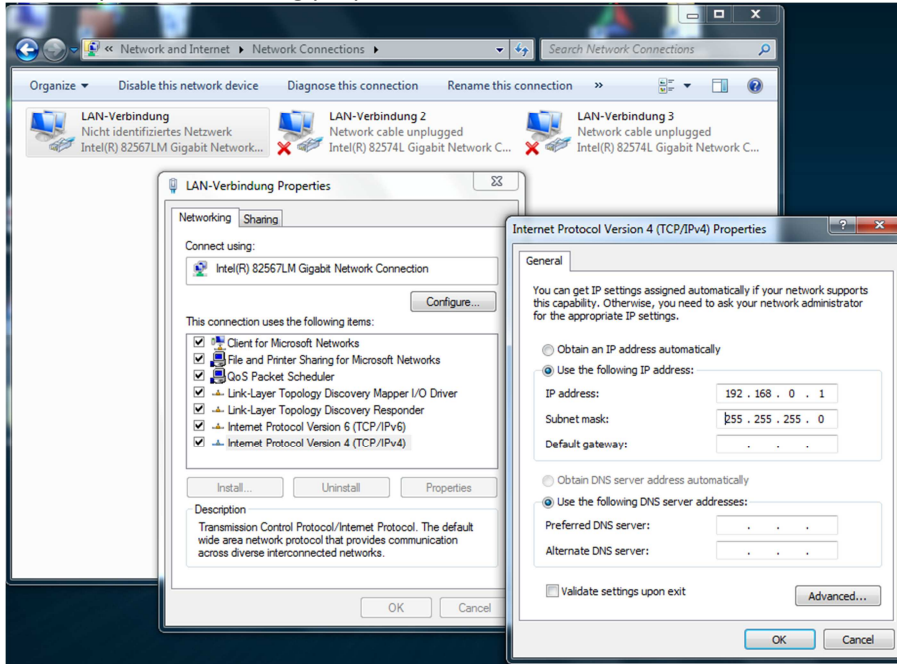
Additionally, please refer to the Photron hardware manual for information about installing Photron hardware. Run PFV to check if hardware is working properly as a first step.

Hint: Please make sure that no firewall or anti-virus software is blocking Ethernet communication.

2. Setup

2.1. Windows network configuration

The windows system is set to fixed IP address by accessing the network connections inside the control panel and editing properties for the LAN connection as shown below.



Hint: If multiple network adapters are installed, please make sure to edit settings for the one connected to Photron hardware.

*Hint: Depending on the model, the camera's default IP address is for example 192.168.0.10
The windows network setting has to be 192.168.0.x, the address has to be different, but inside the same subnet, for example 192.168.0.1.*

2.2. Photron.ini file

This INI configuration file tells DEWESoft where to search for the Photron hardware and can be found in the DEWESoft Addons folder (e.g. D:\DEWESoft7\Bin\V7_0\Addons).

[Search options]

ETHERNET = YES

IP_mask = 192.168.10.XXX

PCI = NO

IEEE1394 = NO

Set the parameters “ETHERNET”, “PCI” or “IEEE1394” to “YES”, depending on the interface of your camera(s).

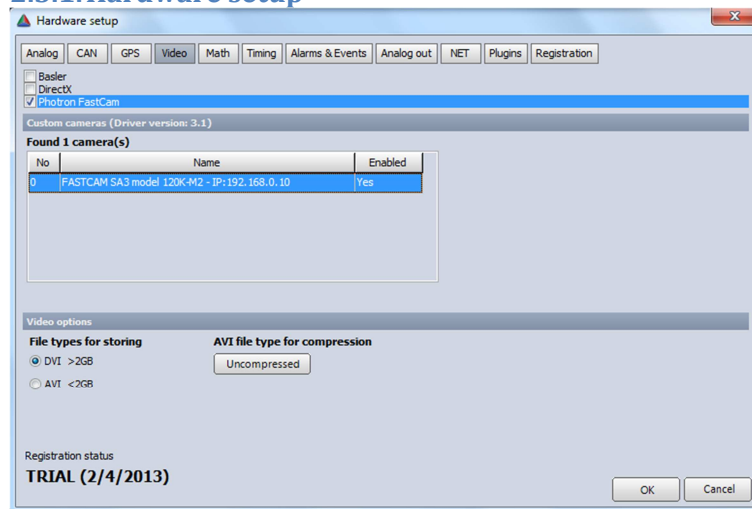
For ETHERNET cameras, the IP mask has to be defined. Setting the parameter “IP_mask” to 192.168.10.XXX means that the driver will search for all cameras with IP 192.168.10.0 to 192.168.10.255. Additionally, refer to Photron manual for information about setting camera IP address.

Hint: The default setting for IP_mask is 192.168.10.XXX – this mask has to fit the connected camera IP address, which – depending on model – could also be 192.168.0.10, so the INI has to be edited to fit connected hardware.

Hint: If an interface is enabled without any hardware connected, start-up time may increase unnecessarily.

2.3. DEWESoft setup

2.3.1. Hardware setup



First check the Photron FastCam checkbox on the Video tab in DEWESoft hardware setup to enable Photron cameras. If any camera is found, it is listed inside the camera table.

Hint: Please note that searching for cameras can take some time.

2.3.2. Video channel Setup



Inside DEWESoft channel setup, the high speed camera options can be set in the Video tab. Store options and frame rate settings are set for all available cameras in the list below. If any camera does not support the selected frame rate, the closest one will be used. Frame rates for each single camera can be set individually in each camera setup window.

Hint: There is no need that all cameras have the same frame rate.

Store options sets the way the camera will be triggered out of 3 available options:

- 1) **Store on start of acquisition:** camera will start at the beginning of data recording
- 2) **Store on DEWESoft trigger:** camera will be triggered by a trigger sent from DEWESoft (fired by some analog data or forced with trigger button in DEWESoft recorder)
- 3) **Start on external trigger:** camera will be triggered with external trigger.
(Please refer to Photron Hardware Manual for information on how to connect and apply external triggers.)

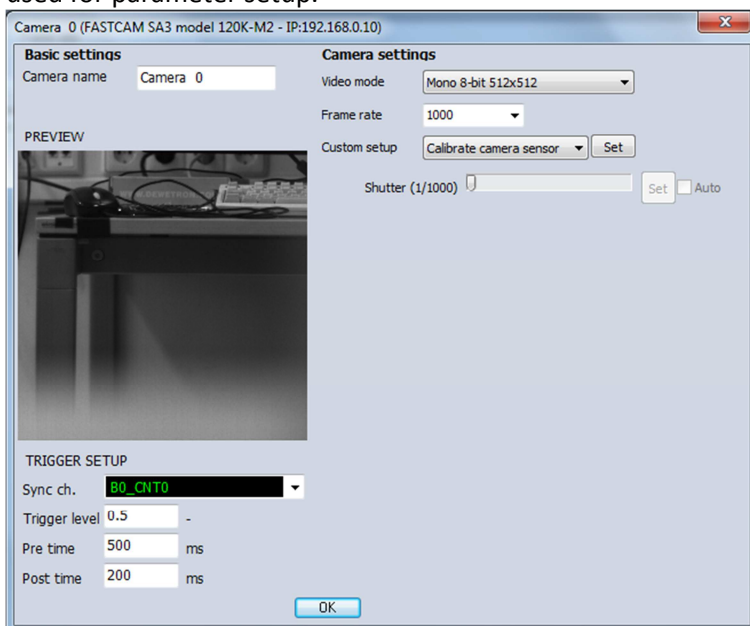
Hint: Please see the trigger section 2.5 for a more detailed explanation of the 3 different modes.

Hint: Video channels have to be set to "Used" to be available in measurement mode.

2.4. Camera setup

2.4.1. Camera settings

There are two important groups of settings in Camera setup - Camera settings and Trigger settings. You can also find Basic settings group where you can adjust camera name and see a preview picture used for parameter setup.



Here you can set Resolution, Frame rate, Shutter speed and Sensor gain (if camera supports hardware sensor gain) parameters. You can also calibrate the camera sensor here (more in section 2.4.2). The options depend on the camera model in use and also from each other. For example, at resolution 1024*1024 1000 fps is the fastest sample rate, but at resolution 256*256, sample rates up to 10000 fps are possible.

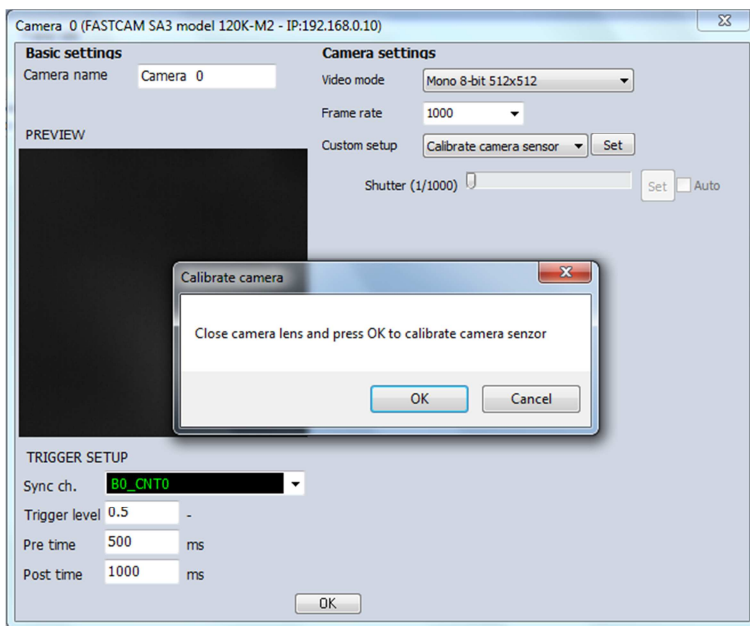
The camera settings are applied to camera as soon as something is changed, so the preview is always up to date with current settings.

2.4.2. Camera sensor calibration

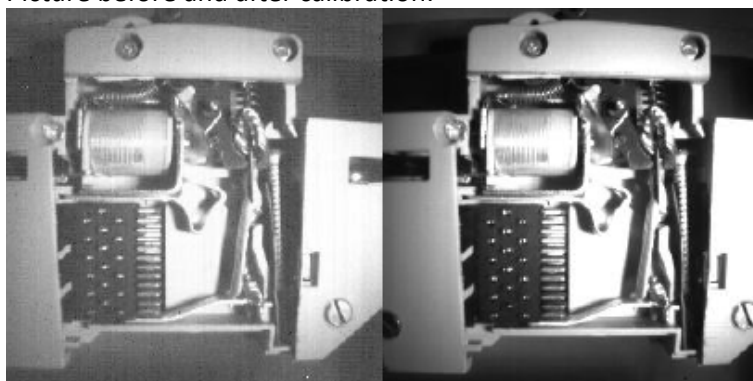
Each camera comes with two sensor calibration files. Here is an example how the calibration files are named (e.g. for FastCam 1024PCI with SN: 145509164):

- PixelGainData_Default_1024PCI_1455_0009_0164.gdf
- shadingdata_1024pci_1455_0009_0164.gdf

If you copy these files to DEWESoft Addons folder, they will be used automatically. Files are optimized for 1000 fps frame rate and picture will not be optimal when other frame rates are selected. If you do not have these files or factory calibration data is not satisfying or for any other reason the picture is grainy and/or contains fixed shading pattern, you have to calibrate sensor to get a better picture. You can do that by selecting “Calibrate camera sensor” from Custom setup and press the “Set” button. The Calibrate camera window will pop up. Just follow the instructions (Close camera lens and then press OK) and sensor will get calibrated.



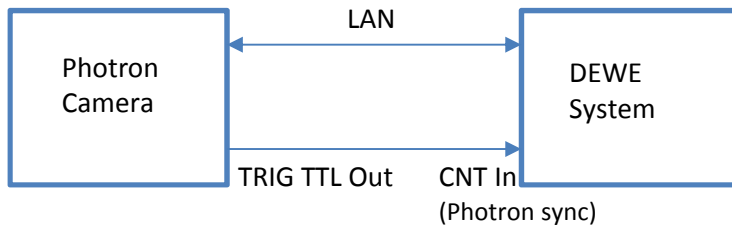
Picture before and after calibration:



2.5. Trigger setup

Synchronization channel and trigger parameters take care of camera synchronization with measurement data. There are 2 main options:

Trigger wiring:

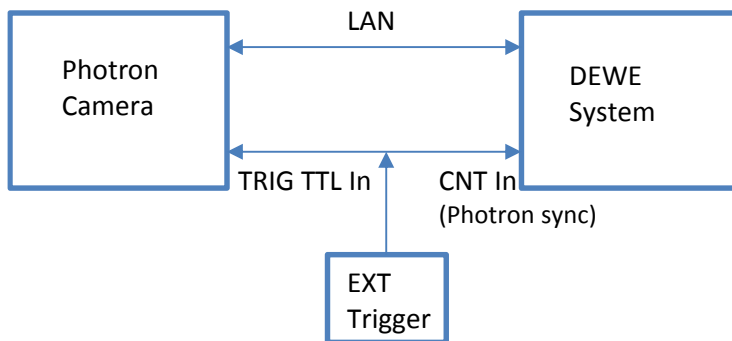


If DEWESoft trigger is used, the camera trigger-out signal is used for synchronization. DEWESoft triggers the camera start via LAN and exact synchronisation is done via the measured TTL pulse from the camera.

Hint: Trigger signal is usually just a 2-3 μ s 5 V pulse, so a counter channel is the preferred input.



Wiring for external trigger:



If the camera is triggered with external trigger, then the same signal can also be used for synchronization.

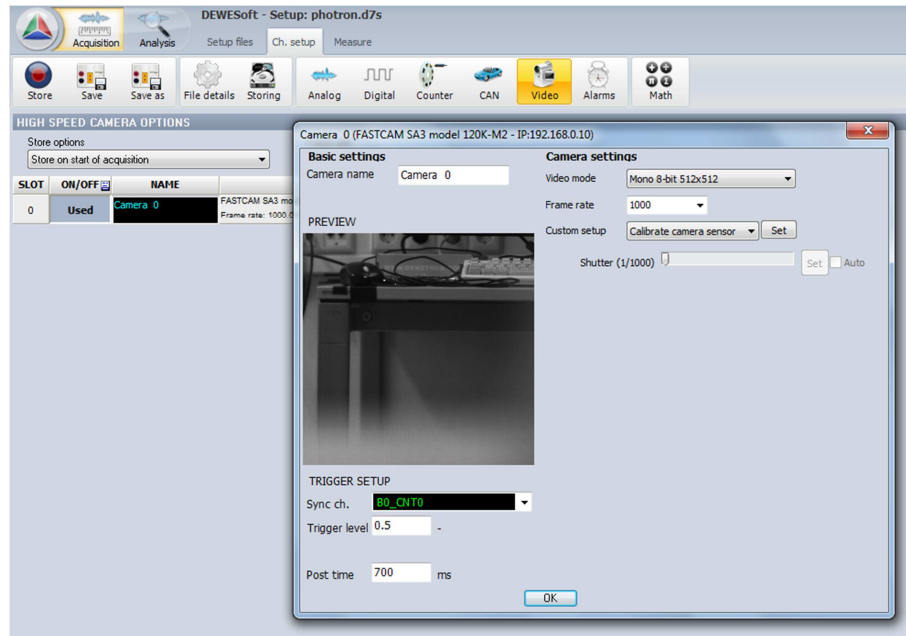
Hint: Please refer to the Photron hardware manual for further information on camera in and out signals.

Hint: On systems equipped with a "PHOTRON SYNC" BNC connector, this input is connected to the base counter source channel (BO_CNT0).



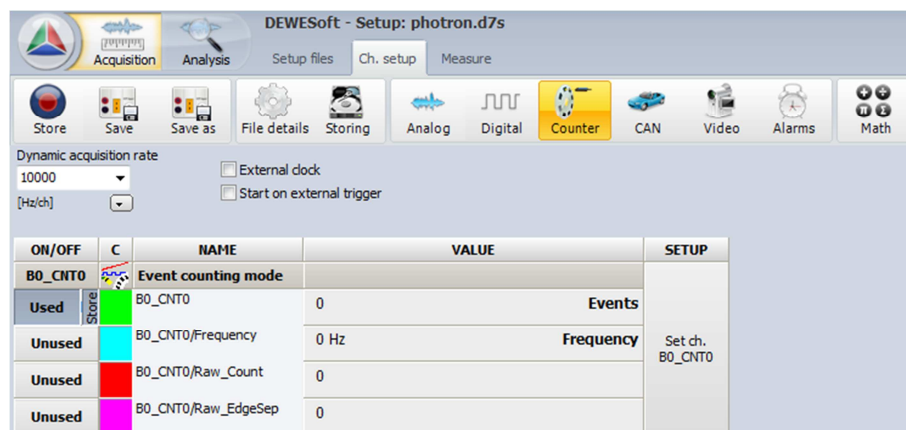
2.5.1. Store on start of acquisition

As soon as storing is started in DEWESoft, the camera is triggered via LAN. Measurement data is acquired as soon as the camera trigger is received; camera data is available from the beginning of the measurement until the post time is reached.

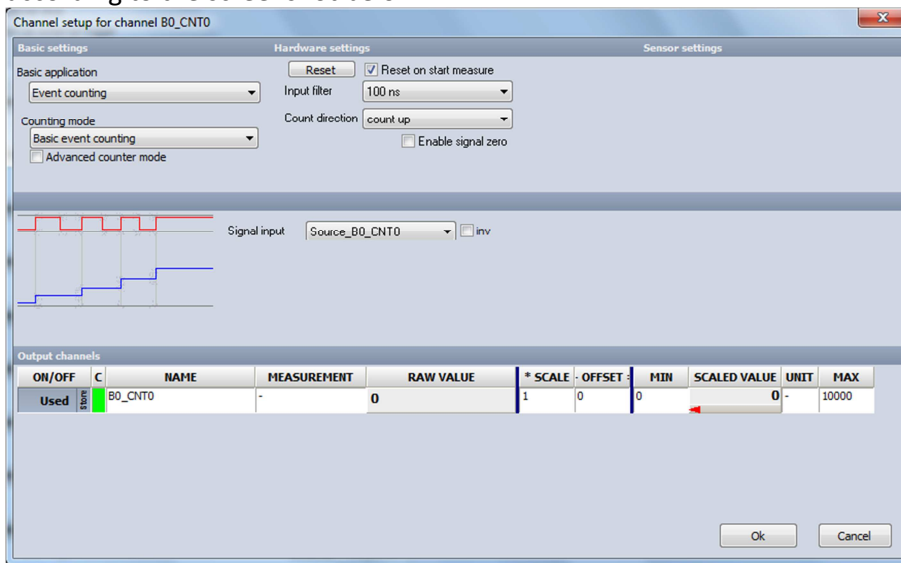


Hint: The maximum time of recording depends on resolution, frame rate and camera memory.

In the camera setup window, usually a counter input is chosen as “Sync ch.”. The counter channel has to be enabled before it is visible here by setting it to “Used” in the counter channel setup.



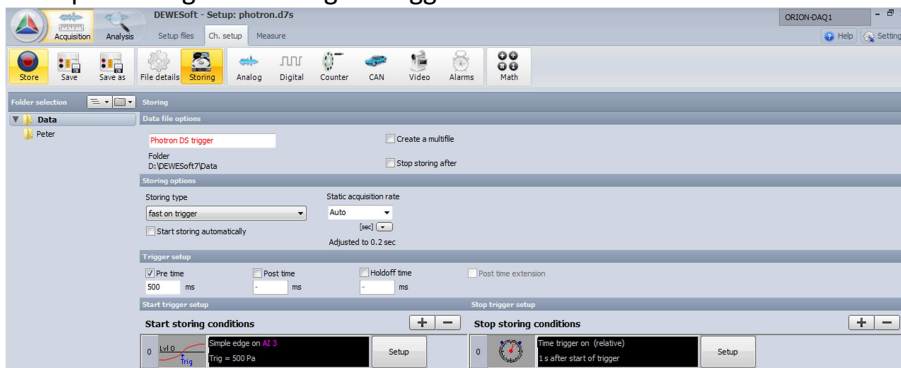
The counter must be setup as application “Event counting” and mode “Basic event counting” according to the screenshot below.



2.5.2. Store on DEWESoft trigger

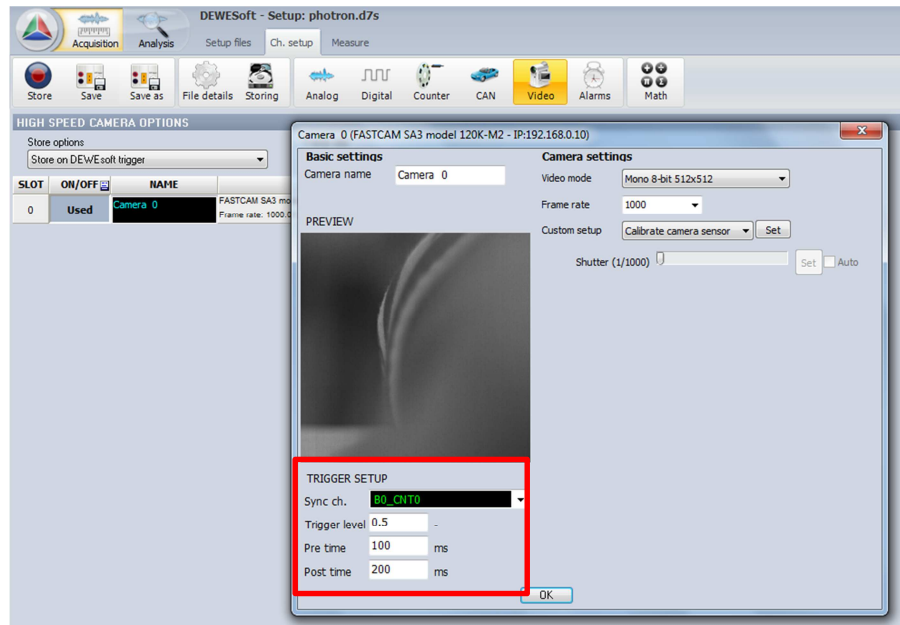
DEWESoft itself is triggered on a user specified storing condition, e.g. a defined threshold on a live input or even mathematic combinations of multiple ones. This trigger starts the camera via LAN and the received synchronisation pulse is used to precisely align data.

Example settings for storing on trigger:

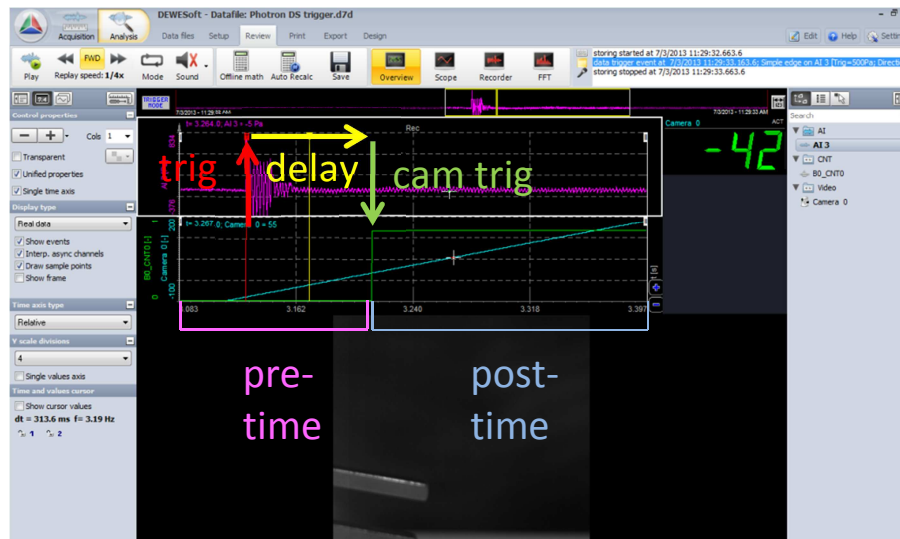


The counter channel is set as the sync input channel in the camera setup menu. Please see section 2.5.1 for counter channel setup details. Additionally, pre and post time must be entered. Pre and post time are parameters for setting time of recording before trigger and after trigger.

Hint: The maximum time of recording depends on resolution, frame rate and camera memory.



Between the camera start command over LAN from DEWESoft (software measurement trigger, red) and the camera trigger (real camera start, green) a delay of approximately 50-100 ms (depending on system load and operating system) is present. To catch the video of a trigger event, this system trigger delay (yellow) has to be compensated by adding it to the pre time inside the video settings.



Hint: The system delay varies; to be sure of the value a test measurement has to be performed each time the setup changes.

Hint: If pre time setting is shorter than system delay, video capturing starts too late (no video is available at trig position).

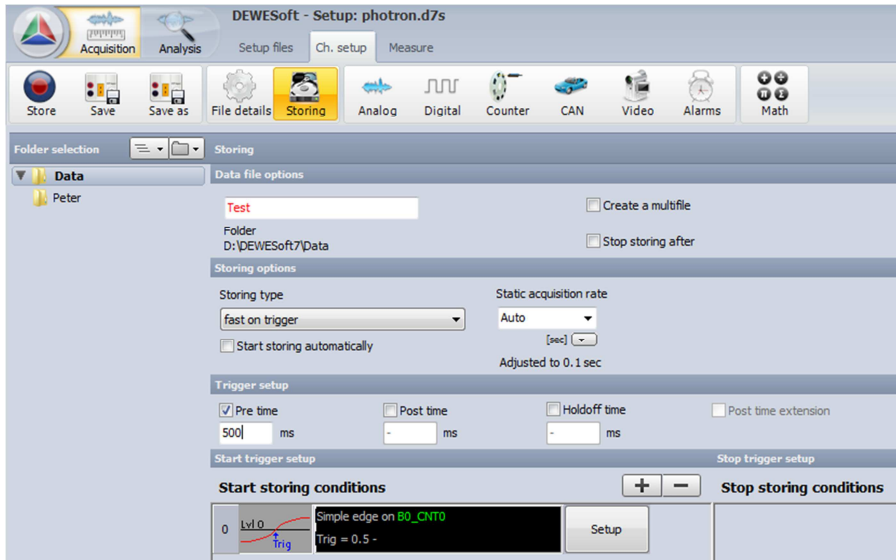
Hint: This system trigger delay has no effect on measurement data synchronisation, since video is automatically post-synced to measured video trigger pulse.

2.5.3. Store on external trigger

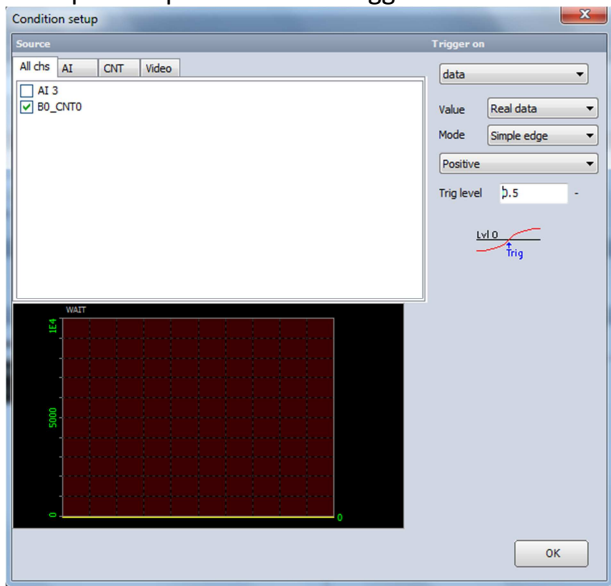
An external TTL trigger is used to start video capturing and data acquisition in DEWESoft simultaneously. Please see section 2.5 for wiring details.

Start measurement with software trigger on external trigger signal

Storing trigger is setup to start data acquisition.

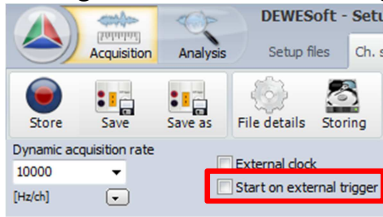


Example setup for software trigger:

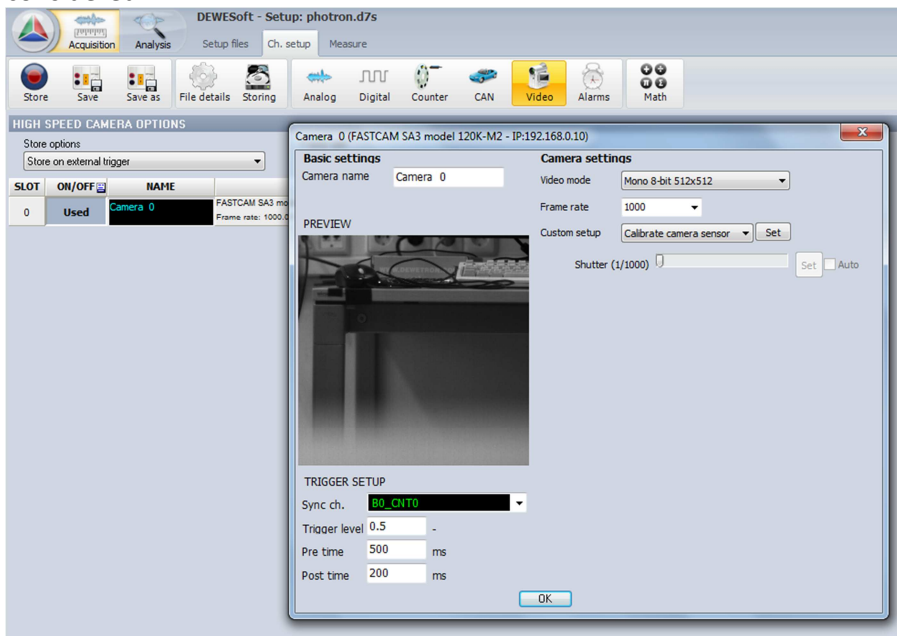


Option: Start measurement with external trigger

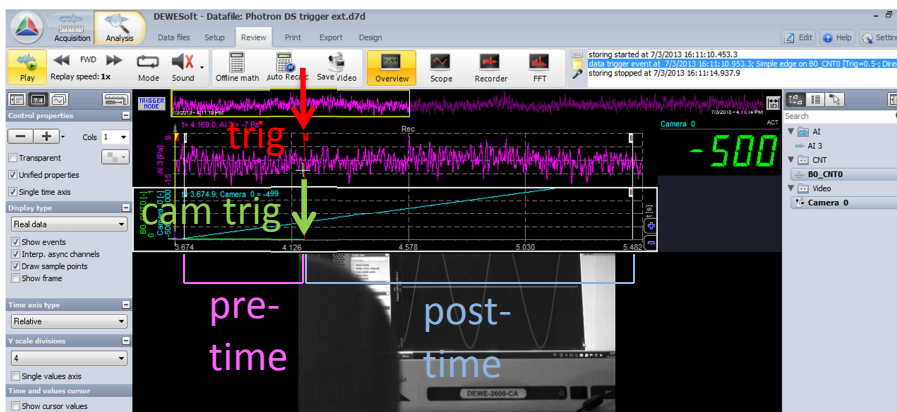
Storing starts with hardware trigger on A/D card.



When using this storing option, there is no system trigger delay, because the camera is triggered externally. In this case pre time and post time are set to desired values; no additional delay has to be considered.



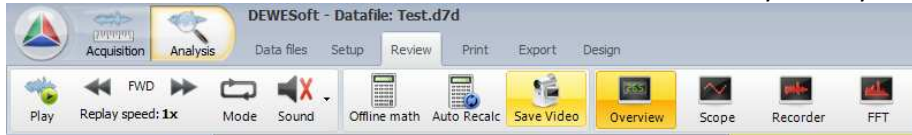
Using this trigger mode, software trigger and camera trigger position are aligned exactly, so pre time and post time are relative to the trigger position in both cases.



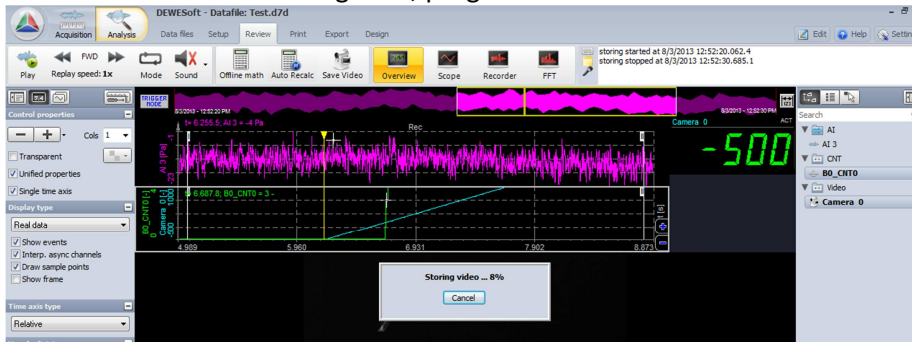
3. Recorded frames transfer

Video frame data is recorded into camera memory during measurement. The duration is limited by resolution, frame rate and camera memory capacity.

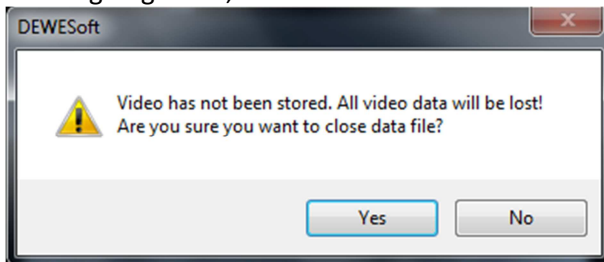
After the measurement has ended, in analysis mode all data from the data file is available, of course, and video data is previewed synchronously. If the measurement was successful, then video data is transferred via LAN from camera RAM onto the measurement system by clicking save video.



Data transfer can take a long time; progress is shown inside the transfer window.



If analysis mode is ended without saving the camera data first, a warning pop-up is displayed. If this warning is ignored, camera RAM is cleared and video data is lost.



4. Video playback

When playing back high-speed video files, bear in mind that the total duration is very short, so replay-speed should be set to a fitting low value, see example below.

