ViRTEx-100/200
Realtime Experiment Control Device

The ViRTEx-100/200 provides sophisticated electronic for experiment control, where highly accurate timing is essential. Typically it is used in Confocal, FRAP and TIRF experiments. All of these applications need fast and highly accurate TTL synchronization of scientific interline, frame-transfer or sCMOS cameras with illumination devices like Poly-chromator, LED or laser systems.
Furthermore for precise Z-stack 3D image acquisition, highly accurate Z-Focus Piezo control is required and now supported by the ViRTEx-200 device.

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ViRTEx-100/200 model for TTL synchronization and analog control:

- TTL synchronization module for fast experiment control
  e.g. device streaming
- camera / illumination device synchronization
- connection via USB 2.0
- 16 TTL output lines
- 4 analog out channels (ViRTEx-200), optional up to 8 channels
- analog output 16 bit with 0 to 10V, 0 to 5V or -5 to 5V
- 4 camera inputs connector board (exposure signal for stream mode)
- available models: ViRTEx -100 / 200 stand-alone devices
  ViRTEx -110 / 210 control boards for VS-Laser

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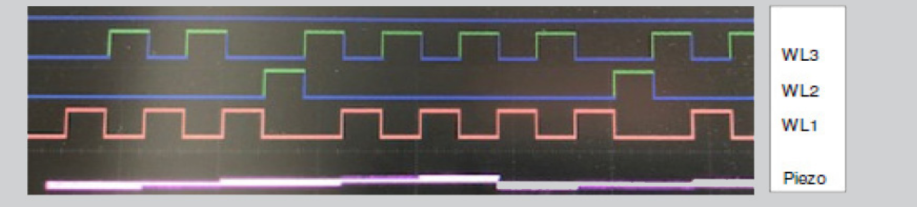
Focus Setting: Do Z For Each Wavelength. Do NOT Keep shutter open during z. Stream ON
Acquire Setting: 3 Wavelengths, Wavelength 2: no z Series, Z-Series: 5 planes. Stream ON

Focus Setting: Do Wavelength for Each Z. Stream ON
Acquire Setting: 3 Wavelengths, Wavelength 2: no z Series, Z-Series: 5 planes. Stream ON



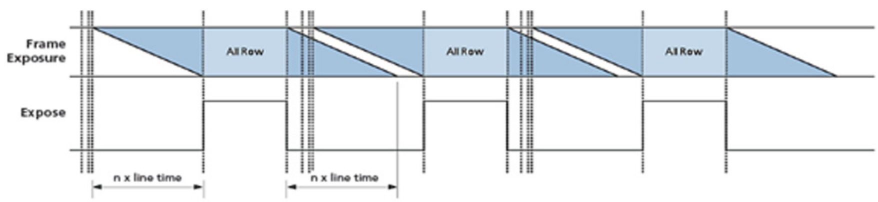
Timing Considerations:

Timing Examples – frame-transfer EMCCD camera

The following examples are taken with an EM CCD camera.
One can see in WL1 and WL2 of the first figure, how the illumination is blanked during the sensor shift time

Timing sCMOS Cameras

In rolling shutter mode, the rows of an sCMOS camera are continuously exposed and digitized. The pixels of a row are digitized simultaneously, then the next row is digitized. Each row requires about 10µs depending on the digitizer speed. This means that each row is exposed 10µs later than the previous one. With 1000 rows to be digitized, the shift between the first row and the last row adds up to 10ms.
sCMOS sensors are actually digitizing symmetrically to the horizontal center line from top to center and from bottom to center. The following timing diagram thus shows only one half of the chip. As the readout of the two halves takes place simultaneously, the timing diagram on one half describes the timing correctly.



Due to the overlapping exposures, it is not possible to change the illumination or the focus without crosstalk between the exposed frames. So, for fast multiwavelength/ multi-Z sequences, it is necessary to illuminate the sensor only in the time where no overlap with the next/previous frame takes place.
In the figure above, this area is named AllRow. Virtex uses the AllRow output of the sCMOS camera to illuminate the chip with the appropriate timing.