

## Double Line cameras for Spectroscopy

The Double Line Cameras are intended for I/O Spectrometer Systems, where 2 spectra's are sampled simultaneously with high repetition rates. Both lines are sampled exactly at the same time, as the lines are clocked with one master clock. The line rates (**mlr= maximal line rate**) are better 1 kHz ( better 1000 spectra's per second). Example applications are pump probe experiments and transient absorption spectroscopy.

These 2 setups are possible:

### Double Line System

Two sensors are assembled as close as possible on one sensor board behind one spectrometer. The distance between sensors is given by the case of the sensor. The Camera Control supplies all clocks and voltages and is connected to our PCI board with 2 cables.



- + one optical path,
- + needs only one spectrometer
- spectrometer price (must have imaging quality)

Sensors available:

Dalsa IL-C6,  
all Hamamatsu PDAs and  
Series S9840, S11071, S10420

mlr (PDAs) 1/3/7 kHz

mlr (IL-C6) 4 kHz

mlr (S9840) 1,5 kHz

mlr (S11071) 1,3 kHz

here shown: Cam Control with double line S11071

### Parallel System

Two separate cameras and two spectrometers are triggered and clocked parallel.



- + all sensors (case size does not matter)
- need two spectrometers

Sensors available:

all Hamamatsu FFTs S7030 (best performance),  
all cooled VIS & IR cameras

mlr(S7030-0906) 2 kHz (tuned 3kHz)

mlr(S7030-1006) 1 kHz

here shown: 2 Jobin Yvon CP140 with separate cameras.

## Camera Control



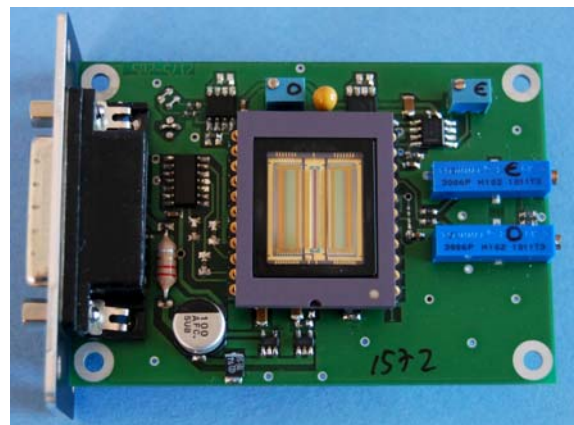
Besides the original sensor heads from Hamamatsu, we can also deliver own sensor heads with a broad range of cooled and not cooled sensors. Here we can offer higher data rates and lower noise.

here shown:  
 two cooled IR sensor heads from Hamamatsu.

Our Camera Control can be connected to one or two sensor heads. Here two sensors can be mounted on one board very close, or on two separate boards. Some sensors have a quite big case, so that the distance if mounted on one board would be >14mm. Most spectrometers do not have this focal plane size. Here two separate spectrometers must be used, but the sensors are clocked parallel.



Sensor Head with two (PDA) sensors.  
 These sensors can be mounted with 13mm distance on one board.



Sensor Head with one (IR) sensor.  
 This sensor has a big case, so here 2 separate boards and spectrometers must be used.

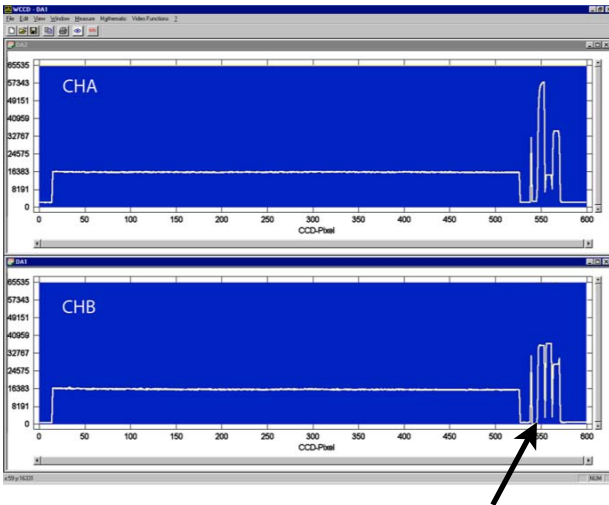
The maximal line rate (mlr) is the same for single and double line systems.

Options for additional photo diode or voltage inputs are available.

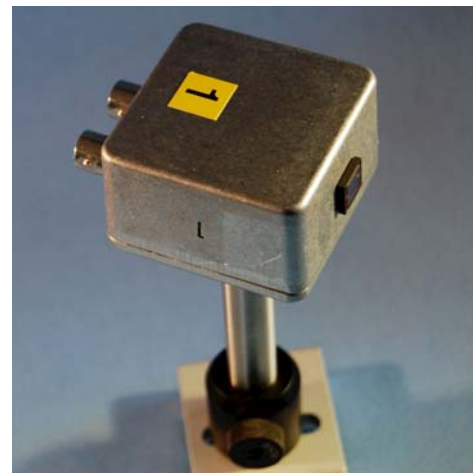
## Camera Control Options

Integrator option for additional external photo diodes: In some cases it is useful to have additional Information about energy fluctuations to correct the light signal and increase dynamic range. Therefore the Camera Control can be ordered with 4 external inputs for additional photo diodes. These values are inserted in the video stream at the end of the line and can be used to correct the data. Here an external triggered integrator (I-version) can be used or just a simple voltage input (can be used to read the delay stage or the jitter).

The values are integrated synchronously to the line cameras data stream.



The integrated signal of the external photo diodes are inserted in the video stream at the end of the line (here: 512 active pixel and in every channel 3 additional signals which are 8 pixel wide).



external photo diode with amplifier (power supplied by Cam Control, so it needs no battery).

## Prism Spectrometer KIT for Broadband Applications



We offer a complete prism spectrometer KIT for our double line cameras: the prism is 60x60x60mm, beam distance is 20mm. 5 spectral ranges are available (others on demand):

uv-vis: 200-1000nm  
 vis: 450-800nm  
 ir: 1000-1700nm  
 ext ir: 1000-2500nm  
 vis-ir: 500-1700nm

- wavelength not linear
- resolution around 5nm
- + no losses in high orders
- + good wide range efficiency
- + prism and lenses can be changed easily



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## Pricelist

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### Cameras (not cooled systems)

<b>Camera Control</b>	€ 3700.-
<b>DoubleLine option</b> (for 2 Sensor Heads) some mixed sensors are possible - please ask	€ 600.-
<b>option: 4 additional Photo Diode inputs with integrator</b>	€ 2700.-
<b>option: 2 voltage input</b> (for position of delay stage) <b>plus 2 integrator input</b>	€ 3200.-
<b>external Photo Diode with Amplifier</b> ( photo diode has same range as head)	€ 700.-
<b>Detector Head with 1 sensor S7030-0906</b> (200-1000nm / L=12.3mm) mlr>2KHz	€ 4000.-
<b>Detector Head with 1 sensor S7030-1006</b> (200-1000nm / L=24.6mm) mlr>1KHz	€ 5000.-
<b>Detector Head with 1 sensor G9204-512</b> (1000-1700nm / L=12.8mm) mlr>1.6KHz	€ 6200.-
<b>Detector Head with 1 sensor G11608-512</b> (500-1700nm / L=12.8mm) mlr>3.4KHz	€ 6600.-
<b>Detector Head with 1 sensor G11608-256</b> (500-1700nm / L=12.8mm) mlr>6.8KHz	€ 6200.-
<b>Detector Head with 2 sensor S8381-512</b> (200-1000nm / L=12.8mm) mlr>3.2KHz	€ 4600.-
<b>Detector Head with 2 sensor S8381-1024</b> (200-1000nm / L=25,6mm) mlr>1.6KHz	€ 5000.-

(mlr = maximal line rate = double spectra per second)

### Spectrometer

<b>Prism Spectrometer</b>	€ 6600.-
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For the Double Line application, the PCI board must get a special option: adaptor for a 2nd channel (simultaneous readout). This needs a 2nd bracket in the PC case. So a complete System needs the following additional items:

1 PCI- Interface	€ 700.-
1 Adaptor for 2. Channel	€ 360.-
1 option: Shutter state input (open / closed state is written to the data stream)	€ 360.-
1 Win Driver packet with examples (all 32 bit systems)	€ 380.-

Example complete Broadband System (mlr > 3.4 kHz -> 3400 double spectra per sec)

Camera Control (DL)	€ 4300.-
2x Detector G11608-512	€ 13200.-
PCI Interface&2nd channel	€ 1060.-
Win driver	€ 380.-
complete system	€ 18940.-

Prices and availability subject to change. Please ask for detailed offer.