

Key Features

Operation of up to 8 spectrometers / detector arrays with one Operating Electronics

Simultaneous and sequential readout mode

Superior results for multi-sensor measurements

Ultrafast multi-channel sampling

No moving parts

Easy to integrate and use

Compatible to tec5 Operating Electronics

Advantages for Applications

Electronic multiplexers provide important advantages when sample and reference data have to be acquired at the same time (2 channel operation) or spectra at different measurement locations have to be taken sequentially.

Therefore, these units are useful for all types of high-precision process analysis, for which a reference channel has to be observed simultaneously. Due to the negligible time delay between two channels, the reference (e.g. the light source) and sample channel measurements are interwoven: variations of the light source or the temperature are compensated.

In case of multiple measurement locations, the costs for each channel can be reduced dramatically by using a MUX board.

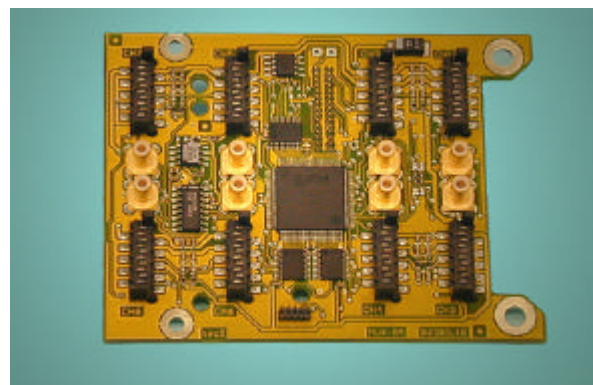
Optical multiplexers have the drawback of moving parts and sequential measurement. Fast fluctuations cannot be overcome. The overall measurement time of our electronic multiplexer is much shorter since no mechanical part has to be moved. More averaging contributes again to superior results.

Compared to spectrometer systems based on multiple interface boards or cascaded electronics, an electronic multiplexer system is much better regulated and faster.

Working Principle

The MUX board is directly plugged onto the Front End Electronics (FEE). The one standard FEE input is replaced by up to 8 input channels of the MUX board. In principle, the electronic multiplexer links one of the connected sensors to the Operating Electronics at time.

Beyond the multiplexer, all sensor signals follow the identical circuitry for processing including A/D conversion. Therefore, any interference affects all channels in exactly the same way.



Spectral Sensor Multiplexer MUX-8A

Operation Modes

Mode 'Sequential'

At the sequential operating mode, the control signals generated by the Operating Electronics (StartOfScan, Clock) are provided to all sensors in parallel. Only the output signals of the selected sensors (EndOfScan, Video) are forwarded to the Operating Electronics by means of the input multiplexer. Software controlled, the sensors may be accessed in any sequence.

Characteristics:

- all sensors are operated concurrently
- with each cycle, the data of the software-selected sensor is stored, the data of all other sensors are lost
- different integration times per channel are possible (software controlled)

Mode 'Simultaneous'

At the operating mode 'simultaneous', all control signals (StartOfScan, Clock) generated by the Operating Electronics are fed to the sequencer logic on the multiplexer board.

The sequencer logic controls that each pixel position of each detector array is integrated one after the other, before the multiplexer switches to the next pixel position. The sequencer logic controls that each pixel position of each detector array is integrated one after the other. In contrast to the sequential mode, the multiplexer input is switched from sensor to sensor for each pixel within a scan. The sequencer performs 256 (in case of arrays of 256 pixels each) cycles, addressing all sensors successively within each cycle (starting at channel 1).

Characteristics:

- all software selected sensors are read out simultaneously for each illumination process
- the time delay of 2 consecutive sensors is equivalent to the readout time per pixel (e.g. 5µs in case of a 200kHz clock frequency)
- the number of channels and the channel combination for the simultaneous read out is software selectable (details see Technical Data)
- the number of sensors is programmable
- no data is lost at the simultaneous mode
- due to this quasi simultaneous operation it is applicable to pulsed illumination
- maximum performance for fast dynamic processes and differential measurements
- all sensors / detector arrays are operated with exactly the same integration time
- the minimum integration is n times the minimum integration time of a 1-channel operation with number of sensors n

Supported Sensors / Detector Arrays

MMS or MCS modules from Carl Zeiss or Hamamatsu diode arrays of type:
S390x (with preamplifier DZA S39x),
S590x (with preamplifier DZA S59x)



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Multiplexer Types

MUX-8A (for FEE-HS)

The MUX-8A (Active) contains a sequencer logic on board and controls the sequence of individual detector arrays independently from the rest of the Operating Electronics.

- 8 input channels
- all channels can be read out sequentially
- software selectable simultaneous readout combinations: Ch1&Ch2, Ch1&Ch2&Ch3, etc. until Ch1&Ch2&Ch3&Ch4&Ch5&Ch6&Ch7&Ch8
- not for use with µ-processor based Operating Electronics (MOE, LOE)
- dimensions 88 x 68 [mm], (equivalent to FEE)

MUX-4P (for FEE-HS and FEE-HR)

The MUX-4P (Passive) can address up to 4 detector arrays, the access and sequence is controlled by the related FEE. In simultaneous mode, only 2 channels at a time can be controlled, the channel numbers are selected by the software.

- 4 input channels
- all channels can be readout sequentially
- 2 channels can be readout simultaneously, combinations Ch1&Ch2, Ch1&Ch3, Ch1&Ch4
- suitable for µ-processor based Operating Electronics (MOE, LOE) too
- HR (high-resolution) performance in conjunction with FEE HR (and appropriate Spectral Sensors)
- dimensions 66 x 67 [mm]

Technical Data / Performance

Configuration: FEE-HS with MUX-8A

- time per pixel approx. 5.3 µs respectively at 187.5kHz Clock frequency
- readout time of a 256 pixel detector array 1.4 ms
- total readout time n times the minimum readout time per array
- minimum integration time with 8 arrays attached 11.2 ms.
- signal to noise ratio equivalent to the related FEE operating mode and channel selection by software
- printed board, slip-on connection to FEE (sandwich configuration)
- Front End Electronic / Multiplexer configurations boxed in FEE housing available as an option for evaluation (4 external inputs only)
- The power for the sensors is supplied via +- 12V from Front End Electronics.