mesytec psd

readout system for position sensitive or standard detector tubes

mesytec psd is a complete readout system for sets or arrays of neutron detector tubes. Position sensitive tubes can be readout as well as standard tubes - even a mix of types is possible in one setup.
The modular system provides amplifier/converter modules, an intelligent central processing device for system control, histogramming and network interfacing, as well as data acquisition and control software.

Modularity:

- 16-fold preamp/shaper/window discriminator units for standard tubes
- 8-fold preamp/shaper/window discriminator units for position sensitive tubes
- Central processing device

Scalability:

- Up to 128 PSD / 256 standard channels per CPD on a single serial event bus
- Multiple central processing devices can be connected to a single PC

Flexibility:

- For PSD and/or TOF systems
- Chopper-, monitor- and sync- options
- Pulseheight- or position spectra
- Histogramming or listmode
- NIM-modules, VME or stand alone
- Additional analog signal output

Ease of use:

- Control and data acquisition on a PC connected by standard ethernet
- Control and display software included

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System overview

mesytec psd consists of two main elements that can be combined in order to build flexible readout systems – from single tubes up to large numbers of detectors:

- Amplifier + converter unit:

  MPSD-8 for up to eight position sensitive tubes
  MPSD-16 for up to sixteen standard tubes

- Central processing device:

  Performs system control, histogramming, data concentration, diagnostics and network interfacing.

  MCPD-2: the standard, low cost version
  MCPD-2s: the high speed version

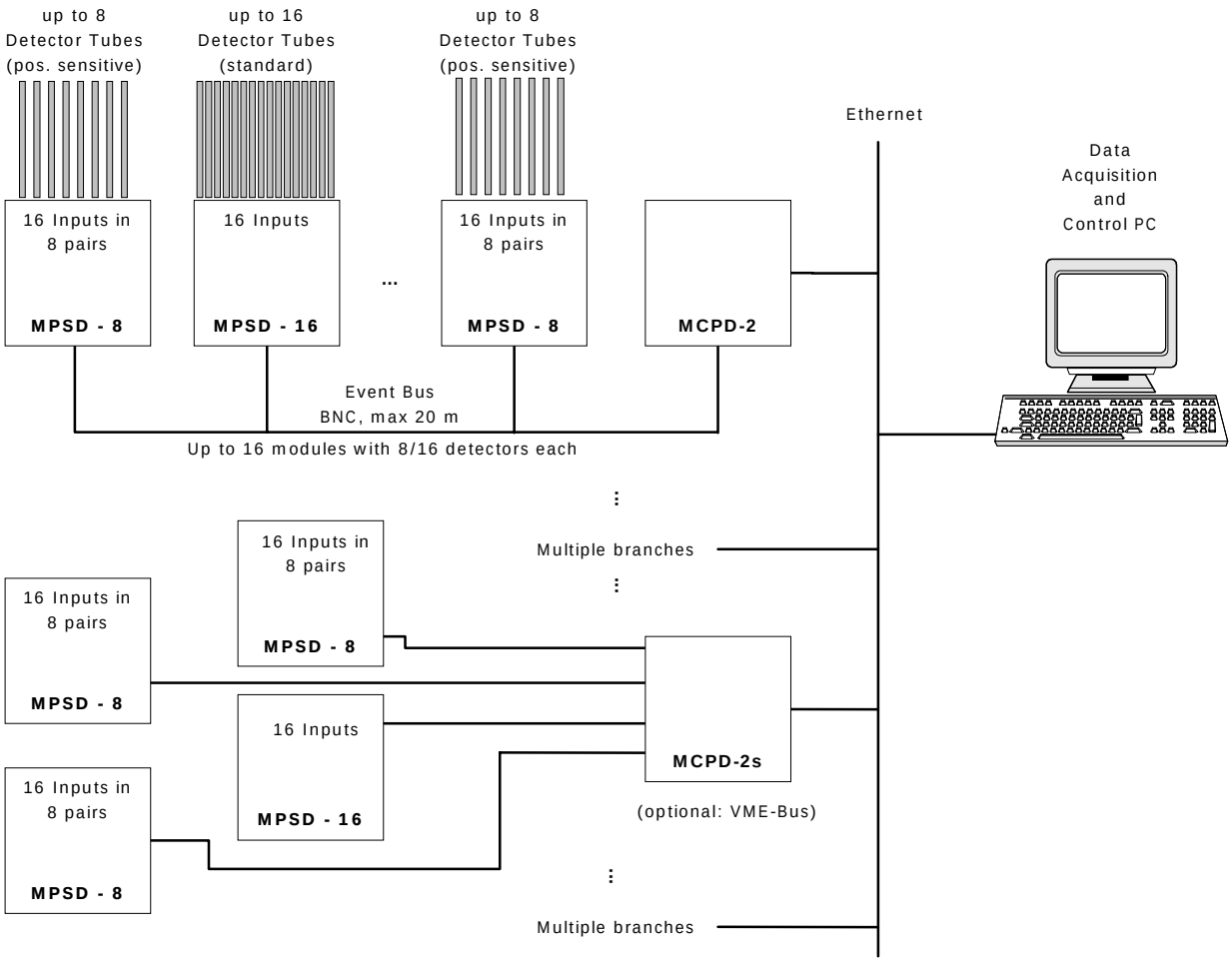
MPSD and MCPD are connected by a high speed serial event bus using a standard RG58 cable (max. 20m).

Up to sixteen MPSD can be connected to a single MCPD. This results in 128 position sensitive or 256 standard channels per branch.

For further extension or increased rate capability, additional branches can be added just by connecting more MCPDs to the ethernet network.
Branches can be synchronized.

System control and data acquisition is done with a PC or workstation connected to the system by standard 10/100 Mbit ethernet.

An easy to use, Linux based data acquisition and control software is included with every mesytec psd system.



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MPSD: 8 / 16 channel amplifier / converter module

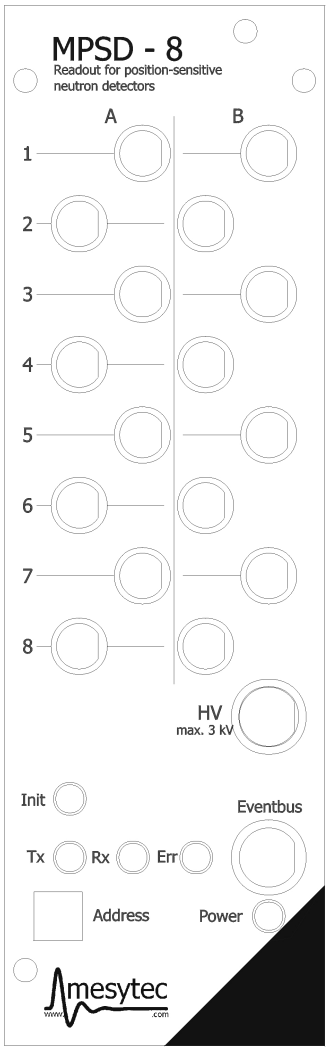
The MPSD are 2/12 standard NIM modules which combine the multi channel preamplifier, shaper sections with a window discriminator and a digitizer. MPSD-8 adds an online position calculation for position sensitive gas detector tubes.

Data are sent by a high speed serial bus to a MCPD central processing unit for further handling.
Vice versa, the event bus is used for remote control of gains, threshold and the built in test pulser.

One central HV input delivers voltage supply to all connected detectors, where cables (RG 59) up to 3 m length are allowed.

Diagnostic LEDs permit quick optical function control.

Up to sixteen MPSD can be put on one event bus – resulting in 128 position sensitive or 256 standard channels. Even a mixed setup is possible.

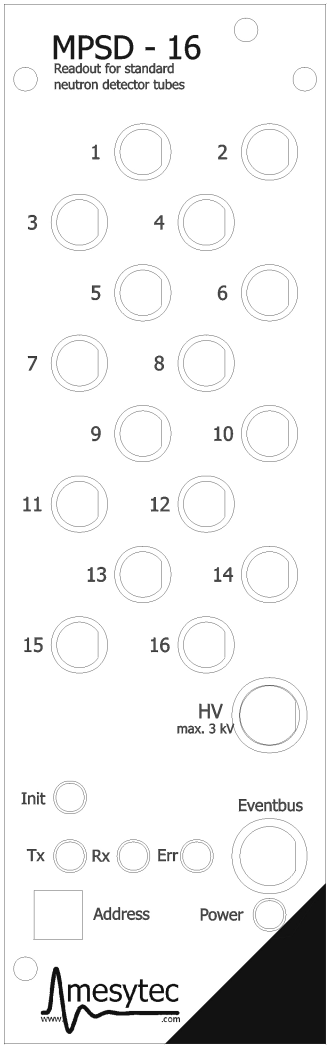


Technical data:

- 8 channels position sensitive (MPSD-8)
  (for tubes with gas amplification from 150 to 250)
- 16 channels standard (MPSD-16)
  (for tubes with gas amplification from 10 to 50)
- Gain adjustable by a factor of 2 (MPSD-8) or 5 (MPSD-16)
- Lower threshold 5%...50%
- built in test pulser: variable amplitude, three positions per channel
- Gains, threshold and pulser remote controlled
- central HV supply (< 3kV) for all detectors
- 2/12 NIM – module
- Power consumption: 4.5W

MPSD-8:

- Transmission of position or amplitude data remote selectable
- Electronical position resolution for thermal peak better than 1% of active detector length
  (Reuter&Stokes tubes, gain = 200, length = 300 mm, R = 3kΩ)



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MCPD: the central processing modules

Buffer, histogrammer, network interface

MCPD are the central processing devices for the mesytec psd system.

They act as hubs in communication between peripherals modules and control PC, collect and process incoming data from the peripherals that are connected over a high speed serial event bus.

Gains, thresholds and test pulser are controlled by the MCPD.

The MCPD delivers central services like monitor counters and chopper timing.

Data are buffered and output to the control PC either as listmode or histogram data.

MCPD and PC are connected over standard 10/100-Mbit Ethernet. MCPD-2s is also available with VME bus. Communication takes place via UDP/IP.

Connecting several MCPD increases channel and rate capability even for huge systems, while internal sync guarantees common start/stop and timing.

MCPD-2
Is the low cost standard central processing device for the mesytec psd system.

It takes incoming data from up to 16 peripheral modules (MPSD) on the high speed serial event bus. (100 kEvents/s at 12% deadtime)

Thus one MCPD-2 can provide 128 position sensitive or 256 standard channels.

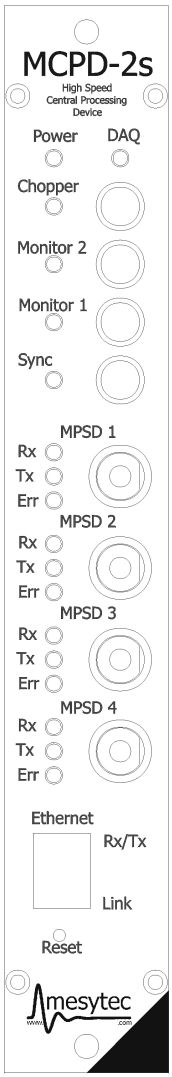
MCPD-2s
Is the high speed central controller.

It offers four dedicated point to point connections to the peripheral modules.

Each of them can handle one MPSD with eight position sensitive or sixteen standard channels with an event rate of 300 kEvents/s at 10% deadtime.

This results in 32 position sensitive or 64 standard high speed channels per central device and a rate of 1.2 Mevents/s at 10% deadtime.

A VME version is available on demand.



Common technical data:

- 1/12 NIM module
- Position or amplitude mode
- Listmode: Detector address, position or amplitude, timing
- Histogramming mode: Position or amplitude, timing
- 2 Monitor counters (32 bit)
- Event counter (32 bit)
- Chopper Timing: 17 bit, 1µs Resolution
- Sync bus for common start/stop and internal clock sync when connecting several MCPDs
- Data connection: 10 / 100 Mbit ethernet, RJ 45
- MPSD-2s: optional VME-Bus
- Power consumption: +6V: 0.40A, -6V: 0.02A, 2.5W

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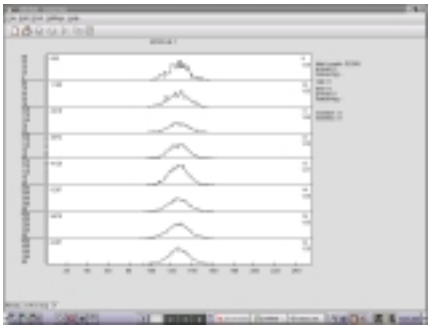
Software

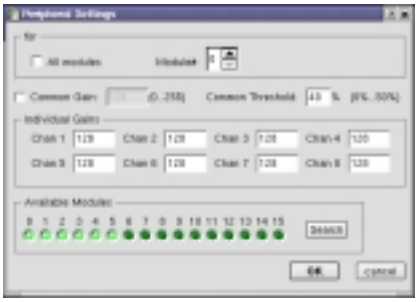
mesydaq: data acquisition and control
daq and control software for the mesytec psd system

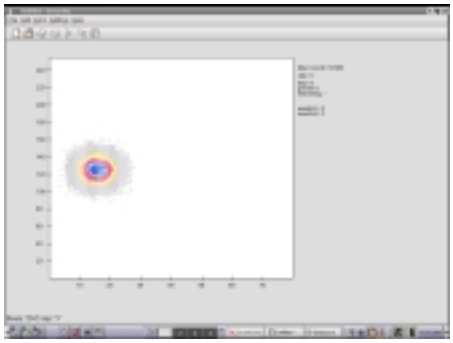
mesydaq is a Linux / KDE application that allows total control over the data acquisition system.
Running on a PC that is connected to the system via standard ethernet, all properties like gains, thresholds, pulser settings can be remote controlled.
Data are displayed live during acquisition and can be saved to disk in listmode and as histograms.



Setup data can be saved for easy reuse.

Already existing experiment control systems can be interfaced.





mesydaq is included with all mesytec psd systems

Additional diagnostics

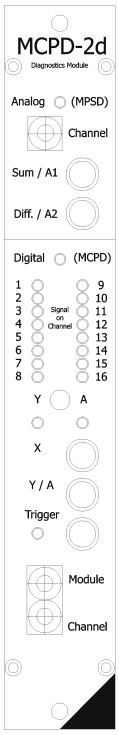
MCPD-2d
Is the diagnostics add-on module for MCPD-2.

The diagnostics module is not needed for normal operation, but it might be a valuable add on for setup and testing purposes, without using the complete data acquisition chain.

To view analog detector signals, MCPD-2d can be connected to the MPSD units and delivers the analog amplitude signals (sum and difference for MPSD-8, two sums for MPSD-16).

For a quick optical system check, a MCPD-2d connected to the MCPD-2 shows triggering channels in 16 LEDs. Furthermore, all digital data from the coupled MCPD-2 are output in analog voltage signals for x (channel number) and position or amplitude. A single channel can be selected for triggering.

In addition, position or amplitude mode can be selected by a switch, allowing diagnostics without using the control pc.



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