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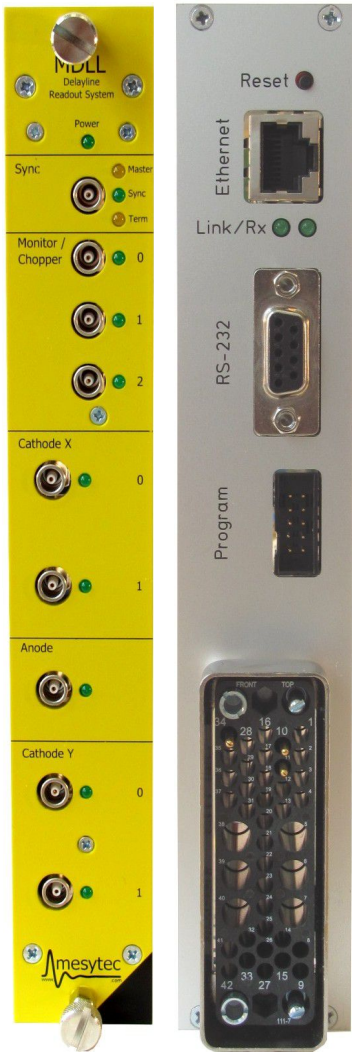
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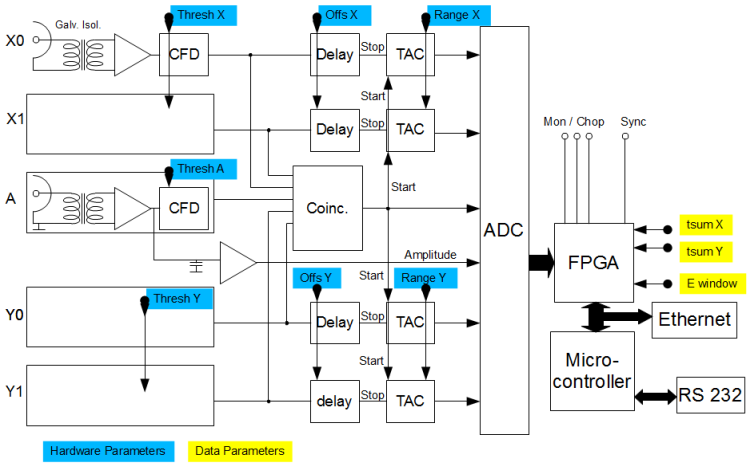
mesytec MDLL is a delay line readout system for multi wire proportional counters with two delay lines. The position is determined from the delay of the signals from the two ends of a delay line. An anode signal is needed to start the signal processing. It includes discriminators (CFDs) and so allows direct processing of detector signals after amplification (input level –1 V).

Features MDLL:

- X and Y position calculation
- Anode amplitude is converted and available for adjustment
- Register adjustable to detector delays from 100 ns to 500 ns
- List mode with time stamped events (100 ns resolution)
- Stand alone and NIM form factor
- In NIM case: can be time synchronized with several MDLL modules and mesytec MCPDs (neutron systems)
- Accepts –1 V analogue detector pulses, rise time typ. 10 ns to 35 ns. (CFD- delays can be selected with jumpers)



MDLL Schematics



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Technical Data

Input stage

- 5 inputs:
  X0, X1 for first coordinate delay line,
  Y0, Y1 for second one
  Anode input for common signal.

- Galvanic separation

- Accepts negative input of max –1 V

Input filter

Time constants: see Table

CFD Discriminator

- CFD delays, standard is
  For Cathode:
  8 ns, 11.5 ns, 15.5 ns, and 19.5 ns,
  For Anode:
  9.5 ns, 14 ns, 19 ns, 28 ns

  Delays are jumper selectable. Shortest delay when jumper is near to bottom.

- Fraction 40
- Threshold adjustable via software.
  Maximum value 255 is –1 V
  (maximum threshold). Default: 20 = 4 n%.

TAC section

MDLL has 4 TACs (time to voltage converters) which are started by the anode signal and are stopped by the X0, X1, Y0, Y1 signals.
The range of the TACs is software adjustable from 100 ns to 500 ns.

Power consumption: (max 7 W)

+6 V 1 A (at power up max 2 A)
–6 V –200 mA

For stand alone modules:
The ripple should be less than 50 mVpp at 50/ 60 Hz.

Adjustment of MDLL module for MWPC

Preparations

Connect detector to the MDLL module (inputs X0, X1, Anode, Y0, Y1). All signals negative, Amplitude typically –1 V, rise time 40 % (= fraction) to maximum 10 ns to 15 ns.
Set CFD-delay via jumpers for 5 inputs.
Install the Detector and add a source to fill all the active area of the detector.
Apply typical voltages to the detector.

The input LEDs should light up.

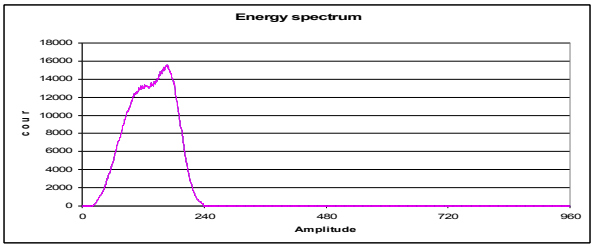
Basic adjustments

Set parameters to adjustment defaults:
1. Open **Set MDLL** window
2. Set low thresholds for discriminators X, Y, and Anode to value 20
3. Set X,Y spread to 40 and X, Y offset to 100
4. Open timing and Energy restrictions
   Energy: (minimum = 10, maximum = 240),
   Timing: low 100, high 1000
5. Click Spectrum „E, X, Y“
6. Click „apply“

Start Data acquisition. → event counter should increment.
After activating the set command the spectra should be cleared with the „clear“ button to see the new data.

Adjust Amplitude

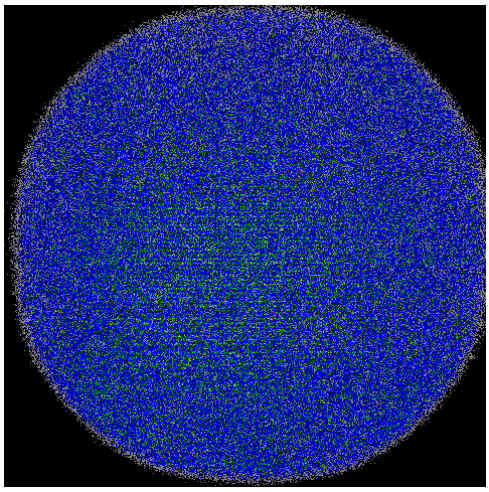
1. Spectrum: click „Energy“
2. Adjust Detector Voltage for correct output amplitude. The amplitude range can be from 0 to 240, the spectrum should not be cut off significantly at the upper edge (240)



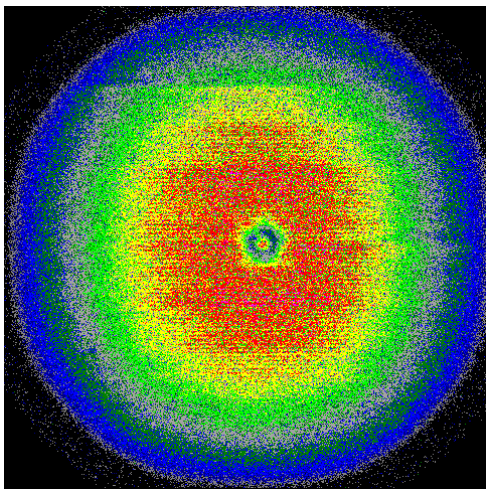
Adjust timing range and offset (spectrum spread)

1. Open 2-D (XY) view
2. Vary the spectrum spread X, Y (reasonable values 20...60)
3. and shift X, Y (range0...256) to fill all the 2-d spectrum

Well adjusted 2-D views



counts



amplitude

Add restrictions to the data (data filter)

The restrictions help to reduce the background. They are not essentially needed for first tests. If you change any other parameter after the restrictions are set, the efficiency may decrease or all data may be filtered off. So when changing other parameters, the restrictions should be removed before (set timing and energy window to adjustment default).

Sum timing restrictions

1. Stop data acquisition
2. Open set MDLL window
3. Click “E, Xtsum, Ytsum”
4. Clear spectra and start data acquisition

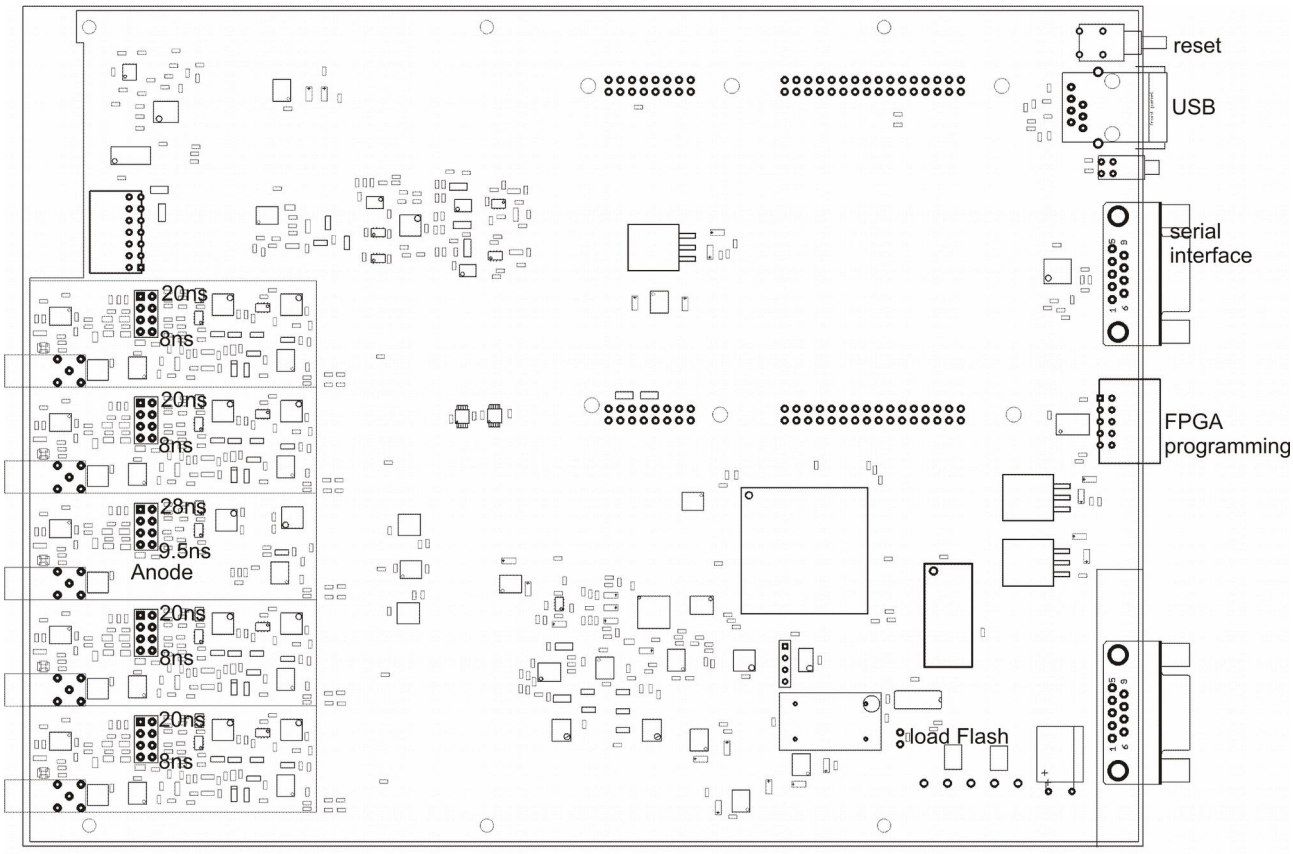
The position X and position Y spectra now show the timing sum of the X-coordinate delay line, and the Y delay line. There should be a sharp peak of about 10 bins FWHM at about position 400 to 500.

Now you can set the timing sum lower and upper limits for X and Y coordinate via „Set MDLL“ window. You can immediately see the effect in the spectrum.

Energy restrictions

If the MWPC provides a significant amplitude resolution, the energy restriction may make sense. Fot neutron detectors, a lower cut off may improve the position resolution with cost of efficiency.

Overview, serviceable elements inside the box



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