

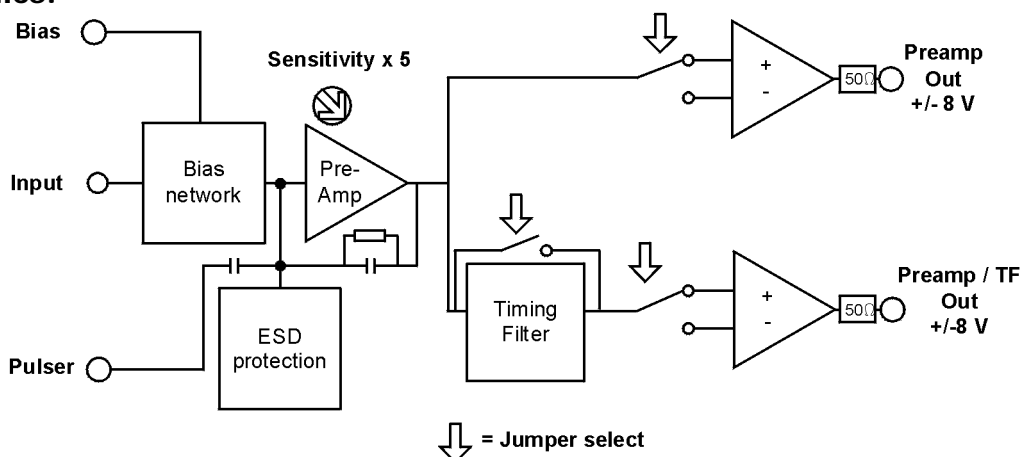
mesytec **MPR-1** is a charge integrating preamplifier module. It provides two outputs which can be jumpered to different or same polarity. One can be configured as timing filter output. Both can drive terminated BNC cables. The sensitivity can be changed by a factor of 5 via front panel switch. This helps to get larger signals at low charge deposition. MPR-1 is available with Lemo, BNC, MHV and SHV connectors.

Features:

- Ni-plated, fully shielded case
- ESD input protection
- Positive and negative input charge
- Pulser input
- Bias voltage up to ± 3000 V
- Two outputs (selectable polarity, one can be configured as timing filter output)
- Strong output driver for 50Ω (optional 93Ω) termination
- Fast risetime ($t < 12$ ns)
- Two sensitivities (switch selectable)
- Low power



Schematics:



Technical Data:

Different standard ranges are available:

Range in energy deposition in silicon detectors. Divide by 3.6 to get number of electrons (1 GeV = $2.8 \cdot 10^8$ electrons)

All values for ± 8 V output, left number for switch position low sensitivity, right number for high sensitivity.

- **200 MeV type** : 200 MeV / 40 MeV -> low noise (for energies up to 200 MeV [Si] = 9pC)
- **1 GeV type** : 1 GeV / 200 MeV -> Si detectors in heavy ion experiments or PMTs (for energies up to 1 GeV = 45pC)

Other ranges on request.

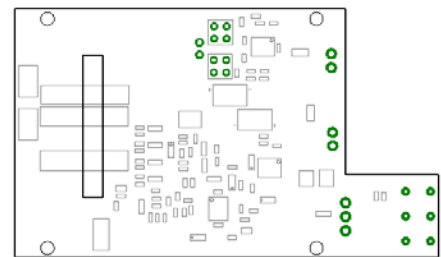
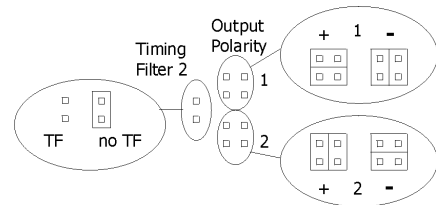
Preamplifier:

- ESD protected
- Positive and negative charge can be amplified equally.
- Open loop gain typ 60000 @ 1 pF integration capacity
- Temperature drift $< \pm 50$ ppm/ $^{\circ}$ C
- Nonlinearity < 50 ppm
- Energy rate capacity at 200MeV: $2 \cdot 10^6$ MeV/s , at switch 40MeV: $4 \cdot 10^5$ MeV/s.
- Risetime of energy and timing output.

<i>detector +cable capacity</i>	<i>signal risetime</i>
0 pF	12ns
100 pF	25ns
330 pF	50ns

Internal Jumper setting:

setting for output 1 and 2



Pulsar input

- Tail pulse, rise-time TR=0..100 ns, decay time typ. 500 μ s
- Terminated with 50 Ω
- Amplitude: max 10 V.
- For 200 MeV type: 1 V corresponds to a charge injection of 10^{-12} C or 22 MeV[Si]
- For 1 GeV type: 1 V corresponds to $4.7 \cdot 10^{-12}$ C or 100 MeV.

Example: for 200 MeV type, switch to 200 MeV: 1 V pulser input will result in 0.8 V output voltage.

Output stage:

- Positive and negative output for single or differential use. Internally switchable: same polarity, or one output with timing filter.
- The timing filter is a single differentiation with time constant $\tau = 33$ ns.
- Output swing: 0 to ± 8 V (not terminated)
- Decay time TD = 100 μ s

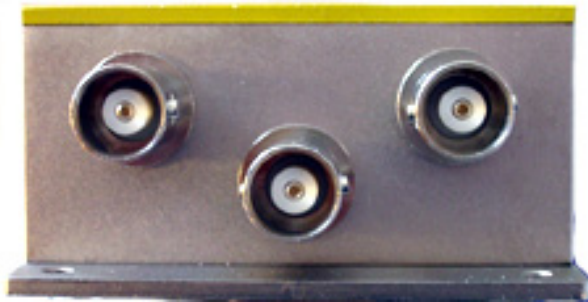
Input capacity:

- The preamplifier can handle capacities of more than 1000 pF.
- Preamp input capacity typ. 10 nF.

Detector bias (Bias Network):

- Maximum: ± 3000 V
- Bias filter: T-filter (RCR) with 10 M Ω from bias input, 4.7 nF filter capacitor to ground, 50 M Ω resistor to detector input. (others on request)

Input side: (Lemo, BNC, MHV or SHV connectors)



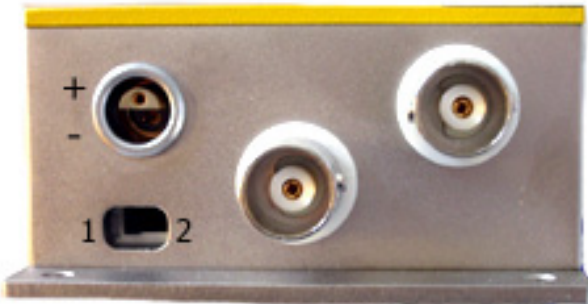
Bias Input
3000 V max.
(BNC, Lemo: +- 400V)

Detector
Input

Pulser
Input

Output side:

Power



Sensitivity Select 2 1 Outputs

Output 1: polarity + or -
Output 2: Polarity + or -, optional Timing filter

Amplifier noise

- Noise vs. input C and shaping time (idealised amplifier and detector):

$$N = (N_0 + C_{Det} * N_s) * \sqrt{1/\Delta T};$$

C_{Det} = cable + detector capacity, in pF;

ΔT = shaping time, in μs ;

N = noise FWHM in keV;

N_0 = noise factor at capacity 0

N_s = noise factor slope

- 200MeV type

For 1 μs shaping time (=2.3 μs FWHM):

$$N = 2.3 \text{ keV} + 0.021 \text{ keV/pF}$$

detector +cable capacity	noise [FWHM] 1 μs shaping time:	0.35 μs Shaping time
0 pF	2.3 keV	2.7 keV
50pF	3.5 keV	4.7 keV
100 pF	4.1 keV	5.9 keV
330 pF	9.1 keV	15 keV

- 1GeV type

detector +cable capacity	noise [FWHM] for 1 μs shaping time:
0 pF	6 keV
50pF	8.5 keV
100 pF	11 keV
200 pF	16 keV
400 pF	25 keV

Power consumption:

- +12 V, 40 mA + output current
- -12V, 30 mA + output current

Power connector:

needed plug:

Lemo: FFA.OS.303.CLAC44ZN.

Lemo to SubD-9 cable included at delivery

Power cable output connector:

SubD9 connection:

1,2 = gnd / 4 = +12V / 9 = -12V / others not connected.

Dimensions:

- 60 mm * 143mm * 30mm including connectors.
- Weight: 240 g