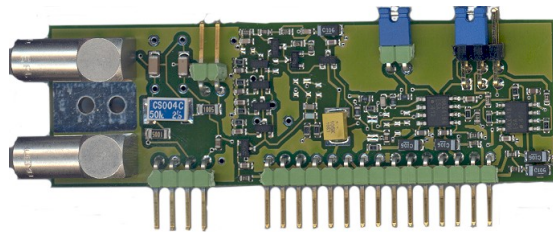


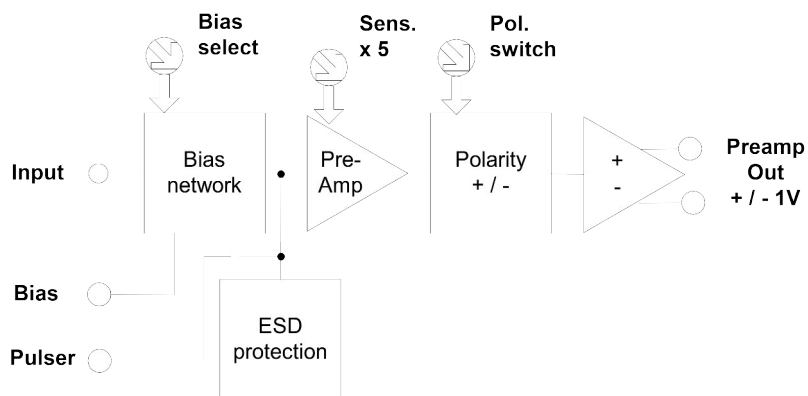
The mesytec MMPR1 is a charge integrating preamplifier module. The MMPR1 together with the MMSH1 shaper PCB fits into the preamp+shaper box **MSI-8**. It can also be connected to the mesytec **MSCF-16** shaping-/timing filter/ discriminator module or **MDPP-16/32**.

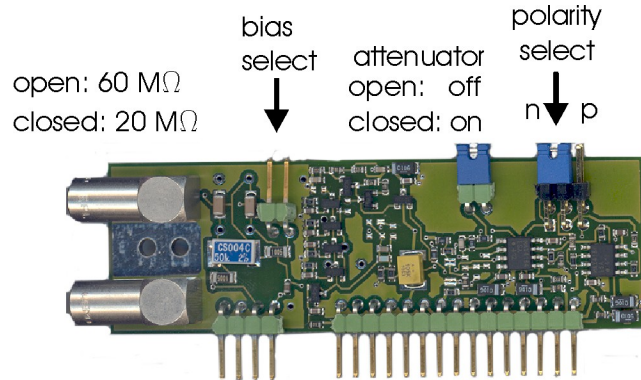
Features:

- ESD input protection
- Positive and negative input signals
- Fast energy output, differential for twisted pair
- Pulser input
- Bias voltage up to ± 400 V (special revision up to ± 600 V)
- Switchable polarity and coarse gain
- Available for energies up to 5 GeV



Schematics:



Technical Data:

Input:

- ESD protected
- Positive and negative charge can be amplified equally.

Pulsar input

- Tail pulse, rise-time TR=0..20 ns, decay time typ. 500 μs
- Couple capacity per channel:
 - 35 MeV type: 0.7 pF (15 MeV/V)
 - 150 MeV type: 1.3 pF (29 MeV/V)
 - 2 GeV type: 15 pF (330 MeV/V)
 - 5 GeV type: 6.8 pF (150 MeV/V)
 - 10 GeV type: 6.8 pF (150 MeV/V)

Sensitivity:

- 2 GeV type: (400MeV/2GeV)
gain at shaper output:
4 MeV/V to 200 MeV/V
- 150 MeV type: (30MeV/150MeV)
gain at shaper output:
0.3 MeV/V to 15 MeV/V
- 35 MeV type: (7MeV/35MeV)
gain at shaper output:
70 keV/V to 3.5 MeV/V
- other ranges on request

Output stage:

- Differential output for twisted pair. Can also be used single ended. Also fits to mesytec STM-16 Shaper-discriminator module.
- Output amplitude: 0 to ± 1.5 V (stacking range ± 3 V)
- Risetime TR typ. 20...50 ns, depends on detector rise time and capacity.
- Decay time TD = 100 μs

Input capacity:

- The preamplifiers can handle capacities of up to 1000 pF.

Detector bias:

- Maximum: ± 400 V (extended ±600V)
- Bias filter 20 MΩ / 60 MΩ (selectable by internal Jumper). Use 20 MΩ for large detectors with high leakage currents (> 100 nA per channel) or for setups where you expect a strong rise in leakage current during beamtime. The 60 MΩ selection (no jumper) results in a slightly better noise and better immunity against noise on the bias voltage.

Amplifier noise

- Noise vs input C and shaping time:

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

C_{Det} = cable + detector capacity, in pF;
 ΔT = shaping time FWHM, in μs ;
 N = noise FWHM in keV;
 N_0 = noise factor at capacity 0
 N_S = noise factor slope

- 35 MeV preamplifier: ($N_0 = 2.7$ keV, $N_S = 0.031$ keV/pF)

detector + cable capacity	noise: 1 μs [σ] shaping, MMSH1:
0 pF	2.7 keV
20 pF	3.3 keV
100 pF	5.8 keV
200 pF	8.9 keV
400 pF	15 keV

- 150 MeV preamplifier: ($N_0 = 5.0$ keV, $N_S = 0.033$ keV/pF)

detector + cable capacity	noise: 1 μs [σ] shaping, MMSH1:
0 pF	5 keV
150 pF	8 keV
300 pF	13 keV
450 pF	18 keV

- 2 GeV preamplifier: ($N < 100.0$ keV)
- For the noise estimation of a timing filter output with an integration time of 20 ns, a shaping time of 100 ns can be assumed.

Power consumption (35 and 150 MeV amplifier):

- + 12 V, 12 mA
- + 6 V, 5 mA
- 6 V, -5 mA
- Total Power: 210 mW

Power consumption, 2GeV amplifier:

- + 12 V, 7 mA
- + 6 V, 5 mA
- 6 V, -5 mA
- Total Power: 150 mW

Due to the low power consumption cooling is not necessary, even not when many preamps are densely packed.

Dimensions:

- Length:
82 mm with Lemo + bias section
68 mm with bias section, without Lemo
- Width: 26 mm (without pin connector)
- Pins: 6mm, $0.6 * 0.6 \text{mm}^2$

Connector of preamp module:

(left pin = 1)
pins 1 to 12 are input section
pins 13 to 19 output section

pin	Name	pin	name
1	nc	11	- 6 V
2	gnd A	12	gnd A
3	bias in	****	*****
4	puser in	13	gnd
5	gnd A	14	+ 6 V
6	nc	15	- 6 V
7	nc	16	gnd
8	gnd A	17	out +
9	+ 10..12 V	18	out -
10	+ 6 V	19	gnd

for most applications gnd A and gnd can be connected. Also the input +-6V may be connected to the +-6V of the output section. The 10...12V supply should be well filtered to high frequency noise.