



ZRF RITEC SIA

MINIATURE PREAMPLIFIER

**Model PA101C
Model PA101C/HV**

User Manual

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1. INTRODUCTION

The RITEC Model Pa101C and PA101C/HV is a miniature, low noise, charge-sensitive preamplifier for gamma spectroscopy with room-temperature-operated semiconductor detectors (CdTe, CdZnTe, HgI₂).

The preamp converts the charge carriers developed in the detector during each absorbed nuclear event to a step function voltage pulse, the amplitude of which is proportional to the total charge accumulated in that event.

Outward appearance of the PA101C and PA101C/HV is shown in fig.1.



Fig. 1. Model PA101C and Model PA101C/HV.

2. SPECIFICATION

Base

- NOISE (CdTe, 1 μ s, +22°C)
with input capacitance 0 pF ≤ 2.0 keV
with input capacitance 50 pF ≤ 3.0 keV
- RISE TIME
at 0 pF ≤ 100 ns
at 50 pF ≤ 200 ns
- DECEY TIME 68μ S $\pm 20 \mu$ S
- CHARGE SENSITIVITY ≥ 200 mV / MeV
- INTEGRAL NONLINEARITY ≤ 0.1 %
- GAIN STABILITY (over range of 0°C to +50°C) ≤ 0.025 % /°C
- DETECTOR BIAS VOLTAGE
PA101C ≥ 2000 V (tested at 2500 V)
PA101C/HV ≥ 3000 V (tested at 3500 V)

Connectors

- INPUT
PA101C type BNC
PA101C/HV type SHV
- OUTPUT – INPUT LEMO FGG.2B.704 type (male)

Electrical and mechanical

- POWER REQUIREMENT +12 V, ≤ 18 mA; -12 V, ≤ 12 mA
- DIMENSIONS
PA101C
diameter 23,0 mm
length 67,5 mm
PA101C/HV
diameter 29,0 mm
length 89,5 mm

3. DESIGN FEATURES

Signals from a semiconductor detector of positive or negative polarity can be applied to an BNC or SHV type INPUT connector. This connector accepts positive or negative charge pulses from semiconductor detector.

The 5-pin LEMO OUTPUT connector of the FGG.2B.704.CLAD62Z type is designed to supply the low-voltage and high-voltage power supply voltage of the detector from the power supplies, as well as to output a unipolar, positive or negative signal directly proportional to the charge signal on the input.

The output signal is inverted relative to the input signal. Output swing range is ± 3 V open circuit. Output impedance is 50Ω .

Simplified Schematic of the AC-coupled Charge Sensitive Preamplifier PA101C is shown in Fig.2.

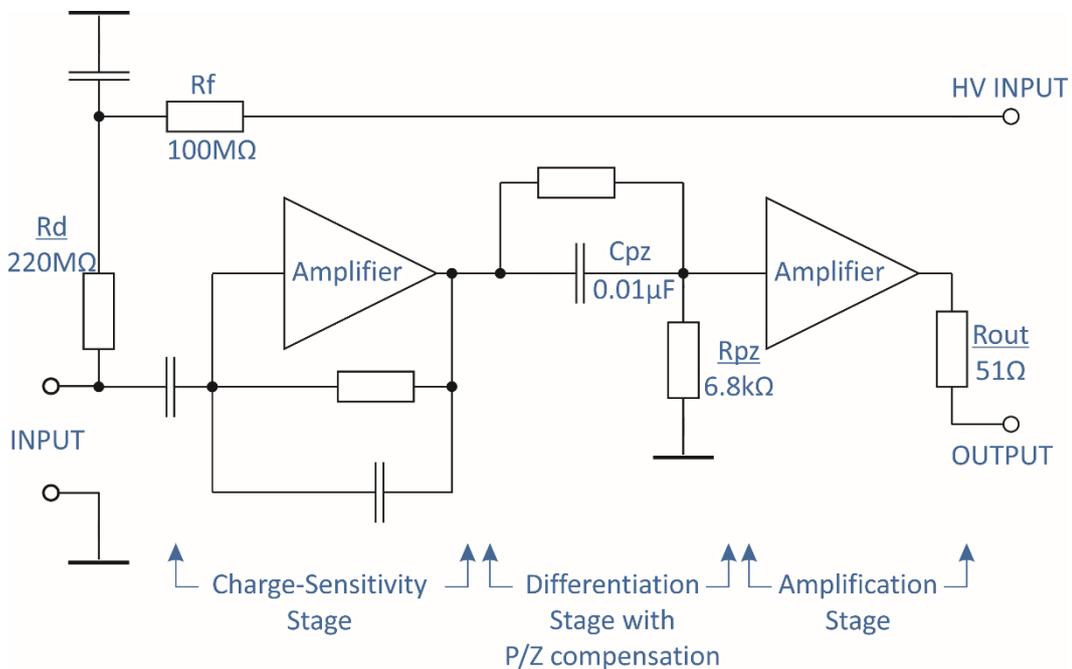


Fig. 2. Simplified Schematic of the AC-coupled Charge Sensitive Preamplifier PA101C and PA101C/HV.

The design of the preamplifier PA101C is shown in Fig.3.

The design of the preamplifier PA101C/HV is shown in Fig.4.

The PA101C can be used with extension connecting cable, fig. 5.

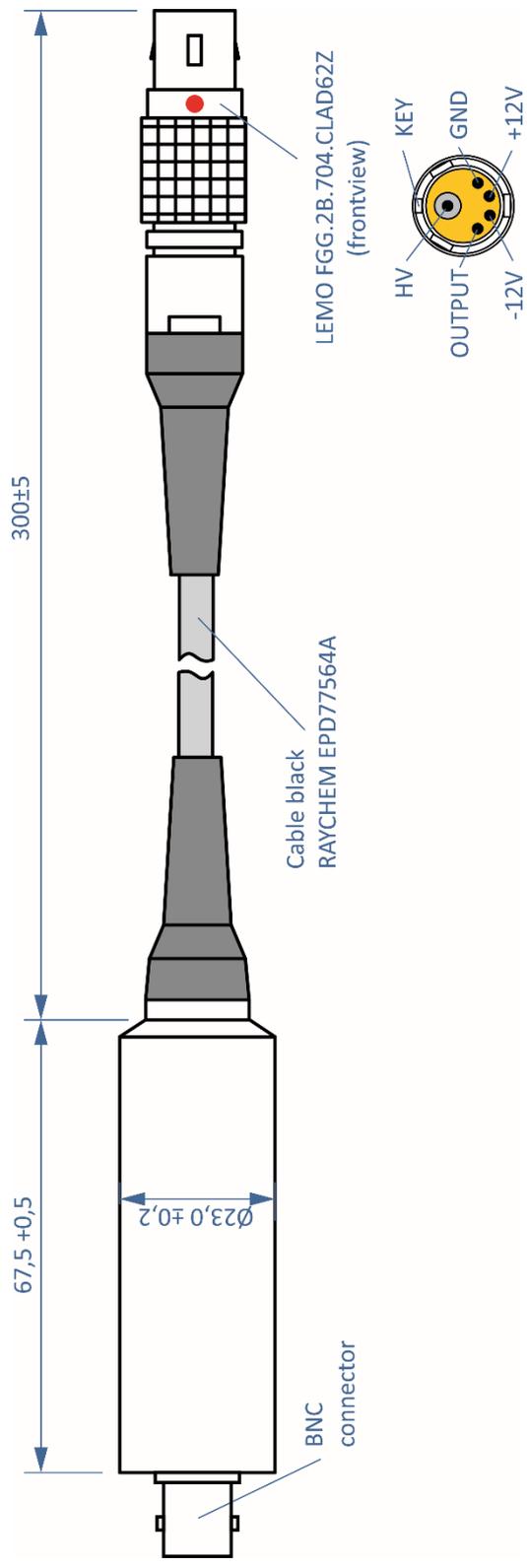


Fig. 3. Design feature of the PA101C.

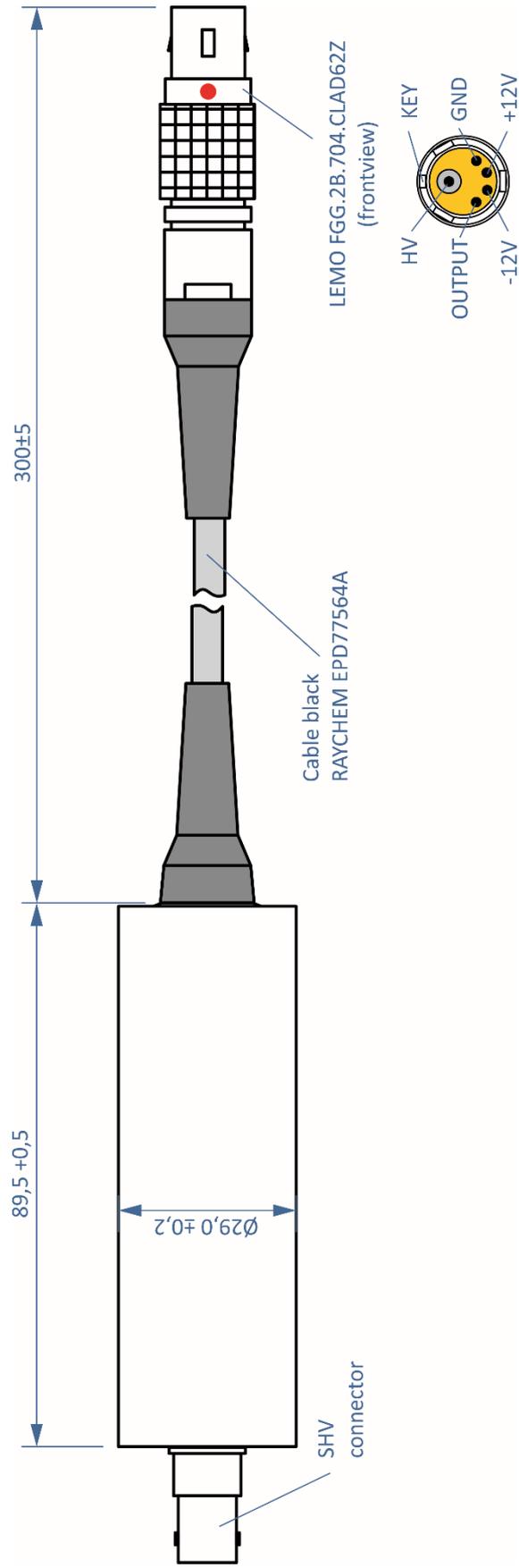


Fig. 4. Design feature of the PA101C/HV.

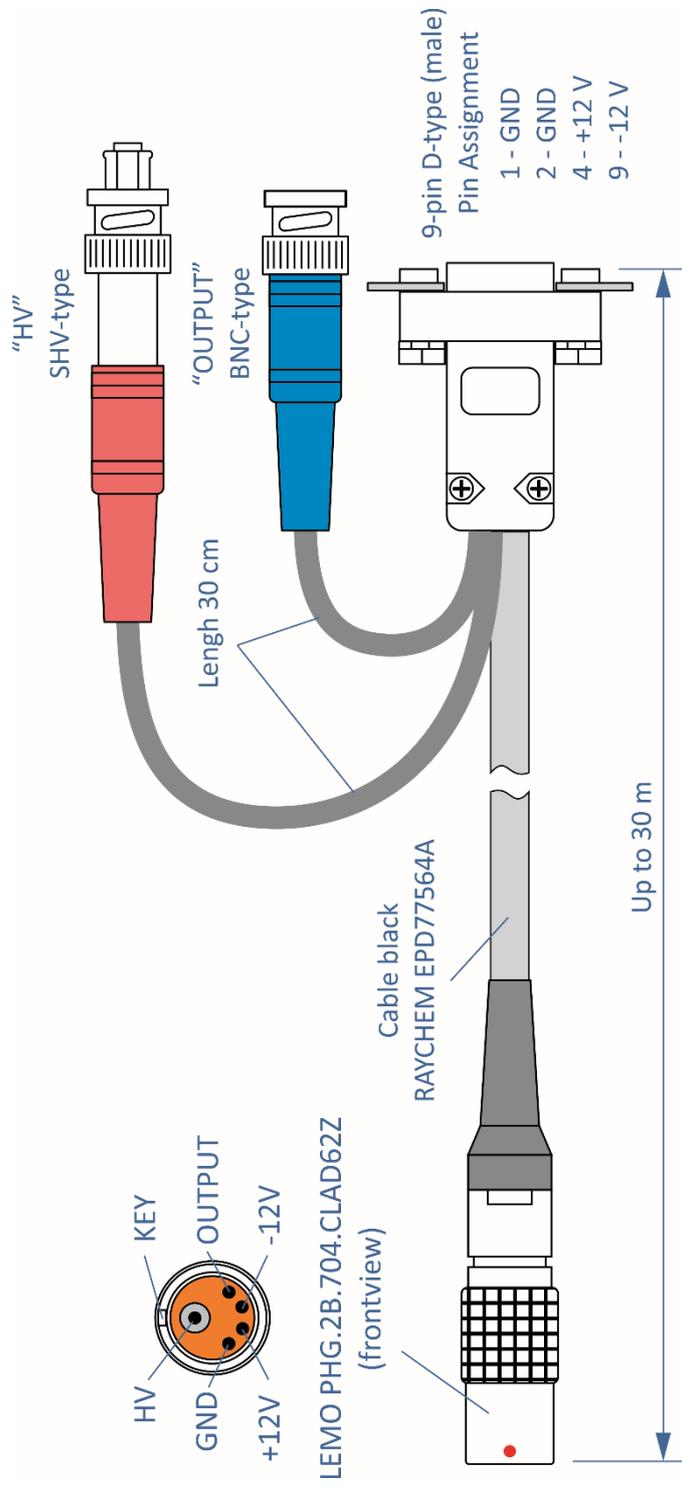


Fig. 5. Connecting cable.

4. SAFETY AND PRECAUTION

The following precautions should be kept to working with a preamplifier.

- Electronic devices connected to the preamp must be reliably grounded.
- First of all, the detector is connected to the preamplifier, then the cable of the preamplifier is connected to the subsequent equipment.
- When connecting or disconnecting the preamplifier cable, the high-voltage power supply must be turned off.
- Switching on the bias voltage of the detector should be done after turning on the low voltage power supply of the preamplifier. Switch off in the reverse order.
- The bias voltage of the detector should be turned on and off at a speed of no more than 100 v/s.