

**Integrated Charge-Sensitive Pre-amplifier  
and Gaussian Shaping Amplifier**

**Features**

- Integration, shaping and optional baseline restoration in a single compact unit
- Clean Gaussian pulse output suitable for pulse height analysis
- Based on proven MIT / Cremat circuitry
- AC-coupled with 3 kV standoff
- Configurable for positive or negative going detector pulses
- Adjustable gain
- Compatible with C400 fast pulse counting system



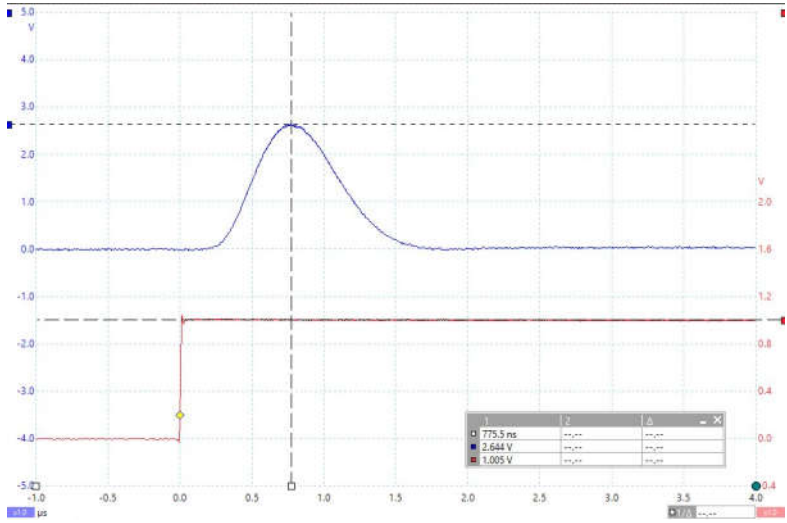
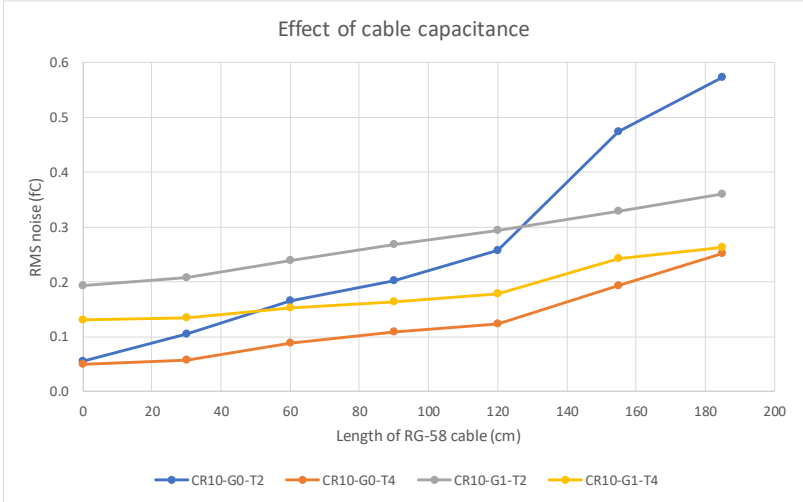
<b>Applications</b>	<ul style="list-style-type: none"> <li>• Readout of proportional counters, scintillators and solid-state detectors for counting and spectroscopy applications</li> <li>• General detector pulse processing</li> </ul>
<b>Options</b>	<ul style="list-style-type: none"> <li>• Choice of pre-amplifier stage conversion gain</li> <li>• Choice of shaping time constant or no shaping</li> <li>• Baseline restoration module option for high count rates</li> <li>• Choice of signal input connector type</li> </ul>

**Specifications (CR10-G1-T2-BR configuration example)**

Cremat modules fitted	CR111 preamplifier CR200-250ns shaping amplifier CR210 baseline restorer
Input stage	0.13 V pC <sup>-1</sup> nominal conversion gain, 3 nsec rise, 150 µsec fall
Input protection	1 kohm series resistor and fast low leakage diodes.
Overall gain (typical)	2.5 V pC <sup>-1</sup> driving 50 ohms Example: 2.64 V output amplitude for 1 V step applied to test input (1 pC nominal charge injected), x10 coarse gain, fine gain control at 50%.)
Output noise	Unloaded: < 0.5 mV RMS, < 3.5 mV peak to peak into 50 ohms DC to 5 MHz(x10 coarse gain, fine gain control at 50%) Equivalent noise charge < 0.3 fC RMS See graph for capacitive loading slope
Maximum output amplitude	2.7 V into 50 ohms, 5.4 V into high impedance
Maximum output cable length	Able to drive >= 10 metre RG-58, RG-174 or RG-316 cable



Specifications (continued, CR10-G1-T2-BR configuration unless stated)

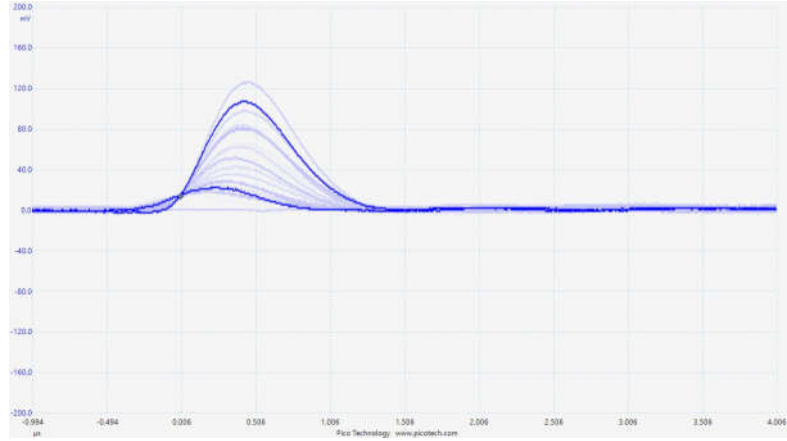
<p>Test input</p>	<p>47 ohm terminated, 1 pF</p>
<p>Response to test input</p>	<p>1.0 V step into test input (pole zero adjusted as necessary) x10 coarse gain, fine gain control at 50%</p> 
<p>Noise slopes (typical)</p>	<p>Loaded with RG-58 coaxial cable at 90 pF m-1 Various configurations as indicated. DC to 5 MHz.</p> 



### Specifications (continued, CR10-G1-T2-BR configuration)

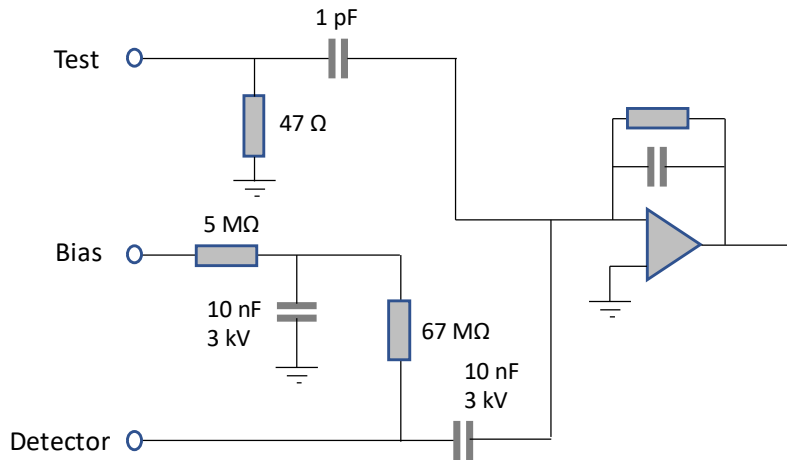
Detector response (typical)

Signals from polycrystalline diamond sensor, Am-241 source. x10 coarse gain, 75% fine gain.



HV bias

Bias applied to detector input via 3 kV decoupling and filter capacitors. High resistance blocks signal loss to bias circuit.



Note: For bias voltage above 500 V, the SHV detector connector option should be selected.



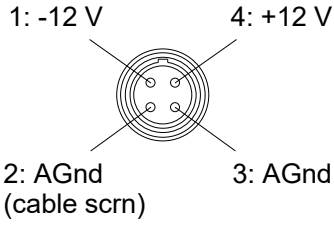
# Datasheet

**CR10**

## Specifications (continued)

Power input	+12V (+2/-4 V) DC, 50 mA and -12V (+4/-2 V), 50 mA Power on indicator red LED
Case	Stainless steel with mounting flange
Weight	0.29 kg (0.63 lb)
Operating environment	10 to 35 C (15 to 25 C recommended to reduce drift and offset) , < 70% humidity, non-condensing, vibration < 0.1g all axes (1 to 100 Hz)
Shipping and storage environment	-10 to 50 C, < 80% humidity, non-condensing, vibration < 1g all axes, 1 to 100 Hz

## Connectors

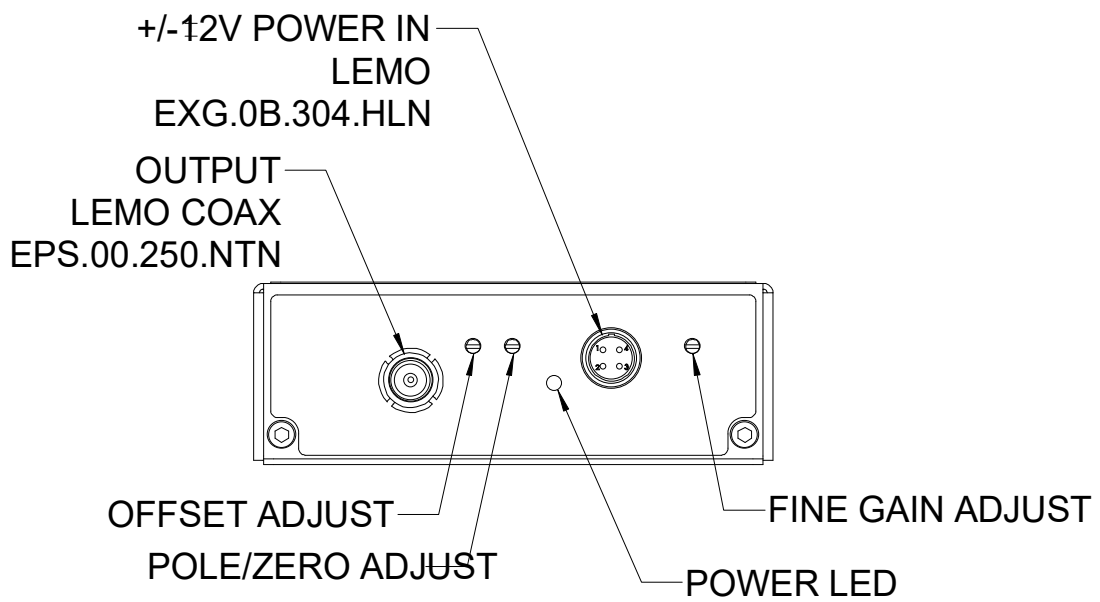
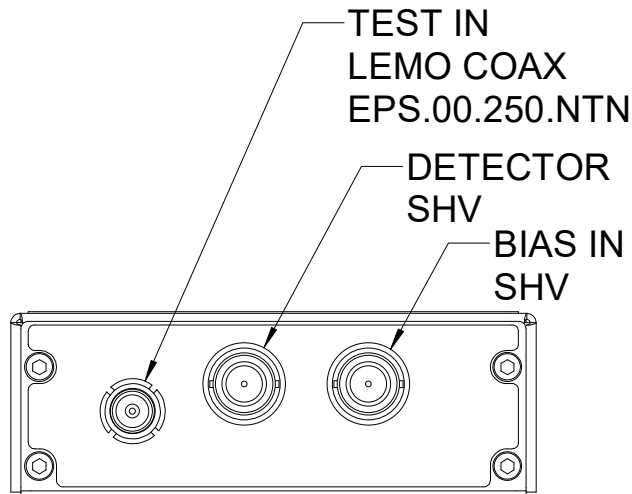
Signal input options	SHV (required for bias voltages over 500 V) BNC Lemo 0B.302 (detector pin 1, AGnd pin 2)
Bias HV input options	SHV (required for bias voltages over 500 V) BNC
Test signal input	Lemo coaxial size 00
Power input	Lemo 0B four-pin female (mating cable connector FGG.0B.304)  <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>(view on CR10 connector / solder side of mating cable connector)</p> </div> <div style="text-align: center;">  </div> </div>
Signal output	Lemo coaxial size 00

## Controls

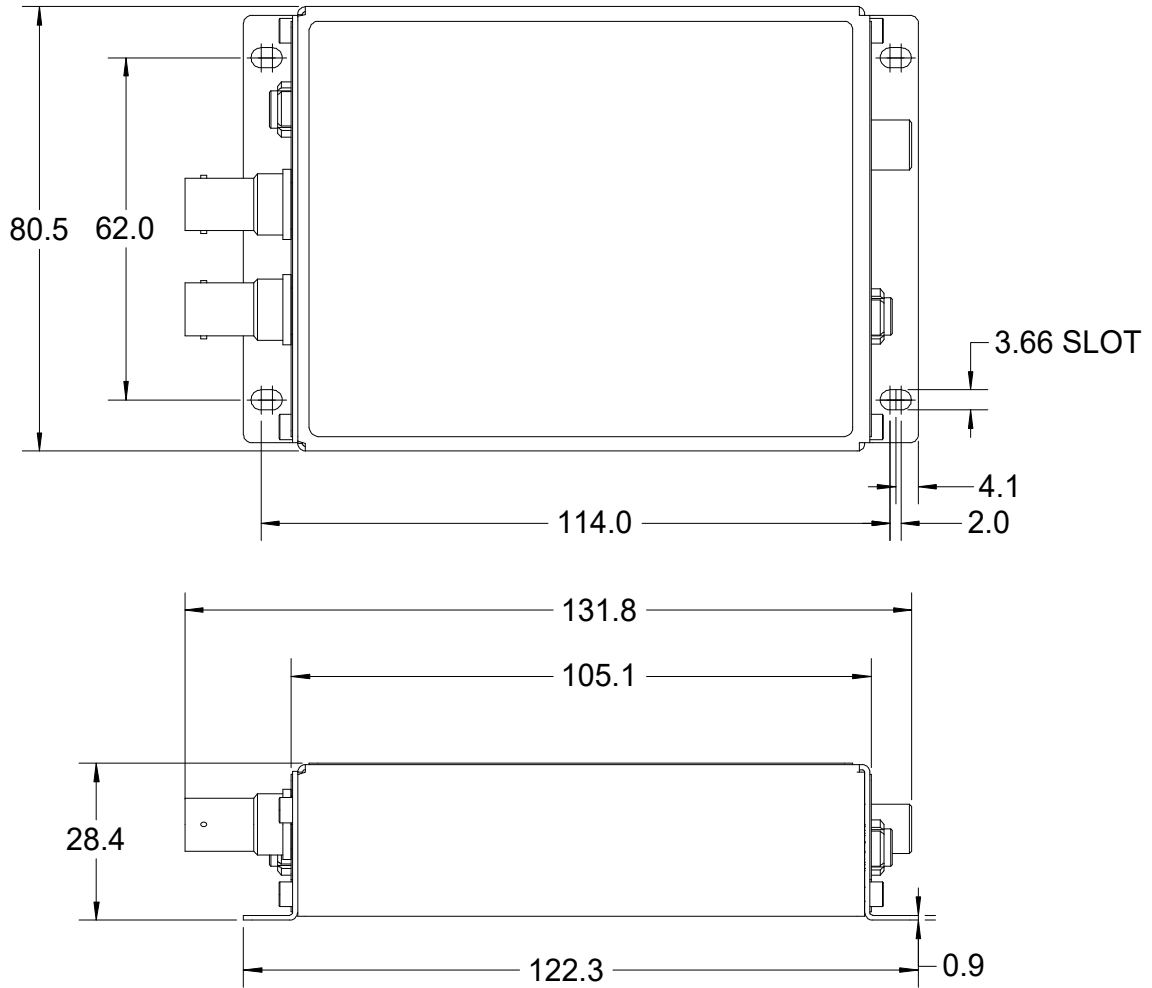
Potentiometers	Output offset adjust, 21-turn potentiometer  Pole-zero adjust, 25-turn potentiometer Nominal setting for CR-111 is 175 kohm (1-2).  Fine gain, 21-turn potentiometer
Internal jumpers	JPR 1: SH - fit if no shaping amplifier installed BL - fit if CR-210 baseline restorer not installed  JPR 2: POL - fit jumper for positive going detector pulses G#1 - fit for 10x intermediate stage gain G#2 - fit for 10x intermediate gain (G#1 plus G#2 for 100x)



Layout and Dimensions - End faces (-SHV/SHV connector option)



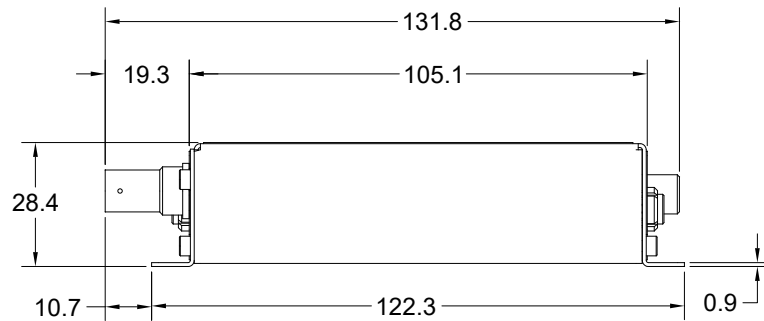
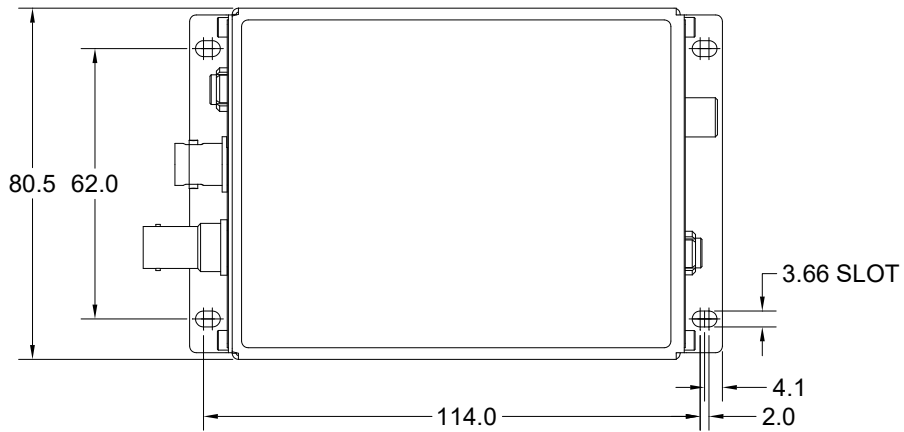
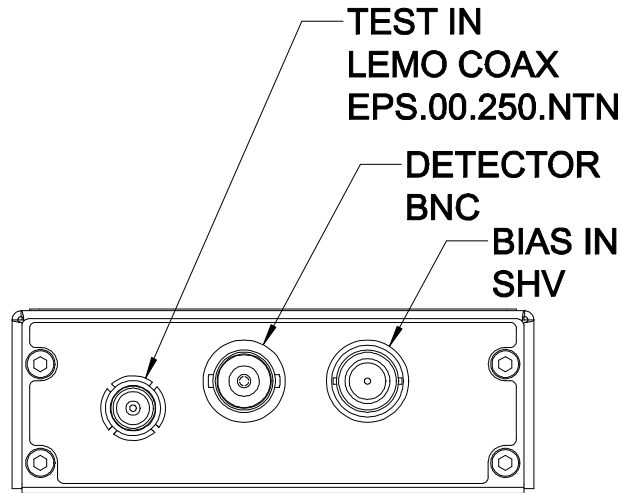
**Layout and Dimensions - plan and side elevation (-SHV/SHV connector option)**



Dims mm



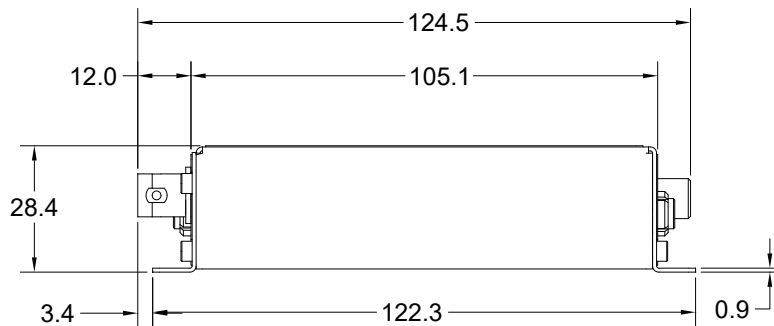
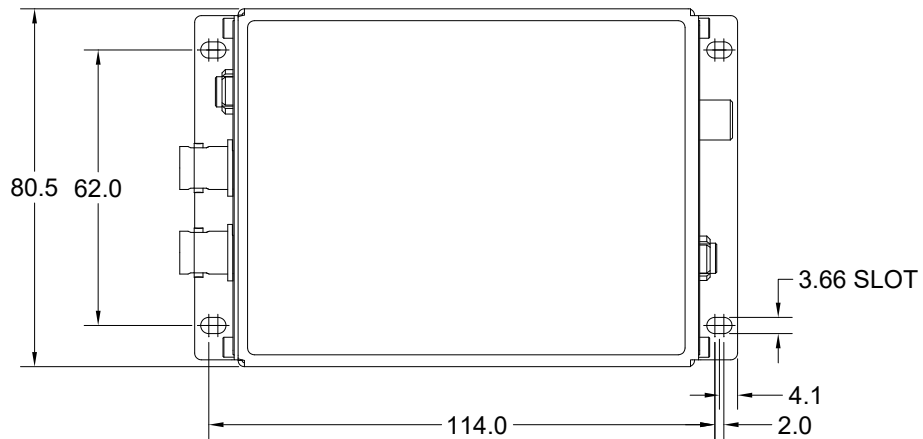
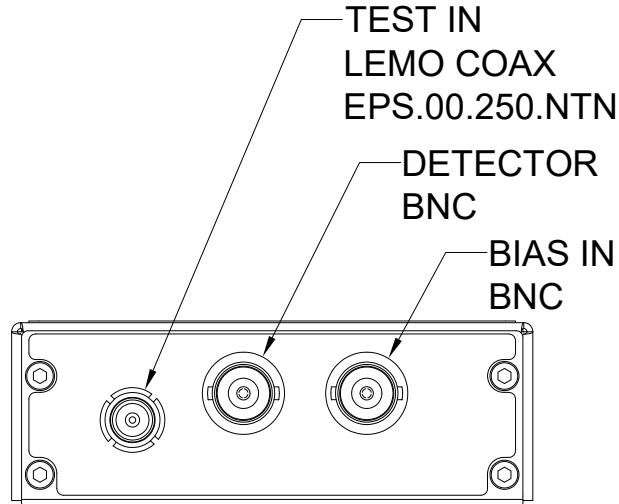
Connector option (-BNC/SHV)



Dims mm



Connector option (-BNC/BNC)

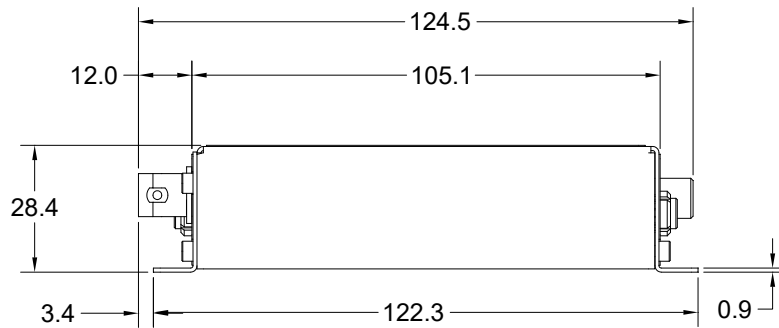
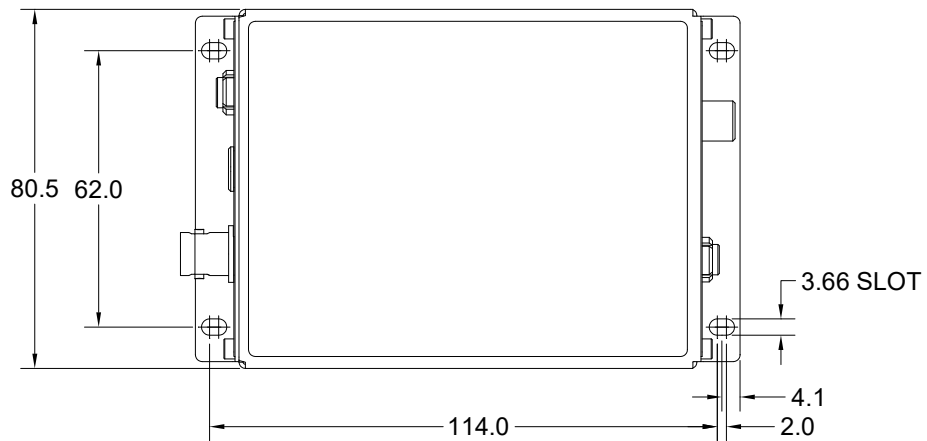
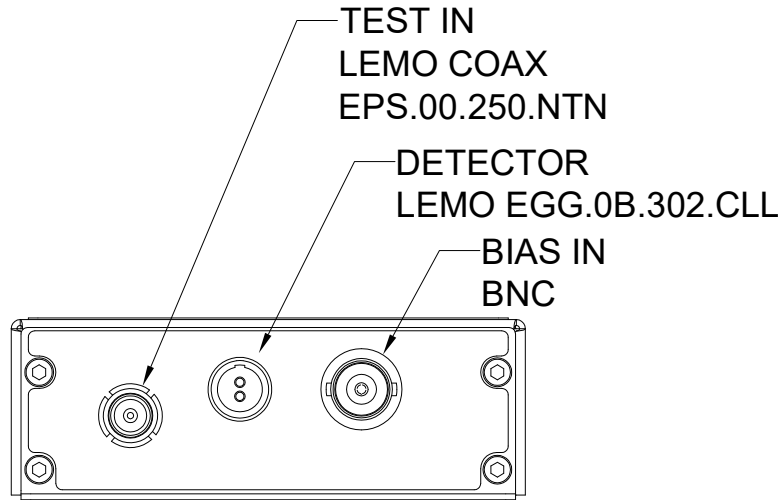


Dims mm





Connector option (-LEM/BNC)



Dims mm



# Datasheet

**CR10**

## Ordering information

CR10	Integrated pre-amplifier / shaping amplifier system.
-GN	Choose input stage conversion gain: N=0 1400 mV pC <sup>-1</sup> (CR-110) N=1 130 mV pC <sup>-1</sup> (CR-111) N=2 13 mV pC <sup>-1</sup> (CR-112) N=3 1.3 mV pC <sup>-1</sup> (CR-113) Internal screen fence fitted for -G0, optional for other choices.
-TN	Choose shaping amplifier stage time constant: N=0 50 ns (CR-200-50ns) N=1 100 ns (CR-200-100ns) N=2 250 ns (CR-200-250ns) N=3 500 ns (CR-200-500ns) N=4 1000 ns (CR-200-1µs) N=5 2000 ns (CR-200-2µs) N=6 4000 ns (CR-200-4µs) N=7 8000 ns (CR-200-8µs)
-BR	Add baseline restorer option (recommended for higher rate applications)
-Detector connector / Bias connector	Choose connectors for signal / bias Detector connector = BNC or SHV or LEM (Lemo 0B.302) Bias connector = BNC or SHV
Example:	CR10-G1-T2-BR-BNC/SHV CR10 with 130 mV pC <sup>-1</sup> input conversion gain, 250 nsec shaping time constant, baseline restorer, BNC detector connector and SHV bias connector.
Other configuration options	Consult supplier for changes to series current limiting resistance (default 0 ohm) and bias voltage feed resistance (default 67 Mohm).
(Build time pre-set requests:)	The following can be pre-set for the customer at time of manufacture: <ul style="list-style-type: none"> <li>Intermediate gain jumpers G1, G2:              none fitted = x1 / G1 fitted = x10 (default) / G1&amp;G2 fitted = x100</li> <li>Signal polarity jumper POL:              not fitted = overall inverting to suit negative signal pulses (default)              fitted = overall non-inverting to suit positive signal pulses</li> </ul>

## Related products

C400	Four channel pulse detector controller (fast window discriminators and scalers, HV bias supplies and pre-amp power).
PSU1212-1L PSU1212-1N PSU1212-1C	24 VDC to +/-12 VDC converter with output connector options: -1L : Lemo 0B.304 -1N / -1C : DSub 9 pin female NIM / C400 pinout

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 CR10\_DS\_230202

**Controls and Diagnostics**



**Pyramid Technical Consultants**