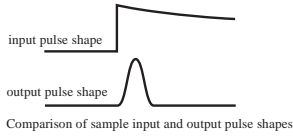


# CR-200-XX-INST assembled Gaussian shaping amplifier instruments: application guide

rev. 0

The CR-200-XX-INST is a single channel Gaussian shaping amplifier instrument, meant for processing signals from charge sensitive preamplifiers. Most radiation detection instrumentation employing charge sensitive preamplifiers use shaping amplifiers to transform the shape of the pulses from a step-like function to a Gaussian-like (bell-shaped) function (see figure below). The purposes of the shaping stage is not only to provide a quickly restored baseline, but also to filter some of the noise and also to further amplify the small signals.



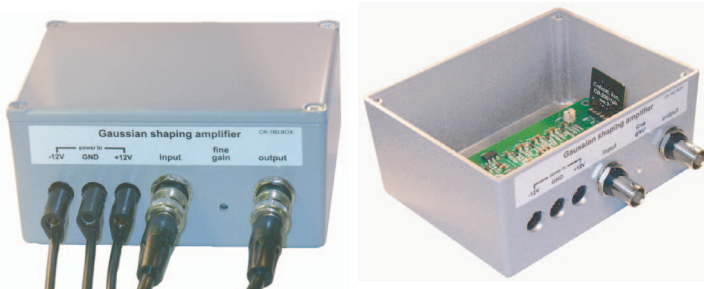
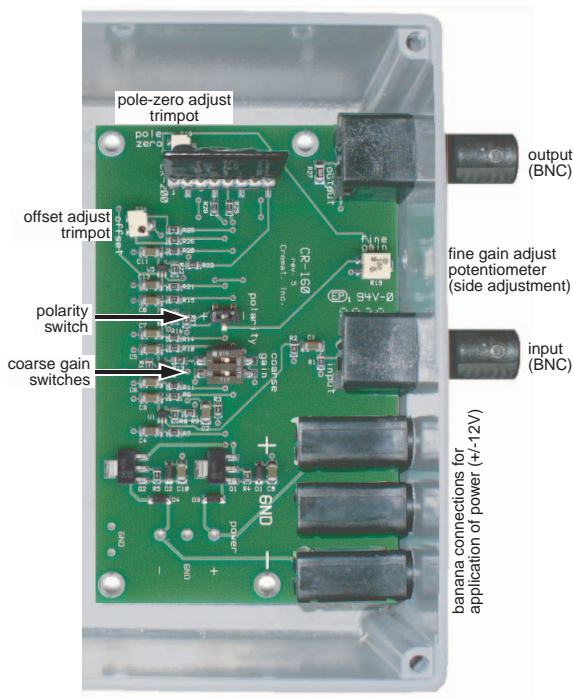
The CR-200-XX-INST is assembled from Cremat parts. There are seven different models available, corresponding to the seven different Cremat shaping amplifier modules used in their assembly. Each CR-200-XX-INST consists of a Cremat shaping amplifier module (either the CR-200-100ns, CR-200-250ns, CR-200-500ns, CR-200-1μs, CR-

200-2μs, CR-200-4μs, or CR-200-8μs), a CR-160 evaluation board, and a CR-160-BOX aluminum housing. Banana connectors have been assembled onto the board providing connections for +/-12V power supply, as well as BNC connections for the amplifier input and output.

The CR-200-XX-INST comes with polarity set to positive and the auxiliary amplifiers both set to gain=1. If additional gain is needed or change to the pulse polarity is desired, these changes can be made by affecting the small slide switches inside the housing (see figure below).

The term "shaping time" refers to the time-equivalent of the *standard deviation* of the Gaussian output pulse. A simpler measurement to make in the laboratory is the full width of the pulse at half of its maximum value (FWHM). This value is greater than the shaping time by a factor of 2.4. For example, a Gaussian shaping amplifier with a shaping time of 1.0 μs would produce pulses having FWHM = 2.4 μs.

More information can be found in the specifications for the CR-200-X and CR-160 available at the Cremat web site <http://cremat.com>.



## Model numbers:

- |                   |  |
|-------------------|--|
| CR-200-100ns-INST | amplifier instrument having 100ns shaping time |
| CR-200-250ns-INST | amplifier instrument having 250ns shaping time |
| CR-200-500ns-INST | amplifier instrument having 500ns shaping time |
| CR-200-1μs-INST   | amplifier instrument having 1μs shaping time   |
| CR-200-2μs-INST   | amplifier instrument having 2μs shaping time   |
| CR-200-4μs-INST   | amplifier instrument having 4μs shaping time   |
| CR-200-8μs-INST   | amplifier instrument having 8μs shaping time   |

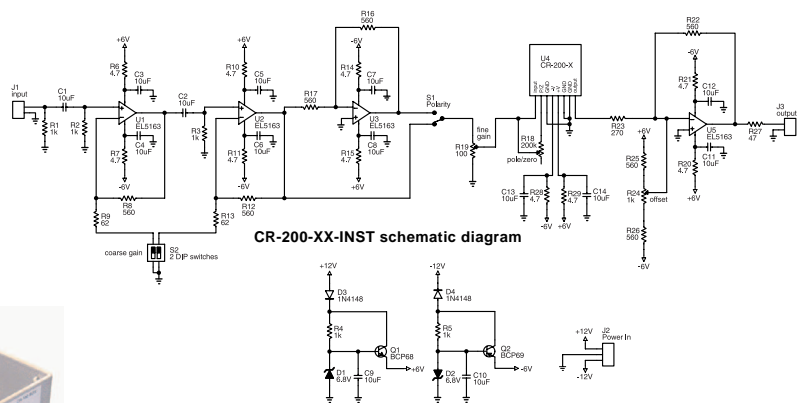
## Specifications

Assume temp = 20°C,  $V_s = \pm 12V$ , unloaded output

### CR-200-XX-INST

Box dimensions:	2.2 x 4.6 x 3.6	inches
amplification channels	1	
gain	variable (0-1000)	
polarity	either + or - (switchable)	
operating temperature range	-40°C to 85°C	
equivalent noise voltage*		
CR-200-100ns-INST	160	μV RMS
CR-200-250ns-INST	90	μV RMS
CR-200-500ns-INST	55	μV RMS
CR-200-1μs-INST	45	μV RMS
CR-200-2μs-INST	40	μV RMS
CR-200-4μs-INST	35	μV RMS
CR-200-8μs-INST	30	μV RMS
output impedance	50	Ω
power supply voltage ( $V_s$ )		
maximum	$V_s = \pm 13$	volts
minimum	$V_s = \pm 7$	volts
quiescent power supply current	23	mA
maximum output swing	±5	volts

\* quoted noise figures are referred to the input, and represent the worst case: when the two auxiliary amplification stages are set to gain=1. The best case occurs when the additional amplification stages are implemented so that both stages have gain=10: the equivalent noise voltage is then dominated by the first amplification stage, significantly reducing the noise. In this case the noise of the CR-200-100ns-INST is 8 μV RMS, CR-200-250ns-INST noise is 5 μV RMS, CR-200-500ns-INST noise is 4 μV RMS, CR-200-1μs-INST noise is 2.5 μV RMS, CR-200-2μs-INST noise is 2 μV RMS, CR-200-4μs-INST noise is 1.5 μV RMS, and CR-200-8μs-INST noise is 1 μV RMS.



Cremat, Inc.  
45 Union St.  
Watertown, MA 02472  
(617) 527-6590  
FAX: (617) 527-2849  
<http://cremat.com>

