ORTEC®

AMETEK®

142AH
Preamplifier

- **Optimum performance for charged-particle or heavy-ion detectors requiring high bias voltage with capacitances of up to 100 pF**
- **Extremely low noise**
- **Accepts 0 to ±5 kV bias**
- **Separate fast-timing output signal with rise time from <5 ns**





The ORTEC Model 142AH Preamplifier was designed to meet the needs of experimenters who require optimum performance from their charged-particle or heavy-ion detectors. This requirement is satisfied by the charge-sensitive Model 142AH through its extremely low noise and fast-timing characteristics. It is particularly suitable for high-energy charged-particle spectroscopy where high-resolution detectors with capacitances of up to 100 pF and bias voltages of up to 5000 V are involved.

Model 142AH has a separate fast-timing output signal approximately 50 ns wide with rise times ranging from <5 ns for 0 pF detectors to <12 ns for 100 pF detectors. This feature enables it to be directly coupled to a timing discriminator for some applications.

When the Model 142AH is used in conjunction with ORTEC's standard electronics, excellent timing resolution is obtained (Fig. 1).

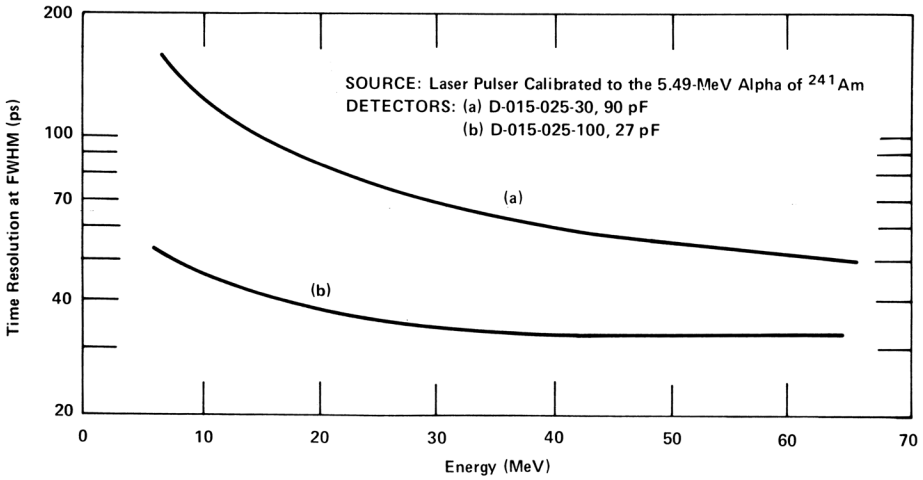


Fig. 1. Typical Time Resolution vs. Energy for 90 and 27 pF Detectors with ORTEC Standard Electronics.

Specifications

PERFORMANCE*

NOISE (see Fig. 2)

Typical and Warranted Noise Values

Detector Capacitance (pF)	Noise (kev) (Si)	
	Typical	Warranted
0	1.55	1.75
20	1.65	—
50	2.35	—
100	3.35	3.60

INTEGRAL NONLINEARITY <±0.05% for 0 to ±7 V open circuit, or ±3.5 V terminated in 93 Ω.

TEMPERATURE INSTABILITY <±50 ppm/°C from 0 to 50°C.

OPEN LOOP GAIN >40,000.

CHARGE SENSITIVITY (Si equivalent) Nominally 20 mV/MeV.

RISE TIME (Fig. 3) <5 ns at 0 pF; <12 ns at 100 pF; with a 0 to +0.5-V pulse at the ENERGY output and a 93-Ω load.

DECAY TIME ~500 μs.

RECOMMENDED INPUT CAPACITY RANGE 0 to 100 pF.

PERMISSIBLE OUTPUT CABLE LENGTH Limited only by cable losses (recommended cable: ENERGY output, RG-71A/U or RG-62A/U; TIMING output, RG-58).

E^2CRP Maximum energy-squared count rate product: 2×10^7 MeV^2/s.

DETECTOR BIAS VOLTAGE ±5000 V.

OUTPUT LEVELS AND LOADING All specifications are stated for open-circuit output and remain unchanged for 93-Ω termination or cable loading, except terminated output levels are half the open-circuit values. Saturated output level, ±10 V; integral nonlinearity specified to ±7 V.

*Performance specifications apply to ENERGY output unless stated otherwise.

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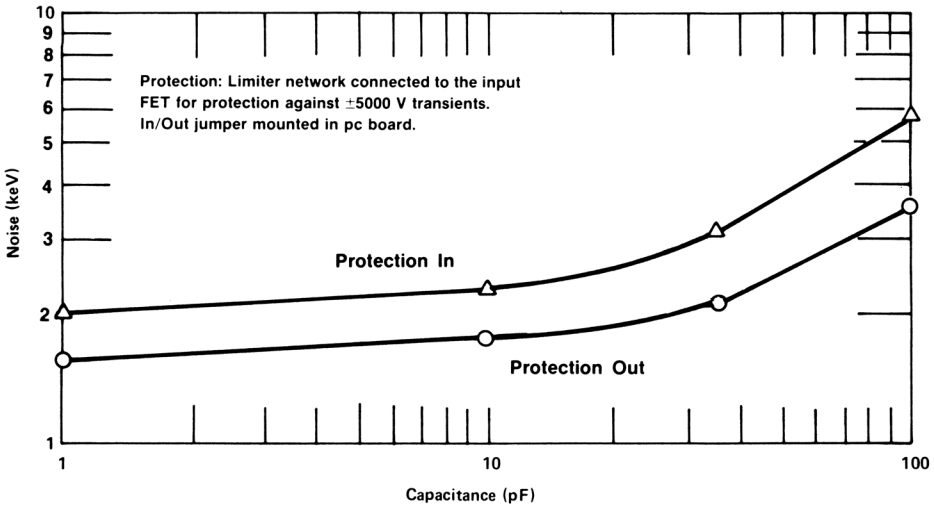


Fig. 2. Noise as a Function of Input Capacitance, Measured with an ORTEC Model 572 Amplifier and 2-µs Time Constant.

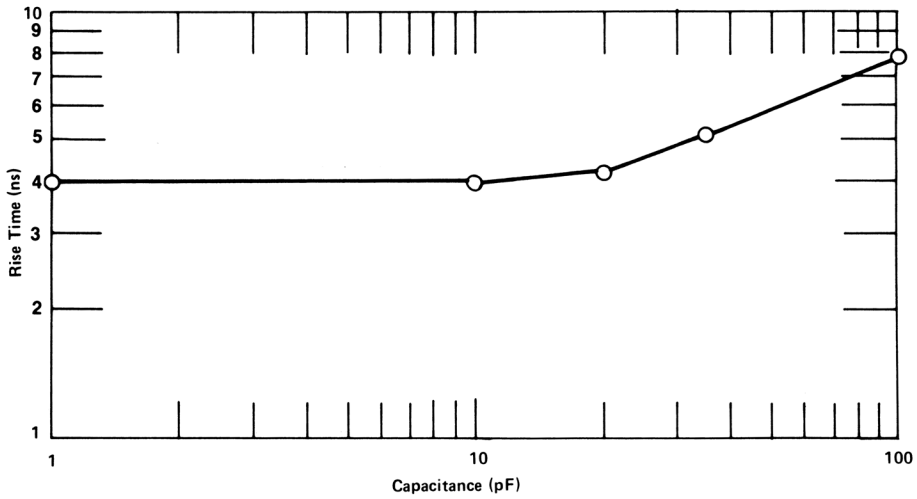


Fig. 3. Typical Rise Time as a Function of Input Capacitance with Rise Time Compensation Optimized at Each Data Point.
(Values given are for a +0.5-V signal into 93 Ω from the ENERGY channel.)

INPUTS

INPUT Accepts positive or negative charge input from any type of detector (normally from a semiconductor detector); SHV connector.

BIAS Accepts detector bias from bias supply and applies it to the detector through a filter network via the INPUT connector; maximum ±5000 V; SHV connector or ORTEC C-38.

TEST Input for pulse generator to test and calibrate the system; BNC connector.

POWER Input power through 3-m (10-ft) captive power cable from any ORTEC main amplifier or from an ORTEC Model 4002P Portable Power Supply.

OUTPUTS

ENERGY Positive or negative linear tail pulse for energy measurement; BNC connector.

TIMING Negative or positive linear fast-clipped pulse for timing. Output generated by using an inverting transformer which differentiates the energy output. Rise time approximately equal to the rise time of the energy output (Fig. 3). BNC connector.

ELECTRICAL AND MECHANICAL

POWER REQUIRED +24 V, 30 mA; –24 V, 10 mA; +12 V, 15 mA; –12 V, 15 mA.

WEIGHT
Net 0.45 kg (1 lb).
Shipping 1.3 kg (3 lb).

DIMENSIONS 4.45 X 10.16 X 13.21 cm (1.75 X 4.0 X 5.2 in.).

Ordering Information

To order, specify:

Model	Description
142AH	Preamplifier

Suggested cable accessories:

C-24-12	RG-62A/U 93-Ω Cable with two BNC male plugs; 12-ft length
C-25-12	RG-58A/U 50-Ω Cable with two BNC male plugs; 12-ft length
C-36-2	RG-59A/U 75-Ω Cable with two SHV female plugs, 2-ft length
C-36-12	RG-59A/U 75-Ω Cable with two SHV female plugs, 12-ft length

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Specifications subject to change
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