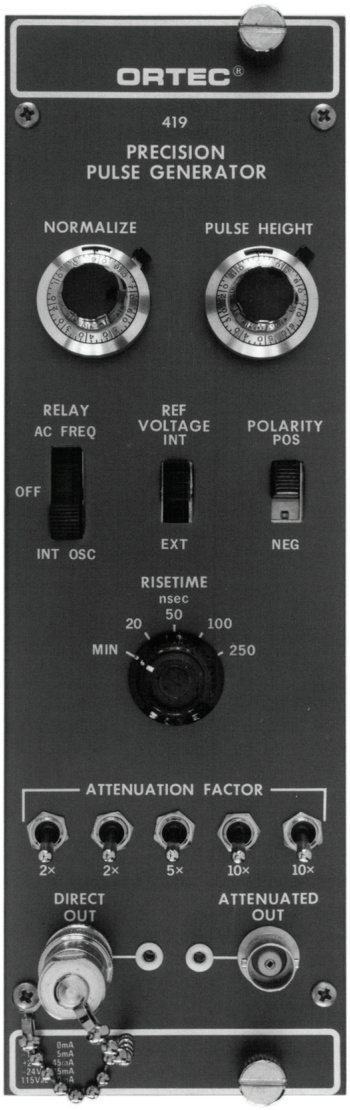
ORTEC®

AMETEK®

# 419
# Precision Pulse Generator

- **Simulates detector output signals**
- **Precision dial may be calibrated to read directly in terms of equivalent energy deposition in semiconductor detectors**
- **Exponential pulse shape with 5- to 250-ns rise time and 200- or 400-µs decay time constant**
- **Line frequency or 70-Hz pulse rate**
- **Positive or negative polarity**
- **Direct 0 to 1-V output (0 to 10 V with external reference voltage)**
- **Attenuated output with 2000:1 attenuation range**
- **Internal or external reference voltage**




The ORTEC Model 419 is a Precision Pulse Generator that simulates the detection of a nuclear particle reaction in a semiconductor or scintillation detector, as well as serving as a specialized pulse generator for use with pulse processing instrumentation. It can be calibrated to read directly in terms of equivalent energy deposition in semiconductors, and the rise time of the pulse may be varied to simulate the collection time constant in the detector.

The pulses are generated with a mercury-wetted relay that can be operated asynchronously from the line frequency for measurement of spectral broadening caused by hum and ripple of the AC line.

A charge terminator and a 100-Ω voltage terminator are provided with this instrument. The use of the charge terminator allows the voltage pulse to be converted to a charge pulse for subsequent amplification by a charge-sensitive preamplifier. The use of the voltage terminator allows the voltage pulse to be input directly to other instruments such as amplifiers, discriminators, and ADCs. A holder is provided on the rear panel to store the charge terminator when it is not in use.

The Model 419 maintains the selected amplitude through long experiments because of excellent stability against changes in line voltage and ambient temperature.

Using the Internal Reference Voltage, the output peak amplitude can be adjusted from 0 to +1 V when both outputs are terminated with 100-Ω loads. The Attenuation Factor affects only the Attenuated Output, and permits reducing the amplitude for driving the input of a high-gain amplifier.

An external reference voltage may be used, up to 20 V maximum, to generate arbitrary waveforms, such as a ramp input, to check overall system linearity. The output level is 50% of the input.

## Specifications

### PERFORMANCE

**PULSE AMPLITUDE** Output peak adjustable from 0 to ±1 V. This converts to 0–2 pC, using the charge terminator supplied, and is equivalent to 0–44 MeV referred to a silicon semiconductor detector. Rise time is selected by front-panel switch; fall time is an exponential decay time constant of 200 µs (terminated) or 400 µs (unterminated).

**TEMPERATURE INSTABILITY** <±0.005%/°C from 0 to 50°C.

**LINE VOLTAGE INSTABILITY** <±0.001% per 10% change in power line voltage.

**RIPPLE AND NOISE** ≤0.003% of pulse amplitude.

**PULSE REPETITION RATE** Either the AC power line frequency, or 70 ±10 Hz using the internal oscillator.

**INTERNAL OSCILLATOR**
**Temperature Instability** <±0.05%/°C, 0 to 50°C.
**Time Instability** <±1%/day.

### CONTROLS

**PULSE HEIGHT** 10-turn potentiometer with a duo-dial adjusts the output pulse amplitudes at both outputs within a total range; the range is a combined function of the reference and the setting of the Normalize control. Linearity ±0.1% of full scale.

**NORMALIZE** 10-turn potentiometer adjusts the total range for the Pulse Height control when using Ref Voltage Int switch; full-scale range from ±0.5 V to ±1 V; linearity, ±0.1% of full scale.

**RELAY** 3-position slide switch selects the AC power line frequency or the internal 70-Hz oscillator for the output repetition rate, and includes an Off position to set the pulser at standby.

**REF VOLTAGE** 2-position slide switch selects either the internal reference voltage for a 100% normalized fullscale range of 0 to ±1 V or the external reference voltage for an output full-scale range and polarity that are determined by the level furnished through the rearpanel BNC connector.

**POLARITY** 2-position slide switch selects either polarity for the output pulses when using the internal reference.

**RISE TIME (nsec)** 5-position rotary switch selects the rise-time shaping for the output pulses to simulate various types of detectors; selections are MIN (~5 ns), 20, 50, 100, and 250 ns.

**ATTENUATION FACTOR** 5 toggle switches select a step attenuation for output pulses furnished through the Attenuated Output connector; the factors are 2, 2, 5, 10, and 10. They may be used in any combination to cover a 2000:1 dynamic range using 0.1% tolerance resistors.

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### INPUT

**EXT REF** Rear-panel BNC connector accepts an external reference voltage to control the full-scale Pulse Height control range and polarity when the front-panel Ref Voltage switch is set at Ext; maximum, ±20 V; output full-scale range, 50% of reference level with output terminated in 100 Ω.

### OUTPUTS

**DIRECT** Front-panel BNC connector with an adjacent test point furnishes the adjusted and normalized full amplitude output pulses through an output impedance of 100 Ω.

**ATTENUATED** Front-panel BNC connector with an adjacent test point furnishes the same output pulses as above, with amplitudes attenuated by the factor selected with the 5 toggle switches.

**PULSE HEIGHT VOLTAGE** Two test points on the rear panel permit a DC voltmeter or oscilloscope to monitor the voltage level that is applied to the pulse-forming relay.

### ELECTRICAL AND MECHANICAL

**POWER REQUIRED** +24 V, 45 mA; –24 V, 25 mA; +12 V, 0 mA; –12 V, 5 mA; 117 V AC, 10 mA.

**WEIGHT**
**Net** 2.0 kg (4.5 lb).
**Shipping** 2.9 kg (6.5 lb).

**DIMENSIONS** Standard double-width NIM module 6.90 X 22.13 cm (2.70 X 8.714 in.) per DOE/ER-0457T.

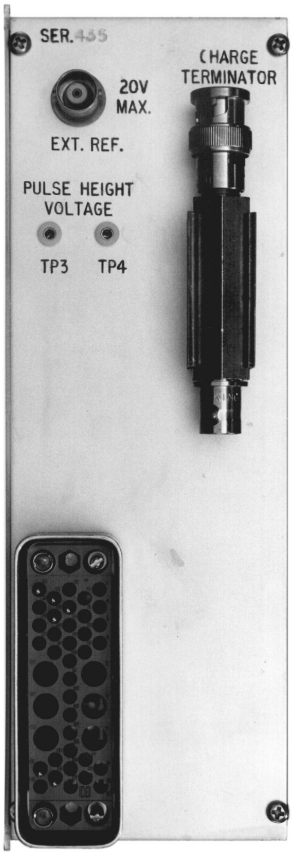
## Included Accessories

**VOLTAGE TERMINATOR** A standard 100-Ω resistive terminator is attached to the Direct Output connector on the front panel to terminate the output correctly when only the Attenuated Output is being used.

**CHARGE TERMINATOR** A specially constructed terminator is mounted in a rear- panel clip and should be used to properly terminate the pulser output and feed a charge signal into the signal input of a charge-sensitive preamplifier when the output pulses are being furnished for this type of test.

## Ordering Information

| Model | Description |
|---|---|
| **419** | Precision Pulse Generator |

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www.ortec-online.com
Tel. (865) 482-4411 ortec.info@ametek.com
801 South Illinois Avenue, Oak Ridge, TN 37830 U.S.A.
Visit Our Website For International Office Locations

Specifications subject to change
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