

# Helium-3 ( $^3\text{He}$ ) proportional counter

(RS-P4-1614-204)

Thermal neutron counting, spectroscopy  
and nuclear materials assay

## A smart design

This Helium-3 filled proportional counter has a 5.08 cm diameter design for safeguards applications. It combines the performance characteristics required by both safeguards and spectroscopy applications: high sensitivity, moderate operating voltage, and excellent spectral resolution. Other sensitive lengths are available on request.

For spectroscopy applications, the detector design uses the diameter, cathode & anode relationship, internal field shaping, and gas additives to minimize wall effects and optimize the spectral resolution over a wide energy range.

## Precision performance

Helium-3 purification techniques and manufacturing process control were developed to ensure precise matching of operating characteristics among large batches of counters. This permits parallel operation of large numbers of detectors without the need for separate power supplies or gain matching.

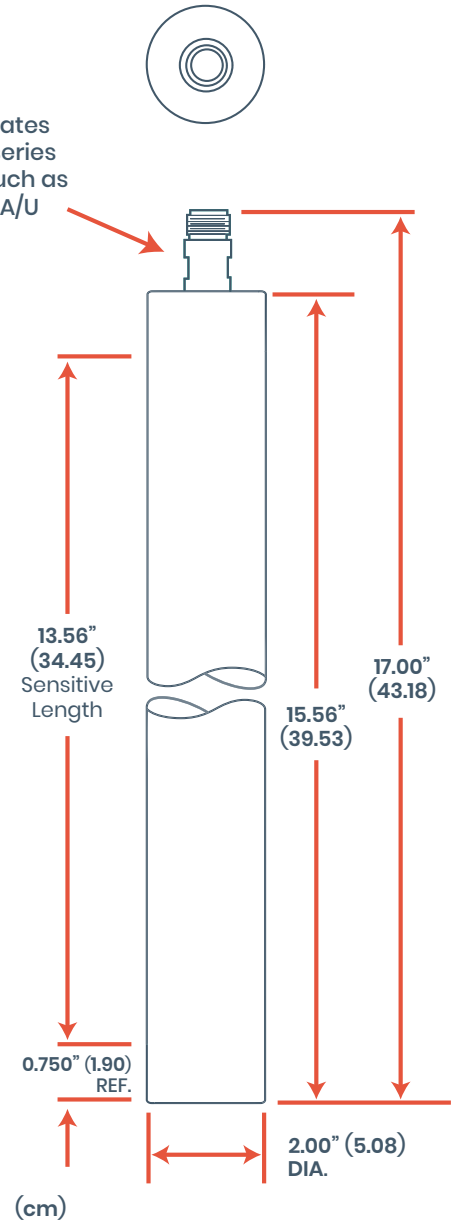
## Customizable solutions

Gas mixtures can be tailored for a customer's application and for optimization of combined parameters, including operating voltage, pulse risetime, pulse jitter time, gas gain, spectral resolution, neutron sensitivity, and gamma ray sensitivity.

## Product configurations

The detector has a sensitive length of 34.45 cm and an outer diameter of 5.08 cm. Sensitivity is approximately 100 cps/nv for thermal neutrons when filled with standard pressure of three atmospheres of Helium-3 gas. Plateau slope <2% per 100 volts over a minimum of 200 volts range.

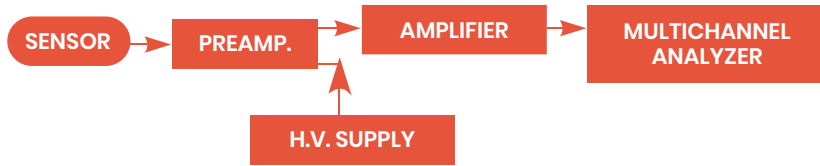
HN jack mates  
with any series  
HN plug such as  
MIL UG-59A/U



This proportional counter is a sample of one of over 10,000 neutron counter designs we have manufactured.

To find the detector that best meets your project's specifications, visit [reuter-stokes.com/helium-3](http://reuter-stokes.com/helium-3)

## Typical spectroscopy arrangement



## Specifications

### Mechanical

- **Maximum diameter:** 5.16 cm.
- **Maximum overall length:** 43.5 cm.
- **Connector type:** HN female
- **Net weight (maximum):** 0.45 kg.

### Material

- **Outer shell:** 304 stainless steel
- **Connector:** Brass, silver-plated
- **Insulation:**
  - **Detector:** Alumina ceramic
  - **Connector:** Teflon
- **Neutron sensitive material:**  $^3\text{He}$
- **Fill pressure:** 3 atmospheres

### Capacitance

- 8 pf

### Resistance @ 25°C

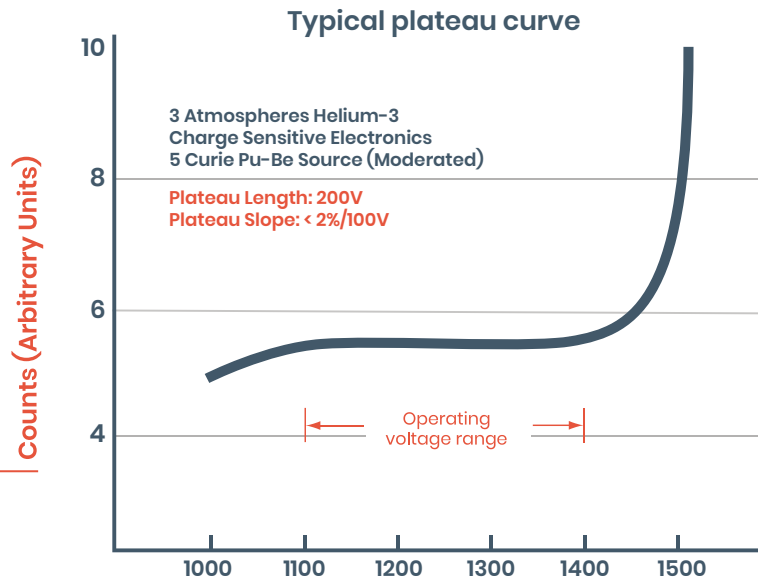
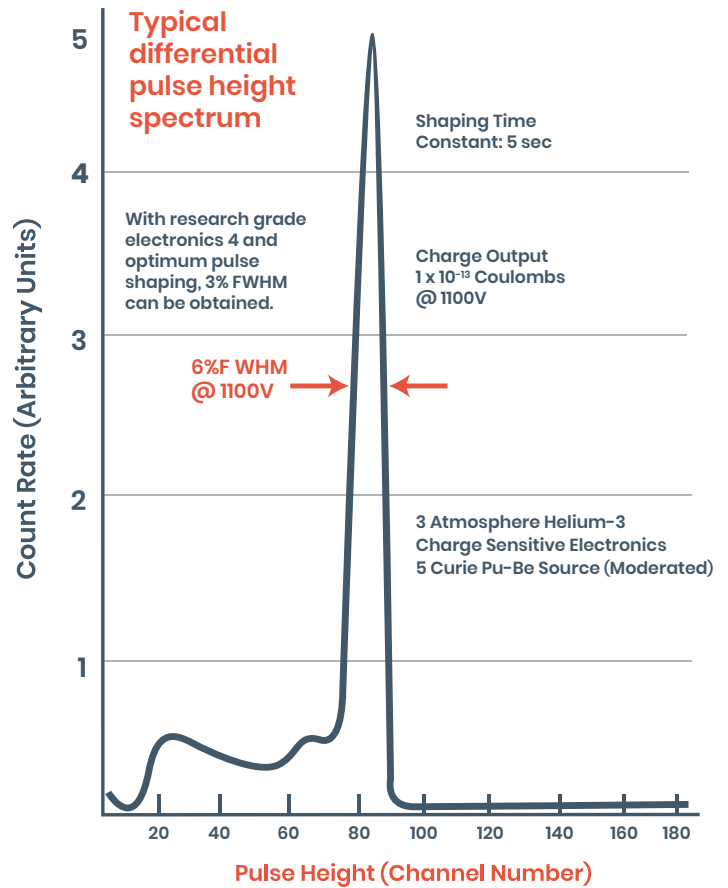
- $10^{12}$  ohms (minimum)

### Maximum ratings

- **Voltage:** 3500 V
- **Temperature:** 100°C (212°F)

### Operating characteristics

- **Thermal neutron sensitivity (unperturbed):** 100 cps/nv
- **Thermal neutron flux range:** to  $10^3$  nv
- **Voltage range:** see plateau curve
- **Resolution (FWHM):** see spectrum
- **Output pulse characteristics (average):**
  - Charge output:  $1 \times 10^{-13}$  coulombs @ 1100 V



## Typical counting arrangement

