

## Model 42-30H Neutron Detector



Part No. 47-3582

### Introduction

The Ludlum Model 42-30H Neutron Detector is typically employed with area monitors such as Models 375, 177-50, and 177-61. It is designed to detect thermal and fast neutrons (0.025 eV to approximately 12 MeV) indirectly by using nuclear reactions which result in energetically charged particles such as protons and tritons. Because intense fields of gamma rays are often found with neutrons, it is important to choose a method of neutron detection that is able to discriminate against those gamma rays in the detection process.

A common reaction for the conversion of slow neutrons into directly detectable particles is  $n+{}^3\text{He}\rightarrow{}^3\text{H}+{}^1\text{H} + 0.764 \text{ MeV}$ . The Model 42-30H uses this reaction in the form of helium-3 ( ${}^3\text{He}$ ) which fills the gas proportional tube of the detector. To detect neutrons with energies above the thermal region, the detector is placed inside the moderator. The detector can be removed from the moderator for the detection of thermal neutrons.

### Specifications

**INDICATED USE:** neutron detection, area monitoring

**DESCRIPTION:** wall mount proportional neutron detector

**SUGGESTED INSTRUMENTS:** Models 375, 177-50, and 177-61

**DETECTOR:** 2 Atm  ${}^3\text{H}$  tube LND 25185 or equivalent

**MODERATOR:** 25.4 cm (10.0 in.) diameter polyethylene sphere

**DETECTION RANGE:** thermal to approximately 12 MeV

**ENERGY RESPONSE:** approximately follows the radiation protection guide curve for neutron dose

**SENSITIVITY:** typically 20,000 cpm/mSv/h (200 cpm per mrem/hr) (AmBe)

**GAMMA REJECTION:** 10 cpm or less through 0.1 Sv/h (10 R/hr)

**OPERATING VOLTAGE:** typically 1200 V

**THRESHOLD:** -2 mV

**CONNECTOR:** type "C" (others available)

**TEMPERATURE RANGE:** -15 to 50 °C (5 to 122 °F), may be certified to operate from -40 to 65 °C (-40 to 150 °F)

**CONSTRUCTION:** polyethylene moderator with aluminium housing and mounting bracket

**SIZE:** 38.1 x 25.4 x 26.2 cm (15.0 x 10.0 x 10.3 in.) (H x W x L), including bracket

**WEIGHT:** 8.8 kg (19.5 lb)