

Passive Neutron Slab Counter

N2004

Introduction

The ANTECH N2004 Series Passive Neutron Slab Counter is a simple assay system for the portable and adaptable assay of waste drums, boxes or crates, and other irregular items by detecting coincidence neutrons from the spontaneous fission of the even numbered isotopes of plutonium. The Passive Neutron Slab Counter is easily deployable to allow for in-situ measurements, and can be combined in multiple panels to fully encompass the item. Combined with the latest ANTECH neutron counting electronics, a set of N2004 counters can provide both individual channel and a single "OR'd" output.



Slab Counter Design

The N2004 consists of four or six ^3He detector tubes arranged in a line in a rectangular high-density polyethylene moderator block. In a laboratory, or to the provided Slab Counter Trolley. On the top of the moderator, a junction box for the ^3He tubes is mounted to combine and amplify the detector signals and distribute high voltage to the detector tubes. The output from the junction box on the detector module is connected to an ANTECH N2000 Series Universal Neutron

Counter by coaxial signal and Low and High Voltage power cables. The N2000 contains circuitry that provides and monitors the high voltage power supply for the ^3He tubes and the low voltage power supply to provide power to the head amplifier.

The ANTECH electrically screened junction box ensures comprehensive electrical screening at the termination of the detector tubes. It houses the fast charge sensitive amplifiers, which employ the AMPTEK A-111 based amplifier. The Junction Box is modular so that ^3He tubes can be replaced easily without disassembling unit. Each ^3He tube is connected via an HN connector to the junction box and supplied with HV.

The Operator Trolley provides a mounting point for the Slab Counter and allows for easy deployment and operation. A mounting plate with quick release locator pins allows for the panel to be mounted and dismantled easily for storage and operation. The trolley features two fixed and two swivel heavy duty castors for easy positioning, and an operator shelf provides a location for the system laptop and the latest ANTECH counting electronics.

Passive Neutron Slab Counter Configuration

The N2004 Passive Neutron Slab Counter can be operated as a single standalone unit, or as an array of multiple units, expanded out to encompass the sample(s). The High Voltage and Low Voltage supply from the N2000 counting electronics can be 'daisy chained' through multiple junction boxes, with input and output connectors provided on each junction box. Similarly, the signal outputs can be 'daisy chained' together with an "OR'ing" circuit to provide a single TTL input to the counting electronics.

Features

- Four or six ^3He detector tubes (25 mm diameter x 1000 mm length, 4 atmospheres ^3He fill pressure with HN connectors) in a rectangular high-density polyethylene block.
- A junction box for the tubes is housed at the top of the module and combines and amplifies the detector signals and distributes high voltage to the detector tubes.
- A-111 Charge Sensitive Amplifier chips for signal processing and TTL output.
- "Daisy-Chain" connections for Signal, High Voltage and Low Voltage for multiple panel deployment and single signal output via TTL 'OR'd' signal.

- Count rate produced by a ^{252}Cf source (with certified activity) positioned at one meter from the mid-height of the detector module is recorded for efficiency.
- The moderator block is clad with a skin of aluminium sheet for ease of decontamination.

Benefits

- Compatible with the ANTECH N2000 Universal Neutron Counter (UNC) and N2000-2 Network Neutron Counter (NNC) standalone counting electronics.
- Individual channel output or “OR’d” combined TTL output and daisy chained HV, LV and Signal cables for expansion.
- Small footprint floor mounted detection module or wall mounted with brackets for ease of use and economy of space.
- Inspection and testing includes measurement of high voltage bias curve, discriminator and gain setting and thermal neutron die-away time.
- Robust construction for operation in laboratory or plant.

For single channel information, the N2000 can accommodate up to 19 channels, allowing for 19 Slab Counters to be connected to a single counting electronics module.

Shipping

Each Passive Neutron Slab Counter can optionally be provided with a bespoke Pelican style shipping case for storage and transportation. The shock and vibration resistant foam liner will provide protection for the ^3He tubes and the system electronics within the junction box.

Specification

Dimensions (H x W x D) (excluding brackets)	Four Tube	1100 mm x 250 mm x 80 mm (43.31 in x 9.84 in x 3.15 in)
	Six Tube	1100 mm x 375mm x 80mm (43.31 in x 14.76 in x 3.15 in)
Weight (approx.)	21 kg (46.3 lbs) - 32 kg (70.55 lbs)	
Detectors	Four or Six ^3He detector tubes with connectors in a rectangular high-density polyethylene block	
Detector dimensions (L x diameter)	25.4 mm diameter x 1000 mm length at 4 atm pressure (1 in x 39.37 in)	
Detection efficiency	~1-1.8% *	
Operating voltage	~1650 volts	
Electrical connections	High voltage	SHV
	5 V supply for head amplifiers	BNC
	Signal output	BNC

(* not warranted)