

ELECTRONIC TUBE REFERENCE

120N

Specialized - Radiation Counter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

GEIGERMULLERCOUNTER

Self-quenching gas-filled Geiger-Müller counter intended for beta-radiation detection, using a thin mica window and stable counting plateau for general laboratory and monitoring applications.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1	GeigerMullerCounter
No fixed ratings recorded.	
Permanent-sensitivity gas-filled radiation counter tube for Beta detection.	

120N — Radiation Counter Tube

A permanent sensitivity, stainless steel radiation counter tube designed for beta radiation detection applications.

Overview

The **120N** is a specialized radiation counter tube designed primarily for the detection of beta radiation. It features a robust physical construction characterized by a stainless steel cathode and a thin mica window. The tube utilizes a neon gas filling with a quenching admixture to achieve stable electrical characteristics and a long operating life.

Engineered for reliability under diverse environmental conditions, the 120N operates over a wide temperature range and offers a life expectancy that is unlimited by use. Its electrical design is optimized for a nominal 700 V D.C. operating voltage, providing a wide plateau and controlled background noise characteristics.

Physical Construction and Dimensions

The mechanical design of the 120N is tailored to facilitate the entry and detection of beta particles while maintaining structural integrity. The tube is built with a stainless steel cathode, ensuring resistance to degradation and consistent performance over time.

The physical dimensions and structural specifications of the tube include:

- **Cathode Dimensions:** The effective cathode measures 2-11/16 inches in length, with an outer diameter (O.D.) of 2 inches and a wall thickness of 5/64 inches.
- **Mica Window:** To permit the penetration of beta radiation into the active volume, the tube features a thin mica window with an effective diameter of 1-29/32 inches. The window has an average thickness of 0.0008 inches, which corresponds to an areal density of 5.6 mg/cm² or a physical thickness of 20.32 microns.
- **Overall Tube Dimensions:** The maximum overall dimensions of the tube housing are 2-3/8 inches in diameter by 5-1/8 inches in length.
- **Operating Temperature Range:** The tube is rated to operate reliably at temperatures ranging from -55°C to +75°C.

Electrical and Detection Characteristics

The 120N relies on a neon gas filling combined with a quenching admixture to facilitate the ionization and quenching cycles necessary for radiation counting. Its primary electrical and operating parameters are:

- **Operating Voltage:** 700 V D.C.
- **Plateau Length:** The operating plateau extends in excess of 200 volts, providing a broad voltage range where the count rate remains relatively stable.
- **Plateau Slope:** The slope of the plateau is rated between 5% and 10% per 100 volts.
- **Dead Time:** The approximate dead time of the tube is 300 microseconds, which defines the minimum interval required between successive ionizing events for individual detection.
- **Background Count:** When placed within a shielded enclosure featuring a 2-inch lead shield, the background count of the tube is limited to a maximum of 100 counts per minute.

Related Variants and Comparisons

The 120N is part of a broader family of radiation counter tubes that share similar physical dimensions or operating principles but differ in their specific configurations:

- **120NB:** This variant shares identical electrical characteristics with the 120N, including a 700 V D.C. operating voltage, a plateau in excess of 200 volts, a 300-microsecond dead time, and a maximum background count of 100 counts per minute. It also utilizes the same cathode and mica window

dimensions. However, the [120NB](#) is equipped with a 4-pin base and has slightly different maximum overall dimensions of 2-5/16 inches by 5-3/4 inches.

- **120C:** While sharing the same physical cathode dimensions, mica window diameter, and window thickness as the 120N, the [120C](#) utilizes an argon and quenching admixture filling instead of neon. This gas composition shifts its nominal operating voltage to 1200 V D.C., extends its plateau to in excess of 300 volts, and expands its application scope to include both Beta and X-Ray detection.

Technical Summary

The **120N** is a neon-filled, self-quenched radiation counter tube designed for beta detection. It features a stainless steel cathode measuring 2-11/16 inches by 2 inches O.D., a 1-29/32 inch effective diameter mica window, and a maximum overall size of 2-3/8 inches by 5-1/8 inches. Operating at 700 V D.C. with a plateau exceeding 200 volts, the tube exhibits a plateau slope of 5% to 10% per 100 volts, an approximate dead time of 300 microseconds, and a maximum shielded background of 100 counts per minute. Its construction ensures an unlimited life expectancy across an operating temperature range of -55°C to +75°C.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1958 Amperex Industrial

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1958 AMPEREX INDUSTRIAL

Section 1 · GeigerMullerCounter

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filling	Neon + quenching admixture	—
Operating voltage	700 V	DC
Window thickness	0.0008 in	MicaWindow
Window areal density	5.6 mg/cm ²	MicaWindow
Effective mica-window diameter	1-29/32 in	—
Cathode dimensions	2-11/16 long x 2 OD x 5/64 wall	—
Maximum overall tube dimensions	2-3/8 x 5-1/8	—
Radiation application	Beta	—
Operating temperature range minimum	-55 degC	—
Operating temperature range maximum	75 degC	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plateau length	in excess of 200 V	—
Plateau slope	5% to 10% per 100 V	—
Dead time	300 us	Approximate
Maximum shielded background	100 counts/min	Shielded by 2 inches of lead

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes, and their source documents.

