

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

18518

1 SECTION

CONSTRUCTION

Specialized - Radiation Counter electronic tube

GEIGERMULLERCOUNTER

Halogen-quenched Geiger-Müller anticoincidence guard counter for low-background beta measurements, detecting coincident background events so associated pulses can be rejected from the primary counting channel.

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.	
Gas-filled radiation-counter section; counter-specific electrical characteristics are retained in TUBE_SECTION_PARAMETER.	

18518 — Anticoincidence Guard Counter Tube

The **18518** is a halogen-quenched cosmic ray guard counter tube designed for low-background radiation measurements. It is typically operated in anticoincidence circuits as a guard tube in combination with a beta counter, such as type 18516.

Mechanical and Construction Features

The 18518 is constructed with materials and dimensions optimized for stable radiation detection. The tube utilizes a gas filling composed of neon (Ne), argon (Ar), and a halogen quenching agent.

Key physical and mechanical specifications include:

- **Cathode and Anode Material:** 28% chromium and 72% iron.
- **Wall Thickness:** 1 mm.
- **Weight:** 190 g.
- **Physical Dimensions:**
 - Maximum diameter: 80 mm
 - Maximum height: 75 mm
 - Body diameter: 39–41 mm
 - Top cap: Maximum diameter of 15 mm, maximum height of 15 mm
 - Terminal leads ('a' and 'k'): 30 mm length

For reliable operation, the tube must be installed in a low-capacitance mounting. It is critical to keep the tube dry and well-cleaned to prevent leakage currents that could interfere with measurement accuracy.

Electrical and Operating Characteristics

The electrical performance of the 18518 is defined by its stable plateau and low background count rate. At an ambient temperature of 25 °C, the tube exhibits the following operating parameters:

- **Interelectrode Capacitance:** 8 pF
- **Recommended Anode Resistor (R):** 10 M Ω
- **Starting Voltage (V_{ign}):** Minimum 550 V, maximum 650 V
- **Nominal Operating Voltage (V_b):** 1000 V
- **Plateau Range:** 800–1200 V
- **Plateau Slope:** Maximum 0.03 %/V (measured between 800 V and 1200 V at a counting rate of 50 counts/second with an anode resistor $R = 10 \text{ M}\Omega$)
- **Dead Time:** Maximum 1 ms
- **Background Count Rate:** Maximum 70 counts/minute (measured in a shielded environment consisting of 10 cm of iron on the outside and 5 cm of mercury on the inside)

Absolute Maximum Ratings

To prevent damage or degradation of the tube, operation must be kept within the following absolute limits:

- **Maximum Operating Voltage (V_b):** 1200 V (with an anode resistor $R = 10 \text{ M}\Omega$)
- **Ambient Temperature Range (t_{amb}):** Minimum -50 °C, maximum +75 °C

Recommended Circuit Configurations

The 18518 can be integrated into radiation detection systems using two primary circuit configurations:

1. **Standard Circuit:** In this configuration, a series resistor $R = 10 \text{ M}\Omega$ is connected to the positive high-voltage supply ($+V_b$). The output signal is taken via a coupling capacitor from a tap located at 1/10 of the series resistance ($1/10R$).

2. **Anticoincidence Circuit:** This is the recommended configuration for low-background applications, where the 18518 serves as a guard tube in combination with a beta counter like type [18516](#) to reject cosmic ray background events.

Temperature and Plateau Curve Analysis

The operating characteristics of the 18518 vary with temperature and applied voltage in a highly predictable manner:

- **Starting Voltage vs. Temperature:** The starting voltage (V_{ign}) increases non-linearly as temperature rises. At -50 °C, the starting voltage is approximately 450 V. It rises steeply to about 590 V at 0 °C, and then gradually flattens out, reaching around 660 V at +140 °C.
- **Plateau Curve:** The tube demonstrates a highly stable, flat counting rate of approximately 50 counts/second across its entire plateau range from an anode voltage (V_a) of 800 V to 1200 V when using a 10 MΩ anode resistor.

Technical Summary

The **18518** is a specialized halogen-quenched cosmic ray guard counter tube filled with a neon-argon-halogen mixture. Featuring a chromium-iron cathode and anode structure, it is designed for low-background anticoincidence detection systems, typically paired with the 18516 beta counter. With a nominal operating voltage of 1000 V, a wide 800–1200 V plateau, and a very low plateau slope of 0.03 %/V, it provides highly stable radiation detection. Proper installation requires low-capacitance mounting and clean, dry conditions to avoid leakage currents across its terminals.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1999 Philips 0-D

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

1999 PHILIPS 0-D

Section 1 · GeigerMullerCounter

CONSTRUCTION

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filling	Neon, argon and halogen quenching agent	—

CAPACITANCE

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Interelectrode capacitance	8 pF	—

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode resistor	10 Mohm	—
Operating voltage	1000 V	—

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plateau minimum	800 V	—
Plateau maximum	1200 V	—
Plateau slope maximum	0.03 %/V	—
Dead time maximum	1 msec	—
Background maximum	70 counts/min	—

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