

ELECTRONIC TUBE REFERENCE

18510

Specialized - Radiation Counter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

GEIGERMULLERCOUNTER

Halogen-quenched Philips Geiger-Müller liquid-flow counter for beta-radiation measurement. Its construction permits radioactive liquid to pass through the sensitive counting region for continuous or sampled activity measurements.

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.	

18510 — Halogen-Quenched Beta Radiation Liquid Flow Counter Tube

The **18510** is a specialized halogen-quenched Geiger-Müller counter tube designed for the detection and measurement of beta radiation in liquid flows. Utilizing a gas mixture of neon, argon, and a halogen quenching agent, the tube features an internal thin-wall glass flow-through design that allows liquids to pass directly through the active volume of the detector.

Mechanical Construction and Physical Properties

The 18510 is constructed with a thin-wall internal glass tube that serves as the conduit for the liquid flow being monitored. This internal glass tubing has a wall thickness of 30 mg/cm², an inside diameter of 5.5 mm, and an effective length of 36 mm. The cathode is fabricated from an alloy consisting of 28% chromium and 72% iron.

Physically, the tube has a maximum overall length of 92 mm and a maximum outer diameter of 24 mm. The total weight of the device is approximately 18 g. Because of the thin-wall internal glass tubing, the 18510 is mechanically fragile and must be handled with extreme care. Additionally, sudden changes in temperature must be avoided to prevent thermal shock and structural failure of the glass envelope.

Electrical and Operating Characteristics

At an ambient temperature of 25 °C, the 18510 exhibits the following electrical and operating parameters:

- **Anode-to-Cathode Capacitance:** 4 pF
- **Ignition Voltage (V_{ign}):** Maximum 375 V
- **Plateau Voltage Range (V_{pl}):** 500 V to 650 V
- **Plateau Slope (S_{pl}):** Maximum 0.07 %/V
- **Dead Time (τ):** Maximum 125 μ s when operated at a supply voltage (V_b) of 550 V with a 5 M Ω anode resistor.
- **Background Count Rate (N_0):** Maximum 15 counts per minute when the tube is shielded with 2 inches of lead (Pb) and 1/4 inch of aluminum (Al).

The operating voltage (V_b) can be selected arbitrarily within the plateau range to suit the requirements of the measurement system.

Recommended Operating Circuit and Absolute Limits

For proper operation, the 18510 is used in a grounded-cathode configuration. The anode is connected to the high-voltage supply ($+V_b$) through a series combination of two resistors: a primary anode resistor (R) of 5 M Ω and a secondary tap resistor of 0.5 M Ω (representing a ratio of R and $1/10 R$). The pulse output is taken via a coupling capacitor connected to the junction between these two series resistors.

To ensure reliable operation and prevent damage, the following absolute limiting values must be respected:

Parameter	Limit Value
Maximum Anode Voltage (V_a)	650 V
Minimum Anode Resistor (R)	5 M Ω
Ambient Temperature Range (t_{amb})	-50 °C to +75 °C
Maximum Internal Liquid Pressure (p)	120 cm Hg (absolute)

Temperature and Voltage Behaviors

The 18510 exhibits highly stable performance characteristics across its rated operating conditions:

- **Ignition Voltage vs. Temperature:** The ignition voltage remains remarkably stable, holding at approximately 340 V to 345 V across a wide temperature range from -20 °C to +80 °C. At temperatures below -20 °C, the ignition voltage drops slightly, reaching approximately 300 V at -60 °C.
- **Dead Time vs. Operating Voltage:** When utilizing the recommended 5 M Ω anode resistor with a 0.5 M Ω series tap, the dead time (τ) remains relatively flat and stable. It stays within a narrow range of approximately 105 μ s to 120 μ s for operating voltages (V_b) spanning from 400 V to 700 V.

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	4 pF	—

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Anode resistor	5 Mohm	—
Operating voltage minimum	500 V	—
Operating voltage maximum	650 V	—
Absolute maximum anode voltage	650 V	—
Minimum anode resistance	5 Mohm	—
Maximum liquid pressure	120 cm Hg abs	—

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Starting voltage maximum	375 V	—
Plateau slope maximum	0.07 %/V	—
Dead time maximum	125 usec	V _p =550V
Shielded background maximum	15 counts/min	2inPb;1/4inAl

TUBE TINKER

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

[Catalog](#) [Tube types](#) [Full books](#) [Blog](#) [Feedback & corrections](#)

© 2026 Tube Tinker