ELECTRONIC TUBE REFERENCE

1725A

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
RECTIFIER

Philips directly heated gas-filled industrial half-wave rectifier for magnetic-chuck supplies, providing substantial current with the low forward drop characteristic of gas-discharge rectification.

General characteristics

BASE DESIGNATION	A	**BASE PINS**	—
NOMINAL HEATER	1.9 V / 3.5 A	**PARALLEL HEATER**	— / —
HEATING	Direct	**SERIES OPERATION**	Not specified
CATHODE ARRANGEMENT	Common cathode	**SECTION CONSTRUCTION**	Similar

Section ratings

SECTION1 Rectifier

PEAK INVERSE VOLTAGE	470 V
NOMINAL OUTPUT CURRENT	650 mA
PEAK FORWARD CURRENT	4 A
FORWARD VOLTAGE DROP	10 V
WARM-UP TIME	15 s

Directly heated gas-filled rectifier for magnetic-chuck rectifier service.

1725A — Gas-Filled Double-Anode Rectifying Valve

A directly heated, gas-filled, double-anode rectifying tube designed for industrial power applications, specifically optimized for driving magnetic chucks.

Overview

The **1725A** is an industrial gas-filled double-anode rectifying valve designed primarily for medium-power rectification duties. Its primary documented application is the excitation of magnetic chucks, where it is rated to deliver an output current of 1.3 A per valve. The tube features a directly heated, oxide-coated filament and is housed in a glass envelope with a specialized base.

The 1725A utilizes a gas filling to achieve a low and stable internal voltage drop during conduction, making it highly efficient compared to high-vacuum rectifiers in low-to-medium voltage, high-current applications. To ensure reliable operation and prevent damage to the internal structure, the tube must be operated in a vertical, base-down position.

Mechanical Construction and Base Configuration

The 1725A is constructed with a robust glass bulb and a specialized base designated as **Base A**. The physical dimensions of the tube are characterized by a maximum overall height of 135 mm, a maximum seated height of 119 mm, and a maximum bulb diameter of 71 mm.

The tube has a net weight of 75 g. For industrial distribution, they are typically packaged in quantities of 25, with a total shipping weight of 5500 g.

Mounting and Socketing

- **Mounting Position:** Vertical, base down only.
- **Socket Type:** Standard socket 40465.

Electrode Connections and Screen Resistor

The tube incorporates an internal screen (s) to stabilize the gas discharge and protect the electrodes. For proper operation, this screen must be connected to the cathode (filament) via an external current-limiting resistor:

- **Screen Resistor Value:** 10 kΩ
- **Screen Resistor Power Rating:** 0.5 W

The base diagram provides connections for the two independent anodes (a and a'), the directly heated filament (f, f), and the screen (s).

Filament and Heating Characteristics

The 1725A features a directly heated, oxide-coated filament designed for AC operation. Because the filament is directly heated, it also serves as the cathode of the rectifying system.

Parameter	Value
Filament Voltage (Vf)	1.9 V
Filament Current (If)	3.5 A

Parameter	Value
Calculated Filament Power	6.65 W
Heating Supply	AC
Filament Type	Oxide-coated
Recommended Pre-heating Time (Tw)	15 s

The pre-heating time (Tw) of 15 seconds is the recommended duration to allow the filament to reach its proper operating temperature before anode current is drawn. In urgent circumstances, this pre-heating delay may be decreased to 0 seconds, though adhering to the recommended 15-second delay is standard practice to maximize tube longevity. The calculated filament power consumption of 6.65 W is derived directly from the nominal filament voltage of 1.9 V and the nominal filament current of 3.5 A (1.9 V * 3.5 A = 6.65 W).

Electrical and Operating Characteristics

The gas filling within the 1725A results in distinct electrical properties, notably a low arc voltage drop and a specific ignition voltage required to initiate conduction.

- **Arc Voltage Drop (Varc):** 10 V (typical)
- **Ignition Voltage (Vign):** 22 V (typical)

Typical Rectifier Circuit Operation

In a typical full-wave rectifying circuit configuration (referred to as circuit 'a'), the 1725A operates under the following nominal conditions:

Operating Parameter	Value
Transformer RMS Voltage (Vtr / Veff)	150 V
Output DC Voltage (Vo)	110 V
Output DC Current (Io)	1.3 A

This operating point demonstrates the tube's capability to deliver a steady 110 V DC output at 1.3 A from a 150 V RMS AC supply, making it highly suitable for powering industrial magnetic chucks and similar inductive loads.

Absolute Maximum Ratings

To prevent premature failure or immediate damage to the gas-filled structure, the 1725A must be operated strictly within its absolute limiting values. These limits represent the maximum stress the tube can withstand under any circumstances.

Limiting Parameter	Absolute Maximum Value
Peak Inverse Anode Voltage (Vainvp)	470 V
Average Anode Current (Ia) (Averaging time Tav <= 5 s)	0.65 A
Peak Anode Current (Iap)	4 A
Minimum Surge Limiting Resistance (Rt)	5 Ω
Ambient Temperature Range (tamb)	-55 °C to +75 °C

The minimum surge limiting resistance (Rt) of 5 Ω is critical to protect the oxide-coated filament from excessive peak currents during start-up or transient conditions. The average anode current limit of 0.65 A is specified per anode, integrated over a maximum period of 5 seconds, ensuring that the thermal limits of the individual anodes are not exceeded during continuous operation.

Technical Summary

The **1725A** is a specialized, gas-filled, double-anode rectifying valve designed for industrial applications, particularly magnetic chucks requiring a reliable 1.3 A DC supply. Operating with a low filament voltage of 1.9 V and a current of 3.5 A, the tube features a directly heated oxide-coated cathode. It exhibits a very low typical arc drop of 10 V and an ignition voltage of 22 V.

When configured in a standard rectifying circuit with a 150 V RMS supply, the 1725A delivers a nominal 110 V DC at 1.3 A. Designers must ensure the tube is mounted vertically (base down) in a 40465 socket, connect the internal screen to the cathode via a 10 kΩ, 0.5 W resistor, and respect the absolute limits, including a 470 V peak inverse voltage, a 4 A peak anode current, and a minimum series resistance of 5 Ω.

SOURCE OPERATING CONDITIONS

SOURCE PDF

1963 Philips Electron Tubes Handbook V3

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

1963 PHILIPS ELECTRON TUBES HANDBOOK V3

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Arc voltage drop	**10 V**	GasFilled

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Maximum peak inverse anode voltage	**470 V**	—
Maximum average anode current	**650 mA**	—
Maximum peak anode current	**4 A**	—
Application	**magnetic-chuck rectifier service**	—
Heater voltage	**1.9 V**	DirectAC
Heater current	**3.5 A**	DirectAC

SOURCE DATA APPENDIX

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 · Rectifier

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Maximum average anode current per anode	**650 mA**	Tav max 5 s
Minimum series resistance	**5 ohm**	—
Permitted mercury/ambient temperature	**-55–75 degC**	—
DC output voltage	**110 V**	—
DC output current	**1.3 A**	—
RMS anode supply voltage	**150 V**	CircuitA

CHARACTERISTICS		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Ignition voltage	**22 V**	—

Tube Tinker

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