



ELECTRONIC TUBE REFERENCE

1002

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Directly heated Philips gas-filled industrial rectifier designed particularly for battery-charger service. Rated for approximately 500 V peak inverse voltage and 100 mA average output from an oxide-coated filament.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.9 V / 2.8 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
PEAK INVERSE VOLTAGE	500 V
NOMINAL OUTPUT CURRENT	100 mA
PEAK FORWARD CURRENT	600 mA
WARM-UP TIME	15 s
<i>Gas-filled industrial rectifier with directly heated oxide-coated filament.</i>	

1002 — Single-Anode Gas-Filled Rectifying Valve

The **1002** is a gas-filled, single-anode rectifying valve designed for low-current industrial applications, particularly battery charging. It features a directly heated, oxide-coated filament and is designed to operate under specific thermal and electrical limits to ensure reliable service.

Overview and Applications

The primary application of the 1002 rectifying valve is in battery chargers. It is rated to deliver an average anode current of 0.1 A per valve, making it suitable for charging systems containing up to a maximum of 60 lead-acid (Pb) cells.

The tube is filled with gas, which allows for a low and stable arc voltage drop during conduction. This characteristic is highly beneficial in battery charging circuits where efficiency and stable voltage output are required.

Mechanical and Physical Specifications

The 1002 is designed with a glass envelope and a specific base configuration. Its physical dimensions and mounting requirements are detailed below:

- **Mounting Position:** The valve must be operated in a vertical position with the base facing down.
- **Base Type:** Base A.
- **Compatible Socket:** Type 40465.
- **Maximum Diameter:** 39 mm.
- **Maximum Seated Height:** 103 mm.
- **Maximum Overall Length:** 121 mm.
- **Weight:** The net weight of the valve is 40 g. For bulk packaging, a lot of 50 valves has a gross shipping weight of approximately 3500 g.

The base diagram indicates that the anode is connected to pin 4 (labeled "a"), while the directly heated filament is connected across pins 1 and 10.

Filament and Heating Requirements

The 1002 utilizes a directly heated, oxide-coated filament. The filament must be supplied with alternating current (A.C.) under the following conditions:

- **Filament Voltage (V_f):** 1.9 V
- **Filament Current (I_f):** 2.8 A
- **Pre-heating Time (T_w):** The recommended pre-heating time before applying anode voltage is 15 seconds. In urgent operating scenarios, this delay may be reduced to 0 seconds.

Electrical Characteristics and Operating Limits

The electrical operation of the 1002 is defined by its typical conduction characteristics and strict limiting values to prevent damage to the gas-filled structure.

Typical Characteristics

During normal conduction, the valve exhibits the following typical parameters:

- **Arc Voltage (V_{arc}):** 7 V
- **Ignition Voltage (V_{ign}):** 16 V

Limiting Values

The operating circuit must be designed to keep the electrical and environmental stresses within the following limits:

- **Transformer Secondary Voltage (V_{tr}):** The effective RMS transformer voltage must be kept between a minimum of 16 V_{eff} and a maximum of 160 V_{eff} .
- **Peak Inverse Anode Voltage (V_{ainvp}):** The maximum allowable peak inverse voltage across the tube is 500 V.
- **Average Anode Current (I_a):** The maximum continuous average anode current is 0.1 A.
- **Peak Anode Current (I_{ap}):** The maximum peak anode current must not exceed 0.6 A.
- **Limiting Resistance (R_t):** A minimum series resistance of 15 Ω is required in the anode circuit to protect the tube from excessive peak currents.
- **Ambient Temperature (t_{amb}):** The valve is rated for operation in ambient temperatures ranging from -55°C to $+75^{\circ}\text{C}$.

Technical Summary

The **1002** is a compact, gas-filled, single-anode rectifier designed by Philips for low-current battery charging applications. Operating with a 1.9 V, 2.8 A directly heated filament, it provides efficient rectification with a low typical arc drop of 7 V and an ignition voltage of 16 V. It supports an average output current of 0.1 A and can withstand up to 500 V peak inverse voltage. Proper operation requires vertical mounting, a minimum series resistance of 15 Ω , and adherence to the specified transformer voltage limits of 16 to 160 V_{eff} .

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
MinimumSeriesResistance	15 ohm	—

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TypicalArcVoltage	7 V	—
IgnitionVoltage	16 V	—

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