ELECTRONIC TUBE REFERENCE

1163

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
RECTIFIER

Directly heated Philips gas-filled industrial rectifier for charging batteries of up to about 36 lead-acid cells. Rated for approximately 375 V peak inverse voltage and 6 A nominal rectified output.

General characteristics

BASE DESIGNATION	GOLIATH	**BASE PINS**	—
NOMINAL HEATER	2.25 V / 17 A	**PARALLEL HEATER**	— / —
HEATING	Direct	**SERIES OPERATION**	Not specified
CATHODE ARRANGEMENT	Separate cathodes	**SECTION CONSTRUCTION**	Similar

Section ratings

SECTION1 Rectifier

PEAK INVERSE VOLTAGE	375 V
NOMINAL OUTPUT CURRENT	6 A
PEAK FORWARD CURRENT	36 A
FORWARD VOLTAGE DROP	9 V
WARM-UP TIME	60 s

Directly heated gas-filled rectifier for battery charging up to 36 lead-acid cells.

1163 — Gas-Filled Single-Anode Rectifying Valve

The **1163** is a gas-filled, single-anode rectifying valve designed primarily for industrial battery charging applications. It features a directly heated thoriated tungsten filament and is capable of delivering a continuous average output current of 6 A per valve, making it suitable for charging systems with up to 36 lead-acid (Pb) cells.

Mechanical Design and Physical Dimensions

The 1163 is constructed with a glass envelope and is designed for vertical mounting with the base facing downwards. It utilizes a heavy-duty **Goliath** base, which is compatible with the **65909 BG/01** socket support.

The physical dimensions of the valve are as follows:

- **Maximum overall height:** 178 mm
- **Maximum bulb diameter:** 83 mm
- **Anode connection:** Top-cap terminal, measuring 15 mm in diameter and between 12.5 mm and 17.5 mm in height.

The net weight of a single 1163 valve is 110 g. For shipping purposes, a standard package of 16 valves has a gross weight of approximately 4800 g.

Filament and Heating Characteristics

The valve is equipped with a directly heated, thoriated tungsten filament designed to operate from an AC supply. The electrical requirements for the filament are:

Parameter	Value
Filament Voltage (Vf)	2.25 V
Filament Current (If)	17 A
Heating Method	Direct (A.C.)
Recommended Preheating Time (T_w)	3 seconds

The calculated nominal filament power consumption is:

$$Pf = Vf \times If = 2.25\ \text{V} \times 17\ \text{A} = 38.25\ \text{W}$$

Although the minimum required preheating time is technically specified as 0 seconds under certain conditions, a preheating time of 3 seconds is recommended to ensure stable operation and longevity of the thoriated tungsten filament.

Electrical Characteristics and Operating Limits

The typical operating parameters of the gas discharge within the 1163 include an arc voltage drop (V_{arc}) of **9 V** and an ignition voltage (V_{ign}) of **16 V**.

The absolute limiting values for the valve depend on the specific rectifier circuit configuration. The operating limits are categorized into two distinct circuit groups (designated as circuits "a, c, e, f, g" and "b, d"):

Parameter	Circuits a, c, e, f, g	Circuits b, d
Maximum Transformer Voltage (V_{tr})	130 V_{eff}	90 V_{eff}
Minimum Transformer Voltage (V_{tr})	20 V_{eff}	20 V_{eff}
Maximum Peak Inverse Anode Voltage (V_{ainv_p})	375 V	250 V
Maximum Average Anode Current (I_a)	6 A	6 A
Maximum Peak Anode Current (I_{ap})	36 A	36 A
Minimum Limiting Resistance (R_t)	0.5 Ω	0.5 Ω
Ambient Temperature Range (t_{amb})	-55 to +75 °C	-55 to +75 °C

The minimum limiting resistance (R_t) of 0.5 Ω must be maintained in series with the anode to protect the valve from excessive peak currents during operation. The wide permissible ambient temperature range of -55 °C to +75 °C allows the valve to be deployed in demanding industrial environments.

Technical Summary

The **1163** is a robust, gas-filled single-anode rectifier designed for high-current applications such as industrial battery chargers. With its directly heated thoriated tungsten filament operating at 2.25 V and 17 A, the valve provides reliable service under vertical mounting conditions. It features a low arc voltage drop of 9 V and can handle a maximum average anode current of 6 A and peak currents up to 36 A. Depending on the circuit configuration, it supports transformer voltages up to 130 V_{eff} and peak inverse voltages up to 375 V, making it a highly capable component for medium-voltage, high-current rectification tasks.

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	**9 V**	GasFilled

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Maximum peak inverse anode voltage	**375 V**	—
Maximum average anode current	**6 A**	—
Maximum peak anode current	**36 A**	—
Application	**battery charging up to 36 lead-acid cells**	—
Heater voltage	**2.25 V**	DirectAC
Heater current	**17 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

CONSTRUCTION		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Filling	**Gas**	—

OTHER		
PARAMETER	**PUBLISHED VALUE**	**CONDITION / NOTE**
Peak inverse voltage	**375 V**	—
Maximum average current	**6 A**	—
Maximum peak current	**36 A**	—
Minimum series resistance	**0.5 ohm**	—
Ambient temperature range	**-55 to +75 degC**	—