

ELECTRONIC TUBE REFERENCE

1048

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
RECTIFIER

Directly heated Philips gas-filled industrial rectifier for battery-charger service. Rated for approximately 185 V peak inverse voltage, 3 A average output, and 18 A peak current from an oxide-coated filament.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.9 V / 7 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	185 V
NOMINAL OUTPUT CURRENT	3 A
PEAK FORWARD CURRENT	18 A
WARM-UP TIME	30 s
Gas-filled industrial rectifier with directly heated oxide-coated filament.	

1048 — Gas-Filled Double-Anode Rectifying Valve

The **1048** is a gas-filled, double-anode rectifying valve designed primarily for industrial battery charging applications. Capable of delivering up to 6 A of rectified current per valve, it is specifically rated for charging battery banks containing up to 20 lead-acid (Pb) cells. The tube features a directly heated, oxide-coated filament and is housed in a robust glass envelope with a specialized four-pin base.

Construction, Heating, and Physical Specifications

The physical design of the 1048 is optimized for high-current industrial service. It utilizes a directly heated, oxide-coated filament that operates from a low-voltage, high-current AC supply.

Filament and Heating Characteristics

To protect the oxide coating of the filament and ensure proper gas ionization, a preheating time (T_w) must be observed before anode voltage is applied. Under normal operating conditions, a preheating time of 30 seconds is recommended. In urgent situations, this preheating period may be reduced to a minimum of 15 seconds.

Parameter	Value
Filament Voltage (V_f)	1.9 V
Filament Current (I_f)	7 A
Nominal Preheating Time (T_w)	30 s
Minimum Preheating Time (Urgent)	15 s
Heating Method	Direct (A.C.)
Filament Type	Oxide-coated

Mechanical and Mounting Specifications

The 1048 must be mounted in a **vertical, base down** position to ensure proper thermal distribution and stable operation of the gas fill.

- **Maximum Overall Height:** 170 mm
- **Maximum Bulb Height (excluding pins):** 156 mm
- **Maximum Bulb Diameter:** 81 mm
- **Net Weight:** 90 g
- **Base Type:** W
- **Associated Socket (Support):** Type 40221
- **Shipping Weight (50 valves):** 7500 g (gross weight)

Pinout and Base Connections

The tube utilizes a type "W" base with four pins. When viewed from the bottom of the tube, the pin connections are assigned as follows:

- **Pin 1:** Filament (f)
- **Pin 2:** Anode 2 (a')
- **Pin 3:** Anode 1 (a)
- **Pin 4:** Filament (f)

Electrical and Operating Characteristics

The 1048 is characterized by low internal voltage drops typical of gas-filled rectifiers, which provides high efficiency in battery charging circuits.

Typical Tube Characteristics

- **Arc Voltage (V_{arc}):** 9 V
- **Ignition Voltage (V_{ign}):** 16 V

The low arc voltage of 9 V minimizes internal power dissipation during conduction, while the 16 V ignition voltage represents the threshold required to initiate the gas discharge.

Operating Conditions in Battery Charging Service

In a typical charging circuit (designated as circuit "a") operating with a transformer secondary voltage (V_{tr}) of 60 V RMS (V_{eff}) and a series limiting resistance (R_t) of 2.1 Ω , the operating parameters vary depending on the state of charge of the connected battery bank:

Parameter	Discharged State	Nominal State	Charged State
Battery Voltage (V_{bat})	36 V	44 V	54 V
Rectified Output Current (I_O)	7.7 A	5.5 A	3.2 A
Peak Anode Current (I_{ap})	—	15 A	—

As the battery charges and its terminal voltage rises from 36 V to 54 V, the average charging current (I_O) automatically tapers from 7.7 A down to 3.2 A. Under nominal conditions, the peak anode current (I_{ap}) reaches 15 A.

Absolute Maximum Ratings

To ensure reliable operation and prevent premature failure of the gas-filled structure, the absolute maximum limits must not be exceeded.

Rating Parameter	Value
Maximum Peak Inverse Anode Voltage (V_{ainvp})	185 V
Maximum Average Anode Current (I_a)	3 A
Maximum Peak Anode Current (I_{ap})	18 A
Minimum Series Resistance (R_t)	1.75 Ω

Rating Parameter	Value
Ambient Temperature Range (t_{amb})	-55 °C to +75 °C

The maximum average anode current of 3 A per anode permits a total rectified output of 6 A per valve in full-wave configurations. The minimum series resistance (R_t) of 1.75 Ω is critical to limit the peak anode current to safe levels under all operating and transient conditions, particularly when charging fully discharged batteries. The wide ambient temperature range of -55 °C to +75 °C allows the tube to be deployed in demanding industrial environments.

Technical Summary

The **1048** is a specialized, gas-filled, double-anode rectifying valve designed for high-current battery charging applications. Operating with a high-current 1.9 V / 7 A directly heated filament, the tube requires a nominal 30-second preheating period (reducible to 15 seconds in urgent situations) before drawing anode current. It is capable of charging up to 20 lead-acid cells in series, delivering a nominal output current of 5.5 A (up to 7.7 A when the battery is discharged) from a 60 V RMS transformer supply. With an exceptionally low arc voltage of 9 V and a robust vertical-mounting design, the 1048 provides efficient and reliable service within an ambient temperature range of -55 °C to +75 °C.

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	1.75 ohm	—
NominalBatteryVoltage	44 V	BatteryCharger
NominalOutputCurrent	5.5 A	BatteryCharger

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
TypicalArcVoltage	9 V	—
IgnitionVoltage	16 V	—

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