



ELECTRONIC TUBE REFERENCE

16P13

Power - Triode electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

TRIODE

Directly heated power triode documented in AEI industrial-valve literature; available source evidence supports industrial high-power service but not a narrower application statement without speculation.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	8 V / 26 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Triode	
MAXIMUM PLATE VOLTAGE	8000 V
MAXIMUM PLATE DISSIPATION	3000 W
REDO promoted-field audit	

16P13 — Water-Cooled Power Triode

The **16P13** is a directly heated, water-cooled power triode designed primarily for industrial and high-power radio frequency applications. Manufactured by Associated Electrical Industries Limited (AEI) under the Ediswan brand, this valve is specifically engineered for use as an R.F. oscillator in eddy current heating apparatus and similar industrial induction heating equipment.

Construction and Cooling System

The 16P13 features an external anode design with an integrated water-cooling jacket. It is the water-cooled version of the [ESA1500](#) (also referred to in some documentation as the ES.MSOO) and is electrically identical to the [16P12](#). The primary physical distinction of the 16P13 is the inclusion of

integral union connectors attached directly to the ends of the water-cooling tube. These union connectors are designed to accommodate 1/2-inch outside diameter tubing conforming to the BS2051 standard.

The tube's filament is constructed from thoriated tungsten, which is robust enough to support direct switching without requiring complex pre-heating or starting circuitry. To ensure proper operation and cooling, the 16P13 must be mounted vertically with the base positioned uppermost.

Mechanical and Physical Dimensions

The physical structure of the 16P13 is characterized by its specialized base and external anode assembly. The key mechanical dimensions and physical parameters include:

- **Maximum Overall Length:** 211 mm
- **Body Height (excluding pins):** 208 mm $\pm$ 3 mm (8.2 inches $\pm$ 0.125 inches)
- **Maximum Width (including water connections):** 115 mm (4.5 inches)
- **Main Body Diameter:** 80 mm (3.15 inches)
- **Water Coil Outer Diameter:** 95.5 mm (3.75 inches)
- **Water Coil Inner Diameter:** 50.8 mm (2.0 inches)
- **Water Pipe Specification:** 16 SWG with a pipe diameter of 6.35 mm (0.25 inches) and a coil pitch spacing of 12.7 mm (0.5 inches)
- **Grid Pins:** 7.938 mm (0.3125 inches) diameter, arranged on a 48 mm pitch circle diameter (P.C.D.)
- **Other Pin Diameter:** 9.525 mm (0.375 inches)
- **Pin Length:** 15 mm minimum to 18 mm maximum

Filament and Electrical Ratings

The directly heated thoriated tungsten filament operates under the following electrical specifications:

Parameter	Symbol	Value	Tolerance / Unit
Filament Voltage	Vf	8.0	$\pm$ 5% V
Filament Current	If	26	A

The calculated nominal power required to heat the filament is 208 W (derived from the nominal 8.0 V voltage and 26 A current).

Typical Operating Characteristics

Under typical operating conditions, the 16P13 exhibits the following electrical characteristics:

- **Anode Voltage (Va):** 5 kV
- **Anode Current (Ia):** 400 mA
- **Mutual Conductance (gm):** 7.5 mA/V
- **Amplification Factor (μ):** 24

Maximum Ratings and Frequency Limits

The absolute maximum ratings of the 16P13 define its safe operating envelope for continuous and pulsed operation:

- **Maximum Anode Voltage (D.C.) ($V_a(\text{max})$):** 8 kV
- **Maximum Peak Cathode Current ($I_k(\text{pk})\text{max}$):** 6 A
- **Maximum Anode Dissipation ($P_a(\text{max})$):** 3.0 kW

The maximum operating frequency of the valve is subject to two distinct limiting factors:

1. **Water Connections Limitation:** When limited by the physical water cooling connections, the maximum operating frequency is **10 Mc/s**.
2. **Valve Limitation:** When considering the internal structure of the valve itself, the maximum operating frequency is **40 Mc/s**.

Inter-electrode Capacitances

The internal capacitances between the electrodes of the 16P13 are specified as follows:

- **Anode to Grid (C_{a-g}):** 11.5 pF
- **Anode to Filament (C_{a-f}):** 0.8 pF
- **Grid to Filament (C_{g-f}):** 14.5 pF

Technical Summary

The **16P13** is a high-power, directly heated, water-cooled triode featuring a thoriated tungsten filament, an external anode, and a specialized base. Operating with an 8.0 V, 26 A filament supply, it is capable of handling up to 8 kV D.C. on the anode and dissipating up to 3.0 kW. Its integrated water-cooling system, complete with union connectors for 1/2-inch BS2051 tubing, allows it to function reliably as an R.F. oscillator in demanding industrial environments such as eddy current heating. The device must be operated in a vertical, base-up orientation and is rated for operation up to 10 Mc/s under water-connection limits, or up to 40 Mc/s when limited solely by the valve's internal structure.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 AEI Industrial Valves

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

1961 AEI INDUSTRIAL VALVES

Section 1 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum operating frequency	50 MHz	—
Full-rating frequency	25 MHz	—
Anode-filament capacitance	0.8 pF	—
Grid-filament capacitance	14.5 pF	—
Typical anode voltage	5000 V	—
Typical anode current	400 mA	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Associated Electrical Industries

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

1961 ASSOCIATED ELECTRICAL INDUSTRIES

Section 1 · Triode

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum operating frequency	50 MHz	—
Full-rating frequency	25 MHz	—
Anode-filament capacitance	0.8 pF	—
Grid-filament capacitance	14.5 pF	—

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