AEI Water Cooled Triode 15P12

GENERAL

The 15P12 is a water cooled triode with a directly heated thoriated tungsten filament. It is intended for use in r.f. heating equipment.

RATINGS*

Filament voltage	V_f	5·0	V
Filament current	I_f	32·5	A
Maximum anode voltage	$V_{a(max)}$	7·0	kV
Maximum anode dissipation	$p_{a(max)}$	650	W
Minimum water flow for maximum anode dissipation		1	L/min
Maximum water outlet temperature		55	°C
Maximum peak cathode current	$i_{k(pk)max}$	3·0	A
Maximum operating frequency at full ratings	f_{max}	60†	Mc/s

* Limiting values are absolute maximum values.
† Limited by water connections to 10 Mc/s.

INTER-ELECTRODE CAPACITANCES

Anode/grid	c_{a-g}	10·5	pF
Grid/filament	c_{g-f}	11	pF
Anode/filament	c_{a-f}	0·5	pF

CHARACTERISTICS

Anode voltage	V_a	4·0	kV
Anode current	I_a	120	mA
Mutual conductance	g_m	3·3	mA/V
Amplification factor	μ	21	

TYPICAL OPERATION—Maximum operating conditions per valve
Class B1 audio amplification—push-pull operation.

Maximum anode voltage	V_a	6·0	kV
Anode current r.m.s.	$I_{a(r.m.s.)}$	0·3	A
Power input	P_{in}	1·2	kW
Power output	P_{out}	0·6	kW
Anode dissipation	p_a	0·6	kW
Anode efficiency		50	%
Bias voltage	V_g	−220	V
Peak signal voltage	$v_{sig(pk)}$	220	V

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TYPICAL OPERATION—Maximum operating conditions
Class C—3-phase full-wave rectified or d.c.

Anode voltage	V_a	4·0	5·0	6·0	kV
Bias voltage	V_g	−220	−300	−400	V
Positive grid voltage	V_{sig}	280	280	280	V
Grid resistor	R_g	1·75	1·9	3·1	kΩ
Mean anode current	$I_{a(av)}$	620	600	550	mA
Mean grid current	$I_{g(av)}$	130	160	130	mA
Peak cathode current	$i_{k(pk)}$	3·0	3·0	3·0	A
Peak anode current	$i_{a(pk)}$	2·0	2·0	2·0	A
Peak grid current	$i_{g(pk)}$	1·0	1·0	1·0	A
Anode dissipation	P_a	630	640	650	W
Grid drive power		60	85	85	W
Grid dissipation	P_g	28	38	30	W
Anode efficiency		75	78	80	%
Power output (amplifier)	P_{out}	1·8	2·3	2·65	kW
Power output (oscillator) at 100% transfer efficiency	P_{out}	1·7	2·2	2·6	kW
Power output (oscillator) at 85% transfer efficiency	P_{out}	1·5	1·9	2·2	kW

TYPICAL OPERATION—Maximum operating conditions
Class C—single-phase full-wave rectified (no smoothing).

		Mean	R.M.S.	Peak	
Anode voltage	V_a	3·8	4·25	6·0	kV
Bias voltage	V_g	−140			V
Positive grid voltage	V_{sig}	184			V
Grid resistor	R_g	1·6			kΩ
Mean anode current	$I_{a(av)}$	460			mA
Mean grid current	$I_{g(av)}$	89			mA
Peak cathode current	$i_{k(pk)}$	1·9	2·1	3·0	A
Peak anode current	$i_{a(pk)}$	1·4			A
Peak grid current	$i_{g(pk)}$	0·5			A
Anode dissipation	P_a	650			W
Grid drive power		23			W
Grid dissipation	P_g	7			W
Anode efficiency		70			%
Power output (amplifier)	P_{out}	1·5			kW
Power output (oscillator) at 100% transfer efficiency	P_{out}	1·5			kW
Power output (oscillator) at 85% transfer efficiency	P_{out}	1·3			kW

MOUNTING POSITION—Vertical, anode upwards

ANODE—External

BASE—Special

OPERATING INSTRUCTIONS

Installation

This valve should be mounted vertically with anode upwards. Connections should always make good electrical contact to prevent overheating of pins and seals, particularly by r.f. currents.

It is essential that connection be made to both grid pins when running at high frequencies, to reduce current taken by each pin.

The valve must be protected against excessive vibration and shock.

Cooling

Water cooling is required for all conditions of service including filament dissipation alone.

The minimum water flow for maximum output is 1 litre/min. The hose connecting the water supply to the valve should not be less than 20 ft long, this also applies to the return hose. Lengths shorter than 20 ft. will result in loss of power.

Cold water should be fed into the lower end of the copper spiral and the outlet temperature from the top of the spiral must not exceed 60°C.

A low velocity air blast directed on filament and grid pins is recommended when running at full power at the higher frequencies.

Operation

The operating data, list conditions for maximum output for respective classes of service at the relevant anode voltage.

Linear interpolation between anode voltage steps is admissible. As these conditions utilize some or all of the maximum valve ratings, close control of conditions has to be maintained.

In Class C Self Oscillator service precautions should be taken against excessive mains voltage variation. Current overload trips should be included in anode and grid circuits as well as an under current trip in the grid circuit.

In industrial r.f. heating it is not usual that all precautions can be taken, and under these conditions, some reductions in operating conditions have to be made so that widely fluctuating loads, poor h.t. regulation and mains variations can be accommodated. Each type of variation brings its own problems and no set rules are practicable.

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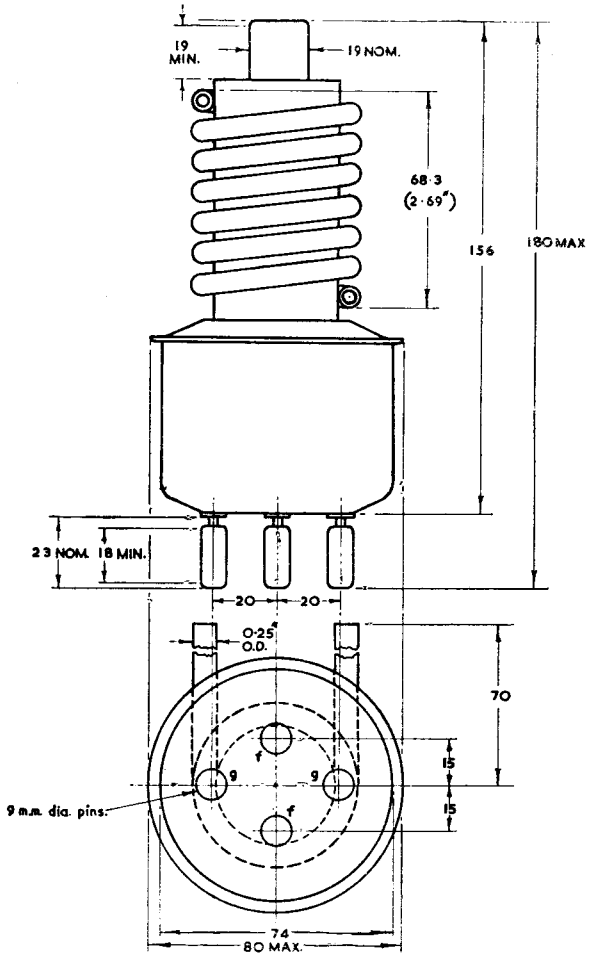
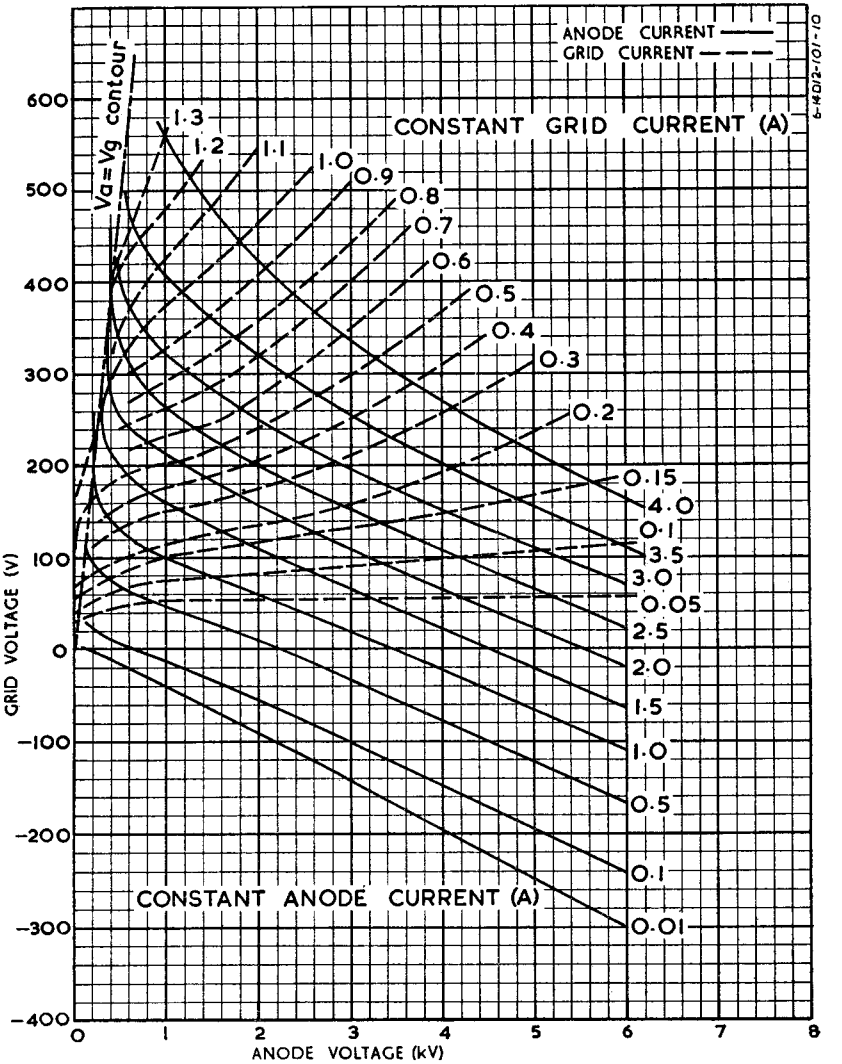


All dimensions in millimetres unless otherwise shown.

CONSTANT CURRENT CHARACTERISTICS



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WATER FLOW/DISSIPATION CHART