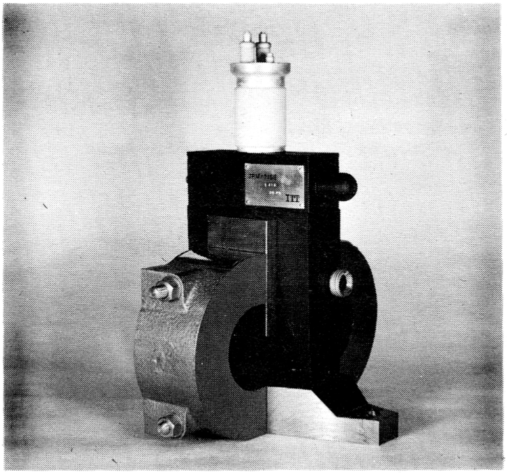
MAGNETICALLY-BEAMED INDUSTRIAL TRIODE

Code: 3RM/215G



DESCRIPTION

This new device employs the field of a permanent magnet to guide the electron flow from cathode to anode.

A controlling electrode, designated 'gate', replaces the conventional wound grid with its attendant problems of emission and distortion. The gate, which is of solid and robust construction, is used to modulate the flow of electrons, and is positioned so that very few electrons are intercepted by it.

As the gate dissipation is negligible, the gain of the tube is very high (approximately 30dB), and the driving power required for full output is low compared with that for a conventional triode. However, the drive voltage is as high as with a conventional triode, ensuring as good a rejection of spurious drive signals.

The relatively high impedance of the gate circuit allows the use of additional components of moderate power ratings for power control or switching in this circuit.

The tube may be used with advantage in r.f. amplifiers, oscillators and r.f. heating applications. The efficiency is good at low anode voltage as well as at higher levels.

ITT Components Group Europe
Standard Telephones and Cables Limited
Valve Product Division, Brixham Road, Paignton, Devon
Telephone: Paignton 50762 (STD Code 0803) Telex: 42830

ITT
COMPONENTS

A particular feature of the tube when used for r.f. heating is its ability to withstand interruption of oscillation resulting from circuit or loading faults; this is because the anode dissipation at full h.t. and zero bias is well within the tube rating at anode voltages up to 4kV.

High efficiency operation at low anode voltage is obtained because of the low anode bottoming potential, whilst the overall efficiency of the tube is enhanced by the lower heating power associated with the matrix type cathode.

The construction of the whole tube is very robust and the breakage and distortion hazards encountered in high temperature filamentary emitters are eliminated.

Anode cooling is effected by means of a newly developed integral, low pressure drop, transverse flow water jacket. Base cooling is not required at operating frequencies below 1MHz.

CATHODE

Indirectly heated, matrix type

HEATER

Heater voltage	12,5	V
Heater current	12	A

CHARACTERISTICS

Amplification factor	42	
Mutual conductance	40	mA/V

DIRECT INTERELECTRODE CAPACITANCES

Gate to anode	55	pF
Gate to cathode	63	pF
Anode to cathode (gate earthed)	6,8	pF

MECHANICAL DATA

Dimensions Connection detail	As shown in Figure 4
Magnet	A recommended permanent magnet, the outline of which is shown in Figure 4 can be supplied as an additional accessory.
Mounting position	Unrestricted
Weight of valve, approx.	10 lb 7 oz 4,75 kg

COOLING REQUIREMENTS

For an anode dissipation of 10kW, a water flow of 1,5 gal/min (6,8 l/min) is required. No other cooling is required at operating frequencies below 1MHz. At higher frequencies forced-air cooling of the seals may be necessary to keep their temperatures within the maximum rating of 220^{o}C.

LIMIT RATINGS AND TYPICAL OPERATING CONDITIONS

CLASS C. INDUSTRIAL HEATING OSCILLATOR

Limit Ratings

Maximum direct anode voltage (peak value of direct voltage plus ripple)	6,5	kV
Maximum direct anode voltage for fail-safe if oscillation ceases	4	kV
Maximum peak cathode current	24	A
Maximum direct anode current	5,5	A
Maximum direct anode dissipation (continuous)	8	kW
Maximum direct gate voltage	-750	V
Maximum frequency for above ratings	10	MHz

Typical Operating Conditions (Measured in induction heating generator)

Direct anode voltage*	2,5	3,0	4,0	5,0	6,0	6,0	kV
Direct gate voltage	-470	-440	-445	-415	-520	-500	V
Direct anode current	4,49	5,02	5,15	5,25	5,2	2,7	A
Peak r.f. gate voltage	1 007	1 004	987	947	1 107	870	V
Direct gate current							
on load	90	85	86	80	100	16	mA
off load	170	160	160	150	180	30	mA
Gate bias resistor	5,2	5,2	5,2	5,2	5,2	33	kΩ
Gate dissipation	48,5	48	46,5	42,5	58,7	6	W
Power input	11,2	15	20,6	26,25	31,2	16,2	kW
Anode dissipation	4,1	5,30	6,3	7,25	8,0	3,2	kW
Power output (oscillator)	7,1	9,7	14,3	19,0	23,2	13	kW
Power into load at 90% transfer efficiency	6,4	8,75	12,9	17,1	20,9	11,7	kW

* In the event of cessation of oscillation the valve remains within P_a limit at $V_g = 0$, $V_a \not> 4kV$.

Fig. 1. Typical Anode Current and Gate Current versus Anode Voltage

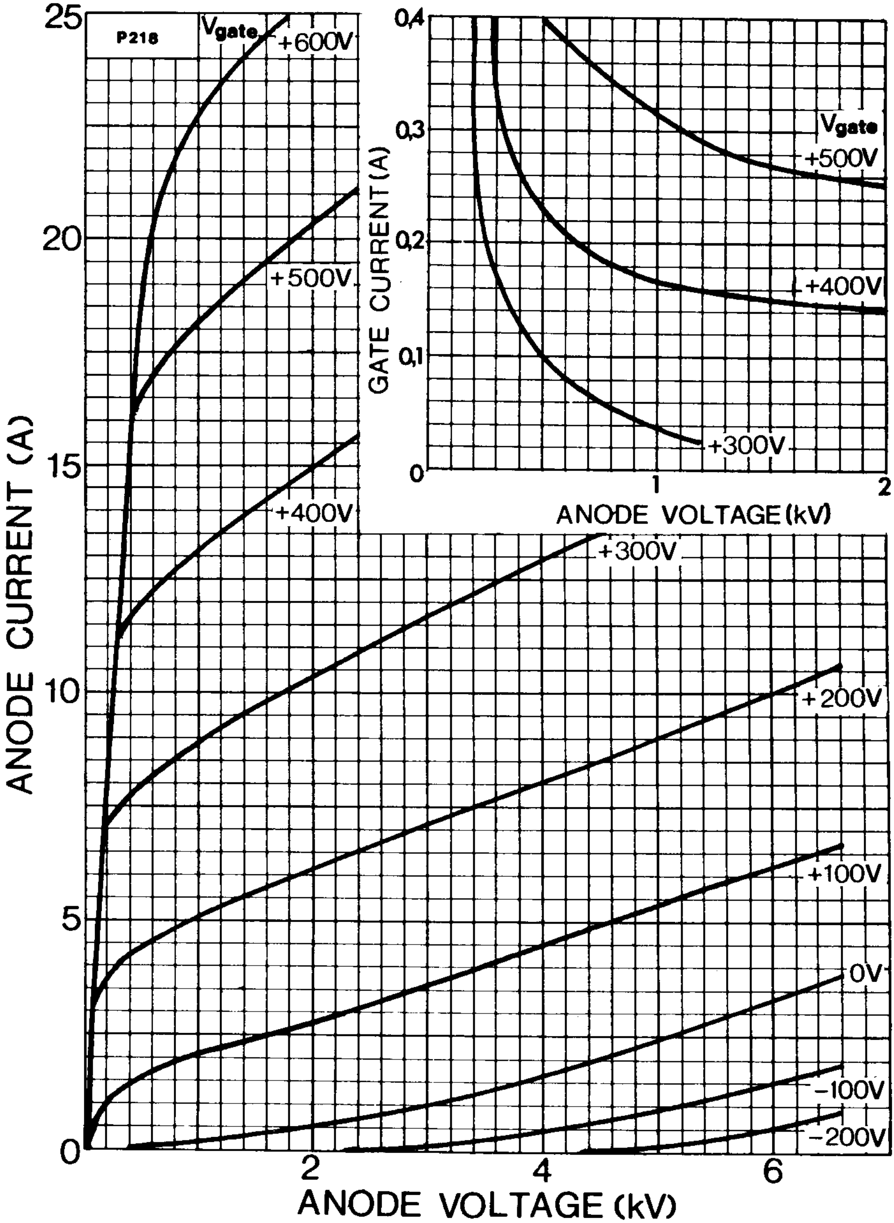


Fig. 2. Typical Constant Current Characteristics

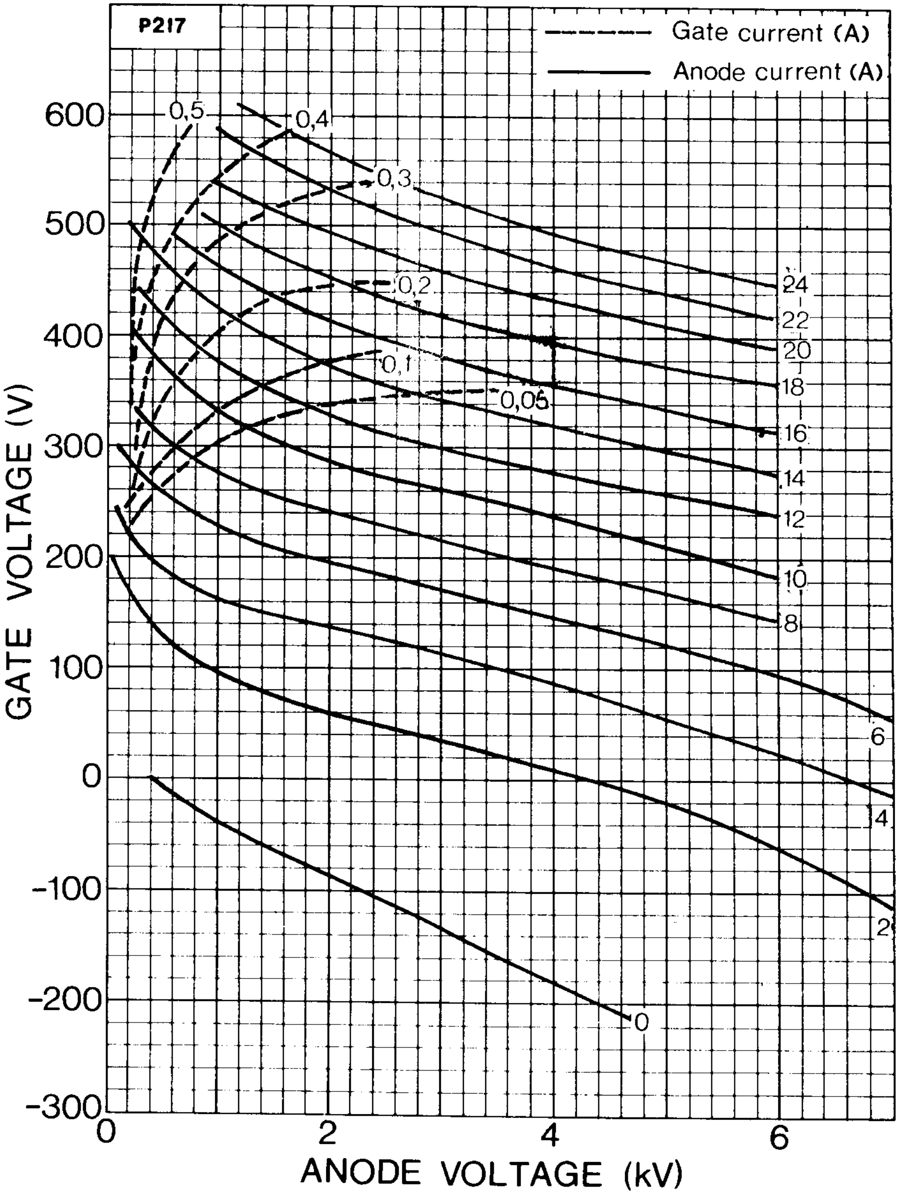


Fig. 3. Typical Anode Current versus Gate Voltage

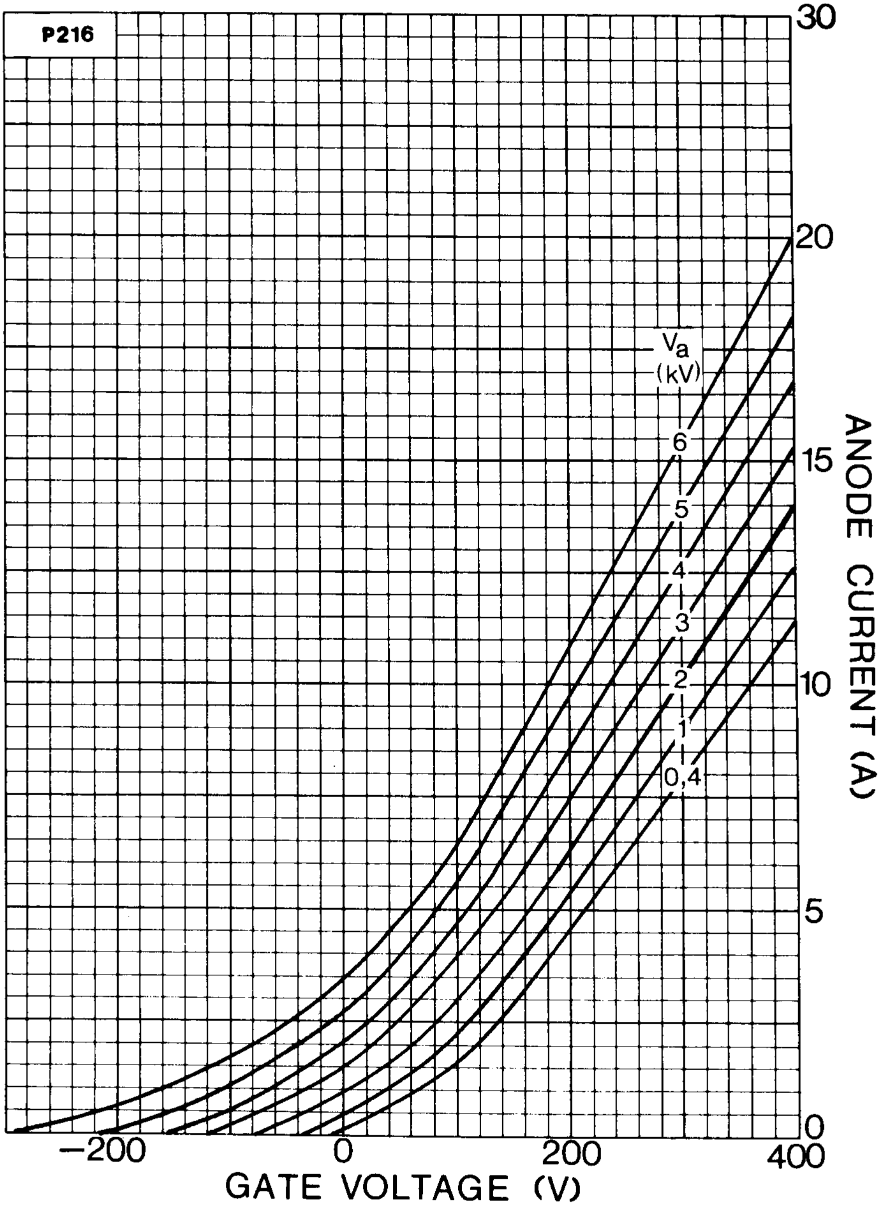
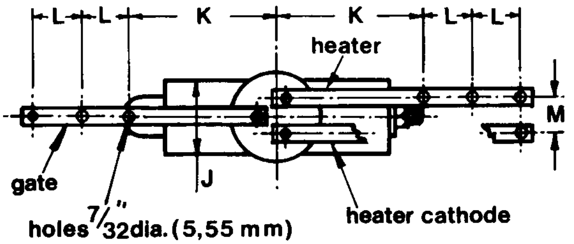
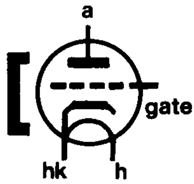
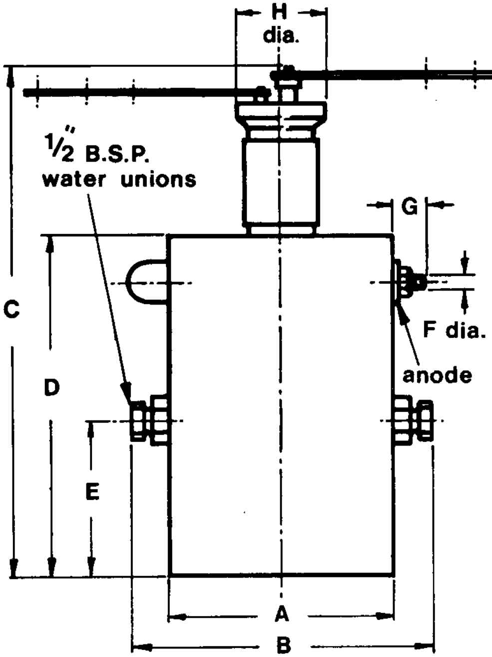


Fig. 4. Tube Outline

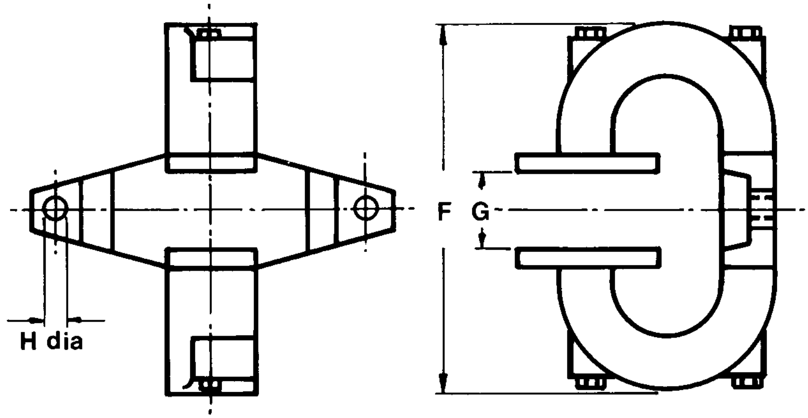


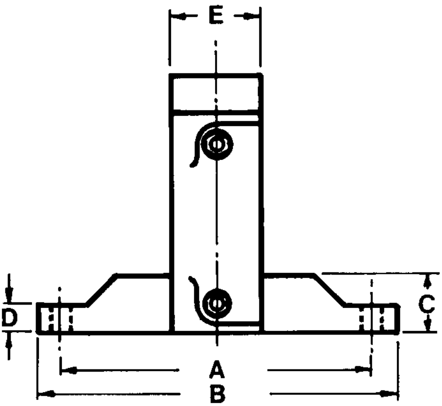




dim.	mm.	ins.
A	117,5 max.	4·625 max.
B	162 max.	6 3/8 max.
C	273 max.	10 3/4 max.
D	177,8 ± 0,8	7 ± 1/32
E	81 approx.	3 3/16 approx.
F	7,94	5/16
G	16 approx.	5/8 approx.
H	45,72 ± 0,8	1·80 ± 0·03
J	43 max.	1 11/16 max.
K	76 approx.	3 approx.
L	25,4 approx.	1 approx.
M	18,7 ± 0,4	0·736 ± 0·015

Fig. 5. Magnet Outline





dim	mm	ins
A	196,9 ± 0,8	$7\frac{3}{4} \pm \frac{1}{32}$
B	230 approx.	9 approx.
C	38 max.	$1\frac{1}{2}$ max.
D	19 approx.	$\frac{3}{4}$ approx.
E	57 approx.	$2\frac{1}{4}$ approx.
F	238 approx.	$9\frac{3}{8}$ approx.
G	48 approx.	$1\frac{7}{8}$ approx.
H	13,5 ± 0,4	$\frac{17}{32} \pm \frac{1}{64}$