BR/BW/BY1121 Series

R.F. POWER TRIODES

The data should be read in conjunction with the Power Triode Preamble.

ABRIDGED DATA

Five r.f. power triodes intended primarily for industrial service. They differ only in the method of anode cooling and in anode dissipation.

Anode cooling:	
BR1121	forced-air
BW1121	water; separate jacket
BW1121J1	water; integral jacket
BW1121J2	water; integral jacket
BY1121	vapour; separate boiler unit
Anode dissipation:	
BR1121, BW1121, BW1121J1, BW1121J2	15 kW max
BY1121	18 kW max
Anode voltage	10 kV max
Frequency for full ratings	50 MHz max
Output power (class C unmodulated conditions)	50 kW

GENERAL

Electrical

Filament	thoriated tungsten	
Filament voltage (see note 1)	6.6	V
Filament current	230	A
Surge filament current (peak) (see note 2)	600	A max
Filament cold resistance	3.5	mΩ
Peak usable cathode current	45	A
Perveance	2.3	$mA/V^{3/2}$
Amplification factor (V_a = 6.0kV, I_a = 3.0A)	38	
Mutual conductance (V_a = 7.0kV, I_a = 3.0A)	45	mA/V
Inter-electrode capacitances:		
grid to anode	54	pF
grid to filament	85	pF
anode to filament	0.8	pF

Mechanical

Overall dimensions	see outline drawings
Net weight:	
BR1121	35 pounds (16kg) approx
BW1121	10 pounds (4.6kg) approx
BW1121J1, BW1121J2	14½ pounds (6.6kg) approx
BY1121	31 pounds (14.1kg) approx
Mounting position	vertical, filament end up

Accessories

Filament leads	MA131
Grid connector	MA66
Water jacket for BW1121	BW4034
Sealing ring (supplied with BW1121)	MA251
Double boiler unit, integral condenser, for BY1121	BY4032
Single boiler unit, integral condenser, for BY1121	BY4033
Single boiler unit, separate condenser required, for BY1121	BY4063
Sealing ring (supplied with BY1121)	MA246

COOLING

Anode

The BR1121 air cooling requirements are shown on pages 9 and 10. The required air flow should be delivered through the radiator before and during the application of any voltages. Filament power, anode power and air flow may be removed simultaneously.

The anode of the BW1121 must be fitted into a water jacket for cooling, the recommended jacket being type BW4034. Minimum water cooling requirements for the BW1121 in a BW4034 water jacket are shown on page 11. The rates of flow given apply to valves with clean anode surfaces; higher values should be used where possible.

Types BW1121J1 and BW1121J2 have integral water jackets and differ only in the location of the water inlet and outlet connectors (see outline drawings, pages 14 and 15). Minimum water cooling requirements are shown on page 11; higher rates of flow should be used where possible.

The BY1121 is vapour cooled and may be operated either singly in boiler unit BY4033 or BY4063, or in pairs in boiler unit BY4032. In BY4032 and BY4033, the steam generated by the anode is condensed by means of an internal water cooled condenser. The steam produced in BY4063 is led away by suitably insulated tubing for condensation at some convenient point external to the boiler unit.

Filament and Grid Seals

The temperature of the filament and grid seals must not exceed 140°C. A flow of air of 20 to 30ft^3/min (0.57 to 0.85m^3/min) directed into the filament header via a 1-inch (25mm approx) diameter nozzle before and during the application of any voltages is usually adequate for limiting the temperatures of the seals.

Anode Seal and Bulb

The anode seal and bulb temperatures must not exceed 180°C.

R.F. POWER AMPLIFIER AND OSCILLATOR

(Class C unmodulated conditions, one valve)

MAXIMUM RATINGS (Absolute values)

Anode voltage (see note 3)	10	kV max
Anode current	6.5	A max
Anode dissipation:		
BR1121, BW1121, BW1121J1, BW1121J2	15	kW max
BY1121	18	kW max
Grid dissipation	1.0	kW max
Frequency (for full ratings)	50	MHz max

TYPICAL OPERATING CONDITIONS

Anode voltage	8.0	10	kV
Grid voltage	−420	−470	V
from grid resistor	510	746	Ω
Peak r.f. grid drive voltage	890	930	V
Anode current	6.4	6.4	A
Grid current (approx)	0.82	0.63	A
Anode dissipation	11.2	13	kW
Grid dissipation	386	290	W
Driving power	730	585	W
Output power	40	51	kW
Efficiency	78	80	%
Load resistance	665	830	Ω

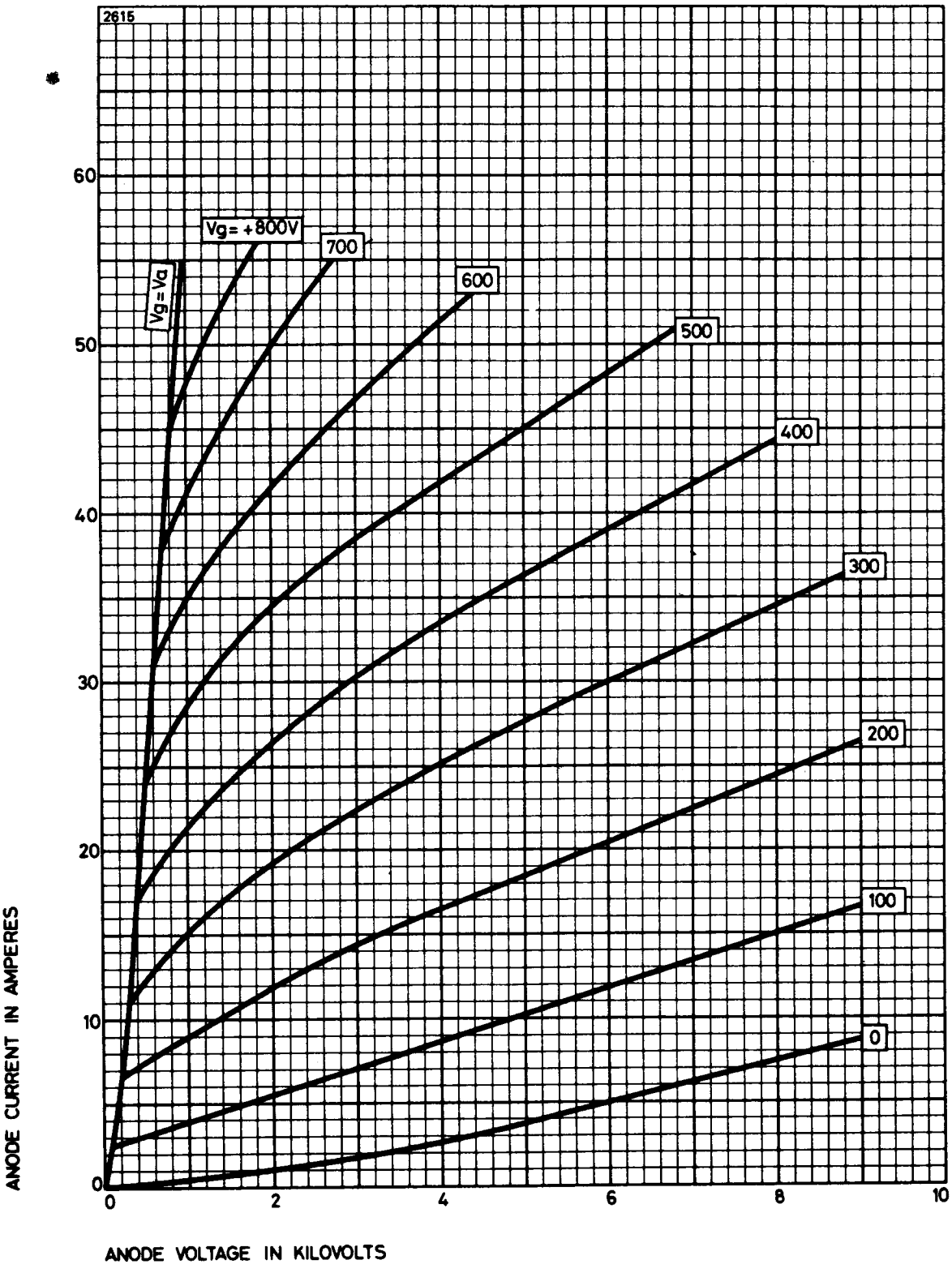
RANGE OF CHARACTERISTICS FOR EQUIPMENT DESIGN

	Min	Max	
Filament current at filament voltage 6.6V	216	244	A
Amplification factor (V_a = 6.0kV, I_a = 3.0A)	33	45	
Mutual conductance (V_a = 7.0kV, I_a = 3.0A)	40	50	mA/V
Grid voltage (negative value) (V_a = 6.0kV, I_a = 0.1A)	—	200	V
Anode current (V_a = 1.5kV, V_g = +600V)	31	40	A
Grid current (V_a = 1.5kV, V_g = +600V)	5.0	8.0	A

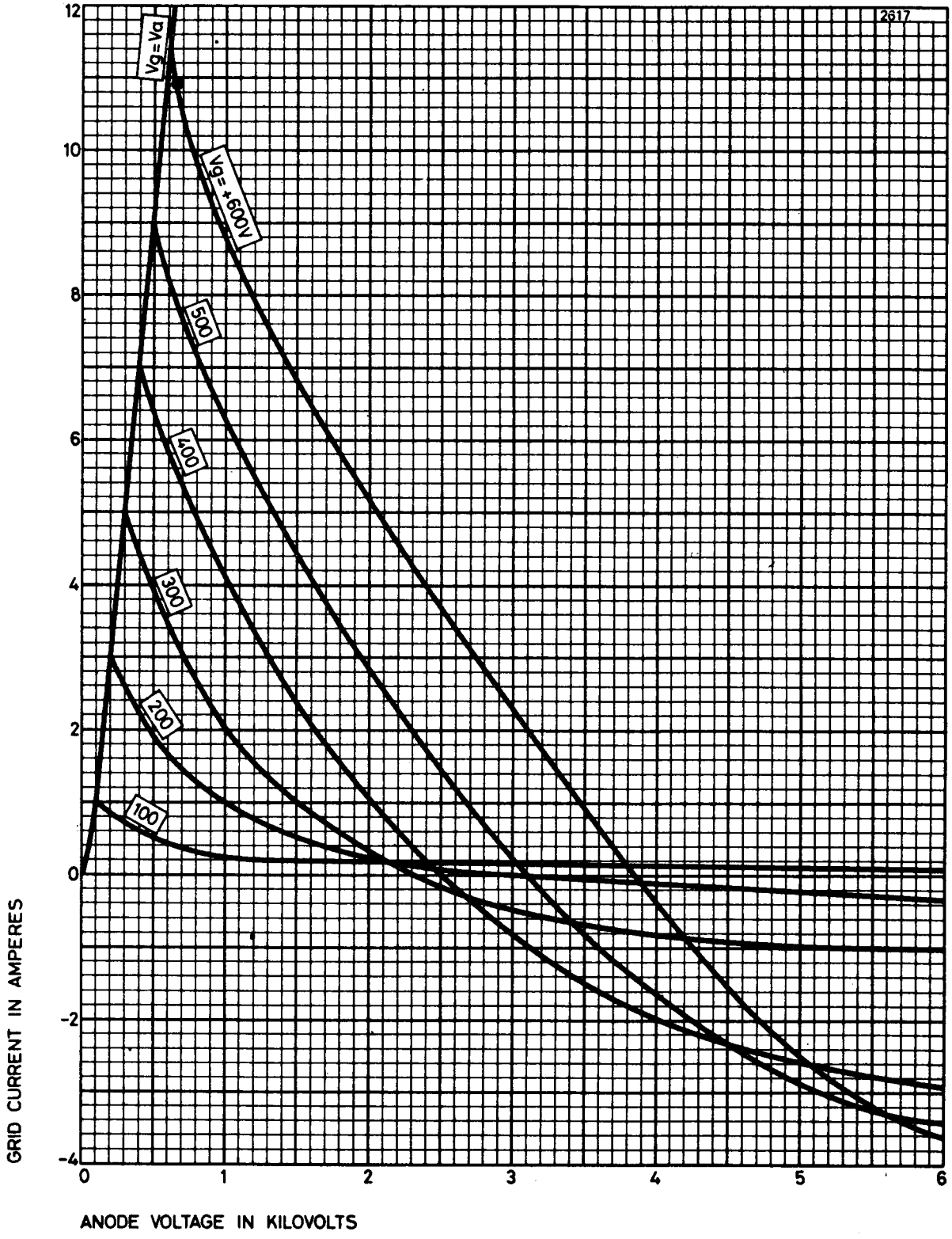
NOTES

1. The valve must be operated at the stated filament voltage. Fluctuation in filament voltage must not exceed ±5%.
2. The filament current must not exceed 600A, even momentarily, at any time.
3. This is the highest nominal operating voltage to be used. It makes allowance for the normal mains voltage fluctuations as well as tolerances in the equipment.
4. The valve can dissipate higher powers for periods up to 15 seconds provided that the average over a long period does not exceed the maximum stated.

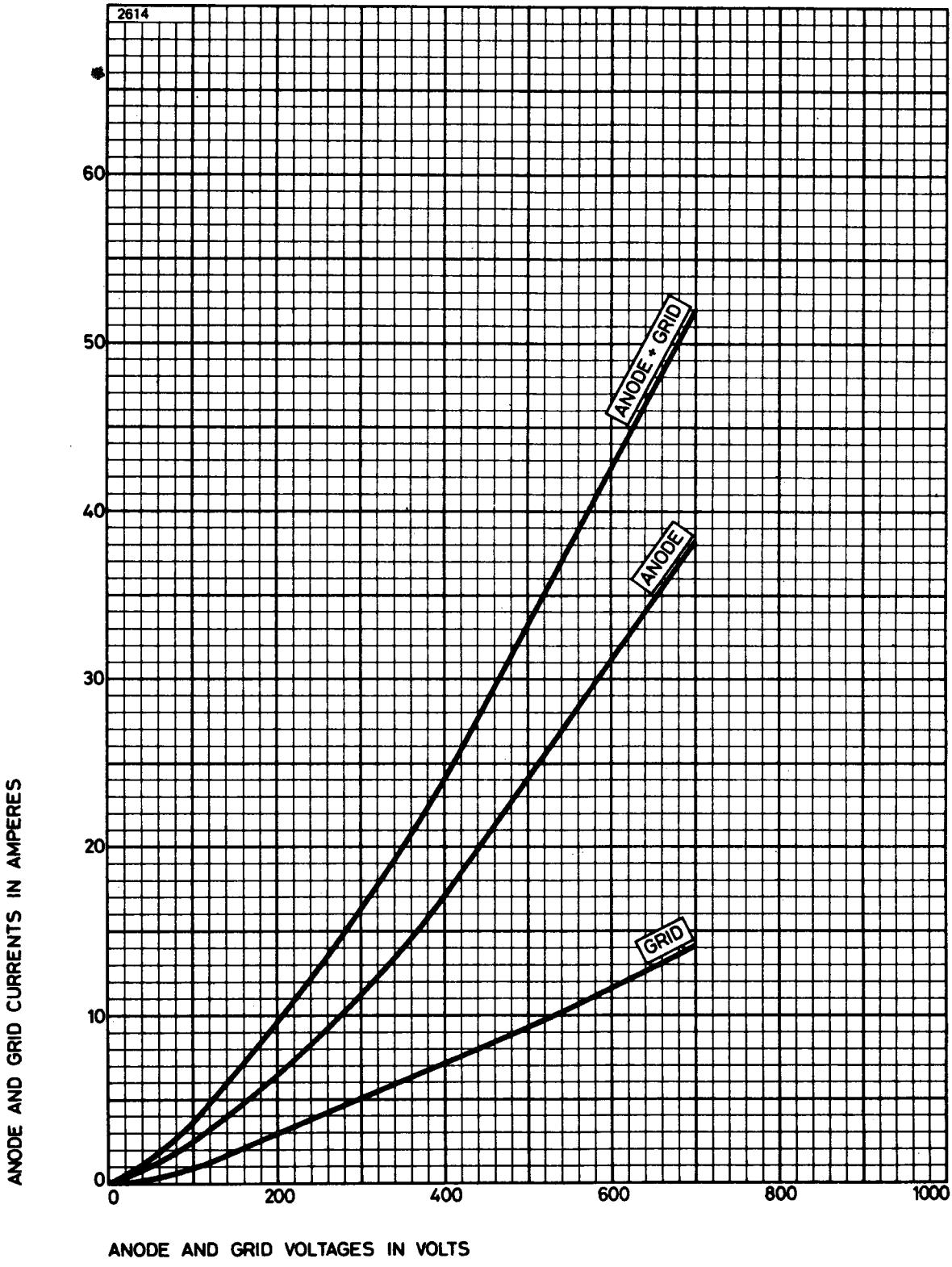
TYPICAL ANODE CHARACTERISTICS



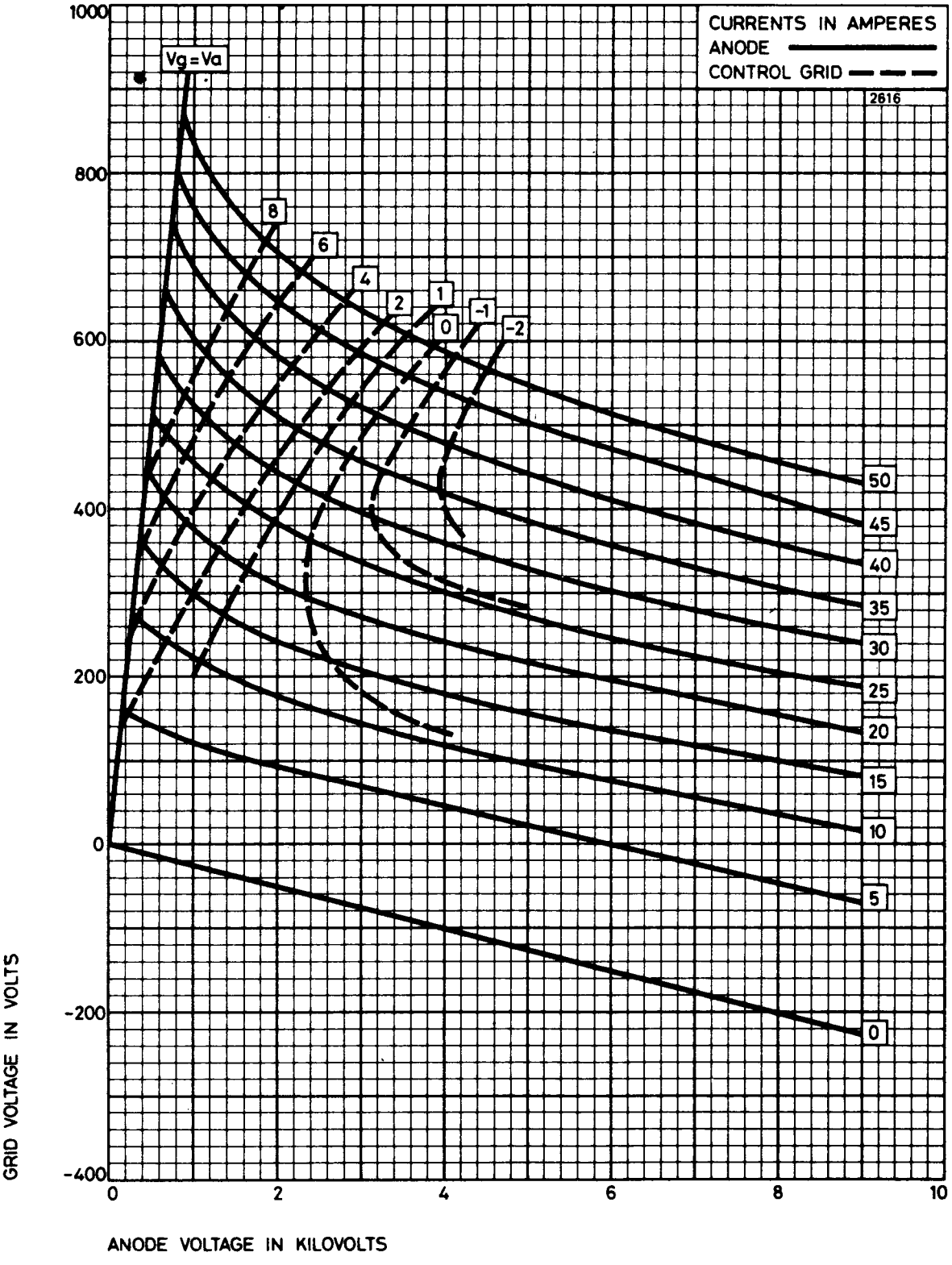
TYPICAL GRID CHARACTERISTICS



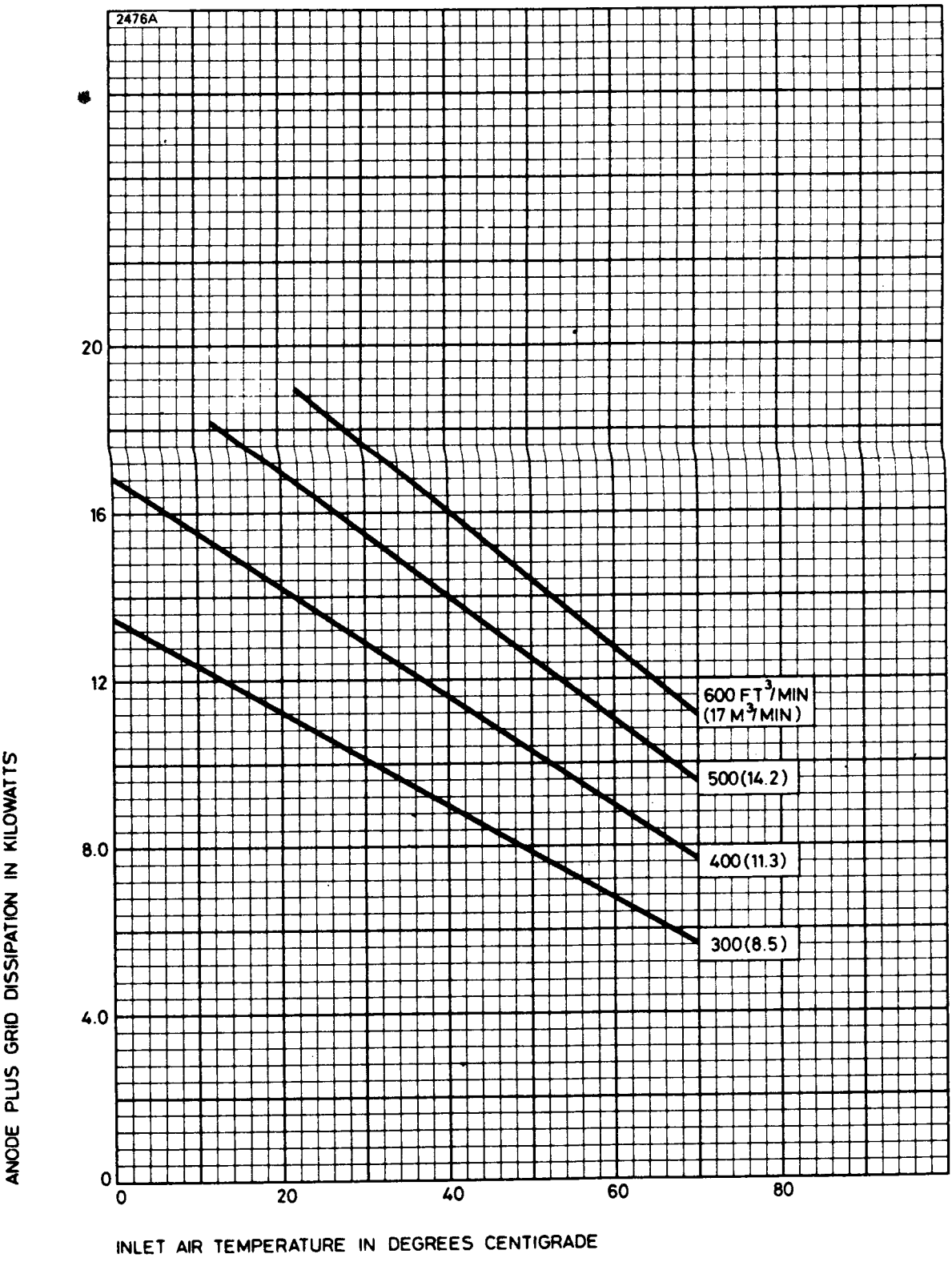
TYPICAL STRAPPED CHARACTERISTICS



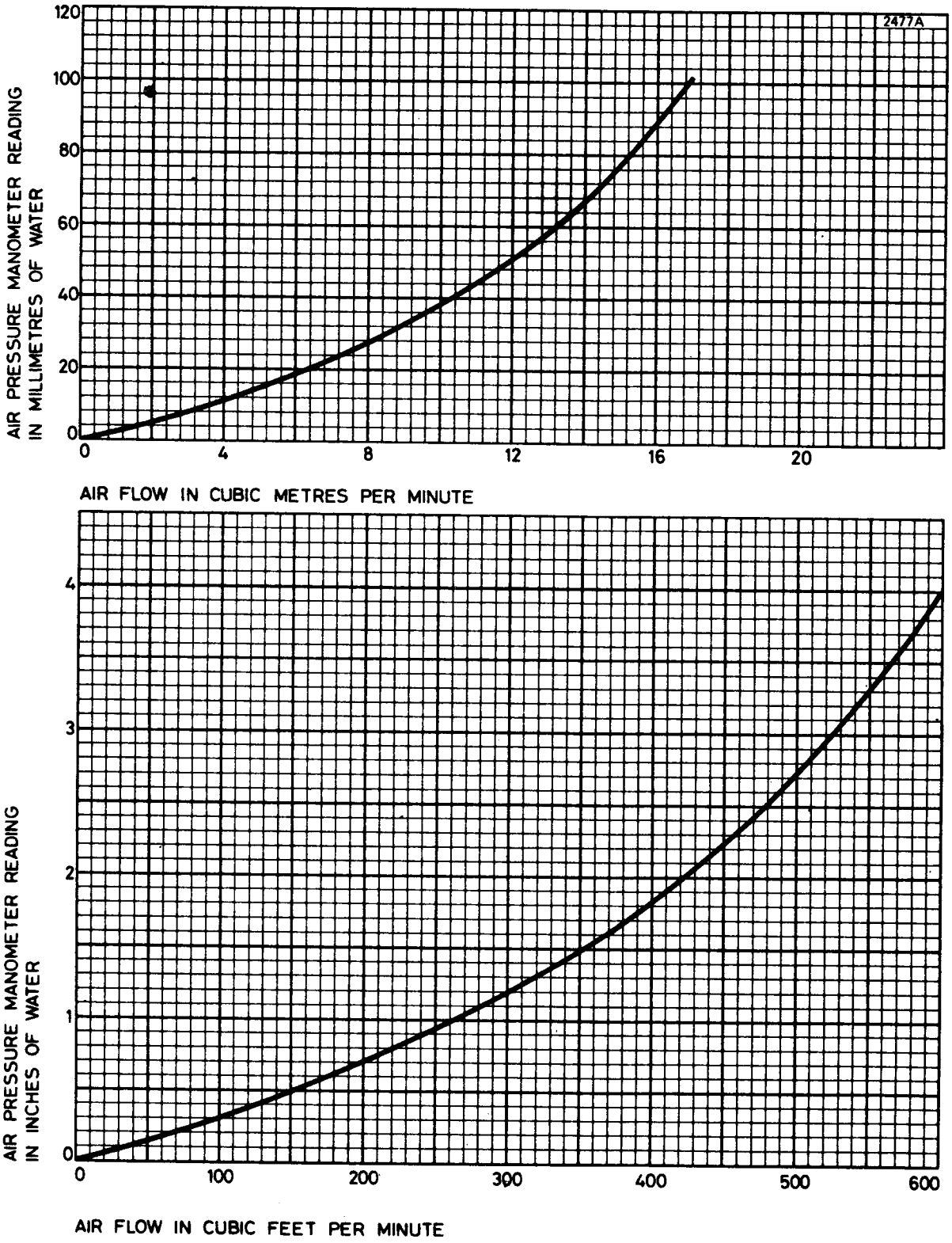
TYPICAL CONSTANT CURRENT CHARACTERISTICS



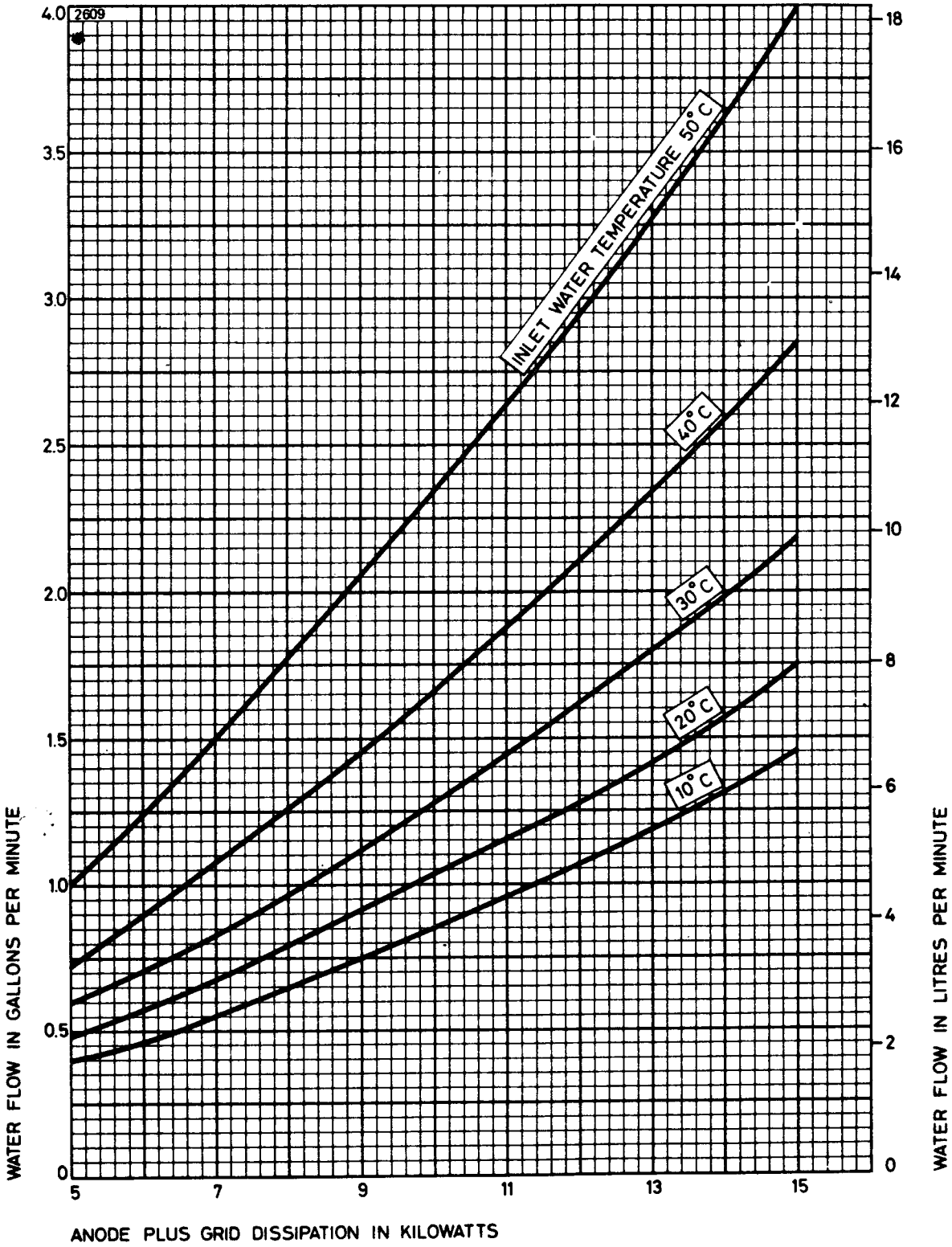
AIR COOLING REQUIREMENTS FOR BR1121



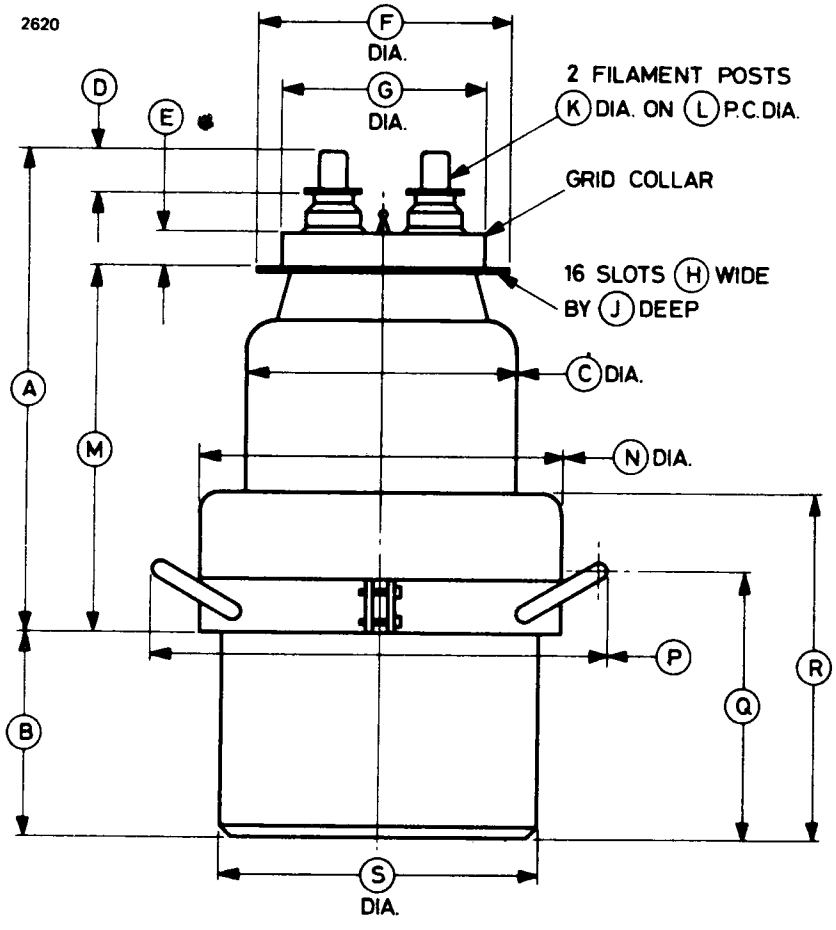
AIR FLOW CHARACTERISTIC FOR BR1121



MINIMUM WATER COOLING REQUIREMENTS FOR BW1121/J1/J2
(Higher rates of flow should be used where possible)



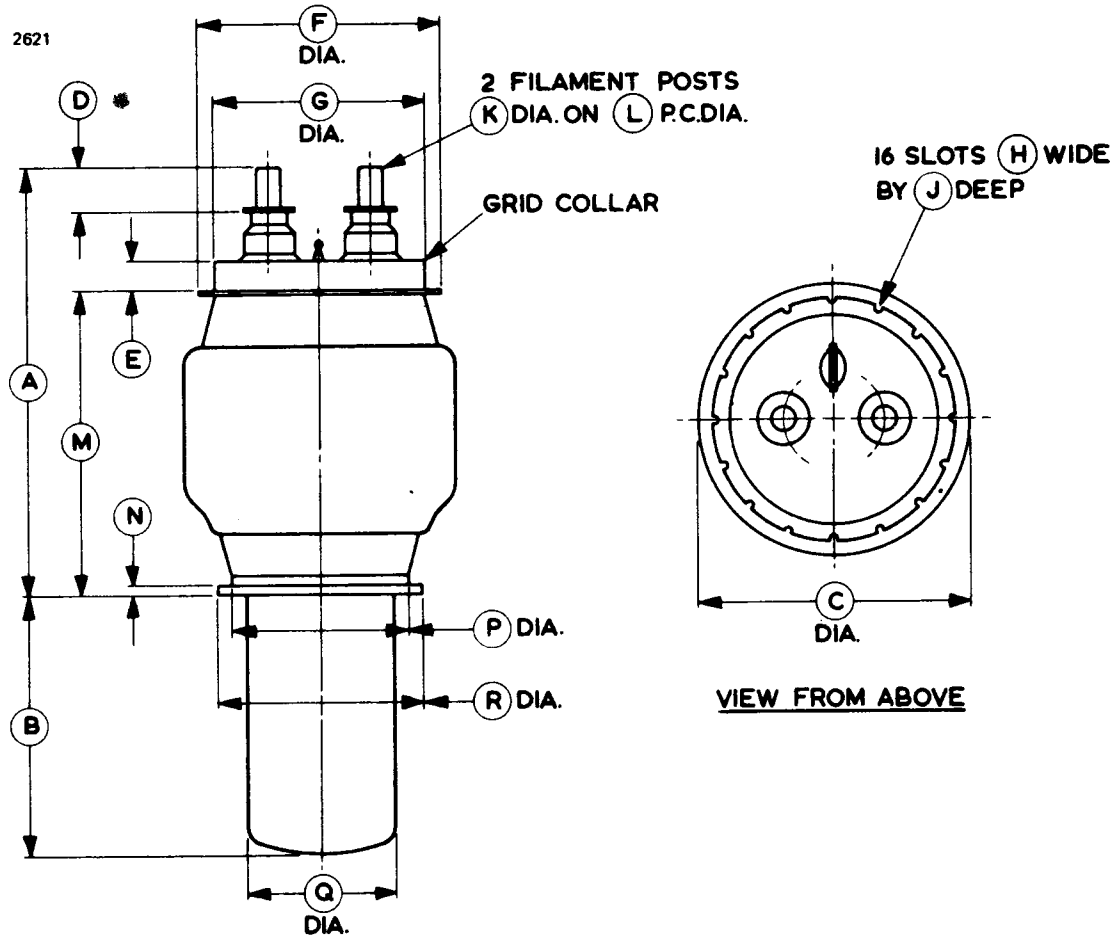
OUTLINE FOR BR1121 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	11.000 max	279.4 max	K	0.625	15.88
B	4.500	114.3	L	2.250	57.15
C	6.000 max	152.4 max	M	8.375 max	212.7 max
D	1.000	25.40	N	8.000 max	203.2 max
E	0.734	18.64	P	10.500 max	266.7 max
F	5.630	143.0	Q	5.937	150.8
G	4.703	119.5	R	7.625	193.7
H	0.153	3.89	S	7.062 max	179.4 max
J	0.205	5.21			

Millimetre dimensions have been derived from inches.

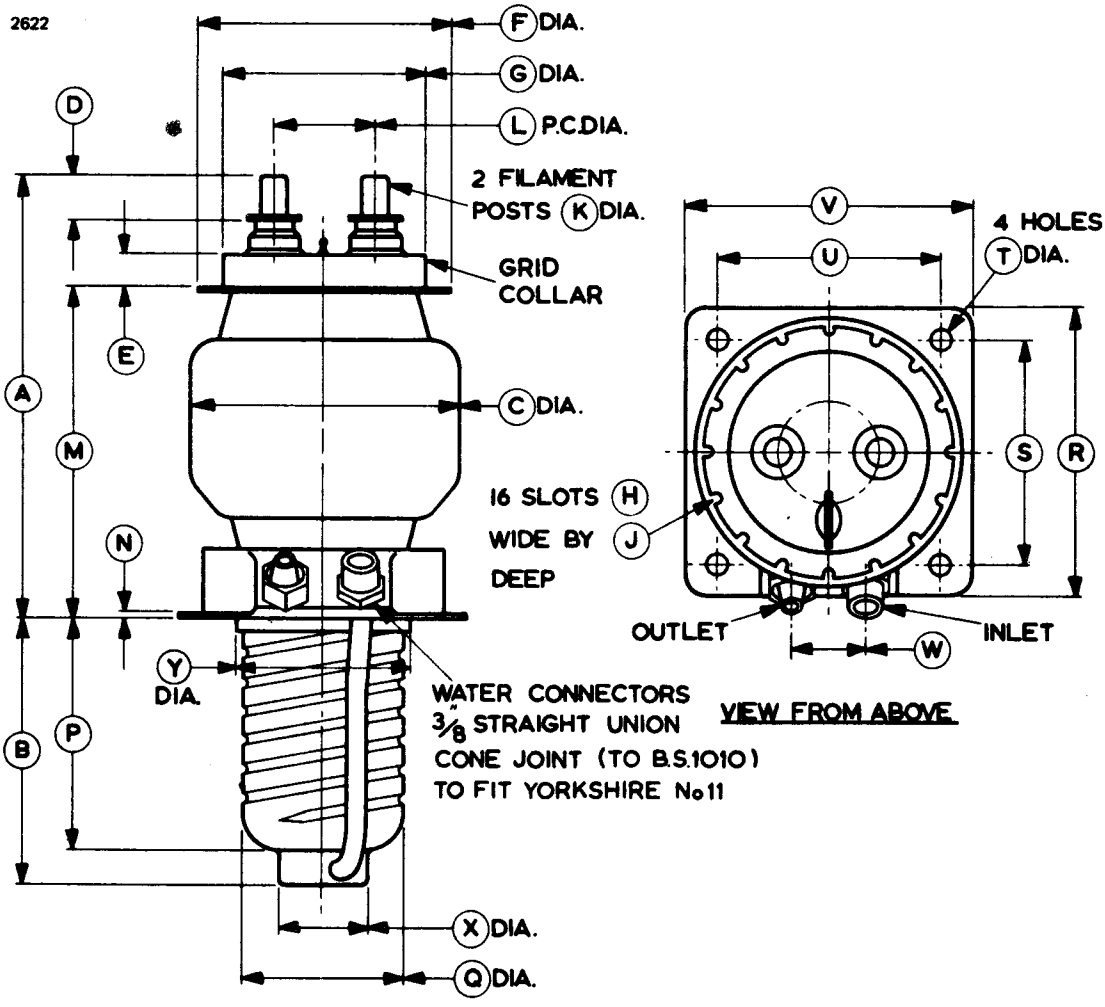
OUTLINE FOR BW1121 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	9.375 max	238.1 max	J	0.205	5.21
B	5.625	142.9	K	0.625	15.88
C	6.000 max	152.4 max	L	2.250	57.15
D	1.000	25.40	M	6.875 max	174.6 max
E	0.734	18.64	N	0.250	6.35
F	5.630	143.0	P	3.875	98.43
G	4.703	119.5	Q	3.250	82.55
H	0.153	3.89	R	4.500	114.3

Millimetre dimensions have been derived from inches.

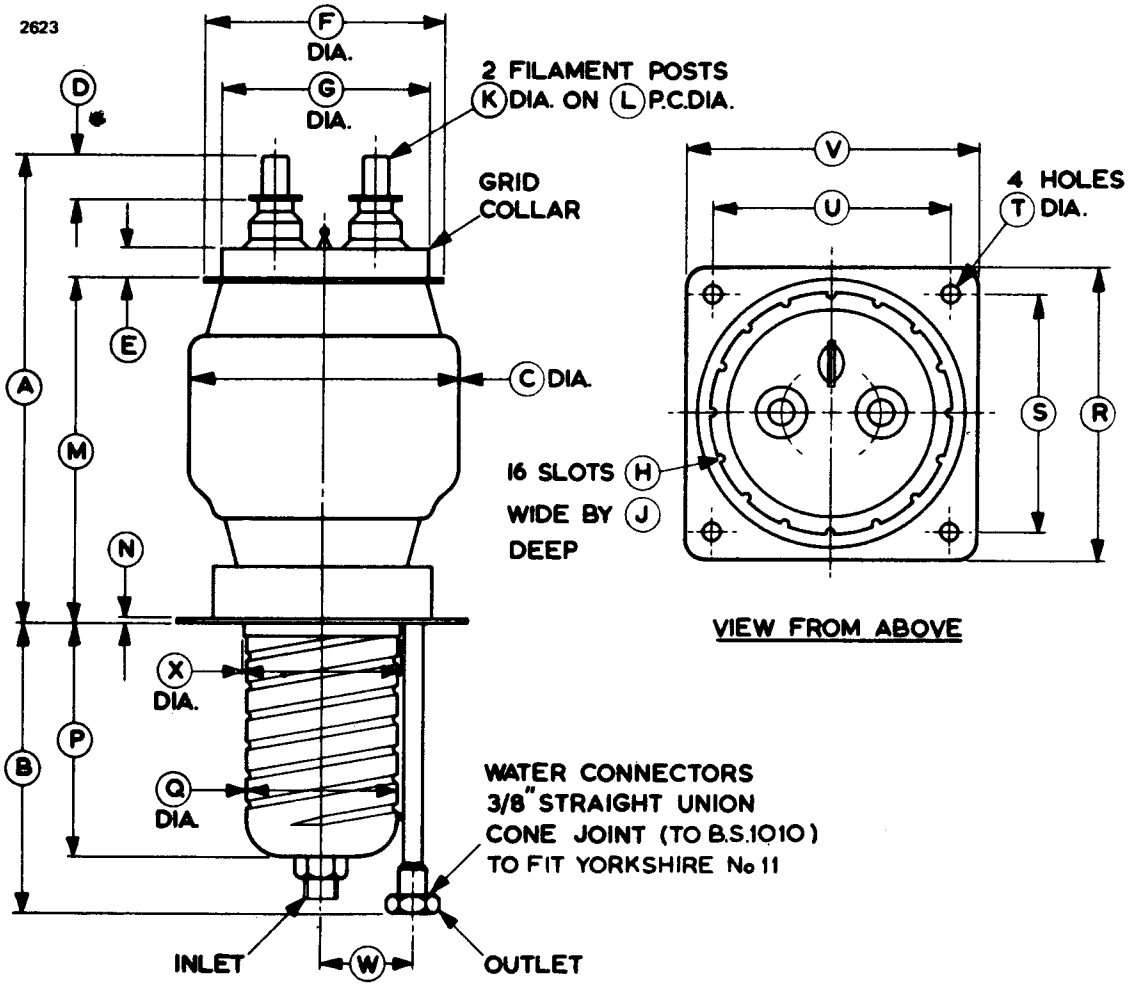
OUTLINE FOR BW1121J1 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	10.250 max	260.4 max	N	0.125	3.18
B	6.250 max	158.8 max	P	5.150	130.8
C	6.000 max	152.4 max	Q	3.562	90.47
D	1.000	25.40	R	6.500	165.1
E	0.734	18.64	S	5.000	127.0
F	5.630	143.0	T	0.375	9.53
G	4.703	119.5	U	5.000	127.0
H	0.153	3.89	V	6.500	165.1
J	0.205	5.21	W	1.250	31.75
K	0.625	15.88	X	2.000	50.80
L	2.250	57.15	Y	4.000 max	101.6 max
M	7.750 max	196.9 max			

Millimetre dimensions have been derived from inches.

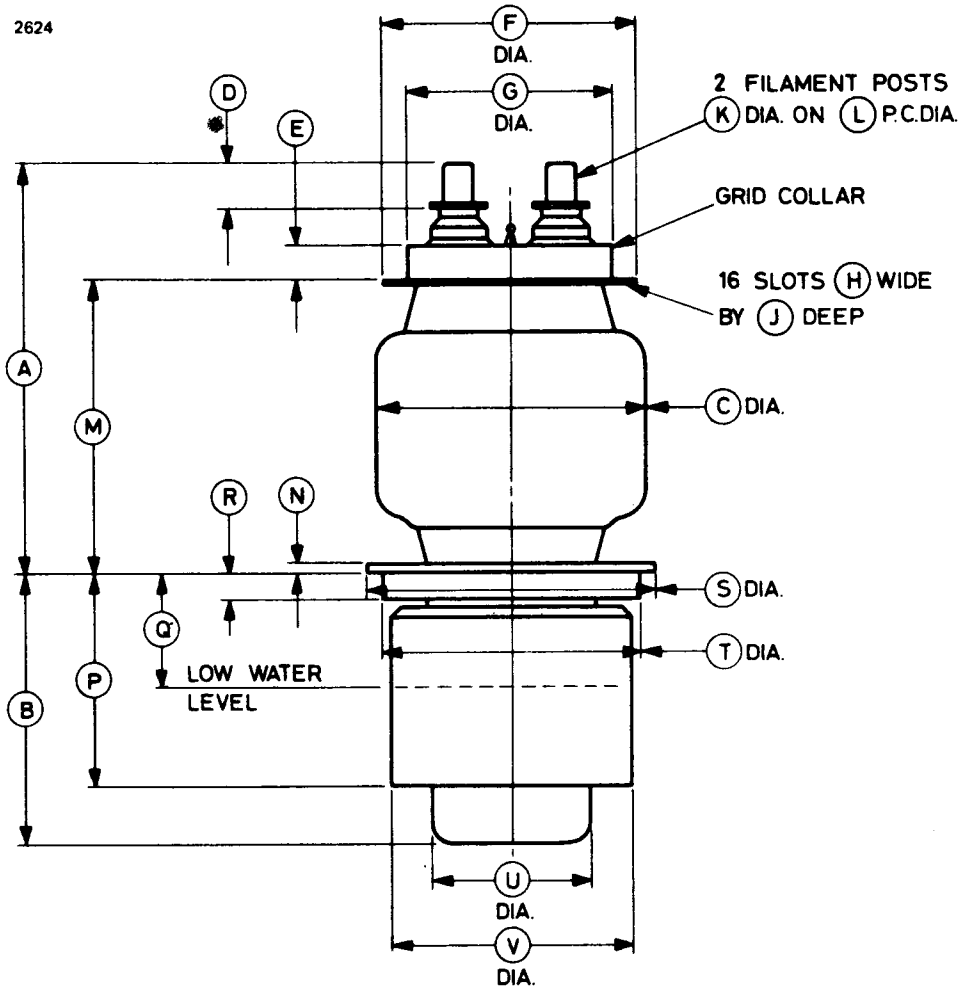
OUTLINE FOR BW1121J2 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	10.250 max	260.4 max	M	7.750 max	196.9 max
B	6.250 max	158.8 max	N	0.125	3.18
C	6.000 max	152.4 max	P	5.240	133.1
D	1.000	25.40	Q	3.562	90.47
E	0.734	18.64	R	6.500	165.1
F	5.630	143.0	S	5.000	127.0
G	4.703	119.5	T	0.375	9.53
H	0.153	3.89	U	5.000	127.0
J	0.205	5.21	V	6.500	165.1
K	0.625	15.88	W	2.170	55.12
L	2.250	57.15	X	4.000 max	101.6 max

Millimetre dimensions have been derived from inches.

OUTLINE FOR BY1121 (All dimensions without limits are nominal)



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	9.250 max	235.0 max	L	2.250	57.15
B	5.937 ± 0.062	150.80 ± 1.57	M	6.750 max	171.5 max
C	6.000 max	152.4 max	N	0.250	6.35
D	1.000	25.40	P	4.687	119.0
E	0.734	18.64	Q	2.500	63.50
F	5.630	143.0	R	0.625	15.88
G	4.703	119.5	S	6.375	161.9
H	0.153	3.89	T	5,750	146.1
J	0.205	5.21	U	3.500	88.90
K	0.625	15.88	V	5.312	134.9

Millimetre dimensions have been derived from inches.