BR/BW/BY1102 Series

R.F. POWER TRIODES

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

ABRIDGED DATA

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

Anode cooling:		
BR1102		forced-air
BW1102		water; separate jacket
BW1102J2		water; integral jacket
BY1102		vapour; separate boiler unit
Anode dissipation:		
BR1102, BW1102, BW1102J2	20	kW max
BY1102	25	kW max
Anode voltage	12	kV max
Frequency for full ratings	50	MHz max
Typical output power (class C unmodulated)	53	kW

GENERAL

Electrical

Filament		thoriated tungsten
Filament voltage (see note 1)	8.2	V
Filament current	230	A
Surge filament current (peak) (see note 2)	600	A max
Filament cold resistance	4.3	mΩ
Peak usable cathode current	45	A
Perveance	1.25	$mA/V^{3/2}$
Amplification factor (V_a = 9.0kV, I_a = 2.0A)	42	
Mutual conductance (V_a = 10kV, I_a = 1.5A)	20	mA/V
Inter-electrode capacitances:		
grid to anode	37	pF
grid to filament	49	pF
anode to filament	0.6	pF

Mechanical

Overall dimensions	see outline drawings
Net weights:	
BR1102	41 pounds (19kg) approx
BW1102	10¼ pounds (4.7kg) approx
BW1102J2	15 pounds (6.8kg) approx
BY1102	41 pounds (19kg) approx
Mounting position	vertical, filament end up

Accessories

Filament leads	MA131
Grid connector	MA66
Water jacket for BW1102	BW4028
Sealing ring (supplied with BW1102)	MA251
Single boiler unit, integral condenser, for BY1102	BY4031
Double boiler unit, integral condenser, for BY1102	BY4030
Sealing ring (supplied with BY1102)	MA246

COOLING

Anode

The BR1102 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 BW1102 must be fitted into a water jacket for cooling, the recommended jacket being type BW4028. A flow of water of 5imp.gal/min (23 l./min) is required; the temperature of the cooling water at the outlet must not exceed 65°C, nor should the temperature rise across the jacket exceed 15°C. Type BW1102J2 has an integral water jacket (see outline drawing, page 14). Minimum water cooling requirements are shown on page 11; higher rates of flow should be used where possible.

The BY1102 is vapour cooled and may be operated either singly in boiler unit BY4031 or in pairs in boiler unit BY4030. In both units, the steam generated by the anode is condensed by means of an internal water cooled condenser.

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 temperature of these 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)	12	kV max
Anode current	7.5	A max
Anode dissipation (see note 4):		
BR1102, BW1102, BW1102J2	20	kW max
BY1102	25	kW max
Grid dissipation	1.0	kW max
Operating frequency (for full ratings)	50	MHz max

TYPICAL OPERATING CONDITIONS

Anode voltage	9.0	12	kV
Grid voltage	−655	−720	V
Grid resistor	625	720	Ω
Peak r.f. grid drive voltage	1455	1520	V
Anode current	5.85	5.85	A
Grid current (approx)	1.05	1.0	A
Anode dissipation	15.6	17.2	kW
Grid dissipation	735	720	W
Output power	37	53	kW
Efficiency	70	75.5	%
Load-resistance	700	1020	Ω

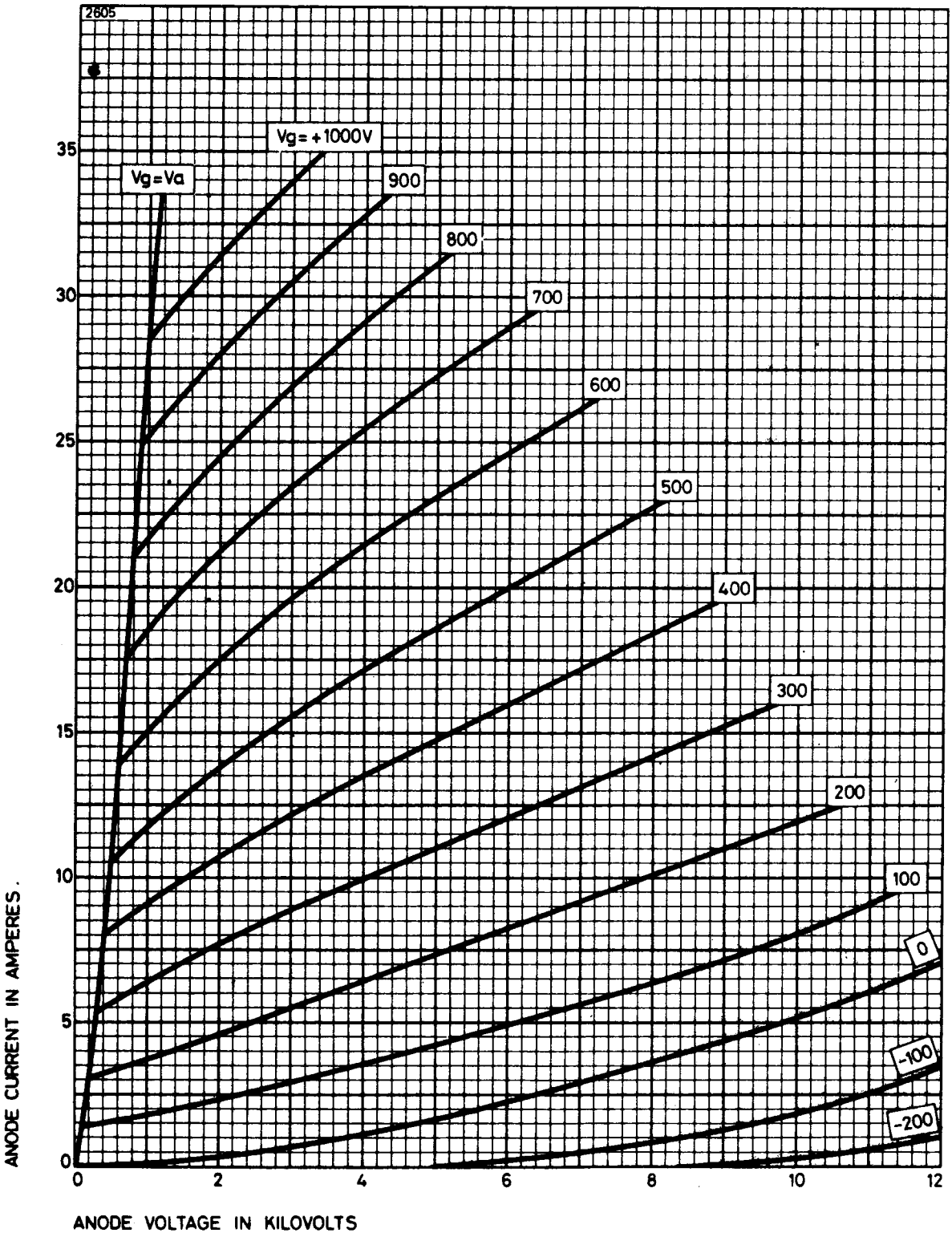
RANGE OF CHARACTERISTICS FOR EQUIPMENT DESIGN

	Min	Max	
Filament current at filament voltage 8.2V	207	253	A
Amplification factor (V_a = 9.0kV, I_a = 2.0A)	35.5	48.5	
Mutual conductance (V_a = 10kV, I_a = 1.5A)	15.5	24.5	mA/V
Grid voltage (negative value) (V_a = 10kV, I_a = 0.1A)	–	340	V
Grid voltage (negative value) (V_a = 10kV, I_a = 2.0A)	95	135	V
Anode current (V_a = 2.0kV, V_g = +250V)	3.8	8.8	A
Grid current (V_a = 2.0kV, V_g = +250V)	0.25	–	A
Anode current (V_a = 4.0kV, V_g = +250V)	6.2	10.4	A
Grid current (V_a = 4.0kV, V_g = +250V)	–0.1	0.5	A
Inter-electrode capacitances:			
grid to anode	32	42	pF
grid to filament	44	54	pF

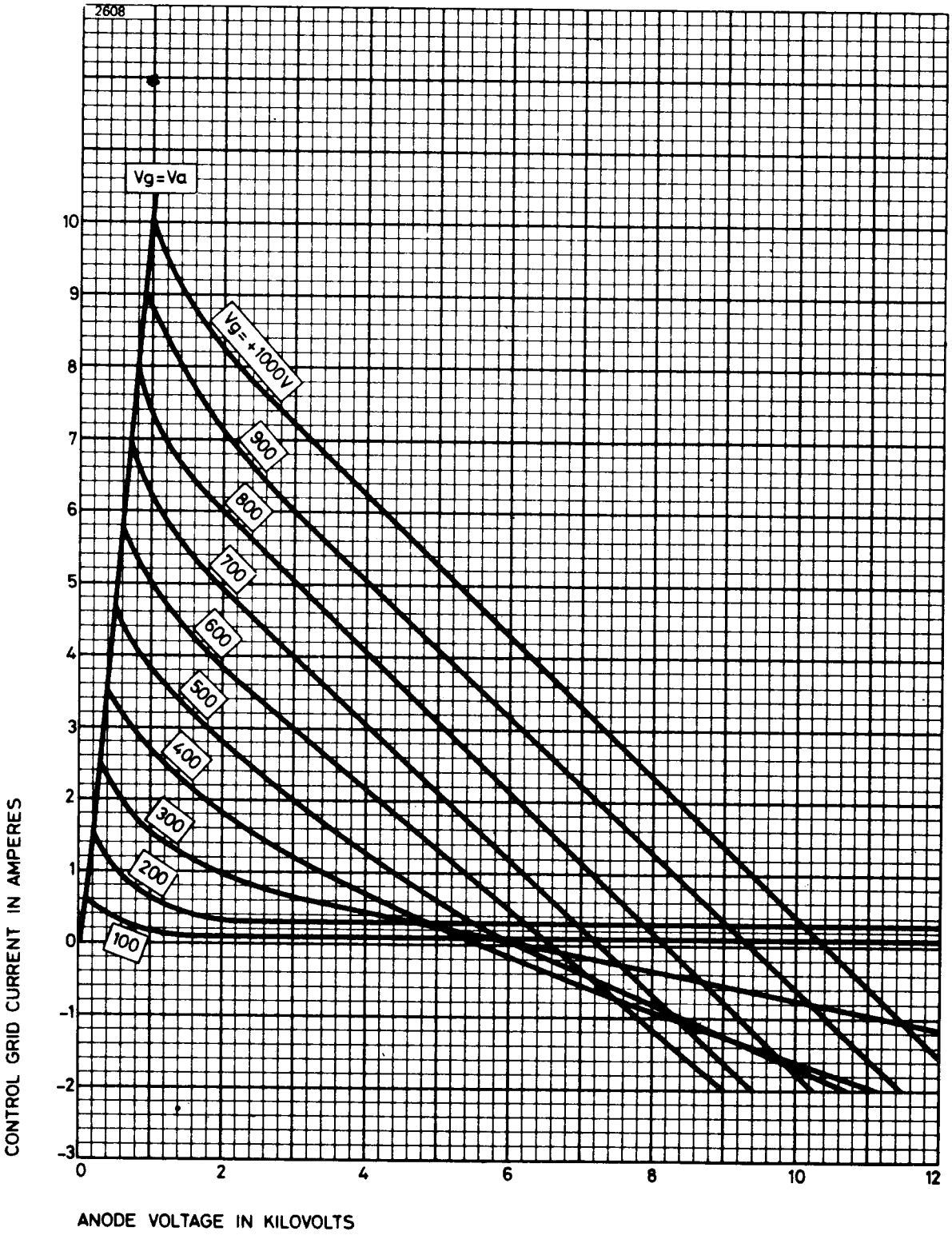
NOTES

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 this value, 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.

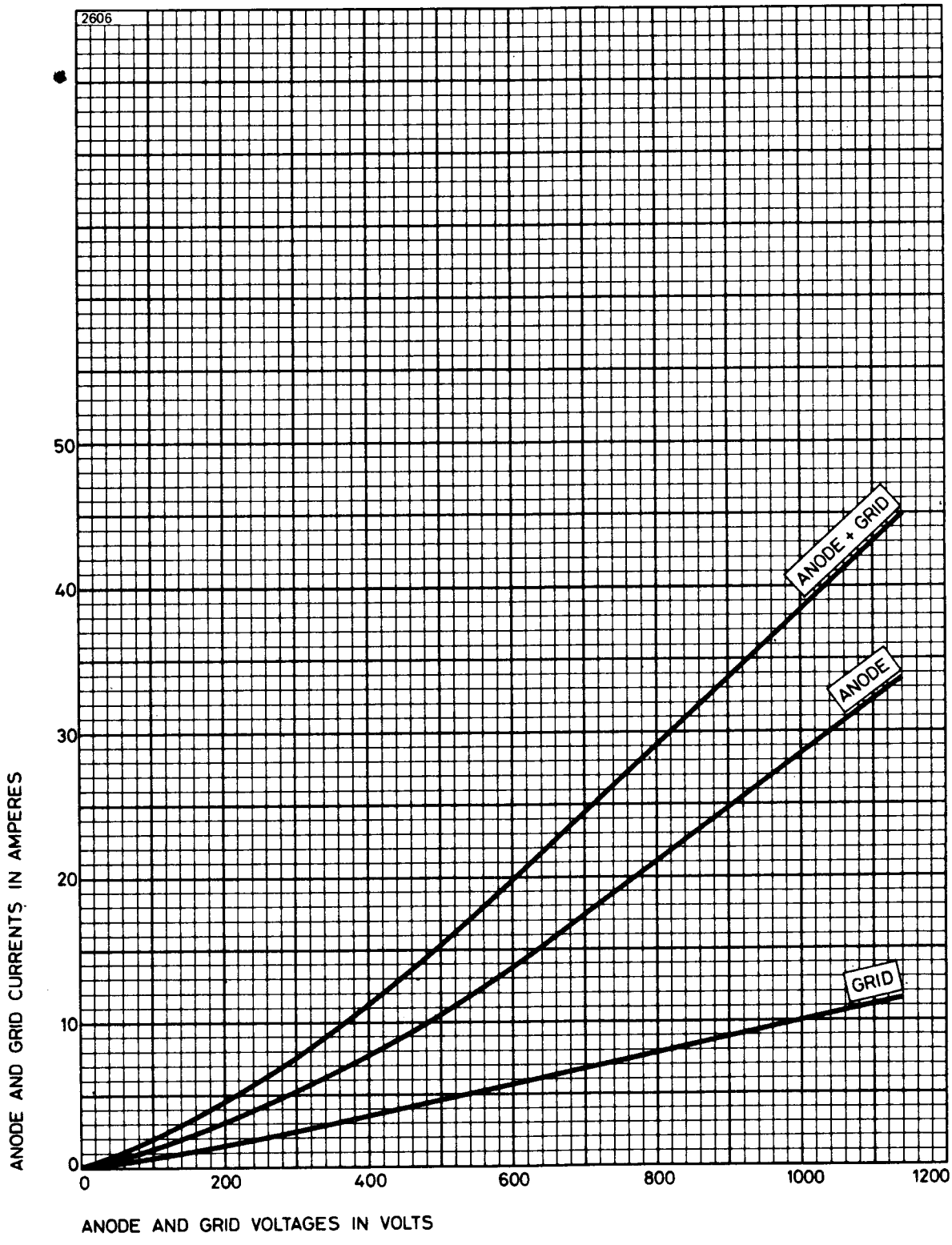
TYPICAL ANODE CHARACTERISTICS



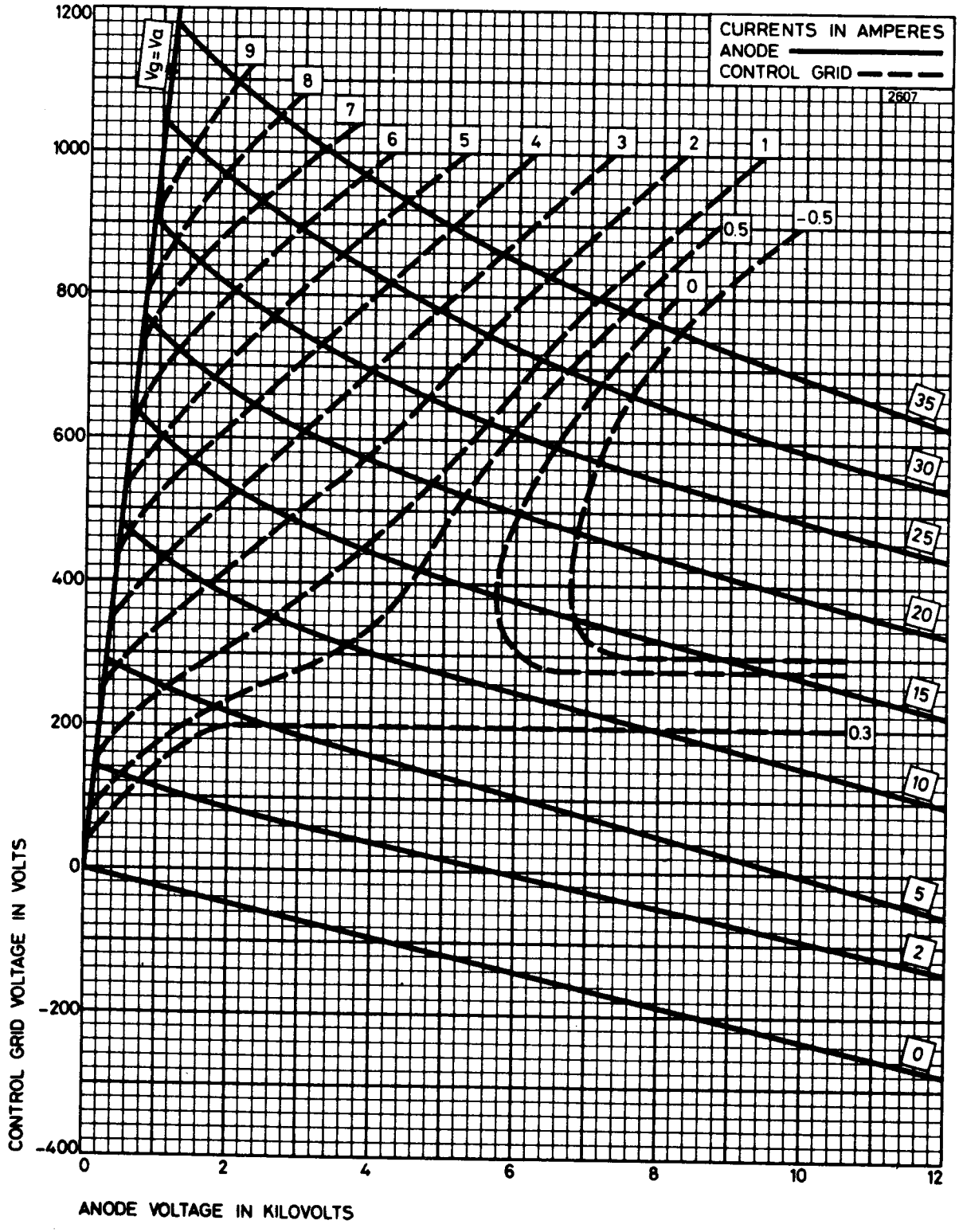
TYPICAL GRID CHARACTERISTICS



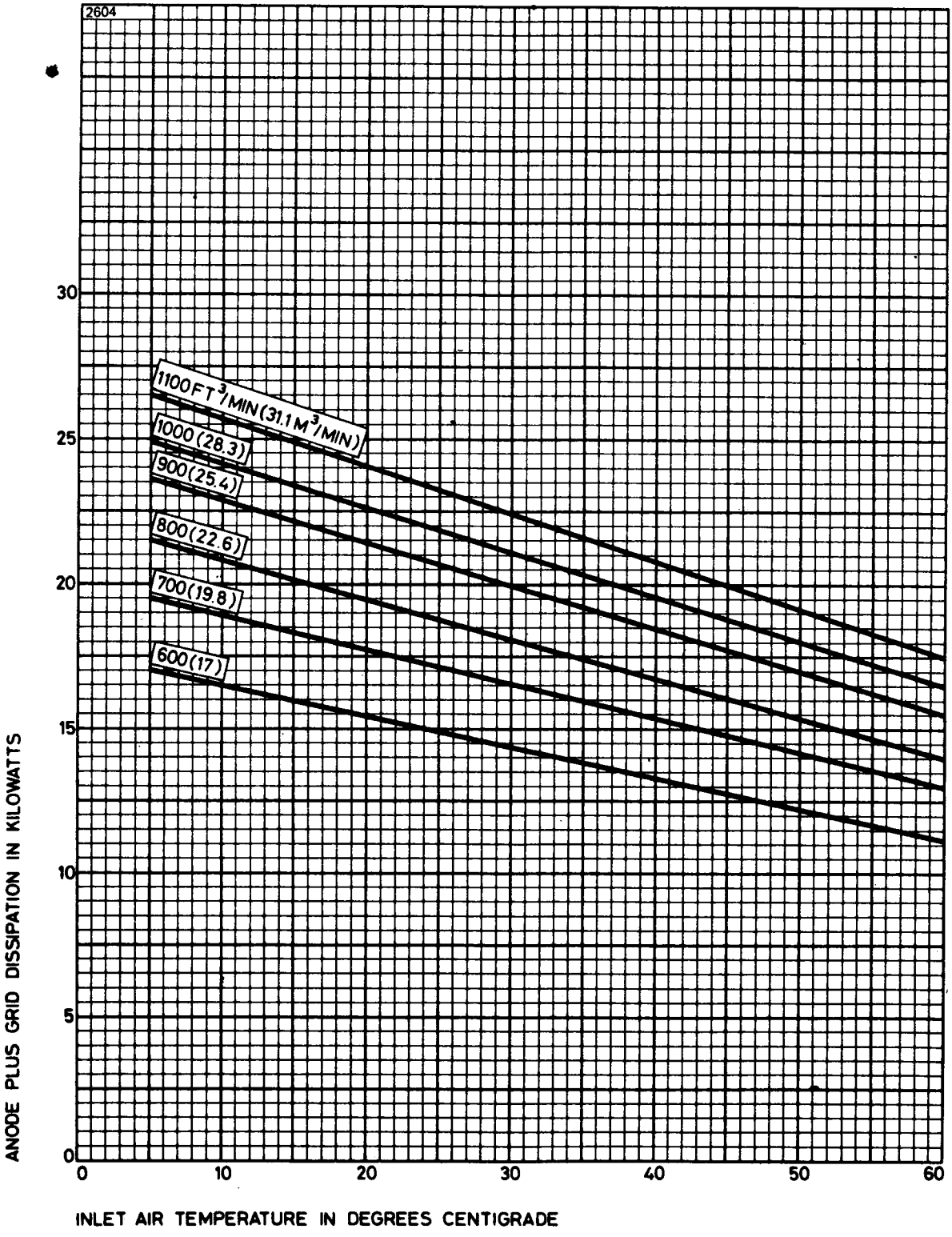
TYPICAL STRAPPED CHARACTERISTICS



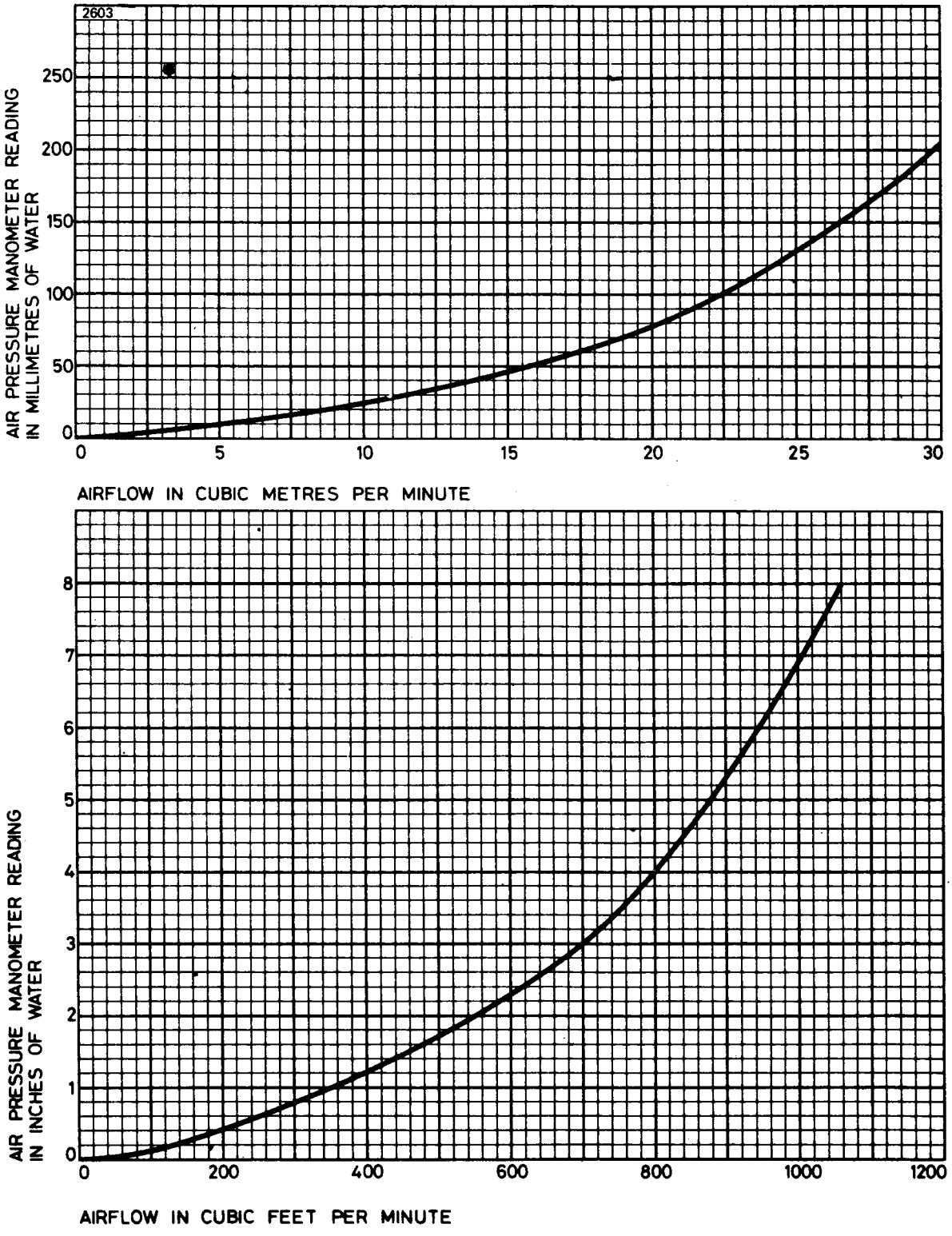
TYPICAL CONSTANT CURRENT CHARACTERISTICS



AIR COOLING REQUIREMENTS FOR BR1102

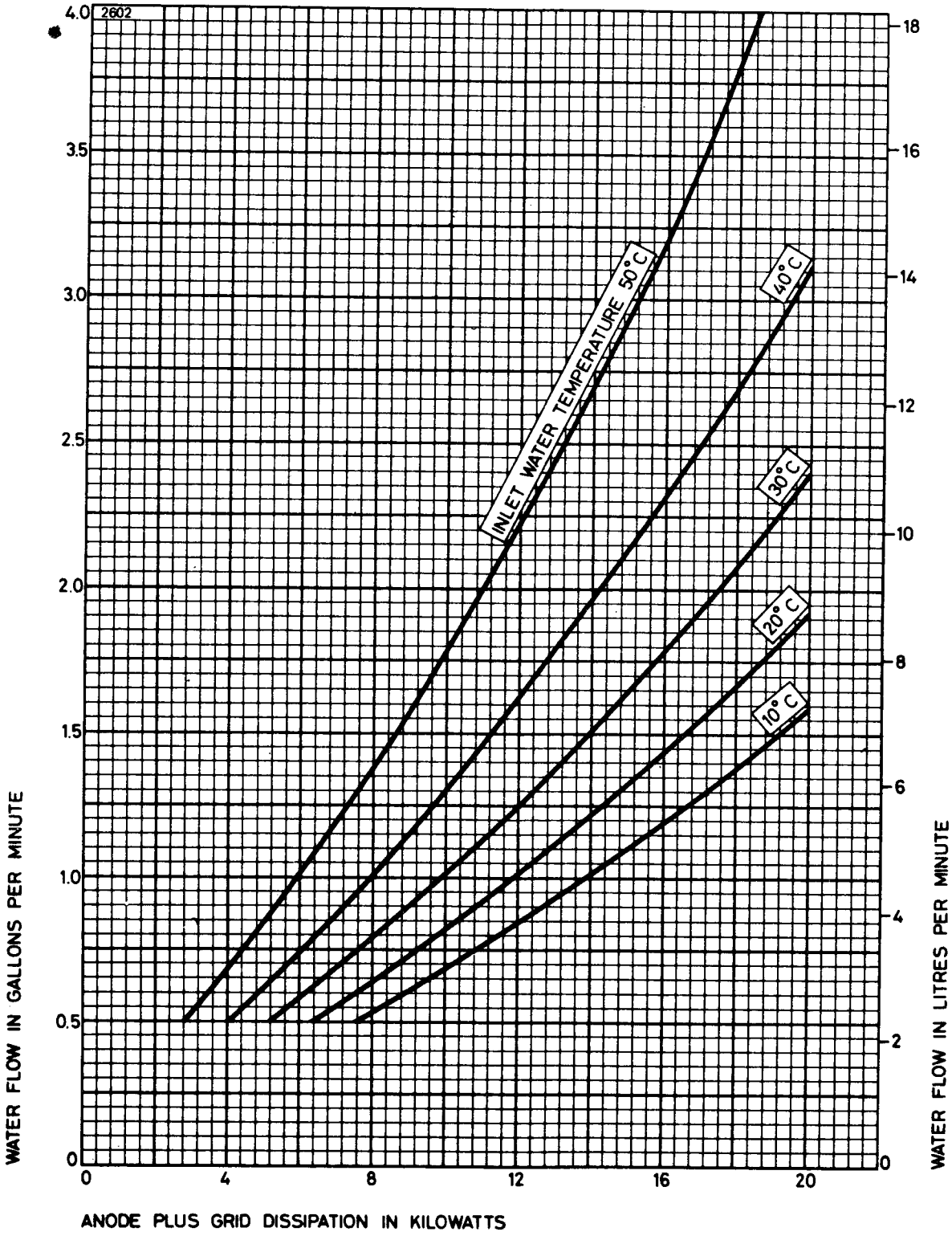


AIR FLOW CHARACTERISTIC FOR BR1102

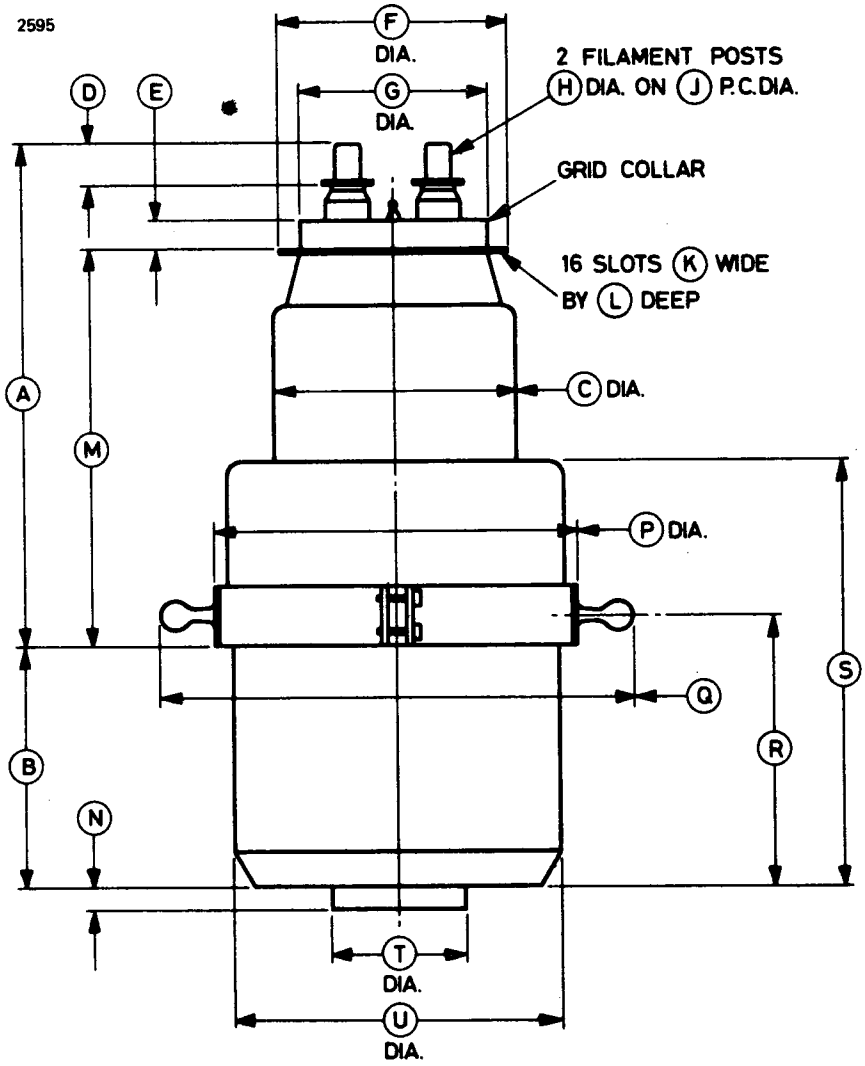


MINIMUM WATER COOLING REQUIREMENTS FOR BW1102J2

(Higher rates of flow should be used where possible)



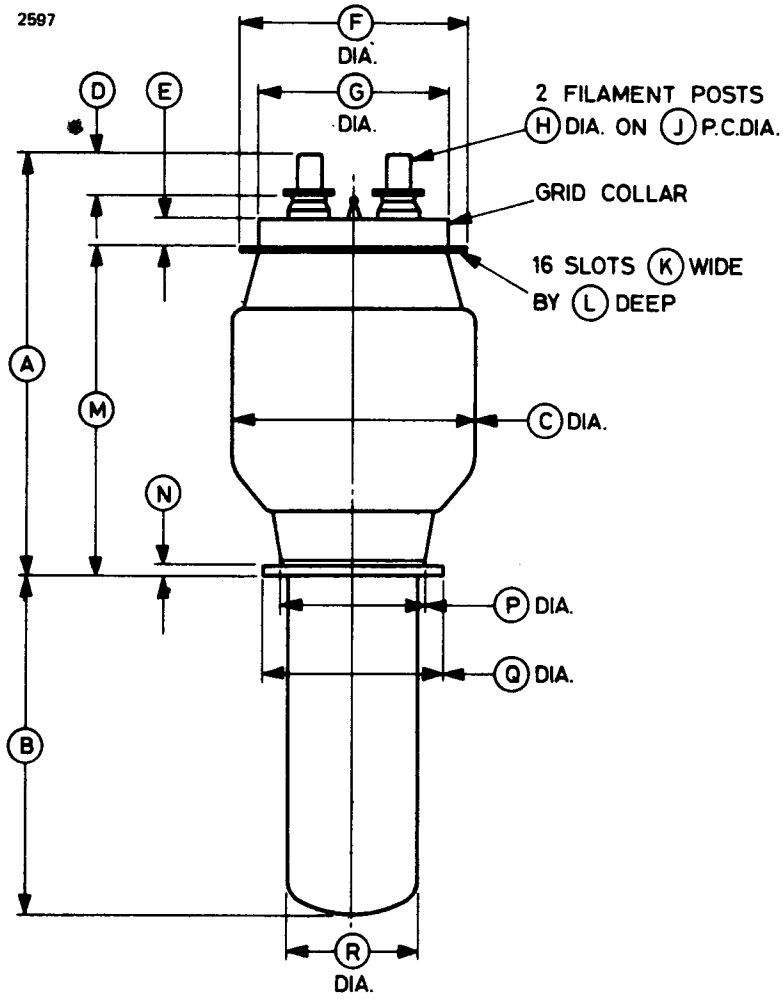
OUTLINE FOR BR1102



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	12.500 max	317.5 max	L	0.205	5.21
B	5.937	150.8	M	10.000 max	254.0 max
C	6.000 max	152.4 max	N	0.562	14.27
D	1.000	25.40	P	9.500 max	241.3 max
E	0.734	18.64	Q	11.813 max	300.1 max
F	5.630	143.0	R	6.687	169.8
G	4.703	119.5	S	10.437	265.1
H	0.625	15.88	T	3.570 max	90.68 max
J	2.250	57.15	U	8.375 max	212.7 max
K	0.153	3.89			

Millimetre dimensions have been derived from inches.

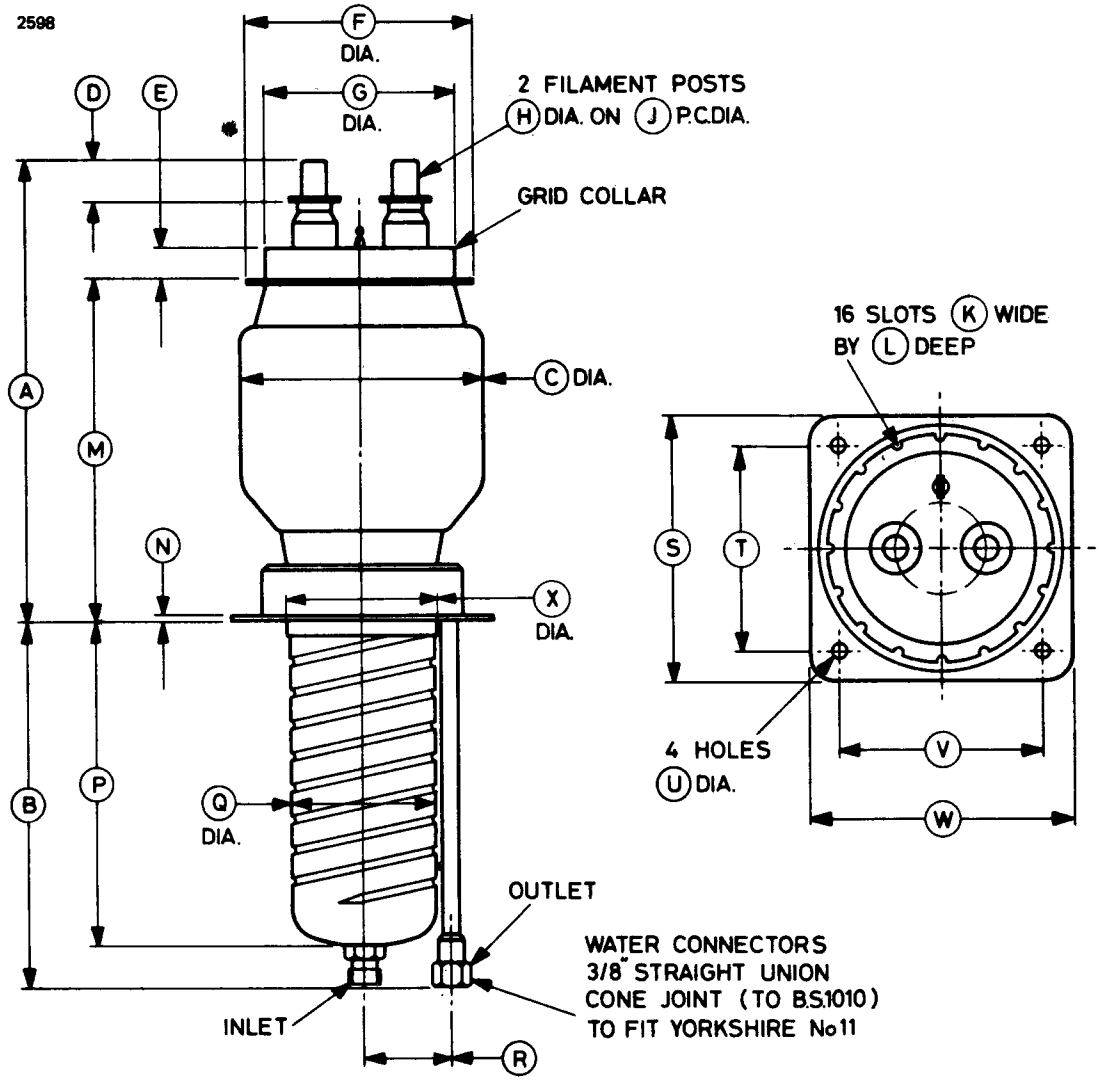
OUTLINE FOR BW1102



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	10.375 max	263.5 max	J	2.250	57.15
B	8.250	209.6	K	0.153	3.89
C	6.000 max	152.4 max	L	0.205	5.21
D	1.000	25.40	M	7.875 max	200.0 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	4.500 max	114.3 max
H	0.625	15.88	R	3.250	82.55

Millimetre dimensions have been derived from inches.

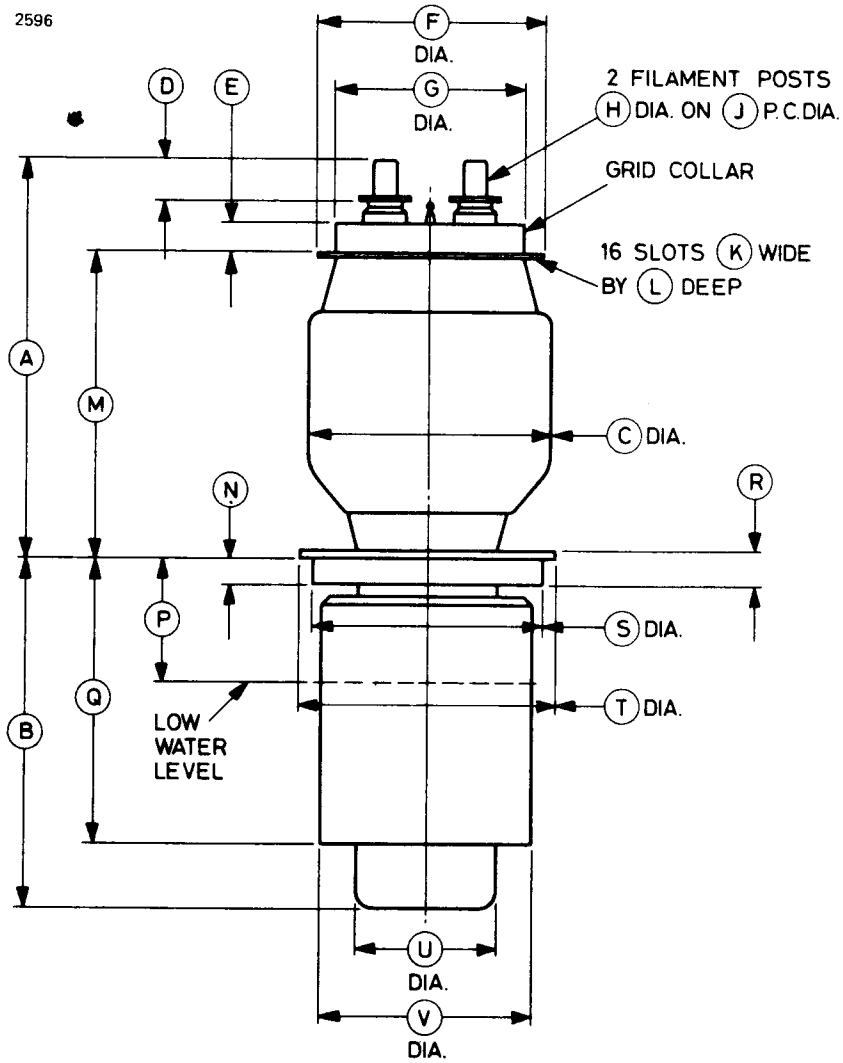
OUTLINE FOR BW1102J2



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	11.200 max	284.5 max	M	8.375	212.7
B	8.750	222.3	N	0.125	3.18
C	6.000 max	152.4 max	P	7.866	199.8
D	1.000	25.40	Q	3.562	90.47
E	0.734	18.64	R	2.000	50.80
F	5.630	143.0	S	6.500	165.1
G	4.703	119.5	T	5.000	127.0
H	0.625	15.88	U	0.375	9.53
J	2.250	57.15	V	5.000	127.0
K	0.153	3.89	W	6.500	165.1
L	0.205	5.21	X	4.000 max	101.6 max

Millimetre dimensions have been derived from inches.

OUTLINE FOR BY1102



Ref	Inches	Millimetres	Ref	Inches	Millimetres
A	10.250 max	260.4 max	L	0.205	5.21
B	8.562 ± 0.062	217.5 ± 1.57	M	7.750 max	196.9 max
C	6.000 max	152.4 max	N	0.625	15.88
D	1.000	25.40	P	3.000	76.20
E	0.734	18.64	Q	6.937	176.2
F	5.630	143.0	R	0.875	22.23
G	4.703	119.5	S	5.750	146.1
H	0.625	15.88	T	6.375	161.9
J	2.250	57.15	U	3.500	88.90
K	0.153	3.89	V	5.312	134.9

Millimetre dimensions have been derived from inches.