

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

ABRIDGED DATA

Water cooled power triodes of coaxial ceramic/metal construction, intended primarily for industrial service. The tubes have an integral water jacket; BW1184J2F has integral filament leads.

Anode dissipation	80	kW max
Anode voltage	14.4	kV max
Frequency for full ratings	30	MHz max
Output power (class C oscillator, less drive)	166	kW

GENERAL

Electrical

Filament	thoriated tungsten
Filament voltage (see note 1)	12.2 V
Filament current	255 A
Surge filament current (peak) (see note 2)	1500 A max
Filament cold resistance	5.3 mΩ
Peak usable cathode current	106 A
Amplification factor ($V_a = 10$ kV, $I_a = 8.0$ A)	30
Mutual conductance ($V_a = 10$ kV, $I_a = 8.0$ A)	150 mA/V
Inter-electrode capacitances:	
grid to anode	55 pF
grid to filament	170 pF
anode to filament	2.7 pF

Mechanical

Overall length:	
BW1184J2	446.0 mm max
BW1184J2F (excluding leads)	475.0 mm nom
Overall diameter	190.5 mm max
Net weight:	
BW1184J2	11.5 kg approx
BW1184J2F	12 kg approx
Mounting position (see note 3)	vertical, anode up or down

Accessories (Both tubes)

Water coupling, 2 supplied with tube	MA709B
Water union, 25 mm hose (optional)	MA2654A
Grid connector:	
above 2 MHz	MA342
below 2 MHz	MA464
Thermal fuse	MA85E or MA85G

Accessories (BW1184J2 only)

Filament connector (with lead)	MA475A
Filament connector (without lead)	MA291C
Filament/cathode connector (with lead)	MA475B
Filament/cathode connector (without lead)	MA291D



For frequencies above 2 MHz, cathode connector MA291F should be used in conjunction with a strip connection to provide a low inductance cathode return.

The tightening torque applied to the clamping screw must be between the limits of 0.23 kg.m min, 0.40 kg.m max.

RADIO FREQUENCY OSCILLATOR FOR INDUSTRIAL SERVICE

(Class C conditions, one tube)

MAXIMUM RATINGS (Absolute values)

Frequency	30	MHz
Anode voltage	14.4	kV max
Anode input power	220	kW max
Anode dissipation	80	kW max
Grid voltage (negative value)	2.0	kV max
Grid current:		
on load	4.0	A max
off load	5.5	A max
Grid dissipation	2.0	kW max
Grid circuit resistance	10	kΩ max
Cathode current	22	A max

COOLING

Anode

The water cooling requirements are given in the following table.

Anode plus grid dissipation (kW)	Inlet temperature (°C)	Minimum rate of flow of water (l./min)	Inlet pressure (bar)	Outlet temperature (°C)
80	20	40	0.36	50
80	50	60	0.66	70
60	20	28	0.18	52
60	50	42	0.32	72
40	20	18	0.08	54
40	50	27	0.15	73

The inlet water temperature must never exceed 50 °C.

The pressure in the water jacket must not exceed 6 bar.

Seals and Envelope

The temperature of the seals and envelope must not exceed 200 °C. Cooling of the seals by low velocity air flow or water cooled filament connectors is required.

TYPICAL OPERATING CONDITIONS

Frequency	30	30	MHz
Anode voltage	12	10	kV
Anode current	18	16	A
Anode dissipation	45	36	kW
Grid voltage	−1080	−700	V
Grid resistor	360	200	Ω
Grid current, on load	3.0	3.5	A
Grid current, off load	3.8	4.8	A
Grid dissipation	1.6	1.5	kW
Feedback ratio (see note 4)	15	12	%
Drive power	4.8	4.0	kW
Output power	171	124	kW
Efficiency	79.5	77.5	%
Oscillator output power (see note 5)	166	120	kW

NOTES

- Temporary fluctuations up to +5% or −10% in filament voltage are permissible.
- The filament current must not exceed 1500 A, even momentarily, at any time.
- If the tube is mounted with the anode uppermost, the water inlet and outlet connections should be reversed (see out-lines).

4. The feedback ratio is defined as $\frac{V_{g(pk)}}{V_{a(pk)}} \times 100$

where $V_{g(pk)}$ = peak RF grid voltage in volts
and $V_{a(pk)}$ = peak RF anode voltage in volts

5. Oscillator output power = $P_{out} - P_{drive}$

where P_{out} = output power of tube to anode circuit
and P_{drive} = drive power fed back to grid circuit.

HEALTH AND SAFETY HAZARDS

e2v technologies electronic devices are safe to handle and operate, provided that the precautions stated are observed. e2v technologies does not accept responsibility for damage or injury resulting from the use of electronic devices it produces. Equipment manufacturers and users must ensure that adequate precautions are taken. Appropriate warning labels and notices must be provided on equipments incorporating e2v technologies devices and in operating manuals.



High Voltage

Equipment must be designed so that personnel cannot come into contact with high voltage circuits. All high voltage circuits and terminals must be enclosed and fail-safe interlock switches must be fitted to disconnect the primary power supply and discharge all high voltage capacitors and other stored energy before allowing access. Interlock switches must not be bypassed to allow operation with access doors open.



RF Radiation

Personnel must not be exposed to excessive RF radiation. A properly designed equipment cabinet with good RF electrical connection between panels will normally provide sufficient protection.



X-Ray Radiation

This device, when operating at voltages above 5 kV, produces progressively more dangerous X-rays as the voltage is increased; the radiation varies greatly during life.

The device envelope provides only limited protection and further shielding may be required. A metal equipment cabinet with overlapping joints will usually provide sufficient shielding, but if there is any doubt an expert in this field should perform an X-ray survey of the equipment.



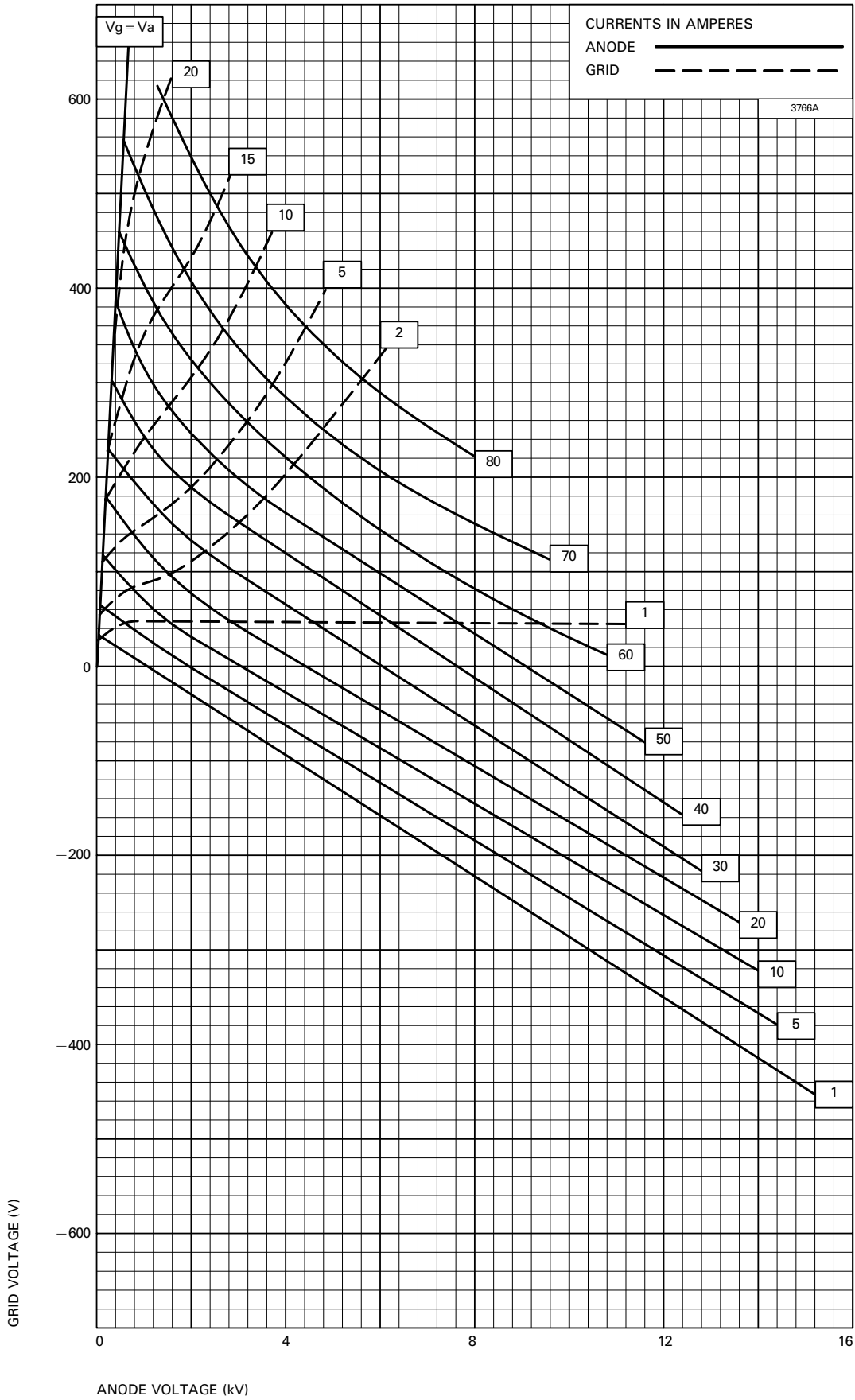
Implosion

This tube stores potential energy by virtue of its vacuum. The energy level is low, but there is some hazard from flying fragments if the tube is dropped or subjected to violent impact. The tube must be stored and transported in its approved pack. During installation or replacement the tube must not be scratched or damaged in any way likely to reduce the strength of the ceramic envelope.

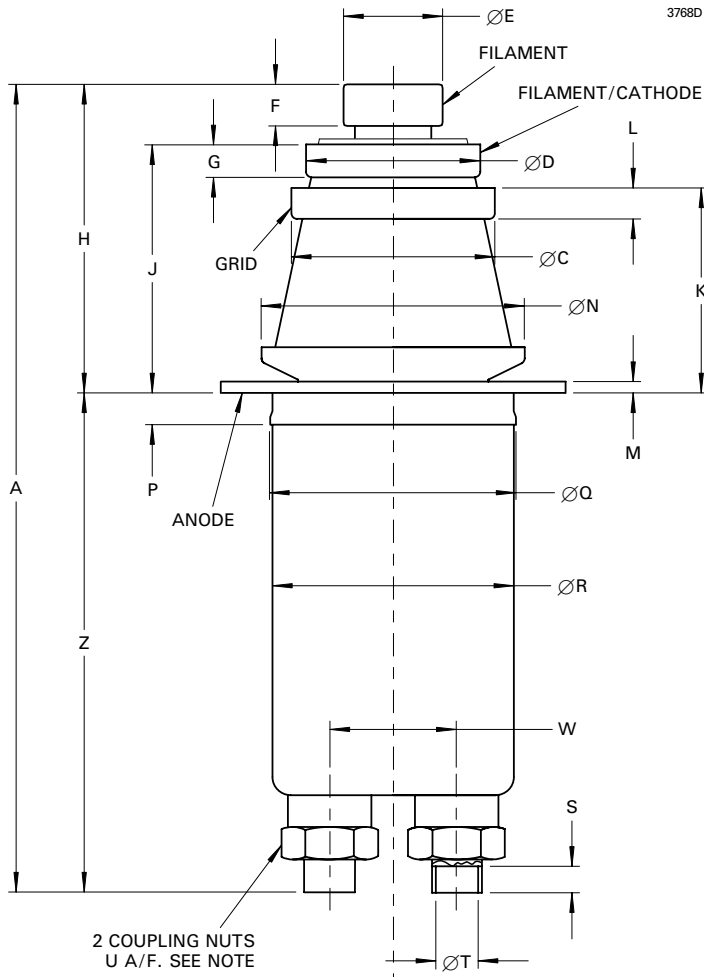
References

- BS 3192. Specification for safety requirements for radio (including television) transmitting apparatus.
- TEPAC Publication no. 181. Recommended practice on X-radiation detection and measurement for high power tubes.

TYPICAL CONSTANT CURRENT CHARACTERISTICS



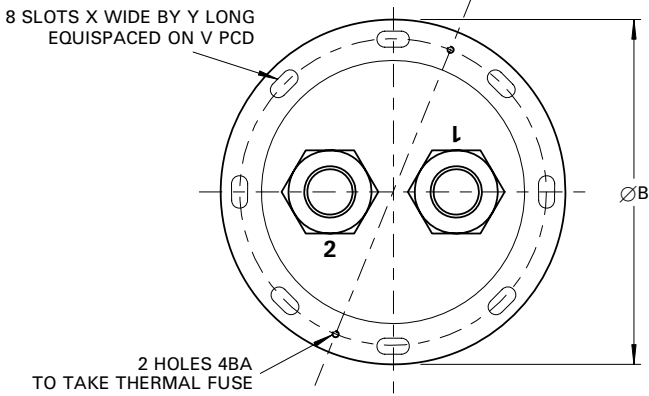
OUTLINE OF BW1184J2 (All dimensions without limits are nominal)



Ref	Millimetres
A	446.0 max
B	190.5 max
C	112.0 \pm 0.2
D	96.0 \pm 0.2
E	54.0 \pm 0.15
F	23.0
G	15.0
H	171.5 max
J	137.0
K	113.0
L	14.0
M	6.3
N	145.0 max
P	17.5
Q	138.0 max
R	133.0 \pm 1.0
S	18.5
T	28.0
U	46.0
V	170.0
W	70.0
X	9.0
Y	18.0
Z	270.0

Outline Note

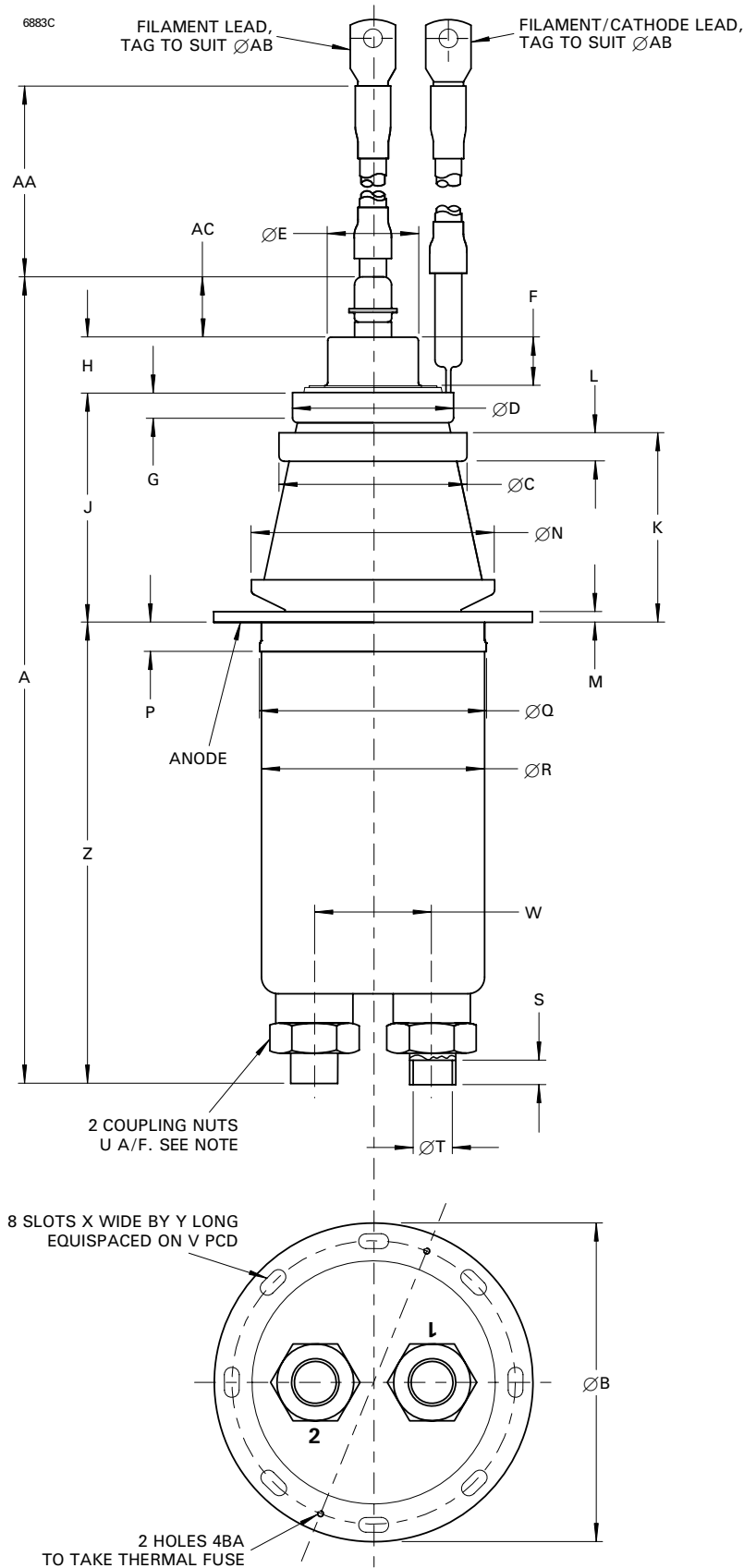
Suitable water pipe connectors are supplied with the tube.



Water Connections

	Anode down	Anode up
Inlet	1	2
Outlet	2	1

OUTLINE OF BW1184J2F (All dimensions without limits are nominal)



Ref	Millimetres
A	475.0
B	190.5 max
C	112.0 \pm 0.2
D	96.0 \pm 0.2
E	54.00 \pm 0.15
F	29.0
G	15.0
H	32.0
J	137.0
K	113.0
L	14.0
M	6.3
N	145.0 max
P	17.5
Q	138.0 max
R	133.0 \pm 1.0
S	18.5
T	28.0
U	46.0
V	170.0
W	70.0
X	9.0
Y	18.0
Z	270.0
AA	330.0
AB	13.1
AC	36.0

Outline Note

Suitable water pipe connectors are supplied with the tube.

Water Connections

	Anode down	Anode up
Inlet	1	2
Outlet	2	1

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