

## WATER COOLED R.F. POWER TRIODE

QUICK REFERENCE DATA									
General purposes									
$\lambda$ (m)	Freq. (MHz)	C telegr.		B teleph.		C <sub>a</sub> mod.		B mod. <sup>1)</sup>	
		V <sub>a</sub> (kV)	W <sub>o</sub> (kW)	V <sub>a</sub> (kV)	W <sub>o</sub> (kW)	V <sub>a</sub> (kV)	W <sub>o</sub> (kW)	V <sub>a</sub> (kV)	W <sub>o</sub> (kW)
4	75	6	6.9	6	1.9			6	13.3
		5	5.6	5	1.45	5	4.7	5	6.6
		4	4			4.5	4.1	4.5	6.0
						4	3.5	4	5.3
						3.5	3	3.5	4.6
						3	2.2	3	3.3
Television service									
Freq. (MHz)	Neg. mod.		Pos. sync.		Pos. mod.		Neg. sync.		
	V <sub>a</sub> (kV)	W <sub>o</sub> sync (kW)	W <sub>o</sub> black (kW)		V <sub>a</sub> (kV)	W <sub>o</sub> white (kW)			
75	5	9	5.35		5		9		

**HEATING:** direct, filament thoriated tungsten

Filament voltage  $V_f$  12.6 V

Filament current  $I_f$  33 A

### CAPACITANCES

Anode to all other elements except grid  $C_a$  0.3 pF

Grid to all other elements except anode  $C_g$  16 pF

Anode to grid  $C_{ag}$  11 pF

<sup>1)</sup> Two tubes

**TYPICAL CHARACTERISTICS**

Anode voltage	$V_a$	4 kV
Anode current	$I_a$	1 A
Mutual conductance	S	17 mA/V
Amplification factor	$\mu$	32

**COOLING:** water/low-velocity air flow

**WATER COOLING CHARACTERISTICS** See also the cooling curves

$W_a$ (kW)	$T_i$ (°C)	$q_{min}^1$ (l/min)	$P_i$ (atm)
1	20	2.5	0.08
	50	3	0.1
2	20	2.5	0.08
	50	5	0.3
4	20	4	0.18
	50	9	0.9
6	20	6	0.4
	50	14	2.5

It is necessary to direct a low-velocity air flow to the anode and the grid seal at frequencies above 30 MHz

The air flow must be started upon or before application of the filament voltage

**TEMPERATURE LIMITS** (Absolute limits)

Water inlet temperature	$T_i$	max. 50 °C
Temperature of seals	T	max. 180 °C

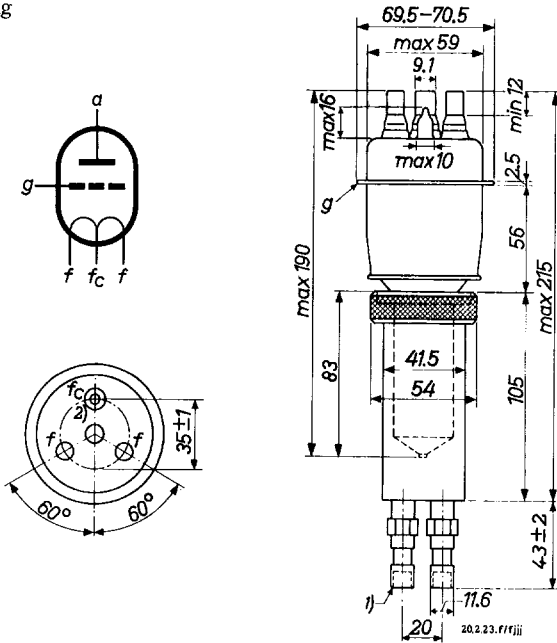
<sup>1)</sup> At inlet temperatures between 20 and 50 °C the required quantity of water can be found by proportional interpolation

**MECHANICAL DATA**

Dimensions in mm

Mounting position: vertical with anode down

Net mass : 0.45 kg



Tube mounted in water jacket K713

The centre tap  $f_c$  must not be used for filament current supply. The connectors type 40634, however, must be used for the cooling of all three filament pins, thus also of pin  $f_c$

**ACCESSORIES**

Grid connector	type	40650 <sup>3)</sup> or 40622
Water jacket		K713
Filament connector		40634
"O" ring		3322 026 82801

1) 1/8 in pipe thread

2) This pin is marked "O"

3) The connector 40650 should be used only below 30 MHz.

When the tube is used with this connector at maximum ratings additional cooling of the grid seals will be required.

**R.F. CLASS C TELEGRAPHY**

**LIMITING VALUES** (Absolute limits)

Frequency	f	up to	75 MHz
Anode voltage	$V_a$	max.	6 kV
Negative grid voltage	$-V_g$	max.	1000 V
Anode current	$I_a$	max.	1.5 A
Grid current	$I_g$	max.	0.35 A
Grid dissipation	$W_g$	max.	120 W
Anode input power	$W_{ia}$	max.	9 kW
Anode dissipation	$W_a$	max.	6 kW 1)

**OPERATING CONDITIONS**

Wavelength	$\lambda$	4	4	4 m
Frequency	f	75	75	75 MHz
Anode voltage	$V_a$	6	5	4 kV
Grid voltage	$V_g$	-400	-300	-200 V
Anode current	$I_a$	1.5	1.5	1.37 A
Grid current	$I_g$	0.31	0.33	0.35 A
Peak grid A.C. voltage	$V_{gp}$	740	640	500 V
Grid input power	$W_{ig}$	210	190	160 W
Anode input power	$W_{ia}$	9	7.5	5.5 kW
Anode dissipation	$W_a$	2.1	1.9	1.5 kW
Output power	$W_o$	6.9	5.6	4 kW
Efficiency	$\eta$	76.5	75	73 %

1) TBL6/6000  $W_a \text{ max.} = 5 \text{ kW}$

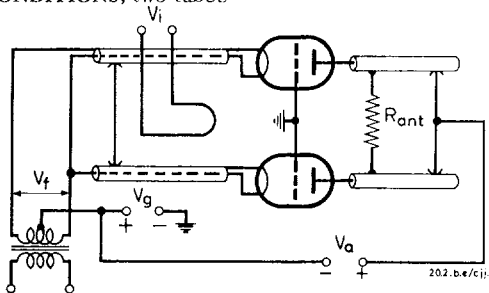
## R.F. CLASS C TELEGRAPHY, grounded grid

## LIMITING VALUES (Absolute limits)

Frequency	f	up to	75 MHz
Anode voltage	$V_a$	max.	6 kV
Positive cathode to grid voltage	$V_{kg}$	max.	1000 V
Anode current	$I_a$	max.	1.5 A
Grid current	$I_g$	max.	0.35 A
Grid dissipation	$W_g$	max.	120 W
Anode input power	$W_{ia}$	max.	9 kW
Anode dissipation	$W_a$	max.	6 kW <sup>1)</sup>

For frequencies from 75 MHz up to 220 MHz, see page 119.

## OPERATING CONDITIONS, two tubes



For data please refer to next page.

1) TBL6/6000  $W_a$  max. = 5 kW

**R.F. CLASS C TELEGRAPHY**, grounded grid (continued)

**OPERATING CONDITIONS**, two tubes (continued)

$\lambda$	4	2.7 <sup>1)</sup>	2.7 <sup>1)</sup>	1.36 <sup>1)</sup> m
f	75	110	110	220 MHz
$V_a$	6	5	4	4 kV
$V_g$	-400	-300	-200	-200 V
$I_a$	2x1.5	2x1.5	2x1.37	2x1.25 A
$I_g$	2x0.31	2x0.33	2x0.35	2x0.2 A
$V_{gp}$	740	640	500	450 V
$W_{ig}$	2x1120	2x920	2x675	2x380 W
$W_{ia}$	2x9	2x7.5	2x5.5	2x5 kW
$W_a$	2x2.1	2x2.2	2x1.7	2x2.5 kW
$W_o$	13.8+1.82	10.6+1.46	7.6+1.03	5+0.6 kW <sup>2)</sup>
$\eta$	76.5	71	69	50 % <sup>3)</sup>

1) When using the tube above 108 MHz, particular attention must be paid to a careful design of the installation, otherwise the tube may be damaged.

Therefore, our guarantee for the tubes operating at frequencies above 108 Mc/s can only be given after approval of the installation.

2) Power transferred from driving stage included.

3) Pure tube efficiency.

## R.F. CLASS B TELEPHONY

## LIMITING VALUES (Absolute limits)

Frequency	f	up to	75 MHz
Anode voltage	$V_a$	max.	6 kV
Anode current	$I_a$	max.	1.1 A
Anode input power	$W_{ia}$	max.	6.6 kW
Anode dissipation	$W_a$	max.	6 kW 1)

## OPERATING CONDITIONS

Wavelength	$\lambda$	4	4 m
Frequency	f	75	75 MHz
Anode voltage	$V_a$	6	5 kV
Grid voltage	$V_g$	-180	-145 V
Anode current	$I_a$	0.99	0.9 A
Peak grid A.C. voltage	$V_{gp}$	250	225 V
Anode input power	$W_{ia}$	5.9	4.5 kW
Anode dissipation	$W_a$	4	3.05 kW
Output power	$W_o$	1.9	1.45 kW
Efficiency	$\eta$	32	32 %
Modulation factor	m	100	100 %
Grid current	$I_g$	0.3	0.32 A
Grid input power	$W_{ig}$	140	130 W

1) TBL6/6000  $W_a$  max. = 5 kW

**R.F. CLASS C ANODE MODULATION**

**LIMITING VALUES** (Absolute limits)

Frequency	f	up to	75 MHz
Anode voltage	$V_a$	max.	5 kV
Negative grid voltage	$-V_g$	max.	1000 V
Anode current	$I_a$	max.	1.3 A
Grid current	$I_g$	max.	0.35 A
Grid dissipation	$W_g$	max.	120 W
Anode input power	$W_{ia}$	max.	6.5 kW
Anode dissipation	$W_a$	max.	4 kW <sup>2)</sup>

**OPERATING CONDITIONS**

Wavelength	$\lambda$	4	4	4	4	4 m
Frequency	f	75	75	75	75	75 MHz
Anode voltage	$V_a$	5	4.5	4	3.5	3 kV
Grid voltage	$V_g$	-400	-350	-300	-300	-250 V <sup>1)</sup>
Anode current	$I_a$	1.2	1.2	1.2	1.2	1 A
Grid current	$I_g$	0.3	0.3	0.3	0.3	0.3 A
Peak grid A. C. voltage	$V_{gp}$	690	650	600	600	510 V
Grid input power	$W_{ig}$	190	180	165	165	140 W
Anode input power	$W_{ia}$	6	5.4	4.8	4.2	3 kW
Anode dissipation	$W_a$	1.3	1.3	1.3	1.2	0.8 kW
Output power	$W_o$	4.7	4.1	3.5	3.0	2.2 kW
Efficiency	$\eta$	78	76	73	71.5	73 %
Modulation factor	m	100	100	100	100	100 %
Modulation power	$W_{mod}$	3.0	2.7	2.4	2.1	1.5 kW

<sup>1)</sup> Grid bias partially obtained by the grid resistor

<sup>2)</sup> TBL6/6000  $W_a$  max. = 3.4 kW



**R.F. CLASS B TELEPHONY** for television service (American and European system).

**LIMITING VALUES** (Absolute limits)

Frequency	f	up to 75	up to 220 MHz
Anode voltage	$V_a$	max. 5	max. 4 kV
Anode input power	$W_{ia}$ sync	max. 9.5	max. 6.5 kW
Anode dissipation	$W_a$ sync	max. 5	max. 4 kW
Anode current	$I_a$ sync	max. 1.9	max. 1.6 A
Grid dissipation	$W_g$ sync	max. 120	max. 120 W

**OPERATING CONDITIONS**, two tubes in push-pull

Frequency	f	48 to 75	170 to 220 <sup>1)</sup> MHz
Bandwidth (-1.5 db)	B	5.25	6.5 MHz <sup>2)</sup>
Bandwidth (-3 db)	B	8	10 MHz <sup>2)</sup>
Anode voltage	$V_a$	5	4 kV
Grid voltage	$V_g$	-200	-150 V
Peak grid to grid voltage	$V_{ggp}$ sync	1000	1000 V <sup>3)</sup>
	black	800	750 V <sup>3)</sup>
	white	0	200 V <sup>3)</sup>
Anode current	$I_a$ sync	3.8	3.2 A
	black	3	2.6 A
	white	0.2	- A
Grid current	$I_g$ sync	0.5	0.4 A
	black	0.22	0.22 A
	white	0	- A
Grid input power	$W_{ig}$ sync	250	350 to 450 W <sup>4)</sup>
Output power	$W_o$ sync	9	6 kW
	black	5.35	3.37 kW

1) When using the tube above 108 MHz, particular attention must be paid to a careful design of the installation, otherwise the tube may be damaged  
Therefore, our guarantee for the tubes operating at frequencies above 108 MHz can only be given after approval of the installation

2) These values are based on measurements on a circuit with a single LC section

3) Measured by the slide back method

4) Driving power is accounted for largely by circuit losses. The indicated driving power is required to take care of losses in damping resistors, circuit losses and tube driving power

**R.F. CLASS C OSCILLATOR FOR INDUSTRIAL USE** with anode voltage from three-phase half-wave rectifier without filter

**LIMITING VALUES** (Absolute limits)

Frequency	f	up to	75 MHz
Anode voltage	$V_a$	max.	6000 V
Negative grid voltage	$-V_g$	max.	1000 V
Anode current	$I_a$	max.	1.5 A
Grid current	$I_g$	max.	0.35 A
Anode input power	$W_{ia}$	max.	9 kW
Anode dissipation	$W_a$	max.	6 kW <sup>4)</sup>
Grid dissipation	$W_g$	max.	120 W

**OPERATING CONDITIONS**

Frequency	f	75	75 MHz
Transformer voltage, RMS	$V_{Tr}$	5.1 <sup>1)</sup>	4.4 <sup>2)</sup> kV
Anode voltage	$V_a$	6.0	5.1 kV <sup>3)</sup>
Anode current	$I_a$	1.5	1.25 A
Grid current	$I_g$	0.31	0.28 A
Grid resistor	$R_g$	1300	1100 $\Omega$
Grid input power	$W_{ig}$	210	160 W
Anode input power	$W_{ia}$	9	6.4 kW
Anode dissipation	$W_a$	1.9	1.74 kW
Output power	$W_o$	6.9	4.5 kW
Efficiency	$\eta$	76.5	70 %

1) Care must be taken that under these operating conditions the absolute limiting values are not exceeded by variation of the supply voltage or the load or by tolerances in the circuit elements

2) Under these conditions normal deviations of voltages and load are permissible. The absolute limiting values of the tube must, however, not be exceeded

3) D. C. value

4) TBL6/6000  $W_a$  max. = 5 kW

**R.F. CLASS C OSCILLATOR FOR INDUSTRIAL USE** with self rectification**LIMITING VALUES** (Absolute limits)

Frequency	f	up to	75 MHz
Transformer voltage, RMS	$V_{tr}$	max.	6800 V
Negative grid voltage	$-V_g$	max.	640 V
Anode current	$I_a$	max.	0.8 A
Grid current	$I_g$	max.	0.19 A
Anode input power	$W_{ia}$	max.	9 kW
Anode dissipation	$W_a$	max.	6 kW <sup>3)</sup>
Grid dissipation	$W_g$	max.	120 W

**OPERATING CONDITIONS**

Frequency	f	75	75 MHz
Transformer voltage, RMS	$V_{tr}$	6.8 <sup>1)</sup>	5.9 <sup>2)</sup> kV
Anode current	$I_a$	0.8	0.7 A
Grid current	$I_g$	0.19	0.165 A
Grid resistor	$R_g$	1050	1050
Grid input power	$W_{ig}$		W
Anode input power	$W_{ia}$	6.05	4.6 kW
Anode dissipation	$W_a$	1.5	1.24 kW
Output power	$W_o$	4.55	3.36 kW
Efficiency	$\eta$	75	73 %

1) Care must be taken that under these operating conditions the absolute limiting values are not exceeded by variation of the supply voltage or the load or by tolerances in the circuit elements

2) Under these conditions normal deviations of voltages and load are permissible. The absolute limiting values of the tube must, however, not be exceeded

3) TBL6/6000  $W_a$  max. = 5 kW

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