

RF POWER TRIODE

Triodes in metal-ceramic construction with flying leads intended for use as industrial oscillators. The YD1174 is forced-air cooled. The YD1178 has an integral water cooler.

QUICK REFERENCE DATA

Oscillator output power ($W_o - W_{\text{feedb}}$)	W_{osc}	30 kW
Frequency for full ratings	f	max. 50 MHz

To be read in conjunction with "General Operational Recommendations".

RF CLASS C OSCILLATOR FOR INDUSTRIAL USE OPERATING CONDITIONS

Frequency	f	30	30 MHz
Oscillator output power ($W_o - W_{\text{feedb}}$)	W_{osc}	25,7	30,3 kW
Anode voltage	V_a	10	10 kV
Anode current	I_a	3,4	4,0 A
Anode input power	W_{ia}	34	40 kW
Anode dissipation	W_a	7,6	9,2 kW
Anode output power	W_o	26,4	30,8 kW
Anode efficiency	η_a	77,6	77,0 %
Oscillator efficiency	η_{osc}	75,6	75,8 %
Feedback ratio	V_{gp}/V_{ap}	12	10 %
Grid resistor	R_g	1440	900 Ω
Grid current, on load	I_g	600	690 mA
Grid voltage, negative	$-V_g$	864	621 V
Grid dissipation	W_g	150	180 W
Grid resistor dissipation	W_{Rg}	518	428 W

LIMITING VALUES (Absolute maximum rating system)

Frequency	f	up to	120 MHz*
Anode voltage	V_a	max.	12 kV
Anode current	I_a	max.	5 A
Anode dissipation	W_a	max.	10 kW
Grid voltage	$-V_g$	max.	1,8 kV
Grid current, on load off load	I_g	max.	1 A
	I_g	max.	1,5 A
Grid dissipation	W_g	max.	300 W
Grid circuit resistance	R_g	max.	10 k Ω
Cathode current, mean peak	I_k	max.	6 A
	I_{kp}	max.	25 A
Envelope temperature	T_{env}	max.	240 °C

HEATING: direct; thoriated tungsten filament

Filament voltage	V_f		5,8 V
Filament current	I_f		130 A
Peak filament starting current	I_{fp}	max.	800 A
Cold filament resistance	R_{fo}		5,6 m Ω

The filament is designed to accept temporary fluctuations of + 5% and -10%.

To ensure that the cathode temperature remains constant irrespective of the operating frequency, it may be necessary to reduce the filament voltage at higher frequencies. When doing so it must be borne in mind that the filament voltage-to-current ratio measured with only the filament voltage applied should remain constant under all operating conditions.

It is extremely important that the filament be properly decoupled. This should be done so that the resonance of the circuit formed, by the filament and the decoupling elements remain below the fundamental oscillator frequency. In grounded-grid circuits this resonance should be below the grid-cathode resonance. For further information please see Application Book "Tubes for RF heating" or contact the manufacturer.

CAPACITANCES

Anode to filament	C_{af}		1 pF
Grid to filament	C_{gf}		47 pF
Anode to grid	C_{ag}		25 pF

* When the tube is to be used at frequencies above 50 MHz the manufacturer should be consulted for more detailed information.

CHARACTERISTICS measured at $V_a = 6 \text{ kV}$, $I_a = 2 \text{ A}$

Transconductance	S	55 mA/V
Amplification factor	μ	24

COOLING

To obtain optimum life, the temperature of the seals and of the envelope should, under normal operating conditions, be kept below 200 °C.

To maintain these temperatures additional cooling may be necessary. At frequencies higher than about 4 MHz cooling of the seals becomes mandatory.

Table 1 Cooling parameters – YD1174

anode + grid dissipation $W_a + W_g$ kW	altitude h m	inlet temperature T_i °C	rate of flow q_{min} m ³ /min	pressure drop ΔP Pa*	max. outlet temperature T_o °C
10	0	35	9,5	550	94
8	0	35	6,5	280	105
6	0	35	4,5	150	113
4	0	35	3,0	80	117
10	0	45	11,0	690	98
8	0	45	7,6	350	108
6	0	45	5,2	190	115
4	0	45	3,5	100	119
10	1500	35	11,4	630	94
8	1500	35	7,8	320	105
6	1500	35	5,5	170	113
4	1500	35	3,6	90	117
10	3000	25	12,0	620	90
8	3000	25	8,2	320	102
6	3000	25	5,7	170	111
4	3000	25	3,8	90	116

Absolute max. air inlet temperature

 T_i max. 45 °C

Direction of airflow

arbitrary

* 1 Pa \approx 0,1 mm H₂O.

Table 2 Cooling parameters – YD1178

anode + grid dissipation $W_a + W_g$ kW	inlet temperature T_i °C	rate of flow q_{min} ℓ/min	pressure drop ΔP kPa*	outlet temperature T_o °C
10	20	6,0	25	46
	50	9,0	52	67
8	20	4,5	15	49
	50	6,7	31	69
6	20	3,0	7	53
	50	4,5	15	72

Absolute max. water inlet temperature

T_i max. 50 °C

Absolute max. water pressure

P max. 600 kPa*

ACCESSORY

Insulating pedestal (YD1174 only)

type 40654

* 100 kPa \approx 1 at

Mounting position: vertical with anode up or down

Net mass: approx. 2,2 kg

Dimensions in mm

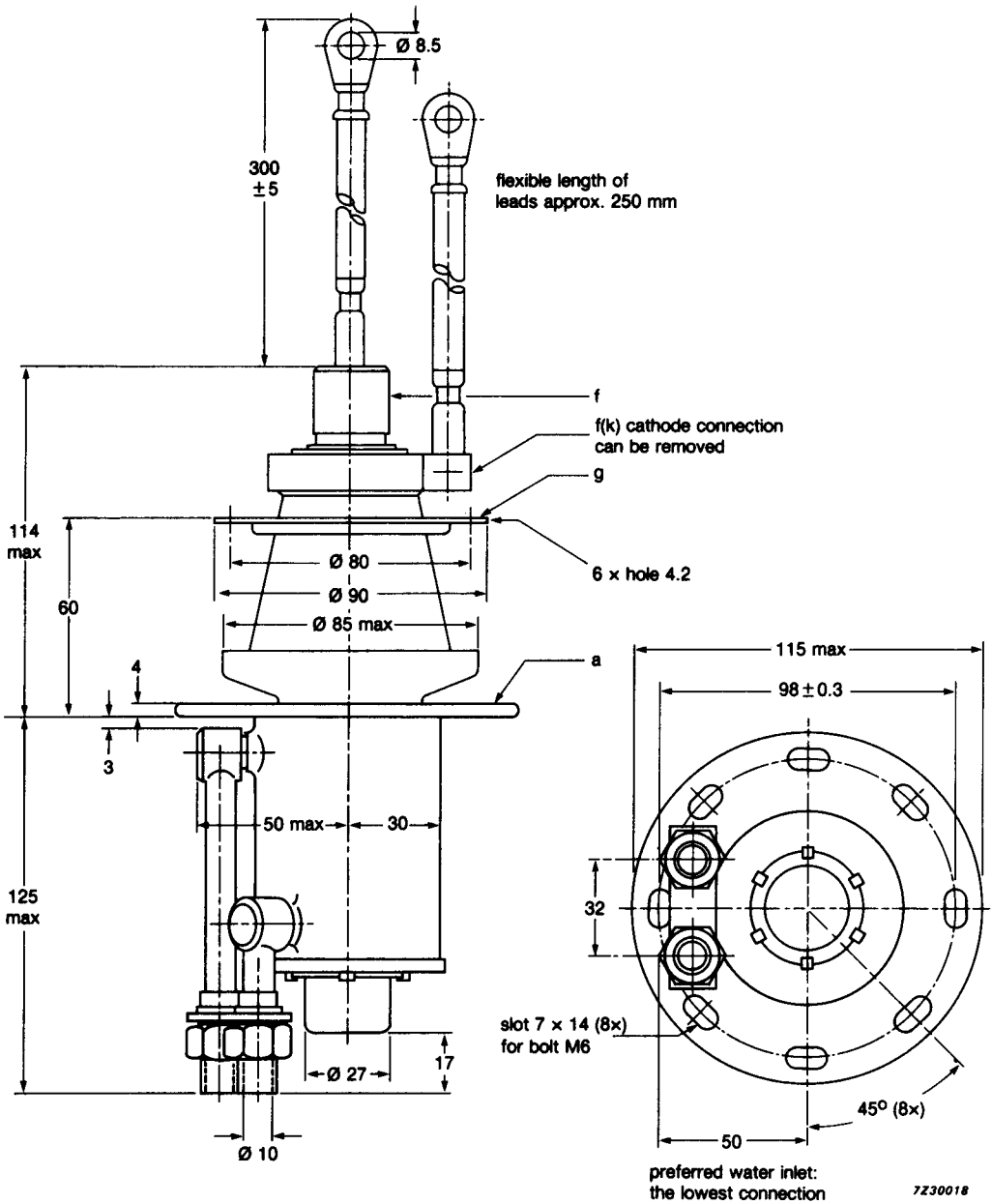


Fig. 2 Mechanical outline – YD1178.

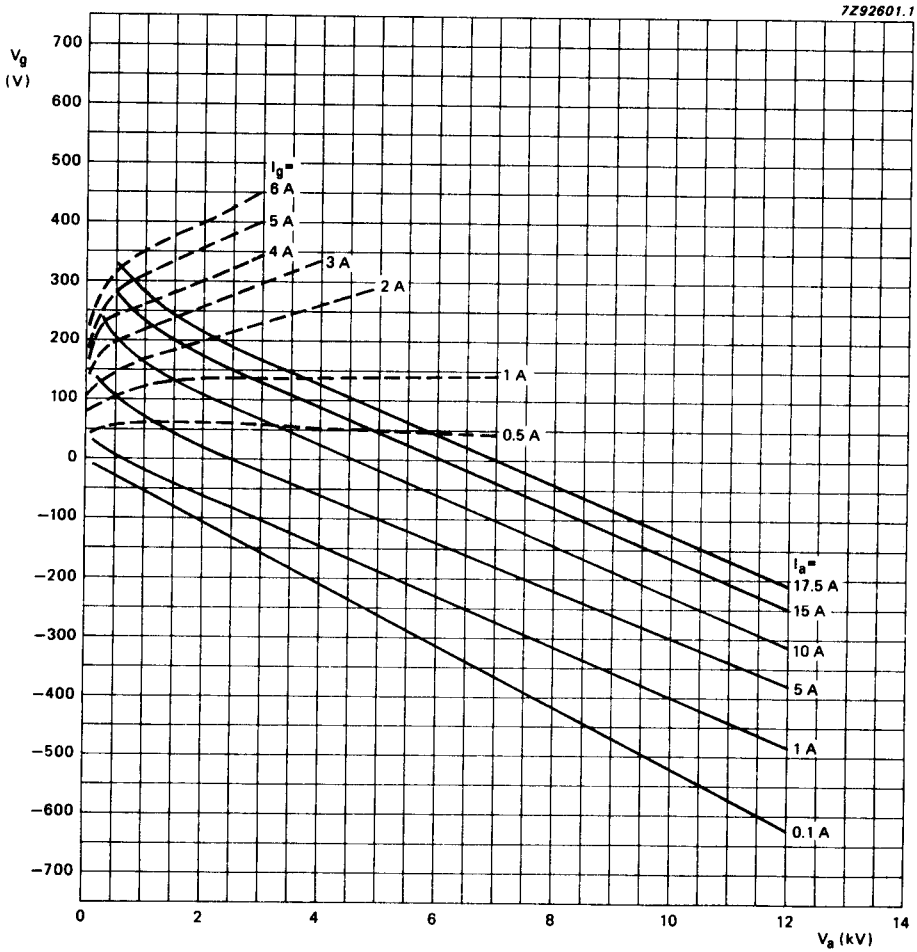


Fig. 3 Constant current characteristics.

PHILIPS

Data handbook



Electronic
components
and materials

YD1174 YD1178

page	sheet	date
1	215	1988.02
2	216	1988.02
3	217	1988.02
4	218	1988.02
5	219	1988.02
6	220	1988.02
7	221	1988.02
8	FP	2000.08.27