

RF POWER TRIODE

Triodes in metal-ceramic construction intended for use as industrial oscillators.
The YD1175 is forced-air cooled.
The YD1177 has an integral water cooler.

QUICK REFERENCE DATA

Oscillator output power ($W_o - W_{\text{feedb}}$), typical	W_{osc}	26,5 kW
Frequency for full ratings	f max	120 MHz

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

RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

Operating conditions

	f	120	120	120	MHz
Frequency	f	120	120	120	MHz
Oscillator output power ($W_o - W_{\text{feedb}}$)	W_{osc}	15,6	22,0	26,5	kW
Anode voltage	V_a	6	8	10	kV
Anode current	I_a	3,6	3,6	3,4	A
Anode input power	W_{ia}	21,6	28,8	34,0	kW
Anode dissipation	W_a	5,4	6,1	6,8	kW
Anode output power	W_o	16,2	22,7	27,2	kW
Anode efficiency	η_a	75	78,8	80	%
Oscillator efficiency	η_{osc}	72,2	76,3	78,0	%
Feedback ratio	V_{g_p}/V_{a_p}	12	10	9	%
Grid resistor	R_g	300	400	560	Ω
Grid current, on load	I_g	1,0	1,0	0,9	A
Grid voltage, negative	$-V_g$	300	400	500	V
Grid dissipation	W_g	290	290	240	W
Grid resistor dissipation	W_{Rg}	300	400	450	W

LIMITING VALUES (Absolute maximum rating system)

Frequency for full ratings		f	up to	120 MHz*
Anode voltage		V_a	max.	12 kV
Anode current		I_a	max.	4 A
Anode input power		W_{ia}	max.	40 kW
Anode dissipation	YD1175	W_a	max.	10 kW
	YD1177	W_a	max.	15 kW
Grid voltage		$-V_g$	max.	1,5 kV
Grid current, on load		I_g	max.	1,1 A
off load		I_g	max.	1,6 A
Grid dissipation		W_g	max.	350 W
Grid circuit resistance		R_g	max.	10 k Ω
Cathode current, mean		I_k	max.	5 A
peak		I_{kp}	max.	25 A
Envelope temperature		T_{env}	max.	240 °C

HEATING: direct; filament thoriated tungsten

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, as 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.

* When the tubes are to be used at frequencies above 30 MHz the manufacturer should be consulted for more detailed information.

CAPACITANCES

Anode to filament	C_{af}	0,4 pF
Grid to filament	C_{gf}	47 pF
Anode to grid	C_{ag}	17 pF

CHARACTERISTICS measured at $V_a = 8 \text{ kV}$, $I_a = 1,2 \text{ A}$

Transconductance	S	35 mA/V
Amplification factor	μ	45

COOLING

To obtain optimum life, the temperatures 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.

YD1175**Table 1** Air cooling characteristics

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.

YD1177

Table 2 Water cooling characteristics

anode + grid dissipation $W_a + W_g$ kW	inlet temperature T_i °C	rate of flow q_{min} ℓ/min	pressure drop ΔP kPa*	max. outlet temperature T_o °C
15	20	7,5	50	50
	50	11,0	100	71
10	20	5,0	24	51
	50	7,2	47	72
5	20	2,5	7	53
	50	3,7	17	73

Absolute max. water inlet temperature

T_i max. 50 °C

Absolute max. water pressure

P_{max} 600 kPa*

ACCESSORIES

Filament connector with cable

type 40692A

Filament/cathode connector with cable

type 40693A

Grid connector $f \leq 4$ MHz

type 40690

$f > 4$ MHz

type 40691

Insulating pedestal (YD1175 only)

type 40654

* 100 kPa \approx 1 at

MECHANICAL DATA

YD1175

Mounting position: vertical with anode up or down

Net mass: 7,5 kg

Dimensions in mm

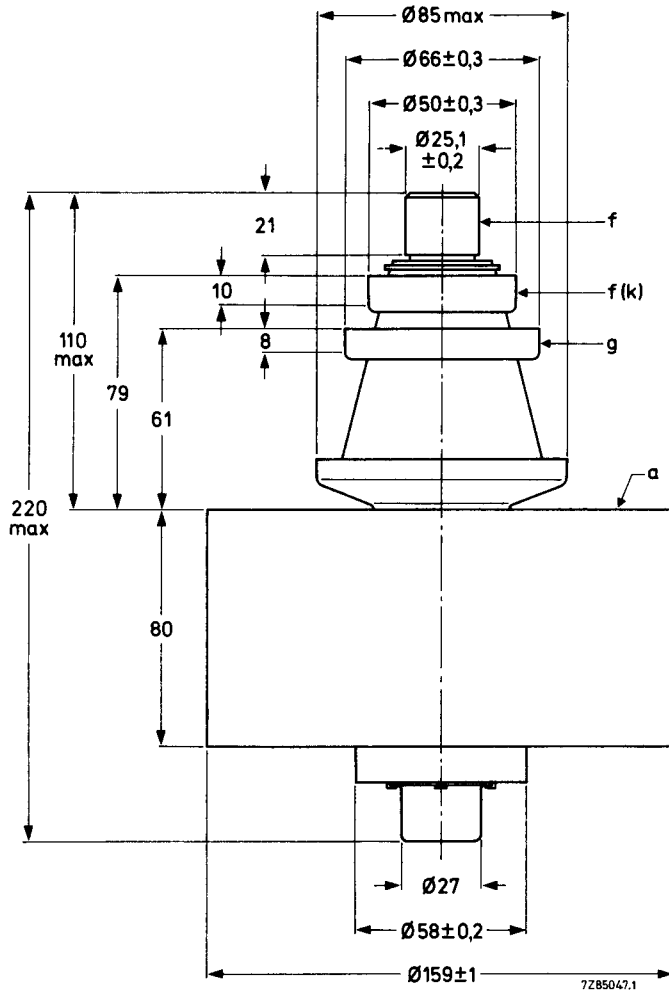


Fig. 1 Mechanical outline – YD1175.

YD1177

Mounting position: vertical with anode up or down

Net mass: approx. 2,4 kg

Dimensions in mm

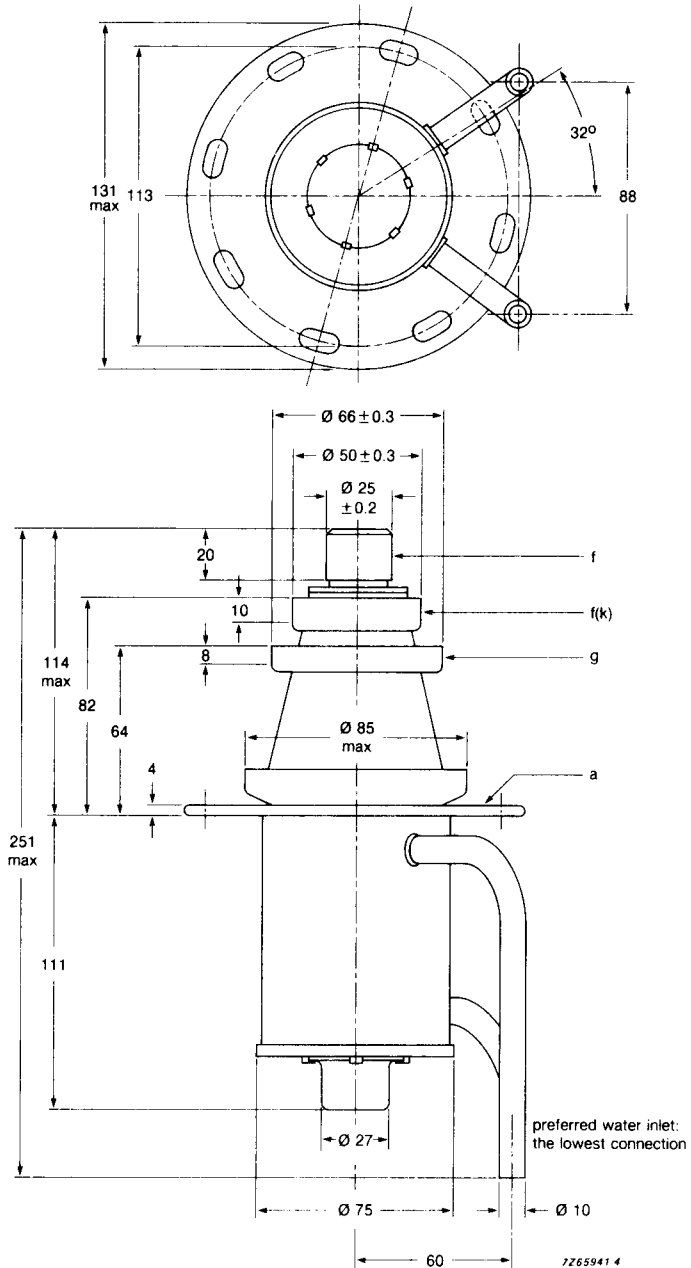


Fig. 2 Mechanical outline – YD1177.

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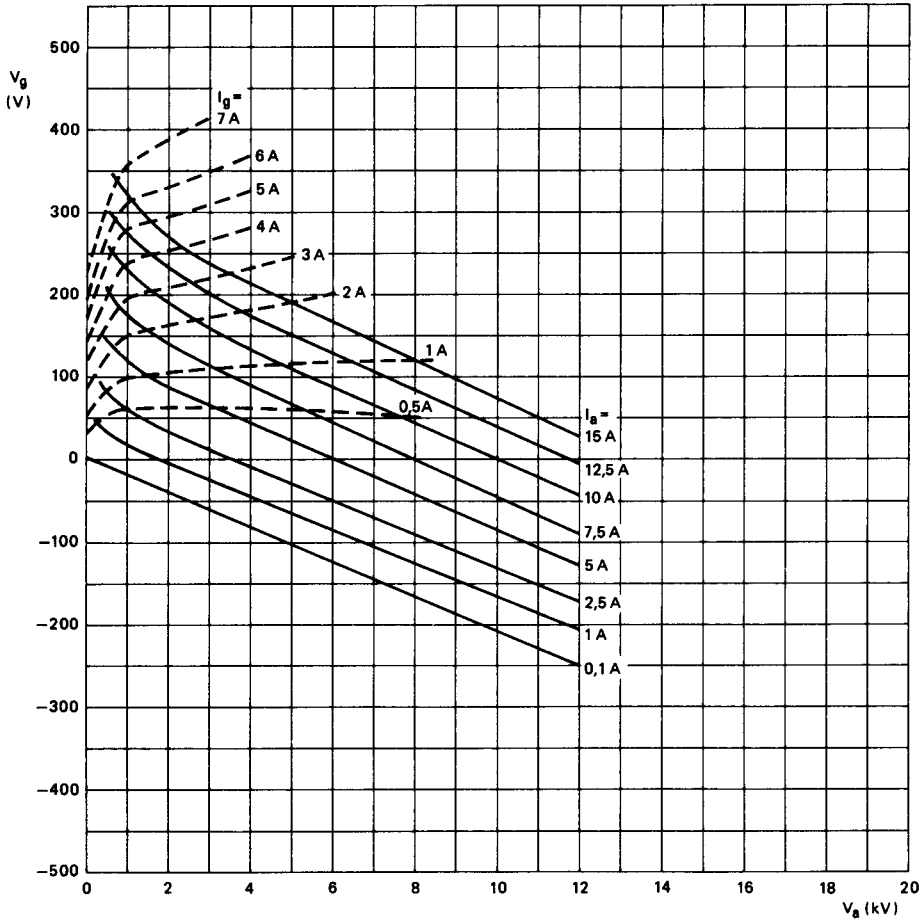


Fig. 3 Constant current characteristics.

PHILIPS

Data handbook



Electronic
components
and materials

YD1175 YD1177

page	sheet	date
1	223	1988.02
2	224	1988.02
3	225	1988.02
4	226	1988.02
5	227	1988.02
6	228	1988.02
7	229	1988.02
8	FP	2000.08.27