

## RF POWER TRIODE

Triodes in metal-ceramic construction intended for use as industrial oscillators.  
The YD1185 is forced-air cooled  
The YD1187 is water cooled by an integral cooler.

## QUICK REFERENCE DATA

Oscillator output power ( $W_o - W_{\text{feedb}}$ ), typical	$W_{\text{osc}}$	50	kW
Frequency for full ratings	f max.	100	MHz

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

## RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

## OPERATING CONDITIONS

Frequency	f	90	90	90	MHz
Oscillator output power ( $W_o - W_{\text{feedb}}$ )	$W_{\text{osc}}$	33,4	40	50	kW
Anode voltage	$V_a$	8,5	10	12	kV
Anode current	$I_a$	5,4	5,33	5,33	A
Anode input power	$W_{ia}$	45,9	53,3	64	kW
Anode dissipation	$W_a$	11,4	12,1	12,8	kW
Anode output power	$W_o$	34,5	41,2	51,2	kW
Anode efficiency	$\eta_a$	75,1	77,3	80,0	%
Oscillator efficiency	$\eta_{\text{osc}}$	72,7	75,0	78,1	%
Feedback ratio	$V_{gp}/V_{ap}$	11	10,2	9	%
Grid resistor	$R_g$	330	400	430	$\Omega$
Grid current, on load	$I_g$	1,5	1,45	1,4	A
Grid voltage, negative	$-V_g$	495	580	600	V
Grid dissipation	$W_g$	400	380	360	W
Grid resistor dissipation	$W_{Rg}$	740	840	840	W

**LIMITING VALUES** (Absolute max. rating system)

Frequency for full ratings	$f$	up to	100	MHz
Anode voltage	$V_a$	max.	14,4	kV
Anode current	$I_a$	max.	6	A
Anode input power	$W_{i_a}$	max.	72	kW
Anode dissipation, continuous service (YD1185)* (YD1187)	$W_a$	max.	15	kW
	$W_a$	max.	20	kW
Grid voltage	$-V_g$	max.	1,5	kV
Grid current, on load off load	$I_g$	max.	1,6	A
	$I_g$	max.	2,4	A
Grid dissipation	$W_g$	max.	500	W
Grid circuit resistance	$R_g$	max.	10	k $\Omega$
Cathode current, mean peak	$I_k$	max.	7,5	A
	$I_{k_p}$	max.	40	A
Envelope temperature	$T_{env}$	max.	240	$^{\circ}C$

**HEATING** : direct; thoriated tungsten filament, mesh construction

Filament voltage	$V_f$		7	V
Filament current	$I_f$		175	A
Peak filament starting current	$I_{f_p}$	max.	1000	A
Cold filament resistance	$R_{f_0}$		4,2	m $\Omega$

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 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 consult the manufacturer.

**CAPACITANCES**

Anode to filament	$C_{af}$		0,8	pF
Grid to filament	$C_{gf}$		66	pF
Anode to grid	$C_{ag}$		22	pF

\* See Fig. 4.

**CHARACTERISTICS** measured at  $V_a = 11$  kV,  $I_a = 1,5$  A

Transconductance	S	40	mA/V
Amplification factor	$\mu$	50	

**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.

**YD1185****Table 1** Air cooling characteristics

With insulating pedestal type 40648

Anode + grid dissipation $W_a + W_g$ (kW)	Altitude h (m)	Inlet temperature $T_i$ (°C)	Rate of flow $q_{min}$ (m <sup>3</sup> /min)	Pressure drop $\Delta P$ (Pa *)	Outlet temperature $T_o$ (°C)
15	0	35	15	850	92
10	0	35	9,3	350	99
8	0	35	7	220	104
15	0	45	17,3	1060	98
10	0	45	10,7	440	104
8	0	45	8,1	270	108
15	1500	35	18	970	93
10	1500	35	11,2	400	100
8	1500	35	8,4	250	104
15	3000	25	19	950	90
10	3000	25	11,8	390	95
8	3000	25	8,9	250	99

\* 1 Pa  $\approx$  0,1 mm H<sub>2</sub>O

**YD1187**

**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 $\Delta P$ (kPa*)	Outlet temperature $T_o$ (°C)
20	20	10	40	51
	50	15	80	71
15	20	7	22	54
	50	10, 5	43	73
10	20	4, 5	10	58
	50	6, 7	20	75

Absolute max. water inlet temperature

$T_i$  50 °C

Absolute max. water pressure

P 600 kPa\* (abs)

**ACCESSORIES**

Filament connector with cable	type	40708A	net mass	600	g
Filament/cathode connector with cable	type	40709A	net mass	640	g
Grid connector ≤ 4 MHz	type	40710	net mass	60	g
Grid connector > 4 MHz	type	40711	net mass	310	g
Insulating pedestal (YD1185 only)	type	40648	net mass	7, 15	kg

\* 100 kPa ≈ 1 at.

## MECHANICAL DATA

## YD1185

Mounting position: vertical with anode up or down

Net mass: approx. 12 kg

Dimensions in mm

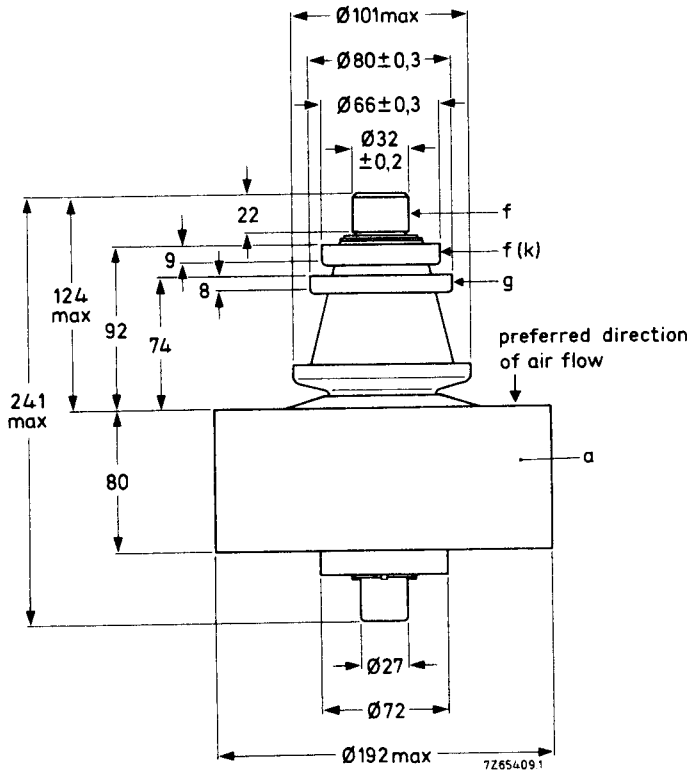


Fig. 1 Mechanical outline – YD1185.

YD1187

Mounting position : vertical, with anode up or down

Net mass : approx. 3,4 kg

Dimensions in mm

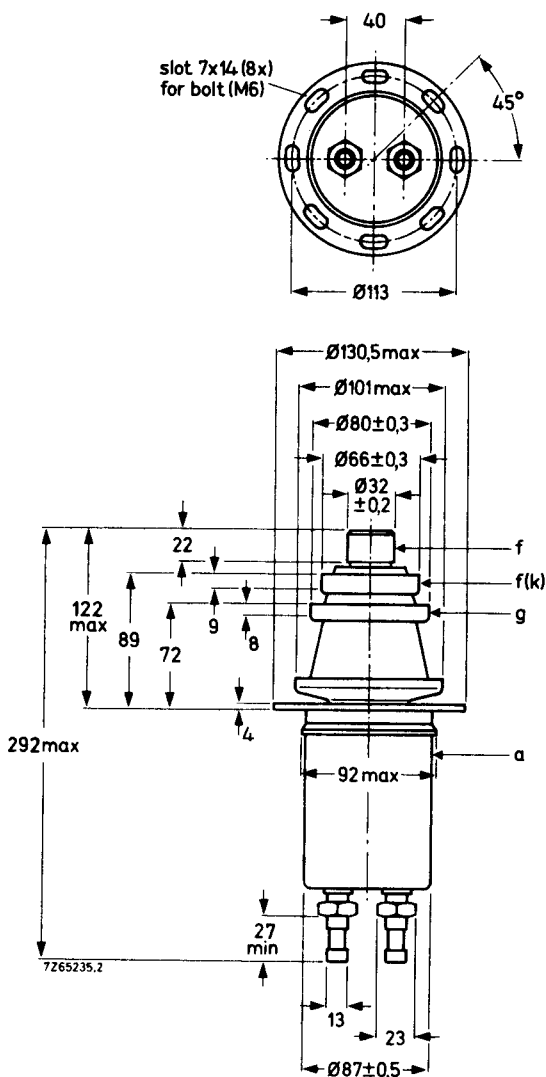


Fig. 2 Mechanical outline – YD1187.

Thread of water connections BSP 1/2 in

With the anode up the inlet and outlet connections should be interchanged.

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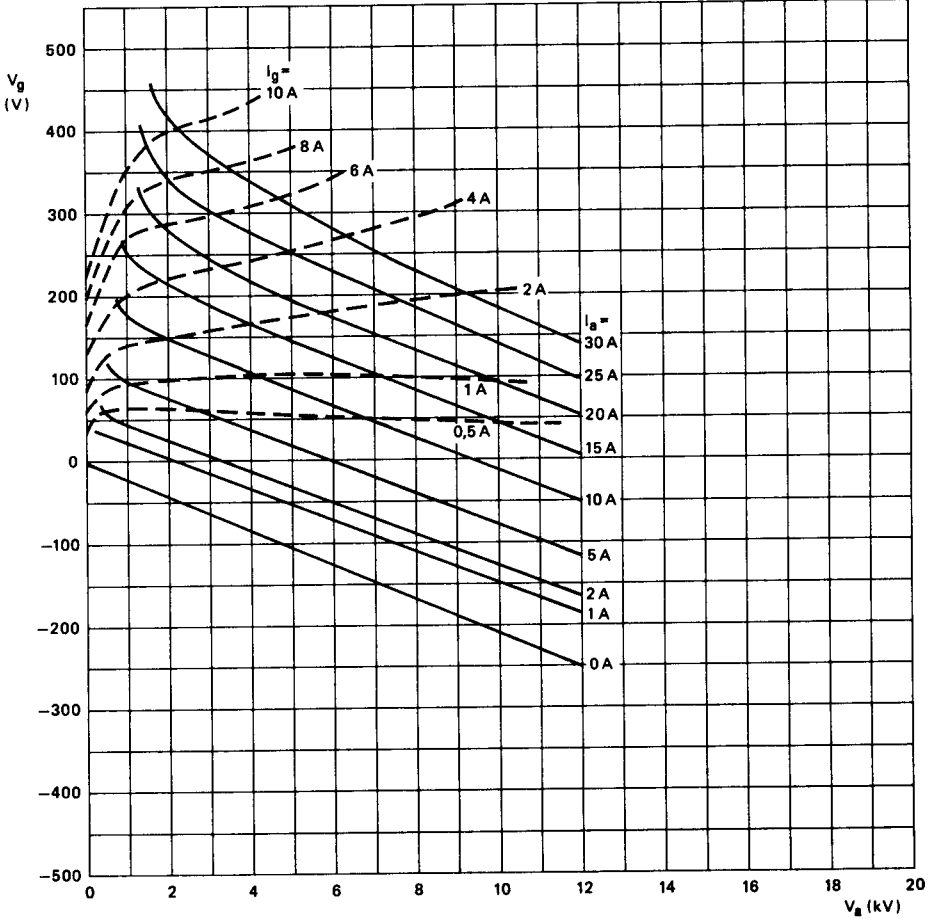


Fig. 3 Constant current characteristics.

YD1185

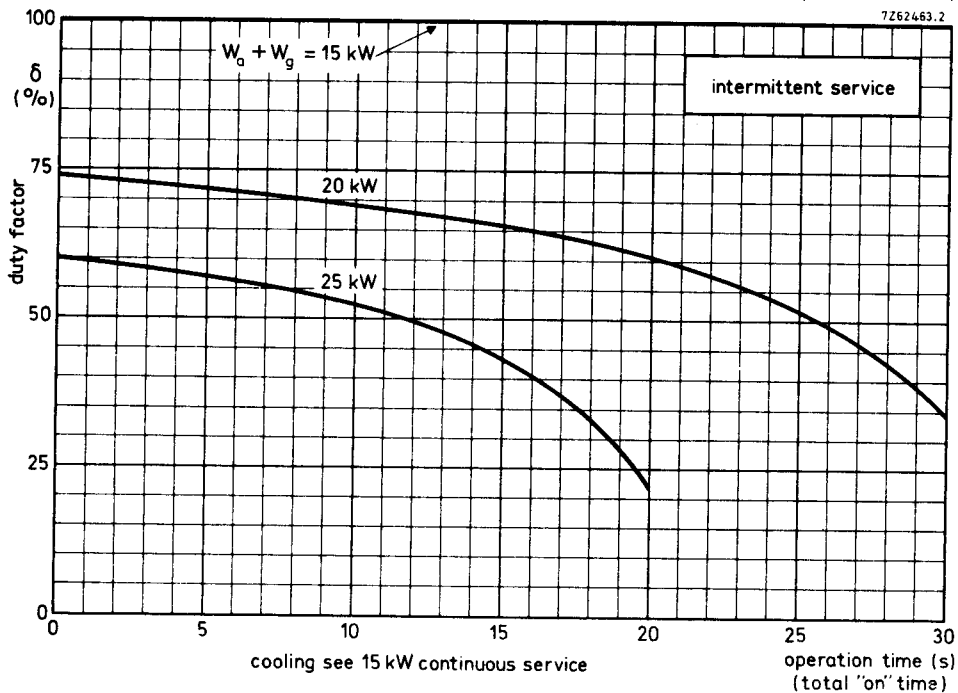
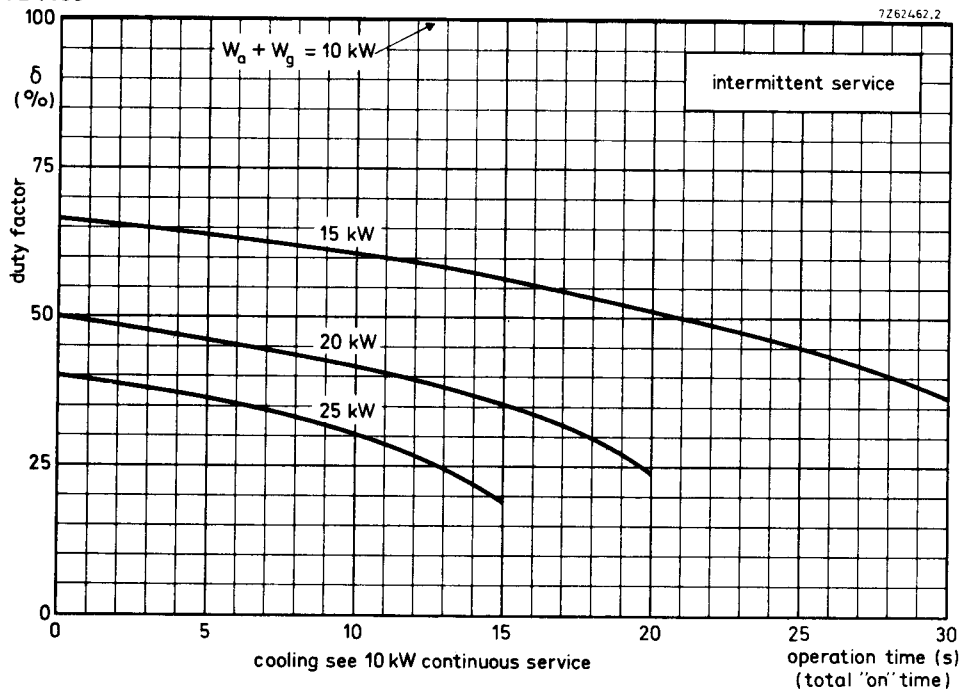


Fig. 4 (YD1185 only). Intermittent service. Limits of anode dissipation and cooling.



# PHILIPS

Data handbook



Electronic  
components  
and materials

YD1185 YD1187

<b>page</b>	<b>sheet</b>	<b>date</b>
1	239	1988.02
2	240	1988.02
3	241	1988.02
4	242	1988.02
5	243	1988.02
6	244	1988.02
7	245	1984.11
8	246	1988.02
9	FP	2000.09.09