

## RF POWER TRIODE

Triodes in metal-ceramic construction intended for use as industrial oscillators. The YD1170 is forced-air cooled. The YD1172 has an integral helical water cooler.

## QUICK REFERENCE DATA

Oscillator output power ( $W_o - W_{\text{feedback}}$ ), typical	$W_{\text{osc}}$	15,4 kW
Frequency for full ratings	f	max. 120 MHz

To be read in conjunction with "General Operational Recommendations Transmitting Tubes for Communication; Tubes for R.F. Heating".

## RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

## OPERATING CONDITIONS

Frequency	f	120 MHz
Filament voltage	$V_f$	5,8 V
Oscillator output power ( $W_o - W_{\text{feedback}}$ )	$W_{\text{osc}}$	15,4 kW
Anode voltage	$V_a$	6 kV
Anode current	$I_a$	3,4 A
Anode input power	$W_{ia}$	20,4 kW
Anode dissipation	$W_a$	4,3 kW
Anode output power	$W_o$	16,1 kW
Anode efficiency	$\eta_a$	78,9 %
Oscillator efficiency	$\eta_{\text{osc}}$	75,5 %
Feedback ratio	$V_{gp}/V_{ap}$	15,5 %
Grid resistor	$R_g$	500 $\Omega$
Grid current, on load	$I_g$	920 mA
Grid voltage, negative	$-V_g$	460 V
Grid dissipation	$W_g$	280 W
Grid resistor dissipation	$W_{Rg}$	423 W

**LIMITING VALUES** (Absolute maximum rating system)

Frequency for full ratings	f	up to	120 MHz
Anode voltage	$V_a$	max.	7,2 kV
Anode current	$I_a$	max.	4 A
Anode input power	$W_{ia}$	max.	24 kW
Anode dissipation	$W_a$	max.	10 kW
Grid voltage	$-V_g$	max.	1,5 kV
Grid current			
on load	$I_g$	max.	1 A
off load	$I_g$	max.	1,5 A
Grid dissipation	$W_g$	max.	350 W
Grid circuit resistance	$R_g$	max.	10 k $\Omega$
Cathode current			
mean	$I_k$	max.	5 A
peak	$I_{kp}$	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 $\Omega$

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 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	$C_{af}$		0,8 pF
Grid to filament	$C_{gf}$		47 pF
Anode to grid	$C_{ag}$		25 pF

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

Transconductance

S 40 mA/V

Amplification factor

 $\mu$  30

## COOLING

To obtain optimum life, the temperature of the seals and of the envelope should, under normal operating conditions, be kept below  $200 \text{ }^\circ\text{C}$ .

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

## YD1170

Table 1 Air cooling characteristics

anode + grid dissipation $W_a + W_g$ kW	altitude h m	inlet temperature $T_i$ $^\circ\text{C}$	rate of flow $q_{\text{min}}$ $\text{m}^3/\text{min}$	pressure drop $\Delta P$ $P_a^*$	outlet temperature $T_o$ $^\circ\text{C}$
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.  $45 \text{ }^\circ\text{C}$ 

Direction of air flow

arbitrary

\*  $1 \text{ Pa} \approx 0,1 \text{ mm H}_2\text{O}$ .

YD1172

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
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

ACCESSORIES

Filament connector with cable

40692A

Filament/cathode connector with cable

40693A

Grid connector  $f \leq 4$  MHz

40690

$f > 4$  MHz

40691

Insulating pedestal (YD1170 only)

40654

\* 100 kPa  $\approx$  1 at

MECHANICAL DATA

YD1170

Mounting position: vertical with anode up or down

Net mass approx. 7 kg

Dimensions in mm

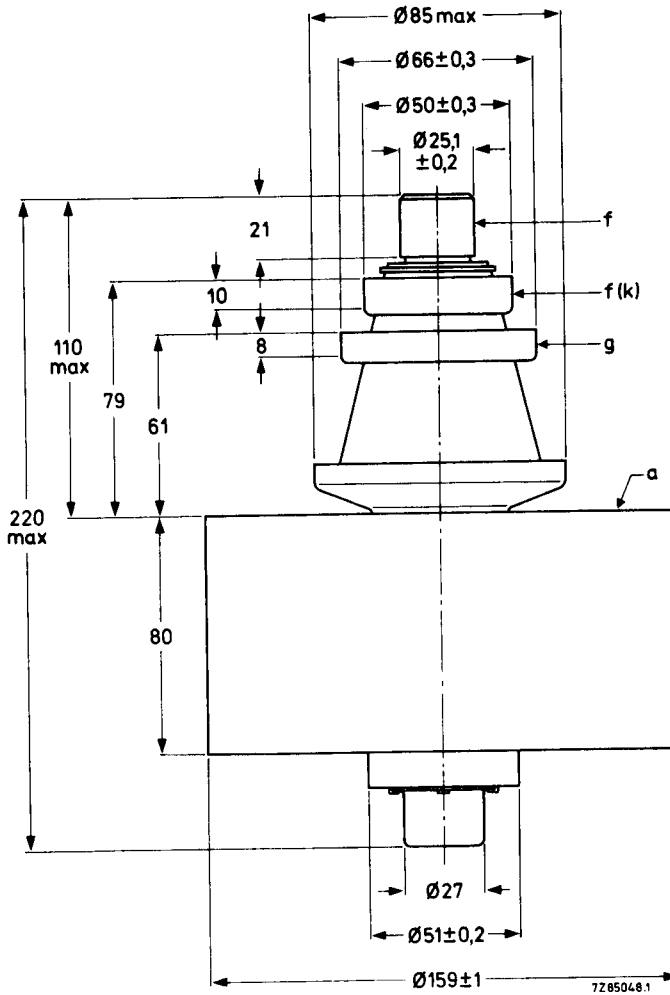


Fig. 1 Mechanical outline – YD1170.

YD1170  
YD1172

YD1172

Mounting position: vertical with anode up or down

Net mass: approx. 1,85 kg

Dimensions in mm

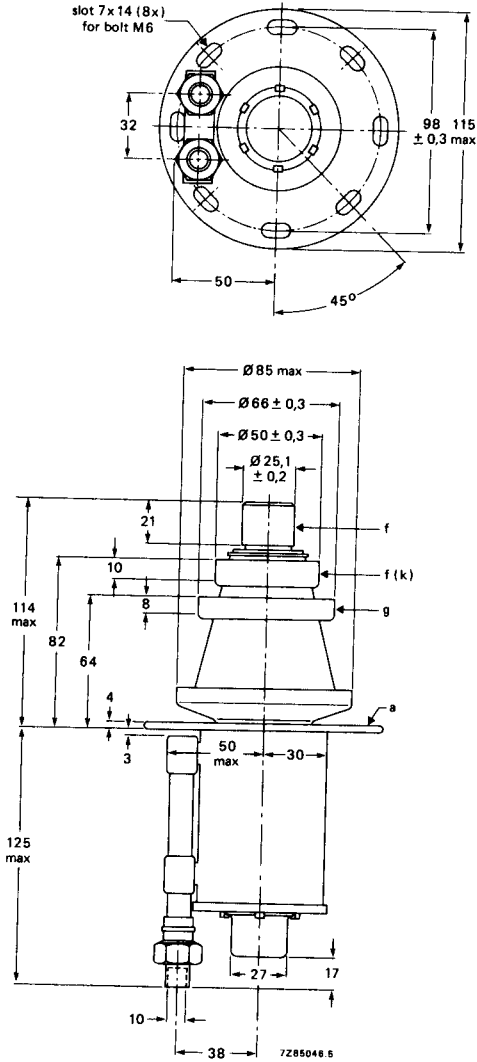


Fig. 2 Mechanical outline – YD1172.

Preferred water inlet  
the lowest connections

Thread of water connections BSP 3/8 in

7292826

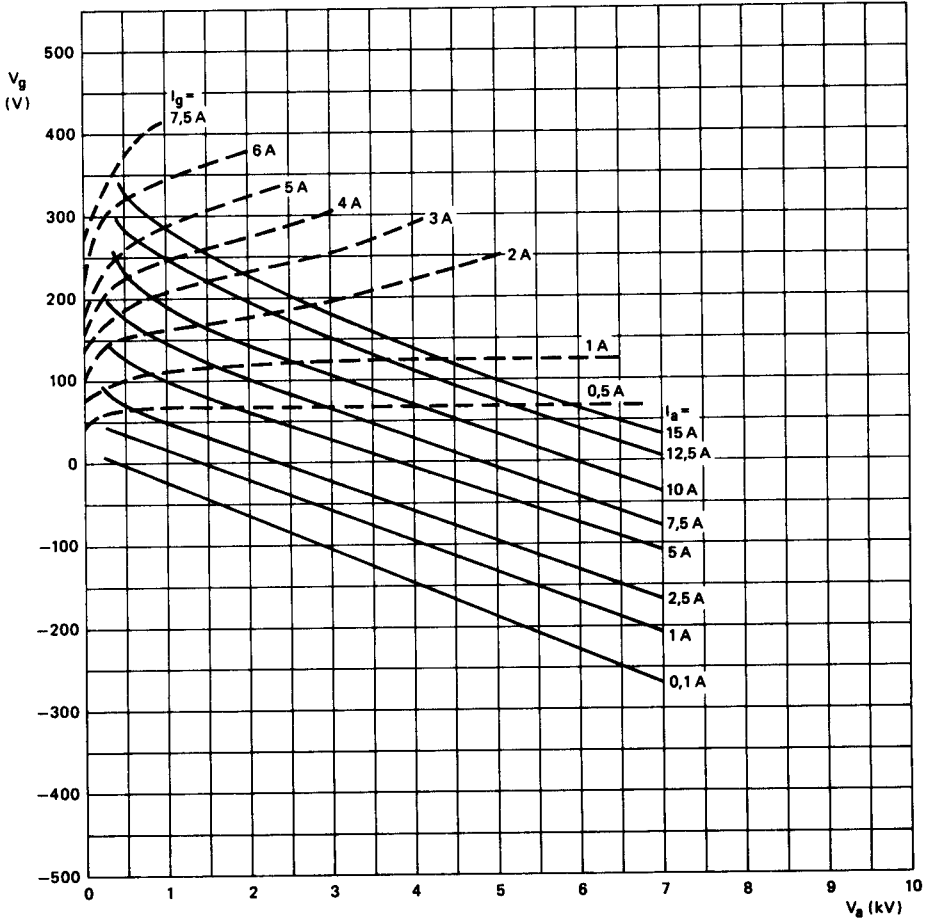


Fig. 3 Constant current characteristics.

# PHILIPS

Data handbook



Electronic  
components  
and materials

YD1170 YD1172

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