RF POWER TRIODE

Triodes in metal-ceramic construction intended for use as industrial oscillators.
The YD1190 is forced-air cooled.
The YD1192 has an integral water cooler.

QUICK REFERENCE DATA

Oscillator output power (W_o–W_{feedb}), typical	YD1190	W_{osc}		96	kW
	YD1192	W_{osc}		110	kW
Frequency for full ratings		f	max.	30	MHz

RF CLASS C OSCILLATOR FOR INDUSTRIAL USE

OPERATING CONDITIONS		YD1190/YD1192			YD1192	
Frequency	f	30	30	30	30	MHz
Oscillator output power (W_o–W_{feedb})	W_{osc}	62,7	84	96	110	kW
Anode voltage	V_a	8	10	12	12	kV
Anode current	I_a	10	11	10	12	A
Anode input power	W_{ia}	80	110	120	144	kW
Anode dissipation	W_a	15	23,4	22	31	kW
Anode output power	W_o	65	86,6	98	113	kW
Anode efficiency	η_a	81,2	78,7	81,7	78,5	%
Oscillator efficiency	η_{osc}	78,4	76,4	80	76,4	%
Feedback ratio	V_{gp}/V_{ap}	14,6	13,5	11	11,8	%
Grid resistor	R_g	300	333	400	364	Ω
Grid current, on load	I_g	2,25	2,25	2	2,2	A
Grid voltage, negative	$-V_g$	675	750	800	800	V
Grid dissipation	W_g	750	810	676	814	W
Grid resistor dissipation	W_{Rg}	1,52	1,7	1,6	1,76	kW

LIMITING VALUES (Absolute maximum rating system)

Frequency		f	up to	100	MHz*
Anode voltage		V_a	max.	13	kV
Anode current		I_a	max.	14	A
Anode input power	YD1190	W_{ia}	max.	144	kW
	YD1192	W_{ia}	max.	150	kW
Anode dissipation, continuous service	YD1190	W_a	max.	30	kW
Anode dissipation	YD1192	W_a	max.	50	kW
Grid voltage		$-V_g$	max.	1,5	kV
Grid current, on load		I_g	max.	2,8	A
Grid current, off load		I_g	max.	3,8	A
Grid dissipation		W_g	max.	1	kW
Grid circuit resistance		R_g	max.	10	kΩ
Cathode current, mean		I_k	max.	17,5	A
Cathode current, peak		I_{kp}	max.	70	A
Envelope temperature**		T_{env}	max.	240	°C

HEATING: direct; thoriated tungsten filament, mesh construction

Filament voltage	V_f		8,4	V
Filament current	I_f		235	A
Peak filament starting current	I_{fp}	max.	1500	A
Gold filament resistance	R_{fo}		3,9	mΩ

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

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

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

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}	1,3 pF
Grid to filament	C_{gf}	100 pF
Anode to grid	C_{ag}	45 pF

CHARACTERISTICS measured at V_a = 8 kV, I_a = 6 A

Transconductance	S	90 mA/V
Amplification factor	μ	30

COOLING

Table 1 Air cooling characteristics

YD1190

anode + grid dissipation $W_a + W_g$ kW	altitude h m	inlet temperature T_i °C	rate of flow q_{min} m³/min	pressure drop ΔP Pa*	outlet temperature T_o °C
30	0	35	34	1200	84
25	0	35	27,2	780	87
20	0	35	21,4	480	89
30	0	45	38	1500	91
25	0	45	30,4	980	93
20	0	45	23,9	600	95
30	1500	35	41	1380	84
25	1500	35	32,7	900	87
20	1500	35	25,7	550	89
30	3000	25	43	1350	79
25	3000	25	34,4	880	83
20	3000	25	27	540	85

The above cooling conditions apply to the air flow direction as indicated in the ouline drawing. In case of reversed flow direction a larger air volume will be required to keep the anode temperature below the limiting value.

* 1 Pa ≈ 0,1 mm H_2O.

Table 2 Water cooling characteristics

YD1192

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
50	20	26	60	49
	50	39	123	69
40	20	20	40	51
	50	30	80	71
30	20	14	21	53
	50	21	43	72
20	20	9	10	56
	50	13,5	20	74

Absolute maximum water inlet temperature	T_i	max.	50 °C
Absolute maximum water pressure	P	max.	600 kPa

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

At low frequencies the seals are sufficiently cooled when the filament connectors are water cooled with a flow of about 0,5 ℓ/min. At higher frequencies, however, an additional air flow of about 1 m^3/min must be led along the seals from a 30 mm diameter nozzle positioned at a distance of 200 mm from the tube header.

ACCESSORIES

Filament connector with cable	type 40705A
Filament/cathode connector with cable	type 40706A
Grid connector, $f > 4$ MHz	type 40736
$f \leqslant 4$ MHz	type 40707
Insulating pedestal (YD1190 only)	type 40729

* 100 kPa ≈ 1 at.

YD1190

MECHANICAL DATA

Dimensions in mm

Mounting position: vertical with anode up or down

Net mass: approx. 20 kg

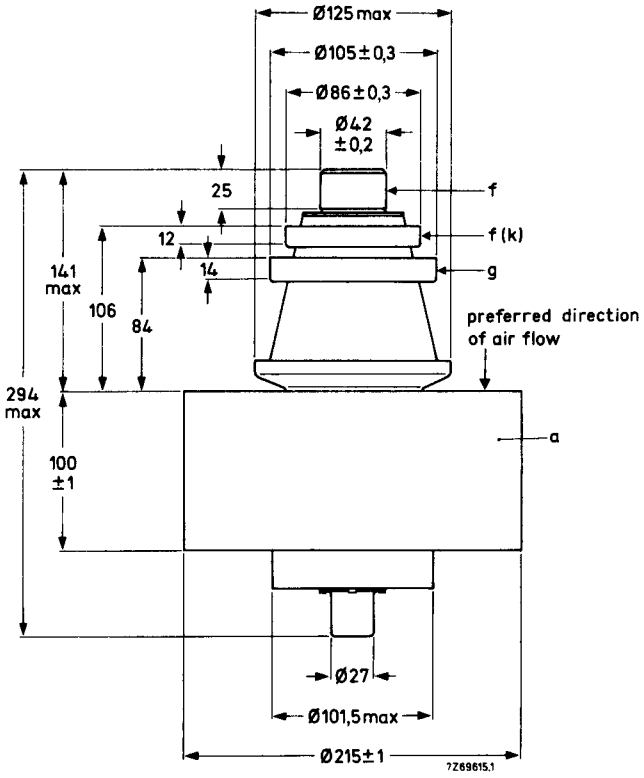

Fig. 1 Mechanical outline – YD1190.

YD1192

MECHANICAL DATA

Dimensions in mm

Mounting position: vertical with anode up or down

Net mass: ≈ 5,8 kg

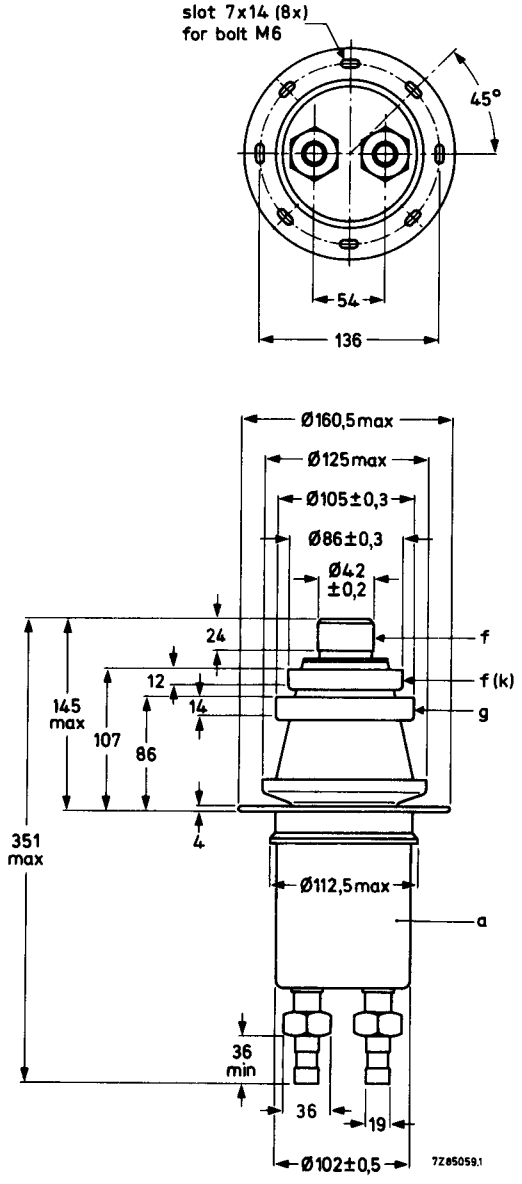

Fig. 2 Mechanical outline – YD1192.

Thread of water connections BSP 1 in

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

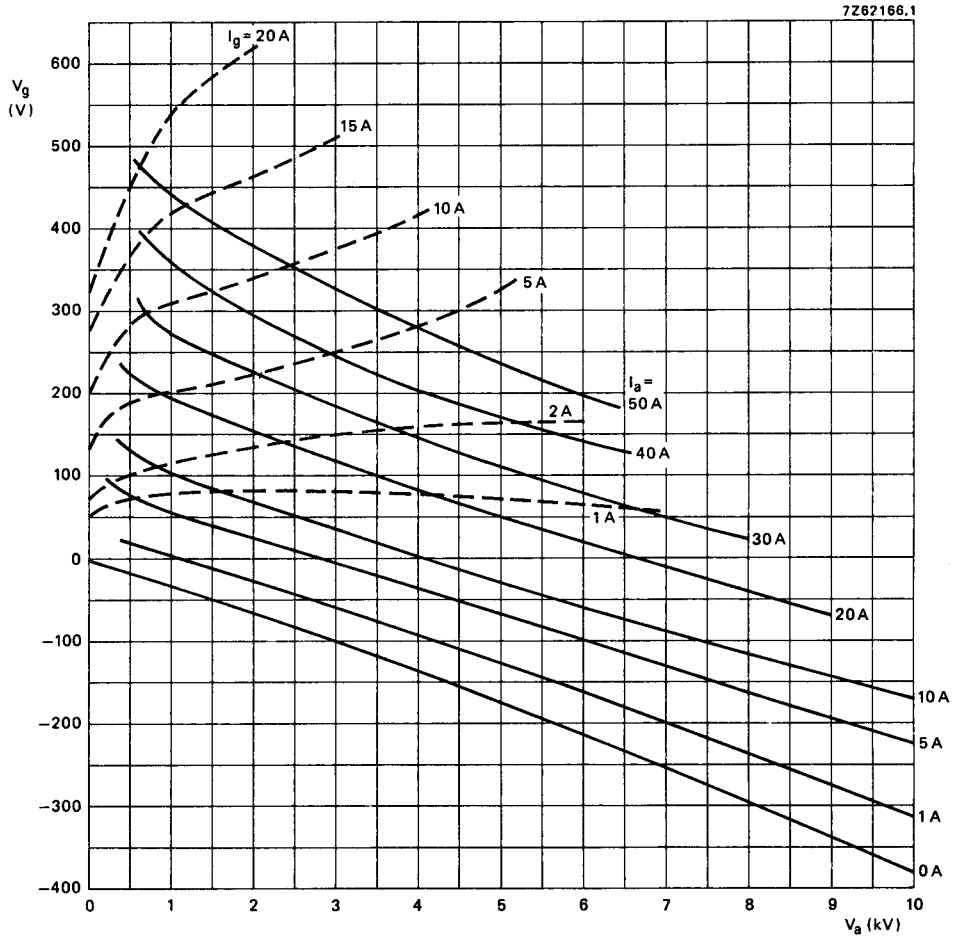

Fig. 3 Constant current characteristics.

PHILIPS

Data handbook

Electronic components and materials

YD1190 YD1192

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