

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 ($W_o - W_{\text{feedb}}$), 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 ($W_o - W_{\text{feedb}}$) | 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 k Ω |
| 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 m Ω |

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} m ³ /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 outline 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 \approx 0,1 mm H₂O.

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 m³/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 $f \leq 4$ MHz | type 40736 |
| | type 40707 |
| Insulating pedestal (YD1190 only) | type 40729 |

* 100 kPa \approx 1 at.

YD1190

MECHANICAL DATA

Dimensions in mm

Mounting position: vertical with anode up or down

Net mass: approx. 20 kg

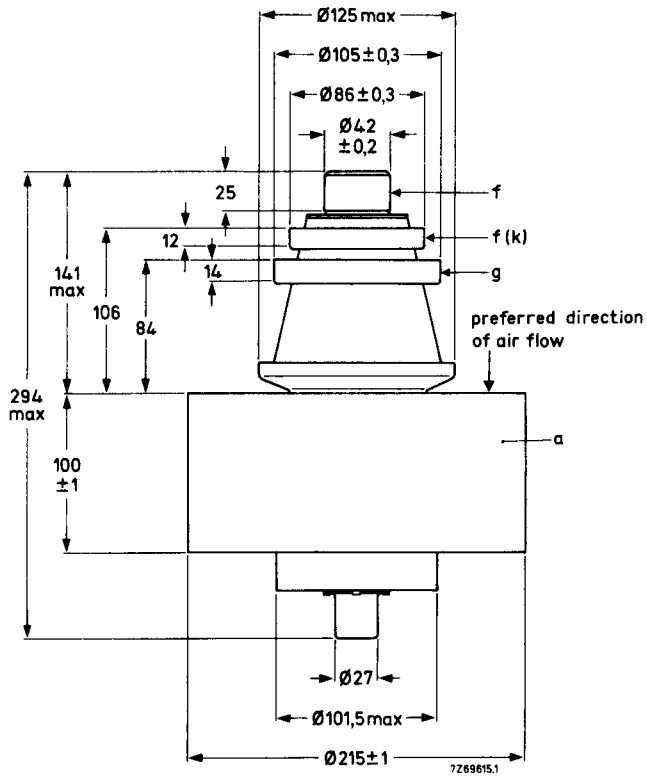


Fig. 1 Mechanical outline – YD1190.

YD1190
YD1192

YD1192

MECHANICAL DATA

Mounting position: vertical with anode up or down

Net mass: $\approx 5,8$ kg

Dimensions in mm

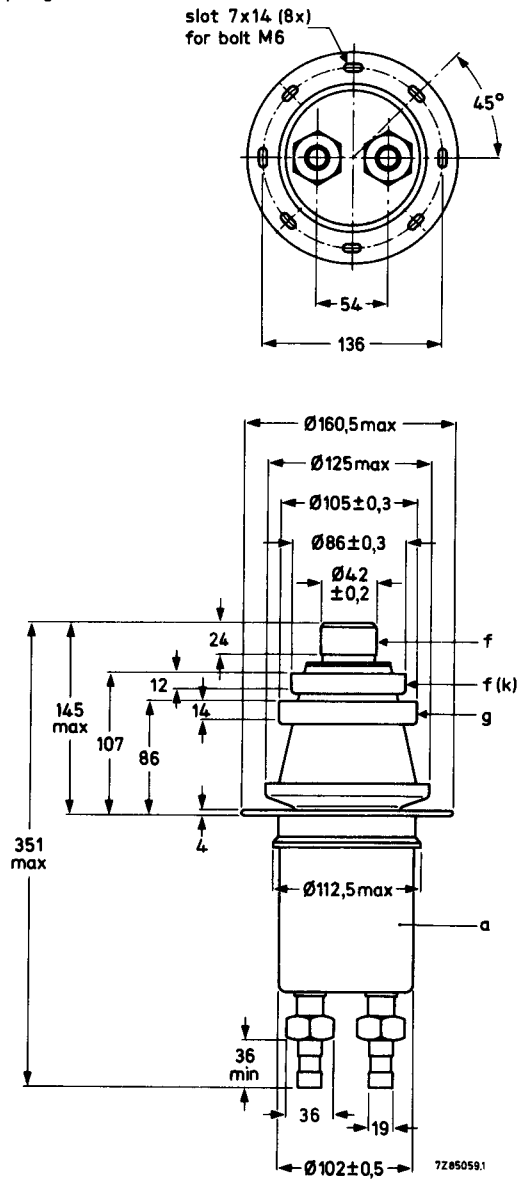


Fig. 2 Mechanical outline – YD1192.

Thread of water connections BSP 1 in

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

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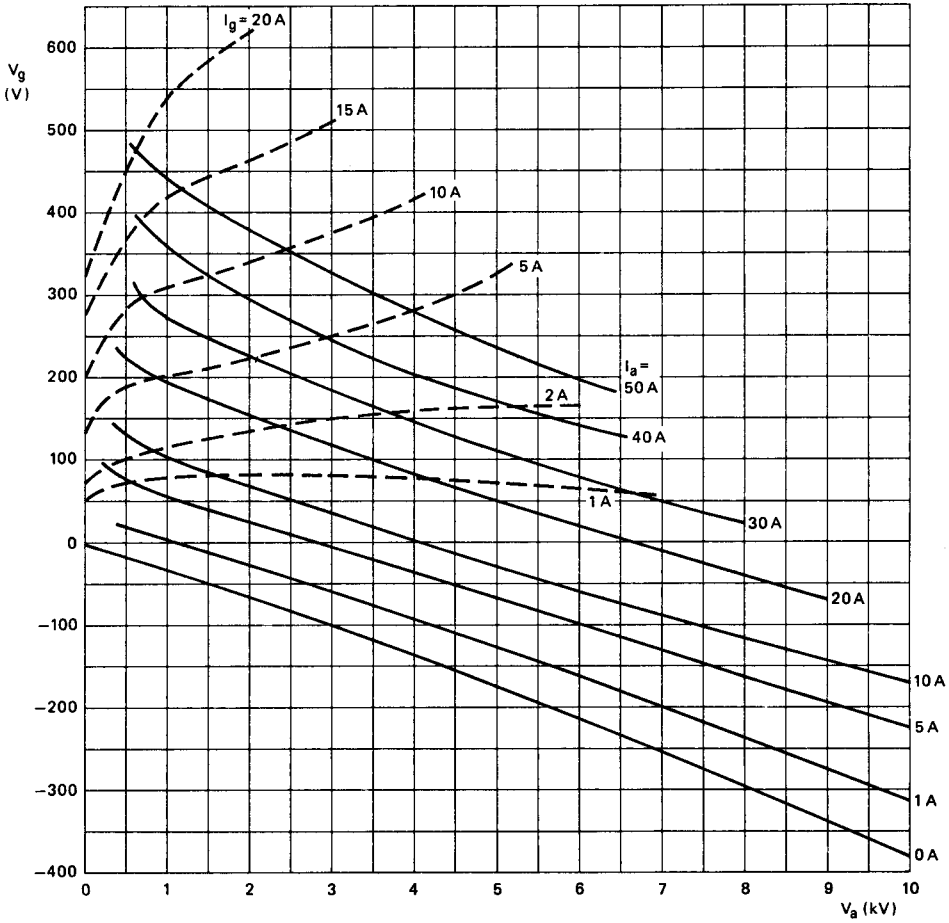


Fig. 3 Constant current characteristics.

PHILIPS

Data handbook



Electronic
components
and materials

YD1190 YD1192

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