

## RF POWER TRIODE

Triode in metal-ceramic construction intended for use as industrial oscillator. The YD1212 has an integral water cooler.

### QUICK REFERENCE DATA

|   |                  |        |
|---|------------------|--------|
| Oscillator output power ( $W_O - W_{\text{feedb}}$ ), typical | $W_{\text{osc}}$ | 240 kW |
| Frequency for full ratings                                    | f max.           | 30 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                   | 30 MHz       |
| Oscillator output power ( $W_O - W_{\text{feedb}}$ ) | $W_{\text{osc}}$    | 240 kW       |
| Anode voltage  | $V_a$               | 14 kV        |
| Anode current  | $I_a$               | 23,5 A       |
| Anode input power                                    | $W_{ia}$            | 329 kW       |
| Anode dissipation                                    | $W_a$               | 81,5 kW      |
| Anode output power                                   | $W_O$               | 247,5 kW     |
| Anode efficiency                                     | $\eta_a$            | 75,2 %       |
| Oscillator efficiency                                | $\eta_{\text{osc}}$ | 73 %         |
| Feedback ratio                                       | $V_{gp}/V_{ap}$     | 10,4 %       |
| Grid resistor  | $R_g$               | 135 $\Omega$ |
| Grid current, on load                                | $I_g$               | 6 A          |
| Grid voltage, negative                               | $V_g$               | -810 V       |
| Grid dissipation                                     | $W_g$               | 2,6 kW       |
| Grid resistor dissipation                            | $W_{Rg}$            | 4,86 kW      |

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

|                         |           |       |               |
|-------------------------|-----------|-------|---------------|
| Frequency               | f         | up to | 100 MHz*      |
| Anode voltage           | $V_a$     | max.  | 16,8 kV       |
| Anode current           | $I_a$     | max.  | 25 A          |
| Anode input power       | $W_{ia}$  | max.  | 375 kW        |
| Anode dissipation       | $W_a$     | max.  | 120 kW        |
| Grid voltage            | $-V_g$    | max.  | 2 kV          |
| Grid current            |           |       |               |
| on load                 | $I_g$     | max.  | 7 A           |
| off load                | $I_g$     | max.  | 8,5 A         |
| Grid dissipation        | $W_g$     | max.  | 3 kW          |
| Grid circuit resistance | $R_g$     | max.  | 10 k $\Omega$ |
| Cathode current         |           |       |               |
| mean                    | $I_k$     | max.  | 31 A          |
| peak                    | $I_{kp}$  | max.  | 175 A         |
| Envelope temperature    | $T_{env}$ | max.  | 240 °C        |

**HEATING:** direct; filament thoriated tungsten

|                                |          |                |
|--------------------------------|----------|----------------|
| Filament voltage               | $V_f$    | 12,6 V         |
| Filament current               | $I_f$    | 380 A          |
| Peak filament starting current | $I_{fp}$ | max. 2000 A    |
| Cold filament resistance       | $R_{fo}$ | 3,6 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 | $C_{af}$ | 3 pF   |
| Grid to filament  | $C_{gf}$ | 185 pF |
| Anode to grid     | $C_{ag}$ | 60 pF  |

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

**CHARACTERISTICS** measured at  $V_a = 14$  kV,  $I_a = 10$  A

|                      |       |          |
|----------------------|-------|----------|
| Transconductance     | S     | 190 mA/V |
| Amplification factor | $\mu$ | 40       |

**COOLING**

To obtain optimum life, the seal/envelope temperature under normal operating conditions should be kept below 200 °C.

At low frequencies the seals are sufficiently cooled if the filament connectors are water-cooled by a flow of about 0,5  $\ell$ /min. At higher frequencies, however, an additional air flow of about 4  $\text{m}^3$ /min must be led along the seals from a 50 mm diameter nozzle positioned at a distance of 250 mm from the tube header.

**Table 1** Air cooling characteristics

| anode + grid<br>dissipation<br>$W_a + W_g$<br>kW | inlet<br>temperature<br>$T_i$<br>°C | rate of<br>flow<br>$q_{\text{min}}$<br>$\ell$ /min | pressure<br>drop<br>$\Delta P$<br>kPa* | outlet<br>temperature<br>$T_o$<br>°C |
|--|-------------------------------------|--|--|--------------------------------------|
| 120  | 20                                  | 60   | 70                                     | 50                                   |
|  | 50                                  | 90   | 130                                    | 70                                   |
| 80   | 20                                  | 34   | 30                                     | 56                                   |
|  | 50                                  | 54   | 55                                     | 72                                   |
| 40   | 20                                  | 15   | 7                                      | 63                                   |
|  | 50                                  | 24   | 13                                     | 77                                   |

|                                       |       |          |
|---------------------------------------|-------|----------|
| Absolute max. water inlet temperature | $T_i$ | 50 °C    |
| Absolute max. water pressure          | P     | 600 kPa* |

**ACCESSORIES**

|                                       |      |        |
|---------------------------------------|------|--------|
| Filament connector with cable         | type | 40695A |
| Filament/cathode connector with cable | type | 40696A |
| Grid connector                        |      |        |
| $f \leq 4$ MHz                        | type | 40694  |
| $f > 4$ MHz                           | type | 40737  |

\* 100 kPa  $\approx$  1 at

**MECHANICAL DATA**

Mounting position: vertical with anode up or down

Net mass: approx. 15,6 kg

Dimensions in mm

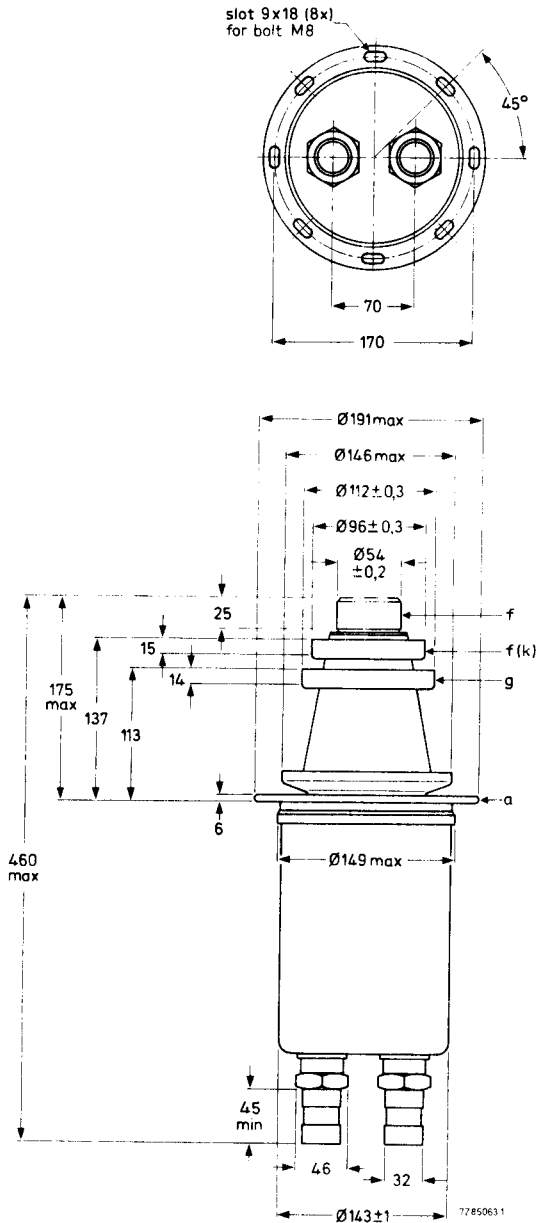


Fig. 1 Mechanical outline.

Thread of water connections BSP 1/4 in.

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

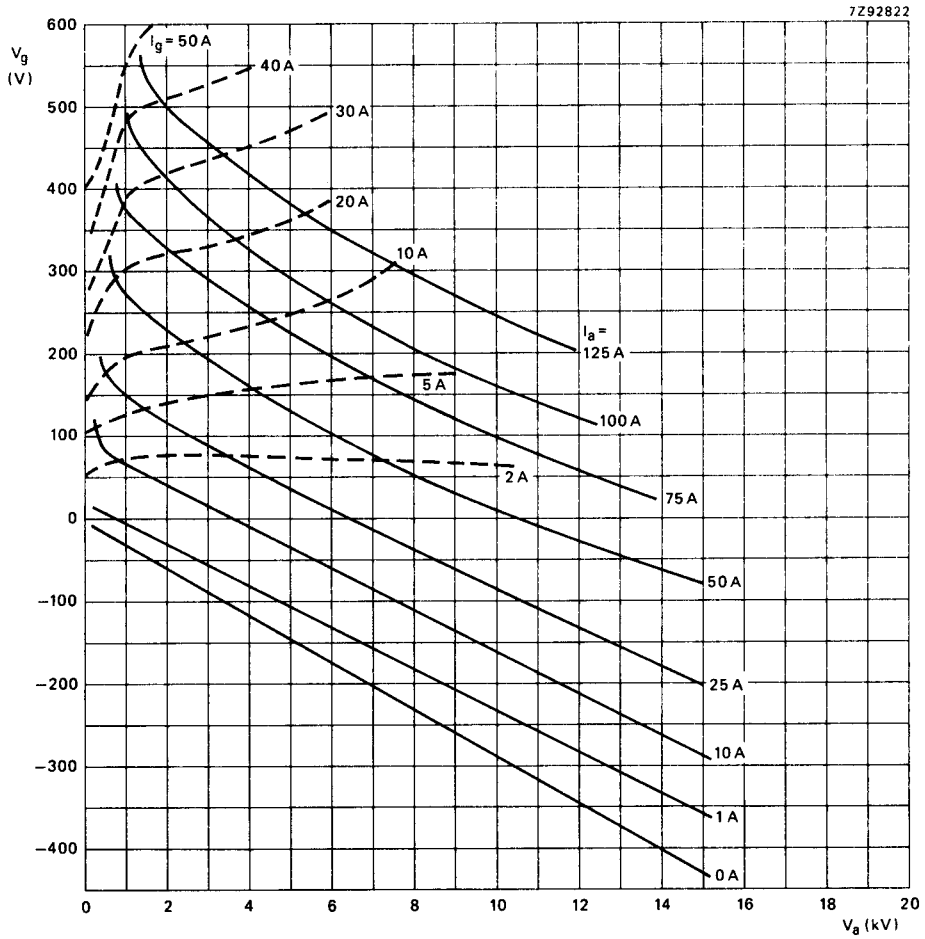


Fig. 2 Constant current characteristics.

# PHILIPS

Data handbook



Electronic  
components  
and materials

YD1212

| <b>page</b> | <b>sheet</b> | <b>date</b> |
|-------------|--------------|-------------|
| 1           | 275          | 1988.02     |
| 2           | 276          | 1988.02     |
| 3           | 277          | 1988.02     |
| 4           | 278          | 1988.02     |
| 5           | 279          | 1988.02     |
| 6           | FP           | 2000.09.09  |