

## RF POWER TRIODE

- Water cooled

### QUICK REFERENCE DATA

Industrial RF oscillator; class-C

| freq. | three phase |       |
|-------|-------------|-------|
|       | $V_a$       | $W_o$ |
| MHz   | kV          | kW    |
| 30    | 12          | 29,0  |
|       | 10          | 23,3  |
|       | 8           | 17,9  |

**HEATING:** direct; thoriated tungsten filament

|                          |          |   |                |
|--------------------------|----------|---|----------------|
| Filament voltage         | $V_f$    | = | 8,0 V          |
| Filament current         | $I_f$    | = | 98 A           |
| Cold filament resistance | $R_{fo}$ | = | 0,008 $\Omega$ |

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

The filament current must never exceed a peak value of 210 A instantaneously at any time during the initial energizing schedule.

### CAPACITANCES

|                                         |          |   |        |
|-----------------------------------------|----------|---|--------|
| Anode to all other elements except grid | $C_a$    | = | 0,4 pF |
| Grid to all other elements except anode | $C_g$    | = | 37 pF  |
| Anode to grid                           | $C_{ag}$ | = | 30 pF  |

### TYPICAL CHARACTERISTICS

|                      |       |   |         |
|----------------------|-------|---|---------|
| Anode voltage        | $V_a$ | = | 12 kV   |
| Anode current        | $I_a$ | = | 2 A     |
| Mutual conductance   | $S$   | = | 20 mA/V |
| Amplification factor | $\mu$ | = | 34      |

### TEMPERATURE LIMIT (Absolute limit)

|                  |      |        |
|------------------|------|--------|
| Seal temperature | max. | 220 °C |
|------------------|------|--------|

Generally, a low velocity air flow to the seals is required.

Table 1 Water cooling characteristics

 $T_i = \text{max. } 50\text{ }^{\circ}\text{C}$ 

| $W_a$<br>(kW) | $T_i$<br>( $^{\circ}\text{C}$ ) | $q_{\text{min}}^{1)}$<br>(l/min) | $\Delta P$<br>(kPa)* | max. outlet temperature<br>$T_o$ ( $^{\circ}\text{C}$ ) |
|---------------|---------------------------------|----------------------------------|----------------------|---------------------------------------------------------|
| 5             | 20                              | 6                                | 2                    | 35                                                      |
|               | 50                              | 15                               | 22                   | 56                                                      |
| 10            | 20                              | 11                               | 10                   | 35                                                      |
|               | 50                              | 25                               | 70                   | 56                                                      |
| 15            | 20                              | 16                               | 25                   | 35                                                      |
|               | 50                              | 37                               | 130                  | 56                                                      |
| 20            | 20                              | 22                               | 50                   | 35                                                      |
|               | 50                              | 49                               | 230                  | 56                                                      |

To ensure a uniform RF current distribution in the grid seal especially at frequencies higher than 4 MHz, the grid lead should be connected as shown below.

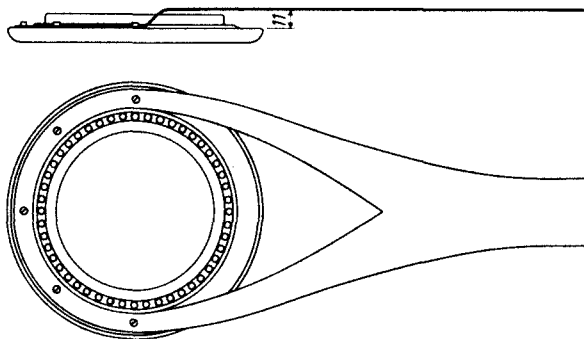


Fig. 1 Grid lead detail.

<sup>1)</sup> At inlet temperatures between 20 and 50  $^{\circ}\text{C}$  the required quantity of water can be found by proportional interpolation

\* 100 kPa  $\approx$  1 at

**MECHANICAL DATA**

Net weight of the tube : 2.8 kg

Net weight of water jacket: 2.1 kg

Dimensions in mm

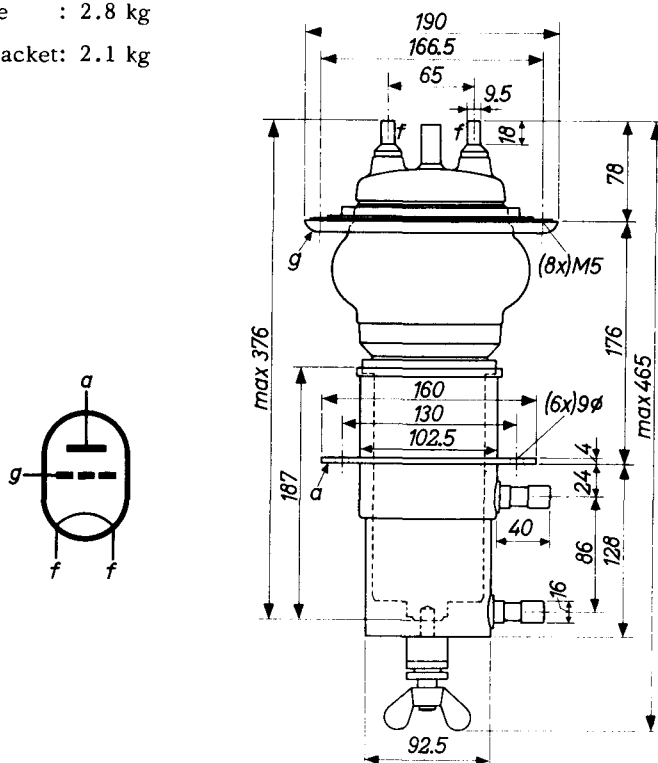


Fig. 2 Mechanical outline.

Tube with grid connector  
and water jacket

Mounting position: vertical with anode down

**ACCESSORIES**

Filament connectors

with cable : 40662

Grid connector : 40663

Water jacket : K717

O-ring : 2622 080 30895 (large)  
          : 2622 080 30736 (small)

**RF CLASS C OSCILLATOR FOR INDUSTRIAL USE** with anode voltage from  
three-phase half-wave rectifier without filter

## LIMITING VALUES (Absolute limits)

| Frequency               | f        | up to  | 30   | MHz        |
|-------------------------|----------|--------|------|------------|
| Anode voltage           | $V_a$    | = max. | 13   | kV         |
| Anode current           | $I_a$    | = max. | 4.8  | A          |
| Anode dissipation       | $W_a$    | = max. | 20   | kW         |
| Anode input power       | $W_{ia}$ | = max. | 60   | kW         |
| Negative grid voltage   | $-V_g$   | = max. | 1500 | V          |
| Grid current            | $I_g$    | = max. | 0.8  | A          |
| Grid circuit resistance | $R_g$    | = max. | 10   | k $\Omega$ |

## OPERATING CONDITIONS

|                                        |                       |   |      |      |      |                  |
|----------------------------------------|-----------------------|---|------|------|------|------------------|
| Frequency                              | f                     | = | 30   | 30   | 30   | MHz              |
| Transformer voltage                    | $V_{tr}$              | = | 8.9  | 7.4  | 6.0  | kV               |
| Anode voltage                          | $V_a$                 | = | 12   | 10   | 8    | kV               |
| Anode current, loaded                  | $I_a$                 | = | 3.2  | 3.2  | 3.2  | A                |
| Anode current, unloaded                | $I_a$                 | = | 0.52 | 0.50 | 0.48 | A                |
| Grid current, loaded                   | $I_g$                 | = | 0.50 | 0.50 | 0.50 | A                |
| Grid current, unloaded                 | $I_g$                 | = | 0.74 | 0.77 | 0.80 | A                |
| Grid resistor                          | $R_g$                 | = | 2.0  | 1.6  | 1.1  | k $\Omega$       |
| Load resistance                        | $R_{a\sim}$           | = | 1800 | 1450 | 1100 | $\Omega$         |
| Feedback ratio under loaded conditions | $V_{g\sim}/V_{a\sim}$ | = | 16   | 17   | 19   | %                |
| Anode input power                      | $W_{ia}$              | = | 38.4 | 32.0 | 25.6 | kW               |
| Anode dissipation                      | $W_a$                 | = | 9.4  | 8.7  | 7.7  | kW               |
| Output power                           | $W_o$                 | = | 29.0 | 23.3 | 17.9 | kW               |
| Efficiency                             | $\eta$                | = | 75.5 | 72.5 | 70   | %                |
| Output power in the load               | $W_l$                 | = | 25   | 20   | 15.5 | kW <sup>1)</sup> |

<sup>1)</sup> Useful power in the load measured in a circuit having an efficiency of 90%

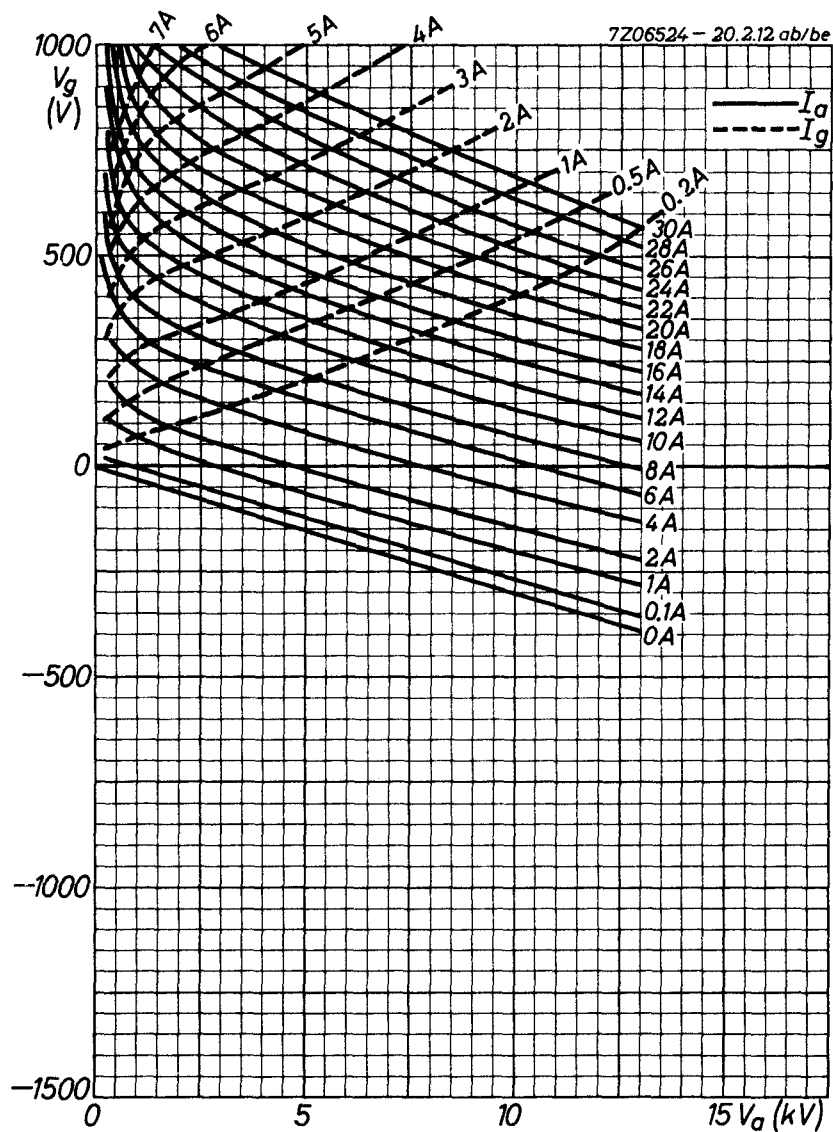


Fig. 3 Constant current characteristics.

# PHILIPS

## Data handbook



**Electronic  
components  
and materials**

**TBW12/25**

| <b>page</b> | <b>sheet</b> | <b>date</b> |
|-------------|--------------|-------------|
| 1           | 165          | 1988.02     |
| 2           | 166          | 1988.02     |
| 3           | 167          | 1988.02     |
| 4           | 168          | 1988.02     |
| 5           | 169          | 1988.02     |
| 6           | FP           | 2000.09.22  |