

# Water-Cooled Industrial Triode with Integral Water Jacket

Code: 3R/202S (Glass-metal envelope)

This triode has been specially designed for industrial heating applications. Design features give a high mutual conductance resulting in high efficiency with a low grid dissipation and large safety factor which are desirable when the valve is operated under variable-load conditions.

## CATHODE

Thoriated tungsten filament

Filament voltage

$5 \pm 5\%$

V

Filament current (nominal)

115

A

Maximum usable emission

18

A

It is recommended that some resistance or reactance be introduced into the filament supply to limit the surge peak current to about two and a half times the normal r.m.s. working value. This impedance may be short circuited if desired as soon as the surge has decayed.

For operation at high frequencies (above 30 MHz) it is recommended that the r.f. return path to the cathode should make connection to the larger filament terminal.

## CHARACTERISTICS

Amplification factor (at  $V_a = 2\text{kV}$ ,  $I_a = 0.25\text{A}$ )

12

Mutual conductance (at  $V_a = 2\text{kV}$ ,  $V_g = -75\text{V}$ )

32

mA/V

## DIRECT INTERELECTRODE CAPACITANCES

Grid to anode

30

pF

Grid to filament

60

pF

Anode to filament

1.5

pF

## COOLING REQUIREMENTS

For water cooling requirements see Figure 1.

Forced-air-cooling of grid and filament seals is required to limit their temperature to below the maximum permissible value of  $180^\circ\text{C}$ . An air flow of 50 ft<sup>3</sup>/min (1.42 m<sup>3</sup>/min) directed vertically downwards on to the seals is sufficient to meet these requirements.

Note.—It is important to observe the correct connection of water inlet and outlet points.

## MECHANICAL DATA

Dimensions

As shown in outline drawing

Mounting position

Vertical, anode upwards or downwards.

### Accessories

The following approved items are supplied separately under the codes indicated:

214-LVA-001A Filament connector, smaller

214-LVA-001B Filament connector, larger

214-LVA-001C Grid connector

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3R/202S—1

## ITT Components Group Europe Standard Telephones and Cables Limited

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# ITT

**COMPONENTS**

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**MAXIMUM RATINGS AND TYPICAL OPERATING CONDITIONS**

Class C. Industrial Heating R.F. Oscillator

**Maximum Ratings**

|                                                                  |        |     |
|------------------------------------------------------------------|--------|-----|
| Maximum anode voltage (peak value of direct voltage plus ripple) | 7      | kV  |
| Maximum direct anode current                                     | 3      | A   |
| Maximum direct anode dissipation (continuous)                    | 6      | kW  |
| Maximum direct grid dissipation (continuous)                     | 280    | W   |
| Maximum direct grid current (Note 1)                             | 700    | mA  |
| Maximum negative grid bias                                       | —1 500 | V   |
| Maximum frequency for above ratings                              | 50     | MHz |

Note 1.—This figure is given for guidance. Grid dissipation is absolute rating.

**Typical Operating Conditions**

|                                                    |           |           |    |
|----------------------------------------------------|-----------|-----------|----|
| Direct anode voltage                               | 6         | 6.5       | kV |
| Direct grid voltage                                | —670      | —770      | V  |
| Direct anode current                               | 2.5       | 3         | A  |
| Peak r.f. grid voltage                             | 950       | 1 050     | V  |
| Direct grid current (Note 2)                       | 450 (650) | 350 (500) | mA |
| Grid dissipation (Note 2)                          | 140       | 115       | W  |
| Grid resistor                                      | 1.5       | 2.2       | kΩ |
| Power input                                        | 15        | 19.5      | kW |
| Output power (oscillator)                          | 11.5      | 14.1      | kW |
| Power into load at 85 per cent transfer efficiency | 10        | 12        | kW |

Note 2.—Subject to wide variation dependent upon the impedance of the load circuit. The values of current shown in brackets are typical of off-load conditions and are given for guidance only: practical figures are dependent upon compensatory devices in the grid circuit.

**Class B. A.F. Power Amplifier or Modulator**  
(for balanced two-valve operation)

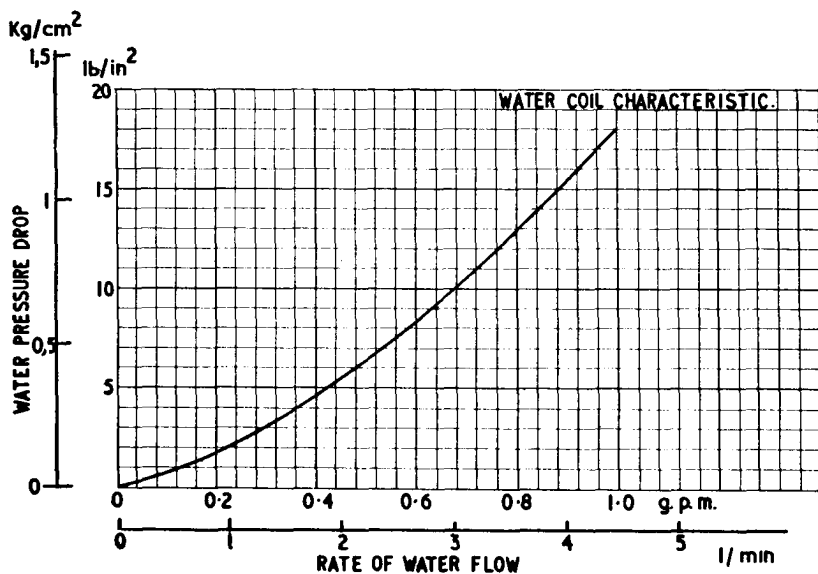
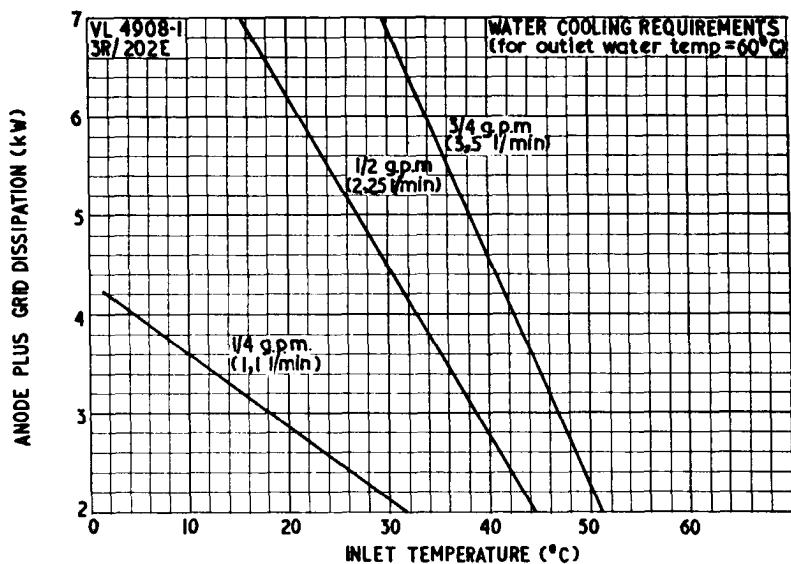
**Maximum Ratings**

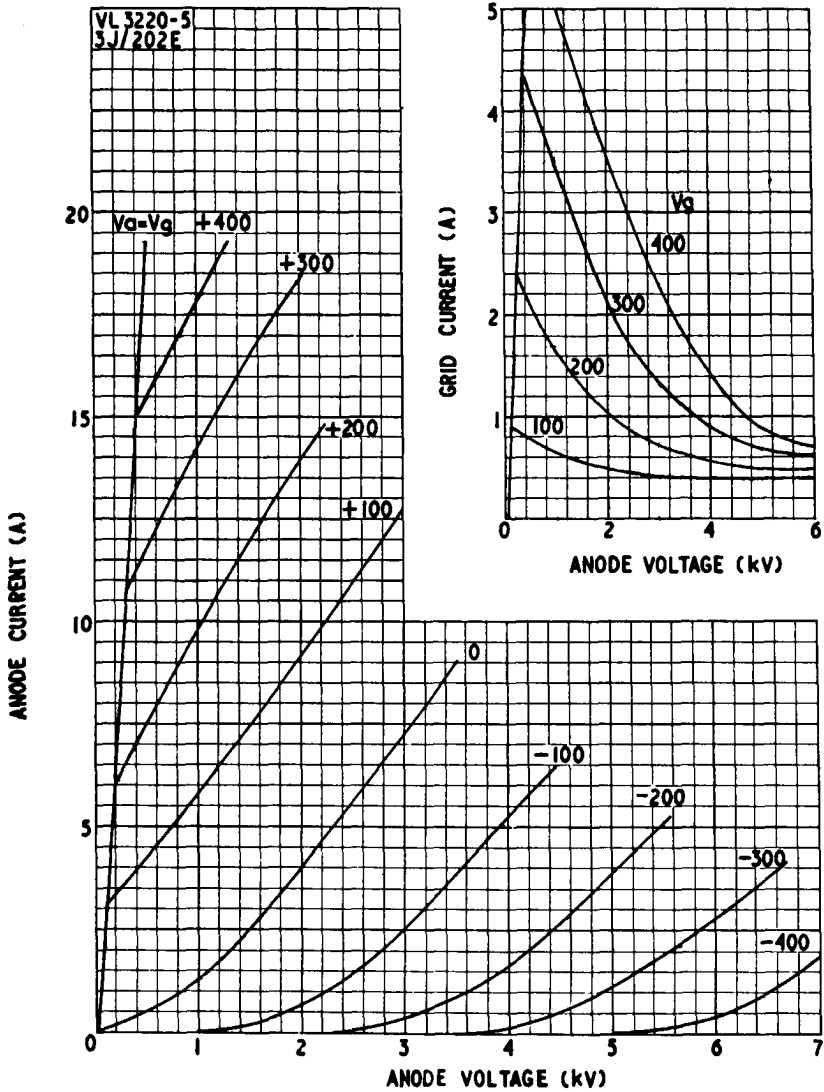
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|-------------------------------------------------|------|----|
| Maximum direct anode voltage                    | 7    | kV |
| Maximum direct anode current                    | 3    | A  |
| Maximum direct anode dissipation (intermittent) | 7    | kW |
| Maximum direct anode dissipation (continuous)   | 6    | kW |
| Maximum direct grid dissipation (continuous)    | 280  | W  |
| Maximum direct grid voltage                     | —1.5 | kV |

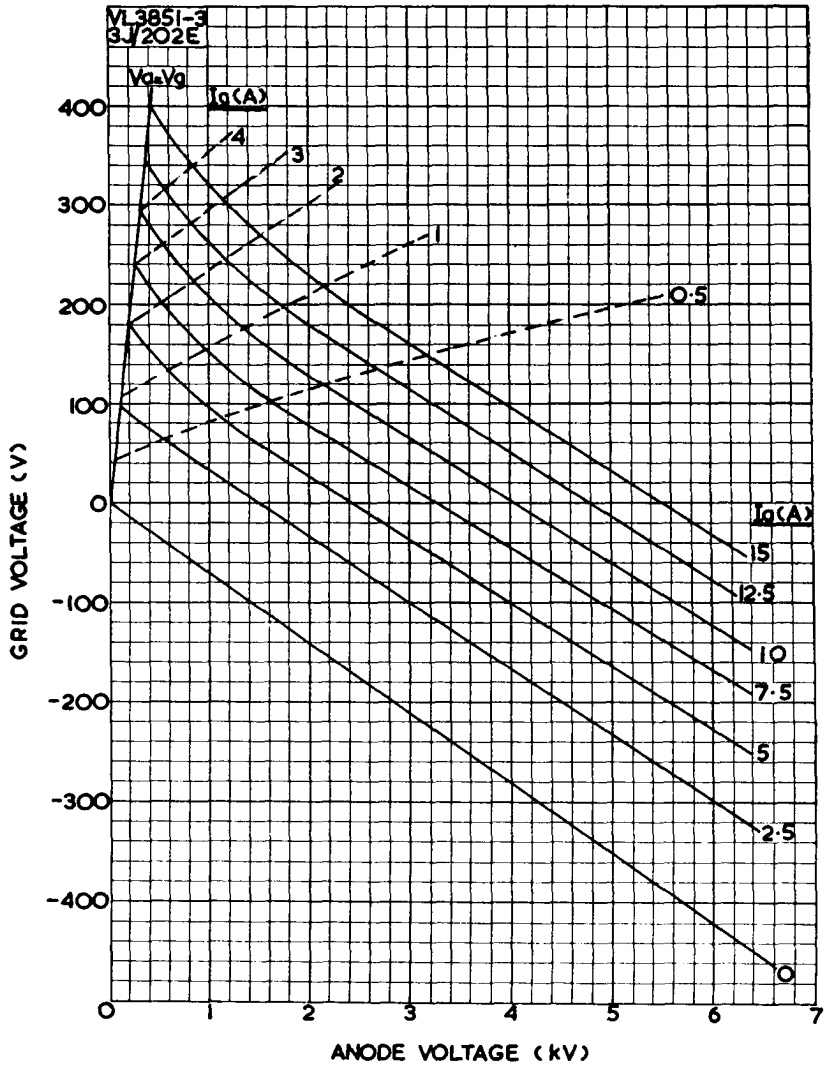
**Typical Operating Conditions**

|                                       |      |    |
|---------------------------------------|------|----|
| Direct anode voltage                  | 5    | kV |
| Direct grid voltage                   | —350 | V  |
| Direct anode current (zero signal)    | 0.5  | A  |
| Direct anode current (maximum signal) | 1.9  | A  |
| Load resistor, anode-to-anode         | 2.7  | kΩ |
| Peak a.f. grid to grid voltage        | 920  | V  |
| Grid drive power, approximately       | 75   | W  |
| Direct grid current                   | 84   | mA |
| Direct grid dissipation               | 7.6  | W  |
| Output power                          | 12   | kW |

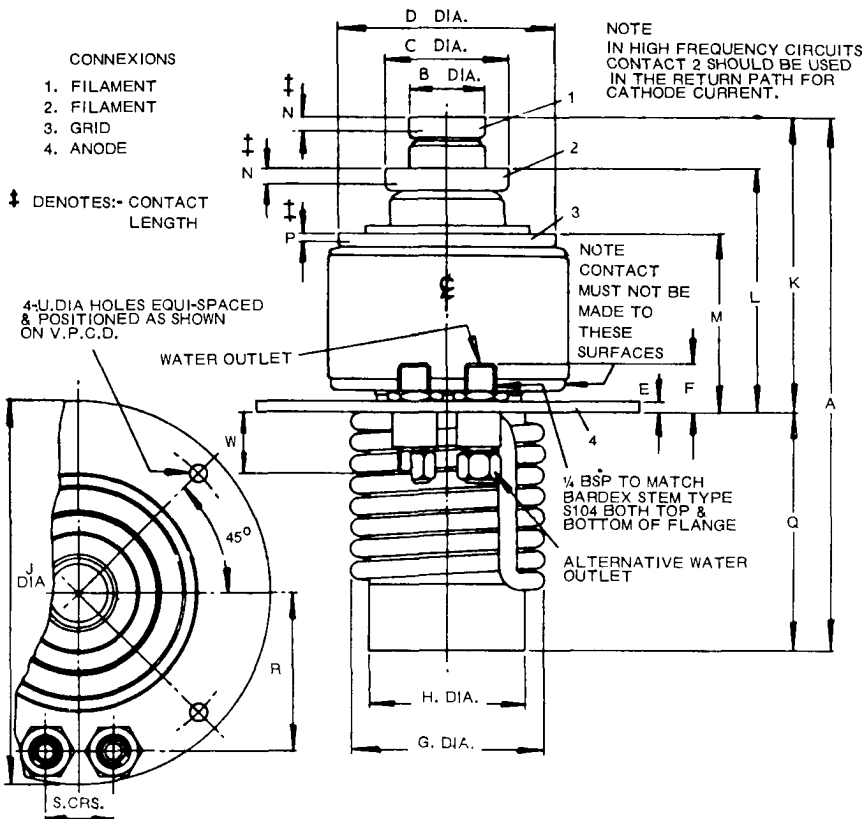
Fig. 1







## 3R/202S Outline



NOTE:- BASIC FIGURES ARE INCHES

| DIM. | MILLIMETRES | INCHES       | DIM. | MILLIMETRES       | INCHES             |
|------|-------------|--------------|------|-------------------|--------------------|
| A    | 242,9 MAX.  | 9.9/16 MAX.  | L    | 107,2 ± 4,8       | 4.7/32 ± 3/16      |
| B    | 31,8 ± 0,4  | 1.1/4 ± 1/64 | M    | 73,8 ± 3,2        | 2.29/32 ± 1/8      |
| C    | 50,8 ± 0,4  | 2 ± 1/64     | N    | 4,7 MIN. 6,4 MAX. | 3/16 MIN. 1/4 MAX. |
| D    | 88,9 ± 0,4  | 3.1/2 ± 1/64 | P    | 3,1 MIN. 4,8 MAX. | 1/8 MIN. 3/16 MAX. |
| E    | 4,8 ± 0,4   | 3/16 ± 1/64  | Q    | 105,6 ± 2,4       | 4.5/32 ± 3/32      |
| F    | 15,9 ± 0,8  | 5/8 ± 1/32   | R    | 65,1 ± 0,8        | 2.9/16 ± 1/32      |
| G    | 82,6 MAX.   | 3.1/4 MAX.   | S    | 27,0 ± 0,8        | 1.1/16 ± 1/32      |
| H    | 65,1 MAX.   | 2.9/16 MAX.  | U    | 6,53 ± 0,18       | 0.257 ± 0.007      |
| J    | 158,8 ± 0,8 | 6.1/4 ± 1/32 | V    | 139,70 ± 0,25     | 5.500 ± 0.010      |
| K    | 130,2 ± 4,8 | 5.1/8 ± 3/16 | W    | 25,4 ± 1,6        | 1 ± 1/16           |