

## INDICATOR TUBE

Cold cathode sign indicator tube for side viewing.

| QUICK REFERENCE DATA |          |      |       |
|----------------------|----------|------|-------|
| Sign height          |          |      | 15 mm |
| Signs                |          |      | + -   |
| Supply voltage       | $V_{ba}$ | min. | 170 V |
| Cathode current      | $I_k$    |      | 4 mA  |

### GENERAL

This tube has the same physical dimensions as the biquinary numerical indicator tube ZM1030. The ZM1031 is provided with a red contrast filter.

### PRINCIPLE OF OPERATION

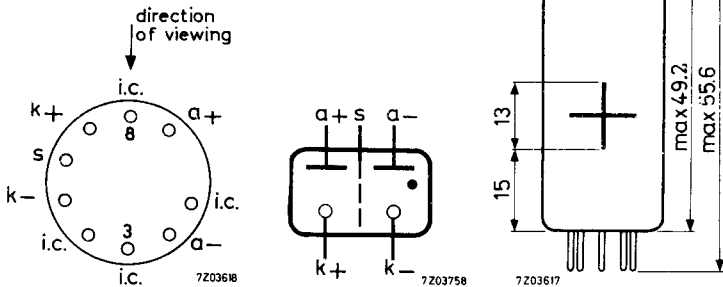
The tube contains two anodes and two cathodes separated by a shield. The rear compartment contains the minus (-) sign and the rear anode, the front compartment contains the plus (+) sign and the front anode.

By applying a suitable voltage between the required sign and the corresponding anode, the sign will be covered by a red neon glow.

### DIMENSIONS AND CONNECTIONS

Dimensions in mm

Base: Noval



Mounting position: any

The signs are viewed through the side of the envelope.

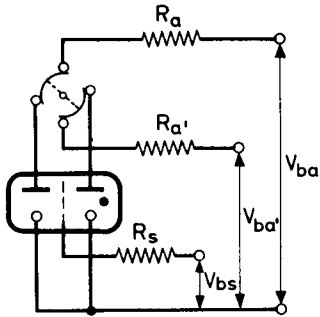
7Z2 5252

**CHARACTERISTICS AND OPERATING CONDITIONS**

|   |           |   |                |
|---|-----------|---|----------------|
| Ignition voltage                                  | $V_{ign}$ | < | 170 V          |
| Maintaining voltage at $I_k = 4$ mA               | $V_m$     |   | 140 V          |
| Anode current,                                    |           |   |                |
| average during any conduction period for coverage | $I_a$     | > | 2 mA           |
| average, $T_{av} = 20$ ms                         | $I_a$     | < | 5 mA           |
| peak  | $I_{aP}$  | < | 10 mA          |
| Incremental resistance                            | $r_a$     |   | 4.5 k $\Omega$ |

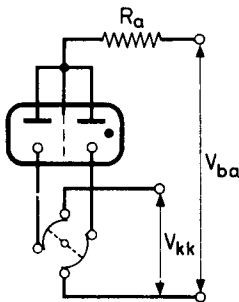
Typical operation at temperatures  $t_{amb} = 10$  to  $50$  °C

I. with anode switches



|                          |          |  |               |
|--------------------------|----------|--|---------------|
| Shield supply voltage    | $V_{bs}$ |  | 50 V          |
| Shield series resistance | $R_s$    |  | 10 k $\Omega$ |
| "Off" anode voltage      | $V_{a'}$ |  | 90 to 110 V   |

II. with cathode switches



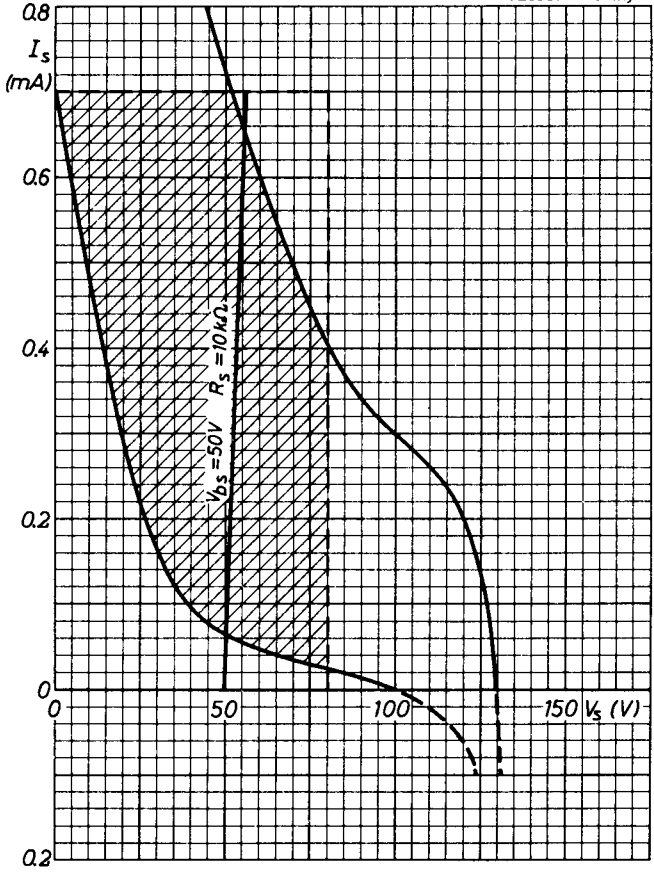
|                           |          |  |            |
|---------------------------|----------|--|------------|
| Cathode selecting voltage | $V_{kk}$ |  | 40 to 70 V |
|---------------------------|----------|--|------------|

**LIMITING VALUES** (Absolute max. rating system)

|                                      |            |      |                      |
|--------------------------------------|------------|------|----------------------|
| Anode voltage necessary for ignition | $V_a$      | min. | 170 V                |
| Anode current,                       |            |      |                      |
| average during any conduction period | $I_a$      | min. | 2 mA                 |
| average ( $T_{av} = 20 \text{ ms}$ ) | $I_a$      | max. | 5 mA                 |
| peak                                 | $I_{ap}$   | max. | 10 mA                |
| Bulb temperature                     | $t_{bulb}$ | min. | -55 °C <sup>1)</sup> |
|                                      |            | max. | +70 °C               |

<sup>1)</sup> Below 10 °C the life expectancy is substantially reduced.

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# PHILIPS

Data handbook



Electronic  
components  
and materials

**ZM1031**

| <b>page</b> | <b>sheet</b> | <b>date</b> |
|-------------|--------------|-------------|
| 1           | 1            | 1966        |
| 2           | 2            | 1966        |
| 3           | 3            | 1966        |
| 4           | A            | 1966        |
| 5           | FP           | 2000.03.11  |