

ZMI000
ZMI000R

Cold cathode, neon filled, side viewing indicator tubes with long life expectancy. The ZM1000R is coated with a red filter to improve the contrast of display. These tubes incorporate a decimal point and are fitted with a pin base to suit the standard grid (2.54mm). A primer allows ionisation without delay in strobe type or blanking applications.

Numeral height	14	mm
Minimum distance between mounting centres	19	mm
Numerals	1 2 3 4 5 6 7 8 9 0	
Decimal point	to the left of the numerals	
Cathode current, average	2.5	mA
maximum peak	12	mA
Minimum supply voltage	170	V

Minimum anode-to-cathode voltage

necessary for ignition	170	V
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Anode-to-cathode maintaining voltage

See page 3

Anode-to-cathode voltage below which all tubes will extinguish

118 V

Cathode current (with or without decimal point $V_{kk} > V_{kk \text{ min.}}$, I_{kk} +ve see page 4)

Minimum (see note 1)	1.5	mA
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Maximum	4.5	mA
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Cathode selecting voltage

See page 4

Cathode resistor, decimal point (see note 2)

 $100 \pm 10\%$ $k\Omega$

Primer resistor

 $10 \pm 10\%$ $M\Omega$

See pages 3, 4, 5 and 6

Minimum pulse duration

100 μ s

Peak currents up to 12mA can be allowed provided the average current value does not exceed 2.5mA. To avoid excessive glow on "off" cathodes, the cathode selecting voltage should exceed 65V.



LIFE EXPECTANCY at anode current of 2.5mA (see note 3)

Sequentially changing the display
from one numeral to another, every
1000 hours or less

100 000

h

RATINGS (ABSOLUTE MAXIMUM SYSTEM)

Minimum anode-to-cathode voltage necessary for ignition	170	V
Cathode current		
Maximum average (averaged over any 20ms)	4.5	mA
Maximum peak	12	mA
Minimum average (averaged over any conduction period)	1.5	mA
Cathode selecting voltage	See page 4	
Bulb temperature		
Maximum	+70	°C
Minimum (see note 3)	-50	°C

MOUNTING POSITION

Any

OPERATING NOTES

1. The minimum average current (averaged over any conduction period) of 1.5mA is necessary to ensure complete cathode coverage initially and throughout life.
2. Lower values of this resistor are permitted. The anode current should be increased due to the increase of decimal point current resulting from the decrease of this resistor.
3. For bulb temperatures below 10°C the life expectancy of the tube is substantially reduced and the characteristics are changed (see page 3). For equipment to be used over a wide temperature range, "constant current operation" (high supply voltage with a high anode series resistor) is recommended.
4. The pins are tinned and may be dip-soldered to a minimum of 5mm from the seals at a solder temperature of 240°C for a maximum of 10 seconds.
5. The natural frequencies of the numeral cathodes lie within the range from 300Hz to 800Hz.

ACCESSORIES

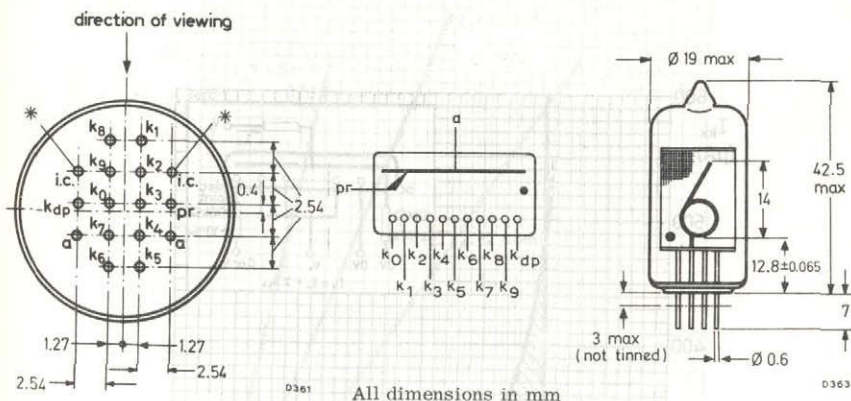
Printed wiring mounting board (19 × 100mm) on which the tube can be mounted. Afterwards the combination can be mounted on a vertical printed wiring board carrying the drive circuit. Can also be used with the snap-fit tube holder	55701
Tube socket (for 2.54mm grid). Phenolic. Tinned contacts	55702
Snap-fit tube holder	55703
Set of one left-hand and one right-hand end piece to complete the snap-fit indicator tube assembly	55704



NUMERICAL INDICATOR TUBES

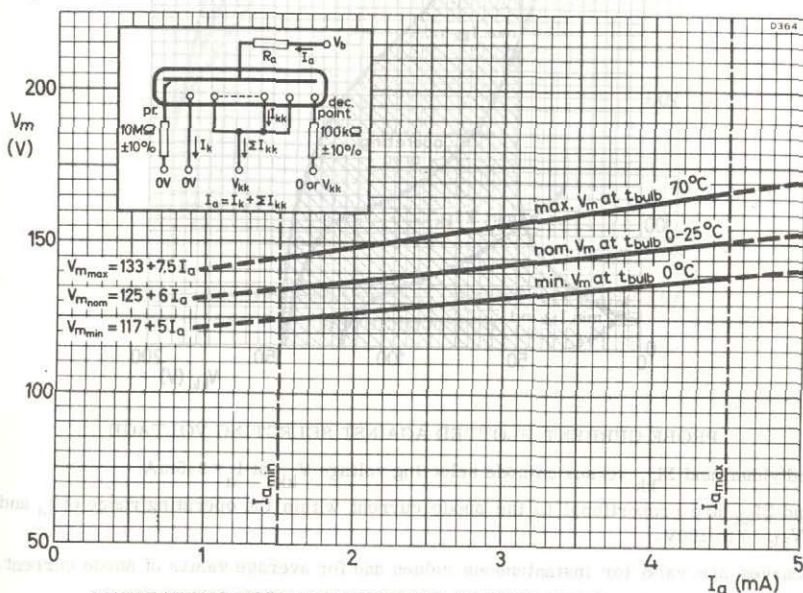
ZM1000 ZM1000R

OUTLINE AND DIMENSIONS



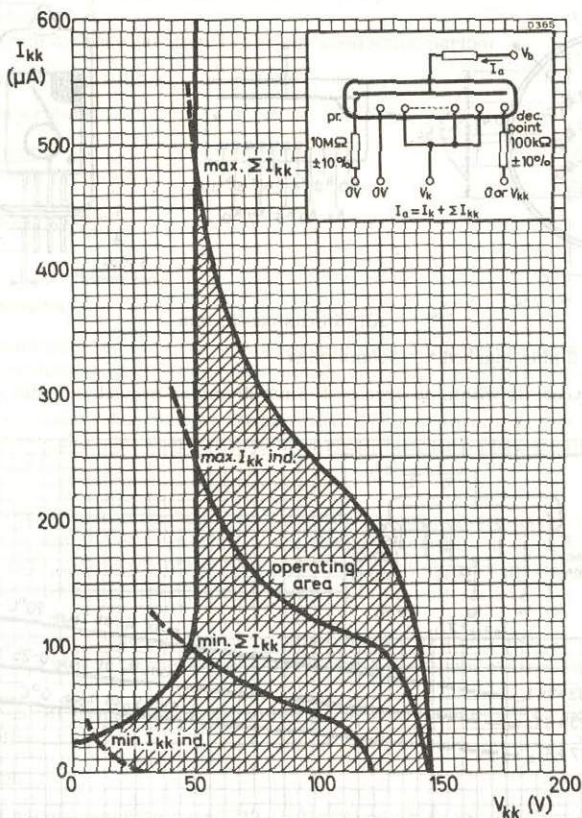
* Length of 2 pins marked * = 2.8 mm max.

All pin centres lie within an area of 0.3 mm diameter around the true geometrical position.



MAINTAINING VOLTAGE PLOTTED AGAINST ANODE CURRENT





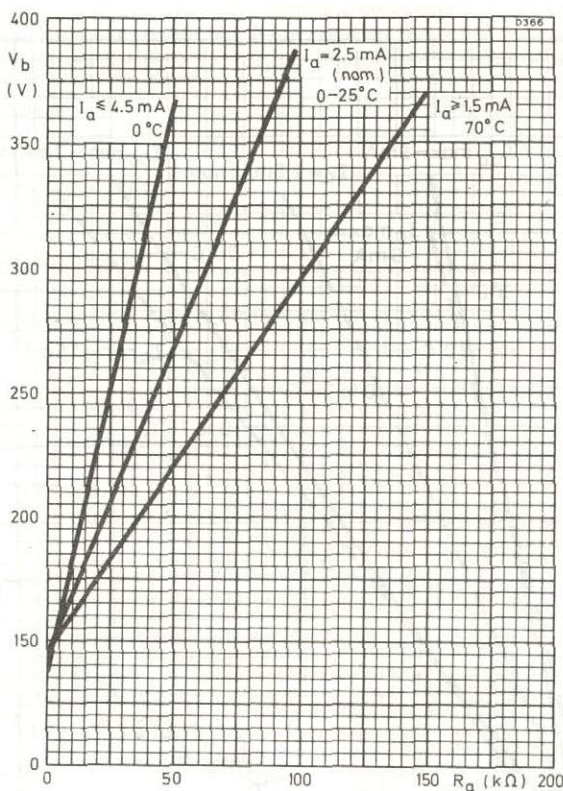
PROBE CURRENT PLOTTED AGAINST SELECTING VOLTAGE

I_{kk} individual and ΣI_{kk} versus cathode selecting voltage V_{kk} at $I_a = 2.5mA$.

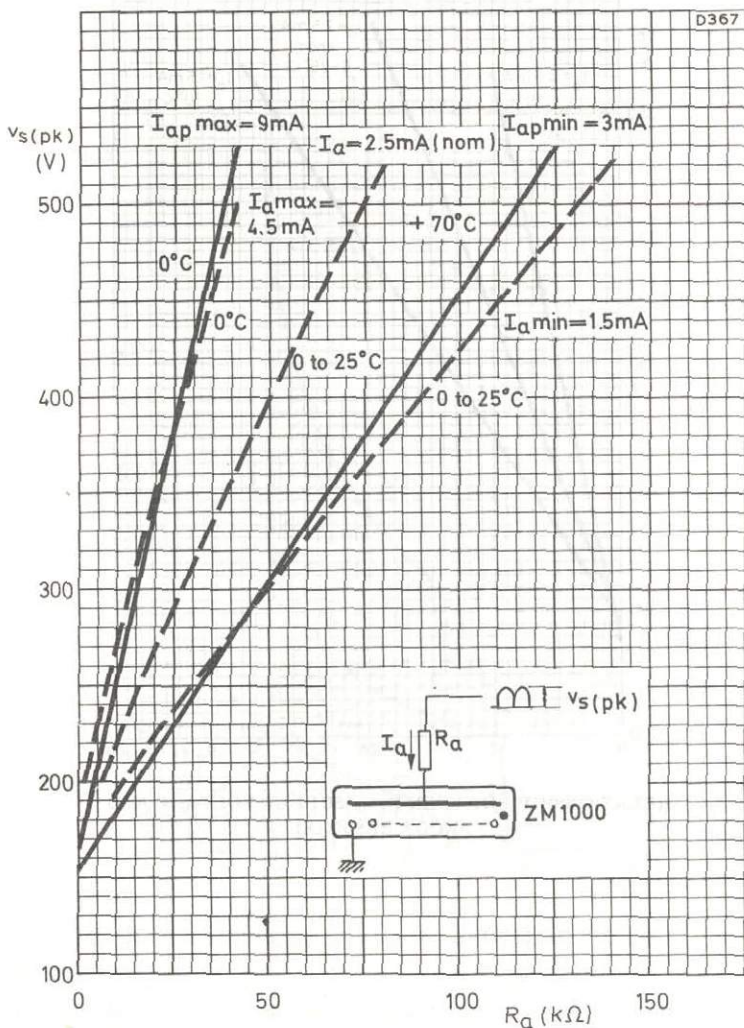
I_{kk} and ΣI_{kk} are proportional to the anode current within the operating range of I_a and with $V_{kk} = 0$ to 100V.

The curves are valid for instantaneous values and for average values of anode current.

Reverse probe current is not permitted.



RELATIONSHIP BETWEEN D.C. SUPPLY VOLTAGE AND
ANODE RESISTOR



RELATIONSHIP BETWEEN PULSE SUPPLY VOLTAGE
AND ANODE RESISTOR