INDICATOR TUBE

Long-life cold-cathode ten-digit indicator tube for side viewing.
The tube is designed for time-sharing (pulse) applications.

QUICK REFERENCE DATA				
Numeral height		approx.	14	mm
Numerals	0 1 2 3 4 5 6 7 8 9			
Decimal point	to the left of the numerals			
Supply voltage	V_{b_a}(pulse)	min.	170	V
Anode current, peak	I_{a_p}	min.	6	mA
	I_{a_p}	max.	20	mA
average	I_a	max.	2.5	mA

GENERAL

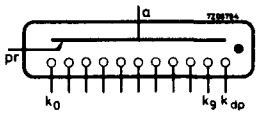
The numerals are 14 mm high and appear on the same base line allowing in-line read-out. The ZM1005R is provided with a red contrast filter. The ZM1005 is identical to the ZM1005R but has no filter.

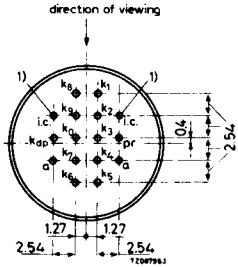
PRINCIPLE OF OPERATION

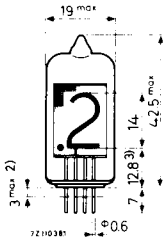
The tube contains ten cathodes in the form of ten numerals and one in the form of a decimal point; a primer, and one common anode. By applying a suitable voltage between the anode and one of the cathodes the corresponding numeral or the decimal point will be covered by a red neon glow.
The primer allows ionization without delay in strobe type or blanking applications.

DIMENSIONS AND CONNECTIONS

Dimensions in mm







The deviation of the axes of the pins with respect to the true geometrical position cover an area of 0.3 mm diameter. The pin configuration is compatible with the reference grid for printed wiring according to IEC Publication 97 (0.1 in).

Mounting position: any

Soldering

The pins may be dip-soldered at a solder temperature of max. 240 °C for maximum 10 seconds up to a point 3 mm from the seals.

Natural frequency

The natural frequencies of the numeral cathodes lie within the range from 300 Hz to 800 Hz.

ACCESSORIES

55701 Printed-wiring mounting board (19 mm x 100 mm) on which the ZM1005 can be soldered; afterwards the combination can be mounted on a vertical printed-wiring board carrying, e.g., the drive circuit. Can also be used with the snap-fit tube holder 55703.

55702 Tube socket (for 0.1 in grid). Phenolic. Tinned contacts.

55703 Snap-fit tube holder.

55704 Set of one left-hand and one right-hand end piece to complete the snap-fit indicator tube assembly.

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1) i.c. pins max. length 2.8 mm
2) Not tinned
3) Standard deviation 0.13 mm

CHARACTERISTICS AND OPERATING CONDITIONS

Ignition voltage	V_{ign}	max.	170	V
Maintaining voltage	V_m	see page 4		
Anode current, average (T_{av} = max. 20 ms)	I_a	max.	2.5	mA
peak	I_{ap}	min.	6	mA
(with or without decimal point)	I_{ap}	max.	20	mA
Pulse duration	T_{imp}	min.	50	μs [1]
Cathode selecting voltage (see also page 4)	V_{kk}	min.	70	V [2]
	V_{kk}	max.	115	V
Cathode resistor, decimal point	R_{dp}		10	kΩ±10% [3]
Primer resistor (anode to primer supply voltage min. 170 V)	R_{pr}		10	MΩ±10%
Extinguishing voltage	V_{ext}	min.	118	V

LIFE EXPECTANCY at I_a = 2 mA

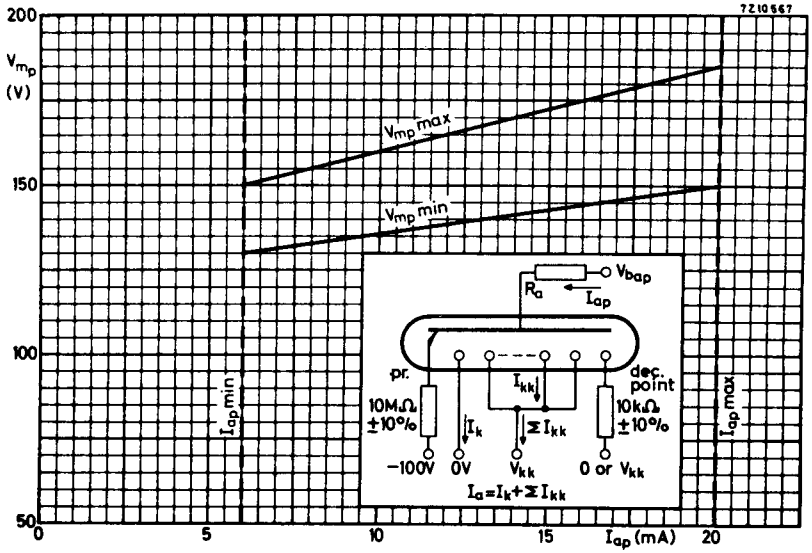
The life expectancy is dependent on the instantaneous and average values of anode current:

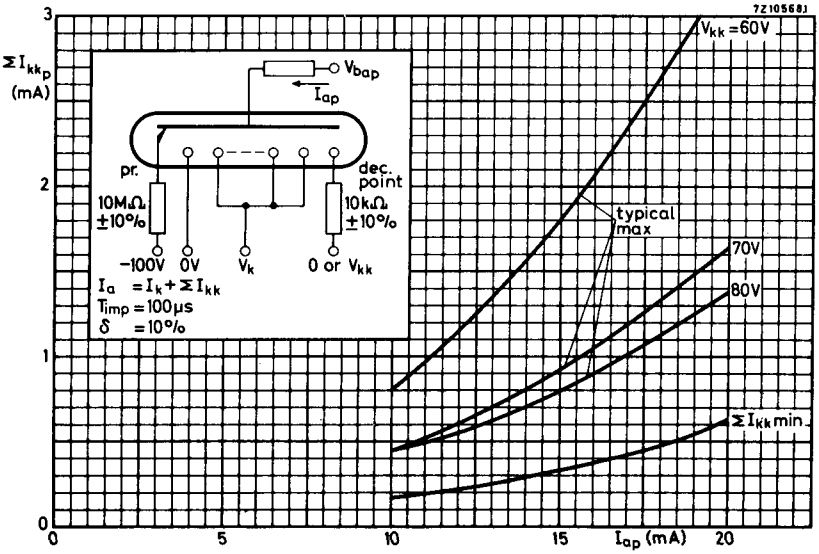
sequentially changing the display from one digit to the others every 100 h or less, I_{ap} = 10 mA	100 000	h
I_{ap} = 20 mA	20 000	h
Mean time between failures	min. 200 000	h

LIMITING VALUES (Absolute max. rating system)

Anode voltage necessary for ignition, pulse	V_{ap}	min.	170	V
Anode current, average (T_{av} = 20 ms)	I_a	max.	2.5	mA
peak	I_{ap}	min.	6	mA
	I_{ap}	max.	20	mA
Pulse duration	T_{imp}	min.	10	μs
Cathode selecting voltage	V_{kk}	min.	70	V
	V_{kk}	max.	115	V
"Off" anode voltage	$V_{a"off"}$	max.	115	V
Ambient temperature	t_{amb}	min.	-50	°C [4]
	t_{amb}	max.	+70	°C

1) Pulse durations down to 10 μs are allowed provided the minimum peak anode current is not less than 10 mA.
2) Lower values of V_{kk} result in increasing background glow impairing readability.
3) The decimal point cathode may not be operated without extra current limiting resistor unless a numeral cathode is operated simultaneously.
4) Bulb temperatures below 10 °C result in a reduced life expectancy and changes in characteristics.
For equipment to be used over a wide temperature range, "constant current operation" is recommended.


7Z10567
200
V_{mp}
(V)
150
100
50
0
5
10
15
I_{ap} (mA)
20
V_{mp} max
V_{mp} min
I_{ap} min
I_{ap} max
V_{bap}
R_a
I_{ap}
pr.
dec. point
I_{kk}
10MΩ ±10%
10kΩ ±10%
I_k
ΣI_{kk}
−100V
0V
V_{kk}
0 or V_{kk}
$I_a = I_k + \Sigma I_{kk}$


7Z10568J
3
ΣI_{kkp}
(mA)
2
1
0
5
10
15
I_{ap} (mA)
20
V_{kk} = 60V
typical max
70V
80V
ΣI_{kk} min
V_{bap}
I_{ap}
pr.
dec. point
10MΩ ±10%
10kΩ ±10%
−100V
0V
V_k
0 or V_{kk}
$I_a = I_k + \Sigma I_{kk}$
T_{imp} = 100μs
δ = 10%