



Cold Cathode Relay Tube GR 46

Type **GR 46**

Nr. 3.46 e

Ed. 6.70 Fol. 1

1. GENERAL

The GR 46 subminiature relay tube is the natural successor to the well-tried GR 44. Its simple design - only one starter - allowed for a specially attractive price. The electrical and mechanical characteristics are adapted to the GR 44. If only one starter is required, interchangeability between the GR 44 and the GR 46 is always ensured.

The main range of applications covers timing circuits and circuits for the industrial electronics. Because of its high anode breakdown voltage (over 400 V), the GR 46 tube may be connected directly and without a transformer to a rectified and smoothed 220 V a.c. supply. Other remarkable features of this tube are its excellent starter breakdown voltage stability (typically $\pm 1\%$), minimal control current (less than $10^{-3} \mu\text{amp}$), unaffected by temperature fluctuations, and the wide temperature range in which it can operate. The GR 46 is so designed that the anode circuit can be supplied with direct voltage, and operation is assured with a positive starter. The starter striking voltage reaches its highest stability only if there is no negative starter current I_{St} (see Fig. 3 and 4).

Starter breakdown delays are largely prevented by an appropriate gas mixture. Should the starter voltage increase at a rate of more than 10 V/s, however, breakdown delays may exceed a permissible value. This is easily avoided by the ionising effect of a small current through the auxiliary anode (H, Fig. 1).

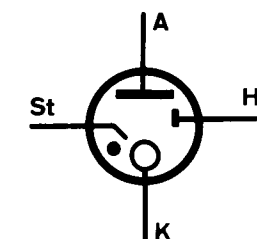


Fig.1

A: Anode
H: Auxiliary anode
St: Starter
K: Cathode

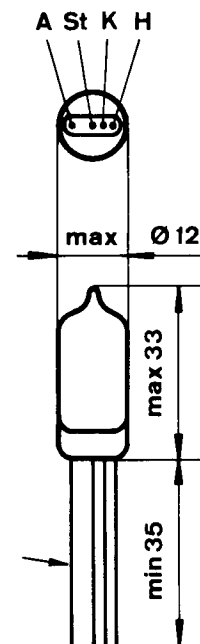


Fig.2

2. TECHNICAL DATA, OPERATIONAL RANGE

(d.c. values)		min.	normal	max.	
Breakdown voltage A-K	U _{ZA} [V]	400			1)
Breakdown voltage S-K (positive starter)	U _{ZS} [V]	120	130	145	
Breakdown voltage H-K	U _{ZH} [V]			180	
Anode supply voltage	U _{AO} [V]	250	300	350	
Maintaining voltage A-K (5,5 mA)	U _{BA} [V]	105	110	117	
Cathode current (mean value)	I _K [mA]	5,5	9	12	2)
Auxiliary anode current	I _H [μ A]			20	3)
Starter current for capacitance transfer (H combined with K)	I _{St} [μ A]	$1 \cdot 10^{-3}$		$12 \cdot 10^3$	2)
Starter current for capacitance transfer (I _H = 20 μ A)	I _{StH} [μ A]	2		$12 \cdot 10^3$	2)
Trigger capacitor	C [pF]	470		5000	4)
Ambient temperatures	T _a [$^{\circ}$ C]	-20		+80	5)
Service life (with I _K = 9 mA)	L [h]		25000		

1) The minimum value is also valid for warm tubes, i.e. shortly after switch-off.

2) Short peak currents several times the maximum value are admissible.

3) The auxiliary anode (H) is connected if extremely short ignition times are needed (Fig. 3).

4) Trigger capacitors of over 5.000 pF (e.g. in timer relays) need a current limiting resistor of 1 ... 10 k Ω in the starter circuit (Fig. 5).

5) The tubes may be operated as well as stored in the stated temperature range.

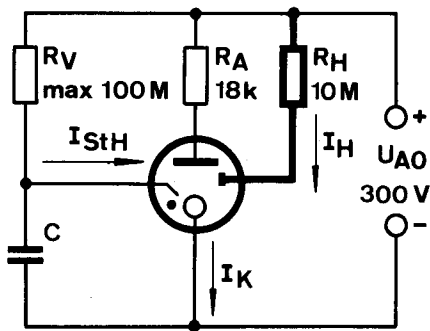


Fig. 3

Connect the auxiliary anode for rapid increase of the starter voltage U_{St} (> 10 V/s), e.g. for timer circuits with time delays of under 10 seconds.

Important: Shortest possible connexion between resistor R_H and auxiliary anode.

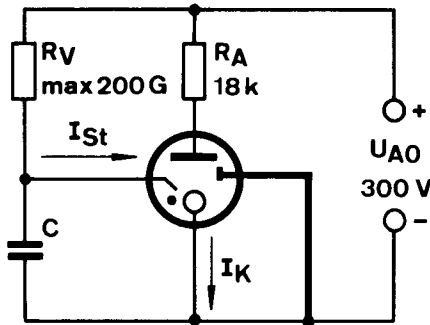


Fig. 4

Lay the auxiliary anode on cathode potential when the starter voltage U_{St} increase is slow (< 10 V/s), e.g. for timer circuits with a time delay of more than 10 seconds.

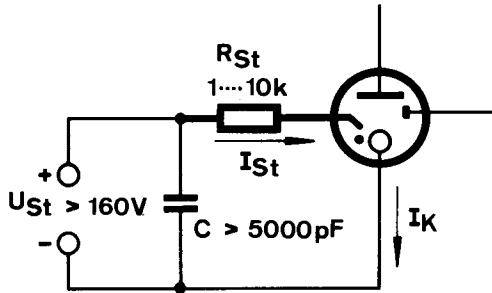


Fig. 5

Limit the starter peak current with a resistor R_{St} for trigger capacitor C of over 5.000 pF. No R_{St} is needed for C 470 to 5.000 pF.

4. MOUNTING ON PRINTED CIRCUITS

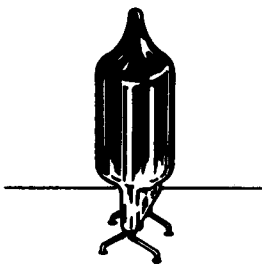


Fig. 6

For vertically mounted tubes straddle the leads to obtain good stability. If it lies at less than 2 cm distance from other metal parts and if these carry a.c. voltages several multiples of 10 V, the tube must be screened as shown in Fig. 7.



Fig. 7

By horizontally mounted tubes, a wire brace will hold and screen the tube (Fig. 7). If it lies at less than 2 cm distance from other metal parts and if these carry a.c. voltages several multiples of 10 V, the brace must be connected to the cathode potential.