

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
THYRATRON

10TC4

Specialized - Switching Tube electronic tube

Cold-cathode gas switching tube for 220-volt AC control and relay applications. Gas-discharge operation provides heaterless electronic switching.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect; cold cathode	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Thyratron
<i>No fixed ratings recorded.</i>
<i>Published ratings and characteristics promoted from the approved TESLA source.</i>

10TC4 — Cold-Cathode Switching Trigger Tube

The **10TC4** is a cold-cathode switching trigger tube designed and manufactured by TESLA. It is engineered for operation with an alternating current (AC) anode supply of 220 V. The tube features an auxiliary control path (trigger) that regulates the ignition of the main discharge path. This auxiliary path can be powered by either direct current (DC) or alternating current (AC) voltages, including audio-frequency signals.

The 10TC4 is designed to ignite when a positive voltage is applied to the anode while a negative voltage is present on the auxiliary control electrode. It is highly versatile and can be controlled via sensitive or high-resistance switches, phototubes, photoresistors, or audio-frequency control signals.

Physical Construction and Pinout

The 10TC4 is built in an all-glass miniature envelope and features a cold molybdenum cathode. It utilizes a standard nine-pin miniature base designated as **S 9/12 ČSN 35 8904**. The device has a maximum weight of 11.5 g.

According to the physical specifications, the tube has a maximum overall height of 55 mm, a maximum body height of 48 mm, and a maximum diameter of 22 mm.

The nine-pin base configuration provides the following connections:

- **Pin 1:** Cathode (k)
- **Pin 2:** Internal connection (ic)
- **Pin 3:** Auxiliary electrode / Grid (g)
- **Pin 4:** Internal connection (ic)
- **Pin 5:** Internal connection (ic)
- **Pin 6:** Anode (a)
- **Pin 7:** Internal connection (ic)
- **Pin 8:** Internal connection (ic)
- **Pin 9:** Internal shield (c)

An internal shield is incorporated into the construction to protect the tube's operation from external disturbing electromagnetic fields.

Electrical Characteristics and Operating Points

The electrical parameters of the 10TC4 define its ignition thresholds and discharge characteristics. Under typical conditions, the main and auxiliary paths exhibit the following characteristic values:

- **Main path ignition voltage (peak value, U_{az}):** 520 V
- **Main path discharge DC voltage (U_a):** 114 V (measured at an anode current $I_a = 20$ mA and an auxiliary voltage $U_g = -150$ V)
- **Auxiliary path ignition voltage (U_{gz}):** 135 V
- **Auxiliary path current (I_g):** < 30 μ A (at $U_g = -150$ V)

Typical Operating Values

When integrated into a standard control circuit, the typical operating parameters are:

- **Anode supply voltage (U_a ef):** 220 V RMS
- **Anode current (I_a):** 15 mA
- **Auxiliary path voltage (U_g):** 180 V
- **Auxiliary path current (I_g):** 2 to 5 μ A (with a maximum limit of < 30 μ A)
- **Input capacitance (C):** 100 pF
- **Shield leakage resistance (R):** 1 M Ω

Limiting Values (Absolute Maximum and Minimum Ratings)

To ensure reliable operation and prevent damage, the following limits must be observed:

- **Average anode current (I_a):** Minimum 5 mA, Maximum 40 mA
- **Operating anode voltage ($U_{a\text{ ef}}$):** Minimum 180 V, Maximum 250 V
- **Auxiliary path current for direct ignition (I_g):** Minimum 50 μA , Maximum 500 μA

Circuit Integration and Application Guidelines

The 10TC4 operates inherently as a rectifier. Because of this rectifying behavior, the average anode current can be monitored and measured directly using a standard DC moving-coil meter. While the continuous average current is limited, short-term peak currents of up to several amperes are permissible.

Anode Load Configuration

The anode load resistance (R_a) in typical applications is not a simple passive resistor. Instead, it is commonly a DC relay equipped with a damping winding or an associated rectifier circuit to introduce a specific operating delay.

Auxiliary Control Path

The auxiliary path voltage is specified as a negative peak value relative to a positive anode. The total voltage applied to the auxiliary path can be composed of a stable bias from a fixed source combined with a superimposed control signal. To ensure reliable triggering, the peak value of the control voltage should generally not fall below 60 V.

A minimum auxiliary path current is specified to guarantee that the main discharge path ignites reliably at the minimum rated anode supply voltage across all production tubes. Furthermore, when using the minimum input capacitance of $C = 100\text{ pF}$, reliable ignition of the main path is guaranteed at the minimum anode supply voltage, provided the auxiliary path reaches its required ignition voltage.

Shielding and Interference Prevention

To safeguard the tube against external electrical interference or disturbing fields, the internal shield (connected to pin 9) can be tied to the cathode via a 1 M Ω leakage resistor.

Related Designations

The TESLA 10TC4 is documented as an approximate replacement for the foreign (non-domestic) cold-cathode trigger tube type [GR17](#).

Technical Summary

The **10TC4** is a cold-cathode, molybdenum-cathode switching trigger tube housed in an all-glass miniature 9-pin envelope. Operating from a nominal 220 V AC supply, it utilizes an auxiliary control electrode to trigger a main discharge path. The tube features a main path ignition voltage of 520 V, a

maintaining discharge voltage of 114 V, and an auxiliary ignition threshold of 135 V. Designed for versatile control applications, it can be triggered by optical sensors, high-resistance switches, or audio signals, and is commonly used to drive DC relays.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X Tesla

Published test conditions and operating points. Values on this page are preserved as reported by this source.

195X TESLA

Section 1 · Thyatron

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
MainPathCurrent	5–40 mA	—
OperatingAnodeVoltage	180–252 V	AC RMS

TUBE TINKER

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