

Mercury-vapor thyatron for high-voltage controlled rectification and industrial switching. Grid triggering controls substantial gas-discharge current with low forward drop.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	3
NOMINAL HEATER	5 V / 14 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Thyatron	
MAXIMUM PLATE VOLTAGE	26000 V
MAXIMUM CATHODE CURRENT	2.5 A
PEAK FORWARD CURRENT	10 A
Mercury-vapor thyatron; canonical SectionType has no Thyatron value, so Other is used.	

12QR205 Mercury-Vapor Thyatron

The **12QR205** is a mercury-vapor filled, hot-cathode thyatron equipped with a control grid. It is designed primarily for use as a high-voltage half-wave rectifier tube in general power supply rectifier systems. Additionally, its grid-controlled design makes it highly suitable for switching and control applications within industrial regulation systems.

Construction, Physical Dimensions, and Base

The 12QR205 is constructed with a robust glass envelope capable of handling high voltages and thermal dissipation. The physical dimensions and installation parameters are highly specific to ensure safe operation:

- **Maximum Overall Height:** 378 mm
- **Maximum Bulb Diameter:** 120 mm (at the widest flared section; the lower body diameter is 70 mm)
- **Mass:** Approximately 850 g
- **Operating Position:** Must be mounted vertically and upright, with the base pointing downwards.

The tube features a top-mounted anode connection to isolate the high anode voltage from the control and heating circuits at the base.

- **Anode Cap:** Type C 20 (TGL 4520), which is a push-on connector with an 18 mm diameter.
- **Base Type:** 3-0 (TGL 70-75), designed to fit a corresponding 3-0 (TGL 68-4) socket.
- **Pin Configuration:** The base contains three pins. Two circular pins of 8 mm diameter are dedicated to the filament (f), while a central flat blade of 3 mm thickness serves as the control grid (g) connection.

Heater and Cathode Characteristics

The 12QR205 utilizes a directly heated oxide cathode. Because it is a mercury-vapor tube, strict preheating protocols must be observed to ensure that the mercury is fully vaporized and distributed before anode voltage is applied. Failure to do so can cause cathode damage due to positive ion bombardment.

- **Filament Voltage (U_f):** 5 V
- **Filament Current (I_f):** Approximately 14 A
- **Normal Preheating Time (t_A):** Minimum of 1 minute under standard operating conditions.
- **Post-Transport Preheating Time (t_A):** Minimum of 60 minutes. This extended period is mandatory after the tube has been moved or transported to ensure any condensed mercury on the electrodes is completely cleared.
- **Anode Delay Time (t_{anl}):** Minimum of 5 minutes before applying anode voltage during initial commissioning or warm-up.

Operating Values and Electrical Characteristics

Under standard operating conditions, the electrical parameters of the 12QR205 are characterized by a low internal voltage drop once conduction is initiated, which is typical of mercury-vapor discharge tubes.

- **Ionization Voltage (Tube Drop, U_i):** Less than or equal to 18 V. This low voltage drop ensures high efficiency in power rectification.
- **Ignition Voltage (U_z):** 2 kV
- **Grid Resistor (R_g):** Must be greater than or equal to 20 k Ω during operation to limit grid current.

Maximum Ratings

To prevent damage and ensure reliable operation, the following absolute maximum limits must not be exceeded:

Parameter	Symbol	Maximum Rating
Peak Inverse Anode Voltage	$-U_{as}$	26 kV
Peak Forward Anode Voltage	U_{as}	26 kV
Peak Cathode Current	I_{ks}	10 A
Average Cathode Current	I_k	2.5 A
Grid Resistance	R_g	30 Ω
Peak Positive Grid Voltage	$+U_{gs}$	600 V
Peak Negative Grid Voltage	$-U_{gs}$	600 V
Peak Grid Current	I_{gs}	0.5 A
Maximum Ambient Temperature	$+ \vartheta_{amb}$	35 °C
Minimum Ambient Temperature	$+ \vartheta_{amb}$	15 °C

The ambient temperature limits (15 °C to 35 °C) are critical for mercury-vapor tubes. If the temperature is too low, the mercury vapor pressure will be insufficient, raising the ionization voltage and risking cathode damage. If the temperature is too high, the vapor pressure becomes excessive, which drastically reduces the peak inverse voltage capability and can lead to arc-back.

Ignition Characteristics

The relationship between the anode voltage and the negative grid voltage required to trigger conduction is defined by the ignition characteristic spread band (Zündkennlinien-Streubereich). Because individual tubes exhibit variations, this characteristic is represented as a shaded region rather than a single curve.

- At lower anode voltages, a smaller negative grid bias is required to prevent ignition. For example, at an anode voltage ($+U_{as}$) of 2 kV, the grid voltage ($-U_g$) required to control or initiate ignition lies between approximately 1 V and 5 V.
- At higher anode voltages, a much larger negative grid bias is required to hold off conduction. For instance, at $+U_{as} = 6$ kV, the ignition threshold lies within a grid voltage range of -3 V to -13 V.
- Near the upper operating limits, such as $+U_{as} = 12$ kV, the negative grid voltage required to control ignition spans from approximately -7 V to -26 V.

Once the tube ignites, the grid loses control over the anode current. Conduction can only be stopped by reducing the anode voltage below the ionization threshold.

Related Designations and Equivalents

The 12QR205 corresponds directly to several industry standard designations, allowing it to be integrated into systems designed for these equivalent types:

- **ASG 5007**
- **HF 3414**
- **RSQ 15/5**
- **Ste 15000/2/12**
- **3 G 25**

Additionally, the 12QR205 serves as a direct replacement for the older **S 15/5 d** tube.

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1953 RFT Rundfunk Technik

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

1953 RFT RUNDFUNK TECHNIK

Section 1 · Thyatron

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
HeaterVoltageNominal	5 V	Nominal
HeaterCurrentNominal	14 A	Nominal
Maximum Plate Voltage	26000 V	—
Maximum Cathode Current	2.5 A	—
PeakForwardCurrent	10 A	—