DATASHEET

HY-3202
Hydrogen Thyratron

Description

The HY-3202 is a deuterium filled, triode thyratron designed for grounded grid operation. The grounded grid configuration Note 1 allows the tube to be operated at a higher peak current compared to a similar grounded cathode thyratron. The deuterium fill gas facilitates operation at a higher voltage and low to moderate pulse repetition rates as compared to similar thyratrons having a hydrogen fill gas. The relatively high pulse current is achieved while employing only free or forced air convection cooling. The tube is mounted by its grid mounting flange in any position.

SPECIFICATIONS

ABSOLUTE RATINGS (MAXIMUMS)(NONSIMULTANEOUS)

Absolute Maximum Ratings (Non-Simultaneous)

Peak Forward Anode Voltage, epy Note 2,3,4	32 Kilovolts
Peak Forward Anode Current, ib	20,000 Amps
Peak Reverse Anode Current, ibx	Note 7
Peak Reverse Anode Voltage, epx	32 Kilovolts
Average Anode Current, Ib	0.5 Amps DC
RMS Average Current, Ip	47.5 Amps AC
Anode Temperature Note 10	450 Degrees C
Charge transfer per shot Note 11	$3x10^{-3}$ Coulombs
Plate dissipation Factor, Pb Note 16	$50x10^{9}$

GENERAL ELECTRICAL DATA

Cathode Heater Voltage, Ef	6.3 +/-8% Volts AC
Cathode Heater Current @ Ef=6.3 Vac	11 - 18 Amps AC
Reservoir Heater Voltage, Er Note 12	6.3 +/-8% Volts AC
Reservoir Heater Current @ Er=6.3Vac	6 - 13 Amps AC
Minimum Tube Warm-Up	5 Minutes

TRIGGER DIRVE REQUIREMENTS

	MIN	TYP	MAX
Peak Open Circuit Driver Voltage, egy (Volts) Negative Going Applied to the Cathode	500	750	1500
Driver Circuit Output Impedance, Zg (Ohms)	----	100	250
Driver Pulse Rise Time (Nanoseconds)	----	100	150
Driver Pulse Width (Microseconds)	1	2	----
Peak Reverse Driver Voltage(Volts)	----	----	400
Bias Voltage, Positive (Volts)	----	----	300

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SWITCHING CHARACTERISTICS (nanoseconds)

Anode Delay Time [Notes 13,14]	----	----	500
Anode Delay Time Drift [Note 14]	----	----	150
Time Jitter [Note 14]	----	----	5
Current Rise Time [Note 15]	----	7	----

NOTES

1. This thyratron is designed to operate with the grid at chassis ground potential. The tube is driven into conduction by applying the triggering pulse to the cathode tab. Therefore, the limits shown for egy are negative while the bias voltage is positive (i.e., the opposite polarity of what would be the case for triggering a standard grounded cathode thyratron).

2. The dwell time at the peak anode voltage should be minimized in order to minimize prefiring. For operation at the rated epy, the dwell time must not exceed 1 millisecond.

3. After thyratron anode current stops flowing and before voltage is reapplied to the anode, the voltage must stay between 0 and -500 volts for at least 100 microseconds to allow the gas to deionize.

4. This tube may be operated in air at up to 32 kV. Some of the more important derating factors that determines the safe operating voltage in air are the cleanliness of the tube's ceramic insulators, the rate of rise of anode voltage, the dwell time at the operating peak anode voltage, the pulse repetition rate, and ambient pressure, temperature, humidity and contaminant level. This tube may also be operated while immersed in an insulating gas or liquid.

5. The peak current capability of 20,000 amperes applies to low duty, short discharge duration (shorter than 150 nanoseconds) applications without significant reverse current.

6. For anode current discharges longer than 150 nanoseconds, or for discharge waveforms which exhibit significant current reversals, use the charge transfer per shot limitation for determination of the allowable peak current capability.

7. This tube is recommended for applications where the discharge current waveform has reversals. Each time the current reverses, the magnitude of the current on that reversal must not exceed 60% of the magnitude of the current on the half cycle immediately preceding it.

8. The reverse anode voltage shown applies for a previously nonconducting tube. Exclusive only of a spike not longer than 50 nanoseconds, the peak reverse anode voltage must not exceed 10 kV during the first 25 microseconds after conduction.

9. The root mean square anode current shall be computed as the square root of the product of the peak current and the absolute average current when the reverse current is negligible. For cases where the reverse current is significant (i.e., where it exceeds 10% of forward current), this simple relationship for calculation of the RMS current does not apply.

10. Forced air or liquid immersion cooling should always be used in any situation where cooling by natural convection is insufficient to keep the temperature of the tube's envelope below 200° C. The anode temperature, measured on the external anode surface, should not be allowed to exceed the value shown.

11. The charge transfer per shot includes the total charge conducted through the thyratron on that shot regardless of the direction of the flow of the charge. In other words, it is the time integral of the magnitude of the current over the duration of the discharge.

12. The optimum reservoir heater voltage is that which provides the best overall compromise among anode heating, anode voltage holdoff and holdoff recovery, anode current rise rate, and the tube's overall triggering characteristics. For most applications, the optimum reservoir heater voltage lies between 90% and 110% of the nominal value. Operation at voltages below 90% of nominal can result in permanent damage from anode overheating, operation at high reservoir heater voltages degrades anode holdoff and holdoff recovery, and can permanently damage the reservoir itself.

13. The anode delay time is measured from the 25% point on the rise of the unloaded grid voltage pulse to the 10% point on the rise of the anode current pulse.

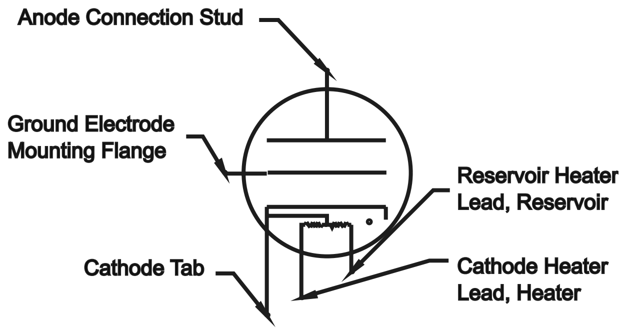
14. Delay time, delay time drift and time jitter may be simultaneously minimized by applying the maximum driver voltage (egy) from a source of low impedance (Zg).

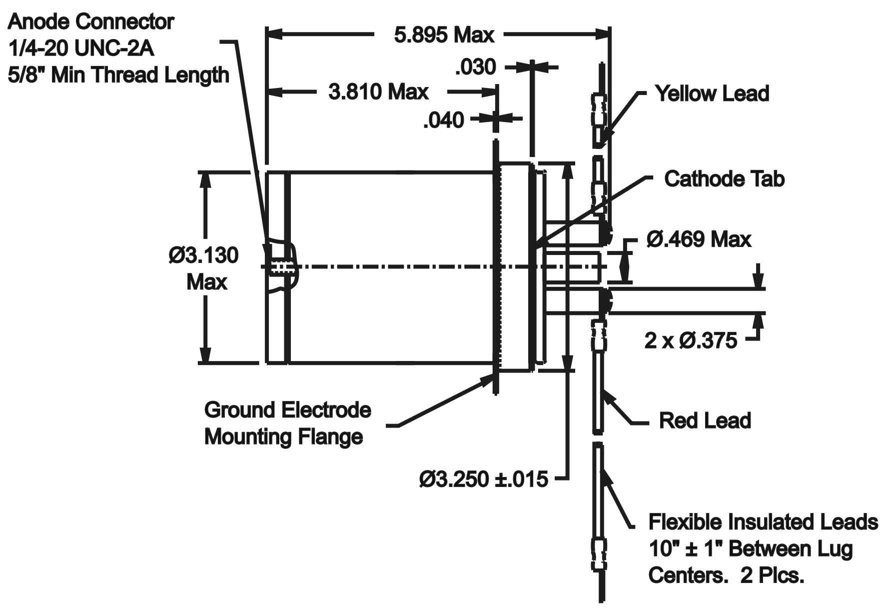
15. The current rise time is a function of the discharge circuit impedance. If care is exercised to reduce the inductance in the circuit, a typical rise time on the order of that shown may be expected when using this thyratron

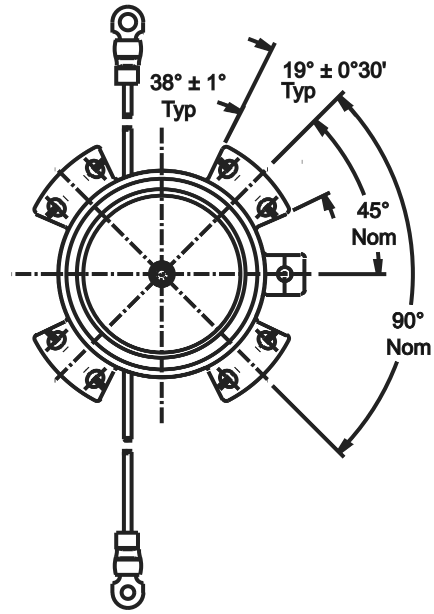
16. Plate Dissipation Factor is the product of epy x ib x prr

17. All data and specifications are subject to change without notice.

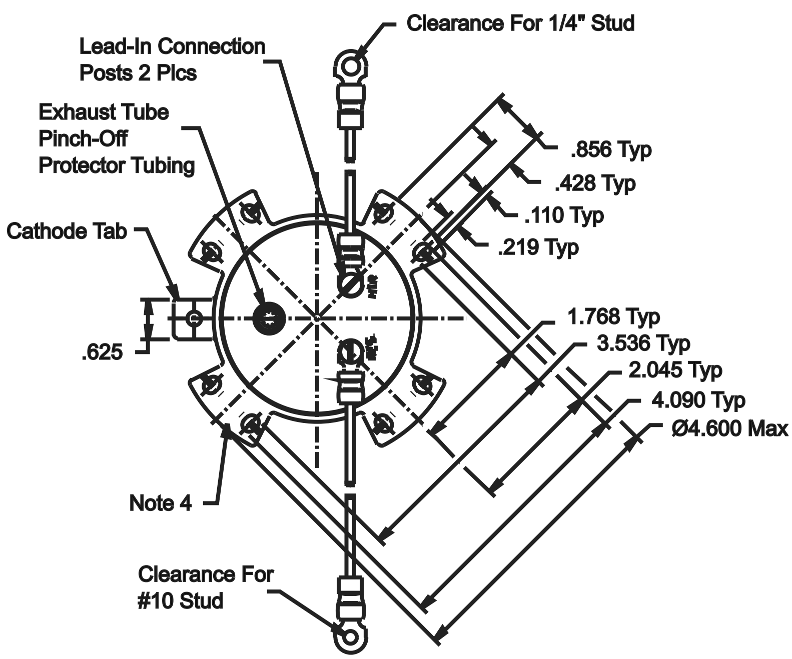
18. Data sheet origination is shown on the last page. This data sheet becomes obsolete when more recent revisions are published.


Anode Connection Stud
Ground Electrode
Mounting Flange
Reservoir Heater
Lead, Reservoir
Cathode Tab
Cathode Heater
Lead, Heater


Anode Connector
1/4-20 UNC-2A
5/8" Min Thread Length
5.895 Max
.030
3.810 Max
.040
Yellow Lead
Cathode Tab
Ø3.130
Max
Ø.469 Max
2 x Ø.375
Ground Electrode
Mounting Flange
Red Lead
Ø3.250 ±.015
Flexible Insulated Leads
10" ± 1" Between Lug
Centers. 2 Plcs.



Top View



Bottom View

For more information email us at opto@perkinelmer.com or visit our web site at www.perkinelmer.com/opto
Note: All specifications subject to change without notice.

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