



Hot-Cathode Mercury-Vapour Thyatron

Code: 3V/561E

This thyatron is equivalent to, and replaces, the 4079GA type, which is now obsolete.

CATHODE.

Oxide-coated, shielded filament

Filament voltage	5	V
Nominal current	40	A
Minimum cathode heating time (ambient temperature > 20°C)	1	min←

DIRECT INTERELECTRODE CAPACITANCES.

Anode to grid	9	pF
Grid to filament	65	pF

MECHANICAL DATA.

Maximum overall length	539.8	mm
Maximum bulb diameter	133.4	mm
Base	Special 3-pin (see drawing)	
Socket		4022D
Top cap	Special (see drawing)	
Net weight	2	kg
Shipping weight, approx.	13.5	kg←
Shipping dimensions	20 × 20 × 36	in←

MAXIMUM RATINGS.

Maximum peak inverse voltage	20	kV
Maximum peak anode current	20	A
Maximum average anode current	7.5	A
Maximum fault anode current	125	A
Maximum duration of fault anode current	0.1	sec
Maximum peak grid current	1.5	A
Maximum average grid current	300	mA
Recommended maximum grid circuit resistance	60	kΩ
Maximum voltage drop	16	V
Maximum condensed mercury temperature range	15 to 65	°C

FILAMENT EXCITATION

	In phase	In quadrature	
Maximum peak inverse voltage	20	20	kV
Maximum peak anode current	20	40	A
Maximum average anode current	7.5	15	A
Maximum fault anode current	125	125	A
Maximum duration of fault anode current	0.1	0.1	sec
Maximum peak grid current	1.5	1.5	A
Maximum average grid current	300	300	mA
Recommended maximum grid circuit resistance	60	60	kΩ
Maximum voltage drop	16	16	V
Maximum condensed mercury temperature range	15 to 65	15 to 65	°C

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Code: 3V/561E

The previous ratings apply to operation with a choke input filter and a supply frequency of 50 c/s.

CATHODE HEATING TIME.

Ambient Temperature	10 to 20°C	20°C and above
Minimum pre-heating period	2 minutes	1 minute

THYRATRON OPERATION.

With a condensed mercury temperature of 35°C the minimum values of grid blocking voltage to prevent ignition are :

<i>Anode Voltage</i>	<i>Grid Voltage</i>
2.0 kV	-3.5 V
16 kV	-12 V

For positive operation it is recommended that for a given anode voltage the grid should be biased back beyond the value required to prevent ignition, and a positive firing pulse of 20 to 30 volts peak applied.

The pulse should have a leading edge as near vertical as possible and the grid circuit should be of high enough impedance to limit the grid current. The control of the output may be affected by varying the phase of the grid pulse relative to the phase of the applied anode voltage.



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MAXIMUM PEAK INVERSE VOLTAGE RATINGS AND CONDENSED MERCURY-VAPOUR TEMPERATURES.

Natural Ventilation	15 to 45°C	15 to 35°C	—	—
Forced Ventilation	15 to 60°C	15 to 50°C	15 to 45°C	15 to 40°C←
Peak Inverse Voltage	Less than 7500 V	7500 to 10000 V	10000 to 12500 V	Greater than 12500 V

After shipment or transit the valve must be pre-heated for not less than 30 minutes before any anode voltage is applied so that the mercury may be distributed correctly.

The temperature limits given under "Natural Ventilation" are only valid for unrestricted natural ventilation. Forced air cooling is recommended and is required for operation up to the limit of condensed mercury temperature.

Before putting a valve of this type into service it is recommended that reference be made to the General Information Section K in the front of the valve handbook.

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TYPICAL OPERATING CONDITIONS.

Circuit	No. of Valves	Maximum A.C. Input Voltage (r.m.s.)	Maximum D.C. Output Voltage (Volts)	Maximum D.C. Output Current (Amperes)
Single-Phase Full Wave Circuit No. 1	2	7000	6300	12.5* ←
		7000	6300	25† ←
Single-Phase Full Wave Bridge Circuit No. 2	4	14000	12600	12.5* ←
		14000	12600	25† ←
Half Wave Three-Phase Circuit No. 3	3	8150	9550	18.75* ←
		8150	9550	37.5† ←
Three-Phase Double Y Parallel Circuit No. 4	6	8150	9550	37.5* ←
		8150	9550	75† ←
Three-Phase Full Wave Circuit No. 5	6	8150	19100	18.75* ←
		8150	19100	37.5† ←

* Filament excitation in phase with anode.

† Filament excitation in quadrature with anode.

The above tables suitable circuits for this thyatron and shows the safe maximum input and output conditions. The values are based on sine wave input and the use of a suitable choke input filter.

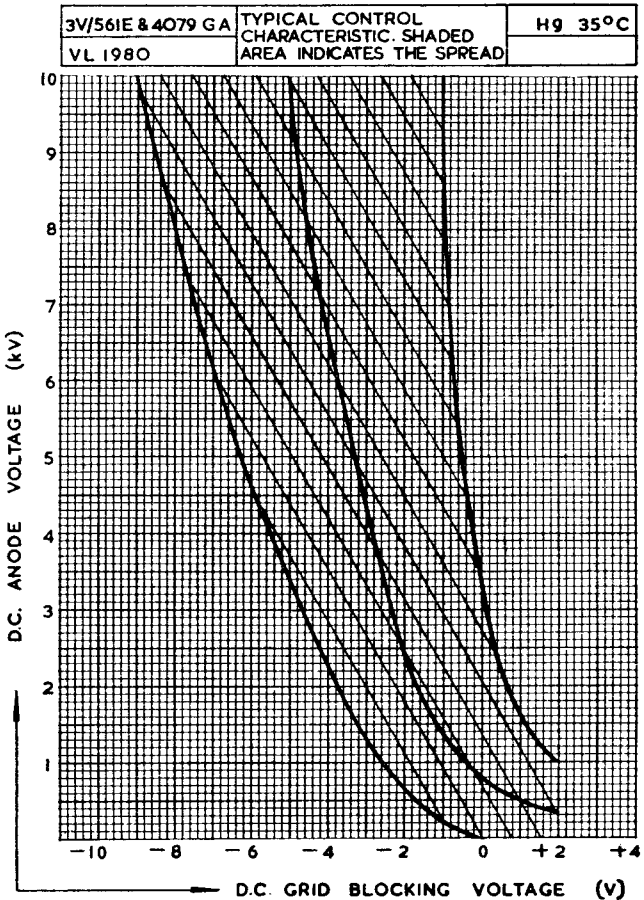
This thyatron being directly heated, it is recommended that the output circuit be taken from the mid-point of the filament supply transformer secondary winding.

For details of the circuits referred to see sheet K—8 in the introduction to this handbook.



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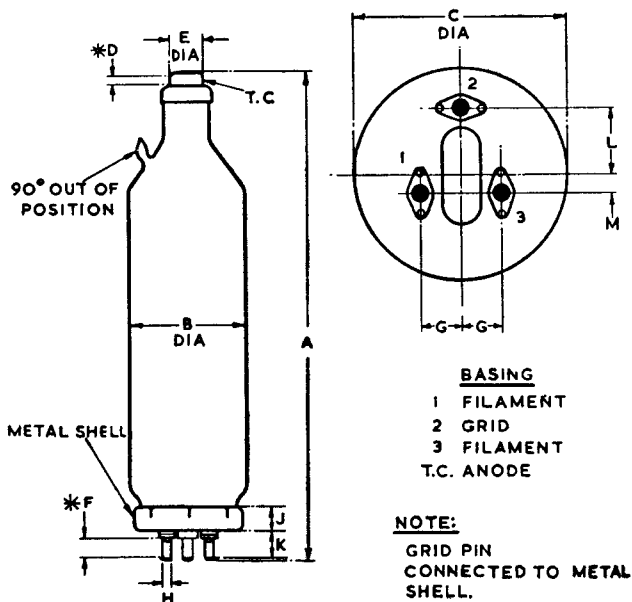
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DIM	MILLIMETRES	INCHES	DIM	MILLIMETRES	INCHES
A	539.8 MAX.	21 1/4 MAX.	F	23.80 ± 0.51	0.937 ± 0.020
B	133.4 MAX.	5 1/4 MAX.	G	22.00 ± 0.25	0.866 ± 0.010
C	117.5 ± 0.4	4 5/8 ± 1/64	H	9.53 ± 0.05	0.375 ± 0.002
D	10.0 MIN	0.393 MIN	J	25.4 ± 0.4	1 ± 1/64
E	36.00 ± 0.25	1.418 ± 0.010	K	28.57 ± 0.51	1.125 ± 0.020
NOTE: BASIC FIGURES ARE INCHES			L	36.00 ± 0.25	1.417 ± 0.010
* DENOTES: - CONTACT LENGTH			M	10.00 ± 0.25	0.393 ± 0.010