Hot-Cathode Mercury-Vapour Thyratron

Code: 3V/531E

This thyratron is equivalent to, and replaces, the 4078GA type, which is now obsolete.

CATHODE.

Oxide-coated, shielded filament		
Filament voltage	5	V
Nominal current	20	A
Minimum cathode heating time (ambient temperature > 20°C)	1	min←

DIRECT INTERELECTRODE CAPACITANCES.

Anode to grid	20	pF
Grid to filament	70	pF

MECHANICAL DATA.

Maximum overall length	435	mm
Maximum bulb diameter	95.3	mm
Base	Special 3-pin (see drawing)	
Top cap	Special (see drawing)	
Socket	4022D	
Net weight	925	g
Shipping weight approx.	9.5	kg
Shipping dimensions	14 × 14 × 29	in

MAXIMUM RATINGS.

	FILAMENT EXCITATION In phase	In quadrature	
Maximum peak inverse voltage	20	20	kV
Maximum peak anode current	10	20	A
Maximum average anode current	2.5	5.0	A
Maximum fault anode current	50	50	A
Maximum duration of fault anode current	0.1	0.1	sec
Maximum peak grid current	1.0	1.0	A
Maximum average grid current	200	200	mA
Recommended maximum grid circuit resistance	75	75	kΩ
Maximum voltage drop	16	16	V
Maximum condensed mercury temperature range	15 to 65		°C

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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 :

Anode Voltage	*Grid Voltage*
2.0 kV	−4 V
16 kV	**−15 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 50°C	15 to 40°C	—	—
Forced Ventilation	15 to 65°C	15 to 55°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	5*
		7000	6300	10†
Single-Phase Full Wave Bridge Circuit No. 2	4	14000	12600	5*
		14000	12600	10†
Three-Phase Half Wave Circuit No. 3	3	8150	9550	7.5*
		8150	9550	15†
Three-Phase Double Y Parallel Circuit No. 4	6	8150	9550	15*
		8150	9550	30†
Three-Phase Full Wave Circuit No. 5	6	8150	19100	7.5*
		8150	19100	15†

* Filament excitation in phase with anode.

† Filament excitation in quadrature with anode.

The above, tables suitable circuits for this thyratron, 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 thyratron 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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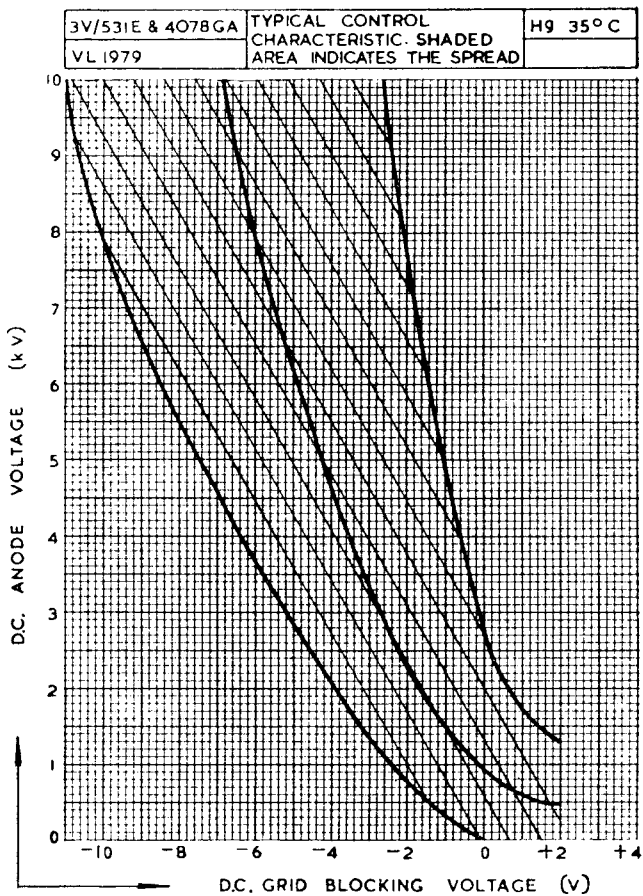

Tentative data
May 1952

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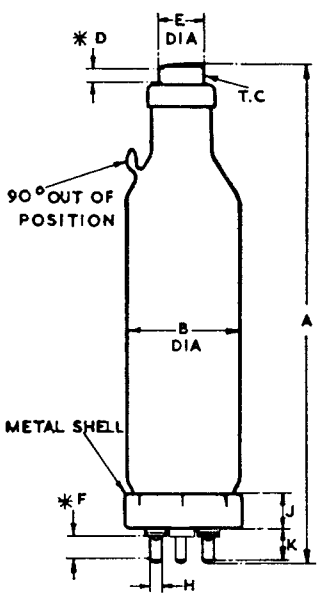

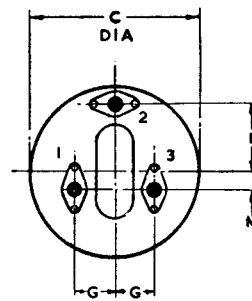

BASING

1 FILAMENT
2 GRID
3 FILAMENT
TC. ANODE

NOTE:—
GRID PIN CONNECTED TO METAL SHELL.

DIM	MILLIMETRES	INCHES	DIM	MILLIMETRES	INCHES
A	435 MAX	17 1/8 MAX	F	23·80 ± 0·51	0·937 ± 0·020
B	95·3 MAX	3 3/4 MAX.	G	22·00 ± 0·25	0·866 ± 0·010
C	96·04 ± 0·4	3 25/32 ± 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

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May 1952