Hot-Cathode Mercury-Vapour Thyatrons

Codes: 57 (CV5027) ←
3V/390B (CV5028) ←

Type 57 is a three-electrode mercury-vapour thyatron developed mainly for use in Industrial Control applications. It is equivalent to the U.S.A. type FG-57. The 3V/390B is an electrically identical thyatron on a British 4-pin base.

**CATHODE**
- Indirectly-heated, oxide-coated
- Heater voltage: 5 V
- Nominal current: 4.5 A
- Minimum cathode heating time: 5 min

**DIRECT INTERELECTRODE CAPACITANCES**
- Anode to grid: 3.5 pF
- Grid to cathode: 8.5 pF

**DIMENSIONS**
- Maximum overall length: 190.4 mm
- Maximum seated height: 168.3 mm
- Maximum bulb diameter: 82.5 mm
- Base: American 4-pin medium
- Net weight: 150 g

**MAXIMUM RATINGS**
- Maximum peak inverse voltage: 1.5 kV
- Maximum peak anode current at 25 c/s and above: 15 A
- Maximum average anode current: 3 A
- Maximum fault anode current: 200 A
- Maximum duration of fault anode current: 0.1 sec
- Maximum peak grid current: 1.0 A
- Maximum average grid current: 0.25 A
- Recommended maximum grid circuit resistance: 0.25 MΩ
- Maximum voltage drop: 16 V
- Maximum condensed mercury temperature range: 35 to 75 °C

The above ratings apply to operation with a choke input filter and a supply frequency of 50 c/s.
MAXIMUM PEAK INVERSE VOLTAGE RATINGS AND
CONDENSED MERCURY-VAPOUR TEMPERATURES

<table>
<thead>
<tr>
<th>Condensed mercury temperature range</th>
<th>Up to 60 °C</th>
<th>60 to 75 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak inverse voltage</td>
<td>Up to 2000 V</td>
<td>Up to 1500 V</td>
</tr>
</tbody>
</table>

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

CATHODE HEATING TIME

The minimum cathode heating time is 5 minutes. After shipment or transit the valve must be pre-heated for at least 30 minutes before any anode voltage is applied so that the mercury may be distributed correctly.

THYRATRON OPERATION

With a condensed mercury temperature of 40°C the minimum values of negative grid voltage required to prevent ignition are:

<table>
<thead>
<tr>
<th>Anode Voltage</th>
<th>Grid Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 V</td>
<td>-1.75 V</td>
</tr>
<tr>
<td>1000 V</td>
<td>-6.5 V</td>
</tr>
</tbody>
</table>

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 pulse circuit should be of high impedance in order to limit the grid current to the safe maximum value.

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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## TYPICAL OPERATING CONDITIONS

<table>
<thead>
<tr>
<th>Circuit</th>
<th>No. of Valves</th>
<th>Maximum A.C. Input Voltage (V&lt;sub&gt;r.m.s.&lt;/sub&gt;)</th>
<th>Maximum D.C. Output Voltage (V)</th>
<th>Maximum D.C. Output Current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Phase Full Wave Circuit No. 1</td>
<td>2</td>
<td>525</td>
<td>475</td>
<td>6</td>
</tr>
<tr>
<td>Single Phase Full Wave Bridge Circuit No. 2</td>
<td>4</td>
<td>1050</td>
<td>945</td>
<td>6</td>
</tr>
<tr>
<td>Three Phase Half Wave Circuit No. 3</td>
<td>3</td>
<td>610</td>
<td>715</td>
<td>9</td>
</tr>
<tr>
<td>Three Phase Double Y Parallel Circuit No. 4</td>
<td>6</td>
<td>610</td>
<td>715</td>
<td>18</td>
</tr>
<tr>
<td>Three Phase Full Wave Circuit No. 5</td>
<td>6</td>
<td>610</td>
<td>1430</td>
<td>9</td>
</tr>
</tbody>
</table>

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

For details of the circuits referred to see sheet K—8 in the introduction to this handbook.
# Hot-Cathode Mercury-Vapour Thyratrons

**Ref.**

3V/390A  
3V/390B

**Codes:**

57 (CV5027) ←  
3V/390B (CV5028) ←

## Typical Control Characteristics

<table>
<thead>
<tr>
<th>3V/390A &amp; B</th>
<th>TYPICAL CONTROL CHARACTERISTICS. SHADED AREA INDICATES THE SPREAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>VL 1896</td>
<td>Hg 40°C</td>
</tr>
</tbody>
</table>

### Graph

- **D.C. Anode Voltage (kV)**
  - 0.1
  - 0.2
  - 0.3
  - 0.4
  - 0.5
  - 0.6
  - 0.7
  - 0.8
  - 0.9
  - 1.0

- **D.C. Grid Blocking Voltage (V)**
  - -14
  - -12
  - -10
  - -8
  - -6
  - -4
  - -2
  - 0

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3V/390A  
3V/390B
Hot-Cathode Mercury-Vapour Thyratrons

Codes: 57 (CV5027) ← 3V/390B (CV5028)

BASING
1. HEATER
2. HEATER - CATHODE
3. GRID
4. HEATER - CATHODE
T.C. ANODE

TYPE 57
MEDIUM 4-PIN

BASING
1. HEATER - CATHODE
2. GRID
3. HEATER - CATHODE
4. HEATER
T.C. ANODE

3V/390B
BRITISH 4-PIN

<table>
<thead>
<tr>
<th>DIM</th>
<th>MILLIMETRES</th>
<th>INCHES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>184.1 ± 6.3</td>
<td>7⅓ ± ¼</td>
</tr>
<tr>
<td>B</td>
<td>82.5 MAX</td>
<td>3⅓ MAX</td>
</tr>
<tr>
<td>D</td>
<td>14.30 ± 0.25</td>
<td>0.562 ± 0.010</td>
</tr>
<tr>
<td>E*</td>
<td>10.3 MIN</td>
<td>1⅓/32 MIN</td>
</tr>
<tr>
<td>L</td>
<td>168.3 NOM</td>
<td>6⅝ NOM.</td>
</tr>
<tr>
<td>C</td>
<td>42.9 MAX:</td>
<td>1⅜/16 MAX:</td>
</tr>
</tbody>
</table>

NOTE.— BASIC FIGURES ARE INCHES.

* DENOTES:— CONTACT LENGTH.