

Specification AD/CV3710  
Issue No. 2 dated 21. 1. 60.  
To be read in conjunction with K1001

SECURITY  
Specification Valve  
Unclassified Unclassified

Indicates a change

<u>TYPE OF VALVE:</u>	Excitren: Single anode, continuously excited, grid controlled mercury arc rectifier.	<u>MARKING</u> See K1001/4
<u>CATHODE:</u>	Mercury Peel	<u>DIMENSIONS AND CONNECTIONS</u> See drawing on page 3.
<u>ENVELOPE:</u>	Glass	
<u>PROTOTYPE:</u>	Excitren Type AR63.	

RATINGS (for operation at 50-60 a/s)

All limiting values are absolute.

Note

Max. Peak Inverse Anode Voltage.	(kV)	6.3	10.4	14.5	
Max. Average Anode Current	(A)	10	6.7	3.3	A
Max. Peak Anode Current	(A)	60	40	20	
Excitation Current Range	(A d.c.)	1.4/3.1	1.4/3.1	1.4/3.1	B
Grid Voltage Range for Sine-Wave Control	(V r.m.s.)	50/150	50/150	50/150	C
Grid Voltage Range for Impulse Control	(V)	100/250	100/250	100/250	C
Grid Voltage Negative Bias for Impulse Control	(V)	50/150	50/150	50/150	C
Max. Grid Circuit Resistance	(Ohms)	10,000	10,000	10,000	
Grid Voltage to prevent Anode Pickup	(V)	- 10	- 10	- 10	
Min. Cooling Air Quantity for Max. Ratings.	(Cu.ft./Min)	40	40	40	
Max. Cooling Air Temperature for Max. Ratings.	(°C)	40	40	40	
Min. Cooling Air Temperature.	(°C)	5	5	5	

GENERAL CHARACTERISTICS

The mercury pool cathode must be forced-air cooled with the air stream directed upwards onto the radiator at about 45° as shown in Fig. 1. The anode to cathode voltage-drop is between 14 and 17 volts at full load and about 20 volts at light load. The valve must be mounted vertically with the cathode radiator downwards. The cathode radiator provides the cathode connection and the mounting base.

NOTES

- Average anode current is the average of the instantaneous anode currents taken over a time interval not exceeding 15 seconds.
- The excitation anode is supplied with a low voltage from an auxiliary DC supply which maintains a continuous excitation current between the cathode and the excitation anode and this maintains a continuous cathode spot independent of the main anode current. The excitation current is the current indicated during operation by a DC ammeter in the circuit to the excitation anode.
- For control of the output voltage from the rectifier the grid is held negative with respect to the cathode until the instant in each cycle when the grid is made positive and current flows to the main anode. The grid may be supplied with impulse voltages, or with sine-wave voltages with variable DC bias.

TESTS

To be performed in addition to those applicable in K1001, at any ambient temperature between 15° and 25°C, and after a Holding Period of at least 28 days.

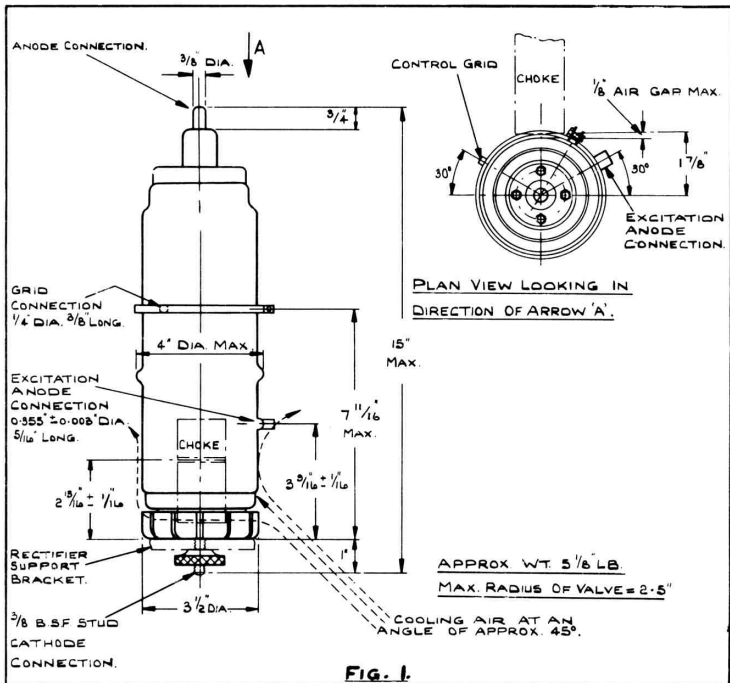
	Test Conditions	Test	Limits		No. Tested	Note
			Min.	Max.		
a	With anode and grid connected together, and excitation anode in contact with cathode, apply 16kV r.m.s. 50 c/s a.c. between anode and cathode.	<u>Vacuum</u> No. of insulation breakdowns in a two minute period.	-	0	100%	
b	See Note 1	<u>Excitation Arc Current</u> Lowest value of excitation arc current which will maintain the arc. (A)	-	1.4	100%	1
c	With the excitation arc current at 1.4A, apply 230 volts r.m.s. 50 c/s a.c. (relative to the cathode) to the main anode through 20 ohms and to the control grid through 500 ohms.	<u>Anode Current</u> Average value main anode current (A)	4	-	100%	←

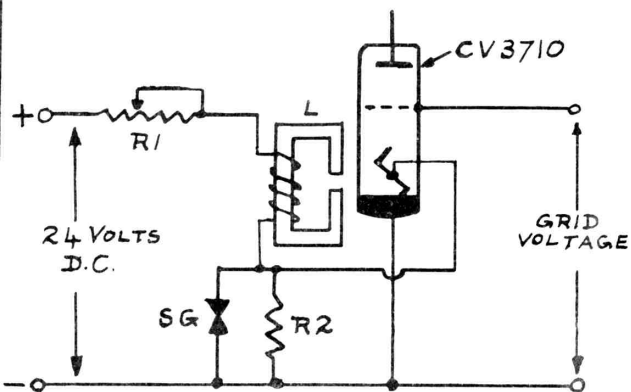
NOTES

1. Ignition and excitation are obtained by means of a pivoted electrode mounted above the mercury pool so that the graphite excitation anode fixed at one end of the electrode rests in contact with the mercury pool when the excitation circuit is not energised. The other end of the electrode is provided with an armature. When the excitation circuit is energised the stray magnetic flux from a choke which is suitably placed near to the armature attracts the latter and thus lifts the graphite excitation anode clear of the mercury pool and starts an arc between this anode and the cathode. The arc current flows through the choke and the resulting magnetic field holds the excitation anode clear of the mercury so that the arc may be maintained.

A suitable excitation circuit is shown in Fig. 2, details of the circuit components being as follows:-

Resistance R1 is of 5 ohms 40 watts and is tapped at 1 and 2 ohms. Resistance R2 is a 100 ohms 15 watts resistor. Spark Gap, SG, is an air gap set to break down at 1000-2000 volts. The choke L has an inductance of 50 mH at 1.5 amps DC and is rated to carry 3.1 amps continuously. The choke L is mounted close to the Excitron with the choke gap opposite the armature on the pivoted electrode, and not more than  $\frac{1}{8}$  inch from the glass wall. The DC supply is normally obtained from a separate, single-phase, bridge-connected metal rectifier unit.



FIG. 2