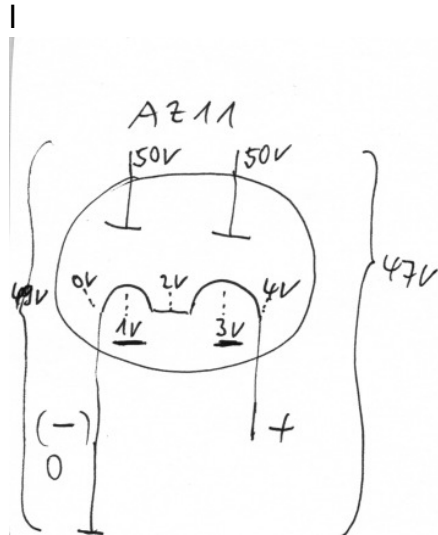


# Measuring Tubes – Heating with DC or AC current?

A report of the experiments of Helmut Weigl

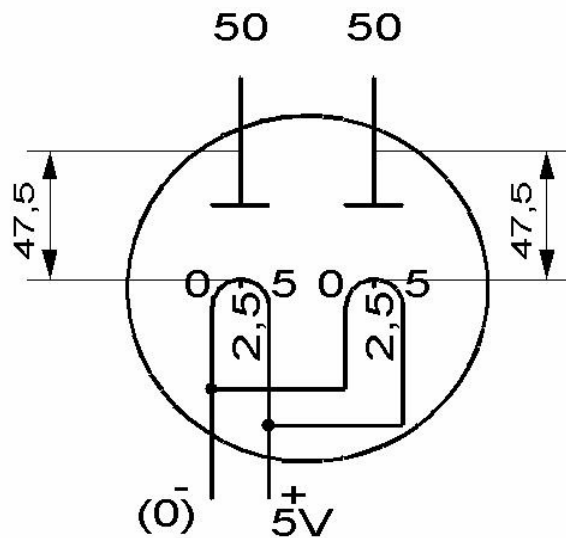
## Addendum for tubes with multiple systems

In the last report the voltage relationship for tubes with 2 systems (example AZ11) has been shown:



This of course only holds when the filaments of both systems are connected in **series**.

There are also tubes with multiple systems where the filaments are connected in **parallel**, for example the 5U4G, a directly heated rectifier tube with 2 systems. The conditions for the voltages are then as follows:



The tube behaves like two single tubes in respect to the heater voltage relationship. With DC heating the voltages for both systems are shifted by  $\frac{1}{2}$  of the heater voltage, here 2.5V. To simulate the same conditions as for AC heating with DC heating, the anode voltages of both systems must be uniformly increased by 2.5V.

### How to recognize if the filaments are connected in series or in parallel?

The data sheets do not state anything about that. First possibility is a look into the tube.

When the bulb is nontransparent there is the possibility to measure the tube (using DC heating) and then reverse the filament connection and measure again. If the measured results are the same the filaments are connected in parallel. If the results are different the filaments are connected in series.

Mantel, den 10.02.2009

Helmut Weigl