Deriving the typical values from the Funke Wxx-Test cards

(for static tube measurement with the RoeTest – DC measurements)

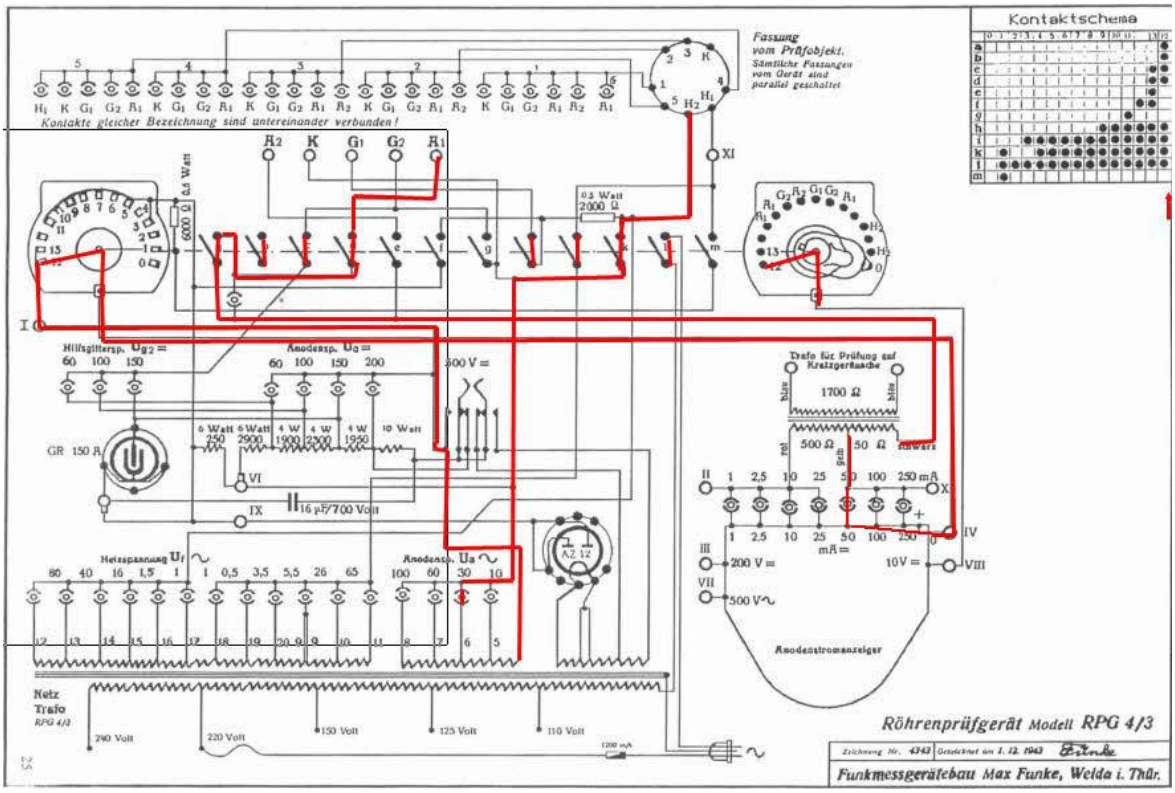
Not for all tubes there exist (complete) data sheets. This especially applies to **diode tubes and rectifier tubes**. Here often static data are missing.

Sometimes the data sheets specify the static values, that is the current, at a given anode voltage ("tube drop"). If this is not the case there are often characteristic curves. Then you can derive from a point of the characteristic curve (anode voltage / anode current) the static data. Both cases allow an optimal comparison with the manufacturer's data.

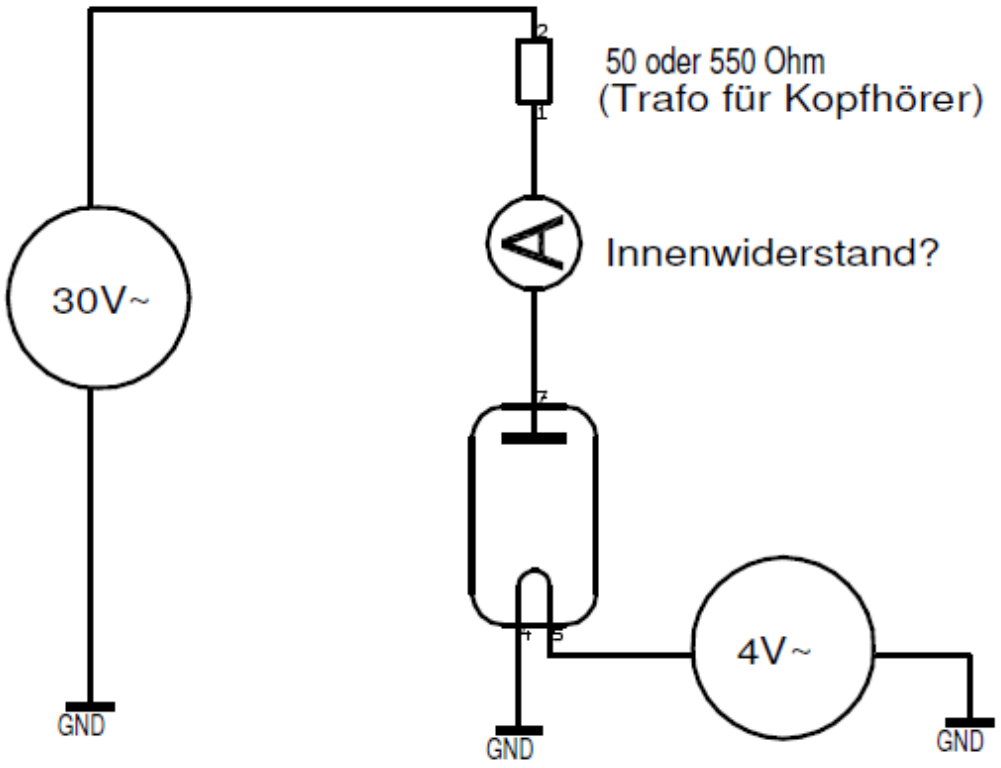
There are also many rectifier tubes and diodes for that no manufacturer data are available. In those cases it is alternatively possible to use the data from other tube measuring devices. Due to other measuring methods or circuits a conversion must be done.

In the following a method to derive the measurement settings for the RoeTest from the Funke test cards is given. I point out that this is only an auxiliary method that is associated with inaccuracies. The Funke test devices have high inaccuracies (try to measure the real voltages for your Funke – including the heater voltage). For our considerations we assume that the data from the test cards are accurate – independent of the device's actual voltages.

First we have to examine how the Funke is measuring. Following is a circuit (RPG3/4 – also applies to the W19) drawn with the path of current for a RGN354 (example):



Below the simplified path of current:



Let us try to use the Funke settings:

As an example we take the RGN354. The Funke data are (for example, see www.radiomuseum.org, K.F.Müller):

Dateikarten für das Röhrenprüfgerät Funke Modell RPG W19
Erstellt durch K.F. Müller, DK4UL; ASCII nach PDF durch Martin Renz
Für www.radiomuseum.org (Ausgabe 04.08.2004)

0066 =*RGN354 (GE) Eu=F9 –> 2+26+40+46+66+72=8,3/12,5mA

Prüfdaten	Heizung
Uf : 4,0V≈	4,0V=/0,30A
Ua : 30V≈	4,0V=/1,00A
	2,0V≈/0,25A

In Stellung 12 Diodenstrom messen.

	TELEFUNKEN	VALVO	TUNGSRAM	PHILIPS
	RGN354/G425	G345	V430	1810
→			V475	373
→			Hoges EG2403	
→			Loewe-Opta 10NG	

→ OPTA 16NG (300V/15mA) → Gut ab 7,5mA
(Eu1) Einweggleichrichter (max.250V/25mA + 373=max.220V/40mA)
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Zum Prüfen der OPTA 16NG (Radio AG DS Loewe) ziehen Sie die Stecker 40+46 und stecken diese in die Löcher 41+44 (2,0V≈). [DK4UL-10/98]

Let us proceed step by step:

1. Nominal current: Funke specifies 12.5mA for “Good” condition. For Funke good means 60% → 12.5mA / 60% x 100% = **20.83 mA.**

2. Funke is measuring using AC. The tube to be measured acts as rectifier. Only each 2nd half wave is passed by the tube (with negative voltage the tube blocks). The measuring voltage is therefore halved (circa):

Anode voltage (RMS) 30V~ : 2 = **15V**=.

3.The tube is connected in series with the (unknown) internal resistance of the milliampere meter and the ear phone transformer (given resistance 50 respectively 550 ohm). For the RGN354 50 ohm are used.
At 100%/20.83 mA the 50 ohm resistor drops 1.04 V.
Measuring voltage 15V-1.04V → gives about **14V=**.
From this the voltage drop at the inner resistance of the milliampere meter should be subtracted.

For **indirectly** heated tubes we have reached the end of the considerations.

4. For **directly** heated tubes the tube heating must also be considered.
In the Funke W19 the tubes are heated using AC (Funke devices also heat DC type tubes using AC). To convert this to DC heating the anode voltage has also to be increased. For tubes with one system by ½ of the heater voltage. For tubes with multiple systems and series connection of the filaments it is necessary to know at which end of the filament the system is located (eventually several measurement tries are required to find this out).
This may require some effort.
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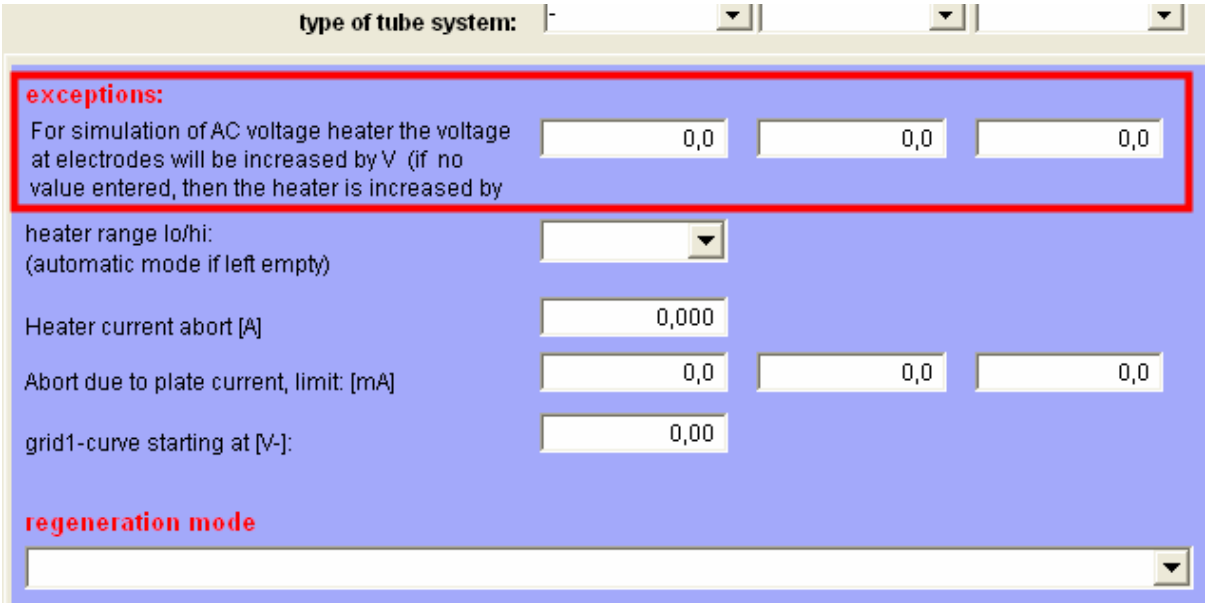
Note: The increase of the voltage by ½ of the heater voltage (simulation of AC heating) will be done with the RoeTest in the automatic modes if the correct type of heating is selected (~direct). For tubes with multiple system is is important to enter the tube data correctly:



Regarding the tube measurement using DC and AC heating see my already released report.

Note: There are larger variations for diode tubes. Good ones often show much more than 100% of the nominal value. Eventually the protection circuit of the RoeTest is activated due to over current. In this case temporarily change the exception for "Anodenstrom Abbruch ab".

For the RGN354 I would therefore enter the following typical values to the RoeTest database:

Anode voltage: 14V
Anode current: 21mA
Type of heating: ~direct