

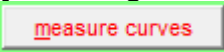
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Special characteristic curve recording method - curvetrace

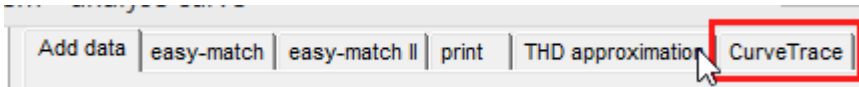
Preliminary:

The software already offers plenty of possibilities for characteristic curve recording. Great emphasis has been placed on the design of largely **fully automatic** methods for recording characteristic curves (by just pressing a button without further user intervention required). If needed recording of characteristic curves can also be modified/controlled manually (see the hint „Kennlinien aufnehmen“ [recording characteristic curves]). Automatic characteristic curve recording is started with the button

measure curves

Special characteristic curve recording method – curvetrace, new:

Below the Button  there is now a new Tab 'CurveTrace':



The special characteristic curve recording method now offers new, additional possibilities:

- up to **20** characteristic curves Ia or **10** characteristic curves Ia + **10** characteristic curves Ig2
- the five voltage sources (A, G1, G2, G3, H) can be flexibly set for each characteristic curve
- selectable voltage control methods are: variable, constant or stepwise (steps)
- this leads to a vast amount of combination possibilities
- the characteristic curves are recorded in the main window and then copied to the large analysis graphics window
- the analysis graphics window can then be printed or copied to other applications via the clipboard
- there is also a built in logic check function to detect serious control input errors (e.g. too high heater voltage, empty [but required] input fields, etc)

However there is a slight drawback compared to automatic characteristic curve recording: You have to collect all parameters manually and have to think about if these parameters make sense at all. The levels of freedom also allow to collect meaningless parameters that could damage the tube.

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Collecting the Parameters:

The screenshot shows the 'curve trace special' window with the following settings:

- system: 1 2 3
- which current?: Ia (max. 20 steps) Ia + Ig2 (max. 10 steps)
- quantity curves/steps: 5
- delay [s]: 2
- Ug1(-): variable from [V] constant [V] steps [V]. Value: -20.00
- Ua(+): variable upto [V] constant [V] steps [V]. Value: 0.0
- Ug2(+): variable upto [V] constant [V] steps [V]. Value: 125.0
- U(-): constant [V] steps [V]. Value: 0.0
- Uh (+): constant [V] steps [V]. Value: 6

Buttons at the bottom: load parameters, save parameters, reset parameters, start.

System: Specifies for which of the up to 3 tube systems characteristic curve recording shall be performed.

which current?
 Ia (max. 20 steps)
 Ia + Ig2 (max. 10 steps)

Selects either recording of Ia only or both of Ia and Ig2

quantity curves/steps: 5

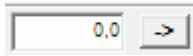
1-20(max.) if only Ia is needed, 1-10 (max.) if both Ia and Ig2 shall be measured

delay [s]: 2

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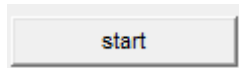
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Delay time in seconds between the curve recordings (note: when the heater voltage is changed, this time should be increased due to the large thermal inertia of the tube).



This field allows to specify a step distance for automatic filling of the following steps starting from the first step value.

With the button



recording of the characteristic curves is started.

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For all voltage sources (U_a , U_{g1} , U_{g2} , U_{g3} , U_h) the voltage's variation type must be specified:

1. 'variable'

For this voltage type the voltage is linearly „ramped-up/down“ beginning at a given starting value.

possible options are:

- U_{g1} variable -> Input characteristic curve $I_a = f(U_{g1})$
- U_a variable -> Output characteristic curve $I_a = f(U_a)$
- U_{g2} variable -> Output characteristic curve $I_a = f(U_{g2})$
- U_a and U_{g2} variable -> Output characteristic curve $I_a = f(U_a, U_{g2})$
if $U_a = U_{g2}$ -> „Triodenmode“ (triode mode)
if $U_a > U_{g2}$ -> „Ultralinearmode“ (ultra linear mode)

2. 'constant'

For this voltage type the voltage is kept constant at the same, given value for all characteristic curves.

3. 'Steps'

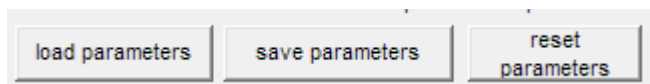
For this voltage type the voltage is changed step by step. It is possible to alter several voltages at the same time for this voltage type.

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Notes:

- All required input fields must have values set (may not be empty)
- U_h , U_a and U_{g2} must be > 0 for all input fields
- U_{g1} and U_{g3} must always be ≤ 0
- U_h may not exceed 1.5 times of the tube's normal value (as specified in the tube database)
- There is no need for a given order of the step values. E.g. it is possible to record 3 curves with $U_h=6V$ and then 3 curves with $U_h=6,3V$
- Recording of characteristic curves can only be done for those tubes where curve recording is allowed for the respective tube type (same as before)
- Due to the fact that with this mode of curve recording only one system can be recorded at a time the tube type „Triode(double)“ [double triode] cannot be used here
- U_{g3} : For the tube type „Pentode“ the suppressor grid of the tube will be connected to ground (fixed). To connect the suppressor grid to the U_{g3} control voltage for characteristic curve recording it is required to select the tube type „Pentode-G3“ in the tube data (do NOT overwrite the tube's data set but make a copy of the tube's original data set!).



With this buttons you can save and reload all parameters of the curve trace.

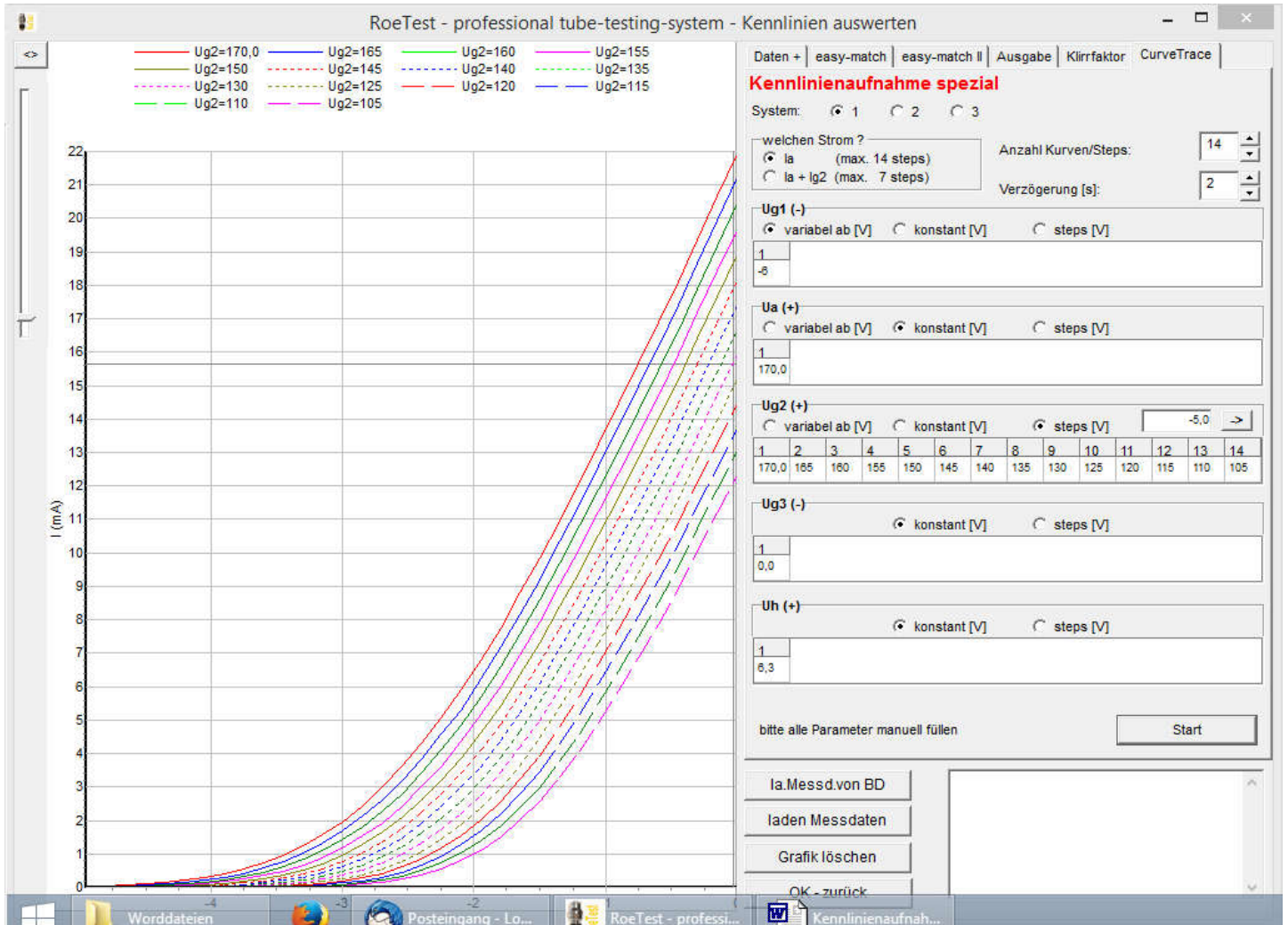
If the filename of the parameterfile is exact the same as the tube name, then the parameter file is loaded together with loading the tube data.

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Examples:

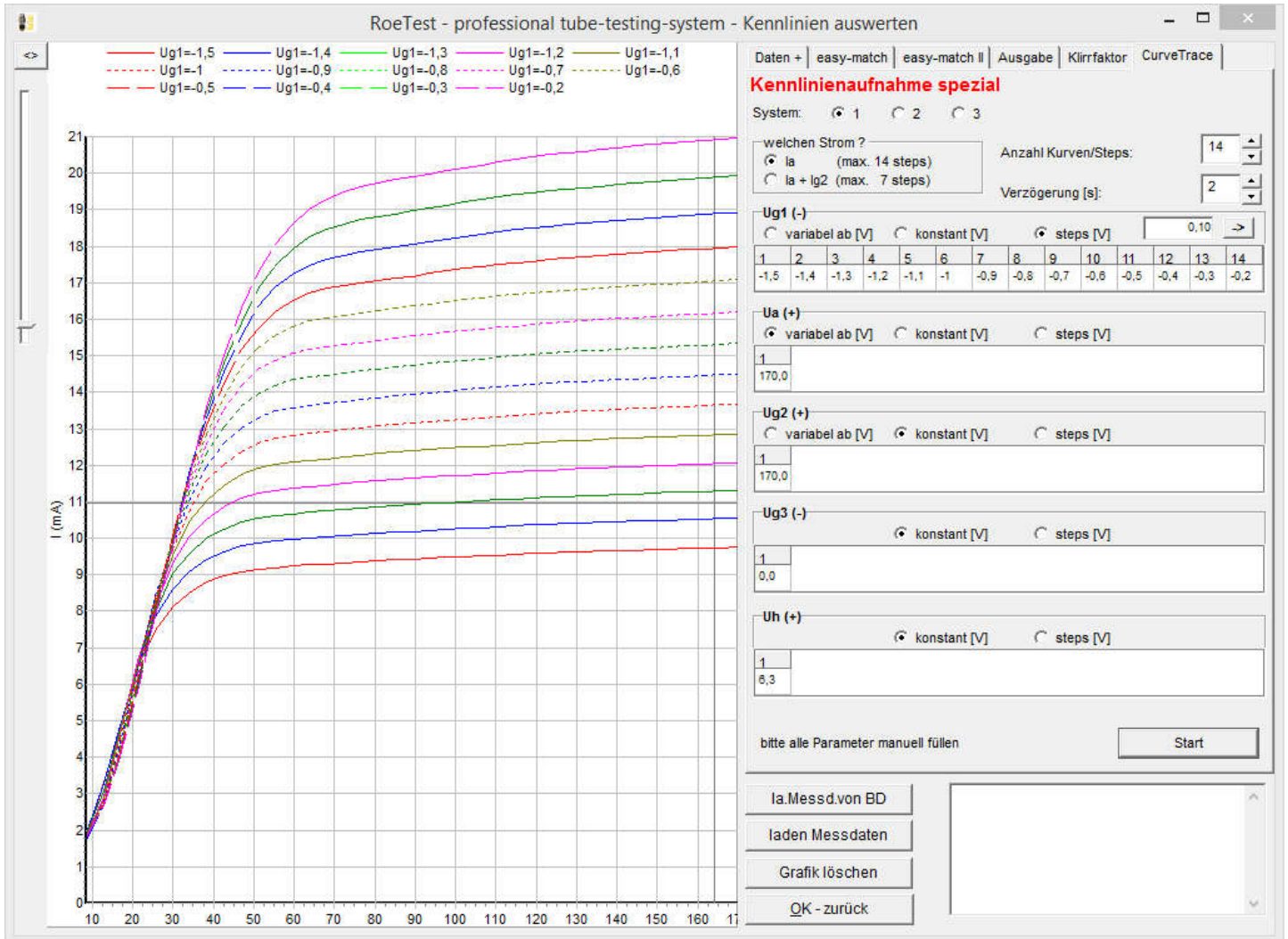
EF80, characteristic curve $I_a = f(U_{g1})$ with U_{g2} as parameter; family of characteristics with 14 curves, with parameter U_{g2} decreasing in steps of 5V



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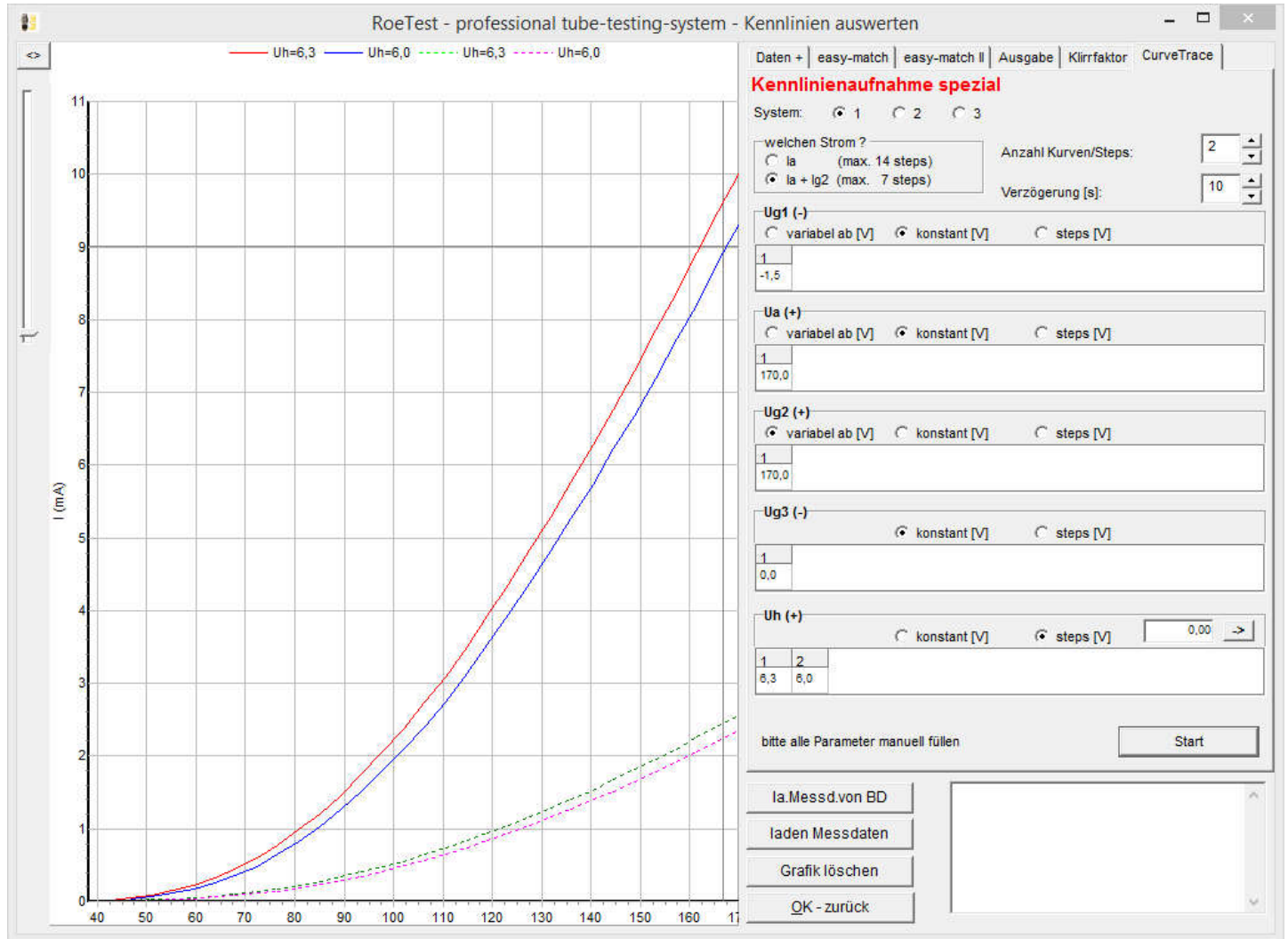
EF80, characteristic curve $I_a = f(U_a)$, with U_{g1} as parameter; family of characteristics with 14 curves, with parameter U_{g1} decreasing in steps of 0.1V



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EF80 characteristic $I_a, I_{g2} = f(U_{g2})$ for two different heater voltages



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EF80 f(Ua), plate and screen currents

