



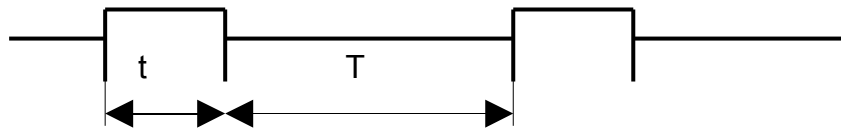
Description of the power Ultrasonic Generator UG-500

The device works only together with a PC (with RS-232 connection), and installed software, described in this paper.

The software allows to control the following parameters (that are available on the start screen)

1. Frequency of the output signal in the region 15-25kHz, with maximum resolution of 2Hz. This signal is synthesized, using quartz generator.
2. Power between 50 and 500W (in some versions 600W).

It is possible to control the output power, using fine adjustment with the help of changing the pulse width from 10-94% (in 2% steps). This is shown on the following picture:

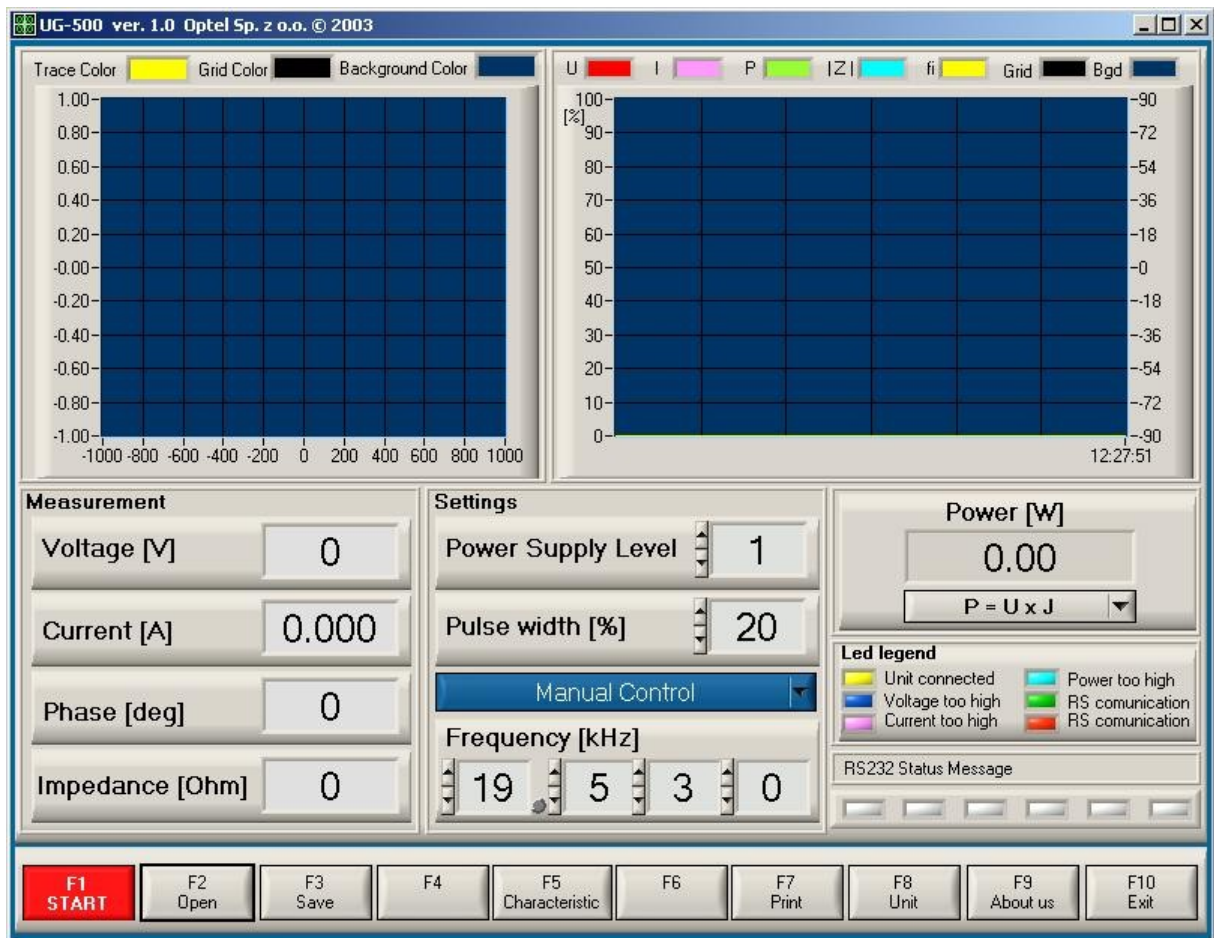


Relative „pulse width“ of the control pulse is defined as follow:

$$PW = t / (1/2 T) \times 100 \quad | \text{ in } \% |$$

Maximal power is given, if: $t / T = 0,5$ (PW= 100%)

The software allows to read following values:



- In the left Window of the Screen Lissajoux curves are shown, that are created on the basis of Voltage and current values at the output of generator. This allows quick analysis of energy transfer to the transducer and adjustment to the resonance frequency.
- In the right window the following charts are shown: voltage (U), current (I), phase difference between current and voltage (f_i), absolute value of impedance ($|Z|=U/I$), effective power ($P=U \times J \times \cos f_i$), and apparent power ($P=U \times J$).
- All this values are also shown in digital form:

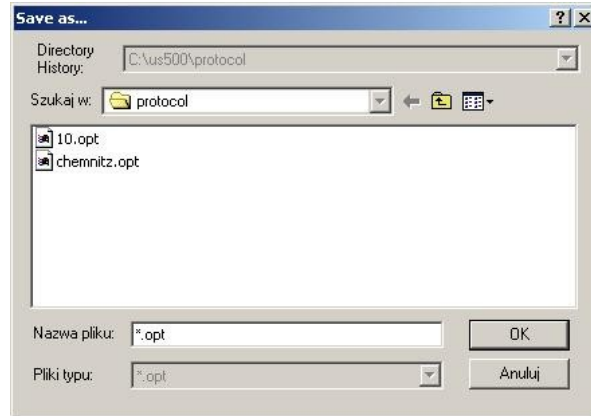
Power (W)
Voltage (V)
Current (A)
Impedance (Ohm)

- Effective power ($P=U \times J \times \cos f_i$), or apparent power ($P=U \times J$) are also shown in a separate window in digital form (it must be chosen, which value is shown).

The software allows additionally diverse settings and actions:

(each function will be started with a function key):

- F1** – Power output is switched on;
- F2** – Earlier saved setting are activated;
- F3** – Actual settings will be saved:



F5 – Gateway to the software part, where frequency depending characteristics of transducer can be measured and further settings made (analyzer window). This will be described later.

F7 – Screen printout

F8 – Automatic search of RS-232 interface, where the generator is connected. Following message occurs, that should be confirmed with Find-button:



F9 – Information about Optel;

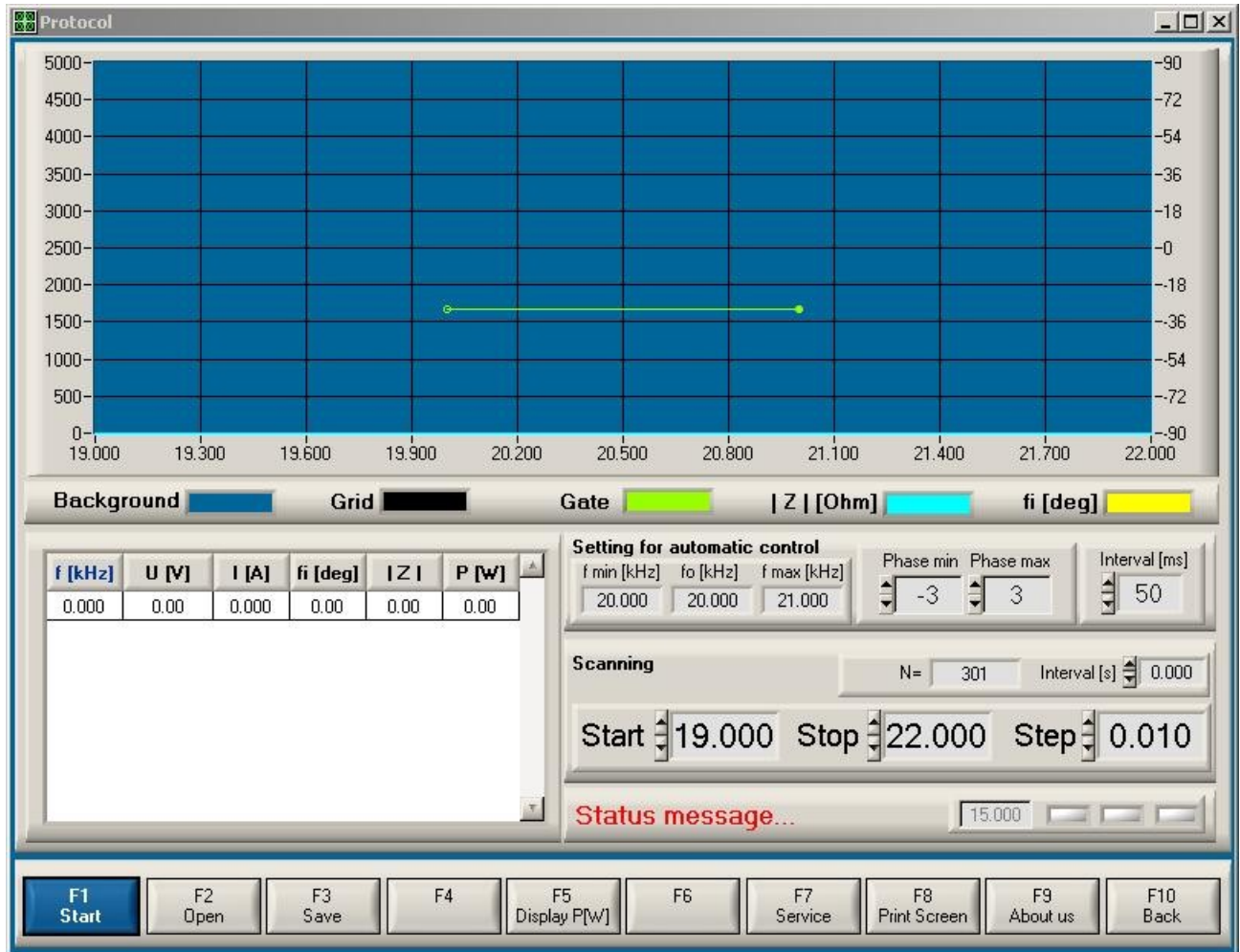
F10 – This key causes shut down of the software. A question occurs, if the user wishes, that the settings will be saved.



The user can choose the color of the background and the gitter or charts. This can be achieved by click on the color windows in the upper line of the screen.

In the row „RS 232 Status Message“ the message about the actual action of the software is shown. Below this row “LED’s”, showing different states are placed. Its meaning is explained about the “RS 232 Status Message” line.

The analyser window of the device has following form:

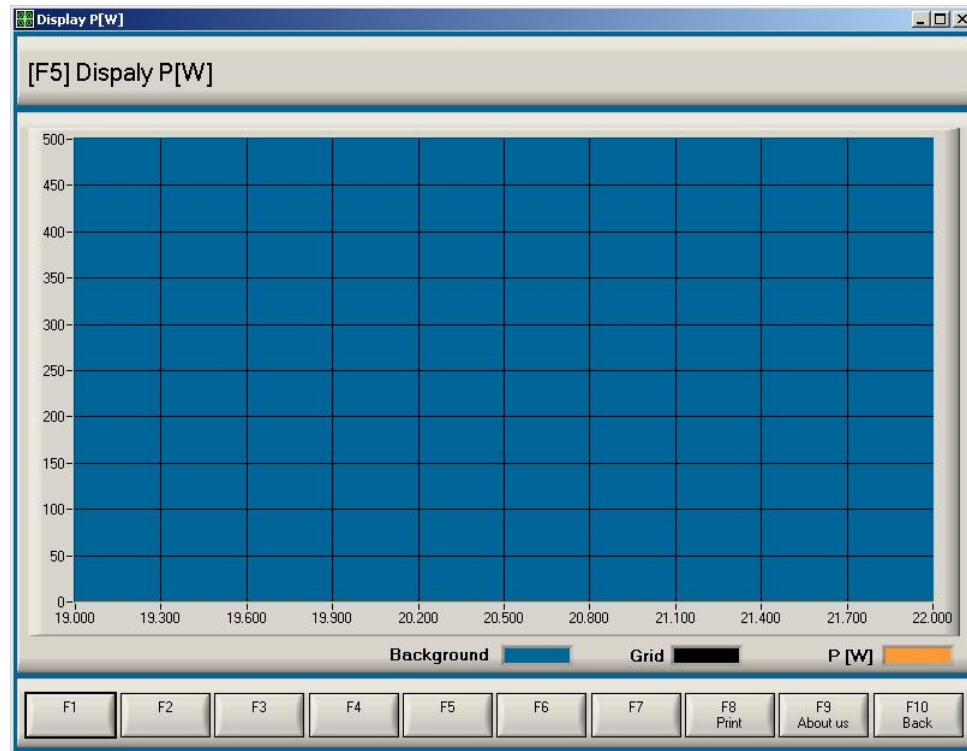


In this mode the generator works as impedance analyzer. It allows to check the impedance of the transducer, that is connected to it within the bandwidth of the generator with full power. This is important, because ultrasonic power transducers are not linear devices. They have slightly different parameters after power is applied.

Explanation of the setting possibilities:

- In the windows, that are described as „Setting for automatic control“ it is possible to read values, that can be set using cursor (gate settings).
- In the left bottom window the table with measured values is shown. It is possible to reach any line of it using arrow keys.
- The choice of phase makes sense for the work with automatic resonance search. The device will try to change the frequency in the way, that the phase will remain in the chosen area. It is also possible to set the phase to zero, but it could be difficult in many cases.

- Interval means the time between the Steps in the analyzer mode. The smallest value is 50ms.
- In the window „scanning“ it is possible to set parameters of scan process. The device changes the frequency between the values, that are given here, with the chosen step and interval. On the main window the measured values in dependence from the frequency are shown.
- F5 opens new window:

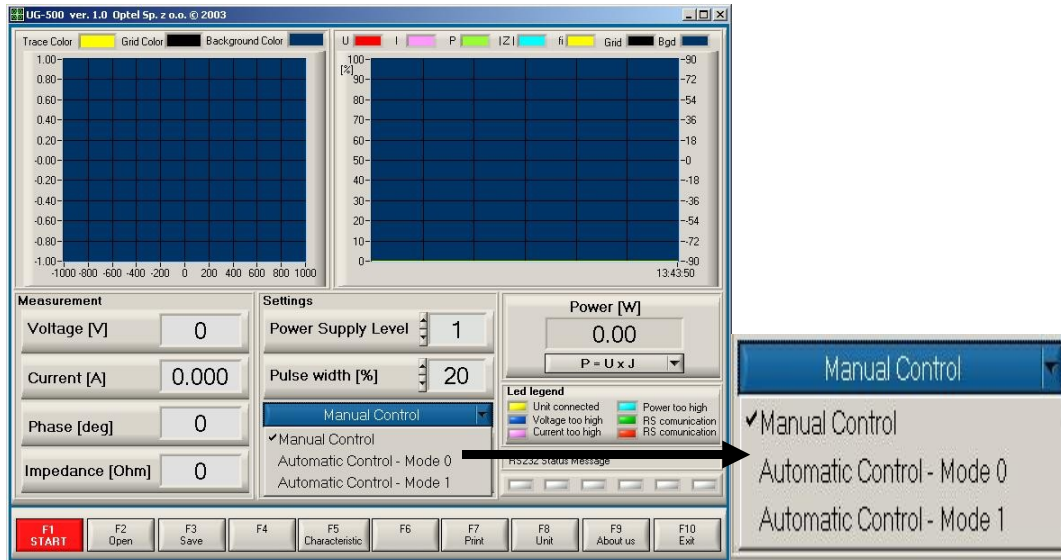


This window shows the dependence of power from frequency shown.

With F3 (from analyzer window) the measured values can be stored – in internal format.

The generator can work in two modes:

- Manual control: the frequency and all other parameters are set manually.
- Automatic control: the device changes the frequency, trying to find a value, that causes, that the phase between the voltage and current is within the region, chosen by the user. In other words: the device tries to find the resonance frequency, that can change during the work of the transducer. This is possible in two ways, that can be chosen in the main screen (as shown below). One possibility is to make the frequency higher if the phase is increasing, other is to do the opposite. Which possibility is better can be decided only by trying.



It is possible to open a control window, that allows to set alarm values.

