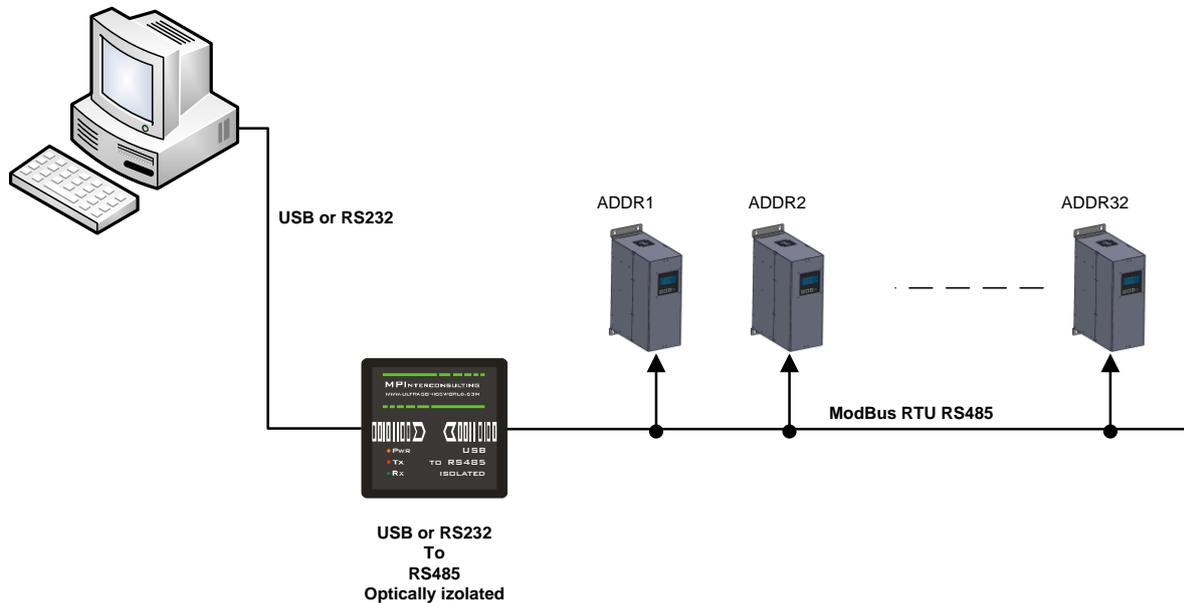## SETTING THE SOFTWARE

The generator has a standard communication interface ModBus RTU over RS 485. To connect to a PC you should use MPI adapter USB or RS 232 to RS 485 optically isolated.

Before starting the software for the generator, you need to follow and execute the following steps

Download to your PC and install all software that is here:
http://www.mastersonics.com/documents/mmm_basics/mmm_power_supplies/SONOWELD-Modbus-generators/NI%20Runtime%202012/

Install the software in the sequence as follows:

1. LVRTE2012f3std   - this is the Runtime Engine of National Instruments LabView2012

2. niser360f3   - drivers for serial communication ports of National Instruments LabView 2012

3. CDM v2.12.00 WHQL Certified   - driver for USB to RS485 adapter using FTDI chip FT232RL - you can use she attached here file (for Windows), or download the latest version, updated for your OS from here: https://www.ftdichip.com/Drivers/VCP.htm

Now download all generyator software files and place them on your PC desktop. Mentioned software is here:
http://www.mastersonics.com/documents/mmm_basics/mmm_power_supplies/SONOWELD-Modbus-generators/sonoweld%20DDS%2003042018-generator%20software/
Directory of / documents/ mmm_basics/ mmm_power_supplies/ OWF-generators

sonoweld DDS.aliases   38 bytes 28 Aug 2018

sonoweld DDS.exe   432 Kb 28 Aug 2018

sonoweld DDS.ini   299 bytes 28 Aug 2018

Now you are ready to start the executable file, "sonoweld DDS.exe", of the software of your generator.

A) First action (regarding all generators and all software we are offering), after activating specific generator software, is to connect your PC with ultrasonic generator using our RS485-USB adapter.

B) Then you need to select and activate proper operating COM port from the generator software tabs. This will open communication between your PC and your ultrasonic generator.

C) Then you need to select initial setting conditions regarding expected frequency range.

D) Then you need to make Scanning to see where ultrasonic load is able to operate.

ADJUSTING THE GENERATOR USING THE PC SOFTWARE
COM Tab
1. **Start with COMM tab**, and select proper COM port.
NOTE: Every new generator has 5 modbus address by default.

To connect the generator to the labview software we need to cover the following three conditions:
1. To know the Modbus address of the generator. Every new generator has 6 modbus address by default.
2. To know the exact COM port where the USB to RS485 driver is installed. Go to the Device Manager of your PC and find the USB Serial Port(The USB adapter must be plugged to one of the USB ports of your PC).

3. To set the correct communication baud rate.

At this moment you will have NO connection (initialized in red on top of the window)(2).
After validating the com port you will have connection (initialized in lime green on top of the window).
4. Select the ModBus address of the generator you want to connect to. Every new generator has default ModBus address 6.

Press "SCANNING FOR GENERATORS". After scanning (the yellow bar will become full in a few seconds), you will find the address (es) of the available generator(s) you will drive . Check if the value of the address in "MODBUS address" field is correct and if needed change it with the value shown in the table below the button "SCANNING FOR GENERATORS". Beat counter will become alive and will start changing the figures. Connection (lime-green) light should be active. Now you are connected to the generator with the selected address.

NOTE: Every new generator has 6 ModBus address by default.

That's why you have the possibility in the upper right side of the window to change the Modbus address selecting a new value in the field "NEW MODBUS ADDRESS" and then press the button ASSIGN NEW MODBUS ADDRESS.

DO NOT FORGET TO CHANGE THE MODBUS ADDRESS IN THE FIELD WITH THE NEW ASSIGNED MODBUS ADDRESS.

Save this setting in generator's EEPROM Memory by pressing button WRITE (top centre of the window).

5. Select "Baud Rate". The default value is 115 200 bauds/sec.

At this stage you could replace the ModBus address and the Baud Rate of the generator. This could be necessary in case you have more than one generator to adjust in the same network. The Baud Rate should be matched to the topology of your network.

The replacement is performed by pressing the button "Assign New ModBus Address" and / or button "Assign New Baud Rate".

The change is saved after pressing the button "WRITE" (top centre of the window).

6. If the generator is connected to the software, the indicator light CONNECTION glows green (YES).

Go to the first tab "CONTROL"

7. Go to CONTROLL Tab. The very first step is to press the button RESCAN to have all parameters and settings from the generator uploaded in Labview software.

8. In the slider Start Frequency set Start frequency.

9. If the transducer is 20 kHz choose for Fstart set a little bit higher of 20 -for example 20,5. Save this setting by pressing button WRITE (top centre of the window).

10. In "SPAN slider" set initially safety operation window 2 kHz, it means Span=2 kHz.

Buttons:

RESCAN – By pushing RESCAN all parameters saved in the generator's memory will upload into Labview software.

WRITE - By pushing WRITE all parameters set in Labview software will download into the generator's memory.

START - By pushing START the generator starts the welding cycle (see page 23).

STOP - By pushing STOP the generator stops working.

TEST - Button "TEST" will start the generator even the Time is selected 1sec. and will stop only when button "STOP" is pressed.

WRITE PARAMETERS TO FILE - WRITES all parameters set in Labview software into a text format(.txt) file on the hard disk of the computer.

READ PARAMETERS FROM FILE - READS all parameters from text format(.txt) file on the hard disk of the computer and downloads the data into the generator.

Sliders:

Start Frequency – sets the start frequency of the generator.

Power Set Point – sets the output power of the generator.

Span – sets the working window, where the generator seeks the working frequency of the transducer, because the working frequency could change because of loading the transducer and/or the temperature of the transducer.

Phase – The optimal phase is 2000. (in relative units x 100)

I max - This is the maximum allowed current over the transducer. You need to check the label on your transducer and set the value.

Amplitude – The actual voltage over the transducer (in % of the maximum allowed)

Actual Values:

Scan Shift – for service use only (in relative units)

Frequency Shift – shows (in kHz) how many the starting frequency is changed by the frequency regulator of the generator.

Frequency – shows (in kHz) the actual working frequency of the transducer.

Analog Set Point – shows(in Watts) the actual value of the analog power set point(0-10V) over the 25-pin connector(see page 10, pin3).

Out_current – shows (in mA) the output RMS current through the transducer.

**PWM –** shows (in %) PWM ratio over the gates of the power transistors.

Power – shows (in W) the actual output power.

Phase– shows (in ru=relative units) actual working phase.

Amplitude – The actual voltage over the transducer (in Volts)

Temperature – Voltage over pin 8 of the Interface connector, corresponding to the transducer temperature. Reference is GND. 0V=0°C; 10V=100°C (in °C)

Go to "SCAN" tab and activate SCAN.
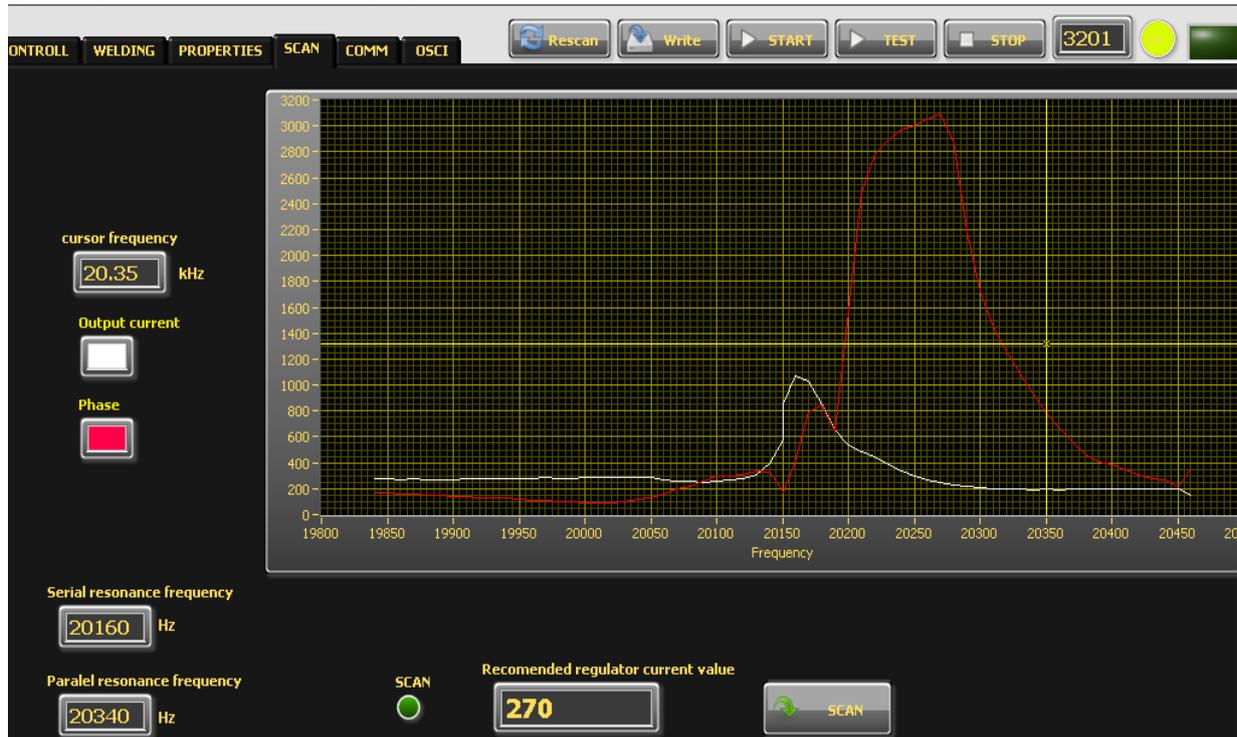
11. Press the SCAN button. The scanning procedure starts. There is a drawing consisting of phase characteristic (red line) and current characteristics (white line). It should be similar to the picture with well-defined phase feature. This diagram shows the actual operating parameters of the transducer. If necessary, pick new Fstart and SPAN (in CONTROL tab).

 You will see an active operating area of transducers, like on the picture above. It starts a scanning procedure on low power that indicates the Phase characteristic (red line) and consumed output current (white line). **For F-start in the <u>CONTROL Tab</u> you need to select, the value in the <u>Autotune Frequency</u> box(it is about 200 Hz higher than the parallel resonance frequency).** Click the WRITE button on top of the window to write in generator's memory all present settings.

12. In "POWER Set Point " in CONTROL tab, set the desired value for maximum power, of your generator.

13. Go to PROPERTIES tab.
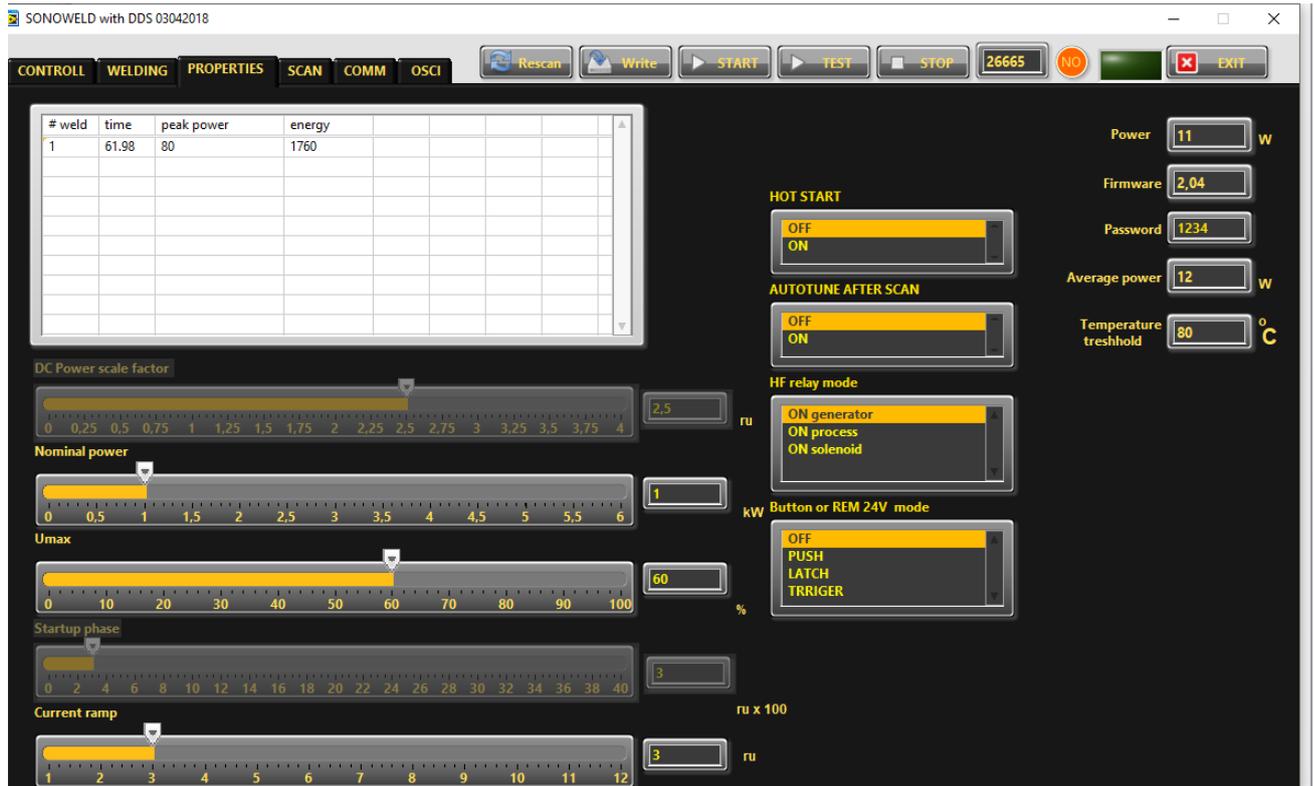
14. Now, your generator and transducer are ready to operate.

15. Start the generator, by pressing button "TEST" .The generator will keep on working until pressing button "STOP".

16. Start the Welding cycle, by pressing button "START".

Current Ramp – This is a type of regulator of the speed of growing of the current, which starts regulating when Imax is close to the set limit in case when the phase set value is still not reached (in ru). When Current Ramp value is small – the current grows fast, when Current Ramp is big – the current grows slow.

**Nominal power** - The nominal power of the generator(in kWatts).

Umax – the maximum output voltage(in % where 1000V RMS= 100%).

TEMPERATURE TRESHHOLD-External Temperature Limit – setting of the External Temperature Limit (in °C). The generator could generate error signal, when the temperature is over the set limit.

The limit for the **External temperature** is set in Labview software in PROPERTIES Tab in **Temperature Treshold**.

PUSH – the button works as a test button – while pushed the generator is on, while released the generator is stopped. See the picture below:
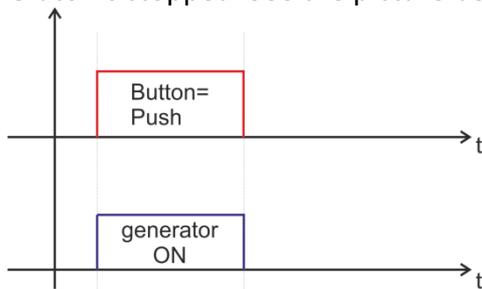
LATCH- pushing the button once the generator starts, pushing the button again the generator stops.

Button= Latch

generator ON
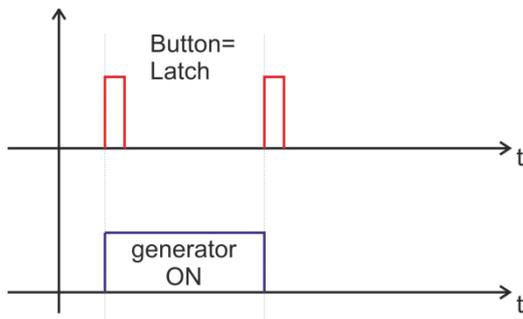
TRIGGER – pushing the button once the welding cycle starts.

Button= Trigger

delay | welding time | hold | after-burst
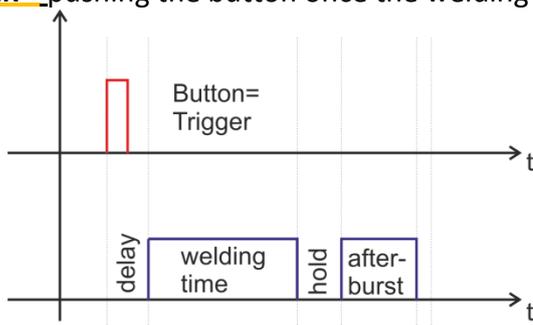
17. OSCI tab.

There is an inserted function for **recording data** – frequency, output current, phase, amplitude and power. Select the duration of the record in the field "**time to write**" – in seconds. The recording starts by START of the generator and ends when the selected time to write is finished. After recording is finished, when the button read is pressed, the data from generator is uploaded in the Labview software and is visualized graphically.

Regulator voltage – This is the K_i of the output voltage regulator(amplitude)

Regulator current - This is the Ki of the output current regulator(amplitude), in case it is selected CURRENT Mode in Regulator Mode Selection Menu.(Phase Mode is the default mode).

Ramp Frequency – This is the ramp that sets the speed of shifting the frequency down- big ramp set value – slow speed, small ramp set value – fast speed.
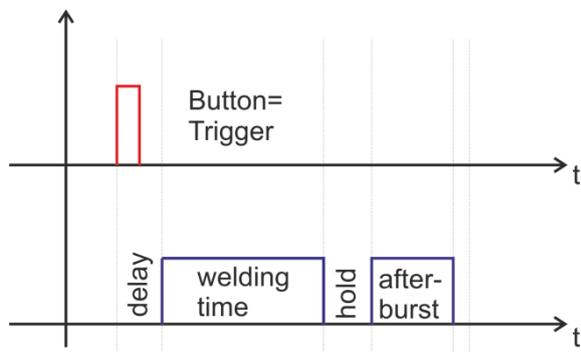
Ramp Amplitude –This is the ramp that sets the speed of growing the amplitude- big ramp set value – slow speed, small ramp set value – fast speed.

SETTING THE WELDING CYCLE PROPERTIES

1.Go to WELDING Tab.

Before setting the welding regime you need to Select TRIGGER Mode for the button – you can do it in PROPERTIES Tab or from the Display.

The generator allows **carrying** out the welding **cycle by** three criteria:
By TIME - **reaching** the preset time, the generator stops
When an external start signal(from PLC for examp.) enters on pin 5, pin 17 on the 25-pin DSUB interface socket, the generator starts the programmed welding cycle (as shown on the graphic above).
Welding cycle includes:
 Delay – delay after the start signal to turn the generator ON.
Welding time – the generator is ON.
Hold – the generator is OFF for the preset hold time.
Afterburst - the generator is ON for the preset afterburst time.

By ENERGY - **reaching** the preset **energy**, the generator stops **only** the programmed Welding Time (as shown on the graphic above) and keep on to execute hold and afterburst .

By PEAK POWER - **reaching** the preset **peak power**, the generator stops **only** the programmed Welding Time (as shown on the graphic above) and keep on to execute hold and afterburst .

There is an option to set limits for TIME, ENERGY and PEAK POWER or any combination of these 3 criteria.
If there are preset limits for TIME, ENERGY and PEAK POWER together or combination of them, different from zero, the generator will stop after reaching any of the given parameters.
If there are preset limits for TIME, ENERGY and PEAK POWER together or combination of them, equal to zero, the generator will work continuously.

Sliders:
(correspond to the parameters on the display of the generator) :
Welding by time:
Time – time when the generator is on (in seconds)
Time plus – shows the additional safety time. This maximum duration of the control signal (in seconds)
Time minus – minimum duration of the control signal (in seconds)
*Note: If entered a control signal from external control unit (PLC) out of limits **Time Plus** and **Time minus**, the bicolour LED will light in red and an error message **Limit Time** will be displayed.*
Last time - duration of the last working cycle (in seconds)

Welding by energy:
Energy – setting of nominal energy during the welding process (in Ws). If the setting is different from 0 and the generator reaches the set value the generator automatically stops.
Energy plus – maximum allowed energy reached during the welding process.(in Ws)
Energy minus – minimum allowed energy reached during the welding process (in Ws)

*Note: If the energy during the welding process is out of limits **Energy Plus** and **Energy Minus**, the bicolour LED will light in red and an error message **Limit Energy** will be displayed.*

Last Energy – energy of the last working cycle (in Ws)
Welding by peak power:
Peak Power – setting of the peak power (in W). If the setting is different from 0 and the generator reaches the set value of the peak power, the generator automatically stops.
Peak plus – maximum allowed peak power reached during the welding process (in W)
Peak minus– minimum allowed peak power reached during the welding process (in W)

*Note: If the Peak Power during the welding process is out of limits **Peak Plus** and **Peak minus**, the bicolour LED will light in red and an error message **Limit Peak Power** will be displayed.*

**Last pk Power** – peak power of the last working process (in W)

Delay – after the start signal, the generator delays starting with the set value of the delay (in seconds)
Hold – the generator delays with the set hold value before executing Afterburst (in seconds)
Afterburst – setting the value of afterburst (in seconds)
Last time - time for the last working process (in seconds)

HF-DA RELAY MODE
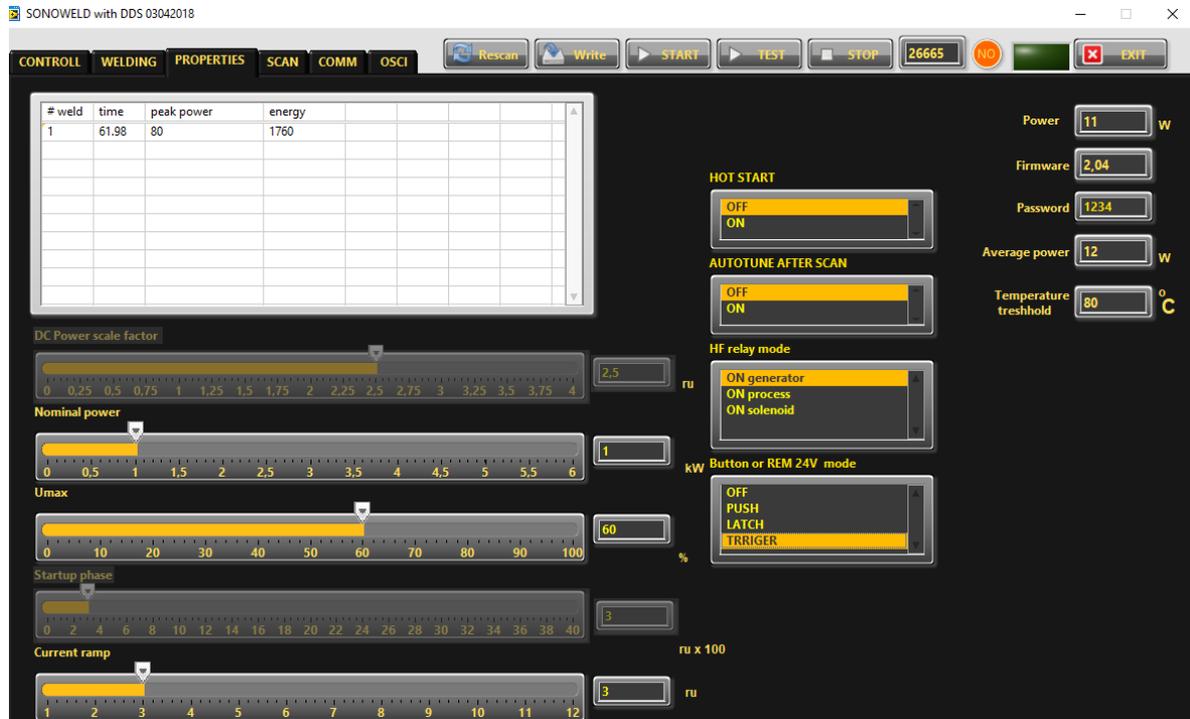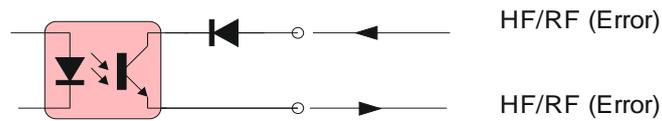
In PROPERTIES Tab you can select the HF Relay Mode(see right bottom corner) from three options:

ON generator – the relay is ON only during welding time.

ON process – the relay is ON during whole process, including delay, welding time, hold and afterburst.

ON solenoid - the relay is ON during delay, welding time and hold together.

ERROR MESSAGES AND TROUBLESHOOTING

When error event occurs the bicolour LED will ligh up in red. The error message will appear over the dynamic bar graph. If you want to see it properly you need to press the rotary encoder once, to move to next window of the display (Power window), where on the last row an error message will be displayed.
All types of error messages will be cleared after restarting the generator.

The following error messages may appear on the display:

OVERCURRENT – Overlimitted high current is flowed through the power transistors

The electronic overcurrent trigger has detected an error.

Possible causes:
· Short circuit in the cable or transducer
· Starting frequency selected is too HIGH
· Starting frequency selected may be too LOW
· There is a problem with the transducer.

Troubleshooting:
· Switch on the generator without the transducer connected. If OVERCURRENT
  Message does not appear on the display, this means that the generator is in good working condition.
· Check the cable between the generator and the transducer.
· Check the transducer for short circuit.
· Change and set properly the starting frequency, if it is not in range as described in this manual.

Error message:
OVERHEATING

The electronic overheating trigger has detected an error

Possible causes:
· Not enough space around the generator.
· Ambient temperature is too high.
· The fan is dirty or malfunctioning .

Error message:
OVERVOLTAGE -Overlimitted high voltage is applied over the transducer

Possible causes:
· The cable between the generator and transducer is broken or just disconnected.

· Starting frequency selected is too HIGH
· Starting frequency selected may be too LOW

Troubleshooting:

· Rescan and re-adjust the generator as described in this manual

Error message:

LOAD ERROR – the generator cannot find the resonance frequency of the transducer inside the choosen frequency window.

Possible causes:

· Starting frequency selected is too HIGH
· Starting frequency selected may be too LOW – below the resonance frequency
· Span selected may be too LOW
· The cable between the generator and the transducer is broken
· The transducer is defective

Troubleshooting:

· Rescan and re-adjust the generator as described in this manual
· Check the cable between the generator and the transducer.
· Check the transducer for disconnection.

Error message:

FREQUENCY ERROR

Possible causes:

· Bad frequency setting
· Control board is damaged

Troubleshooting:

· Check the frequency settings

LIMIT TIME ERROR

Possible causes:

· Over limit for Time Plus or Time minus has been entered

Troubleshooting:

· Check the Time settings

LIMIT ENERGY ERROR

Possible causes:

· the energy during the welding process is out of limits **Energy Plus** and **Energy Minus**,

Troubleshooting:

· Check the Energy settings
· Check the Welding Process for lapses

LIMIT Peak Power ERROR

Possible causes:

· the Peak Power during the welding process is out of limits **Peak Plus** and **Peak minus**

Troubleshooting:

· Check the Time settings
· Check the Welding Process for lapses

MAINTENANCE

The ultrasonic generator does not need special maintenance.

Dust and dirt should be removed regularly using a damp cloth.

ATTENTION: • **Do not use aggressive cleaners!**
• **Not suitable for ultrasonic cleaning!**

SPECIFICATIONS:

	SONOWELD 2000	
Frequency	**35 kHz**	
Operating voltage	210-250 V , 50-80 Hz	
Power consumption	9 A	
Maximum output	2,000 W	
Fuse protection	10 A	
Dimension casing	**W x H x D/mm/** 90x180x370	**Weight** 3.3 kg
Operating Temperature range	-10 to +40°C	**Protection class** IP 20, IEC 60 529, EN 60 525

WARRANTY

The length and coverage of the warranty can be found in the terms of delivery as part of the general terms and conditions (valid at the time of purchase) or in the sales contract / order confirmation, should any special agreements have been made.

The following cases are not covered by warranty:

- Damage caused by inappropriate operation
- The device not being used for its intended purpose
- Inappropriate alterations or modifications made without prior authorization from the manufacturer
- Damage caused by extreme circumstances, such as knocks, falling over, moisture and dirt
- Insufficiently qualified operating staff
- Non-compliance with current safety and accident-prevention regulations
- Damage resulting from modifications made to the operating instructions

SERVICE HOTLINE

Should you still have questions after reading through this operating manual,
please feel free to call our service hotline.

Service contact details
ADDRESS
TEL
FAX
EMAIL
SKYPE
Etc.

Please have the device type and serial number at hand, to help us quickly answer your questions (the serial number is on the backside of the generator)

SPARE PARTS

Parts are available upon request. Please provide us the serial number of your device, to ensure we supply you with the appropriabout 500 , it means that the load is under control.