Operating Manual

Ultrasonic Generator
Boa

35-600, 35–900

Version 1.1

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Safety Instruction

The design of the generator conforms to the current state of engineering and is safe to use.

The parts and the complete unit are subject to continual inspection by our quality assurance department.

The generator is intended exclusively for the ultrasonic welding of thermoplastic materials. Any other use is regarded as inconsistent with the intended purpose, and is undertaken at the user's own risk.
The manufacturer is not liable for any resultant damage.

Before you are using this generator the first time you must read this instruction manual carefully. Being badly informed about how to use the unit can result in damage.
Always keep this instruction manual next to the unit.

Do not make any modifications witch might endanger safety without permission of the manufacturer.

Work on the unit may only performed by reliable staff.

Attention !!!

Before you open the cover of the generator you must remove the power cable.

Do not touch any part inside of the generator before the 3 mm LED next to the big Elko 390u/400V is no longer alight. The Elko are still loaded for some time after power off.

Attention !!!

Be sure to fit the power connection with a grounded connector!

Technical Data

Pos	Function	Boa
1	Line voltage	230 V (190 - 265 V AC) 50-60Hz
2	Size	H250 x B130 x L 415
3	Weight	6 kg
4	Colour	RAL 3020 red, other colours on request
5	Display	2x16 characters with backlight
6	Keyboard	5 key
7	Microcontroller	16 bit / 20 MHz
8	AD / DA converter	10 bit / 12 bit
9	Power measuring	10 bit
10	Frequency range	34700 - 35150 Hz
11	Auto tuning	Real time
12	Nominal output power	600, 900 W at 35 kHz
13	Maximum output power	10 % above nominal power
14	Amplitude constant	230V +- 10%
15	Amplitude	50 to 100% in 5 % steps
16	Amplitude external	Setting over four digital Input
17	Time Mode	0.005 - 9.999s
18	US Stop Mode	Integrated
19	Time Trigger	Timer 0 - 9.999s
20	Valve output	Integrated
21	Inputs	Opto coupler 20 - 28 V DC / max. 7 mA
22	Power supply for DIO	Integrated 24V DC / 500 mA overload protected
23	Output	Opto coupler 22 - 26 V DC / 250 mA
24	Emergency stop	Message in display
25	Error message Display	Message in display
26	Error message Hardware	Output (Option buzzer)
27	Ambient Temperature	-5°C ~ 45°C / stock -20°C ~ 60°C
28	Design & Production	Switzerland

Power on message

Swiss made www.apsonic.com

Boa 35-900 Version V 1.1

123456	80%
1.000s	100%

The power on procedure will take about 7s.

The Boa is ready as soon as the parts counter will be displayed. The output READY will be activated.

Key function

E	select parameter menu / quit & save parameter menu
–	decrease values / reset errors
+	increase values / US Test
↑	Scrolling up
↓	Scrolling down

on / off	Power on / off

The power on/off button can be set inactive with a jumper on the front board. The jumper must be set to **ON** if the power on/off switch must be inactive. For details see page 24.

Indicator

LED Bar red	Power	Output power in 10 % steps. Peak value will be displayed after each welding
Display		After each welding you can see the welding result in the display

US – Test

Press the key [+] for manual US Test. The minimum test time will be 300 ms.

Attention !!!

Do not touch the horn when the US Test is executed.

Tuning frequency

35.000 – 35.050 Hz

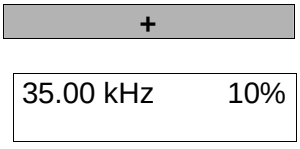
Newly made horn must meet this specification.

Frequency range during operation

34.700 – 35.150 Hz*

* The frequency range is depending on the connected vibration system. The above values are valid for the following vibration system.

Booster 1: 2 with Horn 1:1 diameter 30mm



Frequency & Loss power

Welding cycle

External Mode

The cycle will start over Input **START**. The output VALVE will be activated. The **WELD TIME** will start after the **TRIGGER TIME** is elapsed. The **WELD TIME** is active as long Input **START** is active. After the **WELD TIME** the **HOLD TIME** will be activated. The **VALVE** will be switched off after the **HOLD TIME** is elapsed. The **DELAY US PULSE TIME** will be activated. The **US PULSE TIME** will be activated after the **DELAY US PULSE TIME** is elapsed.
The cycle is finished.

Press the **-** key to reset an **ERROR**. The next **START** will reset the **ERROR** as well.
The Boa will be blocked after 8 consecutive **ERROR**. Press the **-** key to reset the blocking.

The effective **WELD TIME** will be displayed. If the **WELD TIME** is longer then 9.999s, the display will always show 9.999s.

Time Mode

The cycle will start over an impulse of 100m at the Input **START**. The output VALVE will be activated. The **WELD TIME** will start after the **TRIGGER TIME** is elapsed. The **WELD TIME** is active as long Input **START** is active. After the **WELD TIME** the **HOLD TIME** will be activated. The **VALVE** will be switched off after the **HOLD TIME** is elapsed. The **DELAY US PULSE TIME** will be activated. The **US PULSE TIME** will be activated after the **DELAY US PULSE TIME** is elapsed.
The cycle is finished.

Press the **-** key to reset an **ERROR**. The next **START** will reset the **ERROR** as well.
The Boa will be blocked after 8 consecutive **ERROR**. Press the **-** key to reset the blocking.

US Stop Mode

The cycle will start over an impulse of 100m at the Input **START**. The output VALVE will be activated. The **WELD TIME** will start after the **TRIGGER TIME** is elapsed. The **WELD TIME** is active as until the input **US-STOP** will be activated. If the input **US-STOP** is activated after the **CONTROL TIIME** is elapsed then the **ERROR TIMEOVERFLOW** will be displayed. After the **WELD TIME** the **AFTER WELD TIME** will be activated. After the **AFTER WELD TIME** the **HOLD TIME** will be activated. The **VALVE** will be switched off after the **HOLD TIME** is elapsed. The **DELAY US PULSE TIME** will be activated. The **US PULSE TIME** will be activated after the **DELAY US PULSE TIME** is elapsed.
The cycle is finished.

Press the **-** key to reset an **ERROR**. The next **START** will reset the **ERROR** as well.
The Boa will be blocked after 8 consecutive **ERROR**. Press the **-** key to reset the blocking.

Welding Parameter External Mode

Press the key **E** to activate **Parameter Setup** menu.

Press the key ↑↓ to scroll up and down in the menu.

Press the key +/– to change the parameter.

Weld Time EXTERNAL	**WELD TIME** over Input	**START**
Amplitude 100 % (external) *	Change with key +/–	50 % - 100 %
Hold Time 9.999 s	Change with key +/–	0.000 s – 9.999 s
Trigger Time 9.999s	Change with key +/–	0.000 s – 9.999 s
After Weld Time Not active		
Delay US Pulse 9.999 s	Change with key +/–	0.000s – 9.999 s
US Pulse 9.999 s	Change with key +/–	0.000 s – 9.999 s
Parts 1234546	Reset with key –	0 – 999999

* If the System is set to **AMPITUDE=EXTERNAL** then the **AMPITUDE** is depending on the settings of the inputs **AMPLITUDE 1-4**.
The display will show the word **EXTRENAL** behind the % value.

Welding Parameter External Mode 2

Jumper J1 must be set to **1** to activate this menu. For details see page 24.

Press the key **E** to activate **Parameter Setup** menu.

Press the key ↑↓ to scroll up and down in the menu.

Press the key +/– to change the parameter.

Weld Time EXTERNAL	**WELD TIME** over Input	**START**
Amplitude 100 % (external) *	Change with key +/–	50 % - 100 %
Parts 1234546	Reset with key –	0 – 999999

* If the System is set to **AMPITUDE=EXTERNAL** then the **AMPITUDE** is depending on the settings of the inputs **AMPLITUDE 1-4**.
The display will show the word **EXTRENAL** behind the % value.

Welding Parameter Time Mode

Press the key **E** to activate **Parameter Setup** menu.

Press the key ↑↓ to scroll up and down in the menu.

Press the key +/– to change the parameter.

Weld Time 9.999 s	Change with key +/–	0.005 s – 9.999 s
Amplitude 100 % (external)	Change with key +/–	50 % - 100 %
Hold Time 9.999 s	Change with key +/–	0.000 s – 9.999 s
Trigger Time 9.999s	Change with key +/–	0.000 s – 9.999 s
After Weld Time Not active		
Delay US Pulse 9.999 s	Change with key +/–	0.000s – 9.999 s
US Pulse 9.999 s	Change with key +/–	0.000 s – 9.999 s
Parts 1234546	Reset with key –	0 – 999999

* If the System is set to **AMPITUDE=EXTERNAL** then the **AMPITUDE** is depending on the settings of the inputs **AMPLITUDE 1-4**.
The display will show the word **EXTRENAL** behind the % value.

Welding Parameter US-STOP Mode

Press the key **E** to activate **Parameter Setup** menu.

Press the key ↑↓ to scroll up and down in the menu.

Press the key +/– to change the parameter.

Weld Time 9.999 s	Change with key +/–	0.005 s – 9.999 s
Amplitude 100 % (external)	Change with key +/–	50 % - 100 %
Hold Time 9.999 s	Change with key +/–	0.000 s – 9.999 s
Trigger Time 9.999s	Change with key +/–	0.000 s – 9.999 s
After Weld Time 9.999s	Change with key +/–	0.000 s – 9.999 s
Delay US Pulse 9.999 s	Change with key +/–	0.000s – 9.999 s
US Pulse 9.999 s	Change with key +/–	0.000 s – 9.999 s
Parts 1234546	Reset with key –	0 – 999999

* If the System is set to **AMPITUDE=EXTERNAL** then the **AMPITUDE** is depending on the settings of the inputs **AMPLITUDE 1-4**.
The display will show the word **EXTRENAL** behind the % value.

Error Message

Press the **-** key to reset an **ERROR**.

The next **START** will reset the **ERROR** as well.

The Boa will be blocked after 8 consecutive **ERROR**. Press the **-** key to reset the blocking.

Error message 1 Overload	Power to small, amplitude too high, welding pressure too high
Error message 2 Converter voltage	Horn, Converter, Booster or RF cable defect, pressure too high
Error message 3 Frequency min.	Bad horn tuning or horn defect
Error message 4 Frequency max.	Bad horn tuning or horn defect
Error message 5 Time Overflow	US – Stop signal not activated
Error message 6 Output 24V	One of the 24V output is overloaded or output driver defect
EMERGENCY STOP	Emergency stop not closed

Input & Output

Input

Connection :	Opto coupler
Voltage :	20 – 28 V DC
Currant :	maximum 7 mA

Output

Connection :	Opto coupler
Voltage :	22 – 26 V DC
Currant :	maximum 250 mA for each output

The maximum load to the internal power supply is 500 mA. The power supply is overload protected.

Each output is overload protected. In case on an overload the message **OUTPUT 24V** will appear in the display.

Press key - to reset the overload.

All connections come as female.

Connection

Start X1 25 pin Sub D

Pin	Signal
1	Emergency
2	Emergency
3	24V DC after Emergency
4	24V DC after Emergency
5	GND
6	Input **AMPLITUDE 1**
7	Input **AMPLITUDE 2**
8	Input **AMPLITUDE 3**
9	Input **AMPLITUDE 4**
10	NC
11	Input **START**
12	Input **US Stop -**
13	GND

Pin	Signal
14	NC
15	NC
16	NC
17	NC
18	NC
19	Output **FREQUENCY ERROR**
20	Output **OVERLAOD ERROR**
21	Output **ULTRASONICS ACTIVE**
22	Output **READY**
23	Output **VALVE**
24	Output **GLOBAL ERROR**
25	Input **US Stop +**

Connection

Pin 1 or 2
Pin 1 or 2 must be connected with Pin 3 or 4 though an **EMERGENCY STOP BUTTON**.

The function can be disabled with a jumper on the main board.
The jumper must be set to **INTERNAL** to bypass the **ERMERGENCY STOP** feature.

Pin 3 & 4
24VDC as soon as the **ERMERGENY STOP BUTTON** is closed.

Pin 5 & 13
GND

Pin 6 - 9
The function **AMPLITUDE=EXTERNAL** is only active if set in the **SYSTEM INIT** Menu.
You can set the **AMPLITUDE** according to the table below. The maximum time to change the **AMPLITUDE** is 50ms. If the setting is wrong it will be set to 50%

INPUT	AMPLITUDE 1 (6)	AMPLITUDE 2 (7)	AMPLITUDE 3 (8)	AMPLITUDE 4 (9)
100%	0	0	0	0
95 %	0	0	0	1
90 %	0	0	1	0
85 %	0	0	1	1
80 %	0	1	0	0
75 %	0	1	0	1
70 %	0	1	1	0
65 %	0	1	1	1
60 %	1	0	0	0
55 %	1	0	0	1
50 %	1	0	1	0

Connection

Pin 11
The input **START** will activate the cycle if activated with 24VDC.

Pin 12
The input **US-STOP -** will activate the US-STOP is activated with GND. The input **US-STOP+** must be connected with 24VDC.

Pin 19
The output **FREQUENCY ERROR** has 24VDC if active.

Pin 20
The output **OVERLAOD ERROR** has 24VDC if active.

Pin 21
The output **ULTRASONICS ACTIVE** has 24VDC if active.
The output is active as long as the **ULTRASONICS** is active.

Pin 22
The output **READY** has 24VDC if active.
The output is activated after the power on procedure. During the welding cycle the output is inactive.

Pin 23
Output **VALVE** has 24V DC if active.

Pin 24
The Output error global has 24V DC if active. The error will be activated if on of the welding gun produces an error.
On the main board there is a buzzer with the same function. The buzzer can be activated with a jumper on the main bard.

Pin 25
The input **US-STOP +** will activate the US-STOP is activated with 24VDC. The input **US-STOP-** must be connected with GND.

Connection

Line X2 C13 / C15

Pin	Signal
1	Phase
2	Neutral
3	Ground

Pin 1 & 2
230 V AC Specs see **TECHNICAL DATA**
Values see **FUSES**

Pin 3
Must be connected to ground

Attention !!!

Be sure to fit the power connection with a grounded connector.

RF- Connector X3 Lemo 1

Pin	Signal
1	RF Output
2	Ground

Pin 1
Attention !!! **HIGH VOLTAGE** **Do not disconnect during operation !**

Pin 2
Ground

Fuse

Fuse	Type	Value
F1 & F3	all	1.25AT

Fuse	Type	Value
F2	35-600	4.0 AT
F2	35-900	6.3 AT

All fuses 5x20 slow.

Check F1 if the power switch on the rear panel is on, but it is not possible to switch on the unit with the power switch on the front panel.

Check F2 is the 3 mm LED next to the 390u Elko on the main board is not alight.

Check F3 if there is no 24VDC output.

Attention !!!

Before you open the cover of the generator you must remove the power cable.

Do not touch any part inside of the generator before the 3 mm LED next to the big Elko 390u/400V is no longer alight. The Elko are still loaded for some time after power off.

Standard Init

Press the key ↑ during power on. You can release the button when the message **INIT** is shown in the display.

Init

The unit will be reset to factory settings.

Attention !!!

All parameters are lost.

System Init Menu

Press the key **E** during power on. You can release the button when the message **WELDING GUN** is shown in the display.

Swiss made www.apsonic.com		
Boa 35-900 Version V 1.1		Press key E during power on
Mode External	Time / US-STOP	Change with key +/ -
Amplitude Internal	External	Change with key +/ -
English	German,…	Change with key +/ -
Soft start 20	2-30	Change with key +/ -

Jumper Main Board

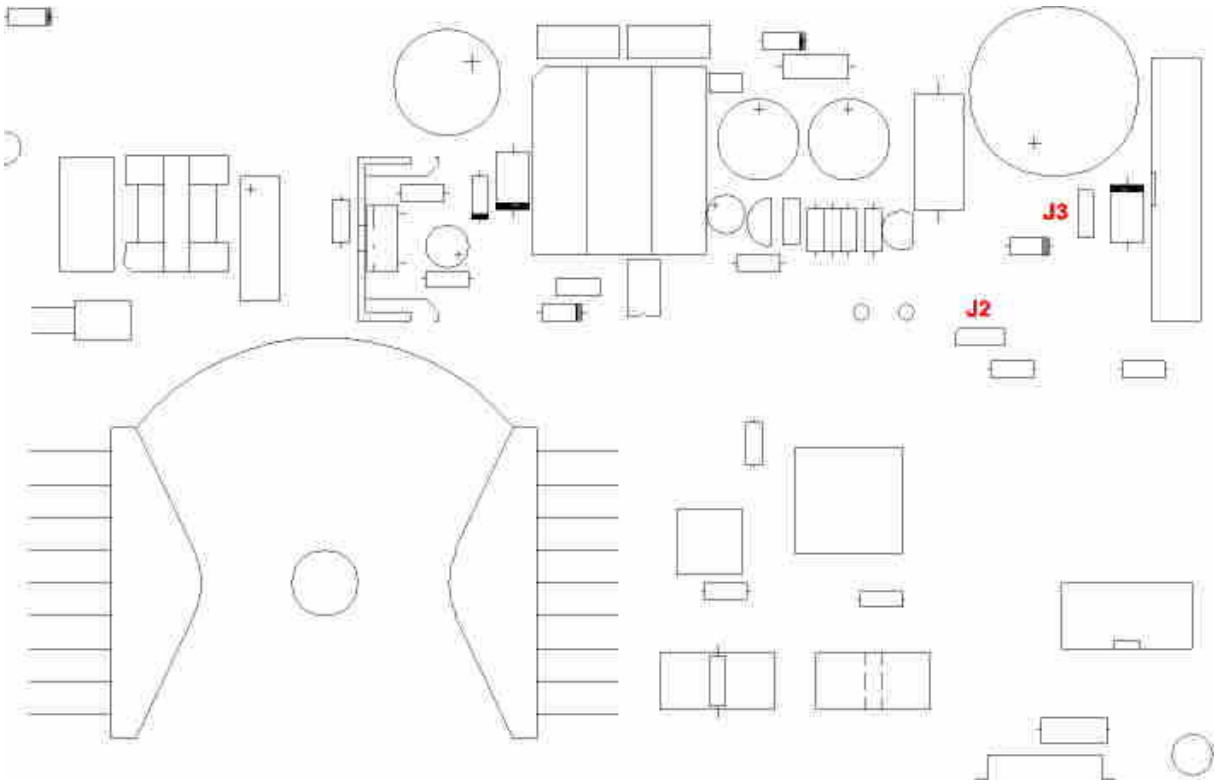
There are two jumpers on the main board. Depending on the settings you can select different features.

J2 Buzzer

The buzzer is active if jumper is in position **BUZZER .**

J3 Notstopp

The Emergency Stop is not active if jumper is set to **INTERNAL.**



Jumper Front Board

There are three jumpers on the front board. Depending on the settings you can select different features.

J1

If the jumper is set to position **1**, then the welding parameter menu **External 2** is activated.

J2

If the jumper is set to position **ON**, then the ON/OFF switch on the front is no longer active.

J3

Only for factory use.