

Operating Instructions



Standard 3000

with generator ADG





Disclaimer

The information in this brochure corresponds to our current state of knowledge. However, it is not to be understood as a warranty for certain characteristics or for suitability of the products for certain applications. Our general contractual terms apply in this regard, and reference should also be made to these terms with regard to liability. No industrial property rights of any kind are granted to the user along with this brochure, nor are any assurances made with regard to a licence. Corresponding separate agreements would be necessary for this purpose. The suitability of the products for particular applications may only be checked with our own specialists. The German version of the brochure is binding with regard to accuracy of the information given.

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Version 2, ADG, gb, Art. No. 36566

Software versions:

Manual established with:

ADG20-3000P-230-B1

AUI V120

0C70

PUA1 V1.2.1

DGC0400 Beflex

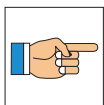
DGC 0G64

ADG Standby Print V1.4

ADG Distributor Print V1.3

Creation date: 1.07.2007

Note



Read and precisely follow the information in this operating manual before unpacking the unit and putting it into operation!

The unit may only be used, maintained and repaired by people, who are familiar with the operating manual and the applicable regulations on work safety and accident prevention.

Agency

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Important!

When asking about your Standard 3000 ultrasonic welding system and the generator, please provide the exact type designation and the unit serial number. These are located on the type label plate (A and B) on the side of the press as well as on the back side of the generator.

**Standard 3000:
Press with 3000 N of maximum force**

The construction and the wiring of this unit are continuously developed and improved and are therefore at the leading edge of technology.

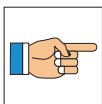
RINCO ULTRASONICS AG
Romanshorn, Switzerland

Preface

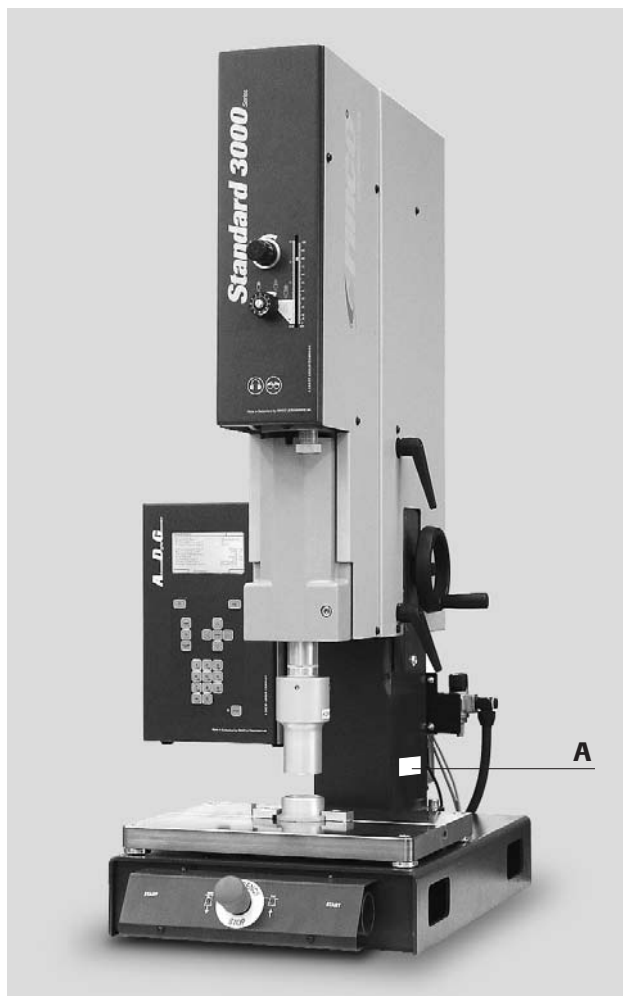
We are very pleased that you chose to buy a RINCO product. We are convinced that you will achieve a maximum degree of economy of operation and product quality when using this unit.

The purpose of this manual is to give the purchaser and the user all the information they need in terms of the handling, assembly, operation and care of the welding press.

To ensure that your system is always in an operational state, you should take note of and follow all the tips and instructions contained within this manual.



These instructions describe the Standard 3000 and Standard 3000 with sound enclosure SSK-H in operation with the generators ADG 20-1000, ADG20-2000 and ADG 20-3000.



Made in Switzerland by: RINCO ULTRASONICS AG Industriestrasse 4 CH - 8580 Romanshorn 1	
Typ:	
Artikel Nr.:	
Serie Nr.:	
Baujahr:	

Made in Switzerland by: RINCO ULTRASONICS AG Industriestrasse 4 CH - 8580 Romanshorn 1	
Typ:	
Artikel Nr.:	
Serie Nr.:	
Baujahr:	
VAC:	
Generator	Fuse

A **B**

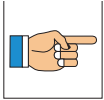
1 Safety

1.1 Explanation of symbols and signs

A system of symbols indicates dangerous behaviour as well as correct behaviour. The symbols are used in the operating manual. All danger and note symbols describe conditions, during which people, things or the environment could be put at risk, if these symbols are ignored.

Danger symbols in the operating manual are structured according to a unified schema.

Structure of the danger warnings



Note!

Especially important information or operating notes for problem-free operation.



Caution!

Denotes a danger warning. Ignoring this warning can lead to severe injury or damage to parts of the unit.



Danger!

Denotes a severe danger warning. Ignoring this warning can lead to death or severe injury.

1.2 Safety information

General information

The construction of the welding system, the generator and the control correspond to the current status of technology and are dependable. The individual components as well as the complete unit are checked in an ongoing manner by our quality control system.

Intended use



The welding unit is intended exclusively for the ultrasonic welding of the plastics for which it is suited. Different use or use beyond that does not count as intended use. The producer does not accept any liability for damage caused by unintended use. The user bears sole responsibility. This system is intended for industrial use!

Unintended use

- Using the system with insufficient knowledge of how to operate, maintain or care for the system.
- Altering the welding system and the generator with, for example, attachments or conversions that could influence the safety, without the approval of RINCO ULTRASONICS.
- Making modification in the control software!
- Using unsuitable working materials.
- Opening the generator housing during operation.
- Handling the converter while energised.
- Allowing a second person to operate the two-hand start button

Special points to note

Before putting the machine into operation, carefully read the operating manual in hand. The operating manual is to be kept near the welding system, where it can be accessed!

Choosing staff

Only trained and instructed personnel should perform work with the welding system.

The responsibility of the personnel to operate, set up, maintain and repair the equipment is to be clearly defined by the operating company! The operating company must make sure that only authorised personnel use the welding system. Work on the electrical equipment of the welding system may only be carried out by trained electricians according to electrical regulations.

Work on the pneumatic equipment may only be carried out by trained personnel who are qualified and experience in the field of pneumatics!

Installation



Danger!

Do not attempt to hook up the equipment when it is plugged in! The electrical connection is to be earthed in all cases! Country-specific, statutory safety measures must be followed during installation! If these regulations are not adhered to, the producer refuses to accept any and all liability for personal and property damages!

The equipment must be put in a closed and secure state each time before it is put into operation.

Only use dry compressed air for operation. If necessary, an air service unit can be added.

Operation



Caution!

Under no circumstances should the generator or the converter housing be opened during operation of the welding system.



Danger!

High voltage prevails inside the device – risk of injury!

- Refrain from any and all possible methods of work which may put safety at risk!
- Only operate the welding system when all protection and safety equipment, e.g. detachable protection equipment, emergency stop button, noise insulation, are present and functional.
- If safety measures such as the sound enclosure are not ordered and operated by the customer, then the producer refuses all responsibility for damages which could have been avoided, had the safety mechanisms been applied.
- Before turning on the welding system, make sure that no one can be harmed by the system starting up.



Danger!

During normal operation, the two-hand start buttons are to be actuated by one person using both hands.

If the buttons are bypassed by a second person or by other conceivable means, the producer refuses to accept any liability for personal or material damages! Technically correct operation and careful use of the units and accompanying tools during operation

- maintain the operational readiness,
- increase the life of the device and
- reduce down time to a minimum.

1.3 Noise emissions



Caution!

Limit value: according to current understanding, ultrasonic causes no damage when the maximum level remains below 140 dB and the median level, referring to 8 hrs/day, remains under a linear 110 dB.

Pay attention to the sub-harmonic, i.e. audible pulsations, that, depending on use, fluctuate greatly and have an annoying and harmful effect. Here, the standard measure is the equivalent sound level L_{eq} over a representative working period (at least 8 hrs/day, max. 2000 hrs/year), with a maximum level of 85-87 db(A).



When welding special materials, the 70 dB (A) sound level may be exceeded.

Counter measures:

- Wear ear protection
- Install a sound hood (optional)
- Operate with sound enclosure

(Information according to SUVA, the Swiss Accident Insurance Fund, no. 86048 d 4.94)

For more measured values see "Sound Measuring Protocol in the RINCO supplements"
no. 920-3903/1.95

Emergency stop functions

If there is a risk that the user will be injured or that the press will be damaged: press the emergency stop button (1).

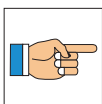
- When you do this, the press equipment immediately returns to its home position.
- The electrical supply to the system is switched off.

Guarantee

RINCO ULTRASONICS delivers the system with a guarantee that corresponds to VSM (Swiss Association of Machinery Manufacturers).

The conditions for RINCO ULTRASONICS fulfilling its guarantee are, among other things, the following:

- The user possesses knowledge of the contents of this operating manual.
- The instructions and warnings in this operating manual are followed.
- The operating company is not permitted to undertake any changes or conversions of the individual parts of the press, the oscillator system or the generator of its own accord.



RINCO ULTRASONICS is happy to explain any possible ambiguities or to provide instructions by our qualified staff via telephone.



2 Transportation



Transportation work may only be carried out by trained personnel. The transportation notes on the packaging must be observed.

The press and the generator must always be transported separately.

Ring bolts have been supplied for transporting the sound enclosure SSK-H.

At the bottom near the two-hand start button, the front faceplate can be dismounted, so that a forklift can pick up the enclosure (1). In addition, the enclosure is packed with a palette and wooden walls on all sides for transportation purposes.

2.1 Unpacking/receiving inspection

For transportation purposes, the press is bolted with the palette on the back side. Loosen the transportation locking screws before internal transportation. The packing case for machines and units withstands the normal demands of road, rail and air transportation. After receiving the shipment, check that all parts correspond to the packing slip and that there is no visible damage. If the shipment has been damaged, contact the shipping company immediately and keep the packaging as evidence.

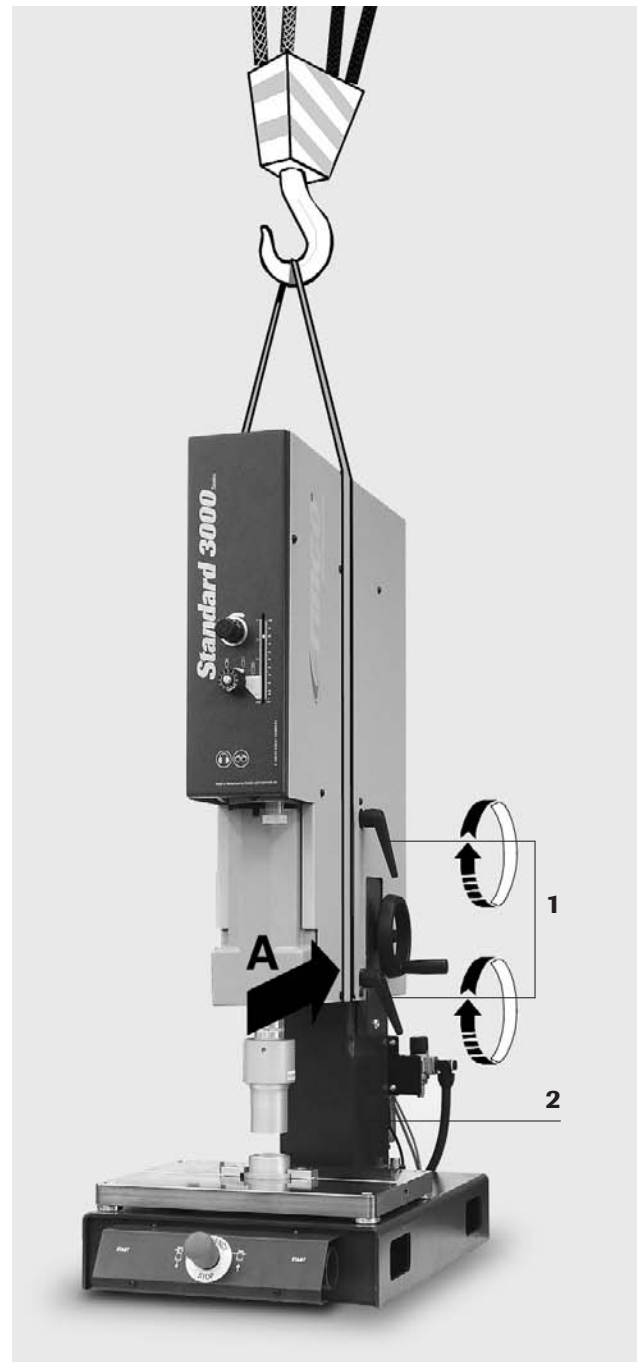
2.2 Damage during transportation

The shipping company is responsible for damage which occurs during transportation. A complete report that precisely describes the damage must be submitted to the shipping company and this serves as the basis for damage claims. Damage or loss of the goods delivered by us should be reported immediately and confirmed with a copy of the above-mentioned report. Provided the delivery was made by RINCO ULTRASONICS free domicile or CIF, the damaged shipment will be replaced if necessary.



2.3 Placing the system

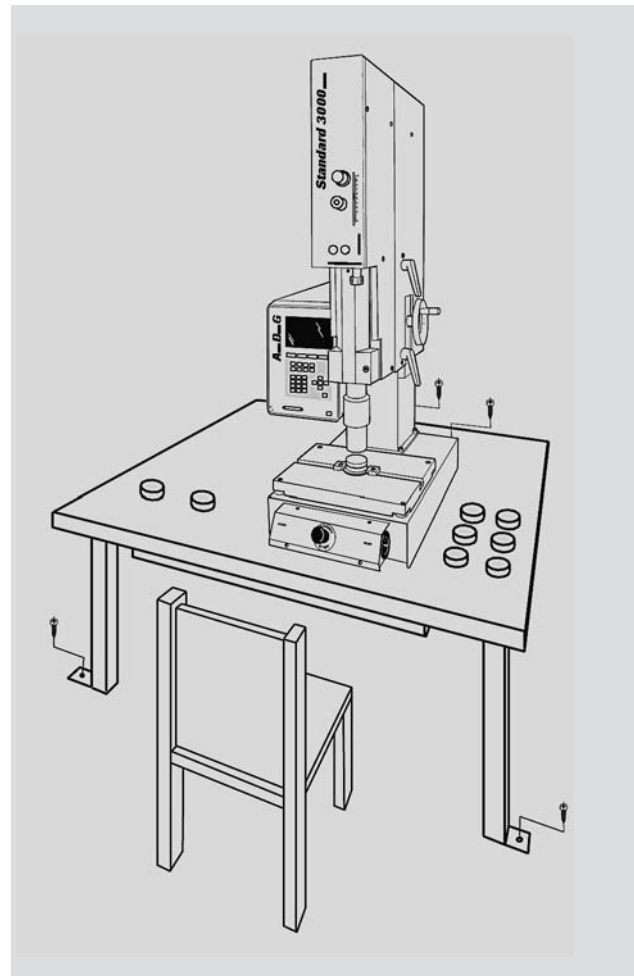
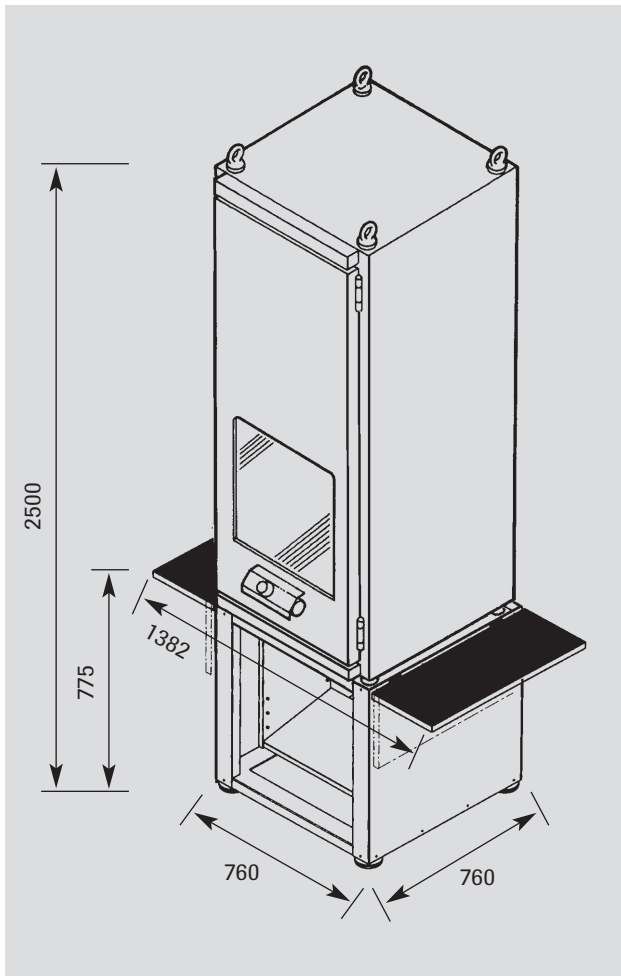
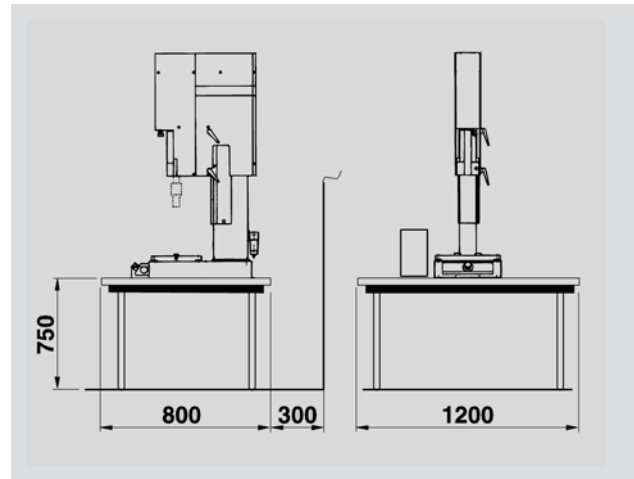
- The release handles (1) must be clamped in the designated direction.
- Slide the transportation band in direction A to the rectangular column (2).



2.4 Site location and work place creation

The ultrasonic welding machine Standard ADG is designed for a normal, clean industrial environment.

The following descriptions of work place creation is a proposal and derived from the valid international norms for industrial work places.



3 Product information

3.1 The entire system

The entire system consists of:

- 1 Press
- 2 Generator/control
- 3 Anvil
- 4 Converter
- 5 Booster
- 6 Horn

3.2 Press

Drive

Double-acting cylinder, diameter 80 mm

- Tool stroke maximum 100 mm
- Power at 6 bar 3000 N
- Travel measurement $\pm 0,01$ mm
- Height adjustment 10–290 mm
- Throat depth 220 mm
- Adjustable depth stop 0.1 mm indexing with vernier scale
- Precision ball track on the sliding actuator carriage
- Switch for upper cylinder position
- Pressure difference sensor for starting the ultrasonic (trigger)
- Safety switch 6 mm

Ultrasonic

Working frequency, 20 kHz

Base

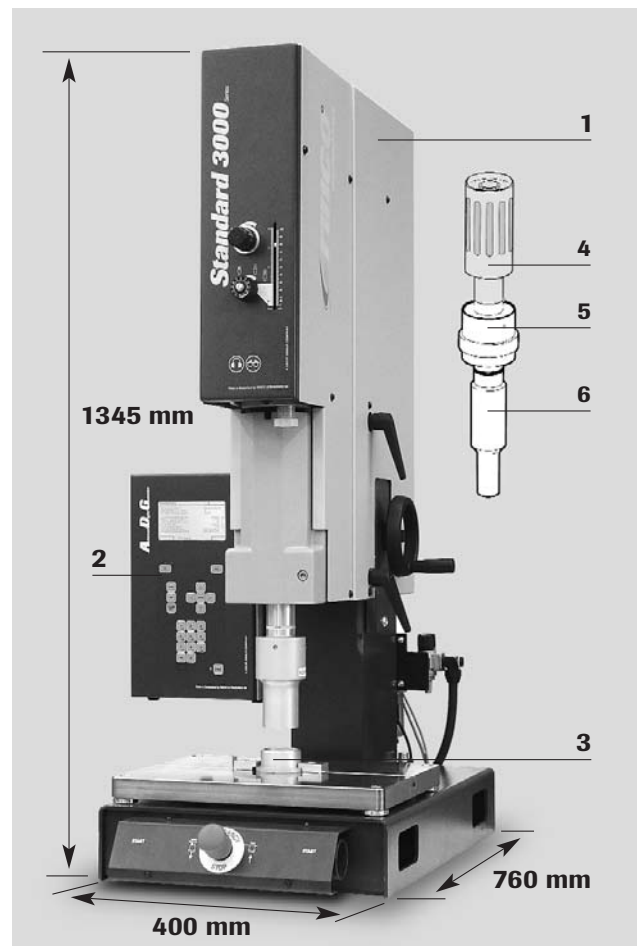
- Corrugated steel construction
- Tool clamping table with T-section and parallel alignment mechanism
- Two-hand safety start with emergency stop button

Energy

- dry, compressed air, maximum 7 bar (105 PSI)

Weight

- Weight, 120 kg
(without generator)



3.3 Sound enclosure SSK-H with built-in press

Weight

- Weight 125 kg without press
270 kg with press and generator

- 1 Main switch
- 2 Generator ADG and generator holder
- 3 Two-hand start button
- 4 Ring bolts for transportation
- 5 Adjustment doors
- 6 Lock
- 7 Emergency stop button
- 8 Lifting door
- 9 Front face plate, can be dismounted (to lift the enclosure)



3.4 Oscillator unit

- 7 Horn
- 8 RF socket Lemo 2
- 9 Converter
- 10 Booster

Amplitude gain

The amplitude can be correspondingly amplified by various booster and horn designs. The individual elements are mechanically connected by means of a screw thread.

The **tightening torque** for 20 kHz systems comes to 30 – 40 Nm. We recommend using the RINCO tool wrench.

The **allowable operating temperature** lies between **10° C and 50° C**.

3.5 Booster

For RINCO 20 kHz welding units, the following booster types are available:

Reduction-Booster	colour	material	booster	colour	material
1:0.5	blue	aluminium	1:1	green	aluminium
1:0.6	violet	aluminium	1:1.5	yellow	aluminium
other ratios available upon request			1:2	white	titanium
			1:2.5	black	titanium
			1:3	brown	titanium

Connection screw thread

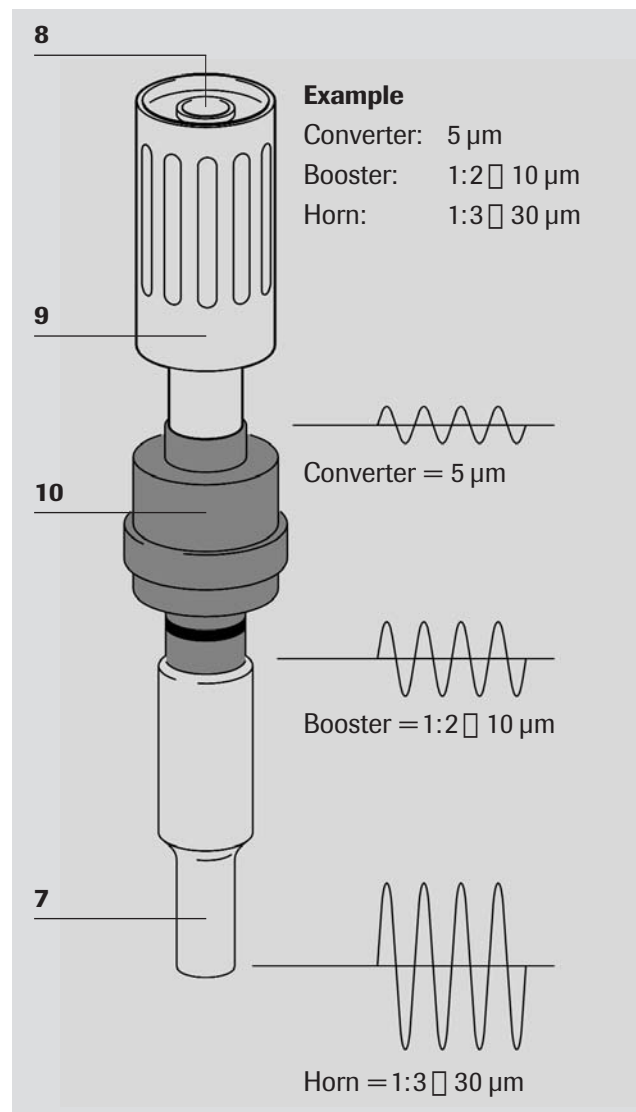
- On the converter: M16
- On the horn: M12

Before mounting, the coupling surfaces are to be cleaned. Parts with damaged coupling surfaces need to be replaced.



If heat production is too high, greater than 50° C, the converter needs to be cooled with compressed air.

A separate cooling set can be obtained for this purpose.



3.6 Generator / control

Technical data

- Dimensions (WxLxH) 205 x 340 x 345 mm
- Power classes 1000, 2000, 3000 W
- Supply voltage 230 V, 50/60 Hz
- Connection One-phase electrical supply
- Interface RS 232
- LCD display 16x40 font size
- Parameter database 32 weld data sets
- Measured values database The last 25 welds remain saved
- Weight approx. 16 kg

The generator fulfils the demands of the following basic technical norms for the industry area:

- EN 61000-6-4 EMV, emitted interference industry area
- EN 61000-6-2 EMV, interference resistance industry area
- EN 55011 class A/group 1, High frequency equipment radio interference
- Low voltage guidelines 73/23/ EWG



4 Initial operation

4.1 Power supply and connections

Take the following steps to put the equipment into operating condition:

1. Anchor the work table and screw on the press on the back side.
2. Connect the cables between the press and the generator.



Danger!

Only use an earthed electrical connection.

3. Insert the unit plug into the socket on the generator:
 - 1 Press
 - 2 Two-hand start
 - 3 RF (converter connection)
 - 4 Power (electrical supply)

Interfaces

- 5 RS232 (9-pole SUB-D)
- 6 Digital input (25-pole SUB-D)
- 7 Digital output (25-pol SUB-D)

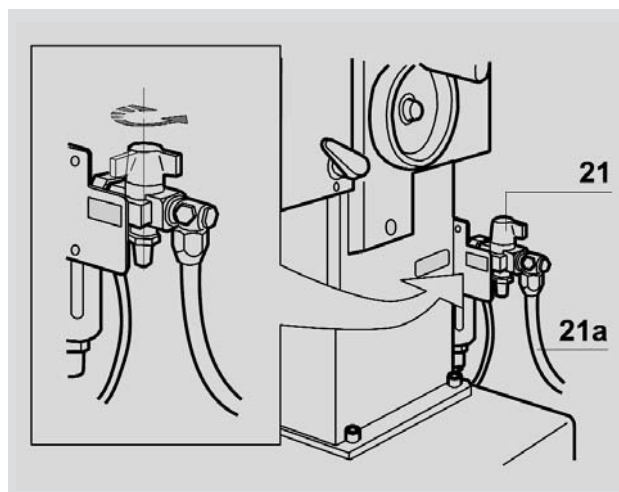
For additional information, see Chapter 8 “Data analysis”; for plug allocation see Chapter 9 “PIN assignment”.

Compressed air connection maximum 7 bar; 105 psi
Turn compressed air valve (21) transversely to flow direction.

4. Connect the compressed air hose (21a) to the available compressed air mains.
5. Bring the compressed air valve (21) to the working position.



If the input pressure exceeds 7 bar, a supplementary safety valve automatically opens to release the excess pressure.



Mounting the sound enclosure SSK-H

- 1 Power (electrical supply) ADG
- 2 Digital input (25-pole SUB-D)
- 3 Digital output (25-pol SUB-D)
- 4 Press
- 5 Two-hand start
- 6 RF (converter tension)



Rear access to the press, and/or its mounting and demounting, is gained by removing the back wall of the enclosure.



4.2 Operation and display elements

4.2.1 Welding press

1 Converter housing

The oscillator system together with the electrical supply line is located in the converter housing.

2 Horn

The horn is the actual welding tool. It is tuned to the resonant frequency by the producer.



Warning!

Never alter the tuned horn by making mechanical changes. This can cause damage to the oscillator system and the generator!

3 Clamping table

The integrated T-section enables rapid centring and fixing of the anvil with the fixing straps delivered with the system.

4 Parallel adjustment nuts

The parallel adjustment nuts enable a most precise alignment of the clamping table (3) and thus also the alignment of the anvil with respect to the front surface of the horn.

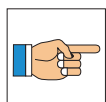
5 Two-hand start button

When both buttons are pressed at the same time, the welding cycle is started manually. Both of the buttons must be activated simultaneously within 0.3 seconds. This guarantees that the operator cannot reach into the area of the tool during the welding process. This precaution serves operational safety and may be neither eliminated nor structurally changed!



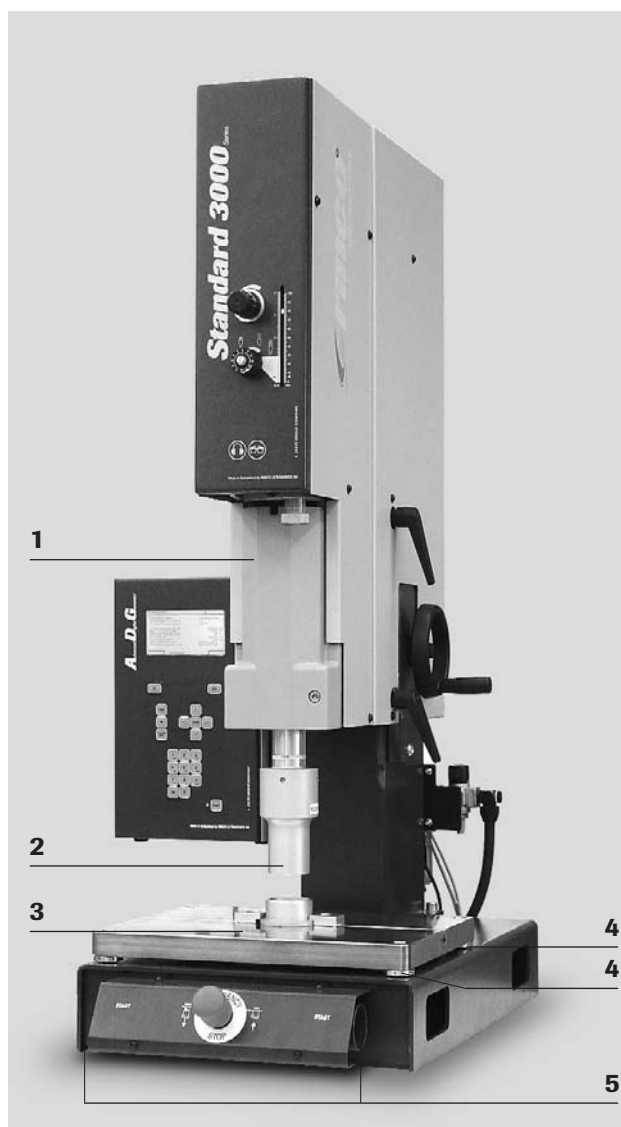
Warning!

Country-specific, statutory safety regulations must be followed during installation!



Note:

If these statutory regulations are not adhered to, the producer refuses to accept any and all liability for personal and property damages!



6 Fine adjustment screw for depth stop (vernier scale)

With this depth stop, which is provided with a scale ("0.1mm" indexing), the distance between the front surface of the horn and the anvil can be continuously adjusted.

7 Emergency stop button

When the emergency stop button is pressed, the press returns to the original position.

After the emergency stop button is pressed, it remains in a blocked position.

Unblocking the emergency stop button:

- Pull the button upwards into the starting position.

8 Gauge for the actuator

Gauge for reading off and setting the actuator.

8.1 Trigger marking

When the trigger marking is passed over, the safety switch is activated. The cycle is automatically executed without pressing the two-hand start (6 mm).

9 Release handles for adjusting the press head

Clamping mechanism for fixing the press head after rough positioning has been made.

10 Hand wheel for height adjustment

The height of the press head is adjusted with the hand wheel.

11 Compressed air connection valve

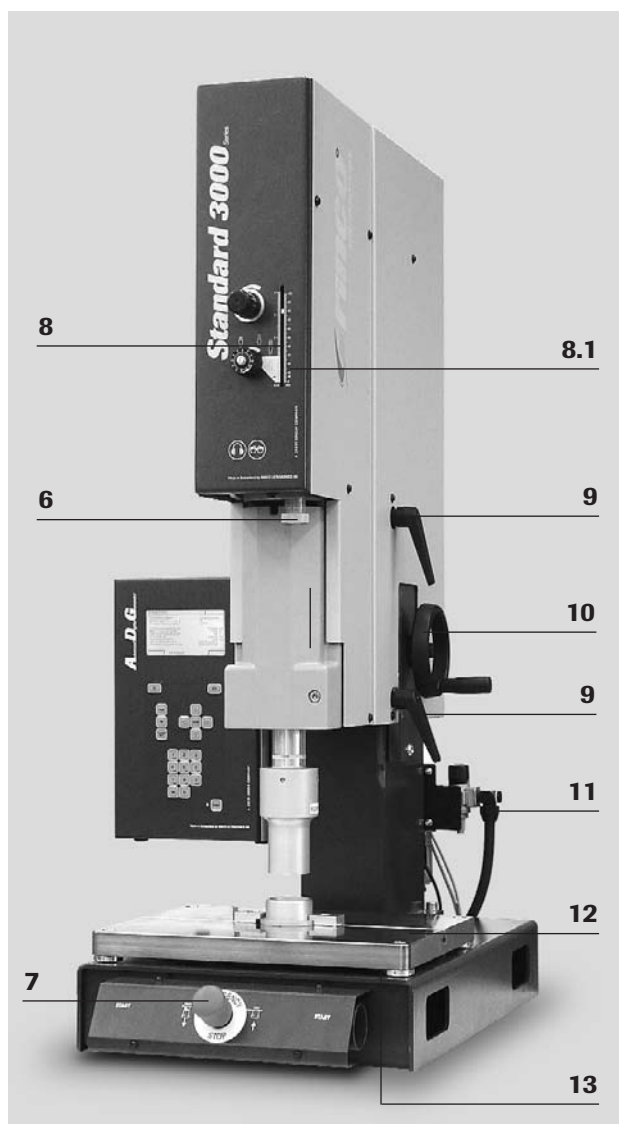
The valve for connecting the compressed air system on the press to the local compressed air mains. The valve serves to divide the energy between the local compressed air mains and those of the compressed air system on the press.

12 Clamping screws for the clamping table

Hexagonal socket clamping screws for loosening and tightening the clamping table for the parallel alignment.

13 Brief operating instructions

For quick information on the most important functions.



14 Pressure regulator DR

The pressure regulator holds the air pressure on the top side of the piston constant and is set to a height which depends on the size of the piece and the length of the weld joint as well as on the material to be welded. As a point of reference, a regulated pressure of approx. 3 [bar] can be set for a circular piece of 50 mm in diameter which is welded around the edges.

15 Throttle VD

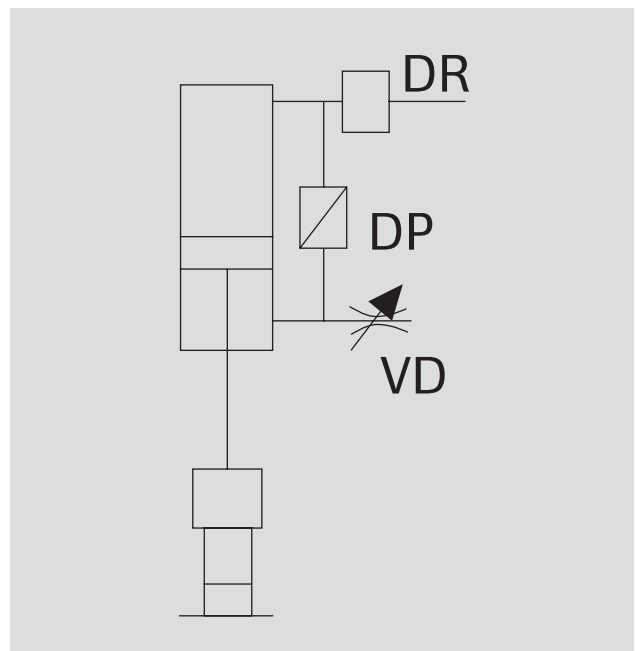
The throttle has two functions

- It reduces the speed on the last 30 mm of the machine stroke.
- It reduces the time power development when the horn sets up on the plastic piece.

See the graphic representations in the brief instructions under the machine table panel.

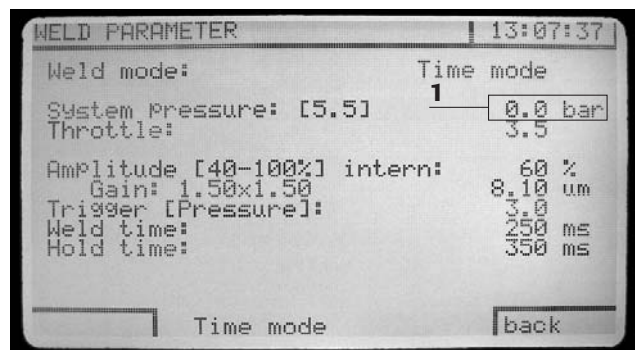
Practical set value: 7

The functions named above are to be understood in combination with the tripping energy of the so-called trigger, since the trigger function corresponds to the permanent measuring of the pressure difference (DP) between the pressure progression of the top side and the bottom side of the piston.



The regulator pressure or system pressure is automatically shown to the ADG display (1).

The throttle setting is a function which must be input separately (menu information).



4.2.2 Control module AUI

The program dialog and the representation of the process results occur on the display.

4.2.2.1 Keyboard

After the process has been started, process data cannot be changed. Queries are, however, possible and easily carried out.

The keyboard is divided into four groups:

1 The function keys F1 and F2 (1)

They correspond to the lines displayed at the very bottom of the screen and lead step by step through the menu.

2 Jump keys (2)

System test:

Ultrasonic oscillator test at idle.

Display of power loss and frequency as well as the ADG software version, press type, generator type and generator software version, project name, database number

PIN:

For entering the respective access code

Home:

Exit from all PIN codes to the top program level
After F1 is pressed (logout), the ADG is blocked of all changes.

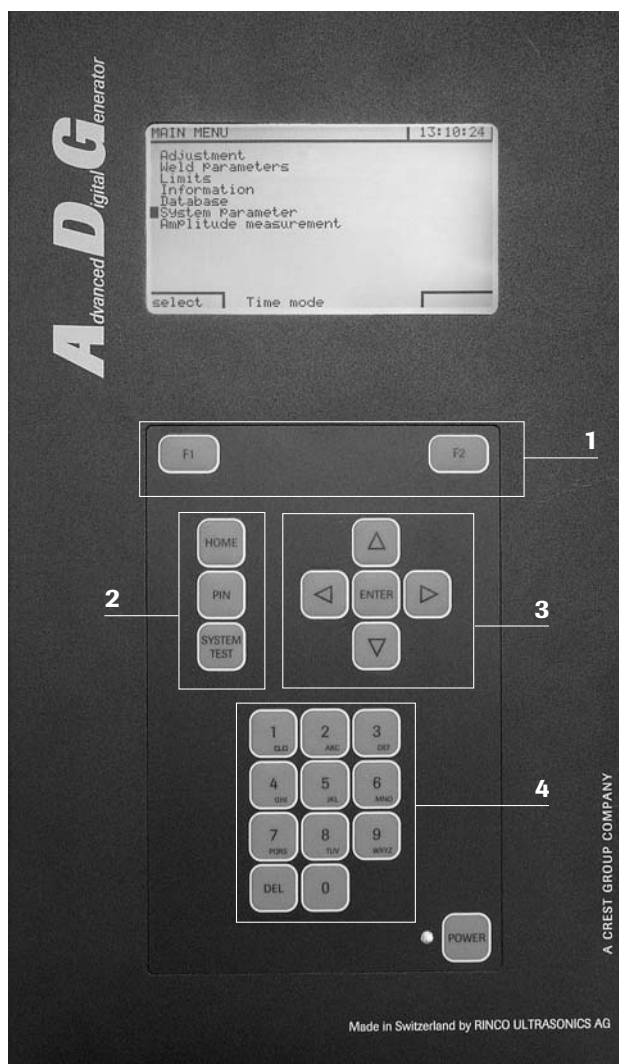
3 Cursor field (3)

✧ Cursor functions for writing and changing data.

<> Additional functions for changing preset values.

Enter: Confirmation of delete functions

When parameters are entered, "Enter" does not have to be pressed.



4 Data input field

Numbers 0-9; letters A-Z

DEL: Delete

The 'internal' PIN codes defined by RINCO are as follows:

PIN 1000 (operator PIN)

PIN 3000 (setup PIN)

PIN 5000 (analysis PIN)

These PIN codes can be modified to meet your own needs by setting the PIN code to internal.

5 Status line (5)

The status line provides information on the last step run by the generator. The parameterised welding mode can be set to indicate for a new welding cycle. Information is given on the following states:

- Cycle active
- Start confirmation
- Pv measurement
- Pretravel
- US active
- Afterwelding
- Solidification
- Return stroke
- Afterpulse waiting time
- Afterpulse
- Ready confirmation
- Cycle ended
- Datastring

Program access PIN standard values

PIN	Adjustment, parameterisation (operator PIN)	
PIN	System functions (Adjuster PIN)	
PIN	Analysis (Analysis PIN)	

5 Starting up the system

5.1 Welding operation

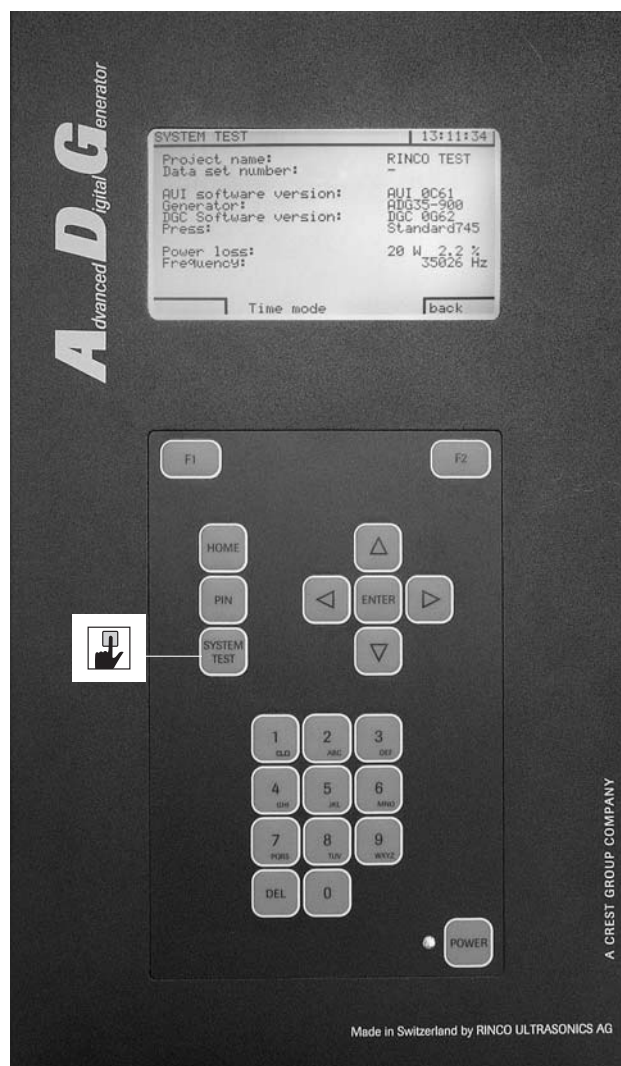
After the system has been started, the results of the "system test" are shown on the display. Using the button **System test**, the system test can be repeated. This occurs to protect the system in the case of a very deeply set amplitude. For measuring a higher amplitude, the corresponding PIN code must be input in order to gain access to the menu "Amplitude measurement".

For determining a possible system change, it is important to enter the **Initial value of the power loss P_v** for a system test on the backmost page of the manual.

Via **System test**, the respective software version installed on the generator and the process control ADG are displayed.

5.1.1 Starting the generator

The generator can be started by means of the POWER button at the front or automatically when the operating voltage is applied. The is selected by means of a jumper, which is located inside the generator underneath the means filter on the Standby Print and is labelled "Engaging". The settings of the jumper are marked with "manual" for startup via the POWER button and "automatic" for use in special machines.



5.2 Process programming

In order to make changes to the system, an appropriate PIN code must be entered. All functions are always visible. For parameters, which cannot be changed with the PIN entered, no cursor is displayed. The PIN codes are pre-set as standard values, but they can be modified individually. The PIN codes are arranged as follows:

5.2.1 Adjustment/parameterisation PIN

Block	Access	Description
Adjustment		Move the press to the lower attachment points for aligning the lower tool.
Weld parameter		Selection of the welding modes; setting the weld parameters. For setting see Chapter 7.1 "System functions".
Limits		Set the limits of the stop conditions Time; Travel differential and absolute; Energy; Power and Part counter. ...Limit: Value beyond limit = machine stop Warning: Value beyond limit = notification on the display without machine stop
Information		Entry of project information and production data
Database		System parameters, limits and information are backed up to save, load, delete and log data sets. To track the last 25 welding operations.
<i>System parameter</i>		See 7.1 "System functions" concerning the display of background settings for information.

5.3 Adjustment

Adjustment with the sound enclosure SSK

All the following functions described can be executed for a system with a sound enclosure SSK-H with an opened or closed door.

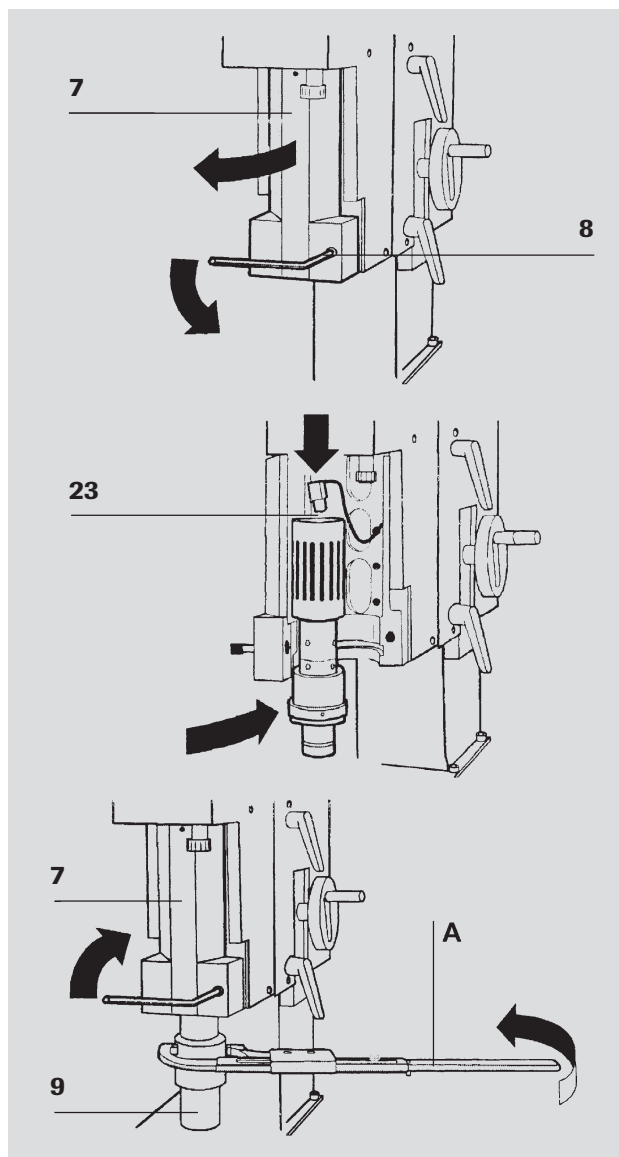
Installing the oscillator system



Caution!

Always switch off the power supply to the generator, before installing the oscillator system. (Power OFF)!

1. Open screw (8) with the supplied allen wrench (SW 6 mm).
2. Open the cover plate (7) on the converter housing.
3. Insert the RF plug in the RF socket (23) on the converter.
4. Insert the oscillator system in the converter housing from the front.
5. Close the cover plate (7) on the converter housing again and tighten with the allen wrench.
6. Screw the horn (9) in and tighten with the special wrench (A) supplied.
Torque 30–40 Nm.
The oscillator system is ready for operation.

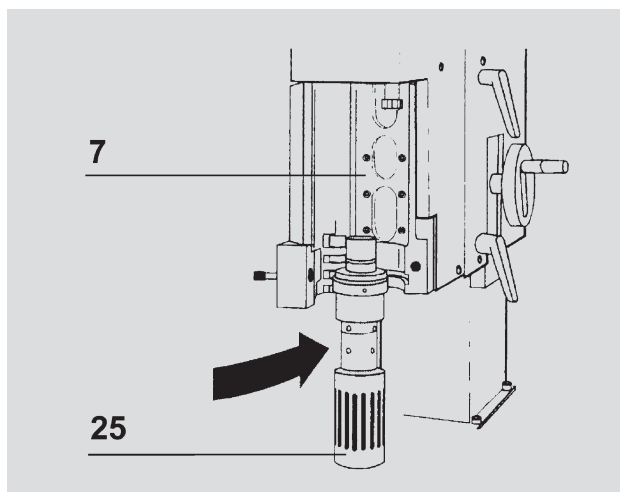


Changing the booster

In order to change the booster, the oscillator unit (25) without the horn can be mounted the other way around.

Note:

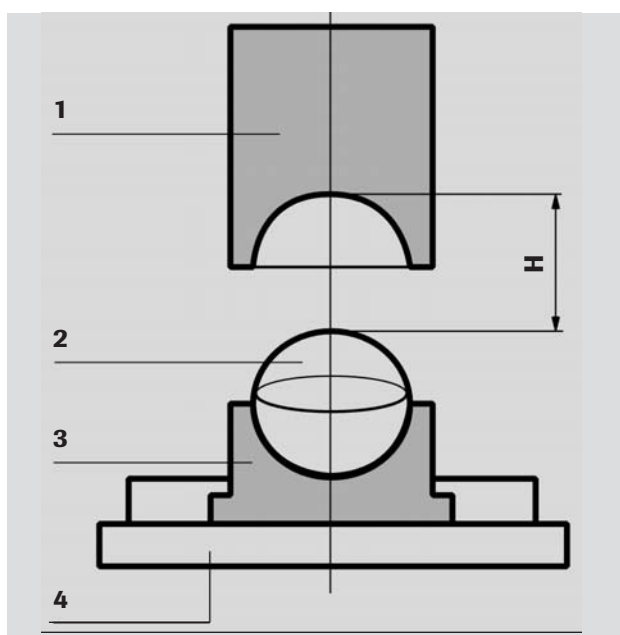
To determine the correct booster, the amplitude which corresponds to the application must be established in advance. See the table in the brief operating instructions on the machine table.



Adjusting the tool

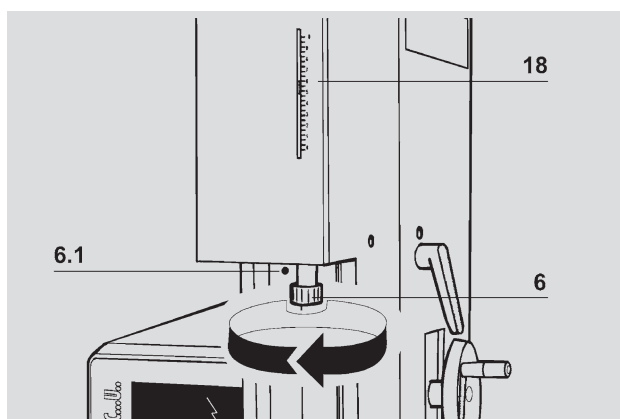
1. Estimate the height "H" required to remove and insert the work pieces.

- 1 Horn
- 2 Work piece
- 3 Anvil
- 4 Clamping table



2. Loosen the knurled screw (6.1) and set height H with depth stop (6); check on the gauge (18).

3. Replace and tighten the knurled screw.



4. Loosen the release handles (19) and turn the press upwards using the height adjustment (20), so that the horn cannot drive against the anvil when the stroke is extended.

5. Retighten the release handles.



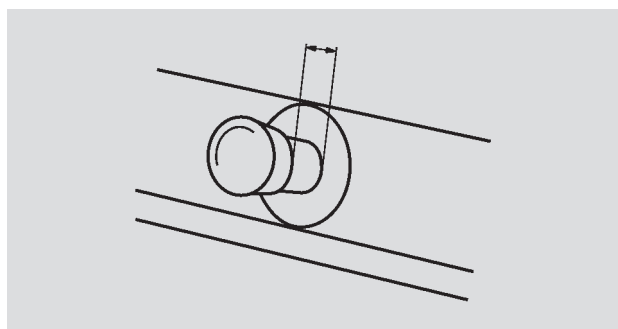
Caution:

If the horn is not set adequately high, there is a risk of collision!



Energy supply

1. Check that the emergency stop is pulled out.



2. Open the compressed air hand valve



Caution! Do not touch the horn!

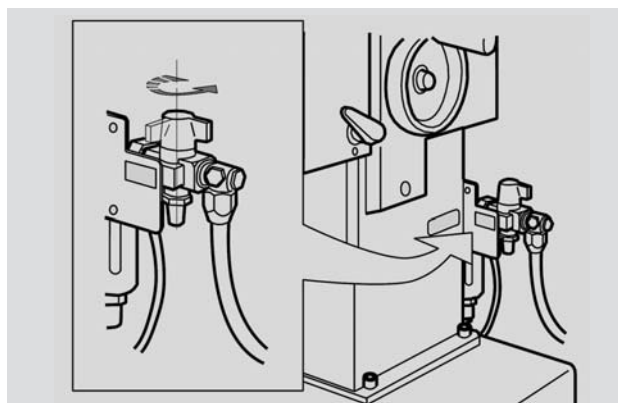
3. The system is turned on with the POWER button. The ultrasonic system conducts a self test.

With PIN and menu item "Adjustment"

Recommendation

Throttle 7-8

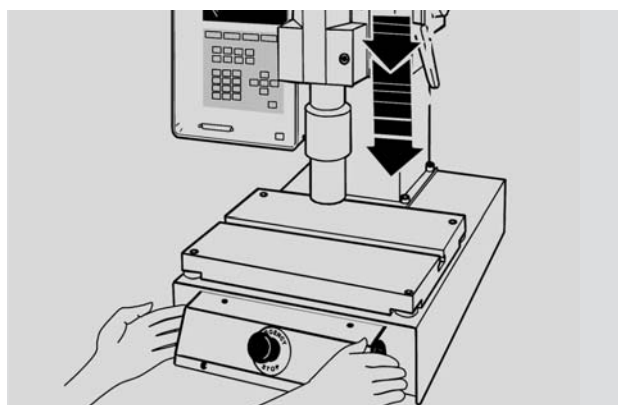
System pressure 1 [bar]



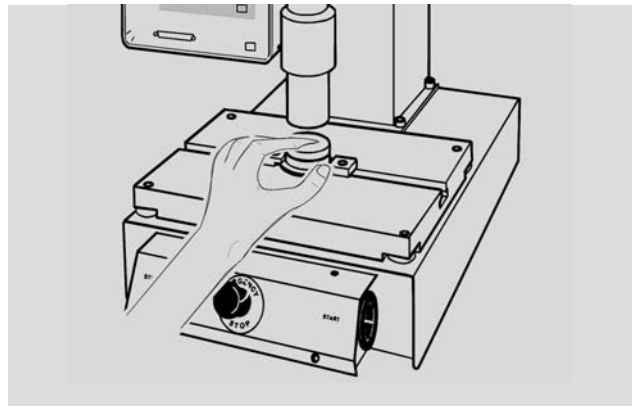
Caution!

The anvil with the welding object may not be located under the horn.

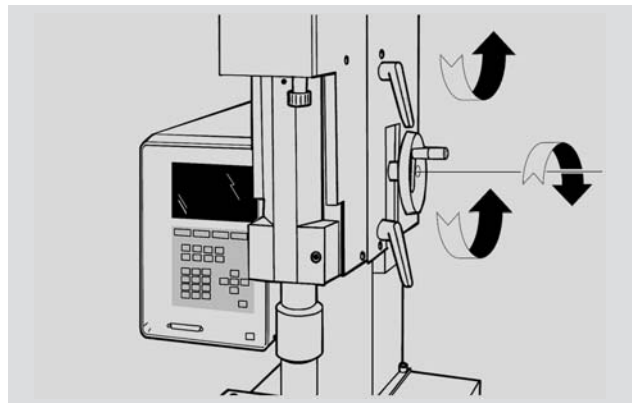
4. The press can be lowered to the mechanical depth stop by operating the two-hand start in manual mode or by applying the start signal in automatic mode..



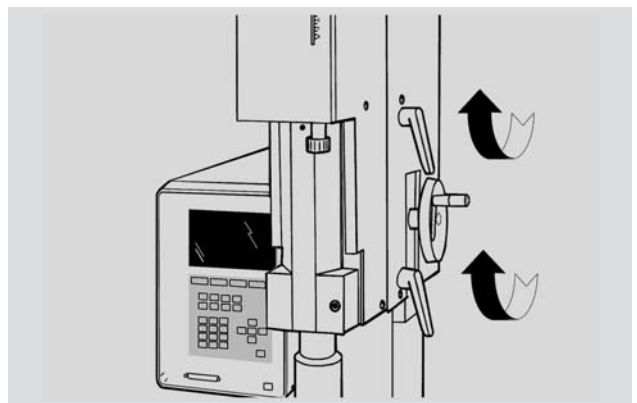
5. Centre the anvil under the horn with an inserted welding object.



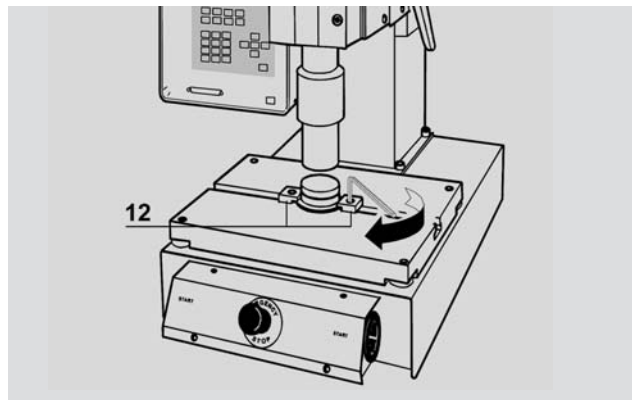
6. Lightly place the press on the welding object using the height adjustment.



7. Tighten the release handles.



8. Fasten the fixing straps (12) using the allen wrench.
9. First lightly tighten both sides, check if the centring is still correct, then tighten completely.



10. Use the two-hand start or the start signal to bring the press in the upper rest position.

11. Remove the welding object.

12. Lower the press again.

13. Loosen the release handles and lower the press until the welding stroke reaches the lower most position without the horn touching the anvil. This guarantees that the horn and the anvil cannot be damaged if the stroke is empty (no plastic part is inserted).

14. Go to "Database / Parameter database" in the main menu, select the desired application and then press F1 "Load data set".

15. Press PARAMETER to check that the parameters correspond to your requirements.

16. Provided you are processing a new application, choose a similar application from the "Database" by selecting "Load dataset".

17. Modify the project description as well as the press information under "Info".

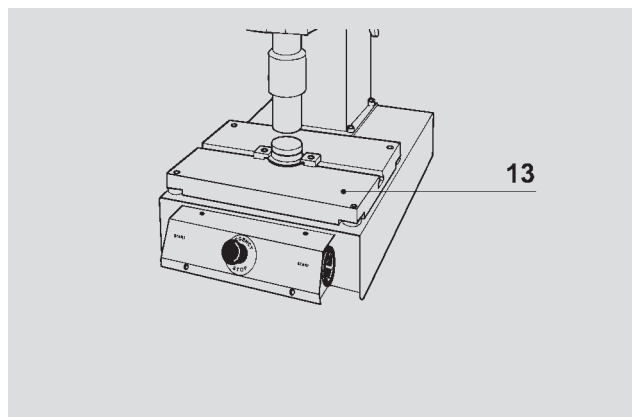
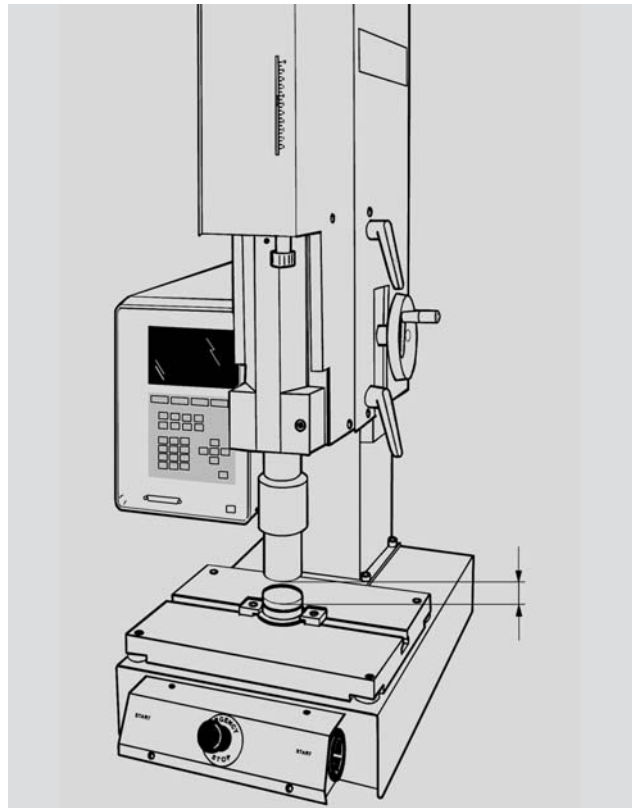
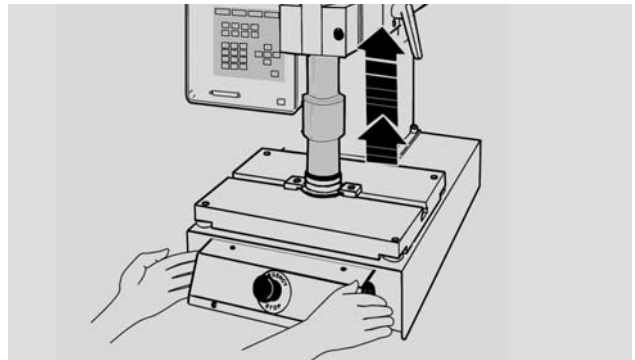
If the welding technology is still unfamiliar to you, carefully read through chapter 6 Welding Technology now. Afterwards, adjust the data set appropriately and optimise it by experimenting.

18. Aligning the clamping table

The clamping table (13) was aligned parallel to the front surface of the horn at the factory. Should corrections of the clamping table be necessary despite this, align the clamping table with the four parallel adjustment nuts (14).

Parallel adjustment:

1. Loosen the clamping screws (22) using the allen wrench (A).
2. Adjust the parallel adjustment nuts (14) according to the diagram as needed.
3. Retighten the clamping screws (22) after the adjustment has occurred.



Course of the welding cycle

The cycle is started when both of the start buttons are pressed within 0.3 seconds. The power loss of the oscillator system is measured (system test) The magnetic valve is activated and the actuator is lowered. The start buttons must remain pressed until the safety switch (indicator underneath the 6 mm mark on the stroke scale) is passed over or until the hold time has expired.

If the start buttons are released early, the actuator returns to the original position. An error message is displayed.

The welding starts via the TRIGGER. After the weld time and hold time have expired, the actuator returns to the original position. In order to prevent the possibility that light work pieces stick to the horn, an after-pulse can be set.

6 Welding technology

In order to guarantee an ultrasonic welding process of high quality and low tolerances, the parameters

- **amplitude A [μm]** as energy source and
- **contact force F [N]** as a coupling between the plastic parts to be welded are of decisive importance for building the melting intensity.

The more precise these two quantities are controlled, the better the welding process can be reproduced.

Plastics are partly very different in their melting-on characteristics. Special semi-crystalline thermoplastics such as PP or POM require a high melting-on energy and are very thin fluid immediately thereafter.

The stop conditions (welding modes)

The stop conditions can be preset as constant for:

- **Time**
- **Energy**
- **Travel**
- **Contact cut-off**

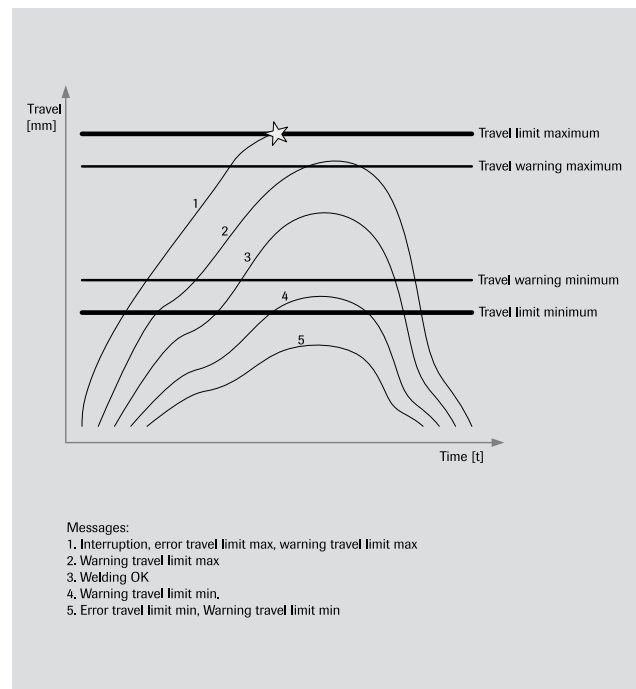
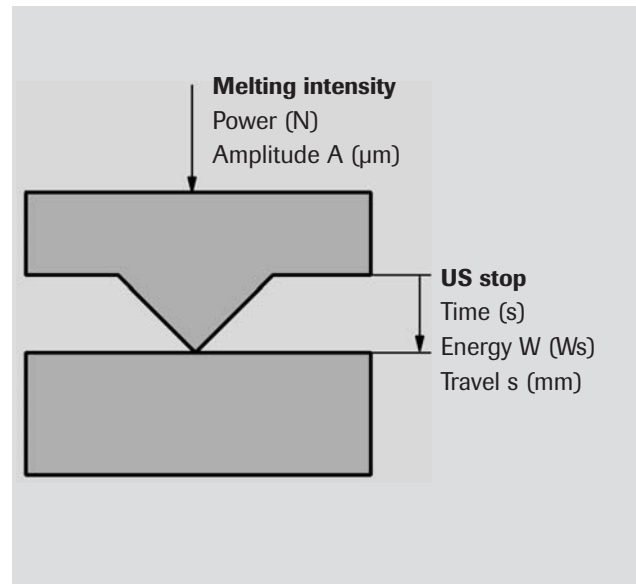
Using **Limits**, you can set limit value windows, which lead to an interruption of the process if they are passed over.

In addition, a warning window can be generated on the display.

The ultrasonic start moment (Trigger)

In order to guarantee a high level of reproducibility, the ultrasonic is preferably triggered at a determined pretensioning force. This happens by measuring the pressure difference in the pneumatic cylinder.

See Trigger DP in Chapter 6.2. Other triggers such as travel and time can be set under “system parameters”.



6.1 Process description

A welding cycle can be divided into six sequences:

The individual process steps

0 – 1 Pretravel:

Rapid advance of the welding tool.

1 – 2 Brake:

Reduction of the lowering speed according to the throttle settings to produce a soft setting down on the welding object.

2 – 3 Power development:

Successive development of the contact force according to the throttle and regulator settings up to the trigger point.

3 – 4 Welding:

Melting of both of the plastic parts by means of power and amplitude.

4 – 5 Solidification:

Hardening and cooling of the plastic melting under power that increases with time.

5 – 6 Return stroke:

A quick return stroke of the welding tool to the upper rest position.

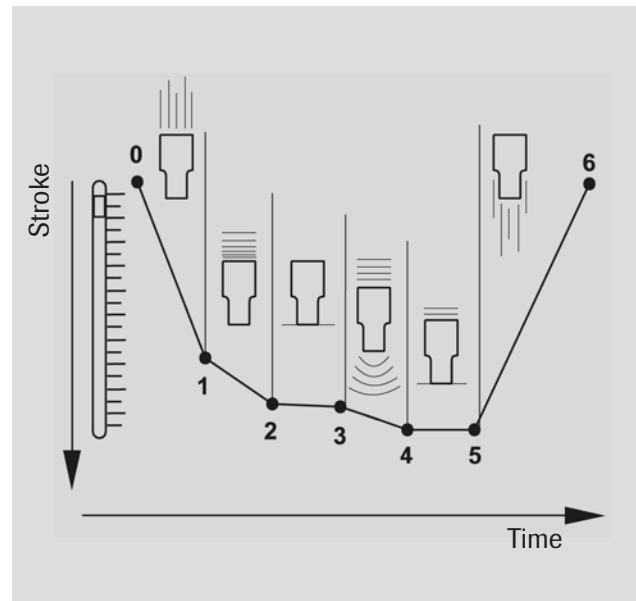
The cycle sequence is controlled by time, travel or energy depending on the welding mode.

The start of the ultrasonic (trigger)

The presses of the “Standard” generation contain a pressure differential measuring system, which measures the current pressure difference between the top side and bottom side of the piston.

Options for starting the ultrasonic:

- Contact force of the horn on the welding object (pressure difference measurement).
- Vertical travel coordinate of the horn
- Time from the press rest position.



6.2 Programming an initial operation

Preparation:

If the press is set in its height, the installed booster and the horn are to be recorded as gain factors under *Info / Oscillator* info.

Thus the control system calculates the corresponding correct value in [μm]

System pressure DR:

The longer the welding joint, the higher the system pressure.

Example:

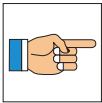
Circular ERG diameter 50 mm (length approx. 157 mm); material ABS

System pressure approx. 3 [bar]

Throttle VD:

The throttle forces the power changes over time during parts contact. The larger the value, the faster the change and the higher the melting intensity. The practical range is between 5 and 10.

Setting for the example above: *Throttle 3*



Note:

The steeper the power development (large throttle opening), the more intensive the melting.

Amplitude:

The range is preset with the selection of the booster and the horn gain.

In addition, the generator allows for fine variation in the range of 40% to 100% in 1% steps.

Trigger DP:

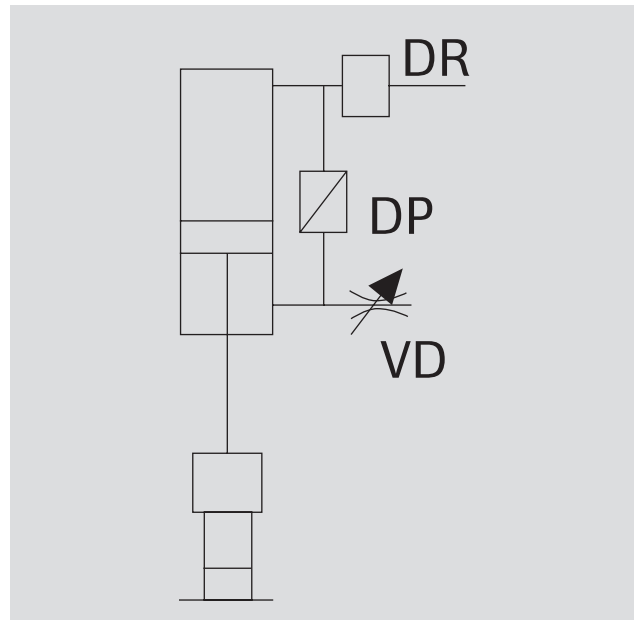
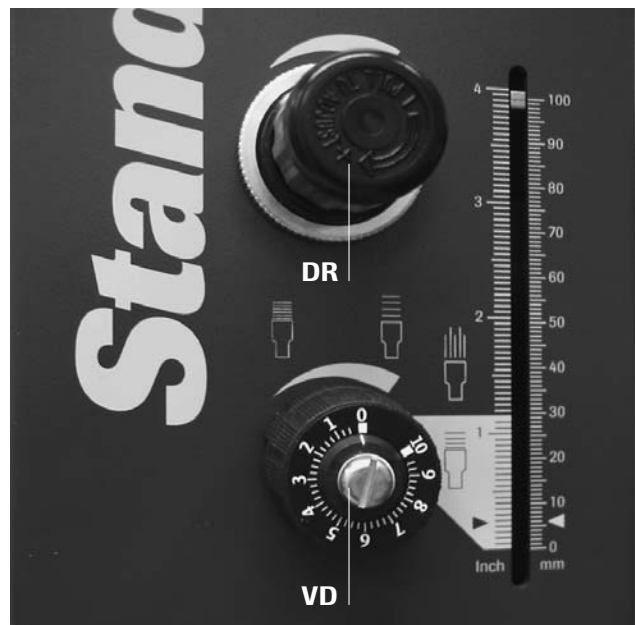
Switches the ultrasonic on according to a preset value (pressure difference between the top side and bottom side of the piston).

Set value for the example above: *Trigger 1.0 [-]*

Mode:

Determines the ultrasonic stop. It is simplest to begin in *Time mode*. It is not a problem to switch to a different mode later.

Limits: Limits are meant for optimised production and should therefore not be programmed until later.



6.3 The individual modes

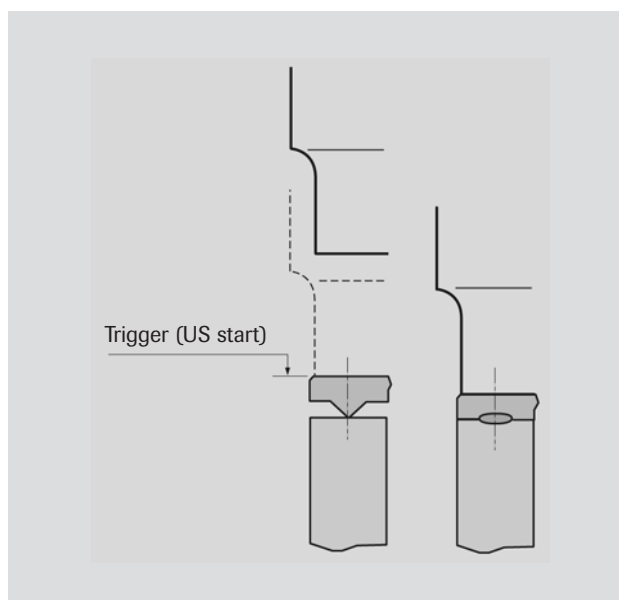
The ultrasonic start moment (trigger) can be set for all welding modes under System parameters / Mode options as pressure (power), travel, time or external. For most applications, the pressure trigger makes the most sense and travel can be selected in few cases.

TIME MODE

In this type of operation, the welding process is ended after the preset time has expired.

Cycle

After the trigger is achieved, the welding is started. Welding occurs from the start until the programmed time is achieved.



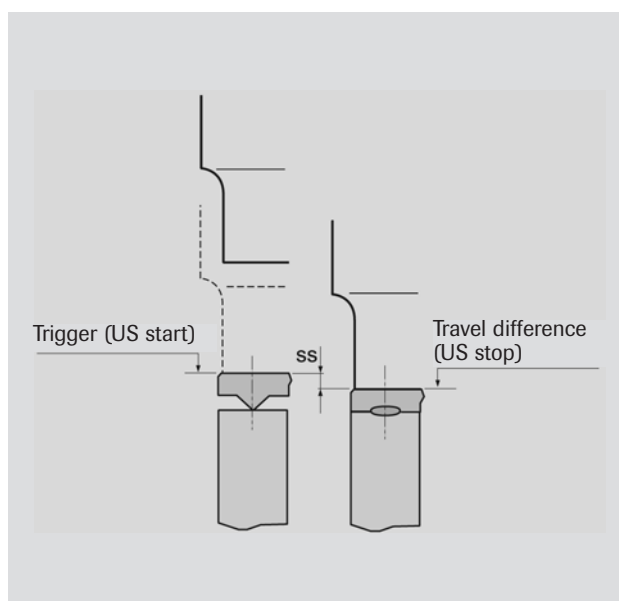
TRAVEL MODE difference

With this type of operation, the welding process is ended when the melting depth is reached.

Cycle

After the trigger is achieved, the welding is started. Welding occurs from the start until the depth [ss] is achieved.

The actual travel value is analysed after the hold time has expired (travel during solidification is displayed as welding travel).



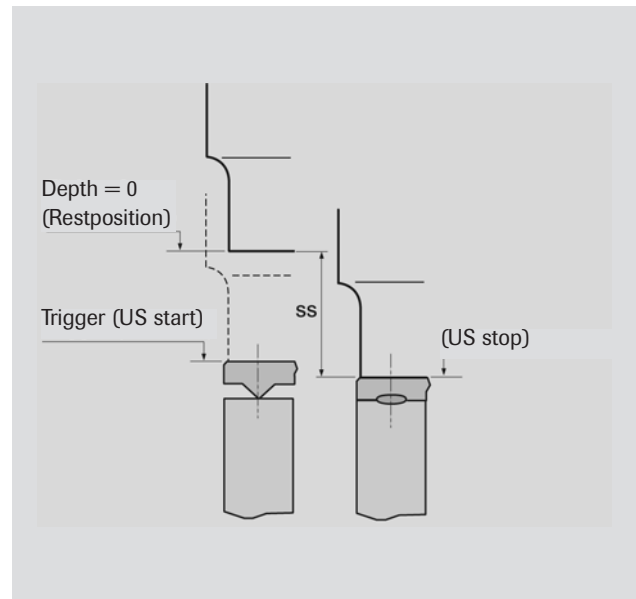
TRAVEL MODE absolute

In this type of operation, the welding process is ended after the absolute difference from the upper rest position is achieved.

Cycle

After the trigger is achieved, the welding is started. Welding occurs from the start until the depth [ss] is achieved.

The actual travel value is analysed after the hold time has expired (travel during solidification is displayed as welding travel).



ENERGY MODE

In the energy mode, the instant power absorbed by the welding object in short time intervals is added up.

In order to detect a consistent welding quality, the energy flow is contained over time using "**Limits**".

Cycle

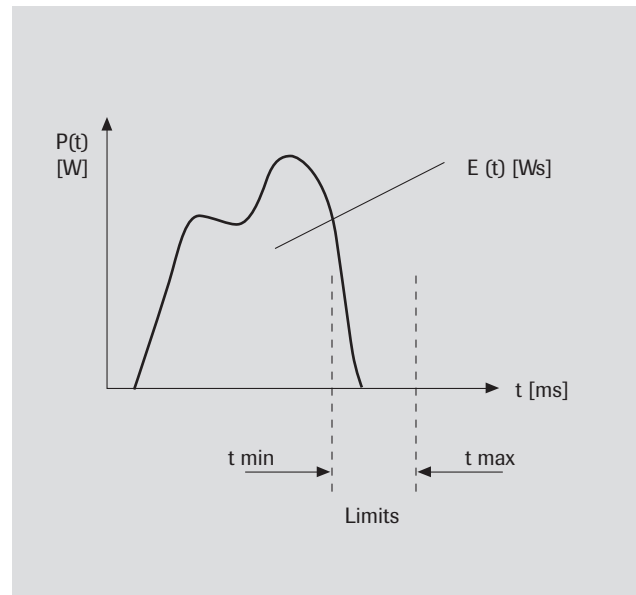
After the trigger (power) is achieved, the welding is started. The ultrasonics stops according to energy achieved.

CONTACT SWITCH OFF

For the stamping of fabrics and non-woven materials, the ultrasonic can be stopped when the metallic contact between the horn and the counter tool produces a potential of 24 V.

Signal socket STO 2_1 Inputs on the back panel of the generator is set up for this.

This is to be supplied externally with 24 V DC to Pin 1 or 2. Pin 8 is connected to the metal anvil which is insulated to the machine table.



7 In-depth system handling

With the corresponding PIN, access to the sequences

System parameters and **Amplitude measurements**

is expanded.

The menu enables expanded access:

- Adjustment
- Weld parameters
- Limits
- Information
- Database
- **System parameters**
- **Amplitude measurements**

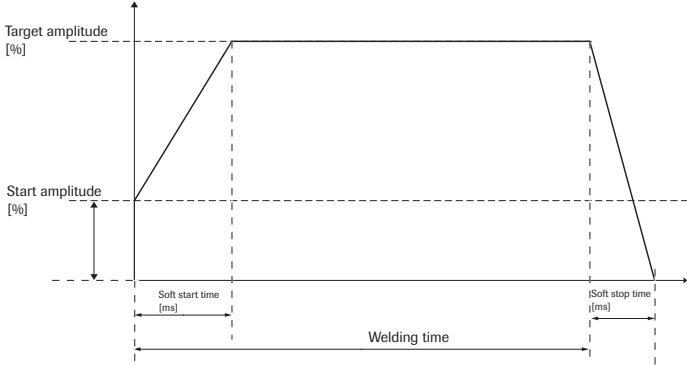
For descriptions of “Adjustment – Database” see chapter 5.2.1.

7.1 System functions (PIN)

System parameters

Block	Access	Description
Options 1		Press type: Enter the welding unit used. Trigger mode: Select the ultrasonic trigger: • Pressure; Afterwards in the built-in differential pressure sensor. • Time: After a certain time from the start of the cycle. • Travel: After a programmed distance from the upper rest position • Off: No trigger exists. • External: Digital input Trigger mode before according to SSW: Select the condition SSW for the ultrasonic trigger • before: For a welding stroke longer than 6 mm > before; that means the ultrasonic start before the 6 mm safety switch (SSW). • after: For all welding operations within 6 mm of the stroke. The ultrasonic starts after the 6 mm safety switch (SSW). After-pulse: A light ultrasonic pulse on the return stroke of the press; prevents the plastic piece from sticking to the horn. System pressure measurement: Disabling of the pressure gauge on the ADG display for special purpose machine configurations. Travel measurement: Disabling of the travel gauge on the ADG display for special purpose machine configurations and selection of various travel gauges. Amplitude mode: External control of the amplitude for special purpose machine configurations. Holding conditions: To allow the weld to harden, the horn can be variously held on the part. • Time • Travel difference • Travel absolute Resting position: Switches of the position of rest monitoring in the case of specific machine configurations.

Block	Access	Description
Options 2		Start mode: • Manual (CE) • Automatic: CE conformity is no longer guaranteed. The system operator must adapt the machine design to conform with the CE machine guidelines. When switching to “automatic” the online data window is switched-off by default. Error position: Press position when blocked after an “error”. Datastring: Weld data transfer via RS 232 to an external computing system. interval datastring: Readout interval, a data string is always sent if there an error occurs during welding. • 000 none • 001 every Database switching: External transfer of data sets. • Off • dec (decimal) • bin (binary) • RS232 Sound enclosure: Program for operating the sound enclosure SSK Start confirmation: If this option has been activated, input START_CONFIRM_IN must have been set in order for the generator to start the cycle. Ready confirmation: If this option has been activated, the input START_CONFIRM_IN must have been set in order for the generator to end the cycle and to set the output READY_OUT. Good part counter output: • Impulse: 300 ms long High pulse indicates a correct welding operation. • Signal: The output is set to High-Level until the start of the next cycle in the event of a correct welding operation. Bad part counter output: • Impulse: 300 ms long High pulse indicates an incorrect welding operation. • Signal: The output is set to High-Level until the start of the next cycle in the event of an incorrect welding operation. Online data window: An information window that displays the travel, trigger and power is opened during the cycle. Statistics: If the statistics function has been switched on, you can select “ongoing”, “groups” and “values” via ther < and > in the “Welding” window (HOME). The F1 button is given a new function as a result (See section 8.1 “Statistics”).
Horn		Power loss measurement: Setting the measurement before or after the welding cycle Max. power loss: Max. limit value • 10% to 40% Power loss measuring interval: Measuring interval • 0 to 9999; 0 = no measuring

Block	Access	Description
Generator parameter		Start amplitude: Is the start value for generating a soft start (see picture above). • Max value 10% - 40%  Soft start time: • 5 to 200 ms Soft stop time: • 0 to 50 ms For the soft oscillating of complicated horns. Frequency reset: Normally the frequency most recently used is set. If this is not desired, frequency reset must be set to "On". Upper frequency limit: • +50 to +500 Hz Lower frequency limit: • -50 to -500 Hz Overload switch off delay: For disabling extremely short power peaks (in continual mode) • 5 to 9999 ms Overload level: Maximum power value for the operational limit of the generator. • 5 W min. -1.2 x nominal generator power Cable length: 1-15 m
Settings		PIN variation; adjusting time date; baud rate External operator PIN: • 0 to 7999 PIN code: • external/internal If the PIN code has been set to internal, then the default PIN codes 1000, 3000 and 5000 are active. If the option has been set to external, then the operator can determine the PIN codes. Baud rate: • Standard 19200 Time/date
Country settings		Language Time format Travel unit • [mm]; [inch] Pressure unit • [bar]; [psi]

Amplitude measurement

Block	Access	Description
Actuation system test		For setting and measuring the amplitudes. Preparation: For automatically calculating the amplitude, enter the gain factors under: Information/oscillator system info/ input factors booster and horn. Measurement: Using the “System test” button or digital input "US_TEST_IN"

7.2 Analysis (PIN)

For analysis in the case of error-free machine function.

No settings are, however, possible.

Block	Access	Description
Cycle analysis		Display of the switch and measurement sizes
Cycle phases		Time and travel dependent display of all cycle phases in their switch moments
Press status		Display of the switch and position status of all switch and measuring members of the welding press
Inputs		Analysis of the signal inputs (STO_2.1)
Outputs		Analysis of the signal outputs (STO_2.2)

7.3 Reset functions (PIN)

Resets all settings to the standard values.

Block	Access	Description
PIN Reset		Sets PIN to “internal” and activates the standard PIN codes
Generator reset		Initialises the generator to the standard settings
Default data set		Deletes all data sets and generates a dataset “0”
Statistic Reset		Resets the statistics and the measured values database
Factory settings		Executes directly all the above-mentioned resets

8 Data analysis

8.1 Statistics

Ongoing:

The median values of the travel, energy and the welding time are shown in the ongoing statistics. In addition, standard deviation is shown as a value and as a percentage. This listing of median values relates to all welding operations shown so far, meaning either from the last time that the machine was started or since the values were last reset. As soon as the parts counter has been set up, the statistics are transferred via the RS232 interface, if serial communication is used. The statistics menu appears on the display instead of the welding menu.

Groups:

These statistics are intended primarily for use when setting up. The last 25 welding operations are shown in groups of a maximum of 5. No parameter changes are permitted within a group of 5, otherwise a new group is started. If there was an incorrect welding operation within the group, this is excluded from the statistics. The number of welding operations within a group is displayed underneath the group number. Correct welding operations are shown with an “o” and incorrect welding operations are shown with an “x”.

The following displays result from the relevant welding mode:

Time

Energy, travel differential and travel absolute

Travel differential

Energy, time and travel absolute

Travel absolute

Energy, time and travel differential

Energy

Time, travel differential and travel absolute

Contact

Energy, time travel differential

The statistics can be shown at any time via the serial interface. Selection for triggering is done by means of the F1 and ENTER keys. The statistics and the database of measured values can be deleted at any time by pressing the DEL key.

If the energy value is greater than four digits plus one decimal place (xxxx.x), then only five digits with no decimal places (xxxxx) are shown.

Values:

The measured values of the last 25 welding operations are specified. The measured values are output via the datastring option. Otherwise, no output is possible via the serial interface.

Example of output after multiple errors in a welding cycle

The datastring shows the relevant current error code in the event of an error. If there is more than one error, then this is indicated with the coding 100:00X. X stands for the number of errors. Warnings are not shown in the datastring.

Examples:

Error "Energy limit min" occurs:

Display: #1
Code: 5:3
Info: Energy limit min
Datastring: 005:003

Errors "Time limit max" and "Energy limit min" occur:

Display: #1
Code: 5:0
Info: Time limit max
Display: #2
Code: 5:3
Info: Energy limit min
Datastring: 100:002

Example of output after exceeding the warning window

Warning "Time warning min" is given:

Display: #1
Code: 20:1
Info: Time warning min
Datastring: 000:000

8.2 Logging the parameter data set via RS232

The contents of a data set can be shown in the “Database – Parameter database” menu by selecting RS232. The following data are output via the RS232 serial interface:

General information:

Date	Time
Project name	Data set No.
Generator type	AUI software version

Information on the press:

Press type	Set pressure
Throttle position	Press position, depth stop position

Information on the oscillator:

Converter No.	Booster No.
Amplification booster	Horn No.
Amplification horn	Holder No.

Information on the generator parameters:

DGC software version	Start amplitude
Soft start time	Soft stop time

Information on the welding parameters:

Amplitude
Start condition (pressure, travel, time trigger)
Stop condition (time, travel, energy, contact)
Holding condition (time, travel)

Example 1

13.06.06;14:01:13;HUGO;1;ADG70-100;AUI
0C70;Standard50;5.5bar;3.5;100mm;99mm;
111111;222222;1:1.5;333333;1:1.5;444444;DGC
0G64;30%;20ms;0ms;60%;Pressure:3.0;
Timemode:333ms;Time:350ms;

Example 2

13.06.06;14:01:11;VRENI;2;ADG70-100;AUI
0C70;Standard50;79.8psi;3.5;3.9370inch;
3.8976inch;111111;222222;1:1.5;333333;1:1.5;444444;
DGC 0G64;30%;20ms;0ms;60%;
Time:150ms;Travel absolute:2.5846inch;Time:350ms;

9 PIN Assignment

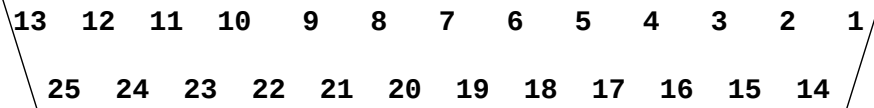
STO_2_1 Inputs



9.1 Inputs on STO_2_1 (DSUB25)

Pin	Signal	Description
1	+24VDC_IO_IN	external supply voltage +24VDC
2	+24VDC_IO_IN	external supply voltage +24VDC
3	START_1_EXT_IO_IN	external start signal for start mode automatic
4	START_2_EXT_IO_IN	external start signal for start mode automatic
5	STOP_IN	abort cycle
6	US_TEST_IN	power loss measurement
7	US_STOP_1_IN	stop ultrasonic (24VDC)
8	US_STOP_2_IN	contact cut off (GND)
9	RESET_IN	error acknowledgment
10	TRIGGER_IN	external trigger
11	START_CONFIRM_IN	start confirm (option enable)
12	READY_CONFIRM_IN	ready confirm (option enable)
13	RESERVE_13_IN	
14	DATASET_1_IN	data set switching
15	DATASET_2_IN	data set switching
16	DATASET_3_IN	data set switching
17	DATASET_4_IN	data set switching
18	DATASET_5_IN	data set switching
19	SSK_CABINE_IN	sound enclosure door closed (option enable)
20	SSK_CABINE_LIFT_IN	lift door not closed (option enabled)
21	RESERVE_21_IN	
22	RESERVE_22_IN	
23	AMPL_AIN	analogue amplitude input 0-10VDC (0-100% amplitude)
24	GND24VDC_IO_IN	external supply voltage GND
25	GND24VDC_IO_IN	external supply voltage GND

STO_2_2 Outputs

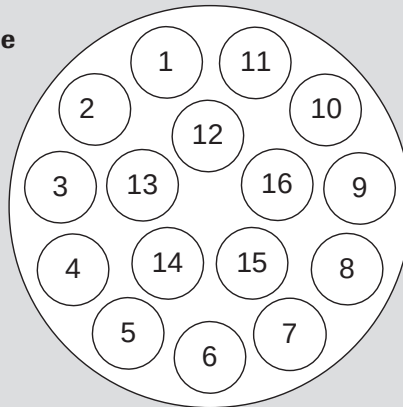


9.2 Outputs on STO_2_2 (DSUB25)

Pin	Signal	Description
1	+24VDC_IO_IN	external supply voltage +24VDC
2	+24VDC_IO_IN	external supply voltage +24VDC
3	ERROR_HIGHPRIO_OUT	high priority error (turn off generator)
4	ERROR_OUT	error
5	ERROR_CODE1_OUT	error code
6	ERROR_CODE2_OUT	error code
7	ERROR_CODE3_OUT	error code
8	READY_OUT	ready for new cycle
9	US_ACTIVE_OUT	ultrasonic activated
10	RESTPOS_OUT	rest position press
11	RESERVE_11_OUT	
12	START_OUT	start cycle done
13	MV_OUT	magnetic valve set (cylinder pre stroke/down)
14	START_RETURN_OUT	back stroke active (cylinder back stroke/up)
15	GOOD_PART_COUNT_OUT	successful cycle finished
16	BAD_PART_COUNT_OUT	cycle finished with error
17	RESERVE_17_OUT	
18	RESERVE_18_OUT	
19	RESERVE_19_OUT	
20	SSK_MV_LIFTDOOR_OUT	magnetic valve lift door (option enable)
21	RESERVE_21_OUT	
22	RESERVE_22_OUT	
23	POWER_AOUT	analogue power output 0-10VDC (0-120% power)
24	GND24VDC_IO_IN	external supply voltage GND
25	GND24VDC_IO_IN	external supply voltage GND

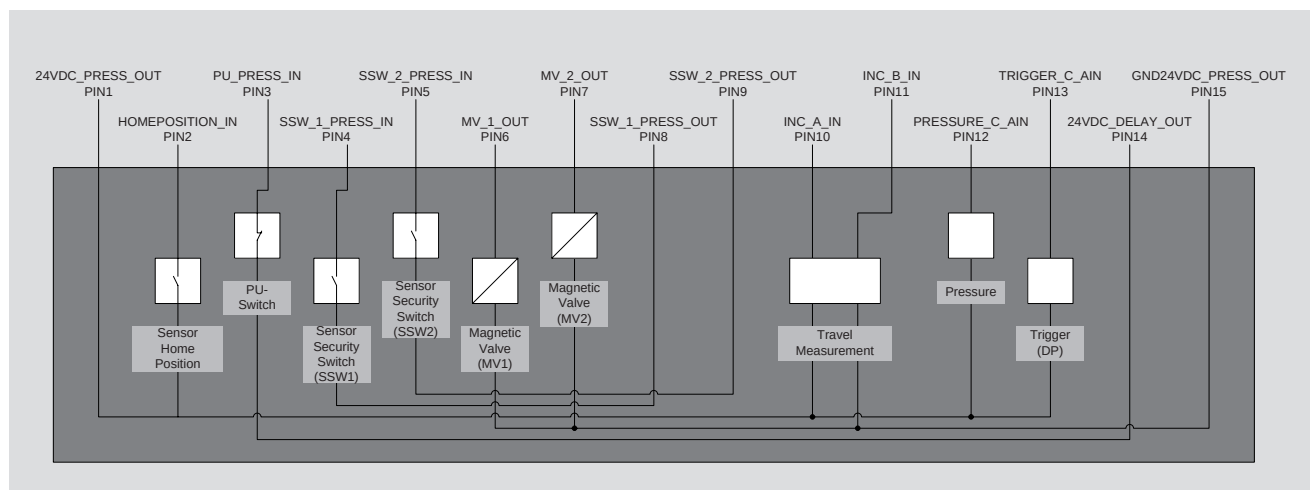
STO_3 Press

Overview Generator Backside

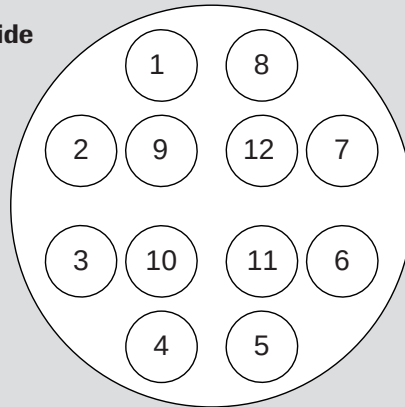


9.3 Press on STO_3

Pin	Signal	Description
1	+24VDC_PRESS_OUT	supply voltage +24VDC press
2	HOMEPOSITION_IN	input sensor resting position
3	PU_PRESS_IN	input PU- switch (supervision magnetic valves)
4	SSW_1_PRESS_IN	input security switch 1 press (6mm)
5	SSW_2_PRESS_IN	input security switch 2 press (6mm)
6	MV_1_OUT	output magnetic valve 1
7	MV_2_OUT	output magnetic valve 2
8	SSW_1_PRESS_OUT	output security switch 1 press (6mm)
9	SSW_2_PRESS_OUT	output security switch 2 press (6mm)
10	INC_A_IN	travel measurement canal A
11	INC_B_IN	travel measurement canal B
12	PRESSURE_C_AIN	analogue input system pressure (4-20mA)
13	TRIGGER_C_AIN	analogue input differential pressure trigger (4-20mA)
14	24VDC_DELAY_OUT	delayed supply voltage for PU- switch
15	GND24VDC_PRESS_OUT	supply voltage GND press

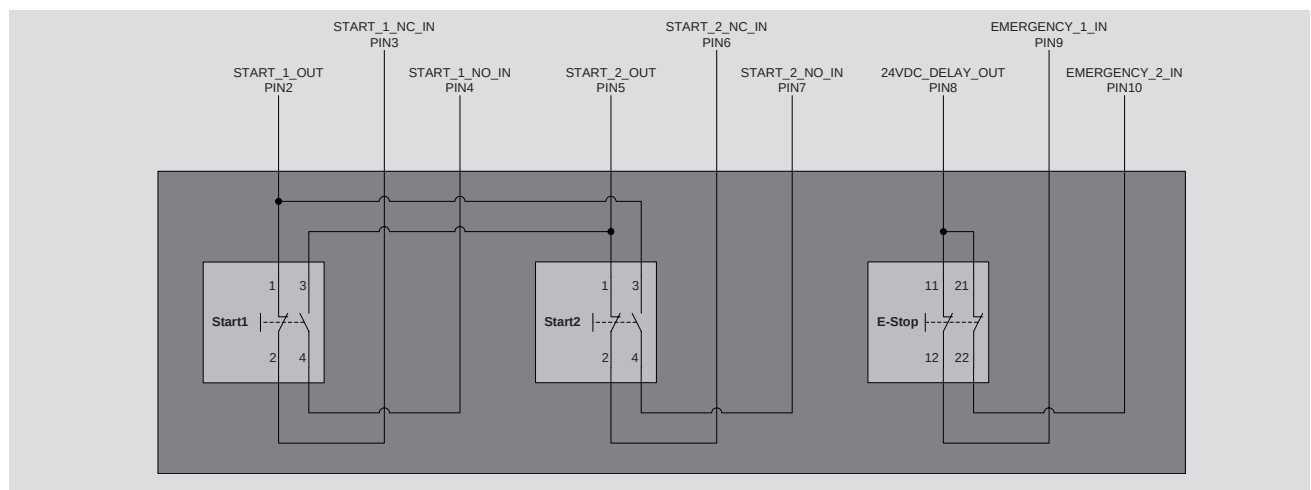


STO_5 Two-hand Overview Generator Backside



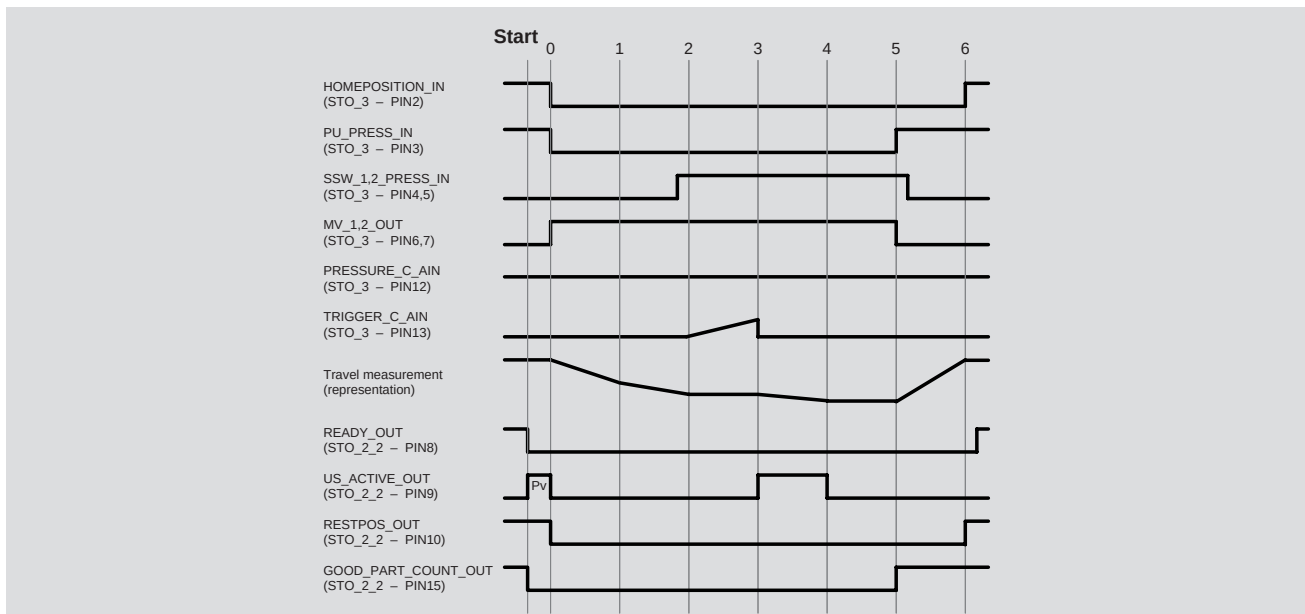
9.4 Two-hand start on STO_5

Pin	Signal	Description
1	nc	
2	START_1_OUT	output start switch 1
3	START_1_NC_IN	input start switch 1 (normally close)
4	START_1_NO_IN	input start switch 1 (normally open)
5	START_2_OUT	output start switch 2
6	START_2_NC_IN	input start switch 2 (normally close)
7	START_2_NO_IN	input start switch 2 (normally open)
8	24VDC_DELAY_OUT	delayed suppl voltage fpr emergency stop
9	EMERGENCY_1_IN	input emergency stop 1
10	EMERGENCY_2_IN	input emergency stop 2
11	nc	
12	GND24VDC_PRESS_OUT	supply voltage GND press



10 Example applications

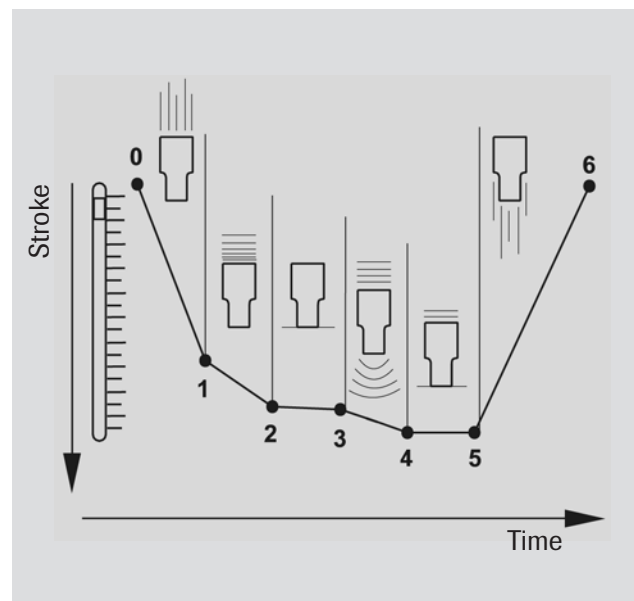
10.1 Standard ADG



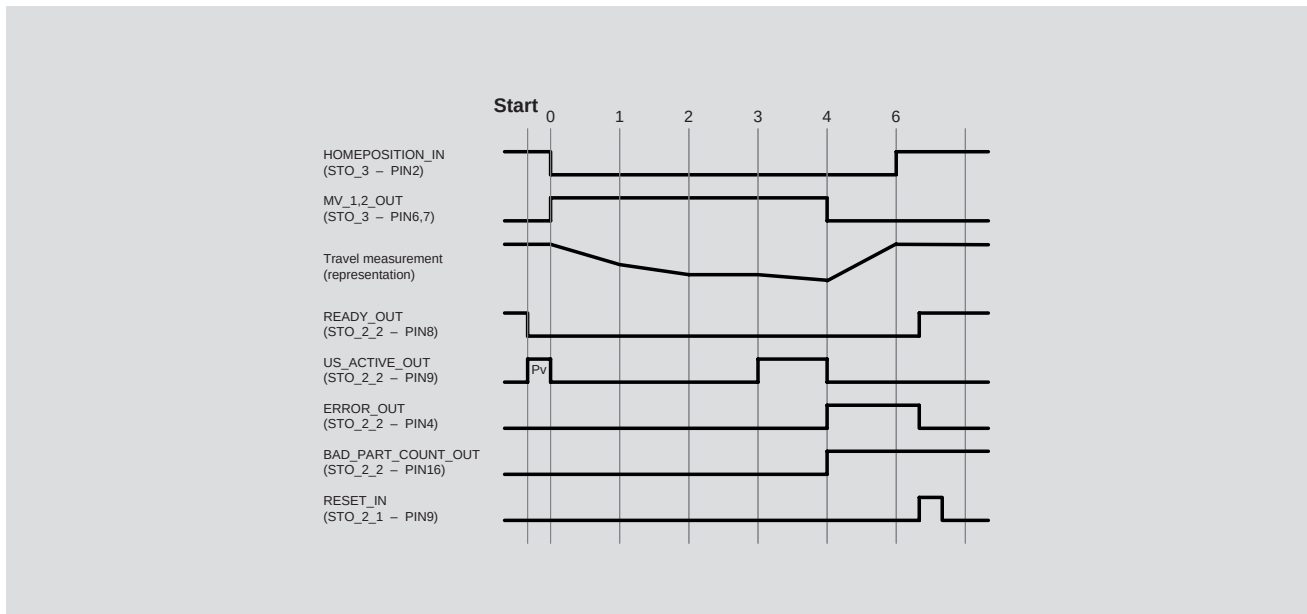
Process step

- 0 > 1 Pretravel
- 1 > 2 Stroke braked
- 2 > 3 Power development
- 3 > 4 Melting on
- 4 > 5 Solidification
- 5 > 6 Return stroke

The cycle is initiated by pressing the two-hand start. Output **READY_OUT** drops out and the power loss measurement (Pv) is shown by output **US_ACTIVE_OUT**. The solenoid valves (**MV_1,2_OUT**) are set after a successful Pv measurement, whereby the press leaves the position of rest. This is indicated by output **RESTPOS_OUT**. The ultrasonics are started when the trigger pressure is reached. This is indicated by output **US_ACTIVE_OUT**. Outputs **MV_1_OUT** and **MV_2_OUT** are reset after the welding and solidification phases. The press is brought back into the position of rest as a result. Output **RESTPOS_OUT** indicates that the position of rest has been reached. Output **READY_OUT** is set as soon as the generator is ready for the next welding operation. An error-free welding operation is indicated by output **GOOD_PART_COUNT_OUT**. This signal is applied until the start of the next cycle.



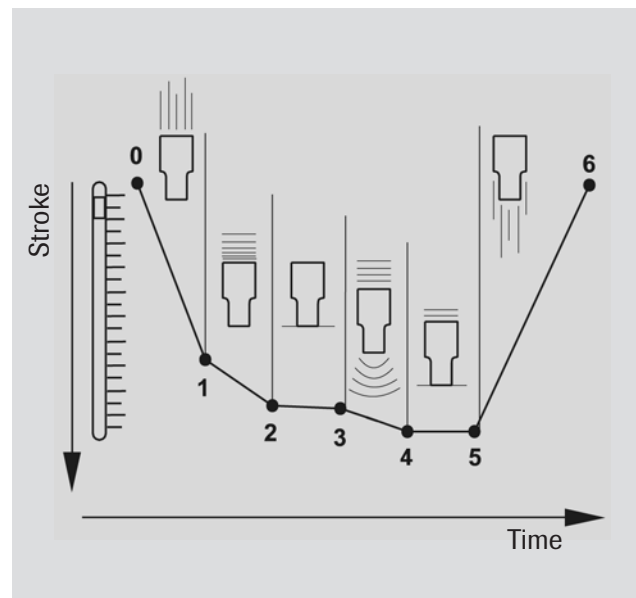
10.2 ADG error signals



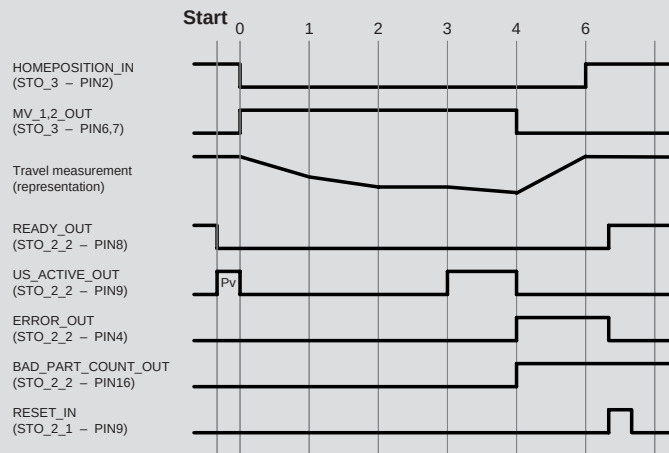
Process step

- 0 > 1 Pretravel
- 1 > 2 Stroke braked
- 2 > 3 Power development
- 3 > 4 Melting on
- 4 > 5 Solidification
- 5 > 6 Return stroke

The cycle is initiated by pressing the two-hand start. Output **READY_OUT** drops out and the power loss measurement (Pv) is shown by output **US_ACTIVE_OUT**. The solenoid valves (**MV_1,2_OUT**) are set after a successful Pv measurement, whereby the press leaves the position of rest. This is indicated by output **RESTPOS_OUT**. The ultrasonics are started when the trigger pressure is reached. This is indicated by output **US_ACTIVE_OUT**. An error occurs during the welding operation, as a result of which the welding operation is broken off. This is indicated by output **US_ACTIVE_OUT** dropping out and the setting of output **ERROR_OUT**. The press is brought back into the position of rest by resetting the solenoid valve outputs **MV_1,2_OUT**. In addition to the error display, output **BAD_PART_OUT** indicates an incorrect welding operation. This signal remains until the start of the next cycle. The current error can be cleared by applying a signal at input **RESET_IN**. If there are no further errors, the generator indicates this with output **READY_OUT**.



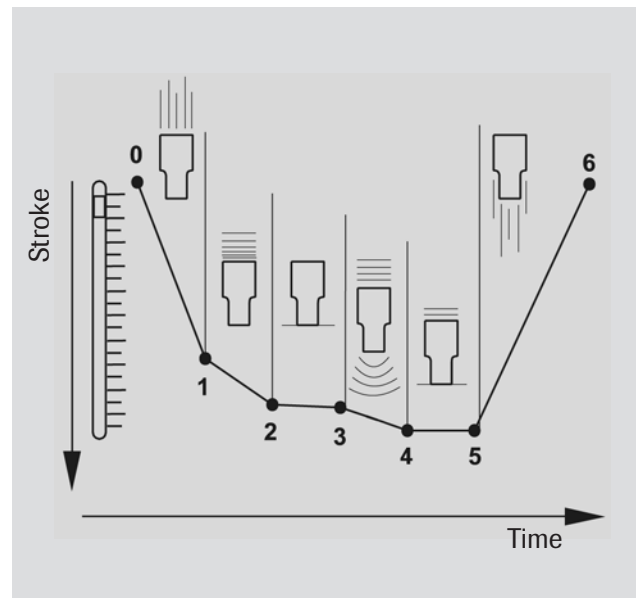
10.3 Standard ADG with sound enclosure



Process step

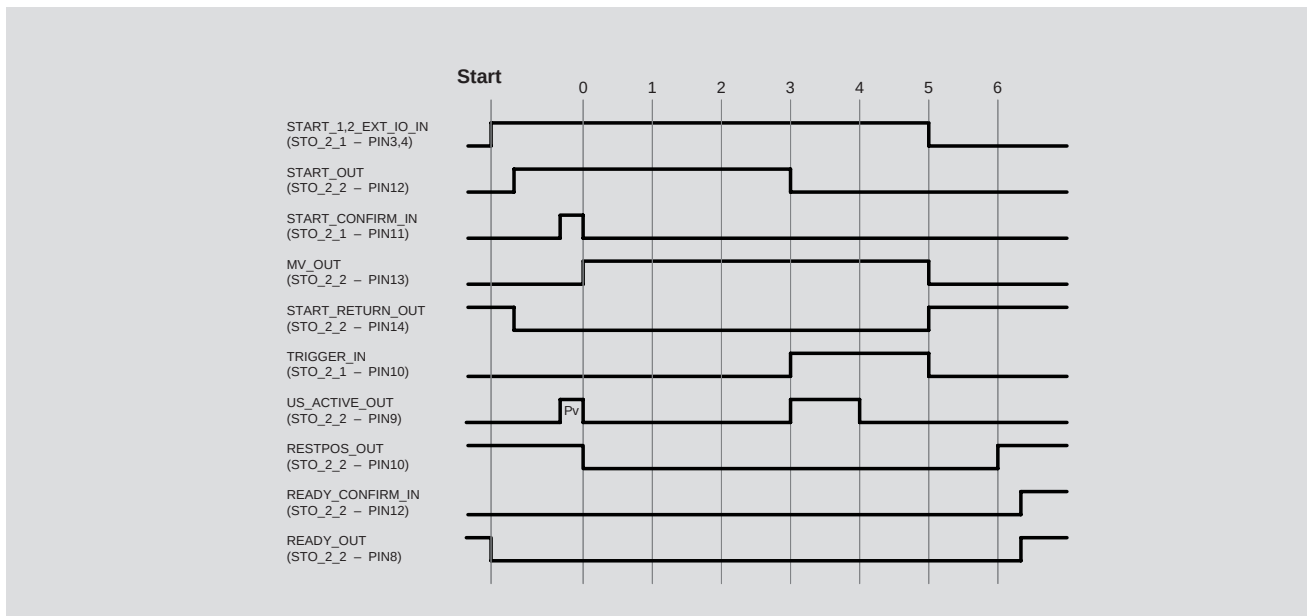
- 0 > 1 Pretravel
- 1 > 2 Stroke braked
- 2 > 3 Power development
- 3 > 4 Melting on
- 4 > 5 Solidification
- 5 > 6 Return stroke

The cycle is initiated by pressing the two handed release. With the cabin doors closed, indicated by the set input `SSK_CABINE_IN`, the output `SSK_CABINE_LIFTDOOR_OUT` is set which lowers the lift doors. Once the lift doors have reached the closed position, the input `SSK_CABINE_LIFT_IN` is set and the welding cycle begins. The power loss measurement (Pv) is indicated by the `US_ACTIVE_OUT` input. After the Pv reading has been successfully taken, the magnetic valves (`MV_1,2_OUT`) are set. The ultrasound is started by pressing a trigger. This is indicated by the output `US_ACTIVE_OUT`. After the welding and setting phase the outputs `MV_1_OUT` and `MV_2_OUT` are reset which returns the press to the idle position.



10.4 ADG with special actuators

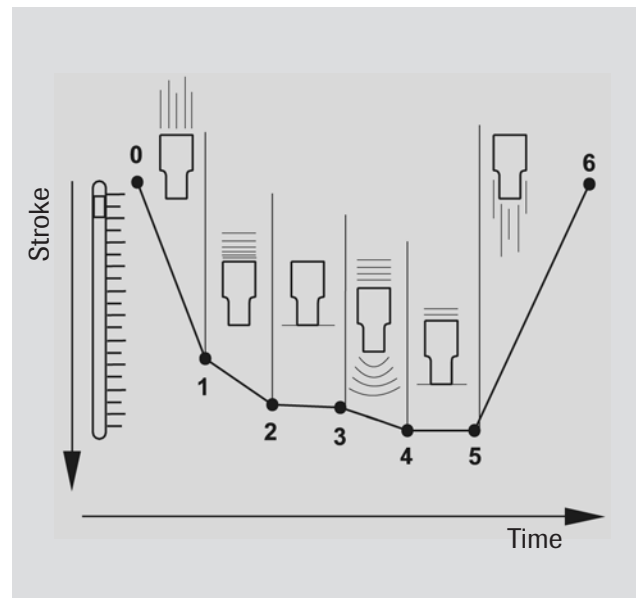
(Start mode automatic)



Process step

- 0 > 1 Pretravel
- 1 > 2 Stroke braked
- 2 > 3 Power development
- 3 > 4 Melting on
- 4 > 5 Solidification
- 5 > 6 Return stroke

Engaging the inputs START_1_EXT_IO_IN and START_2_EXT_IO_IN starts the process which is indicated by the output START_OUT. The two start inputs START_1,2_EXT_IO_IN must be engaged until the output START_RETURN_OUT indicates that the press is on the return stroke, In this application the options "Confirm start" and "Confirm stand by" are activated. For that reason, the power loss reading (Pv) is only issued after the input START_CONFIRM_IN is engaged. Equally, the stand by signal for the next welding cycle READY_OUT is only indicated if the input READY_CONFIRM_IN is engaged.



10.5 Data set switching

Data set switching is used to initiate multiple welding applications with one generator.

The welding parameters, limits, information and system parameters are stored in a data set. The data sets can be switched over according to the setting of the “Data set switching” option.

Option „Data set switching“ dec

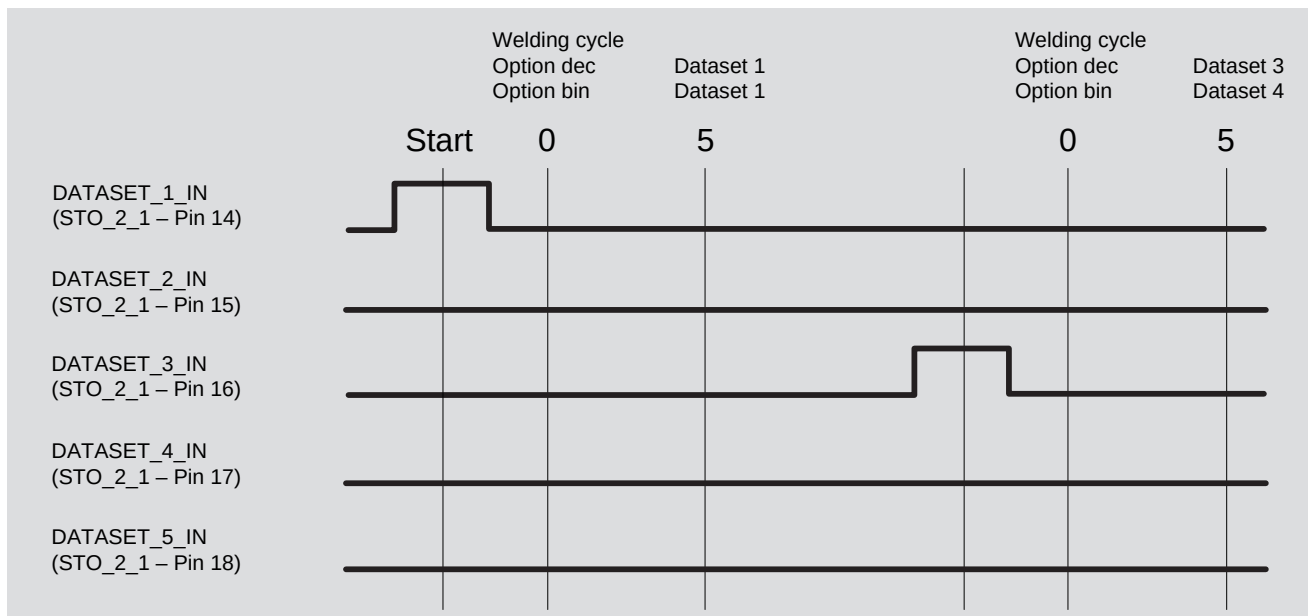
DATASET_1_IN	DATASET_2_IN	DATASET_3_IN	DATASET_4_IN	DATASET_5_IN	Dataset no action
0	0	0	0	0	
1	0	0	0	0	1
0	1	0	0	0	2
0	0	1	0	0	3
0	0	0	1	0	4
0	0	0	0	1	5

Option „Data set switching“ bin

DATASET_1_IN	DATASET_2_IN	DATASET_3_IN	DATASET_4_IN	DATASET_5_IN	Dataset no action
0	0	0	0	0	
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
...	...	...	...	...	...
0	1	1	1	1	31
1	1	1	1	1	32

Option „Data set switching“ RS232

Dataset	ASCII-Types	Dataset	ASCII-Types	Dataset	ASCII-Types	Dataset	ASCII-Types
1	1	11	;	21	E	31	O
2	2	12	<	22	F	32	P
3	3	13	=	23	G		
4	4	14	>	24	H		
5	5	15	?	25	I		
6	6	16	@	26	J		
7	7	17	A	27	K		
8	8	18	B	28	L		
9	9	19	C	29	M		
10	:	20	D	30	N		



The process is started by applying inputs **START_1_EXT_IO_IN** and **START_2_EXT_IO_IN** in automatic mode or by operating the two-hand start in manual mode. Inputs **DATASET_1_IN** to **DATASET_5_IN** are checked at this time. Once the option has been selected, the corresponding data set is used for the welding. Note the changeover time of 200 ms for the HF switchover boxes that are used.

11 Technical data

11.1 Power supply

The generator is operated at the nominal voltage specified on the type plate. A deviation of $\pm 10\%$ of the nominal voltage is permissible.

11.2 Analog and digital inputs/outputs

11.2.1 Power supply and voltage level

The digital inputs/outputs require an external power supply (+24 V DC_IO_IN) of 24 V. The voltage levels of the power supply and the digital inputs/outputs are shown in the following table.

Parameter	Condition	Min	Typ	Max	Unit
+24VDC_IO_IN		20	24	28	V
Digital Input High Signal		15			V
Digital Input Low Signal			1		V
Digital Output High Signal	Vsupply = 24V			24	V
Digital Output Low Signal	Vsupply = 24V		0	0.5	V

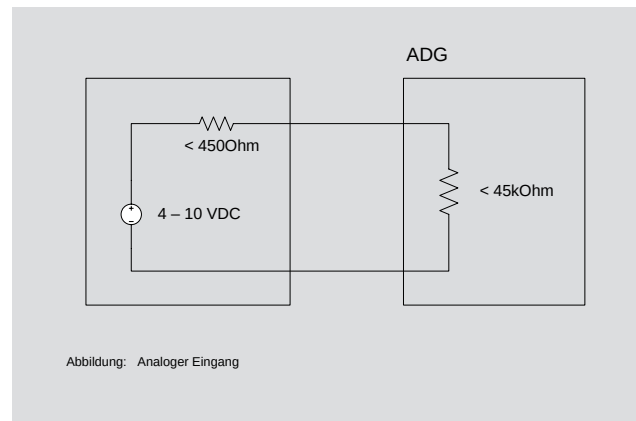
11.2.2 Overview of the inputs/outputs

The following table gives an overview of the inputs/outputs.

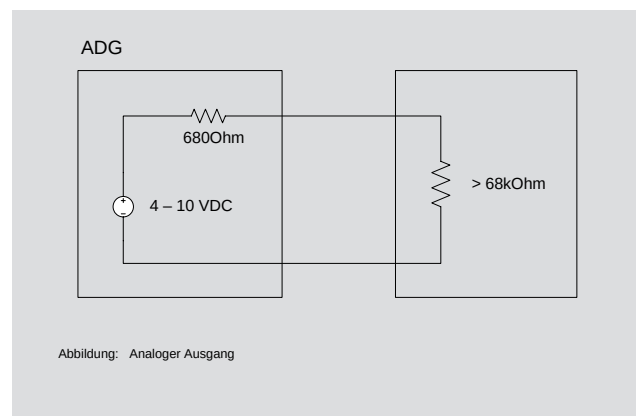
Signal type	Voltage level
Digital inputs	24VDC Input current = 5mA type. Input resistance = 8.4k Ω
Analog inputs	0 - 10VDC Precision $\pm 3\%$ Input current = 0.3mA typ. Input resistance = 45k Ω
Digital outputs	24VDC Output current = 100mA max.
Analog outputs	0 - 10VDC Output current = 10mA max. Output resistance = 680 Ω

11.2.3 Analog input and output

In order to ensure that no errors occur at the analog input, the internal resistance of the supply source may not be greater than 450 Ω .

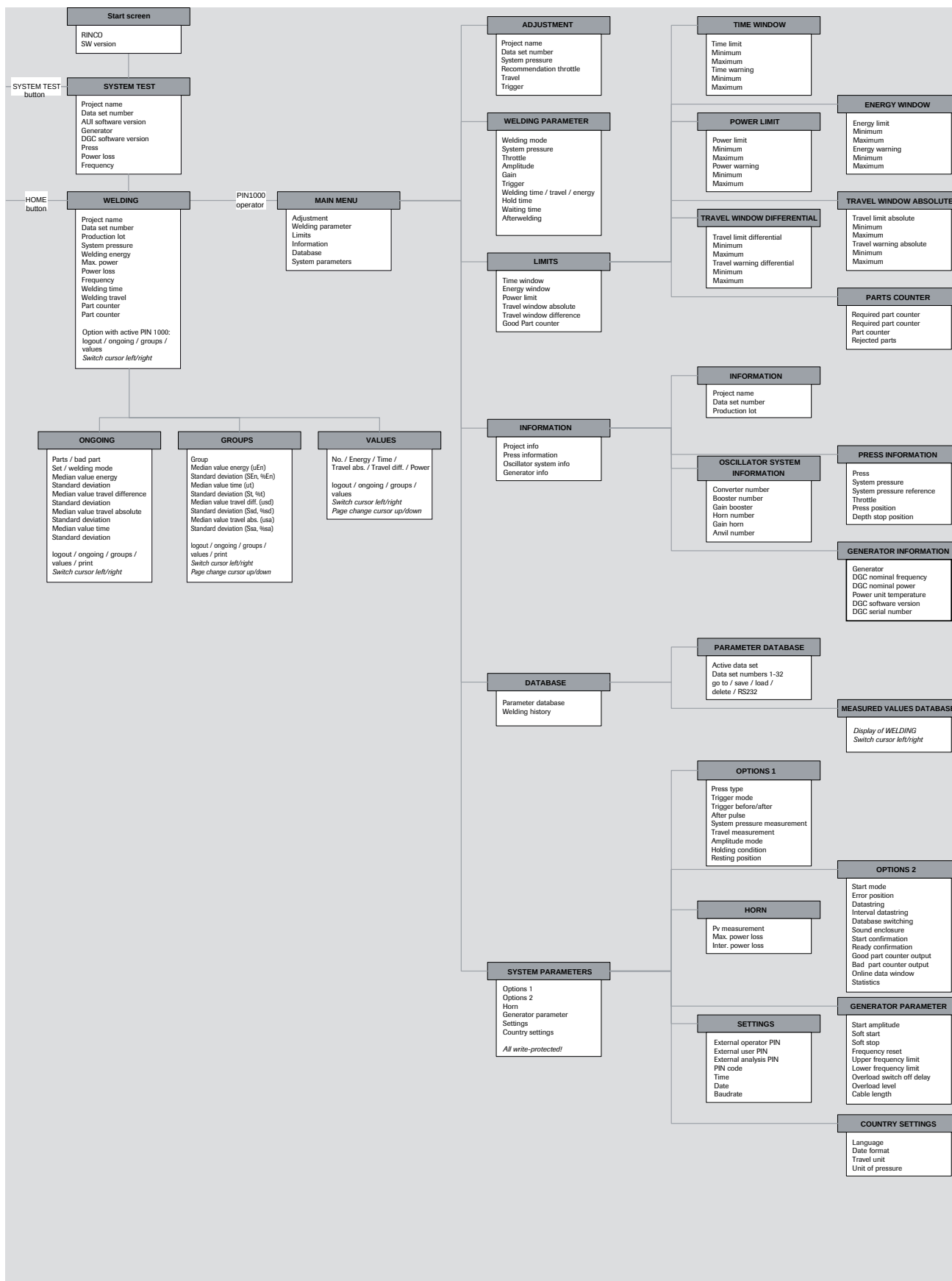


In order not to generate errors at the analog power output, the internal resistance of the sink that is connected must be greater than 68 k Ω .

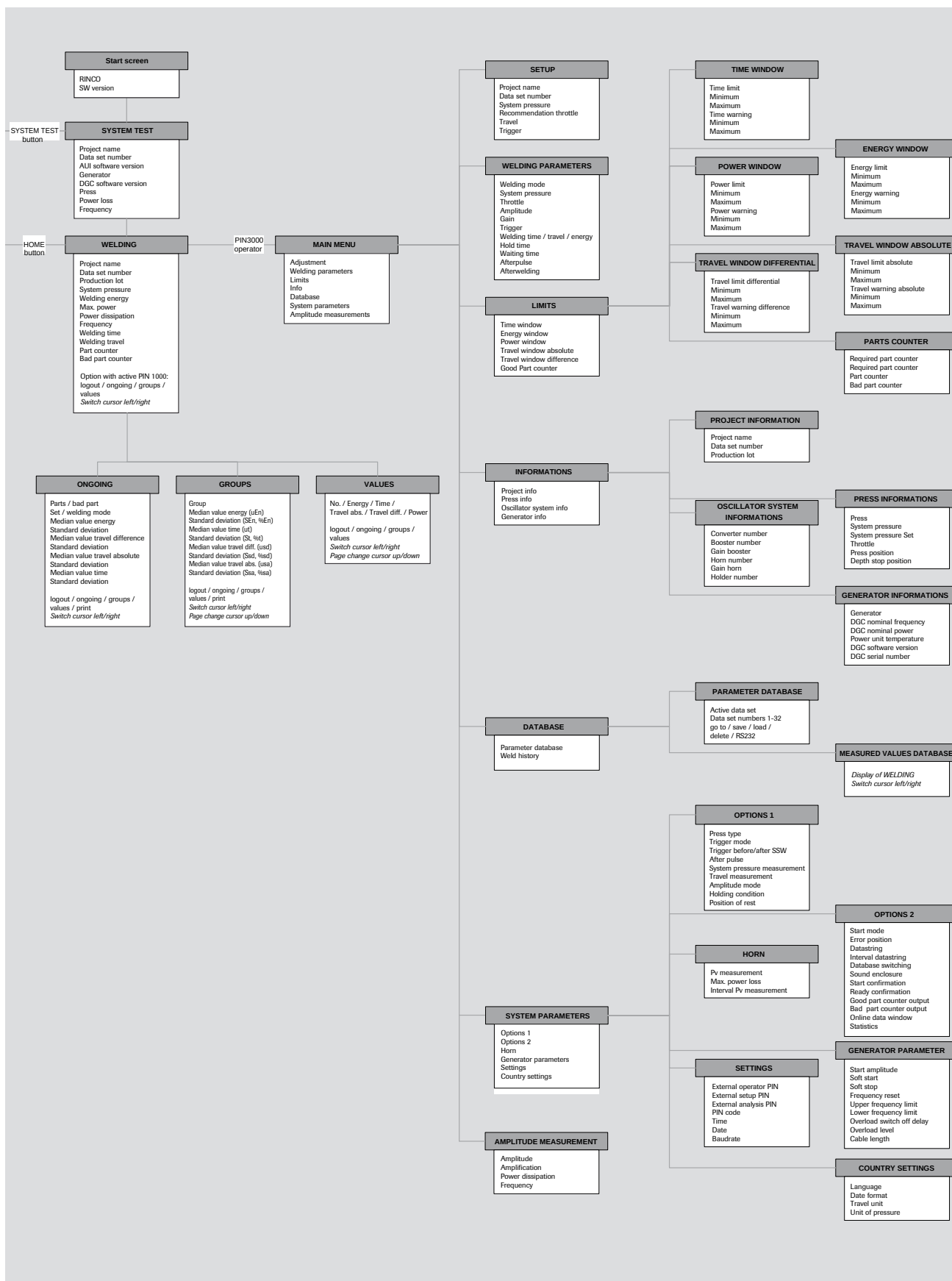


12 Maintenance and service

12.1 Menu tree PIN 1000



12.2 Menu tree PIN 3000



12.3 Description of error areas (error groups)

Error groups

002	Error generator
003	Error press
004	Error sound enclosure
005	Error Limits
006	Error digital I/Os
007	Error hardware
008	Error RS232
009	Error CANopen
020	Warning limits
021	Warning parameters

12.4 Detailed description of errors (error numbers)

12.4.1 Explanation concerning priority

Low: These errors can be cleared with buttons F1, F2 or input RESET_IN (STO_2_1 PIN9).

High: errors cannot be cleared. The generator must be switched off.

Warning: These messages are for information only. Warnings do not need to be cleared.

Error generator (error group 002:xxx)				ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
Error	Description	Priority	Type of error					
002:000	Maximum power loss reached (Pv test)	low	Oscillator	0	1	1	0	0
002:001	Supply voltage too low	high	Generator	1	1	0	1	0
002:002	Power pack +12V defective	high	Generator	1	1	0	1	0
002:003	Minimal level control final stage	high	Generator	1	1	0	1	0
002:004	Temperature final stage too high	high	Generator	1	1	0	1	0
002:005	Frequency minimum undershot	low	Oscillator	0	1	1	0	0
002:006	Frequency maximum exceeded	low	Oscillator	0	1	1	0	0
002:007	Maximum converter voltage exceeded	low	Oscillator	0	1	1	0	0
002:008	Power overload level exceeded	low	Oscillator	0	1	1	0	0
002:009	Full level control of the final stage reached	low	Oscillator	0	1	1	0	0
002:010	Converter not connected	low	Oscillator	0	1	1	0	0

Error press (error group 003:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
003:000	Error when measuring travel	low	Cycle	0	1	0	1	1
003:001	Error valves	low	Cycle	0	1	0	1	1
003:002	Error two-hand start	low	Cycle	0	1	0	1	1
003:003	Rest position of press not reached	low	Cycle	0	1	0	1	1
003:004	Error safety switch	low	Cycle	0	1	0	1	1
003:005	Maximum cycle time reached	low	Cycle	0	1	0	1	1
003:006	Welding interrupted	low	Cycle	0	1	0	1	1
003:007	Error trigger set	low	Cycle	0	1	0	1	1
003:008	Error ultrasonic active	low	Cycle	0	1	0	1	1
003:009	Error system pressure too low	low	Cycle	0	1	0	1	1

Error sound enclosure (error group 004:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
004:000	Error during initialisation	low	Cycle	0	1	0	1	1
004:001	Lifting door not open at start of cycle	low	Cycle	0	1	0	1	1
004:002	Time overrun lower lifting door	low	Cycle	0	1	0	1	1
004:003	Time overrun raise lifting door	low	Cycle	0	1	0	1	1
004:004	Enclosure door open	low	Cycle	0	1	0	1	1
004:005	Lifting door open during cycle	low	Cycle	0	1	0	1	1

Error limits (error group 005:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
005:000	Limit time max exceeded	low	Limit	0	1	1	1	0
005:001	Limit time min undershot	low	Limit	0	1	1	1	0
005:002	Limit energy max exceeded	low	Limit	0	1	1	1	0
005:003	Limit energy min undershot	low	Limit	0	1	1	1	0
005:004	Limit power max exceeded	low	Limit	0	1	1	1	0
005:005	Limit power min undershot	low	Limit	0	1	1	1	0
005:006	Limit travel absolute max exceeded	low	Limit	0	1	1	1	0
005:007	Limit travel absolute min undershot	low	Limit	0	1	1	1	0
005:008	Limit travel differential max exceeded	low	Limit	0	1	1	1	0
005:009	Limit travel differential min undershot	low	Limit	0	1	1	1	0
005:010	Target part count reached	low	Limit	0	1	1	1	0

Error digital I/Os (Error group 006:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
006:000	Stop cycle	low	Cycle	0	1	0	1	1
006:001	Stop 1 set	low	Cycle	0	1	0	1	1
006:002	Stop 2 set	low	Cycle	0	1	0	1	1
006:003	Reset set	low	Cycle	0	1	0	1	1
006:004	Start external dropped out	low	Cycle	0	1	0	1	1
006:005	External start still requested	low	Cycle	0	1	0	1	1
006:006	Inputs for data set transfer incorrect	low	Cycle	0	1	0	1	1
006:007	Analog amplitude input too low	low	Cycle	0	1	0	1	1

Error hardware (error group 007:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
007:001	Short circuit output group 1	high	Hardware	1	1	1	0	1
007:002	Short circuit output group 2	high	Hardware	1	1	1	0	1
007:003	Short circuit output group 3	high	Hardware	1	1	1	0	1
007:004	Short circuit output group 4	high	Hardware	1	1	1	0	1
007:005	Short circuit output group 5	high	Hardware	1	1	1	0	1
007:006	Short circuit output group 6	high	Hardware	1	1	1	0	1
007:007	Pressure input <1mA	low	Hardware	0	1	1	0	1
007:008	Trigger input <1mA	low	Hardware	0	1	1	0	1
007:009	Analogue amplitude input >12V (120%)	low	Hardware	0	1	1	0	1

Error RS232 (Error group 008:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
008:000	Bit overrun error (characters were lost)	low	Hardware	0	1	1	0	1
008:001	Parity error (incorrect parity character)	low	Hardware	0	1	1	0	1
008:002	Framing error (no valid stop bit, incorrect bit rate)	low	Hardware	0	1	1	0	1
008:003	Break interrupt (byte too long, incorrect bit rate)	low	Hardware	0	1	1	0	1
008:004	No receiver connected	low	Hardware	0	1	1	0	1

Error CANopen (Error group 009:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
009:000	SDO read error (possible timeout)	low	Hardware	0	1	1	0	1
009:001	SDO write error (possible timeout)	low	Hardware	0	1	1	0	1
009:002	SDO service (incorrect parameter)	low	Hardware	0	1	1	0	1
009:003	SDO access error (incorrect value range)	low	Hardware	0	1	1	0	1
009:004	SDO other error	low	Hardware	0	1	1	0	1

Warnings Limits (Warning group 020:xxx)

Error	Description	Priority	Type of error	ERROR_HIGHPRIO_OUT	ERROR_OUT	ERROR_CODE1_OUT	ERROR_CODE2_OUT	ERROR_CODE3_OUT
020:000	Time max exceeded	Warning	Warnings	0	0	0	0	1
020:001	Time min undershot	Warning	Warnings	0	0	0	0	1
020:002	Energy max exceeded	Warning	Warnings	0	0	0	0	1
020:003	Energy min undershot	Warning	Warnings	0	0	0	0	1
020:004	Power max exceeded	Warning	Warnings	0	0	0	0	1
020:005	Power min undershot	Warning	Warnings	0	0	0	0	1
020:006	Travel absolute max exceeded	Warning	Warnings	0	0	0	0	1
020:007	Travel absolute min undershot	Warning	Warnings	0	0	0	0	1
020:008	Travel differential max exceeded	Warning	Warnings	0	0	0	0	1
020:009	Travel differential min undershot	Warning	Warnings	0	0	0	0	1

Warnings Parameters (Warning group 021:xxx)

021:000	Data set empty / data not loaded	Warning	Warnings	0	0	0	0	1
021:001	Warning data not deleted	Warning	Warnings	0	0	0	0	1

12.3 Cleaning the machine



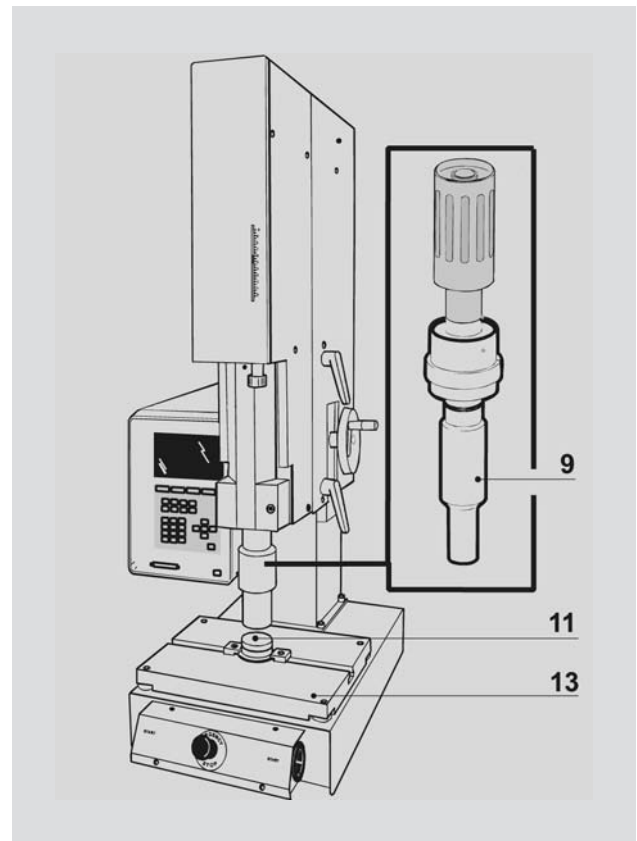
Caution!

Cleaning and maintenance work may only be carried out by trained personnel. Before beginning the maintenance work, make sure that all power sources, such as electrical power and compressed air, are disconnected. Never clean the keyboard or the display with acidic cleaners. The multipress and the generator do not require any special maintenance.

However, regularly cleaning the

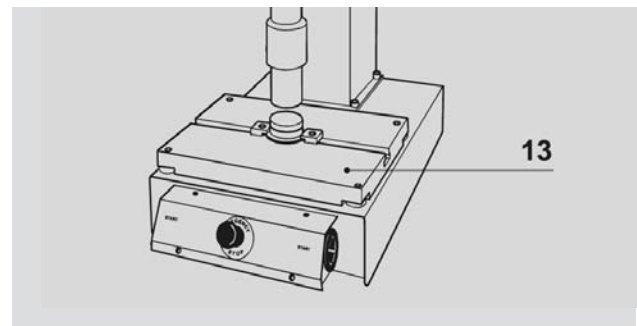
- actuator,
- clamping table (13),
- anvil (11),
- horn (9),

guarantees a long and problem-free operation of the press system.



Clamping table

Clean the clamping plate (13) regularly.



Pneumatic unit

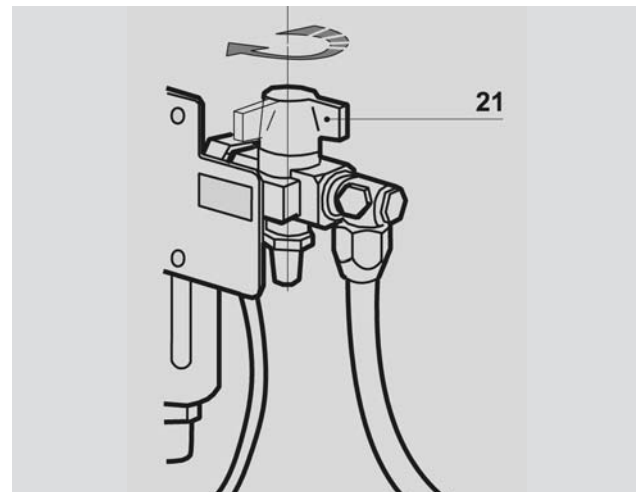
After work is completed, bring the compressed air valve (21) into a transverse position; this reduces maintenance work.

Lubrication system

Maintenance-free.

Generator

Always keep the generator display clean.



Oscillator system



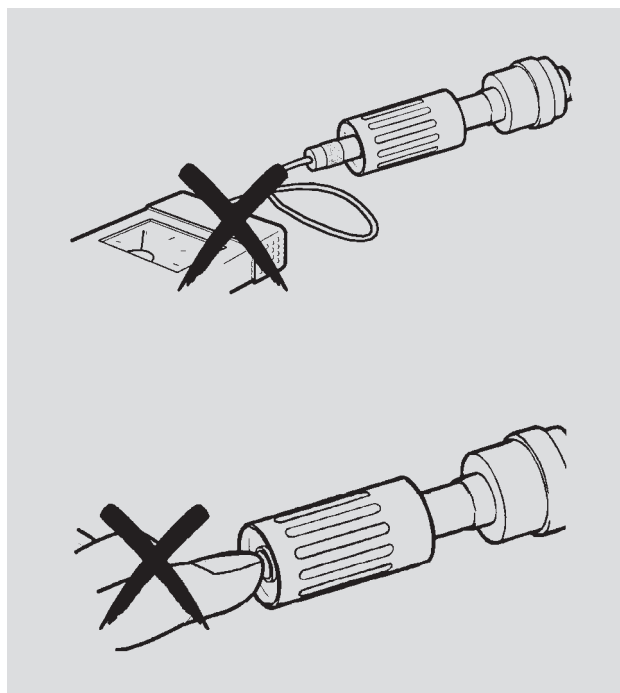
Danger!

Work on the oscillator system and converter housing only if the supply voltage is switched off! High voltage!

Avoid contact with the RF socket of the converter.

Do not connect any measuring device to the RF socket of the converter!

The converter contains an electrical charge even after the generator has been switched off!



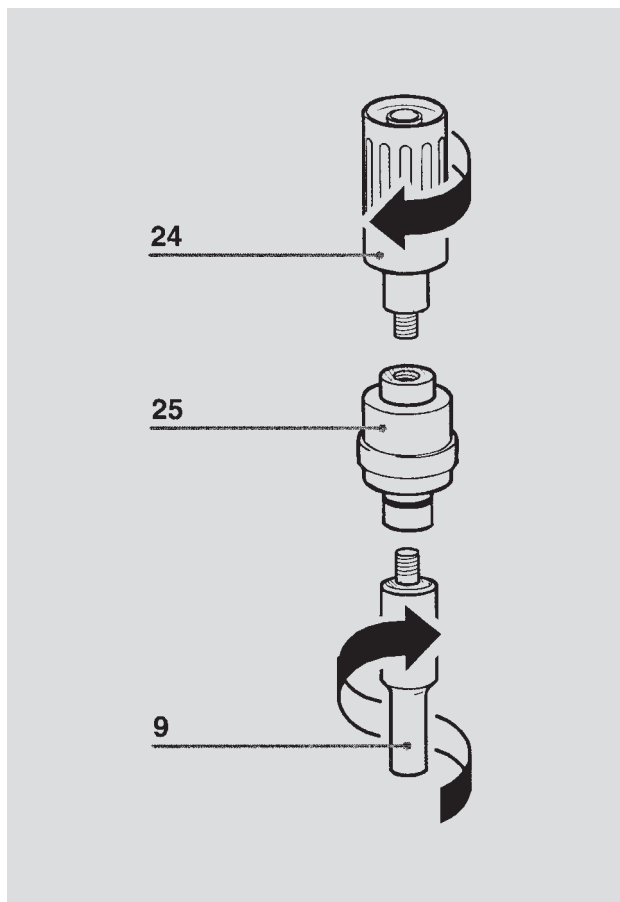
Screw connection

Converter (24), booster (25) and horn (9) are screwed to each other.

Tightening torque: 30 – 40 Nm

Black spots on the surfaces of the booster (25) and the horn (9) can be easily removed.

1. Lay a polishing rag on an flat surface
2. Draw the black spots over the polishing rag.



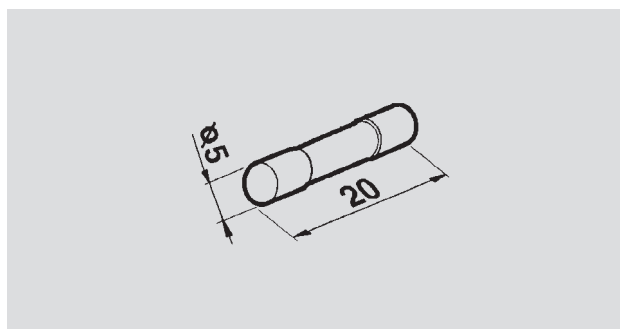
12.4 Fuses on the generator

All fuse dimensions: 5 x 20 mm.

List of the fuses for the generators

1000 W / 2000 W / 3000 W

Generator	F1	F2
ADG20-1000	10 A/T	10 A/T
ADG20-2000	12.5 A/T	12.5 A/T
ADG20-3000	16 A/T	16 A/T



13 Service addresses

The RINCO ULTRASONICS AG technical service agents are happy to answer any questions you may have concerning any technical malfunctions or welding problems which may occur. Our customer service agents need the following information for earnest advice:

- an exact description of the technical problem or the welding problem.
- article number and serial number of the unit

Our address:

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[illegible]



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