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Caution

**The machine has to be operated exclusively with a power supply line equipped with a protective grounding conductor, as a power supply without this safety element may cause severe machine damage. If the machine is operated through a power supply without a grounding conductor, this will void any and all warranty under which the product may be.**

---

## 1 Introduction

Dear Customer:

Thank you very much for purchasing our product. We are confident that it will meet your expectations.

The development, manufacture, and check of the butt-welding machine for beadless plastic pipe jointing has been guided by our concern to offer a unit characterized by superior operation safety and user-friendliness. The unit was manufactured and checked according to the most recent standards as they are applied, and bearing ergonomic aspects in mind.

To ensure maximum operation safety, please conform to the appropriate messages in this booklet and the regulations for the prevention of accidents. Carefully read the User's Manual to avoid damage to the machine or hardware in its environment as well as injury.

This manual is applicable to the following machines:  
**agru SP 110-B**

Thank you.

## 2 Safety Messages

This User's Manual contains important instructions for operating the beadless plastic welding machine agru SP 110-B safely. Every person who operates the machine will have to conform to the instructions of this manual.

The machine has been developed and checked with respect to welding AGRU materials. For welding other makes, no experiential data are available and/or no liability or warranty can be assumed for the fitness and the reliable operation of the machine.

### 2.1 The User's Manual

The User's Manual is presented according to sections which explain the different functions of the machine. All rights, in particular the right to copy or reproduce (in print or electronic form) and distribute as well as to translate, are reserved and subject to prior written authorization.

All figures of the welding system and its screens reproduced in this manual are for reference only. They may differ from the particular welding system and screens you use.

### 2.2 Explaining Icons

The following expressions and icons are used in this User's Manual to refer to safety-related issues:



This icon indicates that non-compliance may result in a hazardous situation that possibly causes bodily injury or material damage.



This icon indicates important messages related to the correct use of the machine. Non-compliance may cause problems of operation and damage to the machine.



This icon indicates tips and useful information for using the machine more efficiently and more economically.

Info

### 2.3 Safety Messages and Information on Remaining Risk

Protect the power supply cord from cutting edges. Have an authorized service shop replace damaged cables or lines immediately.

The machine has to be operated with a 230 V, 50/60 Hz power supply with safety fuse or breaker of 16 A maximum. If power is connected through a power line manifold, the power supply has to feature an earth-leakage circuit breaker.

The length of the power supply cord is 4 m (13 feet). The length of an extension cable will preferably not exceed 10 m (30 feet).



Caution

#### Parts Under Power

After opening the machine or removing the cover, parts of it are accessible that may be under power. The machine may be opened exclusively by an authorized service shop.



Caution

#### Pipe Facing Tool

Start the pipe facing tool only when it is in its working position. When facing pipes, do not wear jewellery; if needed, wear a hair snood or net. It is forbidden to remove shaving from the machine while the facing process is running. Make sure nobody is present in this danger zone.



Caution

#### Heating Element and Heating Element Assembly

When working with the machine, be extremely cautious while the heating element is operating. Since the element and the assembly of which it is a part present a very high temperature during the welding process, it must not be operated if unobserved, and sufficient distance to combustible materials in its surroundings has to be ensured. Do not touch the heating element or its assembly. **The affixed safety alerts have to be complied with strictly.**



Caution

#### Danger of Bruises and Injury

Do not remain in the danger zone while the machine opens or closes and be sure not to have your hands between the moving and the fixed parts of the machine. The forces that the machine develops are so high that it will be unable to detect and recognize parts of the body.



Caution

#### Acceptable Work Conditions

The work zone has to be clean and has to have proper lighting. It is dangerous to operate in a humid environment or close to flammable liquids. In regard of this, acceptable work conditions have to be ensured (e.g., sufficient distance between the machine and other functional areas of the workshop).



Important

#### Power Supply Only through Line with Protective Grounding Conductor

The machine has to be operated exclusively with a power supply line equipped with a protective grounding conductor, as a power supply without this safety element may cause severe machine damage. **If the machine is operated through a power supply without a grounding conductor, this will void any and all warranty under which the product may be.**



#### **Power Only to Operational Machine**

Power must never be applied to the machine before it is completely installed and ready for operation.

Important



#### **No Foreign Bodies in Work Area**

The machine must never be used if there are foreign bodies or objects in the work area; in particular, it must not be started if anything obstructs the smooth movement of any movable part or component of the machine.

Important



#### **User's Manual**

The User's Manual has to be available at any time on the site where the machine is used. If the User's Manual should come to be incomplete or illegible replace it without delay. Feel free to contact us for assistance.

### **2.4 User/Operator Obligations**

- The machine may be operated exclusively by persons who are familiar with the applicable rules, the guidelines for the prevention of accidents, and the User's Manual.
- The machine may be operated only when observed. Only persons who were properly trained by agru or another, authorized organization and whose training was acknowledged by an appropriate certificate are allowed to operate and observe the machine. Other persons must neither operate nor observe it.
- The operating/owning organization engages to check at reasonable intervals if the machine is operated by the users with the intended use and under proper guidelines of safe work.
- The machine must never be operated if not in proper state of repair. Before welding, the user is required to make sure that the state of the machine is in order.
- The user has to make sure that only one person is present in the zone where the machine is operating.

### **2.5 Worksite Description**

- The conditions have to fully ensure that the machine cannot slide.
- Worksite access limitations have to be provided. Appropriate equipment to achieve this can be requested from a service point or the selling entity.

### **2.6 Warranty**

Warranty claims may be raised only if the conditions for warranty given in the General Terms and Conditions of Sale and Shipment obtain. Furthermore, the provisions and instructions contained in the User's Manual have to have been respected.



The term of warranty under which the welding machine is shipped is 12 months:-

- from the date of purchase, if the machine is bought as a new machine;
- from the date of first use, if it is used independently of purchase (e.g. when lent) or not bought as a new machine.

### **2.7 Transport and Storage**

During transport, the machine must be at all times in the transport box it is shipped in.



During transport, the movable parts of the machine superstructure have to be secured with the transport lock at all times (see guidelines and figures below).

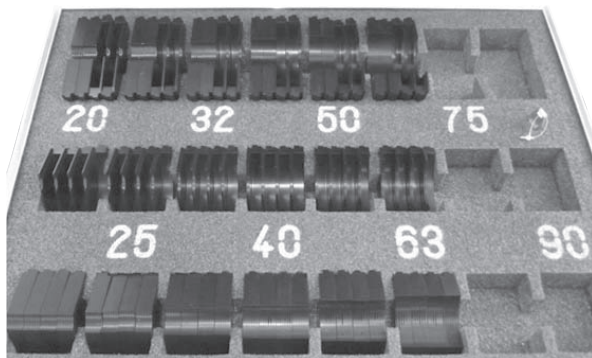
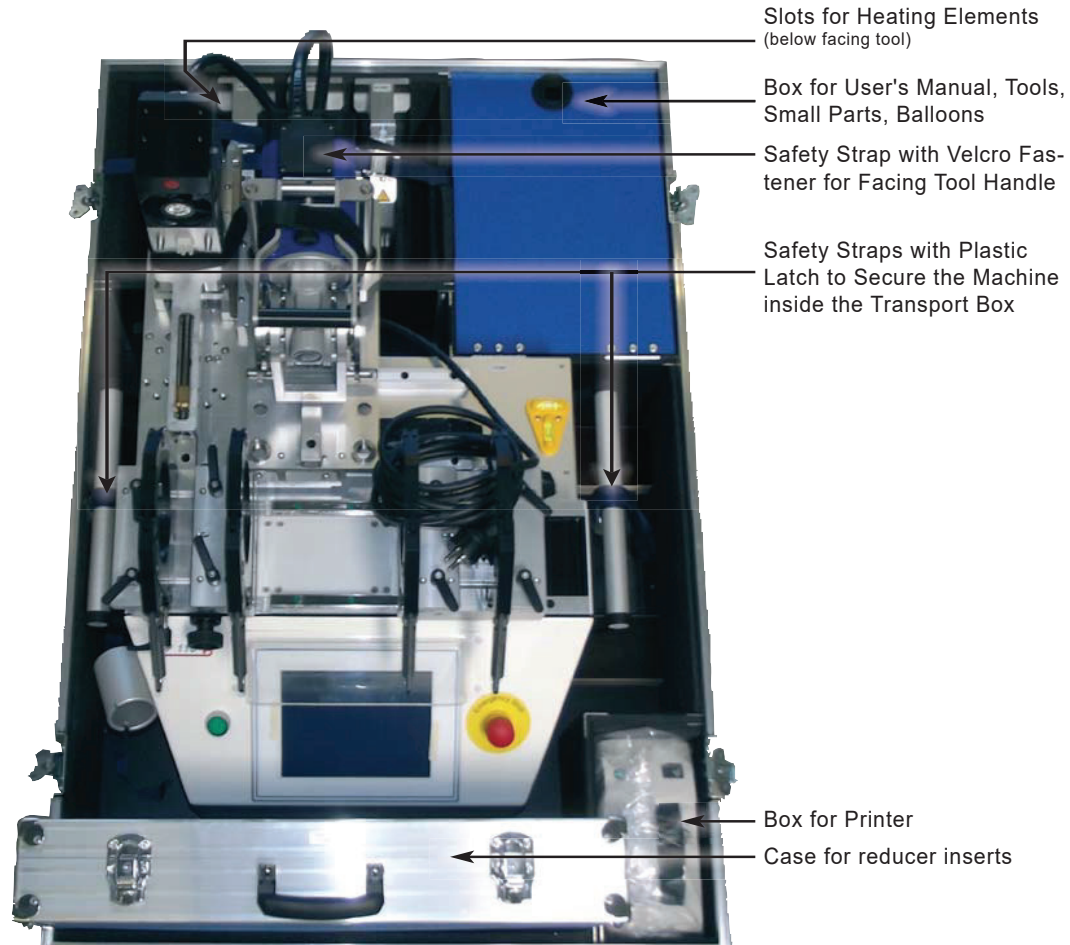
Important

The transport box should also be used to store the machine. The machine has to be stored in a dry location, be clean or has to be cleaned, and be locked against unwanted operation.



Caution

The weight of the machine exceeds 100 kg (220 lbs). Because of this heavy weight, transporting the machine or moving it on site requires appropriate hoisting tools.



Inside view of the case for the reducer inserts



Strap with buckle and Velcro fastener to secure the handle of the facing tool



Transport lock of facing tool/heating element console; to lock/unlock it, pull out lever and turn it by 180 degrees



Important

When the printer is moved or shipped, the roll of labels in the printer has to be removed.





Box for tools and small parts (left, with a lid when shipping) and slots for heating element secured with a strap with buckle



Strap with Velcro fastener to secure the base of the heating element support on the carriage



Always place heating elements into case for transport, never leave installed on machine's heating element support.  
Important

### 2.8 Identifying the Machine

Each machine is identified by a name plate. It shows the machine model ("Typ"), its year of manufacture ("Baujahr"), the serial number ("Geräte-Nr."), the rated power ("Netz"), and the manufacturer ("Lizenzhersteller").

<b>Wulstlos-Stumpfschweißmaschine</b>	
Typ	agru SP 110-B
Geräte-Nr.	11013901
Netz	230V 50/60Hz 2250W IP54
Gewicht	105kg Baujahr: 2013
Lizenzhersteller	
<b>HÜRNER Schweißtechnik GmbH</b>	
Nieder-Ohmener Str. 26	
D - 32325 Mücke	

## 3 Product Description and Principles of Operation

### 3.1 Intended Use

The agru SP 110-B Welding Machine is designed exclusively for welding plastic pipes and fittings using the inside and outside beadless butt-welding technique.

Only the welding parameters shown on the touchscreen display (pre-set by the manufacturer or defined by the user) can be selected for a welding operation. Technical data on the heating element that is used to match the size of the pipes, are recognized and saved automatically from a transponder in the heating element assembly. Any modification of the welding parameters contained in the software is strictly prohibited.

It is also part of the intended use to conform to the instructions provided in the User's Manual.



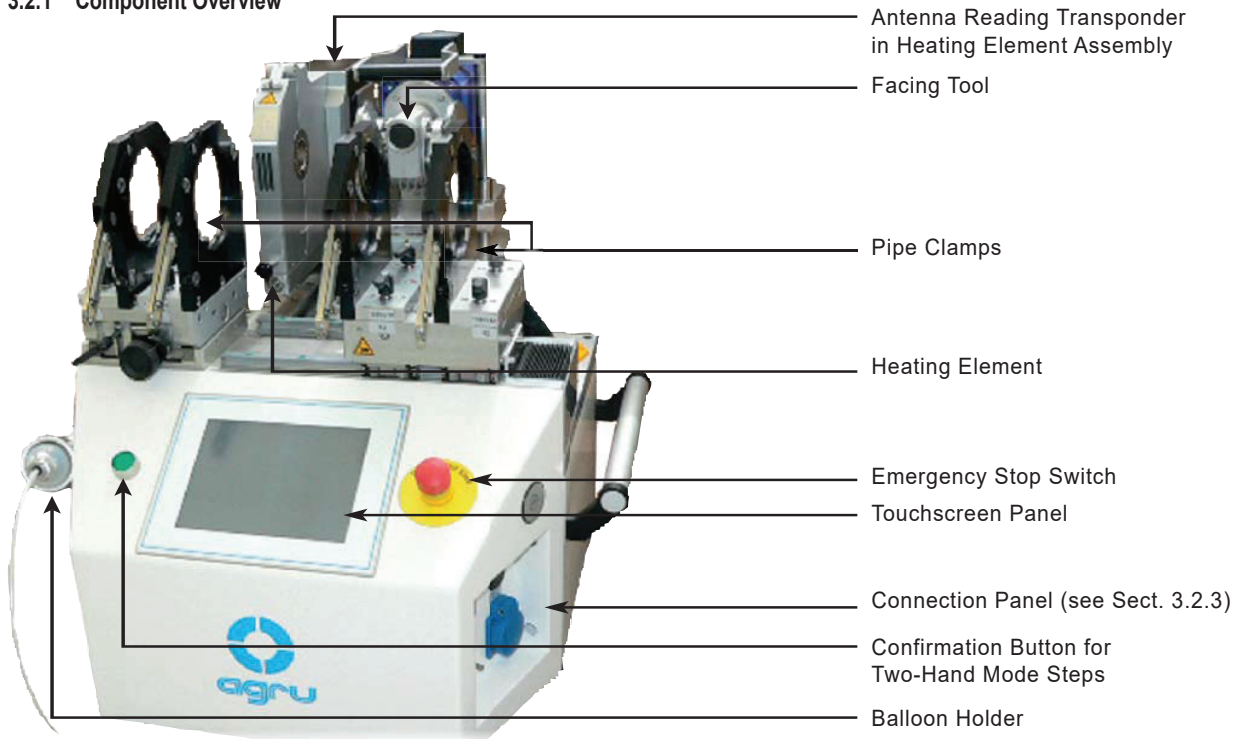
The manufacturer can in no circumstances be held liable for damage or consequential damage that occurs as a result of the non-compliance with the procedures described in the User's Manual, the modification of the manufacturer-programmed welding parameters, or non-intended use. Any such deviation or modification will void any and all warranties under which the product may be.  
Important

### 3.2 Machine Description

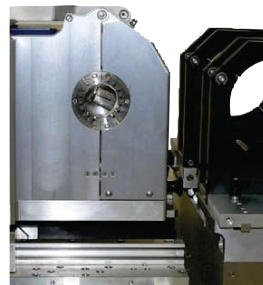
(see figures on next pages)

Typ	agru SP 110-B
<b>Exklusives Produkt der Fa.</b>	
<b>agru Kunststofftechnik GmbH</b>	
Ing.-Pesendorfer-Str. 31	
A - 4540 Bad Hall	
Tel. +43 7258 7900	
Fax +43 7258 3863	

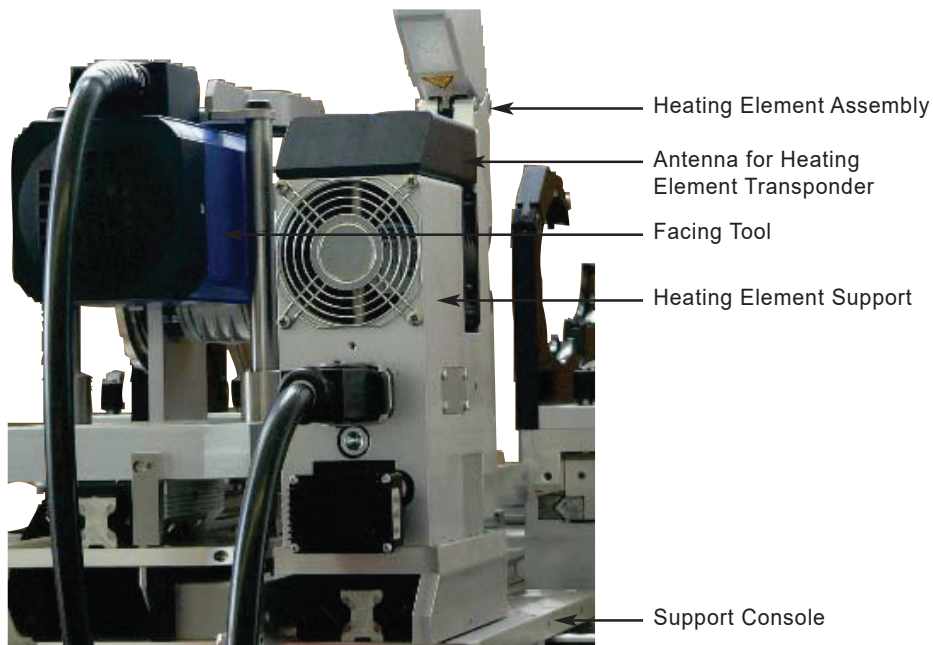
### 3.2.1 Component Overview



Heating Element Open, Tilted up

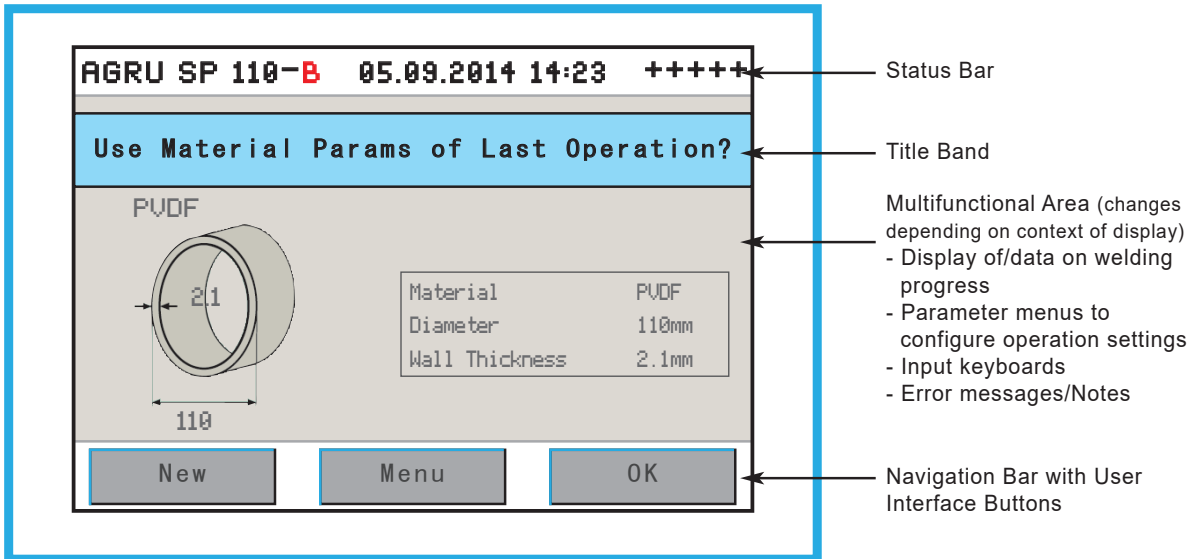


Heating Element Closed, Locked

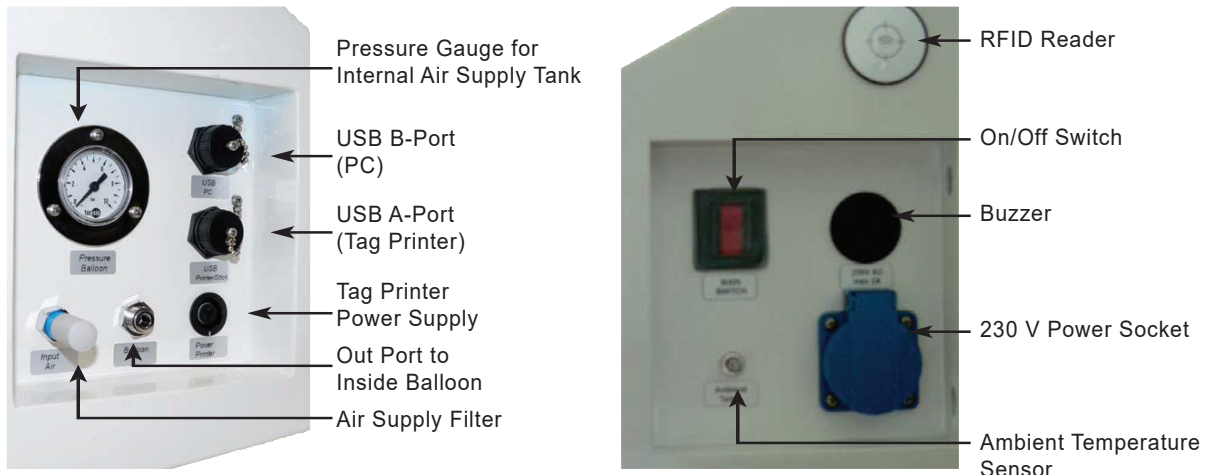




### 3.2.2 Touchscreen / Control Panel



### 3.2.3 Ports and Switches



The machine can be used as an in-shop installation and with anodized aluminum components, it is also suited for clean room applications. The machine enables users to enter the data that are relevant for the welding process and for the traceability of the welded joint. From the entered welding parameters, it calculates the applicable forces and temperatures and controls the welding process automatically.

All welding and traceability data are either read from the heating element transponder or entered directly on a touchscreen panel or read from a code card using RFID radio identification. The welding process is monitored in its entirety and saved to a welding report. All welding reports can be printed or transferred to a computer with a suitable pipeline management software (such as DataWork agru).

Using the menus on the touchscreen, the machine can be customized to the application at hand (see Sect. 4.3, Configuring the Machine).

### 3.2.4 Specifications

agru SP 110-B	
<b>Power Supply Characteristics</b>	
Voltage	230 V AC
Frequency	50/60 Hz
Total Rated Power	2.25 kW

Welding Operation Specs	
Welding Force	10 - 500 N
Speed of Facing Tool	approx. 45 rpm
Ambient Temperature (operation)	+10°C to +40°C (50°F to 104°F)
Ambient Temperature (storage)	-5°C to +50°C (23°F to 122°F)
Operating Range	20 - 63 mm (4/5" - 2-1/2"), optional to 110 mm (12-1/2")
Max. Compressor Pressure	8 bar
Dimensions and Weight	
Dimensions (W x D x H)	
Machine	660 x 800 x 660 mm (2' 3/4" x 2' 1/5" x 2' 3/4")
Transport Box	800 x 1200 x 790 mm (2' 1/5" x 3' 15/16" x 2' 11/16")
Weight	
Machine	105.0 kg (222 lbs)
Transport Box	50.8 kg (112 lbs)
Heating Elements	approx. 2.4 kg (5-1/4 lbs) each depending on size

### 3.3 Welding Process Overview

The welding process is performed as follows:

- If it is not installed yet, the needed heating element assembly is installed in the heating element support (see at the beginning of Sect. 4.1).
- The facing tool is inserted and adjusted centrally (so-called "Position 1"), then the pipes are clamped fast; depending on the form of the component to be welded, this may mean that the outer clamps have to be repositioned or that reducer inserts have to be installed. Repositioned clamps may require manual clamping of the components (machine will then hint at this requirement).
- The facing tool is moved to "Position 2" and pipe butts are worked to obtain abutment along a fully parallel plane.
- Component alignment is checked and confirmed on the touchscreen.
- If alignment is in order, the inside balloon is positioned in the pipes and the heating element is placed at the surfaces to be welded; when inserting it, the heating element has to be clean.
- When correct position of the balloon is confirmed on the screen, the the components close in automatically on each other at the predefined force.
- The heating element is closed around the jointing line, which starts the welding process proper by heating the heating element to the predefined temperature.
- When the heating phase is over, the welding temperature and force are kept until the defined welding time is over.
- The new joint then cools down at the predefined force.
- After the cooling time is over, the balloon is emptied and force is removed from the heating element automatically; the heating element can be opened and the balloon and the component, taken out.

## 4 Operation

Before putting the machine into operation, review the transport locks and safety auxiliaries as well as the way the machine is set into its transport box. Whenever the machine is moved or shipped, it has to be set into this box and all locks and auxiliaries have to be engaged. The photographs in Sect. 2.7 help with understanding the transport helpers.



When the printer is moved or shipped, the roll of labels in the printer has to be removed

Important

#### 4.1 Check-out, Turning on, Selecting the Display Language

When the machine ships, no heating element is installed. When it is first used and every time another heating element is needed, place the required one onto the heating element support and fasten it. Slide it to its working position in the open and tilted-up position. Fasten it by the screw that is accessible at the back and sits in the provided through hole in the heating element support. To tighten this screw, use only the supplied Allen wrench. In doing so, be sure not to overtighten it. It is sufficiently tight when the back of the heating element is fully flush with the front surface of the heating element support. No gap should be visible.

When removing the heating element from its support, perform these steps in reverse order and slide it off its support in the open and tilted-up position.



Changing the heating element should be performed exclusively while the standard screen (see Display 5) is showing. Failure to do so may result in loss of saved welding data.

Place the machine on a level surface and ensure it cannot slide. Sufficient distance has to be kept to other areas in the workshop, especially to those in which combustible materials are used, in order for the heating element temperature of generally up to 270°C (520°F), even higher for some component materials, not to be hazardous. When starting the machine up, remove all transport locks (see Sect. 2.7) before applying power to the machine if it was transported before start-up and the locks were engaged.

Depending on the piece that is going to be welded, the outer clamps may have to be repositioned or removed. To do so, loosen the locking bolts and either remove the clamp or re-adjust it and secure it by tightening the locking bolts again.

If the diameter of the pieces to be welded is smaller than the clamp, insert the reducer inserts. Magnets will hold them in the clamps.



The wider reducer inserts should be placed into the two clamps in the middle. It is recommended not to deviate from this general rule unless a particular situation requires so.



Important

Pipe clamps, reducer inserts, and the heating element have to be clean or must be cleaned before welding starts. To insert or remove them, in order to avoid damage, do not use heavy tools (hammer, wrench), but only the supplied tools, e. g., the Allen wrench.



Important

The surfaces of the heating element have to be free of grease and clean, or they have to be cleaned, preferably with isopropyl alcohol.



Important

Make sure all connectors are tight in their sockets and make sure that the machine is operated only if the conditions for safe and intended use are met (see also section 2).



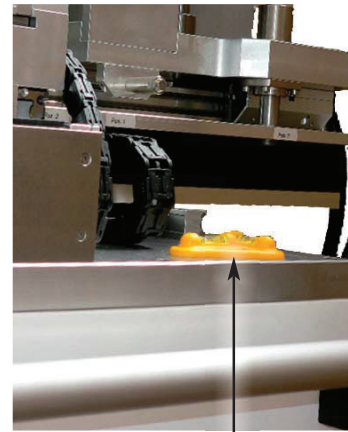
Important

If the label tag printer is going to be used with the machine, it, too, has to be fully connected **and switched on** before the machine is turned on. Failure to do so may result in loss of data and damage to the machine.

After preparing the machine for welding and connecting the power supply cord to the mains supply, the machine is turned on using the On/Off



Screw for Locking the Heating Element

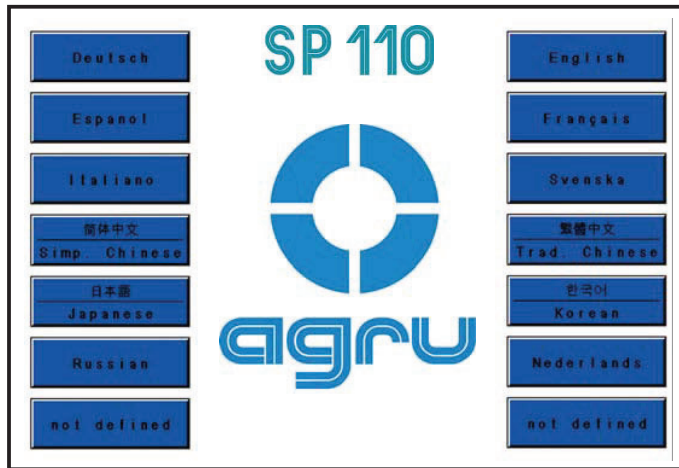


Dual level to Balance the Machine

switch. The welcome screen reproduced in Display 1 appears on the touchscreen panel. Touch a button to select the display language used by the machine.

After the language was selected, the machine takes the user to the welder code entry screen. Without a valid welder identification code, it is impossible to start welding processes on the machine, since the machine is unblocked for operation only after a valid welder identification code was entered.

If the machine finds that something is wrong or that the last joint was not properly welded (power supply failure, emergency stop, clock failure, etc.; see Sect. 4.7), an error message is displayed instead of the welder code input screen. Then, the error has first to be cleared.



Display 1

Read the welder identification code by holding a transponder card in front of the RFID reader. Alternatively typing it on the touchscreen and saving it to memory by touching the “Ok” button is also possible.

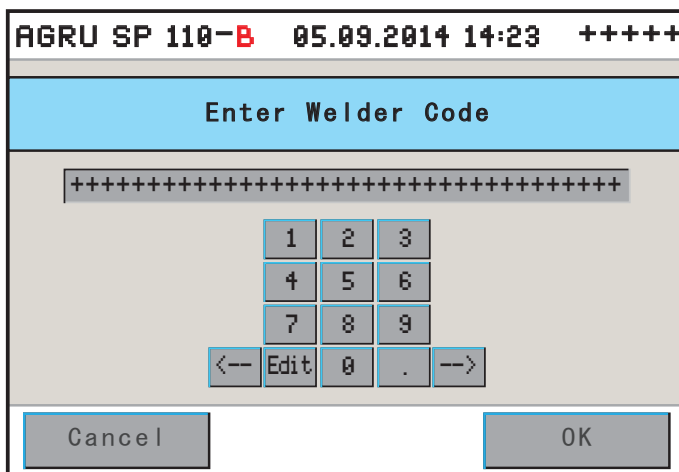


All inputs for which a data card is available can be entered by having the RFID reader read that card.



Important

Entering data on the touchscreen must always be performed with the bare finger. Using objects (ballpoint pens, screwdrivers, etc.) may cause unrecoverable damage to the surface of the touchscreen.



Display 2

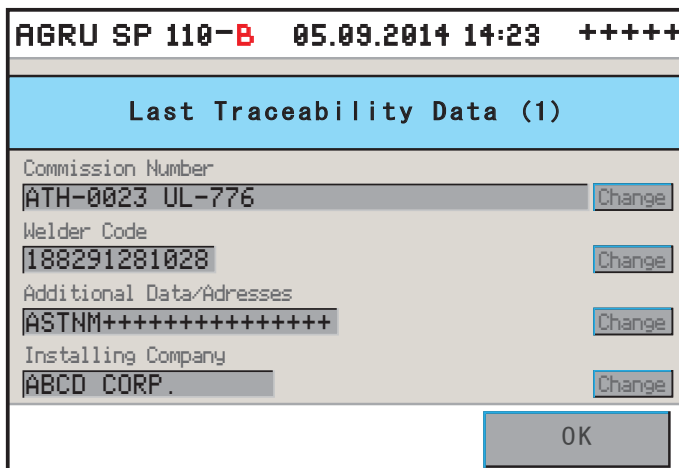
#### 4.2 Entering Traceability Data for the Joint

After the welder identification code was entered, the traceability data for the joint have to be entered. The machine displays the traceability data for the last joint that was welded (see Display 3), which can be re-used for the next welding operation by simply touching the “Ok” button.

If traceability data are not the same as for the last joint, change the data that are different by touching the appropriate “Change” button. Depending on the kind of data you want to change, the machine displays either a numeric keypad (see Display 2) or an alphanumeric keyboard (see Display 4). To confirm and save your data input to memory, touch the “Ok” button.



Depending on the software version installed in your machine, some screens may differ slightly on your machine from the reproductions in this manual.



Display 3

When the traceability data were entered, the machine displays the first input screen of the welding process proper (see Display 5). In this

continued on page 18



**Presentation of Machine and Component Cleaning at the Beginning of the Welding Process**

These figures describe the the steps of preparatory cleaning before two components can be joined. A quality joint can be guaranteed only if the machine and the pipes or fittings are carefully cleaned before the welding operation.



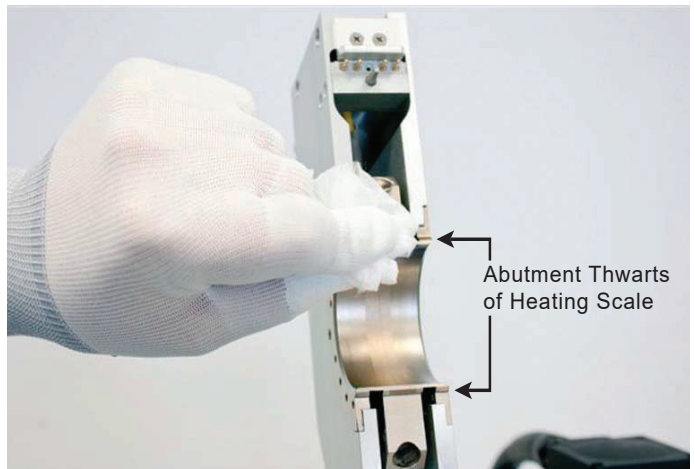
**1** Wet a **fibre-/lintless** towel with isopropylic alcohol (ethanol content 70 - 80 %).



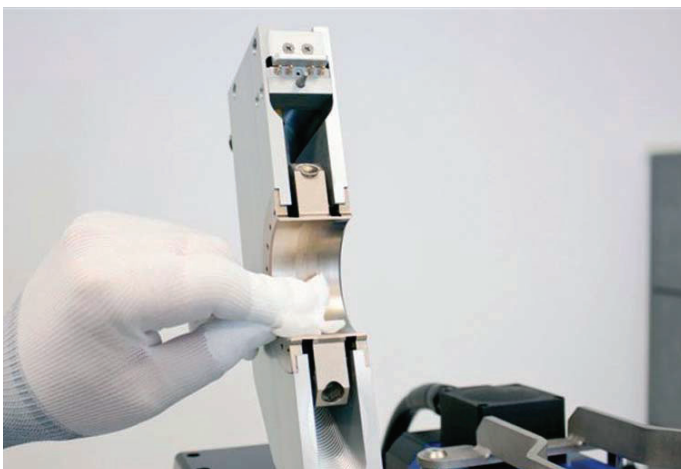
**2** Carefully clean the heating scales and ...



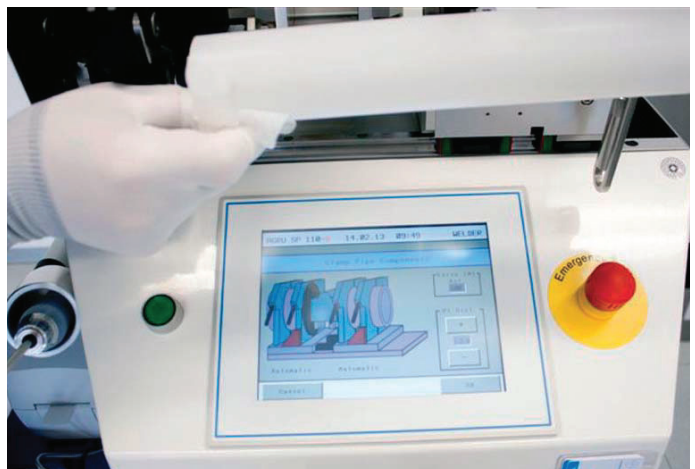
**3** ... abutment thwarts of the heating element ...



**4** ... to remove any residues, the ...



**5** ... wait for them to dry.



**6** Prior to facing, move facing tool to pos. 1 and ...





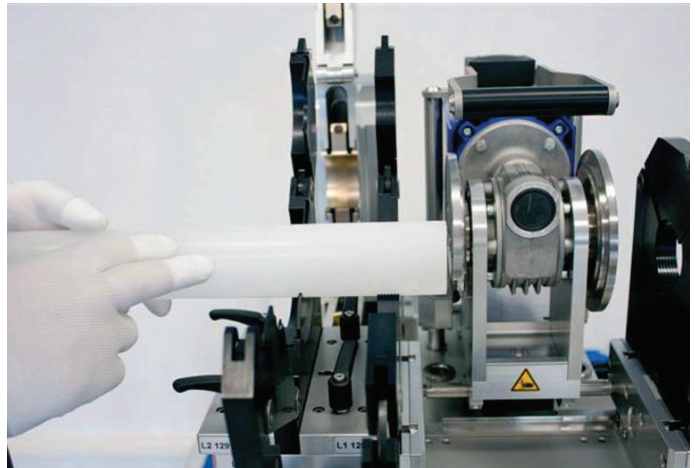
**7** ... close in movable carriage of machine (see figures 2 - 8 ...



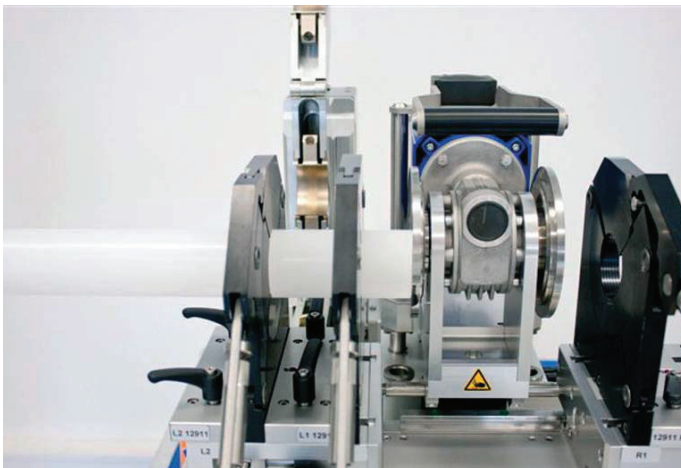
**8** ... depicting the welding process); then clean butts of pipe ...



**9** ... to be plasticized extensively, inside and outside, ...



**10** ... wait for them to dry, and clamp them into ...



**11** ... the previously cleaned clamps.



**12** Support the far end of the pipe as needed.



**13** After facing and component alignment check, insert the inside balloon (see figures no. 26 - 30 depicting ...



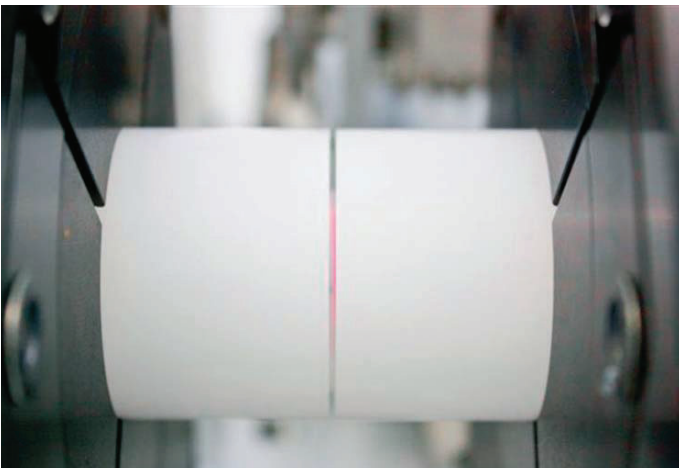
**14** ... the welding process) after cleaning both the balloon and ...



**15** ... the air supply tubing carefully. For long components to be jointed, in particular, first pushing the tubing through the ...



**16** ... component to the joint and then connecting the balloon is recommended.



**17** Inside balloon aligned by the midline on it between the components to be jointed, ready for welding

continued from page 14

display, it is possible to start the welding process and to customize the configuration of the machine.

The welder will enter all settings and perform all control actions on the touchscreen panel.

### 4.3 Configuring the Machine

In the first input screen of the welding process proper (Display 5), the key parameters of the last welding are shown (material, diameter, and wall thickness of the welded pipe). Furthermore, the status bar at the top of the screen shows the date, time of day, and also either the current ambient temperature or the power supply voltage or the welder's name or code.

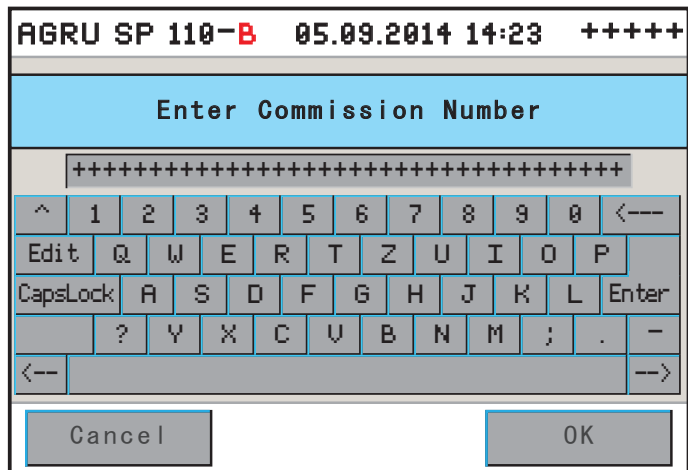
In the event that no heating element was installed, an error message to this effect is displayed by the machine (see Display 6) instead of the welding parameter overview.

In Display 5, the welder has the possibility to:

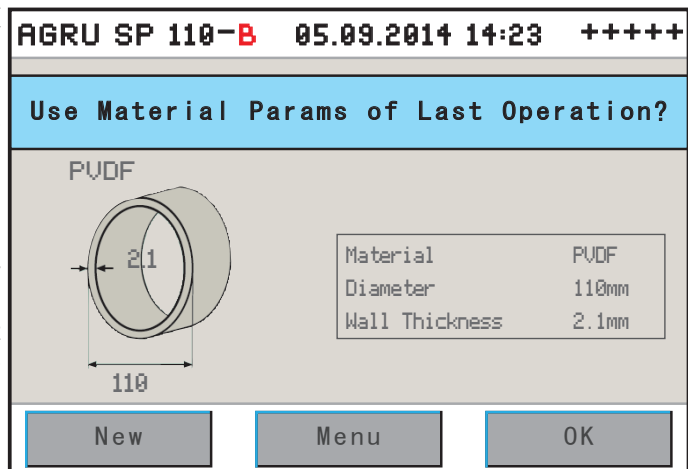
- immediately start a welding process that will be performed with the same welding parameters as the previous welding (touch the "Ok" button and move on to section 4.6);
- enter new pipe-related data for the next welding (touch the "New" button and move on to section 4.4);
- change the machine settings in the configuration menu (touch the "Menu" button);
- to read a new welder ID code using the RFID reader; or
- display the date for the next scheduled maintenance on the screen by touching "New" button for some time.



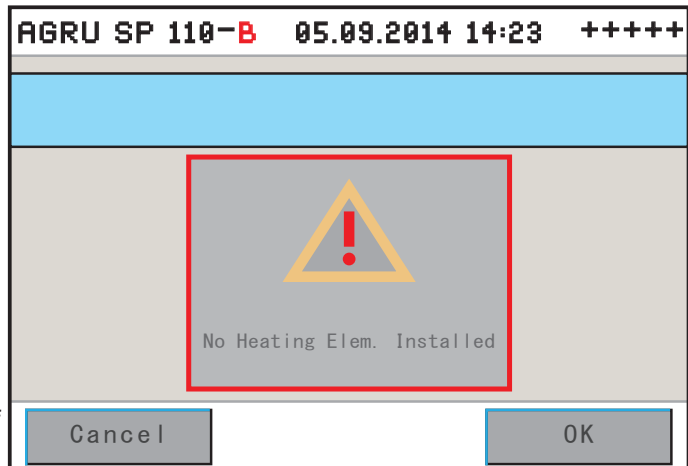
The green confirmation pushbutton on the front allows locking the machine functions at any time when it is held down for a minimum of 3 seconds. When it is locked, the machine can be unlocked by entering the welder code.



Display 4



Display 5



Display 6

The first three pages of the configuration menu are immediately accessible, the other ones will be displayed only after an access code for the machine, the so-called selection code, was entered (see Display 7). The menu has the items listed in the following table. To toggle between various possible settings, or to open a sub-menu for a given menu item, touch the appropriate button.



Some of the buttons next to menu option change their color when they were pressed and are then displayed as though the



button is held down. In this case the “held down” button mean that this menu option is the selected option.

To browse to the respective next page of the configuration menu, touch the “Next” button of the page you are viewing.

Designation	Setting	Description / Data to be entered
Number of Tags	Menu	In a sub-menu, the number of tags to be printed with respect to a welded joint can be selected.
Show Reports	Menu	In a sub-menu, it is possible to select a job number in order to display the welding reports of this commission. In report display mode, it is also possible to print a label tag for this welding once again (see section 5.2).
Unit of Length (mm / inch)	Menu	In a sub-menu, the unit of length used for displaying and saving welding data can be selected.
Temperature Unit (°C / °F)	Menu	In a sub-menu, the temperature unit used for displaying and saving welding data can be selected.
—— New Page in Menu ———		
Audible Signal	On / Off	By touching this button, the signal sound that the machine emits to validate the execution of a given step in the process can be enabled or disabled. Whatever this setting, the sound will be heard to indicate the imminence of the change-over phase.
Select Language	Menu	In a sub-menu, the language in which display texts and reports are edited can be selected.
—— New Page in Menu ———		
Clean Heating Element	Menu	In a sub-menu, the heating scale cleaning process can be launched and managed (see Sect. 7).
Info	Menu	In a sub-menu, data on the product and the number of the support hotline can be viewed.
—— New Page in Menu ———		
Memory Control	ON / OFF	if ON: Machine stops when the memory is full; if OFF: Machine overwrites the oldest report when the memory is full.
Machine Parameters	Menu	In a sub-menu, the machine number can be entered and the temperature of the heating element and the welding force can be zeroed/calibrated. <i>Access to this sub-menu requires an additional access code that is available from the manufacturer/distributor.</i>
Date/Time	Menu	In a sub-menu, date and time can be set.
Delete Reports	Menu	In a sub-menu, it is possible to delete <b>all</b> welding reports currently in memory. <i>To access this sub-menu, the so-called selection code is required (see at the beginning of this sub-section); the reports will be deleted only after another safety warning was confirmed.</i>
—— New Page in Menu ———		
Additional Materials	Menu	In a sub-menu, the key data for welding can be defined for pipe materials that are not available yet.
Force Control	On / Off	When force control is enabled, as soon as the machine reaches the nominal welding force, it keeps it at this level through to the beginning of the cooling stage.
Constant Force Control	On / Off	When constant force control is enabled, the machine keeps the nominal force value, after reaching it, constantly throughout the entire process, including the cooling phase.
Two Hand Operation <i>(for future use, not enabled at present)</i>	ON / OFF	if ON: Steps of the process where machine parts move have to be carried out by pressing two controls for the full step duration; if OFF: Steps involving moving parts can be carried on with one control only, but have still to be started using two controls.



The menu options “Force Control” and “Constant Force Control” have no function if default materials, in memory at delivery, are

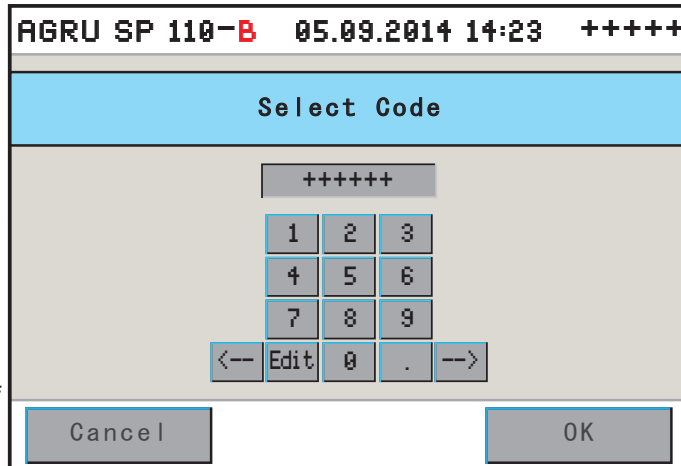
joined. Their being enabled is relevant for welding processes with user-defined additional materials (see Sect. 4.5).

#### 4.4 Changing Technical Parameters of the Welding

In the welding-individual start screen (see Display 5), it is possible to change the weld-specific key data for the joint to be welded. To do so, touch the “New” button. The screen that allows selecting the material of the pipes that are going to be welded, is then displayed on the touchscreen panel (see Display 8). To select a material, touch the appropriate button on the screen.

Default Materials are those pipe materials that are defined by default when the machine is shipped. Additional Materials, if any, are those pipe materials that were defined by the user in the definition screens accessible from the appropriate configuration menu option (see section 4.5). The maximum number of additional materials is three.

When the appropriate button was touched to select a pipe material, the screen changes to allowing adding further parameters to it and the diameter of the components, which is recognized automatically from the installed heating element. Browsing through the selectable parameters is possible using the cursor/arrow buttons on the screen.

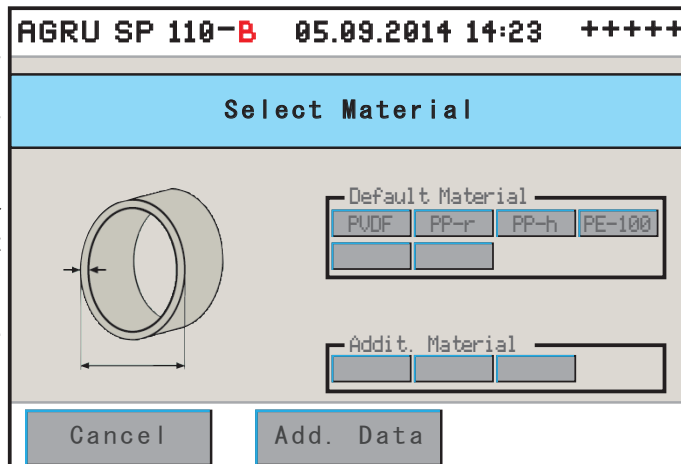


Display 7



Info

When defining additional materials, it is under the user’s responsibility to choose names for those materials that are “speaking” when they appear on the additional material buttons of the material selection screen. With several similar or identical names, only the next screen, for assigning further welding parameters to that operation, may reveal that the wrong additional material button was pressed. Then, the material selection has to be canceled and repeated.



Display 8

Note that the parameter assignment screen will always appear — as a welding parameter overview —, even if there is only one selectable parameter defined for a given material/diameter combination. Moreover, when you select an additional material, this has to be confirmed by entering the so-called selection code (see sub-section 4.3). Default materials can be welded without entering this code.



Important

The machine must never be used to weld pipe materials, diameters, and thicknesses other than those available in the welding parameter screens. The manufacturer is in no circumstances liable for damage or consequential damage that occurs as a result of deviations from these pipe data or of modifications or attempted modifications to the control software. Furthermore, this will cancel any claims to warranty expressed for the machine. To make a material available in this screen, it has to be entered previously with all its technical welding parameters in the configuration menu.



The following messages may occur in relation to the material selection:

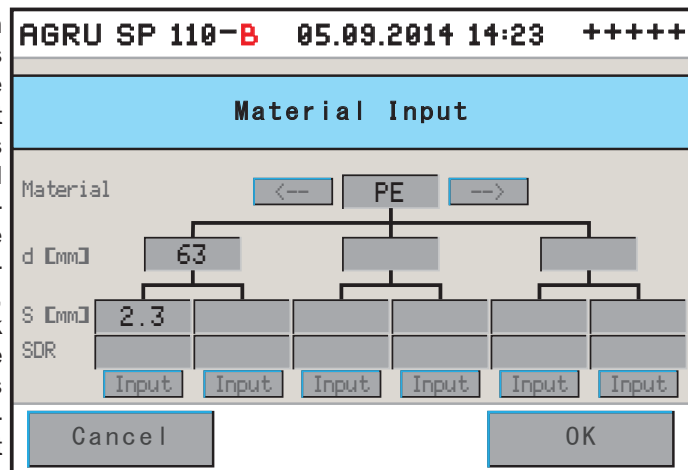
- Failure to retrieve data means that no additional material definition was found.
- Failure to retrieve a function means that there are applicable data, but they are not valid in the circumstances.

In all screens that allow changing the key data for the welding operation, by touching the “Additional Data” button, it is possible to access the additional traceability data and change them as needed.

#### 4.5 Definition of Welding Parameters for Additional Materials

The configuration menu (see section 4.3) has an option “Additional Materials,” which allows defining the key data the machine should use when welding pipes of a material that is not currently available in the machine.

If no additional, operator-defined pipe material has been saved to system memory, the unit displays an input screen that allows entering the name of the material for which the parameters for welding it shall be defined. Enter the name on the touchscreen keyboard (see Display 4) and confirm it by touching the “Ok” button. The machine moves on to the next input screen, in which a pipe diameter for this material has to be entered on the numeric keypad (see Display 2). After having confirmed this input by “Ok” once more, another screen allows entering the wall thickness for this material and size. After the wall thickness, the pressure level per SDR has to be entered in the next screen. After this, define the key welding parameters for the material just entered, e.g. 50 mm PE pipe with a wall 2.3 mm thick (SDR 22). To define them, the unit guides the operator through a series of input screens in which the following can be entered: balloon pressure, joining force, heating element temperature, maximum heating time, joining time, maximum cooling time, facing force, fan speed, maximum cooled temperature. Confirm every entered value by touching “Ok.”



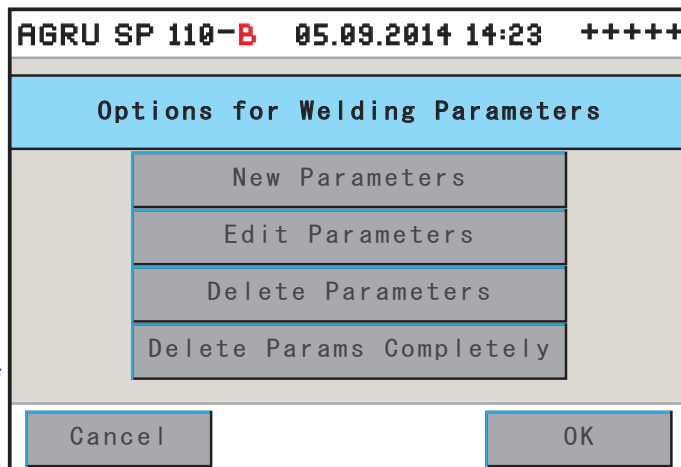
Display 9

If parameters for welding additional, user-defined materials have already been entered and saved previously, the unit shows a screen that resembles Display 9. Use the arrow keys in the upper area of the screen to switch back and forth between the various additional pipe materials currently in memory. For every pipe material, up to three pipe diameters can be defined, and for each diameter, up to two wall thicknesses or SDR values. By touching one of the “Input” buttons on this screen, the key parameters for welding this material can be edited. Touching the leftmost “Input” button in Display 9 will allow entering, changing, or deleting the welding parameters for 63 mm PE pipe with a 2.3 mm wall. Using the second “Input” button from the left, the welding parameters for 63 mm PE pipe with another wall thickness can be entered, and all other “Input” buttons allow entering the parameters for PE pipe with other diameters.

As soon as one of the “Input” buttons was touched, Display 9 shows. From this screen, it is possible to edit in various ways the specific data “branch” of which the “Input” button was used to access Display 9. The button “New Parameters” allows entering from scratch all welding parameters for the branch in the data “tree” of which the “Input” button was touched. Data input proceeds as described at the beginning of section 4.5:

from the name of the pipe material and the size of the pipe through to fan speed during welding and the cooled temperature.

Touch the “Edit Parameters” button to change the value of a single welding parameter in the appropriate data “branch”. Touching this button will let you access a screen in which the parameter you want to change can be selected from all the welding parameters that need to be defined. From that screen, an input screen is accessed in which the value can be changed; then confirm the change by touching the “Ok” button.



The “Delete Parameters” button can be used to delete the “branch” of the data “tree,” of which the “Input” button was used to access Display 10. Deleting has to be confirmed in another safety message, and then the key data for welding the material, from joining force to heating element temperature, are deleted along with the appropriate wall thickness or SDR. If this wall thickness or SDR is the only one left for the pipe diameter in question, then the diameter is deleted from the data “tree” too. And if the thus deleted diameter is the only one left for this pipe material, the entire “tree,” including the material itself, is deleted.

Display 10

By touching the “Delete Parameters Completely” button, it is possible to delete the parameter of **all** additional, user-defined pipe materials. Here too, deleting is possible only after confirming it in a safety message. After deleting them, only the default materials with which the machine is shipped, remain.



If the material that was used in the last welding operation is deleted, then the next welding operation of necessity requires a new material to be selected for welding.

#### 4.6 Welding Process



Important

If a code error message or a screen asking to enter an access code appears after the heating element was installed on its support, the transponder in the heating was not properly read. In this case welding is impossible. Call customer service.

Prior to welding, make sure that the heating element has been correctly set onto the heating element support (see Sect. 4.1).

##### 4.6.1 Facing the Pipe Butts

In the input screen reproduced in Display 5, when the “Ok” button was touched, the welding process proper starts by the insertion of the pipe facing tool. The machine alerts the welder to this next step.

The facing process is performed either with “automatic clamping” or with “manual clamping.” The components to be jointed are said to be **automatically clamped** when they are clamped at the beginning of the facing process, remain fast in the clamps through to the end of welding and are moved only automatically sitting in the clamps on the carriage.

Using **manual clamping**, the operator can reposition one or both inner clamps closer to the midline in order to be able to properly face components that project less far beyond the edge of the inner clamp (see the photograph). After a facing process with manual clamping, the machine does not continue automatically into the welding process after compo-

ment alignment check. Rather, it requests that the operator moves the clamps back to their standard position for welding and re-clamps the components manually.



Normal position of the component clamps in automatic clamping mode and during the welding process: flush with the inside edge of the support consoles. In manual clamping they can be repositioned closer to the midline between the carriages.



Be sure that the clamps are set on the correct support console, “L” for the left-hand carriage, and “R” for the right-hand carriage.

Important

The machine switches to manual clamping mode automatically when one or both clamps are moved closer to the midline. Proximity switches under the clamps detect their effective positions.

Facing requires three steps:

- Zeroing the facing tool position before clamping the pipes
- Cleaning the pipes before clamping them
- Securing the pipes in the clamps and determining the facing road
- Facing the butts

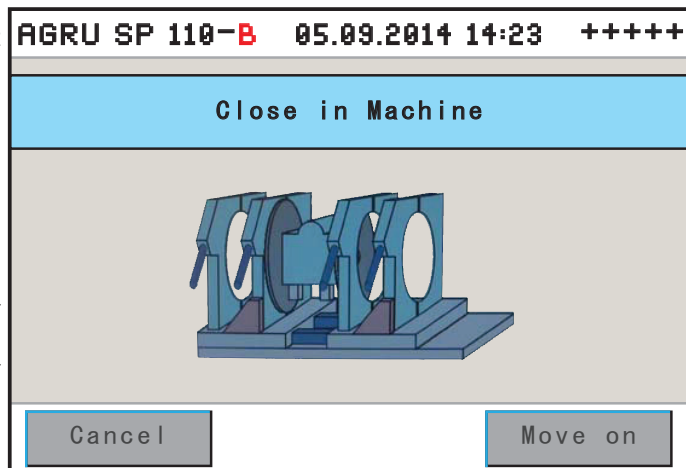
First, the machine asks the operator to put the facing tool into Position 1. This is the position for zeroing the facing tool in relation to the movable carriage. Slide the facing tool in-between the carriages of the machine so as to place the position handle into the rest that is labeled “Pos. 1” at the facing tool support.



While the machine automatically performs a zeroing calibration of the carriage position when it is switched on (including when power is re-applied after it was switched off using the emergency off button), it is critical to zero the facing tool prior to the facing operation proper, failing what it is not possible to ensure a joint of appropriate quality.

Important

When the facing tool handle is located at Position 1, the machine asks the operator to close in the carriage (see Display 12). This is done by touching the “Move on” button and simultaneously holding down the green confirmation push button on the machine front. Then follow the steps the machine indicates on the screen: determine the facing road, clamp in the pipes, and move the facing tool to Position 2, the facing position. Remember that every action that makes the carriage close in or pull away has to be confirmed or confirmed and carried through in two-hand mode: with the appropriate button on the touchscreen panel and the confirmation push button on the machine front.



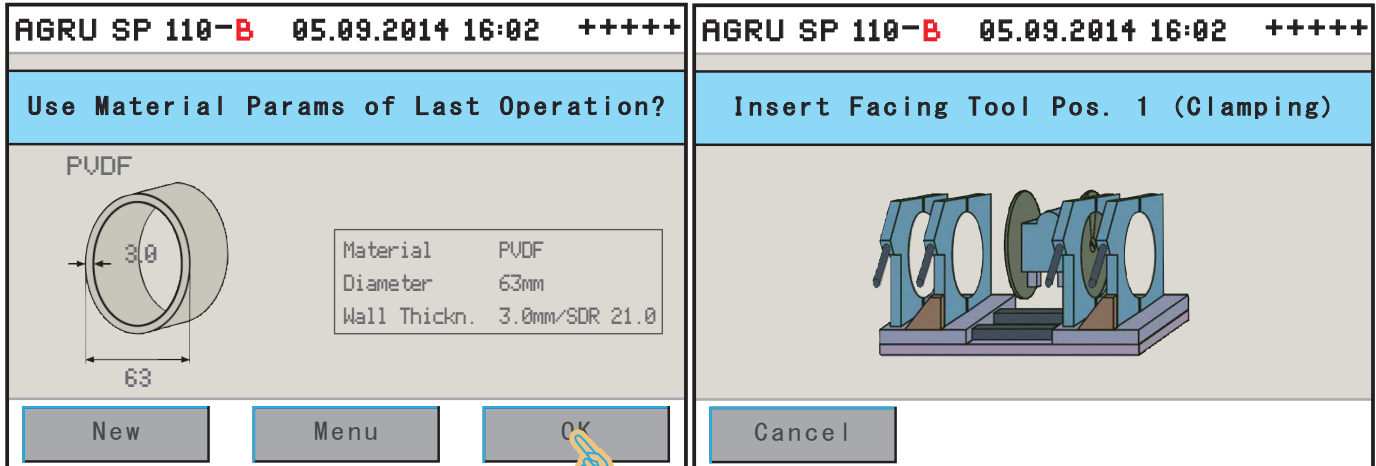
Display 12

Before starting the facing process proper, you can determine the facing road, i.e. the distance that the carriage must travel during facing. To

*continued on page 31*

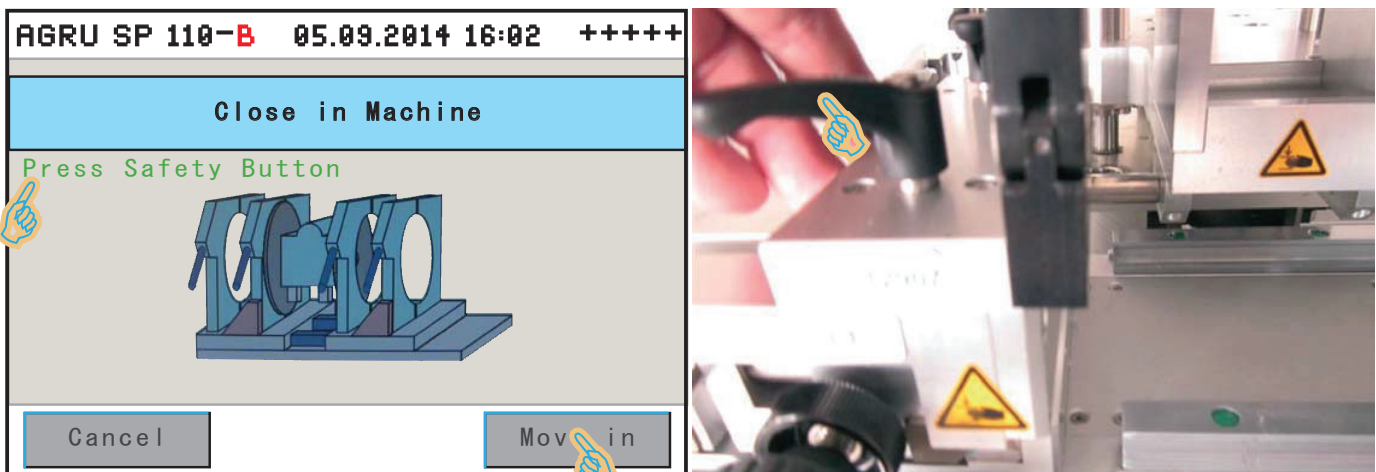
### Presentation of a Complete Welding Process, a PVDF Tee as an Example

When two pipes are joined, all steps below that are specific for the manual clamping of a “short” component, such as a tee or an elbow, are not required. The hand icon is meant to indicate what has to be touched on the screen or used/moved on the machine or component.



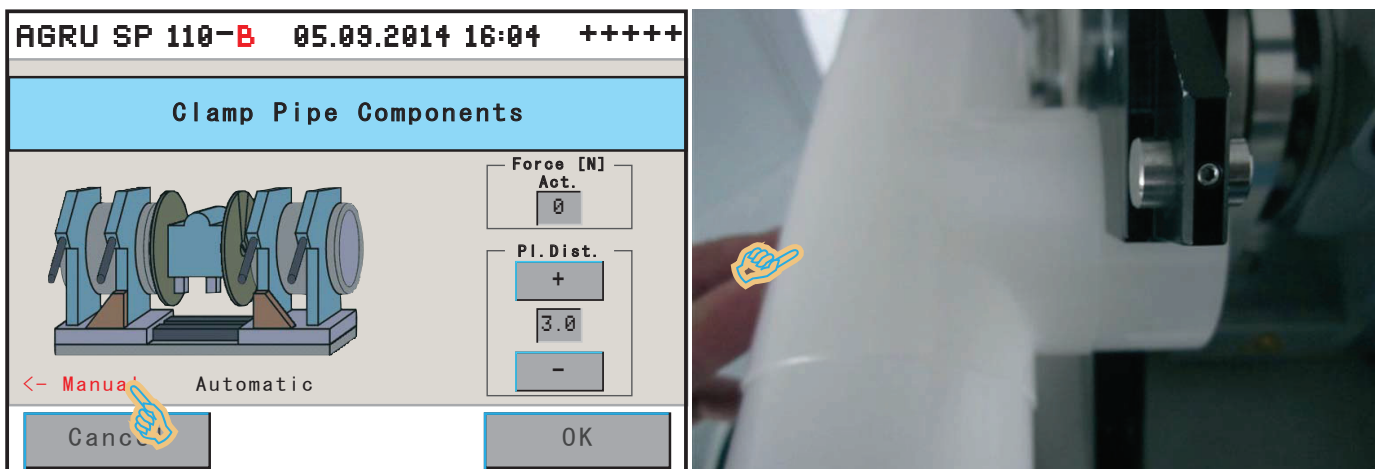
1 Start the welding process.

2 Insert the facing tool for component clamping.



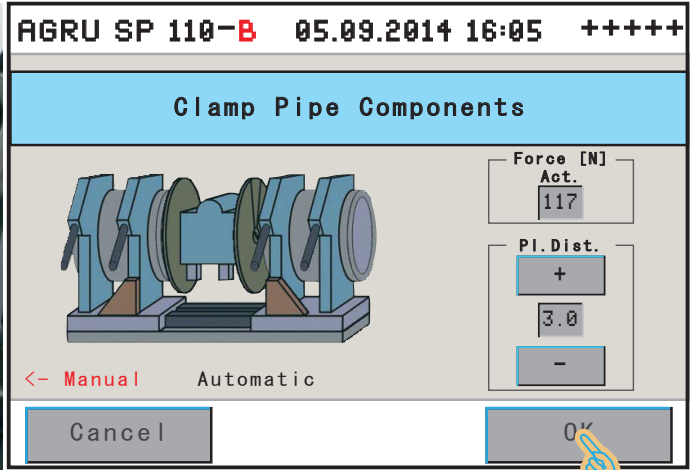
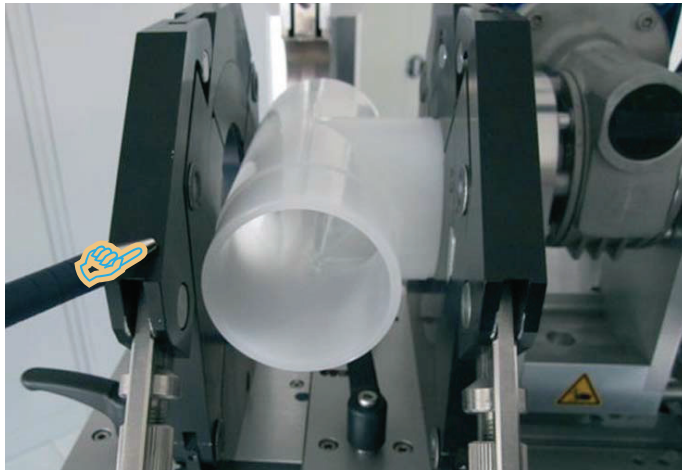
3 Close in the movable carriage to position the facing tool.

4 Reposition the clamps as needed for manual clamping.



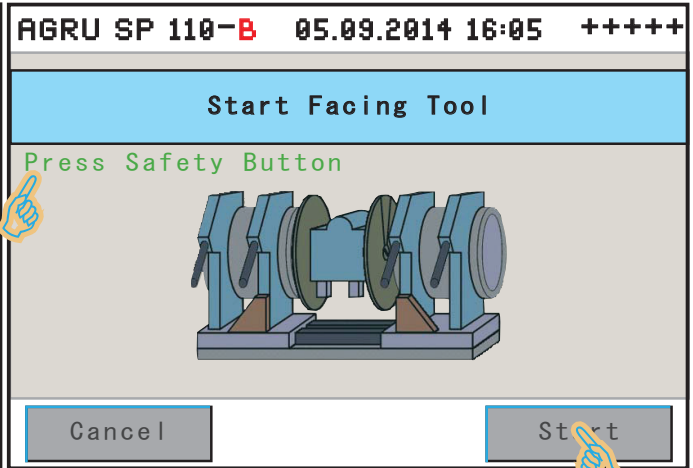
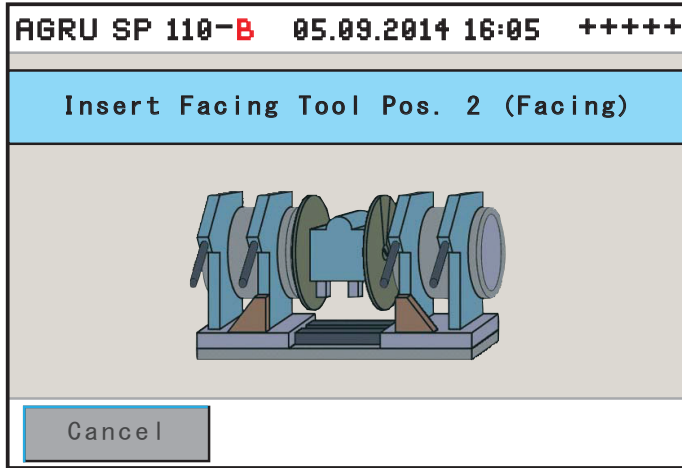
5 Select manual clamping prior to facing.

6 Clamp the “short” component, here a tee.



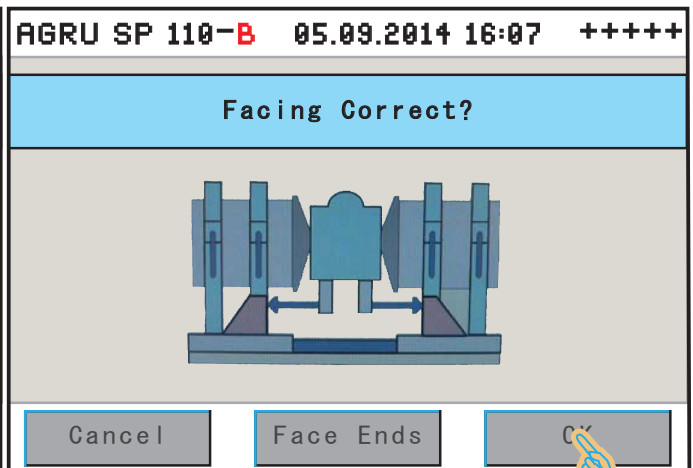
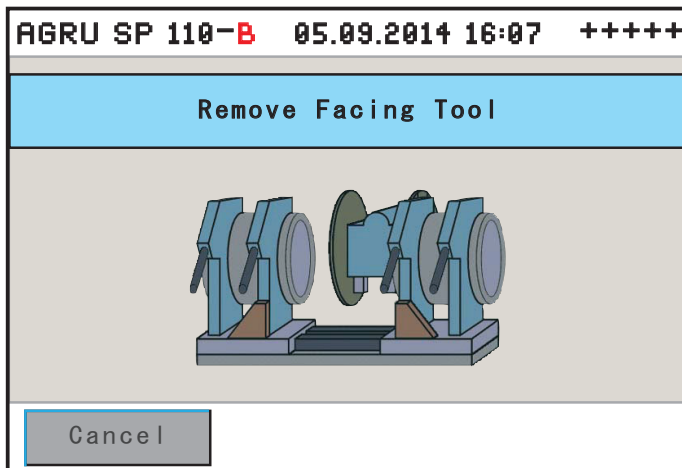
**7** Adjust the outer clamp so it supports the “short” component.

**8** Start the clamping of the component prior to facing.



**9** Insert the facing tool for facing.

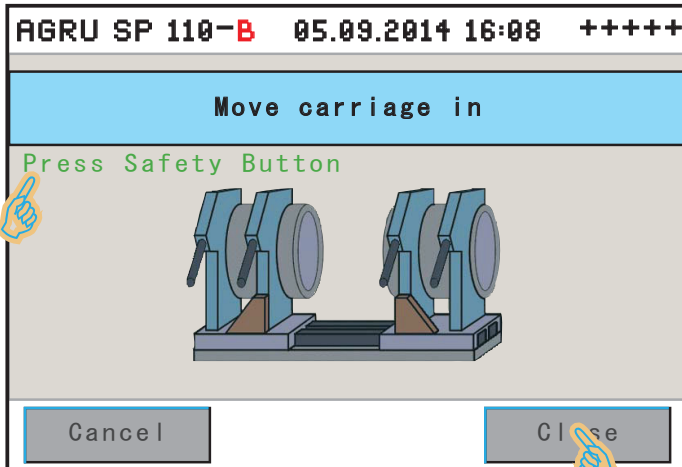
**10** Start the facing process.



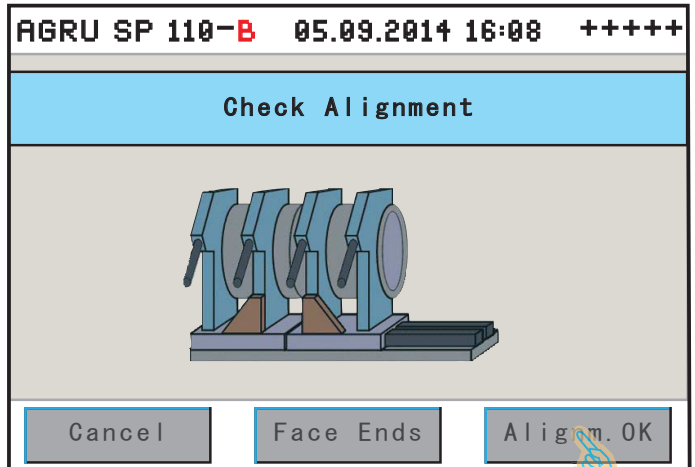
**11** Remove the facing tool from in-between after facing.

**12** Assess the facing outcome. (Touch “Face Ends” and start over at no. 2 above if the outcome is not o.k.)





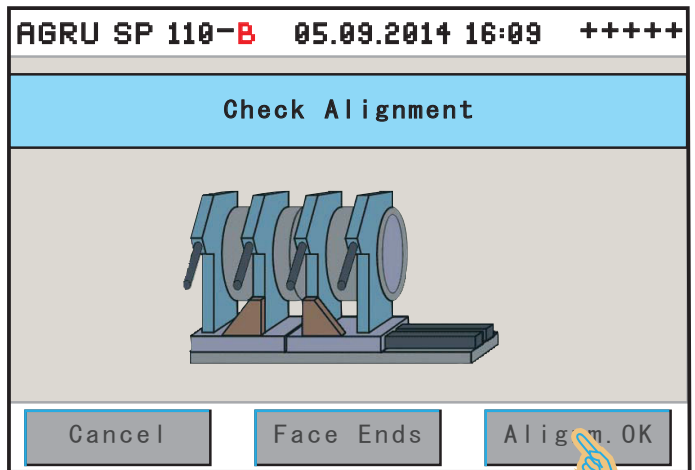
**13** Close in the movable carriage to check component alignment.



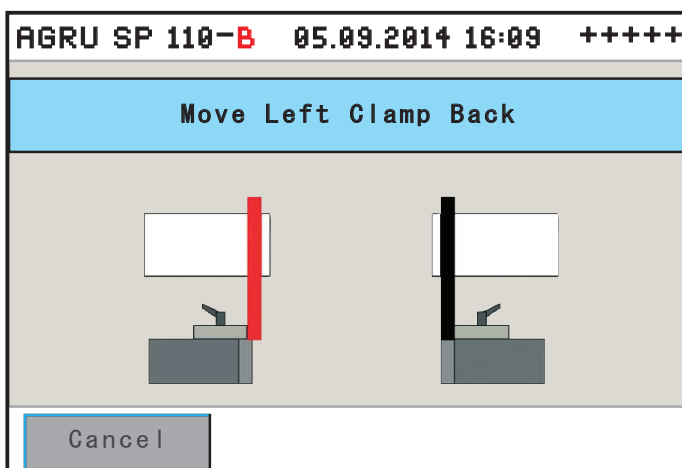
**14** Assess the alignment (try no. 15 below as needed or touch "Face Ends" and start over at 2, if alignment not o.k.)



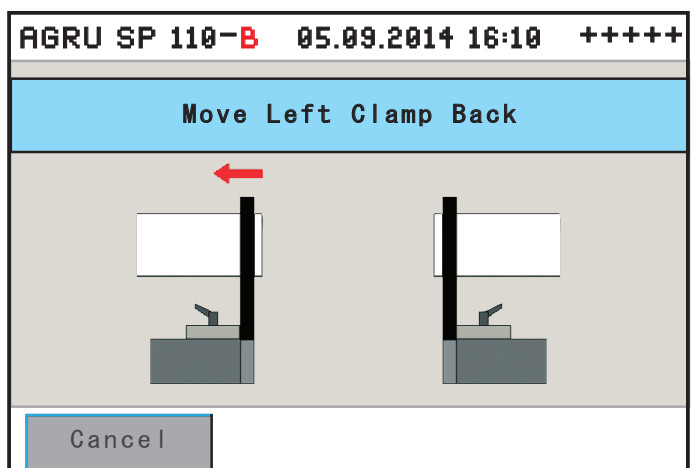
**15** Correct any small alignment offset as needed, first a vertical offset (1), then a horizontal offset (2).



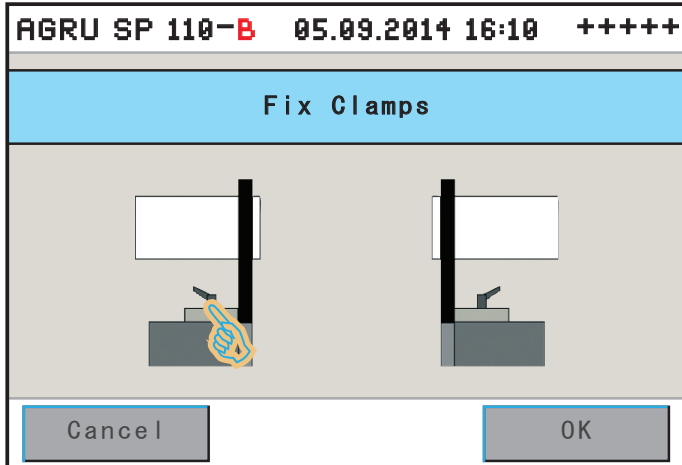
**16** Assess the alignment as being o.k. when it is.



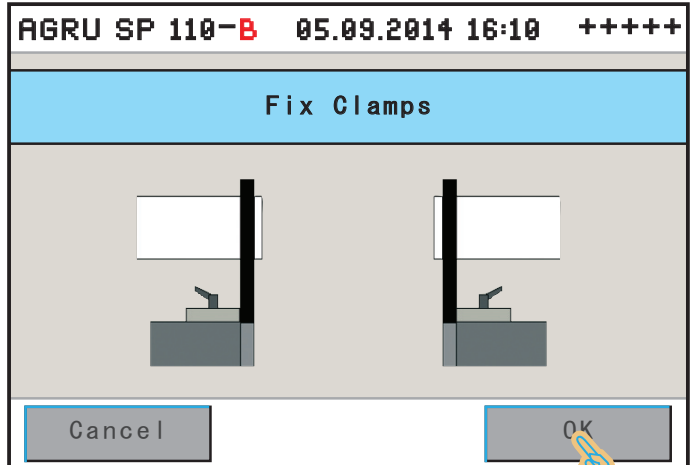
**17** Reposition LH clamp back to its position for welding.



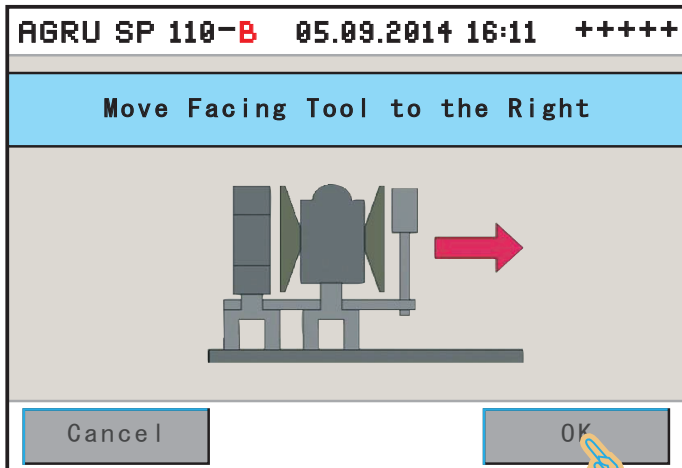
**18** The display indicates the repositioned, ready-for-welding clamp.



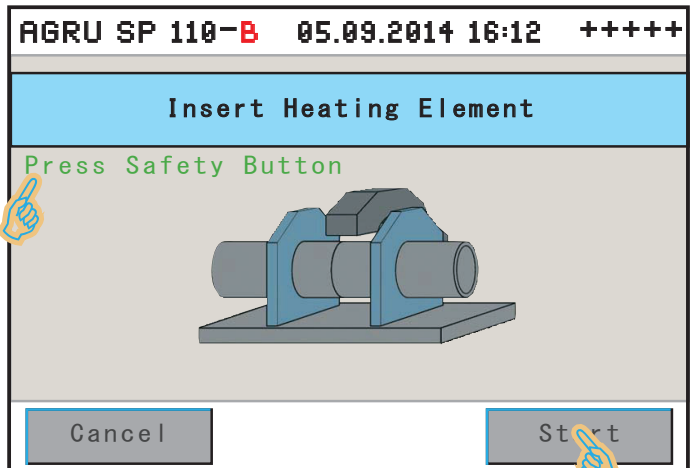
**19** Secure the clamps in the position for welding (on the machine console, not by touching the screen!).



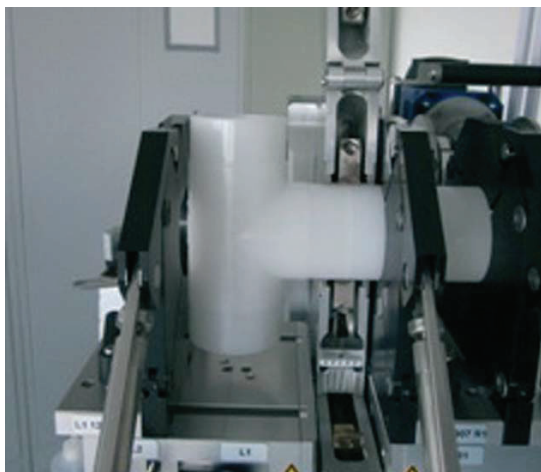
**20** Confirmation (on the screen!) that the clamps are now in the welding position.



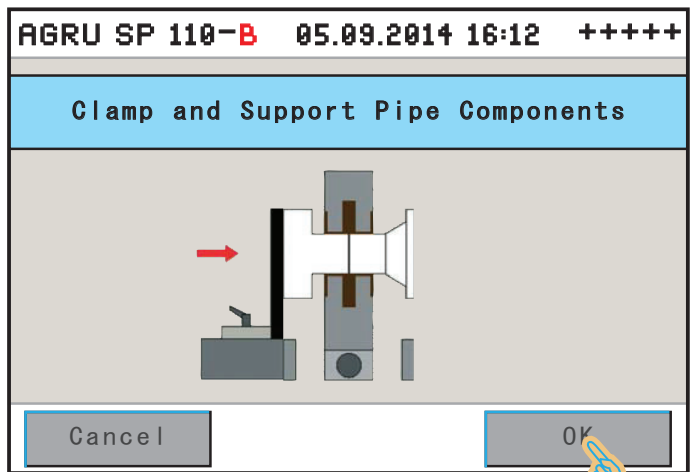
**21** Remove the facing tool, to be able to insert the heating element, then confirm having done so in the screen.



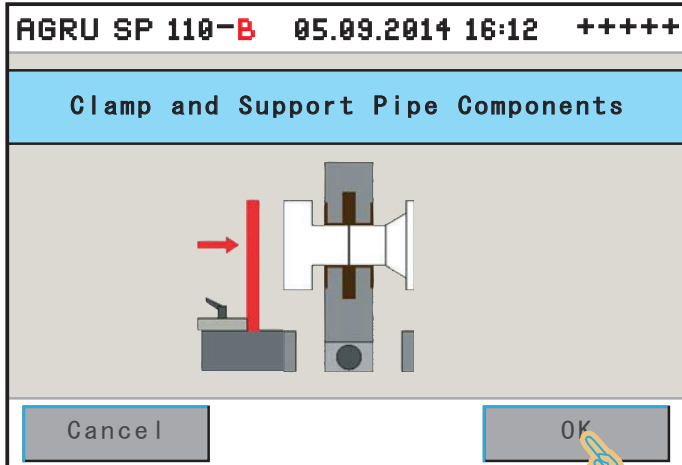
**22** Insert the heating element around the butts to be plasticized.



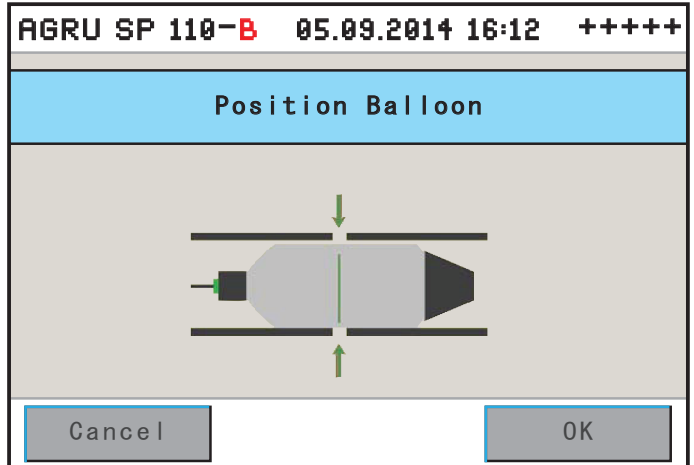
**23** Heating element, inserted, not closed yet.



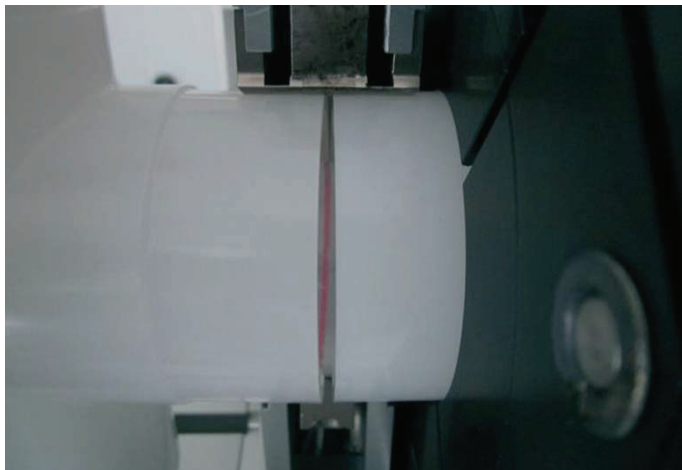
**24** Finalize positioning of clamp/component and confirm it on the screen (display when fine-tuning needed shown).



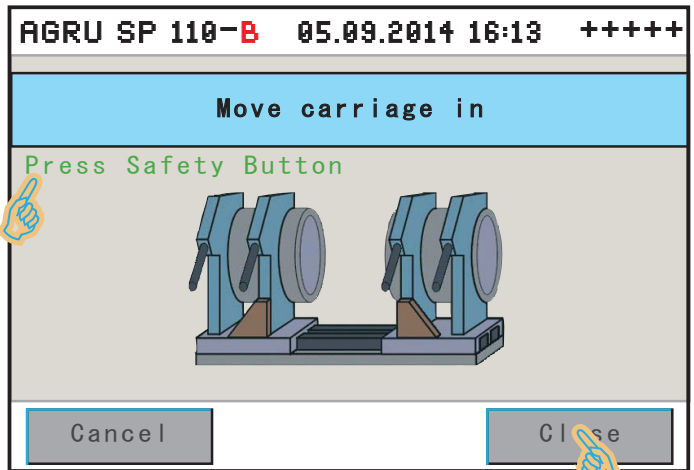
**25** Finalize positioning of clamp/component and confirm it (display when coarse and fine-tuning needed shown).



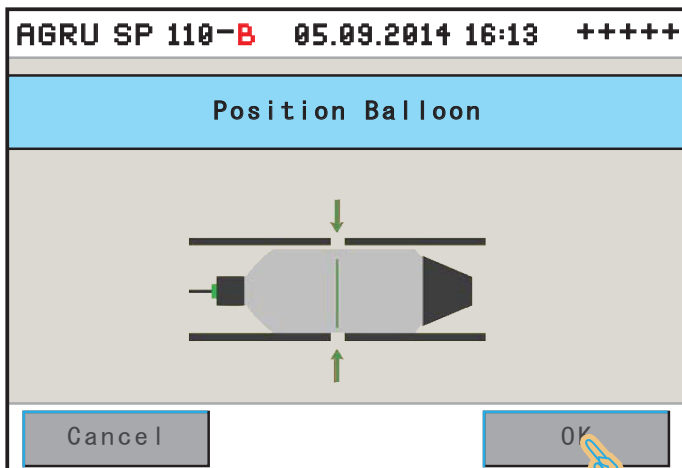
**26** When components are properly secured, insert inside balloon.



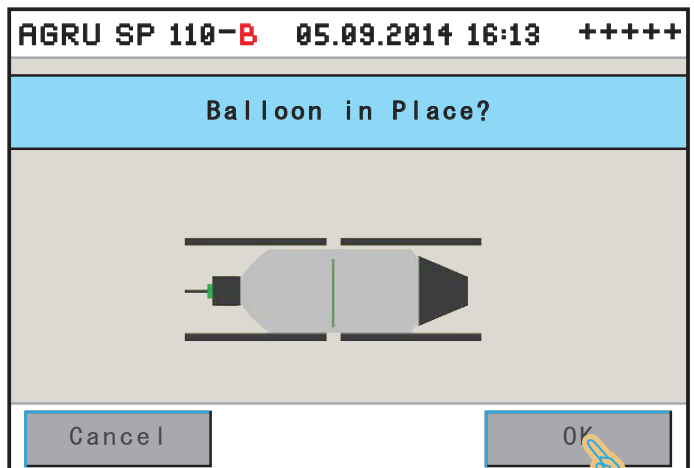
**27** Align the balloon between the butts to be plasticized with the help of the midline on it.



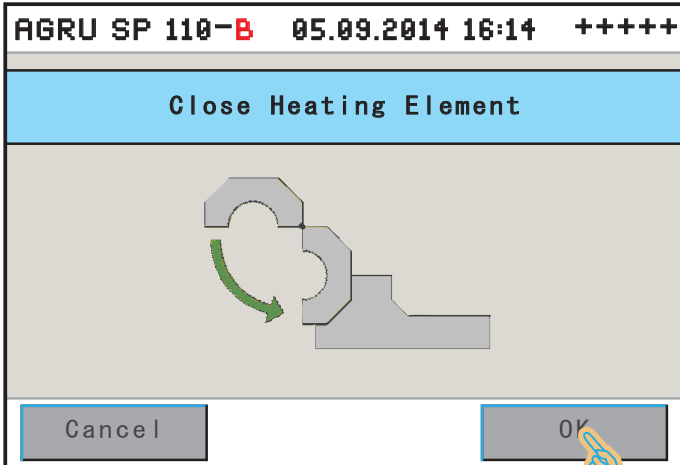
**28** Close in the movable carriage to start welding.



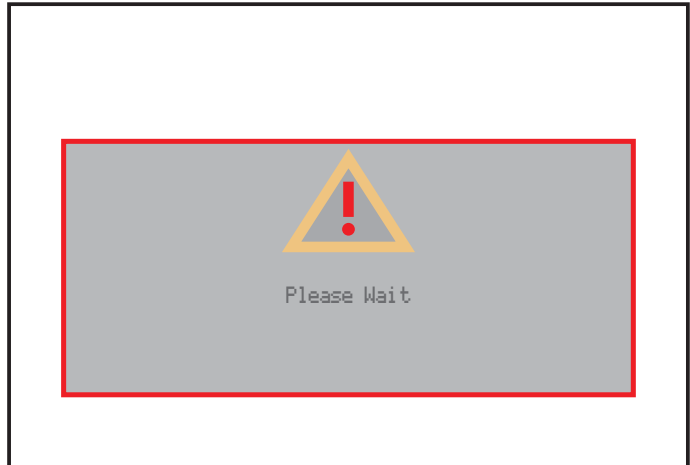
**29** Confirm on the screen that the balloon position is correct.



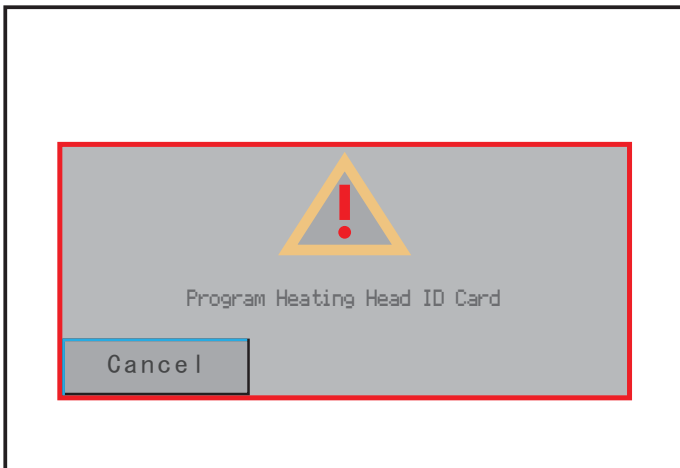
**30** Confirm the second, safety message asking whether the balloon is correctly positioned.



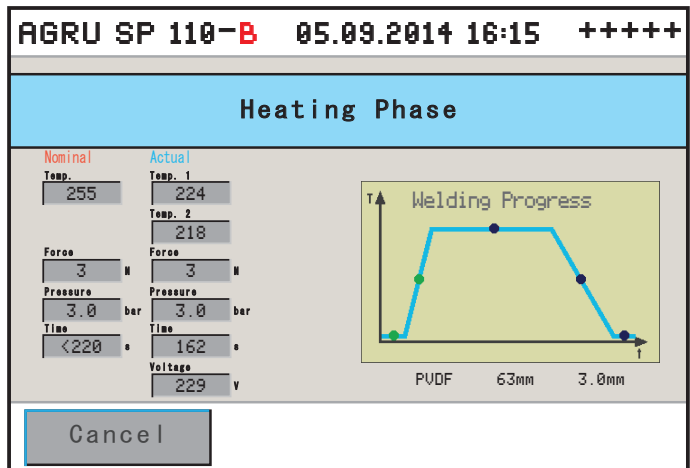
**31** Close the heating element around the butts to be plasticized and confirm it on the screen.



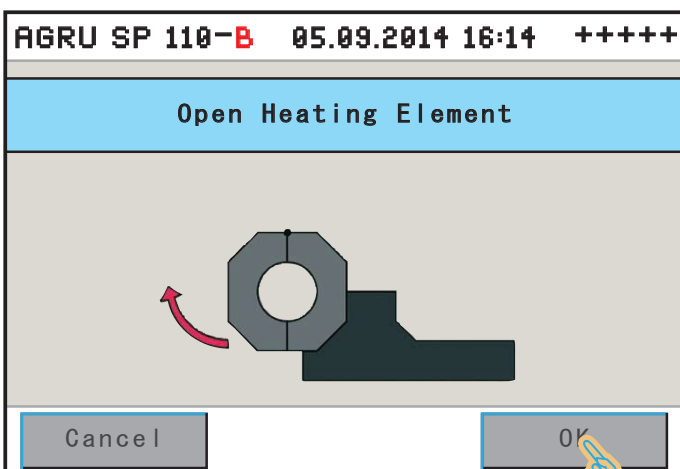
**32** Check by the machine whether the welding process can start without creating any issues



**33** If not, the error that would interfere is shown on the screen.



**34** The welding process is performed according to the defined welding stages.



**35** Open the heating element and confirm it on the screen.



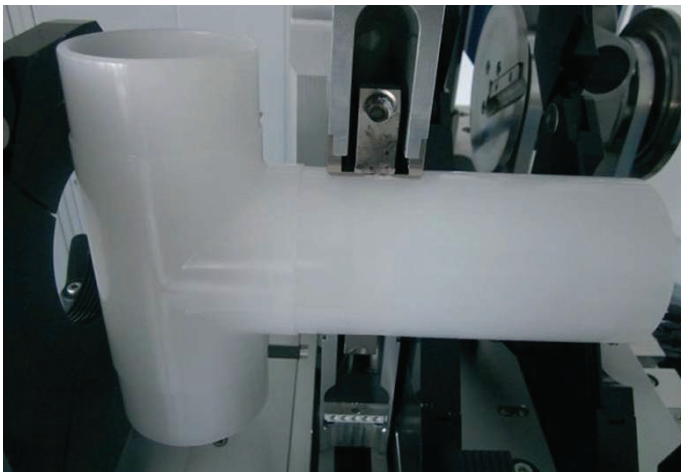
**36** Heating element opened around the new joint in its scale.



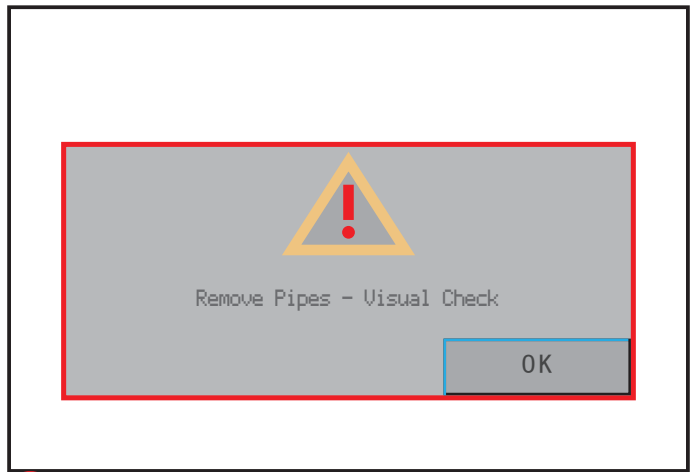
**37** Specialty tool for removing the inside balloon from inside the new joint



**38** Remove the balloon from inside using the specialty tool.



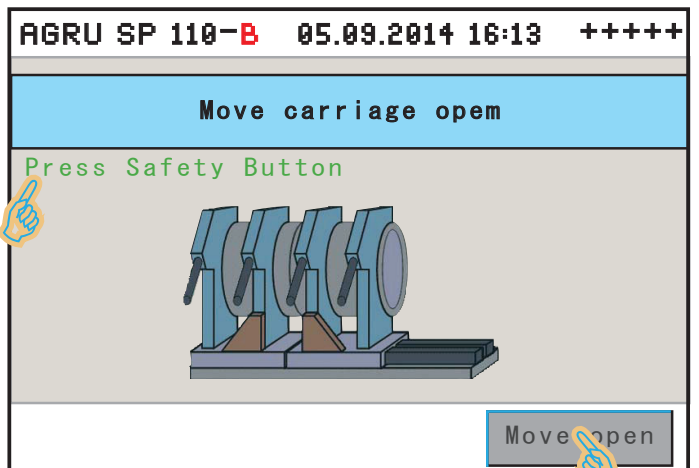
**39** New joint, cooling down



**40** Perform a visual check of the new joint to complete the welding operation.

AGRU SP 110-B 05.09.2014 16:22 +++++			
Welding Overview/Visual Check			
Date/Time	05.09.14/16:19		Welding Times
Material	Nominal Temp.	Actual Temp.	Nominal Actual
PURF	255	252	Fill Balloon
Diameter	Temp.	252	23 s 24 s
63mm	Force	Force	Heating
Wall Thickn.	3 N	3 N	220 s 215 s
3.0mm	Pressure	Pressure	Welding
SDR	3.0 bar	2.9 bar	435 s 435 s
21.0	Amb. Temp	23	Cooling
Welder	+++++		240 s 240 s
Welding No.	Error		Empty Balloon
00102483-153	WELD P. OK rcmc		25 s 23 s
			937 s

**41** Overview of the parameters of the new joint, with possibility to assess the joint manually as not being o.k.



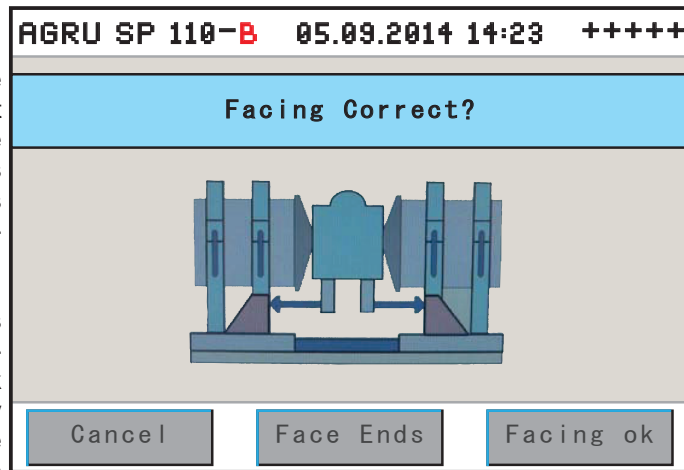
**42** Open the clamps and move the carriage apart to remove the new joint from the machine.



continued from page 23

change the value displayed on the screen when the process reaches this step, use the “+” and “-” buttons. The travel length must be a minimum 3 mm. After you changed the facing road, you have to clamp in the pipes anew. During facing, the machine displays nominal and actual force along with the effective facing road so far achieved.

When the defined length/road of facing is achieved, the machine shows an end-of-facing message (see Display 13). Visually check the pipe butts and, if they are o.k., confirm by “Facing Ok”. The machine moves the carriage apart to let you remove the facing tool. If the result of facing is poor, the process can be repeated after touching the “Face Ends” button. To face the butts once again, in most cases the pipes have to be re-adjusted in the clamps.



Display 13



After facing, the pipe ends must in no event be touched. No fatty layers must be present there for welding. They should always be removed **already prior** to facing using specialty cleaning towels.

#### 4.6.2 Checking Alignment and Positioning the Inside Balloon

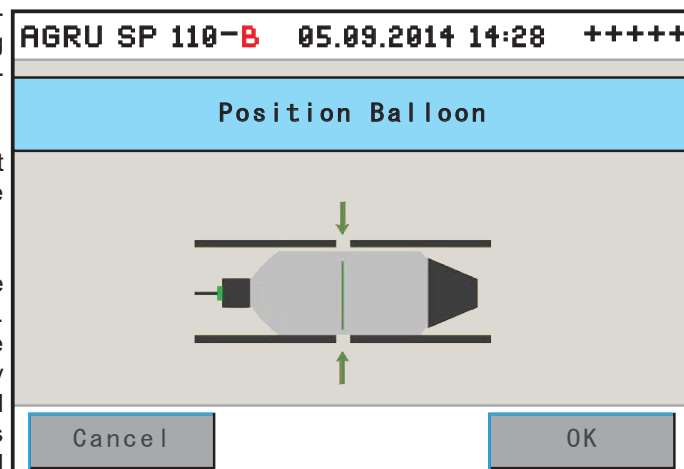
When the pipe butts are level to satisfaction, it has to be checked if the pipes align properly to each other or if there is an offset. Similar to facing, the touchscreen tells the welder that this is the next step, and the carriage can be closed in on the other pipe by the “Start” button. When the pipe butts are next to each other, two additional buttons appear besides “Cancel”: the “Face Ends” button and the “Alignment Ok” button.

A small offset between the pipes can be readjusted using the adjustment set screws at the front of the machine, where first the vertical, then the horizontal offset is compensated as needed. If the alignment offset is too large, or if there is too large or too uneven a distance between the pipe butts, touch the “Face Ends” button to re-adjust the pipes in the clamps and start the facing process again. If the alignment is o.k., touch that button.

After checking the component offset, the machine asks the operator to set the right-hand, left-hand or both clamps back to their normal position, if the facing process was with manual clamping. When they are back to the normal position, confirm it on the touchscreen. Finally, to start welding, re-clamping the components in the pipe clamps is required (see also Sect. 4.6.3).

After alignment/offset check, if the offset is in order, press “Ok.” This will move the component butts apart by about 8 mm

In this small gap, the center mark on the inside balloon, if it has one, has to be visible. With balloons without that mark, estimate the midline. When the balloon is centrally positioned, touch the “Ok” button, which will cause the machine to move the components in on each other and to pump air to nominal pressure into the balloon.



Display 14



Use only balloons that match the component material, as recognizable from the color-coded mark or the signature applied to the balloon.

When the balloon is full of air, the machine asks again, “Balloon positioned?” Touch the “Ok” button to start the welding process proper, of which the first step is the closure of the heating element. Both this confirmation message and the previous message, asking the welder to position the balloon, allow canceling the process altogether by touching the “Cancel” button. The balloon then releases the air and the position can be corrected as needed.

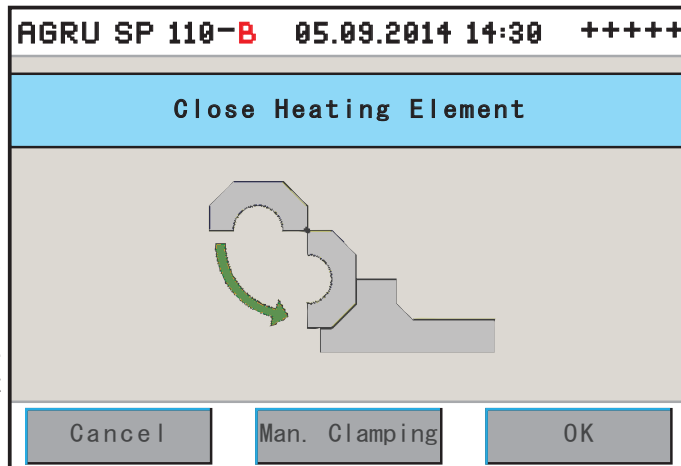


As the components have to be manually re-clamped after a facing process with manual clamping, the order of steps is then different from these explanations. Instead of the order FACING · CHECKING ALIGNMENT · POSITIONING THE BALLOON · INSERTING THE HEATING ELEMENT · CLOSING THE HEATING ELEMENT, the operating order is FACING · CHECKING ALIGNMENT · REPOSITIONING THE CLAMPS TO NORMAL · INSERTING THE HEATING ELEMENT · MANUALLY RE-CLAMPING THE COMPONENTS · POSITIONING THE BALLOON · CLOSING THE HEATING ELEMENT. The individual steps, however, are carried out exactly as described.

#### 4.6.3 Inserting the Heating Element

When the balloon is correctly placed, the machine tells the welder first to reposition the facing tool and heating element assembly to the right. After manually moving the console, this has to be confirmed in two-hand mode: touching the appropriate button on the touchscreen and holding down the confirmation push button on the front of the machine. When the facing/heating assembly is in the ready-to-heat position, the machine shows the display asking the welder to insert the heating scale.

In the next step, the machine asks that the heating scale be closed around the pipe butts. The welder can then either start the standard welding process by closing the heating element, thereby launching the heat-soaking phase automatically, or press the “Manual Clamping” button and re-clamp the pipes again in the holding clamps. If he decides to manually re-clamp, a further message has still to be confirmed to the effect that manual clamping is actually desired. When done, the manual clamping has to be declared done in another confirmation message. Touching “Cancel” will return the machine to the previous screen.



Display 15



Manually supporting the closure by pushing the heating element closed is recommended. This will avoid any undesired tilting open during the closing process, which in turn, if so, would trigger an error condition and the appropriate message.



Manual re-clamping is compulsory after a facing process with manual clamping and subsequent repositioning of the clamps to their normal position (see the info at the end of Sect. 4.6.2).

While the welding procedure is starting by bringing the inside balloon to the preset air pressure, the machine controls and monitors constantly the temperature of the heating element and the welding force and time. Nominal values and tolerance ranges are defined by the parameters for

the welding operation previously entered or confirmed. If a value is not within the applicable tolerance thresholds, the machine shows an error message to this effect and the welding process is aborted.

#### 4.6.4 Heat-Soaking Phase

In the first welding phase, the pipes are heated by the heating scale with the defined welding force to the defined welding temperature.

On the touchscreen, the welding progress diagram indicates in which phase the welding currently is (green LED icon). In case of malfunction, the welding process can be aborted by touching the “Cancel” button. If the machine detects a malfunction, the color of the LED icon for the appropriate phase changes from green to red.

#### 4.6.5 Welding Phase

In the welding phase (or, joining phase) the machine keeps the butts at the preset temperature and force to ensure that the joint will be seamless and beadless. This phase is also indicated on the touchscreen panel.

#### 4.6.6 Cooling Phase

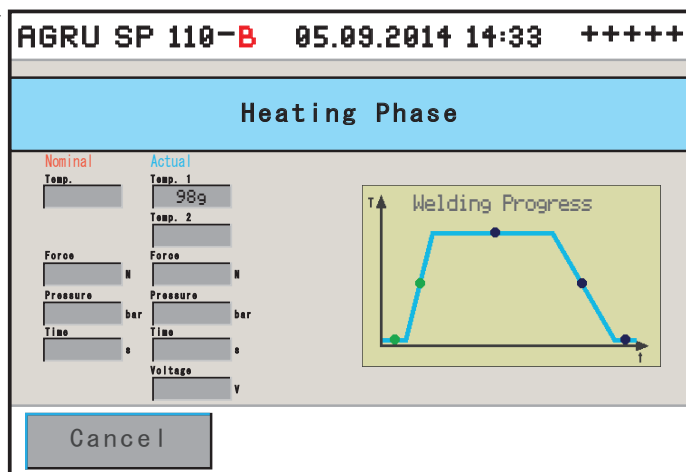
At the end of the joining stage, the machine moves on automatically to the cooling phase (second-last LED in Display 16). The settings in the configuration menu (see Sect. 4.3) determine whether the machine maintains and controls the welding force during the cooling stage. The duration of this stage is a preset value.

At the end of the cooling phase, the air in the inside balloon is released (last LED in Display 18).

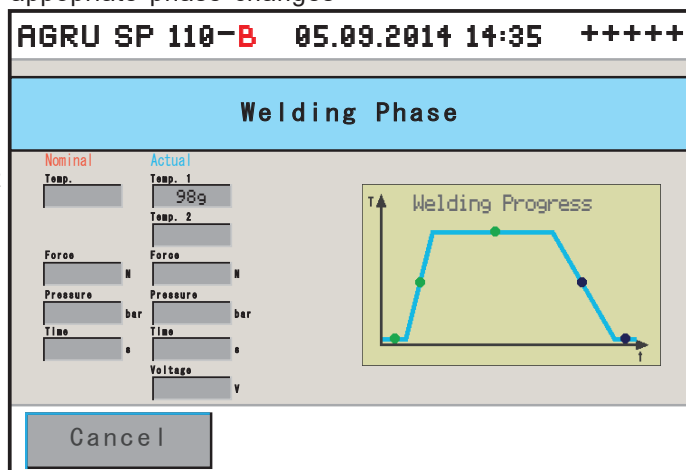
#### 4.6.7 End of Welding

After a successful welding operation, which can also be recognized in the welding diagram, the heating element is released. It still has to be tilted up by the welder, this has then to be confirmed on the screen, and the heating element has to be moved to the back of the console. Then the clamps can be opened and the pipes can be taken out of them. The machine hints at all this steps on the touch screen.

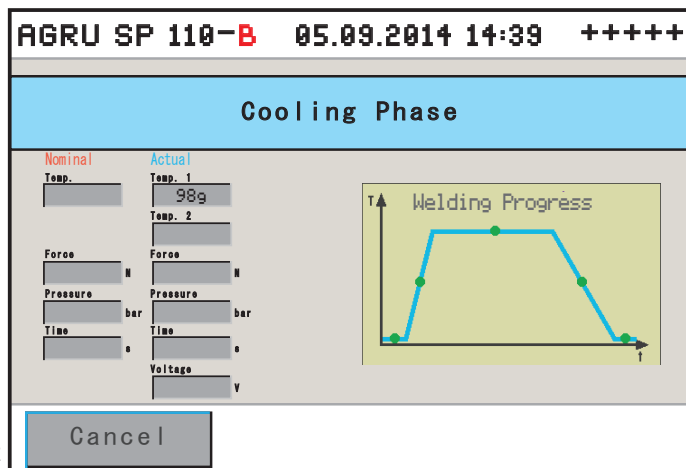
When the welding process is finished, the machine displays an overview of the welding and traceability data that will be saved to the report (the screen resembles the one in Display 22), and asks the welder to visually check the quality of the joint. In case he finds that the joint is of poor quality, although the machine did not alert him to any welding error, he can manually classify the welding result as poor by touching the “Error” button. This causes the machine to mark the joint as poor rather than good in the the welding report.



Display 16



Display 17



Display 18

#### 4.7 Aborted Welding Process

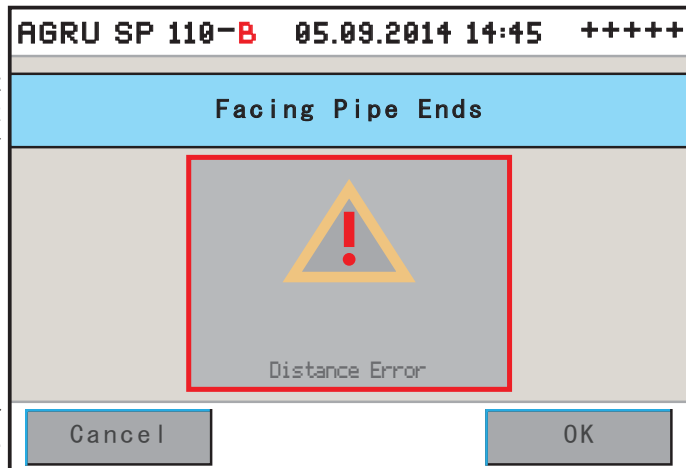
All welding-relevant data are constantly monitored while the welding process is running. If one or more of the parameters are out of tolerance and the machine cannot adjust them, the welding process is aborted after a given period of time.

The error that made the welding abort is displayed on the screen (see Display 19). Additionally, the LED icon in the welding diagram that belongs to the welding phase with the malfunction turns red.



Info

If one or more errors occurs rather frequently, contact customer service. It may be possible to correct the error on site without further trouble, or at least to identify its cause.



Display 19

Along with the errors listed in the following table, which can be displayed, some of them, together with data on the status of the past welding and the joint that is its outcome are encoded as a hexadecimal figure and written to the welding report that can be reviewed in memory (see Sect. 5.2) and to the label tag that can be printed and reprinted of that joint. See Sect. 4.8 for more details.

Type of Error	Description
<b>a. Data Input</b>	
Input Error	Error while entering data on the touchscreen.
Code Error	Error while reading data from a code.
<b>b. System</b>	
Clock Error	The internal clock of the machine is defective; re-set the clock in the configuration menu.
Memory Full	The memory to which the welding reports are saved is full and memory control is enabled. Welding reports need to be downloaded and/or deleted (see Sect. 5.3).
System Error	Malfunction in the control system of the machine; power to the machine has to be turned off and unplugged immediately, and the machine has to be sent to the manufacturer or an authorized service point for check and repair.
Power Supply Voltage Error	The voltage of the power supply is too high or too low; welding has to be suspended provisionally.
Printer not Ready	The printer or PC connected to the machine is not ready (no communication, faulty cable or – if serial interface – bad interface configuration).
Unit Maintenance Due	The recommended service interval for the machine is over. It should be sent to the manufacturer or an authorized service point for scheduled maintenance and service.
No Function Available	A control (touchscreen button, switch) was used for which no function is defined.
<b>c. Welding Process</b>	
Ambient Temperature Error	The ambient temperature is out of the acceptable range from 10°C through to 40°C; welding is not possible.
Balloon Error	It was impossible to position the balloon correctly and/or to inflate it correctly.



Type of Error	Description
Welding Aborted	A stage of the welding process or the entire process was interrupted by the user's touching "Cancel."
Servo 2 Error	The servomotor that clamps the heating element shut and releases it, "servo 2," does not work properly or — if the error is triggered at power-up — does not recognize its default, idle position. In both cases, no proper joint can be guaranteed.
Distance Error	The stroke of the carriage (at facing or joining) does not correspond to the expected distance it should travel; welding has to be repeated.
Force Error	The applied force is out of tolerance; welding has to be repeated.
Visual Check Error	A welded joint was declared defective by the welder upon visual check.
Power Supply Failure	In the course of the last welding operation, a power supply failure occurred; welding has to be repeated.
Emergency Stop	The welder has turned the machine off using the Emergency Stop switch. If this was done because of a malfunction of the machine, it must not be turned on again, unless it is beyond doubt that it works properly.
Heating Element Temperature Low	The heating element temperature is out of tolerance and cannot be adjusted; as long as this error is not cleared, welding or repeating a welding operation is not possible.
Heating Element Temperature Exceeds Max	The heating element temperature is higher than the maximum allowable limit; the machine has to be turned off.

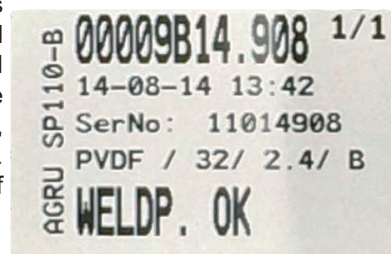


If the information in this chart does not allow finding the solution to an issue, please contact an authorized service point.

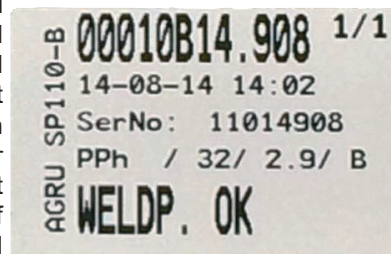
#### 4.8 Indication of Joint Status and Possible Errors on the Tag

The status of the joint and possible errors during jointing are indicated on the printed label tag and in the report that can be viewed in memory (see Sect. 5.2) in the form of an abbreviation or a hexadecimal figure.

The abbreviation "WELDP. OK" tells you that the welding process was completed correctly. If the letter "r" (for German, *Regelung*) is added to the abbreviation, the welding force control feature was enabled during the process, in case of the letters "rc," the constant force control was on (see table in Sect. 4.3). If the letters "mc" are added, the components were manually clamped for that welding process. The label tags shown on the photos on the right express this kind of information on a label tag.



Instead of the "OK" message, the tag and the report that can be viewed may tell you that something went wrong, by the word "ERROR" and a hexadecimal figure. The hexadecimal format can be recognized from the prefix "0x" that is not part of the figure proper. The relevant meaning of the hexadecimal figure can be seen after its conversion to a binary figure. The easiest way to do this is to use the calculator that is part of the Windows operating system. In its "View" menu, set it to "Scientific" and click the "Hex" option in the upper left corner of the scientific calculator display. Then type the hexadecimal figure and set the display option to "Bin" in the upper left corner. This changes the displayed figure, which now represents sixteen binary digits, each of which is one bit of the binary expression of the previously entered hexadecimal figure.



For instance, if a label tag says, “ERROR 0x7D01,” entering the figure “7D01” in the hexadecimal format and converting it to the binary format with the calculator will result in the figure “0111110100000001” on the display. These sixteen digits indicate the status of the joint and the welding as well as the encountered error or errors, where every bit set to “1” tells you that the status or error it represents is applicable to the welding process in question. The bits are assigned to the statuses and errors in the table below.

Bit	Error or Status	Hexidecimal Format	Binary Format Figure (only if no other error or status)
0	Pressure Error	0x0001	0000 0000 0000 0001
1	Temperature Error	0x0002	0000 0000 0000 0010
2	Force Error	0x0004	0000 0000 0000 0100
3	Heating-up Time Error	0x0008	0000 0000 0000 1000
4	Welding Time Error	0x0010	0000 0000 0001 0000
5	Cooling Time Error	0x0020	0000 0000 0010 0000
6	Emergency Off	0x0040	0000 0000 0100 0000
7	Error Because of Power Supply Failure	0x0080	0000 0000 1000 0000
8	Manual Welding Parameters Used	0x0100	0000 0001 0000 0000
9	No Label Tag	0x0200	0000 0010 0000 0000
10	Balloon Error	0x0400	0000 0100 0000 0000
11	Error by Visual Check	0x0800	0000 1000 0000 0000
12	Force Control Enabled	0x1000	0001 0000 0000 0000
13	Constant Force Control Enabled	0x2000	0010 0000 0000 0000
14	Components Manually Clamped	0x4000	0100 0000 0000 0000
15	<i>(Bit not used)</i>	0x8000	1000 0000 0000 0000
-	Welding o.k. with Default or Additional Mat. with, or Default Mat. w/o, Force Control	WELDP. OK	----
-	Welding o.k. with Additional Material with Force Control	WELDP. OK r- --	----
-	Welding o.k. with Additional Material with Constant Force Control	WELDP. OK rc --	----
-	Welding w/ Manual Clamping o.k.	WELDP. OK -- mc	----

In the example quoted above, the hexadecimal figure in the ERROR code, 0x7D01, results in the binary figure 0111 1101 0000 0001. That is, bit 0 (the rightmost one) and, ascending towards the left, bits 8, 10, 11, 12, 13, 14 are set to “1.” In other words — looking at the table above — a pressure error (bit 0) occurred. Furthermore, manually entered welding parameters were used (bit 8), there was a balloon error (bit 10), the joint was declared incorrect by the visual check (bit 11), and finally constant force control was enabled and the components were clamped manually (bits 12 - 14).

Right of the welding time, a label tag may show a “m” or a “p.” If the letter “m” is present, the joint was made using an additional material. The letter “p” means that printing label tags right after welding was enabled, but no label was printed, possibly because the printer was not connected or not ready for operation.



Important

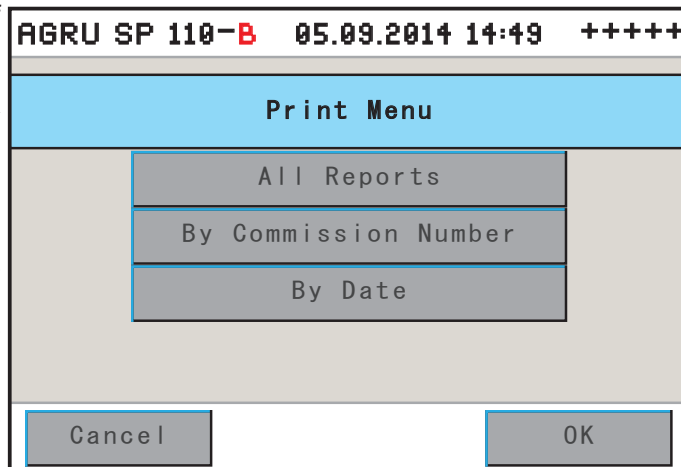
Hexadecimal and binary figures have to be interpreted right-to-left in all cases because the lowest bit is found at the rightmost digit. Accordingly, leading zeros of the hexadecimal (e.g., 0x0031) have to be typed prior to converting the figure. The resulting binary, too, has to be “filled up” with leading zeros to have a figure with a total of sixteen digits.

## 5 Printing and Transferring Welding Reports

The machine is equipped with USB A interface that gives you the opportunity to connect the tag printer or, if permitted, a USB stick and a USB B interface through which data can be transferred to a PC, e.g. with an installation of the DataWork agru software.

### 5.1 The Print Menu and Printing/Transferring Reports

When a data communication cable is connected while the standard data screen (see Display 5) is showing, the machine displays the print menu. According to the selection made on this menu, data will be sent to the connected device: to the a printer for print-out or to a PC for further processing and archiving.

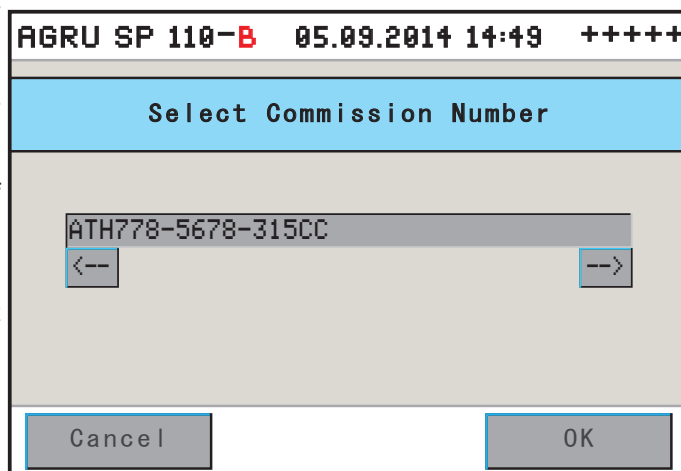


Display 20

Touch the appropriate button to select printing “All Reports”, printing “By Commission Number”, or printing “By Date”.

The option “All Reports” causes all the welding reports stored in system memory to be printed. While the machine transfers the reports, a countdown indicates how many of them remain to be printed or transferred.

The options “By Commission Number” and “By Date” lead the operator to the next screen in which arrow buttons can be used to browse through the reports in system memory to select the desired commission or date from which reports should be printed or transferred (see Display 21). The options show the first available commission number or date, and once the desired one is found, the selection has to be confirmed by “OK” to start the transfer to printer or PC.



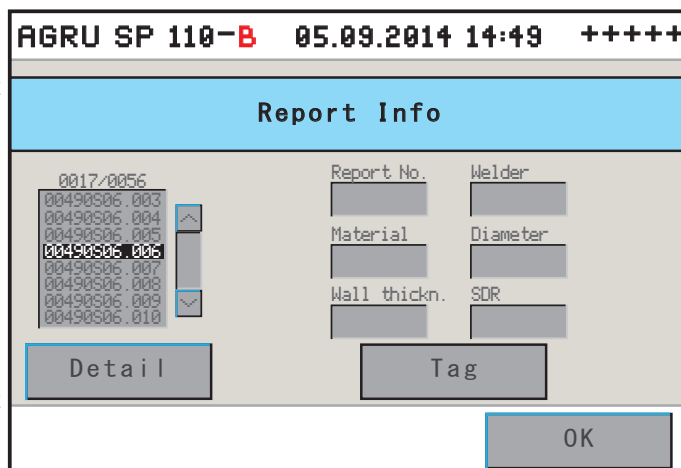
Display 21

If the machine displays a “Printer not Ready” error message after you touched the “Ok” button, the printer has to be switched to on-line mode. Check for potentially damaged connections from the machine to the printer or the PC.

After successful printing, the machine displays a message telling the welder that printing was o.k.

### 5.2 Showing Reports in Memory, Reprinting Tags

Using the appropriate option of the configuration menu (see section 4.3), it is possible to display on the screen the welding reports saved to memory. A screen like the one in Display 22 appears. It is similar to the welding and traceability data overview shown at the end of each successful welding operation. This is only an abstracted overview with the main welding parameters. By touching



Display 22

the “Detail” button, a new screen is displayed and show all data relevant to the welding operation. In this detailed view (see no. 41 in the image illustrations of the welding process), a “Not OK” button allows assessing a weld as unfit upon visual inspection, even when the machine did not throw any error. However, this is possible only right after the welding process, never when this screen is called for printing off additional labels.

Near the left edge of the Report Info screen, you will find a list of all welding reports currently in memory. Above this list, the number of the selected report is given (before the slash), along with the total number of reports in memory (after the slash). To move the selector bar through the list, touch the scrollbar arrows to the right of the list. The longer you touch them, the faster the bar scrolls through the list.

To display the detailed view of the report, touch the “Detail” button or to reprint an extra tag of this welding operation for sticking it onto the pipe, the “Tag” button.

### 5.3 Deleting Reports from Memory

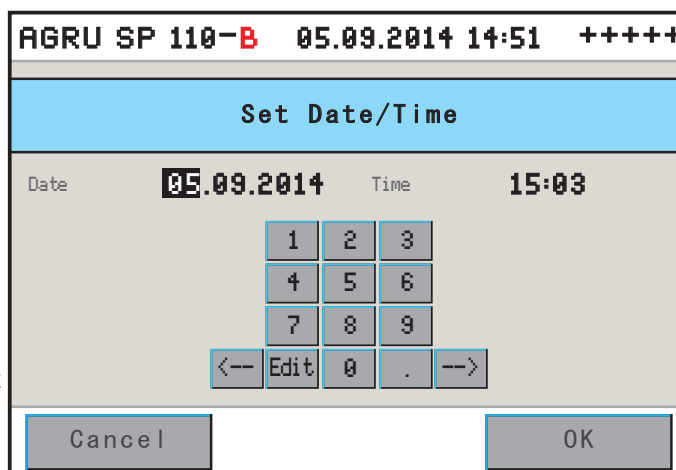
To delete the reports stored in memory, use the appropriate option in the configuration menu (see sub-section 4.3). Upon touching this button, a safety warning asking if you really want to delete them appears on the screen and has to be confirmed to effectively delete the reports currently in memory.

## 6 System Data

### Setting the Date and the Time of Day

When the “Date/Time” sub-menu was selected in the configuration menu (see sub-section 4.3), the screen shows what is reproduced in Display 23.

The time of day and the date can be set using the keypad shown on the touchscreen panel.



Display 23



Time and date cannot be set when the regular preventative maintenance of the machine is due.

## 7 Service and Repair

As the machine is used in applications that are sensitive to safety considerations, it may be serviced and repaired only on our premises or by partners who were specifically trained and authorized by us. Thus, constantly high standards of operation quality and safety are maintained.



Non-compliance with this provision will dispense the manufacturer from any warranty and liability claims for the unit and any consequential damage.

All machines that are new or newly programmed during maintenance or upon request is wished are shipped with the most recent software version.



At the date of shipment, the service and maintenance interval is set to 18 months or 5000 welding operations (different in some markets), whichever comes first.



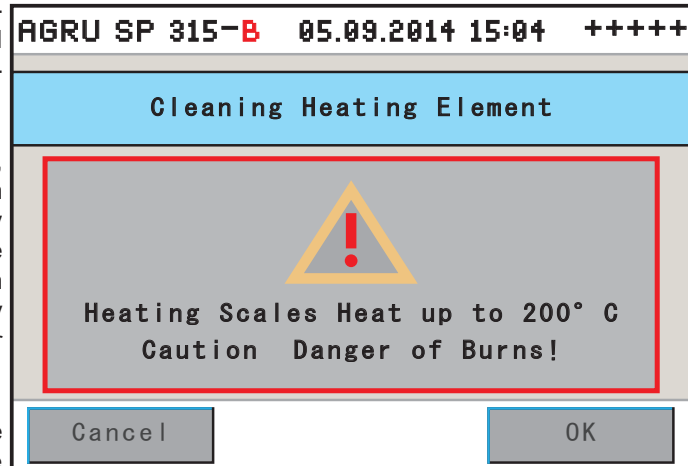
## Cleaning the Heating Element

The heating scales should be rid of residues that may result from welding operations regularly and **with a lint-free cloth and a dedicated polyethylene cleaner**. The heating element cleaning feature is accessible in the configuration menu (see Sect.4.3). Failure to clean it regularly and thoroughly puts the heating element surfaces at risk of discoloration and sticking plastic residues potentially compromising the safe welding of future joints and the smoothness of the articulated movements of the heating scales.



Info

As the heating element is cleaned, the outside surface of the balloon should be included. Independently of the regular cleaning of both the heating element and the balloon for maintenance purposes, they should be rid of any residues prior to every welding operation.



Display 22

The initial warning to the effect that the temperature of the heating scales will be dangerously high has to be confirmed by "Ok" in order for the process to begin. Then the heating-up of the scales, which is needed to be able to clean them, follows the same steps as their being heated up during a welding operation (see Sect. 4.6.3). During the heating, a be-patient message is displayed, which disappears when the heating element reached and has kept the 200°C for 1 minute. Then, being extremely cautious, clean the heating scales.

If needed, the machine will alert to the requirement that the clamps be repositioned to the normal position. In this case, proceed as requested and confirm the alert on the screen.

That the scales can now be cleaned is displayed on the screen. When the message to this effect appears, the welder can open the heating scale. When it is open, it is no longer heated. If the temperature decreases to the point where residues cannot be removed anymore, close the scale again and heating will resume automatically in an analogous manner as previously.



Important

It is **not acceptable** in any circumstances to use sharp or pointed objects to clean the heating scales. This may seriously damage the heating surfaces, which will void any warranty assumed for the product.

At the end of the cooling of the heating element after the cleaning, the element is retracted from the working position in a manner analogous to the end of a welding procedure, except that there are no pipes.

## 8 Service and Repair Contact

agru Kunststofftechnik  
Ing.-Pesendorfer-Str. 31  
4540 Bad Hall, Austria

Tel.: +43 (0)7258 790 3503  
+43 (0)7258 790 3502  
Fax: +43 (0)7258 790 3852

Web: [www.agru.at](http://www.agru.at)

E-mail: [anwt@agru.at](mailto:anwt@agru.at)



We reserve the right to change technical specifications of the product without prior notice.

### 8.1 Manufacturer Warranty

The warranty assumed by the licensed manufacturer is effective, on principle, for 1 year, both for the machine and the heating element, excepting, however, the coating of the heating elements. Claims for warranty related to heating elements may only be raised if the default parameters present in memory at delivery are/were used for welding and if the nominal temperature is/was lower than or equal to 280°C (530°F). Customized heating elements are excepted from this limitation. The warranty conditions are stated separately for them.

### 8.2 Technical Documentation

Wiring diagrams, computer-assisted designs and further technical literatures, as complements or more in depth, will be gladly provided by agru Kunststofftechnik upon request at the address given above.

### 8.3 Risk Assessment

A risk assessment under the provisions of the so-called machinery directive 2006/42/EC was conducted for the machine by a qualified person entitled to the performance of such an assessment.

### 8.4 Standardlieferungumfang

1 x Welding System upon request	
1 x Case with Reducers 20 mm - 63 mm	SAGSP110009
1 x Balloon for PVDF 20 mm	SAGSP11B220
1 x Balloon for PVDF 25 mm	SAGSP11B225
1 x Balloon for PVDF 32 mm	SAGSP11B232
1 x Balloon for PVDF 40 mm	SAGSP11B240
1 x Balloon for PVDF 50 mm	SAGSP11B250
1 x Balloon for PVDF 63 mm	SAGSP11B263
1 x Balloon for PP 20 mm	SAGSP11B320
1 x Balloon for PP 25 mm	SAGSP11B325
1 x Balloon for PP 32 mm	SAGSP11B332
1 x Balloon for PP 40 mm	SAGSP11B340
1 x Balloon for PP 50 mm	SAGSP11B350
1 x Balloon for PP 63 mm	SAGSP11B363
1 x Heating Element for 20 mm	SAGSPEL0901
1 x Heating Element for 25 mm	SAGSPEL0903
1 x Heating Element for 32 mm	SAGSPEL0905
1 x Heating Element for 40 mm	SAGSPEL0906
1 x Heating Element for 50 mm	SAGSPEL0907
1 x Heating Element for 63 mm	SAGSPEL0908
1 x Label Tag Printer	SAG110315S1
1 x Label Tag Roll	SAG11025008
1 x Thermal Transfer Strap	SAG11025009
1 x Power Cord for Label Tag Printer	SAGSPEL0004
1 x Communication Cable for Label Tag Printer	SAGSPEL0005
1 x CD-Rom DataWork with License Card	SAGSPVE0033
1 x Data Download Cable	SAGSPEL0005
1 x USB Stick	SAGSPVE0032
1 x CD-Rom Software for Label Tag Printer	SAGSPVE0058
1 x Cleaning Pen for Printer	SAGSPVE0039
1 x Welder/Operator ID Card	SAG110315S9
1 x Access Card for Machine	SAGSPVE0041
1 x User's Manual	SAGSPVE0029
1 x Tubing 15 m (6 x 1 mm)	SAGSPVE0910


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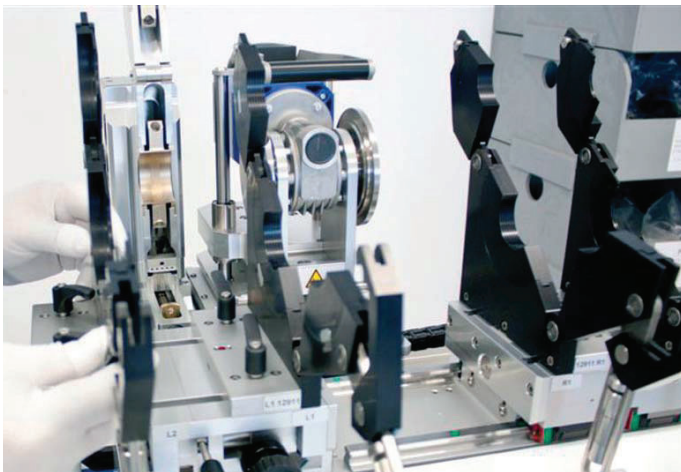
1 x Tubing 1 m (4 x 0,75 mm)	SAGSPVE0911
1 x Tubing Reducer 6 / 4 mm	SAGSPVE0912
1 x Allen Wrench w/ Bar Handle SW 4 mm	SAGSPVE0034
1 x Allen Wrench w/ Bar Handle SW 8 mm	SAGSPVE0036
1 x Heavy-duty Grease, tube of 25 ml	SAGSPVE0037
1 x Specialty Tool for Removal of Balloon	SAGSPVE0916
1 x Bottom for Accessories w/ Foam Insert	SAGSPVE0914
1 x Balloon Holder	SAGSPVE0915
1 x Transport Box	SAGSPME0914
2 x Transport Lock (Velcro strap)	SAGSPVE0060
2 x Shockwatch	V80100
2 x Drying Agent	V601013
1 x Bill of Lading	

### Presentation of Heating Scale Cleaning with a Cleaning Emulsion

The scales of the heating element have to be cleaned not only at every welding, but also very thoroughly, and using a specialty emulsion for cleaning, as needed. The schedule below is a general rule for cleaning. The thorough cleaning with the emulsion has the steps depicted below. The hand icon is meant to indicate what has to be touched on the screen or used/moved on the machine or component.

Cleaning Schedule	at every welding	as needed
Balloon cleaning	•	
Component cleaning	•	
Heating scale cleaning	•	
Scale cleaning w/ emulsion		•
Clamp cleaning		•
Machine chassis cleaning		•

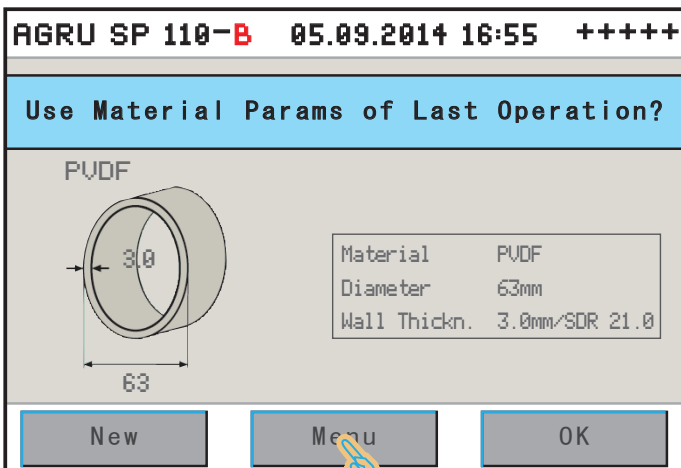
 **Important** Cleaning the heating scales is performed **exclusively** using the following: specialty emulsion for polyethylene cleaning (ready-to-use emulsion for polyethylene plastics or cleaning concentrate for polyethylene plastic diluted with water to form an emulsion according to the instructions of use), fibre-free/lintless towels made of pure cotton without any synthetic fibres, and compressed air.



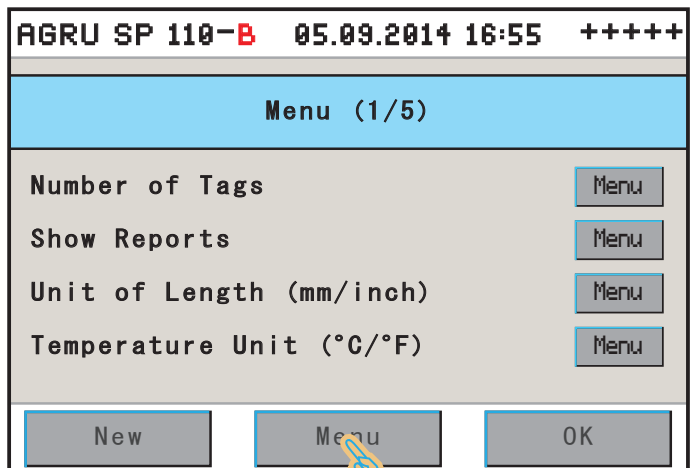
**1** Remove the clamp on the "heating element side" by ...



**2** ... loosening their locking screws.

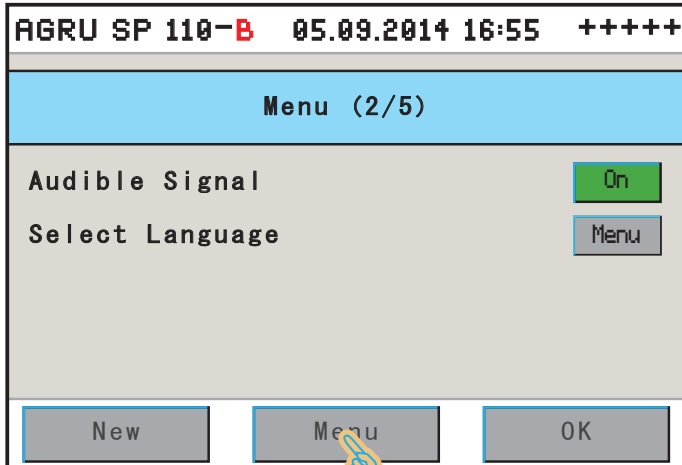


**3** Access the configuration menu.

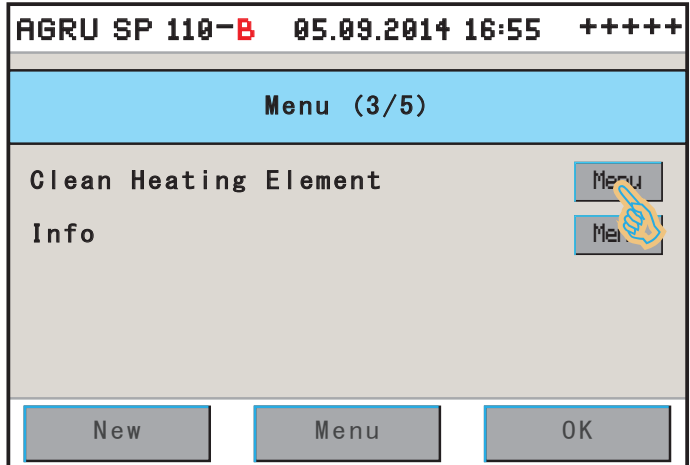


**4** In the menu, access the second page of options.

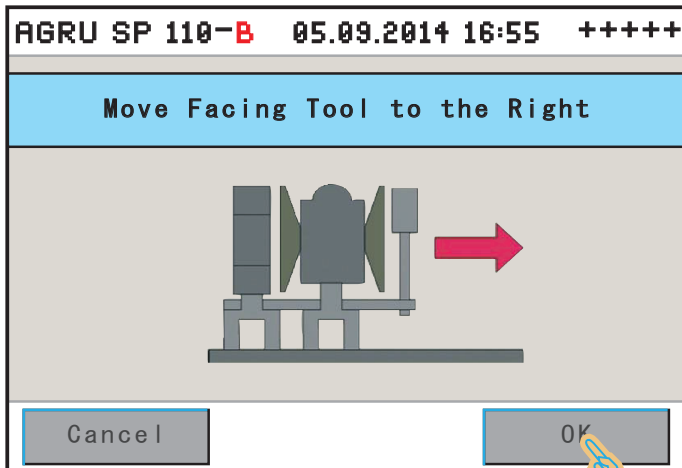




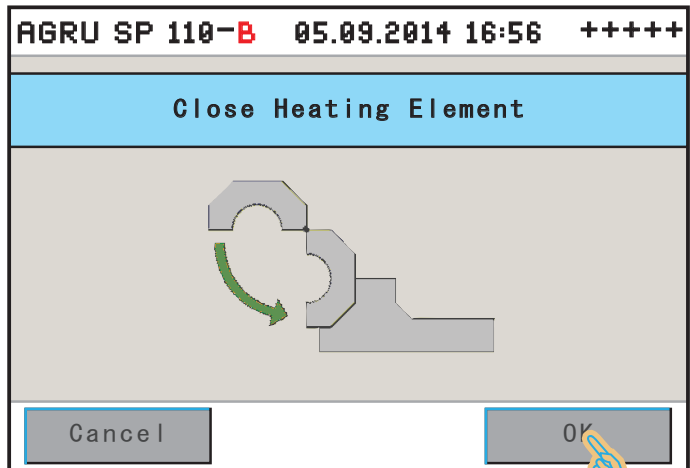
5 Access the third page of options.



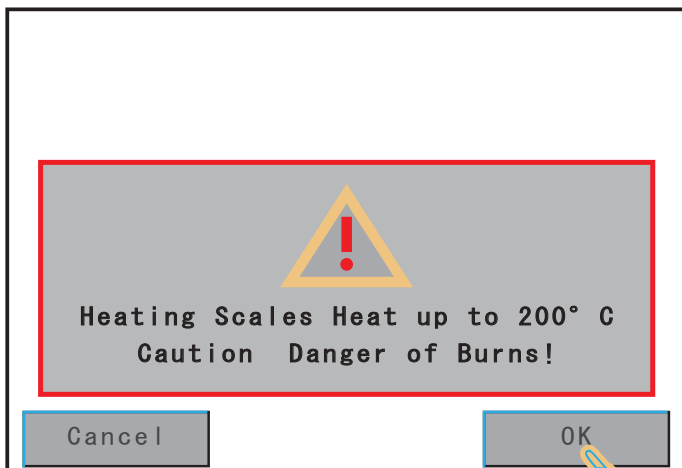
6 Select the menu for cleaning the heating element.



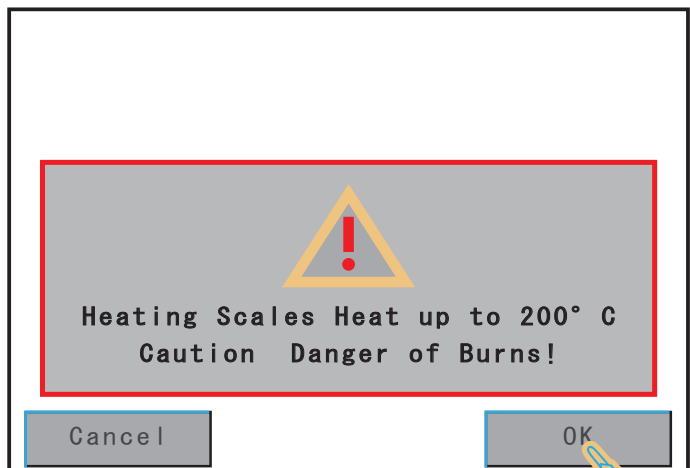
7 Move the facing tool/ heating element console so the heating element can be inserted; confirm on the screen.




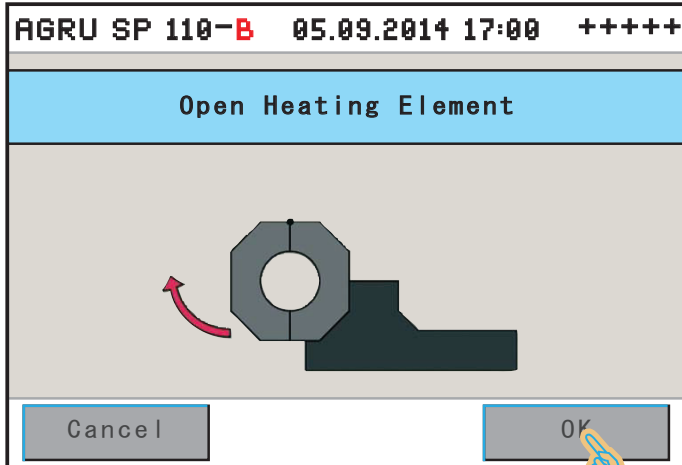
8 Close the heating element and confirm it on the screen.



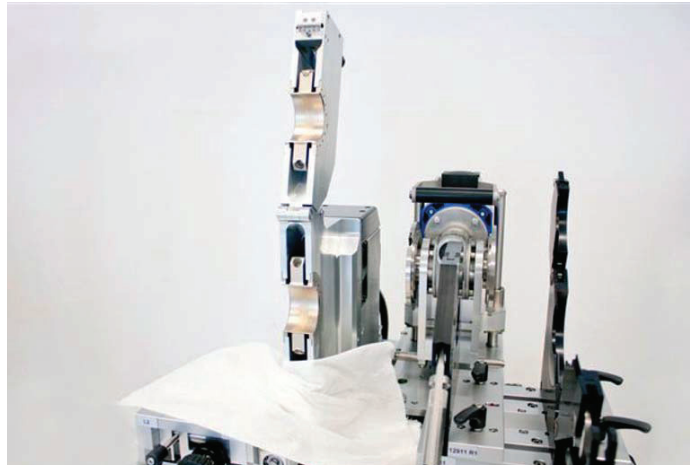
9 Warning messages while the machine heats the scales up to cleaning temperature



10  **Danger of Burns**  
Warning alternating with "Please Wait"; "Ok" button only visible when heating scales have cleaning temperature.



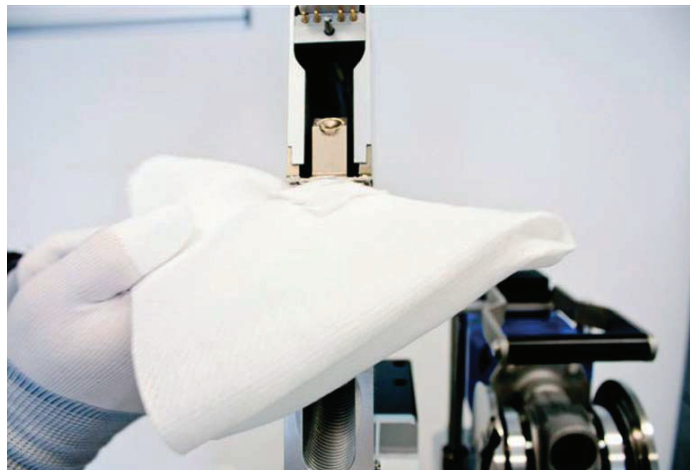
**11** When the cleaning temperature is achieved, open the heating element and confirm it on the screen.



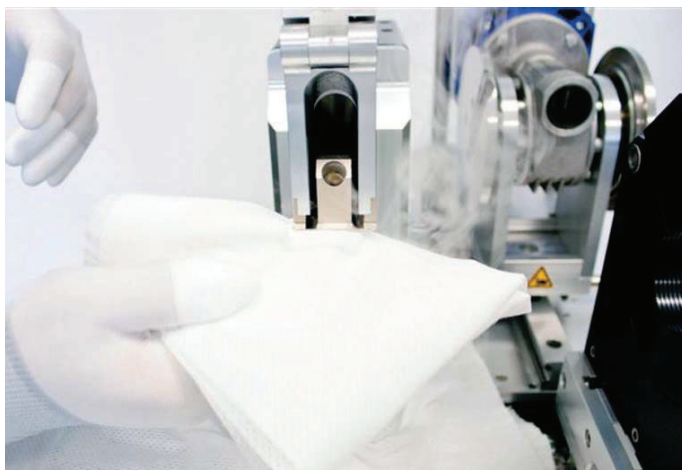
**12** Lay out a clean cotton towel on the machine to protect it from falling plastic residues.



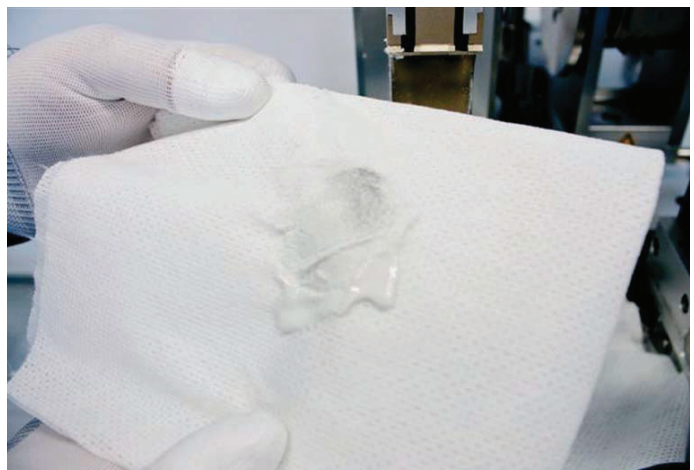
**13** Wet a clean cotton towel with the cleaning emulsion.



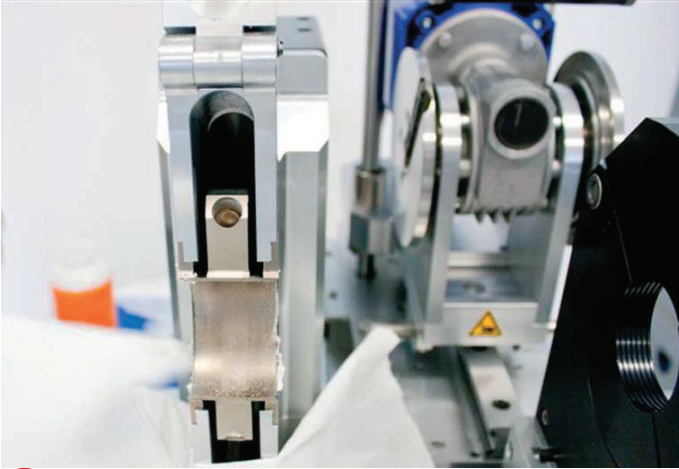
**14** Use the wetted towel to clean the heating scales thoroughly.



**15**  **Danger of Burns**  
Caution



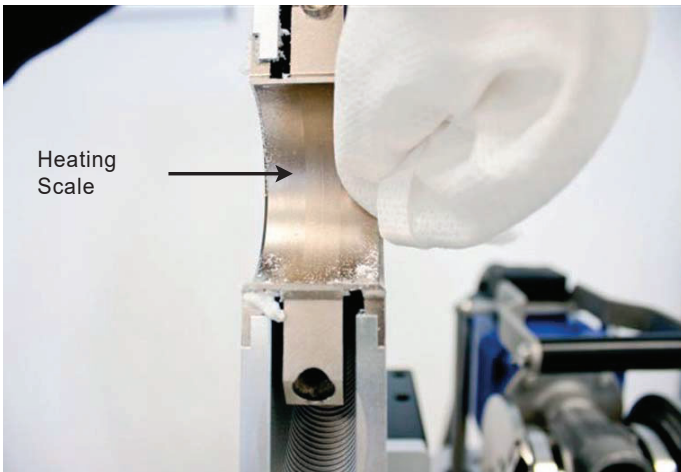
**16** While the heating element is tilted up/open for cleaning, the touchscreen panel shows the cleaning screen.



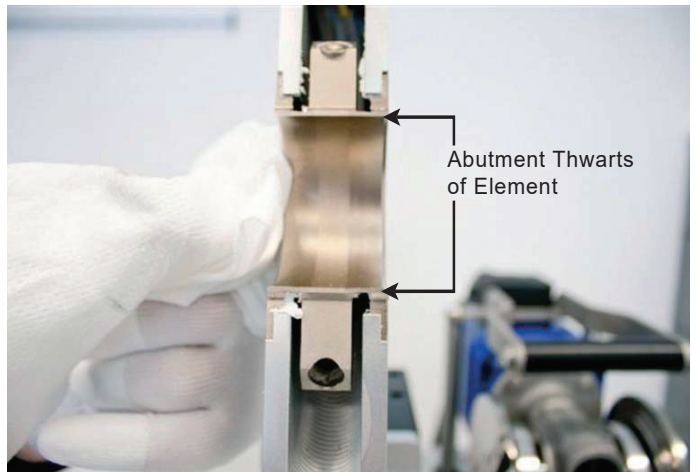
**17** Clean the heating scales and the abutment thwarts ...



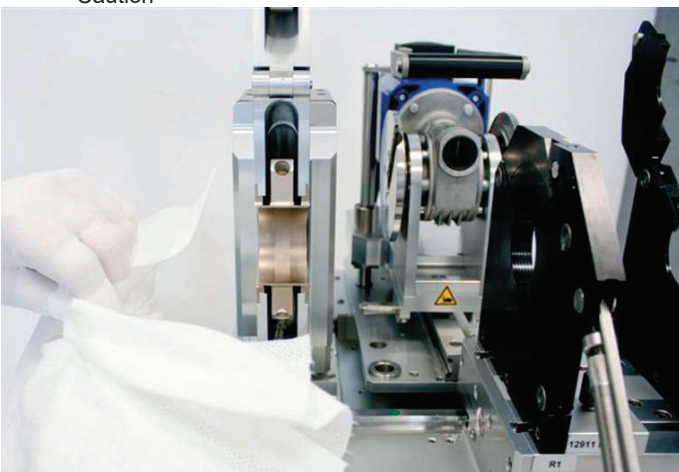
**18** ... of the heating element with the emulsion-wetted towel.



**19**  **Danger of Burns**  
Caution



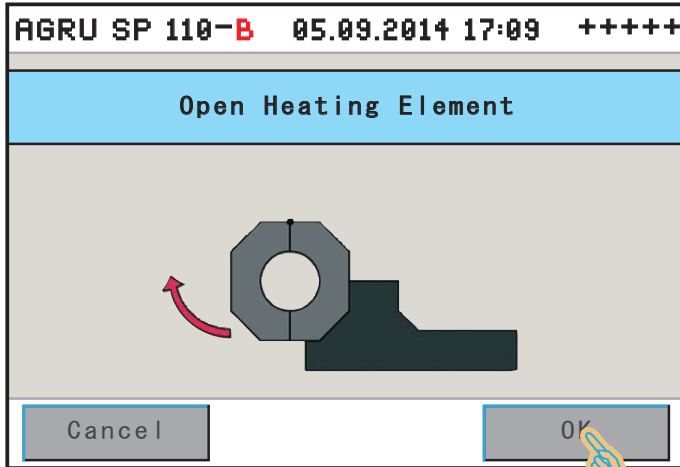
**20** When you are done cleaning them, wipe off the scales and the thwarts with a clean cotton towel ...



**21** ... and finally use a dry cotton towel to polish them.



**22** When done cleaning, touch "Ok" on the cleaning screen and close the heating element to let it cool down.



At the beginning of the cleaning routine, heating up the scales ends when the heating element is tilted up (see no. 11). The cleaning routine can be repeated immediately by closing the heating element when the cleaning screen is showing on the touchscreen. This will restart heating up, and the cleaning routine starts over at no. 9 above.

**23** Open the heating element and confirm it on the screen.