

# Instruction manual

## WM 315 CNC PC / WM 315 CNC FC Workshop Butt-Fusion Machines



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# 1 About this manual

The warning notices, symbols and their meanings as used in this manual are explained below to help you quickly understand the format of this instruction manual and how to use the machine safely.

## 1.1 Warning notice

Warning notices are used in this manual to inform you of possible injuries or damage to property. Please read them and always abide by these warnings!

Symbol	Meaning
 <b>Danger</b>	Imminent accute danger! Failure to comply could result in death or extremely serious injury.
 <b>Warning</b>	Possible accute danger! Failure to comply could result in serious injury.
<b>Caution</b>	Dangerous situation! Failure to comply could lead to injury or damage to property.

## 1.2 Other symbols and notices

Symbol	Meaning
<b>Attention</b>	Mandatory: you must observe this regulation
<b>Advice</b>	Suggestion: this notice contains especially important information
1.	Action request in a sequence of actions

## 1.3 Abbreviations

Abbr.	Meaning
WM 315 CNC PC	Workshop Butt Fusion Machine d 90–315 mm CNC with pipe clamps
WM 315 CNC FC	Workshop Butt Fusion Machine d 90–315 mm CNC with fitting clamps
DVS	Deutscher Verband für Schweißtechnik (German Association of Fusion Technology)
PE	Polyethylene
PP	Polypropylene
PTFE	Polytetrafluorethylene
d	Pipe outer diameter



## 2 Safety instructions

The WM 315 CNC Workshop Butt Fusion Machine CNC with pipe clamps/WM 315 Workshop Butt Fusion Machine CNC with fitting clamps (hereinafter referred to as WM 315 CNC PC/WM 315 CNC FC) is designed according to the latest standards of technology. Using it for purposes other than those described in this manual may cause injury to the operator or to others. It may also cause damage to the machine or other equipment.

Any person in the company, who is involved in the assembly, disassembly, reassembly, installation, operation or maintenance (inspection, maintenance work, repair work) of the WM 315 CNC, must have read and understood the complete instruction manual, and in particular Section 1 on "Safety instructions".

It is recommended that the user has this confirmed in writing.

Thus:

- The machine should only be used when in perfect working order.
- Always follow the safety instructions.
- Complete documentation should be kept in the vicinity of the machine.

### 2.1 Proper use

The WM 315 CNC PC/WM 315 CNC FC is to be used exclusively for the fusion of pipes and fittings made of PE and PP.

### 2.2 General safety measures

- Use only the materials and dimensions specified in this manual. Other materials may only be used after consulting Georg Fischer after-sales service.
- Use only original Georg Fischer spare parts and equipment.
- Inspect the WM 315 CNC PC/WM 315 CNC FC daily for visible signs of damage or defects. Have damage or defects repaired immediately.
- Any work on the electrical equipment may only be done by a specialist.

## 2.3 Working with safety in mind

"Make your contribution to safety in the workplace."

- Report any deviations from normal operation immediately to the person in charge.
- Always keep safety in mind while working.

For your own personal safety as well as for the safe and optimal handling of the machine, the WM 315 CNC PC/WM 315 CNC FC must be installed correctly.

Connect hydraulic hoses to and from the pump only when the hydraulic unit is shut off and not under pressure (observe manometer).



**Danger**

---

### **Danger of electric shock!**

Inspect the electrical cords and devices!

Do not connect damaged cords or devices to the power supply.

---



**Warning**

---

### **Danger of burning!**

The heater is hot (220 °C)!

Danger of burning hands on the hot heater.

Do not touch the heater when on

---



**EN 407 321XXX**

---

### **Danger of burning!**

► Use the handles on the heater.

**To move the heater, use the gloves! (EN 407 321XXX)**

---



**Warning**

---

### **Danger of crushing hands!**

The machine slide moves!

Danger of injury to hands in the moving machine slide!

Do not reach into the machine when moving to the end positions.

---



**Warning**

---

### **Danger of crushing hands!**

The upper half of the clamping unit is heavy!

Do not reach between lower and upper parts when closing the clamping units.

---



**Warning**

---

**Danger of cutting hands!**

The planer blades are sharp!

Danger of cutting hands on the planer disk.

Do not touch the rotating planer disk

---



**EN 388 2241**

---

**Danger of bruising!**

Machine components are heavy!

**To move the components, use the gloves! (EN 388 2241)**

---

## 2.4 Disposal

Shavings and used hydraulic oil should be disposed of properly.



## 2.5 Other disposal

Separate collection of electronic and electrical waste (from the equipment) has to be ensured through appropriate systems



## 2.6 Further safety guidelines

Observe all the regulations, standards and guidelines applicable in your country.

### note:

The symbol below indicates separate collection for electrical and electronic equipment according to 2002/96/CE WEEE directive (Waste Electrical and Electronic Equipment).



## 3 General

### 3.1 Introduction

This instruction manual was written for those persons responsible for the operation and care of the WM 315 CNC PC/WM 315 CNC FC. It is expected and assumed that such persons have read, understood and will abide by the manual in its entirety.

Only with the knowledge contained in this manual can faults on the WM 315 CNC be prevented and trouble-free operation be ensured. It is therefore imperative that the responsible persons are familiar with this manual.

We recommend that this manual be read carefully prior to putting the machine in operation, as we are not liable for any damage or interruptions in operation resulting from failure to comply with this manual.

Should problems nevertheless arise, please contact the nearest Georg Fischer representative.

This manual applies only to the WM 315 CNC PC/WM 315 CNC FC.

We reserve the right to make the technical changes necessary to improve the WM 315 CNC PC/WM 315 CNC FC which may result in deviations from the illustrations and information contained in this manual.

### 3.2 Range of application

The WM 315 CNC PC/WM 315 CNC FC is designed exclusively

- for the joining of plastic pipes and fittings through fusion
- for the manufacture of pipe segment arcs
- for the manufacture of T and Y fittings using the segment fusion process

for dimensions from 90 to 315 mm (250 mm for Y- & T- pieces) diameter.

Any other use is not authorized. The manufacturer cannot be held liable for damage resulting from unauthorized use; the user bears sole responsibility.

### **3.3 Copyright**

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This instruction manual is intended for assembly, operation and maintenance personnel. No part of the technical regulations or illustrations contained herein may be reproduced or distributed in any form, used illicitly for competitive purposes or passed on to others.

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## 4 Product design, equipment

### 4.1 Design

#### WM 315 CNC PC



- 1 Base machine
- 2 Clamping units (for pipes, left / right)
- 3 Reduction clamping inserts
- 4 Electric planer
- 5 Heating element
- 6 Touch screen

## WM 315 CNC FC



- 1 *Base machine*
- 2 *Clamping units (for fittings, left/ right)*
- 3 *Reduction clamping inserts*
- 4 *Electric planer*
- 5 *Heating element*
- 6 *Touch screen*
- 7 *Pipe supports*





## 4.2 Standard equipment

- **Base machine**
  - Distortion-free and sturdy machine bed
  - Hardened, hard chrome-plated linear guide rails for extreme loads
  - Closed machine base with separate electric and hydraulic unit
  - Control panel with clearly arranged operating and control instruments
  - Left carriage movable
  
- **Planer**
  - Manually movable in axial direction in correct working position
  - Insertion and extraction manually operated
  - Load transfer via robust chain drive
  - Planer blades sharpened on both sites
  
- **Heating element**
  - Manually movable in axial direction in correct working position
  - Insertion manually and extraction hydraulically operated
  - PTFE-coating
  - Electronic temperature control
  
- **Clamping unit, left/right for segment fusion**
  - Swiveling angle of 22° 30' (WM 315 CNC PC)
  - Swiveling angle of 15° 00' (WM 315 CNC FC)
  - Opening and closing manually operated
  - Fixation manually
  
- **Reduction clamping inserts left and right for segments jointing (d 90 - 280 mm)**
  - Interlocking (WM 315 CNC PC)
  - 1 piece per dimension (WM 315 CNC FC)
  
- **Pipe supports (WM 315 FC)**
  - With reduction inserts d 90 – 280 mm
  
- **Touch screen**
  - Operator Interface
  - USB connector for fusion data transfer

## 5 Technical specifications

Planer	Power:	1200 W
	Voltage:	230 V
Heater	Power:	2800 W
	Voltage:	230 V 3~ / 400 V 3~
Hydraulic motor	Power:	370 W
	Voltage:	400 V 3~
Machine complete	Power:	4650 W
	Voltage:	400 V 3~

### 5.1 Characteristic data

Machine description:

Plastic butt fusion machine

Machine type	WM 315 CNC PC	WM 315 CNC FC
Machine no.	.....	.....
Total hydraulic piston surface	392 mm <sup>2</sup>	392 mm <sup>2</sup>
Maximum pressure	160 bar	160 bar
Weight of complete WM315 CNC, with main clamps and reduction inserts	465 kg	465 kg
Noise level	70 dB(A)	70 dB(A)
Working temperature range	0° – 50 ° C	0° – 50 ° C

## **6 Transport and assembly**

### **6.1 Packaging**

A decisive factor in the choice of packaging is the means of transport. Normally, the machine and all the accessories are delivered in a cardboard box on a pallet.

### **6.2 Sensitivity**

Special care must be taken when transporting the WM 315 CNC PC/WM 315 CNC FC in order to prevent damage from impact or improper loading and unloading.

All movable parts must be fixed in place.

Transport insurance should be provided for according to the type and duration of transport. Condensation due to large temperature fluctuations and sharp jolts during shipment should be avoided.

Please handle the WM 315 CNC PC/WM 315 CNC FC with care.

### **6.3 Intermediate storage**

If the WM 315 CNC PC/WM 315 CNC FC is not used immediately upon delivery, the machine must be stored in a safe place and properly covered against humidity.

### **6.4 Scope of delivery**

The contents (number of transport crates, pallets, packages) and their condition should be checked immediately upon receipt. Any damage and/or missing parts should be noted right away on the bill of lading and reported to Georg Fischer Omicron without delay.

## 7 Fusion preparation

### 7.1 General information and requirements

Chapter 7 (Fusion Preparation) and Chapters 8,9 (Fusion Process) are based on the instruction sheets and guidelines issued by the DVS.

The fusion area should be protected against the influences of weather (humidity, ambient temperature  $<+ 5\text{ }^{\circ}\text{C}$ , extreme direct exposure to sun) with such measures as pre-warming the fusion materials, sun protection, heating.

For optimal use of the WM 315 CNC PC/WM 315 CNC FC, operating personnel should be specially trained by Georg Fischer. Knowledge of the machine and its components and competence rule out handling errors thereby also preventing faulty fusion joints.

#### 7.1.1 Recommendation for the working area and the installation



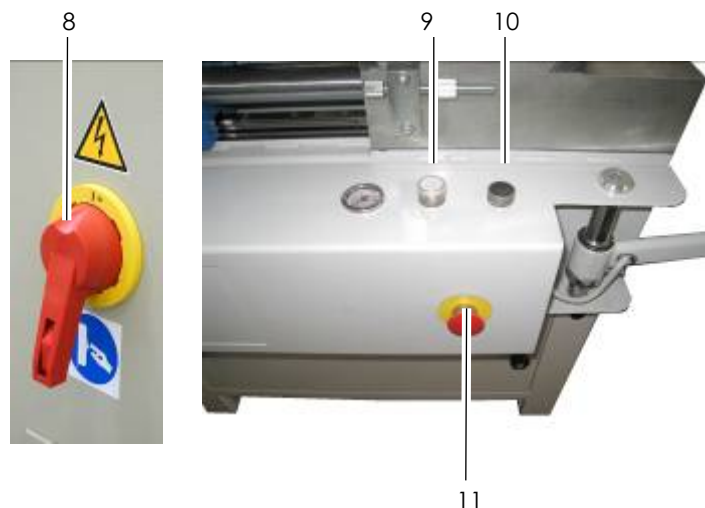
- Install the machine on a concrete base
- Adjust the base machine horizontally and take care that all legs of the machine are in contact with the floor
- Open space around the machine (minimum 1 meter at the rear side) to handle the clamps, accessories and pipes
- If necessary stand by supports for long pipe pieces to be welded
- Place the machine close to the saw to grant an effective work flow

## 7.2 Preparations

1. Connect the machine to electric power supply.

### Caution Check the voltage!

- ▷ Main power switch (8) ON
2. Check that the emergency stop (11) is not activated
3. Press button (9) to switch hydraulic system ON (button will be illuminated)
4. The touch screen will start up automatically to the main page with the possibility of data input, preparation and welding mode



8 Main switch

9 Switch on the current to the hydraulic unit

10 Switch off the current to the hydraulic unit

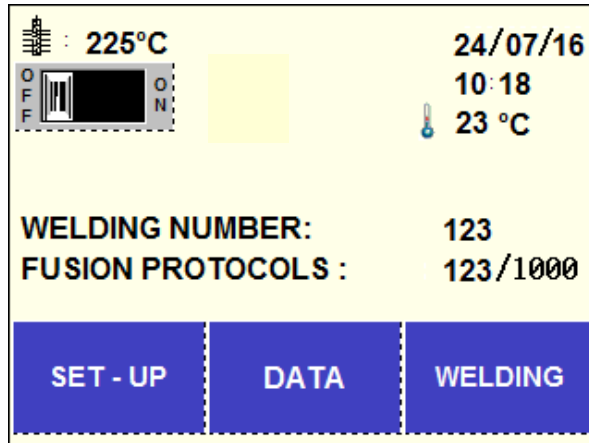
11 Emergency stop

At machine start the following page is shown for a few seconds:

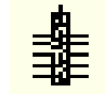
GENERAL INFORMATION ABOUT THE UNIT	
MACHINE TYPE:	WM315 CNC
MACHINE Nr:	M151A5906030
HYDRAULIC UNIT Nr:	9001
SW:	3.82 / 1.26
REV.DATE:	11 / 2017

It reports the general information, including the serial number of the machine and of the hydraulic unit controller, the installed software versions (SW) for PLC / touchscreen and the last date for periodic maintenance (REV.DATE - see chap. 15).

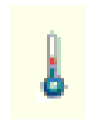
Then the HOME PAGE appears:



The toggle switch at upper left side of the display permits to switch-on the heating plate for pre-heating directly from the home-page, without need to get the welding process preparation started.



: heating element temperature (actual)



: ambient temperature

WELDING NR: number of executed welds

FUSION PROTOCOLS: number of welding records stored in the internal memory / 1000 records maximum capacity

**Attention** When fusion protocols number gets 1000, the next recorded weld will replace the first one stored in the internal memory(see chapter 11.4.4 “Reset Memory”).

### 7.2.1 Status of error lamps

The 3 lamps on the right side of the touch screen are showing the status of the machine:

- ▶ RED: Start button (10) not pressed (white lamp not lightning) or Emergency Stop activated or system error.
- ▶ YELLOW: ON, when the carriage is moving
- ▶ GREEN: ON, at the end of welding without an error

**Attention** In case of system error, switch off the main switch (8) and start again the machine!

If the emergency stop (11) is pushed the following window occurs:



**Attention** To reset the Error message, solve the problem, release the emergency stop and touch the Stop button on the screen.

### 7.3 Touch screen interface

The touch screen is the operator interface of the machine, mounted on hydraulic unit case.



**Achtung**

---








Don't place any objects on the screen!

Keep liquids away from the touch screen!

Use your finger or a soft pin to touch the screen!

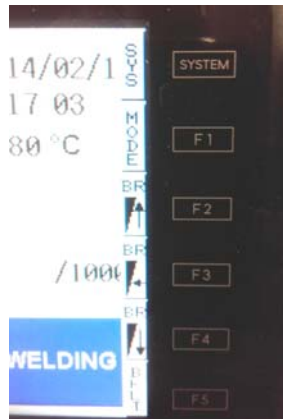
---

Some common rules in the use:

- The button  in the left upper corner leads you to the HOME PAGE
- The button  leads you one page **BACK**
- The button  leads you to the **NEXT** page
- To cancel a character typed with the digital keyboard, push  to go left, push  to go right
- To move among different input fields with the digital keyboard press the Up/Down arrows  

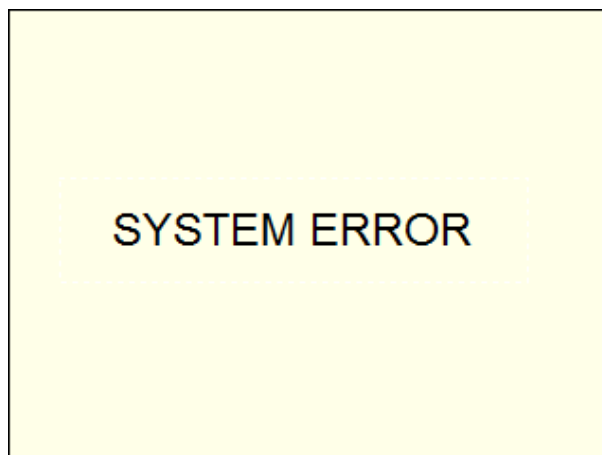
- All data typed with the digital keyboard must be confirmed by pushing ENTER

### 7.3.1 Touch Screen Settings



1. Press the button "System", on touch screen. On the screen the explanation on each of the 6 buttons is shown.
2. To change the brightness press F2 / F4. With F3 the default values are set again.

### 7.3.2 System error



The system error could be caused by insertion of wrong welding data. The machine block itself and you cannot continue the operation.

When a system error occurs, switch-off the machine and restart again!

If inserted welding data are correct and should problems nevertheless arise, please contact the nearest GF service representative.



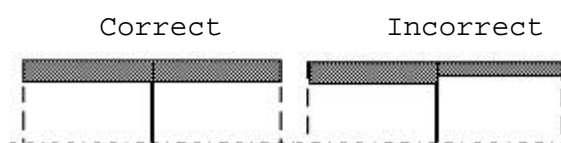
## 8 WELDING

For butt fusion with a heating element, the parts to be joined (pipe/pipe, pipe/fitting or fitting/fitting) are heated to fusion temperature in the fusion area and are fused under pressure without the use of additional materials.

Various country specific standards are applicable; these standards differ in the pressure, time and temperature values.

**Attention** Only the same type of materials are to fuse.

The wall thicknesses in the fusion area need to be the same.

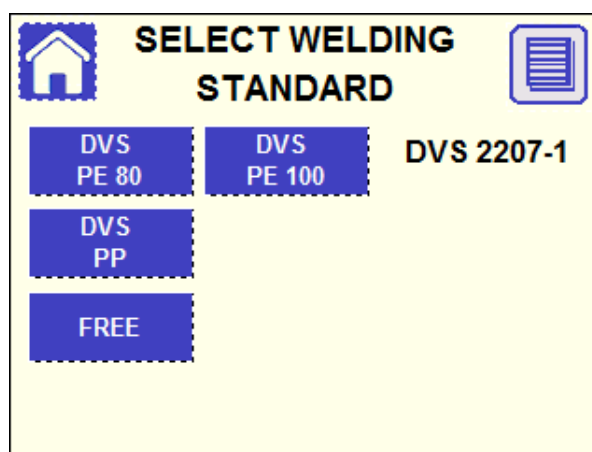


**Only the same wall thicknesses in the fusion area!**


Select in the Home Page the button WELDING. This menu consists of the material selection, the preparation of the welding and the automated welding process itself.

### 8.1 Welding according given standards


#### 8.1.1 Selection of the welding standard



Select the applicable standard and material, then it moves automatically to the next page.

By pushing the button  it is possible to check the complementary information (see chapter 12.1 – Optional Data), which will be included in the fusion protocol together with the fusion parameters.


INPUT DATA SUMMARY	
Operator Name:	JOHN SMITH
Contractor:	OMICRON
Road:	5TH STREET
N°:	12A
Locality:	HILL VALLEY
Note:	TEST JOINT 1





**Attention** "FREE" function makes possible to create customized welding sequences (see chapter 13).

**Attention** For changing the available standards, it is necessary to enter into Welding Standard configuration menu (11.5).

### 8.1.2 Selection of the welding angle

SELECT CLAMP ANGLE				 DVS 2207-1 [°]: 45.0	
0	7.5	11.25	15		
22.5					
T	Y	-	+		





Enter the angle of each single clamp, then the resulting angle between the 2 pipe axis is displayed at right side.

#### Example

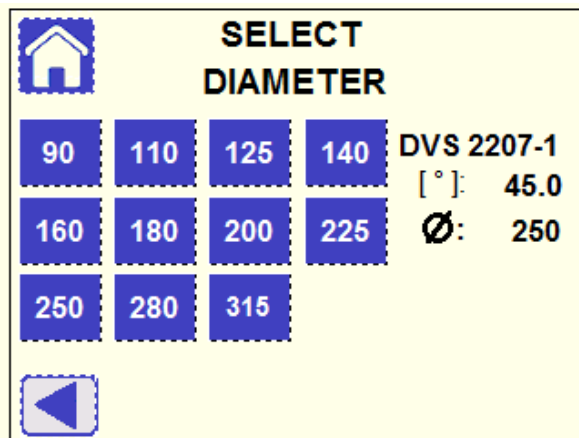
If the 2 clamping units are rotated 22.5° each, the final angle between the axis will be 45°: therefore select 22.5° and then 45° will appear at right side .

To adjust a resulting angle which is not selectable by the buttons, use the +/- buttons e.g. you have to adjust a resulting angle between the 2 axis of 35°, select 15° below the graphic 30° will be displayed, press several times the + button until you reach 35°.

After setting the angle change to the next page by pushing the button .

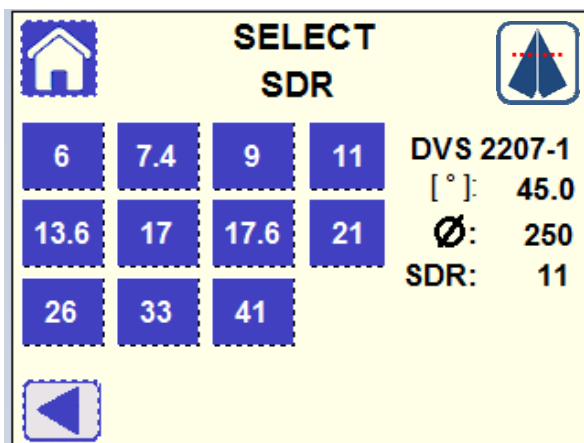
**Attention** To work with special clamps for the fabrication of T and Y fittings (available as optional), push the buttons T or Y respectively (refer to chapters 9 and 10)

**8.1.3 Selection of the pipe diameter**




Select the pipe diameter, then it moves automatically to the next page.

**8.1.4 Selection of the wall thickness (SDR)**

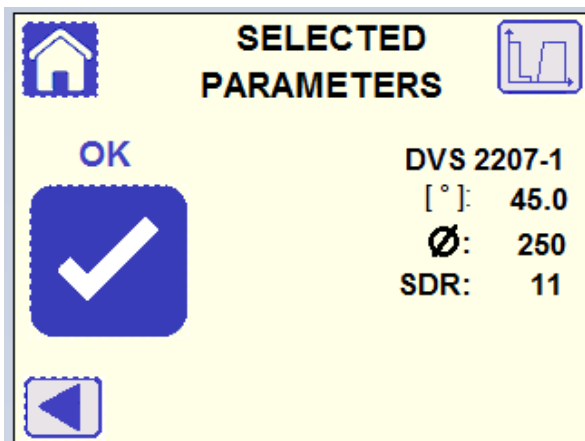


Select the SDR value (relation between diameter and wall thickness), then it moves automatically to the next page.

**Attention** In case it takes to cut the tip of the pipe pieces to be joined, in order to fit the planer and the heating element diameter (T and Y- fittings


fabrication, refer to chapters 9 and 10) the button  is to be pushed to reduce the welding pressure according to the welding area reduction.

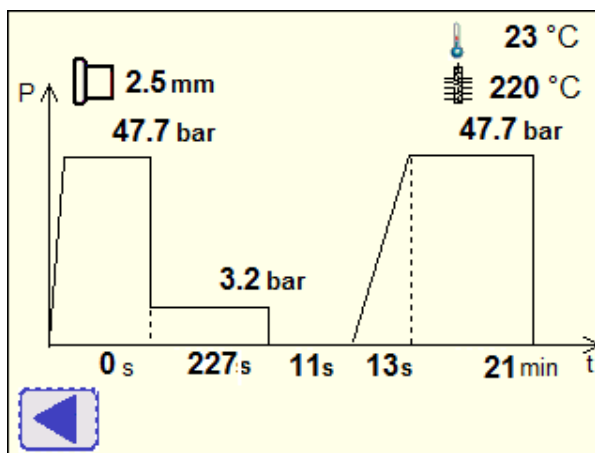
### 8.1.5 Summarization of selected parameters



All selected data will be displayed, to change a single value push the button ◀ to get the steps back.

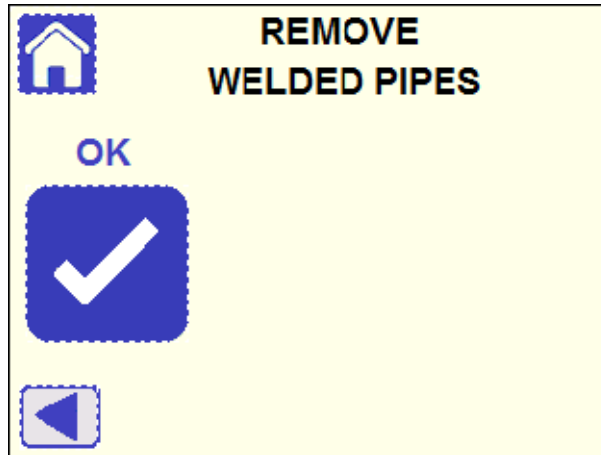
Push the button OK to confirm the parameters.

By touching the button  in the upper right corner, the time/pressure diagram is displayed.



## 8.2 Preparation

The following page appears after confirmation of welding parameters, to remind the operator that he must remove the previously jointed pipes from the machine to proceed.



Push the button OK to confirm.



**Warning**

---

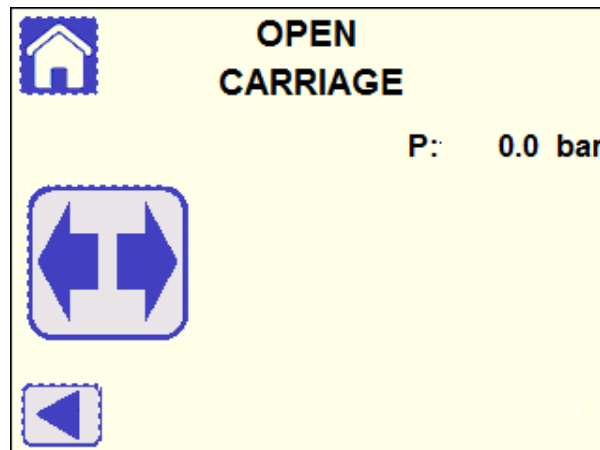
**Remove welded parts out of clamping units to avoid damages of the machine!**


**Don't try to move the carriage with welded components between the clamps!**

---

### 8.2.1 Clamp the pipe

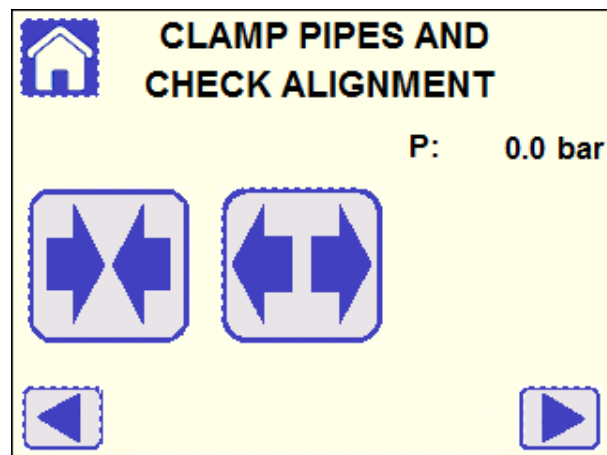
If the base machine carriage is not completely open, the following page appears:





keep button  pushed until the final opening position of the carriage is reached, then the display moves automatically to the next page.

**Attention** If the carriage stops but the page doesn't change, it could be due to obstacles to pipe movement (check if pipes are properly supported and aligned!) or the potentiometer - that is the device which measures the carriage position - may need to be calibrated (see chapter 11.3)

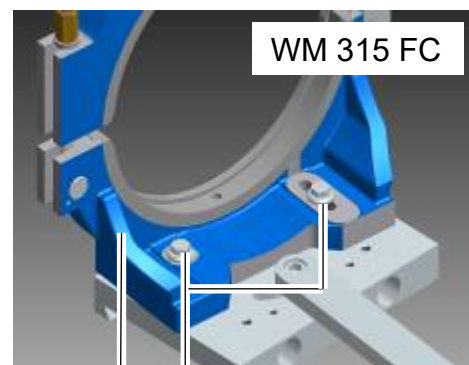
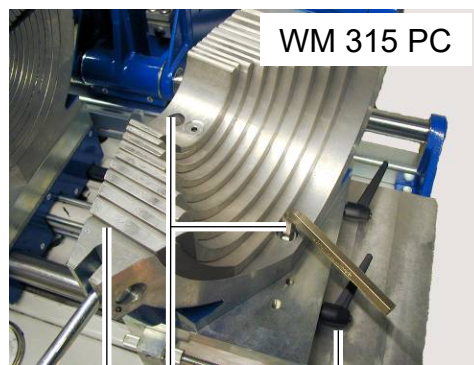
### 8.2.2 Position and clamp pipes



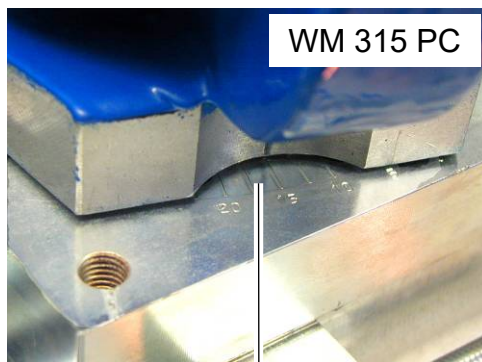
Here it is possible to move the carriage by pushing the buttons  and  to control the correct positioning of the pipes and to align them.

To adjust the angle of the clamping units follow the procedure:

1. Loosen screws (12).



- Position clamping units (2), left and right, at the desired angle (0° - 22° 30' with WM 315 PC, 0° - 15° 00' with WM 315 FC)



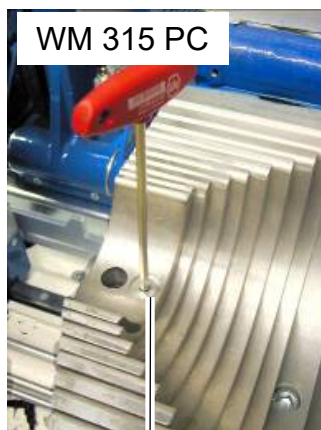
Scale Degrees



Scale Degrees

- ▷ Tighten screws (12).

- In order to join pipes  $d < 315$  mm, insert matching clamp inserts and secure them with the screws (13). Ensure that they are in the correct position. Use the proper screw lengths.

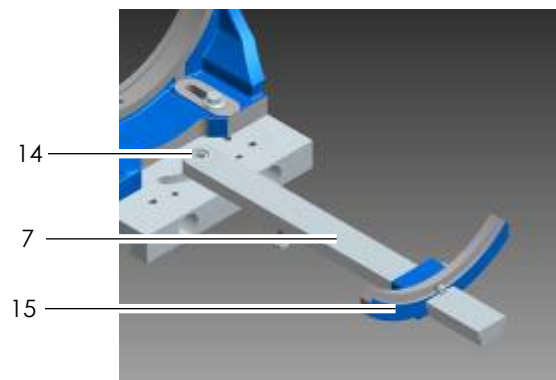


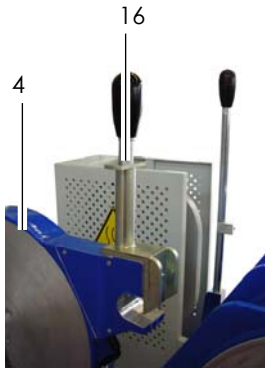
13



13

- Only with WM 315 FC: align the guide rail (7) for pipe support and back stop with the pipe, then tighten the screw (14). In order to fit pipe and fittings  $d < 315$  mm, insert the corresponding reduction inserts in the pipe support (15).





5. While pulling safety lock (16), swing planer unit (4) down into machine. As soon as planer lies on the guide shaft, release safety lock.



Warning

---

### Danger of crushing hands!


**The upper half of the segment clamping unit is heavy!**

**Do not reach between lower and upper parts when closing the clamping units!**

---

6. Clamp pipes into clamping units (2).
  - ▷ Pay attention to the following:
    - Clamp both pipes with the same length out of the clamping unit (mark the distance before with a pencil).
    - The pipe ends must be in range of the planer blades. If necessary, release locking levers (17); adjust the clamping unit (2) perpendicularly to the machine axis so the pipe ends are correctly positioned. Secure clamping unit (2) using the locking levers (17).

When the pipes are properly clamped, open the carriage completely

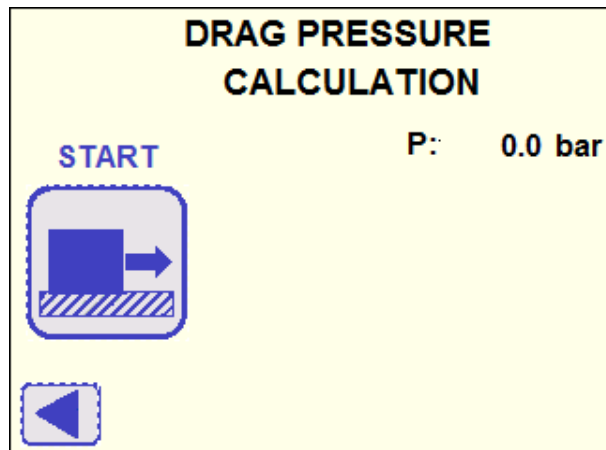
by keeping the button  pushed, then push ► to move to the next page.

**Attention** **If the page doesn't change and the message "Open the Carriage!" appears, it could be due to a not complete opening of the carriage or due to a not correct calibration of the base machine potentiometer (see chapter 11.3)**

### 8.2.3 Drag pressure calculation

The Drag pressure is the pressure used for moving the carriage with the clamped components to be joint. This pressure will be calculated and added automatically to the fusion pressure by the system.





**Warning**

---


**Danger of crushing hands!**

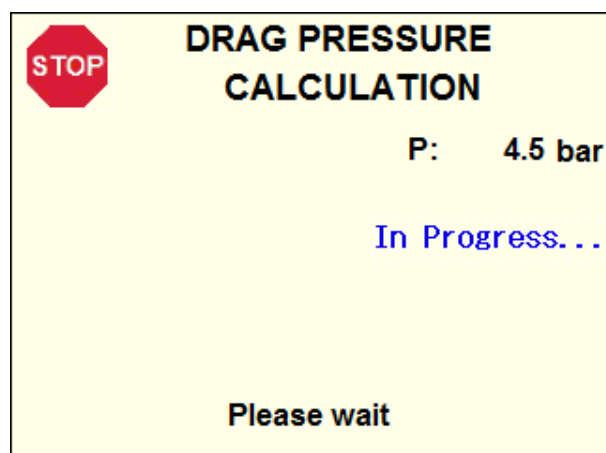
**Machine slide moves!**

**Danger of injury inside the moving machine carriage!**

**When moving to the end positions do not reach into the machine.**


---

Start the action by touching the button , then the display changes automatically into the following page:

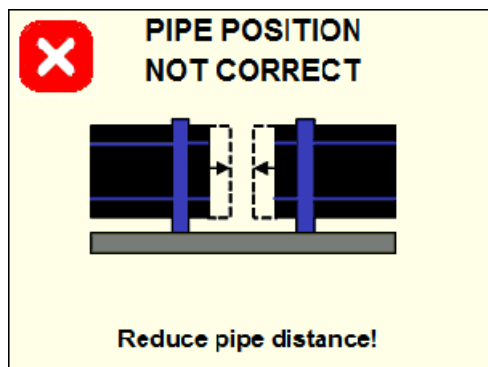
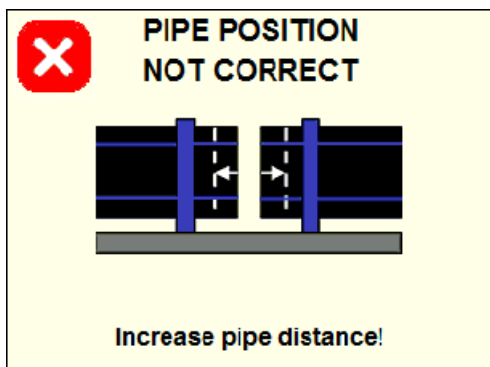


The machine carriage moves slowly until the pipes are in contact. The calculation of the drag pressure is executed during the movement. The machine opens automatically again after the measurement and the display moves to the next page.

**Attention**

**To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage!**

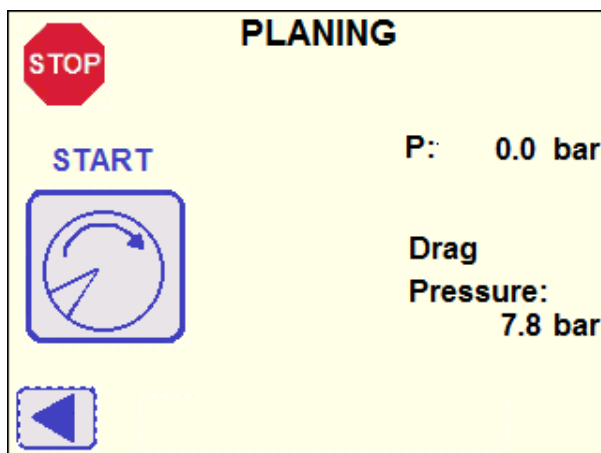
**Attention** If the pipes are not clamped correctly (less space to insert the facer or not enough pipe material to grant welding) a specific message appears to indicate how to adjust the pipes position.



Push the button  to get back to CLAMP PIPES & ALIGNMENT page and adjust the pipes position.

**Suggestion** If the drag pressure is higher than the welding pressure, check if the pipes are properly supported by roller supports and repeat the measurement of drag pressure. The machine will allow to weld even in this condition!

#### 8.2.4 Pipe planing



The calculated drag pressure is shown at lower right side of the display. To repeat the measurement of the drag pressure press button .



**Warning**

**Danger of cutting hands!**

**Sharp planer blades!**

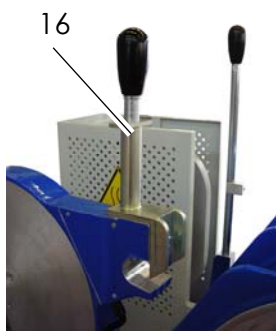
**Danger of injury to hands if the planer disk is touched.**


**Do not touch the rotating planer disk.**

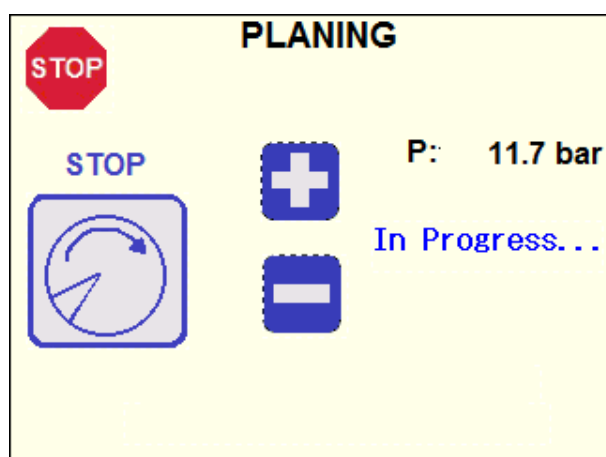
**Advice** Clean the blades before first use of planer!

**The blades are protected by an anticorrosive treatment. The blades must be cleaned with lint-free paper and cleaner like trichloroethylene or pure industrial alcohol (such as "Tangit KS").**

While pulling the safety mechanism lock (16), insert the planer unit (4) . As soon as the planer rests on the guide shaft, release the safety lock (16). This prevents the planer unit (4) from moving out of the working position while rotating.



Check if the planer motor switch is set ON, then start the process by pushing the button : the display moves to the next page.




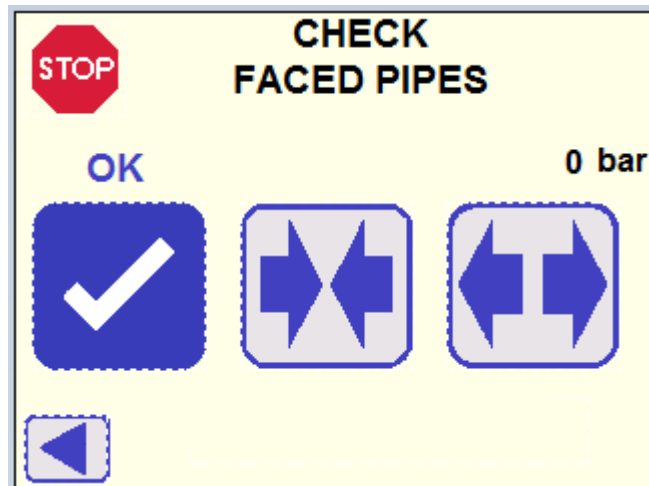
It is possible to release or increase the pressure by pushing the buttons - and +.

**Attention** The starting planer pressure is properly set by the controller: do not increase the pressure more than 10 bars over the drag pressure (check the blades or cutting conditions). Too high pressure will cause damages to the planer!



**Attention** If the planer is not inserted into working area, the message "Insert Planer!" appears and the process stops.


Machine the surfaces of pipes/fittings until shavings are produced on both sides in endless ribbons, which have the same width as the pipe wall thickness. When a minimum shaving has been cut from the pipe ends, the message "Minimum step achieved" appears, then it is possible

to stop the planing by pushing the button  again: the pressure will be released and the rotation stops after 2 additional turns to smoothen the surface. The carriage opens and the following page appears:




If the pipe ends are properly faced, confirm by pushing the button OK and the display moves automatically to the next page: it is possible to

move the carriage by pushing the buttons  and  to properly check the pipes alignment before confirmation.


To repeat the planing procedure get back by pushing the button . If the planing is stopped before the message "Minimum step achieved" appears, the display moves a step back to re-start the procedure.

#### Attention

To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage!



#### Warning

In case of risk to injure the operator or to damage the machine push the button .

When planing is completed, extract the planer and remove shavings from the welding area and also in the pipe, for example with a brush. If you have touched the pipe ends, the fusion surfaces must be cleaned with lint-free paper and cleaner like trichlorethylene or pure industrial alcohol (such as "Tangit KS").

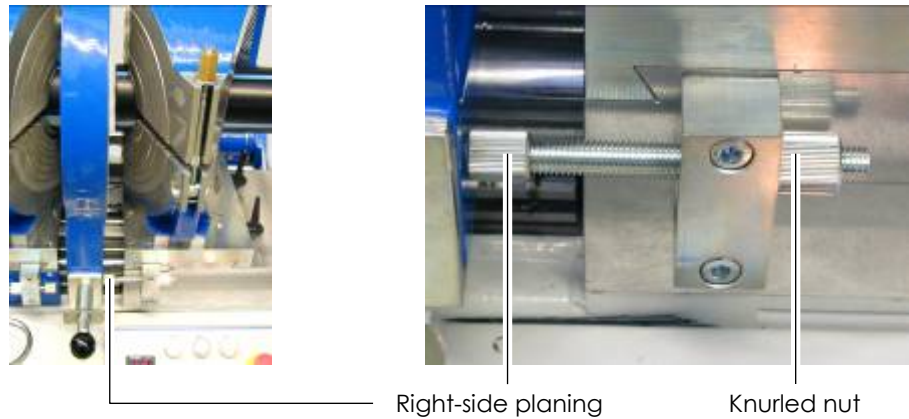
**Advice** After cleaning, never touch the fusion surfaces again!

#### Single-sided operation

This function is mainly used by jointing fittings to pipes. In that case the fitting should only be machined in the final step !

- **Left-side planing**

- ▷ Place right-side planing stop into position.



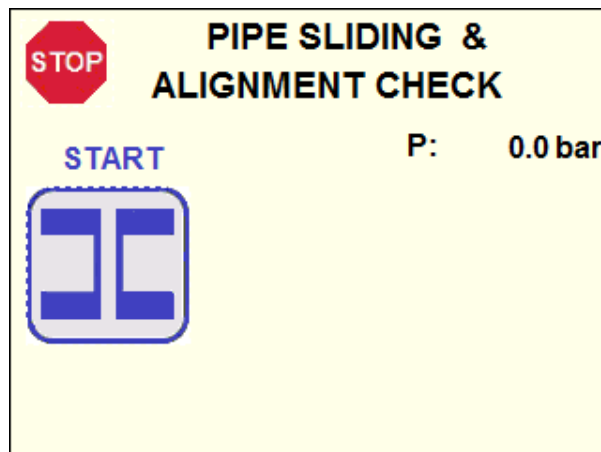
- **Right-side planing**


- ▷ Place left-side planing stop into position.

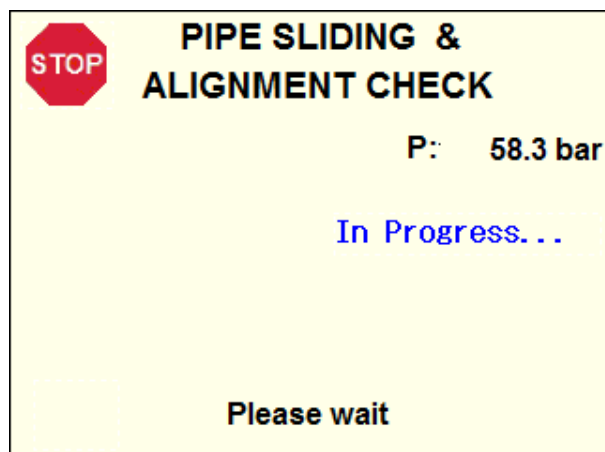
Adjust planing stop as required and secure using knurled nut.

Turn back and secure planing stop after planing is finished.

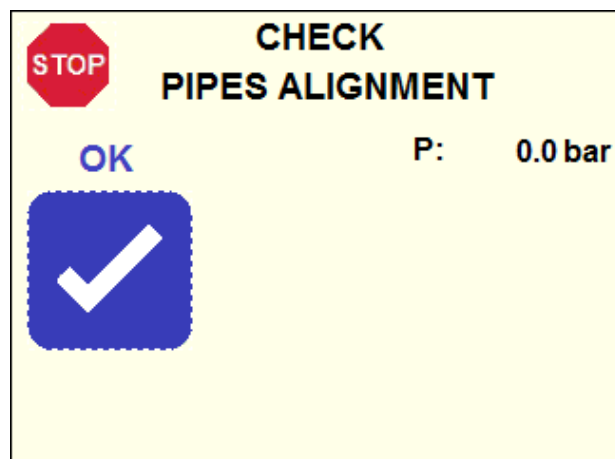
### 8.2.5 Sliding and Alignment control



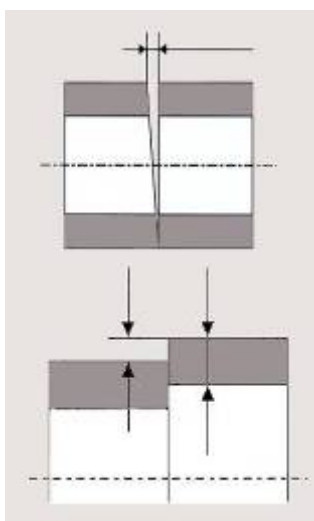
Push the button  to start and the display changes into the next page:



the carriage closes and the fusion pressure is applied to check the clamping. Then the pressure will drop to zero to enable the visual check of pipe alignment by the operator and the following page appears:




Check the pipe ends according to the following guidelines:



The gap must not be larger than 0.5 mm.

Check wall offset at the same time. The wall offset on the outside must not exceed 10% of the wall thickness. If it is larger, the wall offset can be reduced by adjusting the clamping unit or by changing the clamping force using the clamping screws.

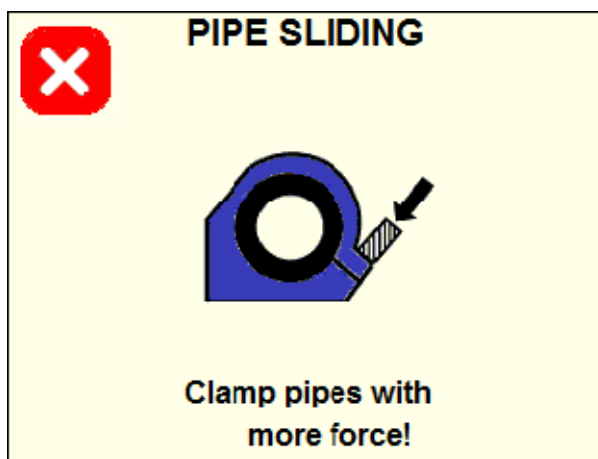
If pipes are properly aligned, confirm by pushing the button OK: the carriage opens automatically and the display moves to the next page.

If not, push the button  to get back to the CLAMP PIPES & ALIGNMENT page to adjust the pipe position and restart the complete procedure.

**Advice** To get a correct alignment of the pipes, use roller supports (at least 1 roller support per pipe)!

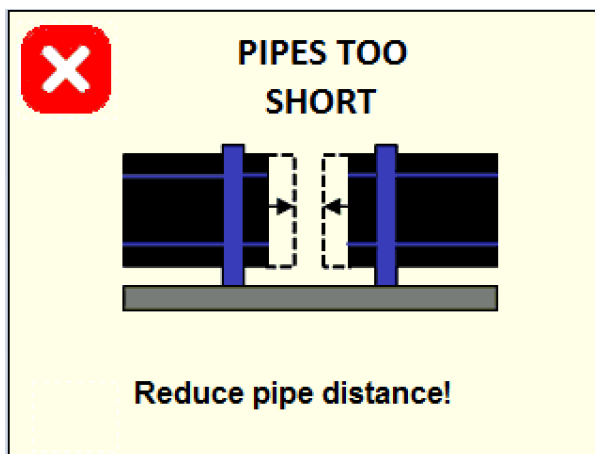
**Attention** To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage!

**Attention** If the pipe slides, a specific message appears.



Push the button  to get back to CLAMP PIPES & ALIGNMENT page and adjust the pipes position.

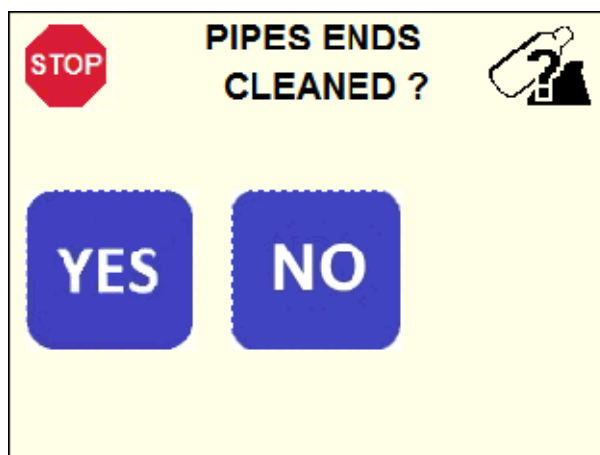
**Attention** If pipe ends distance is too big (not enough material to grant a proper welding) a specific message appears:



Push the button  to get back to **CLAMP PIPES & ALIGNMENT** page and adjust the pipes position.

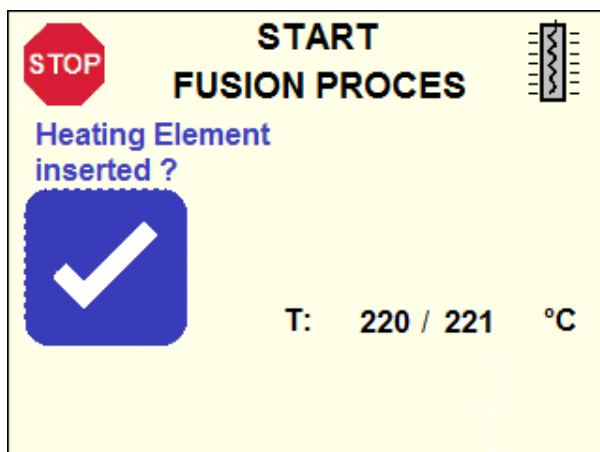
### 8.2.6 Clean the pipes

Then you will be asked to confirm if pipes fusion surfaces have been properly cleaned before getting the welding started.



Push the relevant button to save this information in the welding protocol: independently of the answer, the display changes automatically to the next page.

### 8.2.7 Insert the heating element



The heater plate temperature is set by the controller according to the selected welding standard.

Please, consider that during the fusion process all the relevant parameters – Temperature of the heating plate (T), Pressure (P), Time(t) – are displayed as follows:


Set value / actual value measured by the system

Go to chapter 8.3 to proceed with the fusion process.



**Attention** If the heater plate temperature is out of the working range, either the message “Temperature low!” or “Temperature high!” is displayed and therefore it is not possible to proceed! Wait until the heater reaches the right temperature and the message disappears!

### 8.3 Fusion process

Insert the heater plate in the working position into the machine and then push the button  to confirm and get the process started: the display moves to the next page and the carriage starts to close automatically.

The PTFE coating of the heating element must be protected from mechanical damages and/or dirt.

Replace the heating element if the PTFE coating is damaged. Non-observance will reduce the quality of the fusion joint.



Warning

---

**Danger of burning!**

**Heater is hot (approx. 220 °C)!**

**Danger of burning hands on the hot heater.**

⊘ Do not touch the heater when on.

---



Warning

---


**Danger of crushing hands!**

**Machine is under pressure!**

**Danger of injury in the moving machine slide!**


---

#### 8.3.1 Bead build up




**STOP**

**BEAD BUILD-UP**



Confirm  
Bead Size




**Bead Size:  
2.5 mm**

t1:	11	s
P1:	55.3 / 55.8	bar
T:	220 / 221	°C

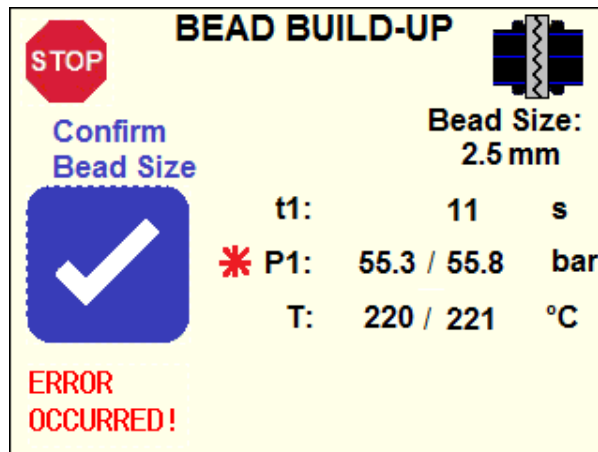
The controller automatically closes the carriage and sets the pressure for the equalization phase (P1).

The operator has to visually check the welding area until the indicated bead size has been achieved externally, all around the circumference,


on both pipe ends, then he has to confirm it by pushing the button : the controller automatically releases the pressure and gets the next phase (heat soak) started.

**Attention** Bead size confirmation is not permitted until t1 hasn't reached 10 seconds.


**Attention** If pressure P1 or heating element temperature T goes out of the tolerance range, the message "ERROR OCCURRED!" is shown and the symbol \* appears close to relevant parameter. The relevant error code will be displayed at the end of the fusion process (see chapter 8.3.5) and an error message will be also printed in the welding report (see chapters 12.2.3/14)




**Attention** If REPEAT BEAD mode is selected (see chapter 11.5.1) and the same parameters (standard, diameter, SDR) are used for the next consecutive welds (see chapter 8.3.7), the system will consider the same time t1 manually confirmed in the first weld and automatically release the

pressure after the countdown: therefore the button  will not be displayed anymore and the message "Repeat Bead" appears. The message "Repeat Bead" will be also displayed in the Selected Parameters summary (see chapter 8.1.4).

**Attention** If DVS 2207-1 (A) standard is selected (see chapter 10.4.3), the equalization phase is automatically controlled by the machine and the

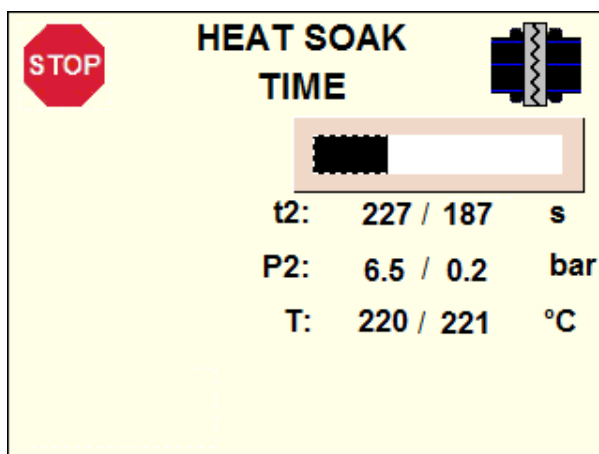
pressure will be automatically released: therefore the button  will not be displayed anymore and the message "Automatic Bead – Please Wait" appears.

**Attention** If NBN T 42-010 standard is selected (see chapter 10.4.3) the system skips the Bead Build-Up phase and directly goes to the next phase.

**Attention** To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage! The message “welding interrupted!” will be also displayed.

### 8.3.2 Heat soak time

The machine now stays for the requested time closed: the pipes ends remain in contact with the heating element.

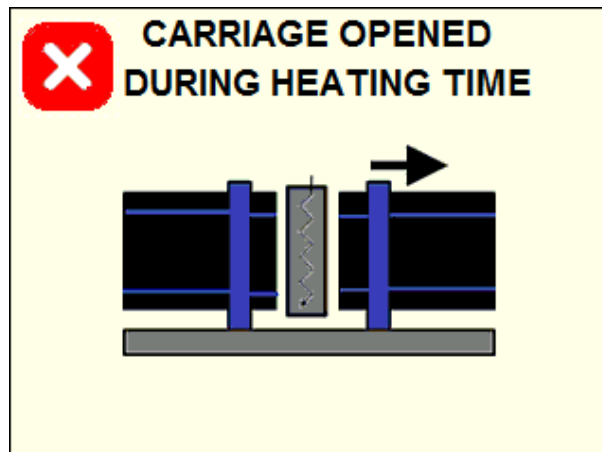


Shortly (6 seconds) before the heat soak time is elapsed an acoustic alarm starts to warn that the carriage is going to open.

When t2 is elapsed the carriage opens and the display moves automatically to the next page.

**Attention** If pressure P2 or heating element temperature T goes out of the tolerance range, the message “ERROR OCCURRED!” is shown and the symbol \* appears close to relevant parameter. The relevant error code will be displayed at the end of the fusion process (see chapter 8.3.5) and an error message will be also printed in the welding report (see chapters 12.2.3/14).

**Attention** If the base machine carriage is forced to open during the heat soak time, the process stops and the following error message appears:



By pushing the button  the display moves to the Error Codes page (see chapter 8.3.5).

**Attention** If NBN T 42-010 standard is selected (see chapter 11.4.3) the system sets a specific pressure higher than zero.

**Attention** To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage! The message “welding interrupted!” will be also displayed.

### 8.3.3 Change over

As soon as the heat soak time is finished, the heating element will be automatically removed from the welding area immediately after machine opening.



**Warning**

---

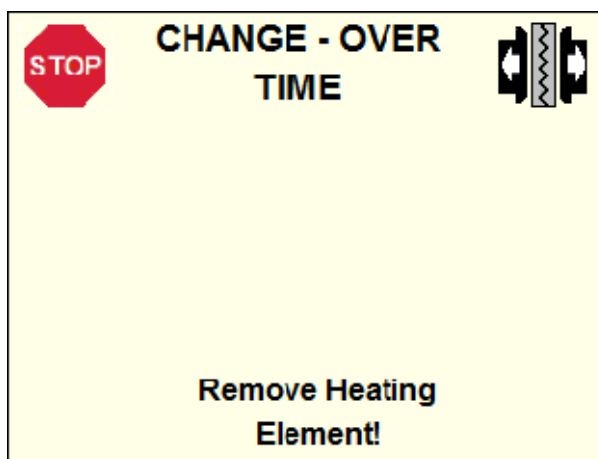
**Danger of crushing hands!**

**Keep your hands out!**

---


**Danger of injury !**

The display shows the following page:



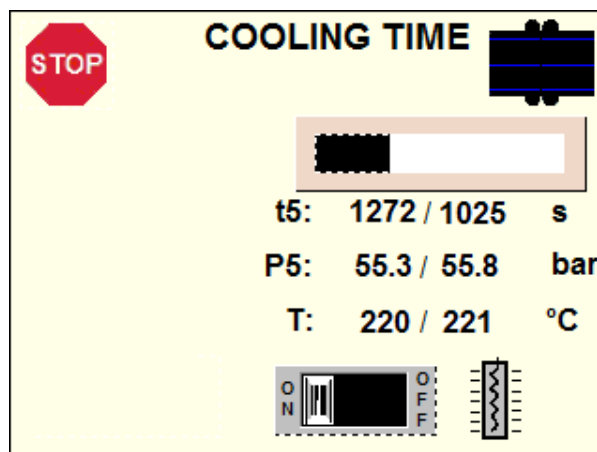
The machine opens the carriage completely, then it closes again to get the pipe ends nearly in contact and stops: the pressure is released and the display moves to the next page.

**Attention** If change over time  $t_3$  goes out of the tolerance range, the message “ERROR OCCURRED!” will be shown. The relevant error code will be displayed at the end of the fusion process (see chapter 8.3.5) and an error message will be also printed in the welding report (see chapters 12.2.3/14).

**Attention** To stop the process immediately push the button . After this action the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage! The message “welding interrupted!” will be also displayed.

### 8.3.4 Cooling time

The system starts to build up the fusion pressure within the required time according to the selected welding standard ( $t_4$ ): an uniform double bead will be formed around the entire pipe circumference.



As soon as the fusion pressure is reached, the counter for the cooling time  $t_5$  starts.

When cooling time is elapsed the system moves automatically to the next step.

If the selected welding standard contains two cooling phases, the controller switches automatically from cooling time 5 to 6.

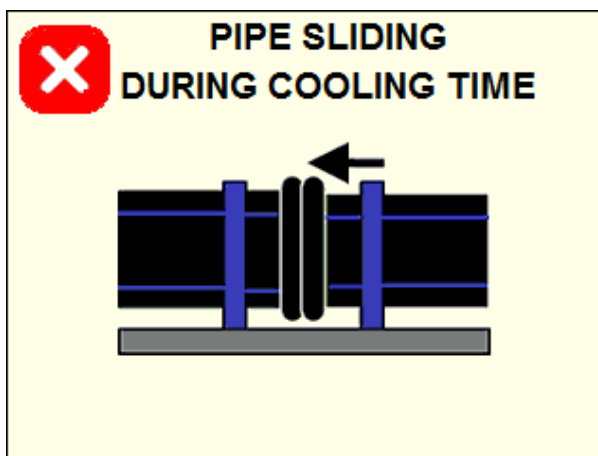


The power to the heater plate could be switched off by means of the toggle switch at bottom of the screen: this function is recommended for the last weld of a day or a long break until the next one.


**Attention** If pressure build up time  $t_4$  goes out of the tolerance range, the message “ERROR OCCURRED!” is shown. The relevant error code will be displayed at the end of the fusion process (see chapter 8.3.5) and an error message will be also printed in the welding report (see chapters 12.2.3/14).

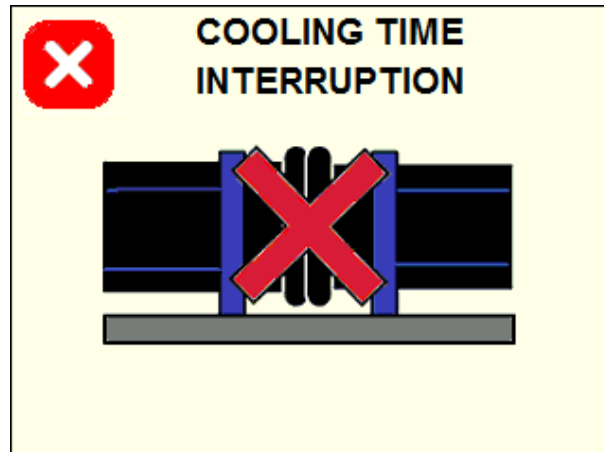
**Attention** If pressure P5 goes out of the tolerance range, the message “ERROR OCCURRED!” is shown and the symbol \* appears close to relevant parameter. The relevant error code will be displayed at the end of the fusion process (see chapter 8.3.5) and an error message will be also printed in the welding report (see chapters 12.2.3/14).

**Attention** If carriage slides during the cooling time (this can be caused for example by premature opening of the clamps), the process stops and the following error message appears:



By pushing the button  the display moves to the Error Codes page (see chapter 8.3.5).

**Attention** The cooling phase could be interrupted at any time by pushing the button . After this action the following error message appears:



By pushing the button  the display moves to the Error Codes page (see chapter 8.3.5).

**Attention** Stopping the on-going fusion process will result in a suspicious welding: the responsibility will be in charge of the operator.

### 8.3.5 Welding conclusion

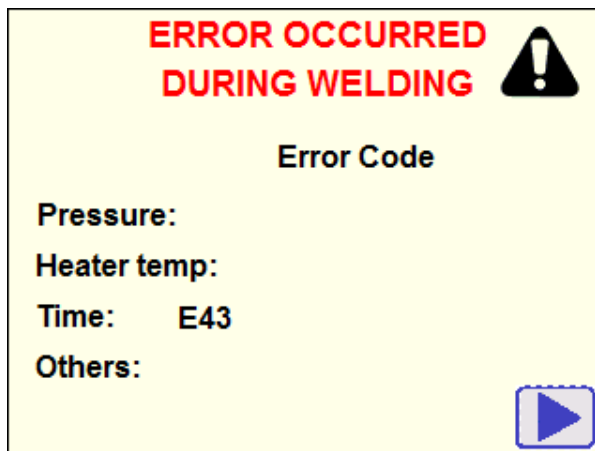
When fusion process is completed without errors, the following page appears:



The reference welding number, considering the sequence of all welds executed with the unit, is displayed.

Push the button  to go to next step.

If any error has been detected during the welding process, a different page is displayed :

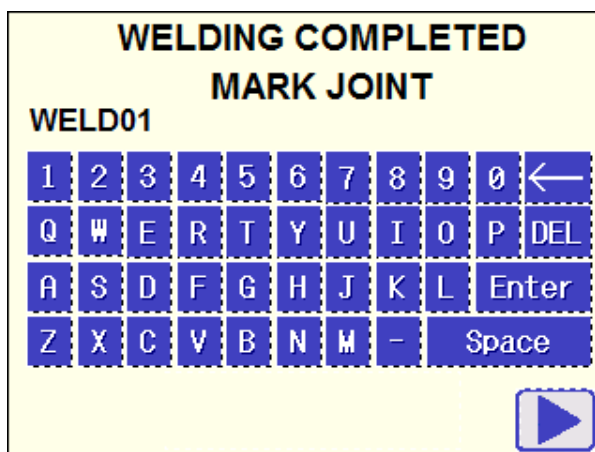


There the specific codes of the occurred errors are indicated, to make easier for the operator to check (see chapter 12.2.3) and report them to GF after-sales support.

Push the button ► to go to next step.

### 8.3.6 Mark joint

After welding conclusion, an individual joint number could be inserted to the welding record.



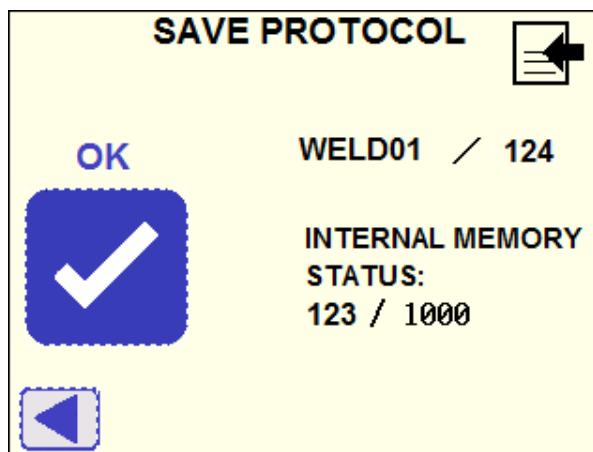
Use the touch key board to input the code (maximum 6 alphanumeric digits), then confirm by pressing the button Enter.

Push the button ► to go to next step.



**Attention** If errors occurred during the welding process, the message **ERROR OCCURRED, CHECK PROTOCOL!** is displayed (see chapters 12.2.3/14)

### 8.3.7 Save protocol



The individual fusion code typed by keyboard and the reference total number are both shown in the upper-right side of the display.

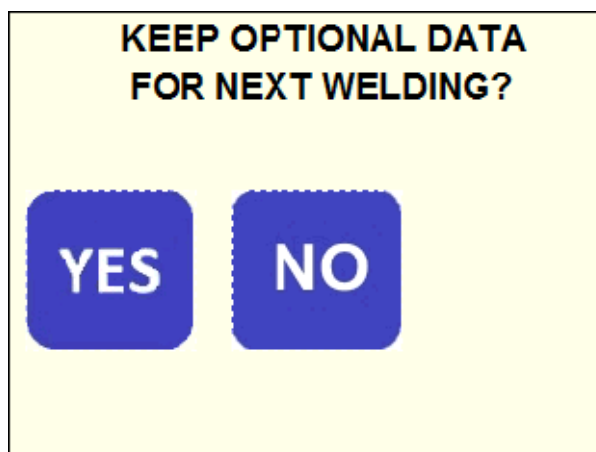
If right, confirm by pushing the OK button: the fusion protocols is recorded in the internal memory and the display moves automatically to the next page.

The status of the internal memory is also displayed (number of welding records stored in the internal memory / 1000 records maximum capacity).

**Attention** When stored fusion protocols number gets 1000, the next recorded weld will replace the first one stored in the internal memory(see chapter 11.4.4 “Reset Memory” in “Machine Set-up”).

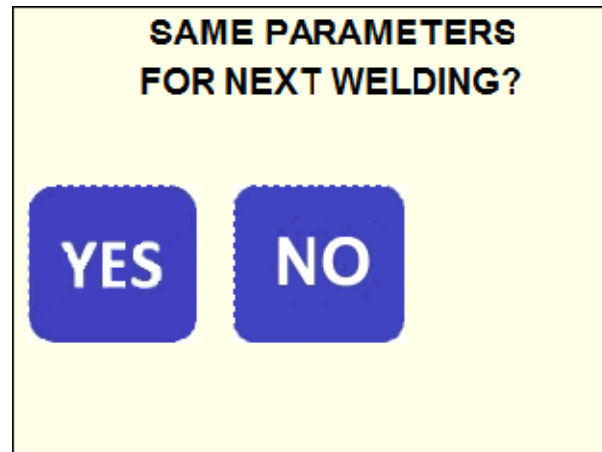
if you need to change the fusion number get a step back by pushing the button ◀.

After saving the record into the memory, you will be asked if the next weld has to be executed with the same Optional Data (see chapter 12.1): if no optional data are stored, this page does not appear.



By choosing NO all the Optional Data will be deleted from the memory.

Afterwards you will be asked if the next weld has to be executed with the same parameters (welding standard/material, diameter, SDR).



By choosing YES the system moves automatically to page SELECTED PARAMETERS (see chapter 8.1.4) to skip the parameters input, if NO it restarts from page SELECT WELDING STANDARD (see chapter 8.1.1).

**Attention** If REPEAT BEAD mode is selected (see chapter 11.5.1) and the button YES is pressed, the system will consider the same time  $t_1$  (see chapter 8.3.1) manually confirmed in the previous weld.



**Warning**

---

**Danger of damaging the machine!**

**Take the welded component out of the clamps !**

---

**Attention** All joints must have cooled completely before the pressure test is performed. This is generally the case approx. 1 hour after the last fusion operation.



**Warning**

---

**Danger of crushing hands!**

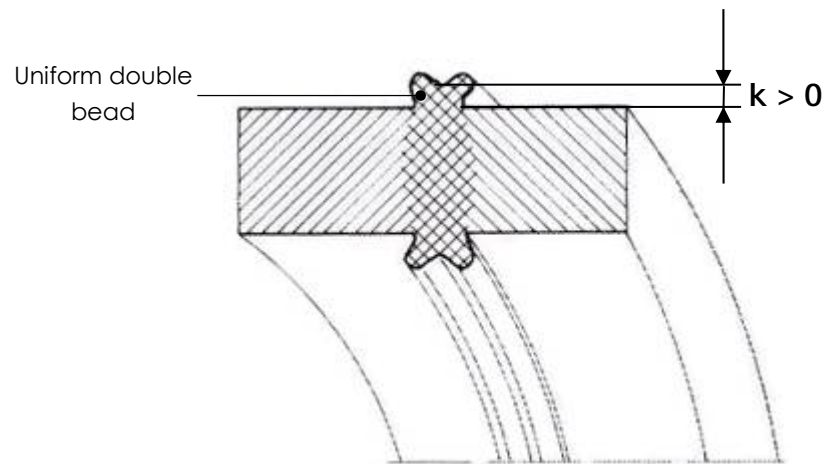
**Machine is under pressure!**

**Danger of injury in the moving machine slide!**

---

## 8.4 Visual inspection of the fused joint

Take out the welded construction with high carefulness, take care not to bend or to stress the welding zone by transporting.



Examine joint visually immediately after unclamping for correct double bead and dimension "k".

Wait for pressure tests at least 1 hour!

## 9 Joining process for manufacturing T-fittings

### 9.1 Installation of T-fitting clamping unit

1. Remove segment clamping units, left and right, which are used for pipes and/or fittings.
2. Mount T-piece clamping device on slide.

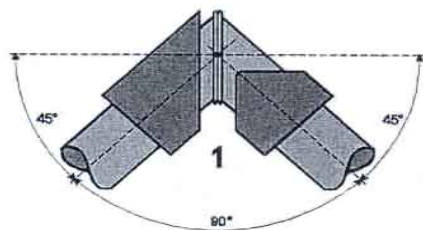


On carriage (left) On carriage (right)

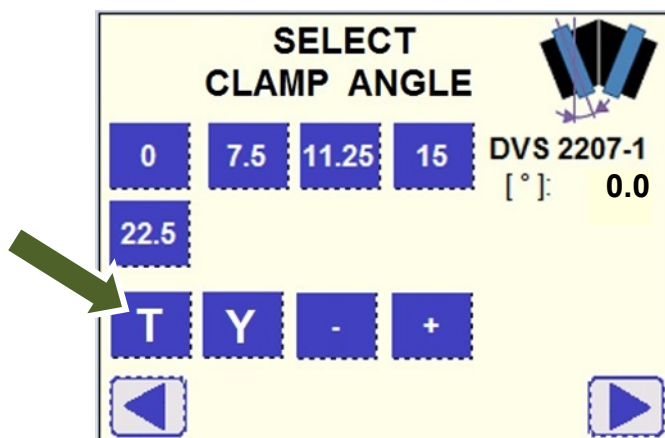
### 9.2 Joining process

#### 9.2.1 Basic process

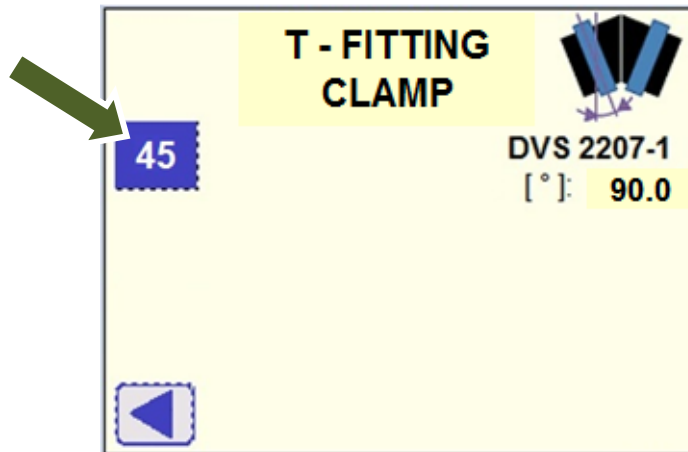
1. Join two pipes at right angles to make a 90° segment



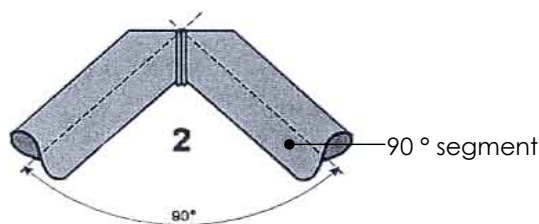
Push the button T in the angle selection page



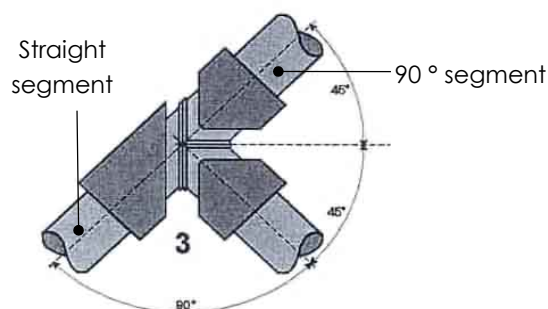
Then push the button 45°, corresponding to the angle of each single clamp, to confirm: then the display will move automatically to "DIAMETER SELECTION" page (see chapter 8.1.3)



2. Cut off a triangular tip from welded pipes.



3. Clamp the 90° segment without triangular tip in the double clamping device (right), then clamp a straight segment (left) at 45° and joint them together by using again the T-FITTING selection in the "SELECT CLAMP ANGLE" page, as done at point 1.



### 9.2.2 Part 1 welding T- fitting

1. Cut pipe ends at 45°.



**Warning**

---

**Danger of crushing hands!**

**Heavy upper clamping inserts!**

- ⊙ **Do not reach between lower and upper parts when closing the clamping stations.**
- 

2. Insert pipes in clamps as described in the Chapter 9.2.1.

- ▷ Align the pipe ends in order to avoid time consuming facing process.

3. Face the pipe ends simultaneously.

- ▷ Check wall offset.

- If necessary, release locking levers (17), adjust the clamping stations ; fix the locking levers (17)
- Face again both sides simultaneously

4. Follow the standard welding sequence.



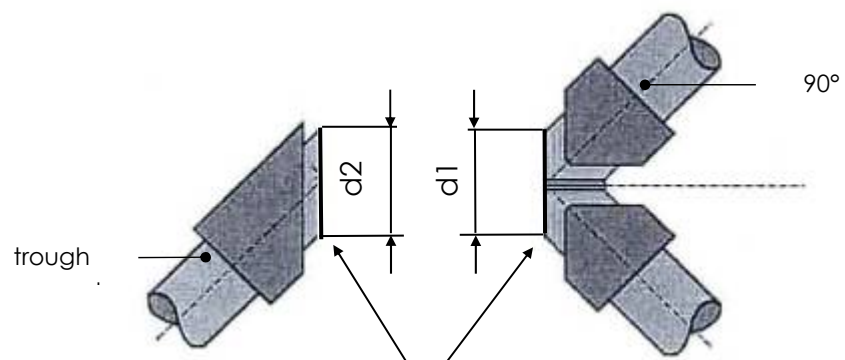
17

### 9.2.3 Part 2 welding T- fitting

1. Assemble the 90° double clamping unit on the right carriage.
2. Assemble the single clamping unit on the left carriage.
3. Clamp the components.
4. Align the pipe ends.
5. Face the components until continuous shaving is produced.
  - Check the alignment if necessary, release locking levers (17), adjust the clamping stations; fix the locking levers (17).
  - Face again both sides simultaneously.

**Important** Take care not to face too much the right component!

**Attention** The outer diameter ( $d_1$ ) of the 90° component should be smaller than the outer diameter ( $d_2$ ) of the straight pipe. During the welding procedure the diameter ( $d_1$ ) will enlarge and fit to the left diameter ( $d_2$ )!



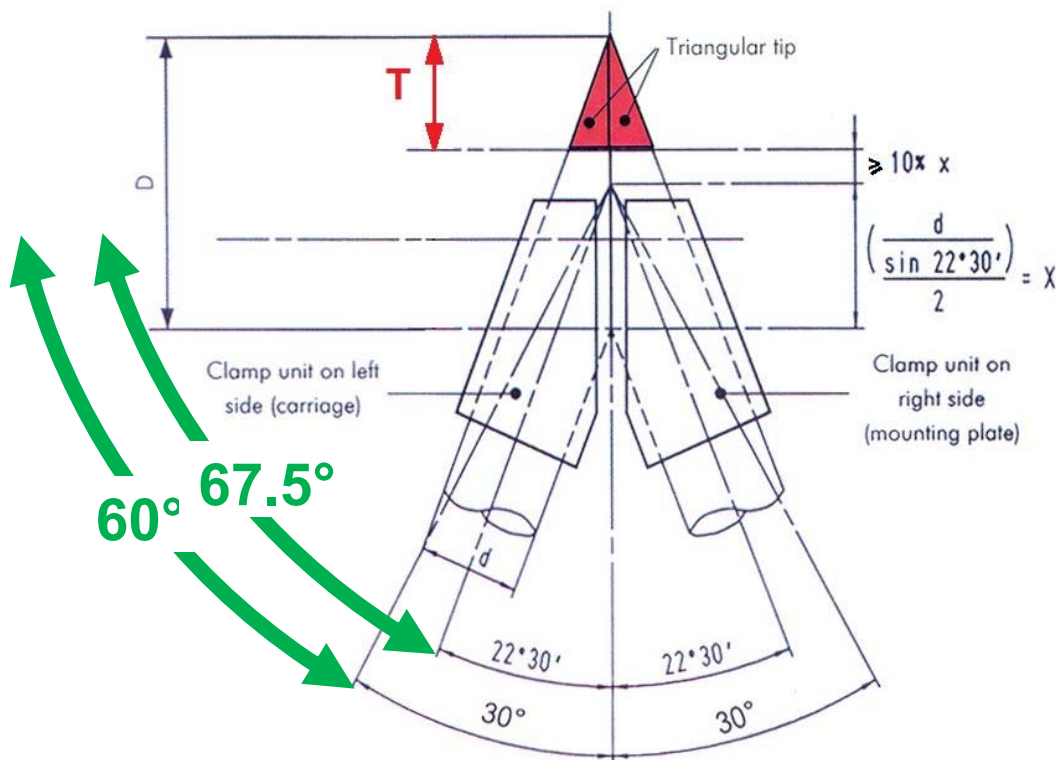
6. Follow the standard welding sequence.

# 10 Jointing process for Y-fittings

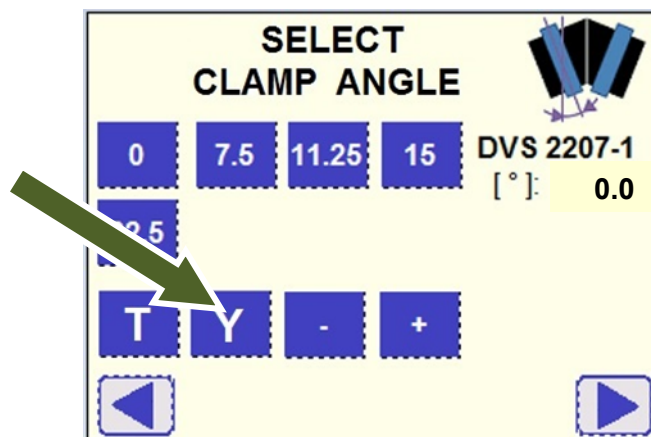
## 10.1 Part 1 welding Y- fitting

Weld a segment by using the adjustable clamping units: the angle between the pipe segments could be set at 45° or 60°.

1. Pre-cut the pipe ends with the requested angle.
2. Insert and align the pipe ends in the clamps.

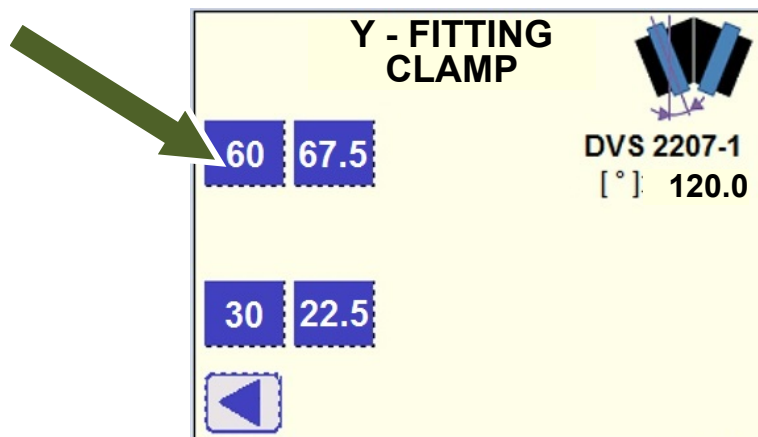


Push the button Y in the angle selection page






Then push the button corresponding to the angle of each single clamp, that is **60°** (if the angle between pipe pieces is 60°) or **67.5°** (if the angle between pipe pieces is 45°), to confirm: then the display will move automatically to "DIAMETER SELECTION" page (see chapter 8.1.3)

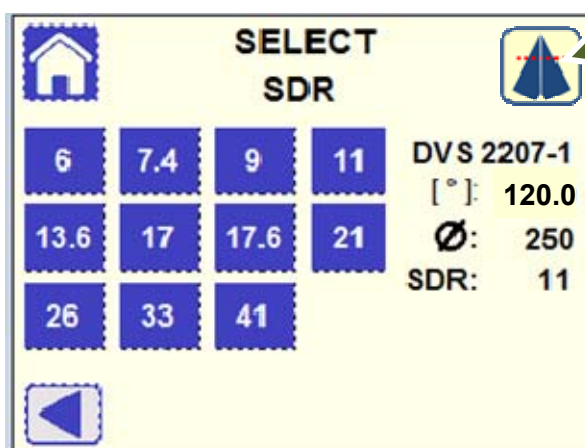


**Important**

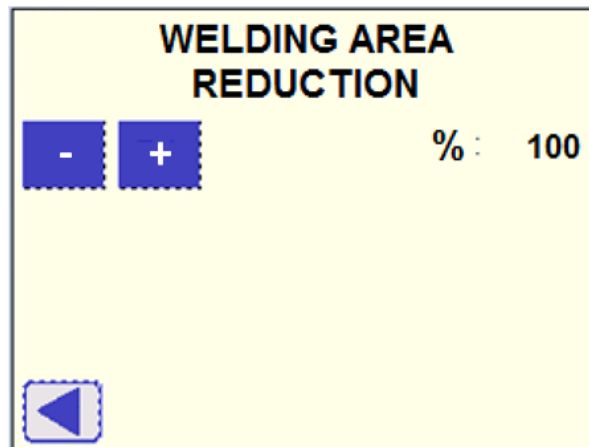
If the welding diameter D of the ellipse is bigger than the working area of the planer and the heating element (depending on the selected angle and the outer diameter of the pipe) a triangular tip have to be cut off **before** starting the welding preparation. Therefore the **welding pressure has to be reduced accordingly!**

**Pressure reduction**

Before selecting the SDR class of the pipe, press the symbol  at the higher right corner of the display.



Then you enter into the page to input the welding area reduction factor:



Depending on the length of the cut tip (T), the reduction factor to be applied should be nearly  $(D-T) / D \times 100$ .

Then push the button ◀ to come back in the SDR selection page and select the SDR to proceed.

### Attention

If the welding area has been reduced (value set < 100%) the message "Welding Area Reduction!" will be displayed in the SDR selection page.

3. Face the pipe ends simultaneously.

▷ Check wall offset.

- If necessary, release locking levers (17), adjust the clamping stations ; fix the locking levers (17)
- Face again both sides simultaneously

4. Follow the standard welding sequence.

## 10.2 Part 2 welding Y- fitting

1. Assemble the V - shaped clamping unit on the right carriage.

2. Assemble the single clamping unit on the left carriage.

3. Clamp the jointed V segment at the right clamping unit and a straight pipe segment at the left.

4. Align the pipe ends.

5. Face the components until continuous shaving is produced.

6. Check the alignment if necessary, release locking levers (17), adjust the clamping stations; fix the locking levers (17)

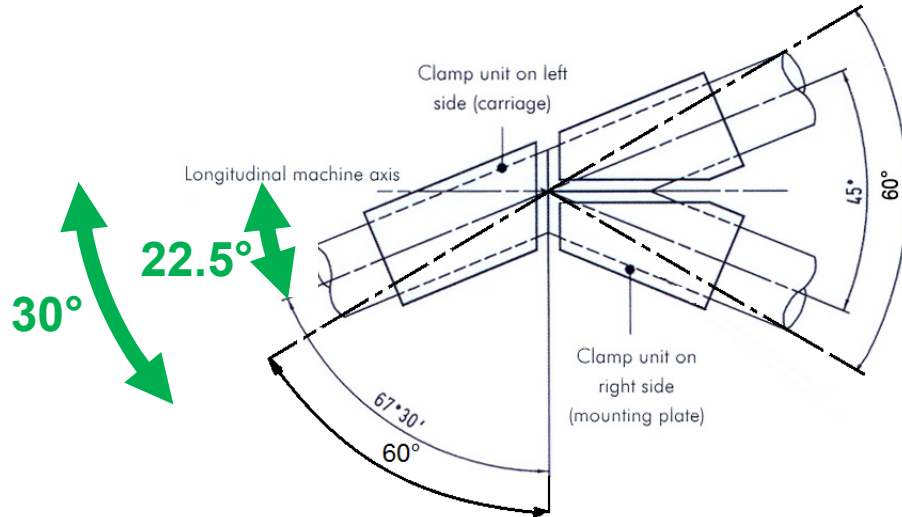
- Face again both sides simultaneously.



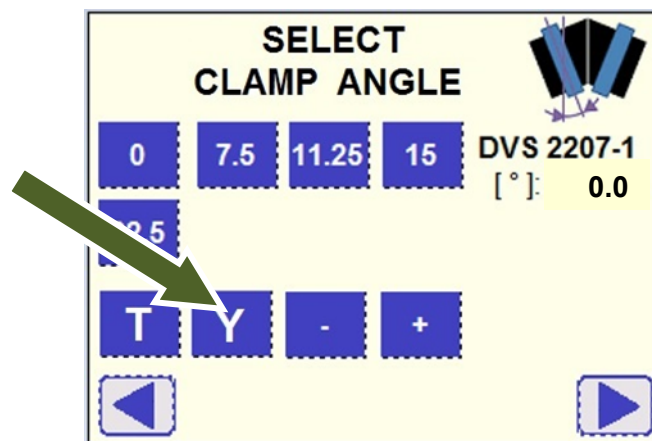
17

**Important** Take care not to face too much the right hand V segment!

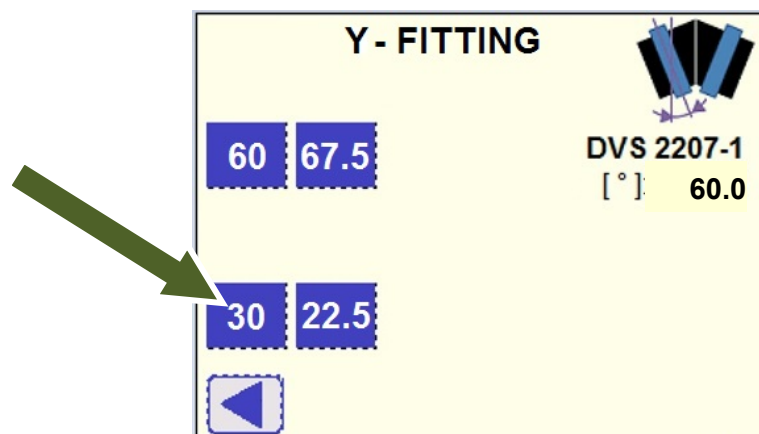
**Attention** The outer diameter (d1) of the V - shaped component should be smaller than the outer diameter (d2) of the straight pipe. During the welding procedure the diameter (d1) will enlarge and fit to the left diameter (d2)!



Push the button Y in the angle selection page



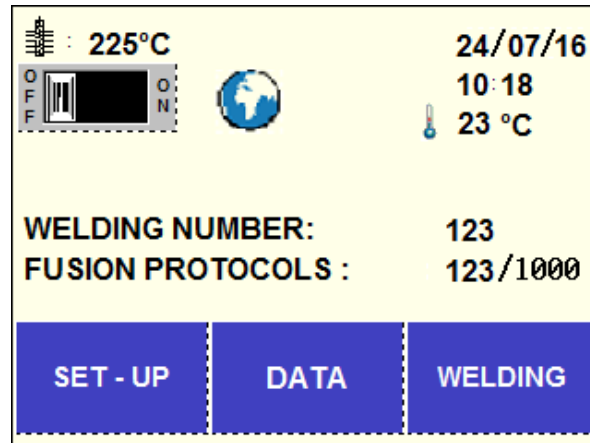
Then push the button corresponding to the angle of each single clamp, that is 30° (if the angle between pipe pieces is 60°) or 22.5° (if the angle between pipe pieces is 45°), to confirm:



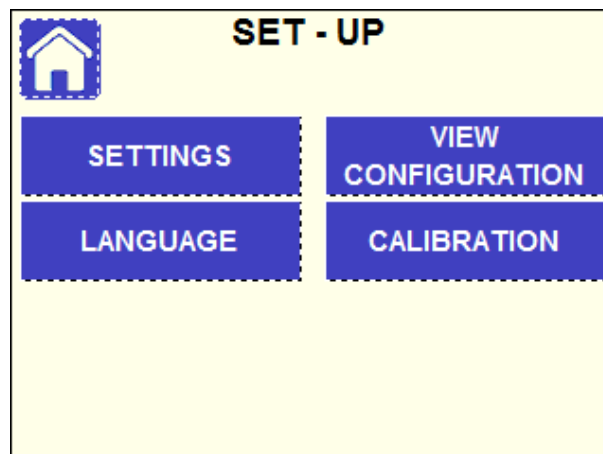
then the display will move automatically to "DIAMETER SELECTION" page (see chapter....)

7. Follow the standard welding procedure.

# 11 Machine Set-up

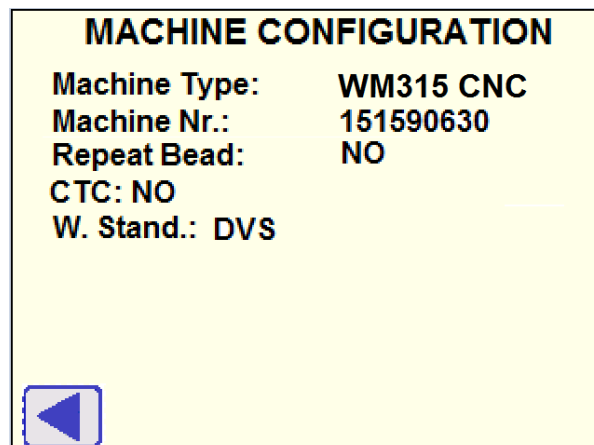


Push the button SET-UP at Home Page and the next page appears.



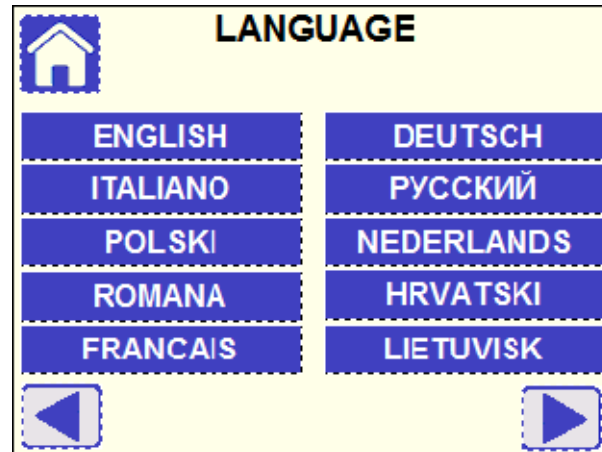
## 11.1 View Configuration

Press the button VIEW CONFIGURATION to check the configuration settings of the unit (see chapter 11.5).



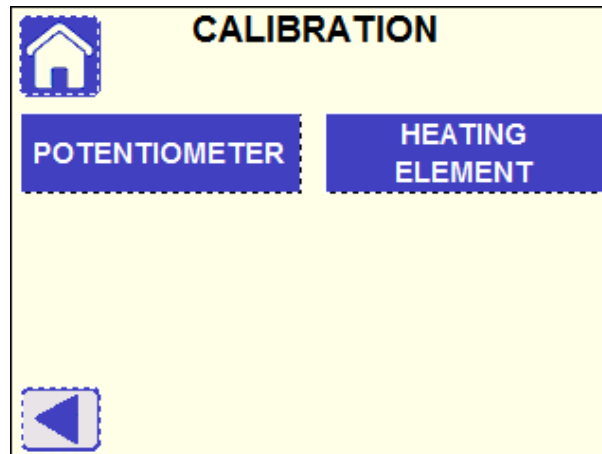
## 11.2 Language selection

Press the button LANGUAGE: to select the appropriate operation language press the corresponding button. The language will change after escaping the language menu by pressing the button ◀.



## 11.3 Calibration

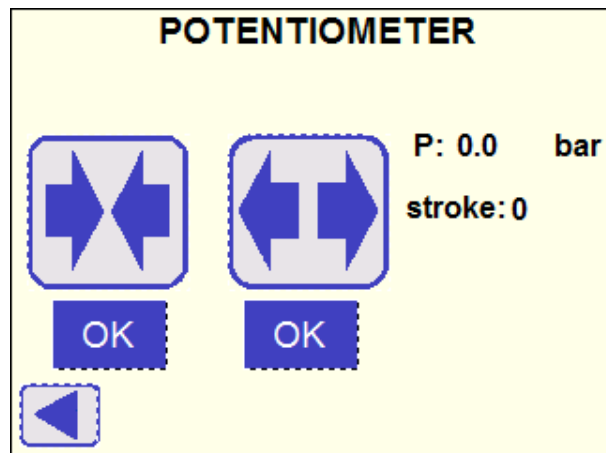
Press the button CALIBRATION and the following page appears:




Here it is possible to calibrate the base machine potentiometer and the heating element.


### 11.3.1 Potentiometer

Press the button POTENTIOMETER and the following page appears:



The potentiometer is the device which automatically detects the position of the base machine carriage.

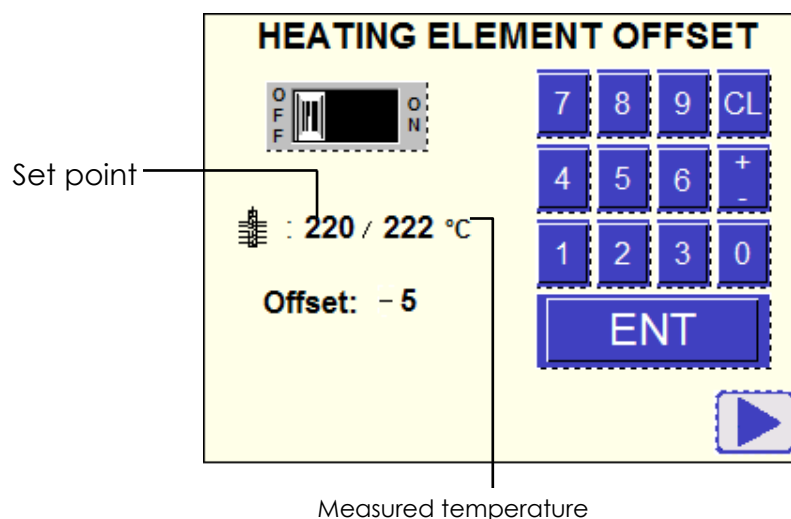
Close the carriage by pushing the button : when carriage has reached the final position, then push OK under the relevant button.

Now, open the carriage by pushing the button : when carriage has reached the final position, then push OK under the relevant button. The potentiometer is calibrated.

Go back by pushing the button .

### 11.3.2 Heating element

Press the button HEATING ELEMENT and the following page appears:



1. Switch on the heating element (set the toggle switch to ON).
2. Wait until the measured temperature (shown at right side) is stable near to the reference set point (220 °C, shown at left side).
3. Measure the actual temperature directly on the heater plate after minimum 10 minutes with a calibrated temperature control device. Measure min. on 4 different points on each side and calculate the average temperature.
4. Adjust the Offset: if the heater plate average temperature is higher than the set point, decrease the offset by the difference. For example measured average temperature on plate is 230 °C (set point is 220 °C) set the offset at -10 °C. Insert first the number (in this example "10") and then the prefix (in this example "-"), the value is saved by pressing the ENT button.
5. Check again the average heater plate temperature (steps 2-3): if necessary, repeat step 4 for finer adjustment.

To exit from the menu, first switch off the heating element by pressing again the toggle switch.

Go back by pushing the button ◀.



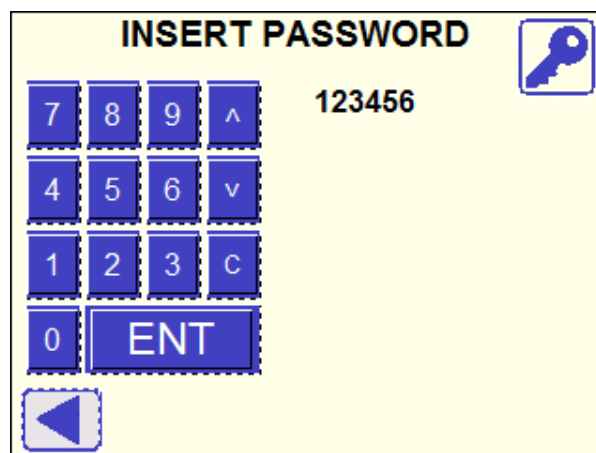

---

**The heating element temperature should be checked regularly according to the country-specific guidelines!**

---

## 11.4 Machine settings

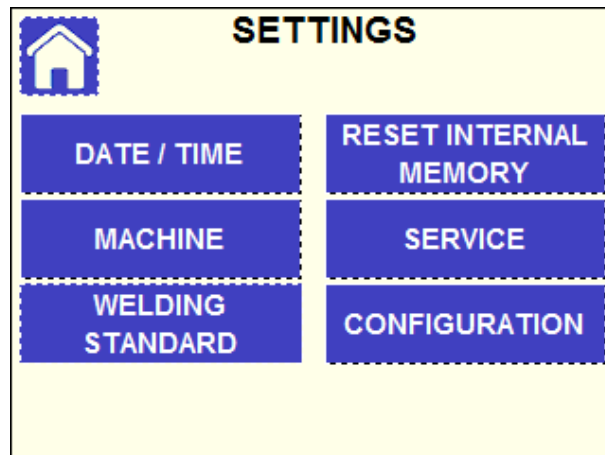
Push the button SETTINGS, then you are asked to insert the protection password to proceed (this menu is specifically dedicated to the machine administrator):



Type the password (6 numerical digits) by means of the display keyboard, then push ENT to confirm (see chapter 11.5.6 for password management).



The following page appears:



**Attention**

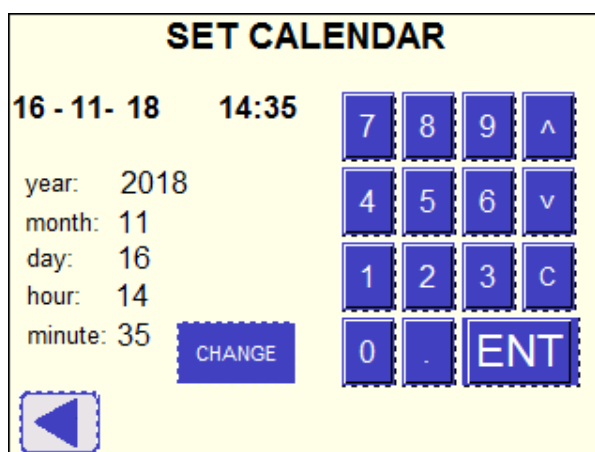
If the inserted password is not correct, the following error message will appear:



Press ◀ button to retry.

**11.4.1 Date / Time**

Set data and time of the system.



To insert a specific value (year, month, day, hour, minute) type it with the keyboard and confirm with ENT; use the up and down buttons to select the other data.

Push CHANGE button to switch current Date / Time to input data.

**Attention** The system automatically switches from summer to winter time (no need to change it manually).

#### 11.4.2 Machine

The screenshot shows a menu titled "MACHINE" with a yellow background. It contains two input fields: "Machine Nr: M151A5906030" and "Hydraulic Nr: 9001". To the right of each field is a blue button labeled "CHANGE". In the bottom-left corner, there is a blue button with a left-pointing arrow.

By selecting Machine, it is possible to insert the serial number of the machine (Machine Nr) and of the hydraulic unit controller (Hydraulic Nr): these input fields are reserved to authorized people of GF Service stations and are protected by passwords.

#### 11.4.3 Welding standard

The screenshot shows a menu titled "WELDING STANDARD SET : DVS" with a yellow background. It contains two columns of blue buttons with white text. The left column has buttons for "DVS", "DVS ( A)", "DVS (A) - IPS", and "ISO 21307 SLP". The right column has buttons for "WIS DVS", "NEN DVS", "INSTAFLEX (PB) DVS", "INSTA\_DS DVS", and "NBN DVS". In the bottom-left corner, there is a blue button with a left-pointing arrow.

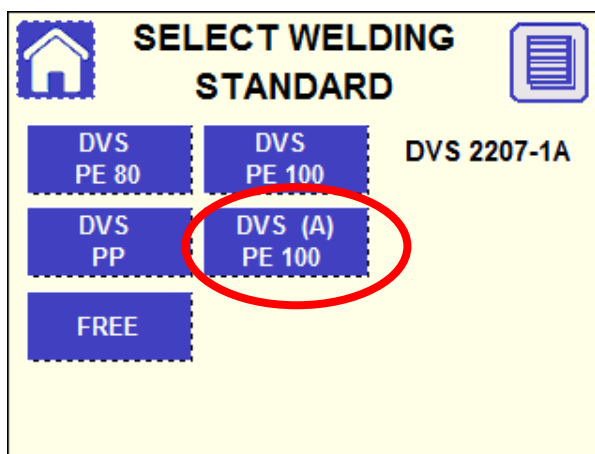
This menu offers the possibility to choose the set of welding standards available for operator selection during the welding processes (see chapter 8.1.1).

Push the correspondent button and the selected set will be displayed at the top of the page.

The default selection is DVS.

**Attention** The selected welding standard set is memorized by the controller and it will be available at each activation of the hydraulic unit.

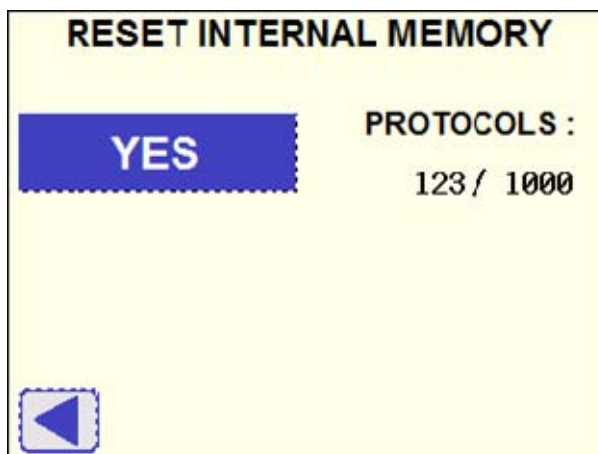
**Attention** If configuration DVS (A) is selected the following page will be displayed in the selection menu, making available the DVS (A) PE 100 button.



If DVS 2207-1 (A) standard for PE 100 is selected, the equalization phase is automatically controlled by the machine (see chapter 8.3.1): the pressure will be automatically released to get heating time started.

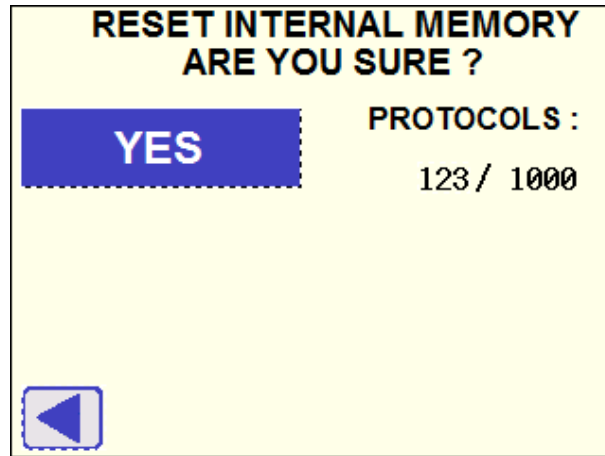
If measured carriage travel is lower than expected, for too long time, the process will be interrupted and the CLAMP PIPES & ALIGNMENT page will appear to enable to move the carriage.

#### 11.4.4 Reset internal memory



It is possible to cancel all the fusion protocols stored in the internal memory.

Press button YES and the following page will be displayed:



Press button YES to confirm or press button ◀ to exit without deleting the data.

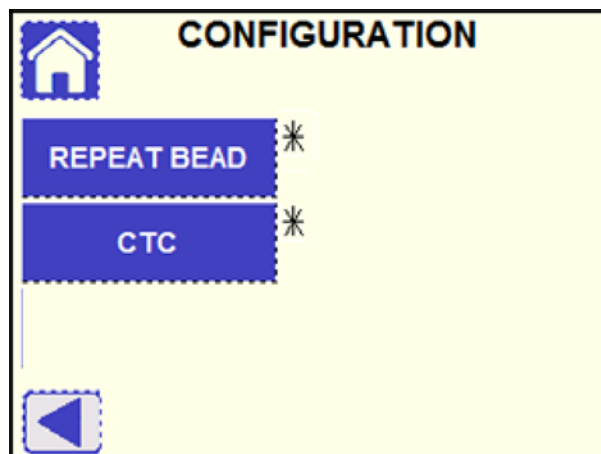
**Attention** Before to proceed with reset operations, ensure that all data is saved to the computer! Once the data are deleted, you cannot recover them!

#### 11.4.5 Service

The access to Service menu is protected by password and reserved to authorized people of GF Service stations for periodical maintenance activities.

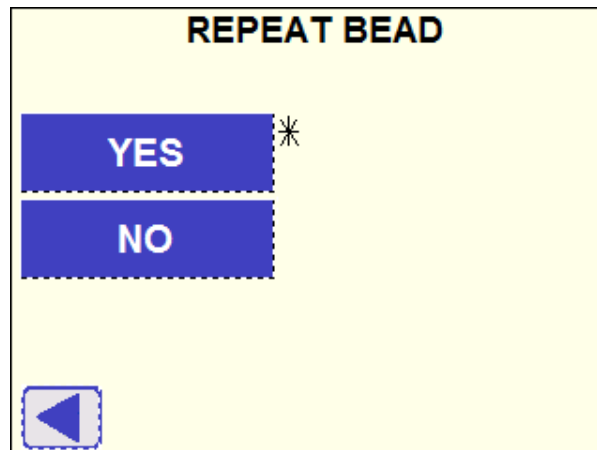
### 11.5 Configuration

The Configuration menu permits to enable special functionalities and working modes during the welding procedure.



### 11.5.1 Repeat Bead

By selecting 'YES' in this menu, you set the machine for working with REPEAT BEAD mode during the equalization time t1 (see chapter 8.3.1).



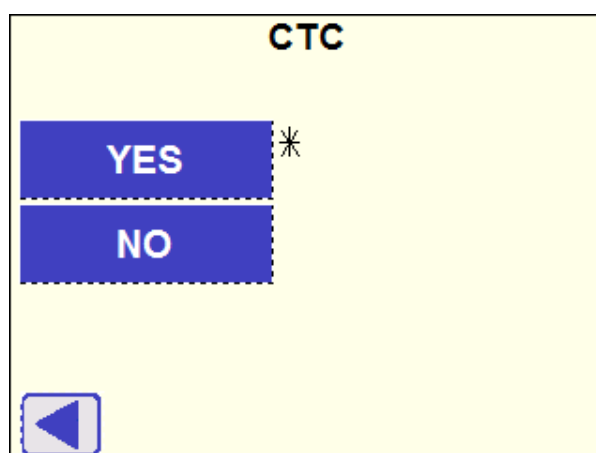
The symbol \* is displayed near to the selected option.

The symbol \* is displayed near to REPEAT BEAD button in the CONFIGURATION page if the selection is YES.

**Attention** If welding standard DVS 2207-1 (A) is selected (see chapter 11.4.3), this function will not be activated.

### 11.5.2 CTC Process

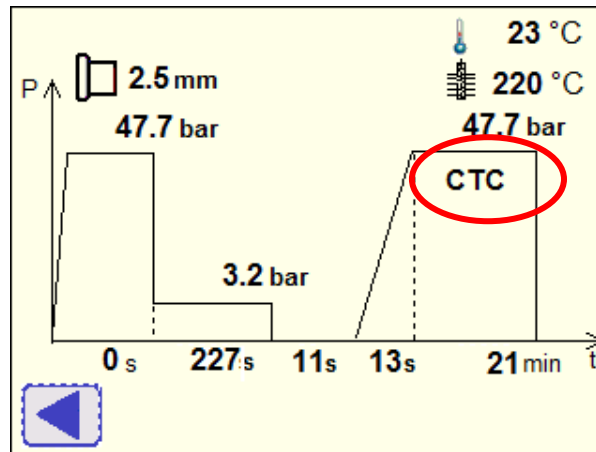
The basics for the CTC process developed by GF Piping Systems are the fusion parameters according to DVS 2207-1 / DVS 2207-11 guideline. The CTC algorithm makes the controller able to calculate the optimized cooling time depending on the measured ambient temperature. All other parameter are according to the DVS 2207-1 / DVS 2207-11 guidelines.



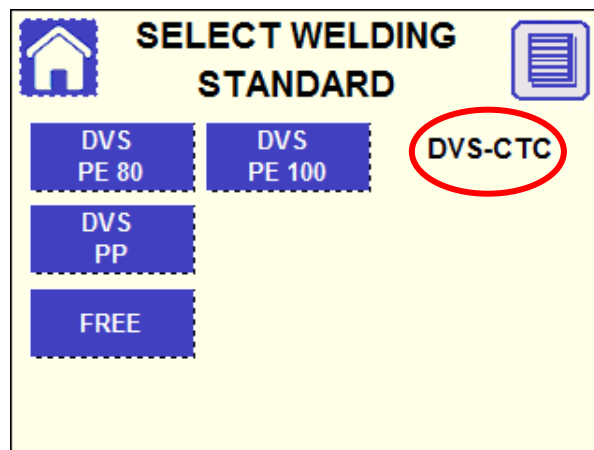
By selecting 'YES' in this menu, you set the machine for working with CTC mode during the cooling time  $t_5$  (see chapter 8.3.4) if using DVS 2207-1 standard for PE or DVS 2207-11 standard for PP.

The symbol \* is displayed near to the selected option.

The symbol \* is displayed near to CTC button in the CONFIGURATION page if the selection is YES. The message CTC will be also displayed in the welding cycle diagram (see chapter 8.1.4).



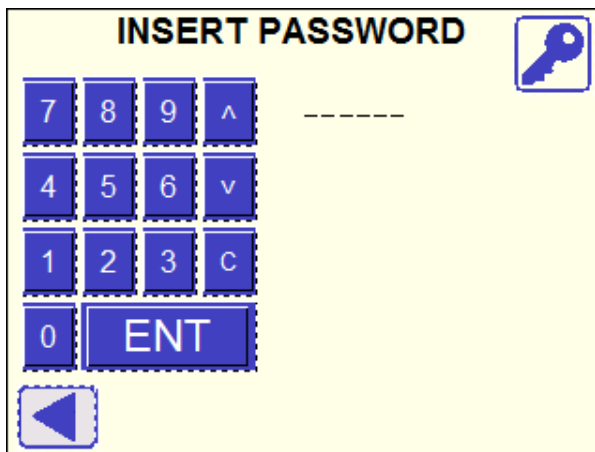
Moreover, **DVS-CTC** will be displayed as selected welding standard in the relevant page (see chapter 8.1.1).



**Attention** **DVS-CTC is not an officially acknowledged welding standard. The overall responsibility will stay with the installer as machine owner (maintenance, operator training, etc.) as well as responsible person for the installed piping system (weld inspection, acceptance tests, pressure test, compliance with installation guidelines etc.).**


### 11.5.3 Password management

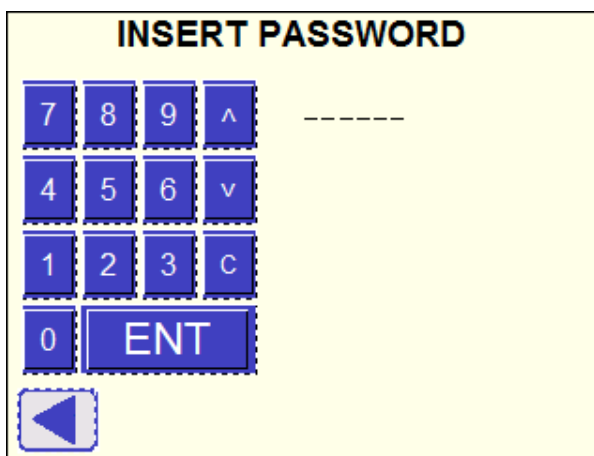
The SETTINGS menu is protected by password (6 numerical digits):



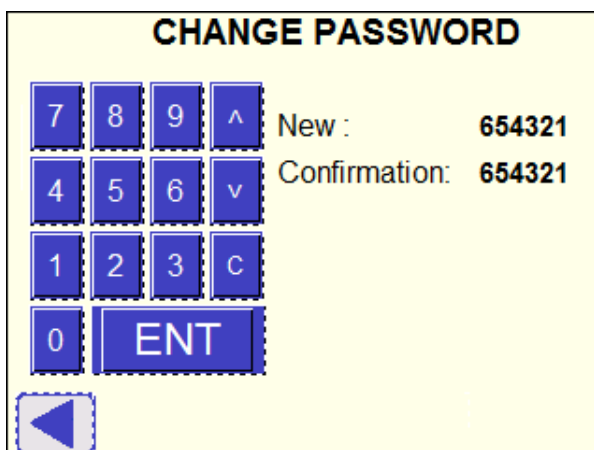
**Attention** Machine is delivered with the default password 123456.



To change the password push the button , then the following page appears:



Use the touch keyboard to type the current password, then confirm by pressing the Enter button and the next page appears:

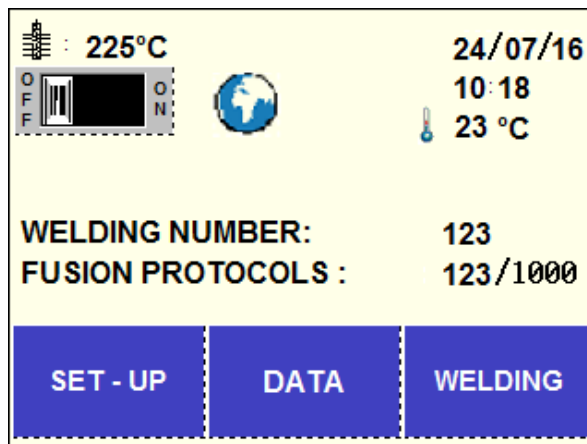


Insert the new password on the first line (press button C to delete numbers already inserted), switch to the second line with down arrow and insert the new password again, then press the ENT button to confirm.

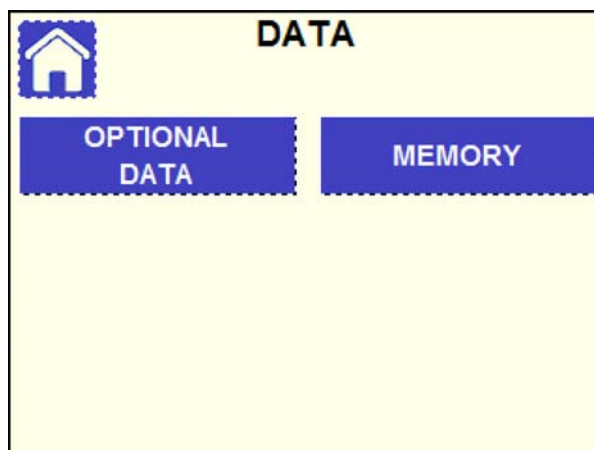
If password has been correctly updated, the ► button appears to proceed to the main page. If the two input codes do not match, the warning message "Password not correct" is displayed.



## 12 Data

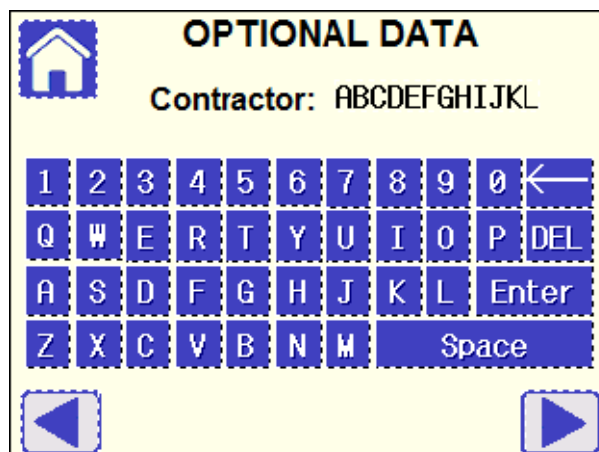


Push the button DATA at Home Page and the next page appears.



### 12.1 Optional data

With the selection of OPTIONAL DATA, additional information (contractor name, jobsite address, place, notes and name of operator) could be manually added to the welding record.

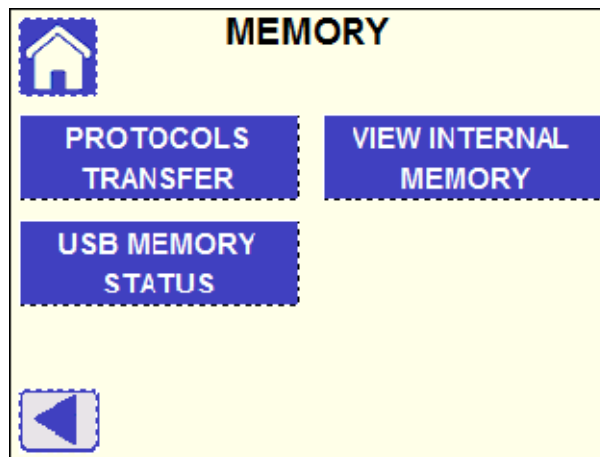


Use the touch keyboard for data input, then confirm it by pressing the Enter button. To switch between the lines use the up and down arrows. Push buttons ◀ ▶ to move to the previous/next page.

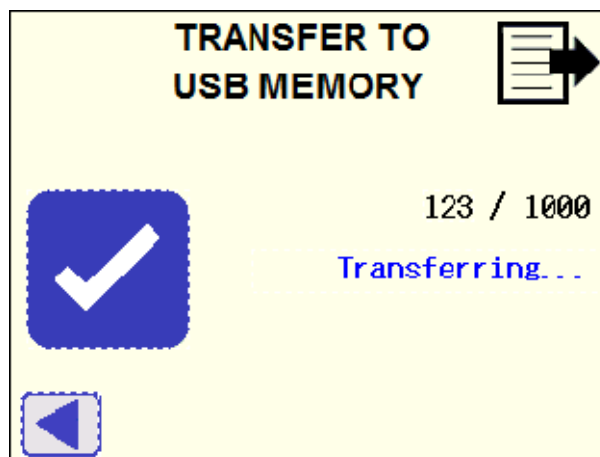
**Attention** **OPTIONAL DATA** remain stored in the memory, even if the unit is switched off: if for the next weld the data is no more valid either erase manually the data in this menu or push the button NO when specifically asked at the end of the welding process (see chapter 8.3.7)!

## 12.2 Memory


The Memory menu includes functions concerning the fusion protocols recording and transfer to an external database.



### 12.2.1 Protocols transfer



To transfer the recorded fusion protocols from the internal memory, plug the USB stick, check the USB memory status (see chapter 12.2.2) and

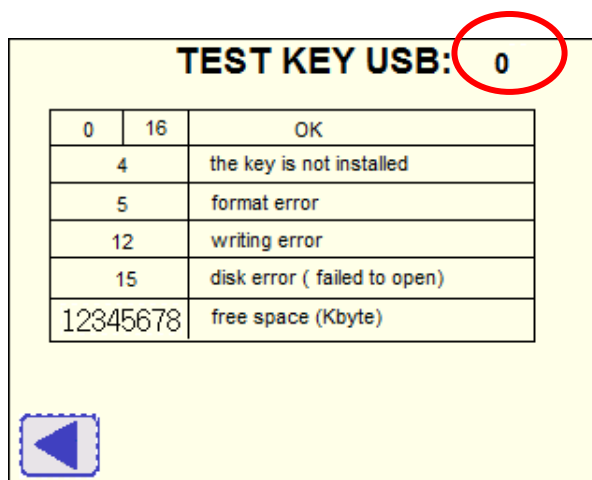
push the button : wait until the message "Transferring..." disappears, then it is possible to remove the USB stick for further transfer to an external PC (see chapter 14).

The status of the internal memory is also displayed (number of welding records stored in the internal memory / 1000 records maximum capacity)

**Attention** The capacity of the internal memory allows the storage of 1000 welding records. As soon as the maximum memory capacity is reached, the first record will be replaced by the new one!

### 12.2.2 USB Memory status

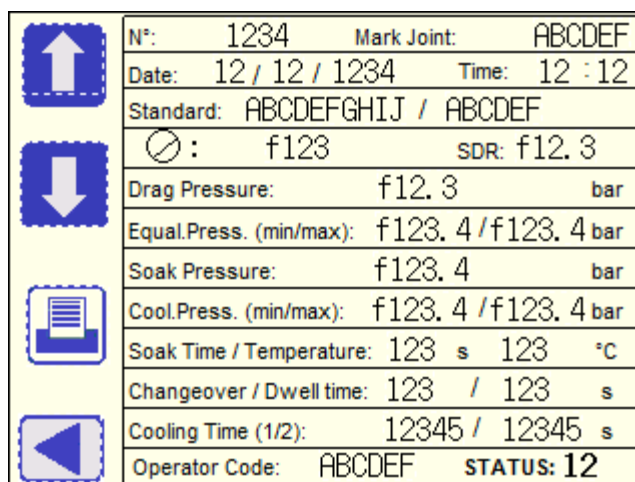
Before proceeding with protocols transfer, check the status of the plugged USB memory stick:



**Attention** If status code reported on top of the page is different than 0 or 16, it means that the USB stick doesn't work properly, therefore it is not recommended to use it for data transfer.

### 12.2.3 View Internal Memory

This menu offers the possibility to directly check on the machine display the main information from each welding protocol stored in the internal memory.



By using the  $\updownarrow$  arrows it is possible to move from one welding protocol to the other. If status number is 0, it means that the welding was completed successfully; if another number is displayed, it means that an error occurred during the process: refer to the following table to check the error code.

Error code	Description
12	Heating element temperature too low
13	Heating element temperature too high
6	Ambient temperature too low (under $-5^{\circ}\text{C}$ )
7	Ambient temperature too high (over $50^{\circ}\text{C}$ )
27	Time t3 over the limit
29	Time t4 over the limit
42	Power interruption during the last welding
43	Welding interrupted with stop button
15	Pressure P1 too low
16	Pressure P1 too high
18	Pressure P2 too high
19	Pressure P5 too low
20	Pressure P5 too high
21	Pressure P6 too low
22	Pressure P6 too high
80	Pipe slipped during cooling time
85	Carriage opened during heating time

#### 12.2.4 Connection with label printer

Plug the dedicated connection cable to label printer (optional) onto the connector placed at the rear side of the machine base.



At the completion of the fusion process, the main information of the latest welding will be automatically printed on the label: machine type, welding number and status, pipes information, like type, size and SDR



It is also possible to print the label later on from the menu View Internal Memory (see chapter 12.2.3): just connect the printer, select the

protocol and push the  button on the screen.

## 13 FREE welding standard

If you need to weld according to special parameters not included in the available standard sets, the FREE welding procedure could be used.

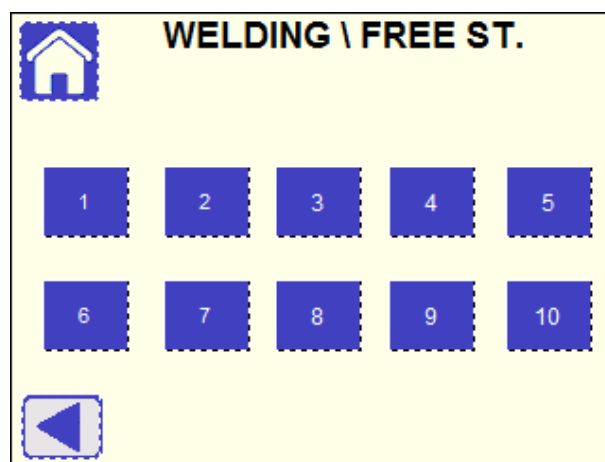


**Warning**

**By selecting a free programmable welding cycle the definition of the welding parameters is done by the operator!**

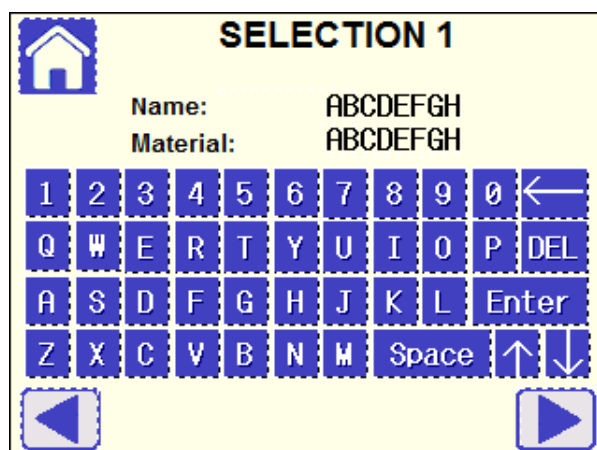
**The responsibility for the welding is exclusively with the operator!**

Push the button **FREE** in the welding standard selection page (see chapter 8.1.1).



Ten different customized welding cycles can be saved: push the correspondent button to select the cycle to be used.

### 13.1 Name of the welding cycle



If the free cycle has been already set-up, push button ► to move to the next page.

If you need to change it or create a new one, type the name of the welding cycle and confirm it by pressing Enter button; then move to next line by pushing the down arrow, type the name of welded material and confirm it with Enter. Push button ► to move to the next page.

## 13.2 Input of welding parameters

SELECTION 1			
∅ :	0		
SDR:	0	HE: 0	7 8 9 ^
P1:	0	t1: 0	4 5 6 v
P2:	0	t2: 0	1 2 3 C
t3:	0	t4: 0	0 . ENT
P5:	0	t5: 0	
P6:	0	t6: 0	
B.S.	0		

If the free cycle has been already set-up, push button ► to move to the next page.

If you need to change or create new parameters, type the value in each field and confirm it by pressing ENT button; move forward and backward with the up and down keys. Push button ► to move to the next page.

Here below a description of the parameters

∅ = pipe nominal diameter [mm]

SDR = pipe SDR

HE = heating element nominal temperature [°C]

P1= equalization (bead build-up) pressure [bar]

t1 = equalization time [s]

P2 = heat soak pressure [bar]

t2 = heat soak time [s]

t3 = change over time [s]

t4 = pressure build-up time [s]

P5 = cooling pressure 1 [bar]

t5 = cooling time 1 [s]

P6 = cooling pressure 2 [bar]

t6 = cooling time 2 [s]

B.S. = bead size after equalization [mm]

**Attention** To calculate the hydraulic working pressure (P1, P2, P5, P6) to be set, refer to the required interfacial pressure between pipe ends in the specific welding phase and calculate it by using this formula:

$$P \text{ [bar]} = (\text{Interfacial pressure [N/mm}^2\text{]} \times \text{Pipe fusion area}^* \text{ [mm}^2\text{]}) / (10 \times \text{Total piston area}^{**} \text{ [mm}^2\text{]})$$

\* see chapter 5

\*\* depending on pipe  $\varnothing$  and SDR

**Attention** If the input value of a parameter is out of the machine limits an error will occur, so you have to change it.



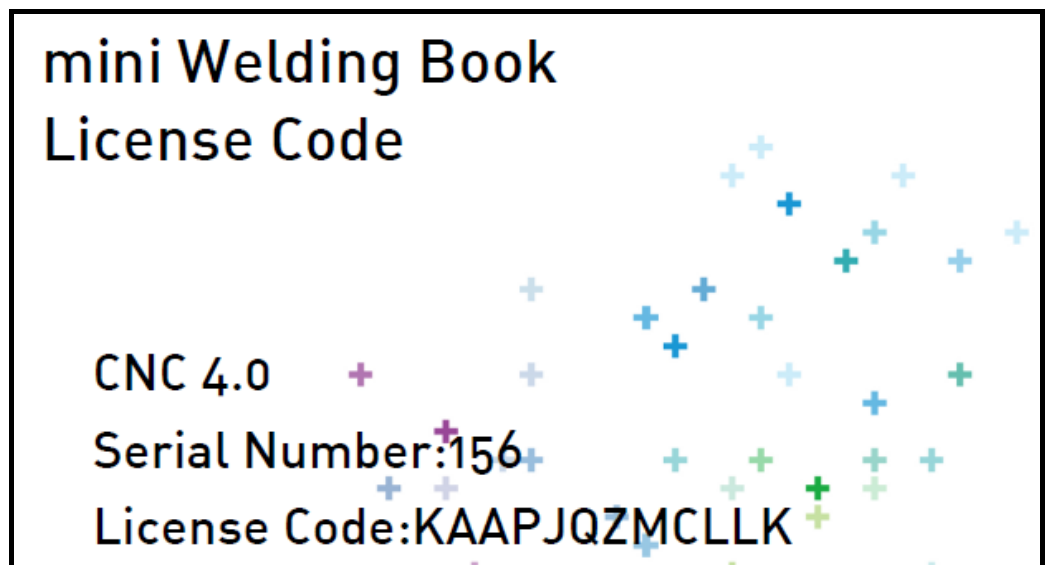
## 14 Fusion data management

In order to properly manage the fusion protocols, the miniWeldingBook application is available: find the folder "WeldinOneVx.x" in the USB memory stick provided with the machine, then copy and paste it on your PC desktop.


Please, follow the WeldinOne User Guide (available in the folder) to start the miniWeldingBook application.


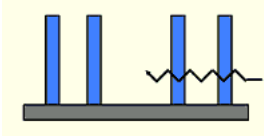
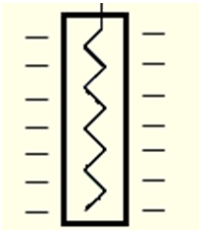
To import the fusion protocols into miniWeldingBook, find the relevant .csv files in the USB memory stick included in the subfolder WM315CNC → RECIPE.

To activate all the miniWeldingBook functionalities for this specific unit, please, insert the license code provided with the machine, which is linked to the hydraulic controller S/N.



## 15 Error/Warning messages

Message	Display page	Meaning	Possible causes	Actions
 <b>PLEASE WAIT</b>	Dedicated page.	The pump motor is running automatically to warm-up the unit.	Ambient temperature $\leq 5^{\circ}\text{C}$	Wait 2 minutes.
<b>WELDING INTERRUPTED!</b>  <b>POWER SWITCHED OFF</b>	Dedicated page, appearing immediately after switching the unit ON.	Power to the unit was cut off during the welding process.	1) Lack of fuel in the generator  2) Connecting cables went damaged or disconnected  3) Main switch was turned OFF	1) Take care of refueling  2) Check cable wires section, cable protection on jobsite
<b>Next revision:</b> <b>MM YYYY</b>	GENERAL INFORMATION ABOUT THE UNIT	It is recommended to get the complete machine serviced by this date to retain the proper level of reliability and safety.	Less than three months left to expiration of the maximum recommended maintenance schedule interval.	Bring the complete machine to a certified Georg Fischer service station.
<b>Unit revision expired!</b>	GENERAL INFORMATION ABOUT THE UNIT	Get the complete machine serviced right now to guarantee the proper level of reliability and safety.	Maximum recommended maintenance schedule interval.	Bring the complete machine to a certified Georg Fischer service station.

Message	Display page	Meaning	Possible causes	Actions
<p><b>AMBIENT TEMPERATURE TOO HIGH</b></p> 	Dedicated page.	<p>Measured ambient temperature too high.</p> <p>It's not possible to proceed with welding process.</p>	1) Temperature probe / temperature board failure.	Get in contact with a certified Georg Fischer service station.
<p><b>BASE MACHINE NOT CONNECTED</b></p> 	Dedicated page.	<p>No potentiometer detected.</p> <p>It's not possible to proceed with welding process.</p>	1) Potentiometer cable damaged	Get in contact with a certified Georg Fischer service station.
<p><b>HEATING ELEMENT NOT CONNECTED</b></p> 	Dedicated page.	<p>No heating element detected.</p> <p>It's not possible to proceed with welding process.</p>	<p>1) Heating element cable damaged</p> <p>2) Temperature probe / temperature board failure</p>	Get in contact with a certified Georg Fischer service station.

Message	Display page	Meaning	Possible causes	Actions
<b>Open the carriage!</b>	CLAMP PIPES AND CHECK ALIGNMENT	Base machine carriage is not completely open.  It's not possible to get the next process step.	1) The carriage is not in the completely open position  2) Obstacles to pipe movement.  3) Potentiometer error.	1) Push ◀▶ button to open  2) Check if pipes are properly supported and aligned.  3) Calibrate the potentiometer (see chapter 9.3.1).
<b>PIPE POSITION NOT CORRECT</b>  <b>Reduce pipe distance!</b>	Dedicated page.	Not enough pipe material to grant welding.  It's not possible to get the next process step.	1) Pipes are not correctly positioned into claps  2) Potentiometer error.	1) Adjust the pipes position.  2) Calibrate the potentiometer (see chapter 9.3.1).
<b>PIPE POSITION NOT CORRECT</b>  <b>Increase pipe distance!</b>	Dedicated page.	Not enough space to insert the facer.  It's not possible to get the next process step.	1) Pipes are not correctly positioned into claps  2) Potentiometer error	1) Adjust the pipes position  2) Calibrate the potentiometer (see chapter 9.3.1)

Message	Display page	Meaning	Possible causes	Actions
<b>Pd+Pset &gt; Pmax !</b>	DRAG PRESSURE CALCULATION	Calculated working pressure is higher than the max. pressure of the hydraulic unit.  It's not possible to get the next process step.	1) Obstacles to pipe movement  2) Dragged pipe too heavy	1) Check if pipes are properly supported and aligned.  2) Reduce pipe length.
<b>Welding Interrupted!</b>	OPEN CARRIAGE / CLAMP PIPES	Welding process interruption.	Welding process has been voluntarily interrupted in phase 1 or 2; heating element not inserted in phase 1.	Open the carriage and re-start the process.
<b>Insert planer!</b>	PIPE PLANING	No signal from the planer safety microswitch.  It's not possible to get the next process step.	1) Planer is not inserted in the base machine  2) Planer is not connected	1) Insert the planer  2) Check connection to the hydraulic unit
<b>PIPES TOO SHORT</b>	Dedicated page.	Not enough pipe material to grant welding.  It's not possible to get the next process step.	Pipes length too short at welding side due too excessive planing.	Quit the process and adjust the pipes position.
<b>PIPE SLIDING</b>	Dedicated page.	Carriage position overtakes the theoretical contact point.  It's not possible to get the next process step.	Pipe slipped in the clamp.	Quit the process, adjust the pipes position and properly fix the clamps!

Message	Display page	Meaning	Possible causes	Actions
<b>Temp. low!</b>	START FUSION PROCESS	Heating plate temperature is lower than the set value. It's not possible to get the next process step.	1) Not enough time passed to complete warming up (less than 20 min) 2) Not enough power to heating element	1) Wait to complete warming-up 2) Check input voltage from generator or mains
<b>Temp. high!</b>	START FUSION PROCESS	Heating plate temperature is higher than the set value. It's not possible to get the next process step.	Set temperature has been switched to a lower value (e.g. welding standard changed).	Wait for cooling down to set temperature.
<b>ERROR OCCURRED!</b>	BEAD BUILD UP / HEAT SOAK TIME / COOLING TIME	A welding parameter (pressure, heater temperature, time) went out the tolerance range: an error will be reported in the fusion protocol.		Check the ERROR CODE on the display after welding (chapter 10.2.3) or the fusion protocol for further analysis. Get in contact with GF after-sales service if necessary.
<b>CARRIAGE OPENED DURING HEATING TIME</b>	Dedicated page.	The base machine carriage moved to opening direction during the HEAT SOAK TIME.	Pulling force exerted by gravity: the pipeline is set on a high slope, so that it overcomes the frictional resistance.	<ul style="list-style-type: none"> <li>- Set the working area on a more gentle slope</li> <li>- Reduce the length of the pipeline clamped on the mobile carriage</li> <li>- Keep the mobile pipeline stable during the heating soak time</li> </ul>

Message	Display page	Meaning	Possible causes	Actions
<b>PIPE SLIDING DURING COOLING TIME</b>	Dedicated page.	The base machine carriage moved to closing direction during the COOLING TIME.	1) The clamps went loosened during the cooling time 2) The pipe was removed before the cooling time completion	1) Take care of properly tightening the clamp knobs before welding 2) Never remove the pipe during the cooling time: this would bring risk of injuries and affect the joint quality
<b>COOLING TIME INTERRUPTION WITH STOP</b>	Dedicated page.	The COOLING TIME has been interrupted.	The STOP button on the display has been pushed.	Do not keep the joint: a proper quality cannot be ensured.
<b>INVALID PASSWORD!</b>	Dedicated page	The inserted password is not valid: it is not possible to enter the SETTINGS menu.	It doesn't correspond to the set password.	Properly check the set password or contact GF after-sales service.
<b>ERROR OCCURRED!</b>  <b>CHECK PROTOCOL!</b>	MARK JOINT	An error occurred during the welding process.		Check the ERROR CODE on the display after welding (chapter 10.2.3) or the fusion protocol for further analysis. Get in contact with GF after-sales service if necessary.

## 16 Maintenance

The WM 315 CNC PC/WM 315 CNC FC is maintenance-free, if it is serviced and operated correctly and cared for properly.

Normal WM 315 CNC PC/WM 315 CNC FC service consists of cleaning all accessible surfaces at least once a week, and changing the hydraulic oil after a certain time of use.

### 16.1 Replacement of worn parts

- PTFE coating of the heating element:  
Clots, cracks or other damage:
  - heating element needs to be recoated
  - get in contact with the nearest service center (see the back of this manual).

#### **Caution** Danger of injury!

Sharp planer blades!

Danger of cutting if the planer blades, which are sharp on both sides, are touched.

- The planer blades on the planer should be replaced periodically. For order number see spare part list.

### 16.2 Hydraulic system

- Hydraulic oil / Oil change
  - Oil quantity required: 2.5 liters
  - Oil change: after every 3200 operating hours

Shell "Tellus" oil	46
Viscosity class ISO	46
Classification ISO	HM
Cinematic viscosity	
at 0 °C cSt	580
40 °C cSt	46
100 °C cSt	6.8
(ASTM D 445)	
Viscosity index (ASTM D 2270)	107
Density at 15 °C kg/dm <sup>3</sup> (ASTM D 1298)	0.879
Flashpoint when container is open	230 °C
Lubricates down to	–30 °C



We recommend having a service booklet to record maintenance work for each machine.

Example:

Date	Service	Repair	Comments
15.09.2007	Georg Fischer Omicron		Everything OK
25.10.2008	Georg Fischer Omicron	Heater	Cable replaced

## 17 Customer Service

There is a separate spare part list for ordering replacement parts.

If repairs are necessary, please contact Georg Fischer Omicron S.r.l. or your local representative.

Please indicate the following information:

- Machine type WM 315 CNC PC/WM 315 CNC FC
- Machine no. (see type plate)
- Spare parts no. (see spare parts list)



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