

LEISTER Astro Automatic Wedge Welding Machine



Please read operating instructions carefully before use and keep it for further reference.

APPLICATION

The LEISTER Astro is an automatic wedge-welding machine for overlap welding of geomembrane liners in earthwork and civil engineering.

• Thermoplastic geomembrane liners

| | |
|---------------------------|-------|
| High-density polyethylene | PE-HD |
| Low density polyethylene | PE-LD |
| Chlorinated polyethylene | PE-C |
| Polypropylene | PP |

• Type of seam

Welding seams are produced in accordance with DVS 2225 part I
Other dimensions are possible on request.

DVS: German Welding Society for welding





WARNING



Danger! Unplug the tool before opening it as live components and connections are exposed.



Incorrect use of the hot wedge tool can present a **fire and explosion hazard** especially near combustible materials and explosive gases.



Do not touch the element housing and wedge when hot as they can cause **burns**. Allow the tool to cool down. Do not point the hot air flow in the direction of people or animals.



Connect the tool to a **socket outlet with protective earth conductor**. Any interruption of the protective earth conductor within or outside the tool is dangerous! **Use only extensions cables with a protective earth conductor!**



CAUTION



The **voltage rating** stated on the tool should correspond to the mains voltage.



For personal protection, we strongly recommend the tool be connected to an **RCCB (Residual Current Circuit Breaker)** before using it on construction sites.



The tool **must be operated** under supervision. Radiant heat from the hot wedge can ignite flammable materials.



Protect the tool from **damp and wet**.

TECHNICAL DATA

Protection class I

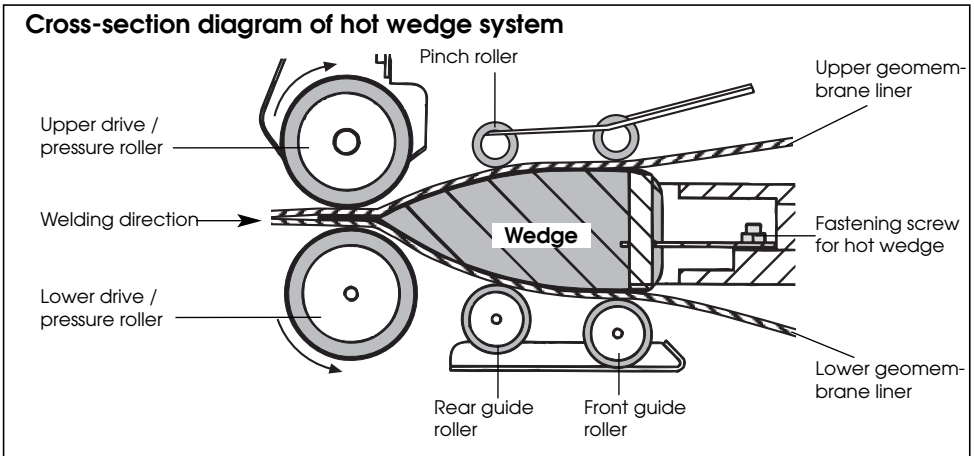


| | |
|-----------------------|----------------------|
| Voltage | V~ |
| Frequency | Hz |
| Power consumption | W |
| Temperature | °C/°F |
| Welding pressure | N/lbs |
| Drive | m/min./feet |
| Overlap width | mm/Inch |
| Thickness of material | mm/mil |
| Noise emission level | L _{PA} (dB) |
| Size L×W×H | mm |
| Weight | kg/lbs |

| |
|---|
| 120, 200, 230 ★ |
| 50 / 60 |
| 1800 |
| max. 420/788 |
| max. 1500/337 |
| 0,8–5,0/2,6 - 16,5 |
| max. 150/5,9 |
| 1,5 – 3,0/60 - 120 |
| 70 |
| 475 × 355 × 315 with carrying handle / guide handle (12) |
| 23/50 |

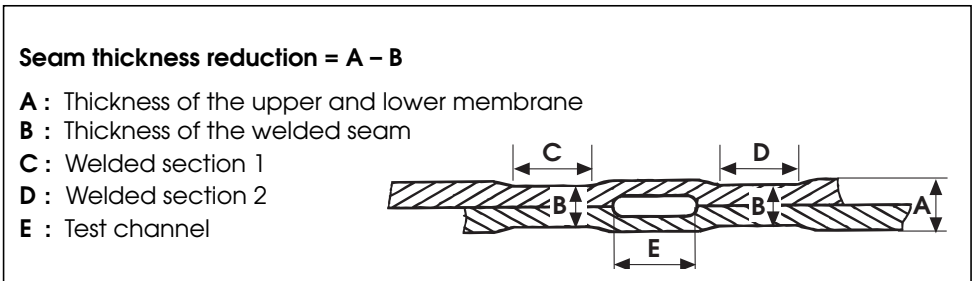
★ mains voltage is not reversible

- **Heating system** → The hot air temperature is steplessly adjustable and electronically controlled. It is a floating hot wedge.



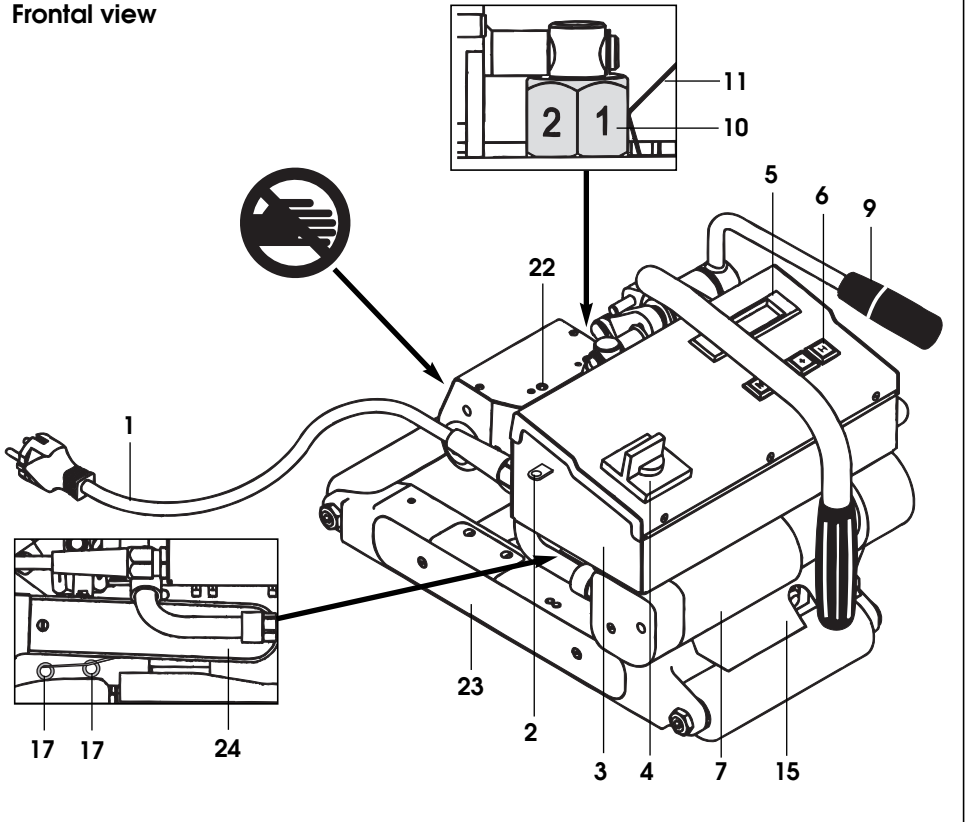
- **Welding pressure** → infinitely variable (steplessly adjustable). The welding pressure is transmitted via a toggle lever to the pressure rollers. The **swivel head guarantees the equalization of the pressure to both** welded sections (C and D) as well as on a welded seam without test channel. This allows T-joints to be welded easily. During the welding process the pressure adjusts itself linearly to the change in material thickness of the geomembrane liners.

Cross sectional diagram of an overlap weld

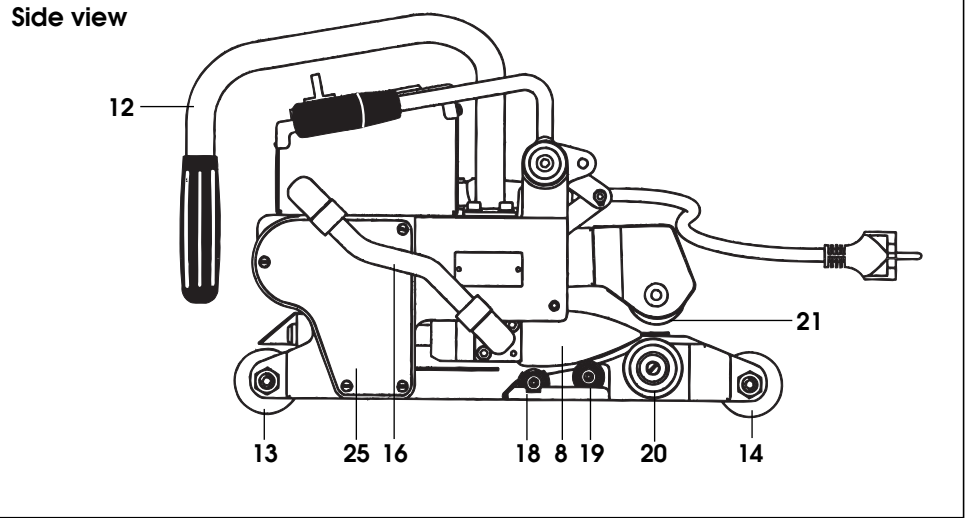


- **Drive** → The welding speed is adjustable and electronically controlled in steps of 0.1 m/min / feet. Digital display of SET and ACTUAL values. The power transmission works through a three stage planetary gear.

Frontal view



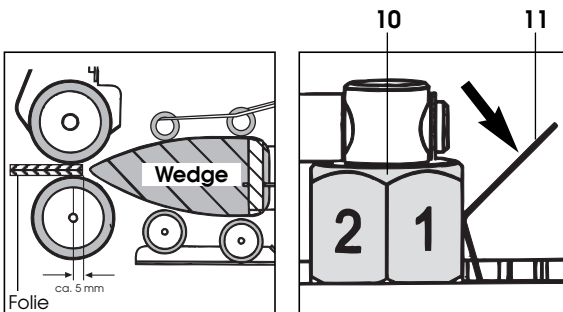
Side view



1. Mains cable
2. Cable clip
3. Housing of electronics
4. Main switch
5. Display
6. Keyboard
7. Motor/ Drive
8. Hot wedge
9. Lever
10. Adjustment screw for welding pressure
11. Locking spring of adjustment screw
12. Carrying handle / Guide handle
13. Front wheel
14. Back wheel
15. Foil guide
16. Cable conduit for hot wedge
17. Pinch roller
18. Front guide roller
19. Rear guide roller
20. Lower drive/pressure roller
21. Upper drive/pressure roller
22. Adjustment screw for swivel head
23. Chain guard of lower part
24. Chain guard of tension arm
25. Chain guard of gear case

WELDING PARAMETER

LEISTER Astro



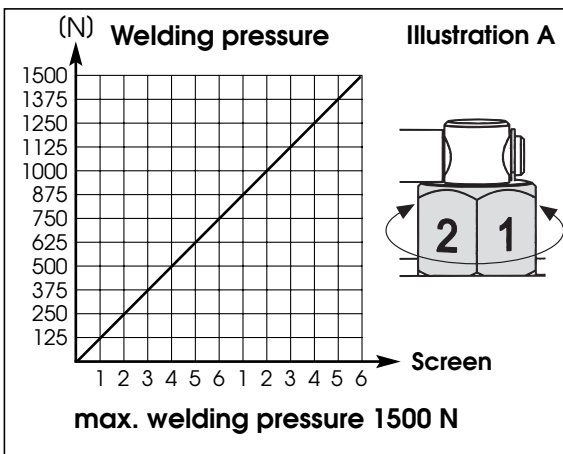
Welding pressure

Engage and position the automatic welding machine onto the material to be welded. Insert the two geomembranes liners or films about 5mm at the back of the machine. Pull the **lever (9)**. The hot wedge is automatically pushed forward. Push and hold down the **locking spring (11)**. Turn the adjustment screw for **welding pressure (10)** until the **drive/pressure rollers (20/21)** slightly touch the material to be welded. Let go the **locking spring (11)** and release the tension of the **lever (9)**.

Keep pushing the locking spring of the **adjustment screw (11)**. Adjust the welding pressure by turning the corresponding **adjustment screw (10)** according to illustration A and let go the **locking spring (11)** at the requested welding pressure.

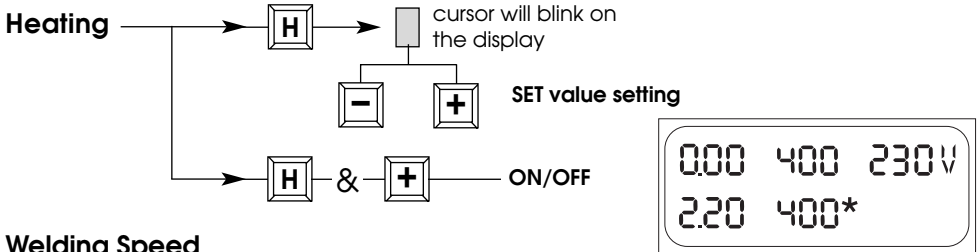
Warning:

If the maximum welding pressure of 1500N is exceeded mechanical damage may occur.



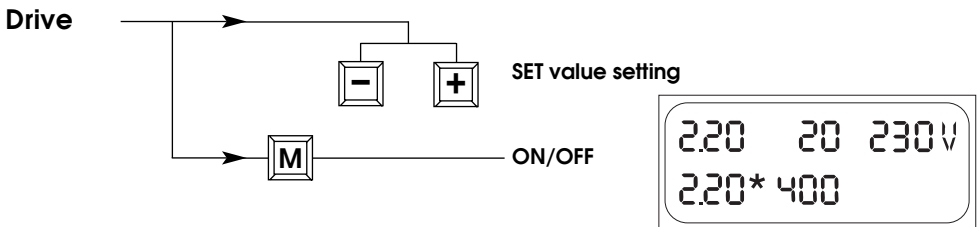
Welding temperature

Set the welding temperature with the **[H]**, **[-]** **[+]** keys. The temperature is dependent on the material and the ambient temperature. The in-put SET value will be shown on the display. Switch on the heating by pressing the **[H]** and **[+]** keys simultaneously. Heating up time approx. 5 mins.



Welding Speed

According on the film or geomembrane liner and the influence of the weather, set the welding speed with the **[-]** **[+]** keys. The in-put SET value will be shown on the display.



Welding preparation

- *Laying* Width of overlap is about 80mm to 130mm
Geomembrane liners must be clean between the overlap as well as above and below.
- *Mains supply* At least 3kW (generator) **supplied with an RCCB**
- *Cable to mains* A minimum cable cross section in accordance with the table.

| | | |
|--------------|----------|-----------------------------|
| 200 – 230 V~ | to 50 m | 3x1,0 mm² |
| | to 100 m | 3x2,5 mm² |
| 120 V~ | to 50 m | 3x1,5 mm² |
| | to 100 m | 3x2,5 mm² |

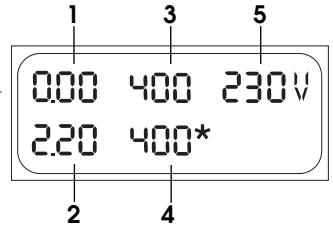
Operating conditions

- Connect the hot wedge-welding machine to the mains
- Start the machine with Main- or Control Level

Main – Level



Main Switch (4) ON



- 1. Speed ACTUAL value
- 2. Speed SET value
- 3. Temperature ACTUAL value
- 4. Temperature SET value
- 5. Voltage display ACTUAL value

Control – Level



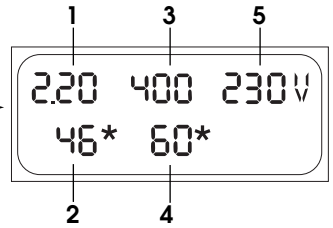
&



&



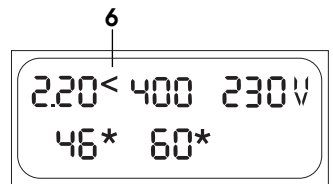
Main Switch (4) ON



- 1. Speed ACTUAL value
- 2. Speed SET value
- 3. Temperature ACTUAL value
- 4. Temperature SET value
- 5. Voltage display ACTUAL value

*** Heating / Drive active**

< Overload indication



Check the welding process and identify faults by means of the display of power consumption.

| Display (4) | Heating reason for fault after heating up time |
|-------------|---|
| 100 % | • mains under-voltage |

| Display (2) | Drive reason for fault |
|-------------|---|
| 100 % | <ul style="list-style-type: none"> • mains under-voltage • overlap of the geomembrane liner too wide • dirt on the drive rollers (20/21) • max. welding pressure (1500 N) has been exceeded • high welding speed with large sudden overload (ie anchoring trench, T-joints...) |
| 100 % or < | |
| 100 % or < | |
| 100 % or < | |
| 100 % or < | |

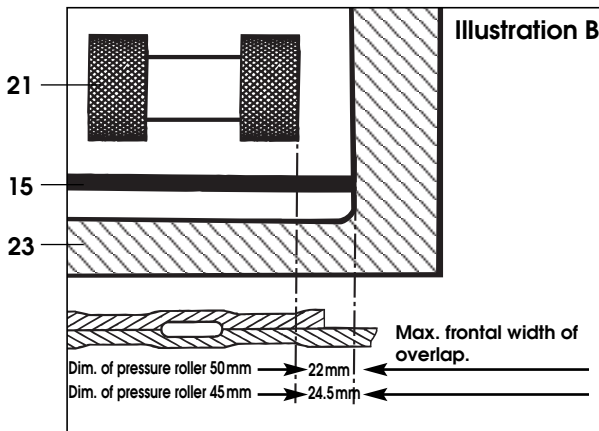
If malfunction does not disappear, contact service center

Welding procedure

- Check:
 - **Drive/ Pressure rollers (20/21)** as well as the **hot wedge (8)** must be clean before engaging into the geomembrane liner or film.
 - Cable length/Cable guide.
- Adjust welding parameters, see page 5/6.
- The welding temperature must be achieved.
- Guide and position the automatic welding machine into the over-lapped geomembrane liner or film.
- Switch on drive motor with **M** key on **keyboard (6)**.
- Pull the **lever (9)**.

Beginning of welding process

- Check the welded seam (wash/seam thickness reduction). As required, adjust the welding speed with **-** **+** keys on **keyboard (6)**.
- The automatic welding machine is guided along the overlap with the **carrying handle/guide handle (12)**, so that the frontal width of the overlap is kept within the 22mm zone (see illustration B).



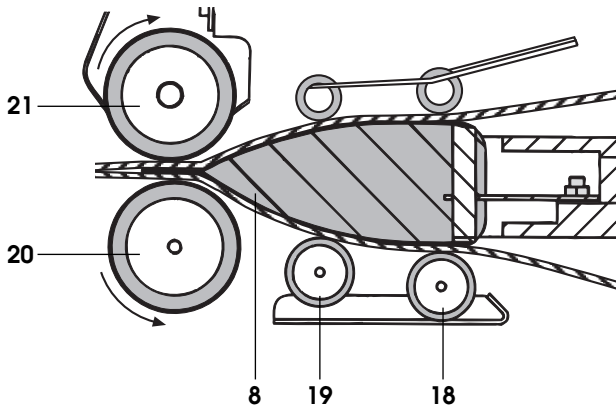
End of welding process

- Release the **tension lever (9)** 1 cm before the end of the welded seam.
- Switch off the drive motor with key **M** on the **keyboard (6)**. Switch off the heating by pressing the **H** and **+** keys on the **keyboard (6)** simultaneously.

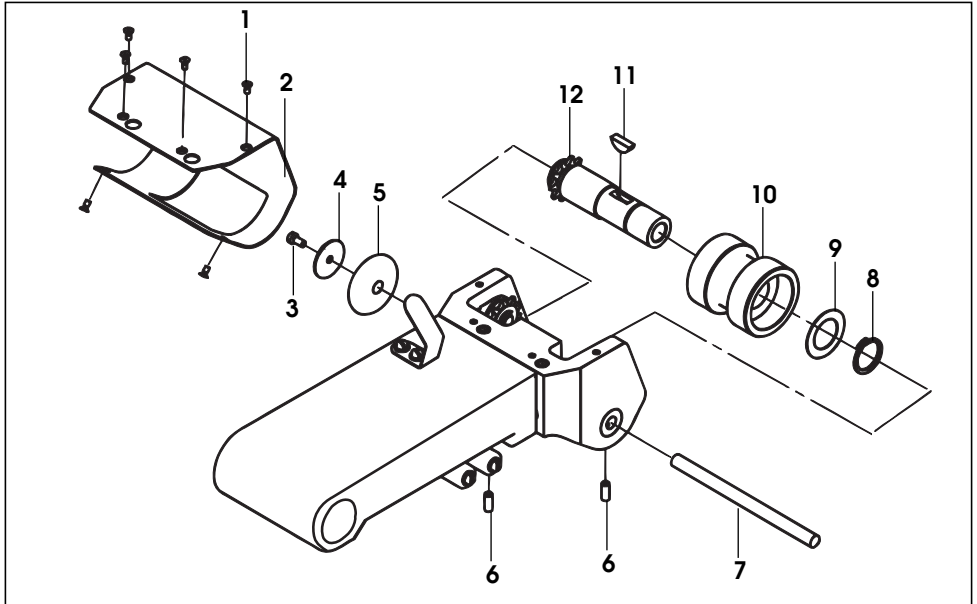
Adjusting of the guide rollers for the requested material thickness

- Engage the automatic wedge-welding machine on the geomembrane liner or film to be welded.
- Stretch the **lever (9)**
- Loosen the hexagon cap screw of the **rear guide roller (19)**.
- The distance between the **hot wedge (8)** and the **rear guide roller (19)** should be the thickness of the material and the sharp tongue of the wedge should lie centrally to the **pressure rollers (20/21)**.
- Tighten the hexagon cap screw of the **rear guide roller (19)**.
- Loosen the hexagon cap screw of the **front guide roller (18)**.
- The distance between **hot wedge (8)** and **front guide roller (18)** should be about 1 mm.
- Tighten the hexagon cap screw of the **front guide roller (18)**.

Cross-section diagram of hot wedge system



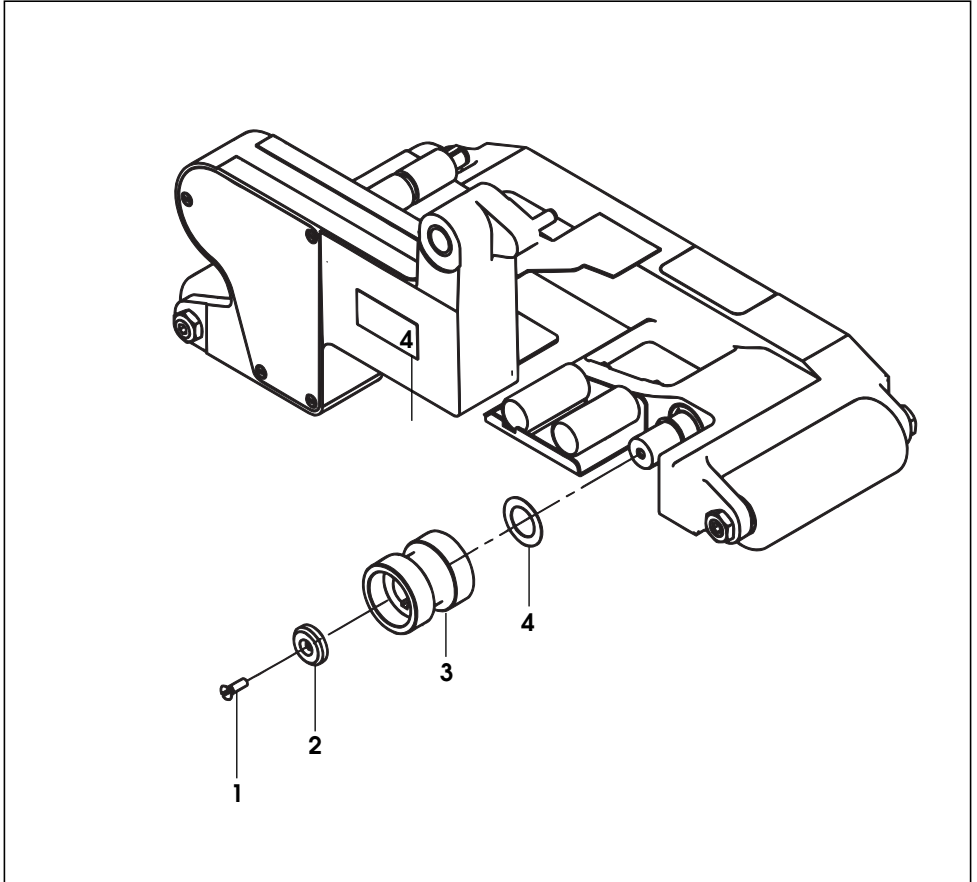
The LEISTER Astro is suitable to manufacture overlap-welded seams in different fields of applications. They differ in the width of the welded seam as well as the width of the test channel. Also welded seams without test channel can be manufactured. In order to implement these different overlap seams, the appropriate drive/pressure rollers have to be installed.



- | | |
|---------------------------------|--------------------------------|
| 1. Countersunk screw M3×6 | 7. Shaft 8×118.5 |
| 2. Protection sheet swivel head | 8. Shaft retaining ring |
| 3. Socket head screw M4×8 | 9. Distance disk 20×32×0.5 |
| 4. Washer 4.2×25 | 10. Drive/pressure roller |
| 5. Slide roller | 11. Woodruff key 5×6.5 |
| 6. Set screw M5×12 | 12. Upper drive shaft complete |

Dismantling of the drive/pressure rollers, sequence 1 – 12

Assembly of the drive/pressure rollers, reverse order 12 – 1



1. Countersunk screw M5×16
2. Clamp disk
3. Drive/Pressure roller
4. Distance disk 20×32×0.5

Dismantling of the drive/pressure rollers, sequence 1 – 4
Assembly of the drive/pressure rollers, reverse 4 – 1

TRAINING

LEISTER Process Technologies and their authorised Service Centres offer free welding courses and training.

ACCESSORIES

- Only LEISTER accessories should be used.

MAINTENANCE

- Check **mains cable (1)** and plug for electrical and mechanical damage.
- Clean **hot wedge (8)** with a copper brush.
- Clean **drive and pressure rollers (20/21)** with a wire brush.
- **Treat chain (22)** with a suitable spray as required (chain guard 23/24).
- Check whether **rollers (13/14/17/18/19)** are running smoothly.

SERVICE AND REPAIR

- The tool should be checked by an authorized Service Center if the following message appears on the display (5): «**maintenance; servicing**».
- Repairs have to be carried out by authorised **LEISTER Service Centres** only. They guarantee a specialized and reliable **repair service within 24 hours** using original LEISTER spare parts.

GUARANTEE AND LIABILITY

- Guarantee and liability are in accordance with the guarantee certificate as well as with the currently valid general business and sales conditions.
- LEISTER Process Technologies rejects any guarantee claims for tools which are not in their original condition. The tools must never be altered or changed.

Technical data and specifications are subject to change without prior notice.

Your authorized Service Centre is:



Please read operating instructions carefully before use and keep for future reference.

Please keep the operating instructions to hand when operating the COMET hot-wedge welding machine.

USB port (optional)



Attachment for the Leister ASTRO hot-wedge welding machine

Application

The USB port enables the process values temperature, speed and pressure to be recorded on a standard USB stick. The assessment is made using spreadsheet software, not supplied, e.g. Microsoft® Excel.

Basic information regarding the USB stick

- **Never remove the USB stick from the USB port while saving!** The data will not be saved! Always finish recording welding in accordance with the operating instructions.
- If a new USB stick is used, this should be formatted in format FAT 32 with memory size 512 bytes.
- **Important:** Always test new USB sticks on the device! Sometimes not all USB sticks work with the device. This can depend on USB copies or on preinstalled software which wants to start up automatically, for example, etc.

Date and time

- Set up or check the date and time the first time that the device is started up. You can find the instructions for this under the heading Presettings (diagram).
- The date and time are powered by a battery independent of the power supply.
It is recommended to check its function periodically.

Inserting USB stick

- Unscrew protective cover
- Insert USB stick in the USB port
- Screw the protective cover back on
- «USB» appears at the bottom right of the machine's display

| | | |
|-------|-------|-----|
| 0 . 0 | 2 0 | 0 |
| 3 . 2 | 4 2 0 | USB |

Without the USB stick, the mains voltage is displayed at the bottom right.

File name

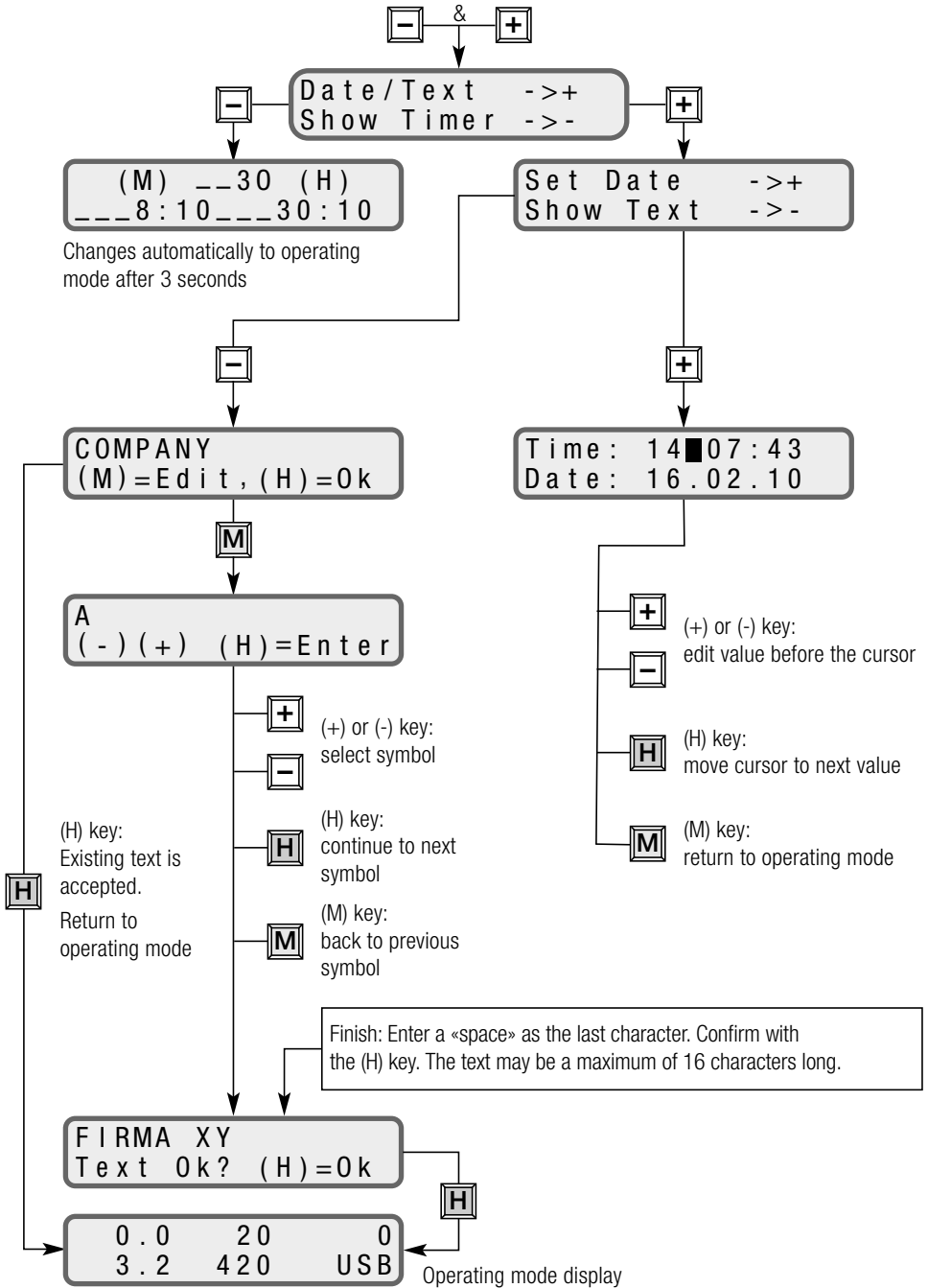
- A file name consisting of the current date (month and day) and the file number will be created automatically when recording is started.
Example 0309-002 → 09. March, second recording.
- The file number increases automatically every time it is saved.
The number begins again at 001 every day.

| | | |
|---------|---------|---------|
| 3 . 2 | 2 0 | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | → 0 0 2 |



To set date, edit client text or display of operating hours counter.

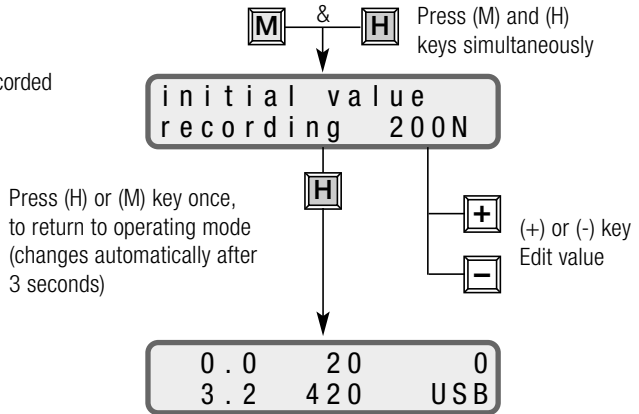
By pressing keys **[-]** and **[+]** at the same time, the following display appears:





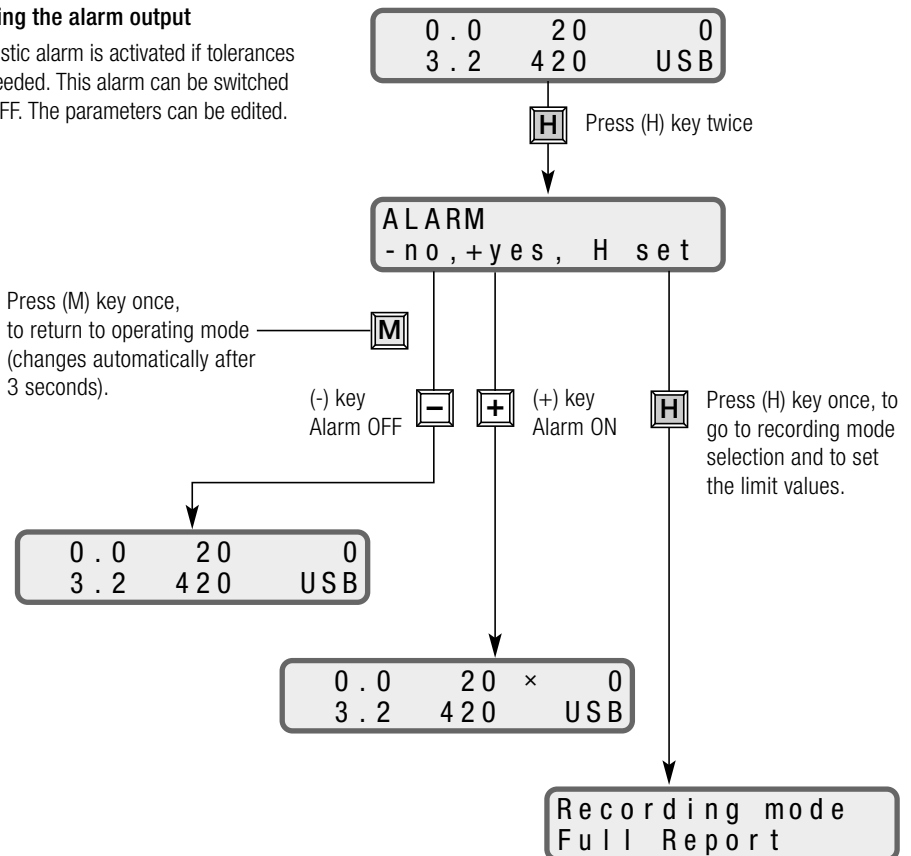
Setting the start value of the joining force for the recording

The joining force which is to be recorded can be set between 100 N and 500 N in 5 N increments



Activating the alarm output

An acoustic alarm is activated if tolerances are exceeded. This alarm can be switched ON or OFF. The parameters can be edited.





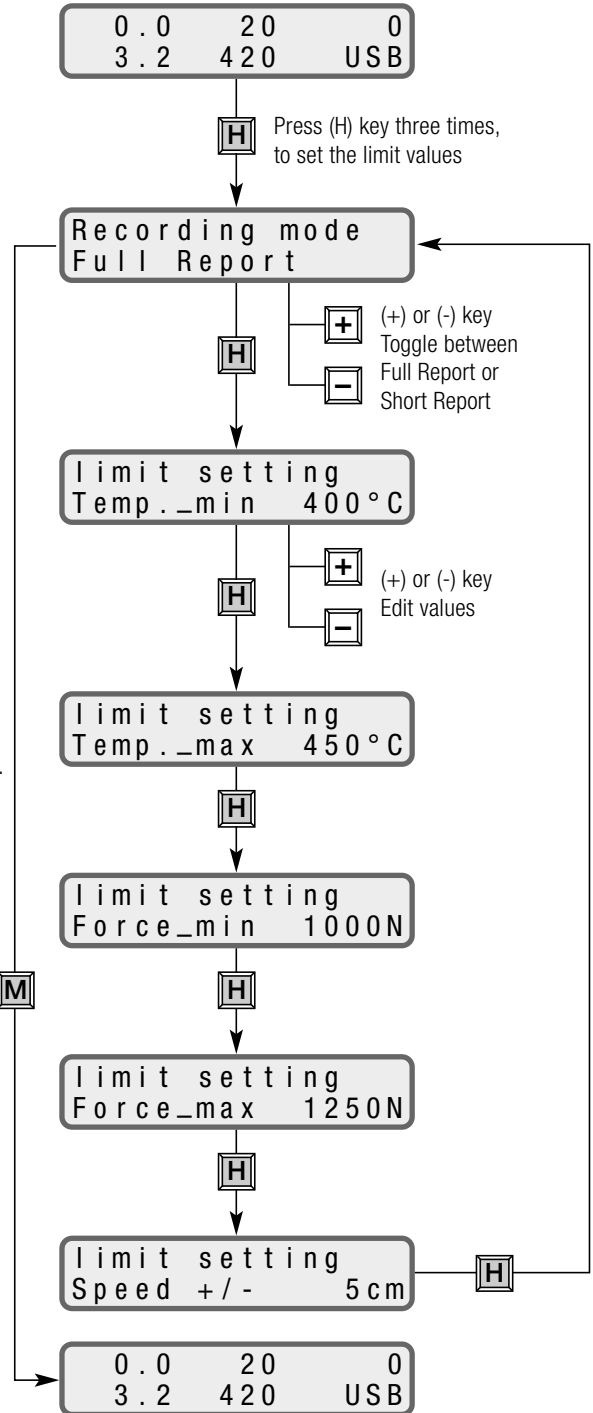
Select recording mode

- **Short Report**
Record only if parameters are outside the set limit values
- **Long Report**
Recording every 5 cm

Set limit values for alarm output

If the effective value is outside the set limit values, the acoustic alarm will be activated.

(M) key:
Return to operating mode
(changes automatically
after 3 seconds)



Display when alarm activated



Display when alarm activated

| | | | |
|-------|-------|---|-------|
| 0 . 0 | 2 0 | × | 0 |
| 3 . 2 | 4 2 0 | | U S B |

Speed below the limit value
flashing

| | | | |
|-----------|---------|---|---------|
| v a l u e | 4 2 0 | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

| | | | |
|---------|---------|---|---------|
| v < | 4 2 0 | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

Speed above the limit value
flashing

| | | | |
|-----------|---------|---|---------|
| v a l u e | 4 2 0 | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

| | | | |
|---------|-------|---|---------|
| v > | 4 2 0 | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 | | → 0 0 2 |

Temperature below the limit value
flashing

| | | | |
|---------|-----------|---|---------|
| 3 . 2 | v a l u e | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

| | | | |
|---------|---------|---|---------|
| 3 . 2 | t < | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

Temperature above the limit value
flashing

| | | | |
|---------|-----------|---|---------|
| 3 . 2 | v a l u e | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

| | | | |
|---------|---------|---|---------|
| 3 . 2 | t > | × | 1 0 0 0 |
| 3 . 2 * | 4 2 0 * | | → 0 0 2 |

Joining force below the limit value
flashing

| | | |
|---------|---------|-----------|
| 3 . 2 | 4 2 0 | v a l u e |
| 3 . 2 * | 4 2 0 * | → 0 0 2 |

| | | |
|---------|---------|---------|
| 3 . 2 | 4 2 0 | F < |
| 3 . 2 * | 4 2 0 * | → 0 0 2 |

Joining force above the limit value
flashing

| | | |
|---------|---------|-----------|
| 3 . 2 | 4 2 0 | v a l u e |
| 3 . 2 * | 4 2 0 * | → 0 0 2 |

| | | |
|---------|---------|---------|
| 3 . 2 | 4 2 0 | F > |
| 3 . 2 * | 4 2 0 * | → 0 0 2 |

Recording the process data



- After the presets have been entered correctly, the device is ready to record.
- The heating and drive must be switched on in order to start a recording (as per ASTRO operating instructions). The message «PLEASE WAIT USB» flashes on the display. Now the file is opened and the header created
- The * symbol appears before the file number as soon as the file has been created. The welding machine is now ready for recording to start.
- Recording is started by activating the clamping lever.

```
PLEASE WAIT USB
3 . 2 * 4 2 0 * - - - -
```

```
3 . 2 4 2 0 0
3 . 2 * 4 2 0 * * 0 0 2
```

As soon as the pressure exceeds the set value (setting of pressure initial value), the symbol on the display changes from * to a flashing →. The speed, temperature and pressure values are now recorded every 5cm.

```
3 . 2 4 2 0 1 0 0 0
3 . 2 * 4 2 0 * → 0 0 2
```

Stopping the recording



- Recording is stopped automatically when the drive is switched off or the clamping lever is released.
- If only the clamping lever is released, a new file will be created automatically which will be written to when the clamping lever is reactivated. The message «PLEASE WAIT USB» appears on the display again

Never remove the USB stick from the USB port while the message «PLEASE WAIT USB» is still shown!

```
PLEASE WAIT USB
3 . 2 * 4 2 0 * - - - -
```

Further recordings



- If the drive and heating remain switched on, a new file will be created and the process values will be recorded every time the clamping lever is activated.
- If the drive is switched off, no new file will be created and there will be no recording of the process values after the clamping lever is activated.
- If the values are not to be recorded any more, the USB stick must be removed
- Check the remaining memory of the USB stick on the PC from time to time.



- Insert USB stick into USB port of a computer (not supplied).
- Start spreadsheet software (not supplied).
- Open file
- Select drive (drive with USB stick)
- File type: «all files»
- Select and open the desired recorded file (*.csv)
- The file opens. Example of file content:

Full-Report

| | | | | | |
|---------------|-----------------------------|---|------------|-------------|-------|
| Header | Client text (can be edited) | COMPANY | | | |
| | Number of recording file | File-number: | 0825-002 | | |
| | Serial number:ASTRO | LEISTER Switzerland ASTRO Software Release 3.1A USB | | | |
| | Recording interval | Serial number: | 715092 | | |
| | Start value for recording | Date: | 25.08.2010 | | |
| | Alarm switched off | Time: | 16:02:16 | | |
| | Column headings | v = | 2.5 m/min | | |
| | Unit | t = | 380 °C | | |
| | | intervall = | 5 cm | | |
| | | initial value = | 350 N | | |
| | | Alarm = | OFF | | |
| | | Distance | Speed | Temperature | Force |
| | | [cm] | v [m/min] | t [°C] | F [N] |
| Data | 1. Record | 0 | 2.5 | 380 | 1015 |
| | another record every 5 cm | 5 | 2.5 | 380 | 1015 |
| | | 10 | 2.5 | 380 | 1015 |
| | | 15 | 2.5 | 380 | 1015 |
| | | 20 | 2.5 | 380 | 1015 |
| | | 25 | 2.5 | 380 | 1015 |
| | | 30 | 2.5 | 380 | 1015 |
| | | 35 | 2.5 | 380 | 1015 |
| | | 40 | 2.5 | 380 | 1015 |
| | | 45 | 2.5 | 380 | 1015 |
| | | 50 | 2.5 | 380 | 1015 |
| | | 55 | 2.5 | 380 | 1015 |
| | | 60 | 2.5 | 380 | 1015 |
| | | 65 | 2.5 | 380 | 1015 |
| | | 70 | 2.5 | 380 | 1015 |
| | | 75 | 2.5 | 380 | 1015 |
| | | 80 | 2.5 | 380 | 1015 |
| | | 85 | 2.5 | 380 | 1015 |
| | 90 | 2.5 | 380 | 1015 | |
| | 95 | 2.5 | 380 | 1015 | |
| | | 100 | 2.5 | 380 | 1015 |



Short Report

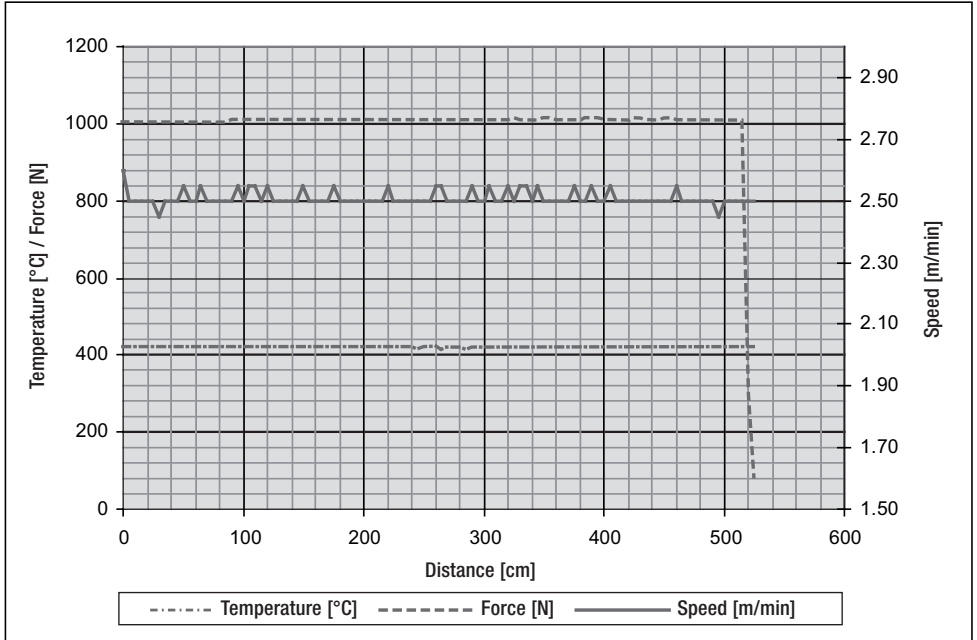
| | | | | | | | |
|---|---|---------|-----------|-------|-------------|-------|-------|
| Header | | | | | | | |
| Client text (can be edited) | COMPANY | | | | | | |
| Number of recording file | File-number: 0826-003 | | | | | | |
| Serial number ASTRO | LEISTER Switzerland ASTRO Software Release 3.1A USB | | | | | | |
| Recording interval | Serial number: 715092 | | | | | | |
| Start value for recording | Date: 26.08.2010 | | | | | | |
| Alarm switched on | Time: 08:02:28 | | | | | | |
| Alarm limit values | v = 2.7 m/min | | | | | | |
| | t = 380 °C | | | | | | |
| | intervall = 5 cm | | | | | | |
| | initial value = 350 N | | | | | | |
| | Alarm = ON | | | | | | |
| | Limit setting | | | | | | |
| | Lower limit temp. = 350 °C | | | | | | |
| | Upper limit temp. = 450 °C | | | | | | |
| | Lower limit force = 800 N | | | | | | |
| | Upper limit force = 1200 N | | | | | | |
| | Tolerance speed = 5 cm | | | | | | |
| Data | | | | | | | |
| Column headings | Distance | | Speed | | Temperature | | Force |
| Unit | [cm] | | v [m/min] | | t [°C] | | F [N] |
| Deviations from the limit values are logged (only if alarm is active) | No limit value deviations | | | | | | |
| | Summary | | | | | | |
| Column headings | Seam length | v min | v max | t min | t max | F min | F max |
| Unit | [m] | [m/min] | [m/min] | [°C] | [°C] | [N] | [N] |
| Summary of the welding parameters at the end of the seam | 5 | 2.7 | 2.7 | 380 | 380 | 1015 | 1015 |

If a parameter is outside the set limit values, this will be logged (only if alarm is switched on). At the end of the recording a summary of the welding is logged.



- Select a recording. Highlight columns including «column headings».
- Click on the «create diagram» symbol and create diagram using the wizard (for more precise specifications, see the Microsoft® Excel help or Excel user's manual, not supplied).

Possible representation





Your authorised Service Centre is:



Leister Process Technologies
Galileo-Strasse 10
CH-6056 Kaegiswil/Switzerland
Tel. +41 41 662 74 74
Fax +41 41 662 74 16
www.leister.com
sales@leister.com