Bedienungsanleitung • User's Manual • Manuel utilisateur

Manual 315

Inliegende deutsche Fassung der Anleitung ist der Urtext, welchen inliegende Übersetzungen wiedergeben.
The German version of the manual enclosed herein is the original copy, reflected in both translations herein.
La version allemande ci-après est la version originale que reflètent les traductions données dans le présent manuel.

HÜRNER SCHWEISSTECHNIK GmbH
Nieder-Ohmener Str. 26
35325 Mücke (Atzenhain)
+49 (0)6401 91 27 0
+49 (0)6401 91 27 39
info@huerner.de
http://www.huerner.de

HÜRNER
SCHWEISSTECHNIK

Version September 2017

Contents

1 Introduction 5
2 Safety Messages 5
2.1 The User's Manual 5
2.2 Explaining Icons 5
2.3 Operating the Product Safely 5
2.4 Owner and Operator Obligations 6
2.5 Intended Use 7
2.6 Warranty 7
2.7 Transport and Storage 7
2.8 Identifying the Product 7
3 Understanding the Machine 7
3.1 Included Components 8
3.2 Control Panel 8
3.3 Connectors 8
3.4 Technical Specifications 9
3.5 Overview of the Welding Process 9
4 Operation 10
4.1 Start of Operation, Switching the Machine on 10
4.2 Welding Process Overview 10
4.3 Performing the Welding Process 11
4.3.1 Facing the Pipe Butts 11
4.3.2 Checking Pipe Alignment and Determining Drag Pressure 12
4.3.3 Bead Build-up Stage 12
4.3.4 Heating Stage 12
4.3.5 Change-over Stage 13
4.3.6 Joining and Cooling Phase 13
4.3.7 End of Welding 13
4.4 Data Logging/Welding Report Generation (optional) 13
5 Indication of Errors Related to the Heating Element 13
6 Service and Repair 14
7 Service and Repair Contact 14
8 Accessories/Parts for the Product 14
Appendix 15

Caution

The success of the jointing operation depends on the proper pressures, times, and temperatures of the welding as given in the welding value tables in the appendix. The correct pressure value depends on the section of the cylinder of the welding machine. Prior to using the tables in the appendix, verify carefully that the section quoted in the technical specifications of this manual is the same as the section given on the name plate affixed to your machine.

1 Introduction

Dear Customer:

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

The development, manufacture, and check of the heating element butt-welding machine **HÜRNER Manual 315** has been performed with a view to superior operation safety and user-friendliness. The machine was manufactured and checked according to state-of-the-art technology and widely recognized safety regulations.

To ensure maximum operation safety, please conform to the appropriate messages in this booklet and the regulations for the prevention of accidents.

Thank you.

2 Safety Messages

This User's Manual contains important instructions for the intended and safe operation of the product. Every person who operates the product has to conform to the instructions of this manual.

2.1 The User's Manual

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

2.2 Explaining Icons

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

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

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

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

2.3 Operating the Product Safely

For your own safety, comply with the following instructions

- Protect the power supply cord and the hydraulic pressure lines from cutting edges. Have an authorized service shop replace damaged cables or lines immediately.
- The product may be operated and serviced exclusively by authorized staff who were briefed on it.
- The product may be operated only when observed.
- Before operating the product, always check for damaged parts and have them repaired or replaced by an authorized service shop as needed.

- The cover caps of the hydraulic lines have to be closed during transport in order to prevent contaminants and humidity from entering the hydraulic and control unit.
- EVU wiring regulations, VDE provisions, DIN / CE regulations, and applicable national legislation have to be respected.
- Without prior authorization by the manufacturer, modifications to the product are unacceptable.


Caution

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


Caution

Pipe Facing Tool
Start the pipe facing tool only after it was inserted into the machine and carry it only by the handle, never by the disk enclosure.
It is unacceptable to remove shavings from the machine while the facing process is in progress. Make sure nobody is present in this danger zone.


Caution

Heating Element
When working with the machine, be extremely cautious while the heating element is used. Since the heating element presents a temperature of more than 200°C during the welding process, it is absolutely indispensable that operators wear suitable protective gloves. Bear in mind that the heating element will remain hot for a while after it was turned off.


Caution

Danger of Bruises and Injury
Do not remain in the danger zone while the machine carriage moves apart or closes in, and be sure not to have your arms or legs between the moving and the fixed carriage of the machine.


Caution

Acceptable Work Conditions
The work zone has to be clean and has to have proper lighting. It is dangerous to operate while it is raining, in a humid environment, or close to flammable liquids. In regard of this, acceptable work conditions have to be ensured (tent, heating, etc.).


Info

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

2.4 Owner and Operator Obligations

- The machine may be operated exclusively by persons who are familiar with the applicable regulations, the guidelines for the prevention of accidents, and the User's Manual. The owner/manager shall provide the worker operating the machine with the User's Manual and shall make sure that the operator reads and understands it.
- The machine may be operated only when observed. Welders must have been briefed properly on the operation of the machine or must have participated in a dedicated training. The operating/

owning organization engages to check at reasonable intervals if the machine is operated by the welders as intended and under proper guidelines of occupational safety.
- The machine must be operated only when in proper state of repair and for one of the intended uses. Before welding, the welder is required to make sure that the state of the machine is in order.

Important

During transport, the facing tool and the heating element have to be placed into the provided carrying rack at all times.

2.5 Intended Use

The Butt-Welding Machine is intended exclusively for joining plastic pipes and fittings according to the butt-welding process with heating element. See Section 3 for a detailed overview of the welding process enabled by this machine.

The notion of intended use also includes:
- Compliance with the instructions in the User's Manual
- Observation of all service and maintenance intervals

Important

All uses other than those mentioned above are not allowed and will cancel any and all liability or warranty by the manufacturer. Unintended use may cause considerable hazards and material damage.

2.6 Warranty

Warranty claims may be raised only if the conditions for warranty given in the General Terms and Conditions of Sale and Delivery obtain.

2.7 Transport and Storage

The box in which the product arrives should also be used for storage as a protection against humidity. During transport or storage in the box, the hydraulic tubing should **not be detached or squeezed**. The pipe facing tool and heating element have to be transported in the provided carrying rack.

2.8 Identifying the Product

Every product is identified by a name plate. It shows the model ("Typ"), the serial number ("Maschinennr."), and the manufacturer. The first two digits of the serial number represent the year of manufacture.

3 Understanding the Machine

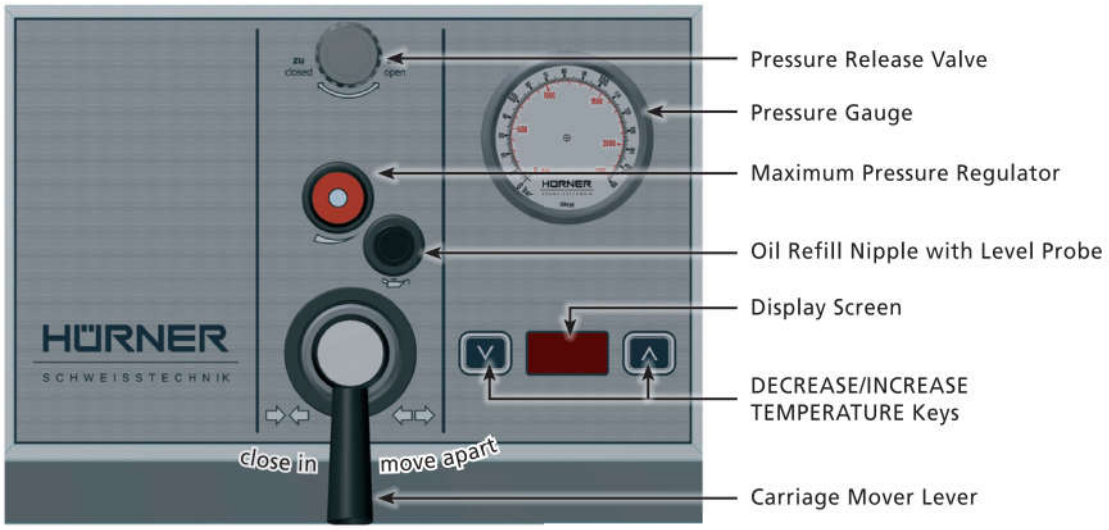
This butt-welding machine for plastics can be used both as an on-site and as a workshop installation, for jointing operations pipe-to-pipe, but also for processing tees and elbows (see also the first paragraphs of Sect. 4.3 for more detailed information on this).

3.1 Included Components

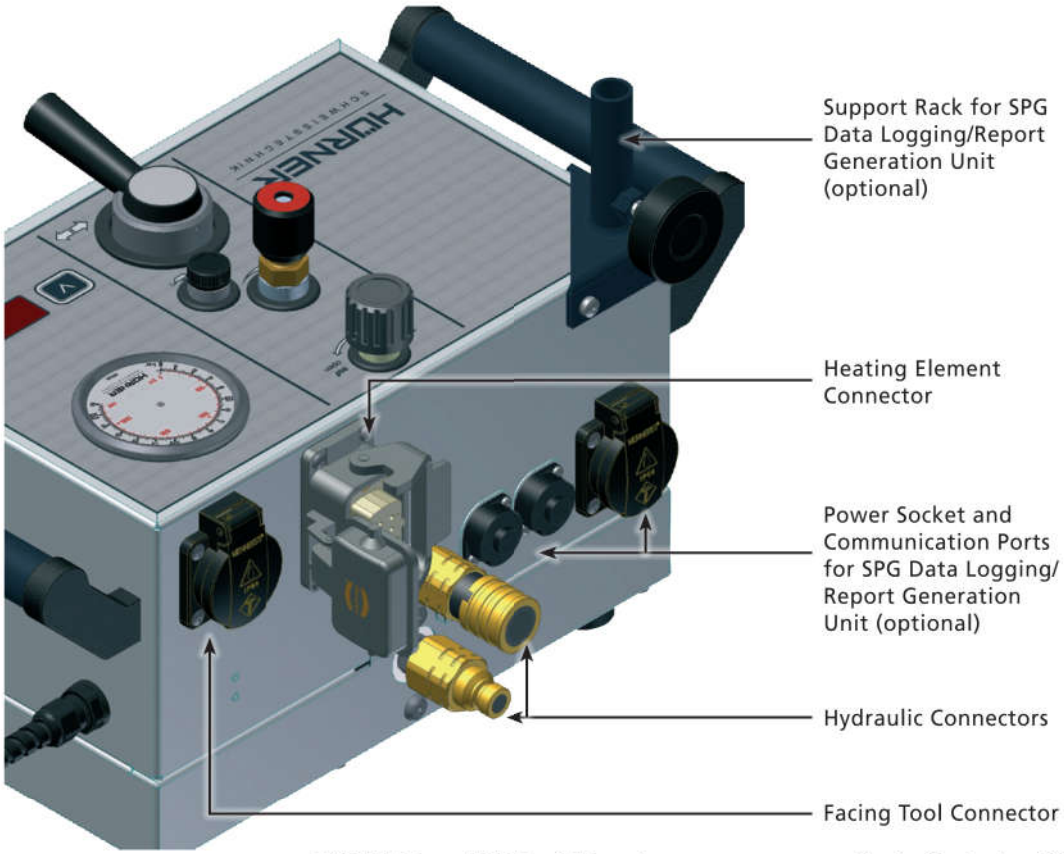
The product ships in its transport box with the following components:

- Machine chassis ("basic machine") to secure the parts to be welded
- Electrical heating element with anti-stick coating
- Electrical facing tool
- Carrying and storage rack for heating element and facing tool
- Hydraulic and control unit with control panel
- Reducer inserts for clamps of machine chassis for the following nominal pipe sizes: O.D. 90, 110, 125, 140, 160, 180, 200, 225, 250, 280 mm

3.2 Control Panel



3.3 Connectors



3.4 Technical Specifications

HÜRNER Manual 315	
Power Specifications	
Voltage	230 V
Frequency	50/60 Hz
Total Rated Powe	4.65 kW
Heating Element	3.00 kW
Facing Tool	1.05 kW
Hydraulic & Control Unit	0.60 kW
Hydraulic Specifications	
Operating Pressure max.	160 bar
Cylinder	5.89 cm²
Ambient Temperature Range	–5°C to +50°C
Hydraulic Oil	HF-E 15
Operating Range	90 through 315 mm
Dimensions	
Basic Machine Chassis	1090 x 620 x 590 mm
Facing Tool	600 x 470 x 390 mm
Heating Element	600 x 470 x 50 mm
Hydraulic & Control Unit	480 x 310 x 300 mm
Carrying and Storage Rack	470 x 330 x 440 mm
Weights	
Basic Machine Chassis	100 kg
Facing Tool	21 kg
Heating Element	13 kg
Hydraulic & Control Unit	23 kg
Carrying and Storage Rack	11 kg
Transport Box	37 kg
All Reducer Inserts	132 kg

3.5 Overview of the Welding Process

The welder performs the welding process in the following manner:

- Applicable welding times and pressures are looked up in the overview tables in the appendix.
- Pipes are clamped into the frame.
  If pipes with an outside diameter smaller than the maximum dimension of the machine are welded, select the reducer set needed. The 8 individual inserts of the set that matches the outside diameter of the pipe to be welded have to be attached to the clamps of the machine chassis using the provided bolts.
- Pipe butts are worked using the pipe facing tool.
- Pipe alignment is checked.
- The drag pressure, i.e. the minimum pressure to set the carriage in motion and “drag” it along, is recorded at the machine.
- The pressures relevant to the welding operation are set.
- The heating element is inserted after cleaning it and checking its temperature.
- The welding process proper is performed (see section 4), and the operator waits for the jointed pipes to cool down.
- After the cooling time is over, pressure can be shutt off from the pipes and the joint can be taken out of the chassis.

4 Operation

4.1 Start of Operation, Switching the Machine on

Important Before the control unit is turned on, check the oil level of the hydraulic and control unit and top up with HF-E 15 hydraulic oil as needed.

Important The surfaces of the heating element have to be free of grease and clean, or they have to be cleaned.

Important Make sure all connectors are tight in their sockets and note that operation on a worksite is only acceptable if the power supply has earth-leakage circuit breakers.

After the power supply cord was connected to the mains power supply or a generator, the machine is ready for operation.

Caution It has to be ensured that the voltage of the power source the machine is connected to corresponds to the rated voltage of the machine. Also the following has to be respected when using extension cables:
For 230 V power: wire section 2.5 mm² = max. 75 m long
wire section 4.0 mm² = max. 100 m long

Using the Integrated Heating Element Temperature Control
When the machine was connected to the power supply, the control electronics runs an auto-test of the three-digit 7-segment display screen. This is indicated by three short flashes of all segments. After the test, the software switches to control mode, which is recognizable from the display now showing a number. This number corresponds to the currently set nominal temperature of the heating element.

As long as the actual temperature of the heating element is not equal to the required nominal temperature (lower or higher), the display screen flashes. This indicates in most cases that the heating element is heating up. When the nominal temperature is reached, providing it is reached within the specified tolerances and time delays, the display screen stops flashing and the heating element can be used.

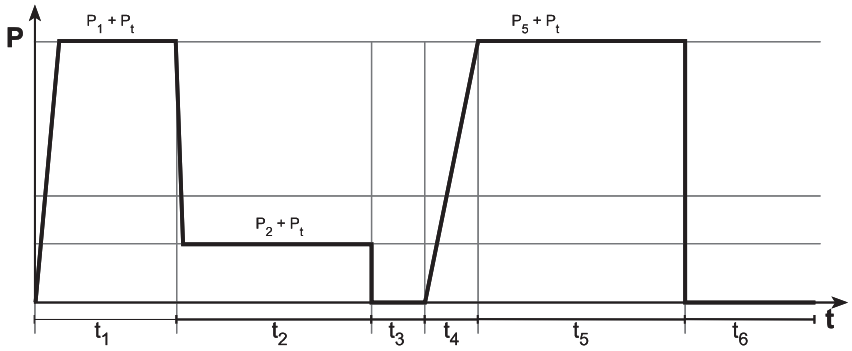
The value of the nominal temperature can be changed using the DECREASE/INCREASE TEMPERATURE keys, either by pressing them repeatedly or by holding them down. The settable temperatures range from 190°C through 250°C. When this setting was changed, the screen starts flashing again, until the heating element has reached the new nominal temperature. The new value is saved to memory and can be used again after the machine is switched on again. To see the current actual temperature of the heating element, hold down both temperature keys. A dot in the lower right-hand corner of the display indicates that the actual temperature is showing.

4.2 Welding Process Overview

The welding process proper, after pipe butt facing and pipe alignment check, has the following four stages, or phases, which are also illustrated by the time-and-pressure diagram below.

- **Bead Build-up Stage** – In this stage, t_1 in the diagram, the pipes are pressed against the heating element and heated to the temperature of it; to ensure consistent bead formation, do this at drag pressure (P_t) plus P_1 from the welding value tables in the Appendix.

- **Heating Stage** – In this stage, t_2 in the diagram, the pipes remain in contact with the heating element, soaking heat from it; the pressure is reduced to drag pressure (P_t) plus P_2 from the welding value tables in the Appendix.
- **Change-over Stage** – In this stage, t_3 in the diagram, pressure is shut off from the pipes, the carriage moves apart to the far end to allow taking the heating element out from in-between the pipes.
- **Joining and Cooling Stage** – This stage is characterized by a succession of events. First, after change-over, the pipe butts are put together and pressure increases as a linear ramp to drag pressure (P_t) plus P_5 from the welding value table in the Appendix (t_4 in the diagram). Then, the joint cools down at $P_t + P_5$, either until pressure is completely removed from the the pipes (t_5 in the diagram) or until pressure is reduced to one-third of P_5 (10 seconds into t_5 in the diagram); in the second case, cooling is completed at the reduced pressure.
  Pipe and fitting manufacturers may include data on how long the new joint should not be exposed to external strain. Also, the applicable welding standard may require a minimum cool-on time after pressure shut-off (t_6 in the diagram). In most cases, however, t_6 is not relevant to the welder.



4.3 Performing the Welding Process

To start welding, clamp the pipes into the machine chassis. Use the appropriate reducer inserts if the component size is smaller than the basic machine chassis. When the fourth clamp of the machine is removed, tees and elbows can be processed.

4.3.1 Facing the Pipe Butts

To ensure that the pipe butts are level, insert the pipe facing tool between the machine carriages and turn it on. Using the carriage mover lever on the hydraulic unit, have the movable carriage close in toward the center in order to bring the pipes into contact with the facing tool. Use the pressure regulator to adjust the pressure manually while the facing tool is trimming the pipes.


Info

The farther the carriage mover lever is pushed to the left, the faster the carriage closes in and the faster pressure increases. The farther it is pushed to the right, the faster the carriage of the machine moves apart, and the faster pressure decreases.

Pipe facing should continue until shaving forms a continuous blade that rolls twice or three times around the pipe ends, so the butts are level. Facing is stopped by moving the carriage apart with the carriage mover lever.

If you discover after the facing process that the butts are still not level,

start over, insert the facing tool and repeat the process. When facing is properly done, pipe alignment has to be checked.

4.3.2 Checking Pipe Alignment and Determining Drag Pressure

When the pipes are properly faced, close in the movable carriage completely to check whether a potential vertical and horizontal pipe misalignment is within the tolerance allowed by the applicable welding standard. If pipe alignment is in order, the welding proper can start. If the misalignment is outside tolerance, the pipes must be readjusted in the clamps and, if needed, facing has to be repeated.

When pipe alignment is appropriate, move the carriage apart using the carriage mover lever; make sure the movable carriage is as far apart as possible before continuing. Turn the maximum pressure regulator counter-clockwise as far as it will go to have zero pressure in the hydraulic circuit. Then set the carriage mover lever to its close-in position while simultaneously turning the maximum pressure regulator gradually clockwise. Watch the pressure gauge closely to observe at which pressure level the carriage is "dragged" to start moving. Take note of this value, preferably on paper, as the drag pressure P_t for this welding operation.


Important

The exact drag pressure depends on various conditions (pipe size and material, position/altitude of the machine, etc.) and has to be determined for every welding individually. The value P_t is needed to compute the bead build-up, the heating, and the joining pressures needed for jointing (stages t_1, t_2, and t_5 in the welding diagram respectively).

4.3.3 Bead Build-up Stage

Use the welding value tables in the Appendix to look up the joining pressure (maximum pressure to be applied during bead build-up and joining) appropriate for your situation. Then set the maximum pressure regulator to joining pressure plus drag pressure (see Sect. 4.3.2) while observing the actual pressure shown on the gauge, and move apart the carriage of the machine. Using the welding value tables, check that the heating element (heating plate) has the correct temperature and insert it between the butts, move the carriage in on the heating plate and press the pipe butts to it at a pressure of $P_1 + P_t$ for the bead build-up duration given in the welding value tables in the Appendix (t_1 in the diagram above) until the weld bead has properly formed.

4.3.4 Heating Stage

After the bead build-up stage (t_1 in the diagram) was completed, the pressure must be decreased to below or equal to the level of $P_2 + P_t$. The decreased pressure will then be applied for the entire duration of the heating stage (t_2 in the diagram), in which the pipe butts continue to soak heat from the plate. Use the welding value tables in the Appendix to determine the heat-soaking time (t_2) and the heat-soaking pressure ($P_2 + P_t$) applicable to your welding situation. To reduce the pressure applied to the pipe, use the pressure release valve and observe the pressure level on the gauge.


Important

Full contact has to be continuously established between the heating plate and the bead, even with lower pressure. While heating, if contact between them is lost somewhere along the circumference, welding has to be aborted and repeated.

4.3.5 Change-over Stage

After the end of the heating, or heat-soaking, stage, set the carriage mover lever on the hydraulic unit to its move-apart position in order to move the carriage to the far end. Then remove the heating element from in-between the pipes.

The change-over has to be followed immediately by the joining stage. The change-over time given for your welding situation in the tables in the Appendix (t_3) must not be exceeded. If it is, welding has to be aborted and repeated.

4.3.6 Joining and Cooling Phase

Set the carriage mover lever to its close-in position again in order to move the pipe butts in on each other and to build the joining pressure ($P_5 + P_t$) according to a consistent increase. Watch the reading of the gauge. Building the joining pressure must correspond to a linearly increasing ramp and its duration must neither be longer nor shorter than indicated for your welding situation in the welding value tables in the Appendix at t_4.

Once the joining pressure is reached and has stabilized at $P_5 + P_t$, depending on the applicable welding standard, the pressure will either be kept at this level until the end of the joining stage is reached (t_5), or pressure will be reduced after 10 seconds to one-third of P_5 and the reduced pressure will be kept until the end of the stage t_5 is reached. Towards the end of the joining stage, the new joint also starts cooling down. If the pressure has to be reduced in the course of the joining stage (under the WIS standard or the UNI standard for PE100 with walls thicker than 20 mm), reducing the pressure is done with the pressure release valve on the hydraulic unit.

Pipe and fitting manufacturers may include data on how long the new joint should not be exposed to external strain. Also, the applicable welding standard may require a minimum cool-on time (t_6 in the diagram). In most cases, however, t_6 is not relevant to the welder.

4.3.7 End of Welding

The welding is finished at the end of a successful joining and cooling stage. The welder has to shut the pressure off from the pipes using the pressure release valve.

4.4 Data Logging/Welding Report Generation (optional)

As an option, the butt-welding machines of the Manual series offer the possibility to log welding and traceability data of every joint and to save them to a welding report.

All it takes is the connection of a HÜRNER Data Logging/Report Generation Unit of the SPG series to the machine. A model version with a support bracket and connection ports for the data logger is available upon request.

5 Indication of Errors Related to the Heating Element

Error indications that may appear on the 7-segment display are composed of the letter “E” and a code number. When an error is cleared while the machine is still running and provided the cleared error was the only one that occurred, the machine changes back to control mode. No machine re-start is needed. As soon as an error condition is

detected, the heating element is switched off. The control unit supports the following error messages:

Error 'E01'	Temperature sensor not connected or ohm value too high
Error 'E02'	Heating element temperature exceeds maximum (> 280°C)
Error 'E03'	Short-circuit at the temperature sensor input

6 Service and Repair

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


Important

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

7 Service and Repair Contact

HÜRNER Schweisstechnik
Nieder-Ohmener Str. 26
35325 Mücke, Germany

Tel.: +49 (0)6401 9127 0
Fax: +49 (0)6401 9127 39

Web: www.huerner.de

E-mail: info@huerner.de


Info

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

8 Accessories/Parts for the Product

Facing Tool Blade for HÜRNER Manual 315


Info

Only genuine spare parts are acceptable. The use of non-genuine parts voids any and all liability and warranty on the part of the manufacturer.

For consultation and ordering spare parts, refer to the seller or manufacturer of the product.

Schweißtabellen
Welding Value Tables
Paramèteres de soudage

HÜRNER Manual 315

Technische Änderungen an der Maschine bleiben vorbehalten.
We reserve the right to change technical specs of the machine without prior notice.
Nous nous réservons le droit d'apporter des modifications techniques sans préavis.

PE 80 / PE 100 DVS 2207-1 (09/2005)		HÜRNER Manual 315 Zylinder/Cylinder/Vérin 5,89 cm²				Angleichen *Bead Build-up*		Anwärmen *Heating*		Umstellen *Change-over*	Fügerampe (t_4), Fügen u. Abkühlen *Pressure Ramp* (t_4), *Joining and Cooling*		
Durchmesser *Diameter*	Wandstärke *Wall Thickn.*	Ø / Wand *Ø / Wall*	Versatz *Align Offset*	Temperatur *Temperature*	Temperatur *Temperature*	P_1	Wulst *Bead*	P_2 max.	t_2	t_3 max.	t_4	P_5	t_6
mm	mm	SDR	mm	°C (PE 80)	°C (PE 100)	bar	mm	bar	sec	sec	sec	bar	min
90	3,5	26	0,4	220	220	2,0	0,5	0,0	45	5	5	2,0	6
90	4,3	21	0,5	219	220	2,5	0,5	0,0	45	5	5	2,5	6
90	5,1	17,6	0,5	218	220	3,0	1,0	0,0	51	5	5	3,0	7
90	5,3	17	0,6	218	220	3,5	1,0	0,5	53	5	5	3,5	7
90	6,6	13,6	0,7	216	220	4,0	1,0	0,5	66	6	6	4,0	9
90	8,2	11	0,9	215	220	5,0	1,5	0,5	82	7	7	5,0	11
90	10,0	9	1,0	213	220	6,0	1,5	0,5	100	7	7	6,0	13
90	12,2	7,4	1,3	211	220	7,5	2,0	1,0	122	8	8	7,5	15
110	4,2	26	0,5	219	220	3,5	0,5	0,0	45	5	5	3,5	6
110	5,2	21	0,6	218	220	4,0	1,0	0,5	52	5	5	4,0	7
110	6,2	17,6	0,7	217	220	5,0	1,0	0,5	62	6	6	5,0	9
110	6,5	17	0,7	217	220	5,0	1,0	0,5	65	6	6	5,0	9
110	8,1	13,6	0,9	215	220	6,5	1,5	0,5	81	6	6	6,5	11
110	10,0	11	1,0	213	220	8,0	1,5	1,0	100	7	7	8,0	14
110	12,2	9	1,3	211	220	9,5	2,0	1,0	122	8	8	9,5	16
110	14,9	7,4	1,5	209	220	11,0	2,0	1,5	149	8	9	11,0	19
125	4,8	26	0,5	218	220	4,5	1,0	0,5	48	5	5	4,5	6
125	6,0	21	0,6	217	220	5,5	1,0	0,5	60	6	6	5,5	8
125	7,1	17,6	0,7	216	220	6,5	1,5	0,5	71	6	6	6,5	10
125	7,4	17	0,8	216	220	6,5	1,5	0,5	74	6	6	6,5	10
125	9,2	13,6	1,0	214	220	8,5	1,5	1,0	92	7	7	8,5	13
125	11,4	11	1,2	212	220	10,0	1,5	1,0	114	8	8	10,0	15
125	13,9	9	1,4	210	220	12,0	2,0	1,5	139	9	9	12,0	18
125	16,9	7,4	1,7	208	220	14,5	2,0	1,5	169	9	10	14,5	22
140	5,4	26	0,6	218	220	5,5	1,0	0,5	54	5	5	5,5	7
140	6,7	21	0,7	216	220	7,0	1,0	0,5	67	6	6	7,0	9
140	8,0	17,6	0,8	215	220	8,0	1,5	1,0	80	6	6	8,0	10
140	8,2	17	0,9	215	220	8,5	1,5	1,0	82	7	7	8,5	12
140	10,3	13,6	1,1	213	220	10,5	1,5	1,0	103	7	7	10,5	14
140	12,7	11	1,3	211	220	12,5	2,0	1,5	127	8	8	12,5	17
140	15,6	9	1,6	209	220	15,5	2,0	2,0	156	9	10	15,5	20
140	18,9	7,4	1,9	207	220	18,0	2,0	2,0	190	10	11	18,0	24

Angleichdruck *Bead Build-up Pressure* = $P_1 + P_t$ (Bewegungsdruck *Drag Pressure*)
Anwärmdruck *Heat Soaking Pressure* = $P_2 + P_t$ (Bewegungsdruck *Drag Pressure*)
Fügedruck *Joining Pressure* = $P_5 + P_t$ (Bewegungsdruck *Drag Pressure*)

PE 80 / PE 100 **DVS 2207-1** **(09/2005)**		**HÜRNER Manual 315** **Zylinder/Cylinder/Vérin** **5,89 cm²**				**Angleichen** ***Bead Build-up***		**Anwärmen** ***Heating***		**Umstellen** ***Change-over***	**Fügerampe (t_4), Fügen u. Abkühlen** ***Pressure Ramp (t_4), Joining and Cooling***		
Durchmesser *Diameter* mm	Wandstärke *Wall Thickn.* mm	Ø / Wand *Ø / Wall* SDR	Versatz *Align Offset* mm	Temperatur *Temperature* °C (PE 80)	Temperatur *Temperature* °C (PE 100)	P_1 bar	Wulst *Bead* mm	P_2 max. bar	t_2 sec	t_3 max. sec	t_4 sec	P_5 bar	t_6 min
160	6,2	26	0,7	217	220	7,5	1,0	1,0	62	6	6	7,5	9
160	7,6	21	0,8	215	220	9,0	1,5	1,0	76	6	6	9,0	10
160	9,1	17,6	0,9	214	220	11,0	1,5	1,0	91	7	7	11,0	12
160	9,4	17	1,0	214	220	11,0	1,5	1,5	95	7	7	11,0	13
160	11,8	13,6	1,2	212	220	13,5	1,5	1,5	119	8	8	13,5	16
160	14,5	11	1,5	210	220	16,5	2,0	2,0	146	9	9	16,5	19
160	17,8	9	1,8	207	220	20,0	2,0	2,5	179	10	11	20,0	23
160	21,6	7,4	2,2	205	220	23,5	2,5	3,0	219	10	12	23,5	27
180	6,9	26	0,7	216	220	9,5	1,0	1,0	69	6	6	9,5	10
180	8,6	21	0,9	215	220	11,5	1,5	1,5	86	7	7	11,5	11
180	10,2	17,6	1,0	213	220	13,5	1,5	1,5	102	7	7	13,5	13
180	10,6	17	1,1	213	220	14,0	1,5	1,5	107	7	7	14,0	14
180	13,2	13,6	1,3	211	220	17,5	2,0	2,0	133	8	9	17,5	17
180	16,4	11	1,7	208	220	21,0	2,0	2,5	165	9	10	21,0	21
180	20,0	9	2,0	206	220	25,5	2,5	3,0	202	10	11	25,5	25
180	24,3	7,4	2,5	204	220	30,0	2,5	4,0	245	12	23	30,0	30
200	7,7	26	0,8	215	220	11,5	1,5	1,5	77	6	6	11,5	10
200	9,5	21	1,0	214	220	14,0	1,6	1,5	96	7	7	14,0	12
200	11,4	17,6	1,2	212	220	17,0	1,5	2,0	115	8	8	17,0	15
200	11,8	17	1,2	212	220	17,5	1,5	2,0	119	8	8	17,5	16
200	14,7	13,6	1,5	210	220	21,5	2,0	2,5	148	9	9	21,5	19
200	18,2	11	1,8	207	220	26,0	2,0	3,5	183	10	11	26,0	23
200	22,2	9	2,3	205	220	31,5	2,5	4,0	224	11	12	31,5	28
200	27,0	7,4	2,8	202	220	37,0	3,0	4,5	272	12	14	37,0	34
225	8,7	26	0,9	215	220	15,0	1,5	2,0	86	6	6	15,0	12
225	10,7	21	1,1	214	220	18,0	1,5	2,0	108	7	7	18,0	15
225	12,8	17,6	1,3	212	220	21,5	2,0	2,5	128	8	8	21,5	17
225	13,2	17	1,4	212	220	22,0	2,0	2,5	134	8	9	22,0	18
225	16,5	13,6	1,7	210	220	27,5	2,0	3,5	166	9	9	27,5	21
225	20,5	11	2,1	207	220	33,5	2,5	4,0	205	10	11	33,5	26
225	25,0	9	2,5	205	220	40,0	2,5	5,0	252	11	13	40,0	31
225	30,4	7,4	3,1	202	220	47,0	3,0	6,0	308	13	16	47,0	38
250	9,6	26	1,0	215	220	18,0	1,5	2,0	96	7	7	18,0	13
250	11,9	21	1,2	213	220	22,5	1,5	3,0	119	7	7	22,5	16
250	14,2	17,6	1,4	211	220	26,5	2,0	3,5	142	8	8	26,5	18
250	14,7	17	1,5	211	220	27,5	2,0	3,5	148	8	9	27,5	19
250	18,4	13,6	1,9	208	220	34,0	2,0	4,5	184	9	10	34,0	23
250	22,7	11	2,3	206	220	41,0	2,5	5,5	227	11	12	41,0	28
250	27,8	9	2,8	203	220	49,0	3,0	6,5	279	12	14	49,0	34
250	33,8	7,4	3,4	201	220	58,0	3,0	7,5	342	14	17	58,0	42

Angleichdruck *Bead Build-up Pressure* = $P_1 + P_t$ (Bewegungsdruck *Drag Pressure*)
Anwärmdruck *Heat Soaking Pressure* = $P_2 + P_t$ (Bewegungsdruck *Drag Pressure*)
Fügedruck *Joining Pressure* = $P_5 + P_t$ (Bewegungsdruck *Drag Pressure*)

PE 80 / PE 100 **DVS 2207-1 (09/2005)**		**HÜRNER Manual 315** **Zylinder/Cylinder/Vérin 5,89 cm²**				**Angleichen** ***Bead Build-up***		**Anwärmen** ***Heating***		**Umstellen** ***Change-over***	**Fügerampe (t_4), Fügen u. Abkühlen** ***Pressure Ramp (t_4), Joining and Cooling***		
Durchmesser *Diameter*	Wandstärke *Wall Thickn.*	Ø / Wand *Ø / Wall*	Versatz *Align Offset*	Temperatur *Temperature*	Temperatur *Temperature*	P_1	Wulst *Bead*	P_2 max.	t_2	t_3 max.	t_4	P_5	t_6
mm	mm	SDR	mm	°C (PE 80)	°C (PE 100)	bar	mm	bar	sec	sec	sec	bar	min
280	10,8	26	1,1	213	220	23,0	1,5	3,0	107	7	7	23,0	14
280	13,3	21	1,4	211	220	28,0	2,0	3,5	134	8	8	28,0	18
280	15,9	17,6	1,6	209	220	33,5	2,0	4,0	159	9	9	33,5	20
280	16,5	17	1,7	208	220	34,5	2,0	4,5	166	9	9	34,5	21
280	20,6	13,6	2,1	206	220	42,5	2,5	5,5	206	10	11	42,5	26
280	25,5	11	2,6	203	220	51,5	2,5	6,5	255	11	13	51,5	31
280	31,1	9	3,1	201	220	61,5	3,0	8,0	312	13	16	61,5	38
280	37,8	7,4	3,8	200	220	73,0	3,5	9,5	381	16	19	73,0	46
315	12,1	26	1,2	212	220	29,0	2,0	3,5	121	8	8	29,0	16
315	15,0	21	1,5	209	220	36,0	2,0	4,5	150	8	9	36,0	19
315	17,9	17,6	1,8	207	220	42,5	2,0	5,5	179	9	10	42,5	23
315	18,5	17	1,9	207	220	43,5	2,0	5,5	187	9	10	43,5	24
315	23,2	13,6	2,4	204	220	54,0	2,5	7,0	232	11	12	54,0	29
315	28,6	11	2,7	202	220	65,5	3,0	8,5	286	12	15	65,5	35
315	35,0	9	3,5	200	220	78,0	3,0	10,0	352	15	18	78,0	43
315	42,6	7,4	4,3	200	220	92,5	3,5	12,0	429	17	21	92,5	52

P P **DVS 2207-11 (02/2017)**		**HÜRNER Manual 315** **Zylinder/Cylinder/Vérin 5,89 cm²**			**Angleichen** ***Bead Build-up***		**Anwärmen** ***Heating***		**Umstellen** ***Change-over***	**Fügerampe (t_4), Fügen u. Abkühlen** ***Pressure Ramp (t_4), Joining and Cooling***		
Durchmesser *Diameter*	Wandstärke *Wall Thickn.*	Ø / Wand *Ø / Wall*	Versatz *Alignment Offset*	Temperatur *Temperature*	P_1	Wulst *Bead*	P_2 max.	t_2	t_3 max.	t_4	P_5	t_6
mm	mm	SDR	mm	°C	bar	mm	bar	sec	sec	sec	bar	min
90	2,2	41	0,3	210	1,0	0,5	0,0	53	5	6	1,0	6,5
90	2,7	33	0,3	210	1,0	0,5	0,0	53	5	6	1,0	6,5
90	3,5	26	0,4	210	1,5	0,5	0,0	53	5	6	1,5	6,5
90	5,1	17,6	0,5	210	2,0	0,5	0,0	60	5	6	2,0	7,0
90	8,2	11	0,9	210	3,5	1,0	0,0	94	6	8	3,5	11,0
90	10,0	9	1,0	210	4,0	1,0	0,0	113	7	9	4,0	13,0
90	12,2	7,4	1,3	210	5,0	1,0	0,5	137	7	11	5,0	15,5
90	15,0	6	1,5	210	6,0	1,0	0,5	165	8	14	6,0	19,0
110	2,7	41	0,3	210	1,5	0,5	0,0	53	5	6	1,5	6,5
110	3,3	33	0,4	210	1,5	0,5	0,0	53	5	6	1,5	6,5
110	4,2	26	0,5	210	2,0	0,5	0,0	53	5	6	2,0	6,5
110	6,2	17,6	0,7	210	3,0	0,5	0,0	72	6	7	3,0	8,5
110	10,0	11	1,0	210	5,0	1,0	0,5	113	7	9	5,0	13,0
110	12,2	9	1,3	210	6,0	1,0	0,5	137	7	11	6,0	15,5
110	14,9	7,4	1,5	210	7,5	1,0	0,5	164	8	13	7,5	19,0
110	18,3	6	1,9	210	8,5	1,0	0,5	199	9	16	8,5	23,0

Angleichdruck *Bead Build-up Pressure* = P_1 + P_t (Bewegungsdruck *Drag Pressure*)
Anwärmdruck *Heat Soaking Pressure* = P_2 + P_t (Bewegungsdruck *Drag Pressure*)
Fügedruck *Joining Pressure* = P_5 + P_t (Bewegungsdruck *Drag Pressure*)

PP **DVS 2207-11** **(02/2017)**		**HÜRNER Manual 315** **Zylinder/Cylinder/Vérin** **5,89 cm²**			**Angleichen** ***Bead Build-up***		**Anwärmen** ***Heating***		**Umstellen** ***Change-over***	**Fügerampe (t_4), Fügen u. Abkühlen** ***Pressure Ramp (t_4), Joining and Cooling***		
Durchmesser *Diameter*	Wandstärke *Wall Thickn.*	Ø / Wand *Ø / Wall*	Versatz *Alignment Offset*	Temperatur *Temperature*	P_1	Wulst *Bead*	P_2 max.	t_2	t_3 max.	t_4	P_5	t_6
mm	mm	SDR	mm	°C	bar	mm	bar	sec	sec	sec	bar	min
125	3,0	41	0,3	210	1,5	0,5	0,0	53	5	6	1,5	6,5
125	3,8	33	0,4	210	2,0	0,5	0,0	53	5	6	2,0	6,5
125	4,8	26	0,5	210	3,0	0,5	0,0	56	5	6	3,0	7,0
125	7,1	17,6	0,7	210	4,0	1,0	0,0	82	6	7	4,0	9,5
125	11,4	11	1,2	210	6,5	1,0	0,5	129	7	10	6,5	15,0
125	13,9	9	1,4	210	8,0	1,0	0,5	154	8	13	8,0	18,0
125	16,9	7,4	1,7	210	9,5	1,0	0,5	185	8	15	9,5	21,5
125	20,8	6	2,1	210	11,5	1,5	1,0	223	10	18	11,5	26,0
140	3,4	41	0,4	210	2,0	0,5	0,0	53	5	6	2,0	6,5
140	4,2	33	0,5	210	3,0	0,5	0,0	53	5	6	3,0	6,5
140	5,4	26	0,6	210	3,5	0,5	0,0	63	5	6	3,5	7,5
140	8,0	17,6	0,8	210	5,5	1,0	0,5	92	6	8	5,5	10,5
140	12,7	11	1,3	210	8,5	1,0	0,5	142	7	12	8,5	16,5
140	15,6	9	1,6	210	10,0	1,0	1,0	172	8	14	10,0	20,0
140	18,9	7,4	1,9	210	12,0	1,0	1,0	205	9	17	12,0	24,0
140	23,3	6	2,4	210	14,5	1,5	1,0	246	10	20	14,5	29,0
160	3,9	41	0,4	210	3,0	0,5	0,0	53	5	6	3,0	6,5
160	4,8	33	0,5	210	3,5	0,5	0,0	56	5	6	3,5	7,0
160	6,2	26	0,7	210	5,0	0,5	0,5	72	6	7	5,0	8,5
160	9,1	17,6	0,9	210	7,0	1,0	0,5	104	6	9	7,0	12,0
160	14,5	11	1,5	210	11,0	1,0	1,0	160	8	13	11,0	18,5
160	17,8	9	1,8	210	13,5	1,0	1,0	194	9	16	13,5	22,5
160	21,6	7,4	2,2	210	15,5	1,5	1,5	230	10	19	15,5	27,0
160	26,7	6	2,7	210	18,5	2,0	1,5	277	11	26	18,5	33,0
180	4,4	41	0,5	210	4,0	0,5	0,0	53	5	6	4,0	6,5
180	5,5	33	0,6	210	5,0	0,5	0,5	64	5	6	5,0	7,5
180	6,9	26	0,7	210	6,0	0,5	0,5	80	6	7	6,0	9,5
180	10,2	17,6	1,1	210	9,0	1,0	0,5	116	7	10	9,0	13,5
180	16,4	11	1,7	210	14,0	1,0	1,0	180	8	15	14,0	21,0
180	20,0	9	2,0	210	17,0	1,5	1,5	215	9	18	17,0	25,0
180	24,3	7,4	2,5	210	20,0	1,5	2,0	255	11	21	20,0	30,0
180	30,0	6	3,0	210	24,0	2,0	2,0	304	12	29	24,0	36,5
200	4,9	41	0,5	210	5,0	0,5	0,5	57	5	6	5,0	7,0
200	6,1	33	0,6	210	6,0	0,5	0,5	71	6	7	6,0	8,5
200	7,7	26	0,8	210	7,5	1,0	0,5	89	6	8	7,5	10,5
200	11,4	17,6	1,2	210	11,0	1,0	1,0	129	7	10	11,0	15,0
200	18,2	11	1,9	210	17,5	1,0	1,5	198	9	16	17,5	23,0
200	22,2	9	2,3	210	21,0	1,5	2,0	236	10	19	21,0	27,5
200	27,0	7,4	2,7	210	24,5	2,0	2,0	279	11	26	24,5	33,0
200	33,3	6	3,4	210	29,5	2,0	2,5	331	13	32	29,5	40,5

Angleichdruck *Bead Build-up Pressure* = $P_1 + P_t$ (Bewegungsdruck *Drag Pressure*)
Anwärmdruck *Heat Soaking Pressure* = $P_2 + P_t$ (Bewegungsdruck *Drag Pressure*)
Fügedruck *Joining Pressure* = $P_5 + P_t$ (Bewegungsdruck *Drag Pressure*)

PP DVS 2207-11 (02/2017)		HÜRNER Manual 315 Zylinder/Cylinder/Vérin 5,89 cm²			Angleichen *Bead Build-up*		Anwärmen *Heating*		Umstellen *Change-over*	Fügerampe (t_4), Fügen u. Abkühlen *Pressure Ramp (t_4), Joining and Cooling*		
Durchmesser *Diameter*	Wandstärke *Wall Thickn.*	Ø / Wand *Ø / Wall*	Versatz *Alignment Offset*	Temperatur *Temperature*	P_1	Wulst *Bead*	P_2 max.	t_2	t_3 max.	t_4	P_5	t_6
mm	mm	SDR	mm	°C	bar	mm	bar	sec	sec	sec	bar	min
225	5,5	41	0,6	210	6,0	0,5	0,5	64	5	6	6,0	7,5
225	6,8	33	0,7	210	7,5	0,5	0,5	79	5	6	7,5	9,5
225	8,7	26	0,9	210	10,0	1,0	1,0	99	6	8	10,0	11,5
225	12,8	17,6	1,3	210	14,0	1,0	1,0	143	7	11	14,0	16,5
225	20,5	11	2,1	210	22,0	1,5	2,0	220	9	18	22,0	25,5
225	25,0	9	2,5	210	26,5	1,5	2,5	262	10	21	26,5	31,0
225	30,4	7,4	3,1	210	31,5	2,0	3,0	307	12	27	31,5	37,0
225	37,5	6	3,8	210	37,5	2,5	3,5	365	14	32	37,5	45,5
250	6,1	41	0,6	210	7,5	0,5	0,5	71	5	6	7,5	8,5
250	7,6	33	0,8	210	9,5	1,0	1,0	87	6	7	9,5	10,0
250	9,6	26	1,0	210	12,0	1,0	1,0	109	6	9	12,0	12,5
250	14,2	17,6	1,4	210	17,5	1,0	1,5	157	7	12	17,5	18,0
250	22,7	11	2,3	210	27,5	1,5	2,5	240	10	19	27,5	28,0
250	27,8	9	2,8	210	32,5	2,0	3,0	286	11	24	32,5	34,0
250	33,8	7,4	3,4	210	39,0	2,5	3,5	336	13	29	39,0	41,0
250	41,7	6	4,2	210	46,0	2,5	4,5	394	15	36	46,0	51,0
280	6,8	41	0,7	210	9,5	0,5	1,0	79	5	6	9,5	9,5
280	8,5	33	0,9	210	12,0	1,0	1,0	97	6	8	12,0	11,5
280	10,8	26	1,1	210	15,5	1,0	1,5	122	6	9	15,5	14,0
280	15,9	17,6	1,6	210	22,0	1,0	2,0	175	7	13	22,0	20,0
280	25,5	11	2,6	210	34,5	1,5	3,0	266	10	21	34,5	31,5
280	31,1	9	3,1	210	41,0	2,0	4,0	313	12	26	41,0	38,0
280	37,8	7,4	3,8	210	48,5	2,5	4,5	367	14	33	48,5	46,0
280	46,7	6	4,8	210	58,0	2,5	5,5	428	16	40	58,0	57,0
315	7,7	41	0,8	210	12,5	1,0	1,0	89	6	7	12,5	10,5
315	9,5	33	1,0	210	15,0	1,0	1,5	108	6	9	15,0	12,5
315	12,1	26	1,2	210	19,5	1,0	1,5	136	7	11	19,5	15,5
315	17,9	17,6	1,8	210	28,0	1,0	2,5	195	8	16	28,0	22,5
315	28,6	11	2,9	210	43,5	2,0	4,0	293	11	26	43,5	35,0
315	35,0	9	3,5	210	52,0	2,0	5,0	345	13	31	52,0	42,5
315	42,6	7,4	4,3	210	61,5	2,5	6,0	400	15	37	61,5	52,0
315	52,5	6	5,3	210	73,5	2,5	7,0	462	18	45	73,5	64,0

Angleichdruck	*Bead Build-up Pressure*	= P_1 + P_t (Bewegungsdruck *Drag Pressure*)
Anwärmdruck	*Heat Soaking Pressure*	= P_2 + P_t (Bewegungsdruck *Drag Pressure*)
Fügedruck	*Joining Pressure*	= P_5 + P_t (Bewegungsdruck *Drag Pressure*)