GLOBAL

USER MANUAL

BUTT FUSION MACHINES
TRACK RANGE

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STPACUSTER GROUP

Contents

1. GENERAL INFORMATION

Note

Before proceeding to work with the machine make sure to closely read this user manual which is an integral element of the machine. User manual shall be used before, during and after starting the machine, and whenever it's deemed necessary.

Following recommendations of this user manual is the only way to achieve its three primary goals:

- optimization of work results and device performance;
- preventing against (operator's) injuries;
- preventing against damaging or destroying the machine.

1.1 Symbols used in present user manual

Danger

This symbol refers to direct danger of one's health or life.
Ignoring this safety sign might lead to serious injury or even have fatal consequences.

Warning

This symbol provides important information regarding proper use of the machine.
Ignoring this information might lead to malfunction, damaging the material, or causing damage to the environment.

Information

This symbol provides useful information or instructions. This information will help optimally utilize all of machine's functions.

1.2 Intended use

Butt-welding machines TRACK are designed for butt-welding of pipes and fittings made of polyethylene (PE), polypropylene (PP), polyvinylidene fluoride (PVDF) and polybutylene (PB). TRACK machines are controlled by the operator basing on table of welding parameters delivered with the machine. Machine doesn't register any welding data. Registration of welding parameters is possible only after equipping the machine with (DL) data logger which is mounted on the frame of hydraulic unit. Data logger is delivered with special connection kit including connection ports allowing to connect the device to power supply and hydraulic system of the machine. Using the machine for purposes other than described in this user manual is strictly forbidden as it might pose threat to the safety of operator, assisting personnel and could lead to damaging the machine.

Electric components that are included the butt-welding machine set: hydraulic unit (HU), trimmer (TR) and heating plate (HP) are adapted to work with AC power supply ~230V, 50Hz or ~400V, 50Hz, depending on the model (more information in the table with TRACK machines parameters.

Warning

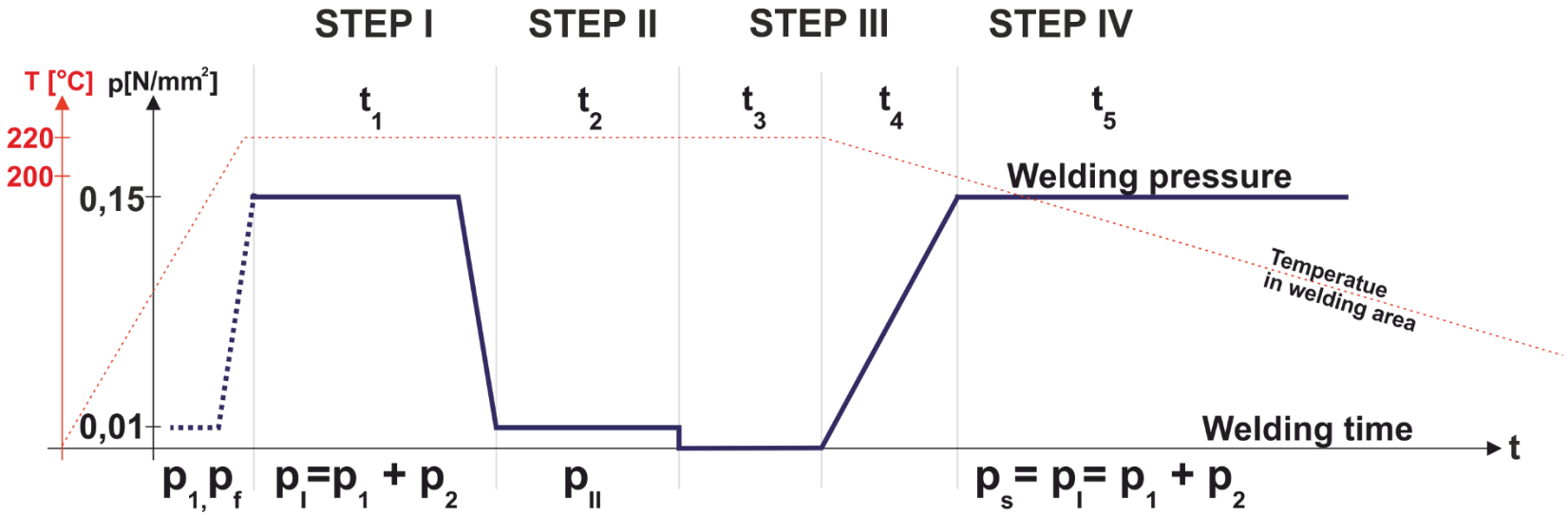
Power supply source should be equipped with grounding wire, overcurrent protection and residual current circuit breaker. It's strictly forbidden to plug the machine to power sockets without neutral wire or grounding pin. Before proceeding to work with machines powered with 400V verify that all 3 phases are active. Missing phase could lead to delivering to the motor asymmetrical voltage which could damage it. Manufacturer takes no responsivity for damages resulting from such situations.

Butt-welding procedure involves connecting two pipe faces of plastic pipes that are previously heated up to proper temperature and then tightened together with suitable pressure. Entire procedure doesn't involve using any additional connecting elements.

Performing butt-welding process can be treated as correct only when used equipment allows for full control of process parameters such as:

- Press force (achieved by properly adjusted pressure in hydraulic system);
- Temperature of heating plate;
- Duration of subsequent phases of welding process.

Steps of welding process	Detailed description
0	*Preparing the pipes. Mounting pipes in machine clamping facilities. Setting the drag pressure* p_1 *(preparation time* t_1*) + trimming the pipe faces at pressure* p_f *(in* t_f *time)*
1	*Preheating (alignment) at* P_I *pressure* $P_I=p_1+p_2$ *(in* t_1 *time required to achieve suitable bead height* h*)*
2	*Proper heating (heat soaking) at* P_{II} *pressure (in normalized time* t_2*)*
3	*Removal of heating plate from between the pipes* $p=0$ *(in time shorter than* t_3*)*
4	*Joining pipes by tightening heated pipes to each other* $P_I=p_1+p_2$ *(in time* t_4*)*
5	*Cooling of finished joint (weld) under pressure* $P_I=p_s=p_1+p_2$ *(in time* t_5*)*



	Timeline values [t]		Pressure scale values [P]
t_w	Time for preparatory operations: installation of pipes, levelling, establishing the drag pressure p_1, etc.	p_1	Drag pressure (minimal pressure value required to overcome tractive resistances)
t_f	Trimming time	p_f	Trimming pressure
t_1	Pre-heating time, (alignment) lasts until bead of required height [h] forms up	p_2	Table value of welding pressure for given pipe (pressure value required to obtain press force of 0,15 N/mm^2]
t_2	Proper heating time (heat soaking)	p_I	Pressure required during alignment stage (initial heating)
t_3	Max. time to remove the heating plate	p_{II}	Proper heating (heat-soaking) pressure (minimal pressure value ensuring proper press of pipes to the heating plate surface $P_{II} \leq 0{,}01$ N/mm^2)
t_4	Welding pressure build-up time ($p_S=p_I$)	$p_S=p_I$	Pressure required during welding and cooling stage
t_5	Time of cooling under pressure [p_I]		

2. SAFETY

2.1 General work safety conditions

Danger

Before proceeding to work, operator is obliged to get acquainted with this user manual. During work operator is also obliged to wear body protective agents like: safety helmet, protective gloves etc.

TRACK butt-welding machine is designed in accordance with current knowledge and shall be used only for welding pipes and fittings made of PE, PP, PVDF, PB. Butt-welding process does not pose any threat to operating personnel under the condition that basic safety rules are followed. However, unqualified personnel or one not following the safety rules could sustain an injury.

Danger

Machine can be operated only by a person with valid qualification certificate allowing to perform butt-welding operation and with proper training. Using the TRACK machine for purposes other than described herein can pose danger to the operator, assisting personnel and lead to damaging the machine or other equipment in machine proximity.

During work with the machine all personnel not involved In welding process shall maintain safe distance from the welding area. Moving or hot elements or ones posing other threats are marked with easily visible pictograms and/or warnings.

Caution

Any use that is unauthorized or against the original purpose of machine, or any interference in the construction of machine will result in the exclusion of the producer's liability for caused damage.

The device should be operated in a place according to general safety rules. The set-up site must ensure adequate ventilation and there is sufficient space around the machine. If placed outdoors, it requires protection from the elements. It is forbidden to work with the device near flammable substances, in explosion hazard zones, in places with excessively high temperature and humidity, and in dusty rooms.

Caution

Butt-welding should take place In temperatures between 0°C and 40°C, in dry conditions and windless weather. In case of other working conditions make sure to use protecting tent and heating equipment.

It is not allowed to clean the device with solvents and other corrosive substances that can permanently damage the paint coating or cause damage to the plastic components. Personnel without proper training should not operate the machine. Any repairs may only be carried out by qualified personnel. All work performed on the electrical system may only be performed by qualified personnel.

2.2 Work place safety

- **Keep the workplace clean and well lit.** Cluttered and unlit work areas can be conducive to accidents;
- **Do not use the machines in potentially explosive atmospheres containing flammable liquids, gases or dust.** The machines are the source of sparks that can ignite dust or vapors;
- **Keep children and third parties away from work area.** Their presence can distract the operator.

2.3 Electric safety

- **Power supply plug must fit perfectly to power outlet socket and cannot be modified in any way.** Devices requiring protective grounding cannot be powered by any type of extension cables. Unmodified plugs and well fitted sockets reduce the risk of sustaining an electric shock.
- **Do not expose the machine to rain or high humidity.** Water soaking inside the machine systems increase the risk of sustaining an electric shock.
- **If it's necessary to use the machine in highly humid conditions use fault current circuit breaker** which reduces the risk of sustaining an electric shock.
- **Power supply cable shall not be pulled or serve to lift the device. Protect the power supply cable against high temperature, oils, sharp edges, and moving parts.** Damaged or tangled cables increase the risk of accidents.
- **During work in outdoor conditions, when it's necessary to use extension cord, use only cords adapted for work in outside conditions.** Using suitable type of extension cords adapted for work in outdoor conditions reduces the risk of accident.

2.4 Personnel safety

- **Remain cautious and focused of performed actions. Do not attempt to work when feeling tired or under the influence of drugs, alcohol or medication.**
- **Always wear personal protective equipment and safety glasses.** Using personal protective equipment such as non-slip footwear, a protective helmet or hearing protection, depending on currently used devices to reduce the risk of accident.
- **Eliminate the possibility of the machine accidentally switching on. Before connecting the machine to power outlet, lifting it or moving it always make sure it's turned off.** Moving any of machine electrical components by holding it by the power switch or connecting it to power outlet while it's turned on could lead to an accident.
- **Before turning on the machine make sure to remove all tools and other devices away from machine.** Tools left in reach of rotating elements of the machine could lead to injury.
- **Avoid standing in unnatural poses during work. Maintain safe standing position at all times to ensure body balance.** This will allow to control the machine more effectively in unexpected situations.
- **Wear appropriate clothing. Do not wear loose clothes or other accessories. Keep hair, clothing and gloves away from moving parts**. Loose clothing, long hair or other accessories can be caught in machine moving parts.

2.5 Safe use

- **Do not overload the machine.** Using proper quality tools makes the work easier and allows for more confident work.
- **Do not use devices with damaged power switch.** Devices that cannot be turned on or off at any given moment pose danger and must get repaired before proceeding to work.
- **Before making adjustments to the machine or replacing some of its parts make sure to disconnect the machine from power outlet.** These safety precautions prevent from accidental start of the machine.

- **Unused machines shall be stored outside of children's reach. Do not people without suitable training or ones that haven't read this manual to operate the machine.** Machine in the hands of inexperienced personnel could be dangerous.
- **Take proper care of the machine. Check the correct functioning of all moving parts, whether they are not damaged or worn out to a degree reducing the machine performance. Replacement of damaged parts shall be carried by authorized service point.** Many accidents are attributed to incorrect maintenance.
- **Use machines, equipment etc. in accordance with this user manual. Make sure to take into consideration working conditions and type of work to be carried.** Using the machine for purposes other than it's destined to could lead to dangerous situations.

2.6 Servicing

Danger

Repairs should be carried out only by an authorized service center and only with the use of original spare parts. This endures the safety of machines.

2.7 Marking

Elements which pose danger have been marked visibly with pictograms/warning messages.

<table>
<tr><th colspan="2">RESIDUAL DANGER WARNING MESSAGES</th></tr>
<tr><td colspan="2">Danger of sustaining an electric shock!</td></tr>
<tr><td>All devices are powered through hydraulic unit. During incorrect exploitation or work with damaged/faulty machines there is a threat of sustaining an electric shock.</td><td> 
</td></tr>
<tr><td>  </td><td>FORBIDDEN ACTIONS!

1. Do not open any covers or lids while the machine is connected to power
2. Any repair works shall be performed only by specialized service personnel with suitable qualifications acc. to the instructions/directives in force at the place of work.
3. It's highly forbidden to connect the power to machines with damaged/cut power supply cables.
4. Do not use the machine with visible mechanical damages or damaged covers.
5. Do not work on a machine with stretched power supply cables.
6. It's forbidden to connect the machine to power supply units that don't conform to requirements set forth in this user manual.
7. It's forbidden to connect the machine base components to 2 separate power supply units.</td></tr>
<tr><td colspan="2">Danger of injuring one's finger or hand – sharp trimming blades!</td></tr>
<tr><td>There is a danger of cutting one's finger or hand by touching rotating blades of the trimmer. Pay special attention during moving the trimmer, mounting it on working position or during its work.</td><td> 
</td></tr>
</table>

FORBIDDEN ACTIONS!

1. Do not touch the trimmer blades during work as well as during transport or while it's resting on the support stand.
2. Do not touch rotating discs of the trimmer during work.
3. Do not launch the trimmer while it's not in its working position
4. Do not start trimming process without checking if the trimmer got locked on position.
5. Trimming remains shall be removed only after the trimmer is removed from the base frame.
6. Do not use the trimmer for purposes other than its original destination.

Danger of sustaining a skin burn! Heating plate is warmed up to 220°C!

There is a danger of sustaining a skin burn by touching heated up heating plate. Make sure to be careful while manipulating with the heating plate. For transport use only special handle bars. Use protective gloves.

FORBIDDEN ACTIONS!

1. Do not touch hot heating plate
2. Do not put the heating plate to rest in any other place than specially designated support stand.
3. Do not use the heating plate for purposes other than its original destination (especially warming up other materials or liquids).

Danger of squeezing, crushing or braking an arm by moving clamps!

There is a danger of sustaining an injury of a person standing between the pipes or within the reach of machine movement range.

FORBIDDEN ACTIONS!

1. Do not reach the machine while it's moving;
2. Do not remove the trimming remains from between the pipes while there is any possibility of pipes moving in any direction;
3. Do not put the clamps in movement if such action could pose a potential threat;
4. Do never reach your hands in between the pipes during montage of pipes as well as during the welding process itself.

Grounding terminals

On each individual component of the machine are located grounding terminals. Contact elements of grounding terminals are galvanized. All grounding terminals are marked.

2.8 Safety equipment

The machine was manufactured in accordance with current standards and safety requirements. Through a range of manufacturer actions, the risk of dangerous situations has been reduced to minimum. Nevertheless, this kind of situations cannot be ruled out, and thus following safety means have been introduced to protect operator's safety:

- Safety valve limiting the maximum pressure in hydraulic system;
- Limit switch on the trimmer

Caution

Removing or modifying any of machine safety system elements results with immediate loss of warranty and is considered a breach of European work safety standards.

3. TECHNICAL SPECIFICATION

Set of butt-welding machine includes:

- Base frame **(BF)** for fastening the pipes in one axis and tightening them together with suitable press force;
- Trimmer **(TR)**: device for even planning of pipe face surfaces and preparing them for joining process;
- Heating plate **(HP)**: element for heating up pipe faces to required temperature;
- Hydraulic unit **(HU)**: distributes hydraulic oil to the system thus controlling the welding process by controlling the pressure, time and temperature;
- Reducing adaptors **(RA)** allowing to catch pipes of smaller diameters than nominal size of the machine

Detailed descriptions of each component can be found In further parts of this user manual.

GENERAL TECHNICAL PARAMETERS OF TRACK MACHINE						
Type:	**TRACK-160**	**TRACK-250**	**TRACK-315**	**TRACK-400**	**TRACK-500**	**TRACK-630**
Diameter range [mm]	Ø 50 – 160	Ø 63 – 250	Ø 90 – 315	Ø 110 – 400	Ø 250 – 500	Ø 315 – 630
Power supply [V]	~ 230				~ 400	
Power [kW]	2,57	3,47	3,67	4,77	6,2	8,1
Weight of machine set* [kg]	81	97	110	190	255	509
Reducing adaptors [mm]	Ø 50, Ø63, Ø75, Ø90, Ø110, Ø125, Ø140	Ø63, Ø75, Ø90, Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225	Ø90, Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225, Ø250, Ø280	Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225, Ø250, Ø280, Ø315, Ø355	Ø250, Ø280, Ø315, Ø355, Ø400, Ø450	Ø315, Ø355, Ø400, Ø450, Ø500, Ø560
Weight of adaptors set [kg]	9	25,5	35	50	59	180

GENERAL TECHNICAL PARAMETERS OF TRACK-R MACHINE				
Type:	**TRACK-250R**	**TRACK-315R**	**TRACK-400R**	**TRACK-500R**
Diameter range	Ø 63 – 250	Ø 90 – 315	Ø 110 – 400	Ø 250 – 500
Power supply [V]	~ 230			
Power [kW]	3,65	3,85	4,95	6,2
Weight of	115	122	158	308
Reducing adaptors [mm]	Ø63, Ø75, Ø90, Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225	Ø90, Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225, Ø250, Ø280	Ø110, Ø125, Ø140, Ø160, Ø180, Ø200, Ø225, Ø250, Ø280, Ø315, Ø400	Ø250, Ø280, Ø315, Ø400, Ø450
Weight of adaptors set [kg]	55	100	127	70

* weight of machine set does not include weight of adaptors set

TECHNICAL PARAMETERS OF INDIVIDUAL COMPONENTS										
Machine type:	**TRACK**						**TRACK-R**			
Component:	**Hydraulic unit**									
Model:	**(HU)-160/400 v.2**			**(HU)-500/630 v.2**			**(HU)-160/400 v.2**			
Power [kW]	0,37			0,55			0,55			
Weight [kg]	29			29			38			
Component:	**Base frame**									
Model:	**(BF)-160**	**(BF)-250**	**(BF)-315**	**(BF)-400**	**(BF)-500**	**(BF)-630**	**(BF)-250R**	**(BF)-315R**	**(BF)-400R**	**(BF)-500R**
Weight [kg]	33	41	46	96	124	300	63	69	86	211
Component:	**Heating plate**									
Model:	**(HP)-160**	**(HP)-250**	**(HP)-315**	**(HP)-400**	**(HP)-400**	**(HP)-630**	**(HP)-250R**	**(HP)-315R**	**(HP)-400R**	**(HP)-500R**
Weight [kg]	3	6	7	12	18	30	8	10	14	18
Power [kW]	1	1,9	2,1	3,1	3,8	6,8	1,9	2,1	3,1	3,8
Component:	**Trimmer**									
Model:	**(TR)-160**	**(TR)-250**	**(TR)-315**	**(TR)-400**	**(TR)-400**	**(TR)-630**	**(TR)-250R**	**(TR)-315R**	**(TR)-400R**	**(TR)-500R**
Weight [kg]	8	15	22	35	58	102	16	22	36	58
Power [kW]	1,2	1,2	1,2	1,3	0,75	1,1	1,2	1,2	1,3	0,75
Component:	**Support stand**									
Model:	**(ST)-160**	**(ST)-250**	**(ST)-315**	**(ST)-400**	**(ST)-500**	**(ST)-630**	**(ST)-250R**	**(ST)-315R**	**(ST)-400R**	**(ST)-500R**
Weight [kg]	4	6	8	14	23	67	6	8	14	23

3.1 Description of individual components

TRACK machine set includes hydraulic unit (HU), base framework (BF), heating plate (HP), trimmer (TR) and reducing adaptors (RA).

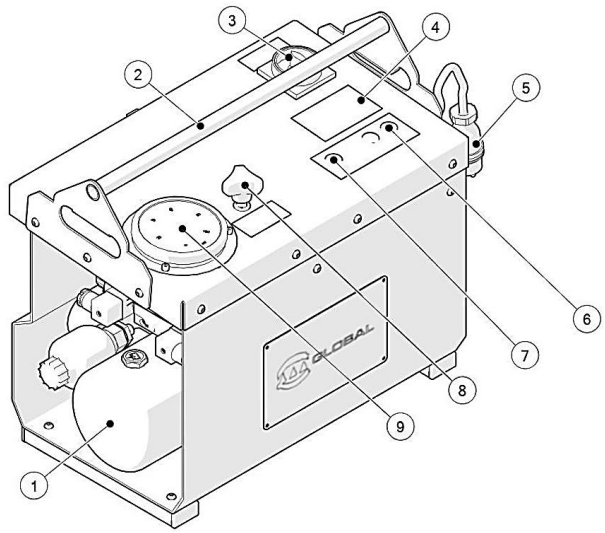
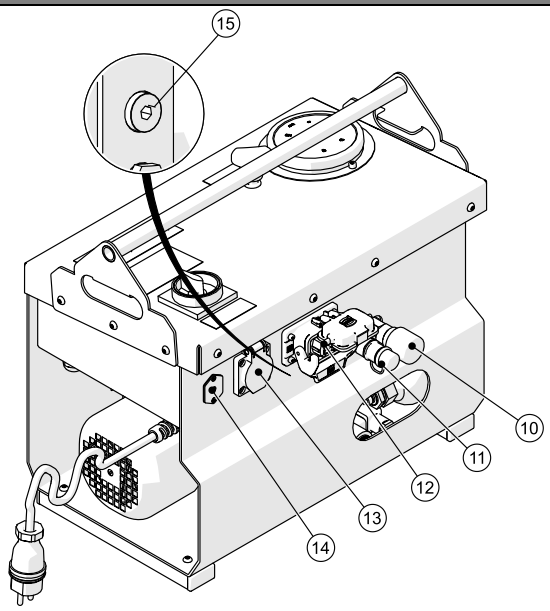
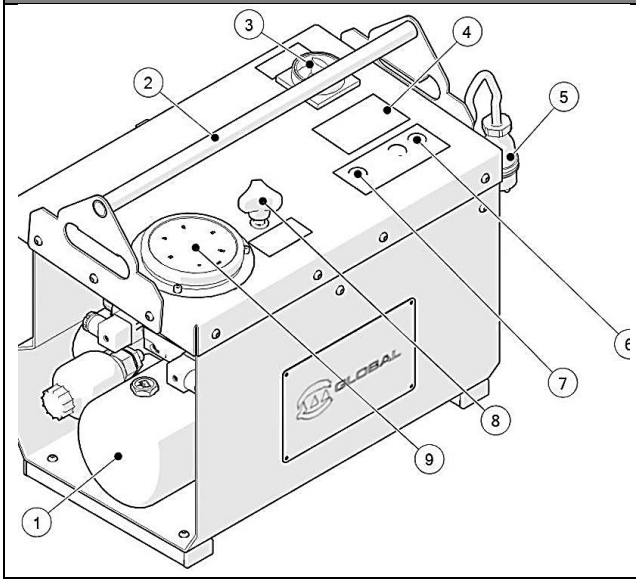
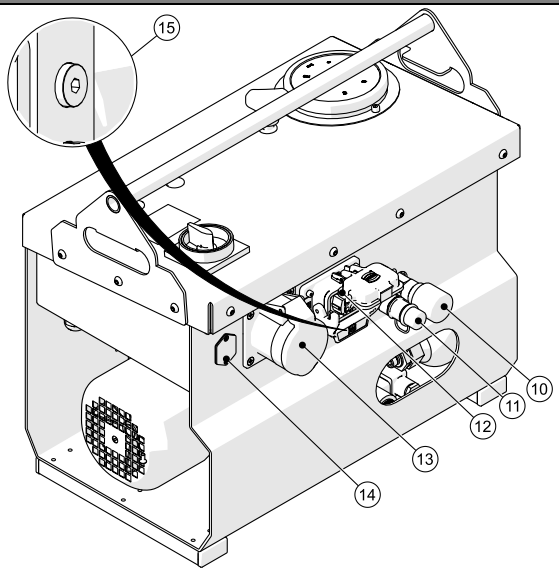
3.1.1 (HU) hydraulic unit

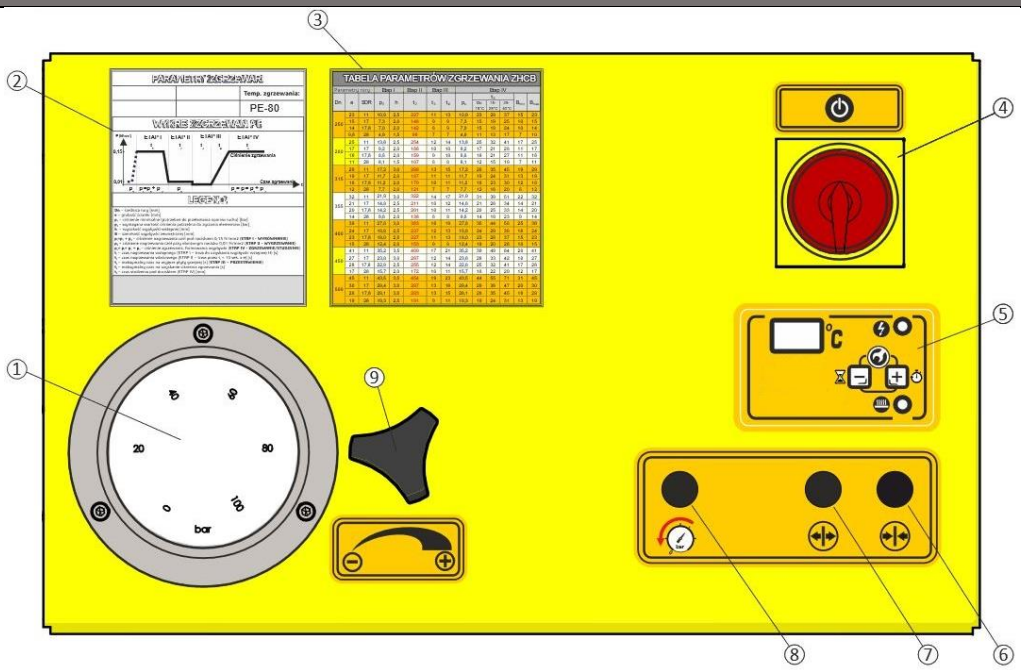
The main purpose of hydraulic unit is to provide hydraulic oil to the cylinders located on base framework under suitable (required) pressure. Hydraulic unit is equipped with (RT) regulator of temperature allowing to control the work of eating plate. Electric system of hydraulic unit consists of electric box integrated into construction of hydraulic unit, switch panel and socket panel.

Hydraulic system consists of pump-motor assembly including hydraulic distributor allowing to change the movement direction of clamps. Machine is controlled with 3 functional buttons: PRESSURE RELIEF, OPEN AND CLOSE. Pressure value is adjusted by turning the pressure valve knob. Pressure regulation valve allows for precise adjustment of pressure in both directions. When holding the CLOSE button operator can increase as well as decrease the pressure. OPENING procedure was designed in such way that it uses full pressure, which cannot be adjusted. Pressing CLOSE button makes the clamps move toward each other, while pressing OPEN button makes the clamps move away from each other. Pressing the PRESSURE RELIEF valve opens the pressure relief valve and reduces the pressure. PRESSURE RELIEF button remains active even in the event of power outage thanks to which it's possible to reduce the pressure in emergency situations e.g. during power outage or after the cooling process when machine is no longer connected to power outlet.

Information

The system responsible for pressure relief during power outage remains functional for about 3 hours from the moment of losing power supply and after that time it might be unable to reduce the pressure in the system. In such case machine must be reconnected to power outlet. Current pressure value can be checked on hydraulic manometer located on the control panel.

Hydraulic unit (HU) 160/400	
	
1. Pump-motor assemby 2. Transport handle 3. Main switch 4. Temperature regulator 5. Power supply plug 6. Buttons for controlling the movement of clamps 7. Pressure relief button 8. Pressure regulation knob	9. Glycerin manometer 10. Female quick-connector with cap 11. Male quick-connector with cap 12. Heaing plate socket 13. Trimmer socket 14. Plug: power supply socket for data logger (DL) 15. Plug: hydraulic connection socket for data logger (DL)
Hydraulic unit (HU) 500/630	
	
1. Pump-motor assemby 2. Transport handle 3. Main switch 4. Temperature regulator 5. Power supply plug 6. Buttons for controlling the movement of clamps 7. Pressure relief button 8. Pressure regulation knob	9. Glycerin manometer 10. Female quick-connector with cap 11. Male quick-connector with cap 12. Heaing plate socket 13. Trimmer socket 14. Plug: power supply socket for data logger (DL) 15. Plug: hydraulic connection socket for data logger (DL)

Hydraulic unit top view	
	
1. Glycerine manometer 2. Machine parameters, description key 3. Table of welding parameters 4. Main power switch 5. Regulator of temperature	6. „CLOSE” button 7. „OPEN” button 8. „PRESSURE RELIEF” button 9. Knob of pressure regulator valve

Mechanical assembly description:

Electric motor is connected with gear pump located inside oil tank through a coupling. The oil tank is made of powder painted steel and has the capacity of V=1,5l. Oil filler together with vent system and dipstick for oil level indication are located on the upper part of hydraulic tank. Hydraulic system is a closed circuit and as long as there are no leaks or other malfunctions the system doesn't require any refills. It's advised to change the oil once a year. Hydraulic system doesn't automatically inform about low oil level and thus it's recommended to check the oil level before work.

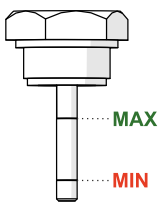
In case of noticing oil loss locate and remove the leak and refill the system with hydraulic oil **L-HV 46** of nominal density 47,2 mm2 /s (in 40°C) taking care not to exceed the maximum allowed level. Hydraulic unit was designed to work within temperature range between 0°C and +60 °C.

Information

Use oil L-HV 46 for refills and oil change operations. Not following this recommendation could lead to improper work of the machine or even damaging it.

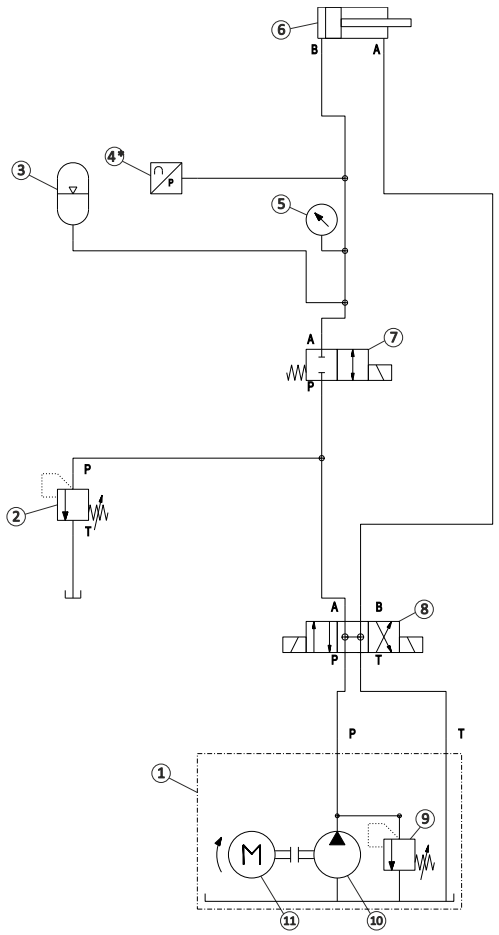
Information

In order to check the oil level, use the dipstick which is integral part of oil tank plug. The reading should fit between MIN and MAX indicators.



Hydraulic assembly includes hydraulic block to which element of hydraulic system are connected: check-valves, cartridge valve, overflow valve.

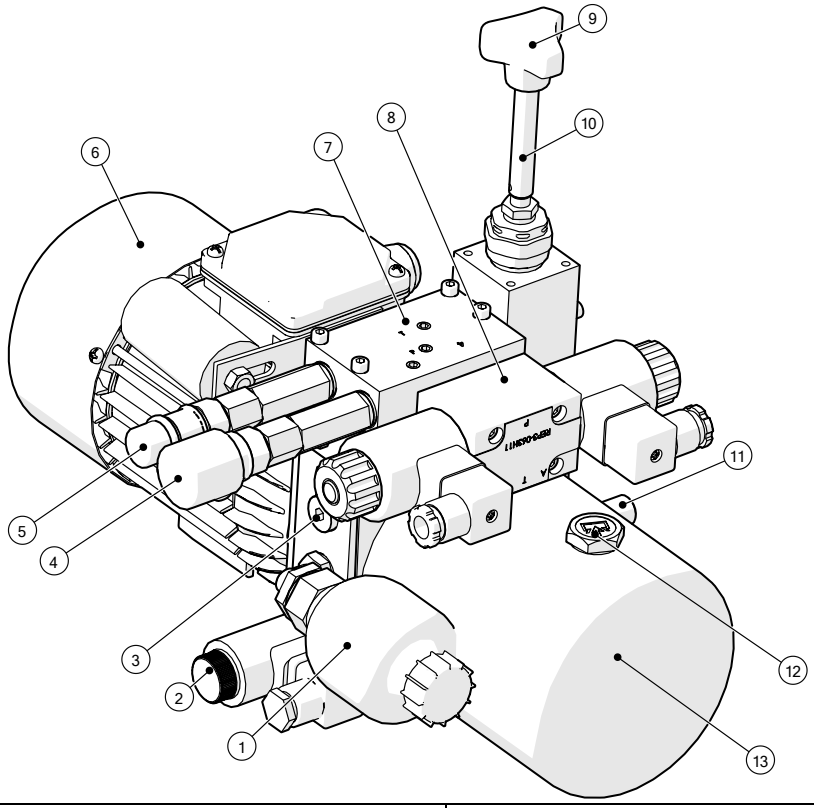
Hydraulic layout of hydraulic unit



1. Oil tank	7. Cartridge valve
2. Pressure regulation valve	8. Divider controlling valves
3. Hydro accumulator	9. Safety valve
4*. Pressure converter	10. Hydraulic pump
5. Manometer	11. Electric motor
6. Hydraulic cylinder	

*****pressure converter belongs to optional equipment that is delivered together with (DL) data logger and is located inside the data logger construction.

Hydraulic assembly



1. Hydro-pneumatic accumulator	7. Hydraulic block
2. Cartridge valve	8. Hydraulic divider controlling the valves
3. Plug for hydraulic measurement socket of data logger (DL)	9. Pressure regulation knob
	10. Pressure regulation valve
4. Female quick-connector with cap	11. Overload valve
5. Male quick-connector with cap	12. Oil filler plug with dipstick
6. Electric motor	13. Hydraulic tank

Hydraulic pressure value is shown on glycerin manometer. Hydro-accumulator is responsible for maintaining stable pressure during proper heating (heat-soaking) and cooling phase. Hydraulic unit is connected to the base frame through hydraulic hoses.

Entire hydraulic assembly including control system and control panel is fastened to the bearing frame which also acts as protection of these systems. Hydraulic system is additionally equipped with overload valve which prevents from achieving pressures above factory set value.

Information

The factory setting of the overload valve takes place before the first start-up and is carried out by the manufacturer's technical inspection staff. It is forbidden to change the settings of the above valve, as it may lead to damaging the machine, for which the manufacturer takes no responsibility.

Electrical assembly:

Electrical assembly is located in drip-proof box mounted inside the upper part of hydraulic unit. Power outlets for trimmer and heating plate are located on the back side of hydraulic unit. Electric layout of hydraulic units are described in details in attachments to this user manual.

Electrical assembly includes two-position power switch (in case of 3-phase powered machines it's 3-position power switch L-0-P), noise filter, control buttons, printed boards (power supply, temp. regulator, pressure relief) and regulator of temperature.

Principle of operation (see: hydraulic layout):

The motor (11) torque is transmitted by coupling onto the hydraulic pump (10). Hydraulic oil is delivered to hydraulic block with built-in pressure regulation valve (2). The direction of oil flow is controlled by hydraulic divider (8) with electromagnetic steering. Pressure reduction is carried with the use of cartridge valve (7). Hydraulic system is equipped with hydro-pneumatic accumulator (3) which maintains the pressure at required level. Welding process is controlled via control buttons located on the hydraulic unit control panel.

Dangerous operations:

Hydraulic unit can be controlled only by properly qualified and trained personnel. Operator has to be also aware that incorrect use of the machine could lead to one's injury or, in extreme cases, even death of people standing close to the machine. Hydraulic system can generate large amounts of press force. During operation of installation of pipes on base framework, moving the clamps, welding it's absolutely necessary to maintain special care. Operator can move the clamps in either direction only when the work space is safe and operation won't pose any danger.

Dangers and forbidden actions

1. Damages done to electrical installation could cause: unstable work of the machine, electric shock, fire, skin burns, etc.
2. Mechanical damages could cause: major body injuries, unstable work of machine
3. Damages of hydraulic system could cause: unstable work of the machine, high pressure oil leaks, pollution to the environment

(HU) (hydraulic unit) scope of examination before proceeding to work:

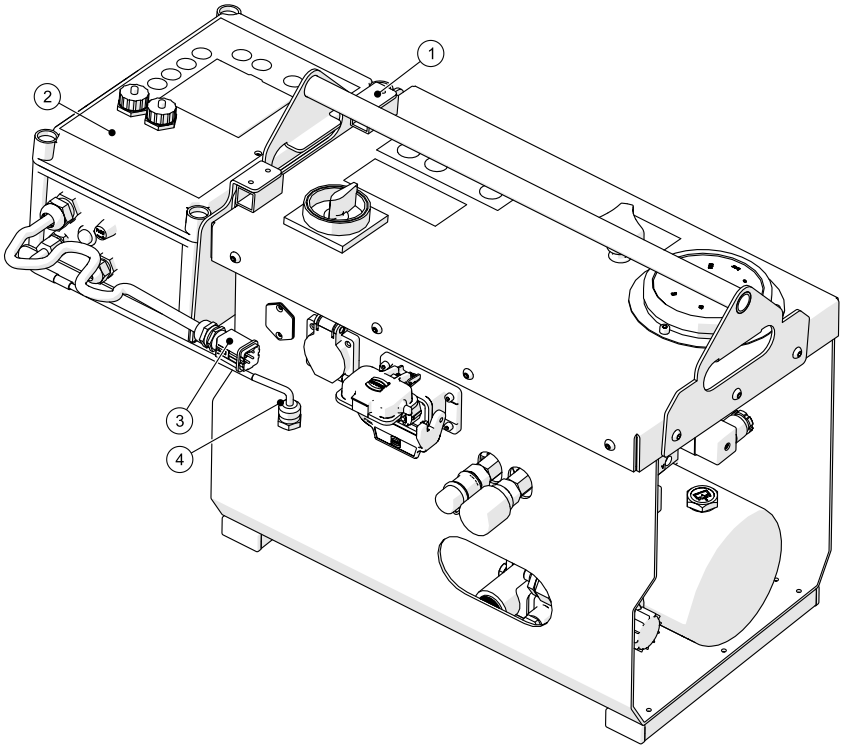
1. Visual evaluation of technical condition of power supply cable and plug
2. Check the level of oil and make sure it's within permissible limit
3. Connect the hydraulic unit to power outlet and check the work of function al buttons on the control panel
4. Check if there are no visible oil leaks on quick couplings

(HU) (hydraulic unit) scope of examination after finishing the work:

1. Disconnect the hydraulic unit from power outlet
2. Disconnect hydraulic hoses from hydraulic unit and secure them with caps protecting against soiling
3. Evaluate the condition of power supply cable and plug

3.1.2 Data logger (DL)

Data logger is an optional equipment for TRACK machine and serves for registration welding parameters (max. 2000 cycles) and guides the operator throughout the welding process using on-screen instructions. Registered welds can be saved on USB stick or sent directly to PC using data transmission cable, and then printed using connection software available free-of-charge online. Data logger is universal and compatible with TRACK machines of various sizes. This means that when owning several TRACK machines and one data logger operator can connect the device to whichever machine he currently needs. Connecting the data logger involves only plugging the power supply plug to suitable socket and attaching the pressure measurement element in designated port.

Hydraulic unit with data logger	
	
1. Data logger fastening points 2. Control panel	3. Square port plug 4. Pressure measurement system connector

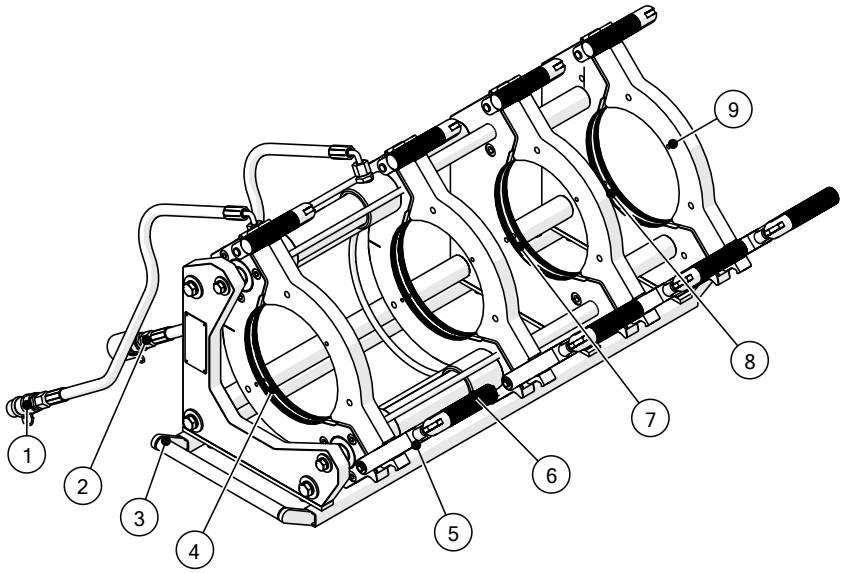
3.1.3 Base framework (BF)

Base frameworks for butt-welding machines are manufactured in two versions: standard and reinforced one. Base framework is responsible for holding welded elements (pipes, fittings) and tightening them together axially during trimming and joining process. Standard version of base framework consists of lightweight aluminum construction with 2 double acting hydraulic cylinders and 4 clamping facilities for holding pipes (two movable clams, middle clamp and right clamp. In order to hole pipes of lower diameter than nominal size of the machine it's necessary to use reducing adaptors. Standard version of (BF) allow to work in '2+2' mode (2 movable clamps + 2 fixed). Joining pipes with fittings like elbows or tees is possible after dismounting the right clamp and thus allowing to work in '2+1' mode. Base framework is connected with hydraulic unit via flexible hydraulic hoses Ø6 x 3000mm, or in case of machines Dn500 and higher Ø6 x 6000mm. For selected markets There are also shorter 3-clamp base frameworks. This kind of base framework has two movable and one fixed clamp. In 3-clamp machines operator is obliged to pay special attention on proper coaxial alignment of joined elements.

Control:

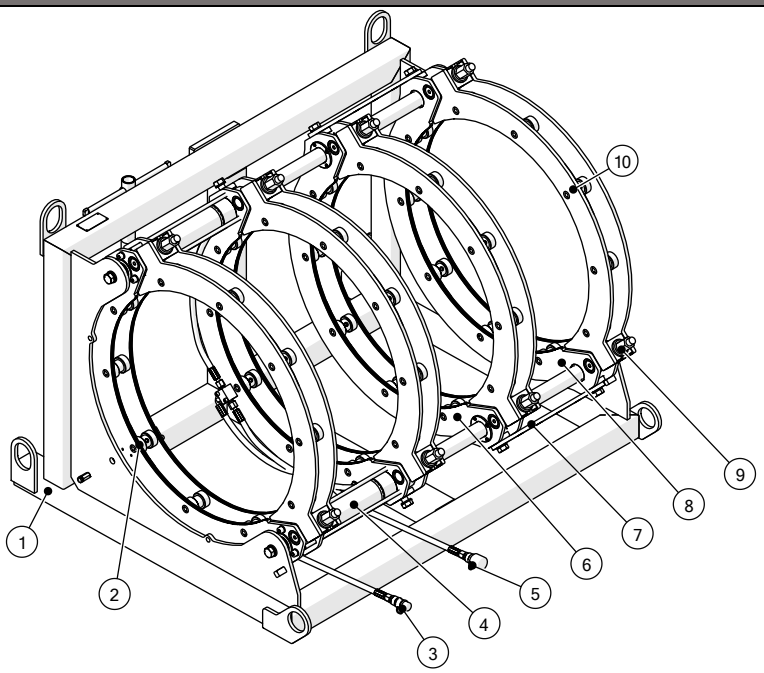
Base framework (BF) is controlled via (HU) hydraulic unit. After turning on the hydraulic unit and pressing button responsible for moving the clamps the oil is pumped into either right or left side of hydraulic cylinders causing them to move in desired direction. Piston rods of hydraulic cylinder act also as supports for trimmer and heating plate during welding process.

(BF) base framework



1. Male quick-connector	6. Hydraulic cylinder
2. Female quick-connector	7. Middle clamp (fixed)
3. Base frame	8. Right clamp – dismountable
4. Jarzmo siłownikowe	9. Upper clamp
5. Locking device	

(BF)-630



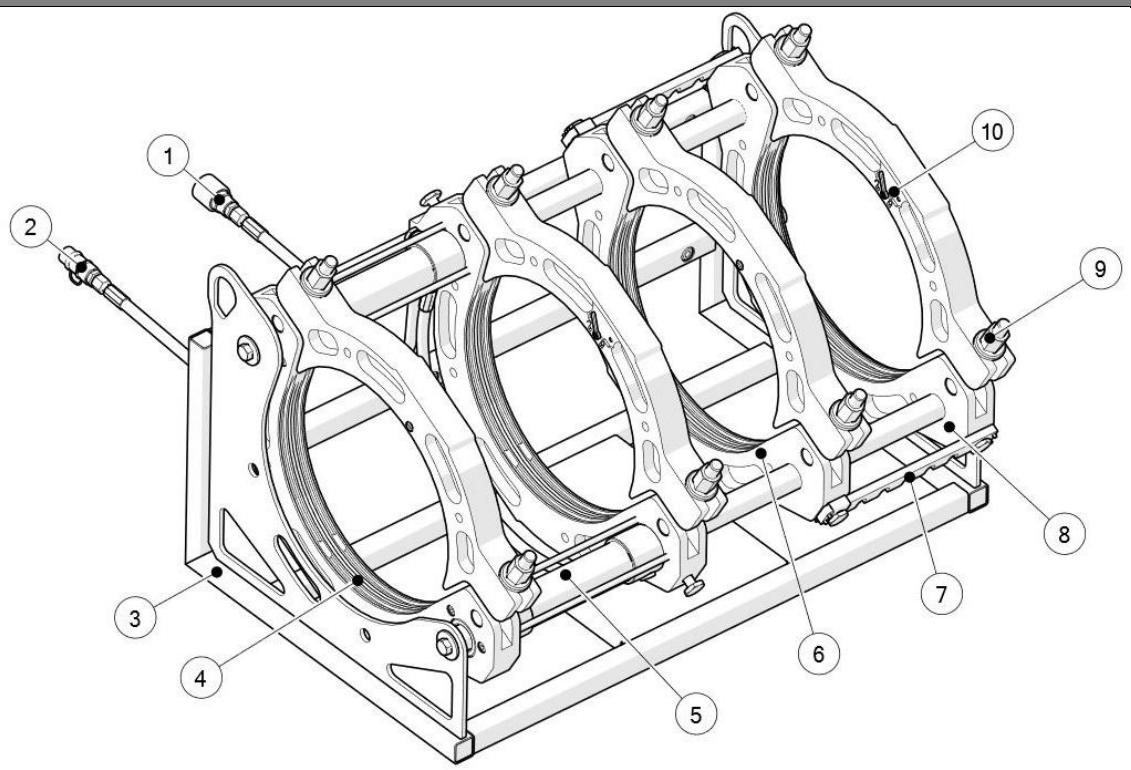
1. Base frame	6. Middle clamp
2. Movable clamp	7. Spacer
3. Male quick-connector	8. Right clamp
4. Hydraulic cylinder	9. Locking device
5. Female quick-connector	10. Upper clamp

(BF)-R (reinforced version)

Reinforced base frameworks marked with 'R' letter and standard Dn630 and higher base frameworks are equipped with wider clamps and both hydraulic cylinders running through their entire length. Base frames are equipped with 3m or 6m hydraulic hoses depending on the model. Pipes are fixed in clamping facilities with the use of special fastening screws (with nuts). Machines are equipped with special ring wrench size 24 for opening and closing the clamps. Normally the machines work in '2+2' mode (2 movable + 2 fixed clamps). In case of welding short-end elements like elbows or tees there a possibility of attaching the middle-fixed clamp to 2 moving clamps with special spacer. As a result, machine will be able to work in '3+1' mode (three movable + 1 fixed clamp). Another advantage of this machine is quick-montage system of reducing adaptors which uses special locking element. Below table comprehensively summarizes basic information about both types of base frameworks.

<table>
<tr><th colspan="11">(BF) and (BF)-R parameters:</th></tr>
<tr><th>Type:</th><th colspan="5">standard (BF)</th><th colspan="5">reinforced (BF)-R</th></tr>
<tr><th>Size [mm]:</th><th>160</th><th>250</th><th>315</th><th>400</th><th>500</th><th>250</th><th>315</th><th>400</th><th>500</th><th>630</th></tr>
<tr><td>Work mode:</td><td colspan="5">2+2, 2+1</td><td colspan="5">2+2, 3+1</td></tr>
<tr><td>Base:</td><td colspan="5">steel</td><td colspan="5">steel</td></tr>
<tr><td>Clamps:</td><td colspan="5">aluminum</td><td colspan="3">aluminum</td><td colspan="2">steel</td></tr>
<tr><td>Reducing adaptors:</td><td colspan="5">aluminum</td><td>steel</td><td colspan="2">DN≤280mm steel
315,355mm aluminum</td><td colspan="2">aluminum</td></tr>
<tr><td>Adaptors installation method:</td><td colspan="5">screw</td><td colspan="3">quick montage</td><td colspan="2">screw</td></tr>
<tr><td>Angle welding adaptors 7°15':</td><td rowspan="2">-</td><td>250/225
250/200
250/180
250/160**</td><td>315/280
315/250
250/225
250/200
250/180
250/160</td><td>400/355
400/315
400/280
315/250
250/225
250/200
250/180
250/160</td><td>500/450
500/400
400/355
400/315</td><td colspan="5">on request</td></tr>
<tr><td>Angle welding adaptors 11°25':</td><td colspan="5">on request</td></tr>
<tr><td></td><td colspan="5">Remaining types: on request</td><td colspan="5"></td></tr>
<tr><td>PMKN*:</td><td colspan="5">-</td><td colspan="5">+</td></tr>
</table>

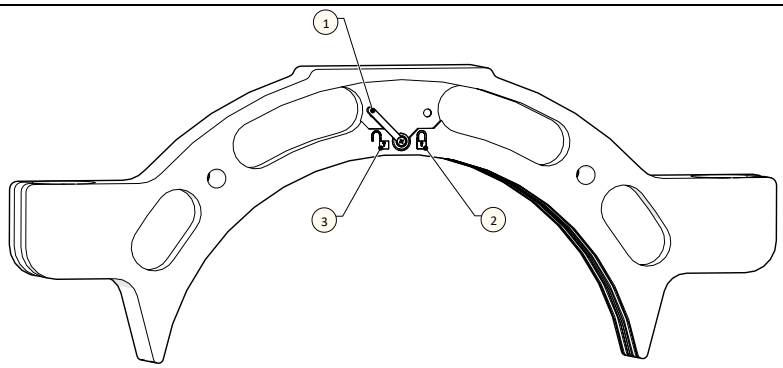
(BF)-R



1. Female quick-connector	5. Hydraulic cylinder	9. Locking screw
2. Male quick-connector	6. Middle clamp (adjustable)	10. Upper clamp
3. Base frame	7. Spacer	
4. Movable clamp	8. Right clamp (fixed)	

Quick-montage system

Upper clamps in machines 250R, 315R i 400R are equipped with quick montage system. Mounting the adaptor is possible by turning the lock lever (1) shown on the picture below. Installation of reducing adaptor is possible after turning the lock lever to OPEN position. In order to secure the adaptor in place turn the lever to CLOSED (2) position after inserting the adaptor in correct position. On lower clamps adaptors are considered mounted after putting them in working position.



1. Locking lever
2. CLOSED position
3. OPEN position

Information

Each upper and lower clamp has two grooves in which reducing adaptors can be fitted. General rule is that for joining long elements adaptors should be mounted in just one groove in each clamp. In case of joining shorter elements, which are too short to be mounted in two clamps it's recommended to add another set of adaptors in respective grooves.

Dangerous operations:

Exposing the machine elements to overloading may result with damaging it. During installation of pipes, moving the clamps and welding it's absolutely advised that operator and assisting personnel stay in safe distance from welding zone.

FORBIDDEN ACTIONS

1. Do not reach the machine while it's in motion toward either open or closed position.
2. Do not remove the trimming remains from the area between the pipes if there is a possibility of clamps moving.

(BF) scope of examination before proceeding to work

1. Visually check the machine condition;
2. Check the cleanness of piston rods;
3. Check the condition and operation of upper clamp locking devices;
4. Connect hydraulic hoses
5. Check if movable clamps can move along entire length of cylinder stroke.

(BF) scope of examination after finishing the work

1. Dismount welded pipes;
2. Disconnect hydraulic hoses (with pressure reduced to „0");

Danger!

Unplugging the hydraulic quick couplers, when the pressure is not reduced to "0", results in pressure remaining in the hydraulic hoses which makes it difficult or impossible to reconnect them back again. In the case when it is not possible to connect the selected quick coupling, use appropriate wrenches, maintaining special care, keep unscrewing them until the oil begins to pour. Then tighten the components together again and try to connect the quick-connectors.

3. Connect the ends of both hydraulic hoses to protect them against dirt or secure them with plugs.
4. Check if there are no visible oil leaks on hydraulic cylinders and other hydraulic elements of base framework;
5. Clean the upper clamp locking devices from mud/dirt using wire brush and spray them with WD-40.

3.1.3.1 Base framework optional equipment

Extractor of heating plate *

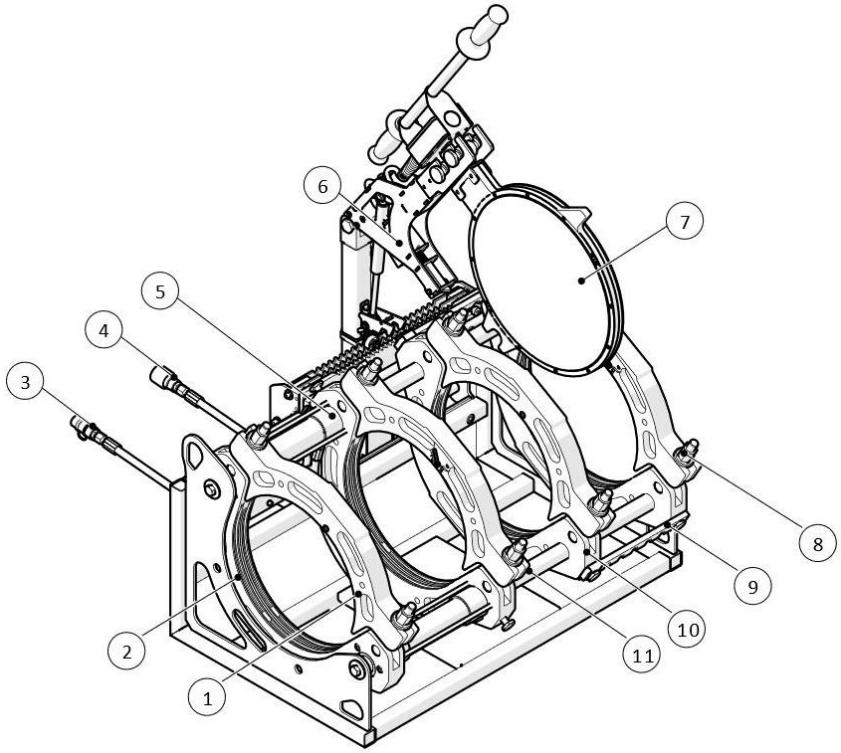
Extractor of heating plate is an optional equipment available for base framework models: (BF)-250R and (BF)-315R. Extractor allows for automatic removal of heating plate during welding process. Operator is obliged only to control the correct installation of heating plate in working position. In case of equipping the base framework with extractor there is still an option of removing the plate manually.

*option available at additional cost

Information

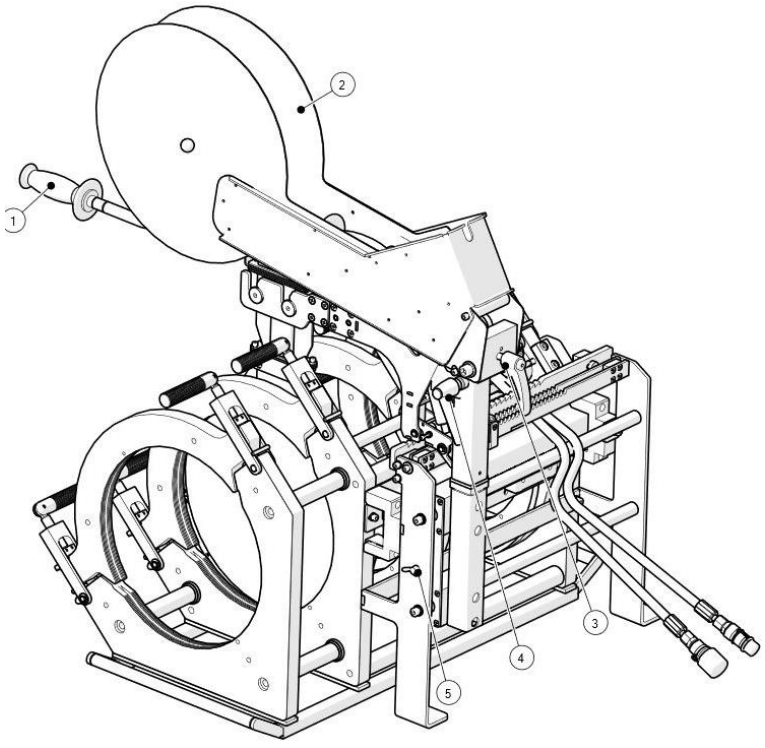
Standard type of heating plate isn't compatible with the extractor and has to be modified accordingly (changed handle type).

(BF)-R + EXTRACTOR



1. Upper clamp	5. Hydraulic cylinder	9. Spacer
2. Movable left clamp	6. Extractor	10. Middle clamp (adjustable)
3. Male quick-connector	7. Heating plate	11. Piston rod
4. Female quick-connector	8. Locking screw	

(BF) + EXTRACTOR

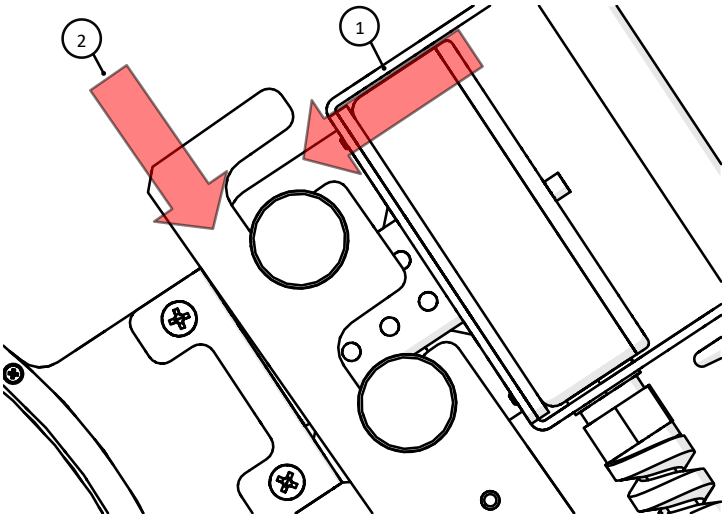


1. Heating plate handle	4. Extractor position lock
2. Thermal cover	5. Extractor locking screw
3. Cover adjustment lock	

Mounting the heating plate in extractor

Steps of installation :

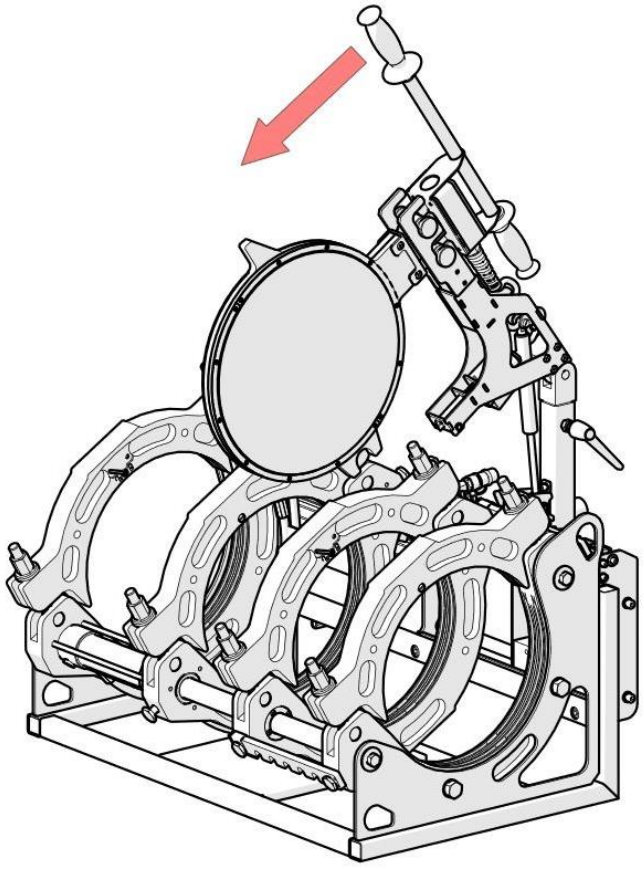
1. Manually Insert the heating plate into fastening element (1).
2. Release the heating plate and push it down accordingly to the drawing (2.) Once the heating plate is assembled in fastening element it should be loose enough to perform correct weld.

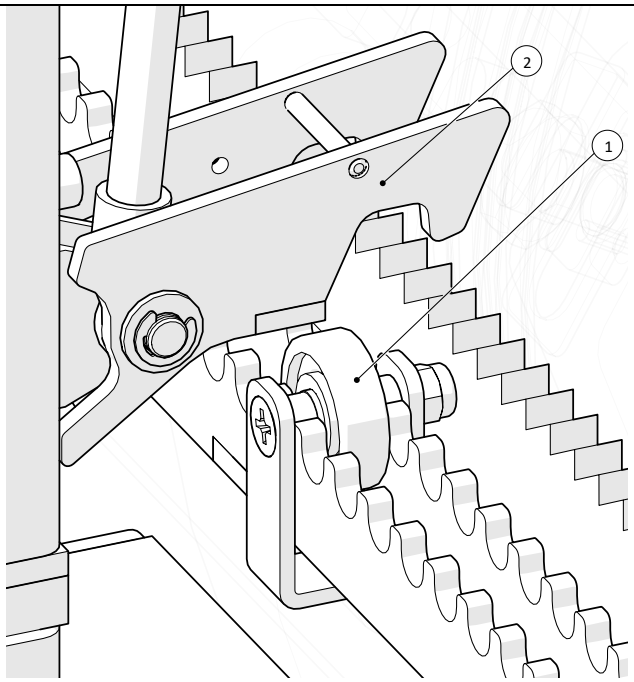


To dismount the plate, follow above instructions in reverse order.

Inserting the plate into working position

Work with the extractor involves two operations (after finishing the trimming process). First step is to lower the plate until the locking mechanism (2) locks the plate in working position.



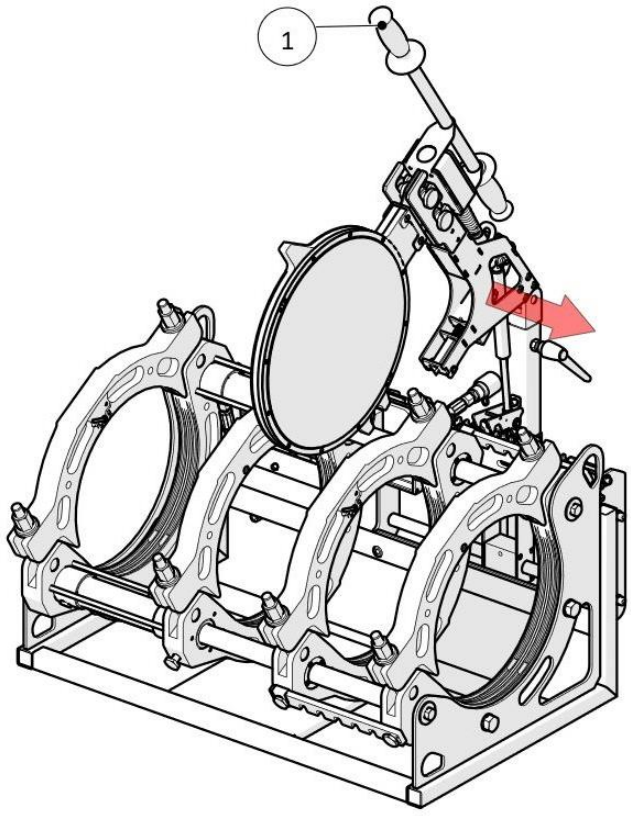


Second operation involves changing the bearing (1) position so that it's as close to the locking mechanism as possible. This will ensure faster release of heating plate and shorten the changeover process. Incorrectly performed operation could lead to an error or collision during removal process.

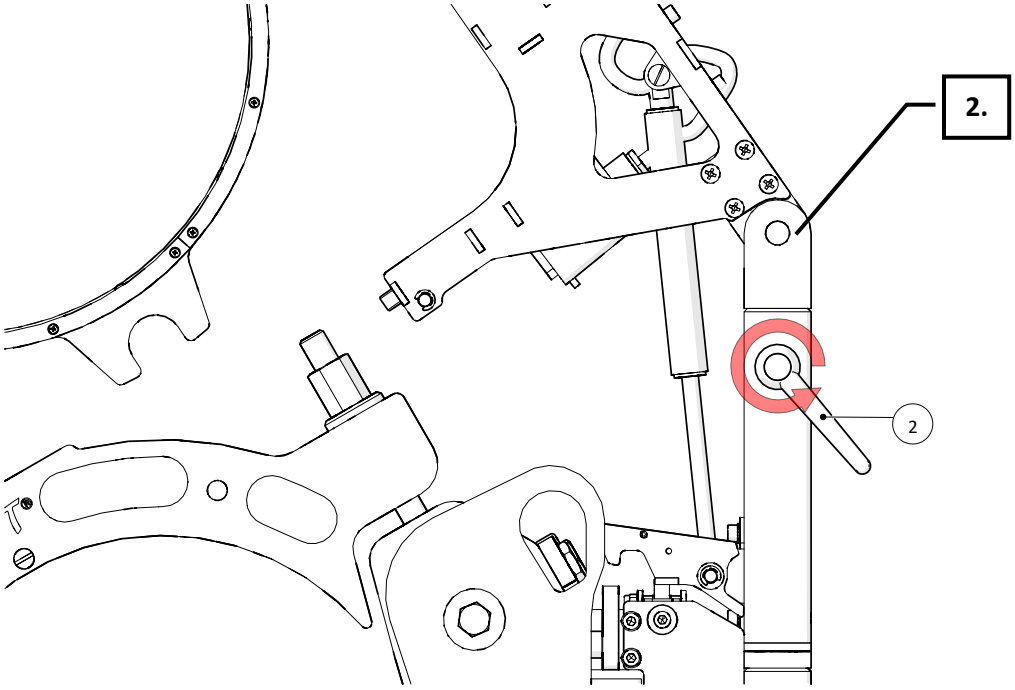
Changing the extractor position

During or after work operator has the possibility to position the heating plate parallel to the base frame axis. Detailed description can be found below:

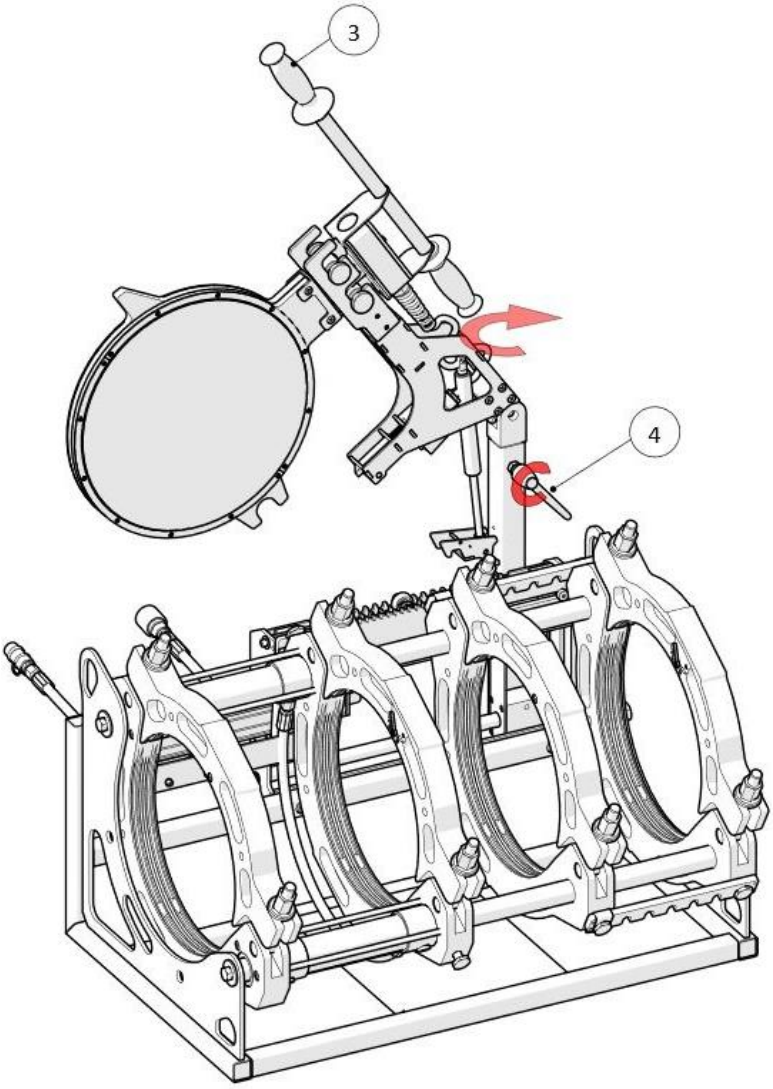
1. While holding the handle (1.) move the extractor with heating plate to the far-end position.



2. Release the extractor arm locking mechanism by turning the adjustable handle (2).



3. Hold the arm (3) and rotate it to sideways position.

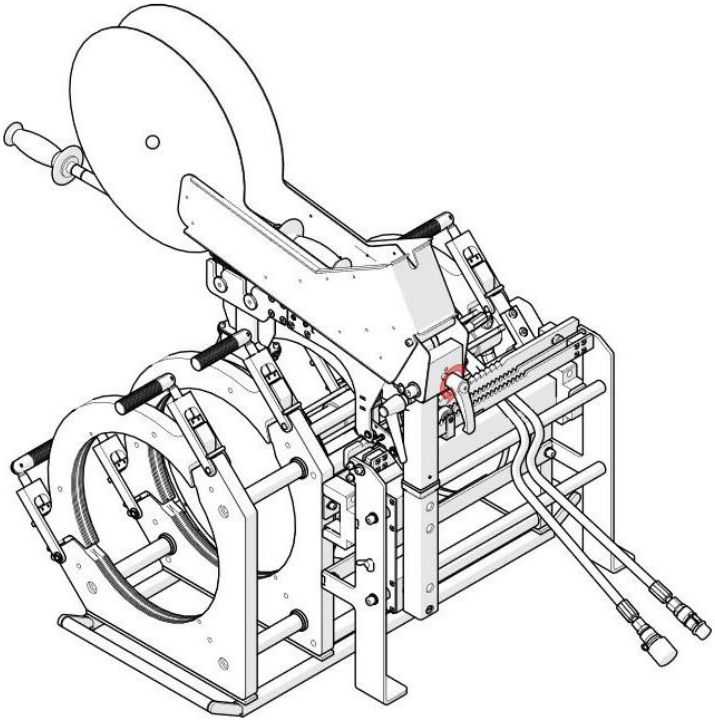


4. Secure the plate in sideways position by locking the adjustable handle (4).
5. In order to return to previous position, follow above steps In reverse order.

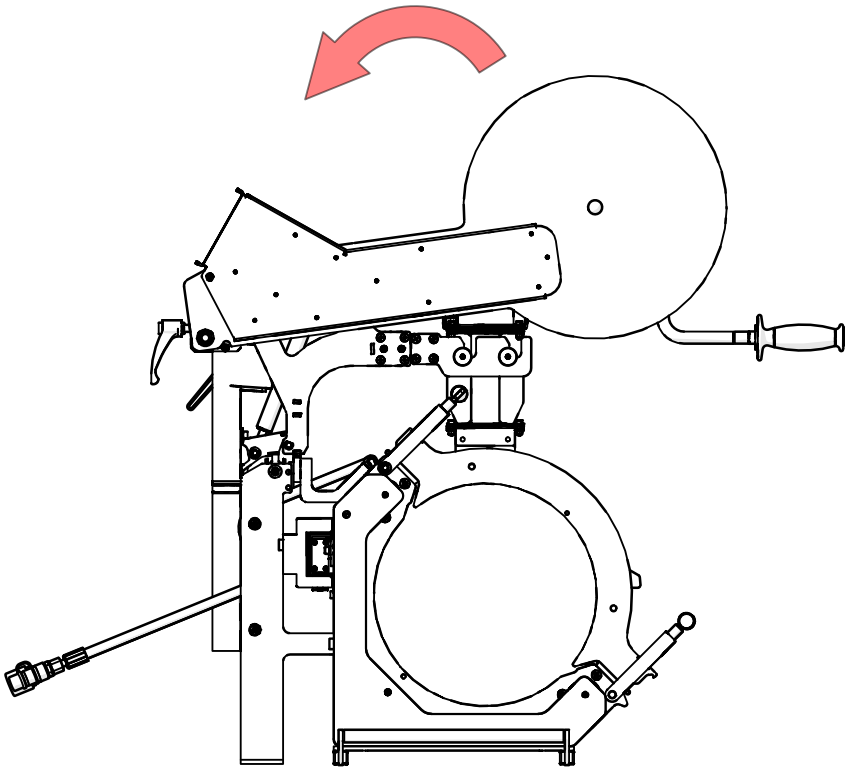
Changing the position of heating plate cover

In order to adjust the position of heating plate cover use the adjustment lock. Operator should, while maintaining special care, change the position of heating plate cover and secure it by closing the locking mechanism. In order to do so follow these steps:

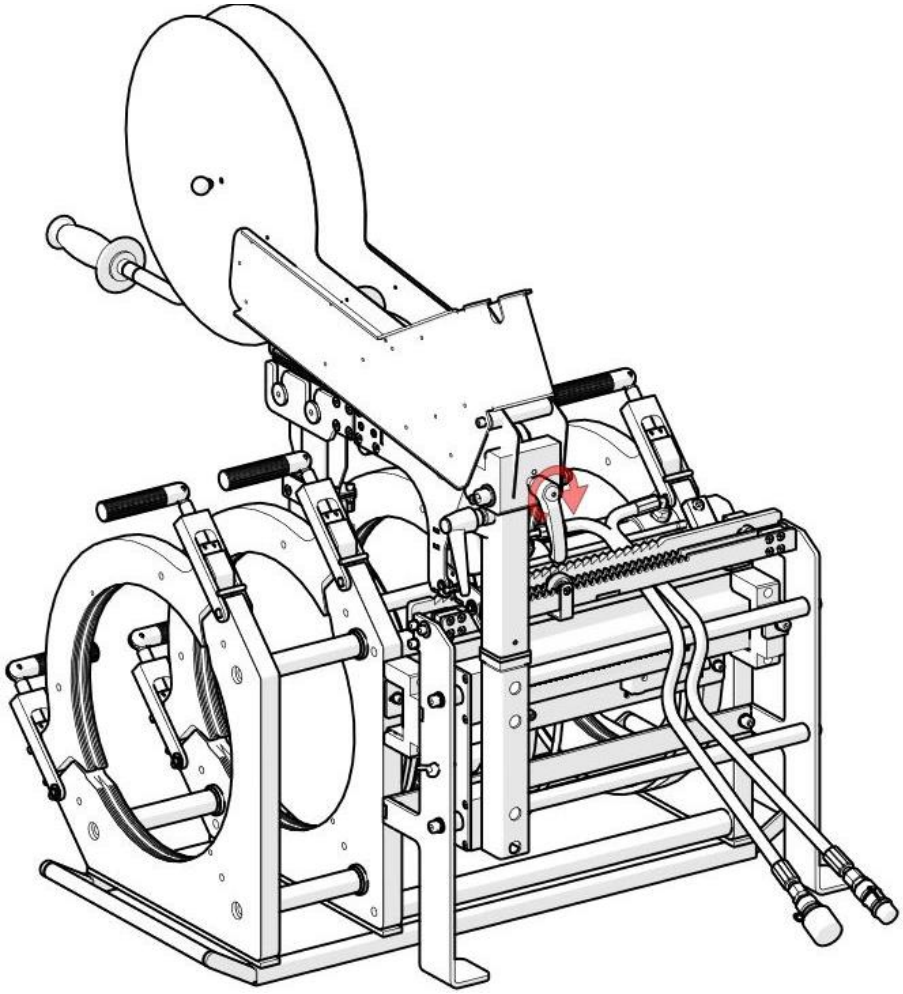
1. While holding the heating plate handle, push the heating plate together with extractor to the far end position.
2. Release the heating plate cover locking mechanism (see picture below).



3. Adjust the position of heating plate cover.



4. Lock the cover position (see picture below).



5. In order to return the cover to previous position follow the instruction in reverse order.

Warning

Before changing the position of extractor make sure that the process won't cause any damage to heating plate power supply cable or other components of machine. During the welding process heating plate is heated up to 220°C, make sure to remain careful and for changing the position grab the plate only by the handle.

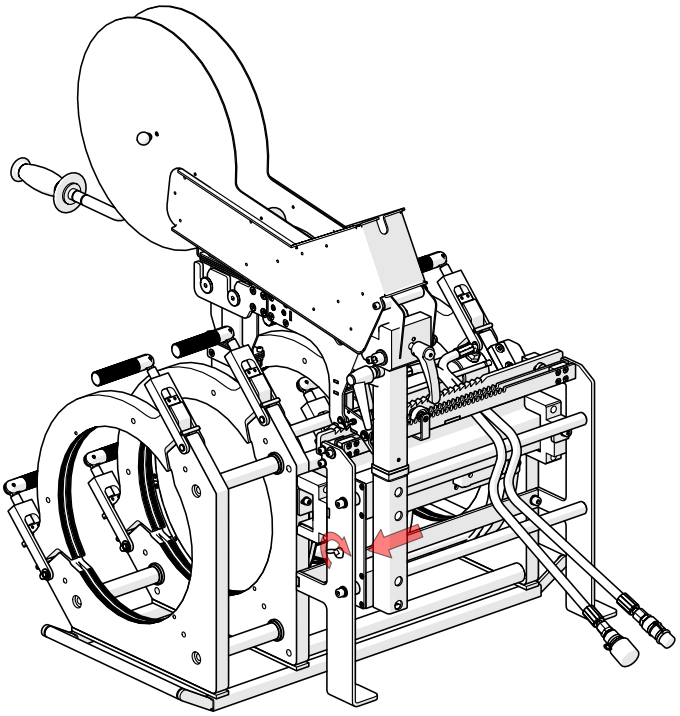
Caution

Transporting the machine with unsecured extractor position might pose a threat to people's health. Manufacturer takes no responsibility for damages resulting from not following above recommendation.

Extractor transport lock

Base framework with extractor shall be transported only after securing the extractor position. In order to do so operator should follow these steps:

1. Loosen the extractor locking screw.
2. By holding the plate handle place, it in far-end position (see picture).



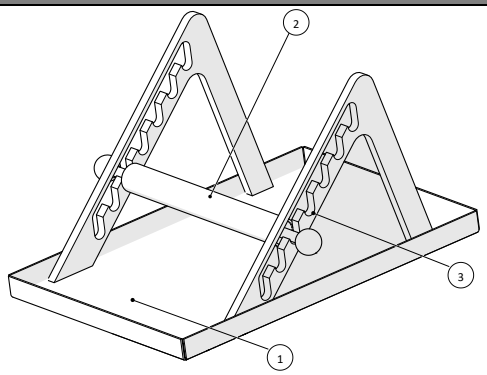
3. Tighten the extractor locking screw.
4. Make sure that the extractor doesn't slide along the guide rail.

In order to unlock the extractor, follow these steps in reverse order.

Pipe rollers

Pipe rollers serve for levelling the pipes. Application of pipe rollers largely affect the final effect of welding process. Pipe rollers reduce the load transmitted by the pipes onto the machine, protect the pipes against mechanical damages and ensures constant value drag pressure.

Pipe roller



1. Base plate
2. Roller
3. Roller height adjustment

Caution

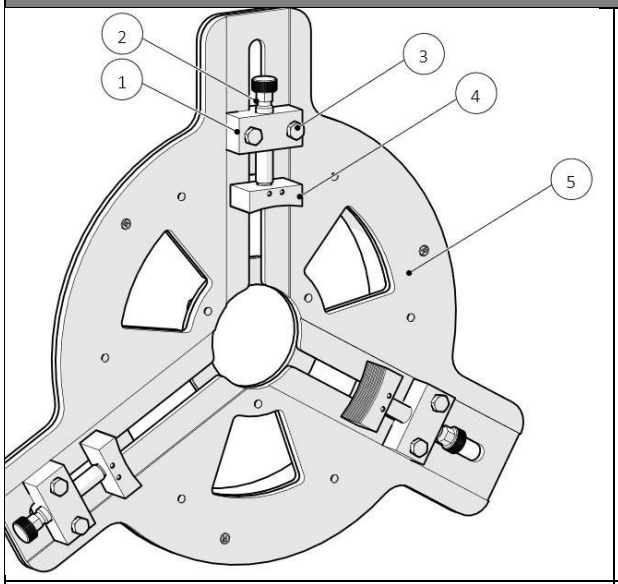
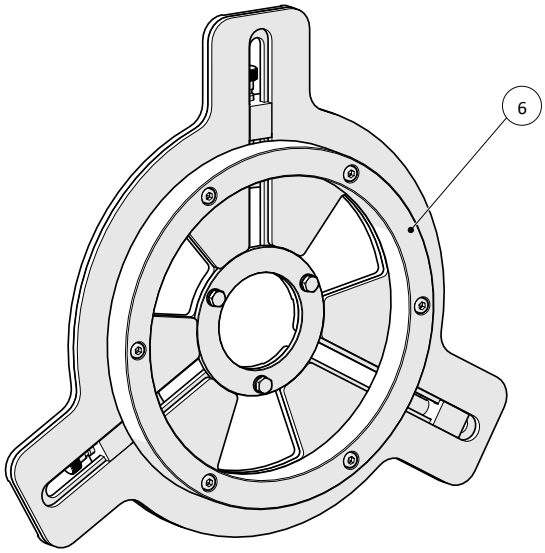
Application of pipe rollers reduces the load transmitted by pipes onto the machine. Lack or improper use of rollers could lead to errors during welding process, as well as contribute to mechanical damage of the welding machine components. Manufacturer takes no responsibility for damages resulting from not following above recommendations.

Tool for flange necks PMKN

PMKN device for welding flange necks serves for facilitating quick and easy fastening and centering of flange necks in base framework (BF)* in order to weld it to the pipe. This tool constitutes optional equipment of butt-welding machine. The tool is very useful and sometimes proves to be indispensable (especially when welding short end flanges). Flange necks are widely applied for joining PE pipelines with cast iron and steel installations.

* option available at additional cost

**list of (BF) on which PMKN can be mounted available on page 20.

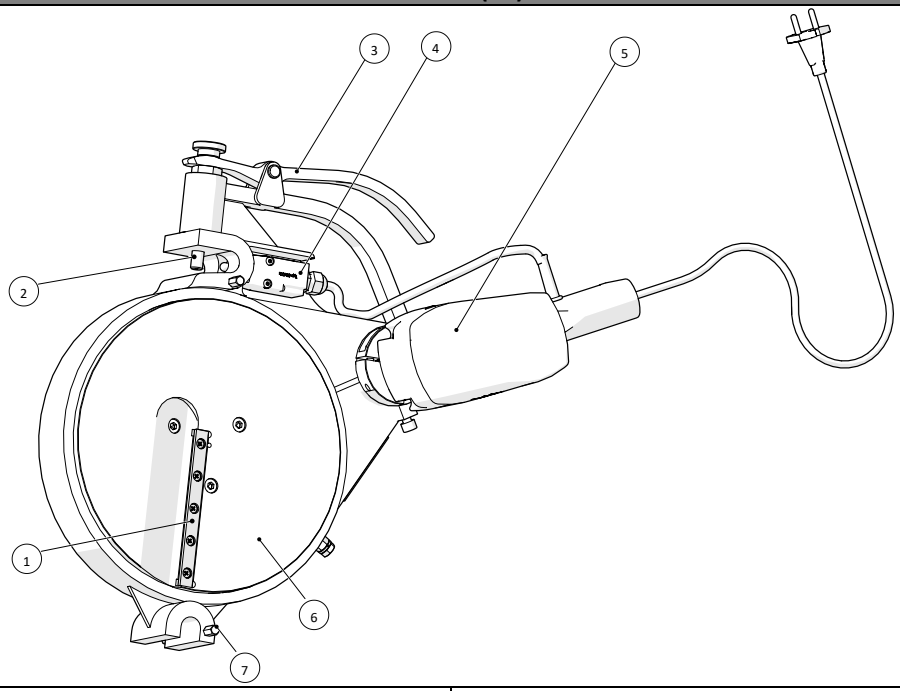
Tool for flange necks	
	
1. Vice block 2. Vice tightening screw 3. Vice block locking screw	4. Vice clamp 5. Disc 6. Fastening ring

Size of the fastening ring corresponds to the nominal size of the machine it is supposed to work with. The device is fixed to the base frame in similar way as pipes are: it's placed on the middle-fixed clamp and locked in position by fastening it with the upper clamp (just like normal pipe). Flange neck installation process:

1. Mounting the tool in the base framework clamp in such way so that the flange front is facing the element to be welded;
2. Mounting the element to which the flange will be connected (welded);
3. Mounting the flange tool inside vice clamps;
4. Regulation of vice cubes in such way so that both welded elements are closely aligned;
5. Tightening the vice block locking screws;
6. Precise adjustment of the flange position with vice tightening screws so that both welded elements are perfectly aligned;

3.1.4 Trimmer

Double sided manually operated trimmer is one of the main components of butt-welding machine ZHCN-CNC set which serves for levelling the surface of joined elements and removing the layer of oxidized material which is important for achieving correct connection.

Trimmer (TR)	
	
1. Trimming blade 2. Locking pin 3. Locking lever 4. Limit switch	5. Rotary drill 6. Trimer disc 7. Spacer

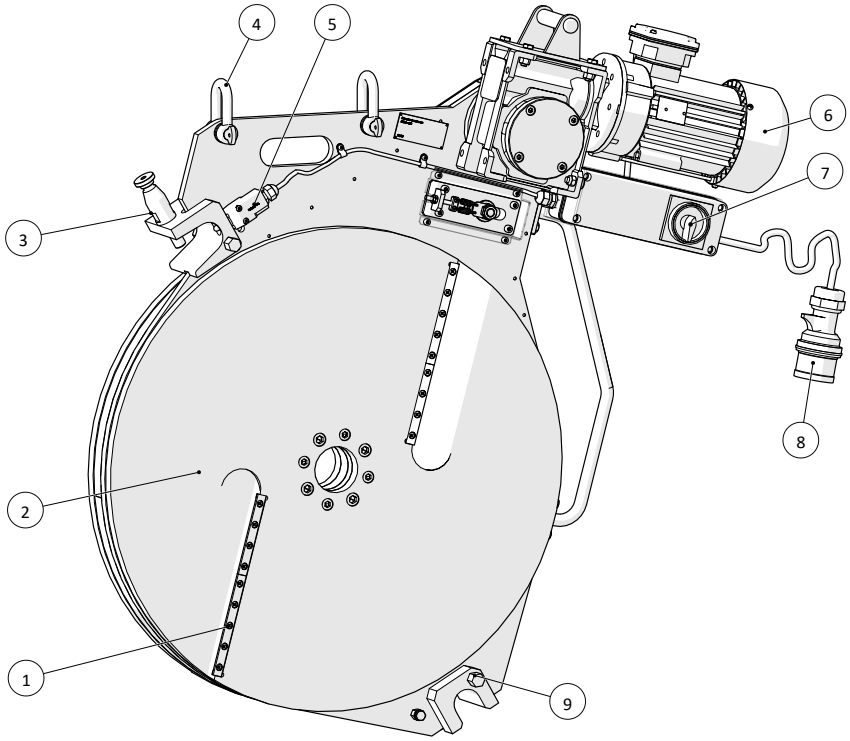
Mechanical and electrical description:

Trimmer consists of compact aluminum construction, the working parts of which are two rolling discs with trimming blades fixed on their surface. It is powered with rotary drill (or motor in case of (TR)-500,500R and 630) via gear train. Trimmer is supplied from power outlet located on hydraulic unit. Trimmer is powered from electric socket located on the hydraulic unit. Device is additionally equipped with safety switch preventing it from accidental start when it's not mounted on the base frame. It can be started only after properly mounting it in working position. Trimming discs can rotate only in one direction ensuring correct trimming.

Trimmer chain tension can be adjusted in two ways. In case of trimmers (TR)-160,250 and 315 (except for 315R) there is an eccentric, the position of which affects the tensioning of the chain. Remaining models ((TR)-315R, 400, 400R, 500, 500R and 630) are equipped with chain tensioner which includes spring (or springs), responsible for proper tensioning of the chain.

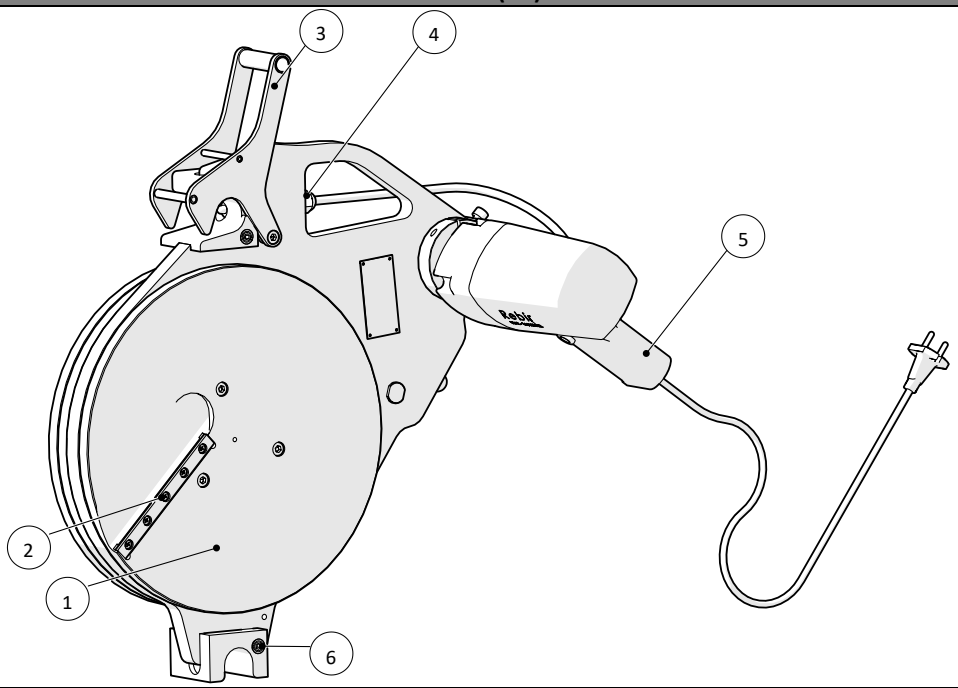
Trimming blades are sharp on both sides. In case of damaging or blunting one side there is still possibility do dismount them, turn around and mount back again.

Trimmer (TR)-630



1. Trimming blade	6. Motor
2. Disc	7. Power switch
3. Locking pin	8. Power supply plug
4. Grip	9. Spacer
5. Limit switch	

Trimmer (TR)-R



1. Trimmer disc	4. Limit switch
2. Trimming blade	5. Rotary drill
3. Locking grip	6. Spacer

Dangerous operations:

The trimmer was designed to ensure safety use and not to pose threat to the operator. Unfortunately, due to the nature of its main purpose it couldn't be equipped with additional protection of rotating discs. The disc has to trim the pipe on its entire circumference and the trimming chip has to be directed to the outside. Therefore, measures of protection against accidental start were applied (limit switch) as well as detailed information in the manual and on the warning, sticker placed on the body of the device informing about residual dangers that could appear. Operator should keep his hands in safe distance from the trimmer when performing the trimming process.

Spacers mounted on the trimmer body allow to perform the trimming procedure only to a certain point. The length of spacers was calculated in such way to ensure that trimming blades won't collide with metal elements of the clamps. Operator has to possibility to regulate the position of spacers. When spacers are dismounted special attention shall be paid on the trimming process.

Caution

Performing the trimming with dismounted or fully screwed in spacers shall be done with special care. Not following this requirement could lead to damaging the blades and discs for which the manufacturer takes no responsibility.

Dangerous operations:

Sharp edges of trimming blades could injure one's hands when used improperly.

Dangers and forbidden operations

1. Do not touch trimming blades during work as well as during transport and rest.
2. Do not touch rotating disc of the trimmer.
3. Do not turn on the trimmer away from its working position on base framework.
4. No not start trimming process before checking the correct locking of the device on base frame and if working trimmer could pose a threat to the operator or bystanders

(TR) examination scope before proceeding to work:

1. Check visually the condition of power supply cable and plug;
2. Evaluate the condition of trimming blades, if they are not chipped or corroded;
3. Connect the trimmer to power outlet, put it in working position on base frame and control the work of control switches.

(TR) examination scope after finishing the work:

1. Unplug the hydraulic unit from power outlet;
2. Evaluate visually the condition of power supply cable and plug;
3. Evaluate the condition of trimming blades.

3.1.5 Heating plate

Heating plate (HP) is one of the main components of TRACK butt-welding machine set the role of which is to heat up the pipe faces up to required temperature. Depending on the type of welded material required temperature might vary between 180° and 280°C. The tool was designed only for this purpose and can realize it only when its type is matched with suitable size of base framework. Proper heating of pipe plays crucial role for creating correct and durable joint. Using the heating plate for any other purposes (especially for heating up materials, liquids or gases other than polyolefines) is strictly forbidden. Due to the temperature to which the heating plate warms up it's recommended to use protective gloves.

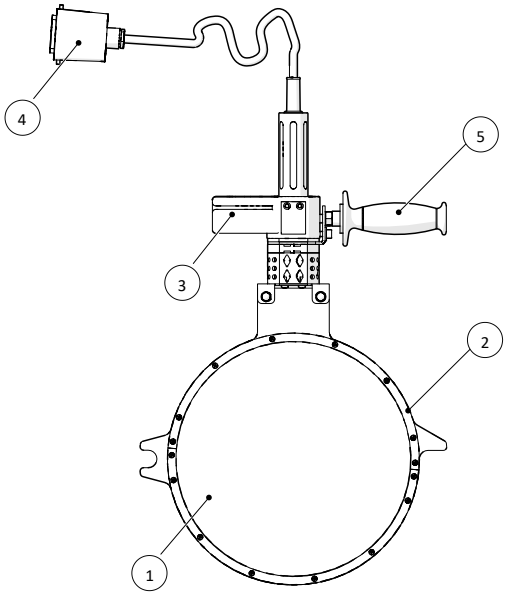
Mechanical and electrical installation:

The main body of heating plate (HP) is made of two aluminum elements with heating element located inside. Aluminum body is tightly sealed and screwed together. Outside surface is covered with PTFE fabric which prevents the pipe from sticking to the surface of heating plate. Operator is able to replace the PTFE cover singlehandedly. PTFE cover is attached to the body of heating plates with holding bands.

Dangerous operations:

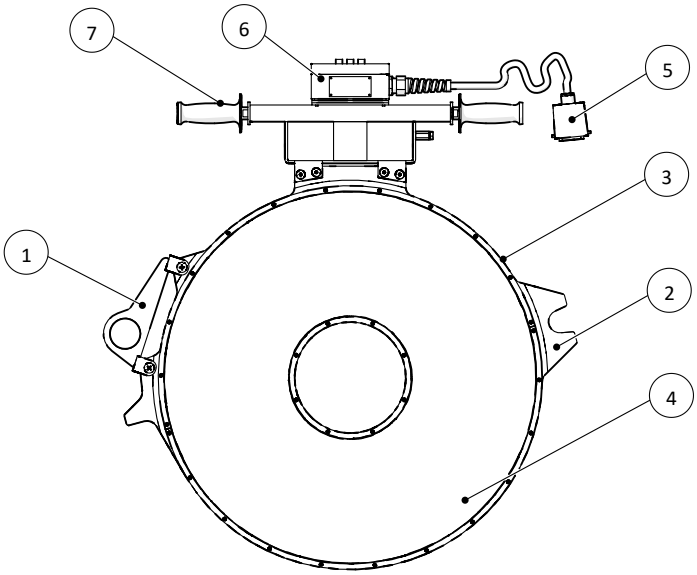
Heating plate (HP) was designed to allow safe usage and not to pose danger to operating personnel. Unfortunately, due to the way how the tool is used the heating surface couldn't be covered. Detailed information about residual risks resulting from improper use can be found in user manual and warning stickers located on the tool and support stand.

Heating plate (HP)



1. Main body with PTFE coat	4. Power supply cable with plug
2. External holding band	5. Grip
3. Handle shell	

Heating plate (HP)-630



1. Transport grip*	5. Power supply cable with plug
2. Main body	6. Electric box
3. Outer holding band	7. Grip
4. PTFE coat	

*used only in selected models

Dangers and forbidden actions

1. Do not touch warmed up heating plate;
2. Do not work with / leave unattended heating plate that is not secured against rain, snow etc.
3. Do not cover hot heating plate with materials that are not resistant to temperatures of at least 250 °C.

(HP) examination scope before proceeding to work:

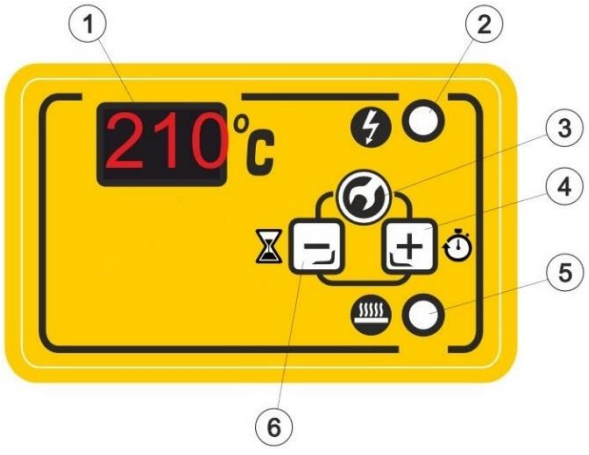
1. Evaluate visually the condition of power supply cable and plug;
2. Check the condition of PTFE coat;
3. Degrease the PTFE cover with the means of spirit-based agents or acetone allowed for general applications;
4. Connect the heating plate to power outlet, check the preset temperature value, and put the plate on support stand to allow it to reach required temperature.

(HP) examination scope after finishing the work:

1. Unplug the heating plate from power outlet;
2. Visually check the condition of power supply cable and plug.
3. Check the condition of PTFE coat.

3.1.5.1 Regulator of temperature RT_301

Heating plate is controlled with electronic regulator of temperature located on the hydraulic unit. In order to start warming up the heating plate connect the heating plate to suitable power outlet on the hydraulic unit and turn on the machine main switch. If the heating pate is working correctly the regulator should automatically detect the heating plate and a dot should light up in right lower corner of the display. If the operator forgets to connect the plate to hydraulic unit or connects plate with damaged temp. sensor an error code will appear after turning on the machine saying ER1. Regulator is equipped with additional feature of countdown timer and stop-watch allowing to control the times of subsequent stages of welding process.

Regulator temperatury	
	
1. Display 2. Power supply diode 3. Settings button	4. “Plus” / “Stop watch” button 5. Plate heating-up diode 6. “Minus” / “Countdown timer” button

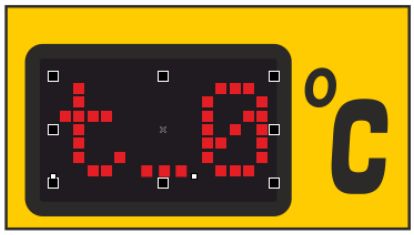
Buttons:

“Settings” button serves for adjusting heating plate parameters (e.g. set temperature, temperature correction value, stop watch, countdown timer)

“Minus” / “Countdown timer” serves to enter the countdown function or to decrease currently adjusted values (temperature correction value, set temperature value, etc.)

“Plus” / “Stop watch” serves to enter the stop watch function or to increase currently adjusted value (temperature correction value, set temperature value, etc.)

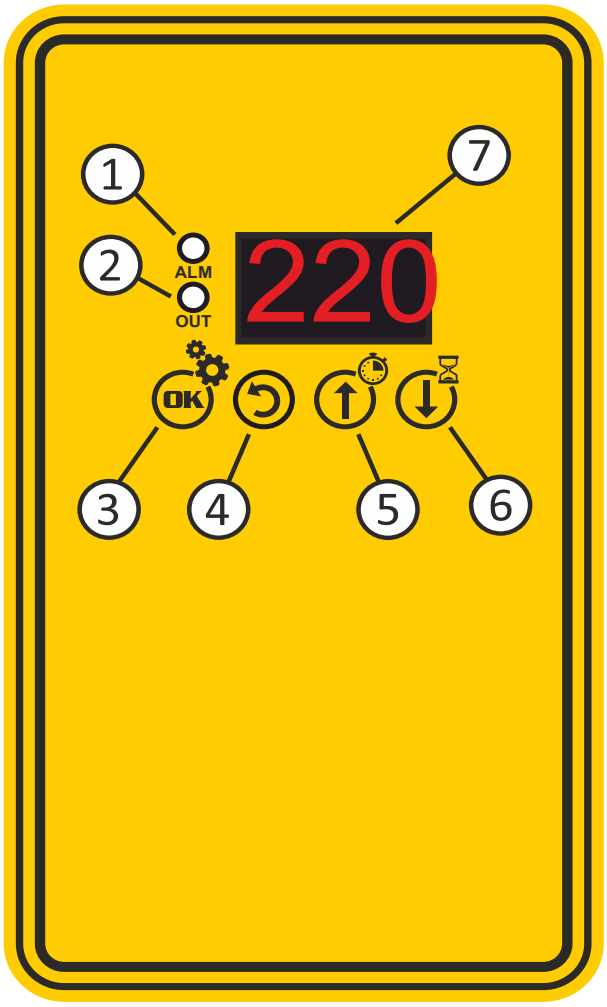
Set temperature	
	Once the heating plate is correctly connected and hydraulic unit is turned on operator has the option to adjust the temperature value to which the plate will heat-up. In order to do so press one time the button. The display will now show currently set temperature to which the plate will heat up. Once the red dot appear on the display program will allow to adjust the set temperature value using + / - buttons. Entire operation is automatically confirmed after a short period of inactivity. After about 5 seconds regulator will return to showing current temperature value.
Temperature correction	
 	In order to adjust the temperature correction value firstly turn on the machine. Once the display shows that required temperature of 220 °C has been reached measure the temperature on the surface of heating plate in 4 spots on each side (top, bottom, left, right) using adequate equipment (temperature sensor) and measure the average value out of those 8 readings. Next, double press the button. Display will show currently adjusted correction value. Adjust the value using ”+/-” buttons. Temperature correction value can be either positive or negative. In order to enter negative value adjust the correction to 0°C and then press ”-” button. Entire operation will confirm automatically after a moment of non-activity. After about 5 seconds device will return to showing current temperature of heating plate. Once the set temperature is reached measure the average temperature again and check if it corresponds with temperature shown on the display. If not, repeat the procedure.
	**Information** Entering incorrect parameters of set temperature or correction value will lead to errors in welding process. Manufacturer takes no responsibility for losses resulting from incorrectly performed operations described above. It’s advised not to perform the correction process on your own or doing so using uncalibrated thermal sensor with touch probe.

Stop watch menu	
 	After selecting the 'Stop-watch' feature by pressing the button, a message '**t_0**' will appear on the screen confirming you're that stop watch is active. In order to start counting the time press the button once again. To quit the 'stop watch' function press once again the button.
Countdown timer menu	
	After selecting the 'Countdown timer' feature by pressing the button, a message "**P….**" will appear on the screen showing last saved value. In order to adjust the starting value press the button while in countdown screen. Next, use buttons to adjust the value to match your requirements. Entire operation will get automatically confirmed after a short moment of non-activity. Press to start the countdown. Once the countdown is finished the display will return to showing current temperature value.

3.1.5.2 Regulator of temperature RT_ST_2020

Heating plate is controlled with regulator of temperature located in hydraulic station. In order to begin heating-up process insert the heating plate plug into suitable socket and turn on the hydraulic station using the main power switch. If the heating plate if fully operational regulator of temperature will detect its presence and a dot will light up in right lower corner of the screen. In order to activate the regulator of temperature press any button on the regulator. Once the regulator is activated the display will turn on and show current software version, then for few seconds proceed to show required temperature to finally show current temperature of heating plate and warm-up until required temperature is reached. If the operator forgets to connect the heating plate to hydraulic station or connects heating plate with damaged temperature sensor the display will show error code ER0 and give acoustic signal. In order to turn off the regulator press and hold BACK button. Regulator is additionally equipped with stop-watch and countdown timer, which help the operator to follow the times of subsequent stages of welding process.

Regulator temperature RT_ST_2020



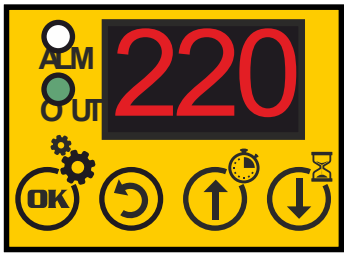
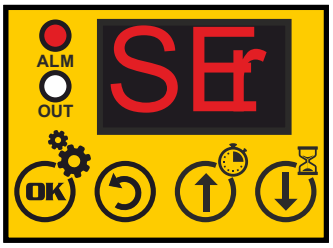
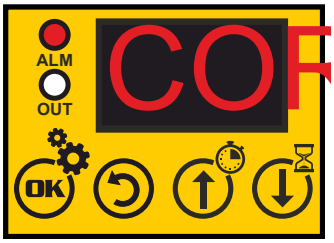
1. ALARM diode 2. HEATING diode 3. CONFIRM button	4. BACK button 5. Stop-watch 6. Countdown timer 7. Display

- OK button – allows to confirm selected functions (e.g. confirm the required temperature value, launch the timer, etc.), allows to adjust required value and temperature correction value.

- BACK – allows to leave currently displayed menu, to cancel selected operations (stop and quit the timer) and to turn off the regulator of temperature.

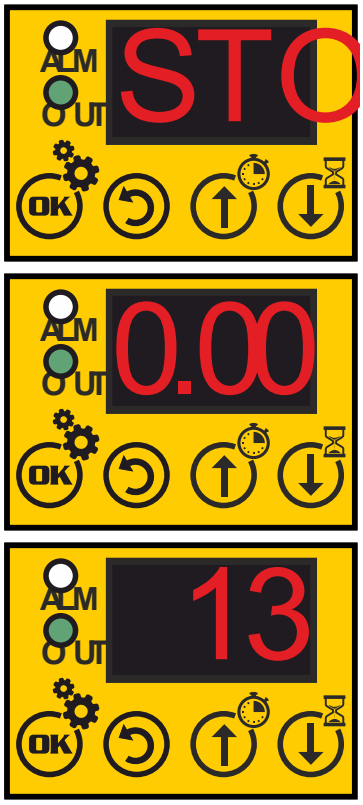
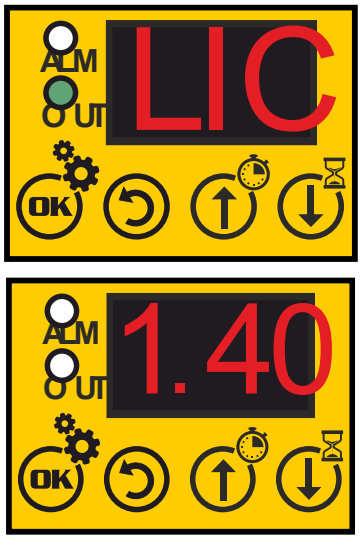
- Stop watch - allows to enter the stop watch function or to increase currently adjusted value (temperature correction value, set temperature value, etc.)

- Countdown timer - allows to enter the countdown function or to decrease currently adjusted values (temperature correction value, set temperature value, etc.)

Required / Preset temperature	
	When the heating plate is correctly connected to the power outlet and then turned on, the operator will have the possibility to adjust the required temperature value. In order to do so single-press the . button and then using buttons adjust the value per your requirements. HEATING diode will light up green up until required temperature is reached. Once the required temperature is reached the diode will begin flashing with green light, which is the sign it's ready for work. At the same time red ALM diode will turn off.
Temperature correction	
 	In order to adjust temperature correction value firstly turn off the machine – main power switch in position '0'. Then, while holding simultaneously and buttons turn on the main switch to position '1'. The display should show 'Ser' message which informs that service mode has been activated. When heating plate reaches required temperature an average temperature value on heating plate surface needs to be calculated. The measurement should be performed with touch probe thermometer. Average temperature value is calculated from 4 points on both sides of the plate. Calculated average value has to be entered as temperature correction. For that purpose, press and hold for about 3 seconds the button. The display will show message 'COR' and an acoustic signal will appear. Then enter the correction value (calculated average temperature) using buttons. Confirm the operation with single press of button. Once the heating plate reach required temperature, based on entered correction value, once again measure the average temperature on its surface. If measured value differs from required temperature value (value shown on the display) by no more than +/-5°C the process can be finished and machine is ready for work. If the temperature difference is higher than +/-5°C repeat the correction procedure.

Information

Entering incorrect parameters of required temperature and temperature correction might result with errors in welding process. Manufacturer takes no responsibility for damages resulting thereof.

Stop-watch	
	After selecting the stop-watch function using button a message STO will appear on the screen which means you entered the stop-watch menu. Next, starting value of 0:00 will appear from which the time will start counting. Press to start counting the time. The format of displayed value if following: - For times shorter than 10 minutes: X.YY where X – minutes, Y – seconds - For times longer than 10 minutes: XXX, where X -minutes
Countdown timer	
	After selecting the countdown timer using button, a message LIC will appear on the screen which means you entered the countdown timer menu. Next, last used value will appear on the screen from which the countdown will begin. In order to adjust this value use buttons and confirm with . Holding the button for longer period of time will reset the timer. In order to activate the timer and start the countdown press . After starting the countdown, the value shown on the display will stop flashing, while the dot separating minutes and seconds will start flashing. 10 seconds before the countdown is over an acoustic signal will appear reminding the operator to remove the heating plate from working position. Adjusting the timer with times under 10 minutes – every 1 second Adjusting the timer with times under 10 minutes– every 1 minute The format of displayed values if following: - For times shorter than 10 minutes: X.YY where X – minutes, Y – seconds For times longer than 10 minutes: XXX, where X -minutes

4. SETTING AND START-UP

4.1 Transport and storage

Caution

Remember to protect the machine components with electric and electronic components against water (rain, drowning), fog and low temperatures during work, transport and storage. It's highly recommended to use covered means of transport.

Hydraulic butt-welding machine TRACK shall be stored in horizontal position in well ventilated spaces, protected against bad weather conditions and meeting the fire safety requirements. Storage temperature should oscillate between 0˚C and +55˚C with relative humidity not exceeding 95%.

After unpacking, machine components should be transported manually or with mechanical means of transport. During manual transport of machine individual components, the number of people involved should be adequate to actual work safety regulations.

Transport of high weight components should be done with the use of lifting equipment. Each component has its own lifting grips. Only machines and lifts with valid technical certificate should be used for this purpose. It's forbidden to use lifting equipment with lifting capacity lower than weight of given machine components.

4.2 Personnel required for work and transport

In order to operate the machine, it's required at least one operator with valid welding operator qualification certificate and certificate of completed training in the field of using the machine. Moreover, the operator has to be aware of improper usage could lead, in extreme cases, to injury or even fatal death of bystanders. Aside from operator at least one or more assistants is also required. Assisting personnel should have appropriate work safety training informing about risks that could appear during work with the machine.

4.3 Power generators and extension cords

Information

Before connecting the machine to power generator make sure that it's suitable for work in on-site conditions. Always make sure to follow the user manual.

Machine should be connected to power generator power outlet at least 30 seconds from the moment of launching the generator. Do not connect other devices to the generator while performing the welding process.

Information

Do not turn on power generator when hydraulic unit is connected to it. In order to correctly disconnect the machine from power generator turn off the butt-welding machine by turning off the main switch and then unplug it from the generator. Only then turn off the generator.
Launching the power generator with butt-welding machine already connected to it could lead to damaging the machine for which manufacturer takes no responsibility.

Required nominal power of power generator should be at least 30% higher than overall power of machine set (information about power consumption can be found on each component).

Information

In case of doubt whether given power generator is suitable to work with butt-welding machine consult with authorized service center of the manufacturer.

Below table shows how the required cable cross-section changes with relation to the length of used extension cord.

Extension cord parameters	
Length	**Cross-section**
to 50 m	2,5 mm^2
to 100 m	4 mm^2

Information

In order to minimize the risk of overheating the extension cord and drops in supplied voltage make sure to unwind it for work.

4.4 Start-up procedure

1. Check if hydraulic unit (HU) is disconnected from power outlet and if necessary, turn the main switch to position **“0” OFF**;
2. Provide the source of 230V/400V (+5% / -10%), 50Hz power supply either from mains or power generator of suitable power depending on the model of butt-welding machine;
3. Set up the base framework in welding zone. Prepare suitable reducing adapters for required pipe size. In order to mount reducing adapters open the upper clamps and mount the adaptors in designated spots;
4. Connect the hydraulic unit with base framework using hydraulic hoses;
5. Connect individual electrical machine components (heating plate, trimmer, encoder) to corresponding power outlets on hydraulic unit;
6. Connect the power supply cable to the mains or power generator (generator has to be already working for at least 30 seconds before plugging in the machine plug)
7. Turn the main switch to position „**L**” or „**P**” or **„1”**.

Information

(HU) hydraulic unit working with machines up to the diameter of 400mm is equipped with 2-position switch ‘**0-1’**. Machines for larger diameters have 3-position switch ‘**L-0-P**’. This allows to choose the change the direction of rotation of trimmer without the need of modifying the direction of phase in the plug/socket.

Caution

If the phase order is incorrect (main switch in wrong position) the pump will not give pressure and trimmer discs will rotate in wrong direction making the trimming impossible.

5. WELDING PROCESS

5.1 Basic information

Joining polyethylene pipes with butt-welding method consist in heating-up and suitable softening of the ends of joined elements by pressing them to the surface of heating element and then, after removing the heating element, pressing them together with suitable press force. It is said that the connection achieves mounting durability after cooling time (only then the pipes can be dismounted from the base framework) while the full strength of connection Is achieved after it's fully cooled (the temperature at any point doesn't exceed 20°C). This method is applied for joining pipes of Dn90mm and higher in case of gas pipelines and accordingly to supplier specification in case of pipes for other mediums. Moreover, pipes should be delivered in straight sections (bars).

Conditions in which butt-welding is carried can differ from each other significantly. Welding in temperatures above 30°C doesn't happen too often and the only effect of welding in such conditions could be slightly wider bead. More risks are associated with welding at lower temperatures (especially below 0 ° C). This is due to faster, than in normal conditions, cooling of heated surfaces, reduced flexibility of polyethylene and its reduced impact resistance. Faster cooling of heated surfaces shortens the switchover time (time in which we should move the heated ends away from heating element, remove the plate and press the pipes together). If the switchover time takes too much time the layer of cooled material at the pipe end will become thicker than it should. The solution to this problem may be setting up a tent over the welding zone and using some heating equipment increasing the temperature inside. Remember however, to avoid rising the dust particles into the air. When transporting pipes into heated-up tent make sure to give them at least an hour to level the temperature of pipe.

Similar effect to weld quality, like cold weather, can be caused by exposure to wind during windy weather. It is a good practice to always, not only during windy weather) close the outside pipe ends with sealing plugs (same ones as used in pipe factories) which protect against air movement inside the pipe during welding process.

Another aspect that could negatively affect the weld quality is humidity. High humidity facilitates the cooling od pipe faces and additionally, when humidity is significant, particles of steam can get trapped inside the connection and create empty bubbles affecting the strength of joint. Due to the above, it's advised to use protective tent when working in weather conditions involving high humidity, rain or fog.

Protective tents should be also set up when welding in highly dusted conditions. Dust sticking to the surface of heated material, after it's detached from heating plate, will not be fully removed from the area with the bead material during tightening the pipes and will affect the durability of obtained connection.

Properly preparing the welding area is equally important. It's necessary to take into consideration all factors that could affect the quality of weld. There have been instances where a single blade of grass got in between the pipes during welding process causing problems with locating the leakage. When welding on grass it's advised to set the machine on some kind of platform or use other means of separating the ground from welding zone.

It's necessary to maintain the heating plate surface in general cleanness. PTFE material can be cleaned with lint-free paper towels or special cleaning tissues. Operation should be repeated each time before work. It's advised to make a 'trial' weld. This will allow to evaluate the shape of bead, adjust parameters and additionally clean the plate in the area of contact with the pipe end.

Taking into account the temperature of melting, applied welding times and the fact that polyethylene degradation of faster in high temperatures, the temperature of heating plate should be between 200÷220°C, however for materials that belong to the group of MFR 010 (PE80) and thicker wall pipes lower values should be applied.

In the last stage of welding process, that is cooling under pressure, cooling cannot be shortened or aborted. It has to be respected because due to low thermal conductivity of polyethylene the pipe will cool down on the outside while the temperature inside the connection will remain nearly the same. In such situations the internal stresses created inside will negatively affect the strength of connection.

Butt-welding method cannot be applied for joining pipes supplied in coils. These are usually relatively thin-wall pipes and additionally the deformation won't allow for obtaining high quality connection.

Butt-welding method allows to join pipes of the same diameter and same wall thickness. If it's necessary to connect pipes of the same diameter and wall thickness, yet of different MRF group obtained bead will be wider on side. (higher MFR ->wider bead).

5.2 Welding process

Butt-welding technology (single pressure cycle) in accordance with DVS 2207-1

Steps of butt-welding process:

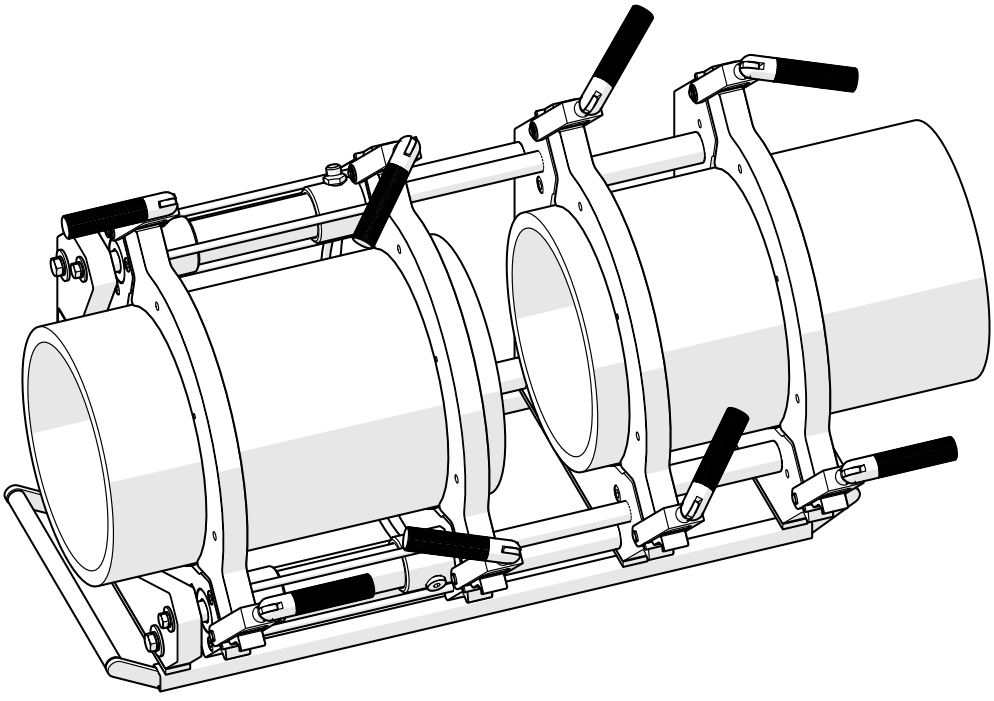
1. **Check the condition of machines and tools necessary to perform the process**
   Machine should have valid certificate of calibration, movable clamps should travel smoothly, PTFE cover should have no visible defects, any oil leaks are unacceptable just as damaged cables etc.

2. **Set up a tent if necessary**
   In case of windy weather, low outside temperature, high dust levels or high humidity cover the welding area with protective tent and set up a heating equipment to increase the temperature or reduce the humidity around the welding area.

3. **Clean the ends of joined elements**
   Pipes and fittings stored in warehouse or outside can be covered with a layer of dirt or mud. In order to prevent the dirt from getting into the weld pipe ends ought to be cleaned at a distance of at least 10 cm. Initial cleaning can be done with dry cloth or towel. Final cleaning should be done with the use of special cleaning agent which will degrease the surface and moisture.

4. **Mount the pipes in clamping facilities of the machine.**
   For fastening the pipes always use two clamping facilities. Pipe secured in two clamps won't move during the welding process. When welding short-end fittings like elbow it is allowed to mount them in one clamp. Remember that element of lower weight should be always fastened in moving clamps.

   Pipes should be mounted on base framework in the same position: with writing on top. This practice will make it easier to identify the pipes and ensure reduced effect of ovalization on the quality of weld (allowed ovalization is 1,5%)



Information

Joined element should be fastened on the base framework with adequate distance between them allowing to insert the trimmer in working position. Trimmer is equipped with special spacers so make sure to leave enough pipe to effectively carry out the trimming process.

Information

Remember to position the handles of clamp locking grips outwards the welding zone.
Not following this recommendation could lead to collision and damage of working elements.

5. **Measure the drag pressure; when using manual machine without data logger make sure to write down this value into the protocol (pressure p_1);**
   In order to reduce the tractive resistances pipes should be supported with pipe rollers set out on firm ground.

Caution

Using pipe rollers reduces the load transmitted by the pipes. Lock of thereof or its improper use could result with errors during welding process as well as lead to mechanical damage of machine components. Manufacturer takes no responsibility for damages resulting from not following above recommendation.

Procedure of establishing the drag pressure:

1. Set up the base framework in open position (clamps moved to the far end of base frame);
2. Press „CLOSE" button once, so that the clamps move toward closed position slightly (0,5-1cm).
3. Using the pressure regulation knob decrease the pressure to a point where clamps stay immobilized despite CLOSE button is pressed;
4. Keep holding down the CLOSE button while gradually start increasing the pressure by turning the pressure regulation knob. Observe the feedback of base framework.
5. When the pipe mounted in movable clamps starts moving read the pressure value from manometer and observe the further movement of clamps;
6. If the pipe travels to the other end and touches the other pipe mounted in base framework read the pressure value again. If the pressure increased by 0-1 bar in relation to pressure read during movement it means it was correctly established and can be written down into the protocol as p_1.

Information

If the pressure shown on the manometer, after the pipes touch each other, differs by more than 1 bar from the initially established drag pressure then the process of setting drag pressure shall be repeated.

7. If, however, the pipe won't manage to travel to the other end and stops during the movement level the pipes again and repeat the process from the beginning;

Information

Incorrectly determined movement resistance values or changing the press force with which the pipe is pressed to the heating plate during heat-soaking process could result with e.g. end of pipe slightly detaching from heating plate surface resulting with insufficient plasticization of pipe material and thus leading to lower quality of connection.

Caution

Before plugging the trimmer into the power outlet make sure that its power switch isn't locked in pushed in position. If it is, release the switch.
Not following this instruction could lead to injury, because the trimmer locked in working position will automatically start rotating.

6. Trimming the pipes.

Caution

Before proceeding to trimming make sure that the drill power button is on OFF position. If it is ON, release the power button. Not following this recommendation could lead to injury of the operator as the trimmer will start working immediately after placing it in working position.

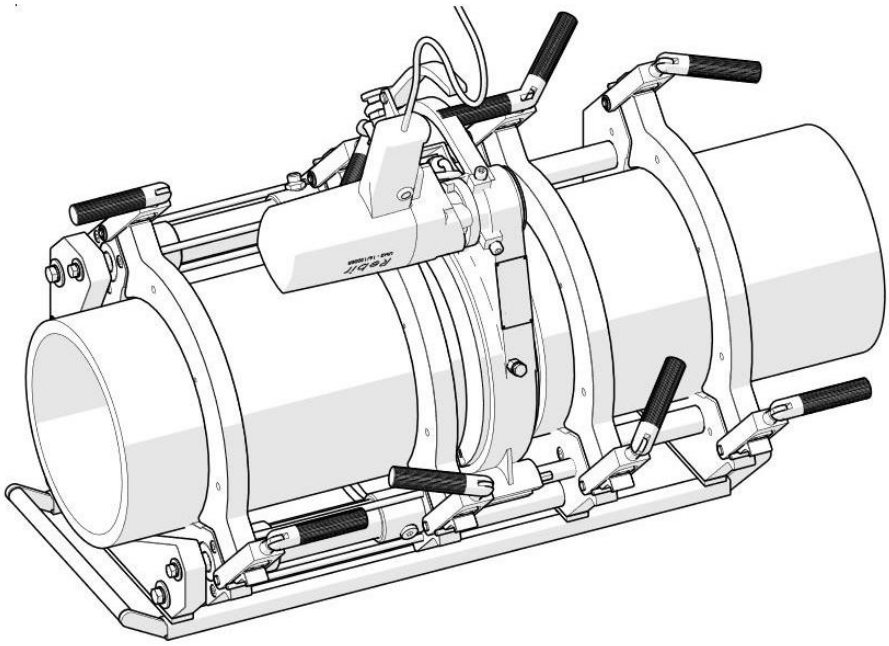
Caution

Trimming under excessively high pressure could lead to damaging the trimmer drive train and might lead to forming a visible 'exit mark' on the pipe face after finishing the trimming process.

The aim of this operation is to ensure perfect alignment and smoothness of joined surfaces. Moreover, oxidized material is removed during trimming, thus leaving clean, undegraded material. In order to correctly perform trimming process, lock the trimmer in working position between joined elements. After turning on the drill that powers the trimmer press and hold the CLOSE button (operation shall be carried at the drag pressure value). If the press force turns out to be too small for the trimming blades to cut into the material it can be slightly increased by turning in the pressure regulation knob. When trimming large diameter pipes with trimmer equipped with reducer (machines Dn400 and higher) it's advised to press the pipes to the trimming disc and when the trimming blades cut into the pipe release the 'CLOSE' button. When the pressure drops to a point where trimmer won't be trimming the pipe anymore press the CLOSE button again to increase the trimming pressure back to the level allowing for effective trimming. Keep repeating this process until reaching continuous ribbon on both sides of the trimmer. After noticing that the ribbon is correct on both sides press PRESSURE RELIEF button which will decrease the trimming pressure and carefully retract the trimming blade from pipe material without visible 'exit mark'.

Danger

Maintain special care during the operation of pressing the pipes to trimmer discs



7. **Press ‘OPEN’ button to retract the pipe faces from the trimmer surface, turn off the trimmer motor and once the trimmer stops put it back on the support stand.**
   For safety reasons to not remove the trimmer when the discs are still rotating as it might lead to damaging the surface of trimmed pipes or injuring the operator.

8. **Remove the trimming remains from the pipe and surrounding area taking care not to touch with hands the cleaned pipe.**
   The best way to do that is to use a metal rod curved at the end. In case of contaminating the trimmed surface (e.g. by touching it with hands) repeat the trimming process and clean with special cleaning agent.

9. **Ensure that mounted pipes are perfectly aligned (allowed misalignment between joined elements cannot exceed 10% of wall thickness).**
   To check the alignment, tighten the pipes together by pressing ‘CLOSE’ button. When pipes touch each other evaluate the alignment. If the misalignment is outside allowed limit press the ‘PRESSURE RELIEF’ button to decrease the pressure to zero and then readjust the alignment by regulating the tightening of clamp locking grips. When done, repeat the points 6-9. Proceeding to the next step is possible only when the alignment is within allowed limit. Misalignment should be as small as possible because large misalignment will result with smaller contact area between joined elements and thus affect the strength of connection. Leaving the misalignment outside of permitted limit manifests itself with incorrect bead shape.

10. **Adjust the welding pressure pI (same as cooling presure p_s).**
    Table of welding parameters for PE pipes compliant with DVS2207-1 is attached on the upper panel of hydraulic unit. When performing welding process use parameters only from this table because it takes into account the parameters of the hydraulic cylinder for converting the press force into pressure value read from the manometer. In case of welding pipes made of material other than PE or of different wall thickness than provided in the table or when producer of pipe recommends to follow different standard than DVS contact the supplier of machine to provide suitable table.

    In order to establish the welding pressure value use following formula pI=p1+p2, where p1 is the drag pressure set in point 5, p2 is the standardized pressure value for given pipe (diameter, SDR, wall thickness) taken from the table. Next, press and hold ‘CLOSE’ button until the pipe faces are pressed to each other. When pipes are pressed and the pressure shown on manometer is stabilized keep holding the ‘CLOSE’ button and adjust the welding pressure pI by turning the knob of pressure adjustment valve. From this moment the pressure adjustment valve won’t be used in any way till the end of welding process.

11. Check the gap between trimmed pipes

Once the welding pressure is adjusted, move the pipes to OPEN position by holding the 'OPEN' button, and then press them together again by holding the CLOSE button. When pipes touch each other ensure that pressure p_I was achieved and check if there is no gap between them; max gap between touching elements cannot exceed allowed values shown in the table below. Most common cause of gaps formation is trimming under too high pressure often resulting from using blunt trimming blades. In case of noticing excessively large gap repeat points 5-11 with special attention put on trimming process. Gaps larger than allowed result with longer preheating time and affect the thickness of obtained bead size which in turn could lead to ruling the connection as incorrect by the site inspector. Tightening the pipes under welding pressure allows also to check if pipes are clamped strong enough to prevent them from sliding inside the clamps.

Allowed gap size:

Dn pipe [mm]	Gap width [mm]
Under 355	0,5
400-630	1
630	1,3

12. Check the preset temperature of heating plate

Read the value of preset temperature and check if it matches the temperature provided in table of welding parameters and requirement of pipe manufacturer. If the values differ from each other readjust the temperature to appropriate value. In case of welding PE pipes accordingly with DVS 2207-1 lower temp. values (200 ÷ 210°C ± 10°C) should be applied for materials with higher melt flow index (group MFI 010) PE80. For materials which melt flow index belongs to group MFI 005 higher temperatures should be applied (~220°C ± 10°C). In case of welding pipes with thicker walls (above 20mm) due to longer heating times and related degradation of PE the preset temp. of heating plate should be lowered by 5°C. Next adjust the timer in regulator of temperature for proper heating time t2 (provided in the table of parameters) suitable for currently used pipe (material, diameter, wall thickness).

13. Degrease the surface of heating plate and ends of joined elements.

Moisten a lint-free material with concentrated ethanol to degrease the heating plate surface and pipe ends. It is recommended to degrease cold plate before starting work, and before each weld when the plate is hot in the contact area between pipes and plate surfaces. After degreasing wait a little for the alcohol to evaporate. Welding of moist pipes or pipes from which the alcohol didn't evaporate causes formation of bubbles inside the weld and weakens the connection. Degreasing is very important as greasy pipe ends (result of cutting touching with hands) are the most common reason of cracking welds. There are studies suggesting that pipes should not be degreased after the trimming. However, in order to skip the degreasing process, you must be absolutely confident that trimmer discs and cutting blades were absolutely clean and that pipe ends weren't touched with hands or contaminated with dust from construction site.

Caution

Not degreased surface of heating plate and pipe faces results with low quality welds. Degrease the heating plate and pipe faces with respect to work safety regulations. Manufacturer takes no responsibility for issues resulting from incorrectly or not cleaned pipes and heating plate.

14. Move the pipes to OPEN position and put the heating plate in working position (between the pipes).

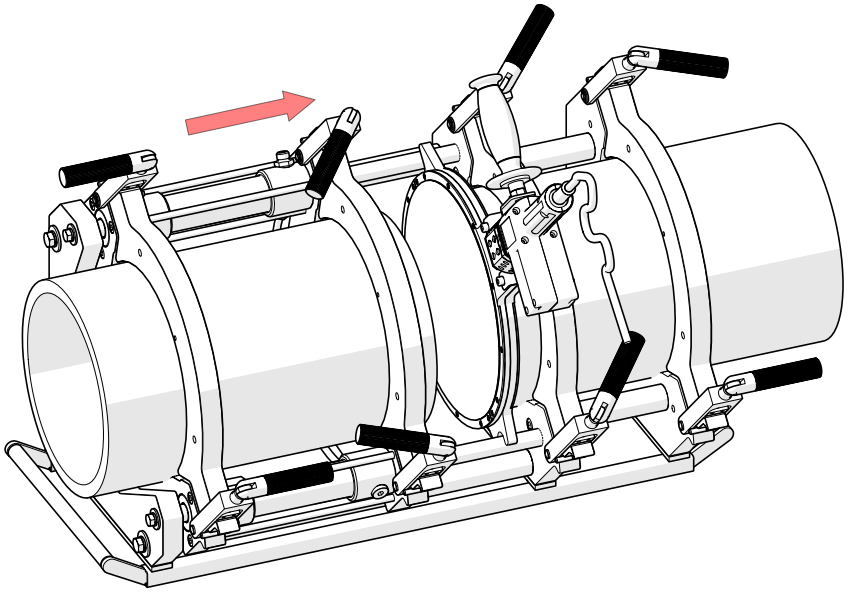
Before placing the heater in working position make sure that contact area between pipe and heater is correctly cleaned and dry and current temp. of heating plate matches the value set in point 12. It's advised to wait a little (2-3 minutes) after the heating plate reach required temperature. This will allow the regulator to stabilize the temperature on heater surface. Entire operation should be carried is shortest possible time to prevent impurities (dust, humidity, etc.) from getting into the contact area and thus lowering the

connection quality. Insert the heating plate into working position by holding it by the handles ((HP)-630 is an exception and should be inserted with the use of special crane mounted on base framework or with other lifting equipment if the machine isn't equipped with the crane). Heating plate should be at first rested on the lower piston rod and then tilted towards the upper piston rod until it rests against it. Heating plate should be inserted as close to the non-moving pipe as possible.

Danger

Pay special attention during the procedure of tightening pipes to the heating plate.

15. Tighten the pipes to the heating plate and maintain the press force at p_I pressure until the initial bead height h reach required value.



After heating plate is inserted in between the pipes, enter the STOP-WATCH option on regulator of temperature press and hold the CLOSE button until the pipes press are pressed to the heating plate and keep it pressed until welding pressure p_I is reached and stabilized. Then release the CLOSE button, start the STOP-WATCH function to start counting the pre -heating time t_1 and observe when the initial bead height forms up (required bead sizes are provided in table of welding parameters). The initial bead should be formed on entire circumference of the pipe. Pay special attention on places in which there was a post-trimming gap between the pipes. The aim of heating up the pipe ends under welding pressure is to achieve sufficient starting temperature for heat-soaking process and to ensure full contact (alignment of uneven surfaces) of the faces of welded elements. During this stage control the pressure value shown on the manometer. In case of noticing pressure drops press 'CLOSE' button for a short moment to readjust the pressure to suitable level.

16. Decrease the pressure to p_{II} and continue the heating process for the time t_2 (heat-soaking)

After the initial bead reach required height h, remember the time shown on the stop-watch (it should be written down on the welding protocol), enter the timer function on the regulator and press 'PRESSURE RELIEF' button to decrease the pressure to p_{II} value. Pressure p_{II} is minimal pressure that ensures that pipe ends aren't pressed to the heating plate anymore but rather are just touching it. The heat is transmitted from the heating plate surface onto the pipe ends, making them plasticized on suitable length. After decreasing the pressure to p_{II} value start the countdown of t_2 time already set in point 12. In the case of welding in conditions where there are no forces to draw the pipe away from the surface of the heating plate, press the "PRESSURE RELIEF" button with one confident move so that the pressure drops almost to zero. In cases where you need to maintain higher pressure so that the pipes aren't pulled away from the plate (vertical welding), press the "PRESSURE RELIEF" button in a pulsating manner and gradually lower the pressure.

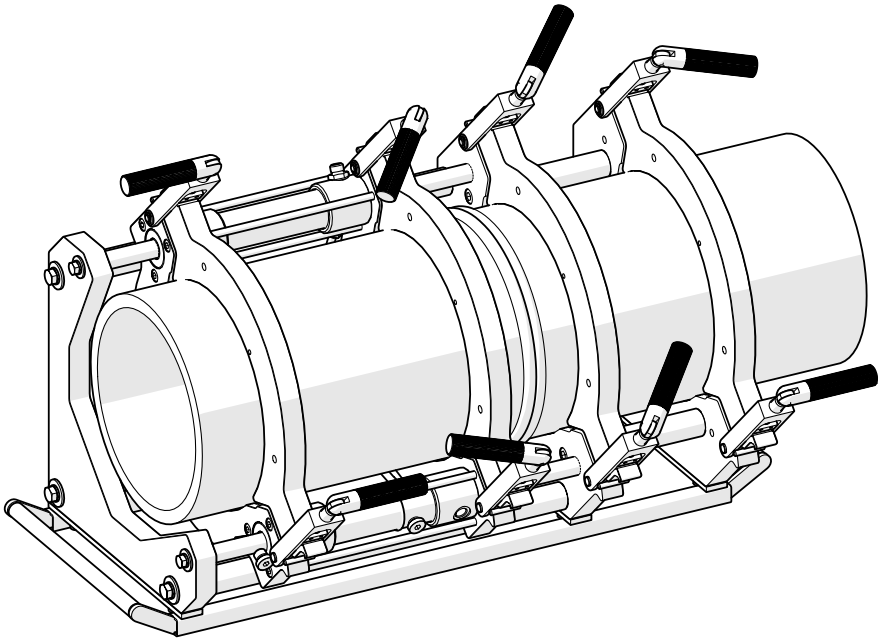
Danger

During removing the plate from working position push it manually away from the pipe surface with adequate care.

17. Removal of heating plate

When timer starts to count down the last 10 seconds of t_2 time an acoustic signal will go off. When the signal becomes continuous press the OPEN button, move the pipes away from the plate at minimal distance allowing to safely remove the plate and remove it with one swift move, taking care not to hit heated-up pipe ends, and press the pipes together by holding the CLOSE button. After pressing the pipes together and obtaining the pressure $p_s=p_l$ (set in point 10) start the STOP-WATCH function and start counting the cooling time t_s provided in the table. Keep holding the CLOSE button for about 1 minute from the moment when pipes touch each other in order to create correct weld and stabilize the pressure inside hydraulic system. Changeover time from the moment of detaching the pipes from heating plate to the moment of welding is described in the table as t_3. Do your best to keep this time as short as possible because pipe faces immediately begin to cool down after being pulled away from the heating plate and a kind of 'coat' is formed on their surface. The longer the changeover time is the thicker coat is formed. When pipe faces are pressed together a part of plasticized material is pushed outside forming external bead while other part is pushed to the inside of pipe forming internal bead. Together with the material that forms the bead (internal and external), a significant part of the "coat" is removed outside the joining zone. However, some of it remains in the joining zone and determines the strength of the weld (mainly long-term). In order to improve the process if removal of heating plate, it is recommended that one person takes out the plate while the other controls the opening and closing process.

18. Maintain the cooling pressure $p_{s\ for}$ the duration of cooling time t_5 (accordingly with DVS2207-1 cooling time is dependent on outside temperature).



By maintaining the cooling pressure of welded elements, an adequate level of molecular diffusion is ensured. The cooling pressure should be maintained for entire cooling time t_5 provided in the table. In case the p_s pressure drops by more than 10%, restore the pressure by pressing the CLOSE button. Decreasing the pressure too early will affect the molecular diffusion and thus lower the strength of connection. It's forbidden to pour water onto the weld, cover it with snow or to direct air stream onto cooling down weld.

19. Decrease the pressure to 0 and dismount the pipes from base framework.

After t_5 time is over the joint has sufficient strength to transmit the loads that appear during installation of pipeline and, therefore, the pipes can be removed from base framework. In order for the weld to be able to transfer loads coming from air pressure in the pressure test, it should cool down to a temperature close to ambient temperature. It can be assumed that overall cooling time is no shorter than 8 minutes per millimeter of wall thickness. Dismounting process begins with decreasing the pressure to 0. For that purpose, press PRESSURE RELIEF button. When pressure value shown on manometer is 0 proceed to dismounting the pipe from base framework beginning from middle clamps and then outside ones. This sequence is important, because if you forget to lower the pressure and start disassembling from outside clamps, the cylinders can move and damage the bead or injure the operator.

20. Put the weld number on the pipe and fill the protocol.

Putting the weld number onto the pipe/fitting will allow to identify it and compare against the welding protocol. This is an important element of the quality assurance system in pipeline construction.

6. TROUBLESHOOTING

List of selected malfunctions of butt-welding machines

1. **Hydraulic unit doesn't start**
   - No power supply - check the source of power supply
   - Machine is not connected to power supply or damaged power supply plug – connect the machine to power outlet or check its condition
   - Main power switch is in position '0' – turn the main switch to position to '1' or 'L' / 'P'
   - Circuit breaker is in position OFF* - put it to position ON

2. **Hydraulic unit starts, but doesn't generate any pressure**
   - Incorrect phase sequence – change the position of main switch from 'L' to 'P' or from 'P' to 'L'

3. **Trimmer doesn't start**
   - Power supply malfunction – check the condition of power supply socket on hydraulic unit
   - Trimmer is not connected to power supply or damaged power supply plug – connect the device to power outlet or check its condition
   - Trimmer switch is in position OFF or is damaged – change the position of trimmer switch to ON or check its condition
   - Limit switch is loose or damaged – tighten the limit switch or contact service center
   - Damaged carbon brushes – disconnect the device from power outlet and check (replace in necessary) carbon brushes (concerns (TR)-160 to (TR)-400 models)

4. **Trimmer motor doesn't transmit the power onto the trimming discs**
   - Chain got broken or fell off, damaged sprockets on the motor/disc – check the cause of malfunction and remove the malfunction, if possible, otherwise contact service center.
   - Damaged gear train (concerns models from 160 to 400mm) – contact service center

5. **Trimmer discs stop during trimming process**
   - Excessive trimming pressure – adjust the trimming pressure accordingly
   - Blunt trimming blades – check the condition of trimming blades, if necessary, turn the blade upside down, sharpen or replace with new ones
   - Drill rpms are not set to maximum – using the knob located next to the drill switch set the rpm's to maximum or contact service center

6. **Heating plate doesn't start**
   - No power supply – check the condition of power supply socket on the hydraulic unit and condition of supply cables, use multimeter to measure the voltage on heating plate power outlet:
     - For machines supplied with single phase 230VAC measure between pins 3 and 4;
     - For machines supplied with 3-phase 400VAC between pins 4 and 5 and between 5 and 6 measured voltages should be equal to nominal voltage value.

7. **Heating plate can't reach required temperature**
   - Incorrectly adjusted required temperature value or heating plate exposed to intensive cooling by excessive wind or excessively low temperatures – readjust the required temperature value using the regulator of temperature / heating plate should reach required temperature while standing in support stand designated for that purpose.

8. **Heating plate regulator doesn't work correctly**
   - Damaged temperature sensor, display shows error message ER1 or ER2 – check the condition of heating plate power supply cable or/and measure the resistance of temperature sensor between pins 1 and 2 on heating plate plug. Value expected in ambient temperature of 20 °C should be ~ ~108Ω. If necessary, contact manufacturer's service center

- Regulator of temperature damaged or overheated – error message ER1 or no display not showing anything – wait for the regulator to cool down, contact service center
- Burned heating element – measure resistance of heating inserts between pins on heating plate plug
  - For machines supplied with single phase 230VAC measure between pins 3 and 4
  - For machines supplied with 3-phase 400VAC between pins 4 and 5, 4 and 6 and between 5 and 6 (measured values should be similar to each other)

Heating plate model	Number of heating elements	Expected resistance of heating element [Ω]
(HP)-160	1	53
(HP)-250, (HP)-250R	1	28
(HP)-315, (HP)-315R	1	25
(HP)-400, (HP)-400R	1	13
(HP)-500, (HP)-500R	3	98
(HP)-630	3	23

Resistance of damaged heating element will go to infinite value.

9. **Hydraulic pressure is dropping**
   - External oil leaks – check the condition of hydraulic connections, make necessary repairs (tighten/replace quick connectors, washers, gaskets, etc.)
   - Internal oil leaks – cracked hose inside hydraulic tank, leaks inside hydraulic cylinder – contact service center.
   - Too short pressure build-up time – maintain pressure build-up for at least 30 seconds
   - Hydro pneumatic accumulator charged too low - contact service center.

10. **Hydraulic hoses cannot be connected to hydraulic unit**
    - Disconnecting quick connectors from hydraulic unit before reducing the pressure inside hydraulic system. High hydraulic pressure inside hydraulic hoses makes it impossible to connect the quick connectors – decrease the pressure in hydraulic hoses by loosening quick connectors and drop the excess of oil. If necessary, refill the oil to appropriate level afterwards.

11. **Pressure can't get reduced**
    - Hydraulic unit is disconnected from power outlet, emergency pressure release system is damaged or discharged – connect the hydraulic unit to power outlet or contact service center.

Regulator of temperature error messages

Error code	Description and solution
	**1. Heating plate doesn't work:** • Heating plate is not connected to power outlet – check the connection and remember to secure the plug-in socket with special locking element • Damaged sensor of heating plate temperature – check the condition of power supply cable.
	**2. Heating plate can't reach required temperature** • Heating plate is not connected to power outlet – check the connection and remember to secure the plug-in socket with special locking element • Short circuit between wires of temperature sensor or sensor damaged – measure the resistance of temperature sensor once the heating plate cools down
	**3. Heating plate can't reach required temperature** • Error of measurement system or CPU – visit service center.

7. MAINTENANCE

Danger

All maintenance work shall be carried with machine disconnected from power outlet.

In order to ensure long-lasting trouble-free work of the machine follow these recommendations:

- Regularly clean the Surface of hydraulic cylinders
- Regularly control the level of hydraulic oil on special indicator mounted on hydraulic tank. If necessary, refill the oil to suitable level
- Regularly check the tensioning and condition of trimmer chain, cogwheels and all screw connections (correct them when necessary)

Use and maintenance

Device does not require any special maintenance aside from keeping it in general cleanness. Standard maintenance of TRACK machines is limited to periodical cleaning of machine's external surfaces.

Electric parts

Pay special attention during use, transport and storage of the machine to protect machine electric and electronic systems against water (rain, drowning) and humidity.

Heating plate (HP)

Every day, before proceeding to work, when the plate is still cold clean the surface of heating plate using special cleaning tissues soaked in acetone or spirit. In case of noticing that material covering the plate is damaged replace the PTFE cover for a new one or send it to the manufacturer service for repair.

Trimmer (TR)

Remember to clean the pipe before trimming. Trimming of pipes covered with dirt or sand drastically reduces the lifetime of trimming blades. If the blades get blunt unscrew them, turn around, and screw back in place (trimming blades are double sided). When both sides get blunt replace the blades for new ones.

Hydraulics

Hydraulic connections should be regularly cleaned. Protect the piston rods against hits from hard or sharp objects. When machine is not used hydraulic connections shall be secured with special caps.

Fastening elements

Screws fastening the upper clamps shall be cleaned from dirt/sand every day with wire brush and sprayed with lubricant (WD-40).

List of wear parts:

1. Electric elements: power supply cables, plugs, sockets
2. Hydraulic elements: quick-connectors, connector sealing caps, hydraulic hoses
3. Other elements: trimming blades, PTFE covers, screws, nuts, hydraulic oil

In case of machine failure turn off the machine by pulling out the power supply plug from power outlet. Report such fact to the superior. Warranty and post-warranty repairs are carried out at manufacturer's service point after delivering the machine to the manufacturer accordingly with guarantee terms and conditions.

Accordingly, to current requirements and regulations for welding machines, the machine is subjected to obligatory annual inspection conducted by the producer or authorized representative. During inspection the machine is checked for correct work and all necessary repairs are made. For this occasion, an appropriate certificate is being issued (so called calibration certificate).

8. FINAL REMARKS

- Every user of this welding machine is obliged to closely read this operation manual;
- Hydraulic butt-welding machine can be operated only by properly trained personnel prepared for work with this device and having proper qualifications allowing for welding of polyethylene pipes.
- Information and comments contained in this instruction manual combined with recommendations of technical supervision will allow to perform high quality connections with high strength and performance features;
- User has to pay special attention on maintaining good technical condition of the machine, storage and proper service;
- Machines are serviced free of charge within 1 year warranty period (post-warranty service is payable) after delivery to manufacturer's service point;
- Manufacturer performs also annual technical examination of the machine, so called 'calibration' after which a suitable certificate is granted;
- The manufacturer reserves himself the right to introducing constructional changes resulting from changing requirements of customers and technical/organization possibilities.
- Making any changes "on one's own" and removing seals without the prior consent of manufacturer is forbidden and results in loss of guarantee.
- Ensure to clean the welding zone of trimming remains and properly utilize used hydraulic oil to protect the environment. Follow all adequate regulations, standards and guidelines regarding the use of welding machine.

9. FORBIDDEN OPERATIONS

- Using the machine against its destination;
- Using machine with faulty cables;
- Repairs and adjustments done by unauthorized personnel;
- Using the machine by untrained and unqualified personnel;
- Using the machine without valid calibration certificate. Machine is subjected to obligatory calibration after each year of use;
- Using the machine against the user manual/welding technology;
- Using the machine in explosion zones;
- Remaining remarks referring to each element of the machine can be found in point 2 of present instruction manual.

10. FIREFIGHTING INSTRUCTIONS

- Machine does not come with firefighting equipment. In case of fire follow general firefighting equipment.
- Do not use water to extinguish the fire. Use fire blankets or dry powder extinguishers.
- Welding process ought to be carried in covered areas not exposed for explosive hazards (e.g. gas leaking from damaged gas pipeline).