



GOLDSCHMIDT

Smart Rail Solutions



SMARTWELD JET

PRE-HEATING TORCH

TRANSLATION OF THE ORIGINAL INSTRUCTIONS



EC declaration of conformity

within the meaning of the EC Machinery Directive 2006/42/EC, Annex II 1 A.

The manufacturer:

Elektro-Thermit GmbH & Co. KG
A company of the Goldschmidt Group
Chemiestr. 24, 06132 Halle, Germany

hereby declares that the following product

Product name: SMARTWELD JET
Function: Preheating for Thermit® welding
Serial number: 00100 - 00500
Year: 2016

complies with all relevant provisions of the Machinery Directive 2006/42/EC.

The machine additionally complies with the following directives:
2014/53/EU Radio equipment
2014/30/EU Electromagnetic compatibility, EMC for short
Related harmonised standards
DIN EN ISO 12100: 2010 Safety of machinery – General principles for design Risk assessment and risk reduction
DIN EN 60204-1:2018 Safety of machinery – Electrical equipment of machines – Part 1: General requirements

Mr Ingolf Schöniger, Chemiestr. 24, 06132 Halle, Germany, is authorised to submit the technical documents.

Halle, 24 June 2020

A blue ink handwritten signature, appearing to read "M. Wewel", is written over a horizontal dashed line.

Dr. Matthias Wewel
Managing Director

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www.goldschmidt.com

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1 For your information

1.1 About these instructions

These instructions contains all the information regarding the intended use of the Smartweld Jet, including the 230 V and 110 V variants, for trained personnel. Its contents include information about the commissioning, operation, transport and troubleshooting of the Smartweld Jet pre-heating torch.

The following must be noted:

- The instructions is a component of the pre-heating torch.
- It must always be at the user's disposal.
- It must always be kept in the vicinity of the Smartweld Jet pre-heating torch throughout its service life.
- It must be handed over when transferring the Smartweld Jet pre-heating torch to other operators and the operator-specific content supplemented accordingly.

1.2 Using the instructions



The information in these instructions is compulsory. Each user of the Smartweld Jet pre-heating torch must have fully read and understood the instructions before use. The instructions, prohibitions and commands in these instructions must always be followed and all safety instructions observed.

1.3 Product identification name plate

A name plate is attached to the bottom of the Smartweld Jet pre-heating torch. The name plate is used for precise product identification (see Figure 1a, 1b). The operator must ensure that the name plate is replaced if damaged or lost. The information on the name plate regarding the serial number and year of manufacture must always be quoted in any correspondence with the manufacturer.



Figure 1a: Example name plate Smartweld Jet, 230 V



Figure 1b: Example name plate Smartweld Jet, 110 V

1.4 About the Smartweld Jet pre-heating torch

The Smartweld Jet pre-heating torch (hereinafter only referred to as “Smartweld Jet”) is used to pre-heat and dry rail ends and the complete casting system for carrying out an aluminothermic welding (see also chapter 2.1 “Intended Use”).

1.5 Supporting documents

The Thermit® code of practice contain important information about how to handle the respective Thermit® welding procedure and must be observed when working with the Smartweld Jet. The GOK installation and operating instructions for type no. 05 288 501 contains information about operation of the overpressure safety shut-off unit OPSO, SAV. Brief information about this unit is provided in Chapter 7.6.

1.6 Liability

The user is liable for not observing the instructions. Any warranty is void for damages to the Smartweld Jet or its accessories or for operational faults, which arise due to non-observance of the instructions or misuse by the user. Unauthorised modifications or changes to the Smartweld Jet or its accessories are prohibited and thus excluded from the liability.

1.7 Copyright protection

These instructions is protected by the copyright legislation of Elektro-Thermit GmbH & Co. KG. Any duplication of this document as a whole or in parts and/or transfer to third parties is only permitted with the prior written approval of Elektro-Thermit GmbH & Co. KG.

1.8 Symbols in these instructions

Pay attention to the symbols shown when using these instructions. Failure to comply may result in the following:

- Risk of injury to personnel,
- Damages to the Smartweld Jet or the surroundings
- Voiding of the warranty or
- The refusal of any liability by the manufacturer.

The following symbols are used in these instructions:




SYMBOL	MEANING
DANGER	The signal word DANGER indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
WARNING	The signal word WARNING indicates a hazard with a medium level of risk that, if not avoided, can result in serious injury.
CAUTION	The signal word CAUTION indicates a hazard with a low level of risk that, if not avoided, can result in minor or moderate injury.
NOTE	The signal word NOTE indicates a hazard that, if not avoided, can result in material or environmental damage.
	Situations with a risk of injury are additionally marked with a warning sign.
	The Info symbol indicates information (tips, recommendations, comments, etc.) that can be useful when dealing with the product.
	Read the safety information before using the product. Non-compliance may lead to injuries and material damages.

Table 1: Symbols

2 Information about your safety

All safety-relevant information can be found in this chapter.



Read through this chapter carefully before using the Smartweld Jet and observe the information during use.

2.1 Intended Use

The Smartweld Jet pre-heating torch is used to pre-heat and dry rail ends and the complete casting system for carrying out an aluminothermic welding.

The Smartweld Jet may only be operated when taking into account the operating conditions (see chapter 5 “Operating conditions”).

The Smartweld Jet is technically designed explicitly for its scope of application and may only be exclusively used and operated for this purpose. Any other use of the Smartweld Jet or its accessories or use that goes beyond its operational boundaries is classed as improper use.

i Elektro-Thermit GmbH & Co. KG is not liable for personal or material damage that has been caused due to improper use of the Smartweld Jet or its accessories.

i Smartweld Jet may only be used by persons who have been trained in the operation of the device and in relevant welding procedures.

i It should be noted that good ventilation must be ensured when using the device indoors.

i When using power generators, it is essential to start the generator first and only then to connect the Smartweld Jet.

2.2 Foreseeable misuse

Foreseeable misuse is envisaged when the Smartweld Jet is used for a purpose other than what is specified in chapter 2.1 “Intended Use” and when the operating conditions in chapter 5 “Operating conditions” have not been observed.

Foreseeable misuse includes, among others:

- Use as a heater or heating fan,
- Thawing of frozen objects,
- Use as a flame-thrower,
- Scorching and burning objects.


2.3 Additional provisions

In addition to the information in these instructions, the legal provisions for accident prevention and environmental protection, as well as the accident prevention provisions of the operator, must be observed.

An "Operator" is a person who operates the Smartweld Jet or its components or allows suitable and trained personnel to operate on their behalf.

The safety provisions issued by the railway authorities for work on or nearby the track must be observed. Work may only be commenced once the competent safety officer has granted approval.

2.4 General sources of danger

 The following safety information must be observed! The safety information draws attention to the possible personal, material and environmental damages present and contains information on preventing and addressing dangers.

2.4.1 Risk of injury in the working environment

Welding work takes place in the working environment of a construction site, whereby several welding tasks and other work may be taking place simultaneously in the immediate vicinity. There is an increased risk of injury, among others, by:

- Being run over by construction vehicles,
- Coming into contact with construction vehicles and other moving work machines,
- Slipping on smooth, wet or oily surfaces,
- Tripping over obstacles,
- Stumbling onto pointed and edged objects,
- Burning from hot surfaces and open flames or
- Hearing damage or loss due to machinery noise.

Observe the following safety measures:

- Comply with all construction site regulations.
- Only work with sufficient lighting.
- Always be cautious and attentive.

2.4.2 Risk of burning

The Smartweld Jet is a machine that may only be operated by authorised personnel. Improper usage can cause severe burns.

Observe the following safety measures:

- Prevent unauthorised personnel from entering the construction site. Coordination must be undertaken by the construction site management.
- Protect the Smartweld Jet from unauthorised use.
- Never work with the Smartweld Jet in environments susceptible to explosions or fires.
- Always ensure that no flammable or explosive substances can be found in the surroundings of the Smartweld Jet.
- If necessary, clean the working area of combustibles and ensure sufficient ventilation.
- Always wear personal protective equipment (see chapter 2.11 "Personal protective equipment")

Risk of burning when switching on

The gas-air mixture is only ignited approx. 10 seconds after the fan starts up. A jet flame will then result from the nozzle. Non-recognition of flame ignition may lead to serious burns.

In addition to the points named above, be sure to observe the following precautionary measure especially during commissioning and operation:

- Once the fan has started up, do not place any body parts (e.g. hands) under the nozzle.

Risk of burning due to hot surfaces

The nozzle heats up to 1,000°C during operation. Contact will result in severe burning.

Pay particular attention to the additional following precautions during commissioning and operation:

- Do not touch the nozzle during and after operation.
- Completely allow the pre-heating program to end and switch on the cooling program if necessary. The program sequence also contains a predefined period of time for cooling of the torch tube and nozzle.

Burns due to toppling during operation

The Smartweld Jet can topple over if the clamping device is insufficiently secured to the rail. In such an instance, the nozzle can assume uncontrolled positions with the jet flame and thus cause severe burns.

Pay particular attention to the following precautions during assembly of the clamping device:

- Carry out proper assembly.
- Check the stability of the clamping device and the Smartweld Jet mounted on it before switching on.

Risk of burning due to incorrect pre-heating program

If the incorrect pre-heating program is selected, the casting system may get too hot or be destroyed altogether, causing sparks or even steel discharge. This can lead to burns.

Pay particular attention to the additional following precautions during commissioning and operation:

- Follow the instructions in these instructions and observe the notes.
- Set the pre-heating program corresponding to the casting system used with the respective Thermit® welding procedure.
- Follow the supporting code of practice (see chapter 1.5 "Supporting documents").

2.4.3 Risk of explosion

The Smartweld Jet contains gas-bearing components, which may cause explosions if not used properly and thus lead to severe burns and death.

Observe the following safety measures:

- Do not use the Smartweld Jet during stormy weather.
- Protect the Smartweld Jet and the gas supply in the event of stormy weather.
- Always disconnect the Smartweld Jet from the power and gas supply before maintenance work on the device.

2.4.4 Risk of injury due to electric shock

When working on live components and cables, there is a risk of serious injuries due to electric shock, which can lead to cardiac fibrillation, cardiac arrest or respiratory failure with fatal consequences.

Observe the following safety measures:

- Only operate the Smartweld Jet in accordance with the specifications of the respective railway company, if a conductor rail is energized at the place of work.

- Never use the Smartweld Jet when the track circuit is under voltage.
- Always ensure that there is no risk of electric shock.
- Always disconnect the Smartweld Jet from the power and gas supply before maintenance work on the device.

2.4.5 Risk of injury due to operational noises

The fan and the nozzle have increased operational noise levels. Extended operational periods may lead to hearing damage and even permanent hearing loss. The following table shows the maximum allowable operating times determined from sound pressure measurements. The ambient noise is not taken into consideration.

PROGRAM	OPERATING TIME UNTIL $L_{EX,8H} = 80 \text{ DB(A)}$	OPERATING TIME UNTIL $L_{EX,8H} = 85 \text{ DB(A)}$
P1 – Preheating program highest performance	145 min	460 min
Drying slag pans	20 min	65 min
Cooling modes	480 min	480 min

Table 2: Daily noise exposure values when operating the Smartweld Jet

Observe the following safety measures:

- If necessary, wear hearing protection.
- Only switch on the Smartweld Jet when required.

2.4.6 Risk of injury due to falling

The gas hose and the power cable lay on the ground during use and during transport to the next location of welding point. There is a risk of injury due to stumbling and falling. Pointed and edged objects may be on the floor.

Observe the following safety measures:

- Place the gas hose and the power cable as such, that there is no risk of stumbling.
- Always wear personal protective equipment (see chapter 2.11 “Personal protective equipment”).

2.4.7 Risk of injury due to lifting heavy objects

The Smartweld Jet has a weight of 23 kg or 28 kg. It must be raised during transport and when placing onto the rail. This can lead to musculo-skeletal injuries in the case of bad posture.

Pay attention to the following precautions when lifting the Smartweld Jet:

- Use the handles on the Smartweld Jet.
- Adopt a healthy posture.

2.5 Safety signage

NOTE

Keep the safety indications legible! The operator must ensure proper replacement of safety signs if they become damaged during service life or go missing altogether.

The following safety signs are attached to the Smartweld Jet:



PICTOGRAM	MEANING	PICTOGRAM	MEANING
	Observe the instructions		Wear safety gloves
	Wear safety goggles		Wear protective clothing
	Wear personal protective equipment		Wear a protective helmet during crane transport
	Warning of hot surfaces		

Table 3: Safety signage

Figure 2 indicates points where the safety signs are attached.



Figure 2: Safety signage

2.6 Emergency stop switch

Triggering the emergency stop switch (see figure 3) causes the electricity and the gas supply to be disconnected immediately. Operation of the Smartweld Jet is then completely interrupted.



Figure 3: left-hand-image: emergency stop switch, variant 230 V; right-hand-image: emergency stop switch, variant 110 V

The emergency stop switch can be used to stop the Smartweld Jet in an emergency and to turn the device on and off during operation.

i The emergency stop switch must be released after activation so that the Smartweld Jet can be started again. A yellow ring (230 V) or a green ring (110 V) is visible when released.

2.7 Fire protection/fire extinguisher

The fire safety regulations at the construction site must be observed.

The operator must ensure that there is a functioning CO₂ extinguisher in the immediate vicinity of the workplace when working with the Smartweld Jet.

2.8 Conduct during an emergency

In the event of an emergency, immediately switch off the Smartweld Jet using the emergency stop button (see chapter 8.3 “Stop Smartweld Jet using the emergency stop switch”) and leave the danger zone as quickly as possible.

- **In the event of personal injury** promptly initiate first aid measures.
- **In the event of a fire** promptly initiate the necessary fire fighting steps.

2.9 Operator obligations

The operator is the person who operates the Smartweld Jet for commercial or economic purposes themselves or transfers the use/application to a third party and bears the legal product responsibility for the protection of personnel or third parties.

Obligations of the operator:

- The operator must be aware and implement the valid regulations on work safety and accident prevention.
- The personnel must be informed of the following points when using the Smartweld Jet in the vicinity of conductor rails:
 - The necessary safety distances between Smartweld Jet and rail,
 - The appropriate safety measures for external energy sources as well as the positioning of the operating personnel.

2.10 Qualification of the personnel

2.10.1 General

Work must only be carried out by qualified personnel!

Only those personnel who fulfil the following requirements may work with the. All other persons are forbidden from using the Smartweld Jet.

- They have fully read and understood these instructions.
- They wear the necessary personal protective equipment to ensure safety in the workplace (see chapter 2.11 “Personal protective equipment”).
- They always observe the safety and accident prevention provisions of the operator and all legal requirements relevant to personal safety and to the safety of others.

2.10.2 Operating personnel (user)

The operating personnel of the Smartweld Jet, who are permitted to carry out work described in these instructions, are defined as follows:

- They are continuously trained about technical innovations and possess the necessary fundamental understanding in handling the Smartweld Jet.
- The following focal points must be emphasised as part of the initial training schedule:
 - functional description of the Smartweld Jet,
 - explanation of the individual components,
 - explanation of the hazard sources,
 - use of the Smartweld Jet,
 - recognition of functional errors and malfunctions,
 - correct cleaning of the Smartweld Jet.

2.11 Personal protective equipment

If the operator has added no further provisions, the protective equipment listed in the following table is mandatory when working with the Smartweld Jet.






SYMBOL	PROTECTIVE EQUIPMENT	WORK
	Protective work clothing (protective wear for welders in accordance with EN 470-1, if necessary hi-vis warning clothing in accordance with EN 471)	Transport, commissioning, operation, decommissioning, maintenance, cleaning/care
	Protective work shoes (S3 safety shoes in accordance with EN ISO 20345 ankle-height shoes)	Transport, commissioning, operation, decommissioning, maintenance
	Protective goggles (normal and protective level 6 for welding work)	Operation (welding)
	Protective gloves (severe mechanical hazards in accordance with EN 388 (4242), EN 402, if necessary protective gloves against thermal risks in accordance with EN 407)	Transport, commissioning, operation, decommissioning, maintenance, cleaning/care
	Protective helmet (industrial safety helmet in accordance with EN 397)	Crane transport

Table 4: Personal protective equipment

3 Structure and function

The most important components of the Smartweld Jet are illustrated and their function explained in this chapter.



Figure 4: Device components and accessories

(1)	Smartweld Jet	(5)	Gas hose
(2)	Nozzle	(6)	Disconnect coupling
(3)	Pressure reducing valve with Euro adapter set	(7)	Clamping device flat bottom rail Smartweld Jet
(4)	Gas leakage shut-off device		

More device components:

- Setting gauge (depending on processing conditions)
- Power connection cable Smartweld Jet or
- Power connection cable Smartweld Jet 110 V with Euro power outlet version and USA power outlet version

Optional accessories:

- Transport and storage box
- Twin hose with gas leakage shut-off device and pressure reducing valve
- Clamping device flat bottom rail/grooved rail/crane rail

3.1 Functional description

The Smartweld Jet pre-heating torch is used to pre-heat and dry rail ends and the complete casting system for carrying out an aluminothermic welding.

Using an external supply and an automatic gas regulator, gas is fed to the Smartweld Jet, which is blended with air in the torch tube by a high performance fan.

The Smartweld Jet starts to build up to the preset output after the corresponding pre-heating program is selected.

Pre-heating is carried out automatically in accordance with the pre-heating program selected. The pre-heating process begins following actuation using the **START** button.

The gas-air mixture is only ignited at a low output level approx. 10 seconds after the fan starts up. A flame visibly emerges from the nozzle.

Depending on the rail profile and welding process, the selected pre-heating program controls the pre-heating process.

i For safety reasons, the **START** button must be pressed twice within three seconds.

3.2 Smartweld Jet



Figure 5: Smartweld Jet

(1)	Control unit (see chapter 3.3)	(7)	Handles
(2)	Emergency stop switch	(8)	Lifting point
(3)	Gas connection	(9)	Filter housing
(4)	Power connection	(10)	Holding fixture for clamping device
(5)	Torch tube	(11)	Interface for diagnostic unit
(6)	Nozzle		

i The interface for the diagnostic unit is used for access exclusively by the manufacturer and the specialist personnel authorised by the manufacturer. Any misuse voids the guarantee.

The Smartweld Jet contains two safety fuses that disconnect the Smartweld Jet from the power supply when a fault occurs or in case of overload. Both fuses are fitted above the power connection (see Figure 6) and can be removed and replaced by turning the cover.



Figure 6: Safety fuses

3.3 Control unit

The Smartweld Jet is controlled using the control unit (see figure 7). The Smartweld Jet is set for the rail profile to be welded and the respective Thermit® welding procedure by selecting the corresponding pre-heating program (P1 and subsequent).



Figure 7: Control unit

	ELEMENT	ANNOTATION	FUNCTION
(1)	Display	-	Display of the pre-heating program, among others
(2)	Error LED	Error	Identification of an error
(3)	Status LED	Run	Indication of the operating status
(4)	BT-LED	Bluetooth®	Identification of an existing Bluetooth® connection
		START	Executing of the preselected pre-heating program when pressed twice within three seconds
		UP	Preselection of the pre-heating program/time/fan capacity upwards
		TIME	Setting of the time using the arrow buttons, either up or down (UP or DOWN)
		RESET	Back to the pre-heating program after troubleshooting
		STOP	Stops the pre-heating program
		DOWN	Preselection of the pre-heating program/time/fan capacity downwards
		OUTPUT	Setting of the fan control voltage in combination with the arrow buttons, up or down (UP or DOWN)
		COOLER	Activation of cooling mode

Table 5: Functions of the operating and display elements

i Observe the instructions in chapter 10 “Troubleshooting” in the case of any possible error messages.

3.4 Pre-heating program

i All data can be found in the code of practice of the corresponding Thermit® welding procedure.

i User-specific parameters can be implemented after consultation with the system provider by using the pre-heating program channel.

3.5 Clamping device flat bottom rail Smartweld Jet

The clamping device (see figure 8) is used for correct mounting of the Smartweld Jet onto the rails.

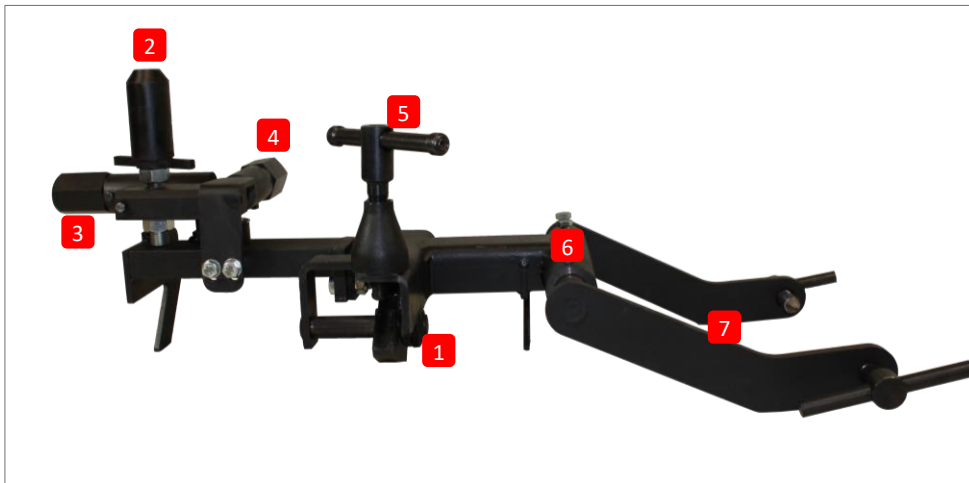


Figure 8: Clamping device

(1)	Tensioning clamp	(5)	Clamping screw
(2)	Mounting mandrel for Smartweld Jet	(6)	Holding fixture for impeller arms
(3)	Positional aid for aligning the Smartweld Jet in the rail's longitudinal direction	(7)	Arms for fixing the mould shoes
(4)	Positional aid for aligning the Smartweld Jet in the rail's transverse direction		

4 Technical data

CATEGORY	DATA	
General	Operating temperature	maximum +60 °C
	Storage temperature	-20 °C to +70 °C
	Stability factor (S)	30.5
	Protection class	1
	Type of protection	IP 54
	Device category	I _{3R}
Dimensions and weight	Height	509 mm
	Width	481 mm
	Length	1,011 mm
	Weight	23 kg (230 V), 28 kg (110 V)
	Weight of the nozzle	1.5 kg
Output	Maximum combustion heating power	Q _{Fmax} 150 kW
	Minimum combustion heating power	Q _{Fmin} 1 kW
	Power consumption	100 to 900 W
Input	Voltage	230 V or 110 V at 50-60 Hz
	Permissible voltage fluctuation	+/- 10 %
	Fuse	250 V, 6.3 A, quick <i>or</i> 110 V, 10 A, slow-acting
Operating materials	Propane (min. 95 percent by weight of propane and propene). No use of gases that contain petroleum distillates.	
Environmental conditions	Temperature	-20 °C to +50 °C
	Air humidity	Non-condensing
Sound immission	Sounds pressure level	83.3 dB re 20 µPa
Sound emission	Sound power level	98.4 dB re 1 pW

Table 6: Technical data

i Sound immission and emission are process-dependent. The sound levels shown in the table refer to preheating with maximum power.

i To ensure control of the flame in the device, the device has an automatic polarity inverter switch on the inside. For measurements where the protective earth is disconnected (e.g. protective earth current), you must ensure that the device is started up with the protective earth connected and that the protective earth is only disconnected when P1 appears on the display. For the measurement with reversed phase connection, the device must be completely disconnected from the electricity network and then reconnected to the network with the protective earth connected. Here too, the protective earth must not be disconnected for the measurement until P1 appears on the device display. You must also ensure that the various screws in the housing are earthed or isolated.

i The gas pressure regulator on the Smartweld Jet sets it to the local gas supply and to local delivery pressure, and is included in device category I3R for liquefied gas.

i Gases containing petroleum distillates must not be used with the Smartweld Jet because they contain liquid hydrocarbons that can damage the Smartweld Jet.

5 Operating conditions

This chapter describes the operating conditions, which must be in place for proper operation of the Smartweld Jet.

NOTE

The Smartweld Jet may not be operated if the actual conditions deviate from the operating conditions. Always check whether all the operating conditions are met before commissioning the Smartweld Jet.

SIZE	VALUE
Ambient temperature (min.)	-20 °C
Ambient temperature (max.)	+50 °C
Air humidity	Non-condensing environment

Table 7: Operating conditions

The following operating conditions must also be fulfilled for the Smartweld Jet and its accessories:

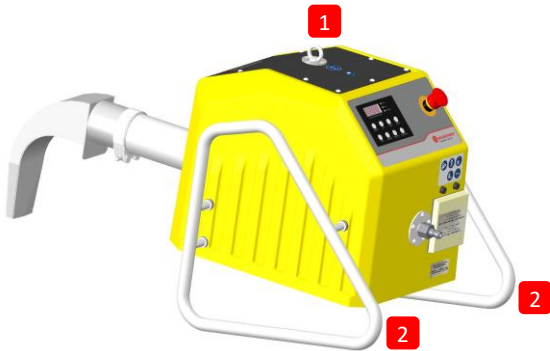
- The Smartweld Jet may only be used when it is in a technically undamaged and serviceable condition.
- The Smartweld Jet may only be used when connected to power supplies that have a protective earthing connection and ground fault circuit interrupter or insulation monitoring with automatic disconnection.
- The power supply (feed-in) must be equipped with an automatic shut-off function. The Smartweld Jet has no protection by automatic shut-off of the supply.
- The Smartweld Jet may only be operated on a track that has been locked and secured in accordance with the specifications of the railway company.
- The Smartweld Jet may only be operated with propane with a purity in accordance with EN 589 (min. 95 percent by weight of propane and propene).
- The Smartweld Jet may only be used with sufficient ventilation and aeration.
- The Smartweld Jet may not be operated with stormy weather.
- The position of use must be observed to prevent the penetration of moisture.

6 Transport

This chapter contains all information that is required for the proper transport of all components of the Smartweld Jet.

6.1 Carrying fixtures on the Smartweld Jet


The Smartweld Jet may only be lifted using the carrying fixtures provided (see figure 9).



(1)	Lifting point for transport by crane
(2)	Handles for lifting by hand

Figure 9: Carrying fixtures

6.2 Transporting by hand

	CAUTION
	<p>Smartweld Jet weighs over 20 kg</p> <ul style="list-style-type: none"> • Use the handles on the Smartweld Jet. • Adopt a healthy posture.

6.3 Transporting by crane

Follow the instructions below when transporting by crane:

- Sufficiently secure the Smartweld Jet against falling.
- Ensure the correct fitting of the crane eyelets.
- Clear transport routes and ensure that no persons are at risk of injury.
- The lifting gear must only be attached using the crane hook on the Smartweld Jet.
- When transporting with lifting equipment, one person should keep hold of the handles on the Smartweld Jet, so that uncontrolled tilting or turning is prevented.

6.4 Transporting on the loading area

Observe the principles of safe load securing when transporting on a loading area.

7 Commissioning

This chapter contains all information that is required for proper commissioning of the Smartweld Jet. Carry out commissioning in the sequence of the following chapters.

7.1 Initial commissioning

Follow the instructions below during initial commissioning:

1. Push the nozzle onto the torch tube so that the opening is against the stop and align (see figure 10).



Figure10: Fitting the nozzle

2. Correctly fasten the nozzle with the clamping device (see figure 11).

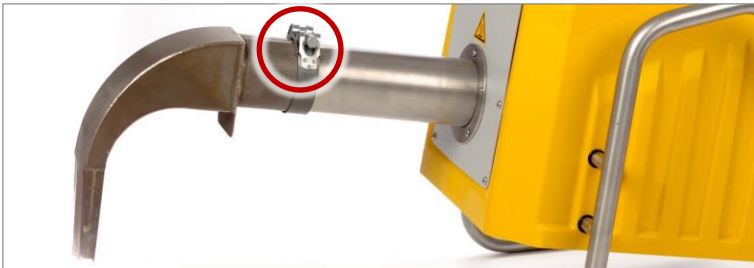


Figure 11: Fastening the nozzle

Incorrect alignment of the nozzle may lead to subsequent improper insertion into the welding mould.

i The nozzle can also remain inserted during transport.

7.2 Checks before commissioning

Check the proper state of the Smartweld Jet each day before commissioning, especially:

1. Check the filter and clean/replace if necessary (see chapter 11 "Maintenance").
2. Check the Smartweld Jet and its components (electricity and gas connection, among others) for signs of damage, such as cracking and breakage.
3. Check whether the nozzle is correctly fitted facing downwards and is secured.
4. Check all connecting parts of the gas supply for gas leakages.

The Smartweld Jet may only be used when it is in a technically undamaged and serviceable condition. If the Smartweld Jet is not in a satisfactory condition, reestablish proper functioning or discuss how to proceed with the manufacturer.


i A slight adjustment of the control voltage in the pre-heating program must be made before welding work at heights exceeding 1,500 m. Contact the system provider for this.

i The exposed metal parts of the Smartweld Jet are connected to the protective conductor of the power supply. If several Smartweld Jet are used on a track at the same time, the notification of track occupation may be triggered during operation on the same power supply. Adjacent rails can be connected to each other in an electrically conductive manner via the protective conductor. This is also possible if the Smartweld Jet is simultaneously operated on a power source with other electrically powered devices and is used on different rails. Inform yourself about whether the notification of track occupation system is active in your work section and carry out work on adjacent tracks sequentially in case of doubt.

7.3 Mounting the clamping device

Follow the instructions below when mounting the clamping device:

1. Place the clamping device onto the rail ends using a setting gauge as such, that the arms for fastening the mould shoes are facing towards the welding gap. The tensioning clamp must encompass the rail head in this case.
2. Secure the clamping device on the rail using the clamping screw.
3. Observe the straight fitting of the clamping device on the rail when tightening the clamping screw. The mandrel of the clamping device must be aligned parallel to the rail axis.

	WARNING
	<p>Toppling of the Smartweld Jet during operation</p> <p>The Smartweld Jet can topple over if the clamping device is insufficiently secured to the rail. This can result in injuries and damage.</p> <ul style="list-style-type: none"> • Carry out proper assembly and check. • Always wear personal protective equipment (see chapter 2.11 “Personal protective equipment”).

7.4 Preparing the location of welding point

Prepare the location of welding point in accordance with the supporting code of practice (see chapter 1.5 “Supporting documents”).

7.5 Setting up the Smartweld Jet

Follow the instructions below when setting up the Smartweld Jet:

1. Position the Smartweld Jet on the mandrel of the clamping device. Ensure it is seated firmly!
2. Align the Smartweld Jet with the positional aid of the clamping device as such, that the nozzle is centred over the welding gap.
3. Check the height setting of the Smartweld Jet using the setting gauge. Refer to the corresponding code of practice for the correct height.

7.6 Establishing the electricity and gas supply

Follow the instructions below when establishing the electricity and gas supply:

1. Connect the power cable (see Figure 12, on the left), use the corresponding correct power cable for the respective variant.
Deactivate the emergency stop switch by turning the switch (see Figure 12, on the right). A yellow or green ring is visible under the switch when deactivated.

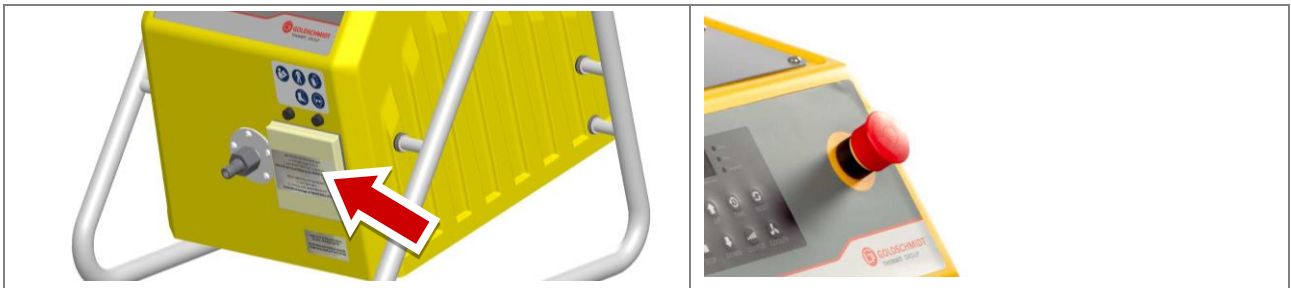


Figure 12: left-hand image: connecting the power cable; right-hand image: emergency stop switch deactivated (230 V)

NOTE

Please ensure that the power supply used to operate the Smartweld Jet complies with the technical data relating to electrical input set out in Table 6 (230 V or 110 V, 50-60 Hz, permissible fluctuation $\pm 10\%$). Generators used must be in normal operating mode (See chapter 10 "Troubleshooting", Table 9 Error and information codes).

When operating the Smartweld Jet using a power generator, it is important to always start the generator first and only then connect the cable to the Smartweld Jet (danger of damage to the Smartweld Jet). Make sure that the Smartweld Jet is not preheating when operating other electrical machines. Voltage peaks can occur in both and this can lead to the overvoltage protection of the Smartweld Jet being triggered.

When the overvoltage protection responds, the Smartweld Jet power supply is cut off and the Smartweld Jet turns off. To reactivate the electronics, the Smartweld Jet must then be voltage free. This is carried out by pressing the emergency stop switch or disconnecting from the power source.


NOTE

Message **CH E**: this message may appear while operating the Smartweld Jet using a power generator. The earthing of the power generator must be checked and the message must be acknowledged by pressing the **STOP** button.

2. Prepare the gas supply, consisting of the pressure reducing valve, gas leakage shut-off device and gas hose, check and connect with the liquid gas cylinder.
3. Connect the other end of the gas hose to the Smartweld Jet using the disconnect coupling (see Figure13).
The gas leakage shut-off device shuts off the gas supply when there is an excessive pressure drop in the gas line.



Figure 13: Connecting the gas hose

	CAUTION
	Position the gas hose and the power cable such that there is no risk of stumbling.

4. Slowly turn up the gas cylinder valve to establish the gas supply.

i Gas only flows through the Smartweld Jet, after the pre-heating program has been started, the fan is running and the necessary air pressure is reached (monitored by the air pressure switch). Since the air must initially escape from the system, the first pre-heating may be automatically interrupted after connecting the gas hose. An error message appears in the display. The pre-heating must be restarted after the **RESET** button or the **STOP** button is pressed.

i The pressure reducing valve used includes an overpressure safety shut-off device, type OPSO (Over-Pressure-Shut-Off). This acts autonomously and protects any gas appliances connected to it from unacceptably high levels of pressure. The red/green visual indicator shows whether the unit has responded or not. When operational, this display is green. If overpressure occurs in the pressure reducing valve, the device triggers and interrupts the flow of gas. The visual display jumps to red and the operator can see immediately that the overpressure shut-off unit is responsible for interrupting operation of the system. After the trigger, the device has to be manually unlocked as follows in order to restore the gas supply (figure 14):

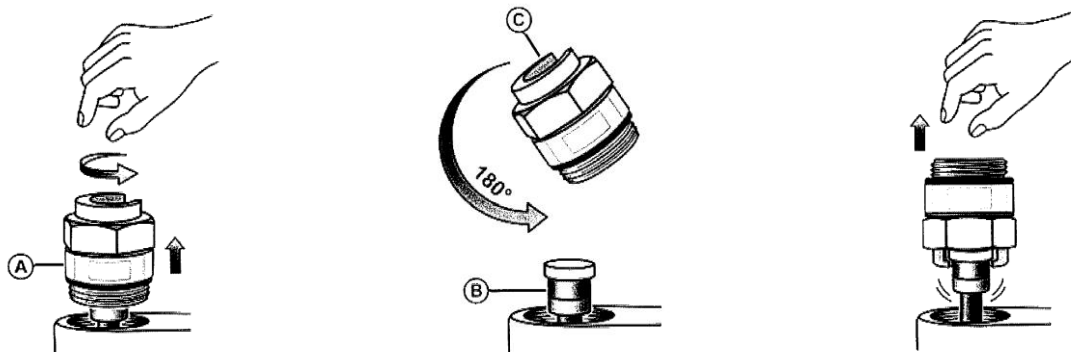


Figure 14: Resetting the overpressure safety shut-off device OPSO

1. Unscrew protective cap A manually.
2. Turn protective cap A over and pull out spindle B using unlocking device C until spindle B noticeably engages and remains open.
3. Screw on protective cap A again.
4. OPSO is ready for operation → visual display green.



Further information can be found in the separate operating instructions of the pressure regulator.

8 Operation

This chapter contains all information that is required for proper operation of the Smartweld Jet.

i Care must be taken to ensure the propane supply is not interrupted, e.g. by stepping on the hose or bending it.

8.1 Pre-heating the rails and casting system

	CAUTION
	<p>Delayed ignition</p> <p>The gas-air mixture is only ignited approx. 10 seconds after the fan starts up.</p> <ul style="list-style-type: none"> • Always wear personal protective equipment (see chapter 2.11 "Personal protective equipment"). • Maintain a safe distance.
	CAUTION
	<p>Risk of burning due to incorrect pre-heating program</p> <p>If the incorrect pre-heating program is selected, the casting system may get too hot or be destroyed altogether, causing sparks or even steel discharge. This can lead to burns.</p> <p>Pay particular attention to the following precautions during commissioning and operation:</p> <ul style="list-style-type: none"> • Always wear personal protective equipment (see chapter 2.11 "Personal protective equipment"). • Follow the instructions in this instructions and observe the notes. • Set the pre-heating program corresponding to the casting system used with the respective Thermit® welding procedure. • Follow the supporting code of practice (see chapter 1.5 "Supporting documents").

Follow the instructions below when pre-heating the rail ends and casting system:

1. Select the required pre-heating program with **UP** and **DOWN** (see figure 15).

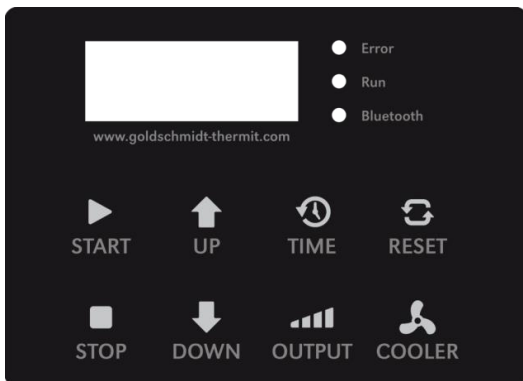


Figure 15: Selection of the pre-heating program

i Special parameters can be implemented after consultation with the manufacturer by using a specific pre-heating program.

i Confirm the selection with **START**.

2. Press twice on **START** within three seconds to start the pre-heating program.

After reaching the necessary output of the Smartweld Jet, the remaining output is indicated in the display (format: mm:ss).

The fan runs immediately at approx 10 % of the maximum speed. The gas valve is then opened. The gas-air mixture is only ignited approx. 10 seconds after the fan starts up, which generates a visible jet flame from the nozzle. The fan will reach its final speed dependent on the pre-heating program.

The gas feed is automatically stopped. **E:nd** is indicated in the display.

3. Remove the Smartweld Jet from the clamping device and place it in a suitable location after ending the pre-heating program. If necessary, start the torch cooling program there with **COOLER**.

C:on is indicated on the display during the torch cooling program.

Refer to the corresponding code of practice for the Thermit® welding procedure for all other work steps.

The most recently used pre-heating program automatically appears in the display after the cooling mode time has finished.

i Make sure to select the correct Smartweld Jet program. The programs can be selected by pressing the **UP** and **DOWN** arrow keys on the display.

8.2 Transferring the Smartweld Jet

The Smartweld Jet may not be transferred during active operation! Follow the instructions below to transfer to a new location of welding point:


1. Finish work on the location of welding point (see chapter 9.1 "Finishing work at location of welding point").
2. Transport the Smartweld Jet to the next location of welding point. Observe the transport conditions (see chapter 6 "Transport").
3. Carry out commissioning (see chapter 7 "Commissioning") of the Smartweld Jet at the new location of welding point.

8.3 Stop Smartweld Jet using the emergency stop switch


In an unforeseen and hazardous situation, press the emergency stop switch to stop the Smartweld Jet immediately (see figure 16). The power and gas supply to the Smartweld Jet is interrupted.



Figure 16: Emergency stop switch

	WARNING
	<p>Hot surface on the nozzle Risk of burning due to contact. The fan to cool the nozzle stops running.</p> <ul style="list-style-type: none"> • Always wear personal protective equipment (see chapter 2.11 “Personal protective equipment”). • Do not touch the nozzle. • Let the nozzle cool down.

8.4 Switch on the Smartweld Jet again after pressing the emergency stop switch


	WARNING
	<p>Do not use a defective Smartweld Jet!</p> <ul style="list-style-type: none"> • Before restarting, eliminate the cause which necessitated use of the emergency stop switch. • Ensure that there are no dangers to persons. • Ensure that the Smartweld Jet is in a technically flawless state and ready for operation.

1. Remove the power cable.
2. Remove the gas hose.
3. Eliminate the cause which necessitated use of the emergency stop switch and restore the proper condition of the Smartweld Jet.
 Inform the manufacturer if necessary.
4. Pull out the engaged emergency stop switch counter-clockwise.
5. Re-connect the gas hose.
6. Re-connect the power cable.

9 Decommissioning

This chapter contains all information that is required for proper decommissioning of the Smartweld Jet.

9.1 Finishing work at location of welding point

	DANGER
	<p>Hot surface on the nozzle Risk of burning due to contact.</p> <ul style="list-style-type: none"> • Always wear personal protective equipment (see chapter 2.11 “Personal protective equipment”). • Let the pre-heating program completely finish. • Do not touch the nozzle. • Let the nozzle cool down.

Follow the instructions below when finishing work at the location of welding point:

1. Allow the Smartweld Jet to cool down.
2. Remove the power cable and store to the side carefully.
3. Remove the gas hose and store to the side carefully.

9.2 Daily decommissioning

Follow the instructions below when finishing work at the location of welding point:

1. Finish work at the welding point (see chapter 9.1)
2. Shut off the gas cylinder valve to stop the gas supply.
3. Clean the Smartweld Jet (see chapter 12 “Cleaning/care”).
4. Shake out the filter and check for damage. Change the filter if it is damaged or no longer functional (see chapter 11 “Maintenance”).
5. Check the Smartweld Jet and its components for signs of damage. Inform the manufacturer if applicable.
6. Either secure the Smartweld Jet against unauthorised access or prepare it for transport (see chapter 6.2 “Transporting by hand”).

10 Troubleshooting

This chapter contains a list of faults which can occur with the Smartweld Jet.

NOTE

If any further maintenance work is required for troubleshooting, other than filter change, then this must only be undertaken by the authorised service partners.

FAULT	POSSIBLE CAUSE	REMEDY
Fan does not start.	Power supply is interrupted or defective.	Check the plug connection and initiate a restart. Inform service partner in case of recurrence.
Smartweld Jet does not ignite.	Spark plug is contaminated.	Contact the service partner.
Smartweld Jet does not switch on, display remains black.	Power supply is interrupted by overloaded fuse.	<ol style="list-style-type: none"> 1. Remove the power cable and store to the side carefully. 2. Remove the gas hose and store to the side carefully. 3. Shut off the gas cylinder valve to stop the gas supply. 4. Remove the covers of both fuse boxes using a suitable screwdriver. 5. Check the fuses and replace them with fuses of the same type if necessary (250 V, 6.3 A, quick or 110 V, 10 A slowly-acting). Re-establish the power and gas supply (see chapter 7.6 "Establishing the electricity and gas supply"). Inform service partner in case of recurrence.
	Emergency stop switch is activated.	Deactivate the emergency stop switch by turning the switch.
	Power supply is interrupted or defective.	Check the plug connection and initiate a restart. Inform service partner in case of recurrence.
The pre-heating does not automatically end.	Program sequence is disturbed.	Interrupt the pre-heating program with STOP or emergency stop. Inform service partner in case of recurrence.

Table 8: Troubleshooting

When an error occurs, it is indicated by an error LED and an error code (see Table 9) in the display.

CODE	POSSIBLE CAUSE	REMEDY
Err1	Gas pressure is too low.	Check the cylinder fill level and the gas supply system as well as the overpressure shut-off device (see chapter 7.6 “Establishing the electricity and gas supply”).
Err2	Air pressure is too low: The gas flow is insufficient due to the fill level of the cylinder being too low, frozen or not fully opened. As a result, the necessary gas pressure is not reached and the fan is not switched on.	Connect a full propane cylinder. Press RESET and switch off the device so it is without current. If only RESET is pressed, you will see Err3 .
Err3	Follow-up error of Err2 and Err4. Firing mechanism is defective.	Press RESET and switch the device off.
Err4	Firing mechanism has not activated fan.	Interrupt the pre-heating program with STOP and initiate a restart. Check the electric cable and connections for damage and replace these if required. Output voltage of the power supply unit is too low: make sure that the Smartweld Jet is supplied with the input voltage specified in Table 6.
Err5	Motor speed limit is exceeded.	Contact the service partner.
Err6	Motor speed limit is undershot.	Contact the service partner.
Err7	Motor output limit is exceeded.	Contact the service partner.
Err8	Motor output limit is undershot.	Contact the service partner.
Err9	Motor voltage limit is exceeded.	Contact the service partner.
ErrA	Motor voltage limit is undershot.	Contact the service partner.
CH E	Assignment of phase and neutral conductor is not recognised.	Check power supply and earthing, confirm the message with STOP and continue operation. See the below note.

CODE	POSSIBLE CAUSE	REMEDY
Err3, Err4	Power supply does not supply the required electrical input values.	Make sure that the Smartweld Jet is operated on power grids or generators having the following characteristics: 230 V or 110 V, 50-60 HZ, permissible fluctuation $\pm 10\%$. Generators used must be in normal operating mode.

Table 9: Error and information codes

NOTE

The **CH E** message cannot be acknowledged via the **RESET** button, but just with the **STOP** button instead. If the **RESET** button is unintentionally pressed instead of **STOP** then the Smartweld Jet must be switched off so it is without current, then turned back on again and **CH E** must be acknowledged with the **STOP** button.

NOTE

If several errors have been generated successively then this may lead to the error memory being filled. In this case, the error cannot be acknowledged via **RESET**, but the memory must be deleted by switching off the device so it is without current.

11 Maintenance

The Smartweld Jet must be serviced annually by an **authorised service partner**. The operator is responsible for compliance with the maintenance cycles.

11.1 Filter maintenance: Cleaning and replacement

This chapter contains all information that is required for proper handling of the filter.

The filter is cleaned and replaced as required. A visual inspection of the filter must be carried out daily to check for obvious damage and coarse dirt, which should be removed.

11.2 Clean filter

Follow the instructions below when cleaning the filter:

1. Take the Smartweld Jet out of operation (see chapter 9 “Decommissioning”).
2. Remove the filter from the filter housing.
3. Shake out the filter to free it from coarse containments.
4. Check the filter for damage. Replace the filter if it is damaged or no longer functional (see chapter 11.3 “Changing the filter”).
5. Insert the filter back into the filter housing and close the filter housing.

11.3 Changing the filter

Follow the instructions below when changing the filter:

1. Take the Smartweld Jet out of operation (see chapter 9 “Decommissioning”).
2. Remove the old filter from the filter housing.
3. Insert the new, undamaged filter into the filter housing and close the filter housing.
4. If necessary, put the Smartweld Jet back into operation (see chapter 7 “Commissioning”).

11.4 Update the Smartweld Jet pre-heating programs

The update for the Smartweld Jet app (available in Google Play Store) helps update the pre-defined pre-heating programs and changes the assignment spaces in said programs. Although these cases seldom arise, they replace the need to take the device to an authorised service representative. The update can be independently carried out with the aid of the Update Smartweld Jet app by following the instructions.

NOTE

The Update Smartweld Jet app informs you when an update is available. Before every update, make sure that your smartphone/tablet has an active Internet connection. Note that the Bluetooth function on your smartphone/tablet must be switched on for the devices to be connected.

1. A power connection must be created to the Smartweld Jet device. To do so, connect the mains cable and make certain that the corresponding mains cable is used for the variant in question. The Smartweld Jet is switched on when the display is lit up.
2. Open the Update Smartweld Jet app and search for available devices via the corresponding button.
3. All available devices are listed in the app. A Bluetooth connection is created when clicking the device in the app.
4. The latest version of the program assignment table is downloaded when clicking the "Download" button.
5. The "Update" button appears after downloading takes place. This starts updating the program assignment table on the device. The display shows you how far the transfer has progressed on the Smartweld Jet.
6. After the "Update successful" message appears, you then see the Disconnect connection" button. The update was successful. The button can be used to disconnect the Bluetooth connection to the Smartweld Jet.

12 Cleaning/care

 We recommend cleaning the Smartweld Jet as part of daily decommissioning.

Follow the instructions below during cleaning:

1. Take the Smartweld Jet out of operation (see chapter 9 "Decommissioning").
2. Allow the Smartweld Jet to cool down.
3. Clean the from the outside using a commercially available plastic cleaner.
 - Never let water flow on or into the Smartweld Jet.
 - Never use combustible or highly flammable cleaning agents.

13 Spare and wearing parts

The Smartweld Jet may only be operated with original spare and wearing parts. The following are classified original spare and wearing parts:

- Filter
- Nozzle
- Safety fuse

Spare and wearing parts can be ordered from any company within the Goldschmidt Group.

14 Storage

This chapter contains all information that is required for proper storage of the Smartweld Jet.

14.1 Storage conditions

The following storage conditions must always be respected:

- Storage temperature: -20 °C to +70 °C
- UV light-protected environment
- Storage without moisture transfer to the Smartweld Jet
- Do not store in the immediate vicinity of heaters or other heat sources above +70 °C to prevent material deformities.
- Store in a dust-free location (use optional transport and storage box).

14.2 Recommissioning after extended downtimes

Follow the instructions below when recommissioning the Smartweld Jet after extended downtimes:

1. Thoroughly clean the Smartweld Jet (see chapter 12 "Cleaning/care").
2. Check the functionality of the emergency stop switch.
3. Check the effectiveness of the operating elements and displays.
4. Before use, put the Smartweld Jet into operation correctly (see chapter 7 "Commissioning").

15 Disposal/recycling

This chapter contains all information that is required for the proper disposal of all components of the Smartweld Jet.

NOTE

Comply with environmentally friendly disposal of the Smartweld Jet and its components.

At the end of the service life of the Smartweld Jet, the operator must ensure the disposal of each individual component of the Smartweld Jet in accordance with the applicable regulations. The Smartweld Jet must be disposed of as electrical waste.