

Welding machine

Picotig 220 puls TG

099-002068-EW501

Observe additional system documents!

26.7.2023

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# General instructions

## WARNING



### **Read the operating instructions!**

#### **The operating instructions provide an introduction to the safe use of the products.**

- Read and observe the operating instructions for all system components, especially the safety instructions and warning notices!
- Observe the accident prevention regulations and any regional regulations!
- The operating instructions must be kept at the location where the machine is operated.
- Safety and warning labels on the machine indicate any possible risks. Keep these labels clean and legible at all times.
- The machine has been constructed to state-of-the-art standards in line with any applicable regulations and industrial standards. Only trained personnel may operate, service and repair the machine.
- Technical changes due to further development in machine technology may lead to a differing welding behaviour.

**In the event of queries on installation, commissioning, operation or special conditions at the installation site, or on usage, please contact your sales partner or our customer service department on +49 2680 181-0.**

**A list of authorised sales partners can be found at [www.ewm-group.com/en/specialist-dealers](http://www.ewm-group.com/en/specialist-dealers).**

Liability relating to the operation of this equipment is restricted solely to the function of the equipment. No other form of liability, regardless of type, shall be accepted. This exclusion of liability shall be deemed accepted by the user on commissioning the equipment.

The manufacturer is unable to monitor whether or not these instructions or the conditions and methods are observed during installation, operation, usage and maintenance of the equipment.

An incorrectly performed installation can result in material damage and injure persons as a result. For this reason, we do not accept any responsibility or liability for losses, damages or costs arising from incorrect installation, improper operation or incorrect usage and maintenance or any actions connected to this in any way.

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### **Data security**

The user is responsible for backing up data of all changes from the factory setting. The user is liable for erased personal settings. The manufacturer does not assume any liability for this.

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## 2 For your safety

### 2.1 Notes on using these operating instructions

#### **DANGER**

**Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.**

- Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol on the edge of the page.

#### **WARNING**

**Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.**

- Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
- The hazard is also highlighted using a symbol in the page margin.

#### **CAUTION**

**Working or operating procedures which must be closely observed to prevent possible minor personal injury.**

- The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
- The risk is explained using a symbol on the edge of the page.



**Technical aspects which the user must observe to avoid material or equipment damage.**

Instructions and lists detailing step-by-step actions for given situations can be recognised via bullet points, e.g.:

- Insert the welding current lead socket into the relevant socket and lock.

## 2.2 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release / Tap / Tip
	Switch off machine		Release
	Switch on machine		Press and hold
	Incorrect / Invalid		Switch
	Correct / Valid		Turn
	Input		Numerical value – adjustable
	Navigation		Signal light lights up in green
	Output		Signal light flashes green
	Time representation (e.g.: wait 4 s / actuate)		Signal light lights up in red
	Interruption in the menu display (other setting options possible)		Signal light flashes red
	Tool not required/do not use		Signal light lights up in blue
	Tool required/use		Signal light flashes blue



## 2.3 Safety instructions

### WARNING



**Risk of accidents due to non-compliance with the safety instructions!**  
**Non-compliance with the safety instructions can be fatal!**

- Carefully read the safety instructions in this manual!
- Observe the accident prevention regulations and any regional regulations!
- Inform persons in the working area that they must comply with the regulations!



**Risk of injury from electrical voltage!**

**Voltages can cause potentially fatal electric shocks and burns on contact. Even low voltages can cause a shock and lead to accidents.**

- Never touch live components such as welding current sockets or stick, tungsten or wire electrodes!
- Always place torches and electrode holders on an insulated surface!
- Wear the full personal protective equipment (depending on the application)!
- The machine may only be opened by qualified personnel!
- The device must not be used to defrost pipes!



**Hazard when interconnecting multiple power sources!**

**If a number of power sources are to be connected in parallel or in series, only a technical specialist may interconnect the sources as per standard IEC 60974-9:2010: Installation and use and German Accident Prevention Regulation BVG D1 (formerly VBG 15) or country-specific regulations.**

**Before commencing arc welding, a test must verify that the equipment cannot exceed the maximum permitted open circuit voltage.**

- Only qualified personnel may connect the machine.
- When taking individual power sources out of operation, all mains and welding current leads must be safely disconnected from the welding system as a whole. (Hazard due to reverse polarity voltage!)
- Do not interconnect welding machines with pole reversing switch (PWS series) or machines for AC welding since a minor error in operation can cause the welding voltages to be combined, which is not permitted.



**Risk of injury due to radiation or heat!**

**Arc radiation can lead to skin and eye injuries.**

**Contact with hot workpieces and sparks can lead to burns.**

- Use hand shield or welding helmet with the appropriate safety level (depends on the application).
- Wear dry protective clothing (e.g. hand shield, gloves, etc.) in accordance with the applicable regulations of your country.
- Persons who are not directly involved should be protected with a welding curtain or suitable safety screen against radiation and the risk of blinding!

## **WARNING**



### **Risk of injury due to improper clothing!**

**During arc welding, radiation, heat and voltage are sources of risk that cannot be avoided. The user has to be equipped with the complete personal protective equipment at all times. The protective equipment has to include:**

- Respiratory protection against hazardous substances and mixtures (fumes and vapours); otherwise implement suitable measures such as extraction facilities.
- Welding helmet with proper protection against ionizing radiation (IR and UV radiation) and heat.
- Dry welding clothing (shoes, gloves and body protection) to protect against warm environments with conditions comparable to ambient temperatures of 100 °C or higher and arcing and work on live components.
- Hearing protection against harming noise.



### **Explosion risk!**

**Apparently harmless substances in closed containers may generate excessive pressure when heated.**

- Move containers with inflammable or explosive liquids away from the working area!
- Never heat explosive liquids, dusts or gases by welding or cutting!



### **Fire hazard!**

**Due to the high temperatures, sparks, glowing parts and hot slag that occur during welding, there is a risk of flames.**

- Be watchful of potential sources of fire in the working area!
- Do not carry any easily inflammable objects, e.g. matches or lighters.
- Ensure suitable fire extinguishers are available in the working area!
- Thoroughly remove any residue of flammable materials from the workpiece prior to starting to weld.
- Only further process workpieces after they have cooled down. Do not allow them to contact any flammable materials!

**⚠ CAUTION****Smoke and gases!**

**Smoke and gases may lead to shortness of breath and poisoning! The ultraviolet radiation of the arc may also convert solvent vapours (chlorinated hydrocarbon) into poisonous phosgene.**

- Ensure sufficient fresh air!
- Keep solvent vapours away from the arc beam field!
- Wear suitable respiratory protection if necessary!
- To prevent the formation of phosgene, residues of chlorinated solvents on workpieces must first be neutralised using appropriate measures.

**Noise exposure!**

**Noise exceeding 70 dBA can cause permanent hearing damage!**

- Wear suitable ear protection!
- Persons located within the working area must wear suitable ear protection!



**According to IEC 60974-10, welding machines are divided into two classes of electromagnetic compatibility (the EMC class can be found in the Technical data) > see 8 chapter:**



**Class A** machines are not intended for use in residential areas where the power supply comes from the low-voltage public mains network. When ensuring the electromagnetic compatibility of class A machines, difficulties can arise in these areas due to interference not only in the supply lines but also in the form of radiated interference.



**Class B** machines fulfil the EMC requirements in industrial as well as residential areas, including residential areas connected to the low-voltage public mains network.

**Setting up and operating**

When operating arc welding systems, in some cases, electro-magnetic interference can occur although all of the welding machines comply with the emission limits specified in the standard. The user is responsible for any interference caused by welding.

In order to **evaluate** any possible problems with electromagnetic compatibility in the surrounding area, the user must consider the following: (see also EN 60974-10 Appendix A)

- Mains, control, signal and telecommunication lines
- Radios and televisions
- Computers and other control systems
- Safety equipment
- The health of neighbouring persons, especially if they have a pacemaker or wear a hearing aid
- Calibration and measuring equipment
- The immunity to interference of other equipment in the surrounding area
- The time of day at which the welding work must be carried out

**Recommendations for reducing interference emission**

- Mains connection, e.g. additional mains filter or shielding with a metal tube
- Maintenance of the arc welding system
- Welding leads should be as short as possible and run closely together along the ground
- Potential equalization
- Earthing of the workpiece. In cases where it is not possible to earth the workpiece directly, it should be connected by means of suitable capacitors.
- Shielding from other equipment in the surrounding area or the entire welding system

**Electromagnetic fields!**

**The power source can create electrical or electromagnetic fields that may impair the function of electronic systems such as EDP and CNC devices, telecommunication, power and signal lines as well as pacemakers and defibrillators.**



- Follow the maintenance instructions > see 6.2 chapter!
- Unwind the welding leads completely!
- Shield radiation-sensitive equipment or facilities appropriately!
- The function of pacemakers may be impaired (seek medical advice if necessary).

## CAUTION



### Obligations of the operator!

**The respective national directives and laws must be complied with when operating the machine!**

- Implementation of national legislation relating to framework directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work and associated individual guidelines.
- In particular, directive 89/655/EEC concerning the minimum safety and health requirements for the use of work equipment by workers at work.
- The regulations applicable to occupational safety and accident prevention in the country concerned.
- Setting up and operating the machine as per IEC 60974.-9.
- Brief the user on safety-conscious work practices on a regular basis.
- Regularly inspect the machine as per IEC 60974.-4.



***The manufacturer's warranty becomes void if non-genuine parts are used!***

- ***Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!***
- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***

### Requirements for connection to the public mains network

High-performance machines can influence the mains quality by taking current from the mains network. For some types of machines, connection restrictions or requirements relating to the maximum possible line impedance or the necessary minimum supply capacity at the interface with the public network (Point of Common Coupling, PCC) can therefore apply. In this respect, attention is also drawn to the machines' technical data. In this case, it is the responsibility of the operator, where necessary in consultation with the mains network operator, to ensure that the machine can be connected.

## 2.4 Transport and installation

## WARNING



### Risk of injury due to improper handling of shielding gas cylinders!

**Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!**

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Do not attach any element to the shielding gas cylinder valve!
- Prevent the shielding gas cylinder from heating up.

**⚠ CAUTION****Risk of accidents due to supply lines!**

During transport, attached supply lines (mains leads, control cables, etc.) can cause risks, e.g. by causing connected machines to tip over and injure persons!

- Disconnect all supply lines before transport!

**Risk of tipping!**

There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to IEC 60974-1).

- Set up and transport the machine on level, solid ground.
- Secure add-on parts using suitable equipment.

**Risk of accidents due to incorrectly installed leads!**

Incorrectly installed leads (mains, control and welding leads or intermediate hose packages) can present a tripping hazard.

- Lay the supply lines flat on the floor (avoid loops).
- Avoid laying the leads on passage ways.

**Risk of injury from heated coolant and its connections!**

The coolant used and its connection or connection points can heat up significantly during operation (water-cooled version). When opening the coolant circuit, escaping coolant may cause scalding.

- Open the coolant circuit only when the power source or cooling unit is switched off!
- Wear proper protective equipment (protective gloves)!
- Seal open connections of the hose leads with suitable plugs.



***The units are designed for operation in an upright position!***

***Operation in non-permissible positions can cause equipment damage.***

- ***Only transport and operate in an upright position!***



***Accessory components and the power source itself can be damaged by incorrect connection!***

- ***Only insert and lock accessory components into the relevant connection socket when the machine is switched off.***
- ***Comprehensive descriptions can be found in the operating instructions for the relevant accessory components.***
- ***Accessory components are detected automatically after the power source is switched on.***



***Protective dust caps protect the connection sockets and therefore the machine against dirt and damage.***

- ***The protective dust cap must be fitted if there is no accessory component being operated on that connection.***
- ***The cap must be replaced if faulty or if lost!***

## 3 Intended use

### **WARNING**



#### **Hazards due to improper usage!**

The machine has been constructed to the state of the art and any regulations and standards applicable for use in industry and trade. It may only be used for the welding procedures indicated at the rating plate. Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!

- The equipment must only be used in line with its designated purpose and by trained or expert personnel!
- Do not improperly modify or convert the equipment!

### 3.1 Applications

Arc welding machines for TIG DC welding with lift arc (touch starting) or HF ignition (contactless) and MMA welding as secondary process. It may be possible to expand the functionality by using accessories (see the documentation in the relevant chapter).

### 3.2 Software version

The software version of the machine control can be displayed in the machine configuration menu (menu Srv) > see 5.7 chapter.

### 3.3 Documents which also apply

#### 3.3.1 Warranty

For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at [www.ewm-group.com](http://www.ewm-group.com)!

#### 3.3.2 Declaration of Conformity



This product corresponds in its design and construction to the EU directives listed in the declaration. The product comes with a relevant declaration of conformity in the original.

The manufacturer recommends carrying out the safety inspection according to national and international standards and guidelines every 12 months (from commissioning).

#### 3.3.3 Welding in environments with increased electrical hazards



Power sources with this marking can be used for welding in an environment with increased electrical hazard (e.g. boilers). For this purpose, appropriate national or international regulations must be followed. The power source must not be placed in the danger zone!

#### 3.3.4 Service documents (spare parts and circuit diagrams)

### **WARNING**



#### **No improper repairs and modifications!**

To prevent injuries and damage to the machine, only competent personnel (authorised service personnel) are allowed to repair or modify the machine.

**Unauthorised manipulations will invalidate the warranty!**

- Instruct competent personnel (authorised service personnel) to repair the machine.

Original copies of the circuit diagrams are enclosed with the unit.

Spare parts can be obtained from the relevant authorised dealer.

#### 3.3.5 Calibration/Validation

An original certificate is enclosed with the product. The manufacturer recommends calibration / validation at intervals of 12 months (from commissioning).

### 3.3.6 Part of the complete documentation

This document is part of the complete documentation and valid only in combination with all other parts of these instructions! Read and observe the operating instructions for all system components, especially the safety instructions!

The illustration shows a general example of a welding system.

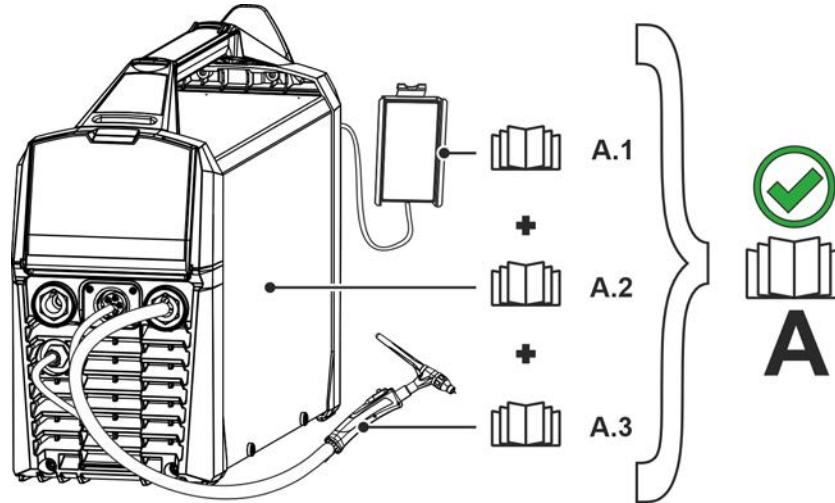


Figure 3-1

Item	Documentation
A.1	Remote control
A.2	Power source
A.3	Welding torch
A	Complete documentation



## 4 Machine description – quick overview

### 4.1 Front view / rear view

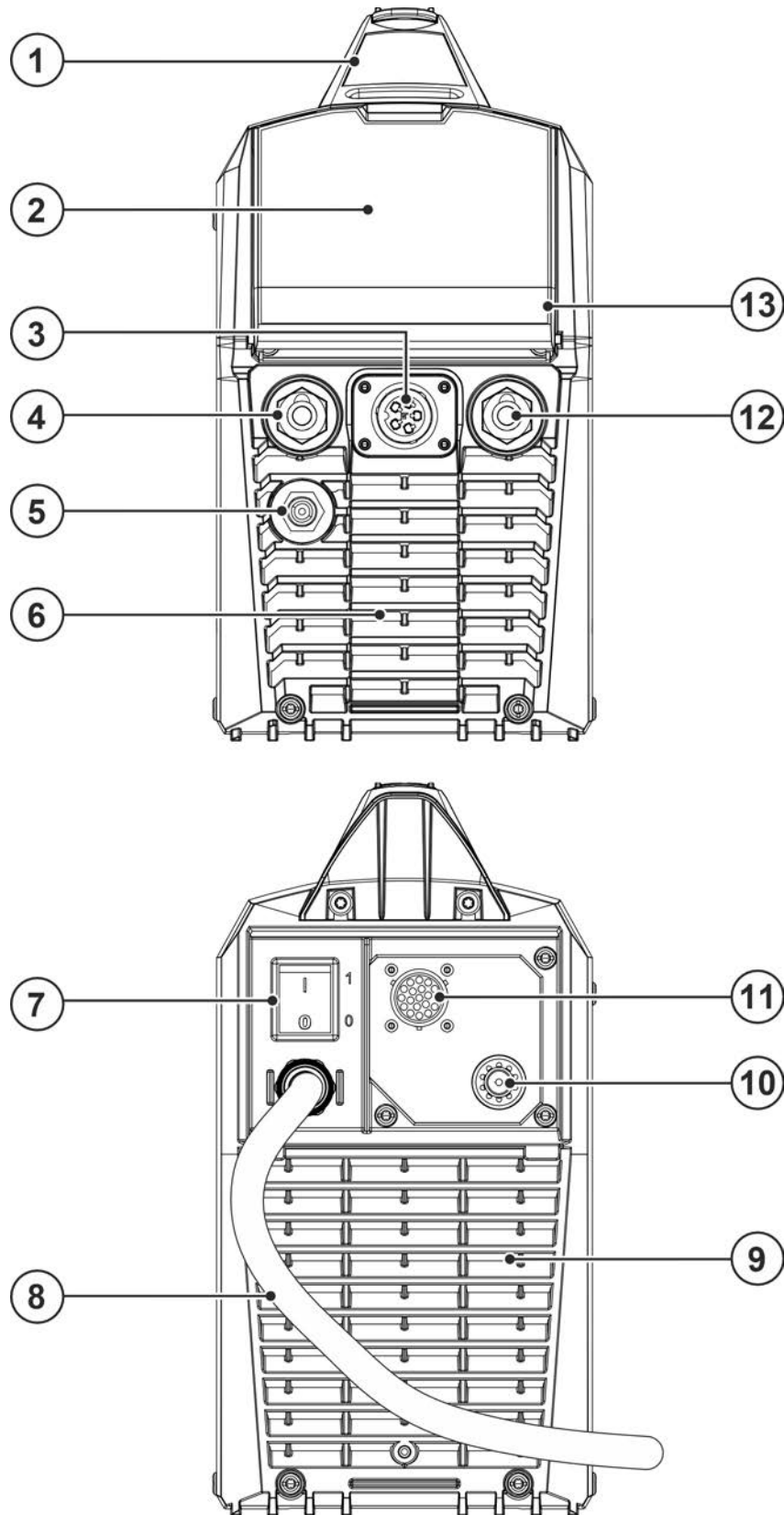








Figure 4-1



Item	Symbol	Description
1		<b>Transport handle with additional integrated functions</b> <ul style="list-style-type: none"> <li>• Wear part compartment &gt; see 5.1.4 chapter</li> <li>• Transport belt &gt; see 5.1.10 chapter</li> </ul>
2		<b>Machine control &gt; see 4.2 chapter</b>
3		<b>Connection socket (welding torch control cable) &gt; see 5.2.1.1 chapter</b>
4		<b>Connection socket, “+” welding current</b> How to connect the accessories depends on the welding procedure. Please observe the connection description for the corresponding welding procedure > see 5 chapter.
5		<b>Connection thread - G¼"</b> Shielding gas connection (outlet)
6		<b>Cooling air outlet</b>
7		<b>Main Switch</b> Switching the machine on or off.
8		<b>Mains connection cable &gt; see 5.1.8 chapter</b>
9		<b>Cooling air inlet</b> Dirt filter optional > see 9 chapter
10		<b>Connection thread - G¼"</b> Shielding gas connection (inlet)
11		<b>Connection socket, 19-pole</b> Remote control connection
12		<b>Connection socket, “-” welding current</b> How to connect the accessories depends on the welding procedure. Please observe the connection description for the corresponding welding procedure > see 5 chapter.
13		<b>Protective cap &gt; see 5.1.9 chapter</b>

## 4.2 Machine control – Operating elements

### 4.2.1 Overview of control sections

For description purposes, the machine control has been divided into two sections (A, B) to ensure maximum clarity. The setting ranges for the parameter values are summarised in the parameter overview section > see 10.1 chapter.



Figure 4-2

Item	Symbol	Description
1		<b>Control section A</b> > see 4.2.1.1 chapter
2		<b>Control section B</b> > see 4.2.1.2 chapter
3		<b>Click wheel</b> <ul style="list-style-type: none"> <li>-----Setting the welding power</li> <li>-----Navigate through menu and parameters</li> <li>-----Setting the parameter values depending on the preselection.</li> </ul>
4		<b>Push-button for operating modes &gt; see 5.2.5 chapter</b> -----Latched -----Non-latched <b>spotArc</b> -----Spot welding procedure spotArc <b>spotmatic</b> -----Spot welding procedure spotmatic
5		<b>Push-button for welding procedure</b> -----TIG-welding -----MMA welding -----MMA Cel welding (characteristics for cellulose electrode)
6		<b>Push-button for shielding gas / lock function</b> <ul style="list-style-type: none"> <li>-----Shielding gas &gt; see 4.2.2.5 chapter</li> <li>-----Lock function &gt; see 5.2.2 chapter</li> </ul>

## 4.2.1.1 Control section A

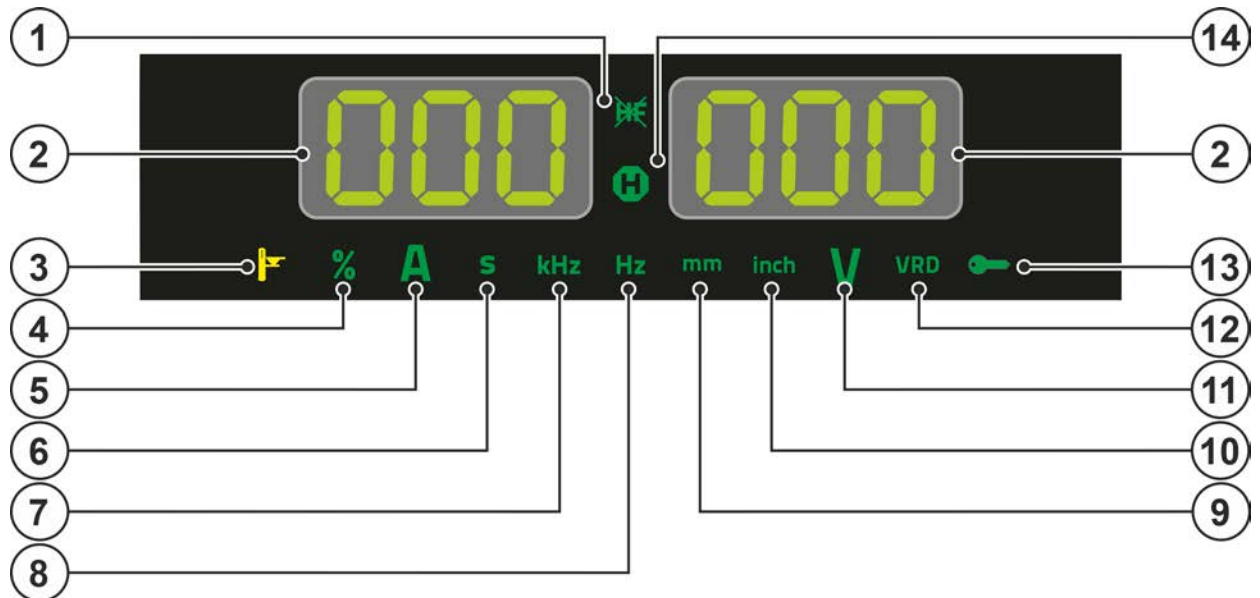


Figure 4-3

Item	Symbol	Description
1		<b>TIG ignition type signal light</b> Signal light on: Lift arc ignition active/HF start off. You can switch the ignition type in the Expert menu (TIG) > see 5.2.4 chapter.
2		<b>Machine display</b> The machine displays primarily show the welding power as a nominal value in terms of current and voltage. Other machine or welding parameters and their values are displayed depending on the current operation > see 10.1 chapter.
3		<b>Excess temperature signal light</b> In case of excess temperature, temperature monitors de-activate the power unit, and the excess temperature control lamp comes on. Once the machine has cooled down, welding can continue without any further measures.
4	%	<b>Signal light - display value in per cent</b>
5	<b>A</b>	<b>Welding current signal light</b> Display of the welding current in amperes.
6	<b>S</b>	<b>Signal light - display value in seconds</b>
7	<b>kHz</b>	<b>Signal light - display value in kilohertz</b>
8	<b>Hz</b>	<b>Signal light - display value in hertz</b>
9	<b>mm</b>	<b>Signal light - display value in millimetres</b>
10	<b>inch</b>	<b>Signal light - display value in inch</b>
11	<b>V</b>	<b>Signal light welding voltage</b> Illuminates when the welding voltage is displayed in volts.
12		<b>Without function in this machine version.</b>
13		<b>Access control active signal light</b> Signal light is on when access control is active on the machine control > see 5.6 chapter.
14		<b>Signal light for status display</b> After each completed welding process, the last values used for welding current and voltage are shown in the displays and the signal light is on.

## 4.2.1.2 Control section B

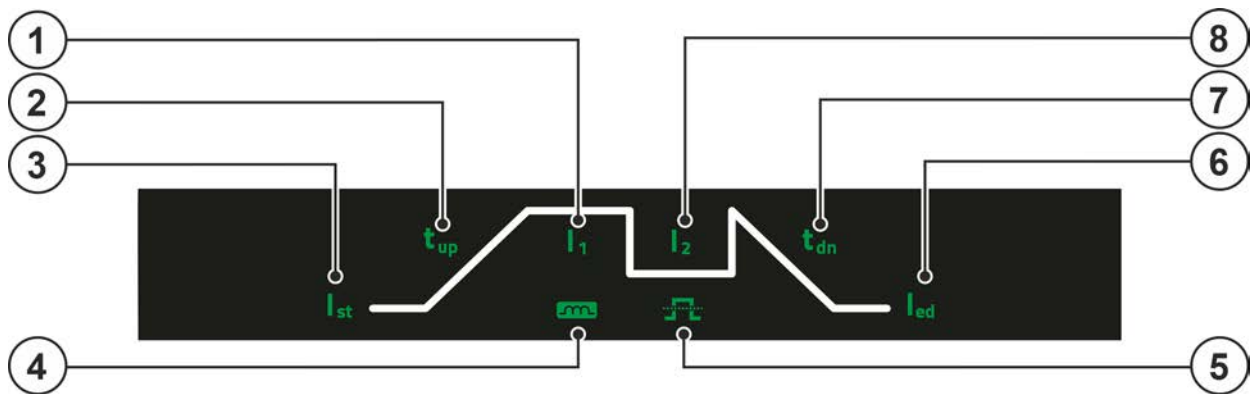


Figure 4-4

Item	Symbol	Description
1	$I_1$	Signal light for main current $I_1$
2	$t_{up}$	Signal light for up-slope time $t_{up}$
3	$I_{st}$	Signal light for start current $I_{st}$
4		Signal light for Arcforce (welding characteristics) > see 5.3.4 chapter
5		Signal light, pulse welding > see 5.2.6 chapter is not on: Function is switched off lights up green: Average value pulsing is activated lights up red: Automatic pulsing is activated
6	$I_{ed}$	Signal light for end current $I_{ed}$
7	$t_{dn}$	Signal light for down-slope time $t_{dn}$
8	$I_2$	Signal light for secondary current $I_2$

## **4.2.2 Operating the machine control**

### **4.2.2.1 Main screen**

After switching on the machine or finishing a setting, the machine control changes to the main screen. This means that the previously selected settings are accepted (if necessary, indicated by signal lights) and the nominal value of the current (A) is shown in the welding data display on the left. The welding data display on the right shows the nominal value for the preselected welding voltage (V). The control changes back to the main screen after 4 s.

### **4.2.2.2 Welding parameter setting in the operation sequence**

Set a welding parameter in the functional sequence by clicking (select) and turning the click wheel (navigate to the desired parameter). Press again to apply the selected parameter as the setting (the parameter value and the corresponding signal light flash). Then turn to set the parameter value.

### **4.2.2.3 Setting advanced welding parameters (Expert menu)**

The Expert menu contains functions and parameters that cannot be set directly on the machine control or for which regular settings are not required. The number and display of these parameters depend on the previously selected welding procedure or functions.



To select, press and hold the click wheel (> 2 s). Select the appropriate parameter / menu item by turning (navigating) and pressing (confirming) the click wheel.

The control changes from the Expert parameters back to the main view if there is no activity (4 s). When a parameter is selected for adjustment, a long press on the click wheel or 30 seconds of inactivity will switch back to the main view.

### **4.2.2.4 Changing basic settings (machine configuration menu)**

The basic welding system functions can be adjusted in the machine configuration menu. Only experienced users should change the settings > see 5.7 chapter.

### **4.2.2.5 Lock function**

The lock function protects against accidental changes to the machine settings and is signalled by the display . All operating elements are disabled when the feature is enabled. The welding process cannot be started when the lock is activated. Press and hold (> 2 s) the push-button  to enable or disable the function.

## 5 Design and function

### ⚠ WARNING



**Risk of injury from electrical voltage!**

**Contact with live parts, e.g. power connections, can be fatal!**

- Observe the safety information on the first pages of the operating instructions!
- Commissioning must be carried out by persons who are specifically trained in handling power sources!
- Connect connection or power cables while the machine is switched off!

Read and observe the documentation to all system and accessory components!

### 5.1 Transport and installation

### ⚠ WARNING



**Risk of accident due to improper transport of machines that must not be lifted!**

**Do not lift or suspend the machine! The machine can drop and cause injuries! The handles, straps or brackets are suitable for transport by hand only!**

- The machine must not be suspended or lifted using a crane.

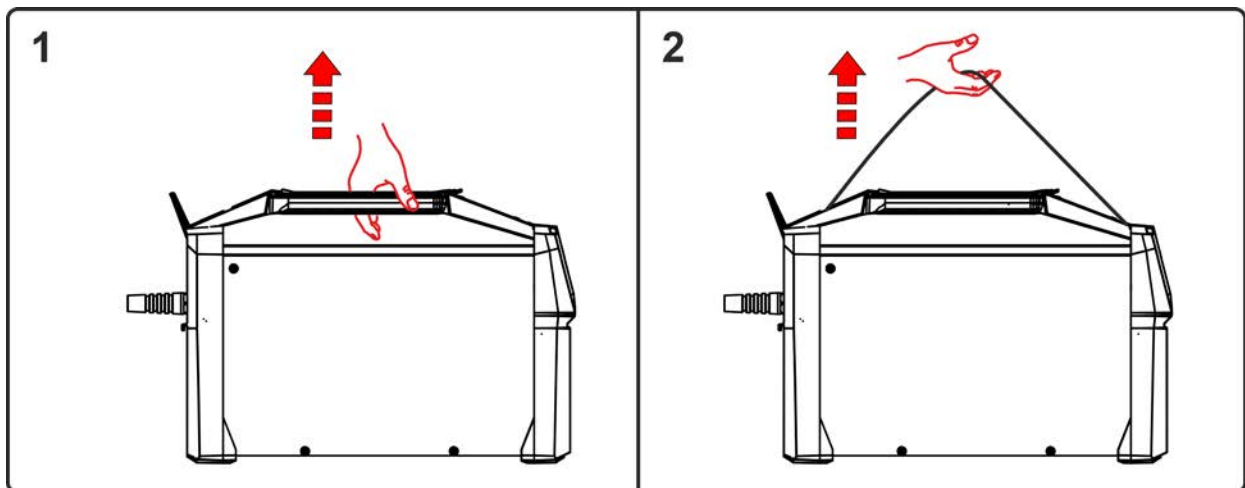




Figure 5-1

The machine can be carried either centrally on the transport handle (1) or using the transport belt (2).

### 5.1.1 Ambient conditions

-  **The machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!**
- **The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.**
  - **Safe operation of the machine must be guaranteed at all times.**

-  **Equipment damage due to contamination!**  
**Unusually high amounts of dust, acids, corrosive gases or substances can damage the machine (observe maintenance intervals > see 6.2 chapter).**
- **Avoid large amounts of smoke, steam, oily fumes, grinding dust and corrosive ambient air!**

#### In operation

Temperature range of the ambient air:

- -25 °C to +40 °C (-13 °F to 104 °F)

Relative humidity:

- up to 50 % at 40 °C (104 °F)
- up to 90 % at 20 °C (68 °F)

#### Transport and storage


Storage in a closed room, temperature range of the ambient air:

- -30 °C to +70 °C (-22 °F to 158 °F)

Relative humidity

- up to 90 % at 20 °C (68 °F)

### 5.1.2 Machine cooling

-  **Insufficient ventilation results in a reduction in performance and equipment damage.**
- **Observe the ambient conditions!**
  - **Keep the cooling air inlet and outlet clear!**
  - **Observe the minimum distance of 0.5 m from obstacles!**

### 5.1.3 Workpiece lead, general

#### CAUTION



**Risk of burning due to incorrect welding current connection!**

**If the welding current plugs (machine connections) are not locked or if the workpiece connection is contaminated (paint, corrosion), these connections and leads can heat up and cause burns when touched!**

- Check welding current connections on a daily basis and lock by turning to the right when necessary.
- Clean workpiece connection thoroughly and secure properly. Do not use structural parts of the workpiece as welding current return lead!

## 5.1.4 Transport belt

### 5.1.4.1 Adjusting the length of the carrying strap

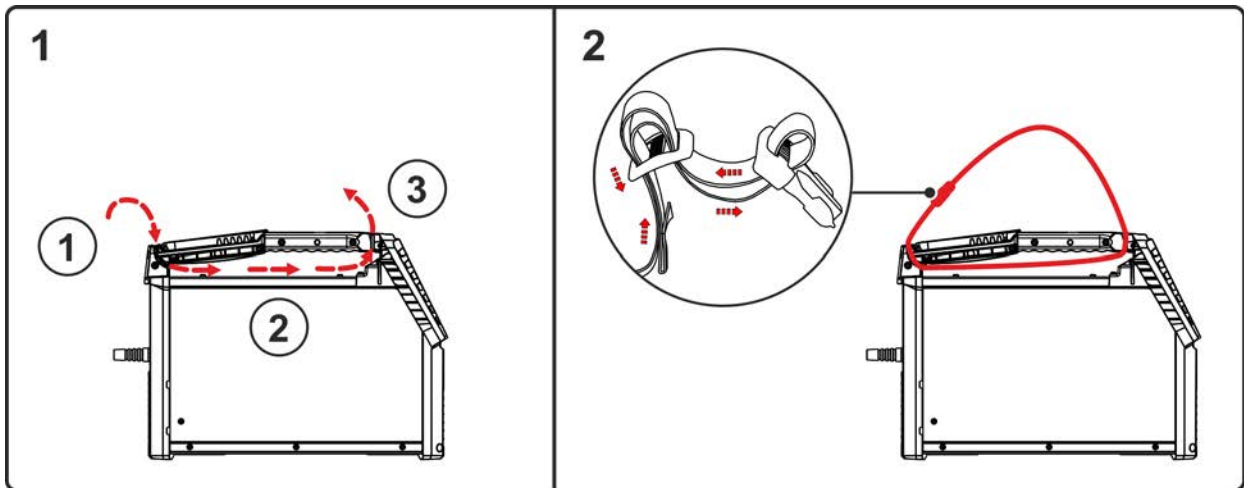


Figure 5-2

## 5.1.5 Dirt filter

**These accessory components can be retrofitted as an option > see 9 chapter.**

When using a dirt filter, the cooling air throughput is reduced and the duty cycle of the machine is reduced as a result. The duty cycle decreases with the increasing contamination of the filter. The dirt filter must be removed at regular intervals and cleaned by blowing out with compressed air (depending on the level of soiling).

## 5.1.6 Notes on the installation of welding current leads

- Incorrectly installed welding current leads can cause faults in the arc (flickering).
- Lay the workpiece lead and hose package of power sources without HF igniter (MIG/MAG) for as long and as close as possible in parallel.
- Lay the workpiece lead and hose package of power sources with HF igniter (TIG) for as long as possible in parallel with a distance of 20 cm to avoid HF sparkover.
- Always keep a distance of at least 20 cm to leads of other power sources to avoid interferences
- Always keep leads as short as possible! For optimum welding results max. 30 m (welding lead + intermediate hose package + torch lead).

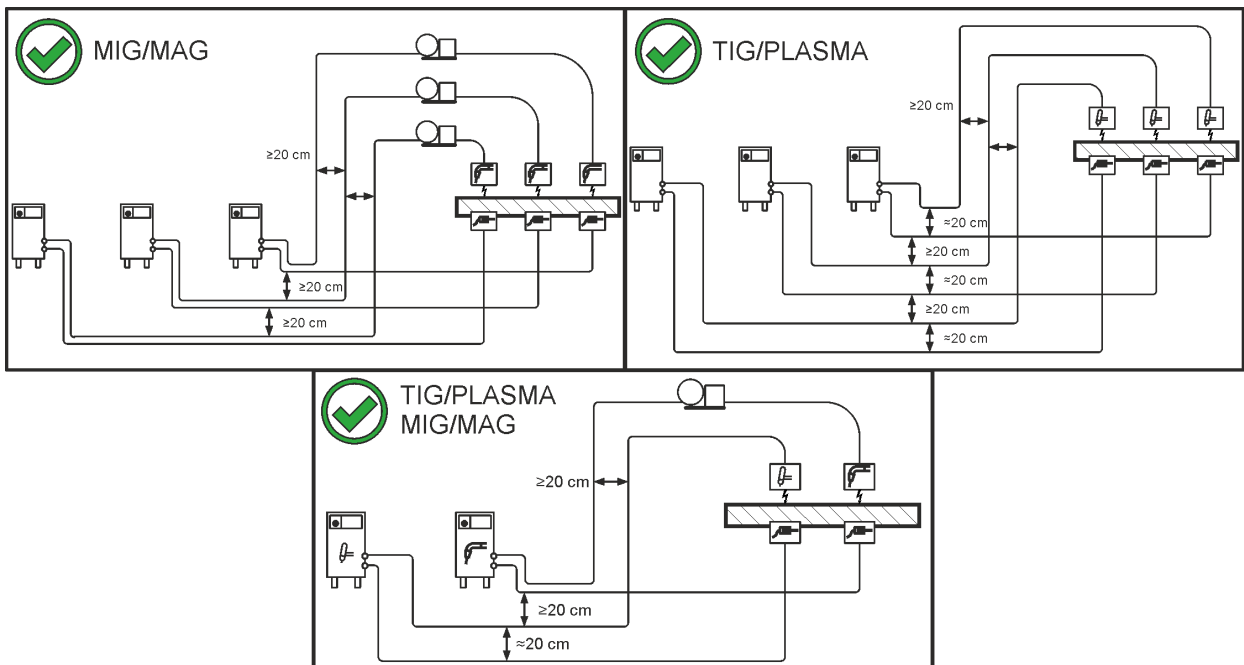


Figure 5-3



- Use an individual welding lead to the workpiece for each welding machine!

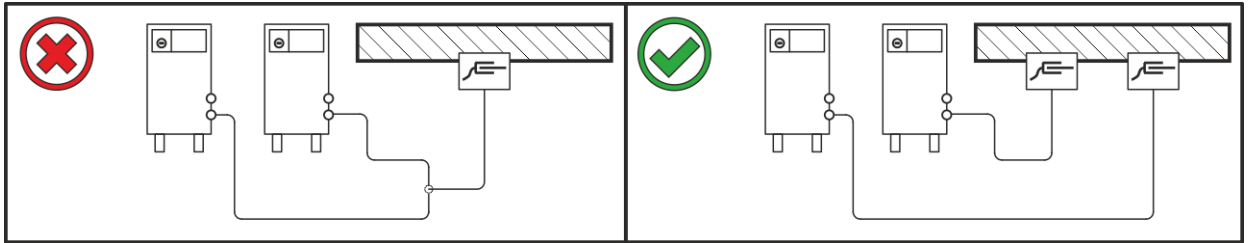


Figure 5-4

- Fully unroll welding current leads, torch hose packages and intermediate hose packages. Avoid loops!
- Always keep leads as short as possible!

**Lay any excess cable lengths in meanders.**

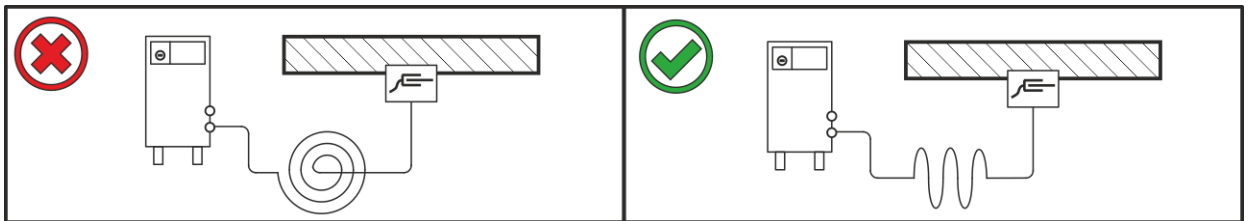


Figure 5-5

## 5.1.7 Stray welding currents

### **WARNING**



**Risk of injury due to stray welding currents!**

**Stray welding currents can destroy protective earth conductors, damage machines and electronic devices and cause overheating of components, leading to fire.**

- Check that all welding current connections are firmly secured and electrical connections are in perfect condition.
- Set up, attach or suspend all conductive power source components such as casing, transport vehicles and crane frames so they are insulated.
- Do not place any other electronic devices such as drills or angle grinders on the power source, transport vehicle or crane frames unless they are insulated.
- Always put welding torches and electrode holders on an insulated surface when they are not in use.

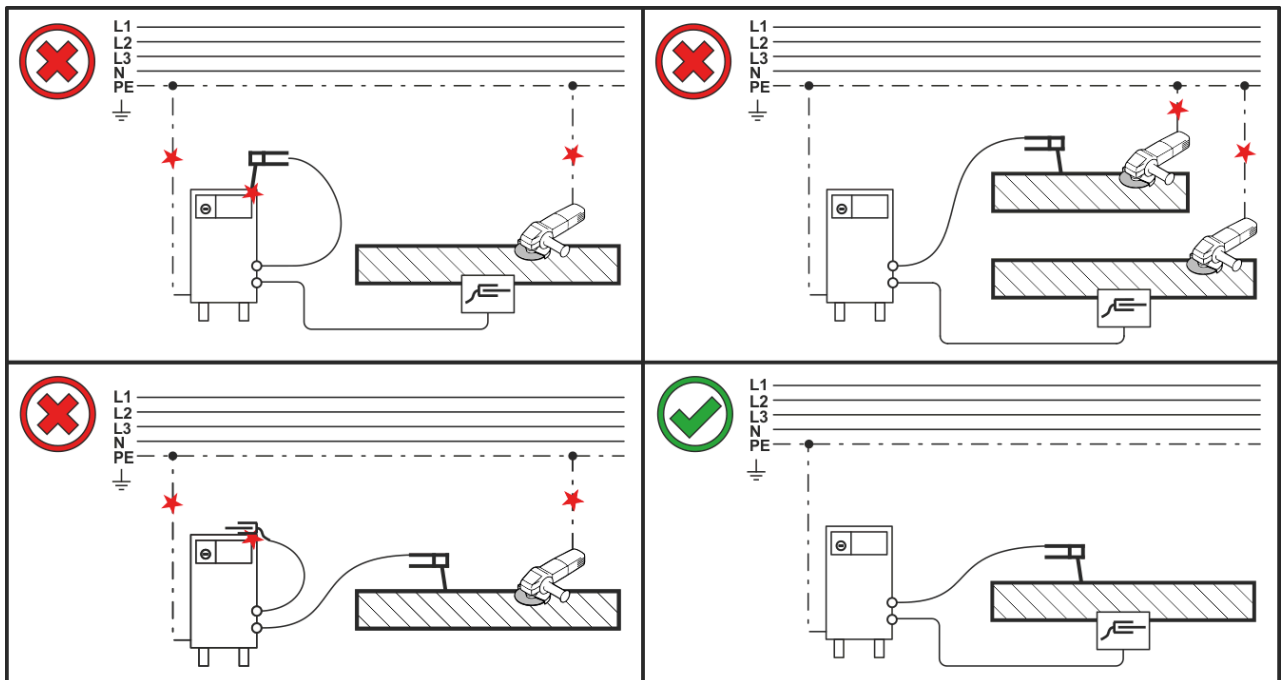


Figure 5-6

## 5.1.8 Mains connection

### DANGER



#### Hazards caused by improper mains connection!

#### An improper mains connection can cause injuries or damage property!

- The connection (mains plug or cable), the repair or voltage adjustment of the device must be carried out by a qualified electrician in accordance with the respective local laws or national regulations!
- The mains voltage indicated on the rating plate must match the supply voltage.
- Only operate machine using a socket that has correctly fitted protective earth.
- Mains plug, socket and lead must be checked by a qualified electrician on a regular basis!
- When operating the generator, always ensure it is earthed as stipulated in the operating instructions. The network created must be suitable for operating machines according to protection class I.

### 5.1.8.1 Mains configuration



*The machine may only be connected to a one-phase system with two conductors and an earthed neutral conductor.*

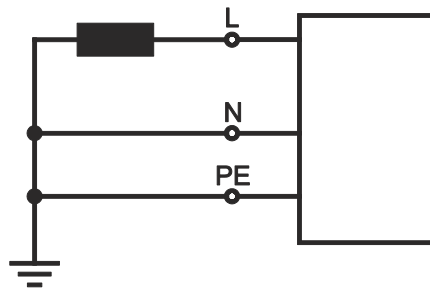


Figure 5-7

#### Legend

Item	Designation	Colour code
L	Outer conductor	brown
N	Neutral conductor	blue
PE	Protective conductor	green-yellow

- Insert mains plug of the switched-off machine into the appropriate socket.

## 5.1.9 Protective flap, welding machine control

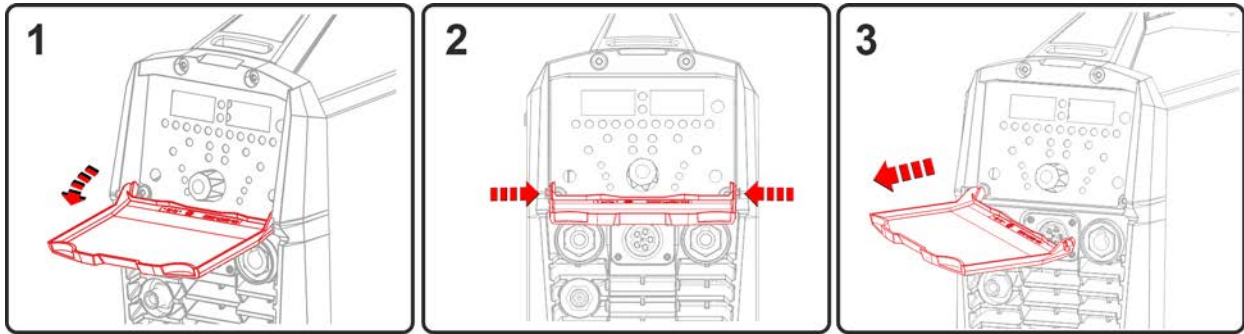


Figure 5-8

- Open the protective cap.
- Apply slight pressure to the left and/or right connecting bridge (illustration) until the protective cap can be removed.

## 5.1.10 Wear part compartment

The transport handles in this machine series have a wear part compartment for stowing typical wear parts, such as gas nozzles and electrodes. The compartment closes with a transparent plastic flap.

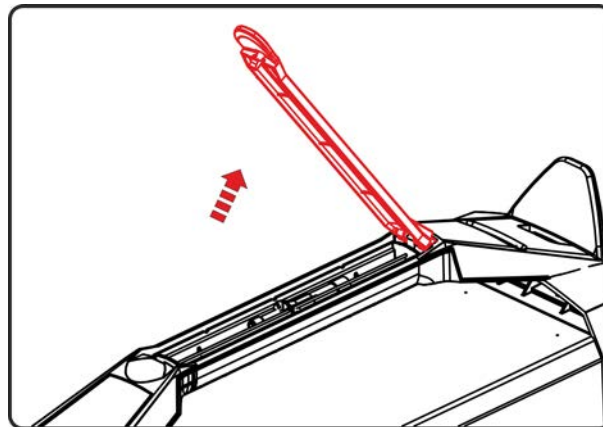


Figure 5-9

## 5.2 TIG welding

### 5.2.1 Welding torch and workpiece line connection

Prepare welding torch according to the welding task in hand (see operating instructions for the torch).

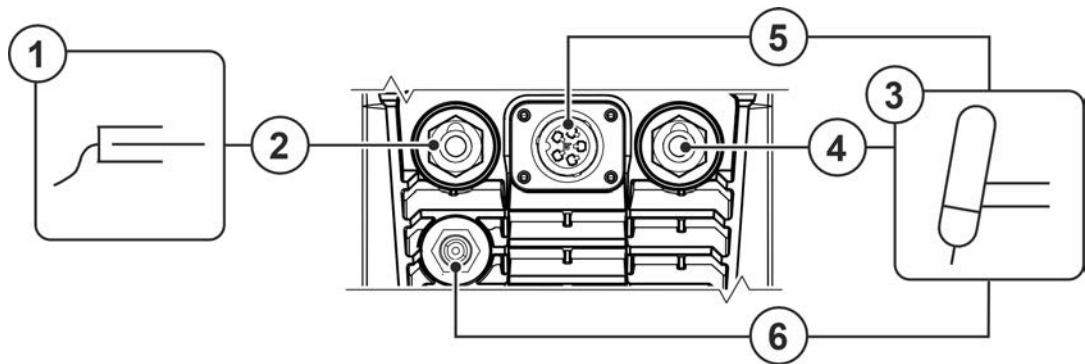


Figure 5-10

Item	Symbol	Description
1		<b>Workpiece</b>
2		<b>Connection socket for "+" welding current</b> Workpiece lead connection
3		<b>Welding torch</b>
4		<b>"-" Welding current connection socket</b> TIG welding torch welding current lead connection
5		<b>Welding torch control cable &gt; see 5.2.1.1 chapter</b>
6		<b>Shielding gas hose</b>

- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.
- Insert the welding current plug on the welding torch into the welding current connection socket and lock by turning to the right.
- Remove yellow protective cap on G $\frac{1}{4}$ " connecting nipple.
- Screw welding torch shielding gas connection tightly onto the G $\frac{1}{4}$ " connection nipple.
- Plug the welding torch control cable plug into the welding torch control cable connection socket and secure.

#### 5.2.1.1 Control lead connection

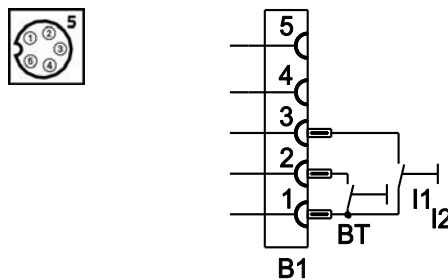


Figure 5-11

## 5.2.2 Shielding gas supply (shielding gas cylinder for welding machine)

### ⚠ WARNING



**Risk of injury due to improper handling of shielding gas cylinders!**

**Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!**

- Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
- Do not attach any element to the shielding gas cylinder valve!
- Prevent the shielding gas cylinder from heating up.



**An unhindered shielding gas supply from the shielding gas cylinder to the welding torch is a fundamental requirement for optimum welding results. In addition, a blocked shielding gas supply may result in the welding torch being destroyed.**

- **Always re-fit the yellow protective cap when not using the shielding gas connection.**
- **All shielding gas connections must be gas tight.**

### 5.2.2.1 Pressure regulator connection

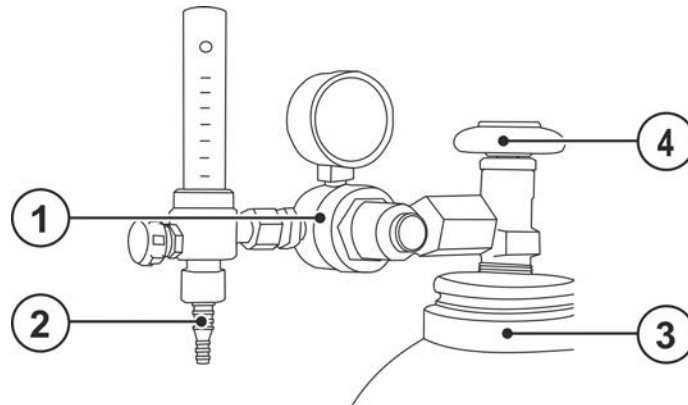


Figure 5-12

Item	Symbol	Description
1		Pressure regulator
2		Output side of the pressure regulator
3		Shielding gas cylinder
4		Cylinder valve

- Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to blow out any dirt.
- Tighten the pressure regulator screw connection on the gas bottle valve to be gas-tight.
- Screw the gas hose connection to the outlet side of the pressure regulator gas-tight.

## 5.2.2.2 Shielding gas hose connection

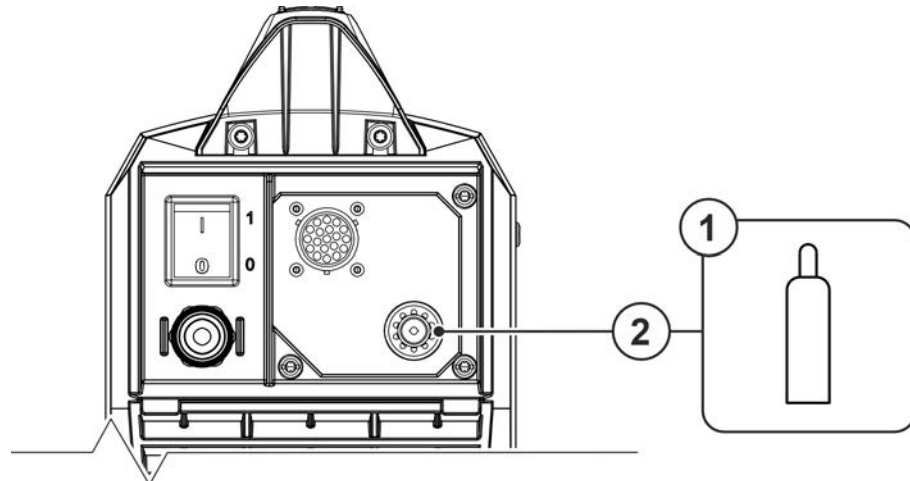


Figure 5-13

Item	Symbol	Description
1		Shielding gas cylinder
2		Connection thread - G $\frac{1}{4}$ " Shielding gas connection (inlet)

- Screw the gas hose connection nipple onto the G $\frac{1}{4}$ " connection nipple.

## 5.2.2.3 Setting the shielding gas volume (gas test)/rinse hose package

- Slowly open the gas cylinder valve.
- Open the pressure regulator.
- Switch on the power source at the main switch.
- Set the relevant gas quantity for the application on the pressure regulator.
- The gas test can be activated at the machine control by pressing the Gas test push-button > see 4.2 chapter.

Setting the shielding gas quantity (gas test)

- Shielding gas flows for 20 s or until the push-button is pressed again.

If the shielding gas setting is too low or too high, this can introduce air to the weld pool and may cause pores to form. Adjust the shielding gas quantity to suit the welding task!

**Setting instructions: The gas nozzle diameter in mm corresponds to the gas flow in l/min.**

**Helium-rich gas mixtures require a higher gas volume!**

The table below can be used to correct the gas volume calculated where necessary:

Shielding gas	Factor
75% Ar/25% He	1.14
50% Ar/50% He	1.35
25% Ar/75% He	1.75
100% He	3.16

## 5.2.2.4 Automatic gas post-flow

When the function is enabled, the machine control adjusts the gas post-flow time depending on the output. The adjustable gas post-flow time relates to the maximum possible current of the power source and decreases linearly.

The automatic gas post-flow function can be enabled or disabled in the machine configuration menu > see 5.7 chapter. With the function enabled, the parameters and for automatic are displayed alternately when the gas post-flow time is selected.

## 5.2.3 Setting welding procedure

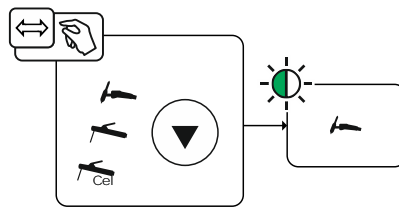


Figure 5-14

Setting the tungsten electrode diameter  $\overline{ndA}$  presets the ignition energy and minimum current limit optimally. Smaller electrode diameters require less ignition energy than larger electrode diameters.

With the selection of the electrode diameter, a minimum current limit is set that in turn affects the start, main and secondary currents. Minimum current limits prevent an unstable arc at low currents. If necessary, the minimum current limits can be disabled with the parameter  $\overline{ELI}$  in the machine configuration menu > see 5.7 chapter. When using a foot-operated remote control, the minimum current limits are disabled by default.

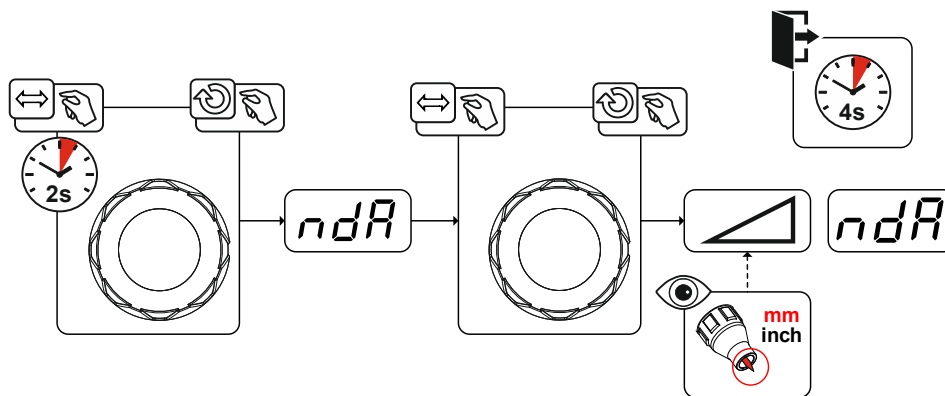


Figure 5-15



## 5.2.4 Arc ignition

### 5.2.4.1 HF ignition

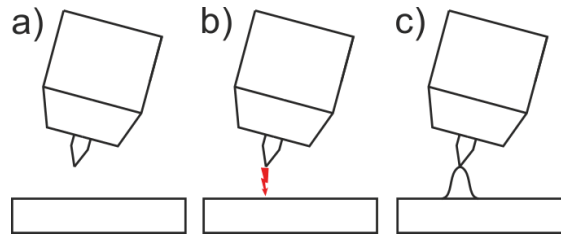


Figure 5-16

The arc is started without contact using high-voltage ignition pulses:

- Position the welding torch in the welding position above the workpiece (distance between the electrode tip and the workpiece approx. 2-3 mm).
- Press the torch trigger (high-voltage ignition pulses start the arc).
- Depending on the selected operating mode, the welding current flows with the set start or main current.

Ending the welding process: Release the torch trigger or press and release depending on the selected operating mode.

### 5.2.4.2 Liftarc

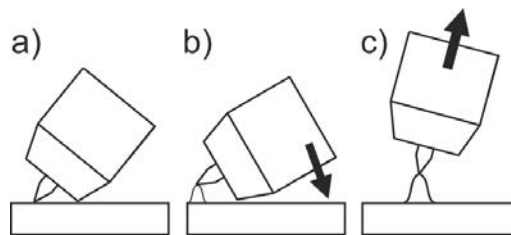


Figure 5-17

The arc is ignited on contact with the workpiece:

- Carefully place the torch gas nozzle and tungsten electrode tip onto the workpiece and press the torch trigger (liftarc current flowing, regardless of the main current set).
- Incline the torch over the torch gas nozzle to produce a gap of approx. 2-3 mm between the electrode tip and the workpiece. The arc ignites and the welding current is increased, depending on the operating mode set, to the ignition or main current set.
- Lift off the torch and swivel to the normal position.

Ending the welding process: Release or press the torch trigger depending on the operating mode selected.



### 5.2.4.3 Automatic cut-out

The automatic cut-out triggered by two states ends the welding process after the error times have elapsed:

- During ignition  
3 s after the start of the welding process, no welding current flows (ignition error).
- During welding  
The arc is interrupted for more than 5 s (arc interruption). You can disable or set the time for re-ignition after an arc interruption in the machine configuration menu > see 5.7 chapter (parameter  $\overline{I_{ER}}$ ).

## 5.2.5 Operating modes (functional sequences)

### 5.2.5.1 Explanation of symbols

Symbol	Meaning
	Press torch trigger 1
	Release torch trigger 1
I	Current
t	Time
$\overline{GPr}$	Gas pre-flow
$\overline{I_{St}}$	Start current
$\overline{t_{St}}$	Start time
$\overline{t_{UP}}$	Up-slope time
$\overline{t_P}$	Spot time
$\overline{I_1}$	Main current (minimum to maximum current)
$\overline{I_2}$	Secondary current
$\overline{I_{PL}}$	Pulse current (average value pulsing)
$\overline{B_{RL}}$	Balance (average value pulsing)
$\overline{FrE}$	Frequency (average value pulsing)
$\overline{t_{S1}}$	Slope time from main current to secondary current
$\overline{t_{S2}}$	Slope time from secondary current to main current
$\overline{t_{dn}}$	Down-slope time
$\overline{I_{Ed}}$	End current
$\overline{t_{Ed}}$	End current time
$\overline{GPE}$	Gas post-flow

## 5.2.5.2 Non-latched mode Sequence

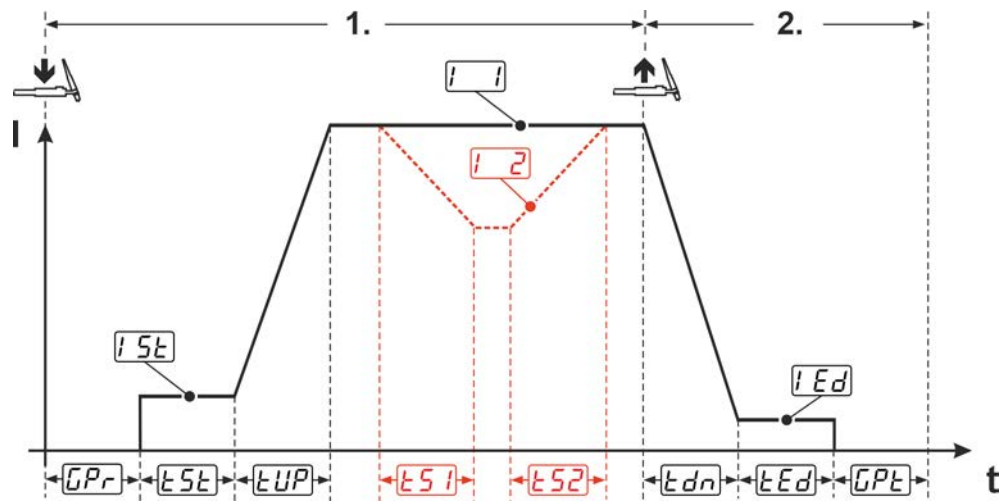


Figure 5-18

### 1st cycle:

- Press and hold torch trigger 1.
- The gas pre-flow time  $GPr$  expires (shielding gas flows).
- The arc is ignited (HF ignition).
- The start current  $ISt$  flows for the start time  $tSt$ .
- The welding current increases in the up-slope time  $tUp$  to the main current  $I1$ .

### 2nd cycle:

- Release torch trigger 1.
- The main current  $I1$  drops during the down-slope time  $tdn$  to the end current  $IEd$ .  
When the 1st torch trigger is pressed during the down-slope time  $tdn$ , the current increases again to the main current  $I1$ .
- The end current  $IEd$  flows for the end current time  $tEd$ .
- The arc extinguishes.
- The gas post-flow time  $GPE$  expires (the shielding gas is shut down).

### Secondary current $I2$

In each current phase, you can switch to the secondary current  $I2$  using the slope times  $tS1$  and  $tS2$ . The slope times can be set in the Expert menu > see 5.2.9 chapter.

Two options for switching to secondary current:

- Hold torch trigger 2.
- Tap the torch trigger 1 (only during the down-slope and end current phase with the tap end function switched off  $tPE$ ).

## 5.2.5.3 Latched mode

### Sequence

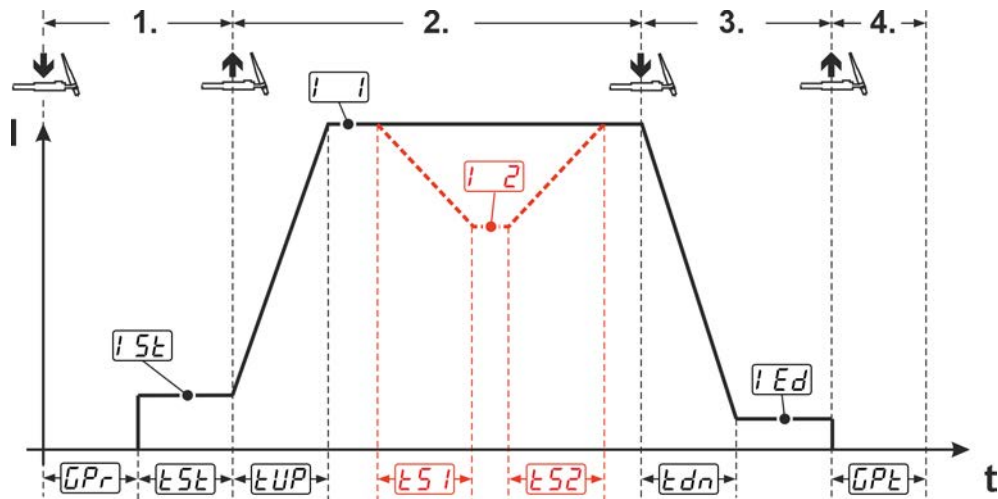


Figure 5-19

#### 1st cycle

- Press the torch trigger 1
- The gas pre-flow time  $GPr$  expires (shielding gas flows).
- The arc is ignited (HF ignition).
- The start current  $iSt$  flows as long as the torch trigger is held, but at least for the start time  $tSt$ .

#### 2nd cycle

- Release torch trigger 1.
- The welding current increases in the up-slope time  $tUp$  to the main current  $i1$ .

#### 3rd cycle

- Press torch trigger 1.
- The main current  $i1$  drops during the down-slope time  $tDn$  to the end current  $iEd$ .

#### 4th cycle

- Release torch trigger 1.
- The arc extinguishes.
- The gas post-flow time  $GPE$  expires (the shielding gas is shut down).

#### Secondary current $i2$

In each current phase, you can switch to the secondary current  $i2$  using the slope times  $tS1$  and  $tS2$ . The slope times can be set in the Expert menu > see 5.2.9 chapter.

Two options for switching to secondary current:

- Hold torch trigger 2.
- Tap torch trigger 1.

#### Alternative welding start (tap start):

The tap start function  $tPS$  must be switched on before using it. With the alternative welding start, the duration of the first and second cycle is only specified by the set process times (tapping the torch trigger in the gas pre-low phase  $GPr$ ).

#### Alternative welding end (tap end):

With the alternative welding end, the duration of the third and fourth cycles is only specified by the set process times (tapping the torch trigger in the main current phase).

The tap end function  $tPE$  must be switched on before using it (this disables tapping on the secondary current).

## 5.2.5.4 spotArc

This process is suitable for tack welding or joint welding of metal sheets made from steel and CrNi alloys up to a thickness of approximately 2.5 mm. Metal sheets of different thicknesses can also be welded on top of one another. As this is a one-sided process, it is also possible to weld metal sheets onto tubular sections such as round or square pipes. In arc spot welding, the arc melts through the upper metal sheet and the lower metal sheet is melted onto it. This produces flat, fine-textured welding tacks which require little or no post weld work, even in visible areas.

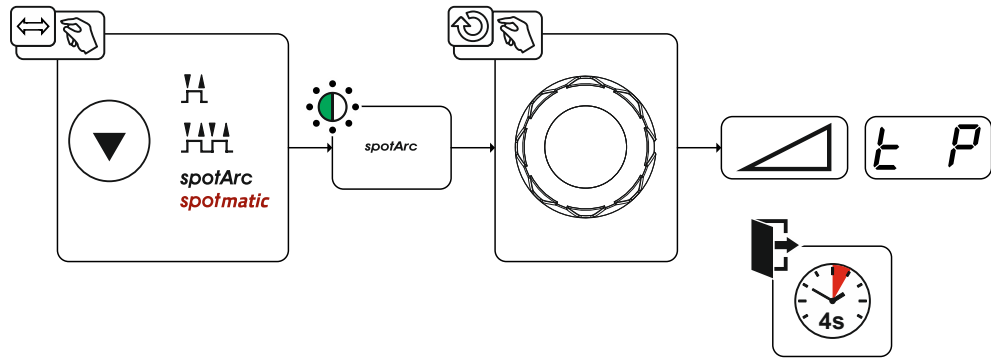


Figure 5-20

With the spotArc function enabled, automated pulsing is activated as well. If required, pulse welding can also be deactivated using the parameter  $PUL$  or switched between the pulse variants average value pulsing or automated pulsing.

**To achieve an effective result, the slope times  $t_{UP}$  and  $t_{dn}$  are deactivated after the function spotArc has been activated. If required, the slope times can also be activated and displayed using the parameter  $SLo$  in this operating mode.**

Example display with factory settings of the parameters:

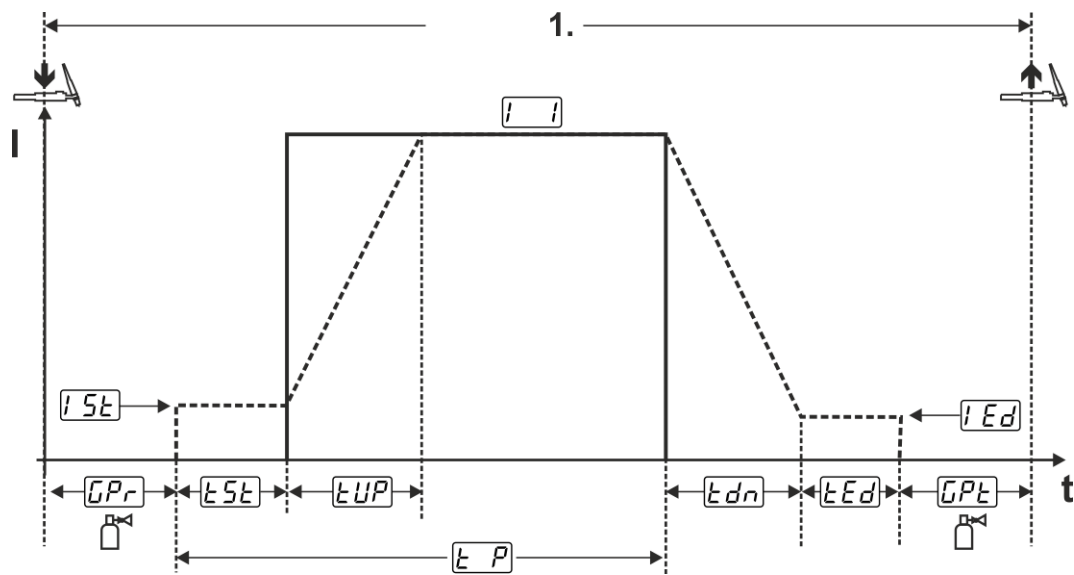


Figure 5-21

### Procedure:

- Press and hold the torch trigger.
- The gas pre-flow time elapses.
- The HF ignition pulses jump from the electrode to the workpiece. The arc ignites.
- HF switches off.
- The welding current flows and immediately assumes the value of the start current  $I_{SE}$ .
- The start current  $I_{SE}$  flows for the ignition current time  $t_{SE}$ .
- The welding current ramps up to the main current  $t_{UP}$  within the set up-slope time  $t_{UP}$ .
- The process ends when the set spotArc time  $t_P$  expires or by releasing the torch trigger prematurely.

## 5.2.5.5 spotmatic

In contrast to the spotArc operating mode, the arc is not started by pressing the torch trigger as in the conventional method, but by briefly placing the tungsten electrode  $\overline{5P7}$  on the workpiece. The torch trigger is used to enable the welding process. The activation is indicated by flashing of the spotArc®/spotmatic signal light. The separate process activation  $\overline{55P}$  and the short setting range  $\overline{5E5}$  of the spot time  $\overline{EP}$  are activated by default with spotmatic.

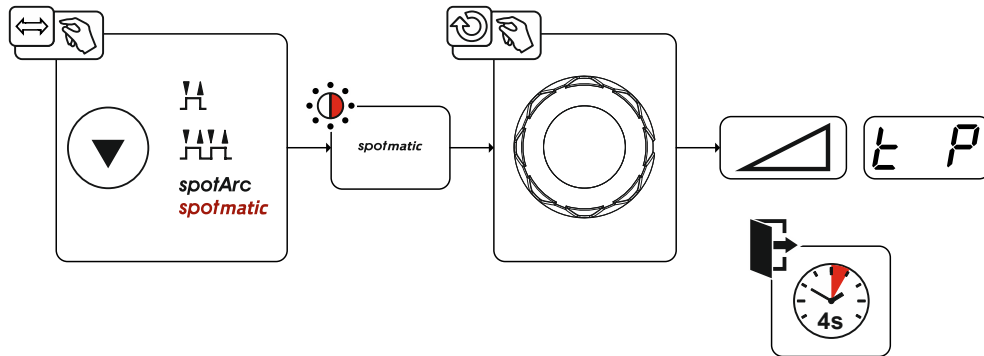


Figure 5-22

Example display with factory settings of the parameters:

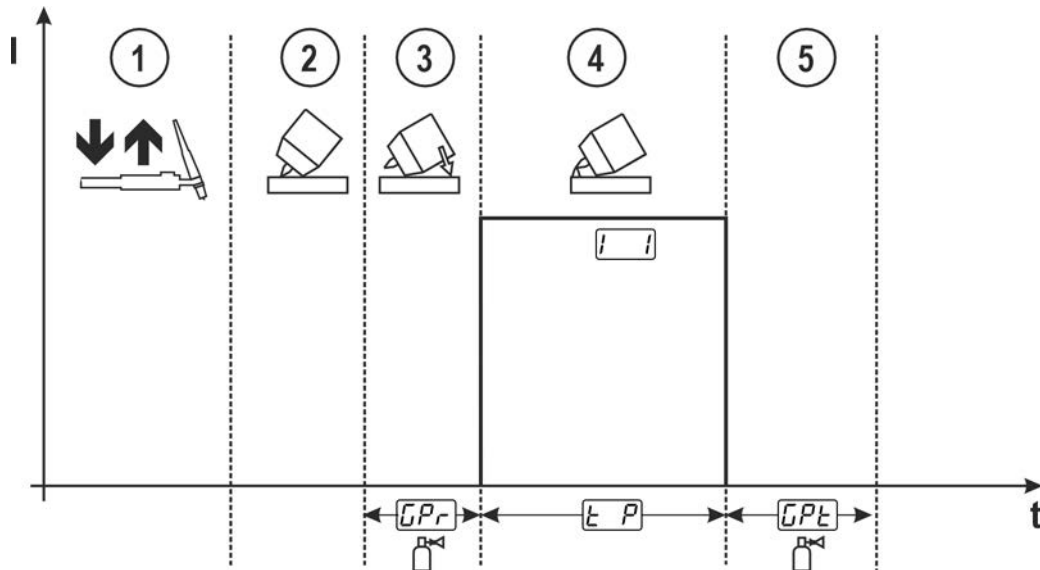


Figure 5-23

- ① Tap the torch trigger to activate the welding process.
- ② Place the torch gas nozzle and tungsten electrode tip carefully on the workpiece.
- ③ Incline the welding torch over the torch gas nozzle until there is a gap of approx. 2-3 mm between the electrode tip and the workpiece. Shielding gas flows with the set gas pre-flow time  $\overline{GPr}$ . The arc ignites and the previously set main current  $\overline{I}$  flows.
- ④ The main current phase  $\overline{I}$  ends when the set spot time  $\overline{EP}$  elapses.
- ⑤ The gas post-flow time  $\overline{GPE}$  elapses and the welding process ends.

## 5.2.6 Pulse welding

### 5.2.6.1 Average value pulse welding

A special feature with average value pulses is that the power source will always maintain the preset average value. This makes this method especially suitable for welding according to welding procedure specifications.

For average value pulsing ( $\overline{AUG}$ ), switching takes place periodically between two currents whereby an average current value ( $\overline{i}$ ), a pulse current ( $i_{PL}$ ), pulse balance ( $b_{RL}$ ) and pulse frequency ( $F_{rE}$ ) must be specified. The set average current value in amperes is decisive. The pulse current is specified as a percentage of the average value current.

The pulse pause current (IPP) is not set. This value is calculated by the machine control to ensure that the average value of the welding current is maintained.

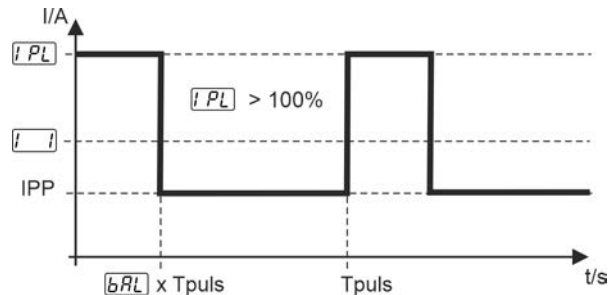


Figure 5-24

### Setting the pulse current, pulse frequency and pulse balance

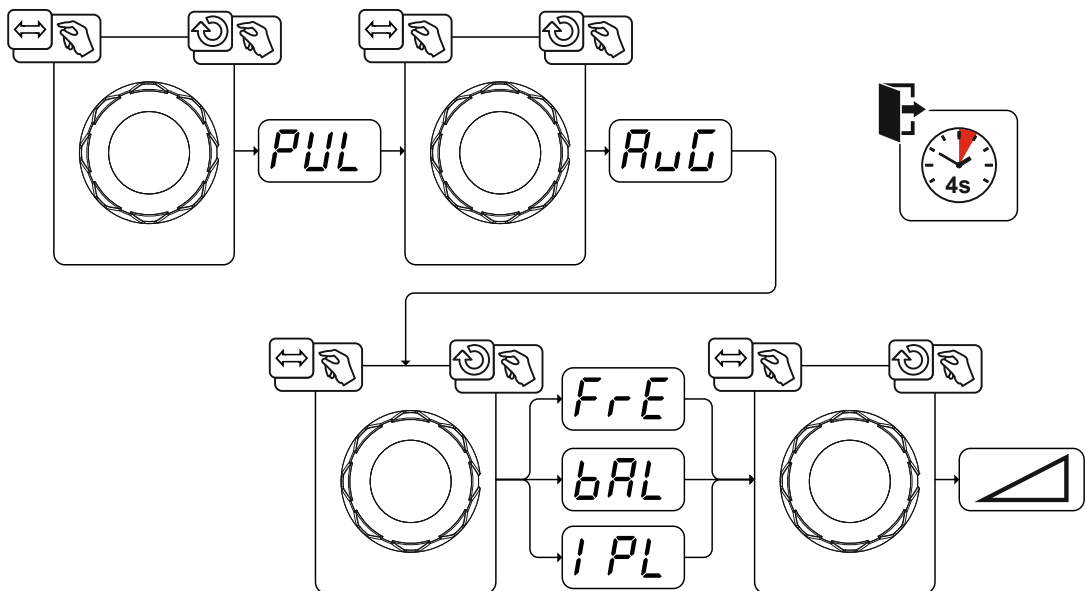


Figure 5-25

### 5.2.6.2 Automated pulses

The current-dependent pulse frequency and balance create vibrations in the weld pool that have a positive effect on the gap bridging. The machine control specifies the required pulse parameters automatically.

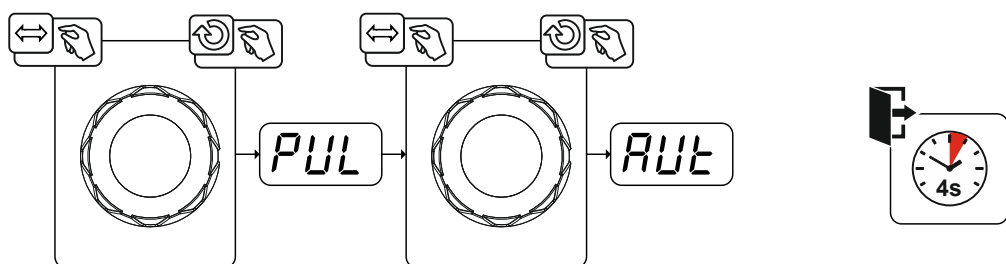


Figure 5-26

## 5.2.7 Welding torch (operating variants)

### 5.2.7.1 Welding torch mode

The operating elements (torch triggers or rockers) and their function can be individually adjusted using different torch modes. Up to four modes are available to the user. The tables for the corresponding torch types describe the functional options.

**Explanation of symbols for welding torch:**

Symbol	Description
	Press torch trigger
	Tap torch trigger
	Tap torch trigger and then press
<b>BRT 1, 2</b>	Torch trigger 1 or 2
<b>UP</b>	Torch trigger UP - increase the value
<b>DOWN</b>	Torch trigger DOWN - decrease the value

The torch modes are set using the torch configuration parameters " $\overline{[t.r.d]}$ " in the machine configuration menu > torch mode " $\overline{[t.r.d]}$ " > see 5.7 chapter.

**Only the modes listed are suitable for the corresponding torch types.**

#### Welding torch with one torch trigger

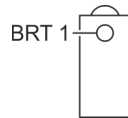


Figure 5-27

Function	Operation	Mode
Welding current On / Off	BRT 1	1
Secondary current		

#### Welding torch with two torch triggers or rocker

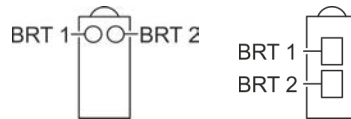


Figure 5-28

Function	Operation	Mode
Welding current On / Off	BRT 1	1
Secondary current		
Secondary current		
Secondary current	BRT 2	
Welding current On / Off	BRT 1 + 2	2
Secondary current		
Increase welding current (up/down speed)	BRT 1	
Decrease welding current (up/down speed)	BRT 2	
Welding current On / Off	BRT 1	3
Secondary current		
Increase welding current (up/down speed)	BRT 2	
Decrease welding current (up/down speed)		



## TIG function torch, Retox XQ

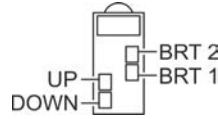


Figure 5-29

Function	Operation	Mode	
Welding current On / Off	BRT 1	1	
Secondary current			↓
Secondary current	BRT 2	1	
Increase welding current (up/down speed)	UP		↓
Decrease welding current (up/down speed)	DOWN		↓
Welding current On / Off	BRT 1		4
Secondary current		↓	
Secondary current	BRT 2	4	
Increase welding current in steps (current jump)	UP		↓
Decrease welding current in steps (current jump)	DOWN		↓

### 5.2.7.2 Tapping function (tap torch trigger)

Tapping function: Swiftly tap the torch trigger to change the function. The set torch mode determines the operating mode.

The tapping function can be selected separately for each torch mode for the start of welding with parameter  $[LPS]$  and for the end of welding with parameter  $[LPE]$ . If parameter  $[LPE]$  is activated, there is no need to tap the secondary current.

### 5.2.7.3 Up/down speed

#### Functionality

Press and hold the up push-button:

Increase current up to the maximum value (main current) set in the power source.

Press and hold the down push-button:

Decrease current to the minimum value.

Use the machine configuration menu > see 5.7 chapter to set the up/down speed parameter  $[UUD]$  which determines the speed with which a current change becomes effective.

### 5.2.7.4 Current jump

By tapping the corresponding torch trigger the welding current can be determined in an adjustable jump range. Each tap will cause the welding current to jump up or down by the defined value.

The “current jump” parameter  $[DJ]$  is set in the machine configuration menu > see 5.7 chapter.

## 5.2.8 RTF 1 foot-operated remote control

The remote control allows the continuous adjustment of the welding current (0% to 100%) depending on the preselected main current  $[I]$  on the welding machine.

Further individual parameter settings affect the remote control behaviour:

- Switching between linear and logarithmic responses  $[FRk]$ .
- Start program  $[SFR]$  to optimise the arc stability.
- Start/stop operation  $[Ftk]$  to start and end the welding process without setting the current using the remote control.

## 5.2.8.1 Response

This function controls the responsiveness of the welding current during the main current phase. The user can choose between linear and logarithmic responsiveness. The logarithmic setting is particularly suitable for welding with low current, e.g., for thin panels as the logarithmic responsiveness enables better control of the welding current.

The responsiveness function can be switched in the machine configuration menu between the parameters for linear and logarithmic responsiveness (factory set) > see 5.7 chapter.

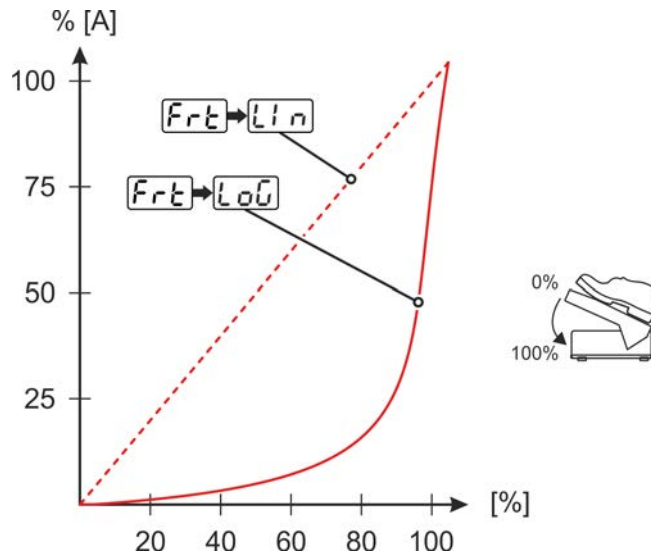


Figure 5-30

## 5.2.8.2 Start program

The start program “ $SFr$ ” can be enabled or disabled in the machine configuration menu > see 5.7 chapter.

### Enabled start program

At the start of the process, the start program ensures the necessary arc stability until the main current “ $I$ ” is reached. The start current “ $I_{St}$ ”, the ignition current time “ $t_{St}$ ” and the ramp “ $t_{UP}$ ” can be adjusted individually according to the welding task. In the main program, the welding current can be freely regulated using the foot-operated remote control (factory setting).

### Disabled start program

Without the start program, the current jumps immediately to the main current (according to the specification of the foot-operated remote control). The start current “ $I_{St}$ ” can be used for arc stabilisation. In this case, the operation with the foot-operated remote control is only enabled when the start current is exceeded. Until then, the welding current corresponds to the start current “ $I_{St}$ ”.

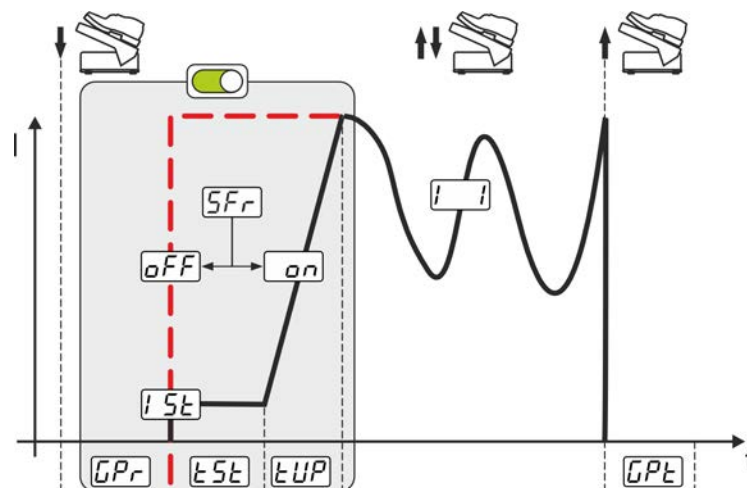


Figure 5-31

### 5.2.8.3 Start/stop operation

Start/stop operation " $\overline{FLo}$ " can be enabled or disabled in the machine configuration menu > see 5.7 chapter.

#### Enabled start/stop operation

The foot-operated remote control is no longer used to specify the welding current, but rather starts or ends the welding process (see torch trigger). As in normal operation, the welding current is specified using the power source control or the welding torch with the up/down function. All operating modes (non-latched, latched, etc.) can be selected.

#### Disabled start/stop operation

The welding current is specified using the foot-operated remote control. In this setting, only the non-latched operating mode is possible. (factory setting).

### 5.2.9 Expert menu (TIG)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

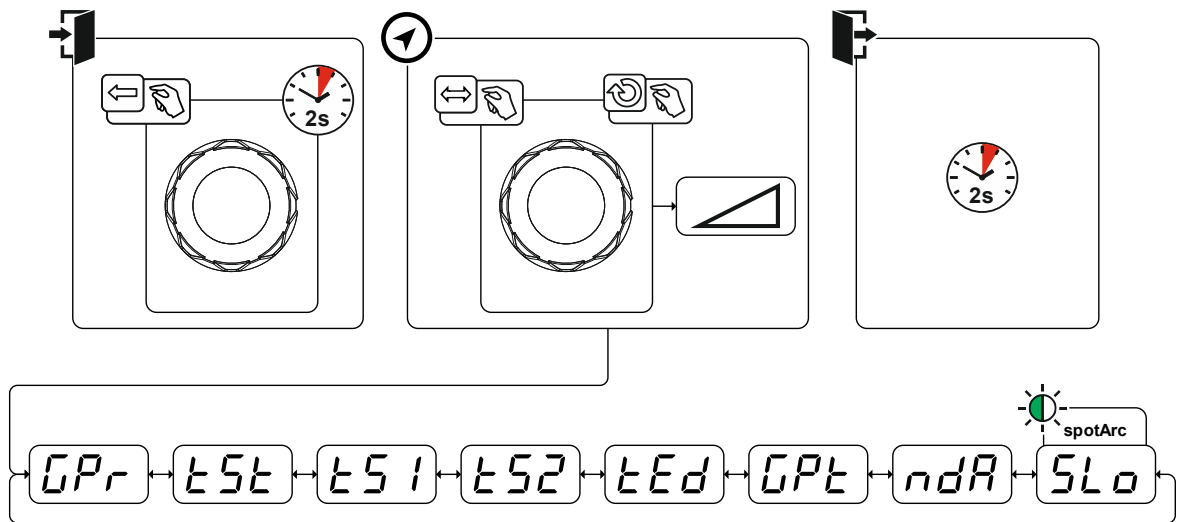


Figure 5-32

Display	Setting/selection
$\overline{GPr}$	Gas pre-flow time
$\overline{tSt}$	Start time (duration of start current)
$\overline{tS1}$	Slope time (main current to secondary current)
$\overline{tS2}$	Slope time (secondary current to main current)
$\overline{tEd}$	End current time (duration of end current)
$\overline{GPt}$	Gas post-flow time
$\overline{ndA}$	Diameter of tungsten electrode / ignition optimisation
$\overline{SL0}$	<b>Slope times (spotArc/spotmatic)</b> Slope times ( $t_{up}$ $\overline{tUp}$ and $t_{dn}$ $\overline{tDn}$ ) in operating modes spotArc and spotmatic (long spot time) $\overline{on}$ ----- Slope times are activated. $\overline{off}$ ----- Slope times are deactivated (hidden).

## 5.3 MMA welding

### 5.3.1 Connecting the electrode holder and workpiece lead

**⚠ CAUTION**

**Risk of crushing and burns!**  
**When changing stick electrodes there is a risk of crushing and burns!**

- Wear appropriate and dry protective gloves.
- Use an insulated pair of tongs to remove the used stick electrode or to move welded workpieces.

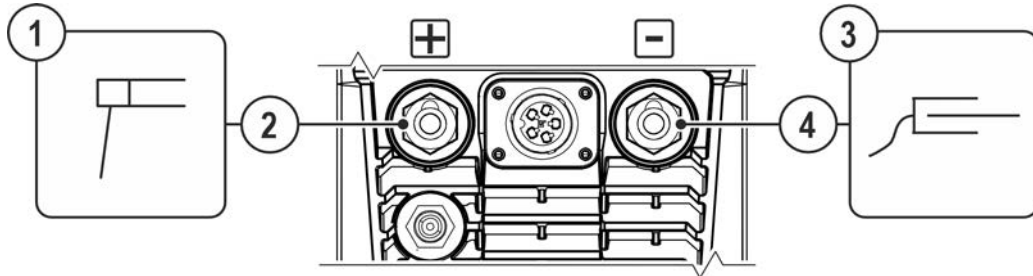


Figure 5-33

Item	Symbol	Description
1		Electrode holder
2		Welding current lead
3		Workpiece
4		Workpiece lead

- Insert the electrode holder plug and workpiece lead into the welding current socket depending on application and lock in place by turning to the right. The corresponding polarity will be based on the information of the electrode manufacturer on the electrode packaging.

### 5.3.2 Setting welding procedure

The following welding task selection is an example of use. In general, the selection process always has the same sequence. Signal lights (LED) will show the selected combination.

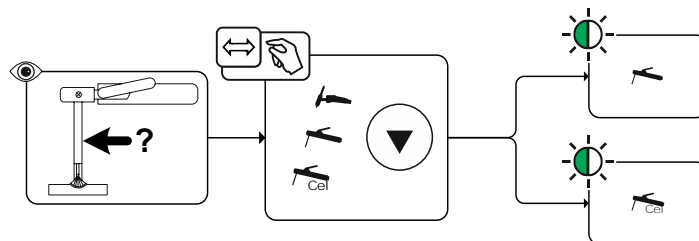


Figure 5-34

### 5.3.3 Hotstart

The function hot start ensures a secure igniting of the arc and a sufficient heating to the still cold parent metal at the beginning of the welding process. The ignition takes place here with increased current (hot start current) over a certain time (hot start time).

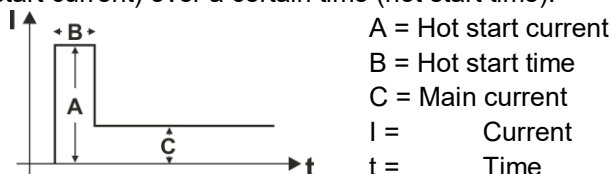


Figure 5-35

### 5.3.3.1 Hotstart current

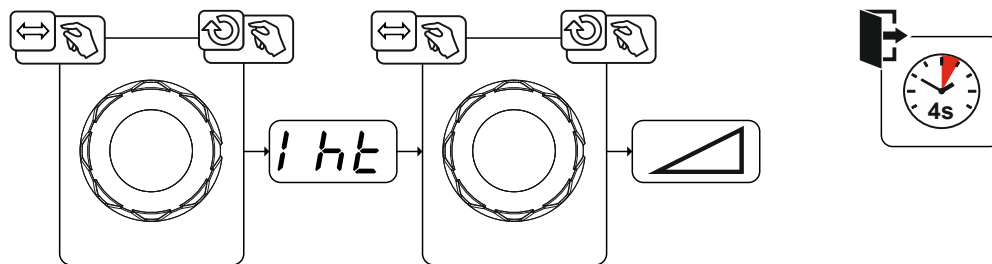


Figure 5-36

### 5.3.3.2 Hotstart time

The hot start times can be set in the Expert menu > see 5.3.8 chapter.

### 5.3.4 Arcforce

During the welding process, arcforce prevents the electrode sticking in the weld pool with increases in current. This makes it easier to weld large-drop melting electrode types at low current strengths with a short arc in particular.

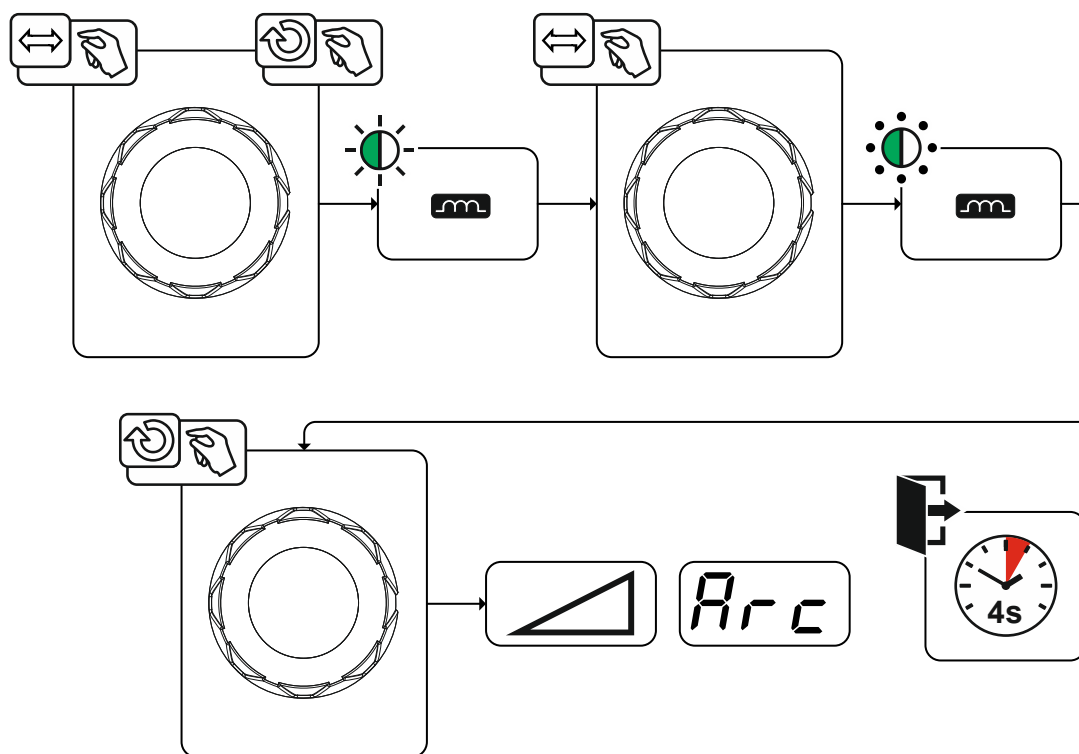
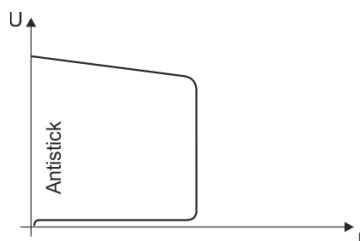


Figure 5-37

### 5.3.5 Antistick



**The Antistick feature prevents the electrode from annealing.**

Should the electrode stick despite the Arcforce feature, the machine automatically switches to the minimum current within approx. one second. This prevents the electrode from annealing. Check the welding current setting and correct for the welding task in hand.

Figure 5-38

## 5.3.6 Pulse welding

### 5.3.6.1 Average value pulse welding

Average value pulse welding means that two currents are switched periodically, a current average value (AMP), a pulse current (Ipuls), a balance ( $\overline{bRL}$ ) and a frequency ( $\overline{FrE}$ ) having been defined first. The predefined ampere current average value is decisive, the pulse current (Ipuls) is defined by the  $\overline{vPL}$  parameter as a percentage of the current average value (AMP). The pulse pause current (IPP) requires no setting. This value is calculated by the machine control, so that the welding current average value (AMP) is maintained at all times.

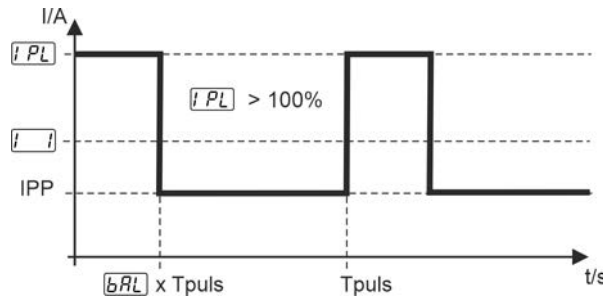


Figure 5-39

AMP = Main current; e.g. 100 A

Ipuls = Pulse current =  $\overline{vPL}$  x AMP; e.g. 140% x 100 A = 140 A

IPP = Pulse pause current

Tpuls = Duration of one pulse cycle =  $1/\overline{FrE}$ ; e.g. 1/1 Hz = 1 s

$\overline{bRL}$  = Balance

### 5.3.7 Arc length restriction (USP)

The function of arc length restriction ( $\overline{USP}$ ) stops the welding process when an excessive arc voltage is detected (an unusually large gap between electrode and workpiece). This function can be switched on or off in the Expert menu > see 5.3.8 chapter.

The arc length restriction cannot be used for cel characteristics (if available).

### 5.3.8 Expert menu (MMA)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.

The setting ranges for the parameter values are summarised in the Parameter overview section > see 10.1 chapter.

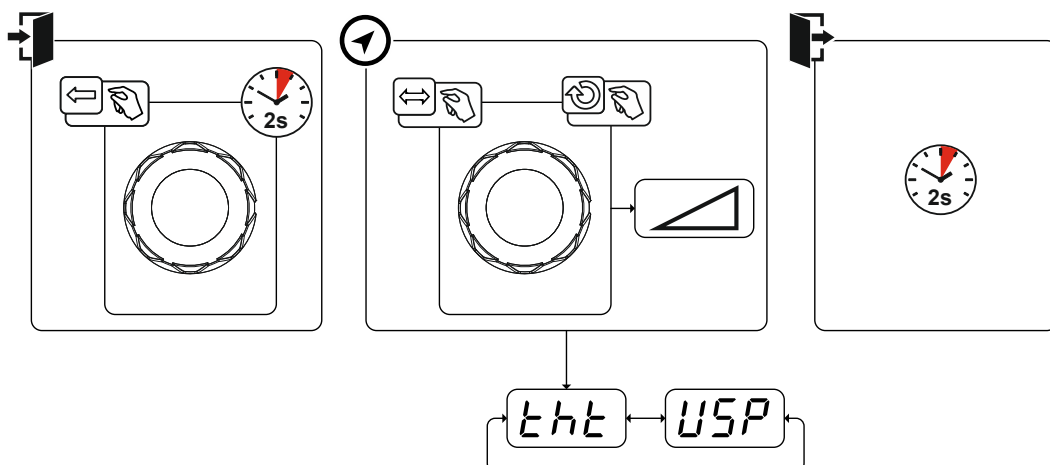





Figure 5-40

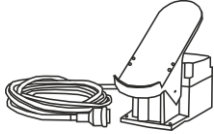
Display	Setting/selection
	Hotstart time

Display	Setting/selection
	<b>Arc length restriction &gt; see 5.3.7 chapter</b>  -----Function switched on  -----Function switched off

## 5.4 Remote control

The remote controls are operated on the 19-pole remote control connection socket (analogue).

### 5.4.1 RTF1 19POL



#### Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Start/stop welding operation (TIG)

### 5.4.2 RT1 19POL



#### Functions

- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.

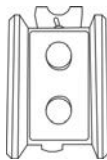
### 5.4.3 RTG1 19POL



#### Functions

- Infinite setting of the welding current (0% to 100%) depending on the main current preselected at the welding machine

### 5.4.4 RTA PWS2

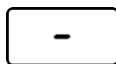


#### Functions

- Welding current setting (0 % to 100 %)
- Switch for changing the polarity. Only active in machines with pole reversing switch (PWS).
- Setting the Arcforce

## 5.5 Power-saving mode (Standby)

Using the parameter  $\overline{SbA}$  in the machine configuration menu, the time for the power-saving mode can be set or the mode can be deactivated > see 5.7 chapter.



When power-saving mode is activated, the machine displays show the horizontal digit in the centre of the display only.

Actuating any operating element (e.g., turning a rotary knob) cancels the power-saving mode and the machine switches back to ready-to-weld mode.

## 5.6 Access control

The machine control can be locked to prevent unauthorised or accidental adjustments. The access lock has the following effect:

- The parameters and their settings in the machine configuration menu, expert menu and the function sequence can only be viewed but not changed.
- The welding procedure cannot be switched.

The parameters for setting the access block are configured in the machine configuration menu > see 5.7 chapter.

### Enabling access block

- Assign the access code for the access block: Select parameter `cod` and select a number code (0–999).
- Enable access block: Set parameter `Loc` to access block enabled `on`.

The access block activation is indicated by the "Access block active" signal light > see 4.2 chapter.

### Disabling access block

- Enter the access code for the access block: Select parameter `cod` and enter the previously selected number code (0–999).
- Disable access block: Set parameter `Loc` to access block disabled `off`. The only way to disable the access block is to enter the selected number code.

## 5.7 Machine configuration menu

Basic machine settings are defined in the machine configuration menu.

### 5.7.1 Selecting, changing and saving parameters

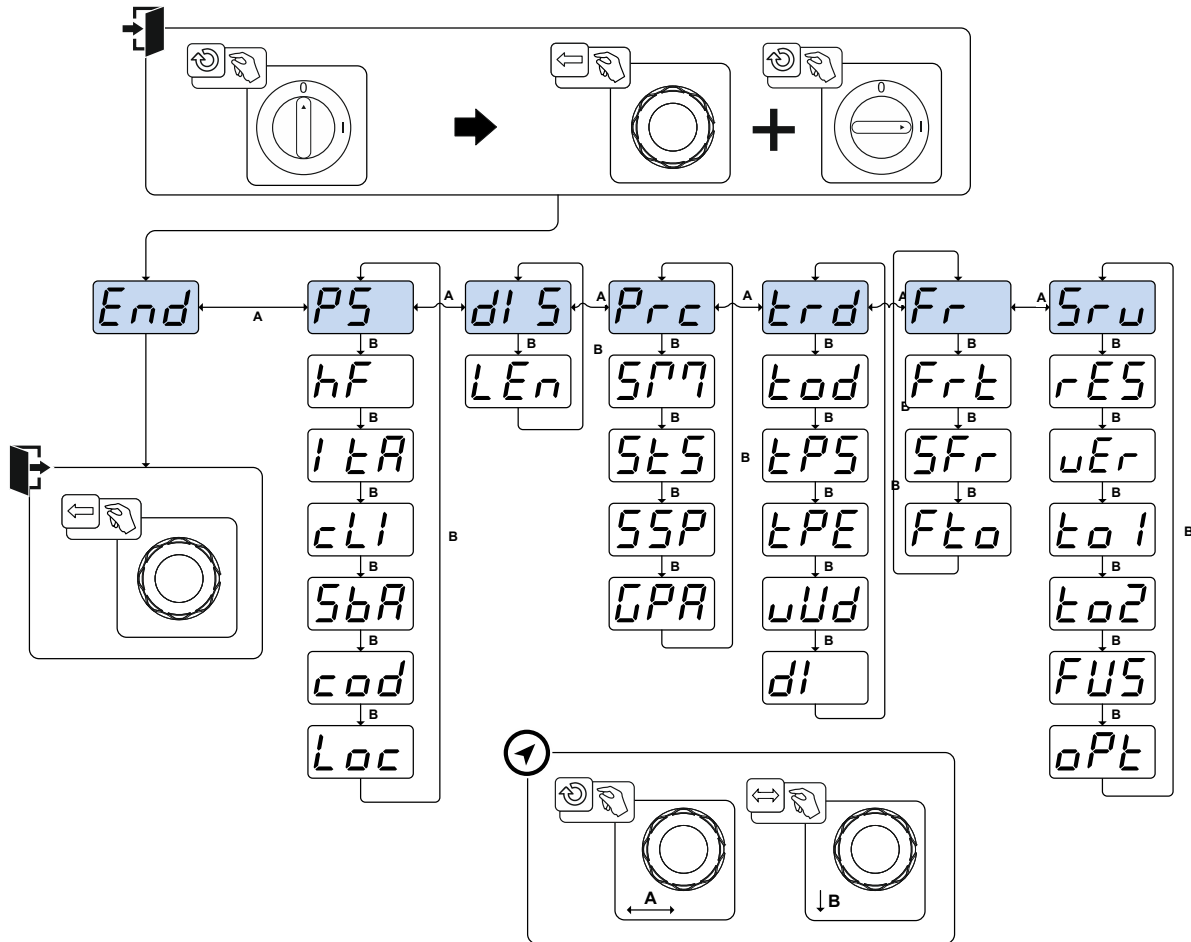

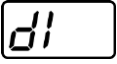
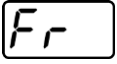
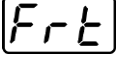


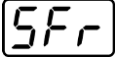


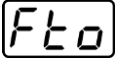


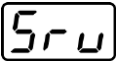
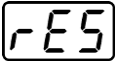





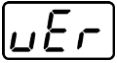
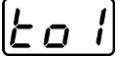




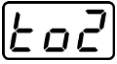


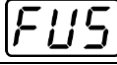
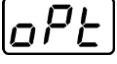





Figure 5-41



Display	Setting/selection
<b>End</b>	<b>Exit the menu</b> Exit
<b>PS</b>	<b>Power source menu</b>
<b>HF</b>	<b>Switch ignition mode</b> <input type="checkbox"/> -----HF ignition <input type="checkbox"/> -----Liftarc
<b>1tA</b>	<b>Re-ignition after arc interruption &gt; see 5.2.4.3 chapter</b> <input type="checkbox"/> -----Function switched off or time setting
<b>cli</b>	<b>Minimum current limit (TIG) &gt; see 5.2.3 chapter</b> Depending on the set tungsten electrode diameter <input type="checkbox"/> -----Function disabled <input type="checkbox"/> -----Function enabled (ex works)
<b>SbA</b>	<b>Time-based power-saving mode &gt; see 5.5 chapter</b> Time to activation of the power-saving mode in case of inactivity. Setting <input type="checkbox"/> = disabled or numerical value 5-60 min..
<b>cod</b>	<b>Access control – access code</b> Setting: 000 to 999 (000 ex works)
<b>Loc</b>	<b>Access control &gt; see 5.6 chapter</b> <input type="checkbox"/> -----Function enabled <input type="checkbox"/> -----Function disabled (ex works)
<b>dis</b>	<b>Machine display menu</b>
<b>LEn</b>	<b>Setting the system of measurement</b> <input type="checkbox"/> -----Length units in mm - metric system (factory setting). <input type="checkbox"/> -----Length units - imperial system.
<b>PrC</b>	<b>Process menu</b>
<b>SP7</b>	<b>spotmatic operating mode &gt; see 5.2.5.5 chapter</b> Ignition by contact with the workpiece <input type="checkbox"/> -----Function enabled (ex works) <input type="checkbox"/> -----Function disabled
<b>StS</b>	<b>Setting the spot time &gt; see 5.2.5.5 chapter</b> <input type="checkbox"/> -----Short spot time <input type="checkbox"/> -----Long spot time
<b>SSP</b>	<b>Process activation setting &gt; see 5.2.5.5 chapter</b> <input type="checkbox"/> -----Separate process activation (ex works) <input type="checkbox"/> -----Permanent process activation
<b>GPA</b>	<b>Automatic gas post-flow function &gt; see 5.2.2.4 chapter</b> <input type="checkbox"/> -----Function on <input type="checkbox"/> -----Function off (factory setting)
<b>tcd</b>	<b>Torch configuration menu</b> Set welding torch functions
<b>tod</b>	<b>Torch mode (ex works 1) &gt; see 5.2.7.1 chapter</b>
<b>tPS</b>	<b>Alternative welding start - Tap Start (see the chapter Latched operating mode)</b> <input type="checkbox"/> -----Function enabled (factory setting) <input type="checkbox"/> -----Function disabled
<b>tPE</b>	<b>Alternative welding end - Tap End (see the chapter Latched operating mode)</b> <input type="checkbox"/> -----Function enabled. <input type="checkbox"/> -----Function disabled (factory setting).

Display	Setting/selection
	<b>Up/down speed &gt; see 5.2.7.3 chapter</b> Increase value > rapid current change Decrease value > slow current change
	<b>Current jump &gt; see 5.2.7.4 chapter</b> Current jump setting in ampere
	<b>Remote control menu</b>
	<b>Responsiveness &gt; see 5.2.8.1 chapter</b>  ----- Linear responsiveness  ----- Logarithmic responsiveness (factory setting)
	<b>Start program of foot-operated remote control &gt; see 5.2.8.2 chapter</b>  ----- Function enabled (factory setting).  ----- Function disabled.
	<b>Start / stop operation &gt; see 5.2.8.3 chapter</b>  ----- Function enabled.  ----- Function disabled (factory setting).
	<b>Service menu</b> Any changes to the service menu should be agreed with the authorised service personnel.
	<b>Reset (resetting to factory settings)</b>  ----- Switched off (factory setting)  ----- Reset all values and adjustments  ----- Reset the operating time  ----- Reset the arc time  ----- Reset the operating time and arc time Reset by pressing the rotary encoder.
	<b>Software version of the machine control</b> Display of the software version (scrolling text).
	<b>Operating time/arc time (resettable)</b>  ----- Display of the resettable operating time in hours and minutes (can be reset using the parameter  ).  ----- Display of resettable arc time in hours and minutes (can be reset using the parameter  )
	<b>Operating time/arc time (total)</b>  ----- Display of the operating time in hours and minutes (total)  ----- Display of the arc time in hours and minutes (total)
	<b>Dynamic power adjustment &gt; see 7.5 chapter</b>
	<b>Arc detection for welding helmets (TIG)</b> Modulated waviness for better arc detection  ----- Function disabled  ----- Medium intensity  ----- High intensity

## 6 Maintenance, care and disposal

### 6.1 General

#### DANGER



**Risk of injury due to electrical voltage after switching off!**

**Working on an open machine can lead to fatal injuries!**

**Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to four minutes after the mains plug is removed.**

1. Switch off machine.
2. Remove the mains plug.
3. Wait for at last 4 minutes until the capacitors have discharged!

#### WARNING



**Improper maintenance, testing and repairs!**

**Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel (authorised service personnel). A competent person is someone who, based on training, knowledge and experience, can recognize the hazards and possible consequential damage that may occur when testing power sources and can take the necessary safety precautions.**

- Follow the maintenance instructions > see 6.2 chapter.
- If any of the test requirements below are not met, the unit must not be put back into operation until it has been repaired and tested again.

Repair and maintenance work may only be performed by qualified authorised personnel; otherwise the right to claim under warranty is void. In all service matters, always consult the dealer who supplied the machine. Return deliveries of defective equipment subject to warranty may only be made through your dealer. When replacing parts, use only original spare parts. When ordering spare parts, please quote the machine type, serial number and item number of the machine, as well as the type designation and item number of the spare part.

Under the specified ambient conditions and normal working conditions this machine is essentially maintenance-free and requires just a minimum of care.

Contamination of the machine may impair service life and duty cycle. The cleaning intervals depend on the ambient conditions and the resulting contamination of the machine. The minimum interval is every six months.

#### 6.1.1 Cleaning

- Clean the outer surfaces with a moist cloth (no aggressive cleaning agents).
- Purge the machine venting channel and cooling fins (if present) with oil- and water-free compressed air. Compressed air may overspeed and destroy the machine fans. Never direct the compressed air directly at the machine fans. Mechanically block the fans, if required.
- Check the coolant for contaminants and replace, if necessary.

#### 6.1.2 Dirt filter

When using a dirt filter, the cooling air throughput is reduced and the duty cycle of the machine is reduced as a result. The duty cycle decreases with the increasing contamination of the filter. The dirt filter must be removed at regular intervals and cleaned by blowing out with compressed air (depending on the level of soiling).

## 6.2 Maintenance work, intervals

### 6.2.1 Daily maintenance tasks

#### Visual inspection

- Mains supply lead and its strain relief
- Gas cylinder securing elements
- Check hose package and power connections for exterior damage and replace or have repaired by specialist staff as necessary!
- Gas tubes and their switching equipment (solenoid valve)
- Check that all connections and wearing parts are hand-tight and tighten if necessary.
- Check correct mounting of the wire spool.
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Other, general condition

#### Functional test

- Operating, message, safety and adjustment devices (Functional test)
- Welding current cables (check that they are fitted correctly and secured)
- Gas tubes and their switching equipment (solenoid valve)
- Gas cylinder securing elements
- Check correct mounting of the wire spool.
- Check that all screw and plug connections and replaceable parts are secured correctly, tighten if necessary.
- Remove any spatter.
- Clean the wire feed rollers on a regular basis (depending on the degree of soiling).

### 6.2.2 Monthly maintenance tasks

#### Visual inspection

- Casing damage (front, rear and side walls)
- Wheels and their securing elements
- Transport elements (strap, lifting lugs, handle)
- Check coolant tubes and their connections for impurities

#### Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check wire guide elements (wire feed roll holder, wire feed nipple, wire guide tube) for tight fit. Recommendation for replacing the wire feed roll holder (eFeed) after 2000 hours of operation, see replacement parts).
- Check coolant tubes and their connections for impurities
- Check and clean the welding torch. Deposits in the torch can cause short circuits and have a negative impact on the welding result, ultimately causing damage to the torch.

### 6.2.3 Annual test (inspection and testing during operation)

A periodic test according to IEC 60974-4 "Periodic inspection and test" has to be carried out. In addition to the regulations on testing given here, the relevant local laws and regulations must also be observed.

For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at [www.ewm-group.com](http://www.ewm-group.com)!

## 6.3 Disposing of equipment



### Proper disposal!

The machine contains valuable raw materials, which should be recycled, and electronic components, which must be disposed of.

- Do not dispose of in household waste!
- Observe the local regulations regarding disposal!
- According to European provisions (Directive 2012/19/EU on Waste of Electrical and Electronic Equipment), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.  
This machine has to be disposed of, or recycled, in accordance with the waste separation systems in use.

According to German law (law governing the distribution, taking back and environmentally correct disposal of electrical and electronic equipment (ElektroG)), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.

The deletion of personal data is the responsibility of the end user.

Lamps, batteries or accumulators must be removed and disposed of separately before disposing of the device. The type of battery or accumulator and its composition is marked on the top (type CR2032 or SR44). The following EWM products may contain batteries or accumulators:

- Welding helmets  
Batteries or accumulators are easy to remove from the LED cassette.
- Device controls  
Batteries or accumulators are located on the back of these in corresponding sockets on the circuit board and are easy to remove. The controls can be removed using standard tools.

Information on returning used equipment or collections can be obtained from the respective municipal administration office. Devices can also be returned to EWM sales partners across Europe.

Further information on the topic of the disposal of electrical and electronic equipment can be found on our website at: <https://www.ewm-group.com/de/nachhaltigkeit.html>.

## 7 Rectifying faults

All products are subject to rigorous production checks and final checks. If, despite this, something fails to work at any time, please check the product using the following flowchart. If none of the fault rectification procedures described leads to the correct functioning of the product, please inform your authorised dealer.



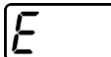
### 7.1 Software version of the machine control

The query of the software versions only serves to inform the authorised service staff. It is available in the machine configuration menu > see 5.7 chapter.

### 7.2 Error messages (power source)

**The possible error numbers displayed depend on the machine series and version!**

Depending on the options of the machine display, a fault is shown as follows:

Display type - machine control	Display
Graphic display	
two 7-segment displays	
one 7-segment display	

The possible cause of the fault is signalled by a corresponding fault number (see table). In the case of an error, the power unit shuts down.

- Document machine errors and inform service staff as necessary.
- If multiple errors occur, these are displayed in succession.

#### Reset error (category legend)

<sup>A</sup> The error message disappears when the error is eliminated.

<sup>B</sup> The error message can be reset by pressing a push-button ◀.

All other error messages can only be reset by switching the machine off and on again.

#### Error 3: Tacho error

Categories A, B

- ✓ Fault in the wire feeder.
  - ✘ Check the electrical connections (connectors, lines).
- ✓ Permanent overload of the wire drive.
  - ✘ Do not lay the liner in tight radii.
  - ✘ Check the wire in the liner for ease of movement.

#### Error 4: Excess temperature

Category A

- ✓ The power source is overheating.
  - ✘ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✘ Check the fan and clean or replace.
- ✓ Air inlet or outlet is blocked.
  - ✘ Check the air inlet and outlet.

#### Error 5: Mains overvoltage

Category A <sup>[1]</sup>

- ✓ Mains voltage is too high.
  - ✘ Check the mains voltages and compare them with the connection voltages of the power source.

**Error 6: Mains undervoltage**Category A <sup>[1]</sup>

- ✓ Mains voltage is too low.
  - ✘ Check the mains voltages and compare them with the connection voltages of the power source.

**Error 7: Low coolant level**

Category B

- ✓ Low flow rate.
  - ✘ Fill with coolant.
  - ✘ Check coolant flow - remove kinks in the hose package.
  - ✘ Adjust the flow threshold <sup>[2]</sup>.
  - ✘ Clean the cooler.
- ✓ Pump does not turn.
  - ✘ Turn the pump shaft.
- ✓ Air in the coolant circuit.
  - ✘ Vent the coolant circuit.
- ✓ The hose package is not filled with coolant.
  - ✘ Switch the machine off and on > pump running > filling process.
- ✓ Operation with a gas-cooled welding torch.
  - ✘ Deactivate the torch cooling.
  - ✘ Connect the coolant feed and return with a hose bridge.

**Error 8: Shielding gas error**

Categories A, B

- ✓ No gas.
  - ✘ Check the gas supply.
- ✓ The pre-pressure is too low.
  - ✘ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

**Error 9: Secondary overvoltage**

- ✓ Overvoltage at the output: Inverter error.
  - ✘ Request service.

**Error 10: Earth fault (PE error)**

- ✓ Connection between welding wire and machine casing.
  - ✘ Remove the electrical connection.
- ✓ Connection between welding circuit and machine casing.
  - ✘ Check the connection and routing of the earth wire / welding torch.

**Error 11: Fast shutdown**

Categories A, B

- ✓ Remove the logical signal "Robot ready" during the process.
  - ✘ Eliminate errors in the higher-level control.

## **Error 16: Pilot arc power source - collective error**

Category A

- ✓ The external emergency stop circuit has been interrupted.
  - ✘ Check the emergency stop circuit and eliminate the cause of the error.
- ✓ The emergency stop circuit of the power source has been activated (internally configurable).
  - ✘ Deactivate the emergency stop circuit.
- ✓ The power source is overheating.
  - ✘ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✘ Check the fan and clean or replace.
- ✓ Air inlet or outlet is blocked.
  - ✘ Check the air inlet and outlet.
- ✓ Short circuit on welding torch.
  - ✘ Check the welding torch.
  - ✘ Request service.

## **Error 17: Cold wire error**

Category B

- ✓ Fault in the wire feeder.
  - ✘ Check the electrical connections (connectors, lines).
- ✓ Permanent overload of the wire drive.
  - ✘ Do not lay the liner in tight radii.
  - ✘ Check the liner for ease of movement.

## **Error 18: Plasma gas error**

Category B

- ✓ No gas.
  - ✘ Check the gas supply.
- ✓ The pre-pressure is too low.
  - ✘ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

## **Error 19: Shielding gas error**

Category B

- ✓ No gas.
  - ✘ Check the gas supply.
- ✓ The pre-pressure is too low.
  - ✘ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).



**Error 20: Low coolant level**

Category B

- ✓ Low flow rate.
  - ✗ Fill with coolant.
  - ✗ Check coolant flow - remove kinks in the hose package.
  - ✗ Adjust the flow threshold <sup>[2]</sup>.
  - ✗ Clean the cooler.
- ✓ Pump does not turn.
  - ✗ Turn the pump shaft.
- ✓ Air in the coolant circuit.
  - ✗ Vent the coolant circuit.
- ✓ The hose package is not filled with coolant.
  - ✗ Switch the machine off and on > pump running > filling process.
- ✓ Operation with a gas-cooled welding torch.
  - ✗ Deactivate the torch cooling.
  - ✗ Connect the coolant feed and return with a hose bridge.

**Error 22: Excess coolant temperature**

Category B

- ✓ Coolant is overheating <sup>[2]</sup>.
  - ✗ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✗ Check, clean or replace the fan.
- ✓ Air inlet or outlet is blocked.
  - ✗ Check the air inlet and outlet.

**Error 23: Excess temperature**

Category A

- ✓ External component (e.g. HF ignition units) overheated.
- ✓ The power source is overheating.
  - ✗ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✗ Check the fan and clean or replace.
- ✓ Air inlet or outlet is blocked.
  - ✗ Check the air inlet and outlet.

**Error 24: Pilot arc ignition error**

Category B

- ✓ The pilot arc cannot ignite.
  - ✗ Check the welding torch equipment.

**Fault 25: Forming gas error**

Category B

- ✓ No gas.
  - ✗ Check the gas supply.
- ✓ The pre-pressure is too low.
  - ✗ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

## **Error 26: Excess pilot arc module temperature**

Category A

- ✓ The power source is overheating.
  - ✗ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✗ Check the fan and clean or replace.
- ✓ Air inlet or outlet is blocked.
  - ✗ Check the air inlet and outlet.

## **Error 32: Error I>0**

- ✓ Current recording is faulty.
  - ✗ Request service.

## **Error 33: Error UIST**

- ✓ Voltage recording is faulty.
  - ✗ Eliminate the short circuit in the welding circuit.
  - ✗ Remove the external sensor voltage.
  - ✗ Request service.


## **Error 34: Electronics error**

- ✓ A/D channel error
  - ✗ Switch the machine off and on.
  - ✗ Request service.

## **Error 35: Electronics error**

- ✓ Slope error
  - ✗ Switch the machine off and on.
  - ✗ Request service.

## **Error 36: error**

- ✓  conditions violated.
  - ✗ Switch the machine off and on.
  - ✗ Request service.

## **Error 37: Excess temperature / electronics error**

- ✓ The power source is overheating.
  - ✗ Allow the switched-on machine to cool.
- ✓ Fan is blocked, dirty or faulty.
  - ✗ Check the fan and clean or replace.
- ✓ Air inlet or outlet is blocked.
  - ✗ Check the air inlet and outlet.

## **Error 38: Error IIST**

- ✓ Short circuit in the welding circuit before welding.
  - ✗ Eliminate the short circuit in the welding circuit.
  - ✗ Request service.

## **Error 39: Electronics error**

- ✓ Secondary overvoltage
  - ✗ Switch the machine off and on.
  - ✗ Request service.

**Error 40: Electronics error**

- ✓ Error I>0
- ✘ Request service.

**Error 47: Radio link (BT)**

Category B

- ✓ Connection error between welding machine and peripheral unit.
- ✘ Note the documentation for the data interface with radio transmission.

**Error 48: Ignition error**

Category B

- ✓ No ignition at process start (automated machines).
- ✘ Check the wire feeding
- ✘ Check the load cable connections in the welding circuit.
- ✘ Clean corroded surfaces on the workpiece before welding if necessary.

**Error 49: Arc interruption**

Category B

- ✓ An arc interruption occurred during welding with an automated system.
- ✘ Check the wire feeding.
- ✘ Adjust the welding speed.

**Error 50: Program number**

Category B

- ✓ Internal error.
- ✘ Request service.

**Error 51: Emergency stop**

Category A

- ✓ The external emergency stop circuit has been interrupted.
- ✘ Check the emergency stop circuit and eliminate the cause of the error.
- ✓ The emergency stop circuit of the power source has been activated (internally configurable).
- ✘ Deactivate the emergency stop circuit.

**Error 52: No wire feeder**

- ✓ After switching on the automated system, no wire feeder (DV) was detected.
- ✘ Check or connect the control cables of the wire feeders.
- ✘ Check the identification number of the automated wire feeder (for 1DV: number 1, for 2DV: each a wire feeder with number 1 and a wire feeder with number 2).

**Error 53: No wire feeder 2**

Category B

- ✓ Wire feeder 2 was not detected.
- ✘ Check the control cable connections.

**Error 54: VRD error**

- ✓ Error in the open-circuit voltage reduction.
- ✘ If necessary, disconnect the external machine from the welding circuit.
- ✘ Request service.

**Error 55: Excess wire feeder current**

Category B

- ✓ Excess current detected in the wire feed mechanism.
- ✘ Do not lay the liner in tight radii.
- ✘ Check the liner for ease of movement.

## **Error 56: Mains phase failure**

- ✓ One phase of the mains voltage has failed.
- ✘ Check the mains connection, mains plug and mains fuses.

## **Error 57: Slave tachometer error**

Category B

- ✓ Fault in the wire feeder (slave drive).
- ✘ Check the connections (connectors, lines).
- ✓ Permanent overload of the wire drive (slave drive).
- ✘ Do not lay the liner in tight radii.
- ✘ Check the liner for ease of movement.

## **Error 58: Short circuit**

Category B

- ✓ Short circuit in the welding circuit.
- ✘ Eliminate the short circuit in the welding circuit.
- ✘ Place the welding torch on an insulated surface.

## **Error 59: Incompatible machine**

- ✓ A machine connected to the system is not compatible.
- ✘ Disconnect the incompatible machine from the system.

## **Error 60: Incompatible software**

- ✓ The software of a machine is not compatible.
- ✘ Disconnect the incompatible machine from the system
- ✘ Request service.

## **Error 61: Welding monitoring**

- ✓ The actual value of a welding parameter is outside the specified tolerance range.
- ✘ Maintain the tolerance ranges.
- ✘ Adjust the welding parameters.

## **Error 62: System component**

- ✓ The system component was not found.
- ✘ Request service.

## **Error 63: Mains voltage error**


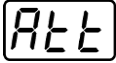
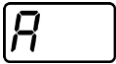
- ✓ Operating and mains voltage are incompatible.
- ✘ Check or adjust the operating and mains voltage.

<sup>[1]</sup> only Picotig 220 pulse

<sup>[2]</sup> See technical data for values and other switching thresholds > see 8 chapter.

### 7.3 Warnings

Depending on the display options of the machine display, a warning message is displayed as follows:

Display type - machine control	Display
Graphic display	
two 7-segment displays	
one 7-segment display	

The cause of the warning is indicated by a corresponding warning number (see table).

- In case of multiple warnings, these are displayed in sequence.
- Document machine warning and inform service personnel, if required.

Warning	Potential cause / remedy
1 Excess temperature	A shutdown is imminent due to excess temperature.
2 Half-wave failures	Check process parameters.
3 Torch cooling warning	Check coolant level and top up if necessary.
4 Shielding gas	Check shielding gas supply.
5 Coolant flow	Check min. flow rate. <sup>[2]</sup>
6 Wire reserve	Only a small amount of wire is left on the spool.
7 CAN bus failure	Wire feeder not connected; automatic circuit-breaker of wire feed motor (reset the tripped automatic circuit-breaker by actuating).
8 Welding circuit	The inductance of the welding circuit is too high for the selected welding task.
9 WF configuration	Check WF configuration.
10 Partial inverter	One of several partial inverters is not supplying welding current.
11 Excess temperature of the coolant <sup>[1]</sup>	Check temperature and switching thresholds. <sup>[2]</sup>
12 Welding monitoring	The actual value of a welding parameter is outside the specified tolerance field.
13 Contact error	The resistance in the welding circuit is too high. Check earth connection.
14 Alignment error	Switch the machine off and on. If the error persists, notify Service.
15 Mains fuse	The power limit of the mains fuse is reached and the welding power is reduced. Check the fuse setting.
16 Shielding gas warning	Check the gas supply.
17 Plasma gas warning	Check the gas supply.
18 Forming gas warning	Check the gas supply.
19 Gas warning 4	reserved
20 Coolant temperature warning	Check coolant level and top up if necessary.
21 Excess temperature 2	reserved
22 Excess temperature 3	reserved
23 Excess temperature 4	reserved

Warning	Potential cause / remedy
24 Coolant flow warning	Check coolant supply. Check coolant level and top up if necessary. Check flow and switching thresholds. <sup>[2]</sup>
25 Flow 2	reserved
26 Flow 3	reserved
27 Flow 4	reserved
28 Wire stock warning	Check wire feeding.
29 Low wire 2	reserved
30 Low wire 3	reserved
31 Low wire 4	reserved
32 Tacho error	Fault of wire feeder - permanent overload of the wire drive.
33 Excess current on the wire feed motor	Excess current detected on wire feed motor.
34 JOB unknown	JOB selection was not carried out because the JOB number is unknown.
35 Excess current on the wire feed motor slave	Excess current detected on wire feed motor slave (push/push system or intermediate drive).
36 Slave tacho error	Fault of wire feeder - permanent overload of the wire drive (push/push system or intermediate drive).
37 FAST bus failure	Wire feeder not connected (reset by actuating the automatic circuit-breaker of the wire feed motor).
38 Incomplete component information	Check the XNET component management.
39 Mains half-wave failure	Check supply voltage.
40 Weak power grid	Check supply voltage.
41 Cooling unit not recognised	Check the cooling unit connection.
47 Battery (remote control, type BT)	Battery level is low (replace battery)

<sup>[1]</sup> only for the XQ machine series

<sup>[2]</sup> See technical data for values and other switching thresholds > see 8 chapter.

## 7.4 Checklist for rectifying faults

**The correct machine equipment for the material and process gas in use is a fundamental requirement for perfect operation!**

Legend	Symbol	Description
	↗	Fault/Cause
	✘	Remedy

### Mains fuse triggers

↗ Mains fuse triggers - unsuitable mains fuse

✘ Set up recommended mains fuse > see 8 chapter.

**Functional errors**

- ✓ Several parameters cannot be set (machines with access block)
  - ✗ Entry level is blocked, disable access lock > see 5.6 chapter
- ✓ All machine control signal lights are illuminated after switching on
- ✓ No machine control signal light is illuminated after switching on
- ✓ No welding power
  - ✗ Phase failure > check mains connection (fuses)
- ✓ Connection problems
  - ✗ Make control lead connections and check that they are fitted correctly.
- ✓ Loose welding current connections
  - ✗ Tighten power connections on the torch and/or on the workpiece
  - ✗ Tighten contact tip correctly

**No arc ignition**

- ✓ Incorrect ignition type setting.
  - ✗ Ignition type: Select "HF start". Depending on the machine, the setting is defined by the change-over switch for ignition types or the  $hF$  parameter in one of the machine menus (see the "Control operating instructions", if applicable).

**Bad arc ignition**

- ✓ Material inclusions in the tungsten electrode due to contact with filler material or workpiece
  - ✗ Regrind or replace the tungsten electrode
- ✓ Bad current transfer on ignition
  - ✗ Check the setting on the "Tungsten electrode diameter/ignition optimisation" rotary dial and increase if necessary (higher ignition energy).

**Welding torch overheated**

- ✓ Loose welding current connections
  - ✗ Tighten power connections on the torch and/or on the workpiece
  - ✗ Tighten contact tip correctly
- ✓ Overload
  - ✗ Check and correct welding current setting
  - ✗ Use a more powerful welding torch

**Unstable arc**

- ✓ Material inclusions in the tungsten electrode due to contact with filler material or workpiece
  - ✗ Regrind or replace the tungsten electrode
- ✓ Incompatible parameter settings
  - ✗ Check settings and correct if necessary

**Pore formation**

- ✓ Inadequate or missing gas shielding
  - ✗ Check shielding gas setting and replace shielding gas cylinder if necessary
  - ✗ Shield welding site with protective screens (draughts affect the welding result)
  - ✗ Use gas lens for aluminium applications and high-alloy steels
- ✓ Unsuitable or worn welding torch equipment
  - ✗ Check size of gas nozzle and replace if necessary
- ✓ Condensation in the gas tube
  - ✗ Purge hose package with gas or replace

### 7.5 Dynamic power adjustment

**This requires use of the appropriate mains fuse.**

**Observe mains fuse specification > see 8 chapter!**

This function enables aligning the machine to the mains connection fusing to avoid continuous tripping of the mains fuse. The maximum power input of the machine is limited by an exemplary value for the existing mains fuse (several levels available).

You can predefine this value in the machine configuration menu > see 5.7 chapter using parameter  $\boxed{FUS}$ .

The selected value will be shown on the machine display  $\boxed{cRL}$  for two seconds after the machine has been switched on.

The function automatically adjusts the welding power to an uncritical level for the mains fuse.



**When using a 20-A mains fuse, a suitable mains plug has to be installed by a qualified electrician.**

### 7.6 Resetting welding parameters to the factory settings

**All customised welding parameters that are stored will be replaced by the factory settings.**





To reset the welding parameters or machine settings to the factory settings, select parameter  $\boxed{cES}$  in the service menu  $\boxed{Sru}$  > see 5.7 chapter.



## 8 Technical data

Performance specifications and guarantee only in connection with original spare and replacement parts!

### 8.1 Picotig 220 puls TG

	TIG	MMA
Welding current (I <sub>2</sub> )	5 A to 220 A	5 A to 190 A
Welding voltage according to standard (U <sub>2</sub> )	10,2 V to 18,8 V	20,2 V to 27,6 V
Duty cycle DC at 40° C <sup>[1]</sup>	220 A (40 %) 190 A (60 %) 160 A (100 %)	190 A (35 %) 155 A (60 %) 125 A (100 %)
Open circuit voltage (U <sub>0</sub> )	97 V	
Mains voltage (Tolerance)	1 x 230 V (-40 % to +15 %)	
Frequency	50/60 Hz	
mains fuse <sup>[2]</sup>	1 x 16 A	
Mains connection cable	H07RN-F3G2,5	
max. Connected load (S <sub>1</sub> )	4,9 kVA	6,2 kVA
Rec. Generator rating	8,4 kVA	
Power consumption P <sub>i</sub> <sup>[3]</sup>	22 W	
Cos φ / efficiency	0,99 / 85 %	
Protection class	I	
Overvoltage category	III	
Contamination level	3	
Insulation class / protection classification	H / IP 23	
Residual current circuit breaker	Type B (recommended)	
Noise level <sup>[4]</sup>	<70 dB(A)	
Ambient temperature	-25 °C to +40 °C	
Machine cooling	Fan (AF)	
Torch cooling	gas	
Workpiece lead (min.)	35 mm <sup>2</sup>	
EMC class	A	
Test mark	 /  /  / 	
Standards used	See declaration of conformity (appliance documents)	
Dimensions (l x b x h)	454 x 165 x 321 mm 17.9 x 6.5 x 12.6 inch	
Weight	10 kg 22 lb.	

<sup>[1]</sup> Load cycle: 10 min. (60 % DC  $\triangleq$  6 min. welding, 4 min. pause)

<sup>[2]</sup> Safety fuses are recommended DIAZED xxA gG. When using automatic cutouts, the "C" trigger characteristic must be used.

<sup>[3]</sup> Power in idle state without external or internal peripherals.

<sup>[4]</sup> Noise level during idle mode and operation under standard load according to IEC 60974- 1 at the maximum operating point.

## 9 Accessories

Performance-dependent accessories like torches, workpiece leads, electrode holders or intermediate hose packages are available from your authorised dealer.

### 9.1 Transport system

Type	Designation	Item no.
Trolley 35-1	Transport vehicle	090-008629-00000

### 9.2 19-pole remote control

Type	Designation	Item no.
RT1 19POL	Remote control current	090-008097-00000
RTG1 19POL 5m	Remote control, current	090-008106-00000
RTG1 19POL 10m	Remote control, current	090-008106-00010
RTF1 19POL 5 M	Foot-operated remote control current with connection cable	094-006680-00000
RTA PWS2	Remote control, welding current setting (0 % to 100 %), pole reversing switch, setting Arcforce	090-008856-00000

#### 9.2.1 Connection cables

Type	Designation	Item no.
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10m	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20m	Remote control e.g. connection cable	092-001470-00020

#### 9.2.2 Extension cable

Type	Designation	Item no.
RV5M19 19POLE 5M	Extension cable	092-000857-00000
RV5M19 19POL 10M	Extension cable	092-000857-00010
RV5M19 19POL 15M	Extension cable	092-000857-00015
RV5M19 19POL 20M	Extension cable	092-000857-00020

### 9.3 Options

Type	Designation	Item no.
ON Filter	Dirt filter for air inlet	092-004516-00000
ON TG	Carrying strap	092-004310-00000





































### 9.4 General accessories

Type	Designation	Item no.
GH 2X1/4" 2M	Gas hose	094-000010-00001
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
SKGS 16A 250V CEE7/7, DIN 49440/441	Protective contact plug, solid rubber	094-001756-00000
ADAP CEE16/SCHUKO	Earth contact coupling/CEE16A plug	092-000812-00000
KLF-L1-N-PE-NETZ	Mains-cable label	094-014869-00001









## 10 Appendix

### 10.1 Parameter overview – setting ranges





#### 10.1.1 TIG welding

Welding data display	Parameter / function	Setting range				
		Standard (factory set)	Min.		Max.	Unit
	Gas pre-flow time	0,5	0	-	20	s
	Start current	50	1	-	200	%
	Start time	0	0		20	s
	Up-slope time	1	0	-	20	s
	Main current	100	5	-	220	A
	Slope time (main current to secondary current)	0	0	-	20	s
	Secondary current	50	1	-	200	%
	Slope time (secondary current to main current)	0	0		20	s
	Down-slope time	1	0	-	20	s
	End current	20	1	-	200	%
	End current time	0	0	-	20	s
	Gas post-flow time	8	0	-	20	s
	Diameter of the tungsten electrode	2,4	1,0		3,2	mm
	Torch mode	1	1	-	4	-
	Up/down speed	10	1	-	100	-
	Current jump	10	1	-	20	A
	Pulse welding (  / 	off	-	-	-	-
	Pulse frequency - (average value pulsing 	2,0	0,2	-	2000	Hz
	Pulse balance - (average value pulsing 	50	1	-	99	%
	Pulse current - (average value pulsing 	140	1	-	200	%
	Automated pulsing ( 	-	-	-	-	-
	Slope times (spotArc/spotmatic)	off	off	-	on	-
	Re-ignite after arc interruption	5,0	off	-	5,0	s
	Spot time - spotArc®	2,0	0,1	-	20,0	s
	Spot time - spotmatic - (  > 	2,0	0,1	-	20,0	s
	Spot time - spotmatic - (  > 	200	5	-	995	ms

## 10.1.2 MMA welding

Welding data display	Parameter / function	Setting range				
		Standard (factory set)	Min.		Max.	Unit
	Hot start current	120	1	-	200	%
	Hot start time	0,5	0,1	-	20,0	s
	Main current	100	5	-	190	A
	Pulse welding	off	off	-	AvG	-
	Pulse frequency	1,2	0,2	-	500	Hz
	Pulse balance	30	1	-	99	%
	Pulse current	142	1	-	200	%
	Arcforce correction	0	-10	-	10	-

## 10.1.3 Basic parameters (independent of process)

Welding data display	Parameter / function	Setting range				
		Standard (factory set)	Min.		Max.	Unit
	Switching the ignition mode	on	off	-	on	-
	Time-based energy-saving function	20	off	-	60	min
	Dynamic power adjustment	16	10	-	20	A
	Arc detection for welding helmets (TIG)	0	0	-	2	-

## 10.2 Searching for a dealer

Sales & service partners  
[www.ewm-group.com/en/specialist-dealers](http://www.ewm-group.com/en/specialist-dealers)



"More than 400 EWM sales partners worldwide"