



Welding machine

Tetrix 230 AC/DC Comfort 5P TM
Tetrix 230 AC/DC Comfort 8P TM

099-000159-EW501

16.08.2016

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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 site of operation.
- Safety and warning labels at the machine indicate any possible risks. Keep these labels clean and legible at all times.
- The machine has been constructed to the state of the art and any regulations and standards applicable. It may be operated, serviced and repaired by trained personnel only.



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.

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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2 Safety instructions

2.1 Notes on the use of 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.



Special technical points which users must observe.

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.

2.1.1 Explanation of icons

Symbol	Description	Symbol	Description
	Indicates technical aspects which the user must observe.		Activate and release/tap/tip
	Switch off machine		Release/do not activate
	Switch on machine		Press and hold
			switch
	Wrong		Turn
	Correct		Numerical value – adjustable
	Menu entry		Signal light lights up in green
	Navigating the menu		Signal light flashes green
	Exit menu		Signal light lights up in red
	Time representation (e.g.: wait 4 s/activate)		Signal light flashes red
	Interruption in the menu display (other setting options possible)		
	Tool not required/do not use		
	Tool required/use		

2.2 General

WARNING



Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!



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!



Risk of injury due to radiation or heat!

Arc radiation results in injury to skin and eyes.

Contact with hot workpieces and sparks results in burns.

- Use welding shield or welding helmet with the appropriate safety level (depending on the application)!
- Wear dry protective clothing (e.g. welding shield, gloves, etc.) according to the relevant regulations in the country in question!
- Protect persons not involved in the work against arc beams and the risk of glare using safety curtains!



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!

⚠ 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!



Danger when coupling multiple power sources!

Coupling multiple power sources in parallel or in series has to be carried out by qualified personnel and in accordance with the manufacturer's guidelines. Before bringing the power sources into service for arc welding operations, a test has to verify that they cannot exceed the maximum allowed open circuit voltage.

- Connection of the machine may be carried out by qualified personnel only!
- When decommissioning individual power sources, all mains and welding current leads have to be safely disconnected from the welding system as a whole. (Danger due to inverse voltages!)
- Do not couple welding machines with pole reversing switch (PWS series) or machines for AC welding, as a minor error in operation can cause the welding voltages to be combined.

⚠ CAUTION

Smoke and gases!

Smoke and gases can lead to breathing difficulties and poisoning. In addition, solvent vapour (chlorinated hydrocarbon) may be converted into poisonous phosgene due to the ultraviolet radiation of the arc!

- Ensure that there is sufficient fresh air!
- Keep solvent vapour away from the arc beam field!
- Wear suitable breathing apparatus if appropriate!



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!



Electromagnetic fields!

The power source may cause electrical or electromagnetic fields to be produced which could affect the correct functioning of electronic equipment such as IT or CNC devices, telecommunication lines, power cables, signal lines and pacemakers.



- Observe the maintenance instructions > see 6.3 chapter!
- Unwind welding leads completely!
- Shield devices or equipment sensitive to radiation accordingly!
- The correct functioning of pacemakers may be affected (obtain advice from a doctor if necessary).

CAUTION



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

**Obligations of the operator!**

The respective national directives and laws must be observed for operation of the machine!

- *National implementation of the framework directive (89/391/EWG), as well as the associated individual directives.*
- *In particular, directive (89/655/EWG), on the minimum regulations for safety and health protection when staff members use equipment during work.*
- *The regulations regarding work safety and accident prevention for the respective country.*
- *Setting up and operating the machine according to IEC 60974-9.*
- *Check at regular intervals that users are working in a safety-conscious way.*
- *Regular checks of the machine according to 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.*

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

- *Make sure all welding leads are securely connected and check regularly.*
- *Always ensure a proper and secure electrical connection to the workpiece!*
- *Set up, attach or suspend all conductive power source components like casing, transport vehicle and crane frames so they are insulated!*
- *Do not place any other electronic devices such as drillers or angle grinders, etc., 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!*

**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.

2.3 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 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 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!



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!***

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!

Arc welding machine for TIG DC and AC 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).

3.1 Documents which also apply

3.1.1 Warranty



For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!

3.1.2 Declaration of Conformity



The labelled machine complies with the following EC directives in terms of its design and construction:

- Low Voltage Directive (LVD) 2014/35/EC
- Electromagnetic Compatibility Directive (EMC) 2014/30/EC
- Restriction of Hazardous Substance (RoHS) 2011/65/EC

In case of unauthorised changes, improper repairs, non-compliance with specified deadlines for "Arc Welding Equipment – Inspection and Testing during Operation", and/or prohibited modifications which have not been explicitly authorised by EWM, this declaration shall be voided. An original document of the specific declaration of conformity is included with every product.

3.1.3 Welding in environments with increased electrical hazards



In compliance with IEC / DIN EN 60974, VDE 0544 the machines can be used in environments with an increased electrical hazard.

3.1.4 Service documents (spare parts and circuit diagrams)

WARNING



Do not carry out any unauthorised repairs or modifications!

To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!

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

Spare parts can be obtained from the relevant authorised dealer.

3.1.5 Calibration/Validation

We hereby confirm that this machine has been tested using calibrated measuring equipment, as stipulated in IEC/EN 60974, ISO/EN 17662, EN 50504, and complies with the admissible tolerances. Recommended calibration interval: 12 months

4 Machine description – quick overview

4.1 Front view

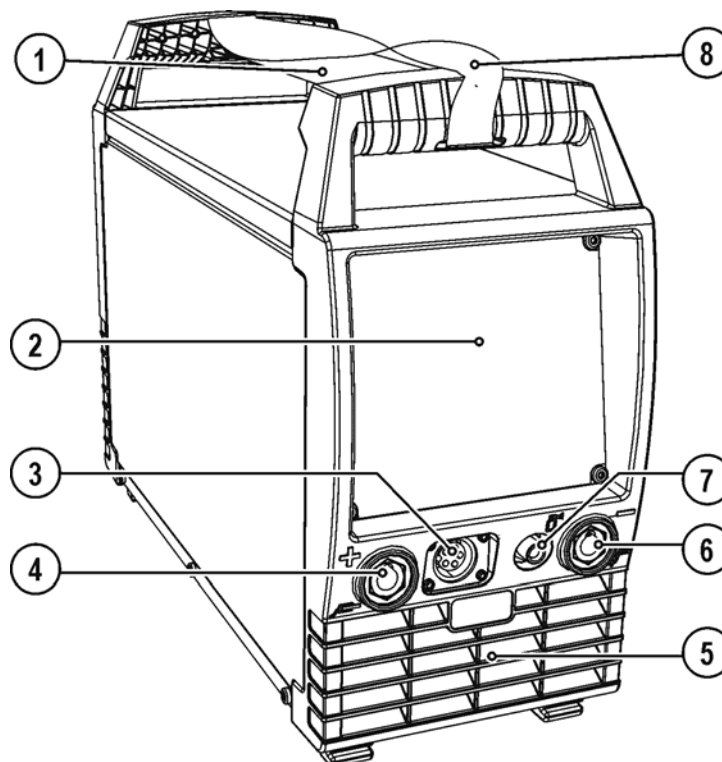








Figure 4-1

Item	Symbol	Description
1		Carrying handle
2		Machine control, see the relevant control operating instructions
3	 5  8  12	Connection socket, 5-pole/8-pole/12-pole (depending on variant) 5-pole: Standard TIG torch control lead 8-pole: TIG Up/Down or potentiometer torch control lead 12-pole: Control lead for TIG up/down torch with display
4		Connection socket, "+" welding current • TIG: Connection for workpiece lead • MMA: Electrode holder or workpiece lead connection
5		Cooling air inlet
6		Connection socket, "-" welding current • TIG: TIG welding torch connection • MMA: Electrode holder or workpiece lead connection
7		G$\frac{1}{4}$" connecting nipple, "-" welding current Shielding gas connection (with yellow insulating cap) for TIG welding torch
8		Carrying strap > see 5.2.2 chapter

4.2 Rear view

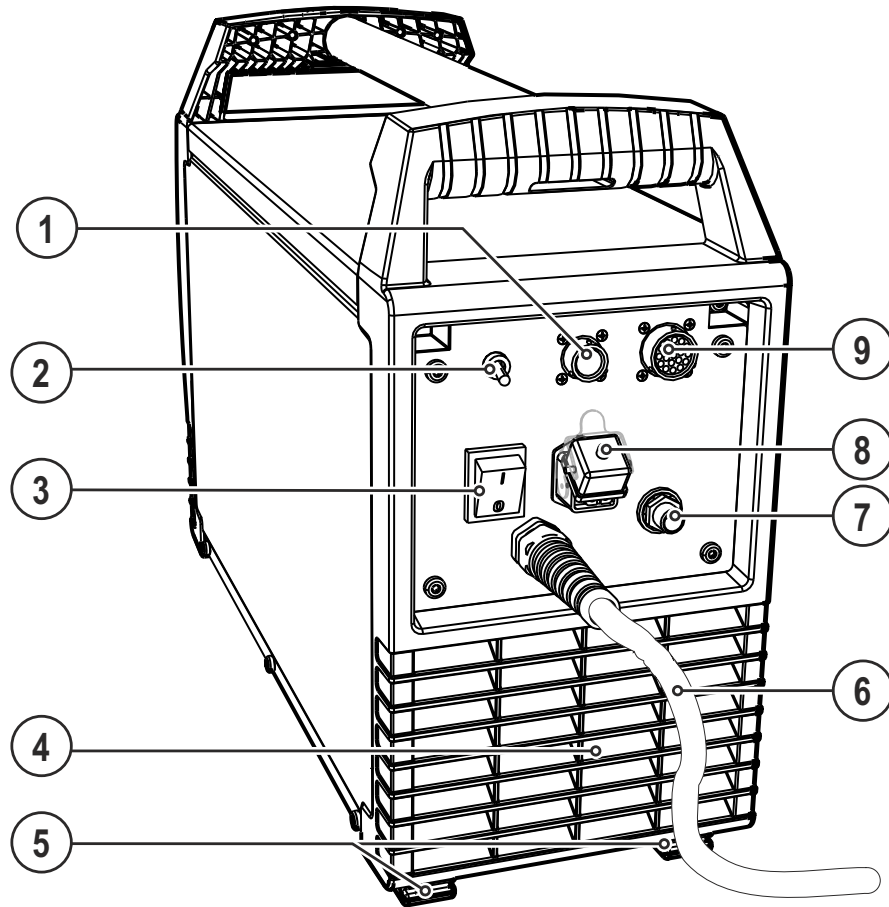


Figure 4-2

Item	Symbol	Description
1		8-pole connection socket Cooling unit control lead
2		Ignition type changeover switch > see 5.10.7 chapter ⚡ = ----- Liftarc (contact ignition) HF = ----- HF ignition
3		Main switch, machine on/off
4		Cooling air outlet
5		Machine feet
6		Mains connection cable > see 5.6 chapter
7		G$\frac{1}{4}$" connecting nipple Shielding gas connection on the pressure regulator.
8		4-pole connection socket Cooling unit voltage supply
9		Connection socket, 19-pole Remote control connection

4.3 Machine control – Operating elements

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

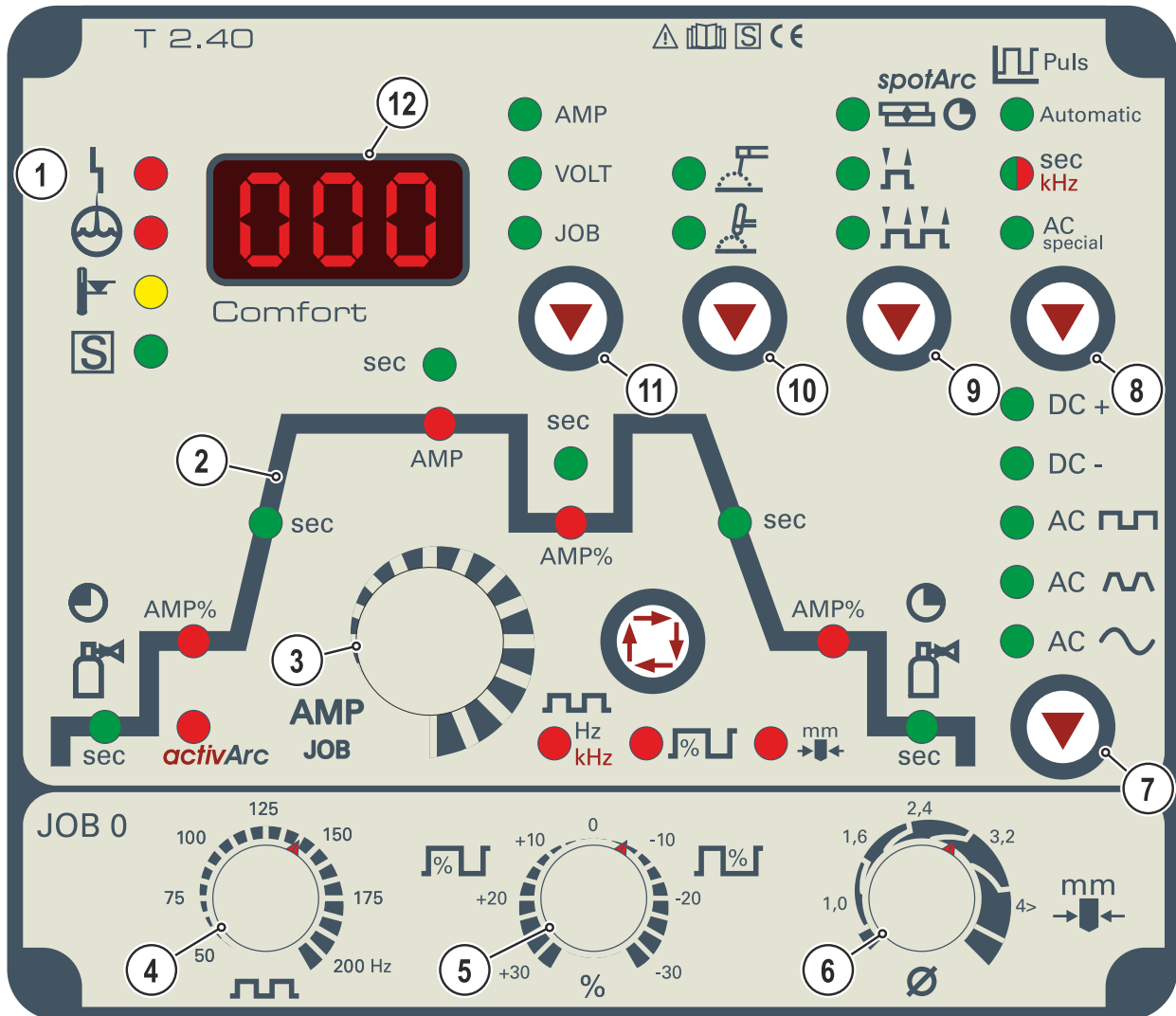


Figure 4-3

Item	Symbol	Description
1		Error/status indicators ⚡----- Collective interference signal light > see 7.2 chapter ☉----- Water deficiency signal light (welding torch cooling) 🔥----- Excess temperature signal light Ⓢ----- safety sign signal light
2		Functional sequence > see 4.3.1 chapter
3		Welding parameter setting rotary dial Setting currents, times and parameters.
4		Alternating current frequency (TIG AC) rotary dial
5		Alternating current balance (TIG AC) rotary dial
6		Tungsten electrode diameter/Ignition optimisation rotary dial

Item	Symbol	Description
7		<p>Welding current polarity button</p> <p>DC +----- Direct current welding with positive polarity on the electrode holder in relation to the workpiece (pole reversal switch, MMA only).</p> <p>DC ------ DC welding with negative polarity on the torch (or stick electrode holder) in relation to the workpiece.</p> <p>AC ----- Alternating current welding with rectangular current output wave form. Maximum power loading and safe welding.</p> <p>AC ----- Alternating current welding with trapezoidal current output wave form. The all-rounder for most applications.</p> <p>AC ----- Alternating current welding with sinusoidal current output wave form. Low noise level.</p>
8		<p>Pulsing push-button</p> <p>Automatic -- TIG automated pulsing (frequency and balance)</p> <p>sec kHz ----- Signal light lights up in green: Pulsing (thermal pulsing)/MMA pulse welding</p> <p>sec kHz ----- Signal light lights up in red: kHz pulsing (metallurgical pulsing)</p> <p>AC special----- Special TIG AC</p>
9		<p>Operating mode / Power-saving mode button</p> <p><i>spotArc</i></p> <p> -- spotArc / spotmatic (spot time setting range)</p> <p> ----- Non-latched</p> <p> ----- Latched</p> <p>Press for 3 s to put machine into power-saving mode. To reactivate, activate one of the operating elements > see 5.13.2 chapter.</p>
10		<p>Welding procedure push-button</p> <p> ----- MMA welding</p> <p> ----- TIG welding</p>
11		<p>Switch display / JOB number button</p> <p>AMP ----- Welding current display</p> <p>VOLT ----- Welding voltage display</p> <p>kW ----- Welding performance display (Signal light AMP and VOLT lit simultaneously)</p> <p>JOB ----- Display and select JOB number</p>
12		Display, 3-digit

4.3.1 Function sequence

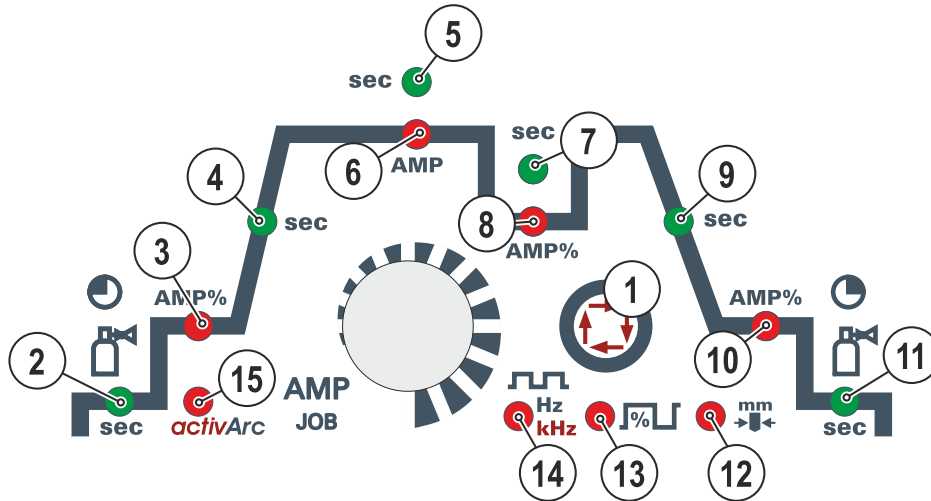


Figure 4-4

Item	Symbol	Description
1		Select welding parameters button This button is used to select the welding parameters depending on the welding process and operating mode used.
2		Gas pre-flow time signal light \overline{GPr}
3	AMP%	Signal light Ignition current $\overline{I_{5E}}$ (TIG)/hot start current $\overline{I_{hE}}$ (MMA)
4	sec	Signal light Up-slope time $\overline{t_{UP}}$ (TIG)/hot start time $\overline{t_{hE}}$ (MMA)
5	sec	Pulse time
		<table border="0"> <tr> <td>TIG pulses The pulse time applies to the main current phase (AMP) for pulses.</td> <td>TIG AC Special The pulse time applies to the AC phase for AC special.</td> </tr> </table>
TIG pulses The pulse time applies to the main current phase (AMP) for pulses.	TIG AC Special The pulse time applies to the AC phase for AC special.	
6	AMP	Main current (TIG) / pulse current I min to I max (1 A increments)
		Main current (MMA) I min to I max (1 A increments)
7	sec	Pulse break time
		<table border="0"> <tr> <td>TIG pulses The pulse break time applies to the secondary current phase (AMP%)</td> <td>TIG AC Special The pulse break time applies to the DC phase with AC special.</td> </tr> </table>
TIG pulses The pulse break time applies to the secondary current phase (AMP%)	TIG AC Special The pulse break time applies to the DC phase with AC special.	
8	AMP%	Secondary current / pulse pause current
9	sec	Down-slope time $\overline{t_{dN}}$ signal light
10	AMP%	End-crater current signal light
11		Gas post-flow time \overline{GPE}
12		Electrode diameter signal light \overline{ndR} Ignition optimisation (TIG)/tungsten balling basic setting
13	+ Balance - 	Balance signal light \overline{BAL} AC balance (JOB 1–7), pulse balance or amplitude balance
14		Signal light, two colour \overline{FFE} Green: AC frequency (TIG)/pulse frequency (MMA) Red: Pulse frequency (TIG, kHz pulsing)
15	activArc	activArc TIG welding process <ul style="list-style-type: none"> Switch activArc \overline{ON} <> \overline{OFF} Correct the activArc characteristic (setting range: 0 to 100)

5 Design and function

5.1 General

WARNING



Risk of injury from electric shock!

Contact with live parts, e.g. welding current sockets, is potentially fatal!

- Follow safety instructions on the opening pages of the operating instructions.
- Commissioning may only be carried out by persons who have the relevant expertise of working with arc welding machines!
- Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off!

5.2 Transport and installation

WARNING



Risk of accident due to improper transport of machines that may not be lifted!
Do not lift or suspend the machine! The machine can fall down and cause injuries! The handles and brackets are suitable for transport by hand only!

- The machine may not be lifted by crane or suspended!



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!***

5.2.1 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.***



Unusually high quantities of dust, acid, corrosive gases or substances may damage the equipment.

- ***Avoid high volumes of smoke, vapour, oil vapour and grinding dust!***
- ***Avoid ambient air containing salt (sea air)!***

5.2.1.1 In operation

Temperature range of the ambient air:

- -25 °C to +40 °C

Relative air humidity:

- Up to 50% at 40 °C
- Up to 90% at 20 °C

5.2.1.2 Transport and storage


Storage in an enclosed space, temperature range of the ambient air:

- -30 °C to +70 °C

Relative air humidity

- Up to 90% at 20 °C

5.2.2 Adjusting the length of the carrying strap

-  To demonstrate adjustment, lengthening the strap is shown in the figure. To shorten, the strap's loops must be inched in the opposite direction.

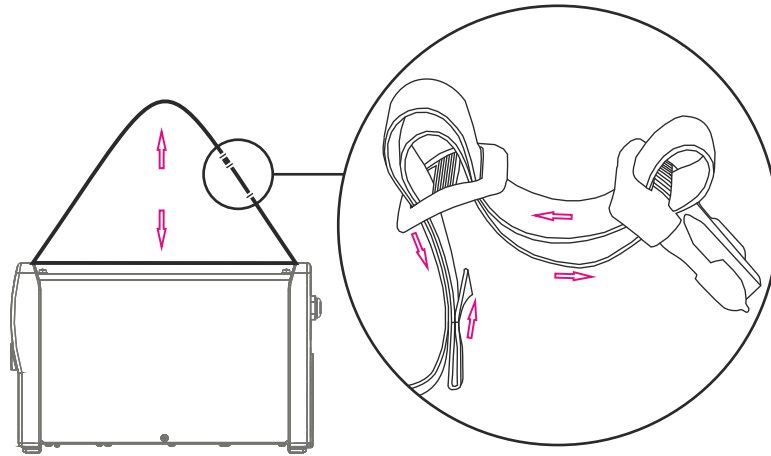


Figure 5-1

5.3 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!

5.4 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, rust) these connections and leads can heat up and cause burnings when touched.

- Check welding current connections on a daily basis and lock by turning to the right, when required.
- Thoroughly clean workpiece connection and secure properly. Do not use construction parts of the workpiece as welding current return lead!

5.5 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).**

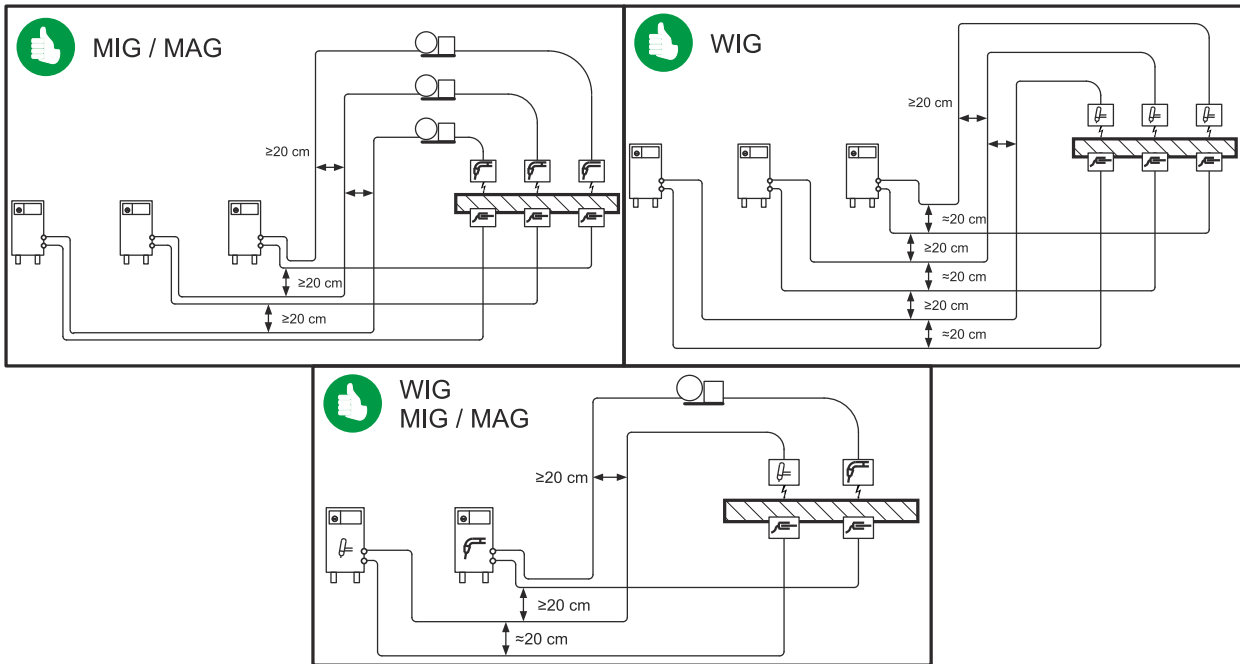


Figure 5-2

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

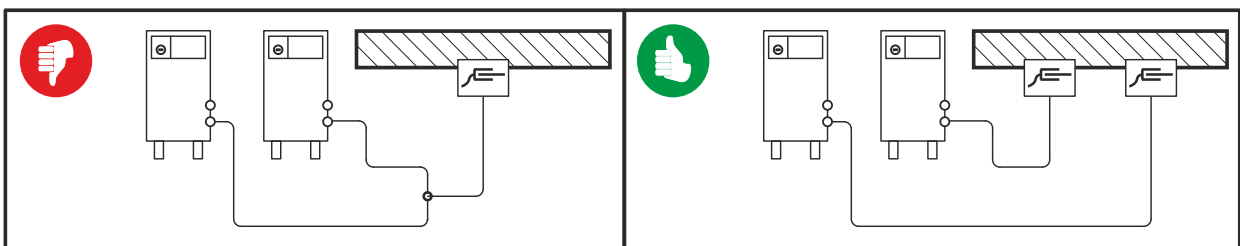


Figure 5-3

- 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.**

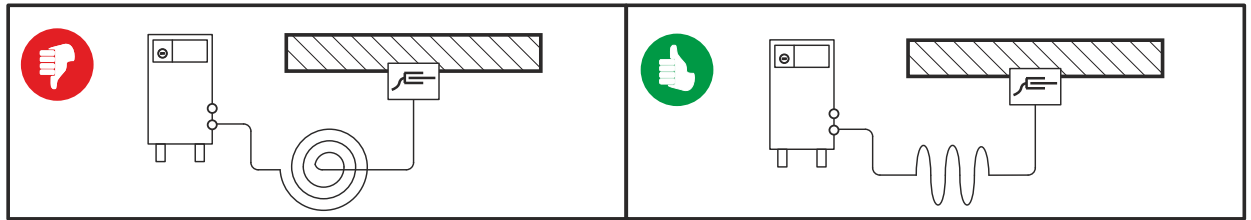


Figure 5-4

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

- **Make sure all welding leads are securely connected and check regularly.**
- **Always ensure a proper and secure electrical connection to the workpiece!**
- **Set up, attach or suspend all conductive power source components like casing, transport vehicle and crane frames so they are insulated!**
- **Do not place any other electronic devices such as drillers or angle grinders, etc., 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!**

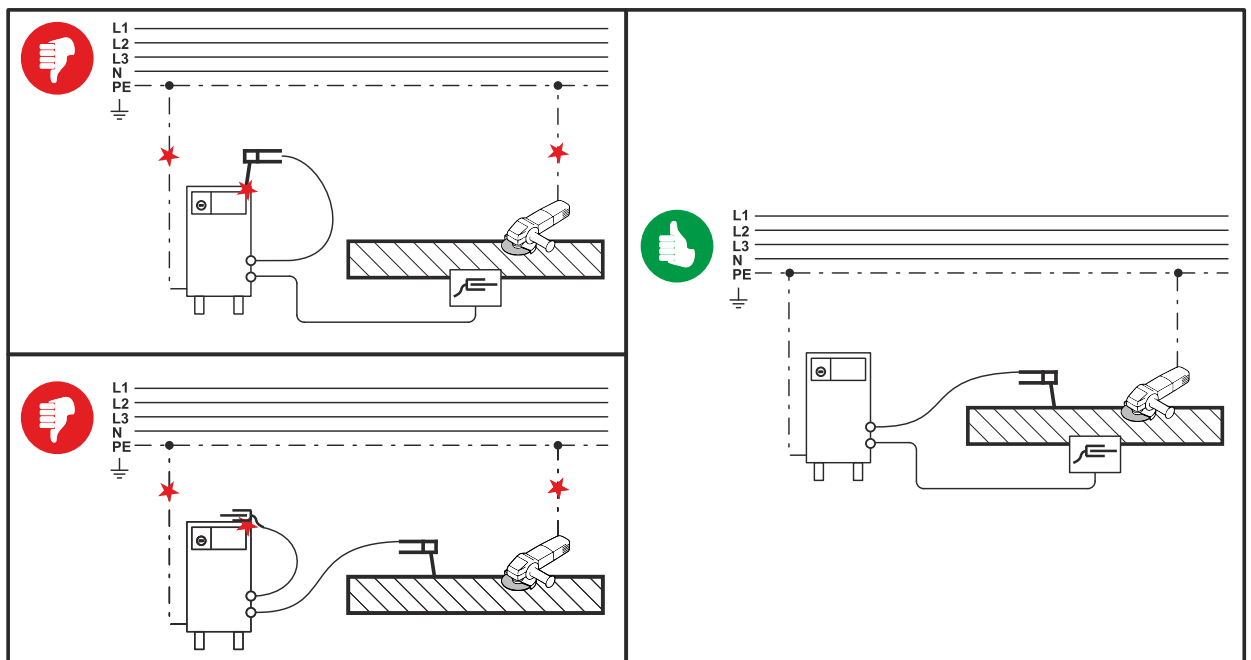


Figure 5-5

5.6 Mains connection

DANGER



Hazard caused by improper mains connection!

An improper mains connection can cause injuries or damage property!

- Only use machine with a plug socket that has a correctly fitted protective conductor.
- If a mains plug must be fitted, this may only be carried out by an electrician in accordance with the relevant national provisions or regulations!
- Mains plug, socket and lead must be checked regularly by an electrician!
- When operating the generator always ensure it is earthed as stated in the operating instructions. The resulting network has to be suitable for operating devices according to protection class 1.

5.6.1 Mains configuration

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

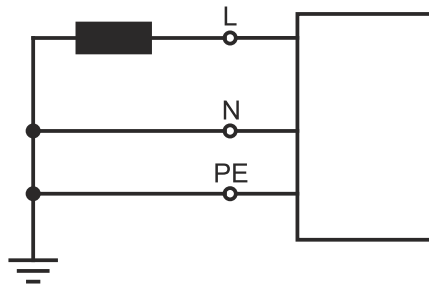


Figure 5-6

Legend

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

The operating voltage shown on the rating plate must be consistent with the mains voltage, in order to avoid damage to the machine > see 8 chapter!

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

5.7 Welding torch cooling system

5.7.1 Welding torch cooling unit connection

Please note the relevant documentation of the accessory components.

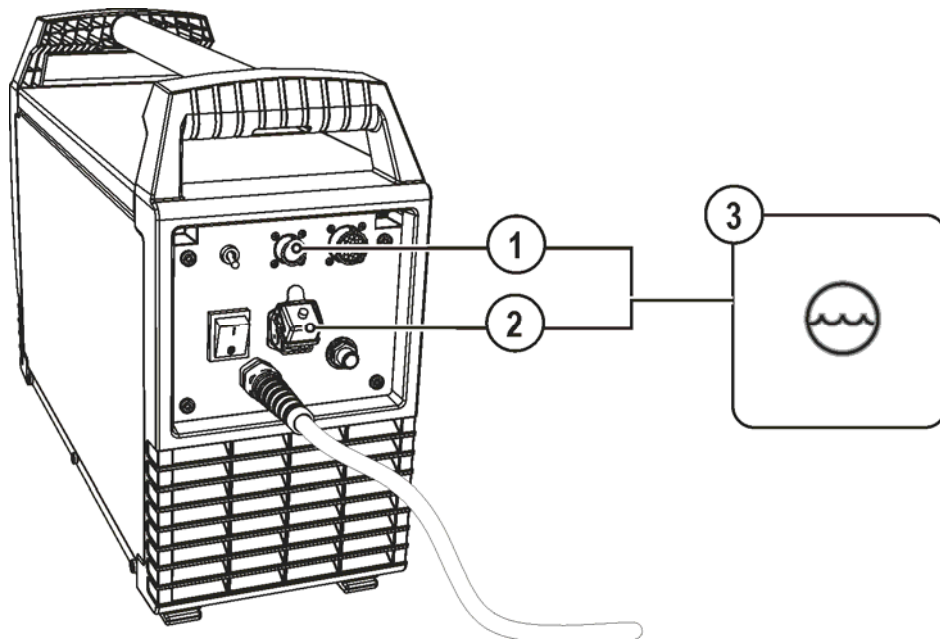


Figure 5-7

Item	Symbol	Description
1		8-pole connection socket Cooling unit control lead
2		4-pole connection socket Cooling unit voltage supply
3		Cooling module

Control and supply lead to the welding machine

The cooling module and welding machine are connected using two leads.

- Insert the control lead plug on the welding machine.
- Insert the power supply lead plug on the welding machine.

5.8 Welding data display

The following welding parameters can be displayed before (nominal values), during (actual values) or after welding (hold values):

Parameter	Nominal values	Actual values	Hold values
Welding current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Welding voltage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding power	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

When the hold values are displayed after welding and the settings are then changed (e.g. welding current), the display will switch to the relevant nominal values.

not possible

possible

5.9 TIG welding

5.9.1 Welding torch and workpiece line connection

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

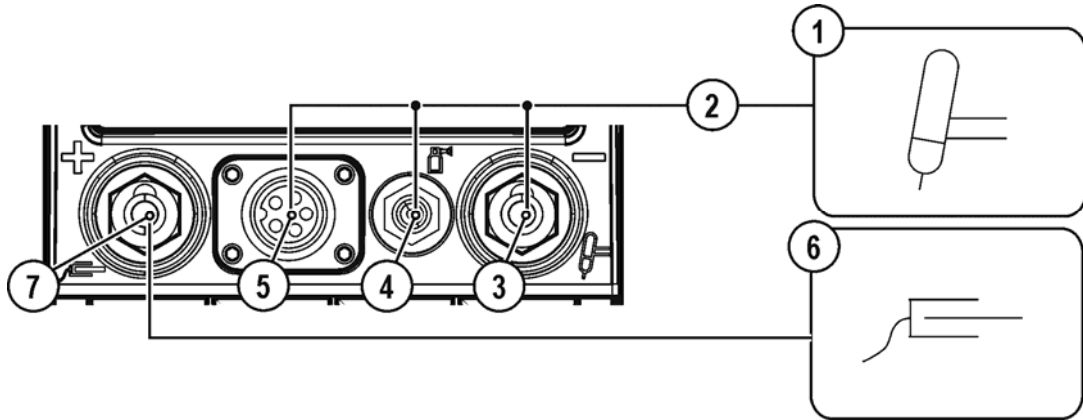


Figure 5-8

Item	Symbol	Description
1		Welding torch
2		Welding torch hose package
3		Connection socket, "-" welding current Welding current lead connection for TIG welding torch
4		G$\frac{1}{4}$" connecting nipple TIG welding torch shielding gas connection
5	5 8 12	Connection socket, 5-pole/8-pole/12-pole (depending on variant) 5-pole: Standard TIG torch control lead 8-pole: TIG Up/Down or potentiometer torch control lead 12-pole: Control lead for TIG up/down torch with display
6		Workpiece
7		Connection socket for "+" welding current Workpiece lead connection

- 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.
- Insert the welding torch control lead plug into the connection socket for the welding torch control lead (5-pole with standard torch, 8-pole with up/down or potentiometer torch and 12-pole with up/down torch with LED display) and tighten.
- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

If fitted:

- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings: Return line red to quick connect coupling, red (coolant return) and supply line blue to quick connect coupling, blue (coolant supply).

5.9.1.1 Torch connection options and pin assignments

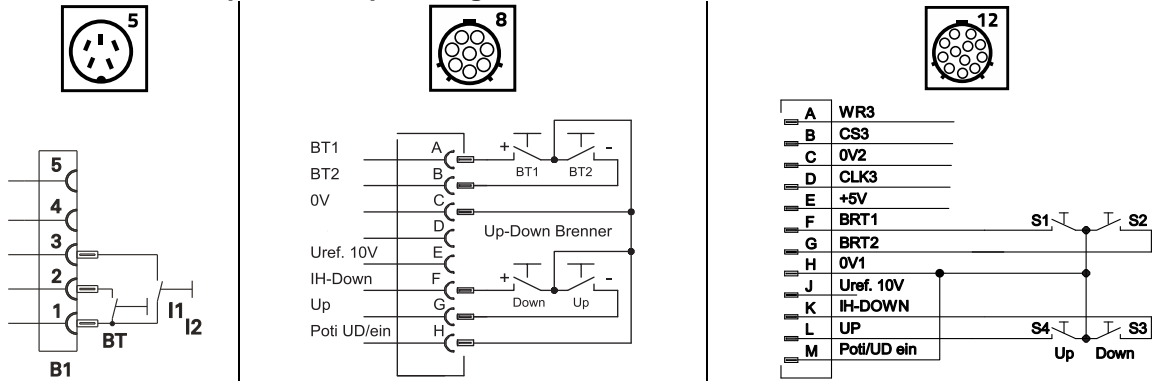


Figure 5-9

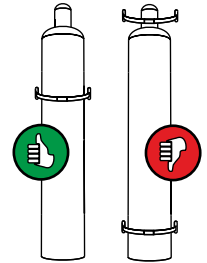
5.10 Shielding gas supply (shielding gas cylinder for welding machine)

⚠ 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!

- Place shielding gas cylinder into the designated holder and secure with fastening elements (chain/belt)!
- Attach the fastening elements within the upper half of the shielding gas cylinder!
- The fastening elements must tightly enclose the shielding gas cylinder!



👉 **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.**

👉 **Before connecting the pressure regulator to the gas cylinder, open the cylinder valve briefly to expel any dirt.**

5.10.1 Connecting the shielding gas supply

- Place the shielding gas cylinder into the relevant cylinder bracket.
- Secure the shielding gas cylinder using a securing chain.

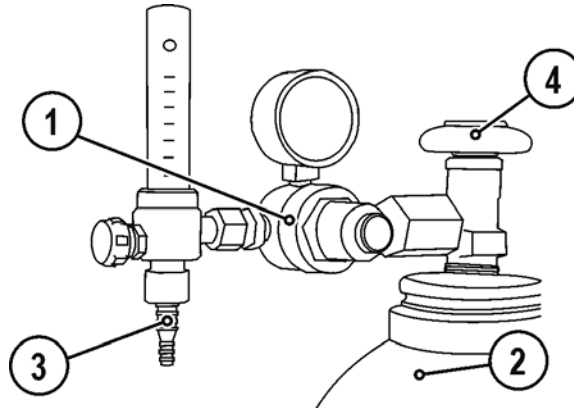


Figure 5-10

Item	Symbol	Description
1		Pressure regulator
2		Shielding gas cylinder
3		Output side of the pressure regulator
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 gas hose connection crown nut onto the output side of the pressure regulator.

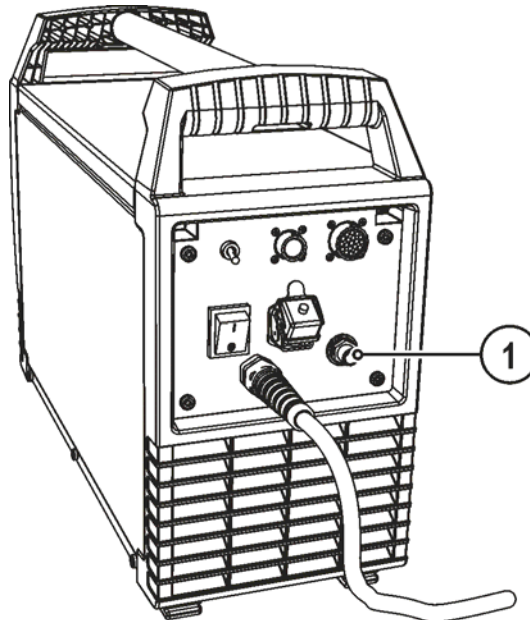


Figure 5-11

Item	Symbol	Description
1		Connecting nipple G $\frac{1}{4}$ ", shielding gas connection

- Connect crown nut of the shielding gas line to the G $\frac{1}{4}$ " connecting nipple.

5.10.2 Gas test – setting the shielding gas volume

CAUTION



Electric shocks!

When setting the shielding gas quantity, high voltage ignition pulses or open circuit voltage are applied at the welding torch; these can lead to electric shocks and burning on contact.

- Keep the welding torch electrically insulated from persons, animals or equipment during the setting procedure.

- Press the torch trigger and set the shielding gas quantity with the flow gauge of the pressure regulator.



Rule of thumb for the gas flow rate:

Diameter of gas nozzle in mm corresponds to gas flow in l/min.

Example: 7mm gas nozzle corresponds to 7l/min gas flow.



Incorrect shielding gas setting!

- **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!**

5.10.3 Welding task selection

The tungsten electrode diameter setting has a direct effect on the machine functions. The set value should correspond to the tungsten electrode diameter. Obviously, the value can also be adjusted to different needs.

The following welding task is an example of use:

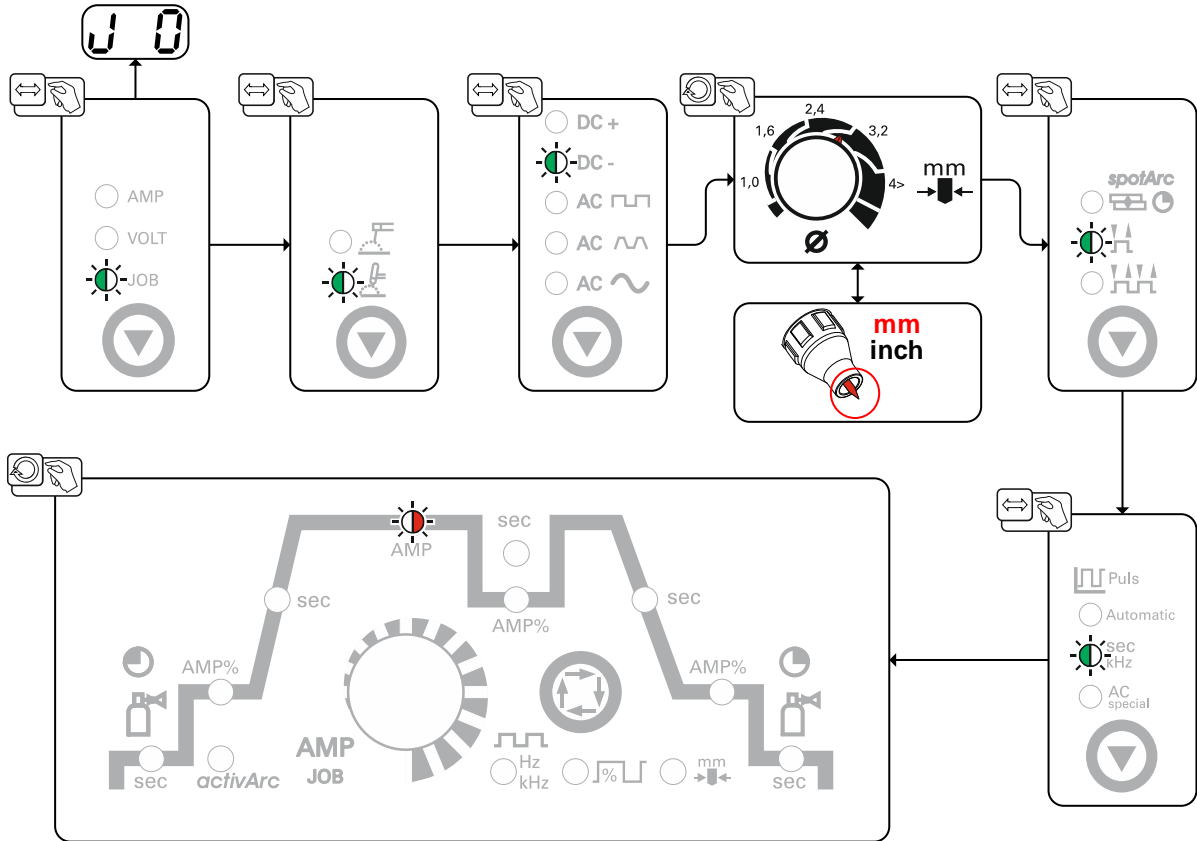


Figure 5-12



Note the differences between JOB 0 and JOBS 1 to 7:

The parameter values for AC frequency, AC balance and Tungsten electrode diameter/optimisation of ignition are set with the respective rotary dials in JOB 0. In JOBS 1 to 7, this setting takes place in the function sequence (signal lights with the same names show the selection).

5.10.3.1 Recurring welding tasks (JOB 1–7)

The user has 7 more memory locations at their disposal to save recurring or different welding tasks on a permanent basis. To do so, simply select the required memory location (JOB 1–7) and the welding task is set as described previously.

The three rotary knobs for AC frequency, AC balance and the tungsten electrode diameter are exceptions. These settings are made in the operation sequence (signal lights with same name).

Switching a JOB is only possible if no welding current flows. Up-slope and down-slope times can be set individually for latched and non-latched operation.

Selection

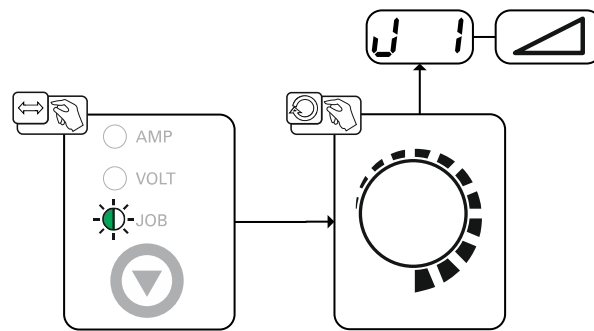


Figure 5-13

When one or more of the recurring welding tasks (JOB 1–7) has been selected the JOB signal light comes on.

5.10.3.2 Welding parameter setting

The parameters that can be set in the function sequence of the machine control depend on the selected welding task. This means that if for example you have not selected a pulse variant, then you cannot set any pulse times in the function sequence.

5.10.4 Optimising the ignition characteristics for pure tungsten electrodes

The best ignition and stabilisation of the arc (DC, AC) and optimum spherical cup formation in the tungsten electrode depend on the electrode diameter being used.

The set value should correspond to the diameter of the tungsten electrode. The value can of course be adjusted in line with different requirements.

5.10.4.1 Manual, standard operation (JOB 0)

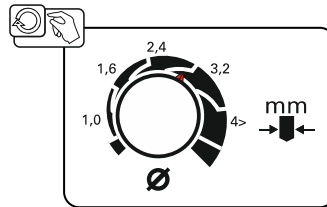


Figure 5-14

5.10.4.2 JOB operation (JOB 1 to 7)

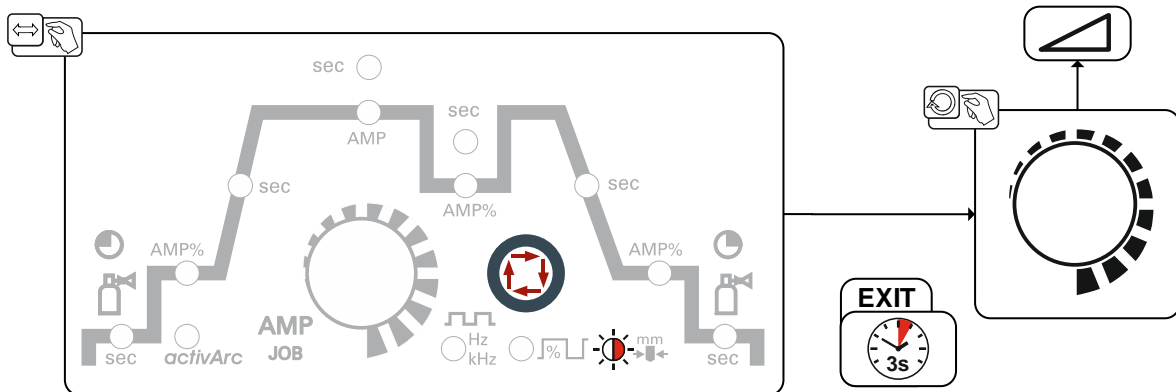


Figure 5-15

5.10.5 Optimal and fast spherical cup formation

Tungsten balling ensures optimum ignition and welding results for AC welding.

A prerequisite for optimum tungsten balling is a sharpened electrode (approx. 15–25°).

Tungsten balling should be performed on a test component as surplus tungsten may be melted and this may lead to impurities on the weld seam.

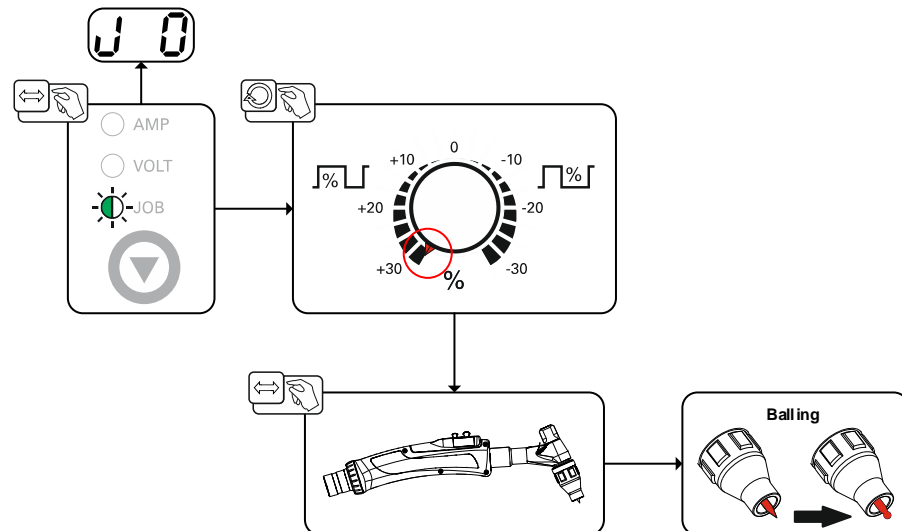


Figure 5-16

- Turn balance setting in JOB 0 to the left stop position (positive).
- Ignite arc with HF start (no contact) and form required tungsten balling for the application in question.
- The end of this process is determined by the user.

5.10.6 Automatic AC frequency

5.10.6.1 Manual, standard operation (JOB 0)

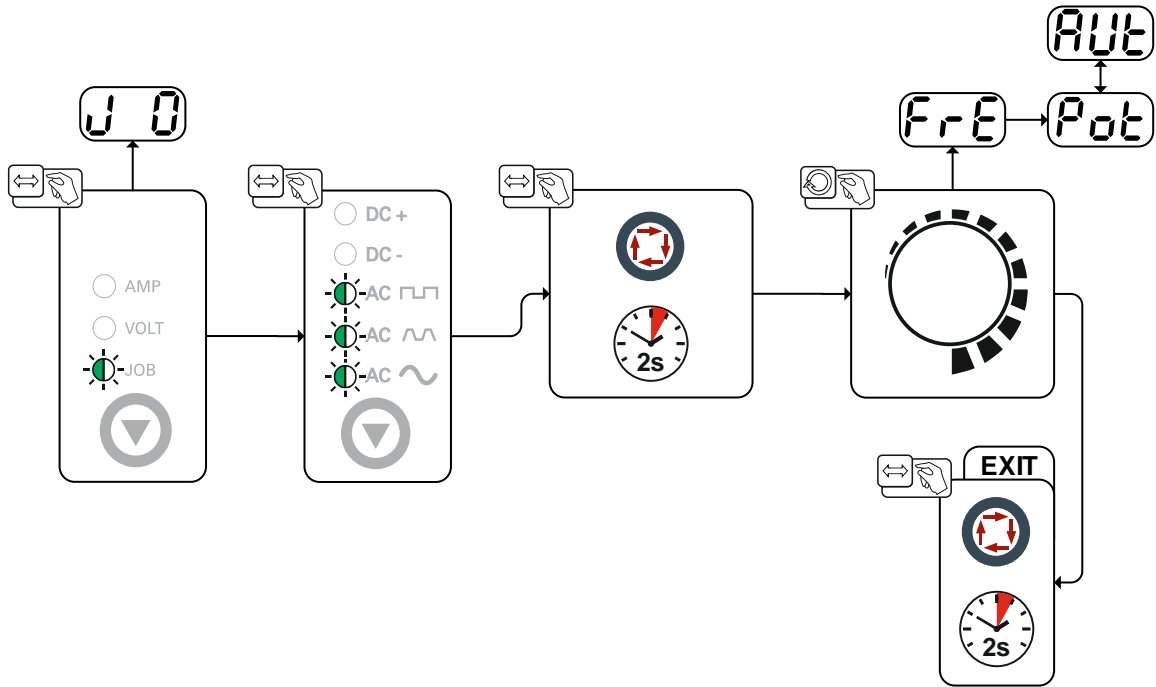


Figure 5-17

Display	Setting/selection
FrE	AC frequency (AC)
AUT	Automatic frequency Function enabled
Pot	Setting via potentiometer Function disabled

The AC frequency rotary knob is now without function. If it is turned nevertheless, the alternate flashing of parameters FrE and AUt on the control display shows the active function. To deactivate the AC frequency automatic, turn the rotary knob to "Pot".

5.10.6.2 JOB operation (JOB 1 to 7)

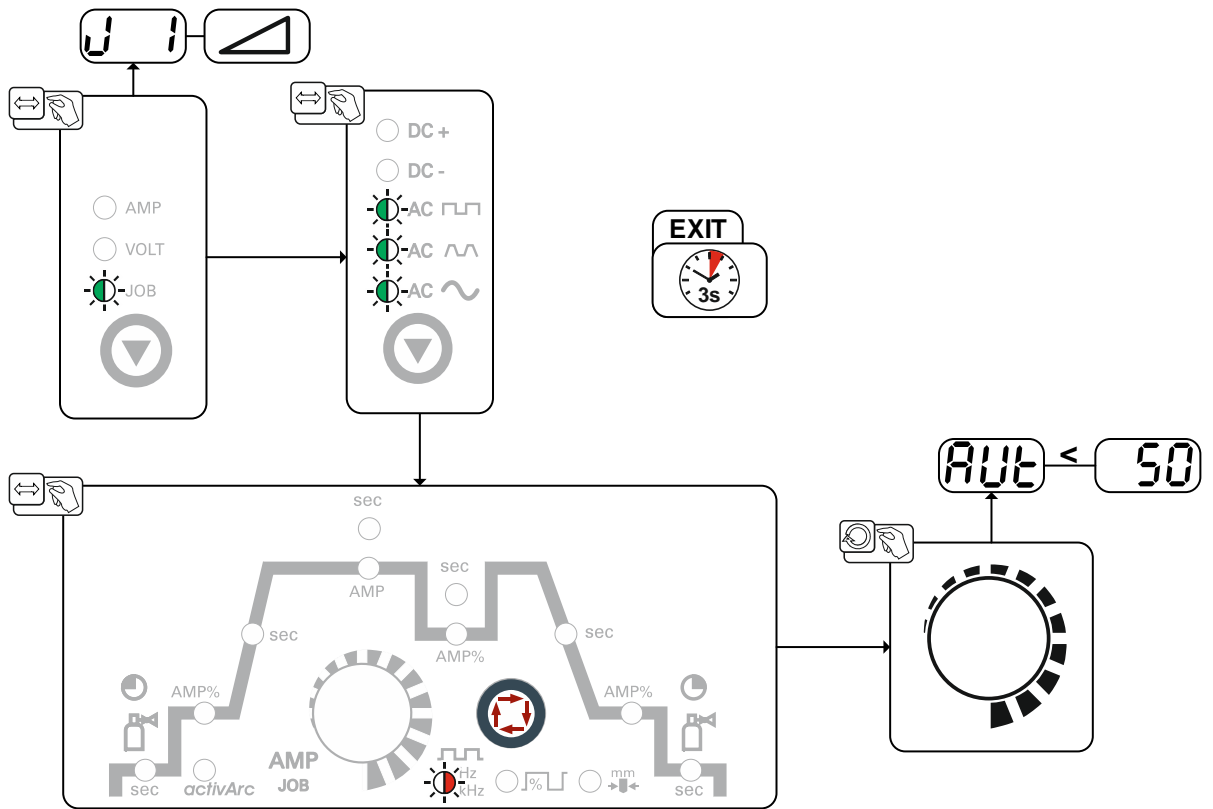


Figure 5-18

Display	Setting/selection
AUT	Automatic frequency Function enabled

5.10.7 Arc ignition

The ignition type can be set at the ignition type changeover switch > see 5.10.7 chapter.

5.10.7.1 HF ignition

The ignition energy can be adjusted, if required > see 5.15 chapter.

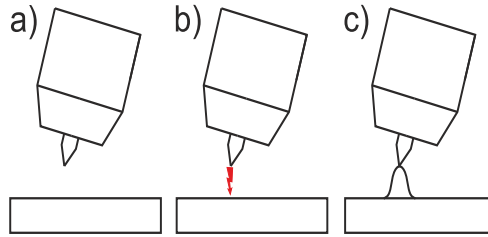


Figure 5-19

The arc is started without contact from high-voltage ignition pulses.

- Position the welding torch in welding position over the workpiece (distance between the electrode tip and workpiece should be approx. 2-3mm).
- Press the torch trigger (high voltage ignition pulses ignite the arc).
- Ignition current flows, and the welding process is continued depending on the operating mode selected.

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

5.10.7.2 Liftarc

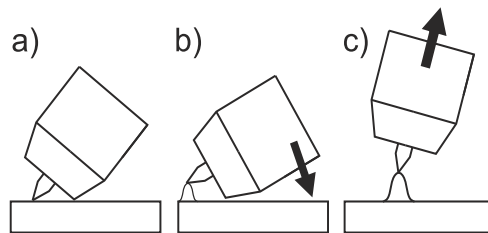


Figure 5-20

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.

5.10.7.3 Automatic cut-out




















The automatic cut-out function will be triggered by two conditions during the welding process:

- During the ignition phase (ignition fault) If there is no welding current within 3s after starting the welding.**
- During the welding phase (arc interruption) If the arc is interrupted for longer than 3s.**

In both cases, the welding machine ends the ignition or welding process immediately.

5.10.8 Function sequences/operating modes

5.10.8.1 Explanation of symbols

Symbol	Meaning
	Press torch trigger 1
	Release torch trigger 1
I	Current
t	Time
  GPF	Gas pre-flows
	Ignition current
	Up-slope time
	Spot time
 AMP	Main current (minimum to maximum current)
 AMP%	Secondary current
	Pulse time
	Pulse pause time
	Down-slope time
	End-crater current
  GPE	Gas post-flows
	Balance
	Frequency

5.10.8.2 Non-latched mode

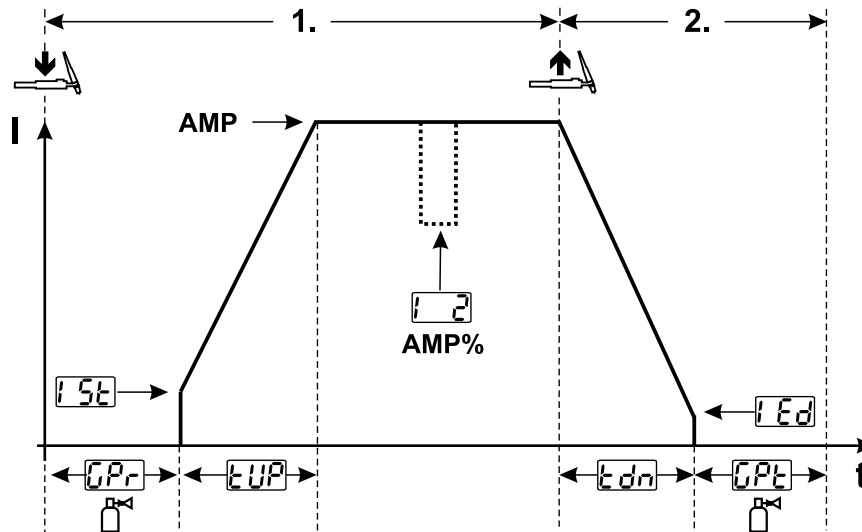


Figure 5-21

1st cycle:

- Press torch trigger 1 and hold down.
- Gas pre-flow time GPr elapses.
- HF ignition pulses jump from the electrode to the workpiece. The arc ignites.
- The welding current flows and immediately assumes the value of the ignition current I_{St} .
- HF switches off.
- The welding current ramps up to the main current I (AMP) in the selected up-slope time tUP .

If torch trigger 2 is pressed together with torch trigger 1 during the main current phase, the welding current decreases to the secondary current I_2 (AMP%).

If torch trigger 2 is released, the welding current increases again to the main current AMP.

2nd cycle:

- Release torch trigger 1.
- The main current falls to the end-crater current I_{Ed} (minimum current) in the set down-slope time tDN .

If the 1st torch trigger is pressed during the down-slope time, the welding current returns to the set main current AMP.

- Main current reaches the end-crater current I_{Ed} ; the arc is extinguished.
- Set gas post-flow time GPE elapses.



When the foot-operated remote control RTF is connected, the machine switches automatically to non-latched operation.

The up- and down-slopes are switched off.

5.10.8.3 Latched mode

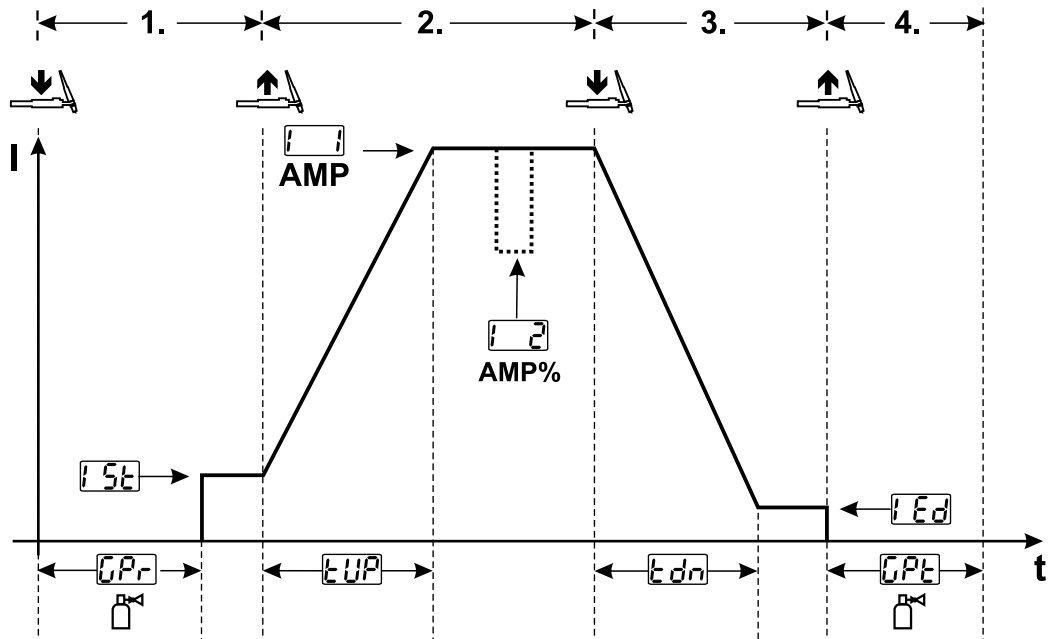


Figure 5-22

1st cycle

- Press torch trigger 1; gas pre-flow time t_{Pr} elapses.
- HF ignition pulses jump from the electrode to the workpiece. The arc ignites.
- Welding current flows and immediately assumes the set ignition current I_{St} (search arc at minimum setting). HF switches off.

2nd cycle

- Release torch trigger 1.
- The welding current ramps up to the main current I (AMP) in the selected up-slope time t_{UP} .

Switching from the main current AMP to secondary current I_2 (AMP%):

- Press torch trigger 2 or
- Tap torch trigger 1 (torch modes 1–4).

3rd cycle

- Press torch trigger 1.
- The main current decreases to the end-crater current I_{Ed} within the set down-slope time t_{dn} .

4th cycle

- Release torch trigger 1; arc is extinguished.
- Set gas post-flow time t_{PE} runs.

Ending the welding process immediately without a down-slope or end-crater current:

- Press the 1st torch trigger briefly > 3rd and 4th cycles (torch modes 11–14).
Current drops to zero and the gas post-flow time begins.



**When the foot-operated remote control RTF is connected, the machine switches automatically to non-latched operation.
The up- and down-slopes are switched off.**



A double-digit torch mode (11-x) needs to be set at the welding machine control to use the alternative welding start (tapping start). The number of torch modes available depends on the machine type.

5.10.8.4 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.

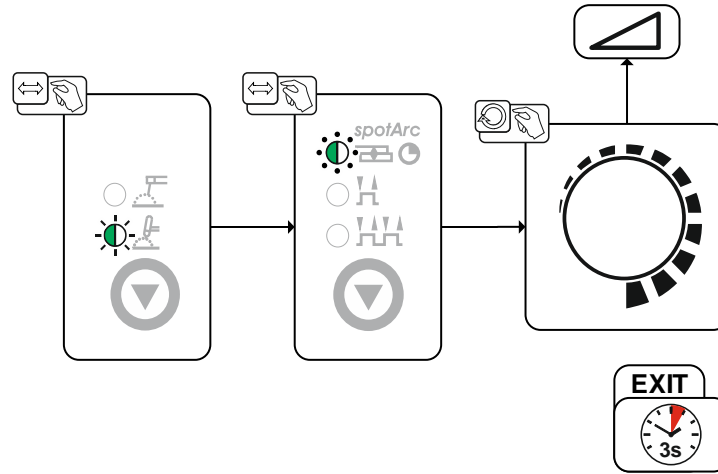


Figure 5-23

The up-slope and down-slope times should be set to “0” to achieve an effective result.

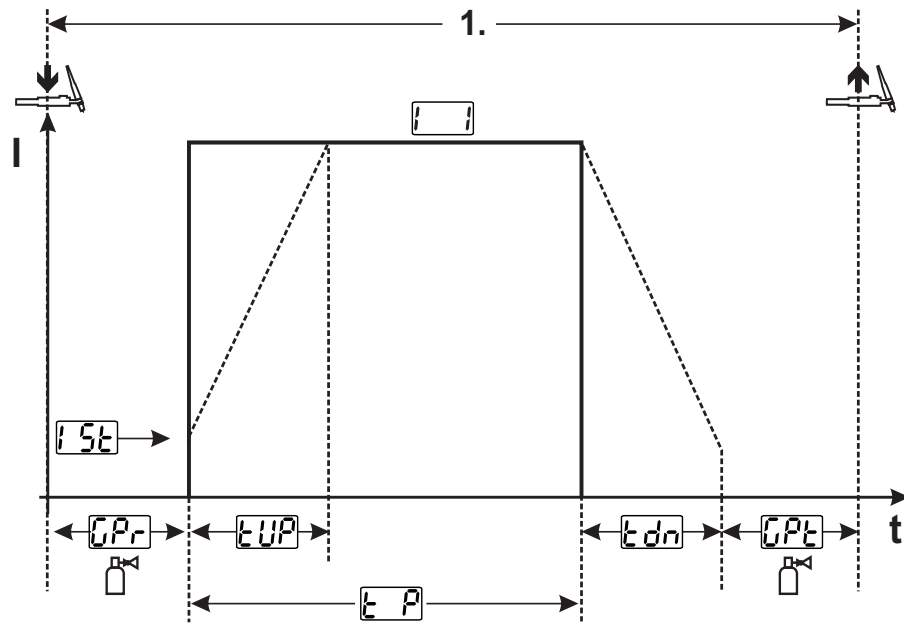


Figure 5-24

As an example the process is shown with HF ignition. Arc ignition with lift arc is also possible, however > see 5.10.7 chapter.

Sequence:

- Press torch trigger and hold down.
- The gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece. The arc ignites. The welding current flows and immediately assumes the value of the ignition current I_{St}
- HF switches off.
- The welding current ramps up to the main current I (AMP) in the selected up-slope time. The process ends when the set spotArc.time elapses or by releasing the torch trigger.

When switching on the spotArc function, Automatic pulsing is switched on as well. Any other pulsing variant can be selected as well, or no pulsing at all.

5.10.8.5 spotmatic

This function must be enabled before use > see 5.15 chapter.

In contrast to the spotArc operating mode, the arc is not ignited by pressing the torch trigger as is usual, but by briefly touching the tungsten electrode against the workpiece. The torch trigger is used for welding process activation. The process can be activated separately for each spot or also on a permanent basis. The settings are defined in the machine configuration menu > see 5.15 chapter.

- Separate process activation (\overline{SET}):
The welding process has to be reactivated for every arc ignition by pressing the torch trigger. Pulsing is not possible with this process.
- Permanent process activation (\overline{ETr}):
The welding process is activated by pressing the torch trigger once. The following arc ignitions are initiated by briefly touching the tungsten electrode against the workpiece. Revoke the activation when pressing the torch trigger again. Pulsing can be selected with this process.

Selection and adjustment are made in the same way as with spotArc operating mode > see 5.10.8.4 chapter.

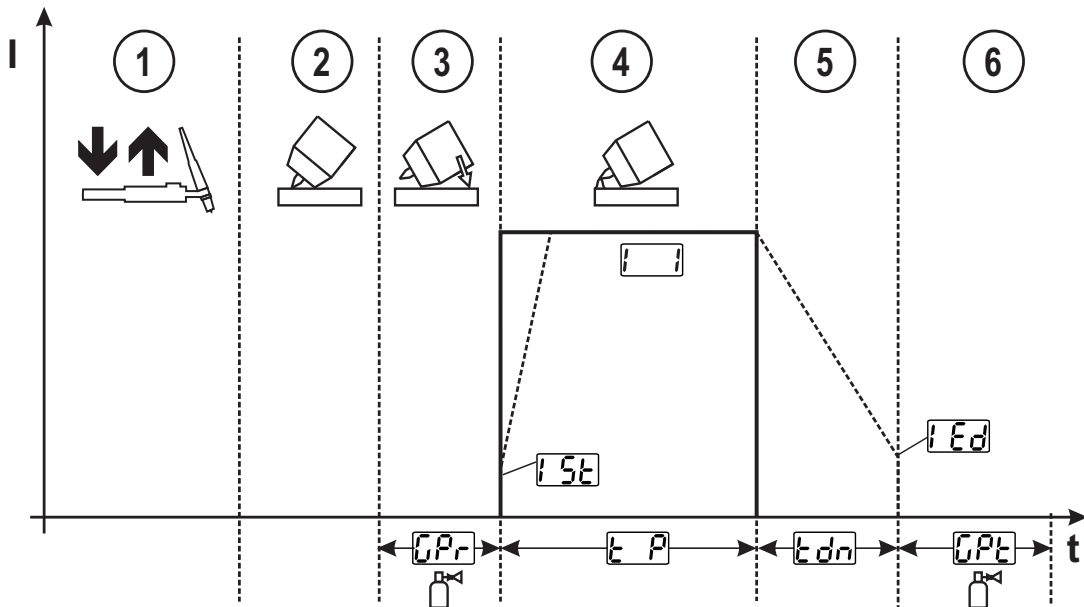


Figure 5-25

As an example the process is shown with HF ignition. Arc ignition with lift arc is also possible, however > see 5.10.7 chapter.

Selecting the process activation type for the welding process > see 5.15 chapter.

Up-slope and down-slope times possible for long spot time setting range (0.01–20.0 sec) only.

- ① Press and release torch trigger (tap) to activate the welding process.
- ② Touch the torch gas nozzle and tungsten electrode tip carefully against 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 during the set gas pre-flow time \overline{GPr} . The arc ignites and the previously set ignition current \overline{ISt} flows.
- ④ The main current phase \overline{ISt} ends when the set spotArc time \overline{EP} elapses.
- ⑤ The welding current decreases to the end current level within the set down-slope time \overline{Edn} .
- ⑥ The gas post-flow time \overline{GPE} elapses and the welding process ends.

Press and release the torch trigger (tap) to reactivate the welding process (only for separate process activation). Touching the welding torch with the tungsten electrode tip again against the workpiece will initiate the next welding processes.

5.10.9 TIG activArc welding

The EWM activArc process, thanks to the highly dynamic controller system, ensures that the power supplied is kept virtually constant in the event of changes in the distance between the welding torch and the weld pool, e.g. during manual welding. Voltage losses as a result of a shortening of the distance between the torch and molten pool are compensated by a current rise (ampere per volt - A/V), and vice versa. This helps prevent the tungsten electrode sticking in the molten pool and the tungsten inclusions are reduced. This is particularly useful in tacking and in spot welding.

Selection

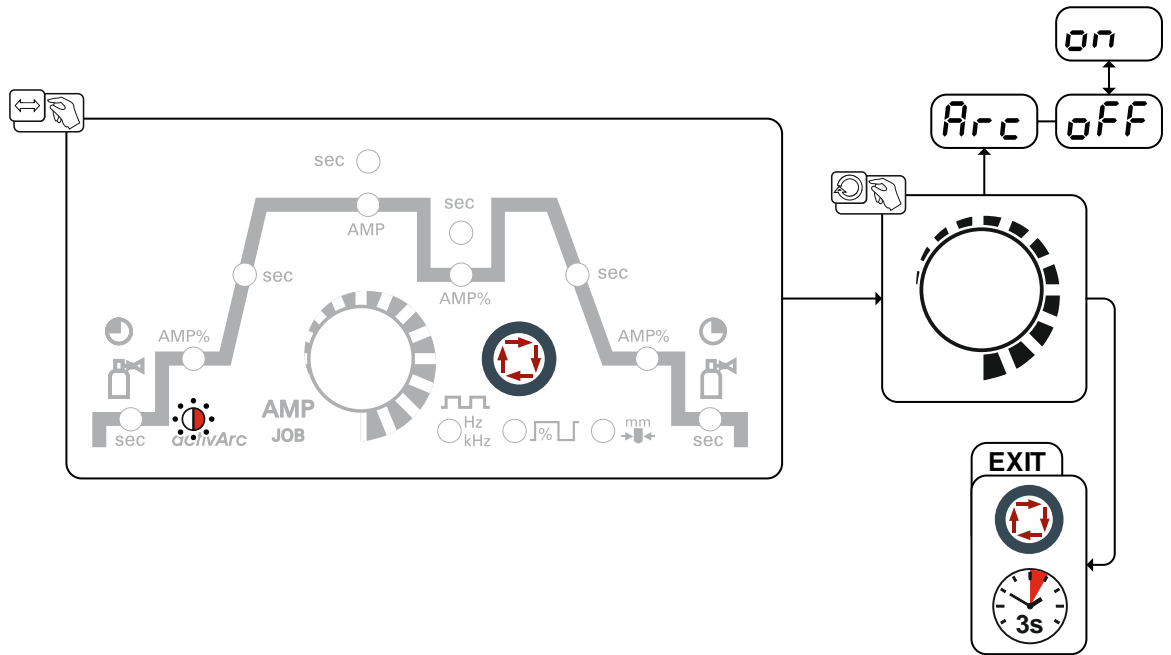


Figure 5-26

Setting

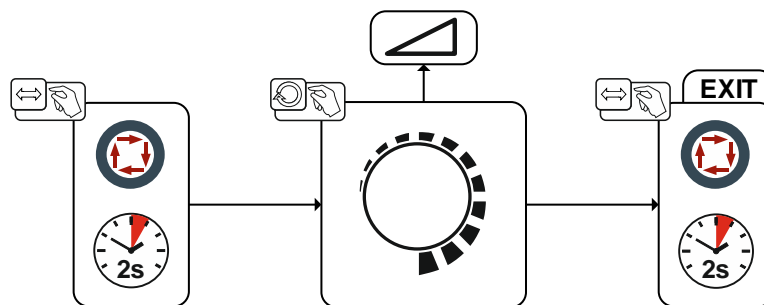


Figure 5-27

5.10.10 TIG antistick

The function prevents uncontrolled re-ignition following the sticking of the tungsten electrode in the weld pool by switching off the welding current. In addition, wear at the tungsten electrode is reduced. After triggering the function the machine immediately switches to the gas post-flow process phase. The welder starts the new process again at the first cycle. The user can switch the function on or off (parameter \overline{ERS}) > see 5.15 chapter.

5.10.11 Pulse welding

The following pulse types can be selected:

- Thermal pulsing (TIG AC or TIG DC)
- Metallurgical pulsing (TIG DC)
- Automated pulsing (TIG DC)
- AC pulsing (TIG AC)
- AC special (TIG AC)

The machines have an integrated pulse device.

With pulses, the machine switches back and forth between the pulse current (main current) and pause current (secondary current).

5.10.11.1 Thermal pulsing

The operation sequences with thermal pulses basically match the standard welding sequences, but there is an additional switching back and forth between pulse and pause currents at the relevant times.

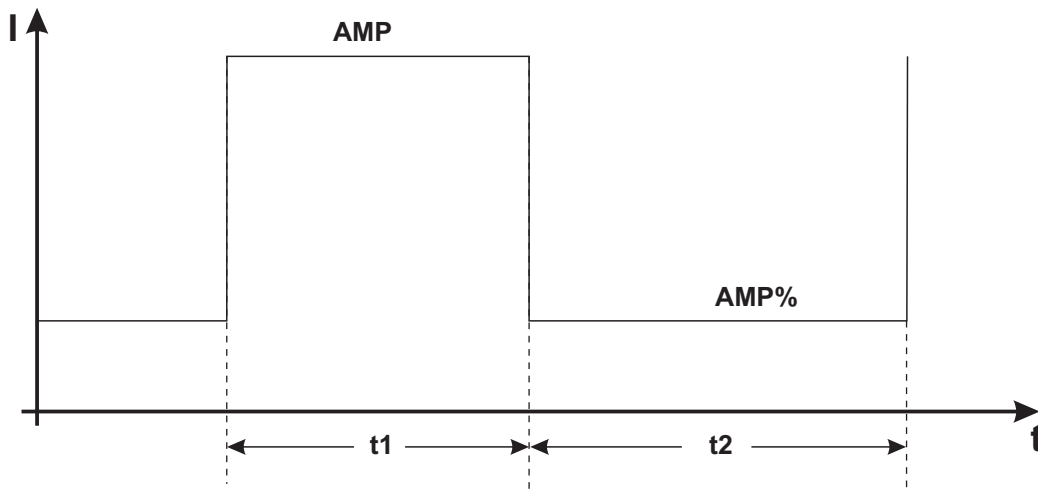


Figure 5-28

TIG pulses – non-latched operation

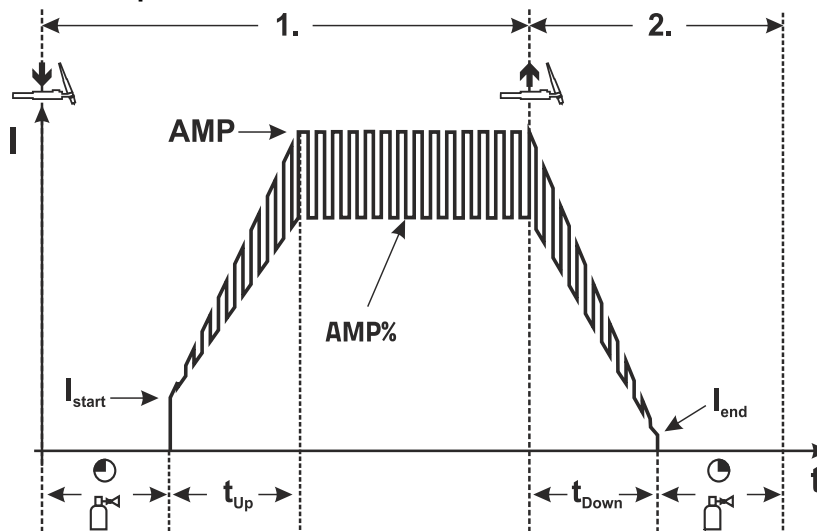


Figure 5-29

TIG pulses - latched operation

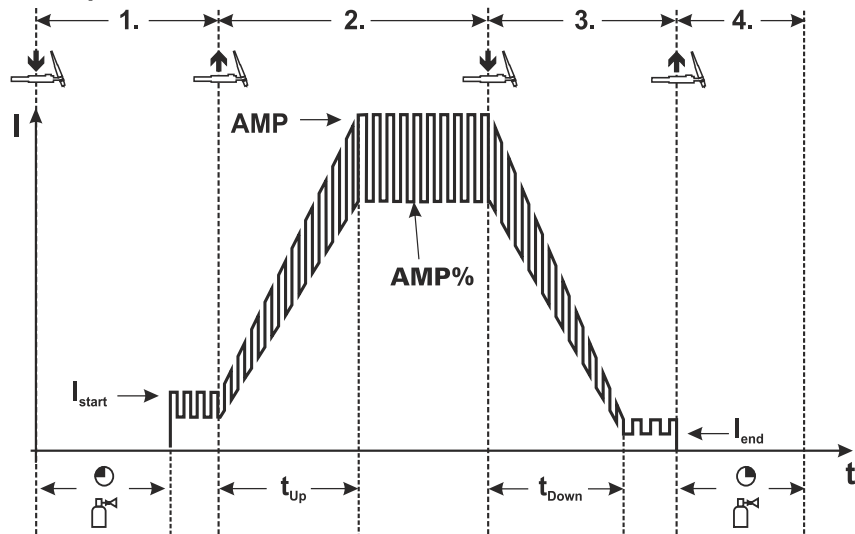


Figure 5-30

Selection

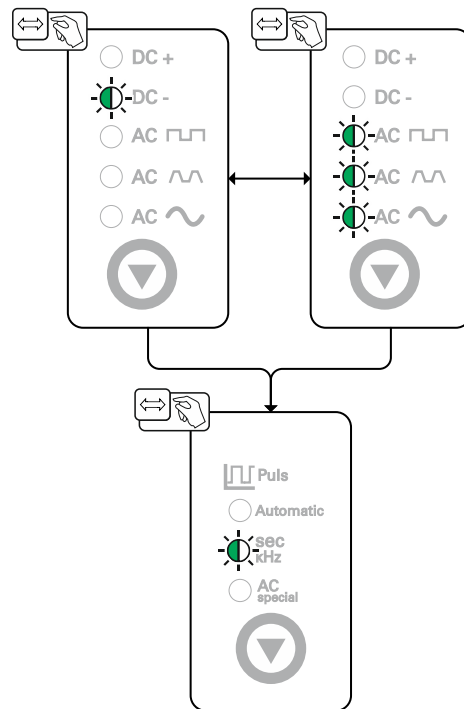


Figure 5-31

Pulse time setting

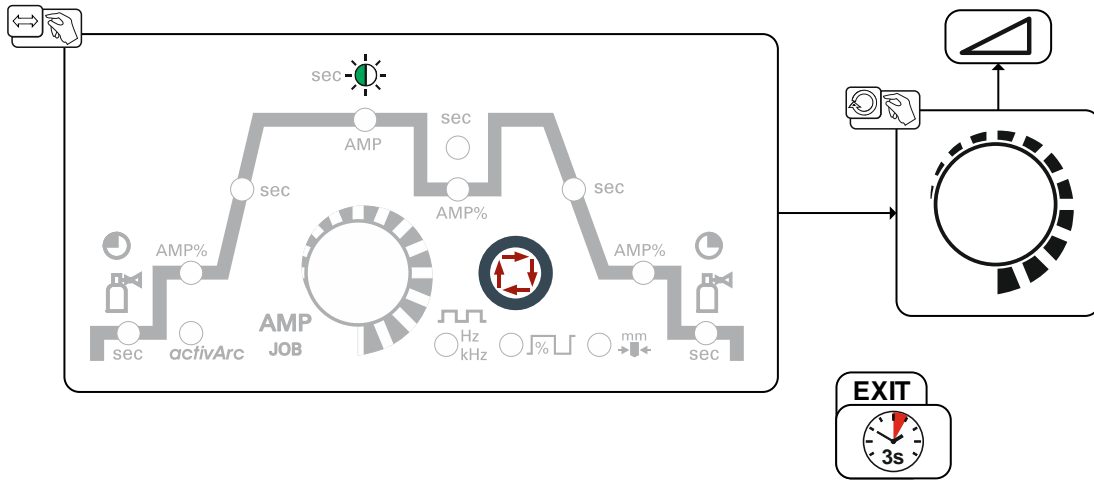


Figure 5-32

Pulse pause setting

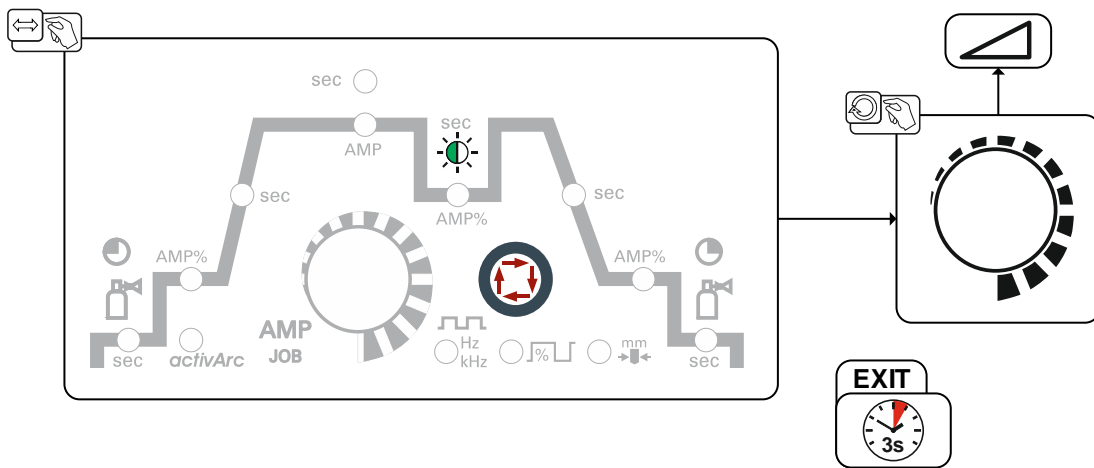


Figure 5-33



The pulse function can also be deactivated if necessary during the up-slope and down-slope phases (parameter `PUD`) > see 5.15 chapter.

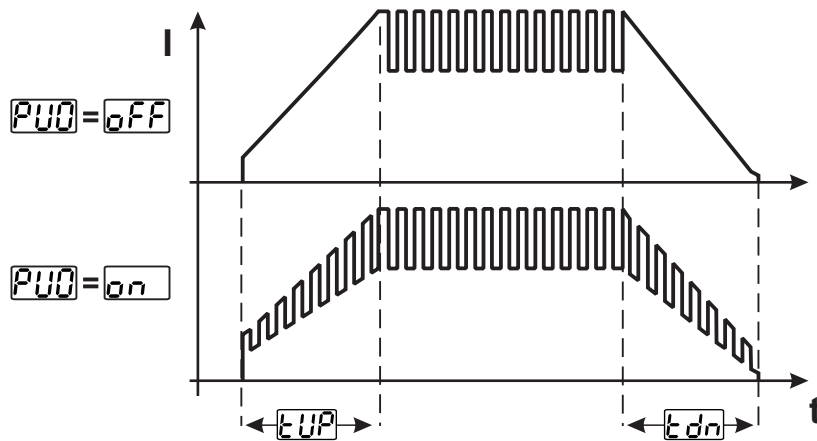


Figure 5-34

5.10.11.2 Metallurgical pulsing (kHz pulsing)

Metallurgical pulsing (kHz pulsing) uses the plasma force (arc force) occurring at high currents which allows you to achieve a constricted arc with concentrated heat input. Unlike thermal pulsing, no times are set; a frequency f_{FE} and the balance b_{BL} are set instead. The pulsing process also occurs during the up-slope and down-slope phase.

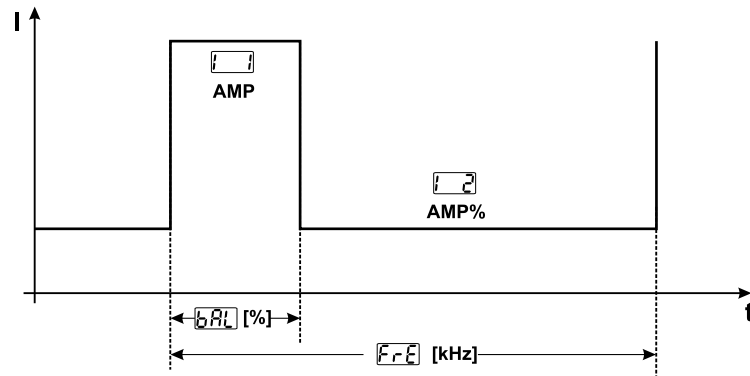


Figure 5-35

Selection

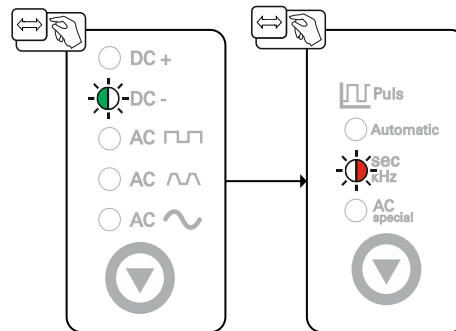


Figure 5-36

Balance setting

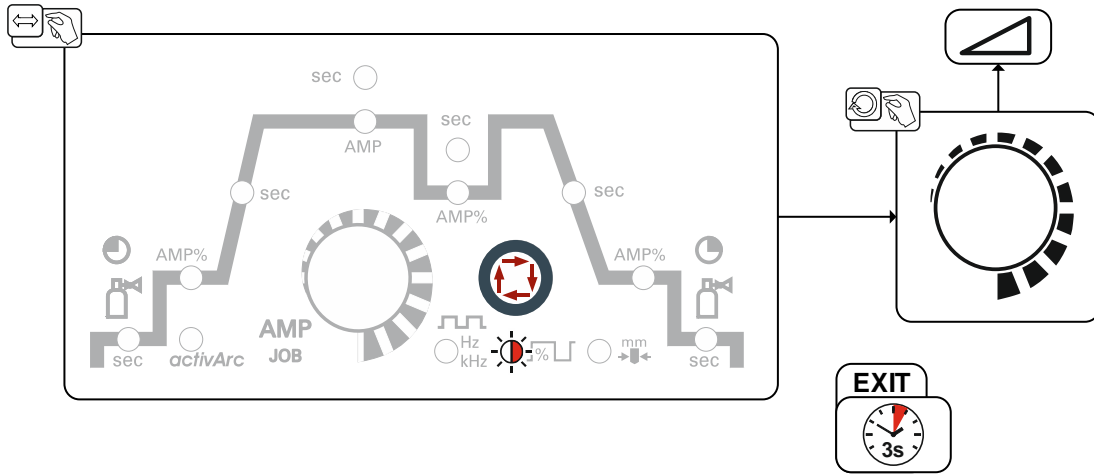


Figure 5-37

Frequency setting

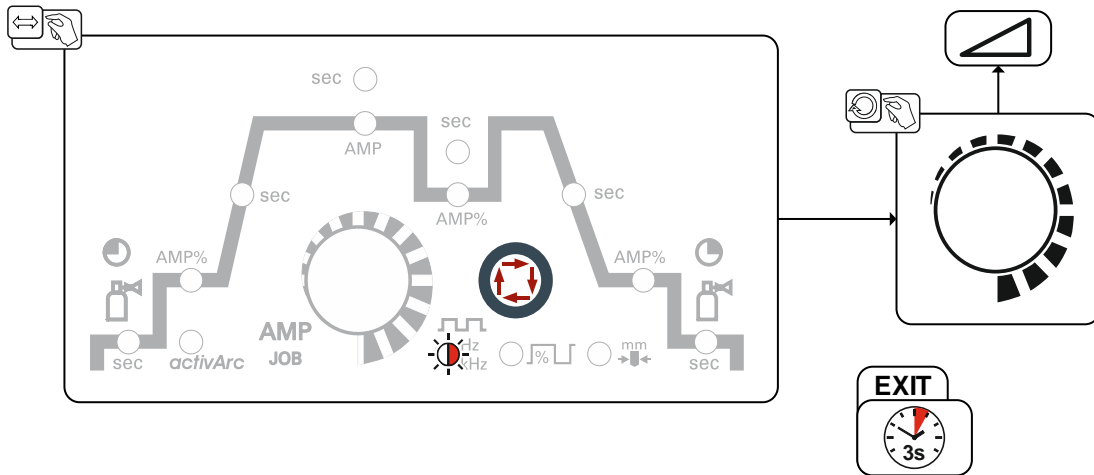


Figure 5-38

5.10.11.3 Automated pulses

The automated pulses are used with tacking and spot welding of workpieces in particular. An oscillation in the molten pool is produced by the current-dependent pulse frequency and balance, which positively influences the ability to bridge the air gap. The pulse parameters required are automatically specified by the machine control.

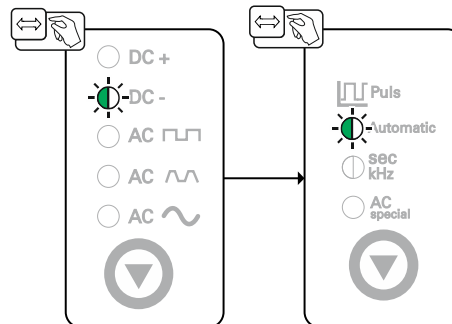


Figure 5-39

5.10.11.4 AC pulses

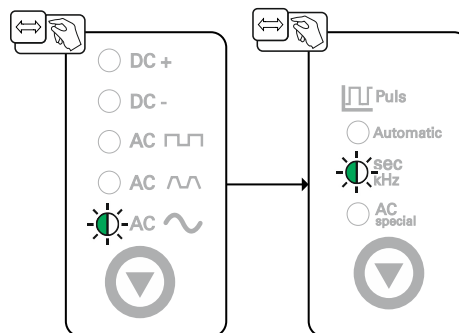


Figure 5-40

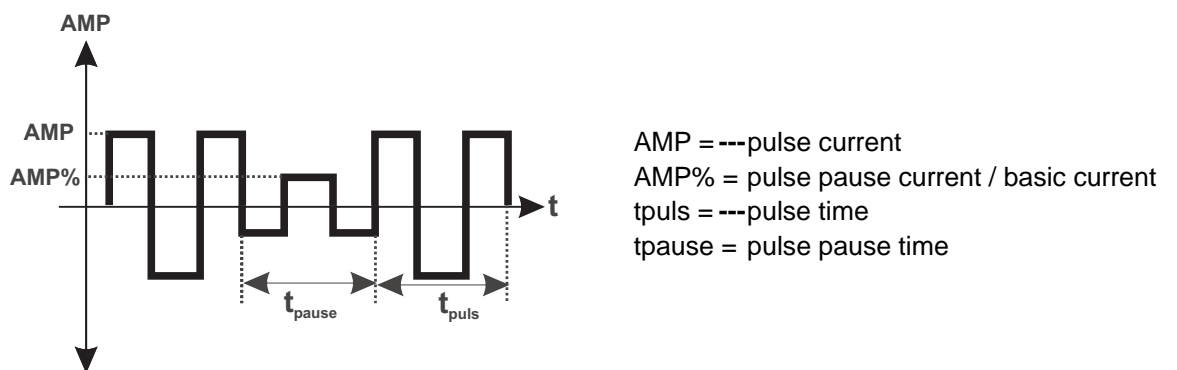


Figure 5-41

5.10.11.5 AC special

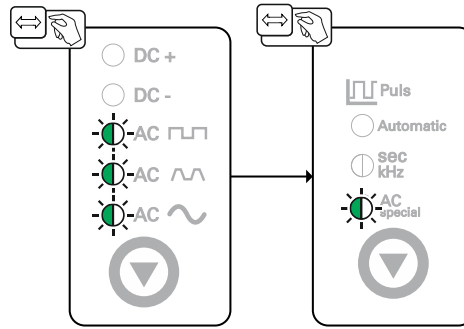


Figure 5-42

Application: e.g. for welding thick metal sheets onto thin metal sheets.

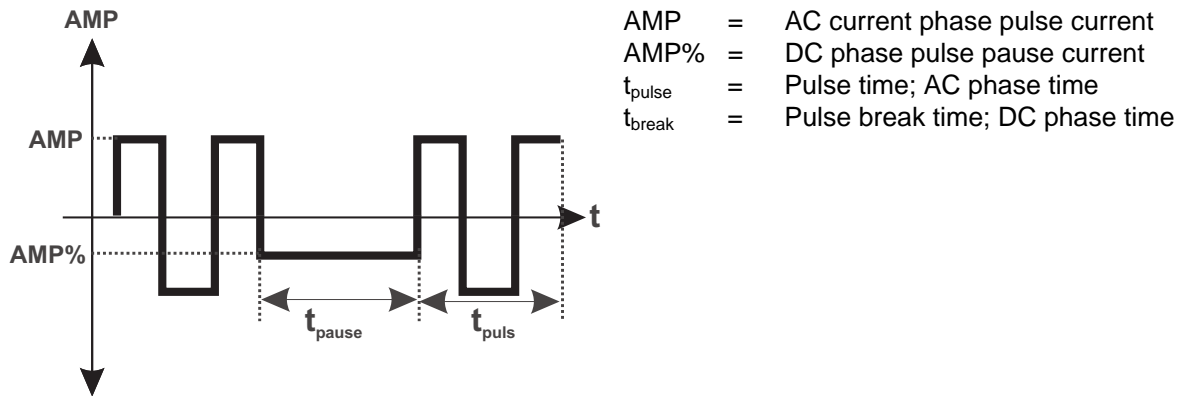


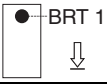
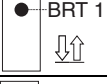
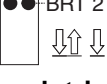
Figure 5-43

5.10.12 Welding torch (operating variants)


Different torch versions can be used with this machine.

Functions on the operating elements, such as torch triggers (TT), rockers or potentiometers, can be modified individually via torch modes.

Explanation of symbols for operating elements:

Symbol	Description
	Press torch trigger
	Tap torch trigger
	Tap and press torch trigger

5.10.12.1 Tap torch trigger (tapping function)

-  **Swiftly tap the torch trigger to change the function.**
The torch mode set determines the operating mode of the tapping function.

5.10.13 Torch mode and up/down speed setting

Modes 1 to 4 and 11 to 14 are available to the user. Modes 11 to 14 feature the same function options as 1 to 4, but without the tapping function for the secondary current.

The function options of the individual modes can be found in the corresponding torch type tables.

The torch modes are set using the torch configuration parameters " $\overline{E_{rod}}$ " in the machine configuration menu " > see 5.15 chapter".

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

5.10.13.1 Standard TIG torch (5-pole)

Standard torch with one torch trigger:

Diagram	Operating elements	Explanation of symbols
		BRT1 = Torch trigger 1 (welding current on/off; secondary current via tapping function)
Functions	mode	Operating elements
Welding current On/Off	1 (factory-set)	
Secondary current (Latched mode)		

Standard torch with two torch triggers:

Diagram	Operating elements	Explanation of symbols
		BRT1 = torch trigger 1 BRT2 = torch trigger 2
Functions	mode	Operating elements
Welding current On/Off	1 (factory-set)	
Secondary current		
Secondary current (tapping mode) / (latched mode)		
Welding current On/Off	3	
Secondary current (tapping mode) / (latched mode)		
Up function		
Down function		

Standard torch with one rocker (MG rocker, two torch triggers)

Diagram	Operating elements	Explanation of symbols
		BRT 1 = torch trigger 1 BRT 2 = torch trigger 2
Functions	mode	Operating elements
Welding current On/Off	1 (factory-set)	
Secondary current		
Secondary current (tapping mode) / (latched mode)		
Welding current On/Off	2	
Secondary current (tapping mode)		
Up function		
Down function		
Welding current On/Off	3	
Secondary current (tapping mode) / (latched mode)		
Up function		
Down function		

5.10.13.2 TIG up/down torch (8-pole)

Up/down torch with one torch trigger

Diagram	Operating elements	Explanation of symbols
		TT 1 = torch trigger 1

Functions	Mode	Operating elements
Welding current on/off	1 (factory-set)	
Secondary current (tapping mode) / (Latched mode)		
Increase welding current, infinite adjustment (up function)		
Reduce welding current, infinite adjustment (down function)		
Welding current on/off	2	
Secondary current (tapping mode)		
Welding current on/off	4	
Secondary current (tapping mode) / (Latched mode)		

Up/down torch with two torch triggers

Diagram	Operating elements	Explanation of symbols
		TT 1 = torch trigger 1 (left) TT 2 = torch trigger 2 (right)
Functions	Mode	Operating elements
Welding current on/off	1 (factory-set)	BRT 1
Secondary current		BRT 2
Secondary current (tapping mode) / (Latched mode)		BRT 1
Increase welding current, infinite adjustment (up function)		Up
Reduce welding current, infinite adjustment (down function)		Down
Welding current on/off	2	BRT 1
Secondary current		BRT 2
Secondary current (tapping mode)		BRT 1
Welding current on/off	4	BRT 1
Secondary current		BRT 2
Secondary current (tapping mode)		BRT 1

5.10.13.3 Potentiometer torch (8-pole)

The welding machine needs to be configured for operation with a potentiometer torch > see 5.10.13.4 chapter.

Potentiometer torch with one torch trigger:

Diagram	Operating elements	Explanation of symbols
		BRT 1 = torch trigger 1
Functions	Mode	Operating elements
Welding current On/Off	3	
Secondary current (tapping mode)		
Increase welding current, infinite adjustment		
Reduce welding current, infinite adjustment		

Potentiometer torch with two torch triggers:

Diagram	Operating elements	Explanation of symbols
		BRT 1 = torch trigger 1 BRT 2 = torch trigger 2
Functions	Mode	Operating elements
Welding current On/Off	3	
Secondary current		
Secondary current (tapping mode)		
Increase welding current, infinite adjustment		
Reduce welding current, infinite adjustment		

5.10.13.4 Configuring the TIG potentiometer torch connection

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 least 4 minutes until the capacitors have discharged!

WARNING



Do not carry out any unauthorised repairs or modifications!
To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!
The warranty becomes null and void in the event of unauthorised interference.

The warranty becomes null and void in the event of unauthorised interference.

- Appoint only skilled persons for repair work (trained service personnel)!



Test!

Before re-commissioning, it is essential that an "inspection and test during operation" is carried out conforming to IEC / DIN EN 60974-4 "Arc welding devices - inspection and testing during operation"!

- **For detailed instructions, please see the standard operating instructions for the welding machine.**

When connecting a potentiometer torch, jumper JP1 on PCB T200/1 inside the welding machine should be unplugged.

Welding torch configuration	Setting
Prepared for TIG standard or up/down torch (factory setting)	<input checked="" type="checkbox"/> JP1
Prepared for potentiometer torches	<input type="checkbox"/> JP1

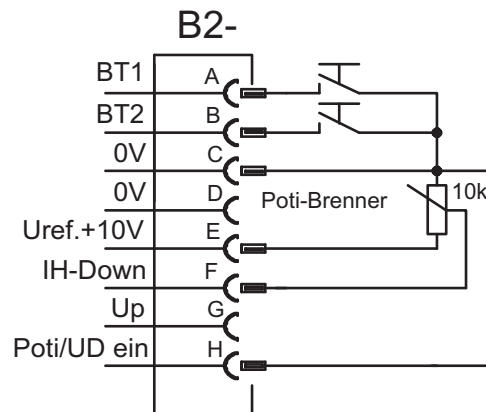


Figure 5-44



For this torch type the welding machine has to be set to torch mode 3 > see 5.10.13 chapter.

5.10.13.5 RETOX TIG torch (12-pole)

For machines with 12-pole torch connection socket only.

Diagram	Operating elements	Explanation of symbols
		TT= torch trigger

Functions	Mode	Operating elements
Welding current on/off	1 (ex works)	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Increase welding current (up function)		TT 3
Reduce welding current (down function)		TT 4
Welding current on/off	2	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Increase JOB number		TT 3
Decrease JOB number		TT 4
Welding current on/off	3	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Welding current on/off	4	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Increase welding current (up function)		TT 3
Reduce welding current (down function)		TT 4
Switchover between Up-Down and JOB changeover		TT 2 (tapping)
Increase JOB number		TT 3
Decrease JOB number		TT 4

5.11 MMA welding

⚠ CAUTION



Risk of being crushed or burnt.

When replacing spent or new stick electrodes

- Switch off machine at the main switch
- Wear appropriate safety gloves
- Use insulated tongs to remove spent stick electrodes or to move welded workpieces and
- Always put the electrode holder down on an insulated surface.



Shielding gas connection!

During MMA welding open circuit voltage is applied at the shielding gas connection (G $\frac{1}{4}$ " connecting nipple).

- Place yellow insulating cap on the G $\frac{1}{4}$ " connection nipple (protects against electrical voltage and dirt).

5.11.1 Connecting the electrode holder and workpiece lead



Polarity depends on the instructions from the electrode manufacturer given on the electrode packaging.

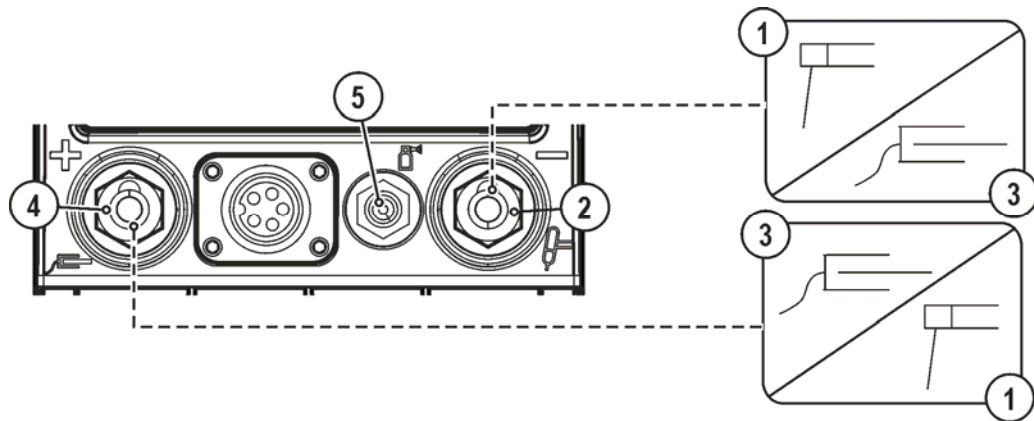


Figure 5-45

Item	Symbol	Description
1		Electrode holder
2		Connection socket, "-" welding current Workpiece lead or electrode holder connection
3		Workpiece
4		Connection socket for "+" welding current Electrode holder or workpiece lead connection
5		Connecting nipple G$\frac{1}{4}$, shielding gas connection

- Fit yellow protective cap onto G $\frac{1}{4}$ " connecting nipple.
- Insert cable plug of the electrode holder into either the "+" or "-" welding current connection socket and lock by turning to the right.
- Insert cable plug of the workpiece lead into either the "+" or "-" welding current connection socket and lock by turning to the right.

5.11.2 Welding task selection

It is only possible to change the basic parameters when no welding current is flowing and any possible access control is disabled > see 5.14 chapter.

The welding task is selected using the buttons on the machine control on the welding machine. Signal lights (LED) display the welding parameter selection.

Set the welding task in the following order:

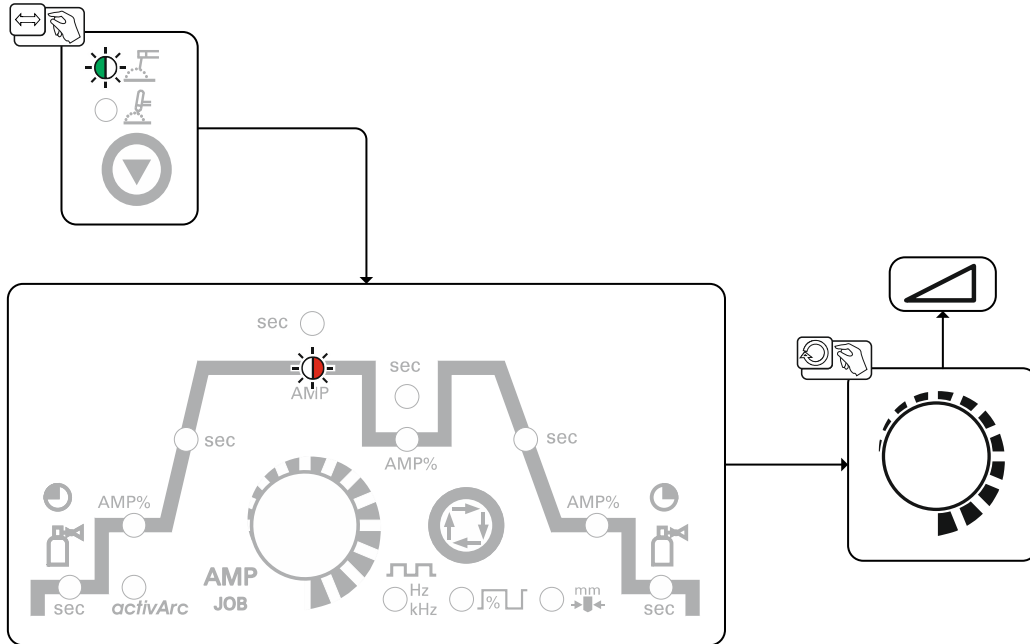


Figure 5-46

5.11.3 Hotstart

The hot start device ensures that stick electrodes ignite more effectively thanks to a greater hot start current. After selecting the stick electrode, the arc ignites with the hot start current [ht] for the preset hot start time [ht] and then reverts to the main current [] (AMP).

The parameter values for hot start current and time can be optimised for the electrode types used.

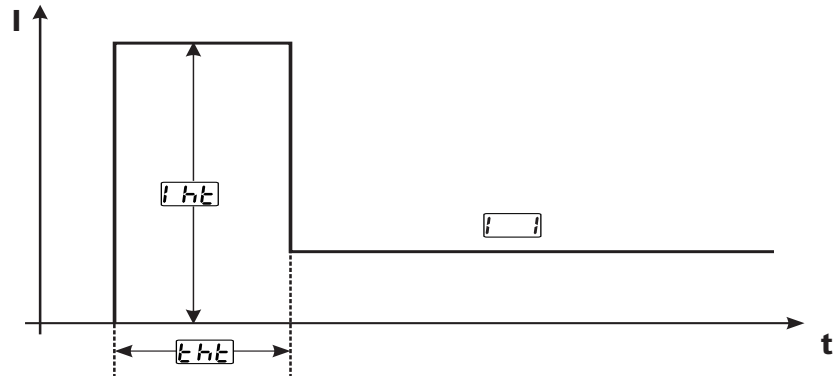


Figure 5-47

5.11.3.1 Hotstart current

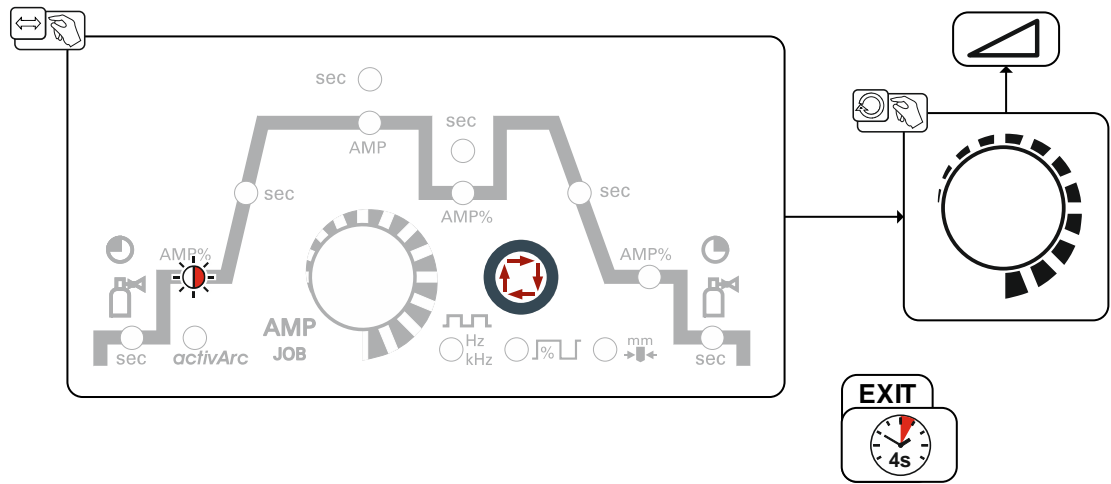


Figure 5-48

5.11.3.2 Hotstart time

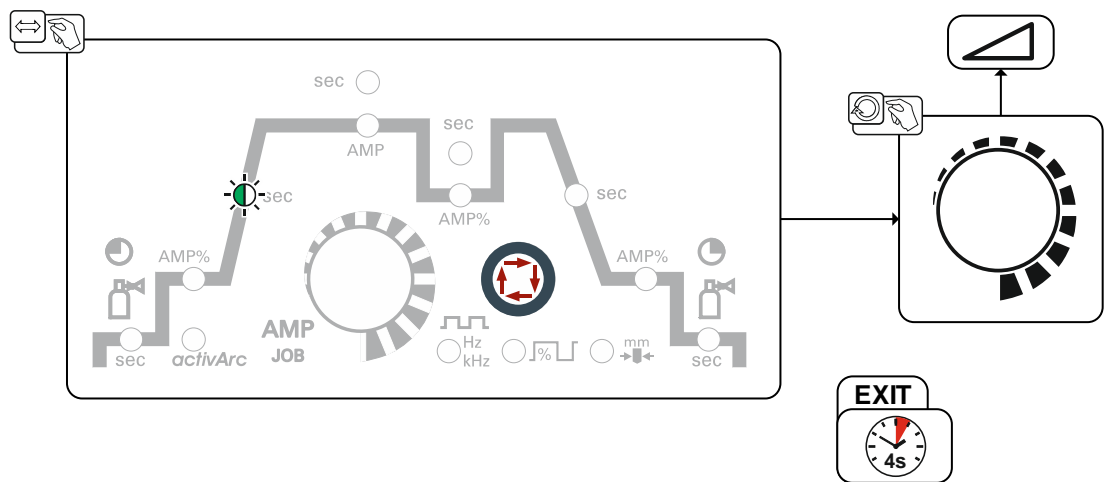
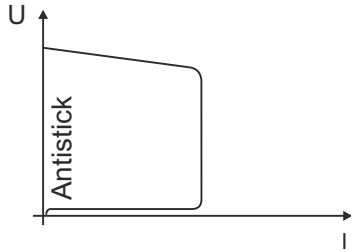


Figure 5-49

5.11.4 Antistick



Anti-stick prevents the electrode from annealing.

If the electrode sticks in spite of the Arcforce device, the machine automatically switches over to the minimum current within about 1 second to prevent the electrode from overheating. Check the welding current setting and correct according to the welding task!

5.11.5 Pulse welding

Welding characteristics:

- Especially suitable for root welding
- Fine-flaked weld surface with a TIG look for final passes
- Less finishing work thanks to less spatter
- Highly suitable for difficult electrodes
- Outstanding gap bridging with no sagging of the root side
- Less distortion thanks to controlled heat input

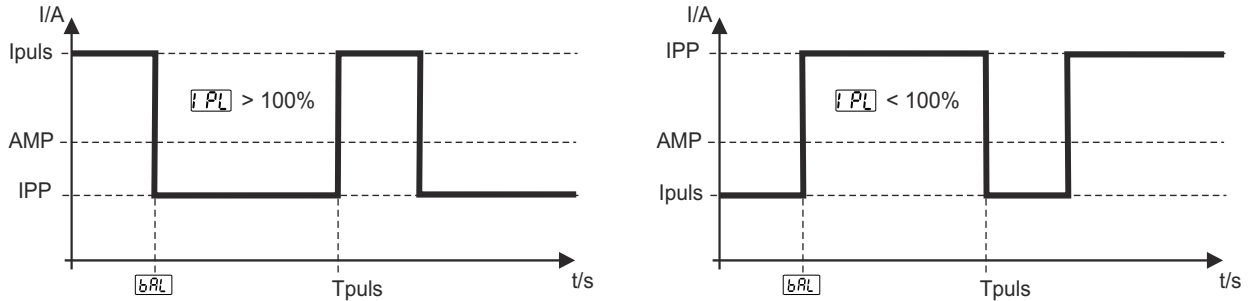


Figure 5-50

AMP = Main current; e.g. 100 A

IPL = Pulse current = $IP1 \times AMP$; e.g. $170\% \times 100 \text{ A} = 170 \text{ A}$

IPP = Pulse pause current

T_{puls} = Duration of one pulse cycle = $1/FrE$; e.g. $1/1 \text{ Hz} = 1 \text{ s}$

bAL = Balance = $bAL \times T_{puls}$; e.g. $30\% \times 1 \text{ s} = 0.3 \text{ s}$

The pulse pause current (I_2) requires no setting. This value is calculated by the machine control, so that the welding current average value always corresponds to the main current selected.

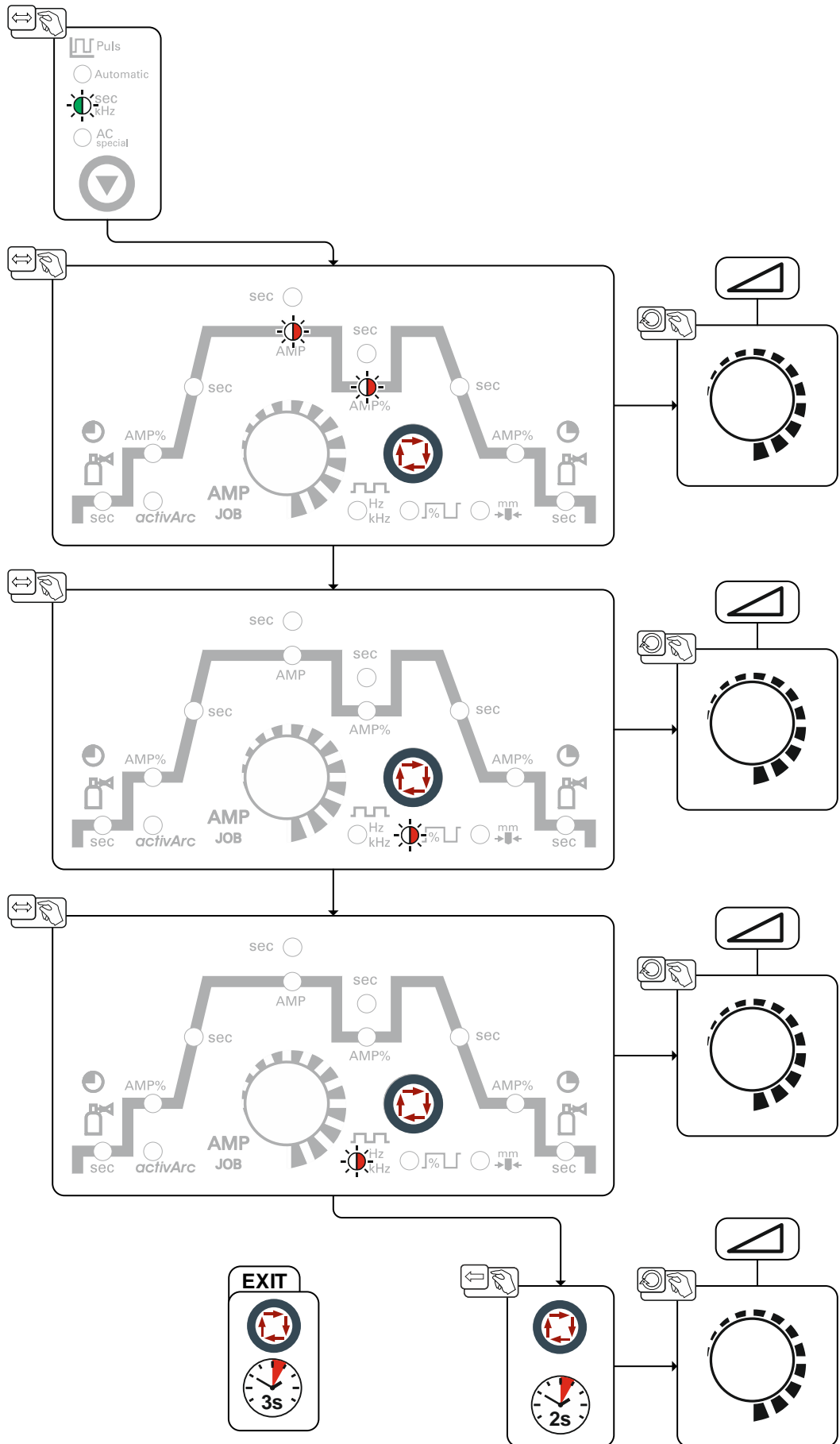

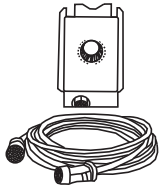


Figure 5-51

5.12 Remote control

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

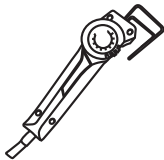
5.12.1 RT1 19POL



Functions

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

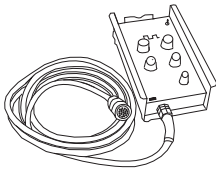
5.12.2 RTG1 19POL



Functions

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

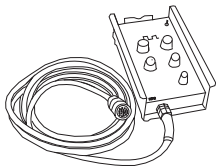
5.12.3 RTP1 19POL



Functions

- TIG/MMA
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse/spot/normal
- Pulse, spot and break times are infinitely adjustable.

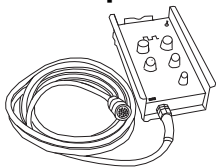
5.12.4 RTP 2



Functions

- TIG/MMA.
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse/spot/normal
- Frequency and spot times infinitely adjustable.
- Coarse adjustment of the cycle frequency.
- Pulse/pause ratio (balance) adjustable from 10% to 90%.

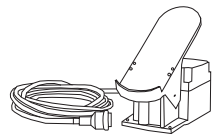
5.12.5 RTP3 spotArc 19POL



Functions

- TIG / MMA.
- Infinitely adjustable welding current (0% to 100%) depending on the preselected main current on the welding machine.
- Pulse / SpotArc spots / normal
- Frequency and spot time infinitely adjustable.
- Coarse adjustment of the pulse frequency.
- Pulse/pause ratio (balance) adjustable from 10% to 90%.

5.12.6 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)

ActivArc welding is not possible in combination with the foot-operated remote control.

5.13 Interfaces for automation

5.13.1 Remote control connection socket, 19-pole



Damage to the machine due to improper connection!

Unsuitable control leads or incorrect connection of input and output signals can cause damage to the machine.

- Only use shielded control leads!
- If the machine is to be operated with control voltages connection via suitable isolation amplifiers is required!
- To control the main or secondary current via control voltages, the relevant inputs must be enabled (see specification for activation of control voltage).

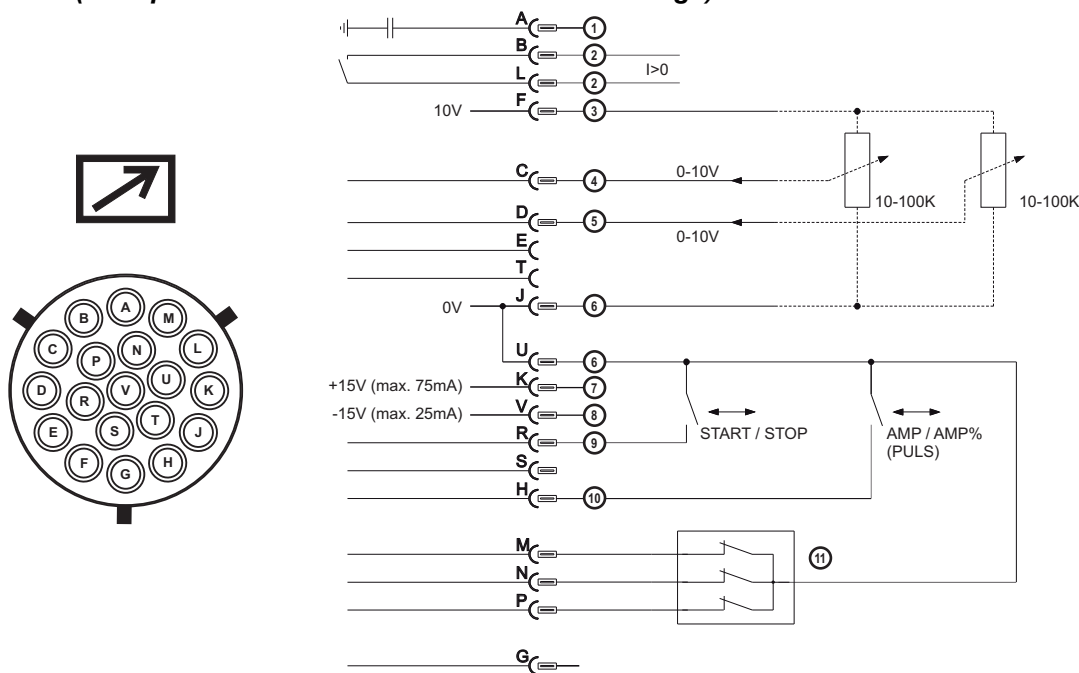


Figure 5-52

Item	Pin	Signal shape	Designation
1	A	Output	Connection for cable screen (PE)
2	B/L	Output	Current flowing signal $I > 0$, galvanically isolated (max. $\pm 15V/100mA$)
3	F	Output	Reference voltage for potentiometer 10V (max. 10mA)
4	C	Input	Control voltage specification for main current, 0–10V ($0V = I_{min}/10V = I_{max}$)
5	D	Input	Control voltage specification for secondary current, 0–10V ($0V = I_{min}/10V = I_{max}$)
6	J/U	Output	Reference potential 0V
7	K	Output	Power supply +15V, max. 75mA
8	V	Output	Power supply -15V, max. 25mA
9	R	Input	Start/Stop welding current
10	H	Input	Switching between main and secondary welding currents (pulses)
11	M/N	Input	Activation of control voltage specification Signals M and N must be set to reference potential 0V to activate the external control voltage specification for main and secondary current.

5.13.2 Power-saving mode (Standby)

You can activate the power-saving mode by either pressing the push-button > see 4.3 chapter for a prolonged time or by setting a parameter in the machine configuration menu (time-controlled power-saving mode) > see 5.15 chapter.



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

Pressing any operating element (e.g. tapping the torch trigger) deactivates power-saving mode and the machine is ready for welding again.

5.14 Access control

The machine control can be locked to secure it against unauthorised or unintentional adjustment. The access block has the following effect:

- The parameters and their settings in the machine configuration menu, Expert menu and operation sequence can only be viewed but not changed.
- Welding procedure and welding current polarity cannot be changed.

The parameters for the access block are configured in the machine configuration menu > see 5.15 chapter.

Enabling the access block

- Assign the access code for the access block: Select parameter `W05` and select a number code (0–999).
- Enable access block: Set parameter to function `ON`.

Disabling the access block

- Enter the access code for the access block: Select parameter `W05` and enter the number code (0–999).
- Disable access block: Set parameter to `OFF`.

The only way to disable the access block is to enter the selected number code.

Changing the access block

- Enter the access code for the access block: Select parameter `Code` and enter the previously selected number code (0–999).
- Change the access block: Set parameter `NEC` and assign a new code (0–999).

5.15 Machine configuration menu

Basic machine settings are defined in the machine configuration menu.

5.15.1 Selecting, changing and saving parameters



ENTER (enter the menu)

- **Switch off machine at the main switch**
- **Press and hold the "welding parameters" button and switch the machine on again at the same time.**

NAVIGATION (navigating in the menu)

- **Parameters are selected by pressing the "welding parameters" button.**
- **Set or change the parameters by turning the "welding parameter setting" rotary dial.**

EXIT (leave the menu)

- **Select the "EIt" menu item.**
- **Press the "welding parameters" button (settings will be applied, machine changes to the ready-to-operate status).**

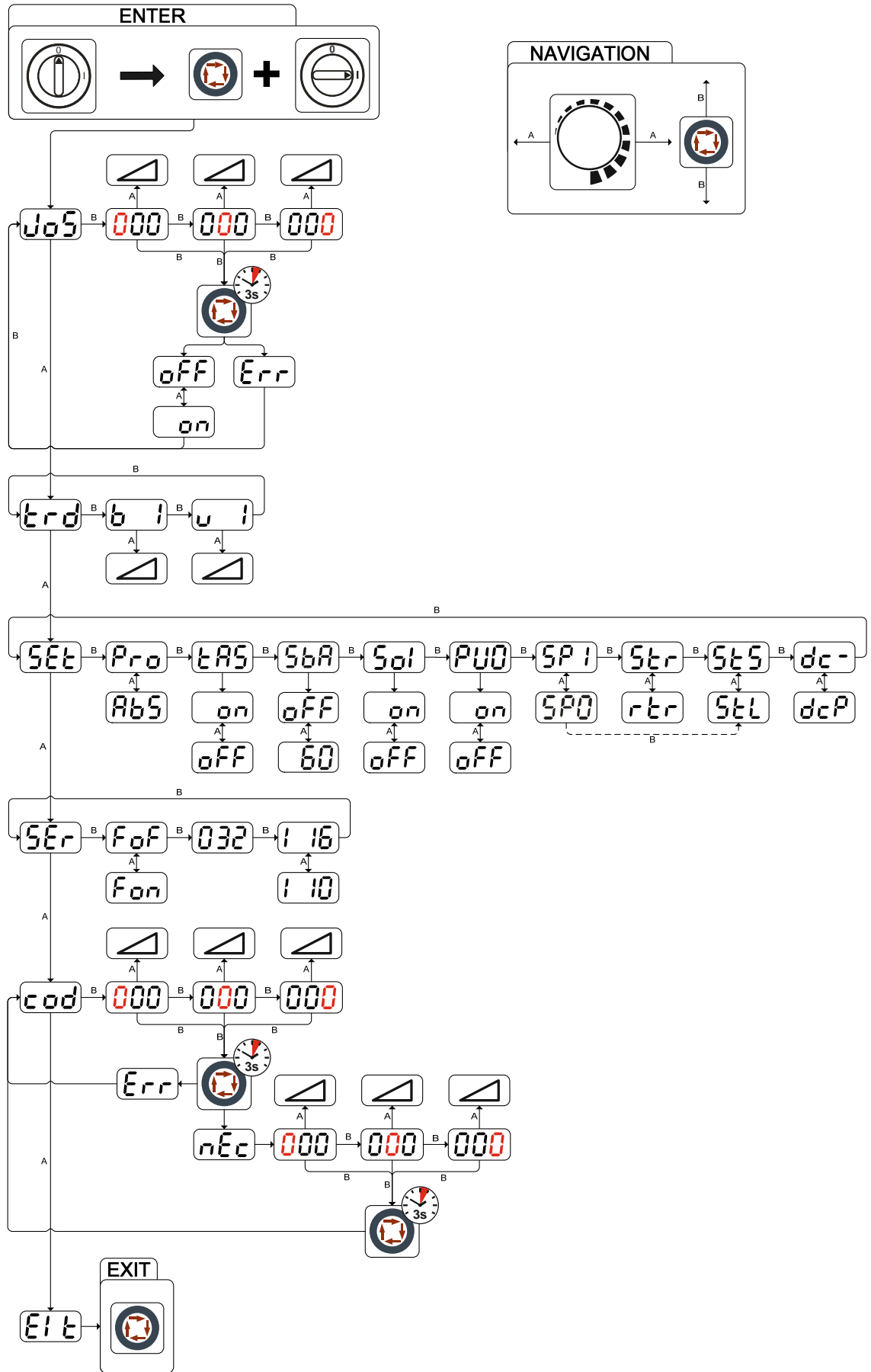











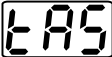












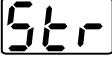

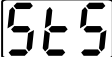












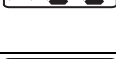

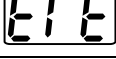


Figure 5-53

Display	Setting/selection
	Lock JOB menu Protect welding parameters from unauthorised access.
	Machine code Querying the three-digit machine code (000 to 999), user input
	Error Error message after entering an incorrect machine code
	Switch on Switching on machine function
	Switch off Switching off machine function
	Torch configuration menu Set welding torch functions
	Torch mode setting (factory setting 1)
	Up-/Down speed (not available in modes 4 and 14) Increase value = rapid current change Reduce value = slow current change
	Settings Settings for machine functions and parameter displays.
	Welding current display, percentage Representation of the welding current as a percentage in relation to the main current setting (AMP). Example: Main current setting to 120A and secondary current to 50% results in an absolute secondary current of 60A.
	Welding current display, absolute Absolute representation of all welding currents in amperes
	TIG antistick > see 5.10.10 chapter  ----- function active (factory setting).  ----- function inactive.
	Time-based power-saving mode > see 5.13.2 chapter 5 min.–60 min. = Time to activation of power-saving mode in case of inactivity.  ----- inactivated
	TIG HF start (soft/hard) switching  ----- soft ignition (factory setting).  ----- hard ignition.
	Pulsed TIG welding (thermic) in the upslope and downslope phases  ----- Function enabled (ex works)  ----- Function disabled
	Spotmatic Function switched on
	Spotmatic Function switched off
	Separate process activation The welding process has to be reactivated for every arc ignition by pressing the torch trigger.
	Permanent process activation The welding process is activated by pressing the torch trigger once. The following arc ignitions are initiated by shortly touching the tungsten electrode against the workpiece.
	Short spot time (ex works) Setting 5 ms to 999 ms (increments of 1 ms)
	Long spot time Setting 0.01 s to 20.0 s (increments of 10 ms)

	Negative welding current polarity during the ignition phase
	Positive welding current polarity during the ignition phase
	Service menu Service settings
	Machine fan test Machine fan is switched off
	Machine fan test Machine fan is switched on
	Software version of the machine control Version display (example 014 = version 14)
	Mains current limit Mains current limited to 16A
	Mains current limit Mains current limited to 10A
	Machine code Confirming the old machine code/entering the new machine code
	Error Error message after entering an incorrect machine code
	New machine code <ul style="list-style-type: none"> • Machine code entered correctly • Prompt for entering the new machine code
	Machine code Querying the three-digit machine code (000 to 999), user input
	Exit the menu Exit
	Numerical value – adjustable

6 Maintenance, care and disposal

6.1 General

DANGER



Incorrect maintenance and testing!

The machine may be cleaned, repaired and tested by skilled and qualified personnel only. A qualified person is one who, due to their training, knowledge and experience, can detect any hazards and possible consequential damage when checking the machine, and can take the necessary safety measures.

- Observe the maintenance instructions > see 6.3 chapter!
- The machine may only be put into operation again once the testing has been successful.



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



Cleaning, testing and repair!

Cleaning, testing and repairing of the welding machine may only be carried out by competent, qualified personnel. A qualified person is one who, because of his or her training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage, and who is able to implement the required safety procedures.

- In the event of failure of any one of the following tests, the machine must not be operated again until it has been repaired and a new test has been carried out.

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.

6.2 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.

6.3 Maintenance work, intervals

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.

6.3.1 Daily maintenance tasks

6.3.1.1 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

6.3.1.2 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).

6.3.2 Monthly maintenance tasks


6.3.2.1 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

6.3.2.2 Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check that the wire guide elements (inlet nipple, wire guide tube) are fitted securely.
- 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.


6.3.3 Annual test (inspection and testing during operation)

 **The welding machine may only be tested by competent, capable persons! A capable person is one who, because of his training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage and who is able to implement the required safety procedures.**

 **For more information refer to the "Warranty registration" brochure supplied and our information regarding warranty, maintenance and testing at www.ewm-group.com!**

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.

6.4 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!**

6.4.1 Manufacturer's declaration to the end user

- According to European provisions (guideline 2012/19/EU of the European Parliament and the Council of Juli, 4th 2021), 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 is to be placed for disposal or recycling in the waste separation systems provided for this purpose.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG) from 16.03.2005), 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.
- Information about giving back used equipment or about collections can be obtained from the respective municipal administration office.
- EWM participates in an approved waste disposal and recycling system and is registered in the Used Electrical Equipment Register (EAR) under number WEEE DE 57686922.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

6.5 Meeting the requirements of RoHS

We, EWM AG Mündersbach, hereby confirm that all products supplied by us which are affected by the RoHS Directive, meet the requirements of the RoHS (Directive 2011/65/EU).

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 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

Functional errors

- ↗ Insufficient coolant flow
 - ✘ Check coolant level and refill if necessary
 - ✘ Eliminate kinks in conduit system (hose packages)
 - ✘ Reset automatic cutout of the coolant pump by activating
- ↗ Air in the coolant circuit
 - ✘ Vent coolant circuit > see 7.4 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.

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

No arc ignition

- ✓ Incorrect ignition type setting.
 - ✘ Ignition type: Select "HF start". Depending on the machine, the setting is defined by the changeover switch for ignition types or the $\overline{HF1}$ 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).


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 (hydrogen) in the gas tube
 - ✘ Purge hose package with gas or replace

7.2 Machine faults (error messages)

 *A welding machine error is indicated by the collective fault signal lamp (A1) lighting up and an error code (see table) being displayed in the machine control display. In the event of a machine error, the power unit shuts down.*

 *The display of possible error numbers depends on the machine version (interfaces/functions).*

- Document machine errors and inform service staff as necessary.

Error message	Possible cause	Remedy
E1	Water fault Only occurs if a water cooling unit is connected.	Ensure that sufficient water pressure can be built up. (e.g. top up water)
E2	Temperature error	Allow machine to cool down.
E3	Electronics error	Switch machine off and on again. If the fault persists, inform the service department.
E4	see "E3"	see "E3"
E5	see "E3"	see "E3"
E6	Balancing error in voltage recording.	Switch machine off, place the torch on an insulated surface and switch on again. If the fault persists, inform the service department.
E7	Balancing error in current recording.	Switch machine off, place the torch on an insulated surface and switch on again. If the fault persists, inform the service department.
E8	Error in one of the electronics supply voltages or excess temperature of the welding transformer.	Allow machine to cool down. If the error message persists, switch the machine off and back on again. If the fault persists, inform the service department.
E9	Low voltage	Switch off the machine and check the mains voltage.
E10	Secondary overvoltage	Switch machine off and on again. If the fault persists, inform the service department.
E11	Overvoltage	Switch off the machine and check the mains voltage.
E12	VRD (open circuit voltage reduction error)	Inform Service

7.3 Resetting welding parameters to the factory settings

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

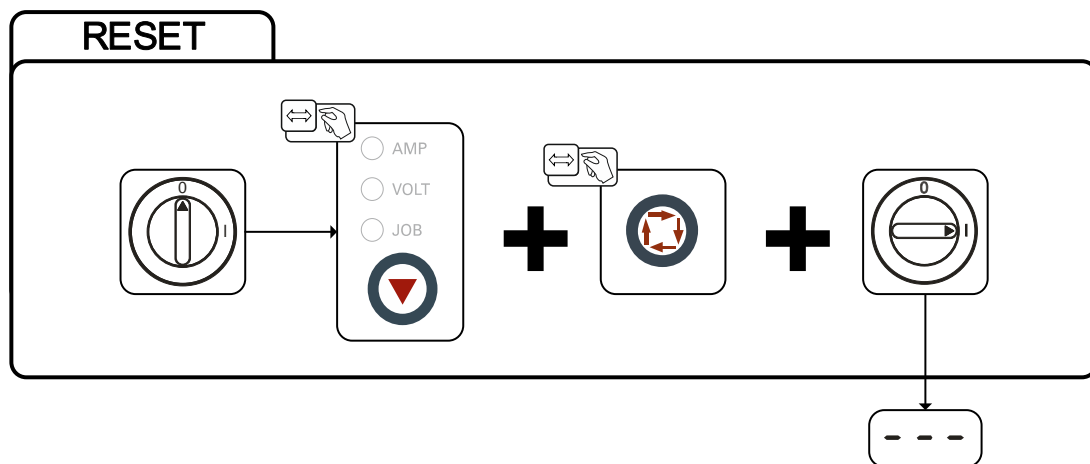


Figure 7-1

Display	Setting/selection
	Input confirmation User entries are applied, release button(s).

7.4 Vent coolant circuit

To vent the cooling system always use the blue coolant connection, which is located as deep as possible inside the system (close to the coolant tank)!

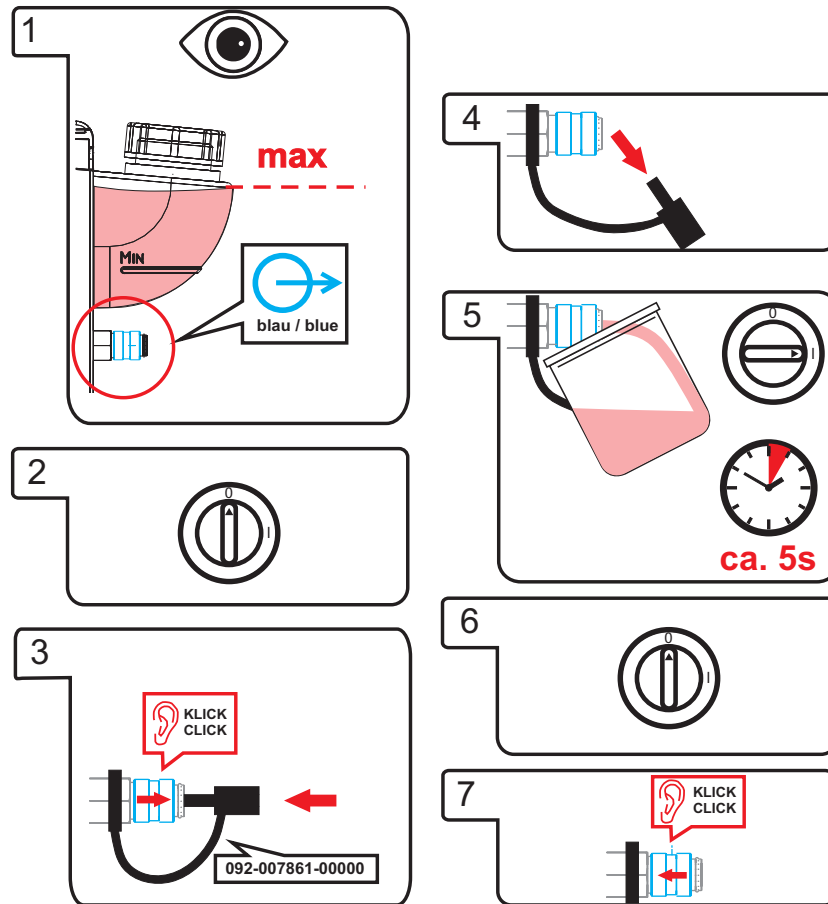


Figure 7-2

8 Technical data



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

8.1 Tetrix 230 AC/DC

Setting range	TIG	MMA
Welding current		
DC	3 A–230 A	5 A–180 A
AC	5 A–230 A	-
Welding voltage	10.1 V–19.2 V	20.2 V–27.2 V
Duty cycle (DC) at 40 °C		
40% DC	230 A	180 A
60% DC	200 A	150 A
100% DC	170 A	120 A
Load cycle	10 min. (60% DC \triangle 6 min. welding, 4 min. pause)	
Open circuit voltage	45 V	
Mains voltage (tolerances)	1 x 230 V (-40% to +15%)	
Frequency	50/60 Hz	
Mains fuse	1 x 16 A (safety fuse, slow-blow)	
Mains connection lead	H07RN-F3G2,5	
Max. connected load	5.5 kVA	6 kVA
Recommended generator rating	8.1 kVA	
Noise level	< 70 dB(A)	
cosϕ/efficiency	1.0/85%	
Insulation class/protection classification	H/IP 23	
Ambient temperature	-25 °C to +40 °C	
Machine cooling	Fan	
Torch cooling	Gas	
Workpiece lead	35 mm ²	
Dimensions L x W x H	539 x 210 x 415 mm	
	21.2 x 8.3 x 16.3 inch	
Weight	19.3 kg	
	42.5 lb	
EMC class	A	
Constructed to standard	IEC 60974-1, -3, -10 ☐ / C €	

9 Accessories

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

9.1 Remote controls and accessories

Type	Designation	Item no.
RTF1 19POL 5 M	Foot-operated remote control current with connection cable	094-006680-00000
RT1 19POL	Remote control current	090-008097-00000
RTG1 19POL	Remote control, current	090-008106-00000
RTG1 19POL 10m	Remote control, current	090-008106-00010
RTP1 19POL	Remote control spot welding / pulses	090-008098-00000
RTP2 19POL	Remote control spot welding / pulses	090-008099-00000
RTP3 spotArc 19POL	spotArc remote control for spot welding / pulses	090-008211-00000
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
RV5M19 19POLE 5M	Extension cable	092-000857-00000

9.2 Transport vehicle

Type	Designation	Item no.
Trolly 35.2-2	Transport vehicle	090-008296-00000
Trolly 38-2 E	Transport vehicle, long wheelbase	090-008270-00000

9.3 Options

Type	Designation	Item no.
ON 12pol Retox TIG 190/230	Optional retrofit 12-pole connection socket, torch	092-002519-00000
ON Filter TIG 200/300-2	Retrofit option, dirt filter for air inlet	092-002551-00000

9.4 Welding torch cooling system

Type	Designation	Item no.
cool40 U31	Cooling module	090-008593-00502

9.5 General accessories

Type	Designation	Item no.
ADAP CEE16/SCHUKO	Earth contact coupling/CEE16A plug	092-000812-00000
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
GH 2X1/4" 2M	Gas hose	094-000010-00001
ADAP 8-5 POL	8 to 5-pole adapter	092-000940-00000

10 Appendix A

10.1 Parameter overview – setting information

10.1.1 TIG welding

Parameter TIG/plasma	Display		Setting range			Comment
	Code	Unit	Standard	Min.	Max.	
Main current	I 1	A		3	- 230	
Gas pre-flow time	GPr	s	0,1	0,1	- 5,0	
Ignition current AMP%	ISr	%	20	1	- 200	% of main current AMP
Up-slope time	tUP	s	0,1	0,0	- 20,0	
Pulse time	t 1	s	0,1	0,01	- 9,99	
Secondary current AMP%	I 2	%	50	1	200	% of main current AMP
Pulse pause time	t 2	s	0,1	0,01	- 9,99	
Down-slope time "H"	t dn	s	0,1	0,0	- 20,0	
Down-slope time "H ⁺ "	t dn	s	5,0	0,0	- 20,0	
End current AMP%	IEd	%	20	1	- 200	% of main current AMP
Gas post-flow time	GPE	s	8	0,1	- 20,0	
Electrode diameter	ndA	mm	1,6	1,0	- 4,0	
spotArc time	t P	s	2,0	0,01	- 20,0	
AC balance (JOB 0)	bAL	%		-30	- +30	Rotary knob
AC balance (JOB 1-7)	bAL	%	0	-30	- +30	
Pulse balance	bAL	%	50	1	- 99	Pulsing, metallurgical
Pulse frequency	FrE	Hz	50	50	- 15000	Pulsing, metallurgical
AC frequency (JOB 0)	FrE	Hz	-	50	- 200	
AC frequency (JOB 1-7)	FrE	Hz	50	50	- 200	
activArc	Arc		50	0	- 100	

10.1.2 MMA welding

Parameter MMA	Display		Setting range		Comment
	Code	Unit	Standard	Min. Max.	
Main current	I	A		5 - 180	
Hot start current	I _{HT}	%	150	1 - 150	
Hot start time	t _{HT}	s	0,1	0,1 - 5,0	
Pulse current	I _{PL}	%	142	1 - 200	
Pulse frequency	F _{PE}	Hz	1,2	0,2 - 500	
Pulse balance	b _{AL}	%	30	1 - 99	

11 Appendix B

11.1 Overview of EWM branches

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