Operating instructions

ewm®

WE ARE WELDING

⚠ 📖

EN

Control

LP-S (M3.7X-U)

General instructions

⚠ WARNING

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

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

A list of authorised sales partners can be found at www.ewm-group.com/en/specialist-dealers.

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.

The content of this document has been prepared and reviewed with all reasonable care. The information provided is subject to change; errors excepted.

Data security

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

1 Contents

2 For your safety

2.1 Notes on using these operating instructions

> ⚠ **DANGER**
>
> **Working or operating procedures which must be closely observed to prevent imminent serious and even fatal injuries.**
> - Safety notes include the "DANGER" keyword in the heading with a general warning symbol.
> - The hazard is also highlighted using a symbol on the edge of the page.

> ⚠ **WARNING**
>
> **Working or operating procedures which must be closely observed to prevent serious and even fatal injuries.**
> - Safety notes include the "WARNING" keyword in the heading with a general warning symbol.
> - The hazard is also highlighted using a symbol in the page margin.

> ⚠ **CAUTION**
>
> **Working or operating procedures which must be closely observed to prevent possible minor personal injury.**
> - The safety information includes the "CAUTION" keyword in its heading with a general warning symbol.
> - The risk is explained using a symbol on the edge of the page.

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

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

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

2.2 Explanation of icons

Symbol	Description	Symbol	Description
☞	Indicates technical aspects which the user must observe.	⇔👆	Activate and release / Tap / Tip
(switch off)	Switch off machine	⇒👆	Release
(switch on)	Switch on machine	⇐👆	Press and hold
✖	Incorrect / Invalid	⇕👆	Switch
✔	Correct / Valid	↻👆	Turn
(input)	Input	◿	Numerical value – adjustable
(navigation)	Navigation	(green light)	Signal light lights up in green
(output)	Output	(green flash)	Signal light flashes green
(clock 4s)	Time representation (e.g.: wait 4 s / actuate)	(red light)	Signal light lights up in red
–/–	Interruption in the menu display (other setting options possible)	(red flash)	Signal light flashes red
(tool crossed)	Tool not required/do not use	(blue light)	Signal light lights up in blue
(wrench)	Tool required/use	(blue flash)	Signal light flashes blue

2.3   Safety instructions

> ### ⚠ WARNING
>
> **Risk of accidents due to non-compliance with the safety instructions!**
> **Non-compliance with the safety instructions can be fatal!**
> - Carefully read the safety instructions in this manual!
> - Observe the accident prevention regulations and any regional regulations!
> - Inform persons in the working area that they must comply with the regulations!
>
> **Risk of injury from electrical voltage!**
> **Voltages can cause potentially fatal electric shocks and burns on contact. Even low voltages can cause a shock and lead to accidents.**
> - Never touch live components such as welding current sockets or stick, tungsten or wire electrodes!
> - Always place torches and electrode holders on an insulated surface!
> - Wear the full personal protective equipment (depending on the application)!
> - The machine may only be opened by qualified personnel!
> - The device must not be used to defrost pipes!
>
> **Hazard when interconnecting multiple power sources!**
> **If a number of power sources are to be connected in parallel or in series, only a technical specialist may interconnect the sources as per standard IEC 60974-9:2010: Installation and use and German Accident Prevention Regulation BVG D1 (formerly VBG 15) or country-specific regulations.**
> **Before commencing arc welding, a test must verify that the equipment cannot exceed the maximum permitted open circuit voltage.**
> - Only qualified personnel may connect the machine.
> - When taking individual power sources out of operation, all mains and welding current leads must be safely disconnected from the welding system as a whole. (Hazard due to reverse polarity voltage!)
> - Do not interconnect welding machines with pole reversing switch (PWS series) or machines for AC welding since a minor error in operation can cause the welding voltages to be combined, which is not permitted.
>
> **Risk of injury due to radiation or heat!**
> **Arc radiation can lead to skin and eye injuries.**
> **Contact with hot workpieces and sparks can lead to burns.**
> - Use hand shield or welding helmet with the appropriate safety level (depends on the application).
> - Wear dry protective clothing (e.g. hand shield, gloves, etc.) in accordance with the applicable regulations of your country.
> - Persons who are not directly involved should be protected with a welding curtain or suitable safety screen against radiation and the risk of blinding!

⚠ WARNING
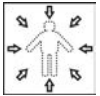
Risk of injury due to improper clothing!
During arc welding, radiation, heat and voltage are sources of risk that cannot be avoided. The user has to be equipped with the complete personal protective equipment at all times. The protective equipment has to include:

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

Explosion risk!
Apparently harmless substances in closed containers may generate excessive pressure when heated.

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

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

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

⚠ CAUTION

Smoke and gases!
Smoke and gases may lead to shortness of breath and poisoning! The ultraviolet radiation of the arc may also convert solvent vapours (chlorinated hydrocarbon) into poisonous phosgene.
- Ensure sufficient fresh air!
- Keep solvent vapours away from the arc beam field!
- Wear suitable respiratory protection if necessary!
- To prevent the formation of phosgene, residues of chlorinated solvents on workpieces must first be neutralised using appropriate measures.

Noise exposure!
Noise exceeding 70 dBA can cause permanent hearing damage!
- Wear suitable ear protection!
- Persons located within the working area must wear suitable ear protection!

According to IEC 60974-10, welding machines are divided into two classes of electromagnetic compatibility (the EMC class can be found in the Technical data):
Class A machines are not intended for use in residential areas where the power supply comes from the low-voltage public mains network. When ensuring the electromagnetic compatibility of class A machines, difficulties can arise in these areas due to interference not only in the supply lines but also in the form of radiated interference.

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

Setting up and operating
When operating arc welding systems, in some cases, electro-magnetic interference can occur although all of the welding machines comply with the emission limits specified in the standard. The user is responsible for any interference caused by welding.
In order to **evaluate** any possible problems with electromagnetic compatibility in the surrounding area, the user must consider the following: (see also EN 60974-10 Appendix A)
- Mains, control, signal and telecommunication lines
- Radios and televisions
- Computers and other control systems
- Safety equipment
- The health of neighbouring persons, especially if they have a pacemaker or wear a hearing aid
- Calibration and measuring equipment
- The immunity to interference of other equipment in the surrounding area
- The time of day at which the welding work must be carried out

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

Electromagnetic fields!
The power source can create electrical or electromagnetic fields that may impair the function of electronic systems such as EDP and CNC devices, telecommunication, power and signal lines as well as pacemakers and defibrillators.
- Follow the maintenance instructions > *see 6 chapter*!
- Unwind the welding leads completely!
- Shield radiation-sensitive equipment or facilities appropriately!
- The function of pacemakers may be impaired (seek medical advice if necessary).

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

☞ *The manufacturer's warranty becomes void if non-genuine parts are used!*
- *Only use system components and options (power sources, welding torches, electrode holders, remote controls, spare parts and replacement parts, etc.) from our range of products!*
- *Only insert and lock accessory components into the relevant connection socket when the machine is switched off.*

Requirements for connection to the public mains network

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

2.4 Transport and installation

> ⚠ **WARNING**
>
> **Risk of injury due to improper handling of shielding gas cylinders!**
> **Improper handling and insufficient securing of shielding gas cylinders can cause serious injuries!**
> - Observe the instructions from the gas manufacturer and any relevant regulations concerning the use of compressed air!
> - Do not attach any element to the shielding gas cylinder valve!
> - Prevent the shielding gas cylinder from heating up.

⚠ CAUTION

Risk of accidents due to supply lines!
During transport, attached supply lines (mains leads, control cables, etc.) can cause risks, e.g. by causing connected machines to tip over and injure persons!
- Disconnect all supply lines before transport!

Risk of tipping!
There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to IEC 60974-1).
- Set up and transport the machine on level, solid ground.
- Secure add-on parts using suitable equipment.

Risk of accidents due to incorrectly installed leads!
Incorrectly installed leads (mains, control and welding leads or intermediate hose packages) can present a tripping hazard.
- Lay the supply lines flat on the floor (avoid loops).
- Avoid laying the leads on passage ways.

Risk of injury from heated coolant and its connections!
The coolant used and its connection or connection points can heat up significantly during operation (water-cooled version). When opening the coolant circuit, escaping coolant may cause scalding.
- Open the coolant circuit only when the power source or cooling unit is switched off!
- Wear proper protective equipment (protective gloves)!
- Seal open connections of the hose leads with suitable plugs.

☞ *The units are designed for operation in an upright position!*
Operation in non-permissible positions can cause equipment damage.
- *Only transport and operate in an upright position!*

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

☞ *Protective dust caps protect the connection sockets and therefore the machine against dirt and damage.*
- *The protective dust cap must be fitted if there is no accessory component being operated on that connection.*
- *The cap must be replaced if faulty or if lost!*

3 Intended use

> ⚠ **WARNING**
>
> § **Hazards due to improper usage!**
> **The machine has been constructed to the state of the art and any regulations and standards applicable for use in industry and trade. It may only be used for the welding procedures indicated at the rating plate. Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!**
> - The equipment must only be used in line with its designated purpose and by trained or expert personnel!
> - Do not improperly modify or convert the equipment!

3.1 Use and operation solely with the following machines

This description may be applied only to machines with the M3.7X-U (LP-S) machine control.

3.2 Software version

The software version of the machine control can be displayed in the machine configuration menu (menu Srv) > *see 5.5 chapter*.

3.3 Documents which also apply

- Operating instructions for the connected welding machines
- Documents of the optional expansions

3.3.1 Part of the complete documentation

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

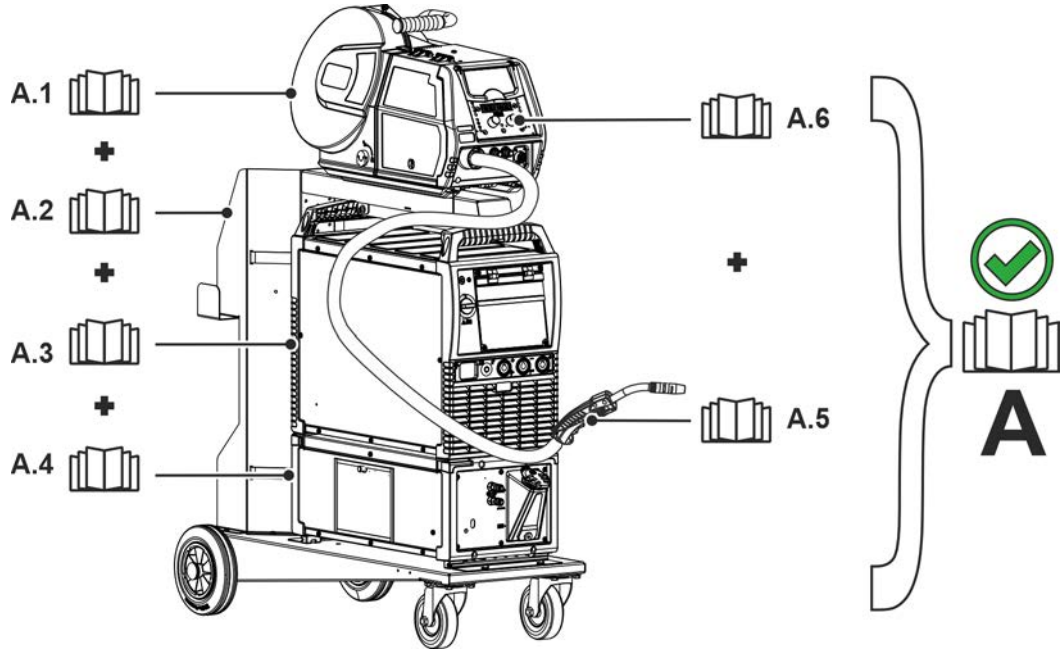The illustration shows a general example of a welding system.

Figure 3-1

Item	Documentation
A.1	Wire feed unit
A.2	Transport vehicle
A.3	Power source
A.4	Cooling unit
A.5	Welding torch
A.6	Control
A	Complete documentation

4 Machine control – Operating elements

4.1 Overview of control sections

For description purposes, the machine control has been divided into two sections (A, B) to ensure maximum clarity. The setting ranges for the parameter values are summarised in the parameter overview section > *see 8.2 chapter*.
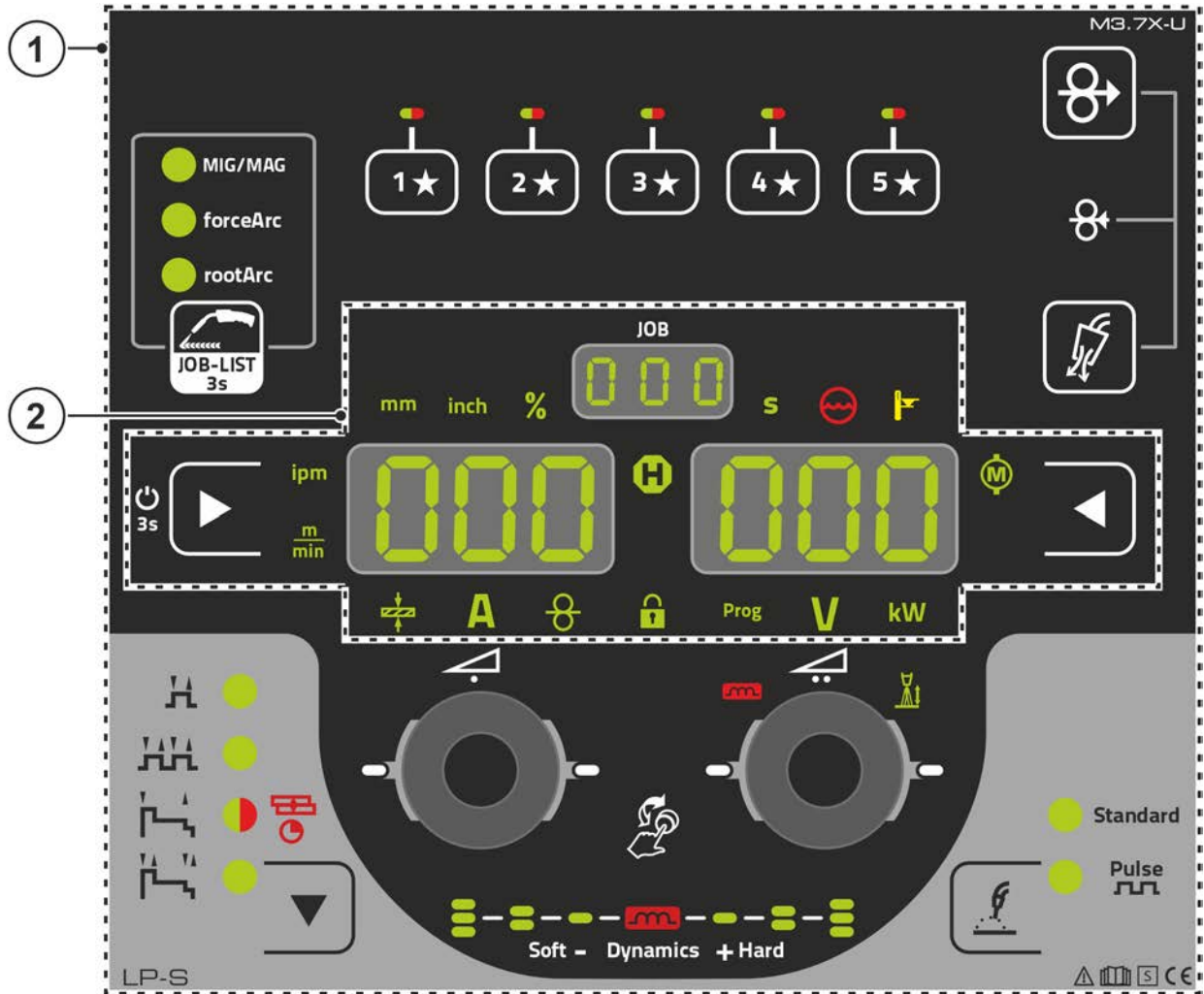

Figure 4-1

Item	Symbol	Description
1		**Control section A** > *see 4.1.1 chapter*
2		**Control section B** > *see 4.1.2 chapter*

4.1.1 Control section A
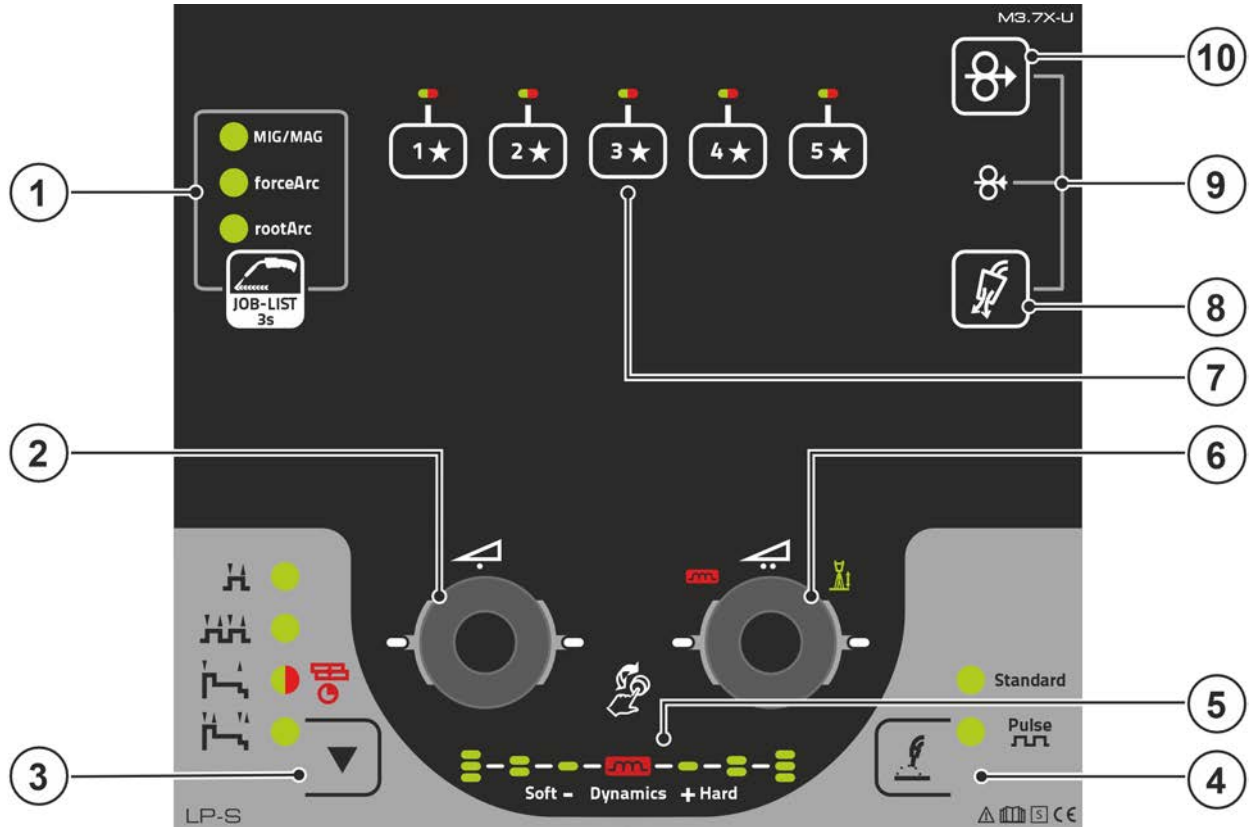
Figure 4-2

Item	Symbol	Description
1	JOB-LIST 3s	**Welding task push-button (JOB)** • ---------- Short press of a button: Fast switching of the available welding procedures in the selected basic parameters (material/wire/gas). • ---------- Long press of a button > 3s: Select the welding task (JOB) from the welding task list (JOB-LIST) > *see 5.2.3 chapter*. • ---------- Long press of a button > 7s: Reset JOBs (welding tasks) to the factory setting > *see 7.4 chapter*.
2		**Rotary knob (click wheel) for welding power** • ---------- Setting the welding power > *see 4.3.2 chapter* • ---------- Setting various parameters values depending on the preselection. (Settings can be made when the backlight is activated.)
3	▼	**Operating modes push-button (functional sequences) > *see 5.2.8 chapter*** H --------- Non-latched HH ------- Latched ⊢ --------- Signal light turns green: Special non-latched ⊟ ⊙ ----- Signal light turns red: MIG spots ⊢ --------- Special latched
4		**Push-button for welding type > *see 5.2.3.4 chapter*** Standard ---- Standard arc welding Pulse ------- Pulsed arc welding
5	⌐m⌐	**Display of arc dynamics** The height and orientation of the set arc dynamics are displayed.
6		**Correction of arc length with click wheel** • ---------- Setting the correction of arc length > *see 5.2.3.6 chapter* • ---------- Setting the arc dynamics > *see 5.2.3.7 chapter* • ---------- Setting various parameter values depending on the preselection. Settings can be made when the backlight is activated.

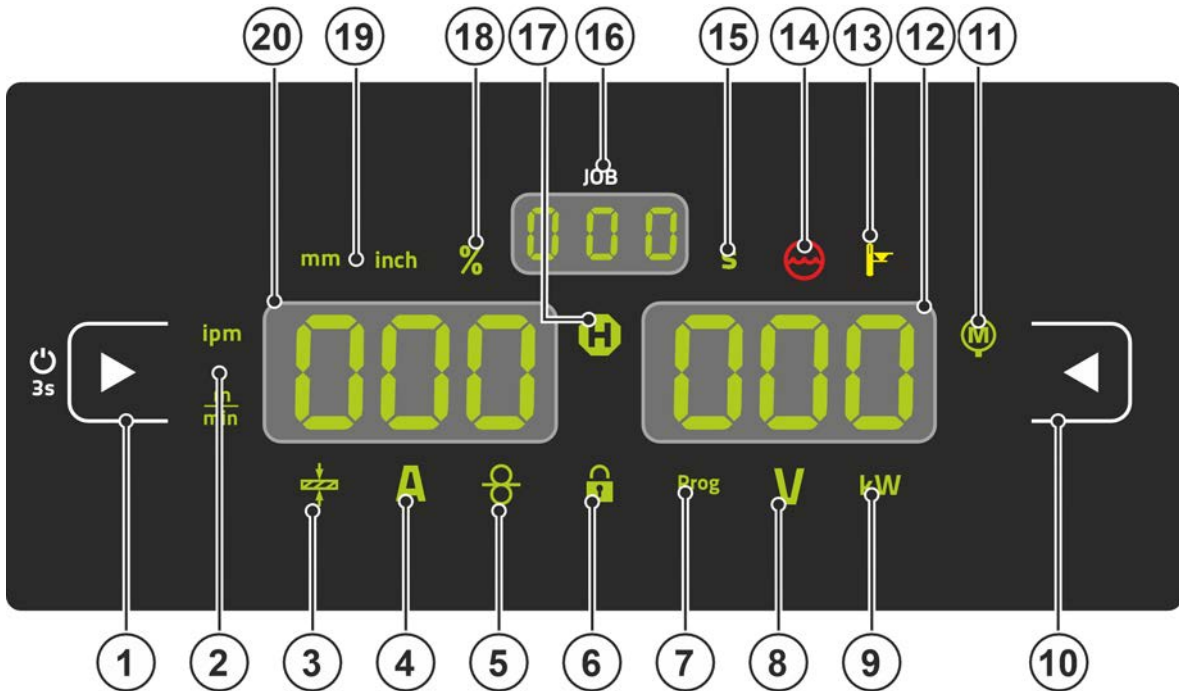| Item	Symbol	Description
7	[5★ 1★]	**push-button JOB Favourites > see 4.3.5 chapter** •----------Pressing the push-button briefly: Loading Favourites •----------Press and hold the push-button (>2 s): Saving as a Favourite •----------Press and hold the push-button (>12 s): Deleting a Favourite
8		**Push-button gas test / rinse hose package > see 5.1.1 chapter**
9		**Wire return > see 5.2.2 chapter** Potential and gas-free return of the wire electrode.
10		**Wire inching push-button** Potential and gas-free inching of the wire electrode > see 5.2.1 chapter.

4.1.2 Control section B

Figure 4-3

Item	Symbol	Description
1	▶	**Display left / Lock function push-button** Switching the device display between various welding parameters. Signal lamps show the selected parameter. ⏻--------- Press for 3 s to put the machine into lock function > see 4.3.4 chapter.
2	ipm m/min	**Wire feed speed unit signal light** m/min --- Parameter value is displayed in meters per minute. ipm------- Parameter value is displayed in inches per minute. Switching between metric or imperial system via special parameters "P29" > see 5.7 chapter.
3		**Material thickness signal light** Indication of the selected material thickness.
4	A	**Welding current signal light** Display of the welding current in amperes.
5		**Signal light Wire speed** Lights when the wire speed is shown on the display.
6		**Lock function signal light** Use display left / lock function push-button to switch on and off.

Item	Symbol	Description
7	**Prog**	**Signal light for the welding program > *see 5.2.5 chapter*** Display of the current program number in the welding data display.
8	**V**	**Correction voltage arc length signal light** Display of correction voltage arc length in volts.
9	**kW**	**Welding power signal light** Display of welding power in kilowatts.
10	◀	**Display push-button, right** Primary display of arc length correction and other parameters and their values.
11	Ⓜ	**Motor current signal light** During wire inching, the current motor current (wire feed mechanism) is displayed in amperes.
12	000	**Display right - Primary display of welding voltage** This display shows the welding voltage, arc length correction, programs or welding power (switching by Display right push-button). Furthermore, dynamics and, depending on the preselection, various welding parameter valuesare displayed. Parameter times or hold values > *see 4.2 chapter*.
13		**Excess temperature signal light / Welding torch cooling failure** For error messages > *see 7 chapter*
14		**Coolant fault signal light** Indicates flow fault or low coolant level.
15	**S**	**Second signal light** The displayed value is displayed in seconds.
16	000	**JOB number display (welding task) > *see 5.2.3 chapter***
17	**Ⓗ**	**Status display signal light (Hold)** Display of average values across the entire welding process.
18	**%**	**Percent signal light** The displayed value is displayed in percent.
19	mm inch	**Material thickness unit signal light** mm-------Parameter value is displayed in millimeters. inch ------Parameter value is displayed in inches. Switching between metric or imperial system via special parameters "P29" > *see 5.7 chapter*.
20	000	**Display left - Primary display of welding power** This display shows the welding power either as wire feed speed, welding current or material thickness (switching by display push-button on the left). Furthermore, depending on the preselection, various welding parameter valuesare displayed. Parameter times or hold values > *see 4.2 chapter*.

4.2 Welding data display

On the left and right of the parameter displays there are push-buttons for the selection of parameters. They are used to select the welding parameters to be displayed and their values.

Each time one the button is clicked, the display proceeds to the next parameter (signal lights indicate the selection). After reaching the last parameter, the system is restarted with the first one.
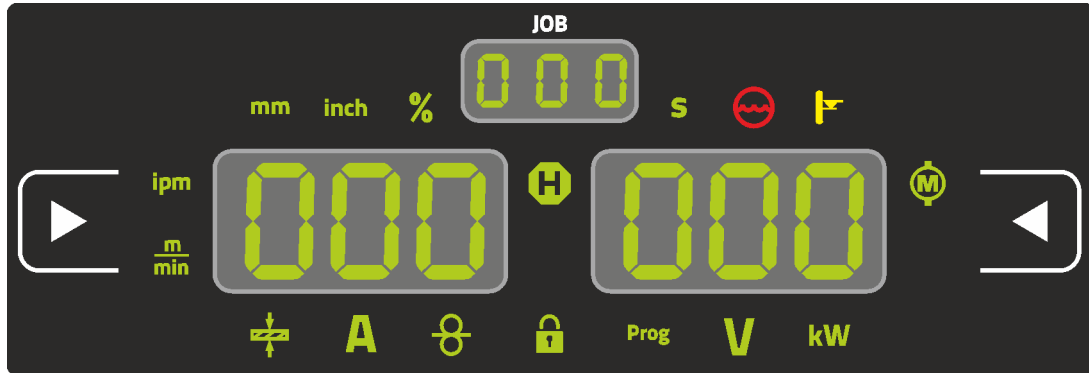

Figure 4-4

MIG/MAG

Parameter	Nominal values [1]	Actual values [2]	Hold values [3]
Welding current	✓	✓	✓
Material thickness	✓	✗	✗
Wire feed speed	✓	✓	✓
Welding voltage	✓	✓	✓
Welding power	✗	✓	✓
Motor current	✗	✓	✗

TIG

Parameter	Nominal values [1]	Actual values [2]	Hold values [3]
Welding current	✓	✓	✓
Welding voltage	✓	✓	✓
Welding power	✗	✓	✓

MMA

Parameter	Nominal values [1]	Actual values [2]	Hold values [3]
Welding current	✓	✓	✗
Welding voltage	✓	✓	✗
Welding power	✗	✓	✗

When changing settings (e.g. wire feed speed), the display immediately switches to the nominal value setting

[1] Nominal values (before welding)

[2] Actual values (during welding)

[3] Hold values (after welding, display of mean values for the entire welding process)

4.3 Operating the machine control

4.3.1 Main screen

The machine control switches to the main screen again and again after it has been turned on or a parameter setting has been completed. This means that the previously selected settings (indicated by signal lights where applicable) are adopted and that the nominal value for the wire feed speed is shown in the left-hand welding data display. The right hand display shows the welding voltage (V).

4.3.2 Welding power setting

The welding power is adjusted with the rotary knob (click wheel) for welding power. You can also adjust the parameters in the operation sequence or settings in the various machine menus.

MIG/MAG settings

The welding power (heat input into the material) can be changed by setting the following three parameters:

- wire feed speed ⌀
- material thickness ✛
- welding current A

These three parameters are interdependent and always change together. The significant parameter is the wire feed speed in m/min. The wire feed speed can be adjusted in increments of 0.1 m/min (4.0 ipm). The associated welding current and material thickness are determined from the wire feed speed.

The welding current displayed and material thickness are to be understood as guide values for the user and rounded to full amperage and 0.1 mm material thickness.

A change in the wire feed speed, for example by 0.1 m/min, leads to a more or less large change in the welding current displayed or in the material thickness displayed depending on the selected welding wire diameter. The display of the welding current and the material thickness are also dependent on the selected wire diameter.

For example, a change in wire feed speed of 0.1 m/min and a selected wire diameter of 0.8 mm results in a smaller change in the current or thickness of material than a change in wire feed speed of 0.1 m/min and a selected wire diameter of 1.6 mm.

Depending on the diameter of the wire to be welded, it is possible that smaller or larger jumps in the display of material thickness or welding current take place or changes of these values become visible only after several "clicks" on the rotary transducer. As described above, the reason for this is the change in the wire feed speed by 0.1 m/min per click and the resulting change in the current or material thickness as a function of the preselected welding wire diameter.

Please note also that the guide value of the welding current displayed before welding may deviate from the guide value during welding depending on the actual stick-out (free wire end used for welding).

The reason lies in the preheating of the free wire end by the welding current. For example, the preheating in the welding wire increases with the length of the stick-out. This means if the stick-out (free wire end) increases, the actual welding current decreases due to larger preheating in the wire. If the free wire end decreases, the actual welding current increases. This enables the welder to influence the heat input in the component within limits by changing the distance of the welding torch.

Setting of TIG/MMA:

The welding power is set with the parameter "welding current" that can be adjusted in increments of 1 ampere.

4.3.3 Changing basic settings (machine configuration menu)

The basic welding system functions can be adjusted in the machine configuration menu. Only experienced users should change the settings > *see 5.5 chapter*.

4.3.4 Lock function

The lock function indicated by the signal light 🔒 protects against accidental adjustment of the machine settings. All operating elements are disabled when the feature is enabled. The welding process cannot be started when the lock is activated. Press and hold (> 3 s) the push-button ⏻ to enable or disable the function.

4.3.5 JOB favourites

Favourites are additional locations for storing and loading frequently used welding tasks, programs and their settings. The status of the Favourites (loaded, changed, not loaded) is indicated by signal lights.

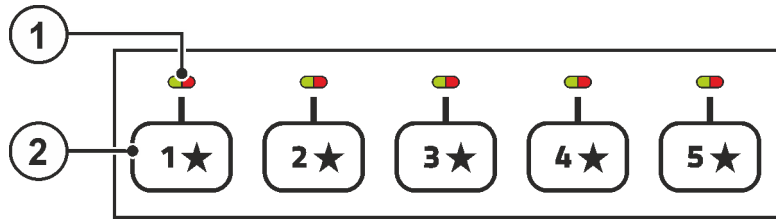- Five Favourites are available to save any settings.

Figure 4-5

Item	Symbol	Description
1		**Signal light of Favourite status**
		---------- Signal light is green: Favourite loaded, settings of the Favourite and the current device settings are identical
		---------- Signal light is red: Favourite loaded, but settings of the Favourite and the current device settings are not identical (for example, the operating point has been changed)
		----------- Signal light is off: Favourite not loaded (e.g. JOB number has been changed)
2		**push-button JOB Favourites**
		•-----------Pressing the push-button briefly: Loading Favourites
		•-----------Press and hold the push-button (>2 s): Saving as a Favourite
		•-----------Press and hold the push-button (>12 s): Deleting a Favourite

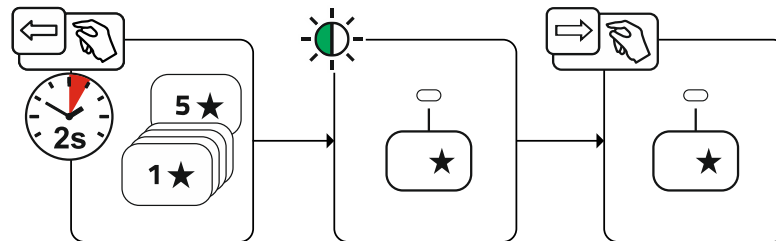#### 4.3.5.1 Saving current settings to Favourites

Figure 4-6

- Press and hold the favourite memory push-button for 2 s (the signal light of the favourite status is green).
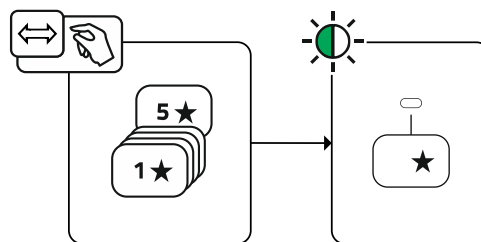
4.3.5.2 Loading saved Favourites

Figure 4-7

- Press the favourite memory push-button (the signal light of the favourite status is green).

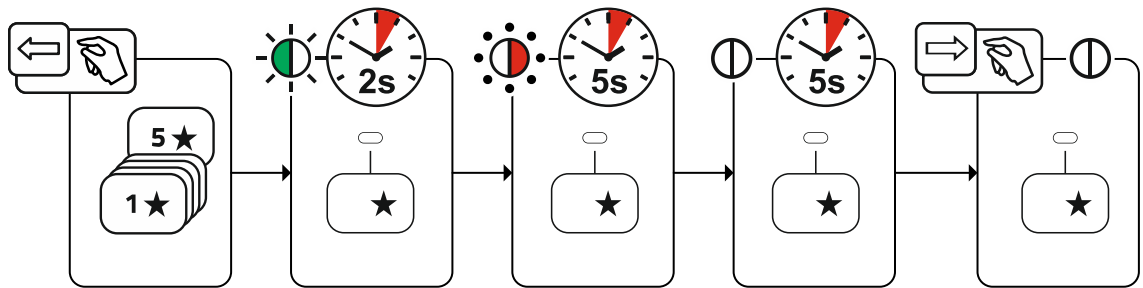### 4.3.5.3 Deleting saved Favourites

Figure 4-8

- Press and hold the favourite memory push-button.
  After 2 seconds, the signal light of the favourite status turns green
  after another 5 s, the signal light starts flashing red
  after another 5 s the signal light goes out

- Release the favourite memory push-button.

5 Functional characteristics

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

5.1.1 Shielding gas volume settings

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!

- Slowly open the gas cylinder valve.
- Open the pressure regulator.
- Switch on the power source at the main switch.
- Trigger gas test > *see 5.1.1.1 chapter* function (welding voltage and wire feed motor remain switched off – no accidental arc ignition).
- Set the relevant gas quantity for the application on the pressure regulator.

Setting instructions

Welding process	Recommended shielding gas quantity
MAG welding	Wire diameter x 11.5 = l/min
MIG brazing	Wire diameter x 11.5 = l/min
MIG welding (aluminium)	Wire diameter x 13.5 = l/min (100 % argon)
TIG	Gas nozzle diameter in mm corresponds to l/min gas throughput

Helium-rich gas mixtures require a higher gas volume!

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

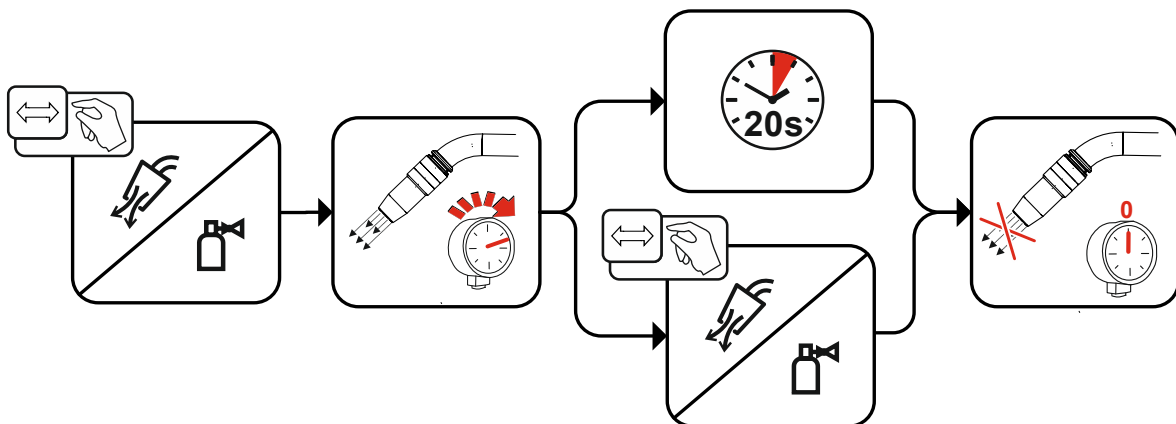| Shielding gas	Factor
75% Ar/25% He	1.14
50% Ar/50% He	1.35
25% Ar/75% He	1.75
100% He	3.16

5.1.1.1 Gas test

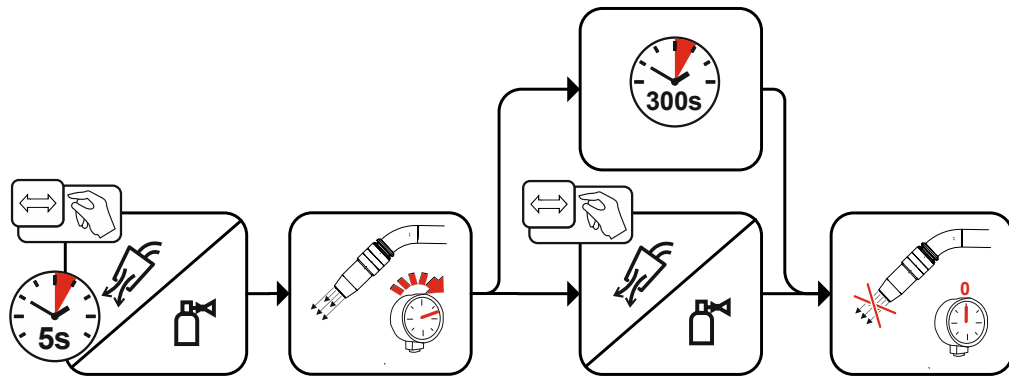*Figure 5-1*

5.1.1.2 Purge hose package

Figure 5-2

5.2 MIG/MAG welding

5.2.1 Wire inching

The wire inching function is used for potential- and gas-free inching of the wire electrode after the wire spool change. By pressing and holding the wire inching button for a long time, the wire inching speed increases in a ramp function (special parameter P1 > *see 5.7.2.1 chapter*) from 1 m/min to the set maximum value. The maximum value is set by simultaneously pressing the wire inching button and turning the left click wheel.
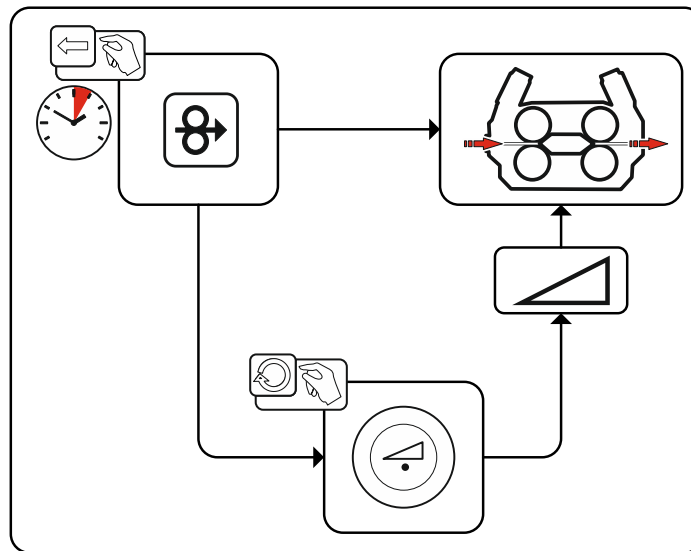

Figure 5-3

5.2.2 Wire return

The wire return function is used to retract the wire electrode without tension and protection gas. By simultaneously pressing and holding the wire inching and gas test buttons, the wire return speed increases in a ramp function (special parameter P1 > *see 5.7.2.1 chapter*) from 1 m/min to the set maximum value. The maximum value is set by simultaneously pressing the wire inching button and turning the left click wheel.

During the process, the wire spool must be turned by hand clockwise to wind up the wire electrode again.
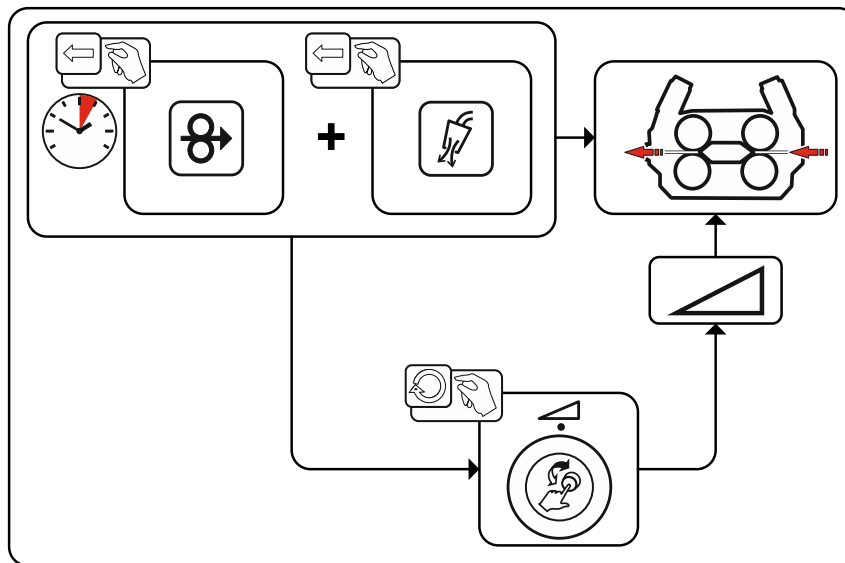
Figure 5-4

5.2.3 Welding task selection

This machine series offers simple operation and a wide range of functions.

- JOBs (welding tasks consisting of welding procedure, type of material, wire diameter and type of shielding gas) pre-defined for all standard welding tasks.
- Simple JOB selection from a list of predefined JOBs (sticker in the protective cap on the wire feeder or complete list > *see 8.1 chapter*).
- The system calculates the required process parameters depending on the operating point specified (one-knob operation over the rotary knob for wire feed speed). Correct the arc length and dynamics if necessary
- Conventional, independent welding task settings using wire feed speed and welding voltage are also possible > *see 5.2.11 chapter*.

5.2.3.1 Basic welding parameters

The user must first determine the basic parameters (material type, wire diameter and shielding gas type) of the welding system. These basic parameters are then compared with the welding job list (JOB-LIST). The combination of the basic parameters gives a JOB number, which must now be entered on the control unit. This basic setting must be rechecked or adjusted only when changing the wire or gas.
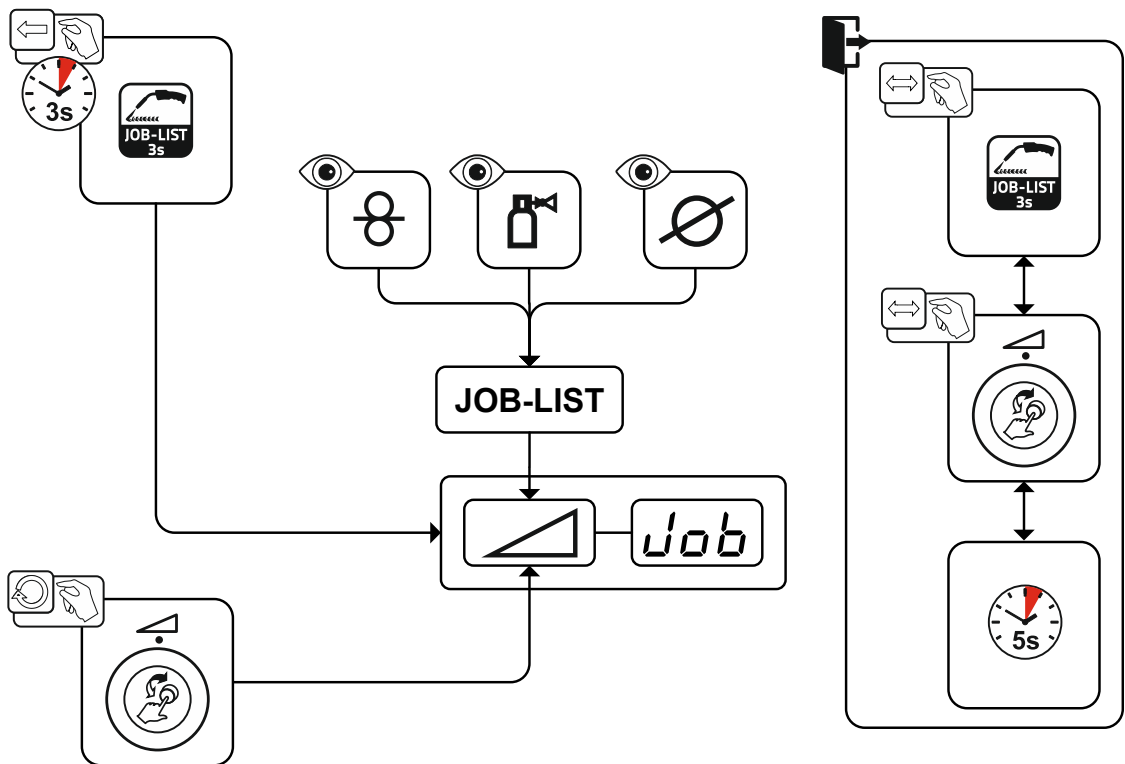

Figure 5-5

5.2.3.2 Welding procedure

After setting the basic parameters, switching between the MIG/MAG welding procedures forceArc and rootArc is possible (provided there is a corresponding combination of basic parameters). The process change will also change the JOB number, but the basic parameters remain unchanged.
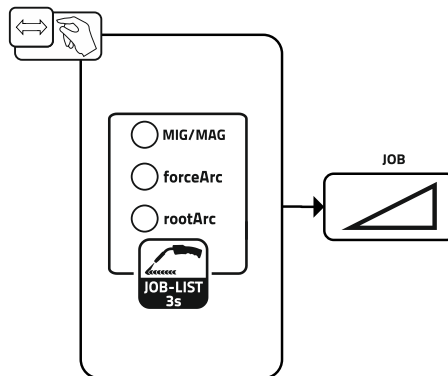

Figure 5-6

5.2.3.3 Operating mode

The operating mode determines the process sequence controlled by the welding torch. Detailed descriptions of the operating modes > *see 5.2.8 chapter*.
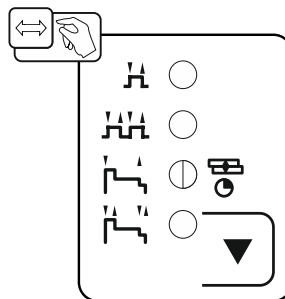

Figure 5-7

5.2.3.4 Welding type

Different forms of MIG/MAG processes are collectively referred to as welding types.

Standard (welding with standard arc)

Depending on the set combination of wire feed speed and arc voltage, short arc, transitional arc or spray arc can be used as arc types for welding.

Pulse (welding with pulsed arc)

A selective change in the welding current generates current pulses in the arc, which lead to a 1 drop per pulse of material transfer. The result is an almost spatter-free process, suitable for welding all materials, in particular high-alloy CrNi steels or aluminium.
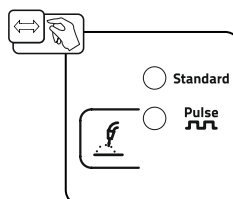

Figure 5-8

5.2.3.5 Welding power (operating point)

The welding power is adjusted according to the principle of one-knob operation. The user can set their operating point optionally as wire feed speed, welding current or material thickness. The optimum welding voltage for the operating point is calculated and set by the welding machine. If necessary, the user can correct this welding voltage > *see 5.2.3.6 chapter*.
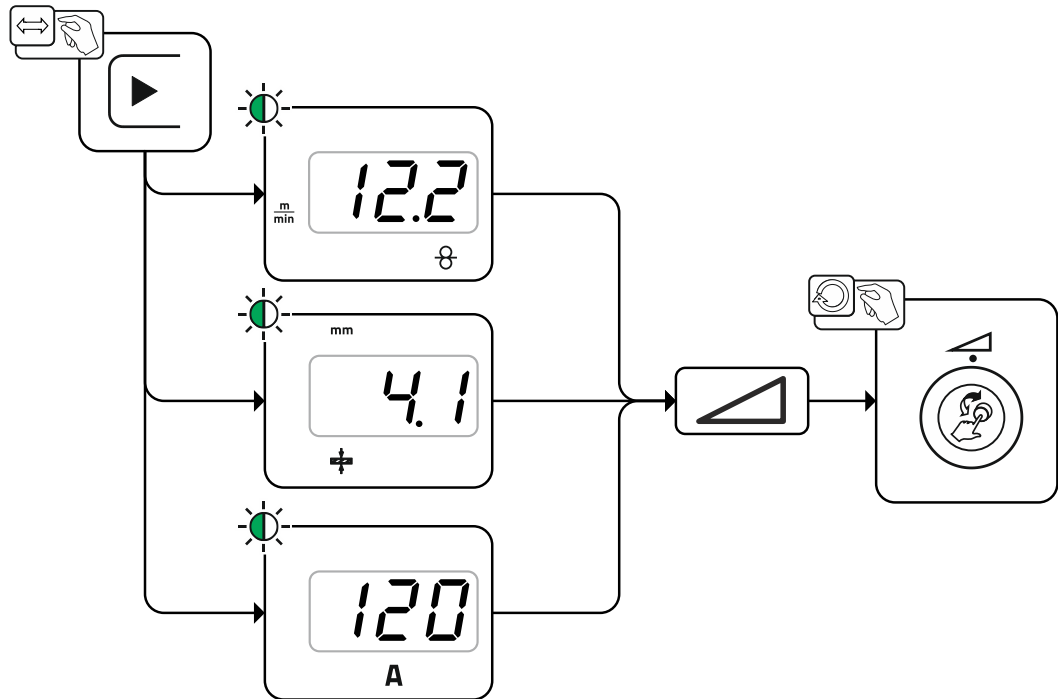

Figure 5-9

Application example (setting via material thickness)

The required wire feed speed is not known and is to be determined.

- Select welding task JOB 76(> *see 5.2.3 chapter*): material = AlMg, gas = Ar 100%, wire diameter = 1.2 mm.
- Switch the display to material thickness.
- Measure the material thickness (workpiece).
- Set the measured value, e.g. 5 mm, at the machine control.
  This set value corresponds to a specific wire feed speed. Switching the display to this parameter will show the associated value.

In this example, a material thickness of 5 mm corresponds to a wire feed speed of 8.4 m/min.

The material thickness details in the welding programs generally refer to fillet welds in the PB welding position. They should be regarded as guideline values and may differ in other welding positions.

5.2.3.6 Arc length

If necessary, the arc length (welding voltage) can be corrected by +/- 9.9 V for each welding task. Effect on the arc:

- Setting to the negative side > shorter arc > more penetration > more spatter formation.
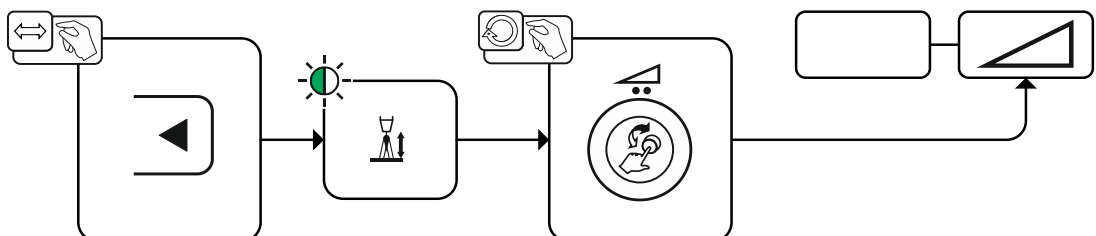- Setting to the positive side > longer arc > less penetration > less spatter formation.

Figure 5-10

5.2.3.7 Arc dynamics (choke effect)

This function can be used to adjust the arc between a narrow, hard arc with deep penetration (positive values) and a wide and soft arc (negative values). In addition, the selected settings are displayed with signal lights below the rotary knobs.
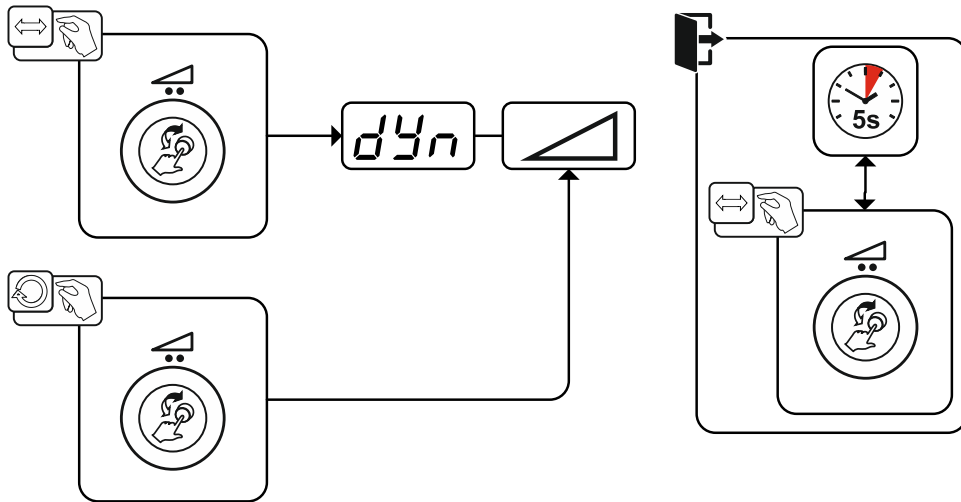

Figure 5-11

5.2.4 Standard MIG/MAG torch

The MIG welding torch trigger is essentially used to start and stop the welding process.

Operating elements	Functions
Torch trigger	• Start/stop welding

Additional functions such as program switching (before or after welding) are possible by tapping the torch trigger.

5.2.5 Programs (P$_A$ 1-15)

Different welding jobs or positions on a workpiece require different welding programs (operating points). The following parameters are stored in each program:

• Wire feed speed and voltage correction (welding power)

• Operating mode, welding type and dynamic
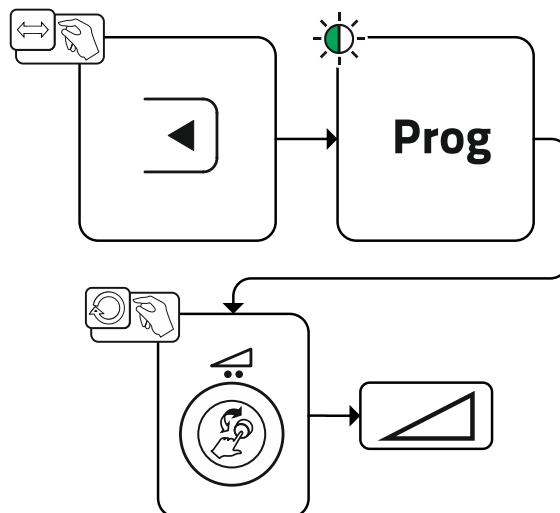
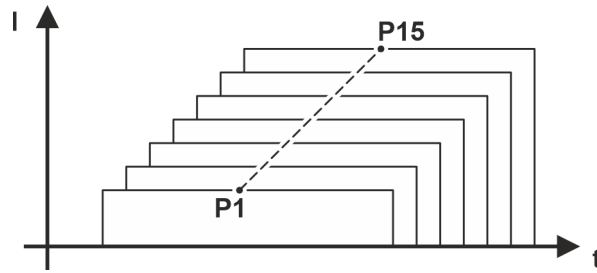#### 5.2.5.1 Selection and adjustment

Figure 5-12

Example 1: Welding workpieces with different sheet metal thicknesses (non-latched)

Figure 5-13

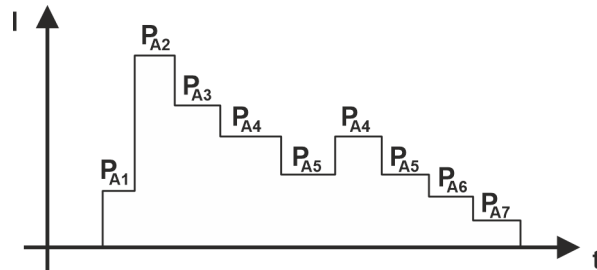**Example 2: Welding different positions on a workpiece (latched)**
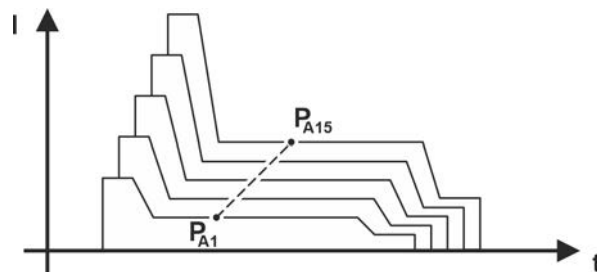

Figure 5-14

Example 3: Aluminium welding of different sheet metal thicknesses (non-latched or latched special)

Figure 5-15

Up to 15 programs (P_{A1} to P_{A15}) can be defined.
In each program, an operating point (wire feed speed, correction of the arc length, dynamics / choke effect) can be permanently stored.

5.2.6   Program sequence

Certain materials, aluminium for example, require special functions for reliable and high-quality welding. In this case, the special latched mode is used with the following programs:

- Start program P_{START} (avoidance of cold welds at start of seam)
- Main program P_A (constant welding)
- Reduced main program P_B (targeted heat reduction)
- End program P_{END}) (avoidance of end-craters by targeted heat reduction)

The programs contain parameters such as wire feed speed (operating point), correction of arc length, slope times, program duration, etc.
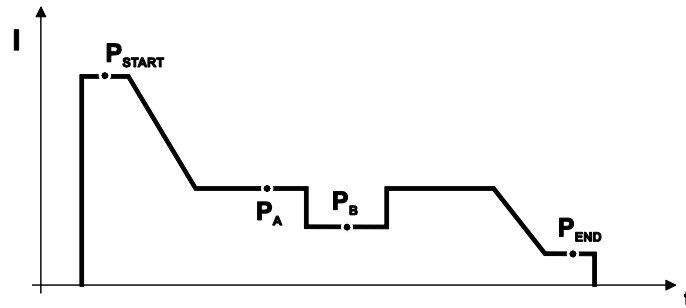
Figure 5-16

5.2.7 Expert menu (MIG/MAG)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.
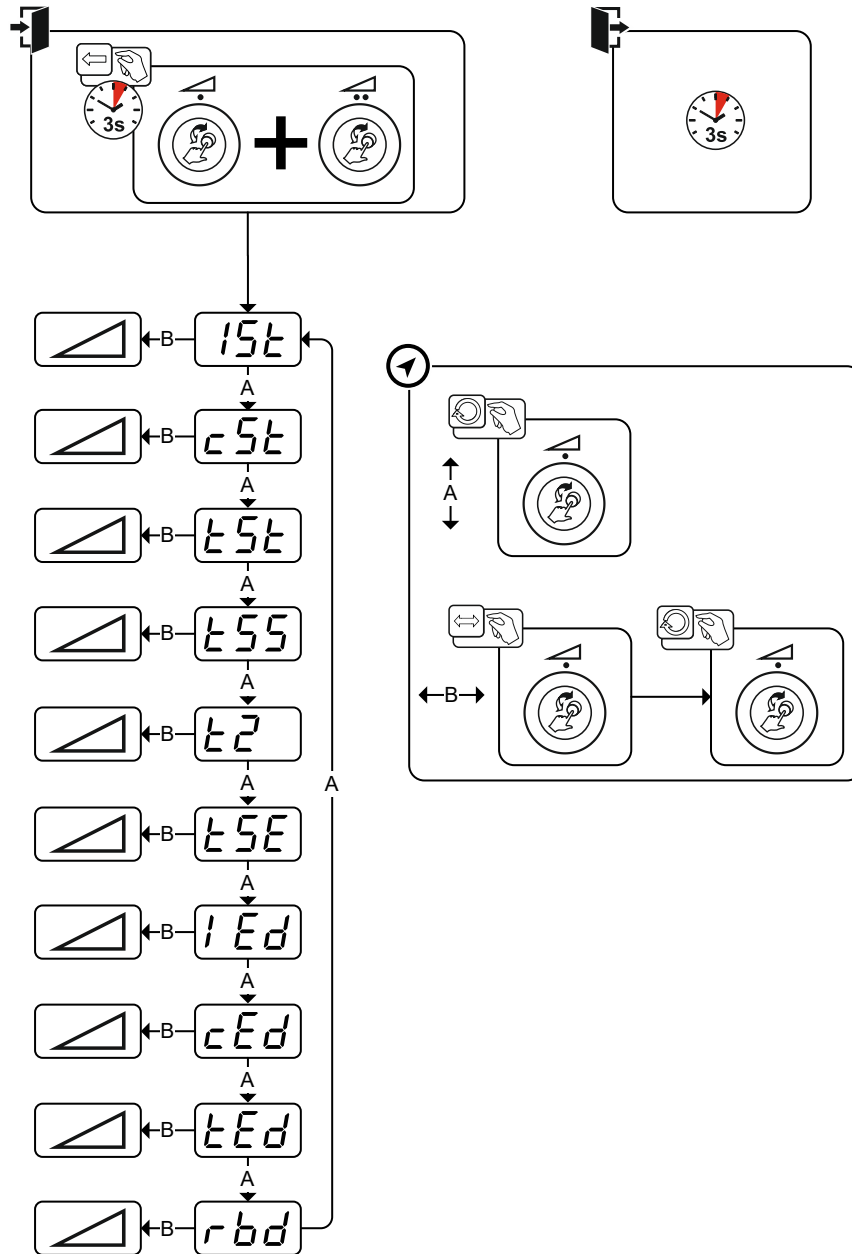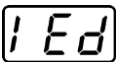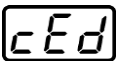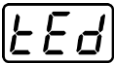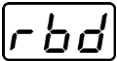
Figure 5-17

Display	Setting/selection
$I \, St$	**Start current (as percentage, dependent on main current)**
$c \, St$	**Correction of arc length in start program P_{START}**
$t \, St$	**Start time (duration of start current)**
$t \, SS$	**Slope time of start program P_{START} to main program P_A**
$t \, 1$	**Spot time**
$t \, SE$	**Slope time of main program P_A to end program P_{END}**

Display	Setting/selection
I Ed	**End-crater current** Setting range in percent: depending on main current Setting range, absolute: Imin to Imax.
cEd	**Correction of arc length in end program P$_{END}$**
tEd	**End current time (duration of end current)**
rbd	**Burn-back time > *see 5.2.7.1 chapter*** • ----------Increase value > increase wire burn-back • ----------Decrease value > decrease wire burn-back

5.2.7.1 Burn-back

The wire burn-back parameter prevents the sticking of the wire electrode in the weld pool or at the contact tip at the end of the welding process. The value is optimally preset for a variety of applications (but can be adjusted if necessary). The adjustable value stands for the time until the power source switches off the welding current after the welding process has been stopped.

Welding wire behaviour	Setting instructions
Wire electrode is sticking in the weld pool.	Increase value
Wire electrode is sticking on the contact tip or large ball formation on the wire electrode	Reduce value

5.2.8 Operating modes (functional sequences)

5.2.8.1 Explanation of signs and functions

Symbol	Meaning
	Pressing the torch trigger
	Releasing the torch trigger
	Tap the torch trigger (briefly press and release)
	Shielding gas
I	Welding power
	Wire feed speed
t	Time
	Gas pre-flow
	Wire creep
P$_{START}$	Start program
P$_A$	Main program
P$_{END}$	End program
	Wire burn-back
	Gas post-flow

Non-latched mode

Figure 5-18

Step 1

- Press and hold torch trigger.
- Shielding gas is expelled (gas pre-flows).
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Change over to pre-selected wire speed.

Step 2

- Release torch trigger.
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

Special, non-latched

Figure 5-19

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece, welding current is flowing (start program P_{START} for the time t_{start})
- Slope to main program P_A.

Step 2

- Release torch trigger
- Slope to end program P_{END} for the time t_{end}.
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

Spot welding
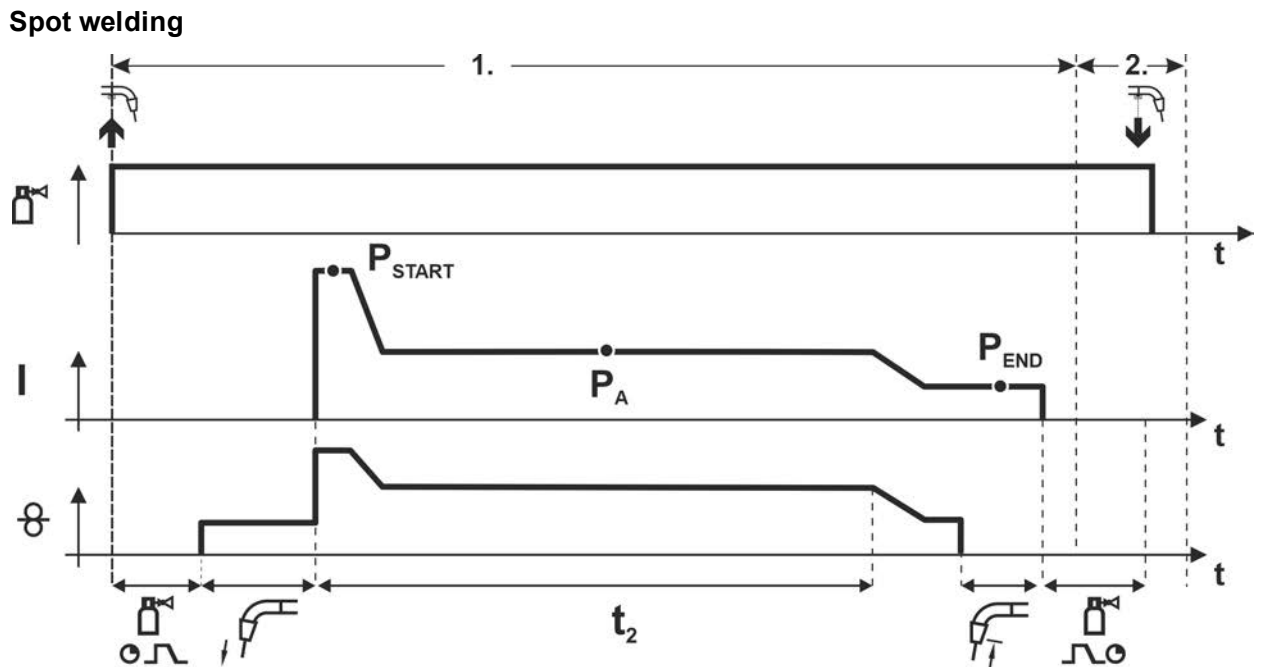
Figure 5-20

Start and slope times from the start program must be added to the spot time.
1st cycle

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed"
- Arc ignites after the wire electrode makes contact with the workpiece, welding current is flowing (start program P_{START}, spot time starts)
- Slope to main program P_A
- After the set spot time elapses, slope goes to end program P_{END}.
- Wire feed motor stop welding.
- Arc is extinguished after the pre-selected wire burn-back time elapses
- Gas post-flow time elapses.

2nd cycle

- Release torch trigger

Releasing the torch trigger (step 2) interrupts the welding process even if the spot time has not yet elapsed (slope to end program P_{END}).
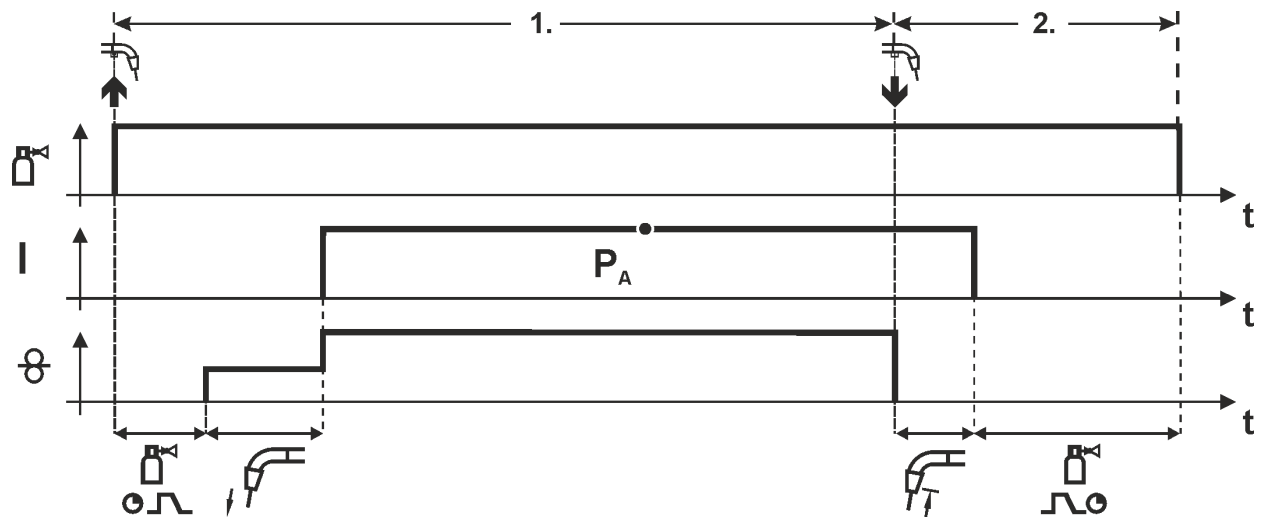
Latched mode
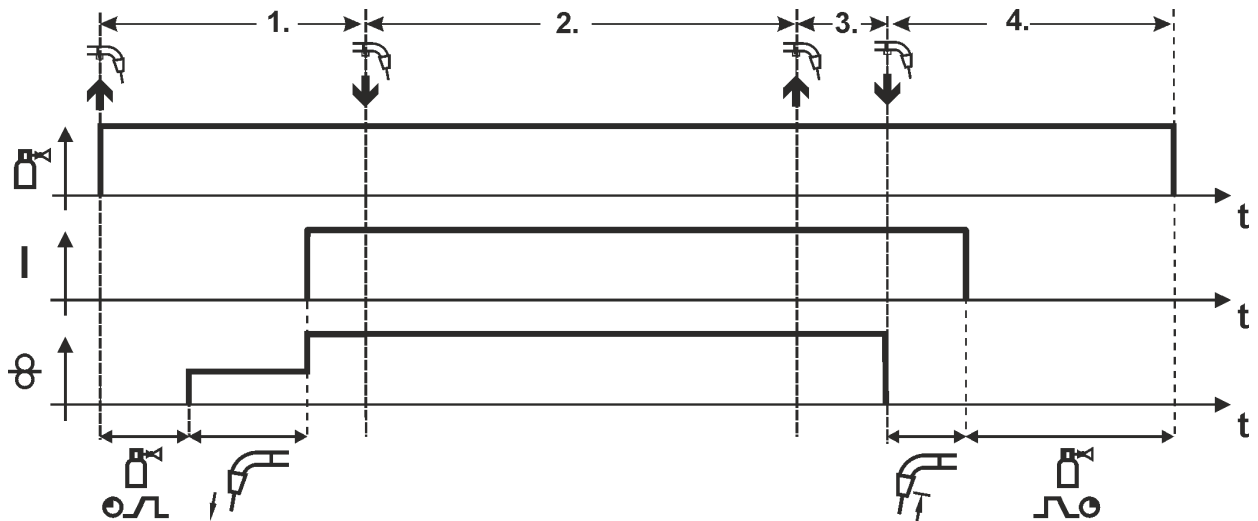
Figure 5-21

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece; welding current flows.
- Change over to pre-selected WF speed (main program P_A).

Step 2

- Release torch trigger (no effect)

Step 3

- Press torch trigger (no effect)

Step 4

- Release torch trigger
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.
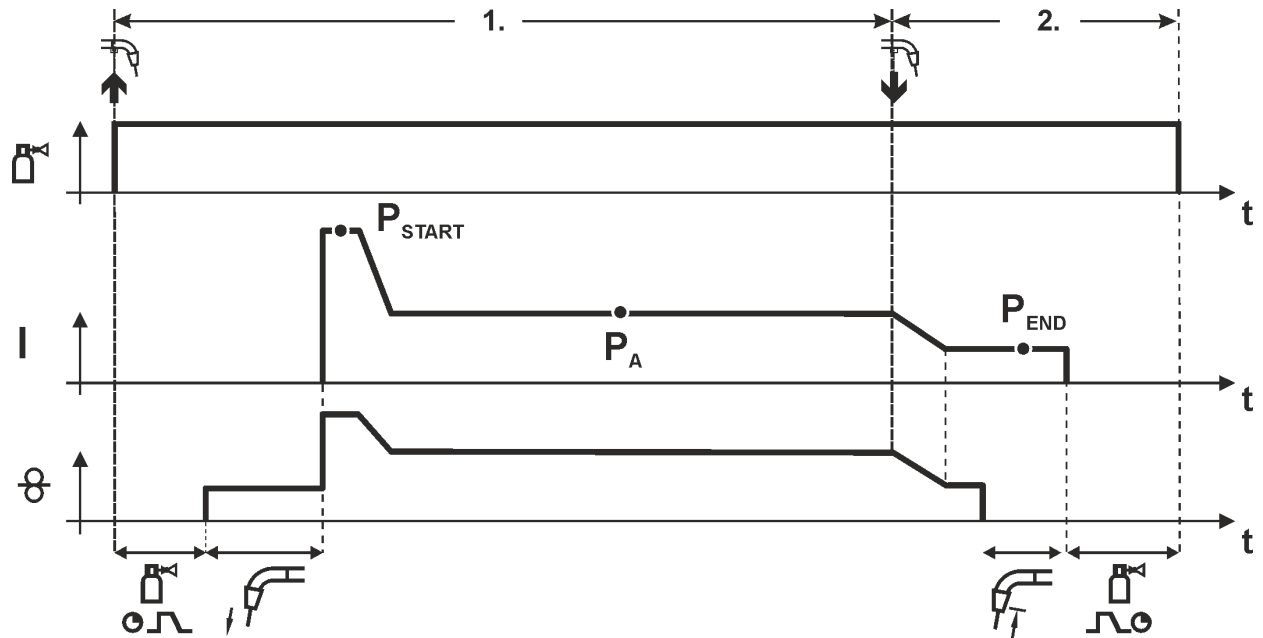
Latched special
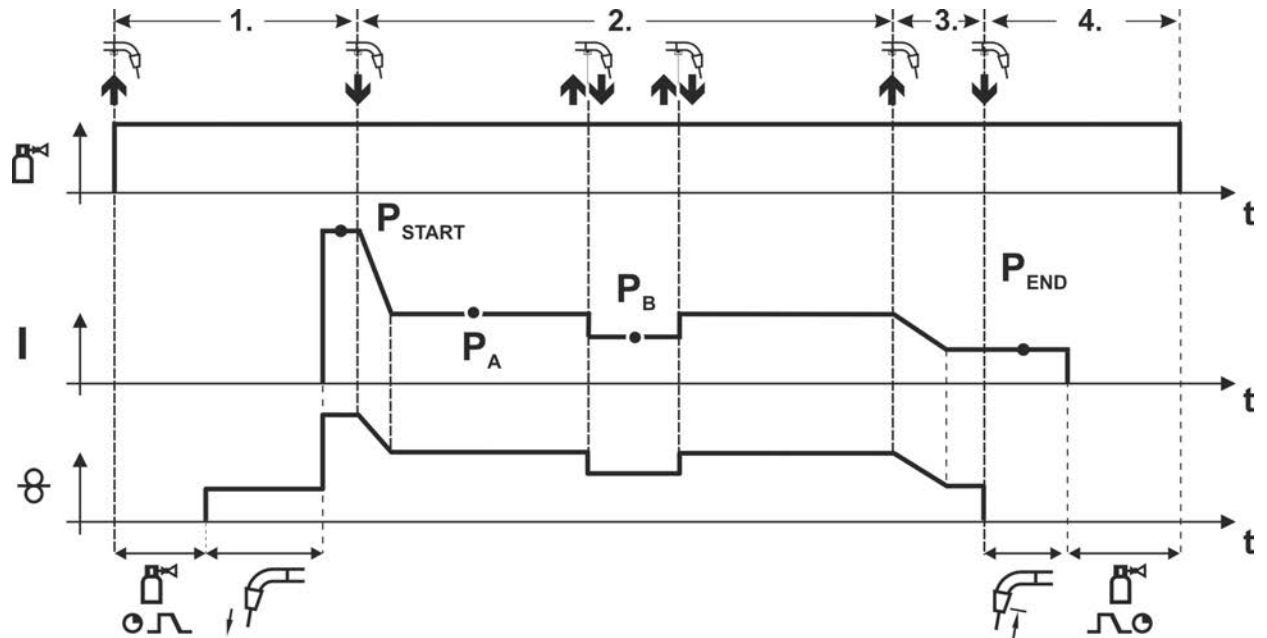
Figure 5-22

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece, welding current is flowing (start program P_{START})

The slope on main program P_A is given at the earliest after the set time t_{START} elapses and at the latest when the torch trigger is released.

Step 2

- Release torch trigger
- Slope to main program P_A.

Tapping[1] can be used to change over to the reduced main program P_B.
Repeated tapping will switch back to the main program P_A.

Step 3

- Press and hold torch trigger
- Slope to end program P_{END}.

Step 4

- Release torch trigger
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

**[1] Prevent tapping (brief press and release within 0.3 seconds)**

If the welding current is to be prevented from switching over to the reduced main program P_B by tapping, the parameter value for WF3 needs to be set to 100% ($P_A = P_B$) in the program sequence.

5.2.8.2 Automatic cut-out

Once the fault periods have elapsed, the automatic cut-out stops the welding process when it has been triggered by one of two states:

- During ignition
  5 s after the start of the welding process, no welding current flows (ignition error).
- During welding
  The arc is interrupted for more than 5 s (arc interruption).

5.2.9 forceArc / forceArc puls

Heat-reduced, directionally-stable and powerful arc with deep fusion penetration for the upper power range.
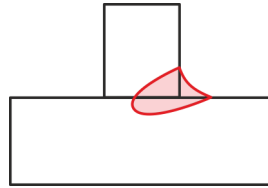
Figure 5-23

- Smaller included angle due to deep penetration and directionally stable arc
- Excellent root and sidewall fusion
- Secure welding also with very long stick-outs
- Reduced undercuts
- Manual and automated applications

You can make use of these properties after selecting the forceArc process > *see 5.2.3 chapter*.

As with pulse arc welding, it is important to make sure of a good welding current connection.

- Keep welding current cables as short as possible and ensure that cable cross-sections are adequate!
- Fully unroll welding current cables, torche hose packages and, if applicable, intermediate hose packages. Avoid loops!
- Use welding torches, preferably water-cooled, that are suitable for the higher power range.
- Use welding wire with adequate copper coating when welding steel. The wire spool should have layer spooling.

Unstable arc!

Welding current cables that are not fully unrolled can cause faults in the arc (flickering).

- **Fully unroll welding current cables, torch hose packages and, if applicable, intermediate hose packages. Avoid loops!**

5.2.10 rootArc/rootArc puls

Short arc with perfect weld modelling capabilities for effortless gap bridging, especially for root welding

Figure 5-24

- Reduced spatter compared to standard short arc
- Good root formation and secure sidewall fusion
- Manual and automated applications

Unstable arc!

Welding current cables that are not fully unrolled can cause faults in the arc (flickering).

- **Fully unroll welding current cables, torch hose packages and, if applicable, intermediate hose packages. Avoid loops!**

5.2.11 Conventional MIG/MAG Welding (GMAW non synergic)

Applications, for example for exotic welding wires, may require special settings of the welding parameters. In this operating method, wire feed speed and welding voltage can be determined independently of each other over the entire setting range.

Operating or welding modes that require synergistic dependencies of the welding parameters in a characteristic curve cannot be selected:

- special non-latched and latched
- Spot welding
- Pulsed arc welding

It is only possible to change the JOB number when no welding current is flowing.
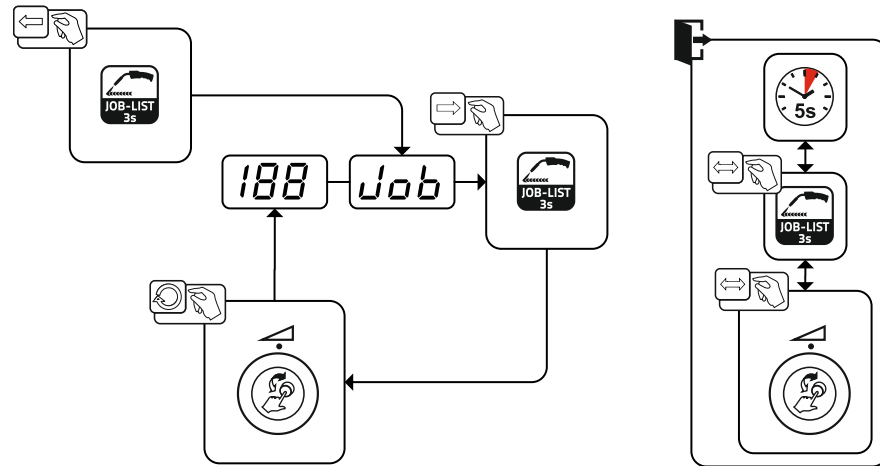
Figure 5-25

5.2.11.1 Welding power (operating point)

The operating point (welding performance) is set with the wire speed and the welding voltage. Settings are made using the "welding parameter setting" and "arc length correction" rotary dials, which are used here to set the wire speed and the welding voltage.
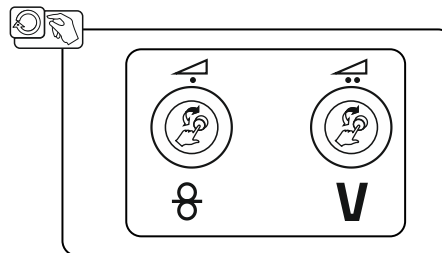
Figure 5-26

5.2.11.2 Arc dynamics (choke effect)

This function can be used to adjust the arc between a narrow, hard arc with deep penetration (positive values) and a wide and soft arc (negative values). In addition, the selected settings are displayed with signal lights below the rotary knobs.

Figure 5-27

5.2.11.3 Expert menu - GMAW non synergic

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

Figure 5-28

Display	Setting/selection
GPr	**Gas pre-flow time**
GPt	**Gas post-flow time**
rbd	**Burn-back time > *see 5.2.7.1 chapter*** • ----------Increase value > increase wire burn-back • ----------Decrease value > decrease wire burn-back

Display	Setting/selection
$\boxed{\text{UUc}}$	**Wire creep** • ----------Increase the value > higher wire creep speed • ----------Decrease the value > lower wire creep speed

5.3 TIG welding

5.3.1 Welding task selection
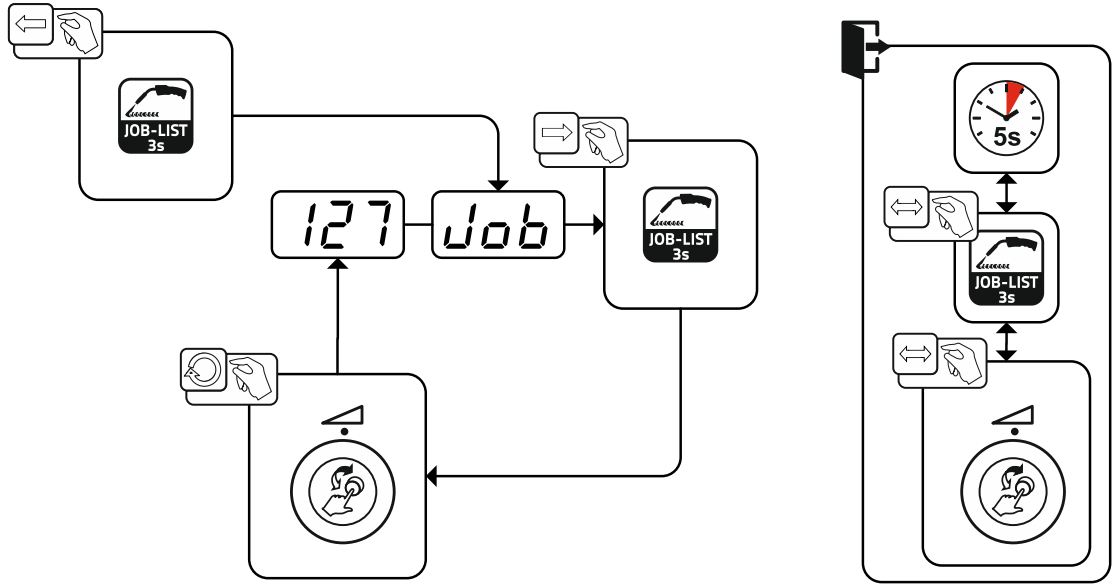
Figure 5-29

5.3.2 Welding current setting
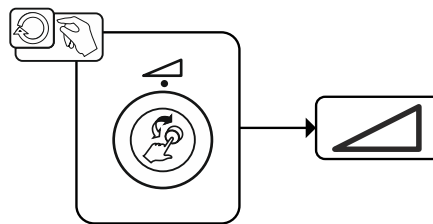
Figure 5-30

5.3.3 Arc ignition

5.3.3.1 Liftarc
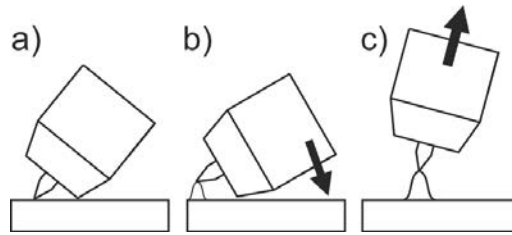
Figure 5-31

The arc is ignited on contact with the workpiece:

a) 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).

b) 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.

c) 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.
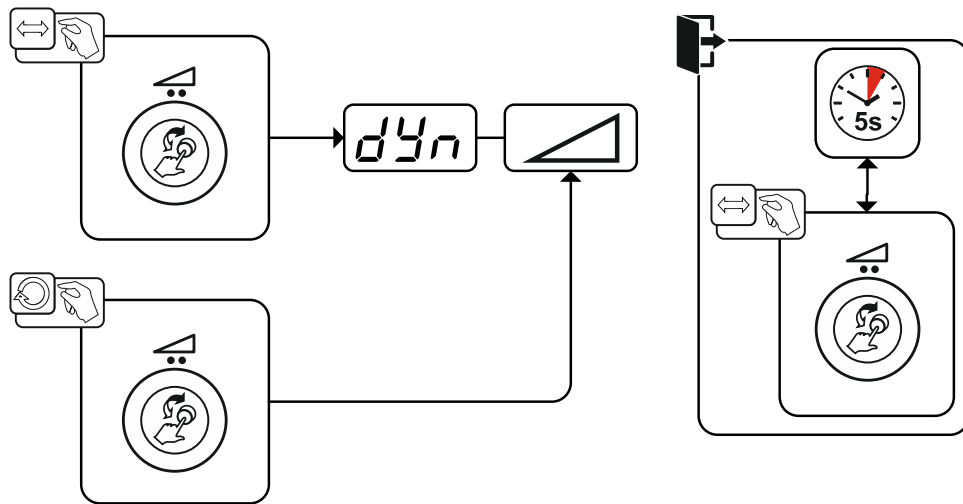
5.3.4 Expert menu (TIG)

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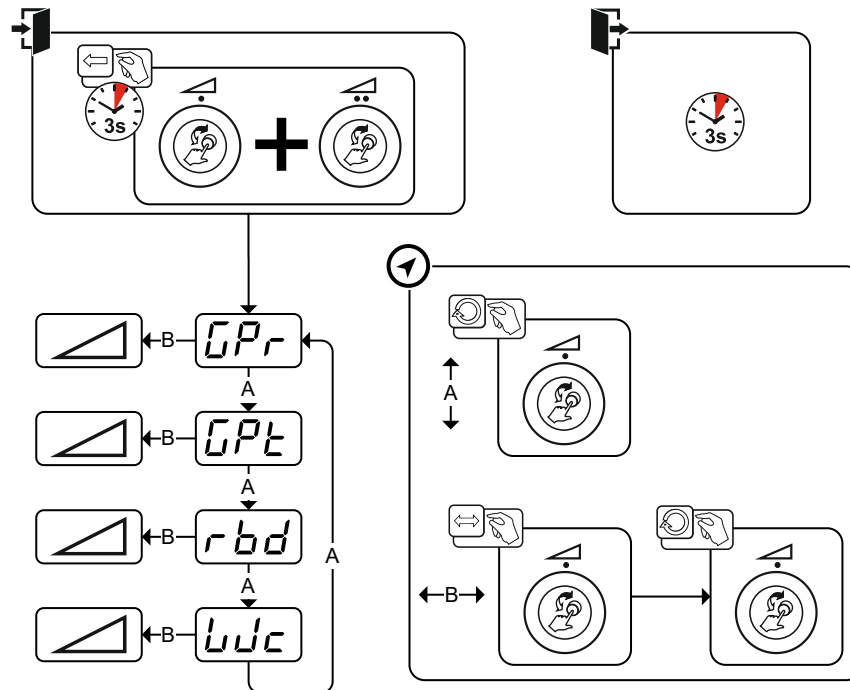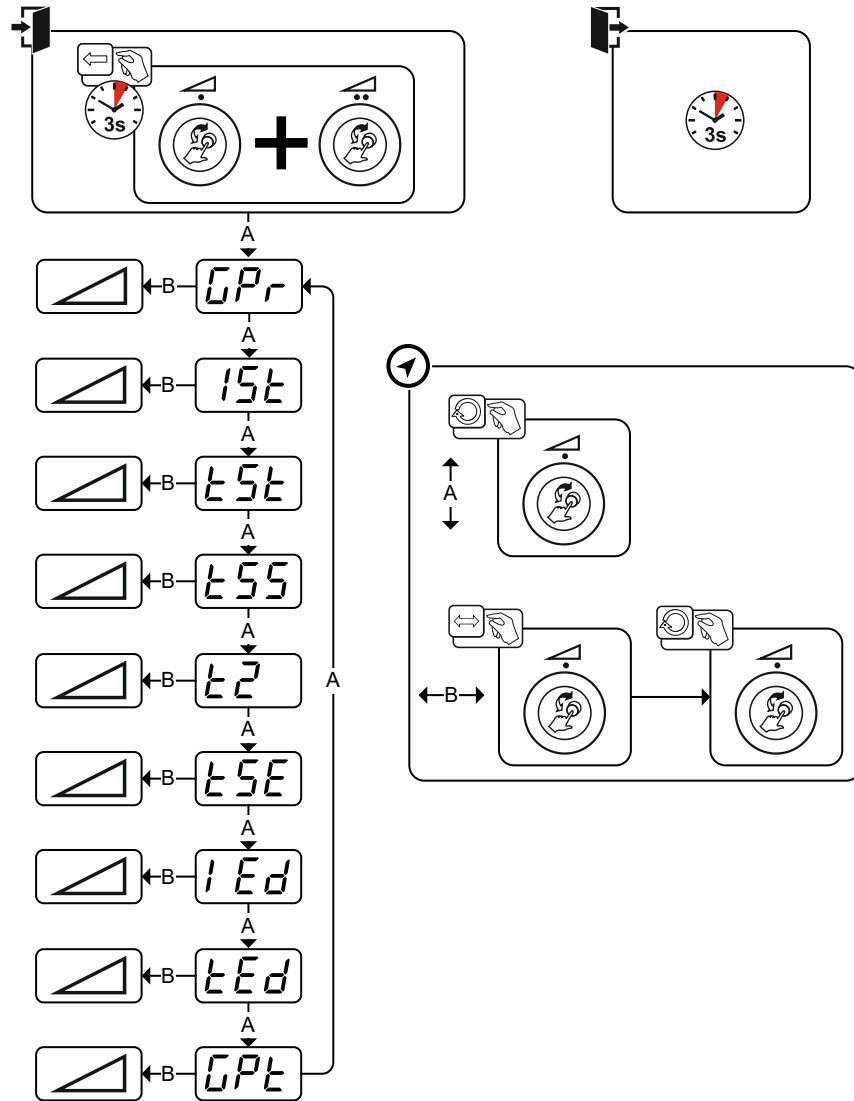

Figure 5-32

Display	Setting/selection
GPr	**Gas pre-flow time**
ISt	**Start current (as percentage, dependent on main current)**
tSt	**Start time (duration of start current)**
tSS	**Slope time of start program P_{START} to main program P_A**
t 1	**Spot time**
tSE	**Slope time of main program P_A to end program P_{END}**
IEd	**End current (as a percentage, dependent on main current)**
tEd	**End current time (duration of end current)**

Display	Setting/selection
GPt	**Gas post-flow time**

5.3.5 Operating modes (functional sequences)

5.3.5.1 Explanation of signs and functions

Symbol	Meaning
	Pressing the torch trigger
	Releasing the torch trigger
	Tap the torch trigger (briefly press and release)
	Shielding gas is flowing
I	Welding power
	Gas pre-flow
	Gas post-flow
	Non-latched
	Special non-latched / spot welding
	Latched
	Special latched
t	Time
P_{START}	Start program
P_A	Main program
P_B	Reduced main program
P_{END}	End program
t_{SS}	Slope time from P_{START} to P_A

Non-latched mode
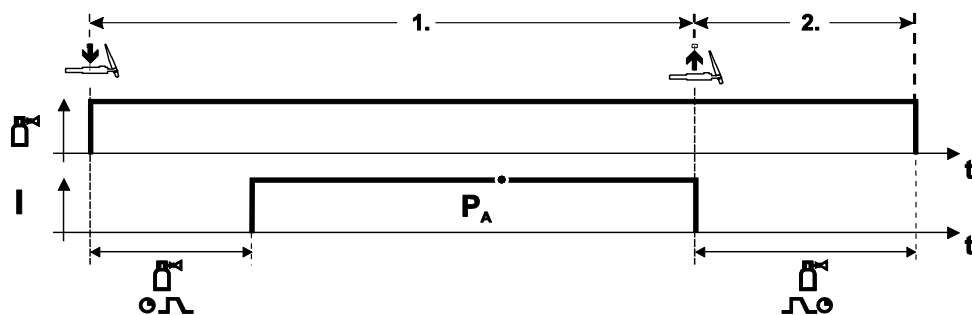
Figure 5-33

Selection

• Select non-latched operating mode   .

Step 1

• Press and hold torch trigger.
• Shielding gas is expelled (gas pre-flows).

The arc is ignited using liftarc.

• Welding current flows with pre-selected setting.

Step 2

• Release torch trigger.
• Arc is extinguished.
• Gas post-flow time elapses.

Latched mode
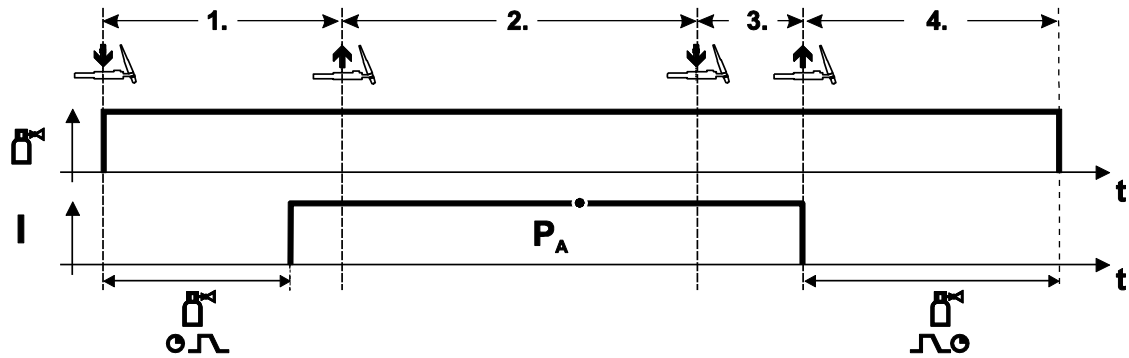
Figure 5-34

Selection

- Select latched operating mode .

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)

The arc is ignited using liftarc.

- Welding current flows with pre-selected setting.

Step 2

- Release torch trigger (no effect)

Step 3

- Press torch trigger (no effect)

Step 4

- Release torch trigger
- Arc is extinguished.
- Gas post-flow time elapses.

Special, non-latched
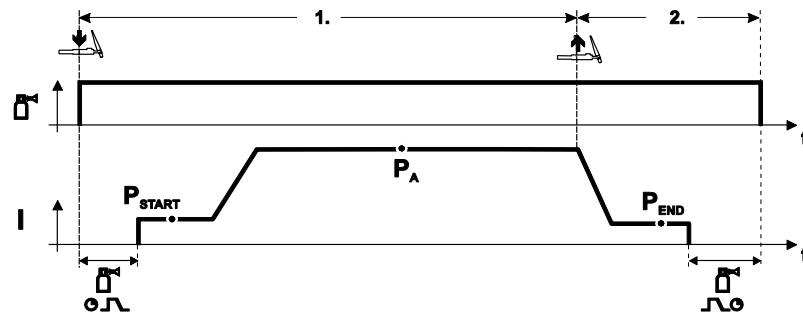
Figure 5-35

Selection

- Select non-latched special mode.

Step 1

- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)

The arc is ignited using liftarc.

- Welding gas flows with pre-selected setting in start program "P_{START}".
- After the "tstart" start current time elapses, the welding current rises with the set upslope time "tS1" to the main program "P_A".

Step 2

- Release torch trigger.
- The welding current reduces with the downslope time "tSe" to the end program "P_{END}".
- After the end current time "end" elapses, the arc will extinguish.
- Gas post-flow time elapses.

Spot welding
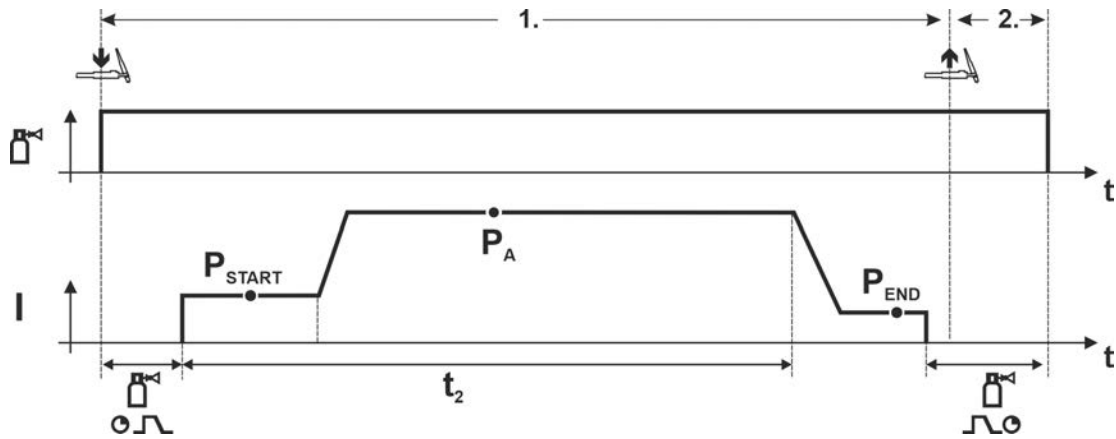
Figure 5-36

Start and slope times from the start program must be added to the spot time.

1st cycle

- Press and hold the torch trigger.
- Shielding gas is flowing (gas pre-flow).

The arc striking takes place with Liftarc.

The slope to the main program P_A occurs at the earliest after the set time t_{START} has elapsed.

- After the set spot time has elapsed, the slope is set to the end program P_{END}.
- The arc extinguishes after the end current time tEd has elapsed
- The gas post-flow time elapses

2nd cycle

- Release the torch trigger.

By prematurely releasing the torch button (cycle 2), the welding process can be aborted before the end of the spot time (slope to end program P_{END}).

Latched special
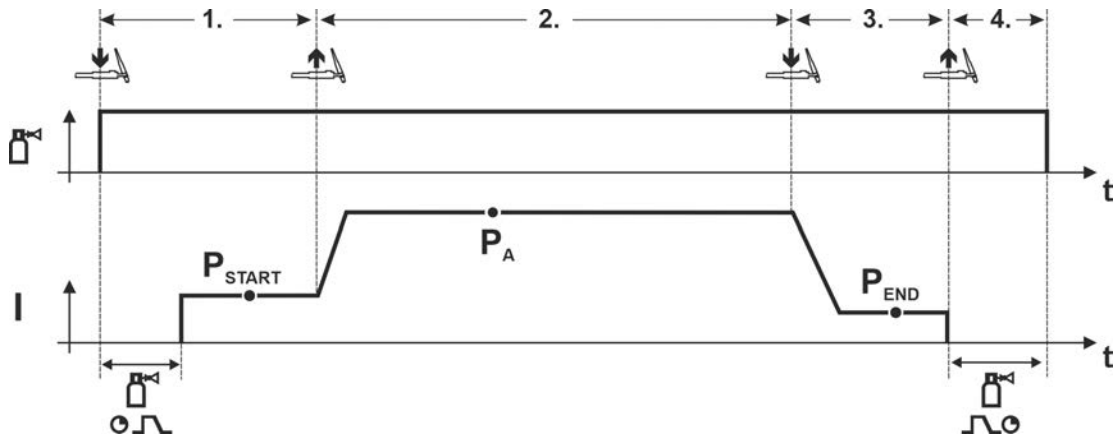
Figure 5-37

Selection

- Select special latched operating mode .

1st cycle

- Press and hold the torch trigger.
- Shielding gas is flowing (gas pre-flow).

The arc striking takes place with Liftarc.

- The welding current flows with the preselected setting in the start program "P_{START}".

2nd cycle

- Release the torch trigger.
- Slope to main program "P_A".

The slope to the main program P_A occurs at the earliest after the set time t_{START} has elapsed, or at the latest when the torch button is released.

3rd cycle

- Press the torch trigger.
- Slope to end program "P_{END}".

4th cycle

- Release the torch trigger.
- The arc extinguishes.
- The gas post-flow time elapses.

5.3.5.2 Automatic cut-out

Once the fault periods have elapsed, the automatic cut-out stops the welding process when it has been triggered by one of two states:

- During ignition
  5 s after the start of the welding process, no welding current flows (ignition error).
- During welding
  The arc is interrupted for more than 5 s (arc interruption).

5.4 MMA welding

5.4.1 Welding task selection
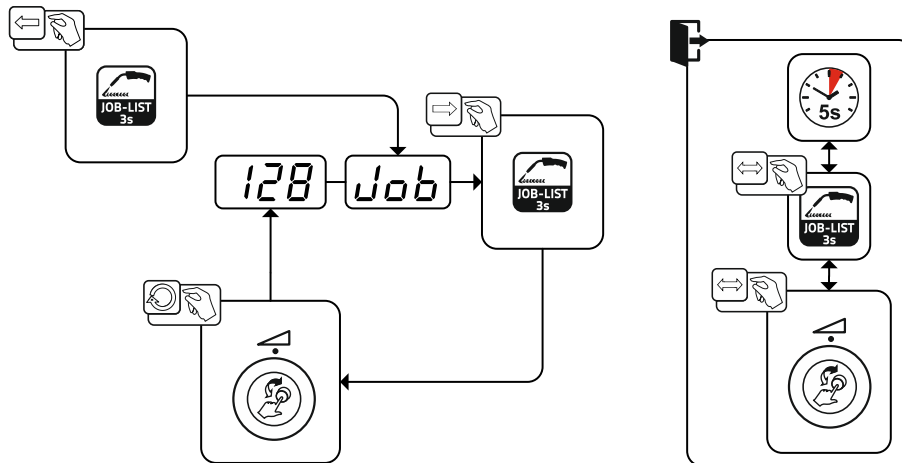
Figure 5-38

5.4.2 Welding current setting
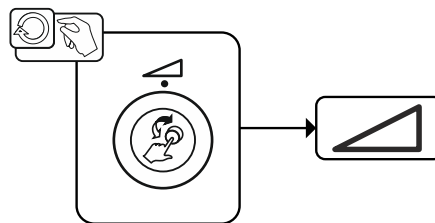
Figure 5-39

5.4.3 Arcforce
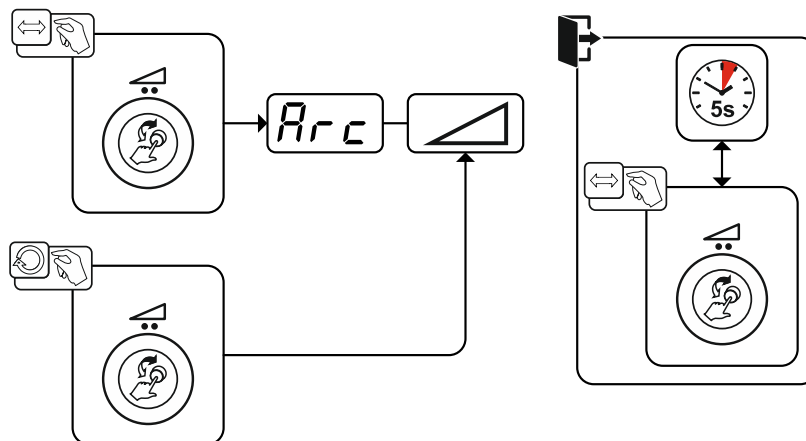
Figure 5-40

Setting:

- Negative values: rutile electrode types
- Values at zero: basic electrode types
- Positive values: cellulose electrode types

5.4.4 Hotstart

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

For parameter setting, > *see 5.4.6 chapter*.

A = Hot start current
B = Hot start time
C = Main current
I =   Current
t =   Time
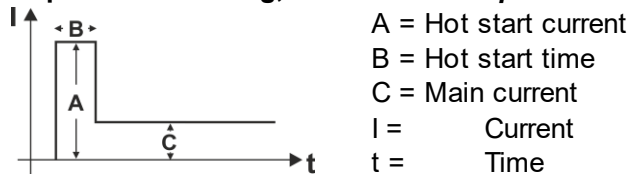
Figure 5-41

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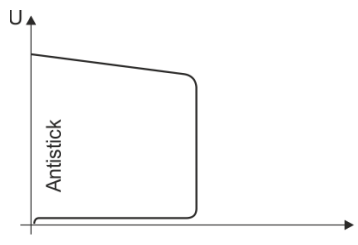
The Antistick feature prevents the electrode from annealing.
Should the electrode stick despite the Arcforce feature, the machine automatically switches to the minimum current within approx. one second. This prevents the electrode from annealing. Check the welding current setting and correct for the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

Figure 5-42

5.4.6 Expert menu (MMA)

The Expert menu has adjustable parameters stored that don't require regular setting. The number of parameters shown may be limited, e.g. if a function is deactivated.
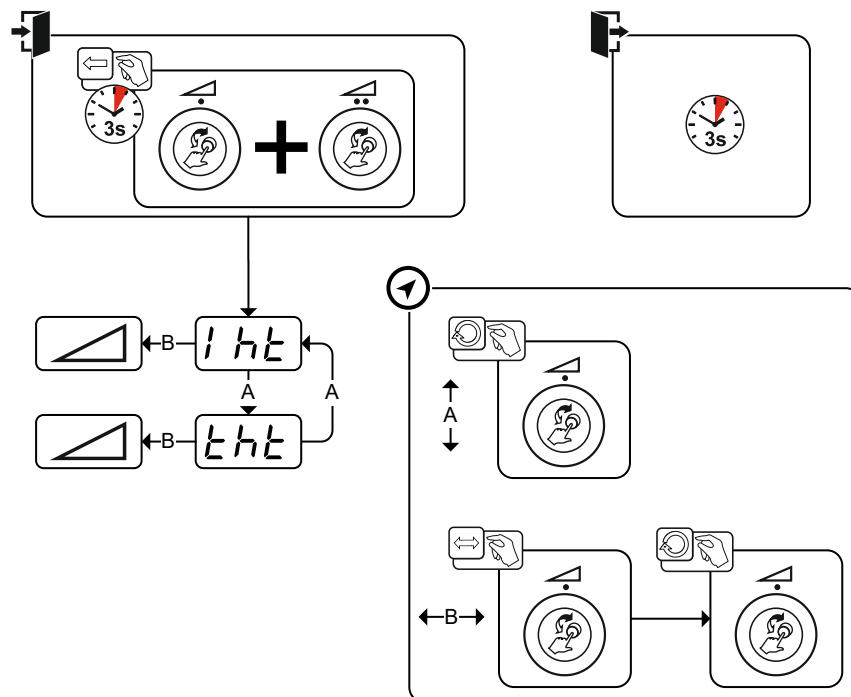
Figure 5-43

Display	Setting/selection
I ht	**Hotstart current**
t ht	**Hotstart time**

5.5 Machine configuration menu

5.5.1 Selecting, changing and saving parameters
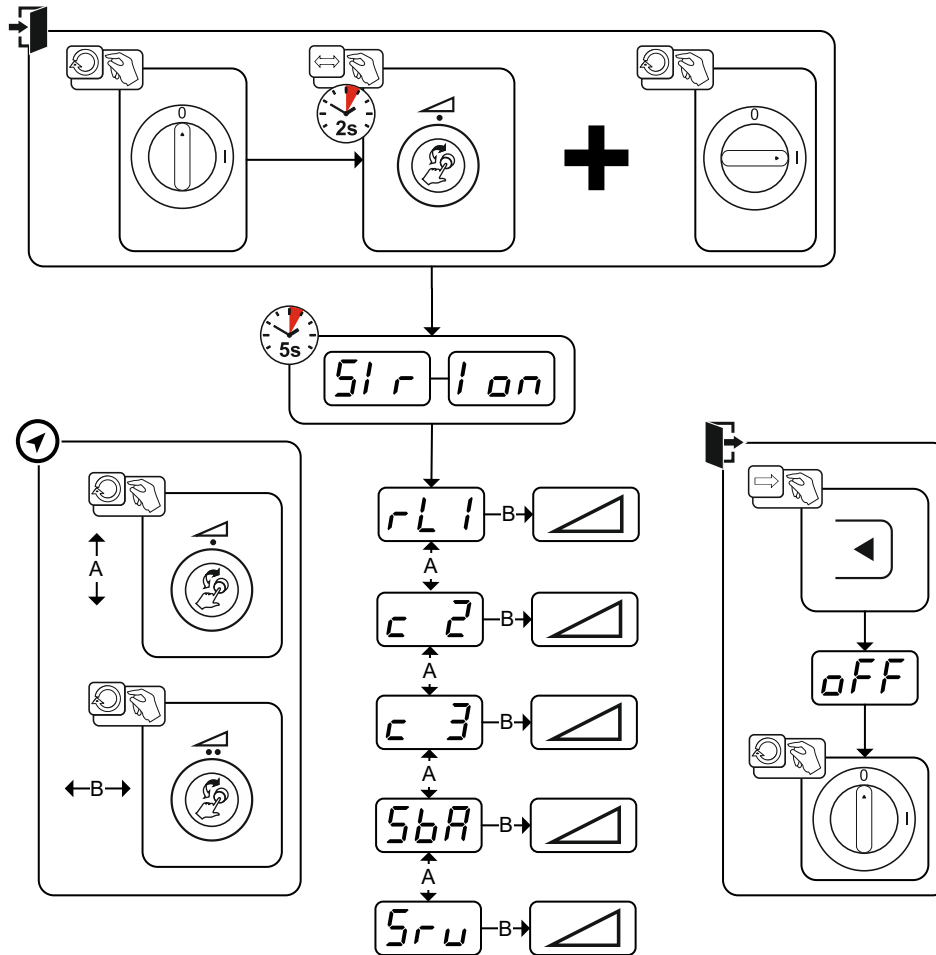
Figure 5-44

Display	Setting/selection
rL 1	**Lead resistance 1** Lead resistance for the first welding circuit 0 mΩ–60 mΩ (8 mΩ ex works).
c 2	**Only qualified service personnel may change the parameters!**
c 3	**Only qualified service personnel may change the parameters!**
SbA	**Time-based power-saving mode > *see 5.6 chapter*** Time to activation of the power-saving mode in case of inactivity. Setting oFF = disabled or numerical value 5-60 min..
Sru	**Service menu** Modifications to the service menu may only be carried out by authorised maintenance staff!

5.5.2 Aligning the cable resistance

The resistance value of the cables can be set directly or adjusted by the power source. The power source cable resistance value is set to 8 mΩ when delivered. This value corresponds to an earth cable length of 5 m, an intermediate hose package length of 1.5 m and a water-cooled welding torch length of 3 m. A +/- welding voltage correction is therefore required to optimise the welding properties for other hose package lengths. By realigning the cable resistance, the voltage correction value can be set close to zero again. The electric cable resistance should be realigned every time an accessory component such as the welding torch or the intermediate hose package has been changed.
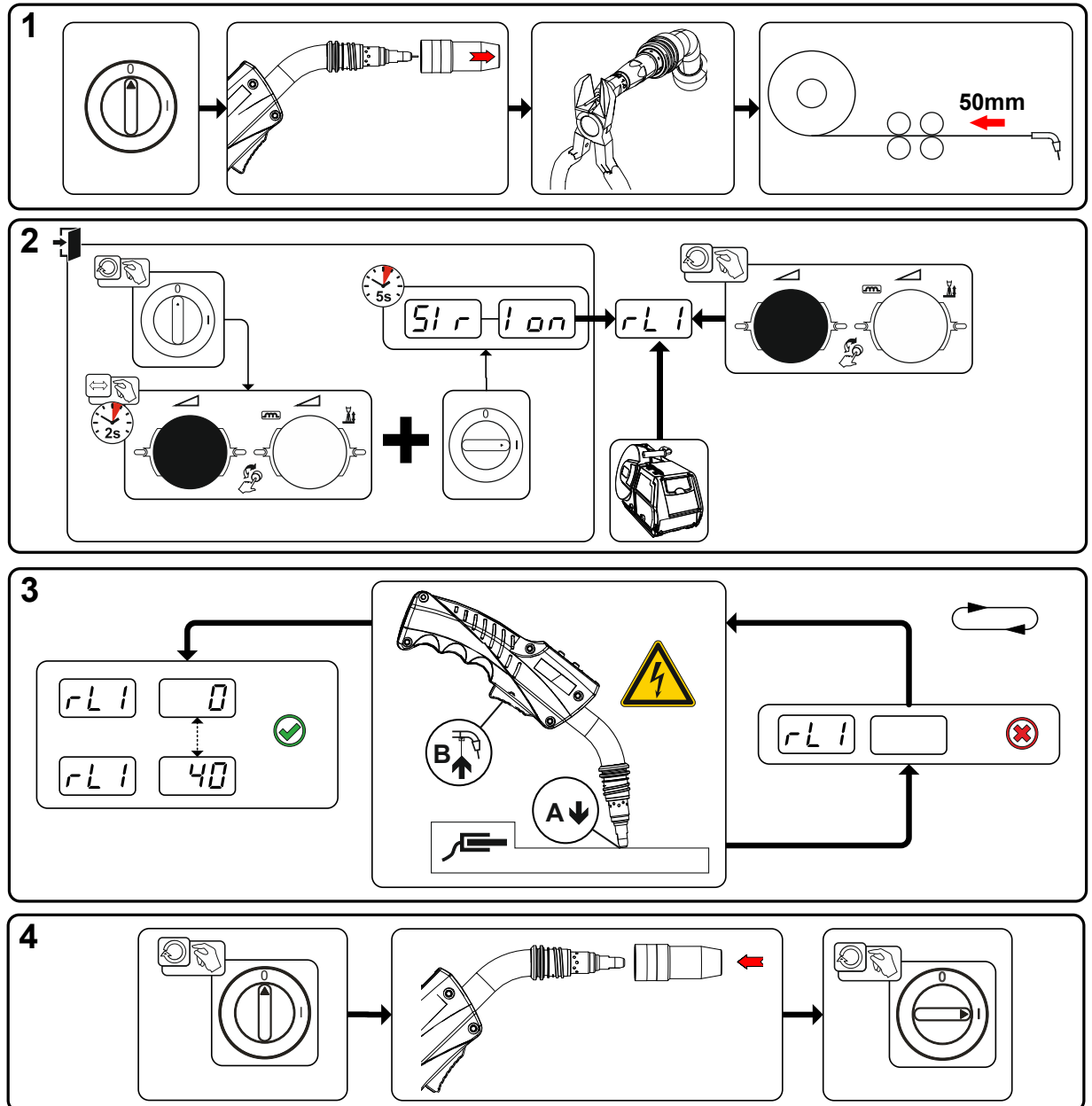
Figure 5-45

1 Preparation

- Switch off the welding machine.

- Unscrew the gas nozzle from the welding torch.

- Trim the welding wire so that it is flush with the contact tip.

- Retract the welding wire a little (approx. 50 mm) on the wire feeder. No welding wire should be left now in the contact tip.

2 Configuration

- Press and hold the "Welding power rotary knob"; at the same time switch on the welding machine (at least 2 s). Release the rotary knob (the machine changes after a further 5 s to the first cable resistance parameter 1).

- Turn the "Welding power rotary knob" to select the appropriate parameter. The "rL1" parameter has to be adjusted for all machine combinations.

3 Alignment / Measurement

- Place the welding torch with the contact tip on a clean spot of the workpiece with a little pressure and press the torch trigger for approx. 2 seconds. The brief flow of a short-circuit current is used to determine and display the new cable resistance. The value can be between 0 mΩ and 40 mΩ. The new value is immediately saved without requiring further confirmation. If no value is shown on the right-hand display, the measurement has failed. The measurement must be repeated.

4 Restoring the welding readiness

- Switch off the welding machine.

- Screw the gas nozzle of the welding torch back on.

- Switch on the welding machine.

- Inch the welding wire.

5.6 Power-saving mode (Standby)

Using the parameter $\boxed{5b\overline{H}}$ in the machine configuration menu, the time for the power-saving mode can be set or the mode can be deactivated *> see 5.5 chapter*.

–

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

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

5.7 Special parameters (advanced settings)

Special parameters (P1 to Pn) are applied for customer-specific configuration of machine functions. This allows the user maximum flexibility in optimising their requirements.

These settings are not configured directly on the machine control since a regular setting of the parameters is generally not required. The number of selectable special parameters can deviate between the machine controls used in the welding system (also see the relevant standard operating instructions).

If required, the special parameters can be reset to the factory settings > *see 5.7.3 chapter*.

5.7.1 Selecting, changing and saving parameters
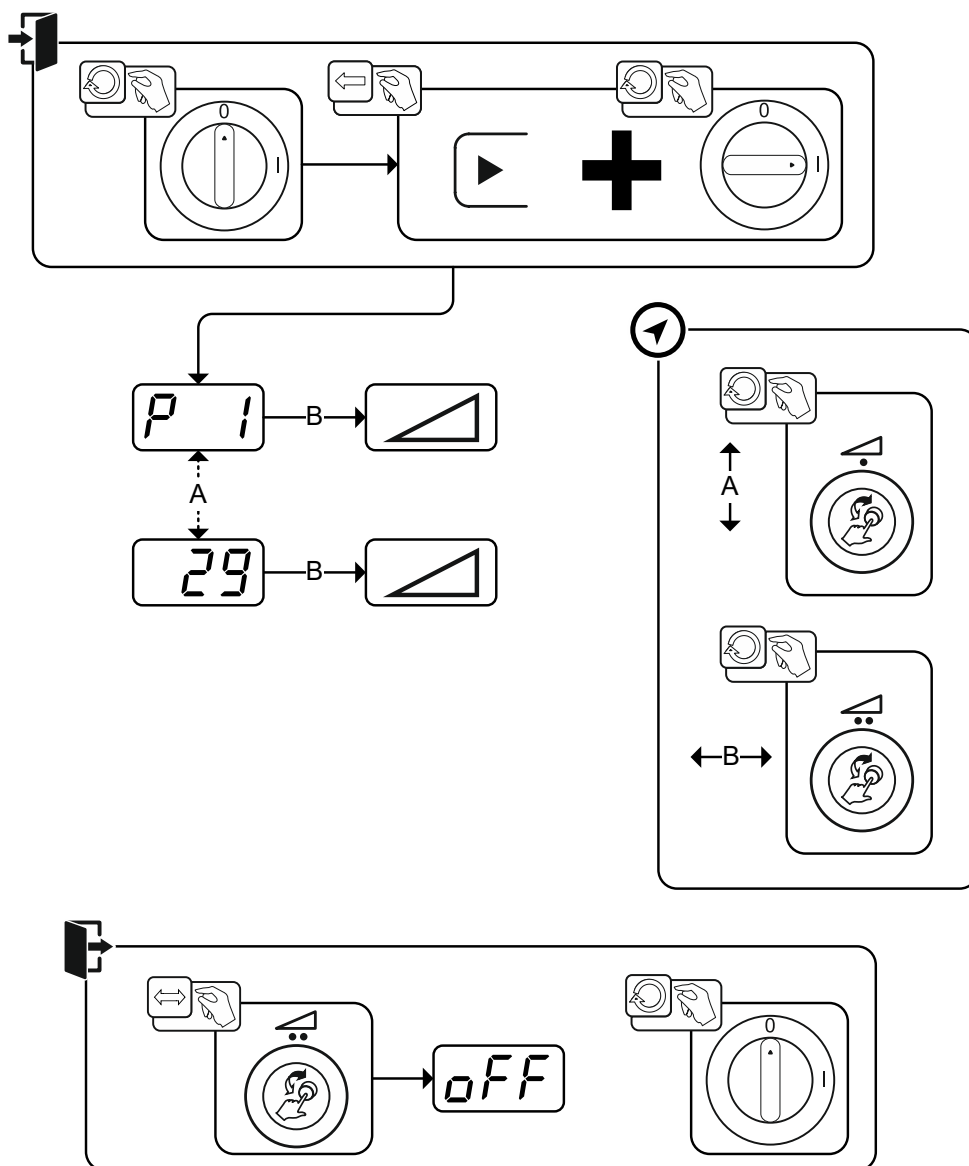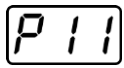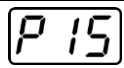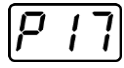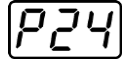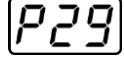
Figure 5-46

Display	Setting/selection
P 1	**Wire inching / wire return ramp time**
	0 =--------normal inching (10 s ramp time)
	1 =--------fast inching (3 s ramp time) (ex works)
P 4	**Program limitation**
	Programs 1 to max. 15
	Ex works: 15
P 9	**Tapping start for latched and special latched operation**
	0 =--------no 4-cycle inching start
	1 =--------4-cycle inching start possible (ex works)

Display	Setting/selection
P 11	**Tapping time** 0 = -------The tapping function is switched off 1 = -------320 ms (factory setting) 2 = -------640 ms
P 15	**HOLD function** 0 = -------HOLD values are not displayed 1 = -------HOLD values are displayed (Ex works)
P 17	**Program selection with standard torch trigger** 0 = -------no program selection (Ex works) 1 = -------program selection possible
P24	**Correction or nominal voltage display** 0 = -------Correction voltage display (ex works). 1 = -------Absolute nominal voltage display.
P29	**Unit system > *see 5.7.2.8 chapter*** 0 = -------metric system (ex works) 1 = -------Imperial system

5.7.2 Special parameters in detail

5.7.2.1 Ramp time for wire inching (P1)

The wire inching starts with a speed 1.0 m/min for 2 secs. It is subsequently increased to a ramp function to 6.0 m/min. The ramp time can be set between two ranges.

During wire inching, the speed can be changed by means of the welding power rotary knob. Changing the speed has no effect on the ramp time.

5.7.2.2 Program limit (P4)

Use the special parameter P4 to limit the selection of programs.

- The setting is applied to all JOBs.

- The selection and setting are described in the chapter "Programs (PA 1-15)" > *see 5.2.5 chapter*.

5.7.2.3 Latched/special-latched tap start (P9)

In latched – tap start – operating mode it is possible to switch straight to the second step by tapping the torch trigger; it is not necessary for current to be flowing.

The welding can be halted by pressing the torch trigger for a second time.

5.7.2.4 Tapping time (P11)

The tapping time (briefly pressing the torch button to change the function) can be set to three levels.
0= No tapping
1 =   320 ms (factory setting)
2 =   640 ms

5.7.2.5 Hold function (P15)
HOLD function is active (P15 = 1)

- The average values of the last welded main program parameters are displayed.

Hold function is not active (P15 = 0)

- The nominal values of the main program parameters are displayed.

5.7.2.6 Selecting programs with the standard torch trigger (P17)

Allows program switching before welding starts.

Briefly pressing the torch button (tapping) switches to the next higher program. After reaching the last enabled program, it continues with the first one.

Use special parameter P4 to limit the number of accessible programs (see special parameter P4).

5.7.2.7 Correction or nominal voltage display (P24)

When setting the arc correction using the right-hand rotary knob the display will either show the correction voltage +- 9.9 V (ex works) or the absolute nominal voltage.

5.7.2.8 Units system (P29)
Function not active

- Metric metric units are displayed.

Function active

- Imperial units are displayed.

5.7.3 Reset to factory settings
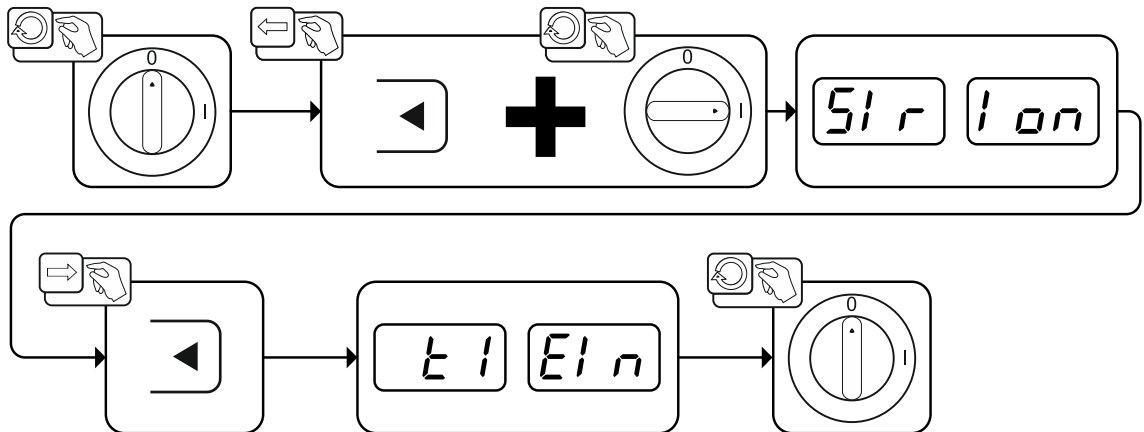**All special parameters saved by the user will be overwritten by the factory settings!**

Figure 5-47

6 Maintenance, care and disposal

6.1 General

> ⚠ **DANGER**
>
> **Risk of injury due to electrical voltage after switching off!**
> **Working on an open machine can lead to fatal injuries!**
> **Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to four minutes after the mains plug is removed.**
> 1. Switch off machine.
> 2. Remove the mains plug.
> 3. Wait for at last 4 minutes until the capacitors have discharged!

> ⚠ **WARNING**
>
> **Improper maintenance, testing and repairs!**
> **Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel (authorised service personnel). A competent person is someone who, based on training, knowledge and experience, can recognize the hazards and possible consequential damage that may occur when testing power sources and can take the necessary safety precautions.**
> • Follow the maintenance instructions.
> • If any of the test requirements below are not met, the unit must not be put back into operation until it has been repaired and tested again.

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

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

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

6.2 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!**

In addition to the national or international regulations mentioned below, it is mandatory to follow the respective national laws and regulations on disposal.

- According to European provisions (Directive 2012/19/EU on Waste of Electrical and Electronic Equipment), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.
  This machine has to be disposed of, or recycled, in accordance with the waste separation systems in use.

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

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

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

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

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

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

7 Rectifying faults

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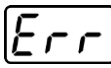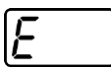
7.1 Software version of the machine control

The query of the software versions only serves to inform the authorised service staff. It is available in the machine configuration menu > *see 5.5 chapter*.

7.2 Error messages (power source)

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

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

Display type - machine control	Display
Graphic display	⌐
two 7-segment displays	*Err*
one 7-segment display	*E*

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

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

Reset error (category legend)

A   The error message disappears when the error is eliminated.
B   The error message can be reset by pressing a push-button ◀.

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

Error 3: Tacho error
Categories A, B

⟋ Fault in the wire feeder.

   � Check the electrical connections (connectors, lines).

⟋ Permanent overload of the wire drive.

   � Do not lay the liner in tight radii.

   � Check the wire in the liner for ease of movement.

Error 4: Excess temperature
Category A

⟋ The power source is overheating.

   � Allow the switched-on machine to cool.

⟋ Fan is blocked, dirty or faulty.

   � Check the fan and clean or replace it.

⟋ Air inlet or outlet is blocked.

   � Check the air inlet and outlet.

Error 5: Mains overvoltage
Category A [1]

⟋ Mains voltage is too high.

   � Check the mains voltages and compare them with the connection voltages of the power source.

Error 6: Mains undervoltage

Category A [1]

✗ Mains voltage is too low.

  ✗ Check the mains voltages and compare them with the connection voltages of the power source.

Error 7: Low coolant level

Category B

✗ Low flow rate.

  ✗ Fill with coolant.

  ✗ Check coolant flow - remove kinks in the hose package.

  ✗ Adjust the flow threshold [2].

  ✗ Clean the cooler.

✗ The pump does not turn.

  ✗ Turn the pump shaft.

✗ Air in the coolant circuit.

  ✗ Vent the coolant circuit.

✗ The hose package is not filled with coolant.

  ✗ Switch the machine off and on > pump running > filling process.

✗ Operation with a gas-cooled welding torch.

  ✗ Deactivate the torch cooling.

  ✗ Connect the coolant feed and return with a hose bridge.

Error 8: Shielding gas error

Categories A, B

✗ No gas.

  ✗ Check the gas supply.

✗ The pre-pressure is too low.

  ✗ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

Error 9: Secondary overvoltage

✗ Overvoltage at the output: Inverter error.

  ✗ Request service.

Error 10: Earth fault (PE error)

✗ Connection between welding wire and machine casing.

  ✗ Remove the electrical connection.

✗ Connection between welding circuit and machine casing.

  ✗ Check the connection and routing of the earth wire / welding torch.

Error 11: Fast shut-down

Categories A, B

✗ Remove the logical signal "Robot ready" during the process.

  ✗ Eliminate errors in the higher-level control.

Error 16: Pilot arc power source - collective error

Category A

✗ The external emergency stop circuit has been interrupted.

    ✖ Check the emergency stop circuit and eliminate the cause of the error.

✗ The emergency stop circuit of the power source has been activated (internally configurable).

    ✖ Deactivate the emergency stop circuit.

✗ The power source is overheating.

    ✖ Allow the switched-on machine to cool.

✗ Fan is blocked, dirty or faulty.

    ✖ Check the fan and clean or replace it.

✗ Air inlet or outlet is blocked.

    ✖ Check the air inlet and outlet.

✗ Short circuit on welding torch.

    ✖ Check the welding torch.

    ✖ Request service.

Error 17: Cold wire error

Category B

✗ Fault in the wire feeder.

    ✖ Check the electrical connections (connectors, lines).

✗ Permanent overload of the wire drive.

    ✖ Do not lay the liner in tight radii.

    ✖ Check the liner for ease of movement.

Error 18: Plasma gas error

Category B

✗ No gas.

    ✖ Check the gas supply.

✗ The pre-pressure is too low.

    ✖ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

Error 19: Shielding gas error

Category B

✗ No gas.

    ✖ Check the gas supply.

✗ The pre-pressure is too low.

    ✖ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

Error 20: Low coolant level

Category B

✗ Low flow rate.

⚒ Fill with coolant.

⚒ Check coolant flow - remove kinks in the hose package.

⚒ Adjust the flow threshold [2].

⚒ Clean the cooler.

✗ The pump does not turn.

⚒ Turn the pump shaft.

✗ Air in the coolant circuit.

⚒ Vent the coolant circuit.

✗ The hose package is not filled with coolant.

⚒ Switch the machine off and on > pump running > filling process.

✗ Operation with a gas-cooled welding torch.

⚒ Deactivate the torch cooling.

⚒ Connect the coolant feed and return with a hose bridge.

Error 22: Excess coolant temperature

Category B

✗ Coolant is overheating [2].

⚒ Allow the switched-on machine to cool.

✗ Fan is blocked, dirty or faulty.

⚒ Check the fan and clean or replace it.

✗ Air inlet or outlet is blocked.

⚒ Check the air inlet and outlet.

Error 23: Excess temperature

Category A

✗ External component (e.g. HF ignition units) overheated.

✗ The power source is overheating.

⚒ Allow the switched-on machine to cool.

✗ Fan is blocked, dirty or faulty.

⚒ Check the fan and clean or replace it.

✗ Air inlet or outlet is blocked.

⚒ Check the air inlet and outlet.

Error 24: Pilot arc ignition error

Category B

✗ The pilot arc cannot ignite.

⚒ Check the welding torch equipment.

Error 25: Forming gas error

Category B

✗ No gas.

⚒ Check the gas supply.

✗ The pre-pressure is too low.

⚒ Remove kinks in the hose package (nominal value: 4-6 bar pre-pressure).

Error 26: Excess pilot arc module temperature

Category A

✗ The power source is overheating.

    ✘ Allow the switched-on machine to cool.

✗ Fan is blocked, dirty or faulty.

    ✘ Check the fan and clean or replace it.

✗ Air inlet or outlet is blocked.

    ✘ Check the air inlet and outlet.

Error 32: Error I>0

✗ The current detection is incorrect.

    ✘ Request service.

Error 33: Error UIST

✗ Voltage recording is faulty.

    ✘ Eliminate the short circuit in the welding circuit.

    ✘ Remove the external sensor voltage.

    ✘ Request service.

Error 34: Electronics error

✗ A/D channel error

    ✘ Switch the machine off and on.

    ✘ Request service.

Error 35: Electronics error

✗ Slope error

    ✘ Switch the machine off and on.

    ✘ Request service.

Error 36: ⓢ fault

✗ ⓢ conditions violated.

    ✘ Switch the machine off and on.

    ✘ Request service.

Error 37: Excess temperature / electronics error

✗ The power source is overheating.

    ✘ Allow the switched-on machine to cool.

✗ Fan is blocked, dirty or faulty.

    ✘ Check the fan and clean or replace it.

✗ Air inlet or outlet is blocked.

    ✘ Check the air inlet and outlet.

Error 38: Error IIST

✗ Short circuit in the welding circuit before welding.

    ✘ Eliminate the short circuit in the welding circuit.

    ✘ Request service.

Error 39: Electronics error

✗ Secondary overvoltage

    ✘ Switch the machine off and on.

    ✘ Request service.

Error 40: Electronics error

✗ Error I>0

    ✗   Request service.

Error 47: Radio link (BT)

Category B

✗ Connection error between the welding machine and peripheral unit.

    ✗   Note the documentation for the data interface with radio transmission.

Error 48: Ignition error

Category B

✗ No ignition at process start (automated machines).

    ✗   Check the wire feeding

    ✗   Check the load cable connections in the welding circuit.

    ✗   Clean corroded surfaces on the workpiece before welding if necessary.

Error 49: Arc interruption

Category B

✗ An arc interruption occurred during welding with an automated system.

    ✗   Check the wire feeding.

    ✗   Adjust the welding speed.

Error 50: Program number

Category B

✗ Internal error.

    ✗   Request service.

Error 51: Emergency stop

Category A

✗ The external emergency stop circuit has been interrupted.

    ✗   Check the emergency stop circuit and eliminate the cause of the error.

✗ The emergency stop circuit of the power source has been activated (internally configurable).

    ✗   Deactivate the emergency stop circuit.

Error 52: No wire feeder

✗ After switching on the automated system, no wire feeder (DV) was detected.

    ✗   Check or connect the control cables of the wire feeders.

    ✗   Check the identification number of the automated wire feeder (for 1DV: number 1, for 2DV: each a wire feeder with number 1 and a wire feeder with number 2).

Error 53: No wire feeder 2

Category B

✗ Wire feeder 2 was not detected.

    ✗   Check the control cable connections.

Error 54: VRD fault

✗ Error in the voltage reduction device.

    ✗   If necessary, disconnect the external machine from the welding circuit.

    ✗   Request service.

Error 55: Excess wire feeder current

Category B

✗ Excess current detected in the wire feed mechanism.

    ✗   Do not lay the liner in tight radii.

    ✗   Check the liner for ease of movement.

Error 56: Mains phase failure
✗ One phase of the mains voltage has failed.

   ⚒   Check the mains connection, mains plug and mains fuses.

Error 57: Slave tacho error
Category B

✗ Fault in the wire feeder (slave drive).

   ⚒   Check the connections (connectors, lines).

✗ Permanent overload of the wire drive (slave drive).

   ⚒   Do not lay the liner in tight radii.

   ⚒   Check the liner for ease of movement.

Error 58: Short circuit
Category B

✗ Short circuit in the welding circuit.

   ⚒   Eliminate the short circuit in the welding circuit.

   ⚒   Place the welding torch on an insulated surface.

Error 59: Incompatible machine
✗ A machine connected to the system is not compatible.

   ⚒   Disconnect the incompatible machine from the system.

Error 60: Incompatible software
✗ The software of a machine is not compatible.

   ⚒   Disconnect the incompatible machine from the system

   ⚒   Request service.

Error 61: Welding monitoring
✗ The actual value of a welding parameter is outside the specified tolerance range.

   ⚒   Maintain the tolerance ranges.

   ⚒   Adjust the welding parameters.

Error 62: System component
✗ The system component was not found.

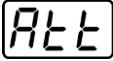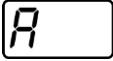   ⚒   Request service.

Error 63: Mains voltage error
✗ Operating and mains voltage are incompatible.

   ⚒   Check or adjust the operating and mains voltage.

[1]   only Picotig 220 pulse

[2]   See technical data for values and other switching thresholds.

7.3   Warnings

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

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

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

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

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

Warning		Potential cause / remedy
24	Coolant flow warning	Check the coolant supply. Check the coolant level and top up if necessary. Check flow and switching thresholds. [2]
25	Flow 2	reserved
26	Flow 3	reserved
27	Flow 4	reserved
28	Wire stock warning	Check the wire feeding.
29	Low wire 2	reserved
30	Low wire 3	reserved
31	Low wire 4	reserved
32	Tacho error	Fault of the wire feeder - permanent overload of the wire drive.
33	Wire feed motor excess current	Excess current detected on wire feed motor.
34	JOB unknown	JOB selection was not carried out because the JOB number is unknown.
35	Wire feed motor slave excess current	Excess current detected on wire feed motor slave (push/push system or intermediate drive).
36	Slave tacho error	Fault of the wire feeder - permanent overload of the wire drive (push/push system or intermediate drive).
37	FAST bus failure	The wire feeder is not connected (reset by actuating the automatic circuit breaker of the wire feed motor).
38	Incomplete component information	Check the Xnet component management.
39	Halfwave failure	Check supply voltage.
40	Weak power grid	Check supply voltage.
41	Cooling unit not recognised	A liquid-cooled welding torch was connected but no cooling unit has been detected. • Check the connection of the cooling unit • Use a gas-cooled welding torch
47	Battery (remote control, type BT)	Battery level is low (replace battery)

[1] only for the XQ machine series

[2] See technical data for values and other switching thresholds.

7.4 Resetting JOBs (welding tasks) to the factory settings

All customised welding parameters that are stored will be replaced by the factory settings.
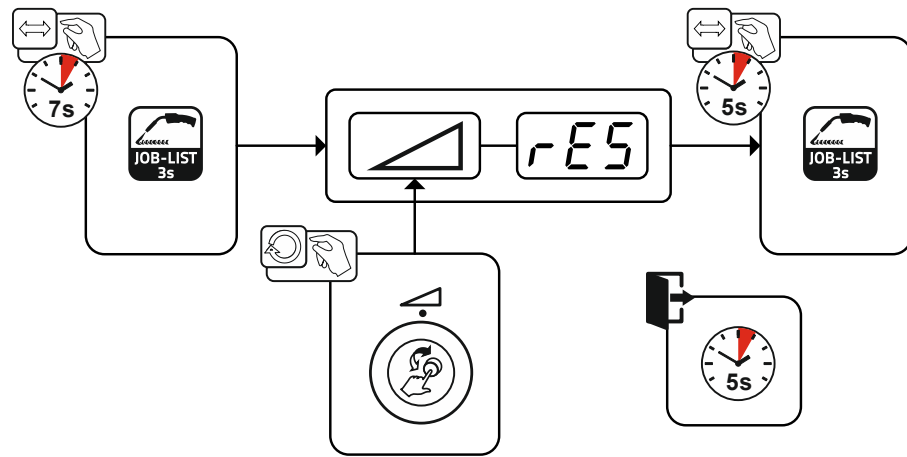
7.4.1 Resetting a single JOB
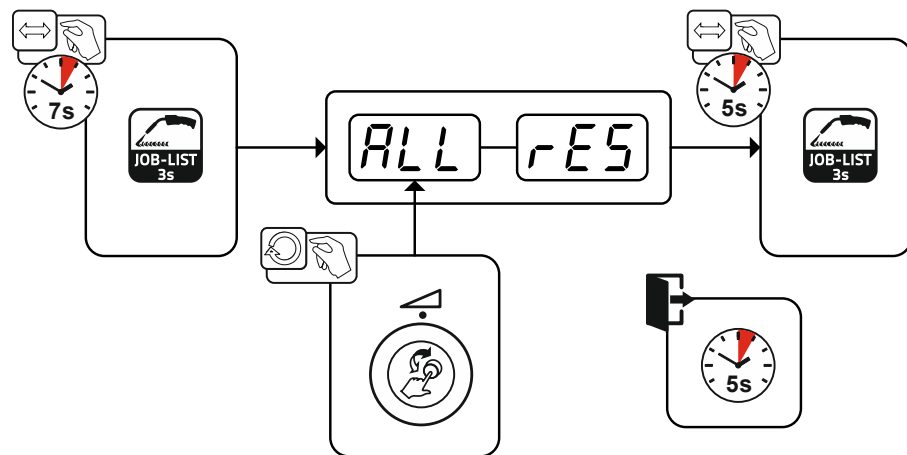

Figure 7-1

7.4.2 Resetting all JOBs

*Figure 7-2*

8   Appendix

8.1   JOB-List

JOB no.	Procedure	Material	Gas	Diameter [mm]
1	GMAW standard	G3Si1 / G4Si1	100% CO2	0,8
3	GMAW standard	G3Si1 / G4Si1	100% CO2	1,0
4	GMAW standard	G3Si1 / G4Si1	100% CO2	1,2
5	GMAW standard	G3Si1 / G4Si1	100% CO2	1,6
6	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	0,8
8	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
9	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
10	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,6
11	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	0,8
13	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
14	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
15	Standard GMAW / pulse	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,6
34	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97,5 / CO2-2,5 (M12)	0,8
35	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97,5 / CO2-2,5 (M12)	1,0
36	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97,5 / CO2-2,5 (M12)	1,2
37	Standard GMAW / pulse	CrNi 19 9 / 1.4316	Ar-97,5 / CO2-2,5 (M12)	1,6
74	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	0,8
75	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,0
76	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,2
77	Standard GMAW / pulse	AlMg4.5Mn	Ar-100 (I1)	1,6
82	Standard GMAW / pulse	AlSi	Ar-100 (I1)	0,8
83	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,0
84	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,2
85	Standard GMAW / pulse	AlSi	Ar-100 (I1)	1,6
98	Standard GMAW / pulse	CuSi	Ar-100 (I1)	0,8
99	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,0
100	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,2
101	Standard GMAW / pulse	CuSi	Ar-100 (I1)	1,6
106	Standard GMAW / pulse	CuAl	Ar-100 (I1)	0,8
107	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,0
108	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,2
109	Standard GMAW / pulse	CuAl	Ar-100 (I1)	1,6
126	Gouging			
127	TIG Liftarc			
128	MMA			
173	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
174	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
179	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
180	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
181	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,6
188	GMAW Non-synergic	Special	Special	Spezial
206	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,0
207	rootArc / rootArc puls	G3Si1 / G4Si1	Ar-82 / CO2-18 (M21)	1,2
212	Flux-cored wire rutile	FCW CrNi Rutile	CO2-100 (C1)	1,2

JOB no.	Procedure	Material	Gas	Diameter [mm]
213	Flux-cored wire rutile	FCW CrNi Rutile	CO2-100 (C1)	1,6
229	Flux-cored wire metal	FCW CrNi Metal	Ar-97,5 / CO2-2,5 (M12)	1,2
230	Flux-cored wire metal	FCW CrNi Metal	Ar-97,5 / CO2-2,5 (M12)	1,6
233	Flux-cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,2
234	Flux-cored wire rutile	FCW CrNi Rutile	Ar-82 / CO2-18 (M21)	1,6
235	Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	0,8
237	Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,0
238	Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,2
239	Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,6
240	Flux-cored wire rutile	FCW steel rutile	Ar-82 / CO2-18 (M21)	0,8
242	Flux-cored wire rutile	FCW steel rutile	Ar-82 / CO2-18 (M21)	1,0
243	Flux-cored wire rutile	FCW steel rutile	Ar-82 / CO2-18 (M21)	1,2
244	Flux-cored wire rutile	FCW steel rutile	Ar-82 / CO2-18 (M21)	1,6
254	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,0
255	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,2
256	forceArc / forceArc puls	G3Si1 / G4Si1	Ar-90 / CO2-10 (M20)	1,6
260	Flux-cored wire rutile	FCW steel rutile	CO2-100 (C1)	1,2
261	Flux-cored wire rutile	FCW steel rutile	CO2-100 (C1)	1,6
290	forceArc / Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	0,8
291	forceArc / Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,0
292	forceArc / Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,2
293	forceArc / Flux-cored wire metal	FCW steel metal	Ar-82 / CO2-18 (M21)	1,6
350	Self-shielded flux-cored wire	FCW steel rutile	No Gas	0,8
351	Self-shielded flux-cored wire	FCW steel rutile	No Gas	1,0
352	Self-shielded flux-cored wire	FCW steel rutile	No Gas	1,2

[1] active only in machine series Titan XQ AC.

8.2 Parameter overview – setting ranges

8.2.1 MIG/MAG welding

| Name	Display	Standard (factory setting)	Unit	Setting range Min.		Max.
Gas pre-flow time in JOB 188	GPr	0,1	s	0	-	20
Wire creep in JOB 188 (depending on the main program P_A)	uuc	0	%	1	-	100
Wire feed speed in the start program P_{START} (depending on the main program P_A)	ISt	- [1]	%	0	-	200
Correction of the arc length in the start program	cSt	0	V	-9,9	-	9,9
Start time	tSt	- [1]	s	0	-	20
Slope time from start program P_{START} to main program P_A	tSS	0,3	s	0	-	20
Wire feed speed in the main program P_A	-	- [1]	m/min	0,5 [1]	-	25 [1]
Spot time	$t2$	- [1]	s	0	-	20
Slope time from main program P_A to end program P_{END}	tSE	- [1]	s	0	-	20
Wire feed speed in the end program P_{END} (depending on the main program P_A)	IEd	- [1]	%	0	-	200
Correction of the arc length in the end program P_{END}	cEd	- [1]	V	-9,9	-	9,9
End current time (duration of end current)	tEd	- [1]	s	0	-	20
Gas post-flow time in JOB 188	GPt	0,5	s	0	-	20
Burn-back time	rbd	20	-	0	-	499
Arc dynamics (choke effect)	dYn	0	-	-6	-	6

[1] The value depends on the selected welding task (JOB)

8.2.2 TIG welding

Name	Display	Standard (factory setting)	Unit	Setting range Min.		Max.
Gas pre-flow time	GPr	0	s	0	-	20
Start current (percentage of the main current)	ISt	50	%	1	-	200
Start time	tSt	0,5	s	0	-	20
Slope time	tSS	0,5	s	0	-	20
Spot time	$t2$	0,2	s	0,01	-	20
Slope time (time from main current to end current)	tSE	0,5	s	0	-	20
End current (percentage of the main current)	IEd	30	%	1	-	200
End current time	tEd	0,5	s	0	-	20
Gas post-flow time	GPt	5	s	0	-	20

8.2.3 MMA welding

Name	Display			Setting range		
	Code	**Standard (factory setting)**	**Unit**	**Min.**		**Max.**
Hot start current, percentage of the main current	$I\,ht$	120	%	0	-	200
Hot start time	tht	0,5	s	0,0	-	20,0
Arcforce	Arc	0		-40	-	40

8.3 Searching for a dealer

Sales & service partners
www.ewm-group.com/en/specialist-dealers

"More than 400 EWM sales partners worldwide"