■ Operating instructions

ewm®

WE ARE WELDING

⚠ 📖

EN

Wire feed unit

drive 4X IC D HP

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.

1 Contents

2 For your safety

2.1 Notes on the use of these operating instructions

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

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

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

☞ *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 icon)	Switch off machine	⇒ 👆	Release
(switch icon)	Switch on machine	⇕ 👆	Press and hold
		↕ 👆	Switch
✖	Incorrect / Invalid	↻ 👆	Turn
✔	Correct / Valid	◿	Numerical value – adjustable
→	Input	(green light)	Signal light lights up in green
◉	Navigation	(green flashing light)	Signal light flashes green
→	Output	(red light)	Signal light lights up in red
🕐 4s	Time representation (e.g.: wait 4 s / actuate)	(red flashing light)	Signal light flashes red
⌇	Interruption in the menu display (other setting options possible)		
🔧✗	Tool not required/do not use		
🔧	Tool required/use		

2.3 Part of the complete documentation

These operating instructions are 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.
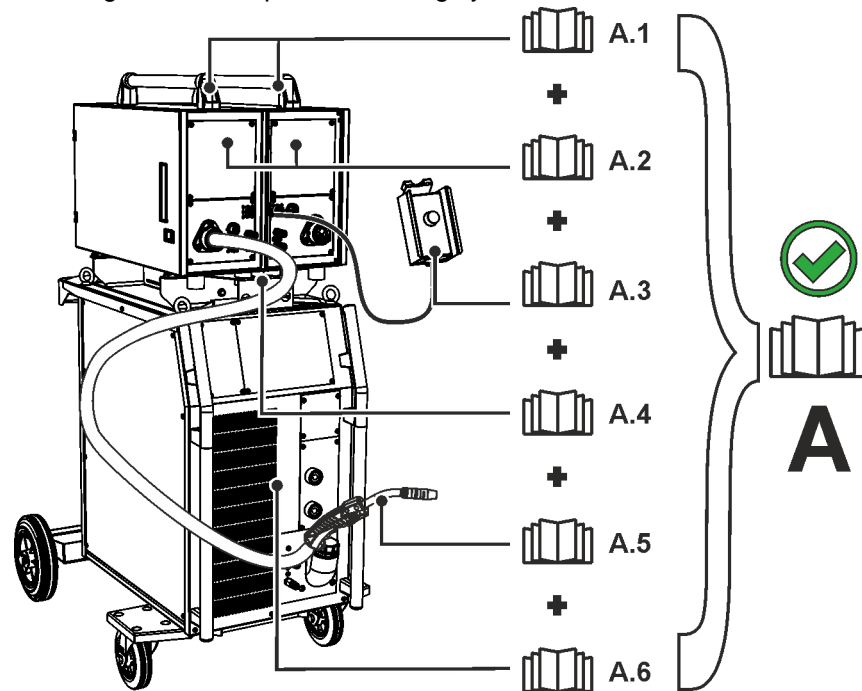
Figure 2-1

The illustration shows a general example of a welding system.

Item	Documentation
A.1	Wire feeder
A.2	Controller
A.3	Remote adjuster
A.4	Options conversion instructions
A.5	Welding torch
A.6	Power source
A	Complete documentation

3 Intended use

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

3.1 Applications

Wire feeder to feed wire electrodes for gas-shielded metal-arc welding.

Machine series	Main process							Secondary process		
	Standard MIG/MAG welding				Pulsed MIG/MAG welding					
	forceArc	rootArc	coldArc	pipeSolution	forceArc puls	rootArc puls	coldArc puls	TIG welding (lift arc)	MMA welding	Gouging
alpha Q puls MM	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Phoenix puls MM	☑	☑	☐	☐	☑	☑	☐	☑	☑	☑
Taurus Synergic S MM	☑	☑	☐	☐	☐	☐	☐	☑	☑	☑

☑ possible

☐ not possible

3.2 Use and operation solely with the following machines

A suitable power source (system component) is required in order to operate the wire feed unit!
For machine variants with wheel spacers only!

The following system components can be combined with this machine:

- alpha Q Expert 2.0 puls MM
- alpha Q Progress puls MM
- Phoenix Expert 2.0 puls MM
- Phoenix Progress puls MM
- Taurus Synergic S MM

Power sources must have the MM identifier for MULTIMATRIX technology in their model designation.

3.3 Documents which also apply

3.3.1 Warranty

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

3.3.2 Declaration of Conformity

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

CE

- Low Voltage Directive (LVD)
- Electromagnetic Compatibility Directive (EMC)
- Restriction of Hazardous Substance (RoHS)

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

3.3.3 Service documents (spare parts and circuit diagrams)

> ⚠ **WARNING**
>
> **Do not carry out any unauthorised repairs or modifications!**
> **To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!**
> **The warranty becomes null and void in the event of unauthorised interference.**
> - Appoint only skilled persons for repair work (trained service personnel)!

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

Spare parts can be obtained from the relevant authorised dealer.

3.3.4 Calibration/Validation

We hereby confirm that this product was tested with calibrated measuring equipment according to the applicable standards IEC/EN 60974, ISO/EN 17662, EN 50504 and complies with the permissible tolerances. Recommended calibration interval: 12 months.

4 Machine description – quick overview

4.1 Front view / side view from the right
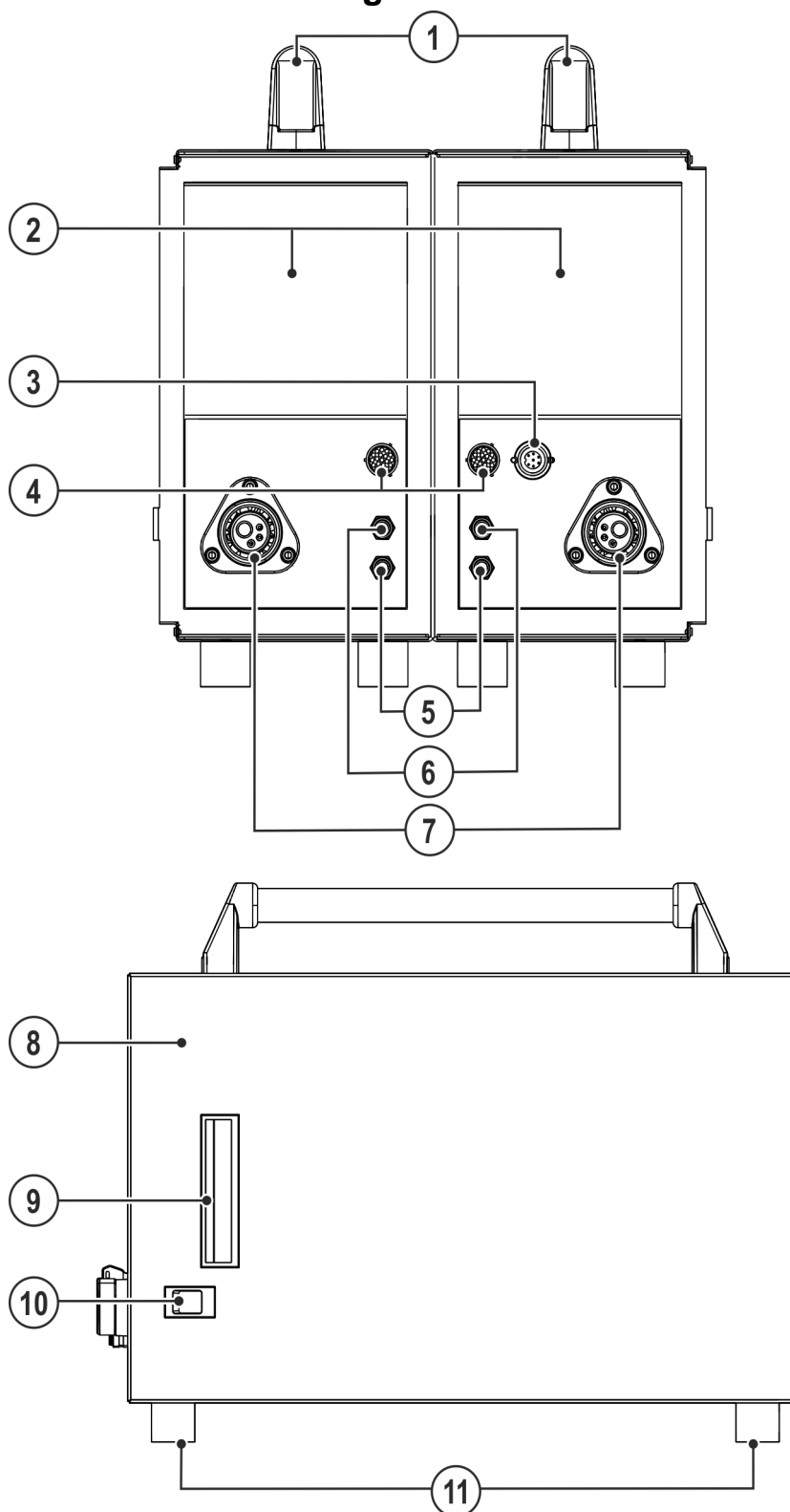
Figure 4-1

Item	Symbol	Description
1		**Carrying handle**
2		**Machine control > *see 4.4 chapter***
3	digital	**Connection socket, 7-pole** Connection for peripheral devices with digital interface
4		**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, etc.)
5	Blue	**Quick connect coupling (blue)** Coolant forward flow to the welding torch
6	Red	**Quick connect coupling (red)** Coolant return from welding torch
7		**Welding torch connection (Euro or Dinse torch connector)** Welding current, shielding gas and torch trigger integrated
8		**Protective cap** Cover for the wire feed mechanism and other operating elements. Depending on the machine series, additional stickers with information on the replacement parts and JOB lists will be located on the inside.
9		**Recessed grip for opening the cap**
10		**Slide latch, lock for the protective cap**
11		**Machine feet**

4.2 Inside view from the right
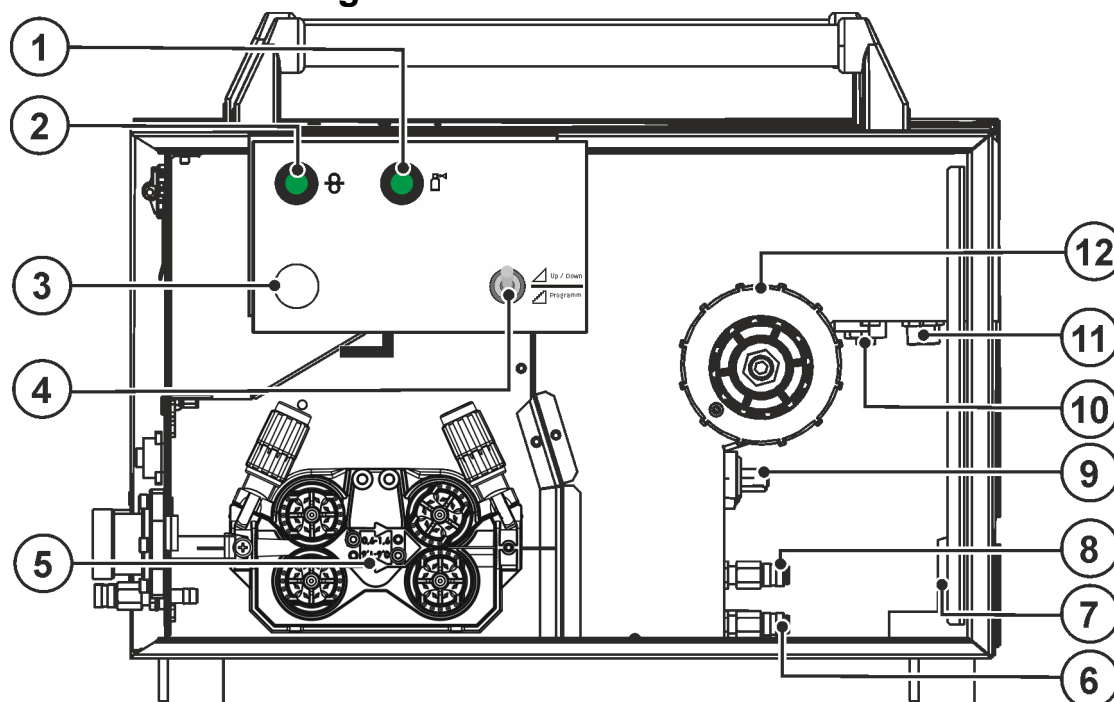
Figure 4-2

Item	Symbol	Description
1	🔲	**Push-button gas test / rinse hose package > *see 5.1.7 chapter***
2	🔲	**Wire inching push-button** For potential- and gas-free inching of the wire electrode through the hose package to the welding torch.
3		**Lighting, inside** In power-saving mode and with MMA or TIG welding, the lighting is switched off.
4	🔲	**Welding torch function changeover switch (special welding torch required)** ◿ Up / Down ---- Welding power infinitely adjustable ◿ Programm ---- Change over programs or JOBs
5		**Wire feed unit**
6	🔲 Red	**Quick connect coupling (red)** Coolant return
7		**Intermediate hose package strain relief > *see 5.1.6 chapter***
8	🔲 Blue	**Quick connect coupling (blue)** Coolant feed
9	✚	**Connector plug, welding current "+"** Welding current connection on wire feed unit
10	◇	**7-pole connection socket (digital)** • Control lead for wire feed unit
11	🔲	**Connecting nipple G¼, shielding gas connection**
12		**Wire spool holder**

4.3 Inside view from the left
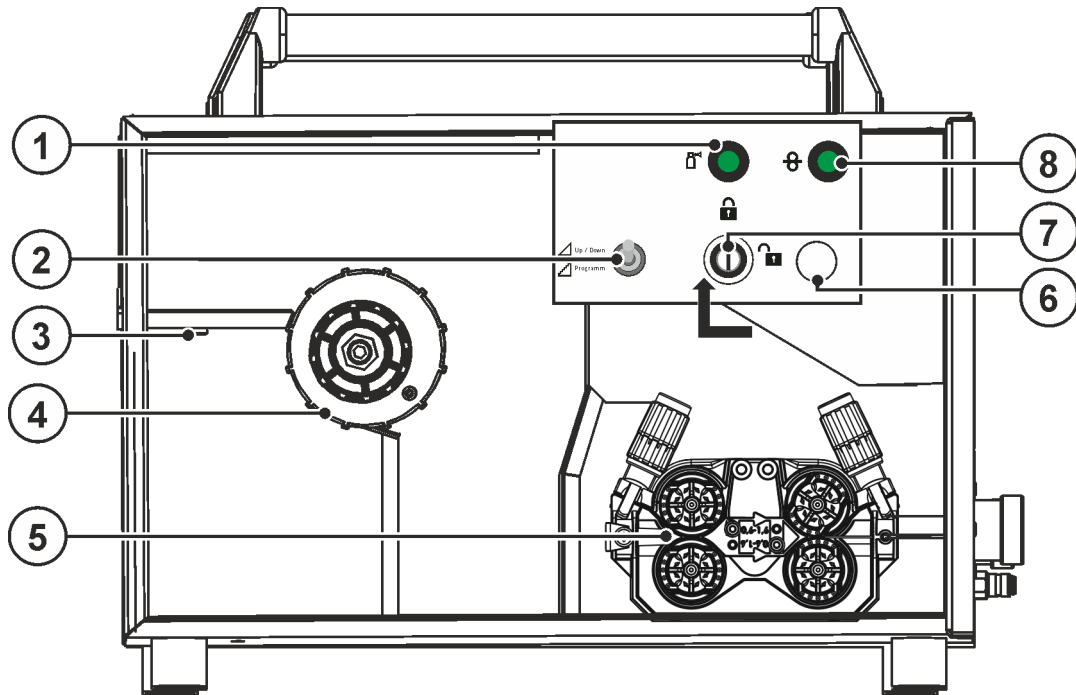
Figure 4-3

Item	Symbol	Description
1		**Push-button gas test / rinse hose package > *see 5.1.7 chapter***
2		**Welding torch function changeover switch (special welding torch required)** ⊿ Up / Down ----- Welding power infinitely adjustable ⊿ Programm ---- Change over programs or JOBs
3		**Connecting nipple G¼, shielding gas connection**
4		**Wire spool holder**
5		**Wire feed unit**
6		**Lighting, inside** In power-saving mode and with MMA or TIG welding, the lighting is switched off.
7		**Key switch for protection against unauthorised use > *see 5.9 chapter*** 🔓--------- changes possible,G front drive-4x-EX 🔒--------- changes not possible.
8		**Wire inching push-button** For potential- and gas-free inching of the wire electrode through the hose package to the welding torch.

4.4 Machine control – Operating elements
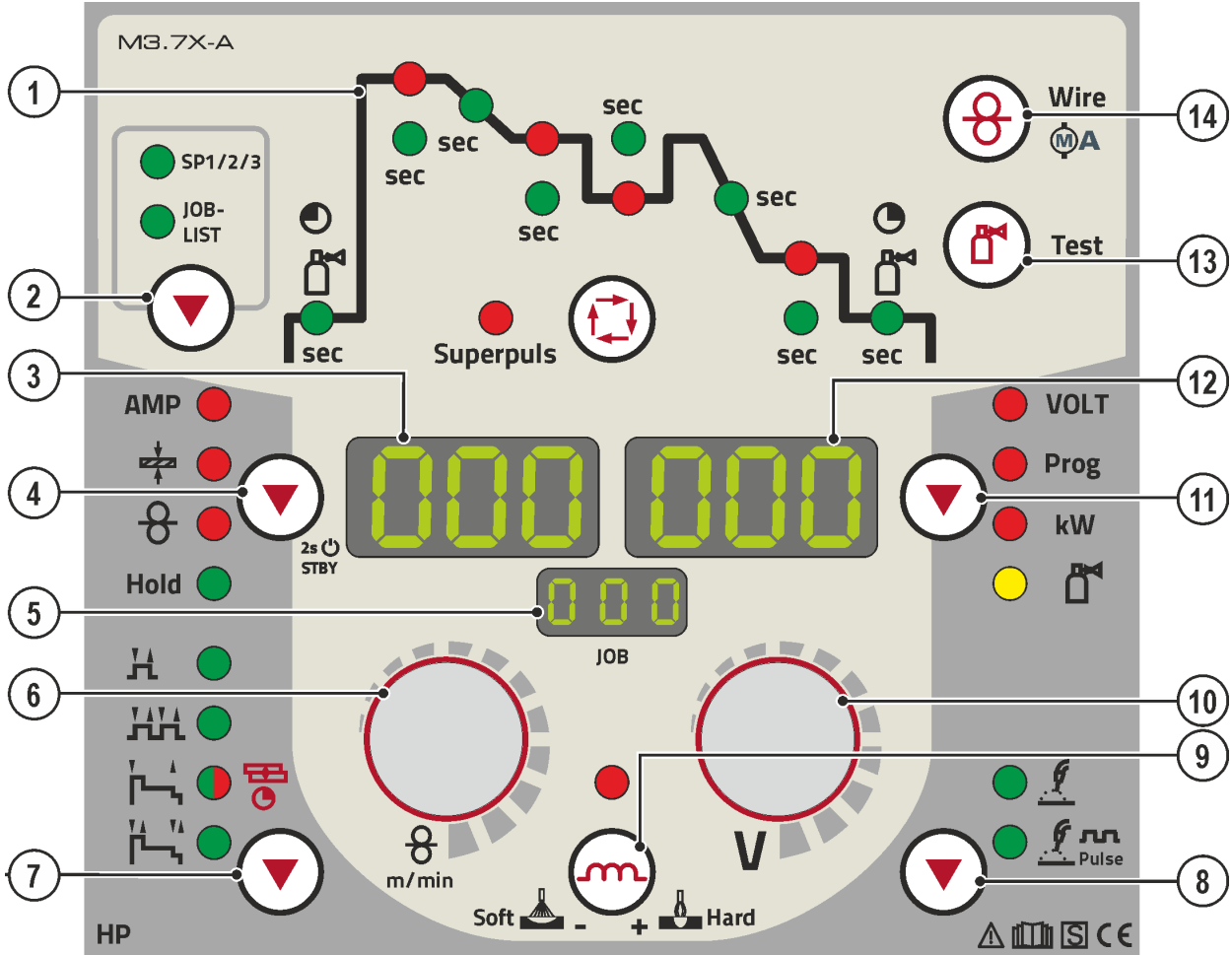
Figure 4-4

Item	Symbol	Description
1		**Functional sequence** *> see 4.4.1 chapter*
2	▼	**Push-button, welding task selection (JOB)** SP1/2/3- Special JOBs (Phoenix Expert only). Pressing the push-button longer: special JOB selection. Pressing the push-button briefly: switching between special JOBs. JOB-LIST Select the welding task using the welding task list (JOB-LIST)) (not applicable for Phoenix Expert). The list can be found inside the protective cap of the wire feed mechanism and in the appendix to these operating instructions.
3	000	**Display, left** Welding current, material thickness, wire speed, hold values
4	▼	**Push-button, parameter selection left/power-saving mode** AMP ----- Welding current ⌖ --------- Material thickness *> see 5.4.4.4 chapter* ⦵ --------- Wire feed speed Hold ----- After welding, the values used last are shown from the main program. The signal light is illuminated. STBY --- Press for 2 s to put machine into power-saving mode. To reactivate, activate one of the operating elements *> see 5.11.2 chapter*.
5	000	**Display, JOB** Shows the currently selected welding task (JOB number). Phoenix Expert machines will display the special JOB selected (SP1, 2 or 3), if applicable.

Item	Symbol	Description
6		**Rotary knob, welding parameter setting** • ---------- Setting the welding task (JOB). With machines of the Phoenix Expert series, welding tasks are selected at the power source control. • ---------- Setting the welding power and other welding parameters.
7	▼	**Operating modes push-button (functional sequences) > *see 5.4.10 chapter*** Ⴖ -------- Non-latched ႩႩ ------- Latched ⊢⊣ --------- Signal light turns green: Special non-latched ▬▬ ⊙ ---- Signal light turns red: MIG spots ⊢⊣" --------- Special latched
8	▼	**Welding type push-button** 🔥 -------- Standard arc welding 🔥 Pulse ---- Pulsed arc welding
9	ᗰ	**Push-button, throttling effect (arc dynamics)** + 🔳 **Hard** Arc is harder and more narrow Soft ◿ ----- Arc is softer and wider
10	(V)	**Arc length correction/selection of welding program, rotary dial** • ---------- Correction of the arc length from -9.9 V to +9.9 V. • ---------- Selection of welding programs 0 to 15 (not possible if accessory components, such as program torches, are connected).
11	▼	**Button, Parameter selection (right)** VOLT ---- Welding voltage Prog ----- Program number kW ------- Welding performance display 🗋 ------- Gas flow quantity (optional)
12	[000]	**Display, right** Welding voltage, program number, motor current (wire feed mechanism)
13	🗋	**Push-button gas test / rinse hose package > *see 5.1.7 chapter***
14	⅛	**Push-button, wire inching** Potential- and gas-free inching of the wire electrode through the hose package to the welding torch > *see 5.4.2.4 chapter*.

4.4.1 Functional sequence
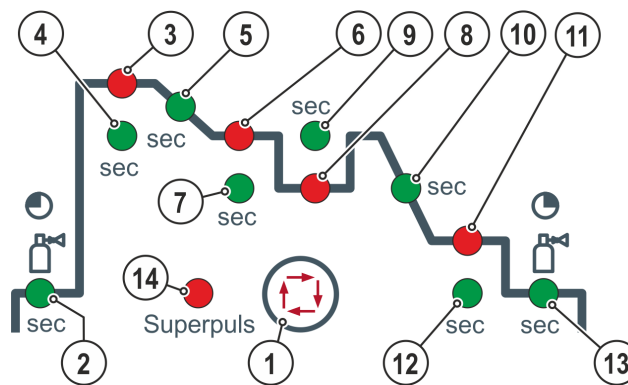
Figure 4-5

Item	Symbol	Description
1	↱↲	**Select welding parameters button** This button is used to select the welding parameters depending on the welding process and operating mode used.

Item	Symbol	Description
2	◕ 🗄	**Signal light, gas pre-flow time** Setting range 0.0 s to 20.0 s
3		**Signal light, start program (P_{START})** • Wire speed:1% to 200% of the main program P_A • Correction of the arc length -9.9 V to +9.9 V
4	sec	**Signal light, start time** Setting range, absolute 0.0 s to 20.0 s (0.1 s increments)
5	sec	**Signal light, slope time program P_{START} to main program P_A** Setting range 0.0 s to 20.0 s (0.1 s increments)
6		**Signal light, main program (P_A)** • Wire speed WF-min. to WF-max. • Correction of the arc length -9.9 V to +9.9 V
7	sec	**Signal light, duration of main program P_A** Setting range 0.1 s to 20.0 s (0.1 s increments). Used e.g. in connection with the super pulse function
8		**Signal light, reduced main program (P_B)** • Wire speed:1% to 200% of the main program P_A • Correction of the arc length -9.9 V to +9.9 V
9	sec	**Signal light, duration reduced main program P_B** Setting range 0.0 s to 20.0 s (0.1 s increments). Used e.g. in connection with the super pulse function.
10	sec	**Signal light, slope time program P_A (or P_B) to end program P_{END}** Setting range 0.0 s to 20.0 s (0.1 s increments)
11		**Signal light, end program (P_{END})** • Wire speed:1% to 200% of the main program P_A • Correction of the arc length -9.9 V to +9.9 V
12	sec	**Signal light, duration of end program P_{END}** Setting range 0.0 s to 20.0 s (0.1 s increments)
13	🗄◕	**Signal light, gas post-flow time**
14	Super-puls	**Signal lamp, super pulse function** Lights up when the super pulse function is active.

5 Design and function

> ⚠ **WARNING**
>
> **Risk of injury from electrical voltage!**
> **Contact with live parts, e.g. power connections, can be fatal!**
> • Observe the safety information on the first pages of the operating instructions!
> • Commissioning must be carried out by persons who are specifically trained in handling power sources!
> • Connect connection or power cables while the machine is switched off!

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

5.1 Transport and installation

5.1.1 Lifting by crane

> ⚠ **WARNING**
>
> **Risk of accident due to improper transport of machines that must not be lifted!**
> **Do not lift or suspend the machine! The machine can drop and cause injuries! The handles, straps or brackets are suitable for transport by hand only!**
> • The machine must not be suspended or lifted using a crane.

5.1.2 Ambient conditions

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

☞ *Equipment damage due to contamination!*
Unusually high amounts of dust, acids, corrosive gases or substances can damage the machine (observe maintenance intervals > see 6.3 chapter).
- *Avoid large amounts of smoke, steam, oily fumes, grinding dust and corrosive ambient air!*

5.1.2.1 In operation

Temperature range of the ambient air:
• -25 °C to +40 °C (-13 °F to 104 °F)

Relative humidity:
• up to 50 % at 40 °C (104 °F)
• up to 90 % at 20 °C (68 °F)

5.1.2.2 Transport and storage

Storage in a closed room, temperature range of the ambient air:
• -30 °C to +70 °C (-22 °F to 158 °F)

Relative humidity
• up to 90 % at 20 °C (68 °F)

> ⚠ **CAUTION**
>
> **Risk of accident due to unsuitable power source!**
> **If this wire feeder is operated with an unsuitable power source, it may topple and injure persons. In addition, the performance of the overall system would be restricted.**
> • For suitable power sources, see the "Intended use" chapter > *see 3.2 chapter*.

⚠ **CAUTION**

Risk of falling!
If the double wire feed unit is not positioned correctly on the holder, it may fall, become damaged and cause injury to persons as a result.

- Always position the inner feet of the wire feed unit in the provided recesses!
- Outer housing frames of the wire feed must lay flat on the holder!
  (See figure, part "b")
- Check that the wire feed is properly secured before any transport and every start-up operation!
- Observe the safety instructions on transport and positioning, as well as on lifting by crane, in the operating instructions for the power source!
- Do not apply tractive force to the torch tube package! If there is any possibility that tractive force may be unavoidable, the wire feed must be removed from the support!
- The press arbor bracket must not be used (even with a single wire feed)!

a   b
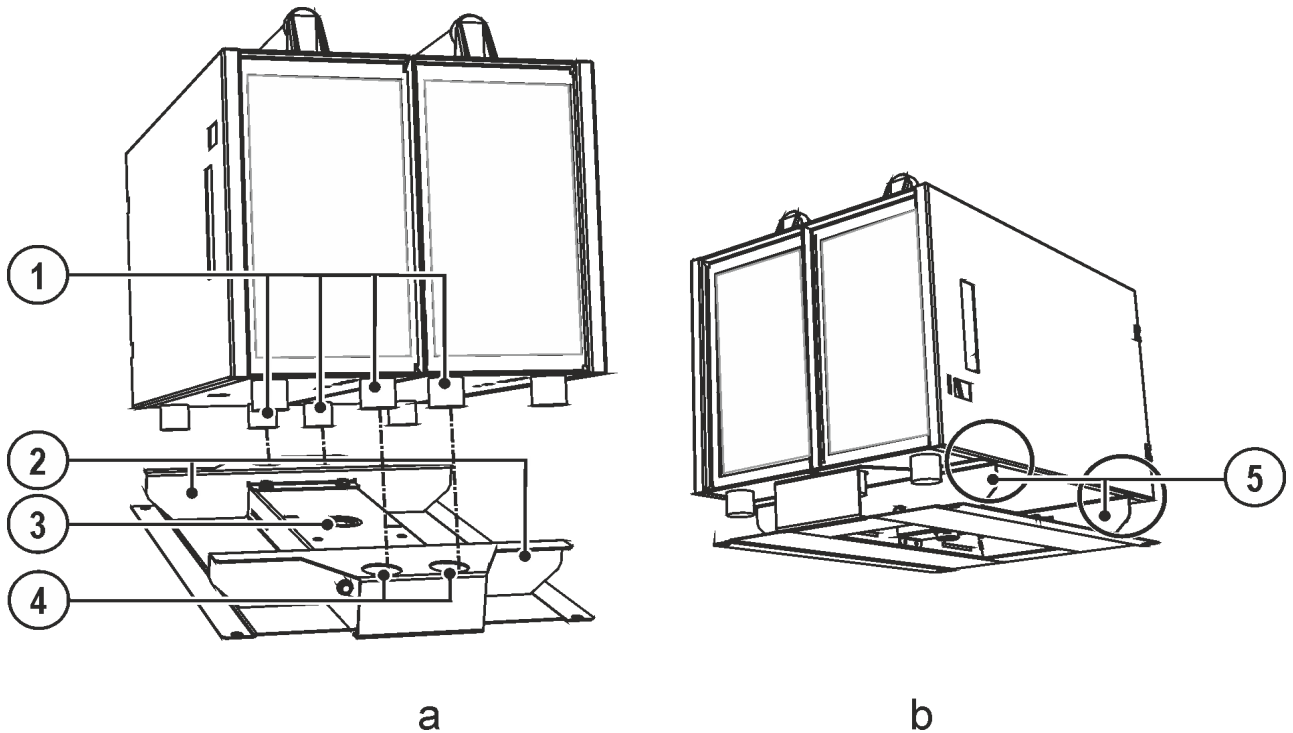
Figure 5-1

Item	Symbol	Description
1		**Internal unit feet**
2		**Holder for wire feed unit**
3		**Press arbor bracket**
4		**Recesses for unit feet**
5		**External casing frame**

- Set the double wire feed on the holder in such a way that the unit's inner feet are held securely in the recesses provided for them.

5.1.3 Welding torch cooling system

☞ *Insufficient frost protection in the welding torch coolant!*
Depending on the ambient conditions, different liquids are used for cooling the welding torch > see 5.1.3.1 chapter.
Coolants with frost protection (KF 37E or KF 23E) must be checked regularly to ensure that the frost protection is adequate to prevent damage to the machine or the accessory components.
- *The coolant must be checked for adequate frost protection with the TYP 1 frost protection tester .*
- *Replace coolant as necessary if frost protection is inadequate!*

☞ *Coolant mixtures!*
Mixtures with other liquids or the use of unsuitable coolants result in material damage and renders the manufacturer's warranty void!
- *Only use the coolant described in this manual (overview of coolants).*
- *Do not mix different coolants.*
- *When changing the coolant, the entire volume of liquid must be changed.*

Dispose of the coolant in accordance with local regulations and the material safety data sheets.

5.1.3.1 Approved coolants overview

Coolant	Temperature range
KF 23E (Standard)	-10 °C up to +40 °C (14 °F up to +104 °F)
KF 37E	-20 °C up to +30 °C (-4 °F up to +86 °F)

5.1.3.2 Maximal hose package length

All information relates to the total hose package length of the complete welding system and presents exemplary configurations (of components of the EWM product portfolio with standard lengths). A straight kink-free installation is to be ensured, taking into account the max. delivery height.

Pump: Pmax = 3,5 bar (0.35 MPa)

Power source	Hose package	Wire feeder	miniDrive	Welding torch	Max.
Compact	✖	✖	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	30 m 98 ft.
	✔ (20 m / 65 ft.)	✔	✖	✔ ✔ (5 m / 16 ft.)	
Decompact	✔ (25 m / 82 ft.)	✔	✖	✔ (5 m / 16 ft.)	
	✔ (15 m / 49 ft.)	✔	✔ (10 m / 32 ft.)	✔ (5 m / 16 ft.)	

Pump: Pmax = 4.5 bar (0.45 MPa)

Power source	Hose package	Wire feeder	miniDrive	Welding torch	Max.
Compact	✖	✖	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	30 m 98 ft.
	✔ (30 m / 98 ft.)	✔	✖	✔ ✔ (5 m / 16 ft.)	40 m 131 ft.
Decompact	✔ (40 m / 131 ft.)	✔	✖	✔ (5 m / 16 ft.)	45 m 147 ft.
	✔ (40 m / 131 ft.)	✔	✔ (25 m / 82 ft.)	✔ (5 m / 16 ft.)	70 m 229 ft.

5.1.4 Notes on the installation of welding current leads

- **Incorrectly installed welding current leads can cause faults in the arc (flickering).**
- **Lay the workpiece lead and hose package of power sources without HF igniter (MIG/MAG) for as long and as close as possible in parallel.**
- **Lay the workpiece lead and hose package of power sources with HF igniter (TIG) for as long as possible in parallel with a distance of 20 cm to avoid HF sparkover.**
- **Always keep a distance of at least 20 cm to leads of other power sources to avoid interferences**
- **Always keep leads as short as possible! For optimum welding results max. 30 m (welding lead + intermediate hose package + torch lead).**
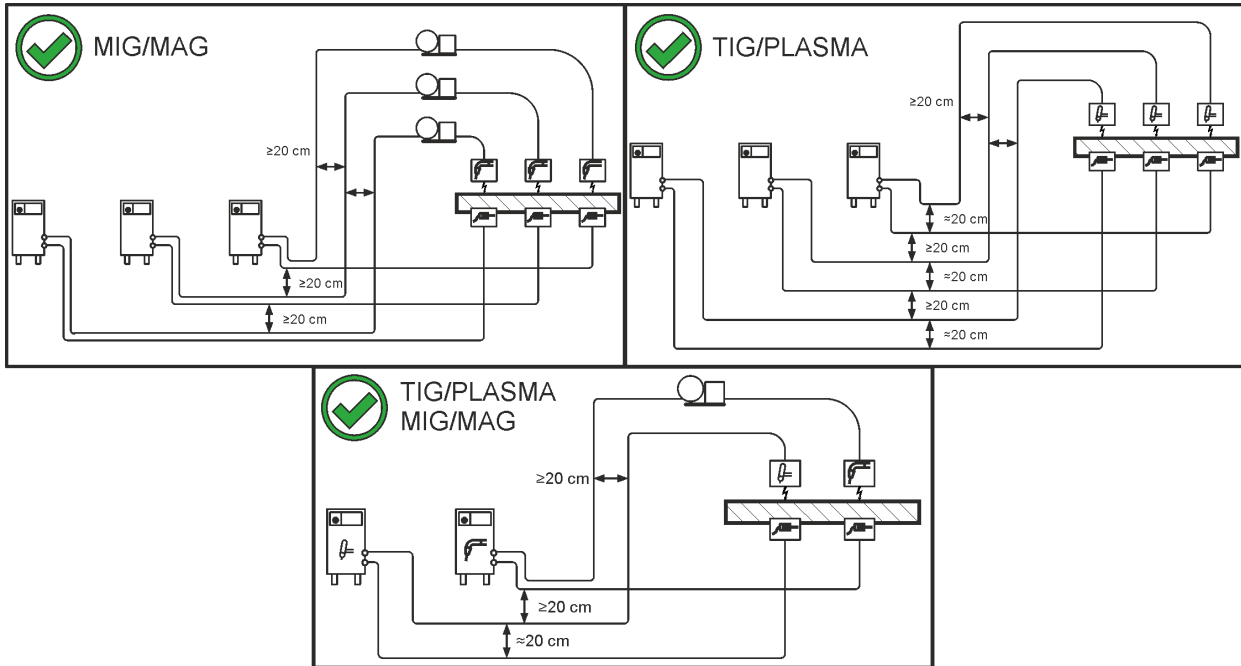
Figure 5-2

Use an individual welding lead to the workpiece for each welding machine!
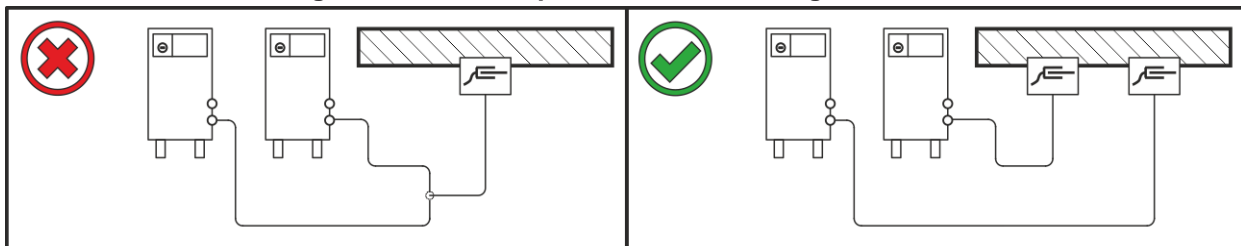
Figure 5-3

Fully unroll welding current leads, torch hose packages and intermediate hose packages. Avoid loops!

Always keep leads as short as possible!

Lay any excess cable lengths in meanders.
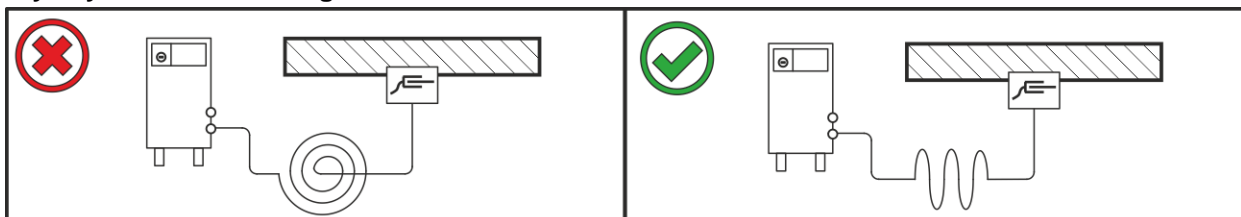
Figure 5-4

5.1.5 Stray welding currents

> ⚠ **WARNING**
>
> ⚡ **Risk of injury due to stray welding currents!**
> **Stray welding currents can destroy protective earth conductors, damage machines and electronic devices and cause overheating of components, leading to fire.**
> - Check that all welding current connections are firmly secured and electrical connections are in perfect condition.
> - Set up, attach or suspend all conductive power source components such as casing, transport vehicles and crane frames so they are insulated.
> - Do not place any other electronic devices such as drills or angle grinders on the power source, transport vehicle or crane frames unless they are insulated.
> - Always put welding torches and electrode holders on an insulated surface when they are not in use.
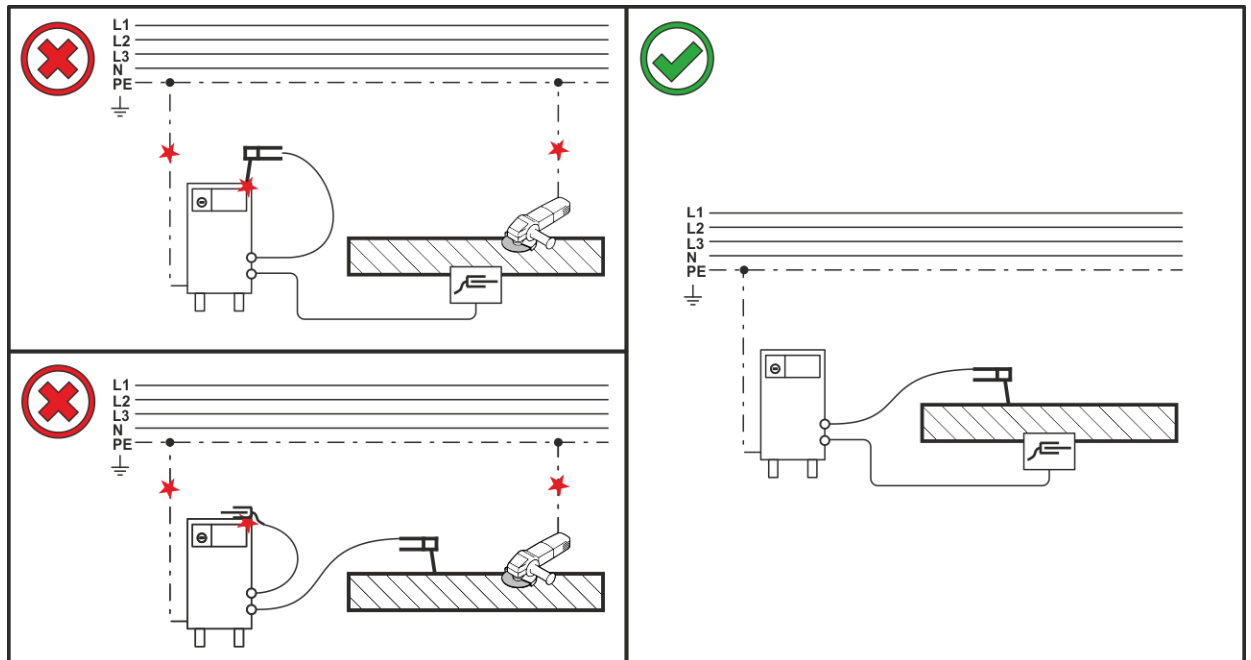
Figure 5-5

5.1.6 Intermediate hose package connection

The connection is carried out in the interior of the wire feed unit. The connections must be fed through the opening on the rear and the hose package end must be fastened using the strain relief.
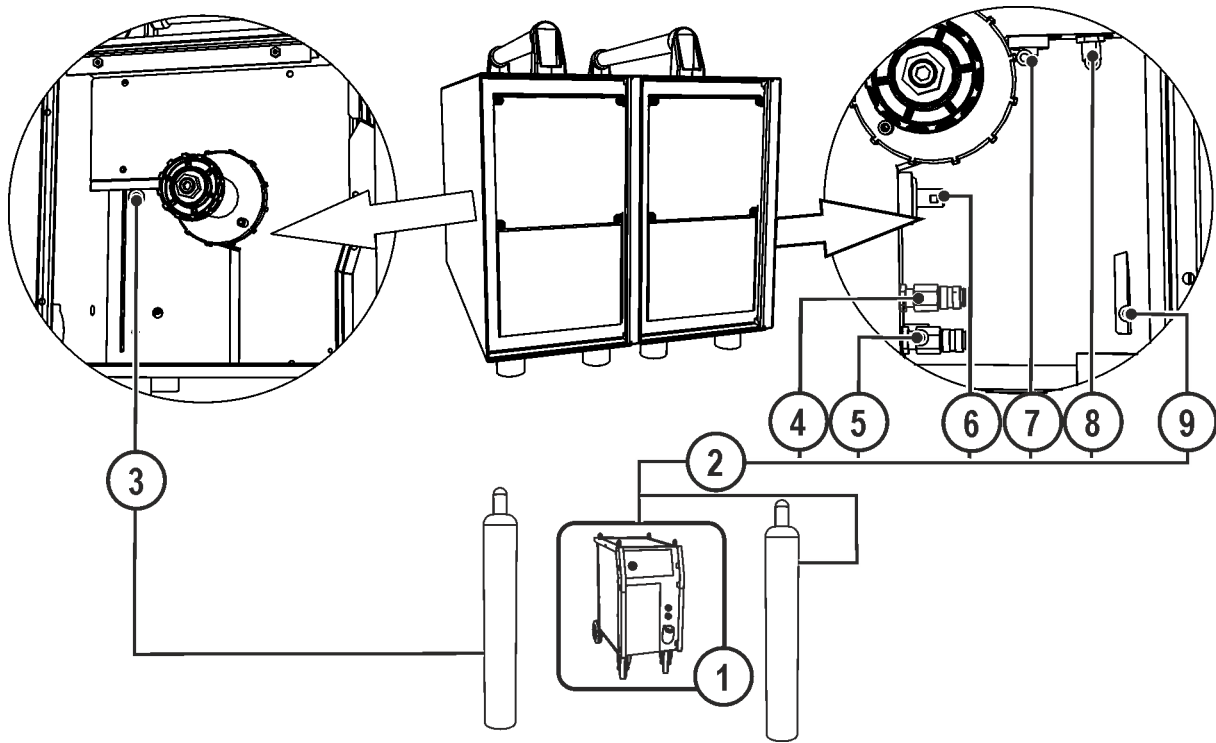
Figure 5-6

Item	Symbol	Description
1		**Power source**
2		**Intermediate hose package**
3		**G¼" connecting nipple, shielding gas connection** Shielding gas supply to the central connection of the second welding torch
4		**Quick connect coupling (blue)** Coolant feed
5		**Quick connect coupling (red)** Coolant return
6		**Connector plug, welding current "+"** Welding current connection on wire feed unit
7		**7-pole connection socket (digital)** • Control lead for wire feed unit
8		**G¼" connecting nipple, shielding gas connection** Shielding gas supply to the central connection of the first welding torch
9		**Strain relief**

- Insert the end of the hose package through the strain relief of the hose package and lock by turning to the right.
- Push the welding current cable socket onto the "welding current connecting plug" and lock by turning to the right.
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings: Return line red to quick connect coupling, red (coolant return) and supply line blue to quick connect coupling, blue (coolant supply).
- Insert cable plug on the control lead into the 7-pole connection socket and secure with crown nut (the plug can only be inserted into the connection socket in one position).
- Connect crown nut of the shielding gas line to the G¼" connecting nipple.

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

5.1.7.1 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 5.1.7.2 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

5.1.7.2 Gas test
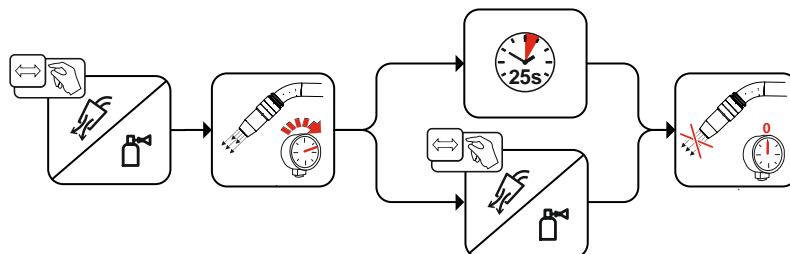
Figure 5-7

5.1.7.3 Purge hose package
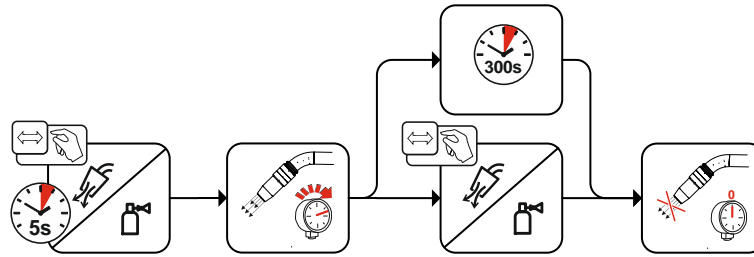
Figure 5-8

5.2 Welding data display

To the left and right of the control displays are the "Parameter selection" buttons (). They are used to select welding parameters to be displayed.

Each press of the button advances the display to the next parameter (LEDs next to the button indicate the selection). After the last parameter is reached, the system starts again from the beginning.

Figure 5-9

The display shows:

- Nominal values (before welding)
- Actual values (during welding)
- Hold values (after welding)

MIG/MAG

Parameter	Nominal values	Actual values	Hold values
Welding current	☑	☑	☑
Material thickness	☑	☐	☐
Wire feed speed	☑	☑	☑
Welding voltage	☑	☑	☑
Welding performance	☐	☑	☑

TIG

Parameter	Nominal values	Actual values	Hold values
Welding current	☑	☑	☑
Welding voltage	☑	☑	☑
Welding performance	☐	☑	☑

MMA

Parameter	Nominal values	Actual values	Hold values
Welding current	☑	☑	☐
Welding voltage	☑	☑	☐
Welding performance	☐	☑	☐

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

5.3 Basic settings for operation with two wire feeders (P10)

The wire feeder controls are configured ex works for double wire feeder operation. This setting should be checked and corrected, if necessary, should the controls have been reset to the factory settings or in the event of errors.

- **Configure one wire feeder as master, the second as slave.**
- **Always configure a wire feeder with key switch (optional) as master.**

The special parameter P10 determines the settings for single or dual operation of the machines.

It is located in the menu levels that are not directly accessible on the wire feed or welding machine control.

Assignment of parameter setting and operating mode:

P10	Meaning
0	Single operation
1	Dual operation as master
2	Dual operation as slave

The following settings should be carried out in sequence on both wire feed units (with compact units, on the welding machine and wire feed unit), or checked:

- Open the special parameters menu on the machine control, > *see 5.10 chapter*

set special parameter P10 on a wire feed unit (or welding machine) to "Master" and

set special parameter P10 on the other wire feed unit to "Slave".

The "Master" or "Slave" setting does not mean a difference in function. The unit configured as the master is active after switching on. (Tapping the torch trigger on the inactive unit will change over units.)

Welding with both wire feeders at the same time is not possible.

5.3.1 Switching between wire feed units

On the welding torch of the inactive wire feed

- Tap torch trigger (press briefly)

Changeover is only carried out if no welding current is flowing!

5.3.2 Special points when operating with two wire feed units

Operation with two wire feed units allows you to weld different materials alternately with one welding machine (e.g. welding steel and CrNi).

The machines can be equipped with different filler materials and the corresponding shielding gases.

The corresponding welding task is set at the respective machine control of the wire feed unit (see chapter "Selecting MIG/MAG welding tasks").

During the start procedure, the controls of the wire feed unit will show the last active JOB for about three seconds. The unit is then ready to weld. The start procedure is carried out

- **at the control configured as master, after switching on**
- **at the control configured as slave, after switching over for the first time**

5.4 MIG/MAG welding

5.4.1 Welding torch connection

☞ *Equipment damage due to improperly connected coolant pipes!*
If the coolant pipes are not properly connected or a gas-cooled welding torch is used, the coolant circuit is interrupted and equipment damage can occur.
- *Connect all coolant pipes correctly!*
- *Completely unroll the hose package and the torch hose package!*
- *Observe maximal hose package length > see 5.1.3.2 chapter.*
- *When using a gas-cooled welding torch, use a hose bridge to establish the coolant circuit > see 9 chapter.*

On delivery, the Euro torch connector is fitted with a capillary tube for welding torches with a steel liner. Conversion is necessary if a welding torch with a liner is used!
- **Operate welding torches with a liner > with a guide tube.**
- **Operate welding torches with a steel liner > with a capillary tube.**

Depending on the wire electrode diameter or type, either a steel liner or liner with the correct inner diameter must be inserted in the torch!

Recommendation:
- Use a steel liner when welding hard, unalloyed wire electrodes (steel).
- Use a chrome nickel liner when welding hard, high-alloy wire electrodes (CrNi).
- Use a plastic or teflon liner when welding or brazing soft wire electrodes, high-alloy wire electrodes or aluminium materials.

Preparation for connecting welding torches with a liner:
- Push forward the capillary tube on the wire feed side in the direction of the Euro torch connector and remove it there.
- Insert the liner guide tube from the Euro torch connector side.
- Carefully insert the welding torch connector with as yet too long a liner into the Euro torch connector and secure with a crown nut.
- Cut off the liner with a liner cutter > *see 9 chapter* just before the wire feed roller.
- Loosen the welding torch connector and remove.
- Carefully chamfer the cut off end of the liner with a liner sharpener > *see 9 chapter* and sharpen.

Preparation for connecting welding torches with a spiral guide:
- Check that the capillary tube is correctly positioned in relation to the central connector!
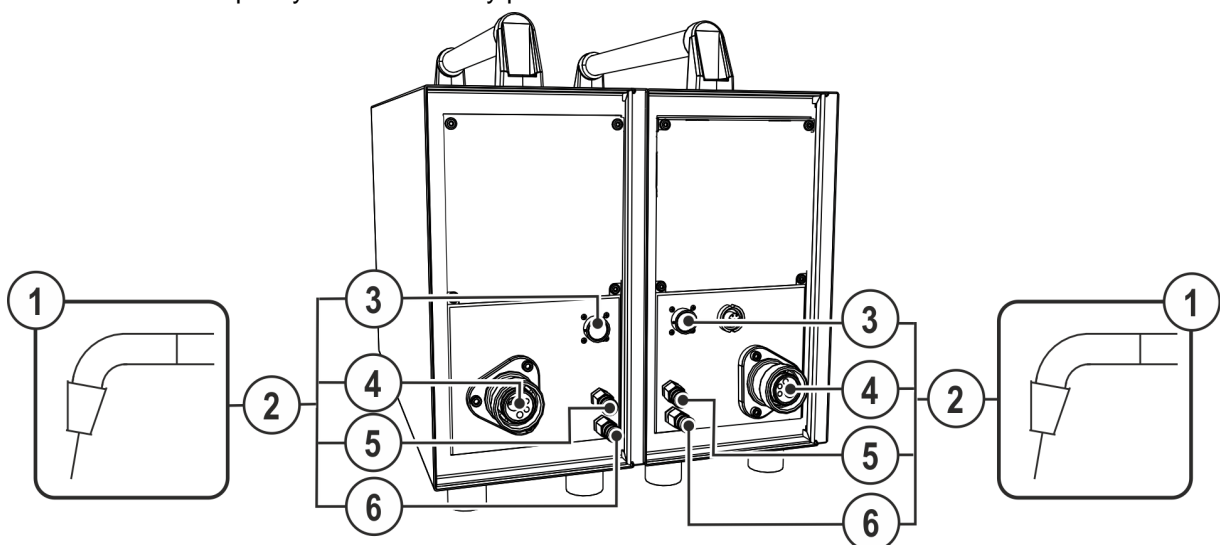
Figure 5-10

Item	Symbol	Description
1		Welding torch

Item	Symbol	Description
2		**Welding torch hose package**
3	↗	**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, etc.)
4		**Welding torch connection (Euro or Dinse torch connector)** Welding current, shielding gas and torch trigger integrated
5	Red	**Quick connect coupling (red)** Coolant return from welding torch
6	Blue	**Quick connect coupling (blue)** Coolant forward flow to the welding torch

• Insert the central plug for the welding torch into the central connector and screw together with crown nut.

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

If fitted:

• Insert the 19-pole torch control lead plug into the 19-pole connection socket (analogue) and lock.

5.4.2 Wire feed

> ⚠ **CAUTION**
>
> **Risk of injury due to moving parts!**
> **The wire feeders are equipped with moving parts, which can trap hands, hair, clothing or tools and thus injure persons!**
> • Do not reach into rotating or moving parts or drive components!
> • Keep casing covers or protective caps closed during operation!
>
> **Risk of injury due to welding wire escaping in an unpredictable manner!**
> **Welding wire can be conveyed at very high speeds and, if conveyed incorrectly, may escape in an uncontrolled manner and injure persons!**
> • Before mains connection, set up the complete wire guide system from the wire spool to the welding torch!
> • Check wire guide at regular intervals!
> • Keep all casing covers or protective caps closed during operation!

5.4.2.1 Open the protective flap of the wire feeder

☞ *To perform the following steps, the protective flap of the wire feeder needs to be opened. Make sure to close the protective flap again before starting to work.*

• Unlock and open protective flap.

5.4.2.2 Inserting the wire spool

> ⚠ **CAUTION**
>
> **Risk of injury due to incorrectly secured wire spool.**
> **If the wire spool is not secured properly, it may come loose from the wire spool support and fall to the ground, causing damage to the machine and injuries.**
> • Make sure to correctly fasten the wire spool to the wire spool support.
> • Before you start working, always check the wire spool is securely fastened.

Standard D300 wire spool holder can be used. Adapters are required when using standardised basket coils (DIN 8559) > *see 9 chapter*.
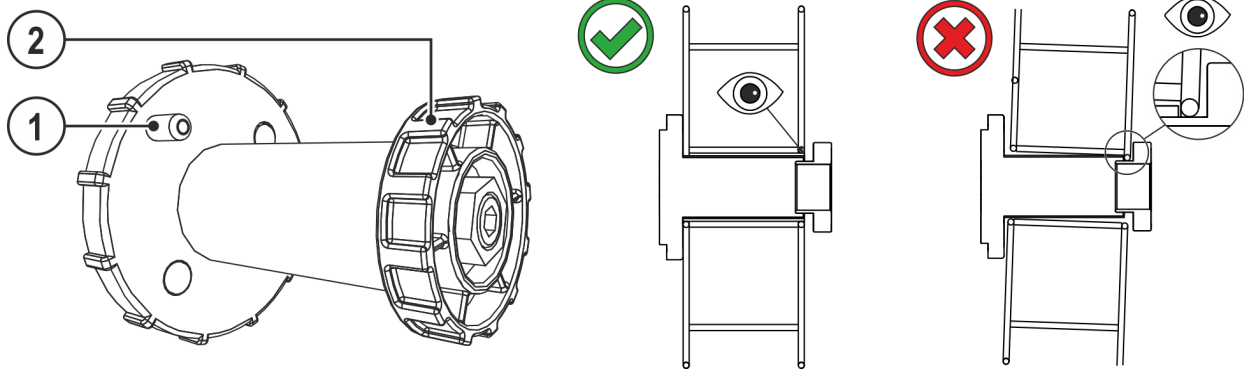
Figure 5-11

Item	Symbol	Description
1		**Carrier pin** For fixing the wire spool
2		**Knurled nut** For fixing the wire spool

• Loosen knurled nut from spool holder.

• Fix welding wire reel onto the spool holder so that the carrier pin locks into the spool bore.

• Fasten wire spool using knurled nut.

5.4.2.3 Changing the wire feed rollers
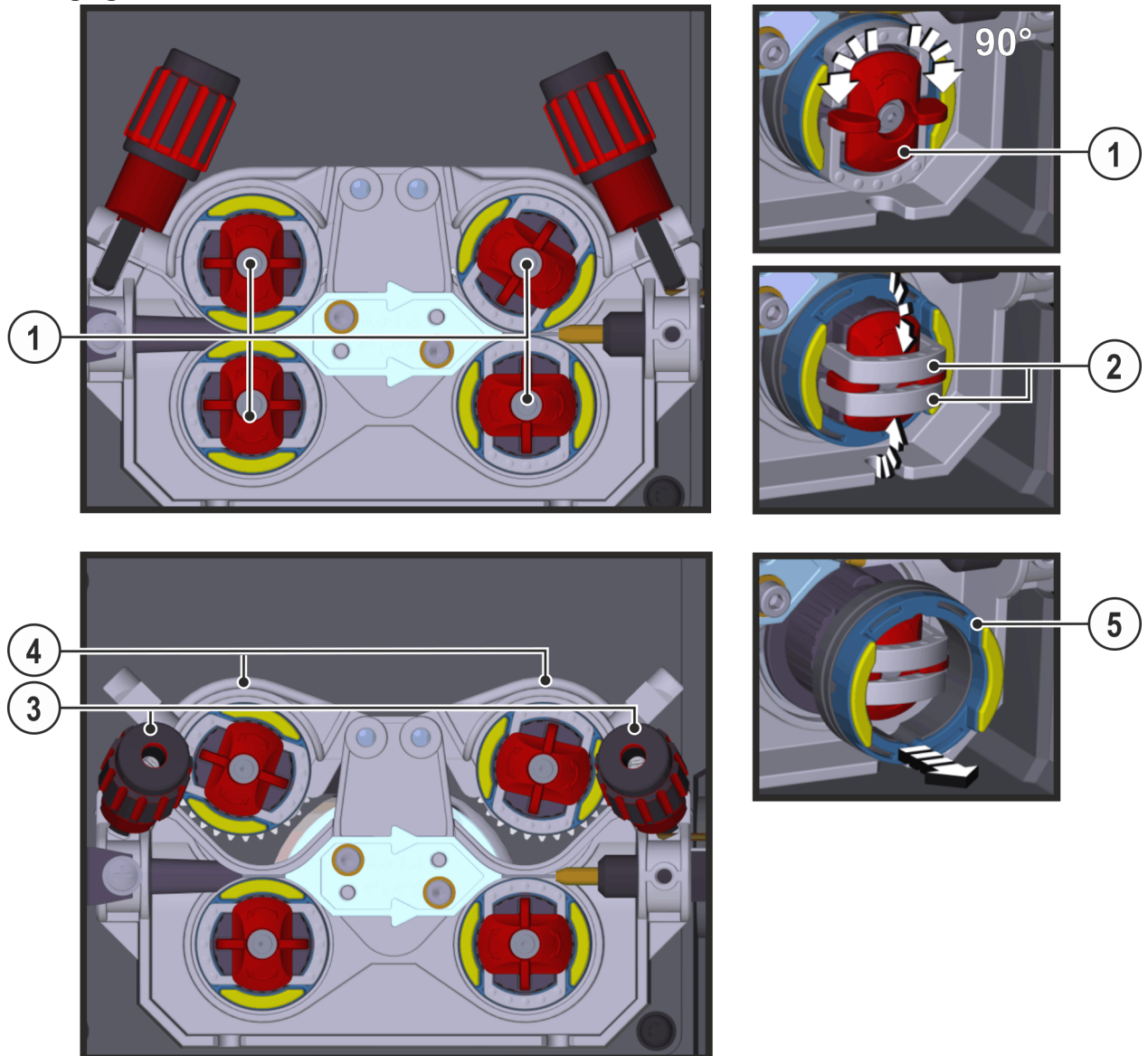
Figure 5-12

Item	Symbol	Description
1		**Tommy** The tommy is used to secure the closure brackets of the wire feed rollers.
2		**Closure bracket** The closure brackets are used to secure the wire feed rollers.
3		**Feed roll tensioner** Fixing the clamping unit and setting the pressure.
4		**Clamping unit**
5		**Wire feed roller** see the Wire feed roller overview table
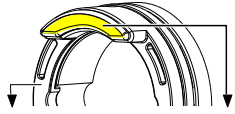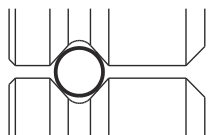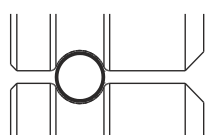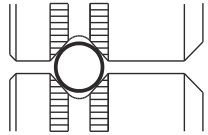
• Rotate the tommy by 90° clockwise or anti-clockwise (tommy locks into place).
• Fold the closure brackets outwards by 90°.
• Unfasten pressure units and fold out (clamping units and pressure rollers will automatically flip upwards).
• Remove the wire feed rollers from the roller support.
• Select new wire feed rollers accoridng to the Wire feed roller overview table and reassemble the wire feed mechanism in reverse order.

Unsatisfactory welding results due to faulty wire feeding!

The wire feed rolls must be suitable for the diameter of the wire and the material. The wire feed rolls are colour-coded to facilitate distinction (see the Wire feed roll overview table). When working with a wire diameter of > 1.6 mm the drive has to be converted for the wire feed kit ON WF 2,0-3,2MM EFEED > *see 10 chapter*.

Wire feed roll overview table:

Material	Diameter		Colour code			Groove form
	Ø mm	Ø inch				
Steel Stainless steel Brazing	0.6	.023	monochrome	light pink	-	V-groove
	0.8	.030		white		
	0.8 0.9 1.0	.030 .035 .040	bicolour	white	blue	
	1.0 1.2	.040 .045		blue	red	
	1.4	.052	monochrome	green	-	
	1.6	.060		black		
	2.0	.080		grey		
	2.4	.095		brown		
	2.8	.110		light green		
	3.2	.125		purple		
Aluminium	0.8	.030	bicolour	white	yellow	U-groove
	0.9 1.0	.035 040		blue		
	1.2	.045		red		
	1.6	.060		black		
	2.0	.080		grey		
	2.4	.095		brown		
	2.8	.110		light green		
	3.2	.125		purple		
Flux cored wire	0.8	.030	bicolour	white	orange	V-groove, knurled
	0.9 1.0	.035 .040		blue		
	1.2	.045		red		
	1.4	.052		green		
	1.6	.060		black		
	2.0	.080		grey		
	2.4	.095		brown		

5.4.2.4 Inching the wire electrode

⚠ **CAUTION**

Risk of injury due to welding wire escaping from the welding torch!
The welding wire can escape from the welding torch at high speed and cause bodily injury including injuries to the face and eyes!

• Never direct the welding torch towards your own body or towards other persons!

☞ *Incorrect contact pressure will cause extensive wear of the wire feed rollers!*
  - *With the adjusting nuts of the pressure units set the contact pressure so that the wire electrode is conveyed but will still slip through if the wire spool jams.*
  - *Set the contact pressure of the front rollers (in wire feed direction) to a higher value!*

The inching speed is infinitely adjustable by simultaneously pressing the wire inching push-button and turning the wire speed rotary knob. The left display shows the wire feed speed selected, the right display shows the current motor current of the wire feed mechanism. Depending on the design of the device, the wire feed mechanism may be reversed!
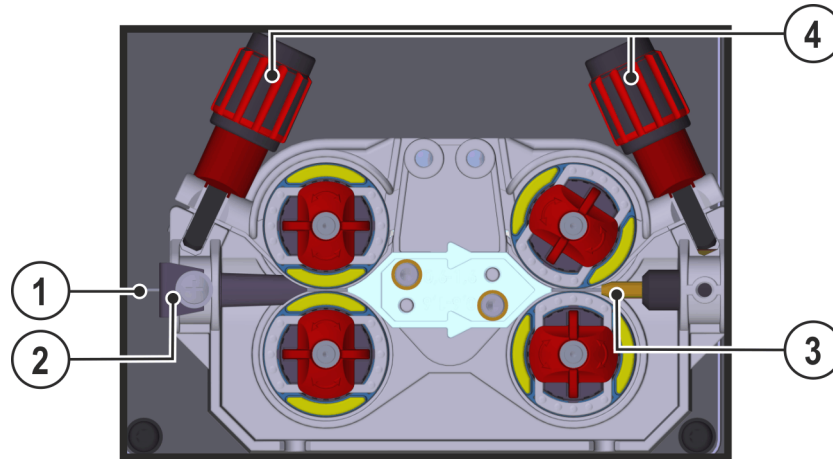
Figure 5-13

Item	Symbol	Description
1		**Welding wire**
2		**Wire feed nipple**
3		**Guide tube**
4		**Adjusting nut**

- Extend and lay out the torch hose package.
- Carefully unwind the welding wire from the wire spool and insert through the wire feed nipples up to the wire feed rollers.
- Press the inching push-button (the drive catches the welding wire and automatically guides it to the welding torch outlet) > *see 4.4 chapter*.

A prerequisite for the automatic inching process is the correct preparation of the wire guide, especially in the capillary and wire guide tube area > *see 5.4.1 chapter*.

- The contact pressure has to be adjusted separately for each side (wire inlet/outlet) at the feed roll tensioner setting nuts depending on the welding consumable used. A table with the setting values can be found on a sticker near the wire drive.

Version 1: left hand mounting   **Version 2: right hand mounting**
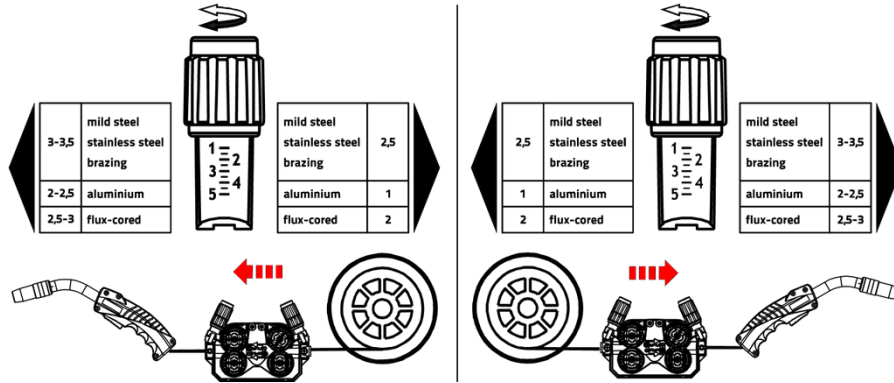
Figure 5-14

Automatic inching stop

Touch the welding torch against the workpiece during inching. Inching of the welding wire will stop as soon it touches the workpiece.

5.4.2.5 Spool brake setting
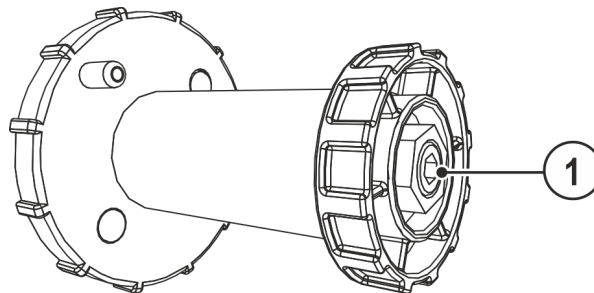
Figure 5-15

Item	Symbol	Description
1		**Allen screw**
		Securing the wire spool retainer and adjustment of the spool brake

- Tighten the Allen screw (8 mm) in the clockwise direction to increase the braking effect.

Tighten the spool brake until the wire spool no longer turns when the wire feed motor stops but without it jamming during operation!

5.4.3 Definition of MIG/MAG welding tasks

This machine series offers user-friendly operation and a multitude of features.

- Various welding tasks (JOBs) consisting of welding procedure, material type, wire diameter and shielding gas type have been predefined > *see 11.1 chapter*.
- The system calculates the required process parameters depending on the operating point specified (one-knob operation via wire feed speed rotary transducer).
- You can adjust additional parameters at the machine control or using the PC300.NET welding parameter software, if required.

Phoenix Expert machine series:

The welding task is set at the power source control; refer to the relevant system documentation.
If required, the predefined special welding tasks SP1 = JOB 129 / SP2 = JOB130 / SP3 = JOB 131 only can be selected at the wire feeder control. The special JOBs are selected by pressing the welding task selection push-button for a longer period. The special JOBs are switched by pressing the push-button briefly.

5.4.4 Welding task selection

The following steps have to be carried out to select the welding job:

- Select basic parameters (material type, wire diameter and shielding gas type) and welding procedures (select and enter JOB number by means of JOB-List > *see 11.1 chapter*).
- Select operating and welding type
- Adjust welding power
- Correct arc length and dynamics if necessary
- Adjust expert parameters for special applications

5.4.4.1 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.

You can only change the JOB number when no welding current is flowing.
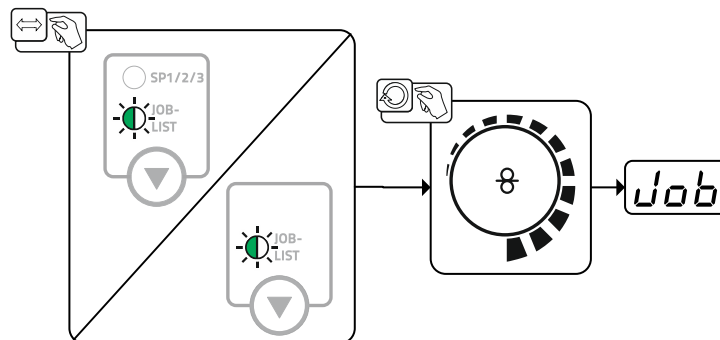
Figure 5-16

5.4.4.2 Operating mode

The operating mode determines the process sequence controlled by the welding torch. Detailed descriptions of the operating modes > *see 5.4.10 chapter*.
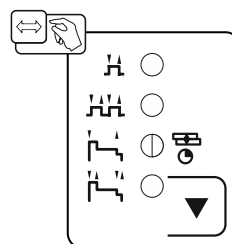
Figure 5-17

5.4.4.3 Welding type

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

Standard (welding with standard arc)

Depending on the set combination of wire feed speed and arc voltage, the arc types short arc, transitional arc or spray arc can be used 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 of all materials, in particular high-alloy CrNi steels or aluminium.
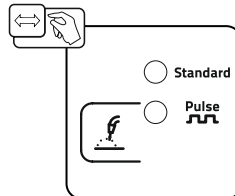
Figure 5-18

5.4.4.4 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 5.4.4.6 chapter*.
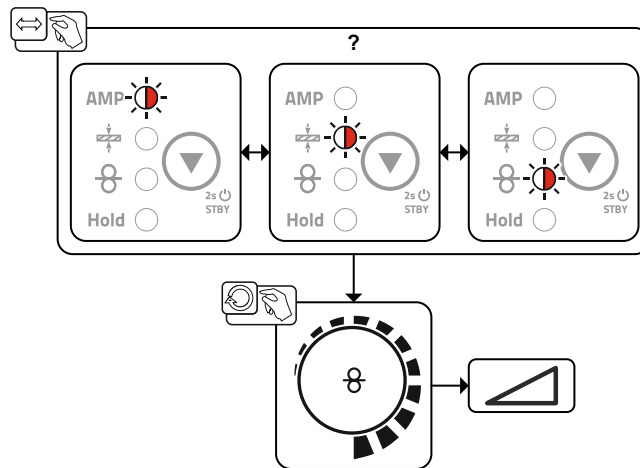
Figure 5-19

5.4.4.5 Accessory components for operating point setting

The operating point can be set at various accessory components as well, such as remote control, special welding torches or robot and industrial bus interfaces (optional interface for automated welding required, not available for all machines of this series).

See the operating instructions for the machine in question for a more detailed description of the individual machines and their functions.

5.4.4.6 Arc length

When required, the arc length (welding voltage) can be adjusted for the welding task in hand by +/– 9.9 V.
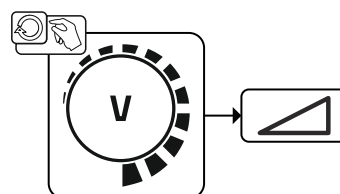
Figure 5-20

5.4.4.7 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.
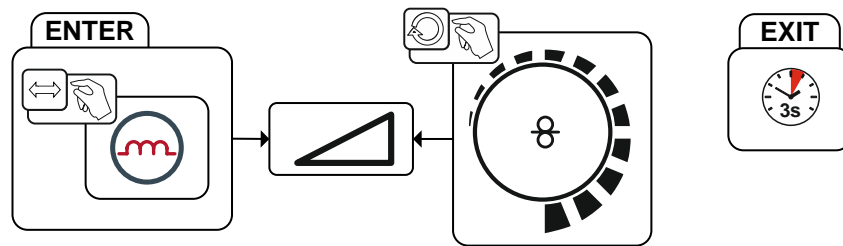
Figure 5-21

5.4.4.8 superPuls

In superPuls mode, the program toggles between the main program (PA) and the reduced main program (PB). This function is e.g. used for thin sheet welding to reduce the heat input in a controlled manner or for positional welding without the need for weaving.

The welding power can be represented as average value (ex works) or solely as program A value. If the average value display is activated the signal lights of the main (PA) and reduced main program (PB) are illuminated simultaneously. The display variants can be toggled using special parameter P19, > *see 5.10 chapter*.
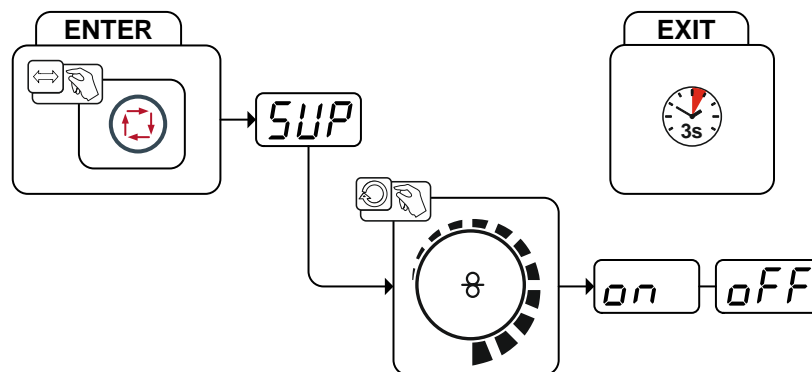
Figure 5-22

Display	Setting/selection
SUP	**Selects superPuls** Switches function on or off.
on	**Switch on** Switching on machine function
oFF	**Switch off** Switching off machine function

5.4.5 Conventional MIG/MAG Welding (GMAW non synergic)

It is only possible to change the JOB number when no welding current is flowing.

Wire feed speed and welding voltage can be configured independently in two performance ranges:

• For wire feed speeds below 8 m/min select JOB 188.
• For wire feed speeds above 8 m/min select JOB 187.
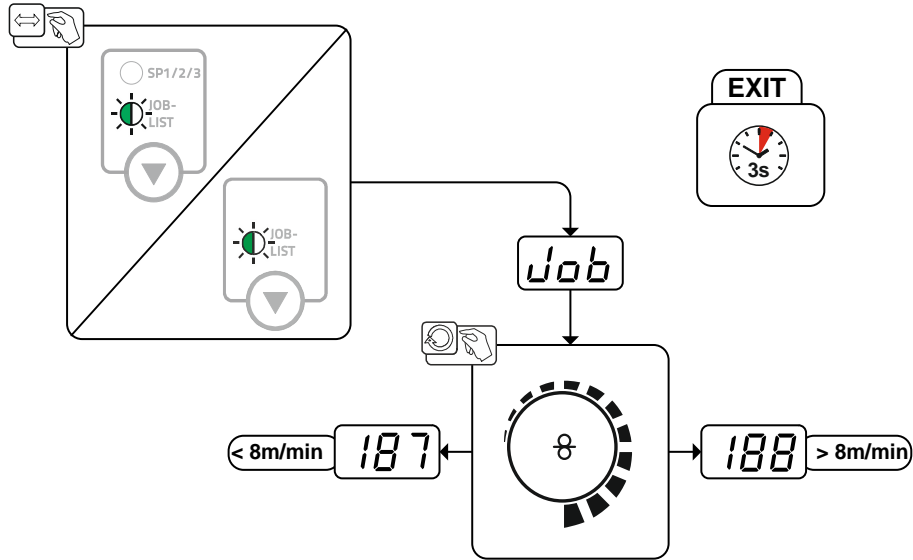
Figure 5-23

5.4.5.1 Setting the operating point (welding output)
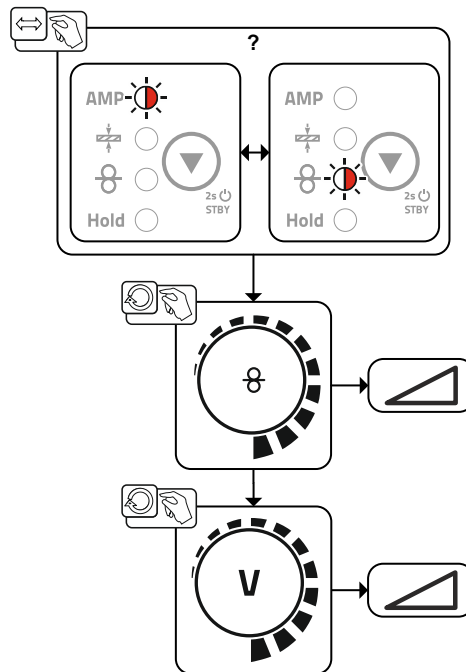
Figure 5-24

5.4.5.2 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 5.4.4.6 chapter*.

5.4.5.3 Operating point setting via welding current, material thickness or wire feed speed
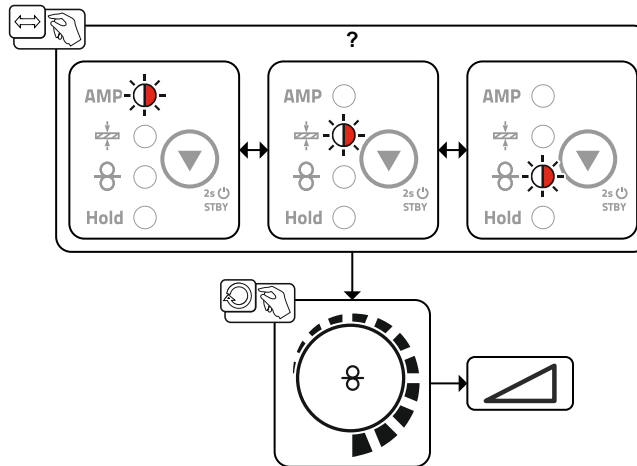
Figure 5-25

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 5.4.4 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.

5.4.5.4 Arc length

When required, the arc length (welding voltage) can be adjusted for the welding task in hand by +/– 9.9 V.
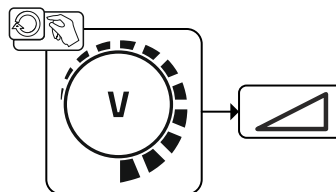
Figure 5-26

5.4.5.5 Accessory components for operating point setting

The operating point can be set at various accessory components as well, such as remote control, special welding torches or robot and industrial bus interfaces (optional interface for automated welding required, not available for all machines of this series).

See the operating instructions for the machine in question for a more detailed description of the individual machines and their functions.

5.4.6 coldArc / coldArc puls

Heat-reduced, low-spatter short arc for high dimensional stability welding and brazing of thin metal sheets with excellent gap-bridging.

Figure 5-27

After selecting the coldArc process > *see 5.4.4 chapter* you benefit from:

- Less distortion and reduced discolouration thanks to minimised heat input
- Considerably reduced spatter thanks to virtually power-free material transfer
- Easy welding of the root passes in all plate thicknesses and in all positions
- Perfect gap bridging even with inconsistent gap widths
- Manual and automated applications

You can make use of these properties after selecting the coldArc process (see the "Selecting a MIG/MAG welding task" chapter).

With coldArc welding, it is important to ensure good quality wire feeding because of the welding filler materials being used!

- Equip the welding torch and torch hose package to suit the task! (> *see 5.4.1 chapter* and the operating instructions for the welding torch.)

This function can only be enabled with the PC300.NET software.

(See operating instructions for the software)

5.4.7 forceArc / forceArc puls

Heat-reduced, directionally-stable and powerful arc with deep fusion penetration for the upper power range.
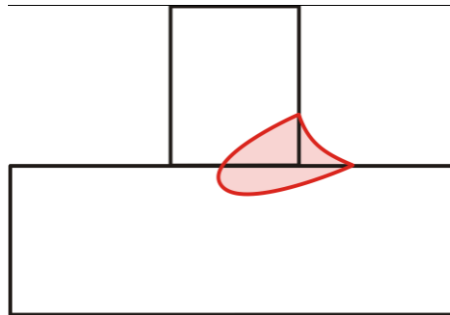
Figure 5-28

- 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 5.4.4 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!**

5.4.8 rootArc/rootArc puls

Short arc with perfect weld modelling capabilities for effortless gap bridging, especially for root welding
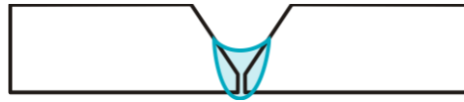
Figure 5-29

- 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!**

5.4.9 pipeSolution

Reduced-energy MAG welding. X-ray-proof welding of pipelines and pipework without lack of fusion. Root pass and fill and final pass with or without air gap. Low- and high-alloy steels with solid wires.
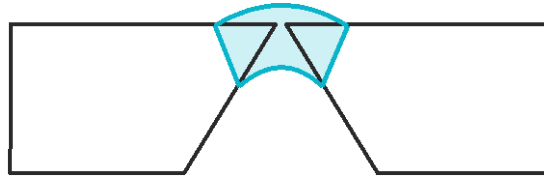
Figure 5-30

- Root welding for metal sheets and pipes in all positions
- Manual and automated applications

5.4.10 Operating modes (functional sequences)

There are optimum pre-sets for welding parameters such as gas pre-flow and burn back, etc. for numerous applications (although these can also be changed if required).

5.4.10.1 Explanation of signs and functions

Symbol	Meaning
	Press torch trigger
	Release torch trigger
	Tap torch trigger (press briefly and release)
	Shielding gas flowing
I	Welding output
	Wire electrode is being conveyed
	Wire creep
	Wire burn-back
	Gas pre-flows
	Gas post-flows
	Non-latched
	Special, non-latched
	Latched
	Special, latched
t	Time
P_{START}	Ignition program
P_A	Main program
P_B	Reduced main program
P_{END}	End program
t2	Spot time

5.4.10.2 Automatic cut-out

The welding machine ends the ignition process or the welding process with an

• **ignition fault (no welding current flows within 5 s after the start signal)**
• **arc interruption (arc is interrupted for longer than 5 s)**

Non-latched mode

Figure 5-31

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.

Non-latched operation with superpulse

Figure 5-32

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.
- Start the super pulse function beginning with main program P_A:
  The welding parameters change at the specified times between main program P_A and the reduced main program P_B.

Step 2

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

Special, non-latched

Figure 5-33

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
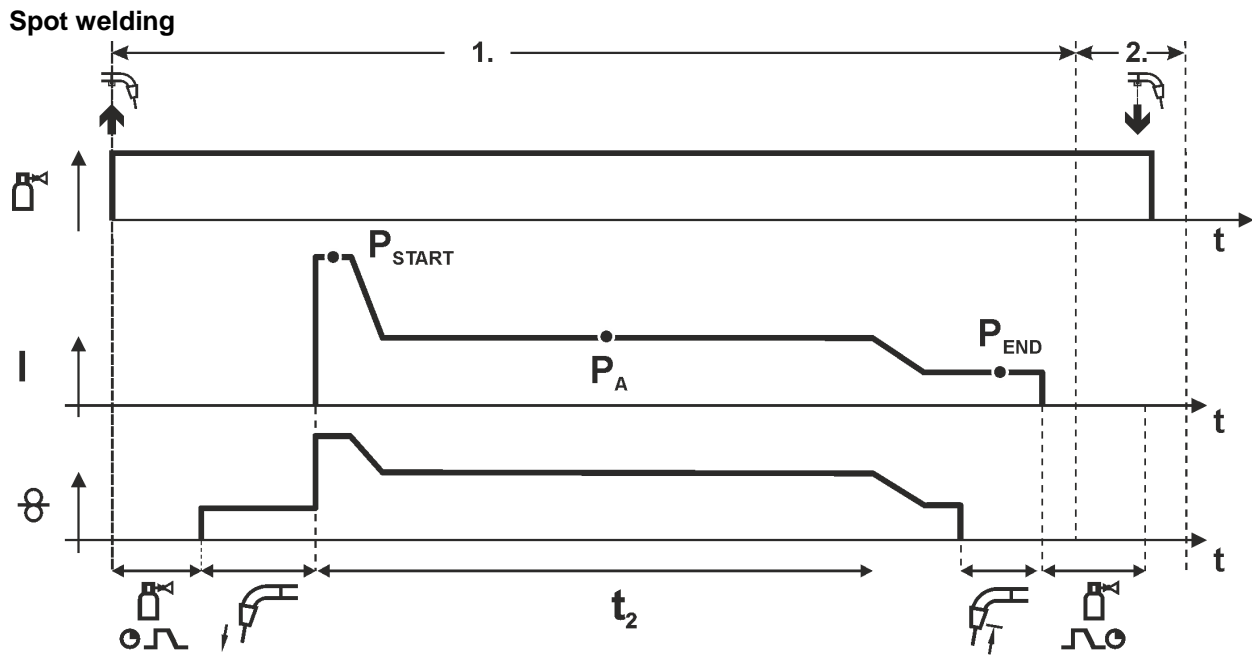
Figure 5-34

The ignition time t_{start} must be added to the spot time t_2.

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}).

Special, non-latched with superpulse
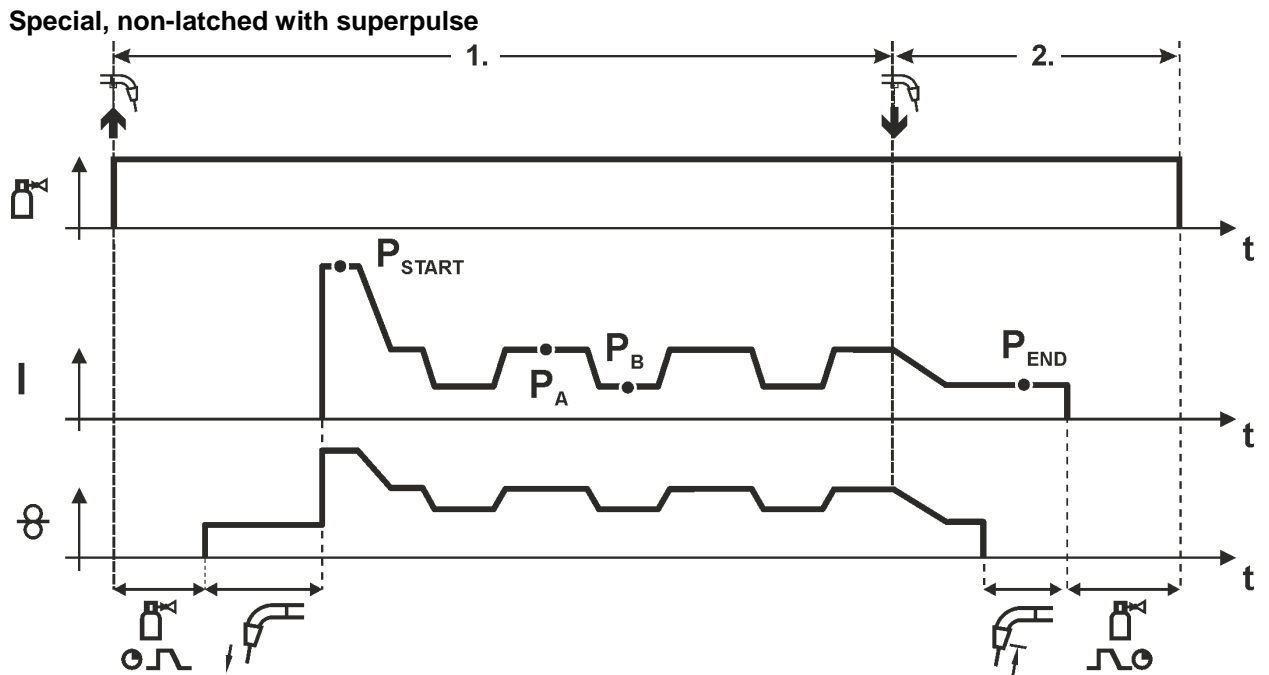
Figure 5-35

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 on main program P_A.
- Start the super pulse function beginning with main program P_A:
  The welding parameters change at the specified times between main program P_A and the reduced main program P_B.

Step 2

- Release torch trigger
- Super pulse function is ended.
- 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.

Latched mode
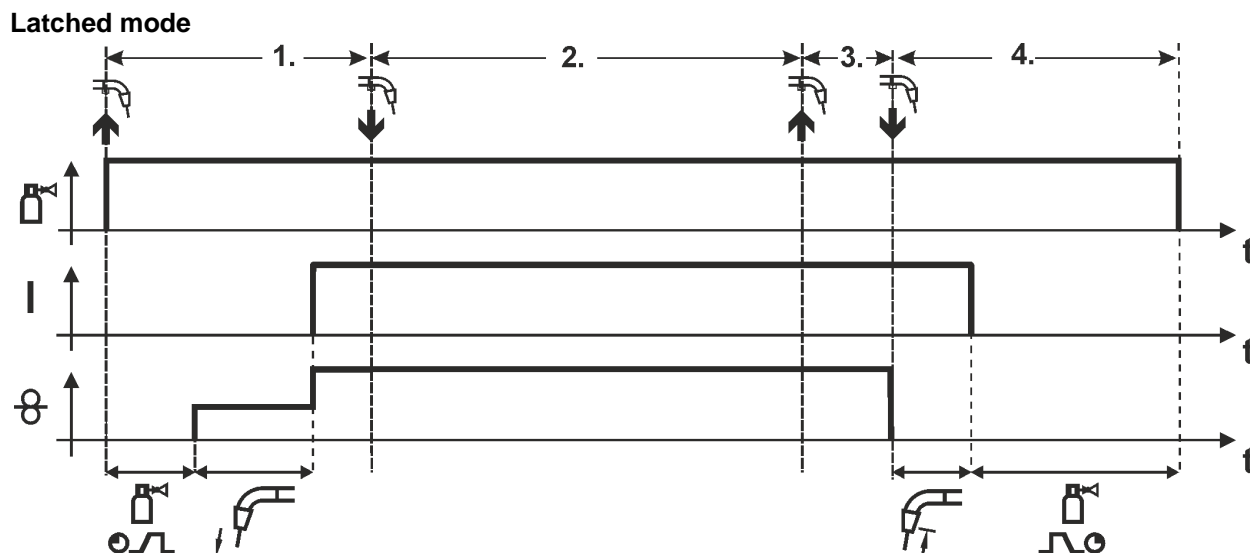
Figure 5-36

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 mode with superpulse
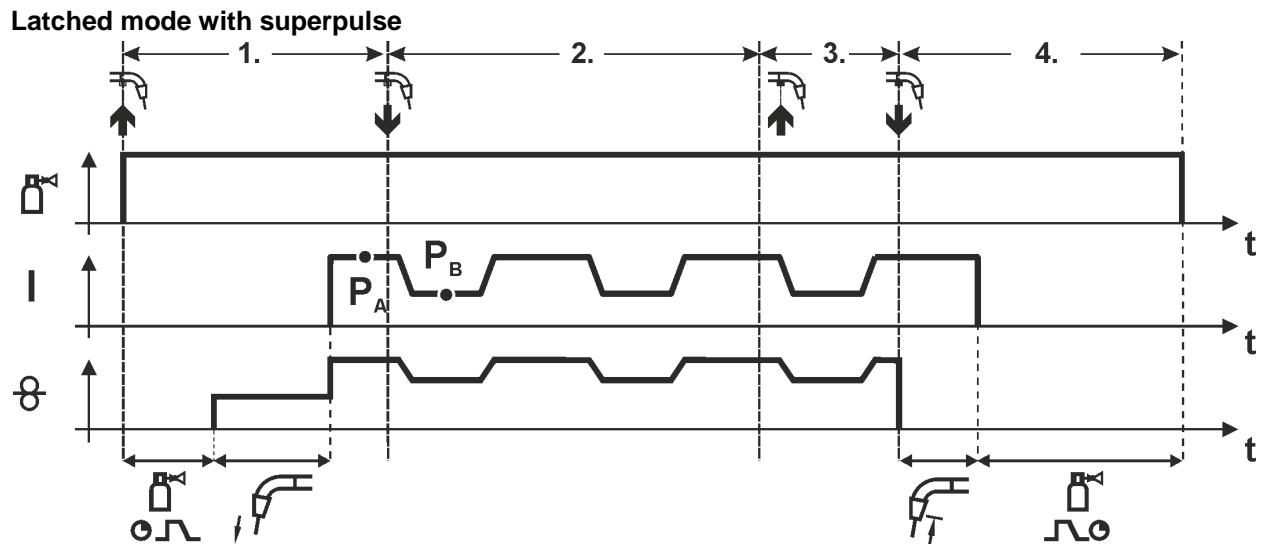
Figure 5-37

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.
- Start the super pulse function beginning with main program P_A.
  The welding parameters change at the specified times between main program P_A and the reduced main program P_B.

Step 2:
- Release torch trigger (no effect)

Step 3:
- Press torch trigger (no effect)

Step 4:
- Release torch trigger
- Super pulse function is ended.
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

Latched with changing welding method (process switching)

To activate or set the function > *see 5.4.15 chapter*.
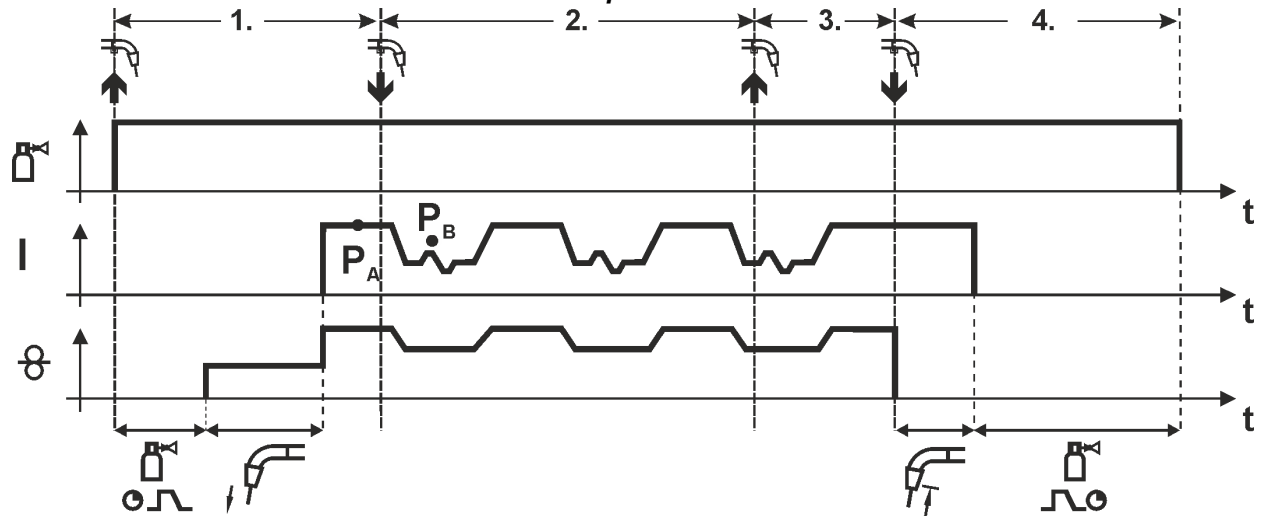
Figure 5-38

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 flows
- Start the process alternation starting with process P_A:
  The welding processes alternate between the process P_A stored in the JOB and the opposite process P_B at the specified times (t_2 and t_3)

If a standard process is stored in the JOB, this means that there is a permanent alternation between the processes, starting with the standard process and followed by the pulse process. The same applies if the situation is reversed.

2nd cycle:

- Release torch trigger (no effect)

3rd cycle:

- Press torch trigger (no effect)

4th cycle:

- Release torch trigger
- Super pulse function is ended
- WF motor stops
- Arc is extinguished after the pre-selected wire burn-back time elapses
- Gas post-flow time elapses

This function can be activated using the PC300.NET software.

Refer to the software operating instructions.

Latched special
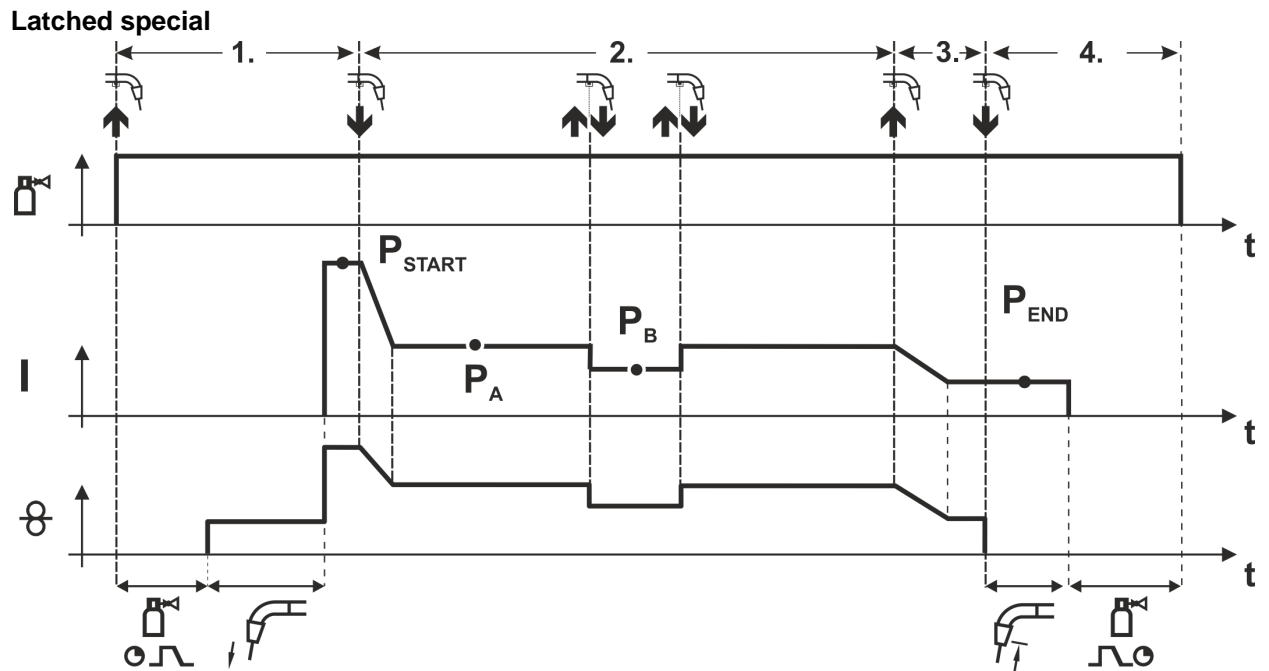
Figure 5-39

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})

Step 2

- Release torch trigger
- Slope to main program P_A.

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.
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.

Special latched with changing welding method by tapping (process switching)

To activate or set the function > *see 5.4.15 chapter*.
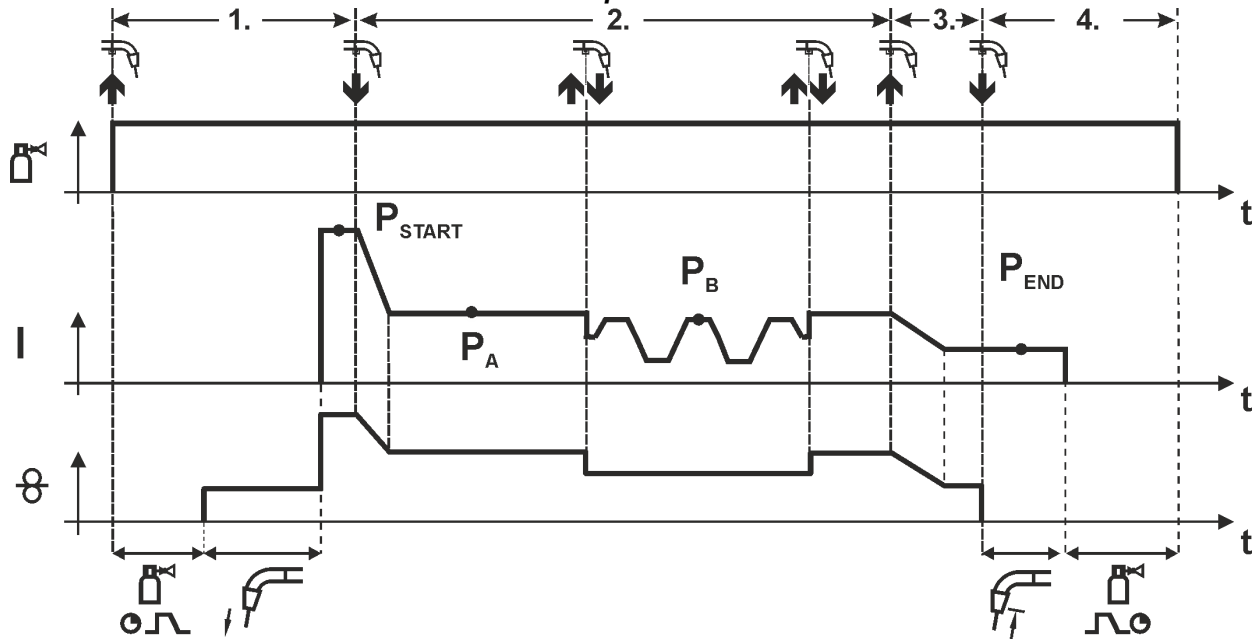
Figure 5-40

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})

2nd cycle

- Release torch trigger
- Slope on main program P_A

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.

Tapping (pressing the torch trigger for less than 0.3 sec.) changes over the welding process (P_B).

If a standard process has been defined in the main program, tapping changes to the pulse process, and tapping again will return to the standard process, etc.

3rd cycle

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

4th cycle

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

This function can be activated using the PC300.NET software.

Refer to the software operating instructions.

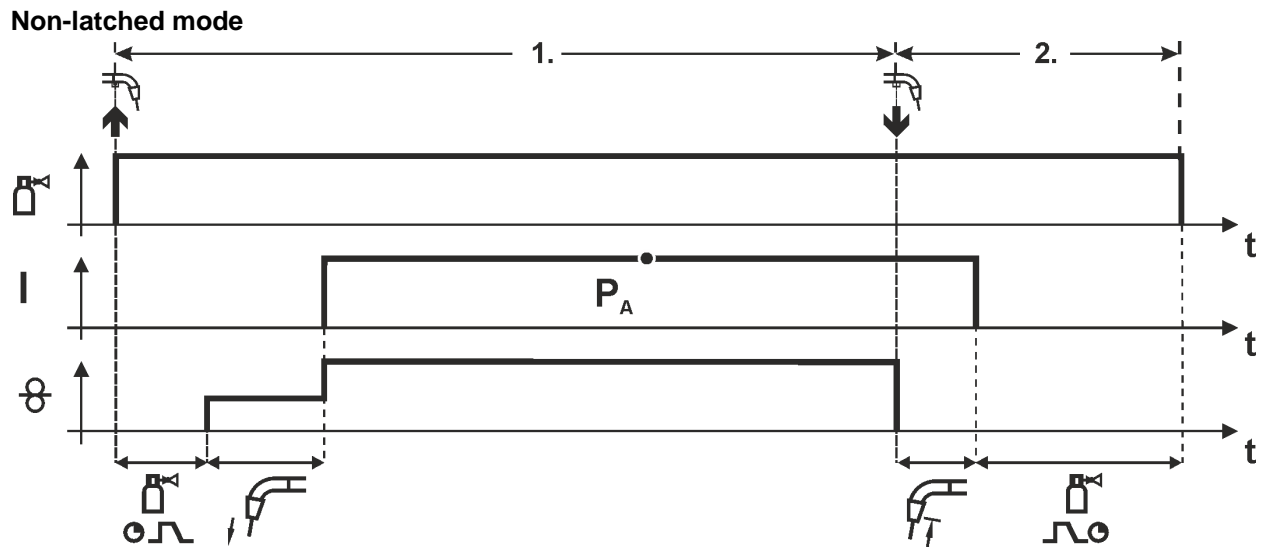**Special latched with changing welding method (process switching)**
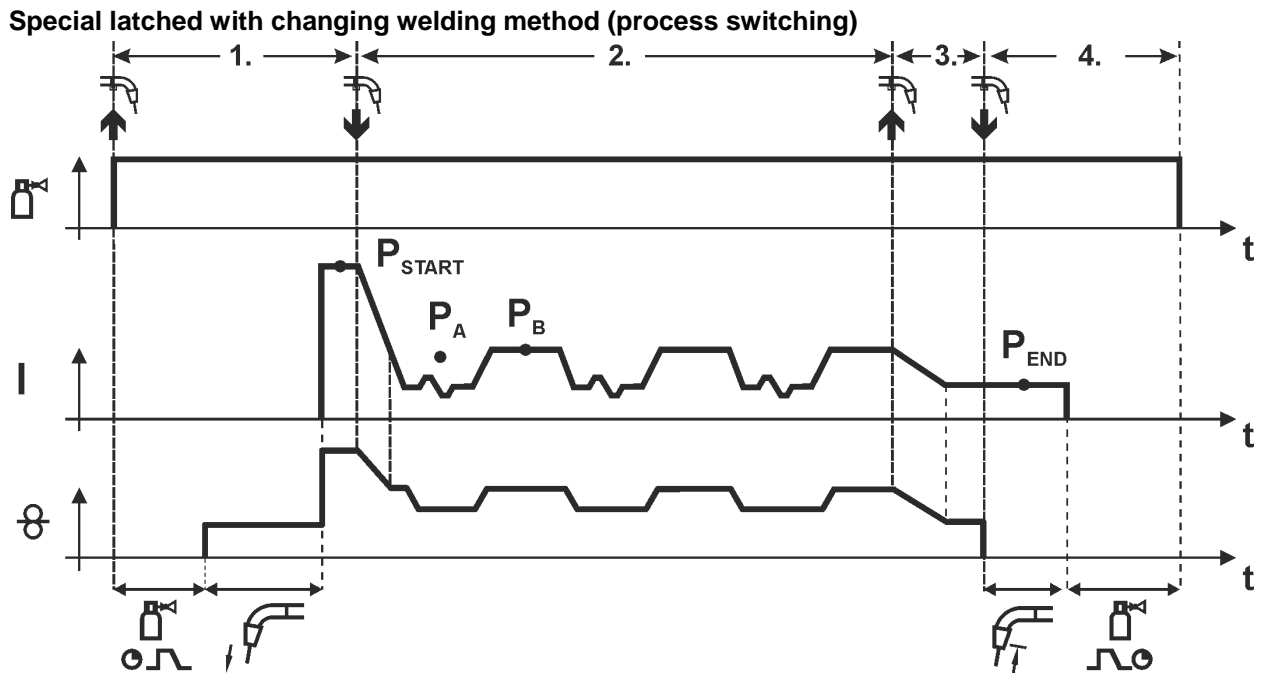
Figure 5-41

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} for the time t_{start})

2nd cycle
- Release torch trigger
- Slope on main program P_A
- Start the process alternation starting with process P_A:
  The welding processes alternate between the process P_A stored in the JOB and the opposite process P_B at the specified times (t_2 and t_3)

If a standard process is stored in the JOB, this means that there is a permanent alternation between the processes, starting with the standard process and followed by the pulse process. The same applies if the situation is reversed.

3rd cycle
- Press the torch trigger
- Super pulse function is ended
- Slope in the end program P_{END} for the time t_{end}

4th cycle
- Release torch trigger
- WF motor stops
- Arc is extinguished after the pre-selected wire burn-back time elapses
- Gas post-flow time elapses

To activate or set the function > see 5.4.15 chapter.

For machine versions with pulsed arc welding procedures only.

This function can be activated using the PC300.NET software.

Refer to the software operating instructions.
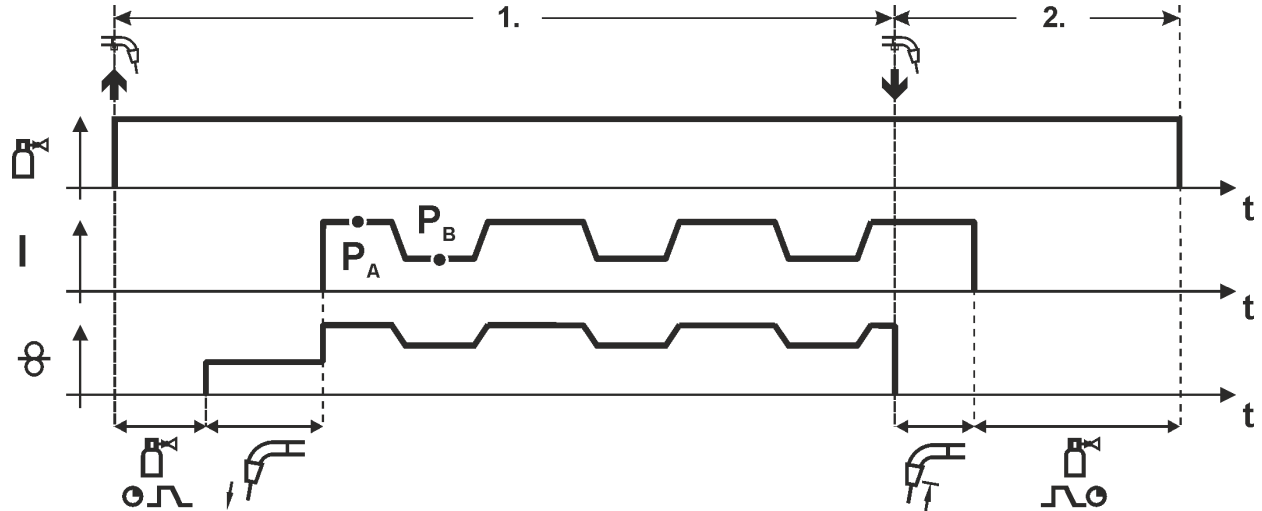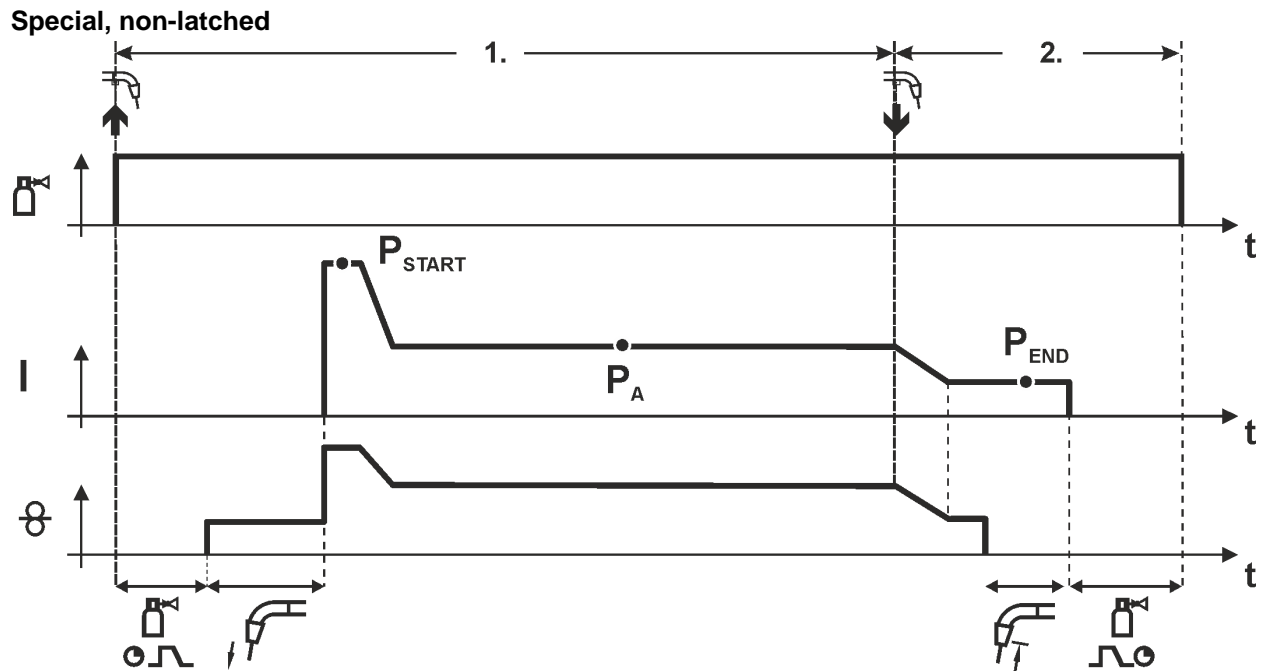
Special, latched with superpulse
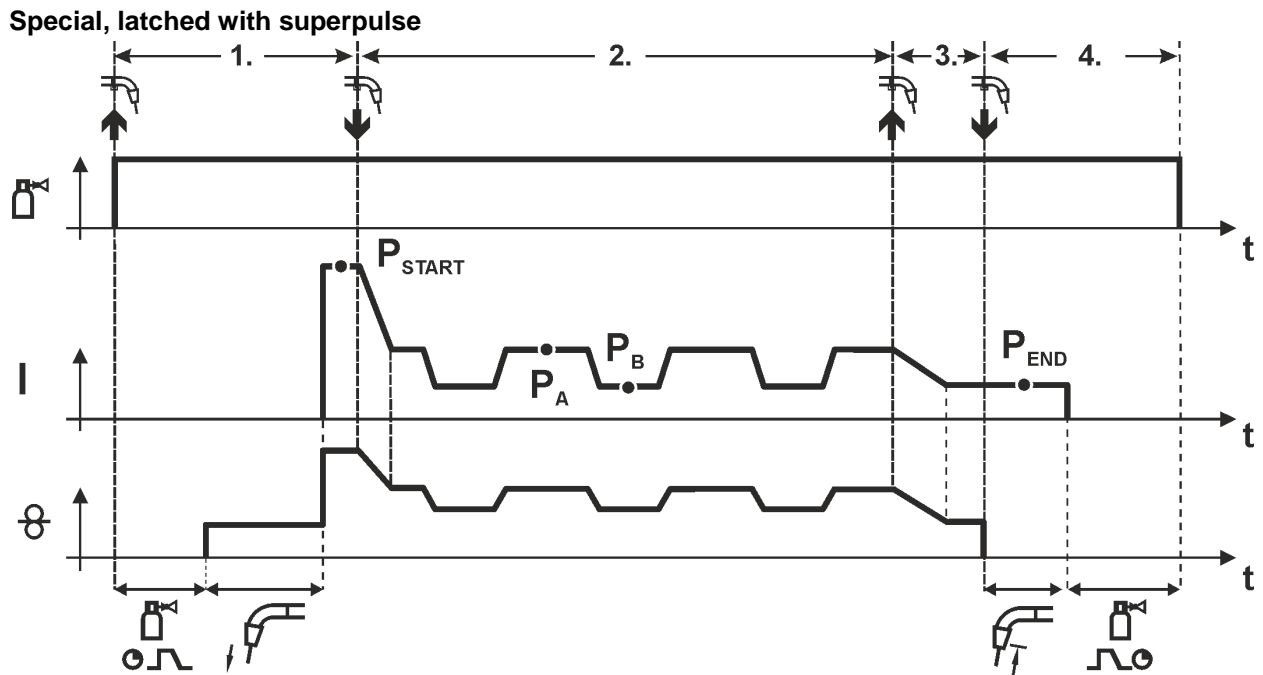
Figure 5-42

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}).

Step 2

- Release torch trigger
- Slope on main program P_A.
- Start the super pulse function beginning with main program P_A:
  The welding parameters change at the specified times between main program P_A and the reduced main program P_B.

Step 3

- Press the torch trigger.
- Super pulse function is ended.
- Slope in the end program P_{END} for the time t_{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.

5.4.11 MIG/MAG program sequence ("Program steps" mode)

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.
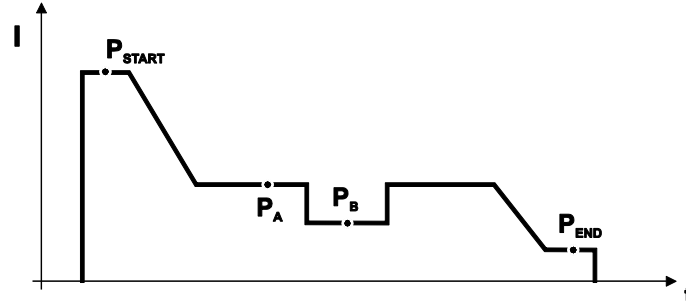
Figure 5-43

In every JOB, separate settings can be made for the ignition program, reduced main program and end program as to whether or not to alternate with the pulse process.

These properties are stored on the welding machine with the JOB. This means that in the factory settings, the pulse process is active during the end program in all forceArc JOBs.

To activate or set the function > *see 5.4.15 chapter*.

5.4.11.1 Selection of the program sequence parameter
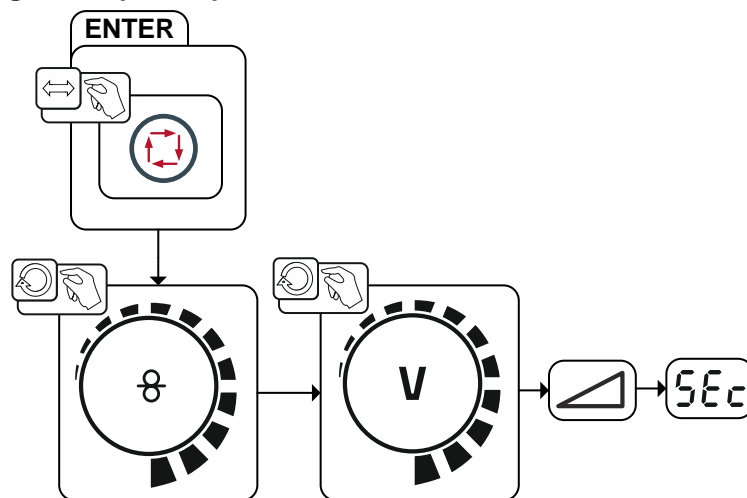
Figure 5-44

5.4.11.2 MIG/MAG overview of parameters

P_{START}, P_B, and P_{END} are set as relative programs ex faxtory. They relate to percentages of the wire feed value of the main program P_A. These programs can also be set in an absolute manner, if desired (see Setting of special parameter P21).
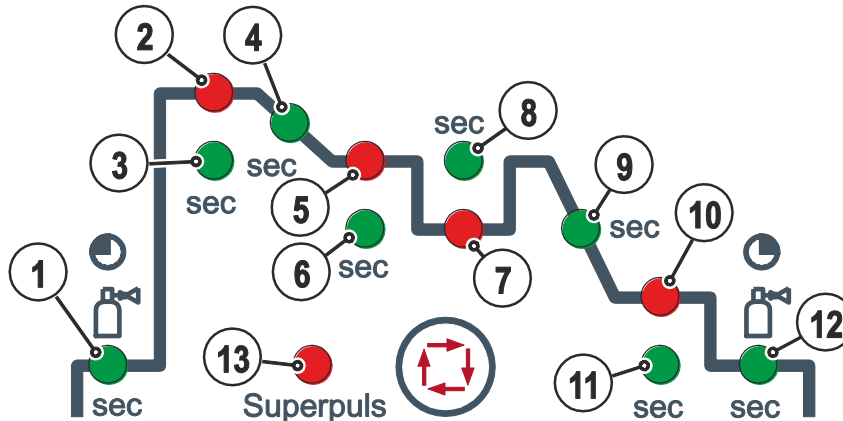
Figure 5-45

Basic Parameters

Item	Meaning / Explanation	Setting Range
1	Gas pre-flow time	0.0s to 20.0s
2	P_{START}: Wire speed, relative Arc length correction	1% to 200% -9.9V to +9.9V
3	Duration	0.0s to 20.0s
4	Slope duration from P_{START} to P_A	0.0s to 20.0s
5	P_A: Wire speed, absolute	0.5 m/min to 25 m/min
6	Duration (spot time and superpulse)	0.01s to 20.0s
7	P_B: Wire speed, relative Arc length correction, relative	1% to 200% -9.9V to +9.9V
8	Duration	0.01s to 20.0s
9	Slope duration from P_A to P_{END}	0.0s to 20s
10	P_{END}: Wire speed, relative Arc length correction	1% to 200% -9.9V to +9.9V
11	Duration (superpulse)	0.0s to 20s
12	Gas post-flow time	0.0s to 20s
13	superPuls	On / Off

5.4.11.3 Example, tack welding (non-latched)
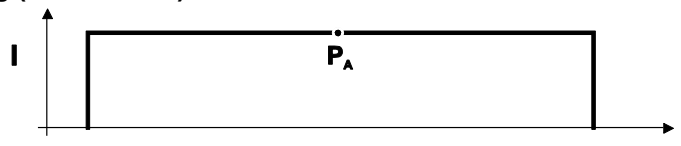
Figure 5-46

Basic parameters

Parameter	Meaning / explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 20.0s
GASend:	Gas post-flow time	0.0s to 20s
RUECK	Wire burn-back length	2 to 500

"P_A" main program

Parameter	Meaning / explanation	Setting range
	Setting the wire speed	

5.4.11.4 Example, aluminium tack welding (non-latched special)
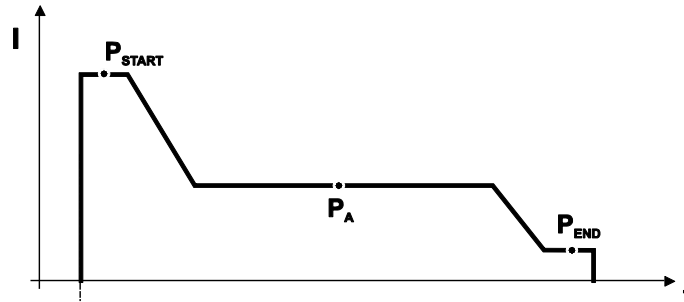
Figure 5-47

Basic parameters

Welding parameter	Meaning / explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 20.0s
GASend:	Gas post-flow time	0.0s to 20.0s
RUECK	Wire burn-back length	2 to 500

"P$_{START}$" start program

Welding parameter	Meaning / explanation	Setting range
DVstart	Wire speed	0% to 200%
Ustart	Arc length correction	-9.9V to +9.9V
tstart	Duration	0.0s to 20s

"P$_A$" main program

Welding parameter	Meaning / explanation	Setting range
	Setting the wire speed	

"P$_{END}$" end-crater program

Welding parameter	Meaning / explanation	Setting range
DVend	Wire speed	0% to 200%
Uend	Arc length correction	-9.9V to +9.9V
tend	Duration	0.0s to 20s

5.4.11.5 Example, aluminium welding (latched special)
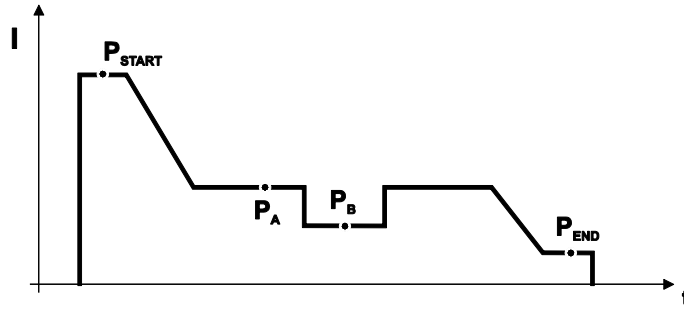
Figure 5-48

Basic parameters

Welding parameter	Meaning / explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 20.0s
GASend:	Gas post-flow time	0.0s to 20.0s
RUECK	Wire burn-back length	2 to 500

"P_{START}" start program

Welding parameter	Meaning / explanation	Setting range
DVstart	Wire speed	0% to 200%
ustart	Arc length correction	-9.9V to +9.9V
tstart	Duration	0.0s to 20s

"P_A" main program

Welding parameter	Meaning / explanation	Setting range
	Setting the wire speed	

"P_B" reduced main program

Welding parameter	Meaning / explanation	Setting range
DV3	Wire speed	0% to 200%
U3	Arc length correction	-9.9V to +9.9V

"P_{END}" end-crater program

Welding parameter	Meaning / explanation	Setting range
tSend	Slope duration from P_A or P_B to P_{END}	0.0s to 20s
DVend	Wire speed	0% to 200%
Uend	Arc length correction	-9.9V to +9.9V
tend	Duration	0.0s to 20s

5.4.11.6 Example, visible seams (latched super pulse)
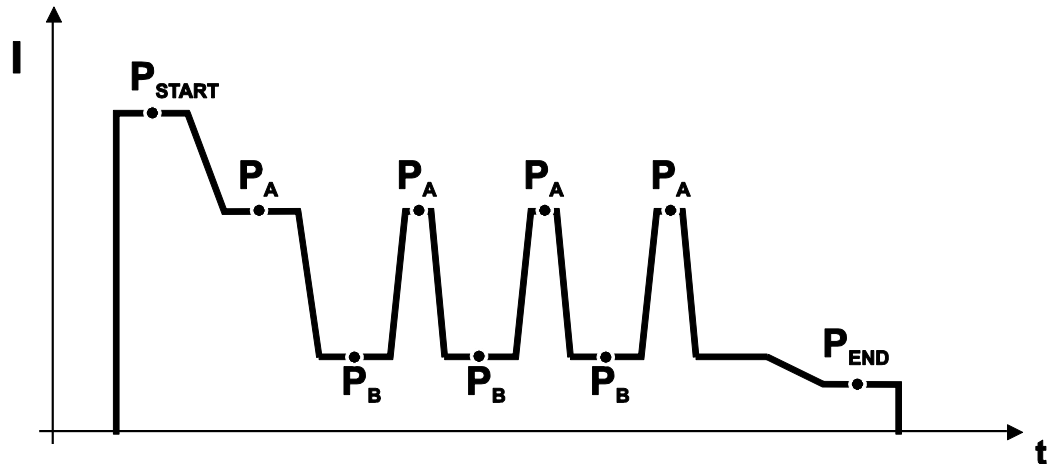
Figure 5-49

Basic parameters

Welding parameter	Meaning / explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 20.0s
GASend:	Gas post-flow time	0.0s to 20.0s
RUECK	Wire burn-back length	2 to 500

"P$_{START}$" start program

Welding parameter	Meaning / explanation	Setting range
DVstart	Wire speed	0% to 200%
ustart	Arc length correction	-9.9V to +9.9V
tstart	Duration	0.0s to 20s

"P$_A$" main program

Welding parameter	Meaning / explanation	Setting range
tS1	Slope duration from P$_{START}$ to P$_A$	0.0s to 20s
DV3	Setting the wire speed	0% to 200%
t2	Duration	0.1s to 20s
tS3	Slope duration from P$_B$ to P$_A$	0.0s to 20s

"P$_B$" reduced main program

Welding parameter	Meaning / explanation	Setting range
tS2	Slope duration from P$_A$ to P$_B$	0.0s to 20s
DV3	Wire speed	0% to 200%
U3	Arc length correction	-9.9V to +9.9V
t3	Duration	0.1s to 20s

"P$_{END}$" end-crater program

Welding parameter	Meaning / explanation	Setting range
tSend	Slope duration from P$_A$ or P$_B$ to P$_{END}$	0.0s to 20s
DVend	Wire speed	0% to 200%
Uend	Arc length correction	-9.9V to +9.9V
tend	Duration	0.0s to 20s

5.4.12 Main program A mode

Different welding tasks or positions on a workpiece demand various welding performances (operating points) or welding programs. The following parameters are stored in each of the up to 16 programs:

- Operating mode
- Welding type
- superPuls (ON/OFF)
- Wire feed speed (DV2)
- Voltage correction (U2)
- Dynamics (DYN2)

The user can change the main program welding parameters using the following components.

	Program switching	JOB switching	Program	Operating mode	Welding process	superPuls	Wire speed	Voltage correction	Dynamics
M3.7x Wire feeder control	Yes	Yes	**P0**	Yes			Yes	Yes	
			P1...15				Yes		
R20 Remote control	Yes	No	**P0**	No			Yes		No
			P1...9				Yes [1]		
R40 Remote control	Yes	No	**P0**	No	Yes		Yes		No
							No		
R50 Remote control	Yes	No	**P0**	Yes			Yes		
			P1...15						
PC 300.NET Software	No	No	**P0**	Yes			No		
			P1...15	Yes					
Up/Down Welding torch	Yes	No	**P0**	No			Yes	No	
			P1...9				No		
2 Up/Down Welding torch	Yes	No	**P0**	No			Yes		No
			P1...15				No		
PC 1 Welding torch	Yes	No	**P0**	No			Yes	No	
			P1...15				No		
PC 2 Welding torch	Yes	Yes	**P0**	No			Yes		No
			P1...15				No		

1) in case of correction mode, refer to Special parameters "P7 – correction mode, limit value setting"

Example 1: Welding workpieces with different sheet metal thicknesses (non-latched)
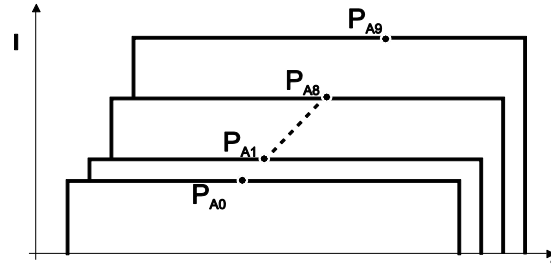
Figure 5-50

Example 2: Welding different positions on a workpiece (latched)
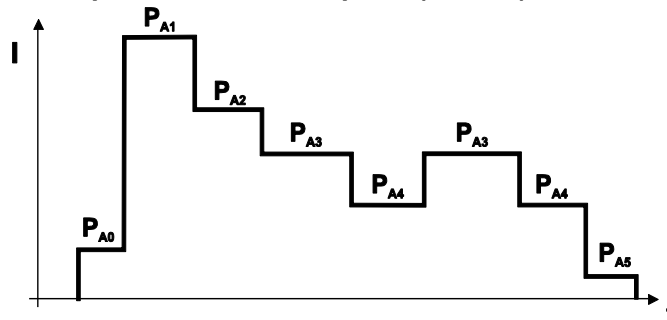
Figure 5-51

Example 3: Aluminium welding of different sheet metal thicknesses (non-latched or latched special)
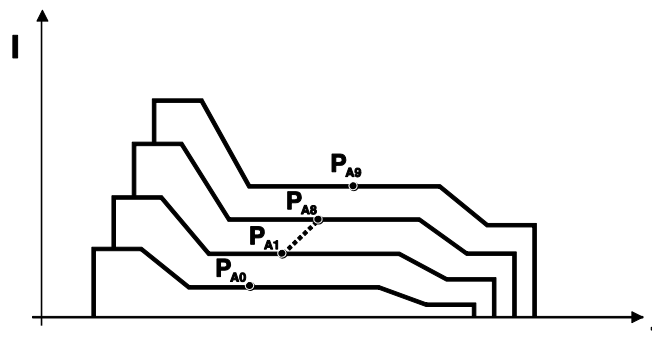
Figure 5-52

Up to 16 programs (P_{A0} to P_{A15}) can be defined.

An operating point (wire speed, arc length correction, dynamics/choke effect) can be defined permanently in each program.

Program P0 is an exception: the settings for operating points are made manually here.

Changes to the welding parameters are saved immediately!

5.4.12.1 Selecting parameters (program A)

Changes to the welding parameters can only be made when the key switch is in position "1".
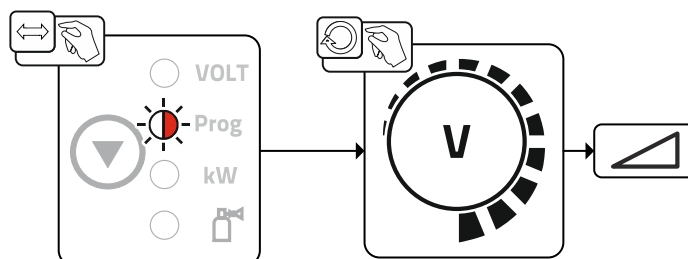
Figure 5-53

Select program number.

5.4.13 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

Other functions are also possible by tapping the torch trigger, depending on the machine type and control configuration > *see 5.10 chapter*:

• Change over between welding programs (P8).
• Program selection before starting welding (P17).
• Change over between pulse and standard welding in the special latched operating mode.
• Switching between wire feed units in dual operation mode (P10).

5.4.14 MIG/MAG special-torches

Function specifications and more indepth information can be found in the operating manual for the relevant welding torch!

5.4.14.1 Program and up/down operation
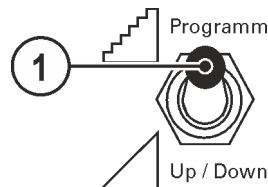
Figure 5-54

Item	Symbol	Description
1	(switch symbol)	**Welding torch function changeover switch (special welding torch required)** ◢▰▰▰___ Changing over programs or JOBs ◢▰▰▰___ Infinite adjustment of welding performance.

5.4.14.2 Switching between Push/Pull and intermediate drive

> ### ⚠ WARNING
>
> ⚡ **Do not carry out any unauthorised repairs or modifications!**
> **To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!**
> **The warranty becomes null and void in the event of unauthorised interference.**
> • Appoint only skilled persons for repair work (trained service personnel)!
>
> ⚡ **Dangers resulting from failure to perform test after conversion!**
> **Before reconnection, "Inspection and Testing during Operation" according to IEC/BS EN 60974-4 "Arc welding systems – Inspection and Testing during Operation" has to be performed!**
> • Perform test to IEC / DIN EN 60974-4!

The plugs are located directly on the M3.7X printed circuit board.

Plug	Function
on X24	Operation with Push/Pull welding torch (factory setting)
on X23	Operation with intermediate drive

5.4.15 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.

5.4.15.1 Selection
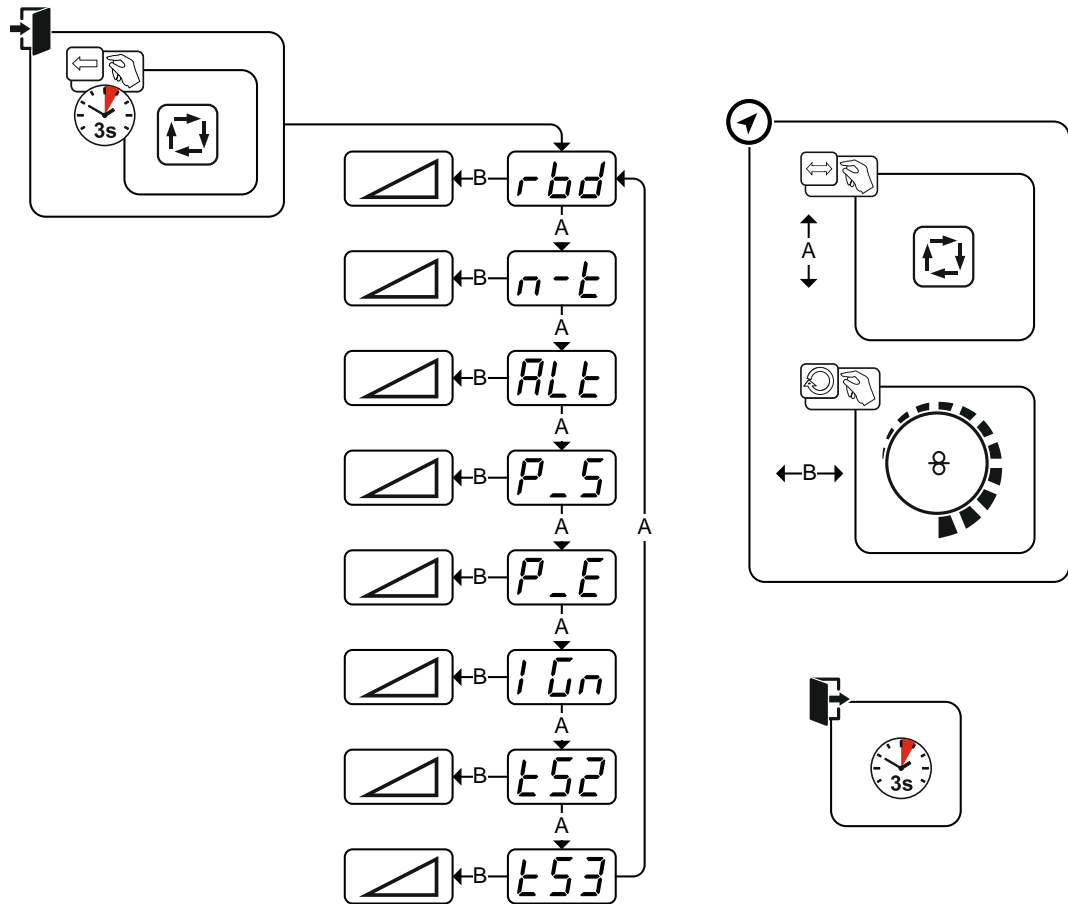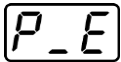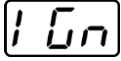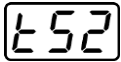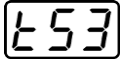
Figure 5-55

Display	Setting/selection
rbd	**Burn-back time > *see 5.4.15.2 chapter*** • ----------Increase value > increase wire burn-back • ----------Decrease value > decrease wire burn-back
n-t	**Setting JOB-dependent program limit/n-cycle > *see 5.4.15.3 chapter*** 1 ----------No JOB-dependent program limit 2–9 -------JOB-dependent program limit for max. selectable programs.
▼	***For machine versions with pulsed arc welding procedures only.***
ALt	**Change welding process (process switching)** With this function activated the welding process switches from standard arc welding to pulse arc welding. Switching is effected by either tapping the torch trigger (special latched) or by activating the superPuls function (switch between program P_A and P_B). on -------Function activated. oFF-------Function deactivated.
P_S	**Pulse arc welding process (program P_{START})** The pulse arc welding process can be activated in the start program (P_{START}) with the special non-latched and special latched operating modes. on -------Function activated. oFF-------Function deactivated.

Display	Setting/selection
P_E	**Pulse arc welding process (program P$_{END}$)** The pulse arc welding process can be activated in the end program (P$_{END}$) with the special non-latched and special latched operating modes.
	on ------- Function activated.
	oFF ------ Function deactivated.
▲	***For machine versions with pulsed arc welding procedures only.***
$I\ Gn$	**Ignition type (MIG/MAG)** Application: Low-spatter ignition, e.g. for aluminium and chrome/nickel materials.
	0 = ------- Traditional arc ignition
	1 = ------- Arc ignition with wire return for push/pull applications
	2 = ------- Arc ignition with wire return for non-push/pull applications
$t52$	**Slope time (main current to secondary current)**
$t53$	**Slope time (main current to secondary current)**

5.4.15.2 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

5.4.15.3 Programme limit

The JOB-dependent program limit allows you to limit the number of programs that can be selected in the selected JOB to (2...9). This option can be set individually per JOB. In addition, a legacy option to set a "global program limit" is also available. To set this option use special parameter P4. This setting is then applied to all JOBs for which no JOB-dependent program limit has been set (see the special parameters description).

You can also use the "Special latched (n-cycle)" operating mode if special parameter 8 is set to 2. In this case (JOB-dependent program switching activated, special parameter 8 = 2, special latched) you can switch to the next program by tapping the torch trigger in the main program (see the special parameters description).

5.5 TIG welding

5.5.1 Welding torch connection

TIG welding torches to be connected to a Euro torch connector are available in two versions:

- **TIG combi welding torches are connected to the Euro torch connector of the wire feeder and to the (-) welding current plug of the power source.**
- **TIG welding torches of the EZA version are connected to the Euro torch connector of the wire feeder only. To do so, the welding current lead of the intermediate hose package must be connected to the (-) welding current connection at the rear of the unit!**
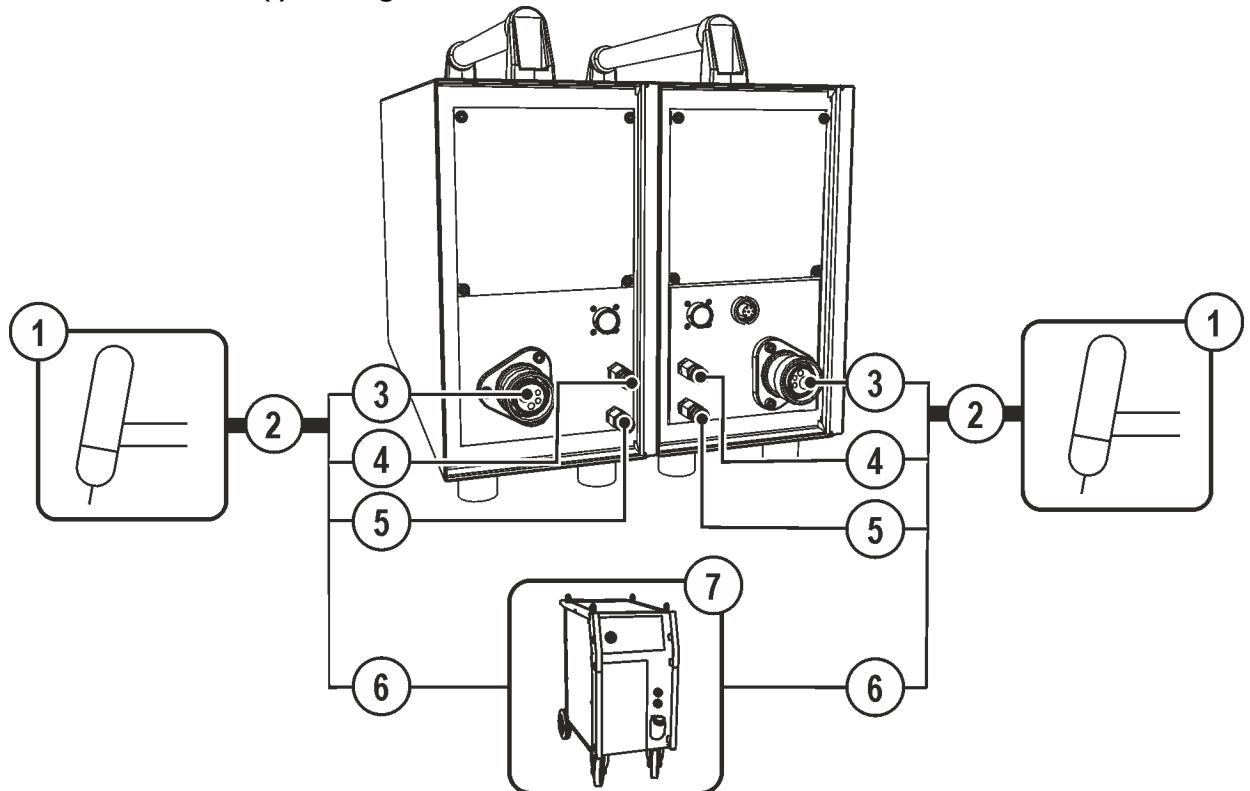
Figure 5-56

Item	Symbol	Description
1		**Welding torch**
2		**Welding torch hose package**
3		**Welding torch connection (Euro or Dinse torch connector)** Welding current, shielding gas and torch trigger integrated
4		**Quick connect coupling (red)** Coolant return from welding torch
5		**Quick connect coupling (blue)** Coolant forward flow to the welding torch
6		**"-" welding current connection socket**

Item	Symbol	Description	
		• TIG welding:	Welding current connection for welding torch
7		**Power source**	

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Insert the welding current plug of the combi welding torch into the (-) welding current connection socket and lock into place by turning to the right (only in case of a separate welding current connection).
- Lock connecting nipples of the cooling water tubes into the corresponding quick connect couplings:
  Return line red to quick connect coupling, red (coolant return) and
  supply line blue to quick connect coupling, blue (coolant supply).

5.5.2 Welding task selection
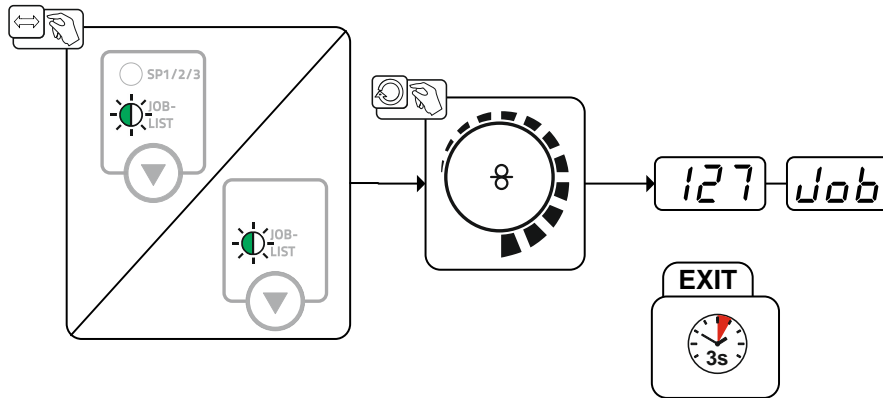
Figure 5-57

5.5.2.1 Welding current setting
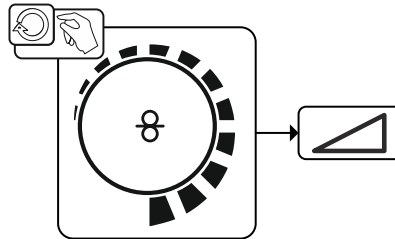
Figure 5-58

5.5.3 TIG arc ignition

5.5.3.1 Liftarc
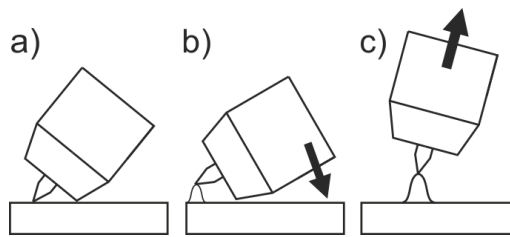
Figure 5-59

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.

5.5.4 Operating modes (functional sequences)

5.5.4.1 Explanation of signs and functions

Symbol	Meaning
	Press torch trigger
	Release torch trigger
	Tap torch trigger (press briefly and release)
	Shielding gas flowing
I	Welding output
	Gas pre-flows
	Gas post-flows
	Non-latched
	Special, non-latched
	Latched
	Special, latched
t	Time
P_{START}	Ignition program
P_A	Main program
P_B	Reduced main program
P_{END}	End program
tS1	Slope duration from PSTART to PA

5.5.4.2 Automatic cut-out

The welding machine ends the ignition process or the welding process with an

- **ignition fault (no welding current flows within 5 s after the start signal)**
- **arc interruption (arc is intrerrupted for longer than 5 s)**
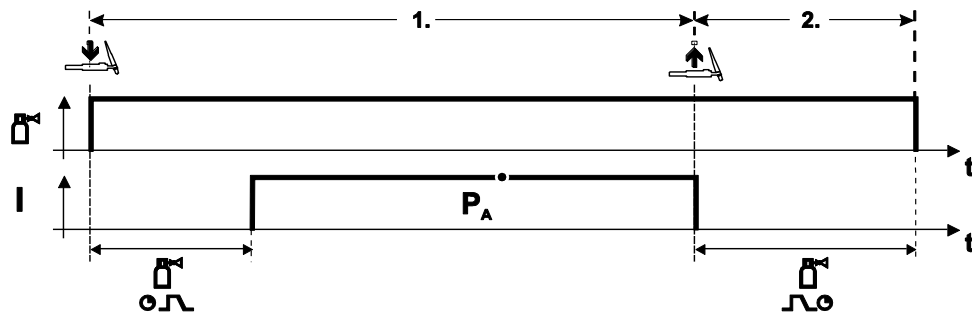
Non-latched mode

Figure 5-60

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.

Special, non-latched
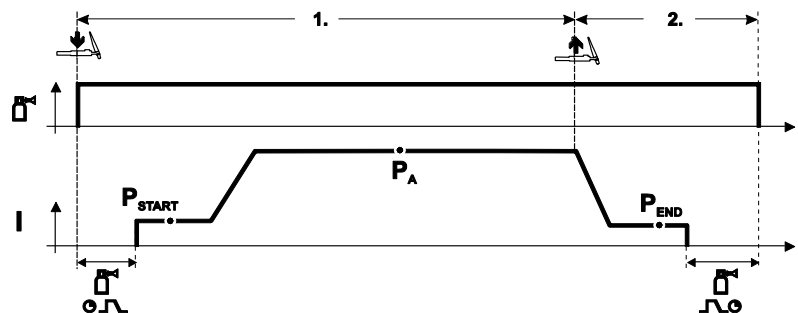
Figure 5-61

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" ignition 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.
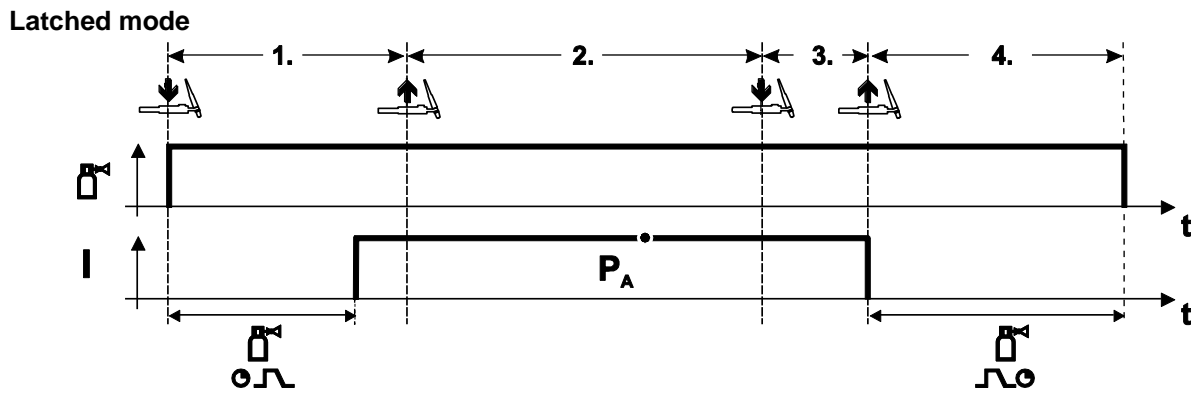
Latched mode

Figure 5-62

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.
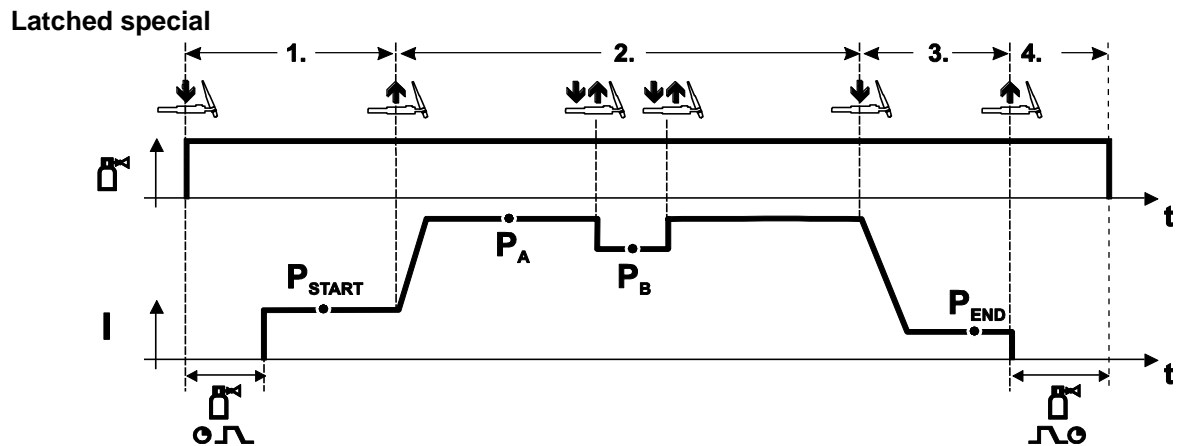
Latched special

Figure 5-63

Selection

• Select 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 at pre-selected setting in start program "P_{START}".

Step 2

• Release torch trigger.
• Slope on main program "P_A".

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.

Tapping can be used to switch to the reduced main program "P_B". Repeated tapping will switch back to the main program "P_A".

Step 3

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

Step 4

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

5.5.5 TIG program sequence ("Program steps" mode)
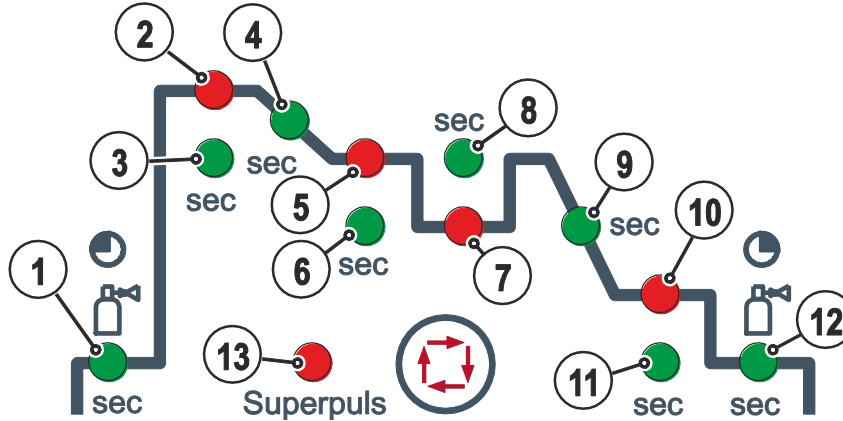
Figure 5-64

Basic parameters

Item	Meaning/explanation	Setting range
1	Gas pre-flow time	0 s to 0.9 s
2	P_{START} Ignition current	0% to 200%
3	Duration (start program)	0 s to 20 s
4	Slope duration from P_{START} to P_A	0 s to 20 s
5	P_A (main program) Welding current, absolute	5 A to 550 A
6	Duration (P_A)	0.01 s to 20.0 s
7	P_B (reduced main program) Welding current	1% to 100%
8	Duration (reduced main program)	0.01 s to 20.0 s
9	Slope duration from P_A to P_{END}	0 s to 20 s
10	P_{END} (end program) Welding current	1% to 100%
11	Duration (end program)	0 s to 20 s
12	Gas post-flow time	0 s to 20 s
13	superPuls	on/off

P_{START}, P_B, and P_{END} are relative programs whose welding current settings are a percentage based on the general welding current setting.

5.6 MMA welding

5.6.1 Welding task selection
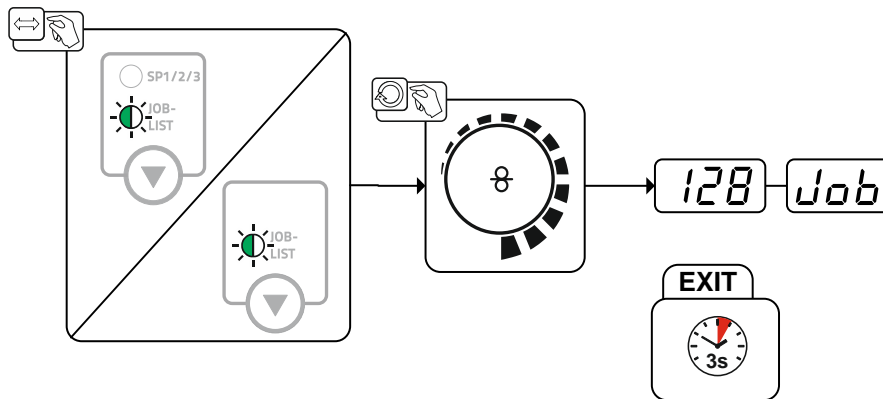
Figure 5-65

5.6.1.1 Welding current setting
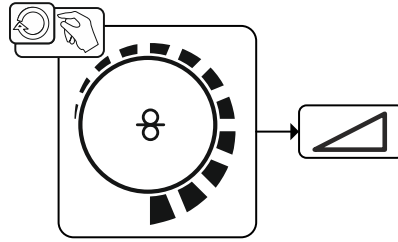
Figure 5-66

5.6.2 Arcforce
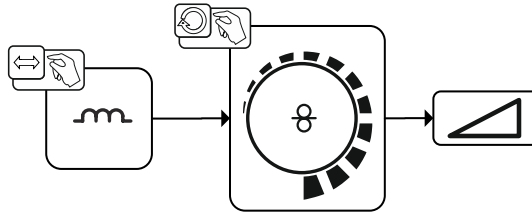
Figure 5-67

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

5.6.3 Hotstart

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

For parameter setting, *> see 5.4.15 chapter*.

A = Hot start current
B = Hot start time
C = Main current
I =   Current
t =   Time
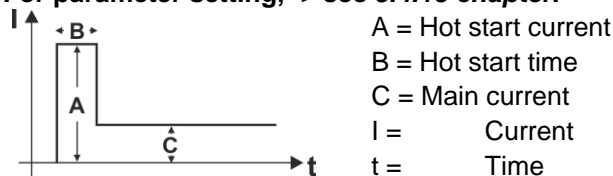
Figure 5-68

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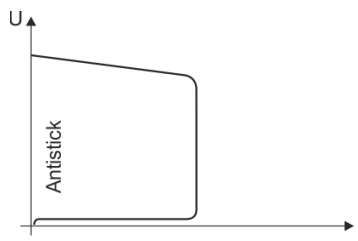
The Antistick feature prevents the electrode from annealing.
Should the electrode stick despite the Arcforce feature, the machine automatically switches to the minimum current within approx. one second. This prevents the electrode from annealing. Check the welding current setting and correct for the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

Figure 5-69

5.6.5 Parameter overview
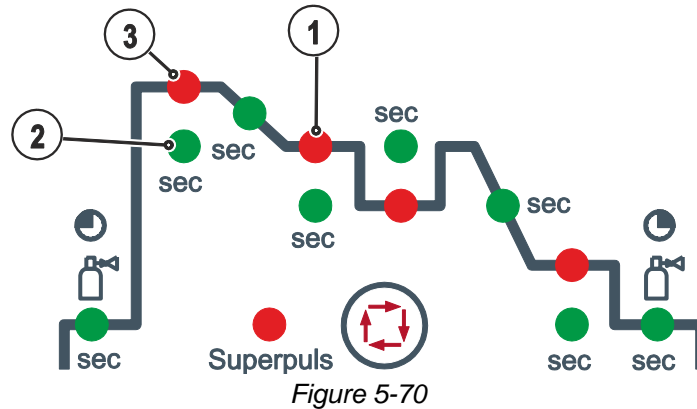
Figure 5-70

Basic parameters

Item	Meaning/explanation	Setting range
1	Welding current	5 A to maximum welding current
2	Hotstart time	0 to 20 s
3	Hotstart current	0 to 200 %

The hotstart current is a percentage based on the welding current selected.

5.7 Remote control

The remote controls are operated via the 19-pole remote control connection socket (analogue) or the 7-pole remote control connection socket (digital), depending on the model.

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

5.8 Interfaces for automation

> ⚠ **WARNING**
>
> **Do not carry out any unauthorised repairs or modifications!**
> **To avoid injury and equipment damage, the unit must only be repaired or modified by specialist, skilled persons!**
> **The warranty becomes null and void in the event of unauthorised interference.**
> • Appoint only skilled persons for repair work (trained service personnel)!

☞ *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.*

5.8.1 Remote control connection socket, 19-pole
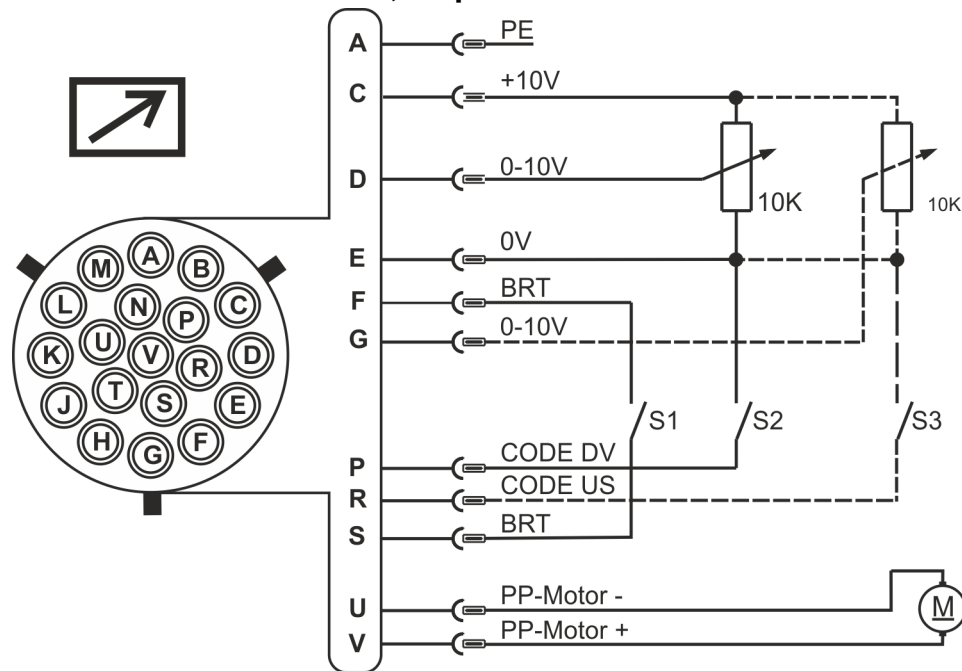
Figure 5-71

Pin	Signal form	Short description
A	Output	Connection for PE cable screen
C	Output	Reference voltage for potentiometer 10 V (max. 10 mA)
D	Input	Control voltage specification (0 V–10 V) – wire feed speed
E	Output	Reference potential (0 V)
F/S	Input	Welding power start/stop (S1)
G	Input	Control voltage specification (0 V–10 V) – arc length correction
P	Input	Activation of control voltage specification for wire feed speed (S2) For activation, put signal to reference potential 0 V (pin E)
R	Input	Activation of control voltage specification for arc length correction (S3) For activation, put signal to reference potential 0 V (pin E)
U/V	Output	Supply voltage push/pull welding torch

5.9 Access control

To protect against unauthorised or unintentional adjustment of the welding parameters on the machine, the control input can be locked with the aid of a key switch.

In key switch position 1 all functions and parameters can be set without restriction.

In key switch position 0 the following functions and parameters cannot be changed:

• No adjustment of the operating point (welding performance) in programs 1–15.
• No change of welding or operating mode in programs 1–15.
• The welding parameters can be displayed but not changed in the control's function sequence.
• No welding task switching (JOB block operation P16 possible).
• No change of special parameters (except P10). Restart required.

5.10 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 5.10.2 chapter*.

5.10.1 Selecting, changing and saving parameters
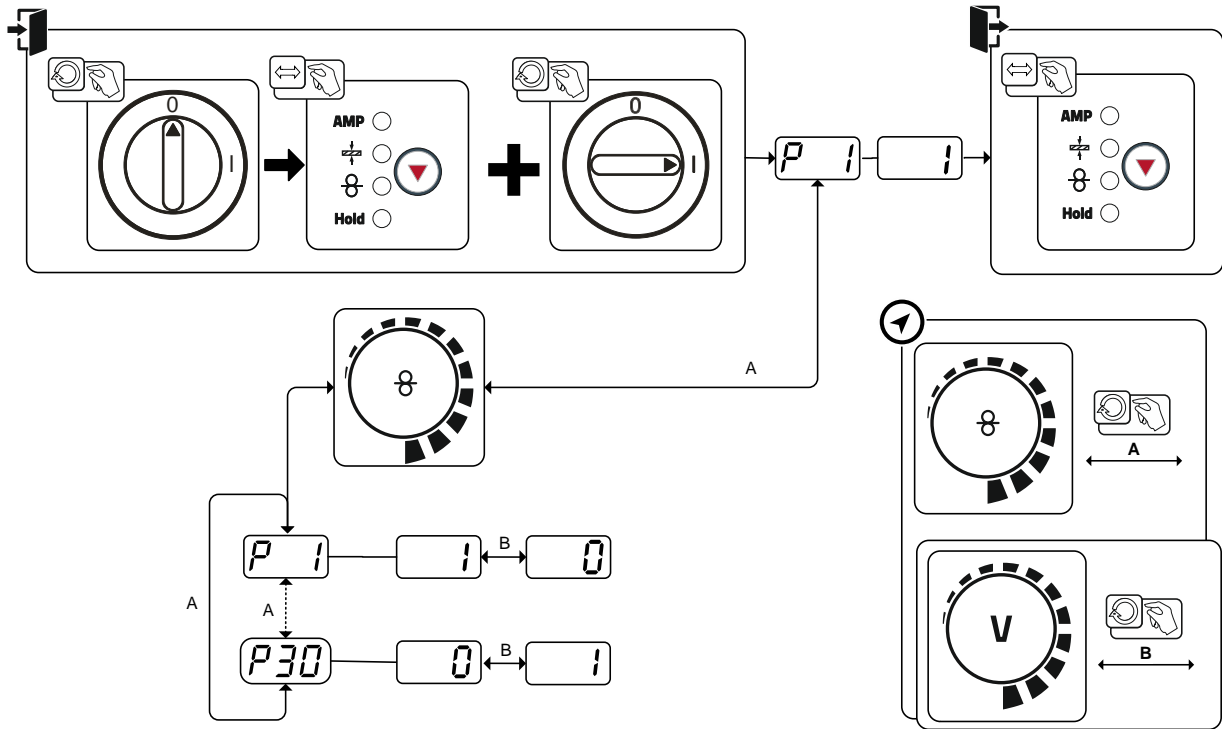
Figure 5-72

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 2	**Block program "0"** 0 = ------- P0 enabled (Ex works) 1 = ------- P0 blocked
P 3	**Display mode for Up/Down welding torch with one-digit 7-segment display (two keys)** 0 = ------- normal display (ex works) program number/welding power (0–9) 1 = ------- display toggles between program number/welding type
P 4	**Program limitation** Programs 1 to max. 15 Ex works: 15
P 5	**Special cycle in the special latched and non-latched operating modes** 0 = ------- normal (previous) non-latched/latched (Ex works) 1 = ------- WF3 cycle for non-latched/latched
P 6	**Enable special jobs SP1 to SP3** 0 = ------- no enabling (Ex works) 1 = ------- enabling of Sp1-3
P 7	**Correction operation, threshold value setting** 0 = ------- correction operation switched off (Ex works) 1 = ------- correction operation on "Main program (PA)" flashing
P 8	**Program changeover with standard torch** 0 = ------- no program changeover (Ex works) 1 = ------- special latched 2 = ------- specific latched special (n cycle active)

Display	Setting/selection
P 9	**Lat. and sp. lat. tapping start**
	0 = --------no latched tapping start (Ex works)
	1 = --------latched tapping start possible
P 10	**One or two-wire feed operation**
	0 = --------single operation (Ex works)
	1 = --------dual operation, this unit is the "master"
	2 = --------dual operation, this unit is the "slave"
P 11	**Special latched tapping time**
	0 = tapping function switched off
	1 = 300ms (Ex works)
	2 = 600ms
P 12	**JOB list changeover**
	0 = --------task-oriented JOB list
	1 = --------actual JOB list (Ex works)
	2 = --------actual JOB list, JOB changeover activated via accessories
P 13	**Lower limit remote JOB switching**
	JOB range of the function torches (MT PC2, PM 2U/D, PM RD2)
	Lower limit: 129 (ex works)
P 14	**Upper limit remote JOB switching**
	JOB-Barea of the functional torch (MT PC2, PM 2U/D, PM RD2)
	Upper limit: 169 (ex works)
P 15	**HOLD function**
	0 = --------HOLD values are not displayed
	1 = --------HOLD values are displayed (Ex works)
P 16	**Block JOB mode**
	0 = --------Block JOB mode not enabled (Ex works)
	1 = --------Block JOB mode enabled
P 17	**Program selection with standard torch trigger**
	0 = --------no program selection (Ex works)
	1 = --------program selection possible
P 18	**Switching the operating mode and welding type using the wire feed control**
	0 = --------Switching the operating mode and welding type using the wire feed control and program 0 (factory setting).
	1 = --------Switching the operating mode and welding type using the wire feed control and programs 0-15.
P 19	**Mean value display for superPuls**
	0 = --------Function switched off.
	1 = --------Function switched on (ex factory).
P 20	**Predefined pulse arc welding process in the PA program**
	0 = --------Predefined pulse arc welding process in the PA program is disabled.
	1 = --------If the superPuls and welding process switching functions are available and activated, the pulse arc welding process is always executed in the main program PA (ex factory).
P 21	**Predefined absolute value for relative programs**
	Start program (P_{START}), down-slope program (P_B) and end program (P_{END}) can be set relative to the main program (P_A) or in an absolute manner, as desired.
	0 = --------Relative parameter setting (ex factory)
	1 = --------Absolute parameter setting
P 22	**Electronic gas flow control, type**
	1 = --------type A (ex works)
	0 = --------type B

Display	Setting/selection
$P23$	**Program settings for relative programs**
	0 = ------- Combined setting of relative programs possible (ex works).
	1 = ------- Individual setting of relative programs possible (ex works).
$P24$	**Correction or nominal voltage display**
	0 = ------- Correction voltage display (ex works).
	1 = ------- Absolute nominal voltage display.
$P25$	**JOB-Selection with Expert operating mode > *see 5.10.3.22 chapter***
	0 = ------- SP1-SP3 Switching on the wire feeder if the machine has an expert control (ex works)
	1 = ------- JOB selection of wire feeder possible
$P26$	**Nominal value of wire spool heater (OW WHS) > *see 5.10.3.23 chapter***
	off = switched off
	Temperature setting range: 25°C - 50°C (45°C ex works)
$P27$	**Operating mode switching at welding start > *see 5.10.3.24 chapter***
	0 = ------- Not enabled (ex works)
	1 = ------- Enabled
$P28$	**Error threshold of electronic gas flow control > *see 5.10.3.25 chapter***
	Error output in case of gas nominal value deviation
$P29$	**Unit system > *see 5.10.3.26 chapter***
	0 = ------- metric system (ex works)
	1 = ------- Imperial system
$P30$	**Selection option for program sequence with rotary knob > *see 5.10.3.27 chapter***
	0 = ------- Not enabled
	1 = ------- Enabled (ex works)

5.10.2 Reset to factory settings

All special parameters saved by the user will be overwritten by the factory settings!

Figure 5-73

5.10.3 Special parameters in detail

5.10.3.1 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.

5.10.3.2 Program "0", releasing the program block (P2)

The program P0 (manual setting) is blocked. Only operation with P1-P15 is possible, irrespective of the key switch position.

5.10.3.3 Display mode for Up/Down welding torch with one-digit 7-segment display (P3)

Normal display:
- Program mode: Program number
- Up/down operation: Welding power (0=minimum current/9=maximum current)

Toggling display:
- Program mode: Program number and welding procedure (P=pulse/n=not pulse) are toggled
- Up/down operation: Welding power (0=minimum current/9=maximum current) and symbol for up/down operation are toggled

5.10.3.4 Program limit (P4)

Program selection can be limited with the special parameter P4.
- The setting is adopted for all JOBs.
- Program selection depends on the position of the "welding torch function" changeover switch > *see 4.3 chapter*.

Programs can only be switched when the changeover switch is in the "program" position.
- Programs can be switched by means of a connected remote control or special welding torch.
- If a special welding torch or a remote control is not connected, it is only possible to switch programs by means of the "arc length correction/select welding program" rotary dial > *see 4.4 chapter*.

5.10.3.5 Special cycle in the operating modes special latched and non-latched (P5)

With the special sequence activated, the start of the welding process changes as follows:

Sequence for special non-latched mode/special latched mode:
- Start program "P_{START}"
- Main program "P_A"

Sequence for special non-latched mode/special latched mode with custom sequence activated:
- Start program "P_{START}"
- Reduced main program "P_B"
- Main program "P_A"

Enabling special JOBs SP1 to SP3 (P6)

Phoenix Expert machine series:

The welding task is set at the power source control; refer to the relevant system documentation.
If required, the predefined special welding tasks SP1 = JOB 129 / SP2 = JOB130 / SP3 = JOB 131 only can be selected at the wire feeder control. The special JOBs are selected by pressing the welding task selection push-button for a longer period. The special JOBs are switched by pressing the push-button briefly.

The JOB changeover is blocked if the key switch is in the "0" position.
This block can be cancelled for the special JOBs (SP1 - SP3).

5.10.3.6 Correction operation, threshold value setting (P7)

The correction operation is switched on and off for all JOBs and their programs at the same time. A correction operation is specified for wire speed (DV) and welding voltage correction (Ukorr) for each JOB. The correction value is saved separately for each program. The correction range can be maximum 30% of the wire speed and +/-9.9 V welding voltage.
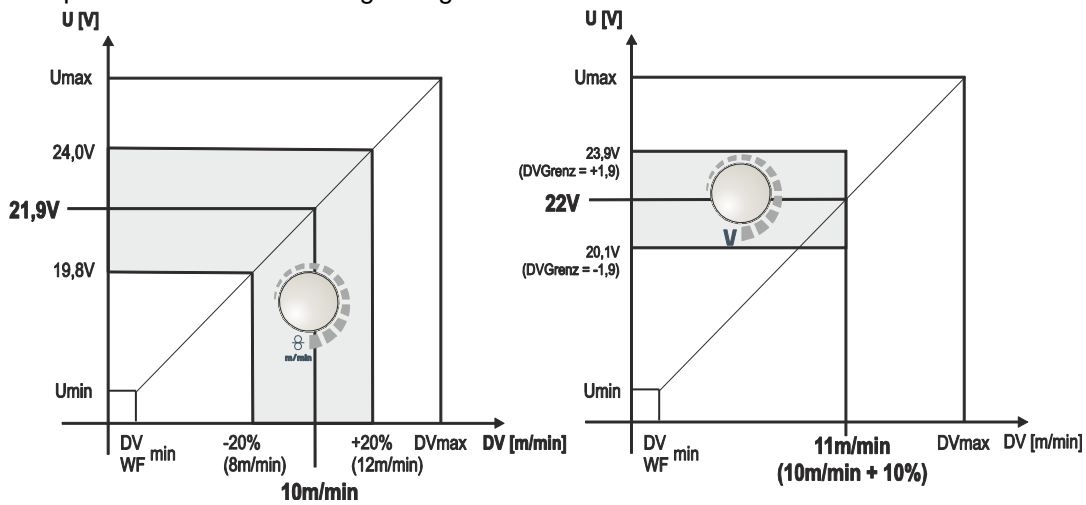
Figure 5-74

Example for the operating point in correction mode:

The wire speed in one program (1 to 15) is set on 10.0 m/min.

This corresponds to a welding voltage (U) of 21,9 V. When the key switch is set to "0" position, welding in this program can only be carried out with these values.

To allow the welder also to perform wire and voltage correction in program mode, the correction mode must be switched on and limit values for wire and voltage must be specified.

Setting of the correction limit value = WFlimit = 20% / Ulimit = 1.9 V

Now the wire speed can be corrected by 20% (8.0 up to 12.0 m/min) and the welding voltage by +/-1.9 V (3.8 V).

In the example the wire speed is set on 11.0 m/min. This corresponds to a welding voltage of 22 V

Now the welding voltage can be corrected by further 1.9 V (20.1 V and 23.9 V).

The values for voltage and wire-speed correction will be reset if the key switch is moved to the "1" setting.

Setting the correction range:

• Activate the "correction operation" special parameter (P7=1) and save. > *see 5.10.1 chapter*
• Key switch to position "1".
• Set the correction range as follows:
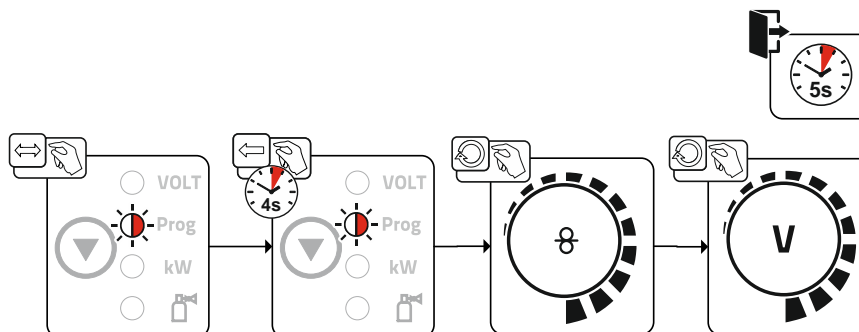
Figure 5-75

• If the user is inactive for about 5 seconds, the pre-set values
will be applied and the display switches back to the program display.
• Key switch back to position "0"!

5.10.3.7 Switching programs with the standard torch trigger (P8)

Special latched (latched absolute program sequence)

- Cycle 1: absolute program 1 is run
- Cycle 2: absolute program 2 is run after completion of "tstart".
- Cycle 3: absolute program 3 is run until the "t3" time has elapsed. The program then switches automatically to absolute program 4.

Accessory components such as remote controls or special torches may not be connected!

Program switching at the wire feed unit control is disabled.
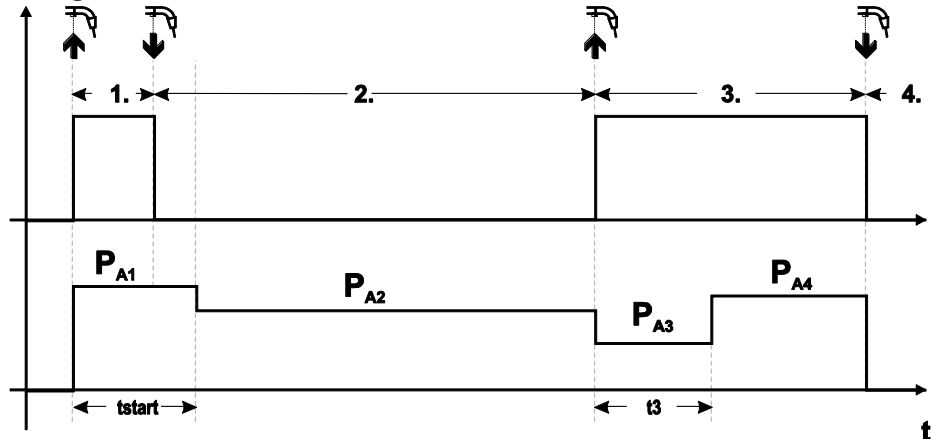
Figure 5-76

Specific latched special (n cycle)

In the n cycle program sequence, the unit starts in the 1st cycle with start program P_{start} from P_1

In the second cycle, the machine switches to absolute program 2, once the start time "tstart" has elapsed. Tapping switches to other programs (P_{A1} to max. P_{A9}).
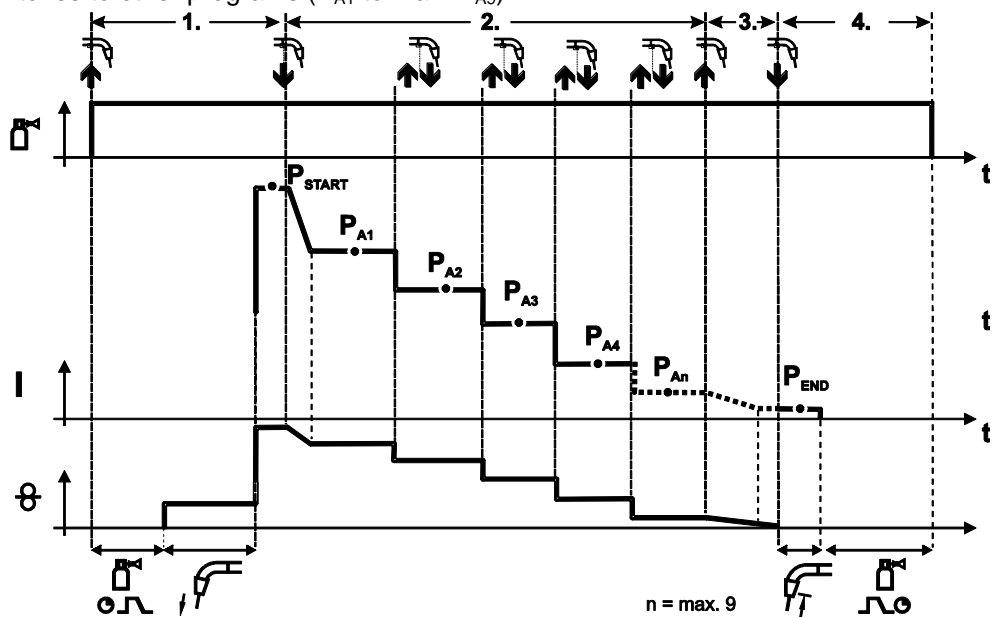
Figure 5-77

The number of programs (P$_{An}$) corresponds to the cycle number specified under N cycle.

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$_{START}$ from P$_{A1}$)

2nd cycle
- Release torch trigger.
- Slope to main program P$_{A1}$.

The slope to main program P$_{A1}$ is given at the earliest after the set time t$_{START}$ elapses and at the latest when the torch trigger is released. Tapping (pressing briefly and releasing within 0.3 sec) can switch to other programs. Programs P$_{A1}$ to P$_{A9}$ are possible.

3rd cycle
- Press and hold torch trigger.
- Slope to end program P$_{END}$ from P$_{AN}$. The program can be stopped at any time by pressing the torch trigger longer than 0.3 sec. P$_{END}$ from P$_{AN}$ is then executed.

4th cycle
- Release torch trigger.
- WF motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

5.10.3.8 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.

5.10.3.9 "Single or dual operation" (P10) setting

☞ *If the system is fitted with two wire feeds, no further accessory components may be operated on the 7-pole connection socket (digital)!*

This relates to digital remote controls, robot interfaces, documentation interfaces, welding torches with digital control lead connection, etc.

No second wire feed may be connected in single operation (P10 = 0)!
- Remove connections to the second wire feed

In dual operation (P10 = 1 or 2), both wire feed units must be connected and configured differently on the controls for this operating mode!
- Configure one wire feed unit as the master (P10 = 1)
- Configure the other wire feed unit as a slave (P10 = 2)

Wire feed units with key switches (optional, *> see 5.9 chapter*) must be configured as masters (P10 = 1).

The wire feed configured as the master is active after the welding machine is switched on. There are no other functional differences between the wire feeds.

5.10.3.10 Latched special tapping time setting (P11)

The tapping time for changing over between the main program and reduced main program can be set in three levels.

0 = no tapping

1 = 320ms (factory setting)

2 = 640ms

5.10.3.11 JOB list switching (P12)

Value	Name	Explanation
0	Task-based JOB list	JOB numbers are sorted by welding wires and shielding gases. When selecting, the JOB numbers may be skipped.
1	Real JOB list	JOB numbers correspond to the actual memory cells. Every job can be selected, there will be no memory cells if the selection will be skipped.
2	Real JOB list, JOB switching active	Like real JOB list. In addition JOB switching with appropriate accessory components such as a function torch is possible.

Creating user-defined JOB lists

An associated memory area, in which switching with accessory components such as a function torch between JOBs is possible, is created.

- Set special parameters P12 to "2".
- Set switch "Program or Up/Down Function" to "Up/Down" position.
- Select existing JOB, which comes as close as possible to the desired result.
- Copy JOB to one or more destination JOB numbers.

If JOB parameters still need to be adjusted, select destination JOBs one after the other and adjust parameters individually.

- Special parameters P13 to the lower limit and
- Adjust special parameters P14 to the upper limit of the destination JOBs.
- Set switch "Program or Up/down function" to position "Program".

With the accessory component JOBs can be switched in the specified range.

Copying JOBs, "Copy to" function

The possible target range is between 129 - 169.

- First configure special parameter P12 to P12 = 2 or P12 = 1!
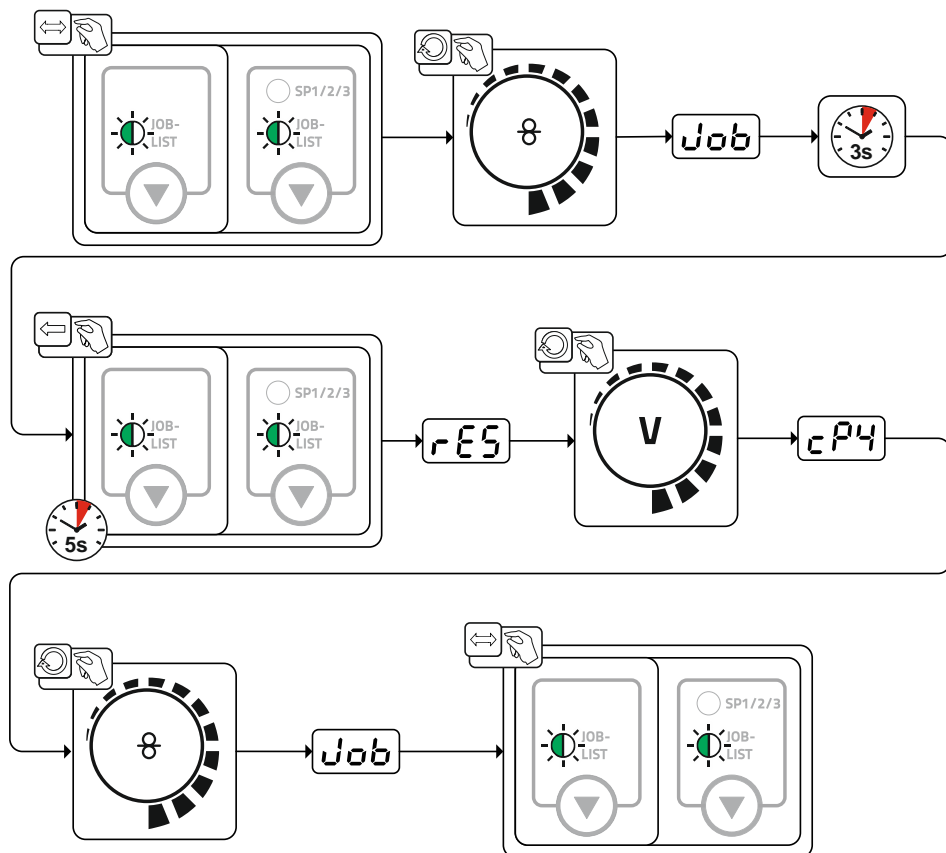
Figure 5-78

By repeating the last two steps, the same source JOB can be copied to multiple target JOBs.

If the control does not register any user activity for longer than 5 seconds, the parameter display is shown once more and the copy process is complete.

5.10.3.12 Lower and upper limits of the remote JOB changeover process (P13, P14)

The highest and lowest JOB numbers which can be selected using accessory components, such as the PowerControl 2 torch.

Avoids an accidental changeover into undesirable or undefined JOBs.

5.10.3.13 Hold function (P15)

Hold function active (P15 = 1)

• Mean values for the last main program parameters used for welding are displayed.

Hold function not active (P15 = 0)

• Setpoint values for the main program parameters are displayed.

5.10.3.14 Block JOB mode (P16)

The following accessory components support block JOB mode:

• Up/Down welding torch with one-digit 7-segment display (two keys)
   Program 0 is always active in JOB 0 and program 1 in all other JOBs

In this operating mode, a total of 27 JOBs (welding tasks) divided into three blocks can be called up using accessory components.

The following settings must be made in order to be able to use block JOB mode:

• Switch the "Program or Up/Down function" changeover switch to "Program"
• Set the JOB list to actual JOB list (special parameter P12 = "1")
• Enable block JOB mode (special parameter P16 = "1")
• Change to block JOB mode by selecting one of the special JOBs 129, 130 or 131.

Simultaneous operation with interfaces such as RINT X12, BUSINT X11, DVINT X11 or digital accessory components such as is the R40 remote control is not possible!

Allocation of JOB numbers to the display on the accessory components

JOB no.	Display/selection on the accessory component									
	0	1	2	3	4	5	6	7	8	9
Special JOB 1	129	141	142	143	144	145	146	147	148	149
Special JOB 2	130	151	152	153	154	155	156	157	158	159
Special JOB 3	131	161	162	163	164	165	166	167	168	169

JOB 0:

This JOB allows you to set the welding parameters manually.

Selection of JOB 0 can be prevented via the key switch or with the "block program 0" parameter (P2).

Key switch position 0, or special parameter P2 = 0: JOB 0 is blocked.

Key switch position 1, or special parameter P2 = 1: JOB 0 can be selected.

JOBs 1-9:

Nine JOBs can be called up in each special JOB (see table).

Nominal values for wire speed, arc correction, dynamics etc must be defined in advance in these JOBs. This can be done easily with the PC300.NETsoftware.

If the software is not available, user-defined JOB lists can be created in the special JOB areas with the "Copy to" function. (See explanations about this in the "Switching JOB lists (P12)" chapter)

5.10.3.15 Selecting programs with the standard torch trigger (P17)

Allows you to select a program or switch a program before starting welding.

You switch to the next program by tapping the torch trigger. Once the last enabled program is reached, you start again at the beginning.

- Program 0 is the first enabled program, provided that it is not blocked.
  (see also special parameter P2).
- The last enabled program is P15.
  - If the programs are not limited by special parameter P4 (see special parameter P4).
  - Or if the programs are limited for the selected JOB by the n cycle setting (see parameter P8).
- Welding starts when the torch trigger is held for longer than 0.64 s.

You can select programs with the standard torch trigger in all operating modes (non-latched, special non-latched. latched and special latched).

Switching the operating mode and welding type using the wire feed control (P18)

Selecting the operating mode (non-latched, latched, etc.) and welding type (MIG/MAG standard welding/pulse arc welding) at the wire feed unit control or the welding machine control.

- P18 = 0
  - Program 0: To select the operating mode and welding type at the wire feed unit.
  - Program 1-15: To select the operating mode and welding type at the welding machine.
- P18 = 1
  - Program 0-15: To select the operating mode and welding type at the wire feed unit.

5.10.3.16 Mean value display for superPuls (P19)

Function active (P19 = 1)

- For superPuls, the performance **mean value** from program A (P_A) and program B (P_B) is shown on the display (ex factory).

Function inactive (P19 = 0)

- Only the performance of program A is displayed for superPuls.

If the function is enabled and only "000" is shown on the machine display, this is a rare case of an incompatible system set-up. Solution: Disable special parameter P19.

5.10.3.17 Predefined execution of the pulsed arc welding process in the PA program (P20)

For machine versions with pulsed arc welding procedures only.

Function active (P20 = 1)

- If the superPuls and welding process switching functions are available and activated, the pulse arc welding process is always executed in the main program PA (ex factory).

Function inactive (P20 = 0)

- Predefined execution of the pulse arc welding process in the PA program is disabled.

5.10.3.18 Predefined absolute value for relative programs (P21)

Start program (P_{START}), down-slope program (P_B) and end program (P_{END}) can be set relative to the main program (P_A) or in an absolute manner, as desired.

Function active (P21 = 1)

- Absolute parameter setting

Function inactive (P21 = 0)

- Relative parameter setting (ex factory)

5.10.3.19 Electronic gas flow control, type (P22)

Active only in machines with integrated gas flow control (option ex works).

Adjustment may only be carried out by authorised service personnel (basic setting = 1).

5.10.3.20 Program settings for relative programs (P23)

The start, down-slope and end program relative programs can be set individually or combined for the P0-P15 operating points. When choosing the combined setting, in contrast to the individual setting, the parameter values are saved in the JOB With the individual setting, the parameter values are identical for all JOBs (except for special JOBs SP1,SP2 and SP3).

5.10.3.21 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.

5.10.3.22 JOB selection in Expert mode (P25)

The special parameter P25 can be used to specify whether the special JOBs SP1/2/3 or the welding job selection according to the JOB list can be selected on the wire feeder.

5.10.3.23 Nominal value wire heater (P26)

Preheating the welding wire in the temperature range of 25°C - 50°C. Setting 45°C ex works.

5.10.3.24 Mode switching at welding start (P27)

With the selected 4-cycle-Special mode, the user can determine by the time of the torch trigger operation in which operating mode (4-cycle or 4-cycle-Special) the program sequence shall be carried out.

Hold torch trigger (longer than 300 ms): Program sequence with operating mode 4-cycle-Special (standard).

Tap torch trigger: Device changes to operating mode 4-cycle.

5.10.3.25 Error threshold electronic gas flow control (P28)

The set percentage value is the error threshold; if it is undershot or exceeded, an error message *> see 7.2 chapter* is displayed.

5.10.3.26 Units system (P29)

Function not active

• Metric metric units are displayed.

Function active

• Imperial units are displayed.

5.10.3.27 Selection option – Program sequence with welding power rotary knob (P30)

Function not active

• The rotary knob is locked, use the welding parameters push-button to select the welding parameters.

Function active

• Rotary knob can be used to select the welding parameters.

5.11 Machine configuration menu
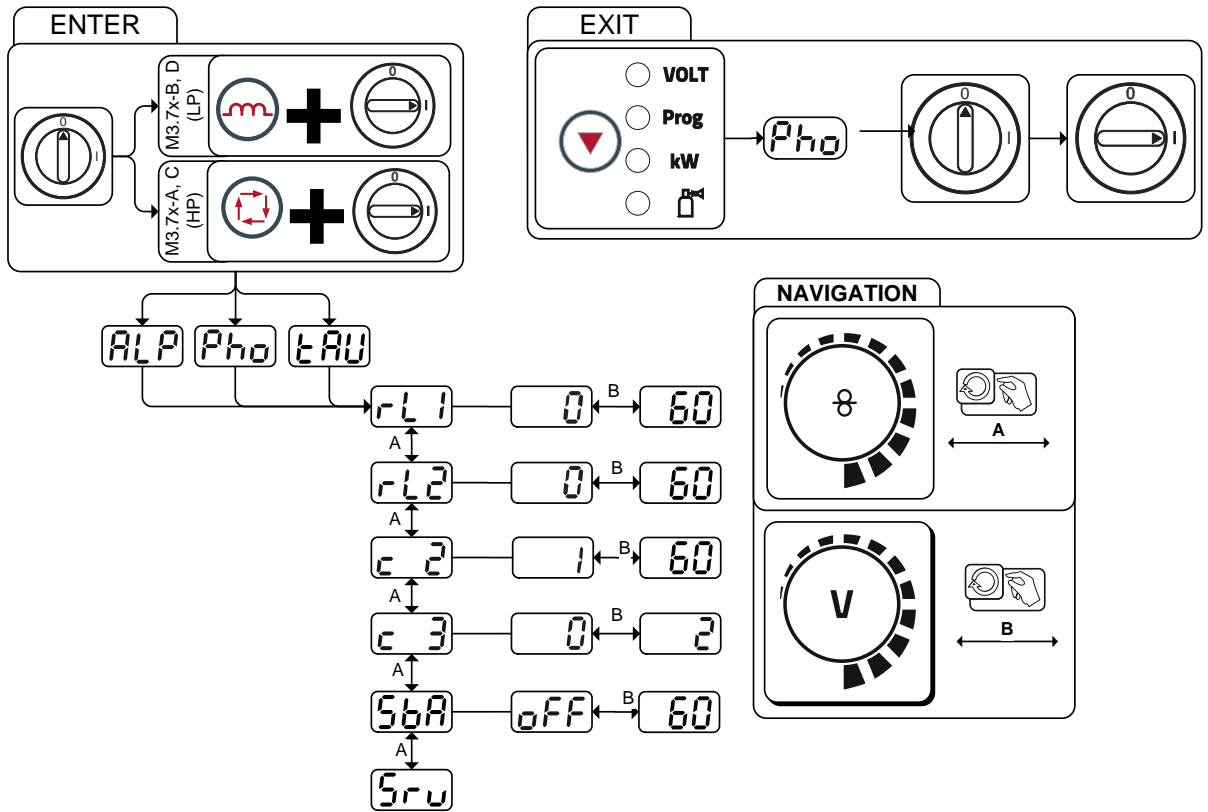
Figure 5-79

Display	Setting/selection
rL 1	**Lead resistance 1** Lead resistance for the first welding circuit 0 mΩ–60 mΩ (8 mΩ ex works).
rL2	**Lead resistance 2** Lead resistance for the second 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 5.11.2 chapter*** Time to activation of the power-saving mode in case of inactivity. Setting oFF = disabled or numerical value 5– 60 min. (ex works: 20).
Sru	**Service menu** Modifications to the service menu may only be carried out by authorised maintenance staff!

5.11.1 Aligning the cable resistance

The resistance value of cables can either be set directly or it can be aligned using the power source. The factory setting of the power sources is 8 mΩ. This value correponds to a 5 m earth cable, a 1.5 m intermediate hose package and a 3 m water-cooled welding torch. With other hose package lengths, it is necessary to carry out a +/- voltage correction to optimise welding properties. The voltage correction value can be set close to zero by means of realigning the cable resistance. It is recommended to align the electric cable resistance after replacing accessories such as torches or intermediate hose packages.

In case a second wire feeder is used the (rL2) parameter has to be aligned. For all other configurations it is sufficient to align the (rL1) parameter.
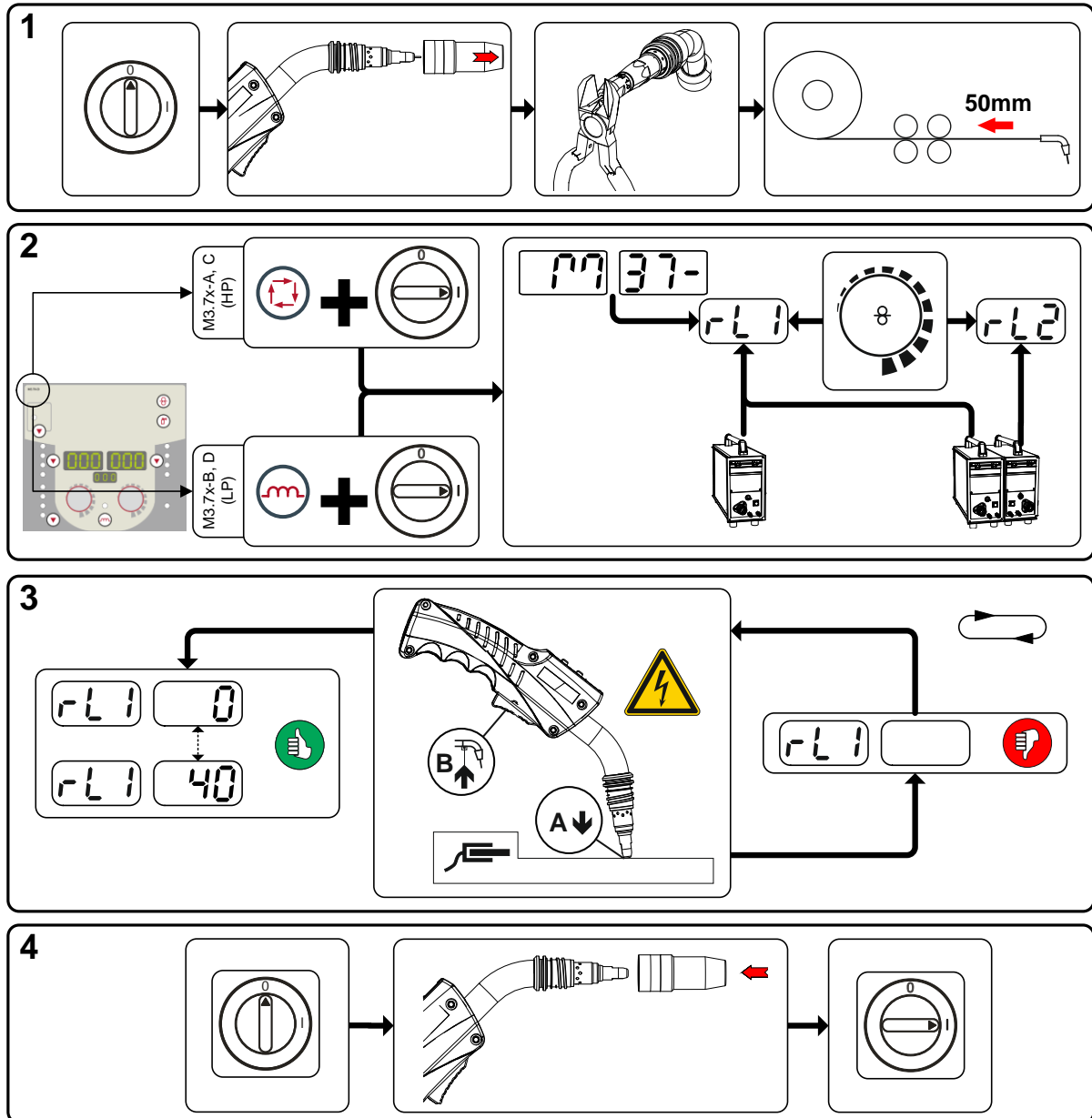
Figure 5-80

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. There should now be no more welding wire in the contact tip.

2 Configuration

• Press the "welding parameter or choke effect" push-button while simultaneously switching on the welding machine. Release push-button.

  • "Welding parameter" push-button on the M3.7x-A and M3.7x-C control.

  • "Choke effect" push-button on the M3.7x-B and M3.7x-D control.

• The required parameter can now be selected using the 'Welding parameter setting' rotary knob. Parameter rL1 must be aligned for all machine combinations. In case of welding systems with a second power circuit – if two wire feeders are to be operated from a single power source, for example – a second alignment with parameter rL2 must be performed.

3 Alignment/measurement

• Applying slight pressure, put the welding torch in place with the contact tip on a clean, purged location on the workpiece and then press the torch trigger for approx. 2 seconds. A short-circuit current will flow briefly, which is used to determine and display the 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, then measurement failed. The measurement must be repeated.

4 Restoring welding standby mode

• Switch off the welding machine.

• Screw the gas nozzle onto the welding torch.

• Switch on the welding machine

• Insert the welding wire.

5.11.2 Power-saving mode (Standby)

You can activate the power-saving mode by either pressing the push-button > *see 4.4 chapter* for a prolonged time or by setting a parameter in the machine configuration menu (time-controlled power-saving mode $5bR$) > *see 5.11 chapter*.
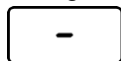
When power-saving mode is activated, the machine displays show the horizontal digit in the centre of the display only.

Pressing any operating element (e.g. turning a rotary knob) deactivates power-saving mode and the machine is ready for welding again.

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**
>
> **Incorrect maintenance, testing and repair!**
> **Maintenance, testing and repair of the machine may only be carried out by skilled and qualified personnel. A qualified person is one who, because of his or her training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage, and who is able to implement the required safety procedures.**
>
>   Observe the maintenance instructions > *see 6.3 chapter*.
> • In the event that the provisions of one of the below-stated tests are not met, the machine must not be operated again until it has been repaired and a new test has been carried out!

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

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

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

6.2 Cleaning

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

6.2.1 Dirt filter

The duty cycle of the welding machine decreases as an effect of the reduced cooling air volume. The dirt filter must be remove at regular intervals and cleaned by blowing out with compressed air (depending on the level of soiling).

6.3 Maintenance work, intervals

6.3.1 Daily maintenance tasks

Visual inspection

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

Functional test

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

6.3.2 Monthly maintenance tasks

Visual inspection

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

Functional test

- Selector switches, command devices, emergency stop devices, voltage reducing devices, message and control lamps
- Check that the wire guide elements (inlet nipple, wire guide tube) are fitted securely.
- Check coolant tubes and their connections for impurities
- Check and clean the welding torch. Deposits in the torch can cause short circuits and have a negative impact on the welding result, ultimately causing damage to the torch.

6.3.3 Annual test (inspection and testing during operation)

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

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

6.4 Disposing of equipment

Proper disposal!
The machine contains valuable raw materials, which should be recycled, and electronic components, which must be disposed of.
- **Do not dispose of in household waste!**
- **Observe the local regulations regarding disposal!**

- 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 electric 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.

- Information about returning used equipment or about collections can be obtained from the respective municipal administration office.

- In addition to this, returns are also possible throughout Europe via EWM sales partners.

7 Rectifying faults

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

7.1 Checklist for rectifying faults

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

Legend	Symbol	Description
	✗	Fault/Cause
	✗	Remedy

Coolant error/no coolant flowing
- ✗ Insufficient coolant flow
  - ✗ Check coolant level and refill if necessary
- ✗ Air in the coolant circuit
  - ✗ Vent coolant circuit

Wire feed problems
- ✗ Contact tip blocked
  - ✗ Clean, spray with anti-spatter spray and replace if necessary
- ✗ Setting the spool brake > *see 5.4.2.5 chapter*
  - ✗ Check settings and correct if necessary
- ✗ Setting pressure units > *see 5.4.2.4 chapter*
  - ✗ Check settings and correct if necessary
- ✗ Worn wire rolls
  - ✗ Check and replace if necessary
- ✗ Wire feed motor without supply voltage (automatic cutout triggered by overloading)
  - ✗ Reset triggered fuse (rear of the power source) by pressing the key button
- ✗ Kinked hose packages
  - ✗ Extend and lay out the torch hose package
- ✗ Wire guide core or spiral is dirty or worn
  - ✗ Clean core or spiral; replace kinked or worn cores

Functional errors
- ✗ All machine control signal lights are illuminated after switching on
- ✗ No machine control signal light is illuminated after switching on
- ✗ No welding power
  - ✗ Phase failure > check mains connection (fuses)
- ✗ Several parameters cannot be set (machines with access block)
  - ✗ Entry level is blocked, disable access lock > *see 5.9 chapter*
- ✗ Connection problems
  - ✗ Make control lead connections and check that they are fitted correctly.
- ✗ Loose welding current connections
  - ✗ Tighten power connections on the torch and/or on the workpiece
  - ✗ Tighten contact tip correctly

7.2 Error messages (power source)

A welding machine error will be signalled by an error code (see table) on the control display. In the event of an error, the power unit shuts down.

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

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

Error (Err)	Category			Possible cause	Remedy
	a)	b)	c)		
1	-	-	x	Mains overvoltage	Check the mains voltages and compare with the welding machine connection voltages
2	-	-	x	Mains undervoltage	
3	x	-	-	Welding machine excess temperature	Allow the machine to cool down (mains switch to "1")
4	x	x	-	Coolant error	Fill coolant Turn on pump shaft (coolant pump) Check air cooling unit overcurrent trip
5	x	-	-	Wire feeder/tachometer error	Check the wire feeder Tachogenerator is not emitting a signal, M3.51 defective > inform Service.
6	x	-	-	Shielding gas error	Check shielding gas supply (for machines with shielding gas monitoring)
7	-	-	x	Secondary overvoltage	Inverter error > inform Service
8	-	-	x	Wire error	Separate the electrical connection between welding wire and casing or an earthed object
9	x	-	-	Quick shut-down	Rectify error on robot (Interface for automated welding)
10	-	x	-	Arc interruption	Check wire feeding (Interface for automated welding)
11	-	x	-	Ignition error (after 5 s)	Check wire feeding (Interface for automated welding)
13	x	-	-	Emergency stop deactivation	Check the emergency stop switch at the interface for automated welding
14	-	x	-	Wire feeder detection	Check cable connections
				ID number allocation error (2DV)	Correct ID numbers > *see 5.3 chapter*
15	-	x	-	Second wire feeder detection	Check cable connections
16	-	-	x	Open circuit voltage reduction error (VRD)	Inform Service.
17	-	x	x	Overcurrent detection on wire feeder	Check ease of wire feeding
18	-	x	x	Tachogenerator signal error	Check the connection and particularly the tachogenerator of the second wire feeder (slave drive).
56	-	-	x	Mains phase failure	Check mains voltages
59	-	-	x	Machine incompatible	Check machine usage > *see 3.2 chapter*
60	-	-	x	Software update required	Inform Service.

Categories legend (resetting the error)

a) The error message will disappear once the error has been rectified.

b) The error message can be reset by pressing a push-button:

Welding machine control	Push-button
RC1 / RC2	Enter
Expert	S
Expert 2.0 / Expert XQ 2.0	
CarExpert / Progress (M3.11)	
alpha Q / Concept / Basic / Basic S / Synergic / Synergic S / Progress (M3.71) / Picomig 355	not possible

c) The error message can only be reset by switching the machine off and on again.

The shielding gas error (Err 6) can be reset by pressing the "Welding parameters" key button.

8 Technical data

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

8.1 drive 4X IC D HP

Supply voltage (from the welding machine)	42 VAC
Duty cycle at 40° C [1]	
60 %	550 A
100 %	430 A
Wire feed speed	0,5 m/min up to 25 m/min 20 ipm - 985 ipm
Factory-installed roll equipment	1,0-1,2 mm (for steel wire)
Drive	4 rollers (37 mm)
Wire spool diameter	Standardised wire spools up to 300 mm
Welding torch connection	Euro torch connector
Protection classification	IP 23
Ambient temperature [2]	-25 °C up to +40 °C
EMC class	A
Safety marking	C E / EHC
Standards used	See declaration of conformity (appliance documents)
Dimensions	633 x 457 x 496 mm 24.9 x 18.0 x 19.5 inch
Weight	44 kg 97 lb

[1] Load cycle: 10 min. (60 % DC = 6 min. welding, 4 min. pause).

[2] Ambient temperature is dependent on coolant! Observe coolant temperature range!

9 Accessories

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

9.1 General accessories

Type	Designation	Item no.
DM 842 Ar/CO2 230bar 30l D	Pressure regulator with manometer	394-002910-00030
AK300	Wire spool adapter K300	094-001803-00001
HOSE BRIDGE UNI	Tube bridge	092-007843-00000
SPL	Sharpener for liner	094-010427-00000
HC PL	Hose cutter	094-016585-00000

9.2 Remote control/connecting and extension cable

9.2.1 7-pole connection

Type	Designation	Item no.
R40 7POL	Remote control, 10 programs	090-008088-00000
R50 7POL	Remote control, all welding machine functions can be set directly at the workplace	090-008776-00000
FRV 7POL 0.5 m	Extension/connecting cable	092-000201-00004
FRV 7POL 1 m	Extension/connecting cable	092-000201-00002
FRV 7POL 5 m	Extension/connecting cable	092-000201-00003
FRV 7POL 10 m	Extension/connecting cable	092-000201-00000
FRV 7POL 20 m	Extension/connecting cable	092-000201-00001
FRV 7POL 25M	Extension/connecting cable	092-000201-00007

9.2.2 19-pole connection

Type	Designation	Item no.
R10 19POL	Remote control	090-008087-00000
RG10 19POL 5M	Remote control to set the wire speed and welding voltage correction	090-008108-00000
R20 19POL	Program changeover remote control	090-008263-00000
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10m	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20m	Remote control e.g. connection cable	092-001470-00020
RV5M19 19POLE 5M	Extension cable	092-000857-00000
RV5M19 19POL 10M	Extension cable	092-000857-00010
RV5M19 19POL 15M	Extension cable	092-000857-00015
RV5M19 19POL 20M	Extension cable	092-000857-00020

10 Replaceable parts

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

10.1 Wire feed rollers

10.1.1 Wire feed rollers for steel wire

Type	Designation	Item no.
FE 4R 0.6 MM/0.023 INCH LIGHT PINK	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00006
FE 4R 0.8-1.0MM / 0.03-0.04 INCH BLUE/WHITE	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00009
FE 4R 1.0-1.2MM / 0.04-0.045 INCH BLUE/RED	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00011
FE 4R 1.4 MM/0.052 INCH GREEN	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00014
FE 4R 1.6 MM/0.06 INCH BLACK	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00016
FE 4R 2.0 MM/0.08 INCH GREY	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00020
FE 4R 2.4 MM/0.095 INCH BROWN	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00024
FE 4R 2.8 MM/0.11 INCH LIGHT GREEN	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00028
FE 4R 3.2 MM/0.12 INCH VIOLET	Drive roll set, 37 mm, 4 rolls, V-groove for steel, stainless steel and brazing	092-002770-00032

10.1.2 Wire feed rollers for aluminium wire

Type	Designation	Item no.
AL 4R 0.8 MM/0.03 INCH WHITE	Drive roll set, 37 mm, for aluminium	092-002771-00008
AL 4R 1.0 MM/0.04 INCH BLUE	Drive roll set, 37 mm, for aluminium	092-002771-00010
AL 4R 1.2 MM/0.045 INCH RED	Drive roll set, 37 mm, for aluminium	092-002771-00012
AL 4R 1.6 MM/0.06 INCH BLACK	Drive roll set, 37 mm, for aluminium	092-002771-00016
AL 4R 2.0 MM/0.08 INCH GREY/YELLOW	Drive roll set, 37 mm, for aluminium	092-002771-00020
AL 4R 2.4 MM/0.095 INCH BROWN/YELLOW	Drive roll set, 37 mm, for aluminium	092-002771-00024
AL 4R 2.8 MM/0.110 INCH LIGHT GREEN/YELLOW	Drive roll set, 37 mm, for aluminium	092-002771-00028
AL 4R 3.2 MM/0.125 INCH VIOLET/YELLOW	Drive roll set, 37 mm, for aluminium	092-002771-00032

10.1.3 Wire feed rollers for cored wire

Type	Designation	Item no.
FUEL 4R 0.8 MM/0.03 INCH WHITE/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00008
FUEL 4R 1.0 MM/0.04 INCH BLUE/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00010
FUEL 4R 1.2 MM/0.045 INCH RED/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00012
FUEL 4R 1.4 MM/0.052 INCH GREEN/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00014
FUEL 4R 1.6 MM/0.06 INCH BLACK/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00016
FUEL 4R 2.0 MM/0.08 INCH GREY/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00020
FUEL 4R 2.4 MM/0.095 INCH BROWN/ORANGE	Drive roll set, 37 mm, 4 rolls, V-groove/knurled for flux cored wire	092-002848-00024

10.1.4 Wire guide

Type	Designation	Item no.
DV X	Wire feed roll mount set	092-002960-E0000
SET DRAHTFUERUNG	Wire guide set	092-002774-00000
ON WF 2,0-3,2MM EFEED	Retrofitting option, wire guide for 2.0–3.2 mm wires, eFeed drive	092-019404-00000
SET IG 4x4 1.6mm BL	Inlet guide set	092-002780-00000
GUIDE TUBE L105	Guide tube	094-006051-00000
CAPTUB L108 D1,6	Capillary tube	094-006634-00000
CAPTUB L105 D2,0/2,4	Capillary tube	094-021470-00000

11 Appendix A

11.1 JOB-List

JOB no.	Processes	Material	Gas	Diameter [mm]
1	Standard GMAW/pulse	G3Si1/G4Si1	100% CO2	0,8
2	Standard GMAW/puls	G3Si1/G4Si1	100% CO2	0,9
3	Standard GMAW/puls	G3Si1/G4Si1	100% CO2	1,0
4	Standard GMAW/puls	G3Si1/G4Si1	100% CO2	1,2
5	Standard GMAW/puls	G3Si1/G4Si1	100% CO2	1,6
6	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
7	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,9
8	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
9	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
10	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
11	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	0,8
12	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	0,9
13	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,0
14	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,2
15	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,6
26	Standard GMAW/puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	0,8
27	Standard GMAW/puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,0
28	Standard GMAW/puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,2
29	Standard GMAW/puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,6
30	Standard GMAW/puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	0,8
31	Standard GMAW/puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,0
32	Standard GMAW/puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,2
33	Standard GMAW/puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,6
34	Standard GMAW/puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	0,8
35	Standard GMAW/puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	1,0
36	Standard GMAW/puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	1,2
37	Standard GMAW/puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	1,6
38	Standard GMAW/puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	0,8
39	Standard GMAW/puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,0
40	Standard GMAW/puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,2
41	Standard GMAW/puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,6
42	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	0,8
43	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,0
44	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,2
45	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,6
46	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-78/H3-20/CO2-2 (M12)	0,8
47	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-78/H3-20/CO2-2 (M12)	1,0
48	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-78/H3-20/CO2-2 (M12)	1,2
49	Standard GMAW/puls	CrNi 22 9 3a/1.4462	Ar-78/H3-20/CO2-2 (M12)	1,6
50*	coldArc/coldArc puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	0,8
51*	coldArc/coldArc puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	1,0

JOB no.	Processes	Material	Gas	Diameter [mm]
52*	coldArc/coldArc puls	CrNi 19 9/1.4316	Ar-97,5/CO2-2,5 (M12)	1,2
55*	coldArc/coldArc puls	AlMg	Ar-100 (I1)	1,0
56*	coldArc/coldArc puls	AlMg	Ar-100 (I1)	1,2
59*	coldArc/coldArc puls	AlSi	Ar-100 (I1)	1,0
60*	coldArc/coldArc puls	AlSi	Ar-100 (I1)	1,2
63*	coldArc/coldArc puls	Al99	Ar-100 (I1)	1,0
64*	coldArc/coldArc puls	Al99	Ar-100 (I1)	1,2
66*	coldArc brazing	CuSi	Ar-100 (I1)	0,8
67*	coldArc brazing	CuSi	Ar-100 (I1)	1,0
68*	coldArc brazing	CuSi	Ar-100 (I1)	1,2
70*	coldArc brazing	CuAl	Ar-100 (I1)	0,8
71*	coldArc brazing	CuAl	Ar-100 (I1)	1,0
72*	coldArc brazing	CuAl	Ar-100 (I1)	1,2
74	Standard GMAW/puls	AlMg	Ar-100 (I1)	0,8
75	Standard GMAW/puls	AlMg	Ar-100 (I1)	1,0
76	Standard GMAW/puls	AlMg	Ar-100 (I1)	1,2
77	Standard GMAW/puls	AlMg	Ar-100 (I1)	1,6
78	Standard GMAW/puls	AlMg	Ar-70/He-30 (I3)	0,8
79	Standard GMAW/puls	AlMg	Ar-70/He-30 (I3)	1,0
80	Standard GMAW/puls	AlMg	Ar-70/He-30 (I3)	1,2
81	Standard GMAW/puls	AlMg	Ar-70/He-30 (I3)	1,6
82	Standard GMAW/puls	AlSi	Ar-100 (I1)	0,8
83	Standard GMAW/puls	AlSi	Ar-100 (I1)	1,0
84	Standard GMAW/puls	AlSi	Ar-100 (I1)	1,2
85	Standard GMAW/puls	AlSi	Ar-100 (I1)	1,6
86	Standard GMAW/puls	AlSi	Ar-70/He-30 (I3)	0,8
87	Standard GMAW/puls	AlSi	Ar-70/He-30 (I3)	1,0
88	Standard GMAW/puls	AlSi	Ar-70/He-30 (I3)	1,2
89	Standard GMAW/puls	AlSi	Ar-70/He-30 (I3)	1,6
90	Standard GMAW/puls	Al99	Ar-100 (I1)	0,8
91	Standard GMAW/puls	Al99	Ar-100 (I1)	1,0
92	Standard GMAW/puls	Al99	Ar-100 (I1)	1,2
93	Standard GMAW/puls	Al99	Ar-100 (I1)	1,6
94	Standard GMAW/puls	Al99	Ar-70/He-30 (I3)	0,8
95	Standard GMAW/puls	Al99	Ar-70/He-30 (I3)	1,0
96	Standard GMAW/puls	Al99	Ar-70/He-30 (I3)	1,2
97	Standard GMAW/puls	Al99	Ar-70/He-30 (I3)	1,6
98	Standard GMAW/puls	CuSi	Ar-100 (I1)	0,8
99	Standard GMAW/puls	CuSi	Ar-100 (I1)	1,0
100	Standard GMAW/puls	CuSi	Ar-100 (I1)	1,2
101	Standard GMAW/puls	CuSi	Ar-100 (I1)	1,6
106	Standard GMAW/puls	CuAl	Ar-100 (I1)	0,8
107	Standard GMAW/puls	CuAl	Ar-100 (I1)	1,0
108	Standard GMAW/puls	CuAl	Ar-100 (I1)	1,2
109	Standard GMAW/puls	CuAl	Ar-100 (I1)	1,6
110	Brazing	CuSi	Ar-97,5/CO2-2,5 (M12)	0,8
111	Brazing	CuSi	Ar-97,5/CO2-2,5 (M12)	1,0

JOB no.	Processes	Material	Gas	Diameter [mm]
112	Brazing	CuSi	Ar-97,5/CO2-2,5 (M12)	1,2
113	Brazing	CuSi	Ar-97,5/CO2-2,5 (M12)	1,6
114	Brazing	CuSi	Ar-100 (I1)	0,8
115	Brazing	CuSi	Ar-100 (I1)	1,0
116	Brazing	CuSi	Ar-100 (I1)	1,2
117	Brazing	CuSi	Ar-100 (I1)	1,6
118	Brazing	CuAl	Ar-97,5/CO2-2,5 (M12)	0,8
119	Brazing	CuAl	Ar-97,5/CO2-2,5 (M12)	1,0
120	Brazing	CuAl	Ar-97,5/CO2-2,5 (M12)	1,2
121	Brazing	CuAl	Ar-97,5/CO2-2,5 (M12)	1,6
122	Brazing	CuAl	Ar-100 (I1)	0,8
123	Brazing	CuAl	Ar-100 (I1)	1,0
124	Brazing	CuAl	Ar-100 (I1)	1,2
125	Brazing	CuAl	Ar-100 (I1)	1,6
126	Gouging			
127	TIG Liftarc			
128	MMA			
129	Special JOB 1	Free JOB		
130	Special JOB 2	Free JOB		
131	Special JOB 3	Free JOB		
132		Free JOB		
133		Free JOB		
134		Free JOB		
135		Free JOB		
136		Free JOB		
137		Free JOB		
138		Free JOB		
139		Free JOB		
140		Block 1/ JOB1		
141		Block 1/ JOB2		
142		Block 1/ JOB3		
143		Block 1/ JOB4		
144		Block 1/ JOB5		
145		Block 1/ JOB6		
146		Block 1/ JOB7		
147		Block 1/ JOB8		
148		Block 1/ JOB9		
149		Block 1/ JOB10		
150		Block 2/ JOB1		
151		Block 2/ JOB2		
152		Block 2/ JOB3		
153		Block 2/ JOB4		
154		Block 2/ JOB5		
155		Block 2/ JOB6		
156		Block 2/ JOB7		
157		Block 2/ JOB8		
158		Block 2/ JOB9		

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JOB no.	Processes	Material	Gas	Diameter [mm]
159		Block 2/ JOB10		
160		Block 3/ JOB1		
161		Block 3/ JOB2		
162		Block 3/ JOB3		
163		Block 3/ JOB4		
164		Block 3/ JOB5		
165		Block 3/ JOB6		
166		Block 3/ JOB7		
167		Block 3/ JOB8		
168		Block 3/ JOB9		
169		Block 3/ JOB10		
171*	pipeSolution	G3Si1/G4Si1	CO2-100 (C1)	1,0
172*	pipeSolution	G3Si1/G4Si1	CO2-100 (C1)	1,2
173*	pipeSolution	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
174*	pipeSolution	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
177	Standard GMAW/puls	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,0
178	Standard GMAW/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
182*	coldArc/coldArc puls	G3Si1/G4Si1	CO2-100 (C1)	0,8
184*	coldArc/coldArc puls	G3Si1/G4Si1	CO2-100 (C1)	1,0
185*	coldArc/coldArc puls	G3Si1/G4Si1	CO2-100 (C1)	1,2
187	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	
188	Standard GMAW/puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	
189	forceArc/forceArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
190	forceArc/forceArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
191*	coldArc/coldArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
193*	coldArc/coldArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
194*	coldArc/coldArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
195*	coldArc/coldArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
197*	coldArc brazing	AlSi	Ar-100 (I1)	1,0
198*	coldArc brazing	AlSi	Ar-100 (I1)	1,2
201*	coldArc brazing	ZnAl	Ar-100 (I1)	1,0
202*	coldArc brazing	ZnAl	Ar-100 (I1)	1,2
204	rootArc/rootArc puls	G3Si1/G4Si1	CO2-100 (C1)	1,0
205	rootArc/rootArc puls	G3Si1/G4Si1	CO2-100 (C1)	1,2
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
208*	coldArc - Mg/Mg	Mg	Ar-70/H3-30 (I3)	1,2
209*	coldArc - Mg/Mg	Mg	Ar-70/H3-30 (I3)	1,6
210	Rutile/basic flux cored wire	CrNi	CO2-100 (C1)	0,9
211	Rutile/basic flux cored wire	CrNi	CO2-100 (C1)	1,0
212	Rutile/basic flux cored wire	CrNi	CO2-100 (C1)	1,2
213	Rutile/basic flux cored wire	CrNi	CO2-100 (C1)	1,6

JOB no.	Processes	Material	Gas	Diameter [mm]
214	Surfacing	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
215	Surfacing	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,9
216	Surfacing	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
217	Surfacing	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
218	Surfacing	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
220*	coldArc - St/Al	ZnAl	Ar-100 (I1)	1,0
221*	coldArc - St/Al	ZnAl	Ar-100 (I1)	1,2
224*	coldArc - St/Al	AlSi	Ar-100 (I1)	1,0
225*	coldArc - St/Al	AlSi	Ar-100 (I1)	1,2
227	Metal flux-cored wire	CrNi	Ar-97,5/CO2-2,5 (M12)	0,8
228	Metal flux-cored wire	CrNi	Ar-97,5/CO2-2,5 (M12)	1,0
229	Metal flux-cored wire	CrNi	Ar-97,5/CO2-2,5 (M12)	1,2
230	Metal flux-cored wire	CrNi	Ar-97,5/CO2-2,5 (M12)	1,6
231	Rutile/basic flux cored wire	CrNi	Ar-82/CO2-18 (M21)	0,9
232	Rutile/basic flux cored wire	CrNi	Ar-82/CO2-18 (M21)	1,0
233	Rutile/basic flux cored wire	CrNi	Ar-82/CO2-18 (M21)	1,2
234	Rutile/basic flux cored wire	CrNi	Ar-82/CO2-18 (M21)	1,6
235	Metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
237	Metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
238	Metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
239	Metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
240	Rutile/basic flux cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
242	Rutile/basic flux cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
243	Rutile/basic flux cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
244	Rutile/basic flux cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
245	forceArc/forceArc puls	Al99	Ar-100 (I1)	1,2
246	forceArc/forceArc puls	Al99	Ar-100 (I1)	1,6
247	forceArc/forceArc puls	AlMg	Ar-100 (I1)	1,2
248	forceArc/forceArc puls	AlMg	Ar-100 (I1)	1,6
249	forceArc/forceArc puls	AlSi	Ar-100 (I1)	1,2
250	forceArc/forceArc puls	AlSi	Ar-100 (I1)	1,6
251	forceArc/forceArc puls	CrNi	Ar-97,5/CO2-2,5 (M12)	1,0
252	forceArc/forceArc puls	CrNi	Ar-97,5/CO2-2,5 (M12)	1,2
253	forceArc/forceArc puls	CrNi	Ar-97,5/CO2-2,5 (M12)	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	Rutile/basic flux cored wire	G3Si1/G4Si1	CO2-100 (C1)	1,2
261	Rutile/basic flux cored wire	G3Si1/G4Si1	CO2-100 (C1)	1,6
263	Metal flux-cored wire	High tensile steels	Ar-82/CO2-18 (M21)	1,2
264	Basic flux-cored	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2

JOB no.	Processes	Material	Gas	Diameter [mm]
268	Standard GMAW/puls	NiCr 617	Ar-70/He-30 (I3)	1,2
269	Standard GMAW/puls	NiCr 617	Ar-70/He-30 (I3)	1,6
271	Standard GMAW/puls	NiCr 625	Ar-70/He-30 (I3)	1,0
272	Standard GMAW/puls	NiCr 625	Ar-70/He-30 (I3)	1,2
273	Standard GMAW/puls	NiCr 625	Ar-70/He-30 (I3)	1,6
275	Standard GMAW/puls	NiCr 625	Ar-67,95/He-30/H2-2 / CO2-0,05	1,0
276	Standard GMAW/puls	NiCr 625	Ar-67,95/He-30/H2-2 / CO2-0,05	1,2
277	Standard GMAW/puls	NiCr 625	Ar-78/H3-20/CO2-2 (M12)	1,6
279	Standard GMAW/puls	CrNi 25 20/1.4842	Ar-97,5/CO2-2,5 (M12)	1,0
280	Standard GMAW/puls	CrNi 25 20/1.4842	Ar-97,5/CO2-2,5 (M12)	1,2
282	Standard GMAW/puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	0,8
283	Standard GMAW/puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	1,0
284	Standard GMAW/puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	1,2
285	Standard GMAW/puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	1,6
290	forceArc / forceArc puls metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
291	forceArc / forceArc puls metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
292	forceArc / forceArc puls metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
293	forceArc / forceArc puls metal flux-cored wire	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
294	forceArc/pulsea	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	0,8
295	forceArc/pulse	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
296	forceArc/pulse	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2
297	forceArc/pulse	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,6
298	forceArc/pulse	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	0,8
299	forceArc/pulse	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,0
300	forceArc/pulse	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,2
301	forceArc/pulse	G3Si1/G4Si1	Ar-90/CO2-10 (M20)	1,6
302	forceArc/forceArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	0,8
303	forceArc/forceArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,0
304	forceArc/forceArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,2
305	forceArc/forceArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,6
306	forceArc/forceArc puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	0,8
307	forceArc/forceArc puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,0
308	forceArc/forceArc puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,2
309	forceArc/forceArc puls	CrNi 18 8/1.4370	Ar-97,5/CO2-2,5 (M12)	1,6
310	forceArc/forceArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	0,8
311	forceArc/forceArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,0
312	forceArc/forceArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,2
313	forceArc/forceArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,6
314	forceArc/forceArc puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	0,8
315	forceArc/forceArc puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,0
316	forceArc/forceArc puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,2

JOB no.	Processes	Material	Gas	Diameter [mm]
317	forceArc/forceArc puls	CrNi 22 9 3a/1.4462	Ar-97,5/CO2-2,5 (M12)	1,6
319	forceArc/forceArc puls	CrNi 25 20/1.4842	Ar-97,5/CO2-2,5 (M12)	1,0
320	forceArc/forceArc puls	CrNi 25 20/1.4842	Ar-97,5/CO2-2,5 (M12)	1,2
323	forceArc/forceArc puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	1,0
324	forceArc/forceArc puls	CrNi 22 12/1.4829	Ar-97,5/CO2-2,5 (M12)	1,2
326*	coldArc/coldArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	0,8
327*	coldArc/coldArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,0
328*	coldArc/coldArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,2
329*	coldArc/coldArc puls	CrNi 19 12 3 Nb/1.4576	Ar-97,5/CO2-2,5 (M12)	1,6
330*	coldArc/coldArc puls	CrNi 18 8 Mn/1.4370	Ar-97,5/CO2-2,5 (M12)	0,8
331*	coldArc/coldArc puls	CrNi 18 8 Mn/1.4370	Ar-97,5/CO2-2,5 (M12)	1,0
332*	coldArc/coldArc puls	CrNi 18 8 Mn/1.4370	Ar-97,5/CO2-2,5 (M12)	1,2
333*	coldArc/coldArc puls	CrNi 18 8 Mn/1.4370	Ar-97,5/CO2-2,5 (M12)	1,6
334*	coldArc/coldArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	0,8
335*	coldArc/coldArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,0
336*	coldArc/coldArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,2
337*	coldArc/coldArc puls	CrNi 19 12 3/1.4430	Ar-97,5/CO2-2,5 (M12)	1,6
338*	coldArc/coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97,5/CO2-2,5 (M12)	0,8
339*	coldArc/coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97,5/CO2-2,5 (M12)	1,0
340*	coldArc/coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97,5/CO2-2,5 (M12)	1,2
341*	coldArc/coldArc puls	CrNi 22 9 3/1.4462/Duplex	Ar-97,5/CO2-2,5 (M12)	1,6
359	wiredArc/wiredArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,0
360	wiredArc/wiredArc puls	G3Si1/G4Si1	Ar-82/CO2-18 (M21)	1,2

* Only in device series alpha Q and Titan active.

12 Appendix B

12.1 Searching for a dealer

Sales & service parteners
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"More than 400 EWM sales partners worldwide"