GB

Operating instructions

Machines for MIG/MAG, TIG and MMA welding

PHOENIX 301,351,421,521 EXPERT forceArc

PHOENIX 301,351,421,521 EXPERT PULS forceArc

PHOENIX 521 EXPERT HIGHSPEED

PHOENIX EXPERT DRIVE 4,4L,4HS

⚠ **N. B. These operating instructions must be read before commissioning.**
Failure to do so may be dangerous.
Machines may only be operated by personnel who are familiar with the appropriate safety regulations.

CE **The machines bear the conformity mark and thus comply with the**
• EC Low Voltage Directive (2006/95/ EG)
• EC EMC Directive (2004/108/ EG)

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

Dear customer,

Congratulations! You have chosen a quality product from EWM HIGHTEC WELDING GmbH.

EWM machines provide results of the highest perfection thanks to their PREMIUM quality. Therefore we are happy to provide you with a full 3-year warranty according to our operating instructions.

We develop and produce quality! From individual components to the final product, we retain sole responsibility for our machines.

In all their high-tech components, our welding machines embody future-oriented advanced technology at the utmost level of quality. Each of our products is carefully checked; we guarantee that the material and processing of our products is faultless.

These operating instructions contain everything about commissioning the machine, notes regarding safety, maintenance and care, technical data as well as information regarding the warranty. Please heed all these notes to ensure many years of safe operation of the machine.

Thank you for the trust that you have placed in us. We look forward to a long-term partnership with you in the spirit of "ONCE EWM – ALWAYS EWM".

Yours sincerely,

EWM HIGHTEC WELDING GmbH

Bernd Szczesny
Executive management

Machine and Company Data

☞ **Please enter the EWM machine data and your company's data in the appropriate fields.**

EWM HIGHTEC WELDING	EWM HIGHTEC WELDING GMBH D-56271 MÜNDERSBACH	
TYP:		SNR:
ART:		PROJ:
GEPRÜFT/CONTROL:		CE

Name of Customer / company

Adress

Post code / Place

Country

Stamp / Signature of EWM-distibutor

Date of purchase

Name of Customer / company

Adress

Post code / Place

Country

Stamp / Signature of EWM-distibutor

Date of purchase

1 Contents

Item No.: 099-004833-EWM01

2 Safety instructions

2.1 For your safety

Observe accident prevention regulations!
Ignoring the following safety procedures can be fatal!

Proper usage

This machine has been manufactured according to the latest developments in technology and current regulations and standards. It is to be operated only for the use for which it was designed (see chapter Commissioning/Area of application).

Improper usage

However, this machine may be a hazard to persons, animals and property if it is

- not used as directed
- used by unskilled persons who have not been trained
- modified or converted improperly

Our operating instructions will provide you with an introduction into the safe use of the machine. Therefore please read them carefully and only start work when you are familiar with them.

Any person involved in the operation, maintenance and repair of this machine must read and follow these operating instructions, especially the safety precautions. Where appropriate, this should be confirmed by signature.

Furthermore, the

- relevant accident prevention regulations,
- generally accepted safety regulations,
- local regulations, etc. must be observed.

Before undertaking welding tasks, put on prescribed dry protective clothing, e.g. gloves.

- Protect eyes and face with protective visor.

Electric shocks can be fatal!

- Do not touch any live parts in or on the machine!
- The machine may only be connected to correctly earthed sockets.
- Only operate with intact connection lead including protective conductor and safety plug.
- An improperly repaired plug or damaged mains cable insulation can cause electric shocks.
- The machine may only be opened by qualified and authorised specialist staff.
- Disconnect from the mains before opening. Switching off is not sufficient. Wait for 2 minutes until the capacitors have discharged.
- Always put down welding torch, stick electrode holder in an insulated condition.
- The machine must not be used to defrost pipes!

Even touching low voltages can cause you to get a shock and lead to accidents, so:

- Protect yourself from falling before working on platforms or scaffolding.
- During welding ensure that you operate earth tongs, torch and workpiece correctly, and not in ways for which they are not intended. Do not touch live parts with bare skin.
- Only replace electrodes when wearing dry gloves.
- Never use torches or earth cables with damaged insulation.

Smoke and gases can lead to breathing difficulties and poisoning.

- Do not breathe in smoke and gases.
- Ensure that there is sufficient fresh air.
- Keep solvent vapours away from the arc radiation area. Chlorinated hydrocarbon fumes can be converted into poisonous phosgene by ultraviolet radiation.

Workpiece, flying sparks and droplets are hot!
- Keep children and animals well away from the working area. Their behaviour is unpredictable.
- Move containers with inflammable or explosive liquids away from the working area. There is a danger of fire and explosion.
- Never heat explosive liquids, dusts or gases by welding or cutting. There is also a danger of explosions when apparently harmless substances develop high pressures in enclosed containers by heating.

Take care to avoid fire hazards
- Any kind of fire hazards must be avoided. Flames can form e.g. when sparks are flying, when parts are glowing or hot slag is present.
- A constant check must be kept on whether fire hazards have arisen in the working area.
- Highly inflammable objects, such as matches and cigarette lighters for example, must not be carried in trouser pockets.
- You must ensure that fire extinguishing equipment - appropriate for the welding process - is available close to the welding work area and that this equipment can be accessed easily.
- Containers in which fuels or lubricants have been present must be thoroughly cleaned before welding begins. It is not sufficient simply for the receptacle to be empty.
- After a workpiece has been welded, it must only be touched or brought into contact with inflammable material when it has cooled down sufficiently.
- Loose welding connections can completely destroy protective conductor systems of interior installations and cause fires. Before beginning welding work, ensure that the earth tongs are properly fixed to the workpiece or welding bench and that there is a direct electrical connection from the workpiece to the power source.

Noise exceeding 70 dBA can cause permanent hearing damage!
- Wear suitable earmuffs or plugs.
- Ensure that other people who spend time in the working area are not inconvenienced by the noise.

Interference by electrical and electromagnetic fields is possible e.g. from the welding machine or from the high-voltage pulses of the ignition unit.
- As laid down in Electromagnetic Compatibility Standard EN 50199, the machines are intended for use in industrial areas; if they are operated in residential environments, for example, problems may occur in ensuring electromagnetic compatibility.
- The functioning of heart pacemakers can be adversely affected when you are standing near the welding machine.
- It is possible that electronic equipment (e.g. EDP, CNC equipment) in the vicinity of the welding site could malfunction.
- Other mains supply leads, control leads, signal and telecommunications leads above, under and near the welding device may be subject to interference.

Electromagnetic interference must be reduced to a level that no longer constitutes interference. Possible reduction measures:
- Welding machines must be serviced regularly. (see Chap. Maintenance and care)
- Welding leads should be as short as possible and run closely together on or near to the ground.
- Selective shielding of other leads and equipment in the environment can reduce radiation.

Repair and modifications may only carried out by authorised, trained, specialist staff.
The warranty becomes null and void in the event of unauthorised interference.

2.2 Transport and installation

The machines may only be transported and operated in an upright position.

Before carrying away or moving, pull out mains plug and place on the machine.

When the power source is moved and positioned, it is only tilt resistant up to an angle of 10° (as specified in EN 60974-A2). The following points should be noted here in particular:
- Add-on parts are to be distributed evenly according to their weight and suitably secured during transport.
- Obstacles on the ground can cause additional tilting.
- Damaged fixed castors and guide castors and their securing elements should be replaced immediately.
- For machines with a rotating external wire feed unit (e.g. DRIVE 4L), make sure that it is fixed securely and cannot rotate in an uncontrolled manner.
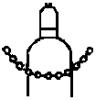
Secure the gas cylinder!
- Place shielding gas cylinders in the holders provided for them and secure with safety chains.
- Take care when handling cylinders; do not throw or heat, guard against them toppling over.
- When moving by crane, take off the gas cylinder from the welding machine.

2.2.1 Ambient conditions

This machine must not be operated in any area where any risk of explosion exists.
The following conditions must be observed during operation:

Temperature range of the ambient air
- During welding: -10°C to +40°C *),
- For transport and storage: -25°C to +55°C *)

*) Using the appropriate coolant.

Relative air humidity
- up to 50% at 40°C
- up to 90% at 20°C

The ambient air must be free of unusual amounts of dust, acids, corrosive gases or substances, etc., assuming these are not produced by the welding process.
Examples of unusual operating conditions:

- unusual corrosive smoke,
- vapour,
- excessive oil vapour,
- unusual vibrations or jolts,
- excessive quantities of dust such as grinding dust etc.,
- severe weather conditions,
- unusual conditions near the coast or on board ship.

When setting up the machine, ensure a free inlet and outlet of air.
The machine is tested to protection class IP23, i.e.:

- Protection against penetration of solid foreign bodies $\varnothing > 12mm$,
- Protection against water spray up to an angle of 60° to the vertical.

2.3 Safety rules while lifting

Carefully observe the accident prevention regulations VBG 9, VBG 9a and VGB 15.
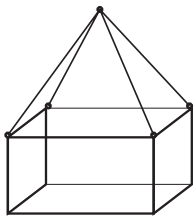
Crane principle
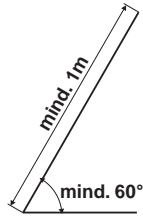
Angle of the suspension ropes

Machines must be connected on the lifting lugs when being lifted by crane (not on the transport bar)!

- Lift on all 4 ring screws simultaneously (as shown in Fig. 1).
- Ensure an even distribution of the load to all four ropes and maintain an angle of at least 60° on the suspension ropes (see Fig. 2). Only use ring chains or suspension ropes of equal length (at least 1 m).
- Use load hooks with circlips and shackles of the relevant size specified in DIN 82 101, Form A, minimum size 0.4.
- Before lifting, always remove the shielding gas cylinder from the welding machine.
- Never lift other loads along with the welding machine, e.g. persons, toolboxes, wire spools etc.
- Avoid jerky movements when raising or lowering the welding machine.
- Wire spools are to be removed from the welding and wire feed units before they are lifted.
- No equipment may be operated during lifting.

2.4 Notes on the use of these operating instructions

These operating instructions are arranged into chapters.

To help you find your way around more quickly, in the margins you will occasionally see symbols along with the sub-headings. These symbols refer to particularly important passages of text which are graded as follows depending on their importance:

Please note:

Technical features which users must observe.

Warning:

Working and operating procedures which must be followed precisely to avoid damaging or destroying the machine.

Caution:

Working and operating procedures which must be followed precisely to avoid risk to persons and includes the "Warning" symbol.

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

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

Symbol	Description
	Press
	Do not press
	Turn
	Switch

3 Technical data

3.1 PHOENIX 301; 351 EXPERT forceArc

PHOENIX	301	351
Adjusting range Welding current/voltage:		
TIG	5A/10.2V - 300A/22.0V	5 A/10.2V - 350A/24.0V
MMA	5A/20.2V - 300A/32.0V	5 A/20.2V - 350A/34.0V
MIG/MAG	5A/14.3V - 300A/29.0V	5A/14.3V - 350A/31.5V
Duty cycle at 20C		
80% DC	300A	-
100% DC	270A	350A
Duty cycle at 40C		
60% DC	300A	350A
100% DC	250A	300A
Load alternation	10 min. (60% DC ≙ 6 min. welding, 4 min. break)	
Open circuit voltage	92V	92V
Mains voltage (tolerances)	3 x 400V (-25% to +20%)	
Frequency	50/60Hz	
Mains fuse (safety fuse, slow-blow)	3 x 16A	3 x 25A
Mains connection lead	H07RN-F4G4	
Max. connected power	14.3kVA	17.8kVA
Recommended generator rating	19.3kVA	24.0kVA
Cosφ/efficiency	099/89%	
Insulation class/protection classification	H/IP 23	
Ambient temperature	-10C to +40C	
Machine/torch cooling	Fan / gas or water[1]	
Cooling capacity at 1l/min[1]	1200W	
Max. flow rate[1]	5l/min	
Max. initial coolant pressure[1]	3.5 bar	
Max. tank capacity[1]	12l	
Coolant[1]	Ex works: KF 23 E (-10C to +40C) or KF 37 E (-20C to +10C)	
Workpiece lead	50mm²	70mm²
Dimensions L/W/H [mm]	1100 x 455 x 950	
Weight in kg	93.5/108([1])	95/111.5 ([1])
Protection classification	IP 23	
Constructed to standards	IEC 60974/EN 60974/VDE 0544 EN 50199/VDE 0544 Part 206/S̲/Ⅽ Є	

[1] Machines with water cooling (DW)

3.2 PHOENIX 421; 521 EXPERT forceArc

PHOENIX	421	521
Adjusting range Welding current/voltage:		
TIG	5A/10.2V - 420A/26.8V	5A/10.2V - 520A/40.8V
MMA	5A/20.2V - 420A/36.8V	5A/20.2V - 520A/40.8V
MIG/MAG	5A/14.3V - 420A/35.0V	5A/14.3V - 520A/40.0V
Duty cycle at 20C		
80% DC	420A	520A
100% DC	380A	450A
Duty cycle at 40C		
60% DC	420A	520A
100% DC	360A	420A
Load alternation	10 min. (60% DC $\triangleq$ 6 min. welding, 4 min. break)	
Open circuit voltage	92V	79V
Mains voltage (tolerances)	3 x 400V (-25% to +20%)	
Frequency	50/60Hz	
Mains fuse (safety fuse, slow-blow)	3 x 35A	3 x 35A
Mains connection lead	H07RN-F4G4	H07RN-F4G6
Max. connection power	23.1kVA	31.6kVA
Recommended generator rating	31.2kVA	42.8kVA
Cosφ/efficiency	0.99/89%	
Insulation class/protection classification	H/IP 23	
Ambient temperature	-10C to +40C	
Machine/torch cooling	Fan/gas or water[1]	
Cooling capacity at 1l/min[1]	1200W	
Max. flow rate[1]	5l/min	
Max. initial coolant pressure[1]	3.5 bar	
Max. tank capacity[1]	12l	
Coolant[1]	Ex works: KF 23 E (-10C to +40C) or KF 37 E (-20C to +10C)	
Workpiece lead	70mm^2	95mm^2
Dimensions L/W/H [mm]	1100 x 455 x 950	
Weight in kg	104/119.5 ([1])	124.5 ([1])
Protection classification	IP 23	
Constructed to standards	IEC 60974/EN 60974/VDE 0544 EN 50199/VDE 0544 Part 206/Ⓢ/ⲥ ∈	

[1] Machines with water cooling (DW)

3.3 PHOENIX DRIVE 4; 4L; PHOENIX EXPERT DRIVE 4; 4L

PHOENIX	DRIVE 4	DRIVE 4L
Supply voltage	42 VAC / 60 VDC	
Max. welding current at 60% DC	520 A	
Wire feed speed	0.5 m/min to 24 m/min	
Standard WF roller fitting	1.0 + 1.2 mm (for steel wire)	
Drive	4-roller (37 mm)	
Torch connection	Euro-central or Dinse-central	
Protection classification	IP 23	
Ambient temperature	-10°C to +40°C	
Dimensions (LxWxH) [mm]	680 x 460 x 265	690 x 300 x 410
Weight	approx. 24 kg	approx. 18 kg
Constructed to standards	IEC 60974 / EN 60974 / VDE 0544 EN 50199 / VDE 0544 Part 206 / C ϵ	

3.4 PHOENIX EXPERT DRIVE 4HS

PHOENIX EXPERT DRIVE 4 HS	
Supply voltage	42 VAC / 60 VDC
Max. welding current at 60% DC	520 A
Wire-feed speed	0.5m/min to 30m/min
Standard WF roller fitting	1.0 +1.2mm (for steel wire)
Drive	4-roller (37mm)
Torch connection	Euro-central or Dinse-central
Protection classification	IP 23
Ambient temperature	-10°C to +40°C
Dimensions (L x W x H) [mm]	680 x 460 x 265
Weight	approx. 24.5kg
Constructed to standards	IEC 60974/EN 60974/VDE 0544 EN 50199/VDE 0544 Part 206/C ϵ

4 Machine description

4.1 PHOENIX 301; 351; 421; 521 EXPERT forceArc

4.1.1 Front view

☞ **The maximum possible machine configuration is given in the text description.**
If necessary, the optional connection may need to be retrofitted (see "Accessories" chapter).
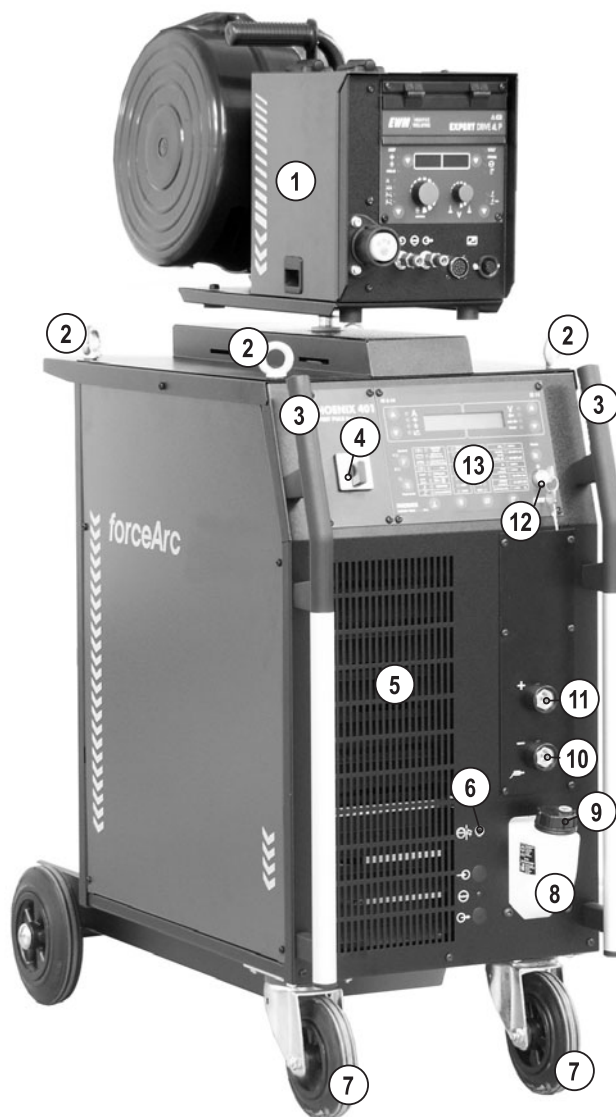
Figure 4-1

Item	Symbol	Description
1		**Wire feed unit**
2		**Lifting lug**
3		**Carrying handle**
4		**Main switch, machine on/off**
5		**Cooling air inlet**
6		**"Automatic cut-out of coolant pump" key button** (press to reset a triggered fuse)
7		**Conveyor rolls, guide castors**
8		**Coolant tank**
9		**Coolant tank cap**
10		**Connection socket, "-" welding current** • MIG/MAG welding: Workpiece connection • TIG welding: Welding current connection for welding torch • MMA welding: Workpiece or electrode holder connection
11		**Connection socket, "+" welding current** • MIG/MAG cored wire welding: Workpiece connection • TIG welding: Workpiece connection • MMA welding: Workpiece or electrode holder connection
12		**Key switch for protection against unauthorised use** Position "1" > changes possible, Position "0" > changes not possible. Please take note of chapter "Key switch"
13		**Control / Operating elements** (see chapter Function specification)

4.1.2 Rear view
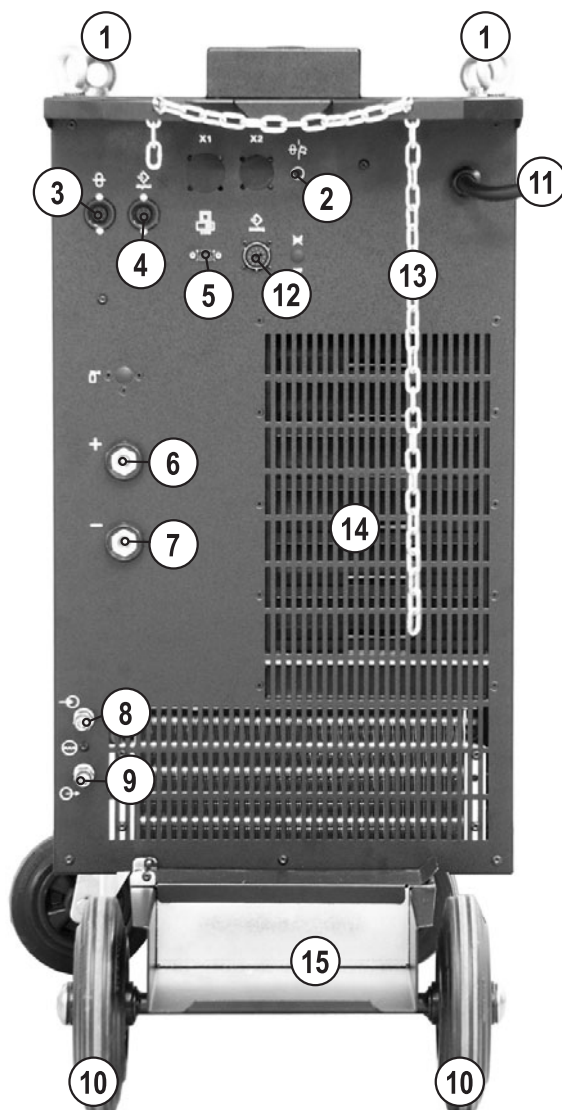
Figure 4-2

Item	Symbol	Description
1		**Lifting lug**
2	42V/4A	**"Automatic cutout" key button** Wire feed motor supply voltage fuse (press to reset a triggered fuse)
3		**7-pole connection socket (digital)** Wire feed unit connection
4	digital	**7-pole connection socket (digital)** For connecting digital accessory components (documentation interface, robot interface or remote control, etc.).
5	PC INT	**PC interface, serial (D-SUB connection socket, 9-pole)**
6	+	**Connection socket, "+" welding current** • MIG/MAG welding: Welding current to "WF" central connection/torch
7	—	**Connection socket, "-" welding current** • MIG/MAG cored wire welding: Welding current to "WF" central connection/torch
8		**Coolant return from the DV device (red rapid-action closure coupling)**
9		**Coolant water supply to the DV device (blue rapid-action closure coupling)**
10		**Conveyor rolls, fixed castors**
11		**Strain relief with mains connection cable**
12	analog	**Automation interface, 19-pole (analogue)** (see Function Specification chapter)
13		**Safety chain**
14		**Cooling air outlet**
15		**Cylinder bracket**

4.2 PHOENIX DRIVE 4L; PHOENIX EXPERT DRIVE 4L

4.2.1 Front view
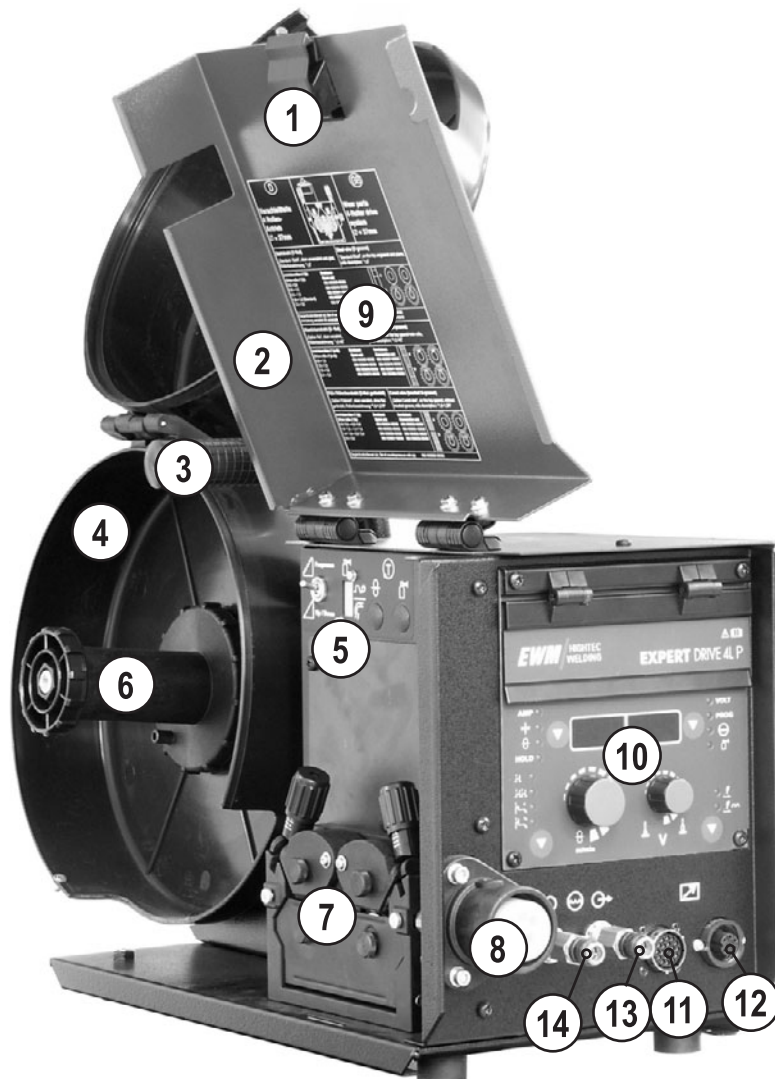
Figure 4-3

Item	Symbol	Description
1		**Slide latch, lock for the protective cap**
2		**Cover for wire delivery unit and operating elements**
3		**Carrying handle with integrated lifting lug**
4		**Wire spool casing**
5		**Operating elements (see chapter Function specification)**
6		**Spool holder**
7		**Wire delivery unit**
8		**Euro-central connector (welding torch connection)** Welding current, shielding gas and torch trigger included
9		**Label "Wire feed parts subject to wear"**
10		**Control / Operating elements** (see chapter Function specification)
11		**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, intermediate drive, etc.)
12		**7-pole connection socket (digital)** For connecting digital accessory components (remote control, welding torch control lead, etc.)
13		**Rapid-action closure coupling, blue (coolant supply)**
14		**Rapid-action closure coupling, red (coolant return)**

4.2.2   Rear view
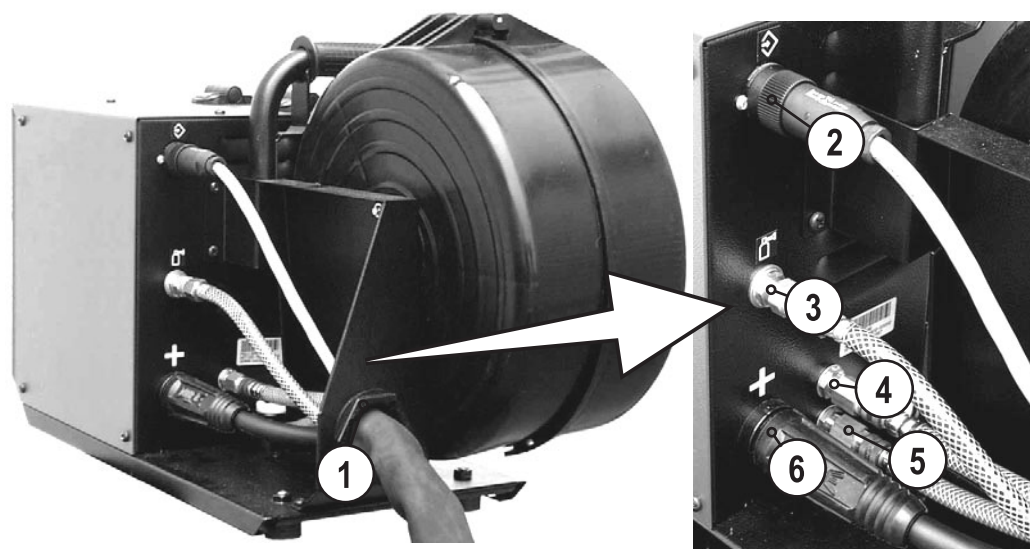
Figure 4-4

Item	Symbol	Description
1		**Intermediate tube package strain relief**
2		**7-pole connection socket (digital)** • Control lead for wire feed unit
3		**Connecting nipple G¼, shielding gas connection**
4		**Rapid-action closure coupling, red (coolant return)**
5		**Rapid-action closure coupling, blue (coolant supply)**
6		**Connector plug, welding current "+"** Welding current connection on wire feed unit

4.3 PHOENIX DRIVE 4; PHOENIX EXPERT DRIVE 4

4.3.1 Front view

Figure 4-5

Item	Symbol	Description
1		**Cover for wire delivery unit and operating elements**
2		**Transport bar**
3		**Control / Operating elements** (see chapter Function specification)
4		**Rubber feet**
5		**Recessed grip (catch) for opening the cover**
6		**Slide latch, lock for the protective cap**
7	⊙	**Euro-central connector (welding torch connection)** Welding current, shielding gas and torch trigger included
8	↗	**7-pole connection socket (digital)** For connecting digital accessory components (remote control, welding torch control lead, etc.)
9		**Rapid-action closure coupling, red (coolant return)**
10		**Rapid-action closure coupling, blue (coolant supply)**
11	↗	**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, intermediate drive, etc.)

4.3.2   Inside view

Figure 4-6

Item	Symbol	Description
1		**Operating elements (see chapter Function specification)**
2		**Wire delivery unit**
3		**7-pole connection socket (digital)** • Control lead for wire feed unit
4		**Connecting nipple G¼, shielding gas connection**
5		**Spool holder**
6		**Rapid-action closure coupling, blue (coolant supply)**
7		**Connector plug, welding current "+"** Welding current connection on wire feed unit
8		**Rapid-action closure coupling, red (coolant return)**

5 Functional characteristics

5.1 Machine control – Operating elements

5.1.1 Welding machine control
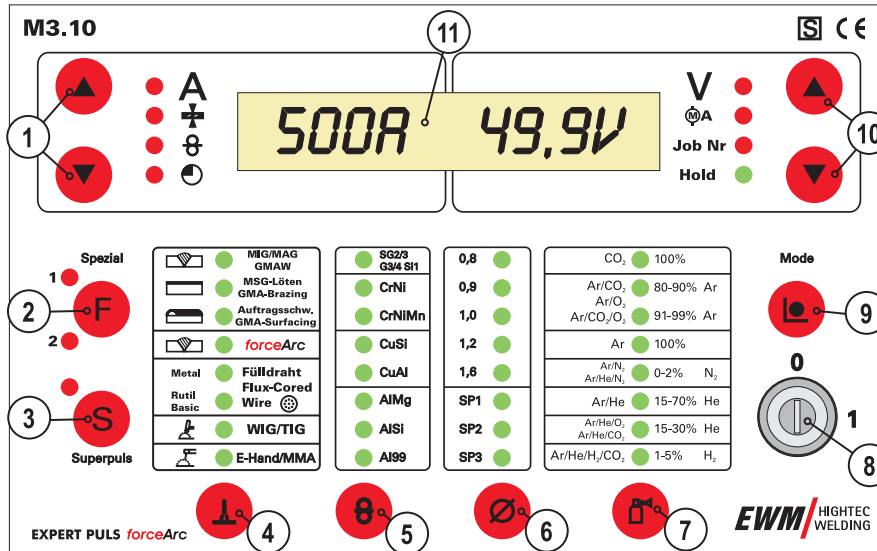
Figure 5-1

Item	Symbol	Description
1		**"Up" and "Down" buttons, left**
		Switching of the digital display between the following welding parameters:
		A — Welding current (nominal, actual and hold values)
		⌖ — Material thickness (nominal value)
		— Wire speed (nominal, actual and hold values)
		☽ — Operating hour counter
		Selection of further welding parameters in lower programming levels
2		**Not used at present**
3		**Superpulse key button with signal light**
		Signal light on > Superpulse active
		Signal light is off > Superpulse inactive
4		**"Select welding process" key button**
		MIG/MAG GMAW — MIG/MAG welding
		MSG-Löten GMA-Brazing — MSG brazing
		Auftragsschw. GMA-Surfacing — Deposit welding
		forceArc — ForceArc MIG/MAG welding
		Metal — Flux-cored wire welding, metal
		Rutil Basic — Flux-cored wire welding, rutile / basic
		WIG/TIG — TIG welding
		E-Hand/MMA — MMA welding

Item	Symbol	Description
5		**"Select material type" key button**
		SG2/3 G3/4 Si1 — Steel
		CrNi — Chrome / nickel
		CrNiMn — Chrome / nickel / manganese
		CuSi — Copper / silicon
		CuAl — Copper / aluminium
		AlMg — Aluminium / magnesium
		AlSi — Aluminium / silicon
		Al99 — 99% aluminium
6		**"Select wire diameter / select special jobs" key button**
		0,8 — 0.8 mm wire diameter
		0,9 — 0.9 mm wire diameter
		1,0 — 1.0 mm wire diameter
		1,2 — 1.2 mm wire diameter
		1,6 — 1.6 mm or greater wire diameter (depending on output)
		SP1 — Special job 1 (fast selection of JOB 129)
		SP2 — Special job 2 (fast selection of JOB 130)
		SP3 — Special job 3 (fast selection of JOB 131)
7		**"Select gas type" button**
		CO_2 100% — 100% carbon dioxide
		80-90% Ar — Argon / carbon dioxide mixture
		91-99% Ar — Argon / oxygen mixture or argon / carbon dioxide / oxygen mixture
		100% — 100% argon
		0-2% N_2 — Argon / nitrogen mixture
		15-70% He — Argon / helium mixture
		15-30% He — Argon / helium mixture
		1-5% H_2 — Argon / hydrogen mixture
8	0 / 1	**Key switch for locking the control**
		Position "1" > Changes can be made
		Position "0" > Changes cannot be made
9		**Mode key button**
		Select further programming levels
		(program steps mode, main program A mode, Job Manager, Job Info)
10	V / $\dot{M}$A / Job Nr / Hold	**"Up" and "Down" buttons, right**
		Switching of the digital display between the following welding parameters:
		V — Welding voltage (nominal / actual values)
		$\dot{M}$A — Motor current (current value)
		Job Nr — JOB number
		Hold — After each completed welding process, the last parameter values used for the welding process are shown in the main program on the display; the signal light is on.
11	500A 49,9V	**LCD display, 16-digit**
		Display of all welding parameters and their values

5.1.2 M3.70 wire feed unit control
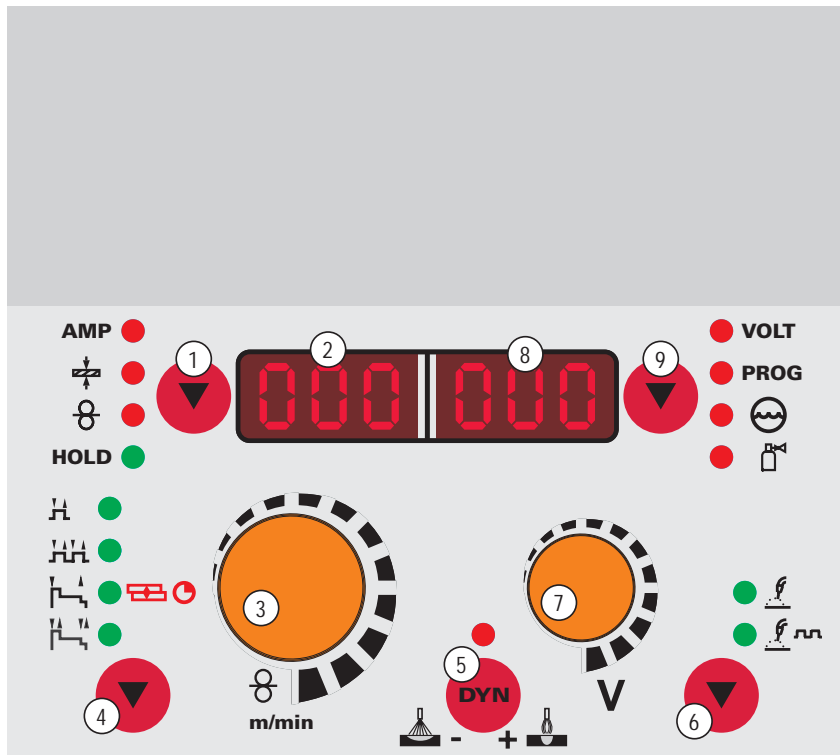
Figure 5-2

Item	Symbol	Description
1	AMP ● ↔ ● 8 ● HOLD ● ▼	**"Parameter selection ▼" (left)**
	AMP ●	Welding current (nominal, actual and hold values)
	↔ ●	Material thickness (nominal value)
	8 ●	Wire speed (actual, nominal and hold values)
	HOLD ●	After each completed welding process, the last parameter values used for the welding process are shown on the display in the main program; the signal light is on
2	000	**LCD display, 3-digit (left)**
		Display of the parameters and values: Welding current, material thickness, wire speed, hold values
3	(orange dial) m/min	**"Wire speed / welding parameter setting" rotary dial**
		Infinitely adjustable setting of the wire speed from 0.5m/min to 24m/min (HS: 30m/min) (welding performance, one-dial operation)
4	▼	**"Select operating mode" button**
	⊓ ●	Non-latched
	⊓⊓ ●	Latched
	⌐⌐ ● ⟐ ●	Non-latched special (LED green) / MIG spots (LED red)
	⌐⌐ ●	Special latched
5	DYN ⟅ - + ⟆	**"Arc characteristics, choke effect" button**
	+ ⟆	Arc harder and narrower
	⟅ -	Arc softer and wider
6	● ⌇ ● ⌇∽ ▼	**"Select welding type" button**
	● ⌇	MIG/MAG standard welding
	● ⌇∽	MIG/MAG pulse arc welding (PULS series only)

Item	Symbol	Description
7		**"Arc length correction / program number" rotary dial** • Arc length correction from -9.9 V to +9.9 V • Setting the program number 0-15 (not possible if accessory components such as program torches is connected)
8		**LCD display, 3-digit (right)** Display of the parameters and values: Welding voltage, program number, coolant low, temperature error
9		**"Parameter selection ▼" button (right)** ● VOLT Welding voltage (actual, nominal and hold values) ● PROG Program number ● ⌣ Coolant error ● ⌐ Temperature error

5.1.2.1 Covered operating elements
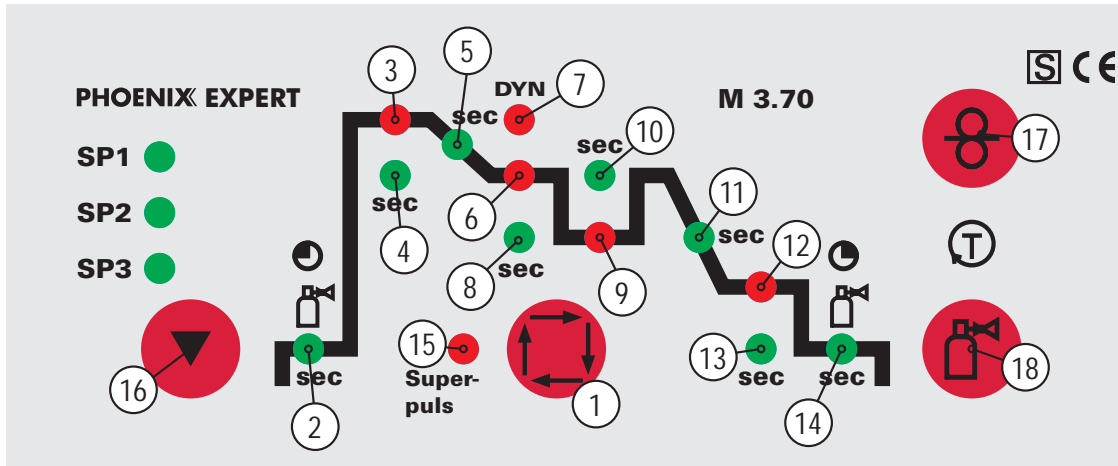
Figure 5-3

Item	Symbol	Description
1		**"Select welding parameters" button**
		This button is used to select the welding parameters depending on the welding process and operating mode used.
2		**LED "Gas pre-flow time"**
		Setting range 0.0 sec to 20.0 sec
3		**LED "start program (P_{START})"**
		• Wire speed setting range 1 % to 200 % of main program P_A
		• Setting range for arc length correction -9.9 V to +9.9 V
4	sec	**LED "Start time"**
		Absolute setting range 0.0 sec to 20.0 sec (0.1s increments).
5	sec	**LED "Duration of slope from program P_{START} to main program P_A"**
		Setting range 0.0 sec to 20.0 sec (0.1s increments).
6		**LED "Main program (P_A)"**
		• Wire speed setting range WF-min. to WF-max.
		• Setting range for arc length correction -9.9 V to +9.9 V
7	DYN	**LED "Dynamics"**
		Setting range -40 to +40
8	sec	**LED "Duration of main program P_A"**
		Absolute setting range 0.0 sec to 20.0 sec (0.1s increments) for superpulse.
9		**LED "Reduced main program (P_B)"**
		• Wire speed setting range 1 % to 200 % of main program P_A
		• Setting range for arc length correction -9.9 V to +9.9 V
10	sec	**LED "Duration of reduced main program P_B"**
		Absolute setting range 0.0 sec to 20.0 sec (0.1s increments) for superpulse.
11	sec	**LED "Slope duration from program P_A or P_B to end program P_{END}"**
		Setting range 0.0 sec to 20.0 sec (0.1s increments).
12		**LED "End program (P_{END})"**
		• Wire speed setting range 1 % to 200 % of main program P_A
		• Setting range for arc length correction -9.9 V to +9.9 V
13	sec	**LED "Duration of end program P_{END}"**
		Setting range 0.0 sec to 20.0 sec (0.1s increments).

Item	Symbol	Description
14	⦶ 🜷	**LED "Gas post-flow time"** Setting range 0.0 sec to 20.0 sec
15	⬤ Super-puls	**"Superpulse" LED** On when the function is activated
16	SP1 ⬤ SP2 ⬤ SP3 ⬤ ▼	**"Special job" button** Select the special jobs SP1 to SP3 (JOB 129 to 131)
17	🜷	**"Wire inching" button** See also "Commissioning/Inching the Wire Electrode" chapter
18	🜷	**"Gas test / rinse" button** • Gas test: For setting the shielding gas quantity • Rinse: For rinsing longer tube packages See also "Commissioning/Shielding Gas Supply" chapter

5.1.3 M3.00 wire feed unit control
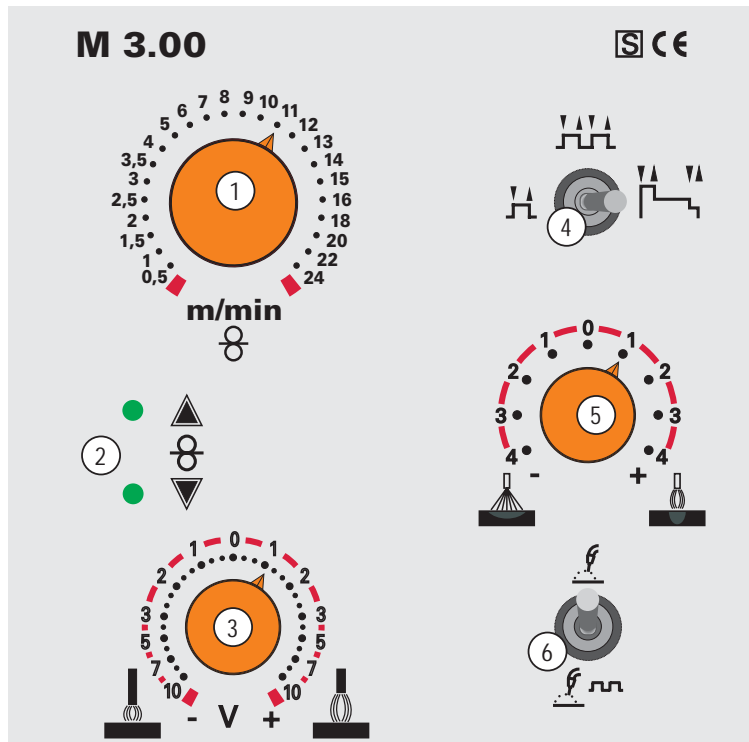
Figure 5-4

Item	Symbol	Description
1		**"Wire speed" rotary dial** Infinitely adjustable setting of the wire speed from min. to max. (welding output, one-dial operation)
2		**"WF-min. / WF-max." signal lights** ● ▲ Max. WF reached ● ▼ Min. WF reached
3		**"Arc length correction" rotary dial** Arc length correction from -10 V to + 10 V
4		**"Operating mode" changeover switch** Non-latched Latched Latched special
5		**"Dynamic correction / choke effect" rotary switch** Dynamic correction or choke effect setting in 9 stages (hard, narrow to soft, wide arc)
6		**"Welding type" changeover switch** Standard MIG/MAG welding MIG/MAG pulse arc welding (EXPERT PULS only)

5.1.4 Operating elements in the machine
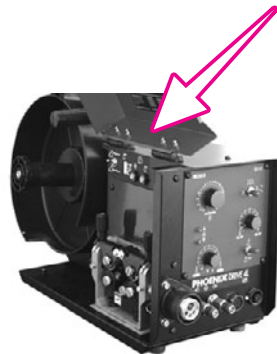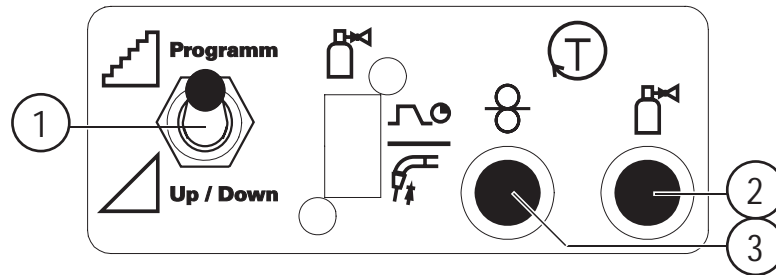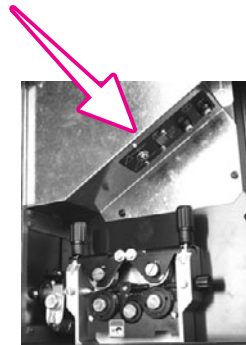
PHOENIX DRIVE 4 L   PHOENIX DRIVE 4

Figure 5-5

Item	Symbol	Description
1		**"Program or up/down function" changeover switch** This changeover switch is only effective on the POWERCONTROL/POWERCONTROL 2 welding torch Programm — Change over welding programs using POWERCONTROL 2 program torch. Up / Down — Set infinite welding performance with the POWERCONTROL 2 program torch, up/down function.
2		**"Gas test" button** The welding voltage and wire feed remain off when testing and setting the gas flow. Pressing the key button once causes shielding gas to flow for approx. 25 seconds. The button can be pressed again at any time to cancel the process. This ensures a high standard of safety for the welder by preventing accidental ignition of the arc.
3		**"Wire inching" button** For inching the wire electrode when changing the wire spool (speed = 50% of set wire speed) The welding wire is inched into the tube package with the current off and without the gas being expelled.

☞ **Wire inching and gas test with M3.7x control using the relevant buttons on the control**

5.2 MIG/MAG welding

5.2.1 Definition of MIG/MAG welding tasks

The PHOENIX product range has been designed so that it is very easy and quick to operate, but still provides all the functions one could ever need.

128 JOBs (welding tasks) have been pre-programmed for the most common applications. The JOB is defined using the four basic welding parameters of welding process, material type, wire diameter and gas type.

The digital system calculates the required process parameters, such as the welding current, welding voltage and pulse current according to the operating point specified.

The user need only use the key buttons (signal lamps indicate the welding parameters selected) to enter the JOB and specify the operating point using one-dial operation on the wire feed button.

According to the pre-programmed JOBs, the typical or frequently used types of gas and wire diameters for the material are suggested automatically depending on the material type selected. It is impossible to select inappropriate combinations for welding.

There are presets for other welding parameters such as gas pre-flow, free-burning, etc. for numerous applications, however these can be changed as necessary.

The parameters and functions described here can also be programmed by PC using the PC300.Net welding parameter software.
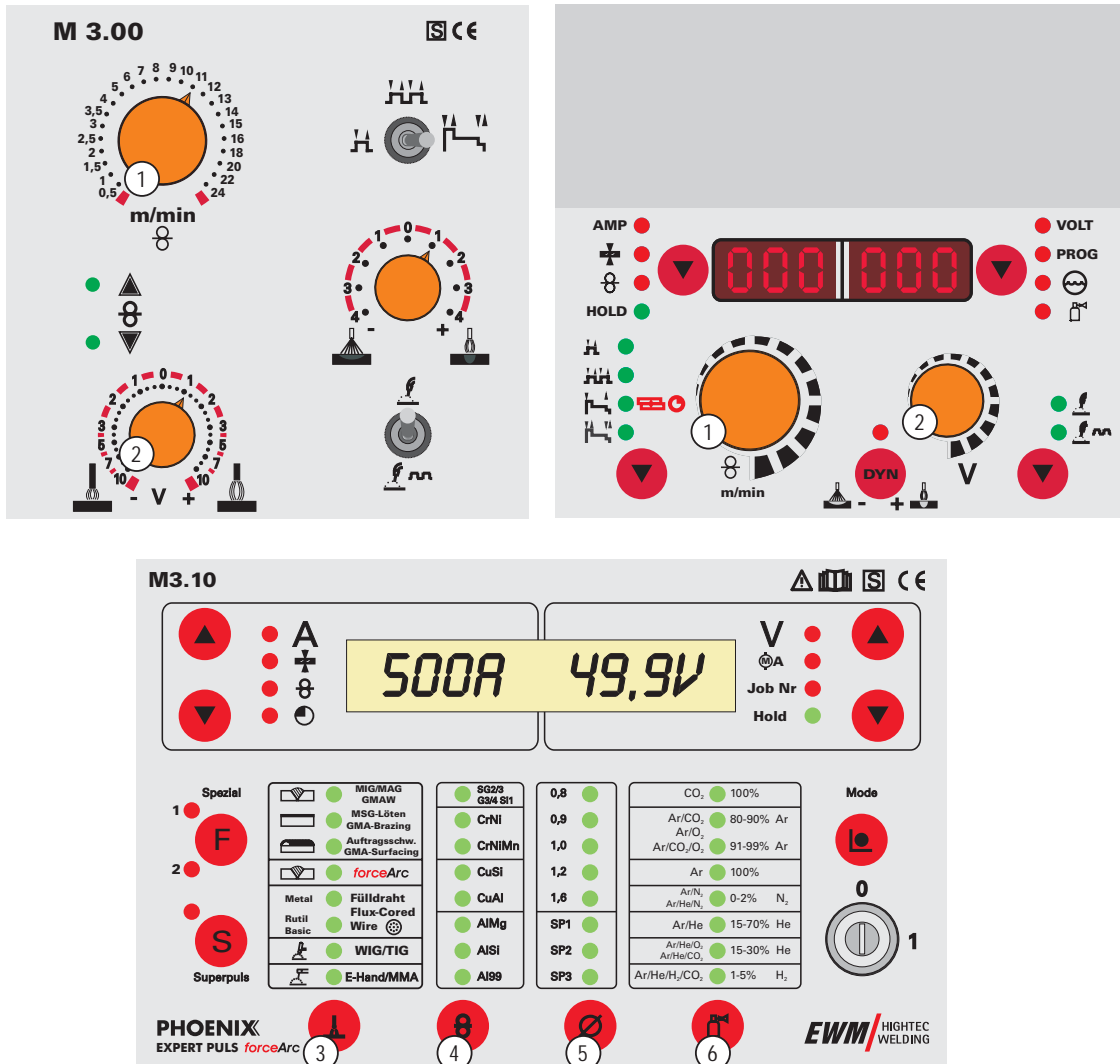
Figure 5-6

Item	Description
1	"Wire speed" rotary dial
2	"Arc length correction" rotary dial
3	"Select welding process" button
4	"Select material type" key button
5	"Select wire diameter / select special jobs" key button
6	"Select gas type" button

5.2.2 Selecting MIG/MAG welding tasks

5.2.2.1 Basic welding parameters

The welding task is selected on the welding machine control.
LEDs display the welding parameter selection.

☞ **It is only possible to change the 4 basic welding parameters if:**
- No welding current is flowing.
- The key switch is set to position "1".

Operating Element	Action	Result	Display
	X x	**Select welding process** The signal light displays the selection.	No change
	X x	**Select material type** The signal light displays the selection.	No change
	X x	**Select wire diameter** The signal light displays the selection.	No change
	X x	**Select gas type** The signal light displays the selection.	No change

5.2.2.2 Operating mode

The setting is carried out using the operating elements on the relevant wire feed machine control.

PHOENIX DRIVE 4 / 4L M3.00

Control element	Action	Result	Display
		Select operating mode	No change

PHOENIX DRIVE 4 / 4L M3.7x

Control element	Action	Result	Display
	X x	**Select operating mode** The signal light displays the selection.	No change

5.2.2.3 Welding type

☞ **Can only be selected using pulse arc welding machines (PHOENIX PULS).**

PHOENIX DRIVE 4 / 4L M3.00

Control element	Action	Result	Display
		Select welding type	No change

PHOENIX DRIVE 4 / 4L M3.7x

Control element	Action	Result	Display
	X x	**Select welding type** The signal light displays the selection. 🟢 Standard MIG/MAG welding 🟢 Pulse arc MIG/MAG welding	No change

5.2.2.4 Choke effect / dynamics

PHOENIX DRIVE 4 M3.00

Operating element	Action	Result	Display
		"Dynamic correction/choke effect" rotary switch Dynamic correction or choke effect setting in 9 stages (hard, narrow to soft, wide arc)	No change

PHOENIX DRIVE 4 M3.7x

Operating element	Action	Result	Display
DYN ⬒ - + ⬒	👆	**Select Dynamics welding parameter** Dynamic" ● comes on.	-40 to +40
🔘 m/min	🔄👆	**Dynamics setting** **+** ⬒ Arc harder and narrower ⬒ **-** Arc softer and wider	-40 to +40

5.2.2.5 Superpulses

☞ **PHOENIX DRIVE 4 with M3.00 control:**
- The settings for superpulses and wire burn-back are made on the M3.10 welding machine control

PHOENIX DRIVE 4 with M3.70 control:
- The settings for superpulses and wire burn-back are made either on the M3.10 welding machine control or on the M3.71 wire feed unit control

M3.10 welding machine control:

Operating element	Action	Result	Display
S Superpuls	1 x 👆	**Switch superpulses on or off** The signal light indicates the selection.	No change

M3.70 wire feed machine control:

Operating element	Action	Result	Display
🔄	X x 👆	**Selects superpulses** Press the "Select welding parameters" button until "on/off Sup" appears on the display.	on/off Sup
🔘 m/min	🔄👆	**Switches function on or off**	on/off Sup
● Super-puls		**The signal light indicates when the function has been activated.**	

5.2.2.6 Wire burn-back

M3.10:

Operating element	Action	Result	Display
🔴	1 x 👆	Select program sequence mode	Program steps
▲ A ✚ ⊕ ⊖ ▼	x x 👆	Select "RUECK" parameter using the ▲ "Up" and ▼ "Down" buttons (left)	RUECK 2-500
V ⊕A Job Nr Hold ▲ ▼	x x 👆	Adjust the selected parameter using the ▲ "Up" and ▼ "Down" buttons (right)	RUECK 2-500
🔴	3 x 👆	Machine returns to Display mode	

M3.70:

Operating element	Action	Result	Display
🔄	3 sec. 👆	Selects wire burn-back	0 rbd
🔘 m/min	🔄👆	Parameter setting (setting range 0 to 499)	0 rbd

5.2.3 MIG/MAG operating point

The operating point (welding output) is specified using the principle of MIG/MAG one-dial operation, i.e. the user need only specify the operating point by setting the required wire speed, for example, and the digital system will calculate the optimum values for welding current and voltage (operating point).

The operating point setting can also be specified using the accessory components such as the remote control, welding torch, etc.

5.2.3.1 Selecting the display unit

The operating point (welding performance) can be displayed as the welding current, material thickness or wire speed.

Am Schweißgerät mit Steuerung M3.1x

Operating element	Action	Result		Display
▲ A / ♢ / 8 ▼	X x ✍	Switching the LCD display between: ● A ● ♢ ● 8	Welding current, Material thickness, Wire speed	No change

On the wire feed unit using control M3.70

Operating element	Action	Result		Display
AMP ● / ♢ ● / 8 ● / HOLD ● ▼	X x ✍	Switching the LCD display between: AMP ● ♢ ● 8 ●	Welding current Material thickness, Wire speed	No change

Example application

You are welding aluminium (material= AlMg, gas= Ar 100%, wire diameter= 1.2 mm and 5 mm material thickness), you don't have any specifications and do not know the required settings, e.g. for the wire speed.

Switch to the material thickness display. Set the operating point to 5 mm.
This corresponds to a wire speed of 8.4 m/min, for example.

5.2.3.2 Operating point setting using material thickness, welding current, wire speed

In the situations given below, only the wire speed is given to represent the operating point.

Operating Element	Action	Result	Display
M3.00 M3.30 · M.3.70	↻✋	Operating point is set using the wire speed previously set	Parameter selected is displayed

5.2.3.3 Arc length correction setting

The "Arc length correction" setting option is provided for adjusting the arc length for any specific welding task.

Operating Element	Action	Result	Display
M3.00 M3.30 · M.3.70	↻✋	Arc length correction setting	Parameter selected is displayed

5.2.3.4 Choke effect / dynamics

PHOENIX DRIVE 4 M3.00

Operating element	Action	Result	Display
		"Dynamic correction/choke effect" rotary switch Dynamic correction or choke effect setting in 9 stages (hard, narrow to soft, wide arc)	No change

PHOENIX DRIVE 4 M3.7x

Operating element	Action	Result	Display
		Select Dynamics welding parameter Dynamic" $\overset{DYN}{\bullet}$ comes on.	-40 to +40
		Dynamics setting ✛ Arc harder and narrower ▬ Arc softer and wider	-40 to +40

5.2.3.5 Wire burn-back

☞ **PHOENIX DRIVE 4 with M3.00 control:**
- The settings for superpulses and wire burn-back are made on the M3.10 welding machine control

PHOENIX DRIVE 4 with M3.70 control:
- The settings for superpulses and wire burn-back are made either on the M3.10 welding machine control or on the M3.71 wire feed unit control

M3.10:

Operating element	Action	Result	Display
	1 x	Select program sequence mode	Program steps
	x x	Select "RUECK" parameter using the ▲ "Up" and ▼ "Down" buttons (left)	RUECK 2-500
	x x	Adjust the selected parameter using the ▲ "Up" and ▼ "Down" buttons (right)	RUECK 2-500
	3 x	Machine returns to Display mode	

M3.70:

Operating element	Action	Result	Display
	3 sec.	Selects wire burn-back	0 ┌ bd
		Parameter setting (setting range 0 to 499)	0 ┌ bd

5.2.3.6 Accessory components for operating point setting

Accessory component	Description
PHOENIX R10 remote control	See "Remote controls" chapter
PHOENIX R20 remote control	See "Remote controls" chapter
PHOENIX R40 remote control	See Phoenix R40 operating instructions
MIG/MAG Powercontrol program torch	See "MIG/MAG Powercontrol program torch" chapter
MIG/MAG Powercontrol2 torch	See Powercontrol2 torch operating instructions
PC300.Net PC software	See PC300.Net operating instructions
RINT X11 robot interface, industrial bus interface	See RINTX11 operating instructions

5.2.4 MIG/MAG welding data display

To the left and right of the LCD display on the control there are 2 "arrow keys" on each side for selecting the welding parameter to be displayed. The 🔺 button is used to scroll through the parameters from the bottom upwards and the 🔻 button is used to scroll downwards from the top.

As soon as changes have been made to the settings after welding (display on hold values), the display switches back to the nominal values.

Figure 5-7

Parameter	Before welding Nominal value	During welding Actual value	During welding Nominal value	After welding Hold value	After welding Nominal value
Welding current	●	●		●	
Material thickness	●		●		●
Wire speed	●	●		●	
Welding voltage	●	●		●	
Motor current		●		●	
JOB no.	●				
Operating time		●			

5.2.5 MIG/MAG functional sequences / operating modes

☞ **The following applies during the wire creep phase:**
If there is no welding current flowing after 5 seconds (factory setting), the ignition process is cancelled (ignition error).

The following applies during the welding phase:
If the arc is broken during the welding process and is not re-ignited within 5 seconds (factory setting), there is an automatic cut-out.

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

5.2.5.1 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
PSTART	Ignition program
PA	Main program
PB	Reduced main program
PEND	End program
t2	Spot time

5.2.5.2 Non-latched mode

Figure 5-8

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 (main program P_A).

Step 2
- Release torch trigger.
- WF motor stops.
- Arc is extinguished after the preselected wire burn-back time expires.
- Gas post-flow time elapses.

5.2.5.3 Non-latched operation with superpulse

Figure 5-9

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.

5.2.5.4 Special, non-latched
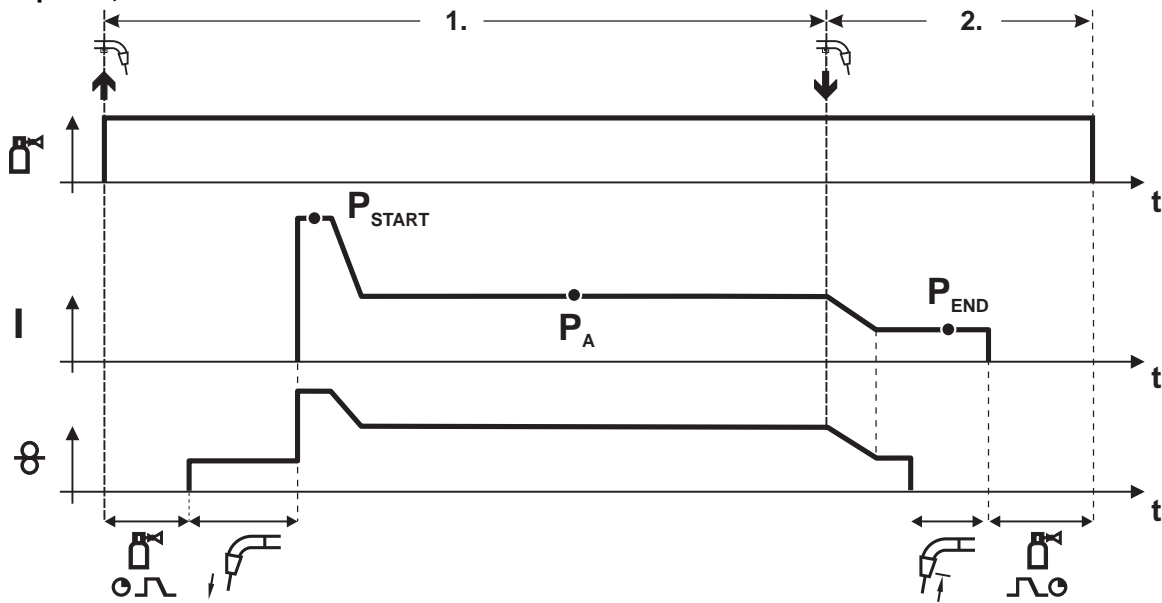
Figure 5-10

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.

5.2.5.5 Spots
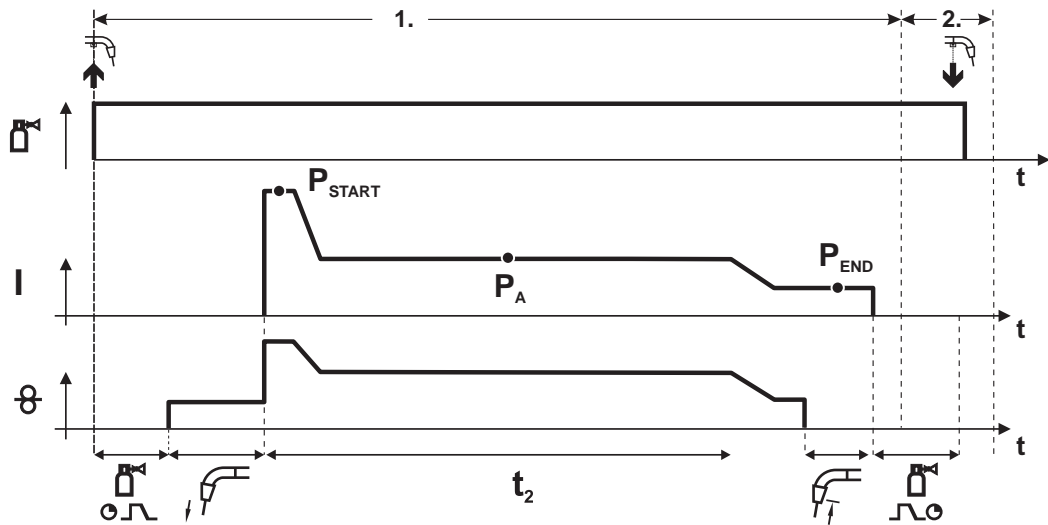
Figure 5-11

☞ **The start time t_start must also be calculated at spot time t_2. The start and spot times are set in the "Program steps mode" menu.**

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, spot time starts).
- Slope on main program P_A.
- After the set spot time elapses, slope goes to end program P_END.
- WF motor stops.
- Arc is extinguished after the pre-selected wire burn-back time elapses.
- Gas post-flow time elapses.

Step 2
- 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).**

5.2.5.6 Special, non-latched with superpulse
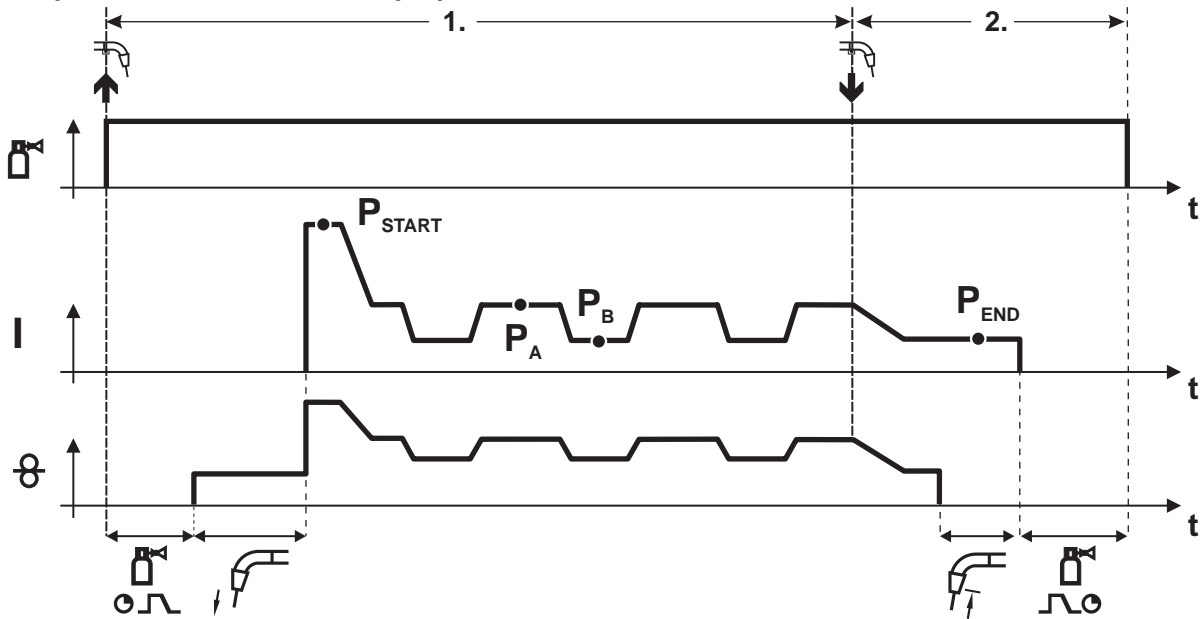
Figure 5-12

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.

5.2.5.7 Latched mode
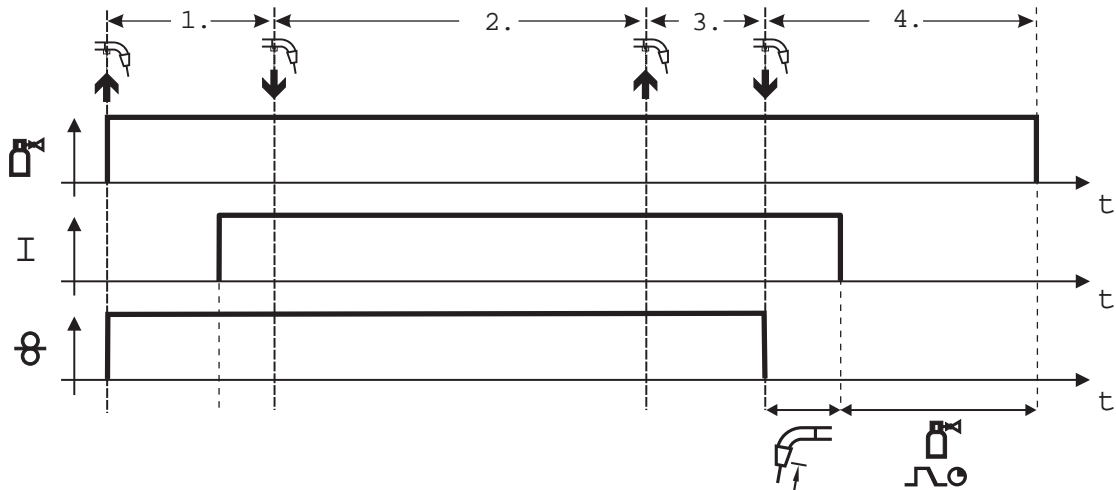
Figure 5-13

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.

5.2.5.8 Latched mode with superpulse
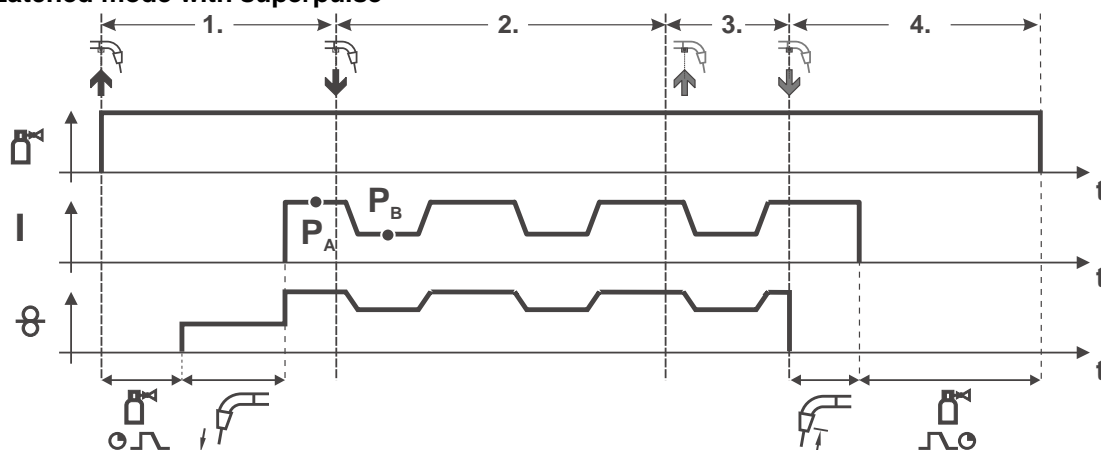
Figure 5-14

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.

5.2.5.9 Latched mode with alternating welding process

☞ **Pulse arc welding machines only.**
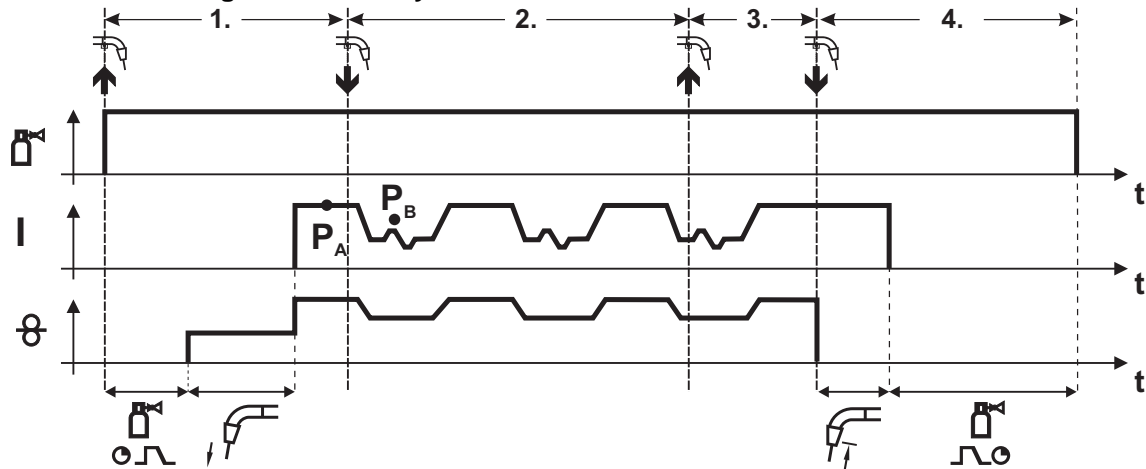
Figure 5-15

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)

2nd cycle:

☞ **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.**
- 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.

5.2.5.10 Latched special
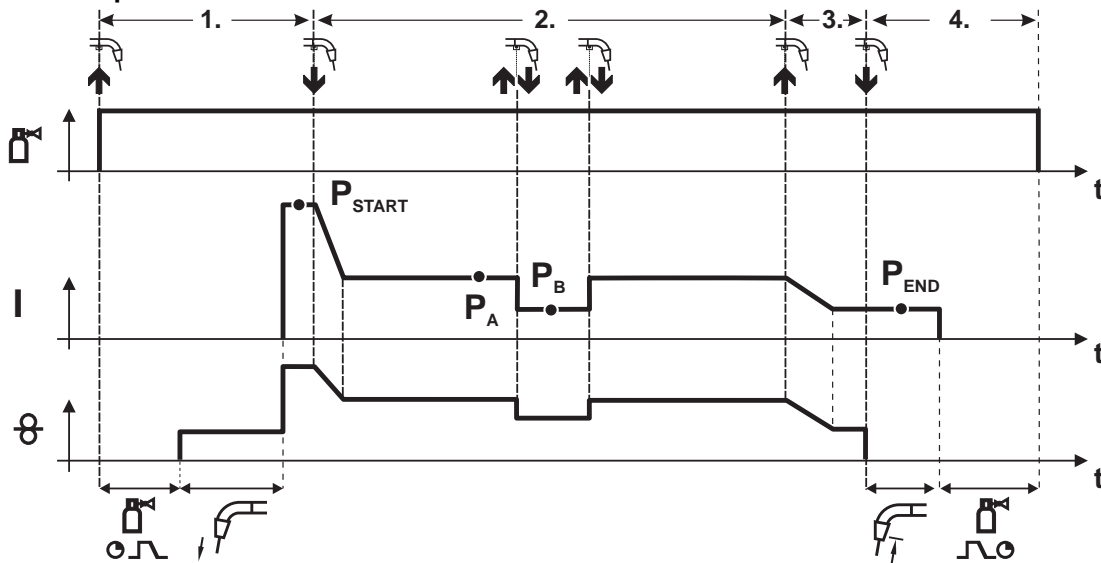
Figure 5-16

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.

5.2.5.11 Latched special with welding process alternation

☞ **Pulse arc welding machines only.**
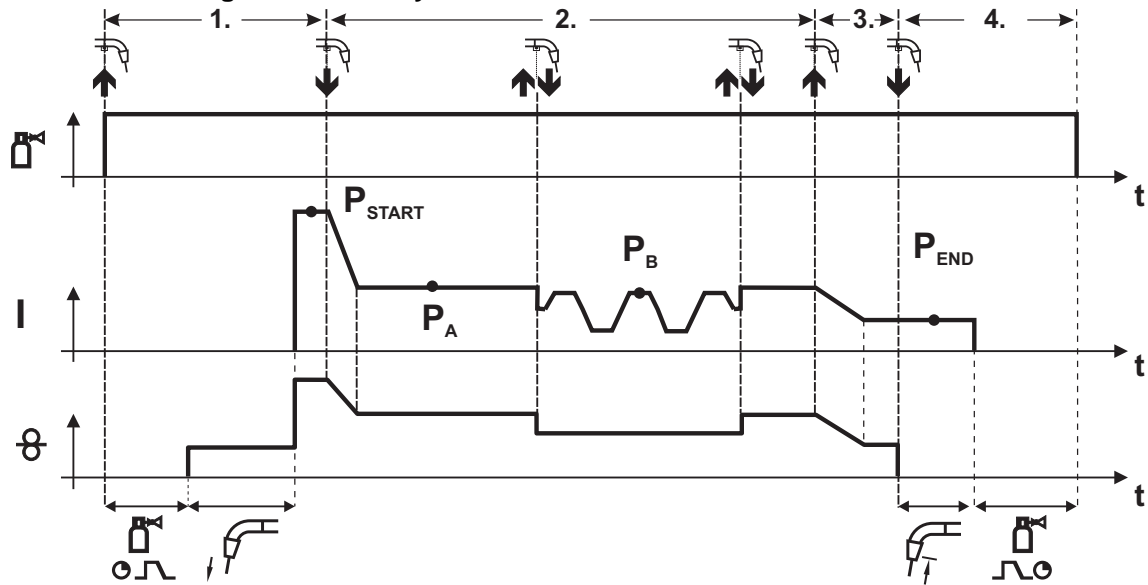
Figure 5-17

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.

5.2.5.12 Special, latched with superpulse
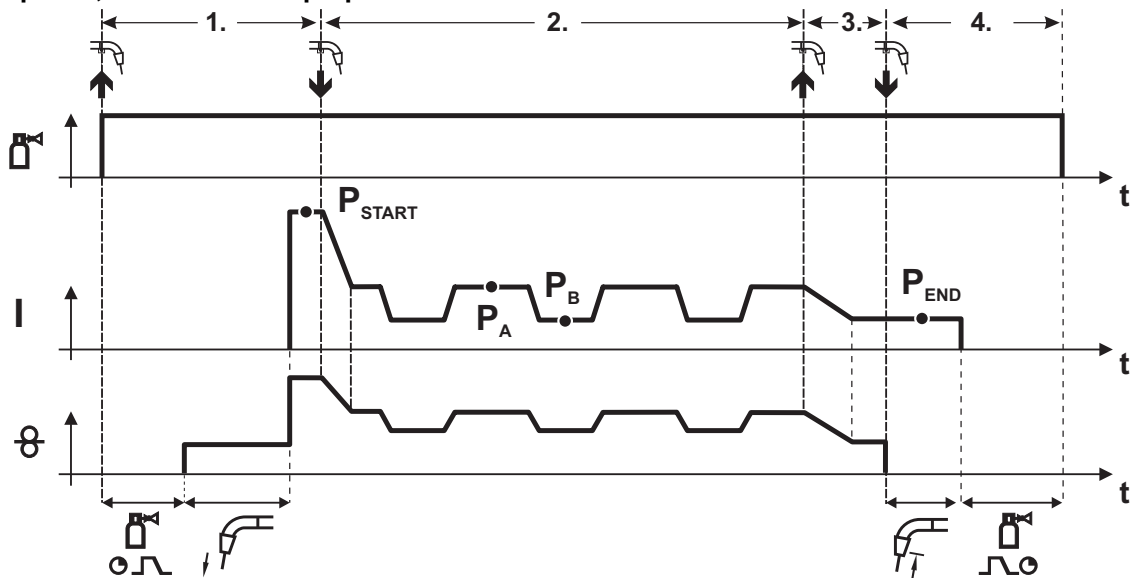
Figure 5-18

Step 1
- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)
- Wire feed motor runs at "creep speed".
- Arc ignites after the wire electrode makes contact with the workpiece, welding current 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.

5.2.5.13 Latched special with alternating welding process
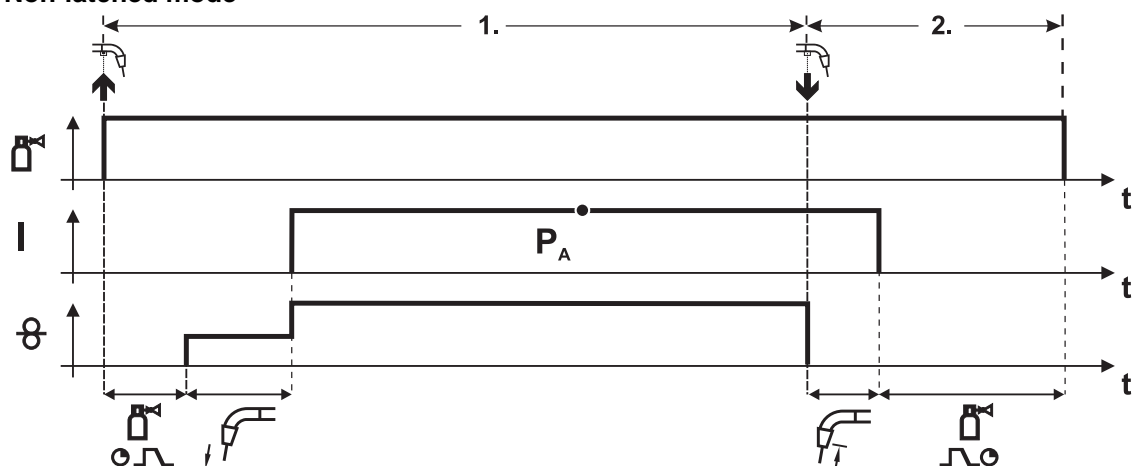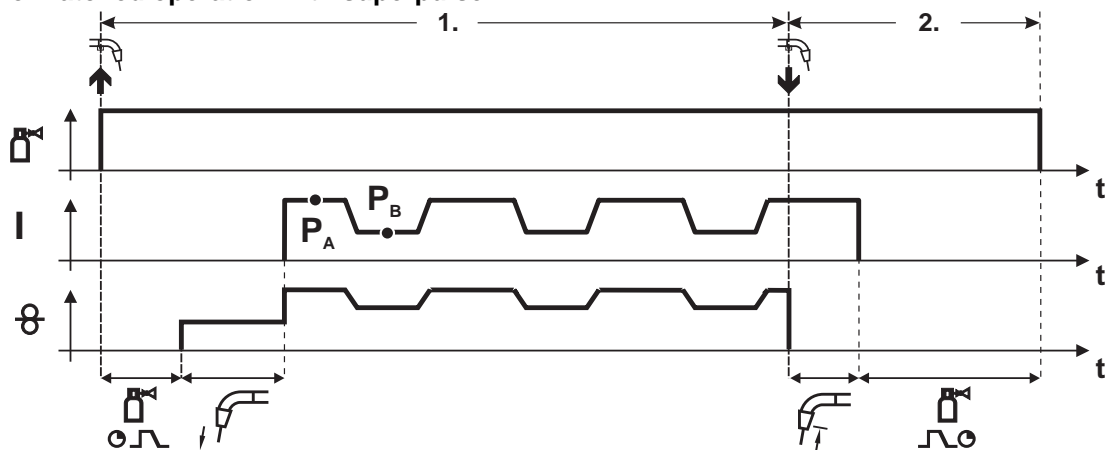
☞ **Pulse arc welding machines only.**
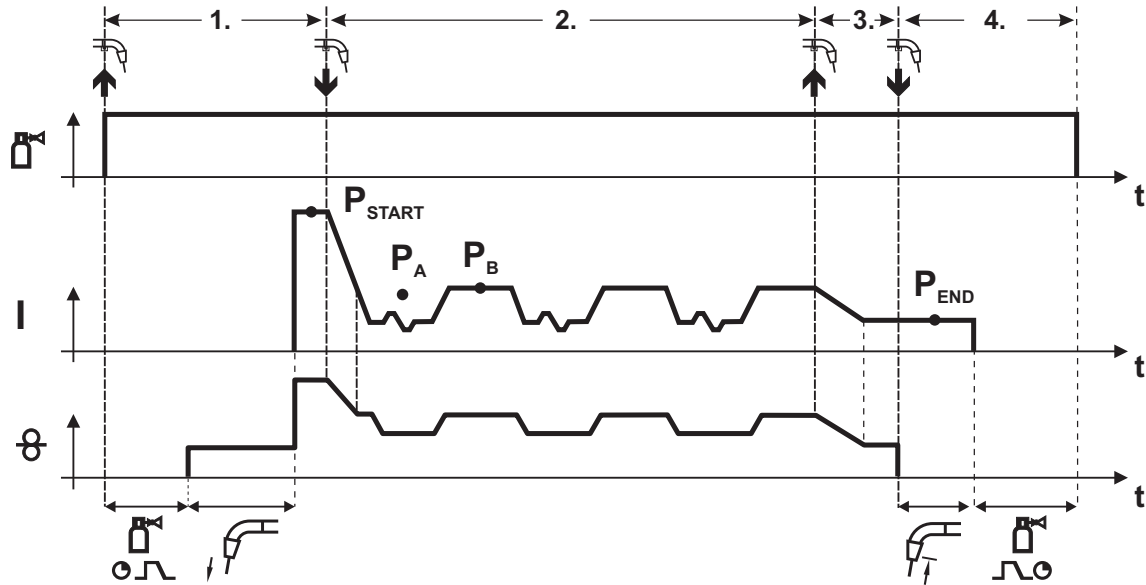
Figure 5-19

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

☞ **This function can be activated using the PC300.Net software.**

Refer to the software operating instructions.

5.2.6 MIG/MAG automatic cut-out

⚠ **If pressing the torch trigger does not ignite the arc or if the arc is interrupted by the torch being removed during the welding process, automatic cut-out occurs within 5 seconds. The welding machine ends the welding process immediately (open circuit voltage or welding current, wire feed and shielding gas are shut off).**

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

Certain materials, such as aluminium, require special functions in order to be able to weld them safely and at high quality. The latched special operating mode is used here with the following programs:

- Start program P_{START} (reduction of cool points at the start of the seam)
- Main program P_A (continuous welding)
- Reduced main program P_B (targeted heat reduction)
- End program $P_{END)}$ (minimisation of end craters via targeted heat reduction)

The programs include the parameters wire speed (operating point), arc length correction, slope times, program duration, etc.
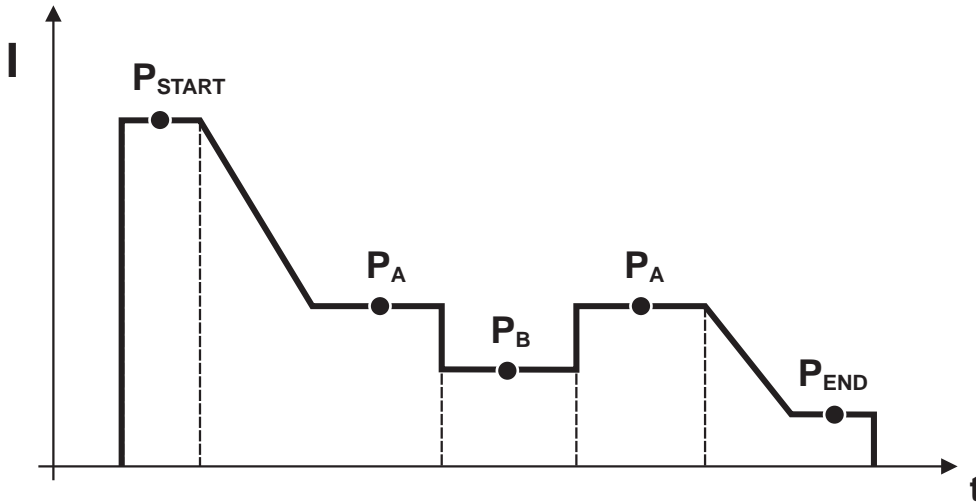
Figure 5-20

☞ **Pulse arc welding machines:**

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.

Settings relating to this can be changed using the PC300.Net software.

5.2.7.1 Selecting the program sequence parameters using welding machine control M3.1x

Operating element	Action	Result	Display
🔴	1 x 👆	Select program sequence mode	Program steps
🔺 A ⊹ 𝟖 ⟲ 🔻	x x 👆	Select the parameters using the buttons 🔺 "Up" and 🔻 "Down" (left)	
V ⊕A Job Nr Hold 🔺 🔻	x x 👆	Adjust the selected parameter using the buttons 🔺 "Up" and 🔻 "Down" (right)	
🔴	3 x 👆	Machine returns to display mode	

5.2.7.2 Selecting the program sequence parameters using wire feed unit control M3.70

Operating Element	Action	Result	Display
🔄	x x 👆	Select parameter in the program sequence	
🟠 𝟖 m/min 🟠 V	🔄👆	Setting welding parameters	

5.2.7.3 MIG/MAG overview of parameters for M3.1x
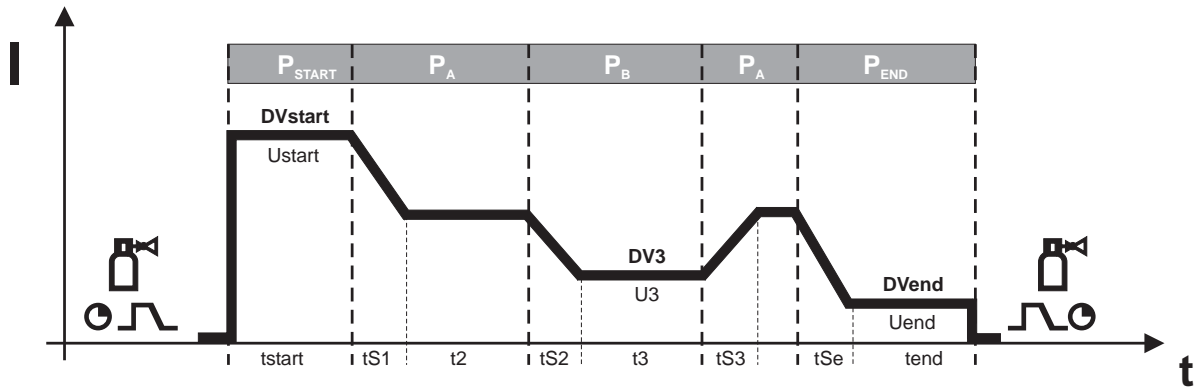
Figure 5-21

Basic parameters

Display	Meaning/explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 20.0s

"P_{START}" start program

Display	Meaning/explanation	Setting range
DVstr (r)	Wire-feed speed, relative	1% to 200%
DVstr (a)	Wire-feed speed, absolute	0.1m/min to 40m/min
Ustart	Arc length correction	-9.9V to +9.9V
tstart	Duration	0.0s to 20.0s

"P_A" main program

Display	Meaning/explanation	Setting range
tS1	Slope duration from P_{START} to P_A	0.0s to 20.0s
t2	Duration (spot time and superpulse)	0.01s to 20.0s
tS2	Slope duration from P_A to P_B	0.00s to 20.0s

"P_B" reduced main program

Display	Meaning/explanation	Setting range
DV3 (r)	Wire-feed speed, relative	1% to 200%
DV3 (a)	Wire-feed speed, absolute	0.1m/min to 40m/min
U3	Arc length correction	-9.9V to +9.9V
t3	Duration	0.01s to 20.0s
tS3	Slope duration from P_B to P_A	0.00s to 20.0s
Alternat	Activate welding process alternation (pulse arc welding machines only)	1 (= active) 0 (= not active)

"P_{END}" end program

Display	Meaning/explanation	Setting range
tSe	Slope duration from P_A to P_{END}	0.0s to 20.0s
DVend (r)	Wire-feed speed, relative	1% to 200%
DVend (a)	Wire-feed speed, absolute	0.1m/min to 40m/min
Uend	Arc length correction	-9.9V to +9.9V
tend	Duration (superpulse)	0.0s to 20.0s

Basic parameters

Display	Meaning/explanation	Setting range
RUECK	Wire burn-back length	2 to 500
GASend:	Gas post-flow time	0.0s to 20.0s
Proc.Sp.	Process speed	10cm to 200cm
nTakt	Special applications, not available in standard range.	-

☞ **P_{START}, P_B, and P_{END} are factory set as "relative programs", i.e. they are dependent on a percentage of the WF value of main program P_A (switching between relative and absolute wire feed values, see chapter "WF Speed Switching (absolute / relative)".**

☞ **Changes to the welding parameters can only be made when the key switch is in position "1".**

5.2.7.4 MIG/MAG overview of parameters, M3.70
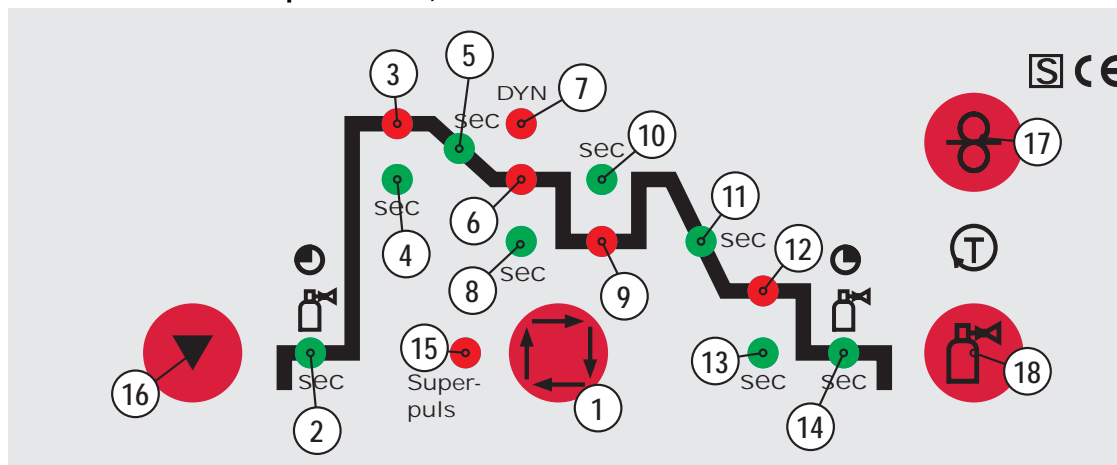
Figure 5-22

Basic Parameters

Item	Meaning / Explanation	Setting Range
1	Gas pre-flow time	0.0s to 20.0s
2	Wire speed, relative Wire speed, absolute Arc length correction	1% to 200% 0.1 m/min to 40 m/min -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	Wire speed, relative Wire speed, absolute	1% to 200% 0.1 m/min to 40 m/min
6	Dynamics	-40 to +40
7	Duration (spot time and superpulse)	0.01s to 20.0s
8	Arc length correction	-9.9V to +9.9V
9	Duration	0.01s to 20.0s
10	Slope duration from P_A to P_{END}	0.0s to 20s
11	Wire speed, relative Wire speed, absolute Arc length correction	1% to 200% 0.1 m/min to 40 m/min -9.9V to +9.9V
12	Duration (superpulse)	0.0s to 20s
13	Gas post-flow time	0.0s to 20s
14	Superpulses	On / Off

Operating element	Action	Result	Display
	3 sec.	Selects wire burn-back	0 rbd
		Parameter setting (setting range 0 to 499)	0 rbd

☞ **Changes to the welding parameters can only be made when the key switch is in position "1".**

5.2.7.5 Example, tack welding (non-latched)
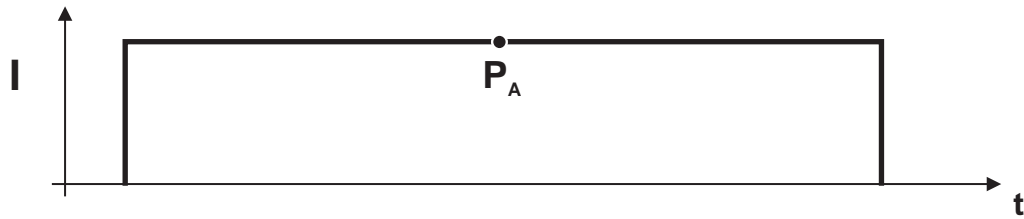
Figure 5-23

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

	Setting the wire speed	

5.2.7.6 Example, aluminium tack welding (non-latched special)
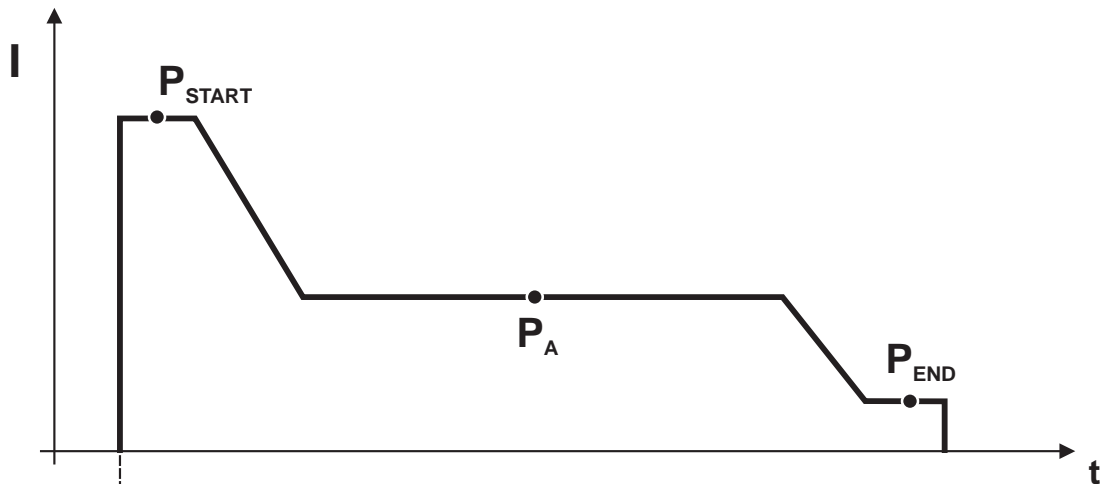
Figure 5-24

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

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

	Setting the wire speed	

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

DVend	Wire speed	0% to 200%
Uend	Arc length correction	-9.9V to +9.9V
tend	Duration	0.0s to 20s

5.2.7.7 Example, aluminium welding (latched special)
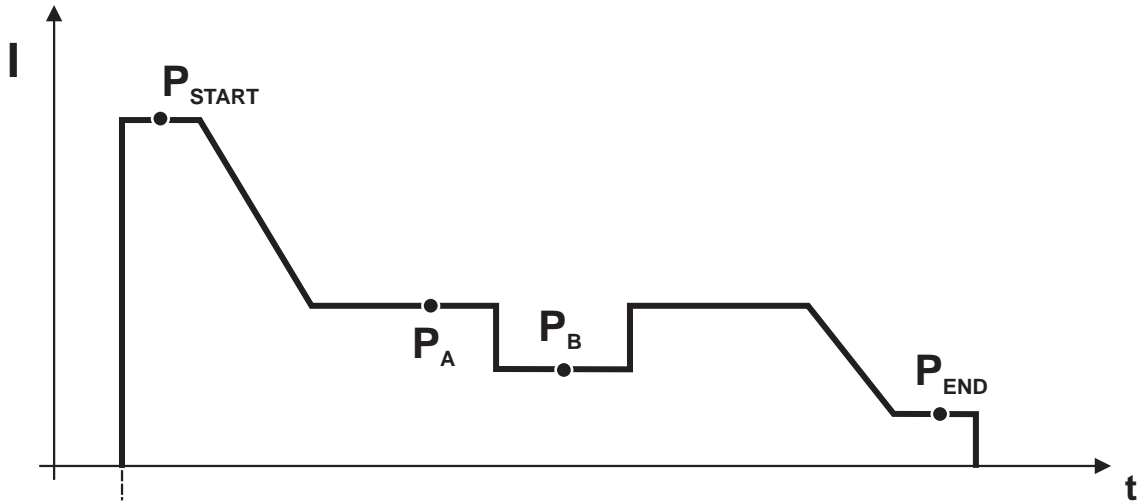
Figure 5-25

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		
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		
	Setting the wire speed	
"P$_B$" reduced main program		
DV3	Wire speed	0% to 200%
U3	Arc length correction	-9.9V to +9.9V
"P$_{END}$" end-crater program		
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

5.2.7.8 Example, visible seams (latched super pulse)

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
PROC.SP.	Travel speed to determine the a-measurement*	10cm to 200cm
"P_{START}" start program		
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		
tS1	Slope duration from P_{START} to P_A	0.0s to 20s
	Setting the wire speed	
t2	Duration	0.1s to 20s
tS3	Slope duration from P_B to P_A	0.0s to 20s
"P_B" reduced main program		
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		
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

5.2.7.9 Welding process changeover

☞ **Pulse arc welding machines only.**
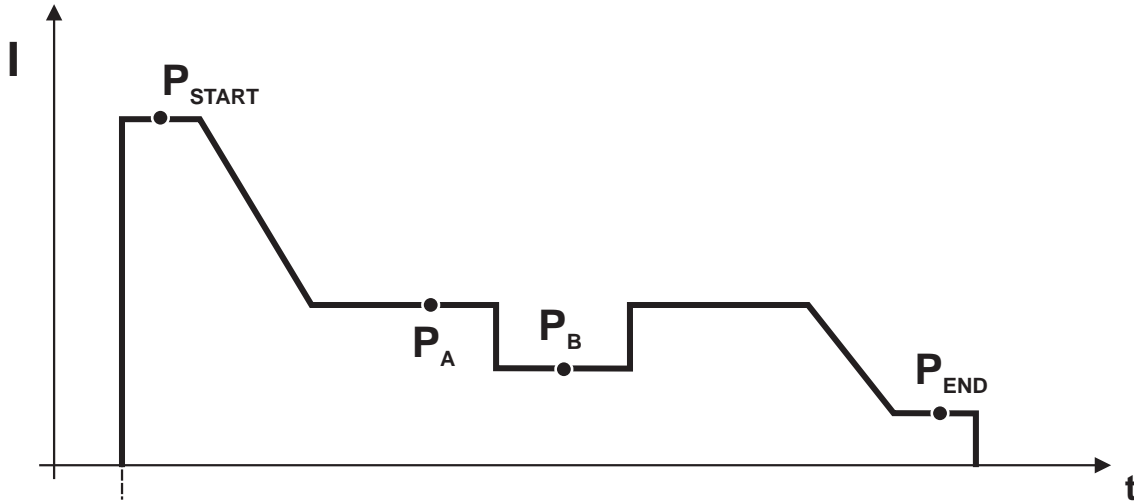
Figure 5-26

Program	Setting option	Relates to	Setting
P_{START}	**Pulse arc welding process on/off** Changes using PC300.Net software	All special, non-latched All special, latched	1 (= on) 0 (= off)
P_A/P_B	**Welding process changeover** If P_A contains a standard arc process, there is a changeover to the pulse arc process, and vice versa. Changes using PC300.Net software (EXPERT machine series: Can also be changed using M3.1x, see chapter "MIG/MAG parameter overview, M3.1x")	Non-latched/latched mode with alternating welding process Non-latched/latched special with alternating welding process Latched special with welding process changeover	1 (= active) 0 (= inactive)
P_{END}	**Pulse arc welding process on/off** Changes using PC300.Net software (Switched on for all forceArc JOBs in factory settings)	All special, non-latched All special, latched	1 (= on) 0 (= off)

☞ **The settings are saved with the JOB and apply to all programs for that JOB.**

5.2.8 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
- Superpulses (ON/OFF)
- Wire feed speed (DV2)
- Voltage correction (U2)
- Dynamics (DYN2)

☞ P_{START}, P_B, and P_{END} **are factory set as "relative programs", i.e. they are dependent on a percentage of the WF value of main program P_A (switching between relative and absolute wire feed values, see chapter "WF Speed Switching (absolute / relative)".**

The user can use the following equipment, controls and accessory components to change the main program welding parameters.

	Program switching	Program	Operating mode	Welding type	Superpulse	Wire speed	Voltage correction	Dynamics
M3.10 or M3.11 Welding machine control	No	P0	No	No	Yes	No	No	No
	No	P1 to 15	No	No	Yes	Yes	Yes	Yes
M3.30 Wire feed control	Yes [5]	P0	Yes	Yes	No	Yes [1]	Yes [1]	Yes [2]
	Yes [5]	P1 to 15	Yes	Yes	No	No	No	No
M3.00 Wire feed control	Yes [5]	P0	Yes [2]	Yes [2]	No	Yes [1]	Yes [1]	Yes [1]
	Yes [5]	P1 to 15	No	No	No	No	No	No
M3.70 Wire feed control	Yes	P0	Yes	Yes	Yes	Yes [1]	Yes [3]	Yes [3]
	Yes	P1 to 15	Yes	Yes	Yes	Yes	Yes	Yes
R40 Remote control	Yes [4]	P0	No	Yes	Yes	Yes [3]	Yes [3]	No
	Yes [4]	P1 to 15	No	Yes	Yes	Yes	Yes	No
PC300.Net Software	No	P0	Yes	Yes	Yes	No	No	No
	No	P1 to 15	Yes	Yes	Yes	Yes	Yes	Yes

1) Setting via rotary dial

2) Setting via changeover switch

3) Internal memory

4) Powercontrol torch not connected

5) Powercontrol torch connected

Example 1: Welding workpieces with different sheet metal thicknesses (non-latched)
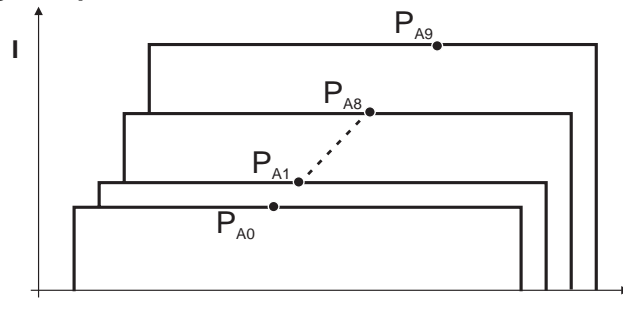
Figure 5-27

Example 2: Welding different positions on a workpiece (latched)
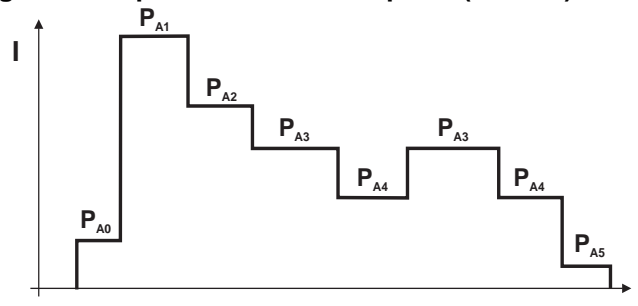
Figure 5-28

Example 3: Aluminium welding of different sheet metal thicknesses (non-latched or latched special)
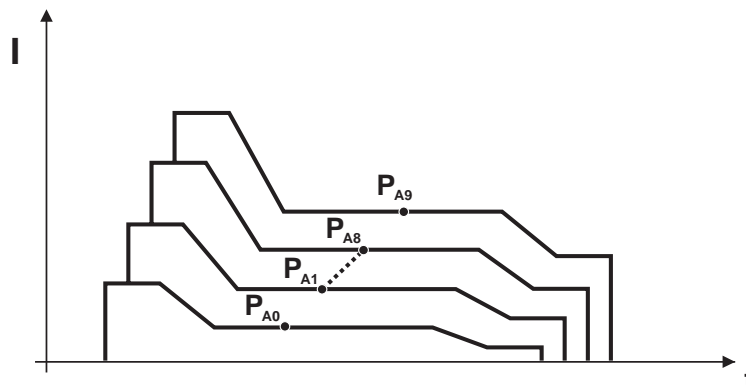
Figure 5-29

☞ This mode can be used to define 16 different programs (P_{A0} to P_{A15}) for one program sequence. The wire speed, arc length correction and dynamics/choke effect can be set for each operating point.

The following applies to program P0: The wire speed, arc length correction and dynamics/choke effect are set using the buttons on the M3.70 wire feed controller.

⚠ **Changes to the welding parameters are saved immediately!**

5.2.8.1 Selecting parameters (program A) using wire feed unit control M3.1x

Operating element	Action	Result	Display
	2 x	Select main program A mode	Program A
	x x	Select the welding parameters using the buttons ▲ "Up" and ▼ "Down" (left)	
	x x	Change values for the selected welding parameter using the buttons ▲ "Up" and ▼ "Down" (right)	
	2 x	Machine returns to Display mode	

5.2.8.2 Selecting parameters (program A) using wire feed unit control M3.70

Operating Element	Action	Result	Display
	x x	Press ● PROG (program number)	
		Select program number	
	x x	Select parameter LED "Main program (P$_A$)"	
		Set wire speed	
		Set voltage correction	
	1 x	Select ● Dynamics parameter	
		Set dynamics	

☞ **Changes to the welding parameters can only be made when the key switch is in position "1".**

5.2.8.3 MIG/MAG overview of parameters for M3.1x

Different welding tasks or positions on a workpiece demand various welding outputs (operating points) or welding programs.

For each program, the

- Wire speed
- Correction of the arc length and the
- Dynamics / choke effect

can be set separately.

15 different programs (PROG 1 to PROG 15) can be defined. It is possible to switch between these programs during the welding process.

Display	Meaning/explanation	Setting range
act.Prg.: X	Active main program A	0 to 15
P0 U2 :+0.0 V	Arc length correction (offset WF unit)	-9.9 V to +9.9 V
P1 15 UK :+2.0 V	Restriction of the setting range for the voltage correction in program mode	0.0 V to +9.9 V
P1 15 DK : 20%	Restriction of the correction range for wire correction (for more details, see chapter on special parameters, "DRIVE 4 P wire feed units")	0% to 30%
P1 DV2 :+2.0 m/m	Wire speed	0.1 m/min to 20.0 m/min
P1 U2 :+0.0 V	Arc length correction	-9.9 V to +9.9 V
P1 DYN2: + 0	Dynamics / choke effect	-40% to +40%
P2 to P14	P2 to P14	P2 to P14
P15 DV2 :+2.0m/m	Wire speed	0.1 m/min to 20.0 m/min
P15 U2 :+0.0 V	Arc length correction	-9.9 V to +9.9 V
P15 DYN2: + 0	Dynamics / choke effect	-40% to +40%

5.2.9 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

☞ **It is also possible to change over between welding programs by tapping the torch trigger, depending on the machine control configuration.**
(see "Program changeover with standard torches (P8)" chapter)

5.2.10 MIG/MAG special-torches

☞ **Function specifications and more indepth information can be found in the operating manual for the relevant welding torch!**
The following special torches can be used together with this welding machine:

- Up/down welding torch with one rocker
  - for setting the wire speed
- PowerControl welding torch with one rocker and single-digit digital display
  - for calling up and displaying up to 10 welding programs, or
  - for infinite, percentage-based operating point setting and display
- PowerControl 2 welding torch with four triggers and three-digit digital display
  - for setting and displaying the welding performance and voltage correction, or
  - for calling up programs and JOBs, as well as for displaying the corresponding parameters
- Push/pull welding torch with integrated wire feed unit
  - for even wire feeding with extra long tube packages
  - and potentiometer to control the wire-feed speed, where necessary

5.2.11 High-speed welding

☞ **This chapter provides setting information and guideline values for high-speed welding and relates to the PHOENIX 521 Highspeed machine series only**
The following examples apply to mechanical welding. In manual welding, 1mm wire can also be used.

In addition, 92%Ar / 8%CO_2, 82%Ar / 18%CO_2 or 90%Ar / 5%CO_2 / 5%O_2 can be used as the shielding gas as well, whereby similar results are achieved using the gases 92%Ar/ 8%CO_2 and 90%Ar / 5%CO_2 / 5%O_2 as when using 96%Ar / 4%O_2.

☞ **Under 82%Ar / 18%CO_2 the rotation is poorer and the seam surface becomes rougher.**

Panel thickness 12mm, parent metal ST.37-2, filler material SG 2 1.2mm

Seam	Gas/quantity	WF m/min	Voltage / correction (V)	Current (A)	Welding speed (cm/min)
Fillet weld horizontal	65%Ar, 8%CO_2, 0.5%O_2, 26.5He, e.g. MG T.I.M.E. 22l/min	18	40 +0.2	402	50
Fillet weld horizontal	96%Ar, 4%02, e.g. MG Argomix 4 22l/min	20	36.8 -4.0	462	50
Fillet weld horizontal	96%Ar, 4%02, e.g. MG Argomix 4 22l/min	22.2	38.8 -4.8	498	70
Fillet weld horizontal	65%Ar, 8%CO_2, 0.5%O_2, 26.5He, e.g. MG T.I.M.E. 22l/min	22.2	44.6 0.0	470	70
Fillet weld horizontal	72%Ar, 8%CO2, 20%He, e.g. MG Argomag T 22l/min	22.2	43.2 0.0	472	60

☞ **The greatest seam volume with a virtually concave seam shape was achieved using Argomix 4.**
The highest level of fusion performance at high welding speed was achieved using Argomag T.
The spatter formation was the lowest under Argomix 4.

Panel thickness 20mm, parent metal ST.37-2, filler material SG 2 1.2mm

Seam	Gas/quantity	WF m/min	Voltage / correction (V)	Current (A)	Welding speed (cm/min)	Stickout (mm) (free wire electrode end)
Fillet weld trough	65%Ar, 8%CO_2, 0.5%O_2, 26.5He, e.g. MG T.I.M.E. 22l/min	27.8	47.4 +3.0	500	40	33
Fillet weld trough	96%Ar, 4%02, e.g. MG Argomix 4 22l/min	25	41.0 -5.0	430	40	33
Fillet weld trough	96%Ar, 4%02, z.B. MG Argomix 4 22l/min	30	43.8 -3.0	500	40	33
Fillet weld trough	65%Ar, 8%CO_2, 0.5%O_2, 26.5He, e.g. MG T.I.M.E. 22l/min	30	49.0 +5.5	500	40	31
Fillet weld horizontal 1st layer	65%Ar, 8%CO_2, 0.5%O_2, 26.5He, e.g. MG T.I.M.E. 22l/min	22.2	43.6 0.0	470	70	36
Fillet weld horizontal 2nd layer	96%Ar, 4%02, z.B. MG Argomix 4 22l/min	27.8	46.0 -2.4	500	40	27

☞ **To create a rotating arc, the contact tube gap must be at least 30mm.**
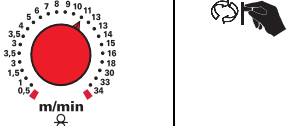
5.3 TIG welding

5.3.1 TIG welding task selection

Control element	Action	Result	Display
	X x	The various welding processes are run through until the signal light for the required welding process comes on.	The nominal values for the welding current and welding voltage are displayed.

5.3.2 TIG welding current setting

The welding current is normally set using the "Wire speed" rotary dial.

		Result	Display
		Welding current is set	The welding current and voltage change depending on the setting

5.3.3 TIG welding data display

To the left and right of the LCD display on the control there are 2 "arrow keys" on each side for selecting the welding parameter to be displayed. The ▲ button is used to scroll through the parameters from the bottom upwards and the ▼ button is used to scroll downwards from the top.

As soon as changes have been made to the settings after welding (display on hold values), the display switches back to the nominal values.

Figure 5-30

Four welding parameters can be selected in the TIG welding process:

Welding current and tungsten electrode diameter (left-hand side) and welding voltage and JOB no. (right-hand side).

The parameters can be displayed before (nominal values), during (actual values) welding.

Parameter	Before welding	During welding	
	Nominal value	Actual value	Nominal value
Welding current	●	●	
Tungsten electrode diameter	●		●
Welding voltage	●	●	
JOB no.	●		

5.3.4 TIG arc ignition
5.3.4.1 Liftarc
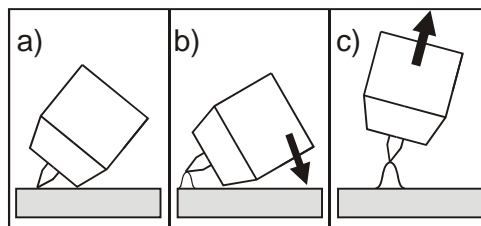
Figure 5-31

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

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

5.3.5 TIG function sequences / operating modes

☞ The arc ignition takes place with Liftarc (see chapter "TIG Arc ignition"). After unsuccessful ignition or interruption of the welding procedure, the automatic cut-out takes place (see chapter "TIG Automatic cut-out").

The welding parameters are optimally preset for a multiplicity of applications (can be adapted if required (see chapter TIG Program sequence "Program-Steps mode"). In every operation mode the Superpulse function can be used.

5.3.5.1 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
PSTART	Ignition program
Flat	Main program
Hor. vert.	Reduced main program
PEND	End program

5.3.5.2 Non-latched mode
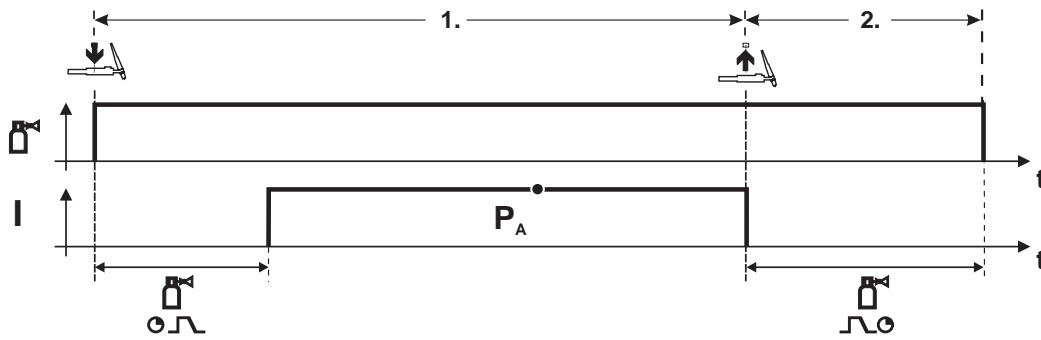
Figure 5-32

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.

5.3.5.3 Special, non-latched
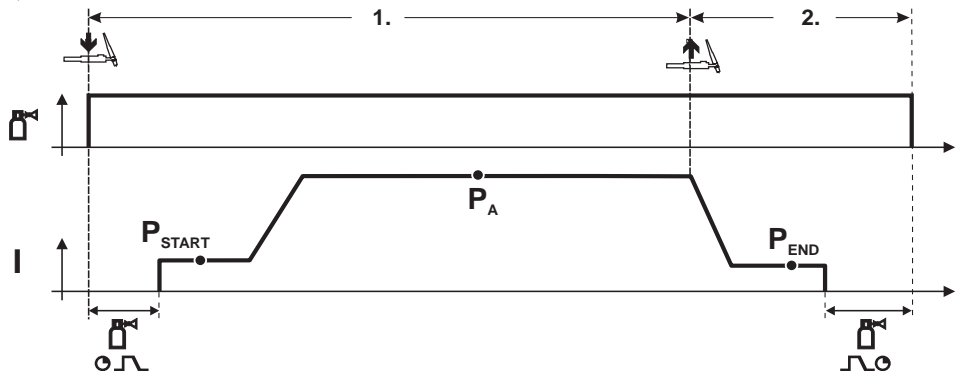
Figure 5-33

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.

5.3.5.4 Latched mode
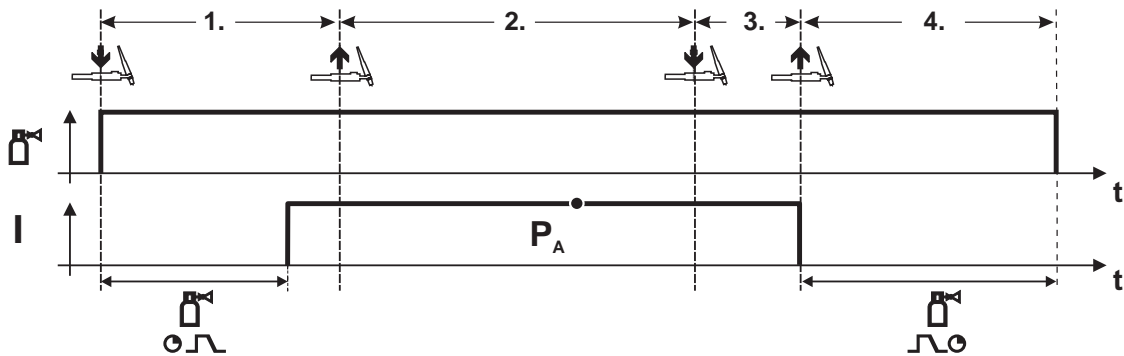
Figure 5-34

Selection
- Select latched operating mode .

Step 1
- Press and hold torch trigger
- Shielding gas is expelled (gas pre-flows)

☞ **The arc is ignited using liftarc.**
- Welding current flows with pre-selected setting.

Step 2
- Release torch trigger (no effect)

Step 3
- Press torch trigger (no effect)

Step 4
- Release torch trigger
- Arc is extinguished.
- Gas post-flow time elapses.

5.3.5.5 Latched special
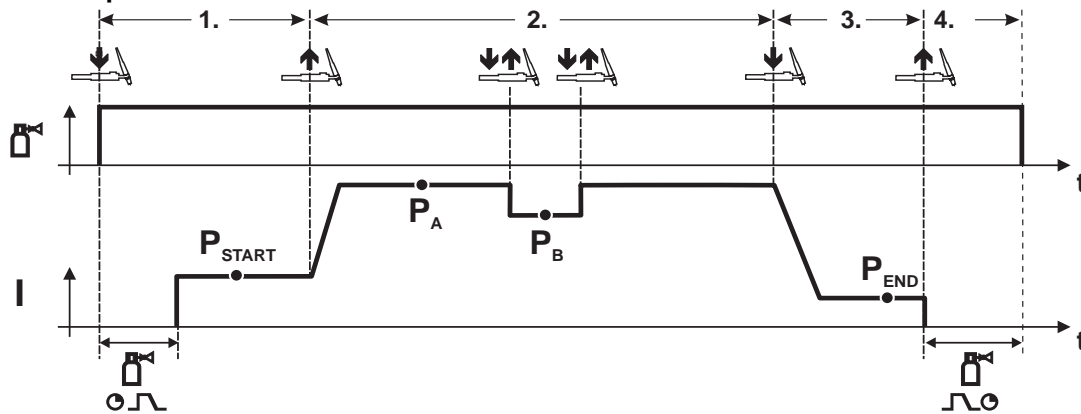
Figure 5-35

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.

5.3.6 TIG automatic cut-out

⚠ **If the arc does not ignite after starting or if the arc is interrupted when the torch is moved away, an automatic cut-out occurs after 3 sec. The HF, gas and open circuit voltage (power unit) are switched off.**

5.3.7 TIG program sequence ("Program steps" mode)

5.3.7.1 TIG parameter overview

The parameter settings are made on welding machine control M3.10 or M3.11
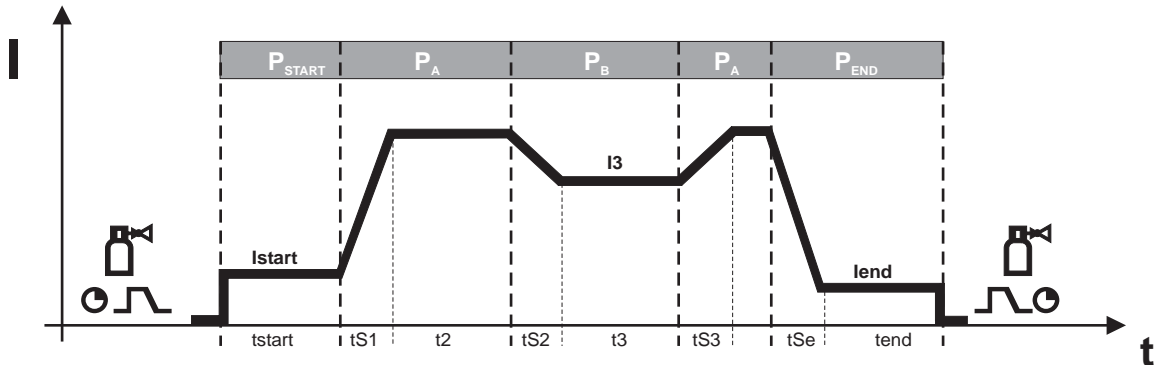
Figure 5-36

Basic parameters

Display	Meaning / explanation	Setting range
GASstr	Gas pre-flow time	0.0s to 0.9s
GASend:	Gas post-flow time	0.0s to 20s

"P_{START}" start program

Istart	Ignition current	0% to 200%
tstart	Duration	0.0s to 20s

"P_A" main program

tS1	Slope duration from P_{START} to P_A (Upslope)	0.0s to 20s
t2	Duration	0.01s to 20.0s
tS3	Slope duration from P_B to P_A	0.00s to 20.0s

"P_B" reduced main program

tS2	Slope duration from P_A to P_B	0.00s to 20.0s
I3	Welding current	0% to 100%
t3	Duration	0.01s to 20.0s

"P_{END}" end program

tSe	Slope duration from P_A or P_B to P_{END} (Downslope)	0.0s to 20s
Iend	Welding current	0% to 100%
tend	Duration	0.0s to 20s

P_{START}, P_B, and P_{END} are "relative programs", i.e. they relate to percentages of the welding current setting (see chap. 3.14)

Various functional sequences can be set up according to the operating mode.
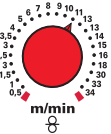
5.4 MMA welding

5.4.1 MMA welding task selection

Control element	Action	Result	Display
	X x 👆	The various welding processes are run through until the signal light for the required welding process comes on.	The nominal values for the welding current and welding voltage are displayed.

5.4.2 MMA welding current setting
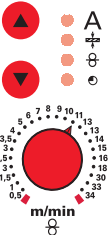
The welding current is always set using the rotary dial "Wire speed" on a wire feed control or using the R40 remote control.

m/min	🖐	Welding current is set	Welding current is displayed

5.4.2.1 Setting using the stick electrode diameter

The welding current can also be set using the stick electrode diameter:
The welder sets the stick electrode diameter being used and the control calculates the relevant welding current for the electrode.

▲ ▼	1 x 👆	Switch to ● ✚ stick electrode diameter	Current stick electrode diameter is displayed
m/min	🖐	Stick electrode diameter being used is set	Stick electrode diameter is displayed

5.4.3 MMA welding data display

To the left and right of the LCD display on the control there are 2 "arrow keys" on each side for selecting the welding parameter to be displayed. The ▲ button is used to scroll through the parameters from the bottom upwards and the ▼ button is used to scroll downwards from the top.

As soon as changes have been made to the settings after welding (display on hold values), the display switches back to the nominal values.
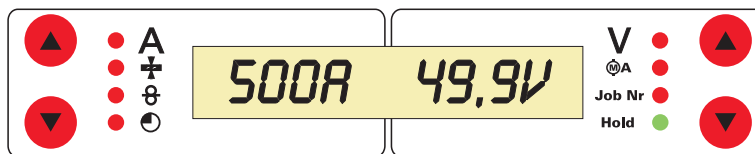
Figure 5-37

Four welding parameters can be selected in the MMA welding process:

Welding current and electrode diameter (left-hand side) and welding voltage and JOB no. (right-hand side).

The parameters can be displayed before (nominal values), during (actual values) welding.

Parameter	Before welding (nominal values)	During welding (actual values)
Welding current	●	●
Electrode diameter (material thickness)	●	
Welding voltage	●	●
JOB No.	●	
Running time meter		●

5.4.4 Arcforcing

Operating element	Action	Result	Display
	X x	**Select arcforcing welding parameter** Press until ● "Dynamic" LED comes on.	-40 to +40
		Arcforcing setting on the "Wire speed/welding parameters" rotary dial	-40 to +40

5.4.5 Hotstart

The hotstart device improves the ignition of the stick electrodes using an increased ignition current.

a) = Hotstart time
b) = Hotstart current
I = Welding current
t = Time
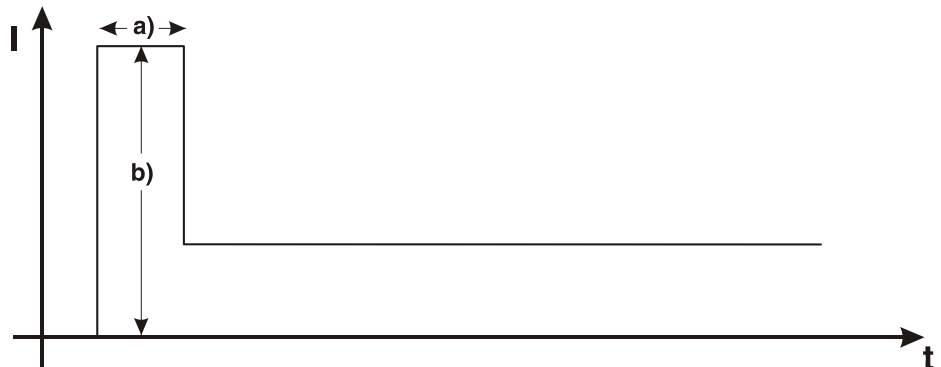
5.4.5.1 Hotstart current and Hotstart time

Control element	Action	Result	Display
	1 x	Select Program sequence mode	Program Steps
	x x	Select the welding parameter using the key buttons ▲ "Up" and ▼ "Down" (left)	
	x x	Adjust the selected welding parameter using the key buttons ▲ "Up" and ▼ "Down" (right)	
	3 x	Machine returns to Display mode	

Basic parameters

Display	Meaning / explanation	Setting range
Ihot	Hotstart current	0% to 200%
thot	Hotstart time	0s to 10.0s
tanti	Antistick time	0s to 2.0s

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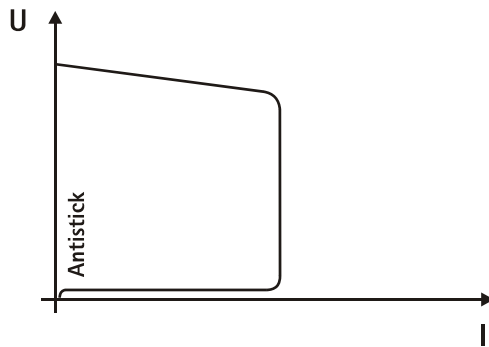
Anti-stick prevents the electrode from annealing.
If the electrode sticks in spite of the Arcforce device, the machine automatically switches over to the minimum current within about 1 second to prevent the electrode from overheating. Check the welding current setting and correct according to the welding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

Control element	Action	Result	Display
	1 x	Select Program sequence mode	Program Steps
	x x	Select the welding parameters using the key buttons ▲ "Up" and ▼ "Down" (left)	
	x x	Adjust the selected welding parameter using the key buttons ▲ "Up" and ▼ "Down" (right)	
	3 x	Machine returns to Display mode	

Basic parameters

Display	Meaning / explanation	Setting range
Ihot	Hotstart current	0% to 200%
thot	Hotstart time	0s to 10.0s
tanti	Antistick time	0s to 2.0s

5.5 Interfaces

Only the accessory components described in these operating instructions may be connected.

Only plug accessory components into the relevant connection socket on the welding machine and lock it when the machine is switched off. The component is detected automatically when the welding machine is switched on.

Comprehensive descriptions can be found in the operating instructions for the relevant accessory components.

5.5.1 Automation interface

☞ **These accessory components can be retrofitted as an option, see Accessories chapter.**

Pin	Input / output	Description		Diagram
A	Output	PE	Connection for cable shielding	
D	Output (open collector)	IGRO	Current flows signal I>0 (maximum load 20 mA / 15 V) 0 V = welding current flows	
E **+** **R**	Input	Not/Aus	Emergency stop for higher level shut-down of the power source. To use this function, jumper 1 must be unplugged on PCB M320/1 in the welding machine. Contact open = welding current off	
F	Output	0 V	Reference potential	
G/P	Output	I>0	Power relay contact, galvanically isolated (max. +/-15 V / 100 mA)	
H	Output	Uist	Welding voltage, measured against pin F, 0-10 V (0 V = 0 V; 10 V = 100 V)	
L	Input	Str/Stp	Start = 15 V / Stop = 0 V [1]	
M	Output	+15 V	Voltage supply (max. 75 mA)	
N	Output	-15 V	Voltage supply (max. 25 mA)	
S	Output	0 V	Reference potential	
T	Output	Iist	Welding current, measured on pin F; 0-10 V (0 V = 0 A, 10 V = 1000 A)	

[1] **The operating mode is given by the wire feed unit (the start / stop function equates to pressing the torch trigger and is used in mechanised applications, for example).**

☞ **The appendix includes a list of equivalent JOB numbers in the PC 300 software for the PHOENIX BASIC and PHOENIX PROGRESS models.**

With PHOENIX EXPERT models, the software JOB numbers are the same as those for the machine.

5.5.2 RINT X11 robot interface

The standard digital interface for automated applications
(optional, retrofitting on the machine or external fitting by the customer)

Functions and signals:
- Digital inputs: Start/stop, operating mode, job and program selection, inching, gas test
- Analogue inputs: Control voltages for welding output, correction, dynamics
- Relay outputs: Current flows, welding data monitoring, ready for welding, etc.

5.5.3 BUSINT X10 Industrial bus interface

The solution for easy integration into automated production lines, with for example

- Profi bus
- CAN bus and
- Interbus systems

(optional, external installation by customer)

5.5.4 DVINT X11 Wire feed interface

For the flexible connection of special wire feed units (optional, retrofitting on the machine or externally by the customer).

As examples: Binzel (APD system), Dinse wire feed systems.

5.5.5 PC Interfaces

PC 300 welding parameter software
Create all welding parameters quickly on the PC and easily transfer them to one or more welding machines (accessories: set consisting of software, interface, connection leads).

Q-DOC 9000 welding data documentation software
(Accessories: set consisting of software, interface, connection leads)

The ideal tool for welding data documentation of, for example:
welding voltage and current, wire speed and motor current.

WELDQAS welding data monitoring and documentation system
Network-compatible welding data monitoring and documentation system for digital PHOENIX and TETRIX machines

5.5.6 Setting options, internal

5.5.6.1 Switching between Push/Pull and intermediate drive

The plugs are located directly on PCB M3.70 in the wire feed unit.

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

5.6 Key switch

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:

- Job switching function, welding task selection
  (block job mode possible with Power-control torch)
- Job Manager mode
- Program Steps mode
- Program A mode
- Job Info mode
- Super pulse function

☞ **When using a wire feed unit with control M3.70, the welding type and operating mode functions cannot be changed if the key switch is in position "0". The parameters can be displayed in the function sequence on the control, but not changed.**

5.7 Operating time counter

The operating time is displayed in the format hhhh:mm:'h'. Four digits for the hours, two digits for the minute, and a final 'h' symbol.

On the welding machine control

Operating element	Action	Result	Display
▲ ● A ● ✛ ● ⊕ ▼ ● ☾	X x ✍	Press until signal light 🔴 ☾ comes on	Operating time display

The operating time is counted when current is flowing, and is written to non-volatile memory once per minute.

5.8 Remote control
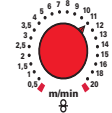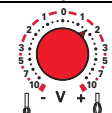
⚠️ **Only the remote controls described in these operating instructions may be connected. Plug the remote control unit into the remote control connection socket on the welding machine or wire feed unit and lock it only when the machine is switched off.**
The remote control is detected automatically when the welding machine is switched on.

5.8.1 R10 manual remote control

Figure 5-38

Item	Symbol	Description
1		**"Wire speed" rotary dial** Infinitely adjustable setting of the wire speed from min. to max. (welding output, one-dial operation)
2		**"Arc length correction" rotary dial** Arc length correction from -10 V to + 10 V
3		**19-pole connection socket (analogue)** For connecting the control lead.
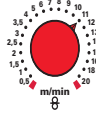
5.8.2 Manual remote control R20

☞ **Manual remote controls R20 can only be used together with controls M3.70 or M3.71!**

Figure 5-39

Item	Symbol	Description
1		**"Wire speed" rotary dial** • Infinitely adjustable setting of the wire speed from min. to max. (welding output, one-dial operation). • The wire correction value is set in the correction operation with welding programs (key switch set to "0").
2		**"Arc length correction" rotary dial** • Arc length correction from -10V to +10V • The arc correction value is set in the correction operation with welding programs (key switch set to "0").
3		**Display for showing the current program number**
4	▲	**Program switching "Up" button** Select program number up
5	▼	**Program switching "Down" button** Select program number down
6		**Holder for suspending the remote control**
7	↗	**19-pole connection socket (analogue)** For connecting the control lead.

5.8.3 R40 manual remote control

Functions
• Create and retrieve up to 16 operating points/main programs
• Set program sequence
• Superpulse function "ON/OFF"
• MIG standard/MIG pulse arc welding switching (EXPERT PULSE only)
• Preset number of main programs (PA1 to PA16)
• LCD display (16-digit) for displaying the welding parameters
• LED for displaying the Hold function
• The remote control is connected to the digital remote control connection socket on the welding machine (7-pole) via an extension cable

☞ **Detailed information can be found in the relevant operating instructions.**

5.9 Advanced functions on the welding machine control

5.9.1 Displaying JOB information (Job-Info)

☞ **Information on the current JOB is displayed in this mode.**

In JOBs 127 and 128 (TIG & MMA), it is not possible to select the mode as it would not be relevant.

Selection:

Operating element	Action	Result	Display
🔴	x x 👆	Select "JOB Info mode"	JOB Info
🔺 ● A ● ✛ ● 🕗 🔻 ● 🕘	👆	Parameter selection	See "JOB Info" parameter list table

"JOB Info" parameter list:

Parameter (display)	Explanation
System	System status
Job-Nr.	JOB number
akt. Prg.	Program number
Mode	Operating mode
Schweiss	Welding type
Job-Text	Text information relating to the JOB (can be edited using PC 300.Net software)
Wire	Wire diameter
Material	Material type
Gas-Typ	Type of gas
Verf.	Welding process

5.9.2 Organising JOBs (Job-Manager)

☞ **The JOB Manager can be used to load, copy or save JOBs.**

The JOB is the welding task defined by the 4 main welding parameters; welding process, material type, wire diameter and gas type.

One program sequence can be defined in each JOB.

Up to 16 operating points (P0 to P15) can be set in each program sequence.

The user has a total of 256 JOBs available. 185 of these JOBs are pre-programmed. A further 61 JOBs can be freely defined.

To ensure that all the changes are active, the welding machine should be switched off at least 5 seconds after changing the JOB.

There are two different memory sectors:

• 185 factory-set, pre-programmed, permanent JOBs (JOB 1 to 128 and 190 to 256; a fixed JOB number is assigned to each welding task).
JOBs 1 to 128 are not loaded but are defined using the welding task (see chap. 3.5). Each welding task is assigned a JOB number (190 to 256). JOB number display.

• 61 freely definable JOBs (JOBs 129 to 189).

5.9.2.1 Creating a new JOB in the memory or copying a JOB

☞ **It is normally possible to adjust all 256 JOBs individually. However, it is useful to issue a separate job number to special welding tasks.**
Define welding task which most closely matches the required application.

Copy pre-defined welding task (JOB1-128) into the free memory range (JOB129-256):

Control element	Action	Result	Display
	3 x	Select Job Manager mode	Job Manager
	x x	Select the copy job function using the key buttons ▲ "Up" and ▼ "Down" (left)	Copy to: xxx
	x x	Select the job target number (JOB129-256) using the key buttons ▲ "Up" and ▼ "Down" (right)	Copy to: xxx
	1 x	JOB has been copied	Copy to: xxx
	1 x	Machine returns to Display mode	

5.9.2.2 Loading special jobs (SP1 to SP3)

☞ **These jobs are the first 3 free JOBs which can be called up directly on the M3.1x control using the buttons SP1 to SP3 (SP1=JOB129, SP2=JOB130, SP3=JOB131).**

Control element	Action	Result	Display
	3 s	Select Special Jobs	
	x x	Select Special Job SP1,SP2 or SP3	
	3 s	Machine returns to Display mode s = seconds	

5.9.2.3 Loading an existing JOB from the free memory

Control element	Action	Result	Display
	3 x	Select Job Manager mode	Job Manager
	x x	Select Job Loading function using the key buttons ▲ "Up" and ▼ "Down" (left)	Load Job: xxx
	x x	Select the JOB to be loaded using the key buttons ▲ "Up" and ▼ "Down" (right)	Load Job: xxx
	1 x	JOB has been loaded	Load Job: xxx
	3 x	Machine returns to Display mode	

5.9.2.4 Using Block mode (Block JOB)

☞ **This function is only appropriate for use in combination with the M3.70 wire feed unit control and a Powercontrol program torch.**
See also the "Powercontrol program torch with one rocker (special function)" chapter

Operating element	Action	Result	Display
	1 x 👆	Select "Special Mode"	Program steps
	1 x 👆		
	2 x 👆		
	1 x 👆		Special-Mode
▲ A / ▼	👆	Select the Block JOB function using the ▲ "Up" and ▼ "Down" buttons (left)	Block Job 0
V ▲ / Job Nr / Hold ▼	👆	Switch Block JOB on or off using ▲ "Up" and ▼ "Down" buttons (right). 1 = Block JOB function switched on 0 = Block JOB function switched off	Block Job 1 Block Job 0
S Superpuls	1 x 👆	Save change	No change
	1 x 👆	Exit "Special Mode"	Last parameters selected are displayed

5.9.2.5 Resetting an existing JOB to the factory setting (Reset JOB)

☞ **If a pre-programmed JOB (JOB 1 to 128) has been changed accidentally, it is possible to reset it to the factory settings.**

Control element	Action	Result	Display
	3 x 👆	Select Job Manager mode	Job Manager
▲ A / ▼	x x 👆	Select the Job Reset function using the key buttons ▲ "Up" and ▼ "Down" (left)	Res. Job: xxx
V ▲ / Job Nr / Hold ▼	x x 👆	Select the job (JOB1-128) to be reset to the factory settings using the key buttons ▲ "Up" and ▼ "Down" (right)	Res. Job: xxx
S Superpuls	1 x 👆	JOB has been reset	Res. Job: xxx
	1 x 👆	Machine returns to Display mode	

5.9.3 Switching the Hold function on and off

Operating element	Action	Result	Display
	1 x	Select "Special Mode"	Program steps
	1 x		
	2 x		
	1 x		Special Mode
		Select the Hold function using the buttons ▲ "Up" and ▲ "Down" (left)	Hold-Fct 1
		Use the buttons ▲ "Up" and ▲ "Down" (right) to switch the Hold function on or off. 1 = Hold function on 0 = Hold function off	Hold-Fct 1 Hold-Fct 0
	1 x	Save change	No change
	1 x	Exit "Special Mode"	Last selected parameters are displayed

5.9.4 WF speed switching (absolute / relative)

Operating element	Action	Result	Display
	1 x	Select "Special Mode"	Program steps
	1 x		
	2 x		
	1 x		Special Mode
		Select function using the buttons ▲ "Up" and ▲ "Down" (left)	Abs-Fct 0
		Switch the function on and off using the ▲ "Up" and ▲ "Down" (right) buttons 1= Absolute wire feed speeds activated 0= Relative wire feed speeds activated	Abs-Fct 0 Abs-Fct 1
	1 x	Save change	No change
	1 x	Exit "Special Mode"	Last selected parameters are displayed

5.9.5 Resetting JOBs to status on delivery (Reset ALL)

This function is used to reset JOBs 1-128 to the original status on delivery.
JOBs 129-256 remain unchanged.

Operating element	Action	Result	Display
▐●	1 x 👆	Select "Special Mode"	Program steps
🔥	1 x 👆		
⚓	2 x 👆		
8	1 x 👆		Special Mode

▲ A
  ✛
▼ 8
  ◔
	👆	Select Res. All using the buttons ▲ "Up" and ▲ "Down" (left).	Res. All 1

S Superpuls	1 x 👆	Save change	No change
▐●	1 x 👆	Exit "Special Mode"	Last selected parameters are displayed

5.10 Advanced functions on the wire feed unit control

5.10.1 Special parameter, "M3.70/M3.71"

The special parameters cannot be viewed directly since they are normally only set and stored once. The machine control offers the following special functions:

5.10.1.1 Special parameters list

Function		Setting options	Ex works
P1	Ramp time for wire inching	0 = normal inching (10s ramp time) 1 = fast inching (3s ramp time)	1
P2	Block program "0"	0 = P0 enabled 1 = P0 blocked	0
P3	PowerControl torch display mode	0 = normal display 1 = alternating display	0
P4	Program limitation	Programs 2 to max. 15	15
P5	Special cycle in the special latched and non-latched operating modes	0 = normal (previous) non-latched/latched 1 = WF3 cycle for non-latched/latched	0
P6[1]	Enable special jobs SP1 to SP3	0 = no enabling 1 = enabling of Sp1-3	0
P7	Correction operation, threshold value setting	0 = correction operation switched off 1 = correction operation on "Main program (PA)" flashing	0
P8[2]	Program changeover with standard torch	0 = no program changeover 1 = special latched 2 = specific latched special (n cycle active)	0
P9	Lat. and sp. lat. tapping start	0 = no latched tapping start 1 = latched tapping start possible	0
P10[2]	One or two-wire feed operation	0 = single operation 1 = dual operation, this unit is the "master" 2 = dual operation, this unit is the "slave"	0
P11	Special latched tapping time	0 = tapping function switched off 1 = 300ms 2 = 600ms	1
P12[2]	JOB list changeover	0 = task-oriented JOB list 1 = actual JOB list 2 = actual JOB list, JOB changeover activated via accessories	0/1[4]
P13[2]	Lower limit remote JOB changeover	Lowest JOB that can be selected using PowerControl 2 torches.	129
P14[2]	Upper limit remote JOB changeover	Highest JOB that can be selected using PowerControl 2 torches.	169
P15	Hold function	0 = hold values are not displayed 1 = hold values are displayed.	1
Key[3]	Software key switch	0 = system complete 1 = system not complete	1

1) PHOENIX EXPERT range only

2) PHOENIX EXPERT und PROGRESS ranges only

3) PHOENIX BASIC range only

4) See note in the relevant section of this chapter

5.10.1.2 Selecting, changing and saving parameters

Operating element	Action	Result	Display	
			Left	**Right**
		Switch off the welding machine	-	-
		Keep the key button pressed	-	-
		Switch on welding machine	-	-
		Release the key button	P 1	Value
		Parameter selection (see list of special parameters)	P 1-x, SCH	Value
		Parameter setting (see list of special parameters)	P x	Value
	1 x	Saving the special parameters	PHO	371
		Switch of the welding machine and restart in order to put the modifications into effect	-	-

5.10.1.3 Reset to factory settings

It is possible to reset all special parameters back to the factory settings.

Operating Element	Action	Result	Display	
			left	**right**
		Switch off the welding machine	-	-
		Press and hold button	-	-
		Switch on the welding machine	t1	on
		Switch welding machine off and back on again to activate the changes	-	-

5.10.1.4 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.

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

☞ **In previous versions of the M3.70/M3.71 control system the block is dependent on the key switch setting. With this version a block will only be effective when the locked status is active.**

The program P0 (Potentiometer program) is blocked. The operation is possible only with P1...P15.

5.10.1.6 Display mode torch power control (P3)

The display of the torch power control shows program number or Up-Down setting in the normal condition. It can be switched over to a blinking display. Then the program number and the welding type (normal/pulse) are displayed alternately in the program operation. In Up-Down operation the Up-Down settings and the Up-Down symbol are displayed alternately.

5.10.1.7 Program limit (P4)

The number of the absolute programs can be limited to above limit.

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

In the "normal" cycle of latched/non-latched the system starts with the start program Dvstart and subsequently enters into the main program DV2.

In the "DV3 cycle" of latched/non-latched, the system starts with the start program Dvstart and subsequently enters into the reduced main program DV3, remains there for the time T3 and then changes automatically into the main program DV2. As a result an additional program is available in the cycle.

5.10.1.9 Enabling special JOBs SP1 to SP3 (P6)

This function is not available with machine control M3.71.

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).

5.10.1.10 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.
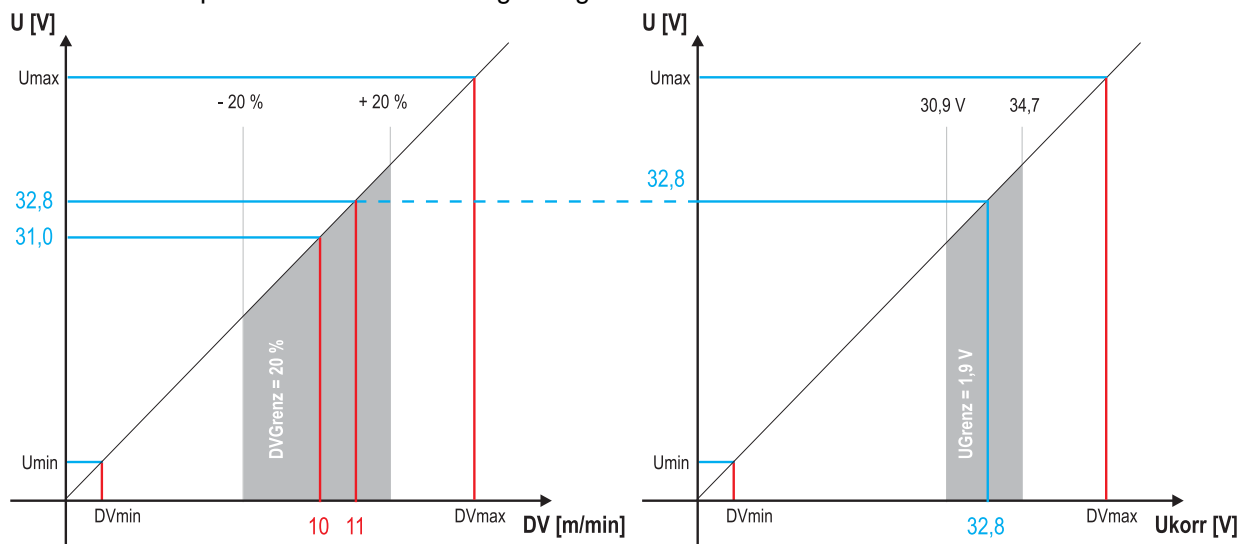
Figure 5-40

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 31.0 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 32.8 V

Now the welding voltage can be corrected by further 1.9 V (30.9 V and 34.7 V).

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

Operating Element	Action	Result	Display (example)	
			Left	**Right**
▼ VOLT PROG	(hand press)	Press key button until only LED „PROG" is shining	7,5 (DV)	4 (prog.-no.)
▼ VOLT PROG	(hand press) 4 sec.	Keep the key button pressed	0 (DVGrenz)	2.0 (UKorr)
		Release the key button	0 (DVGrenz)	2.0 (UKorr)
(knob m/min)	(turn/press)	Set tolerance value for wire speed	10 (DVGrenz)	2.0 (UKorr)
(knob V)	(turn/press)	Set tolerance value for voltage tolerance	10 (DVGrenz)	5.0 (UKorr)
		Wait approx. 5 secs. Tolerance limits (DV: 10%; U: +/- 5.0 V) were entered.	7.5 (DV)	4 (prog.-no.)

5.10.1.11 Program changeover with standard torch (P8)

Special latched

In "Latched absolute program sequence", the machine starts at the first cycle with absolute program 1.

In the second cycle, the machine switches to absolute program 2, once the start time "tstart" has elapsed.

In the 3rd cycle, the unit switches to absolute program 3. After "t3" is elapsed, the unit is automatically switched to absolute program 4.

☞ **This function is only available if no other accessory components such as remote controls or special torches are connected.**
Programs cannot be switched over on the wire feed unit control either.
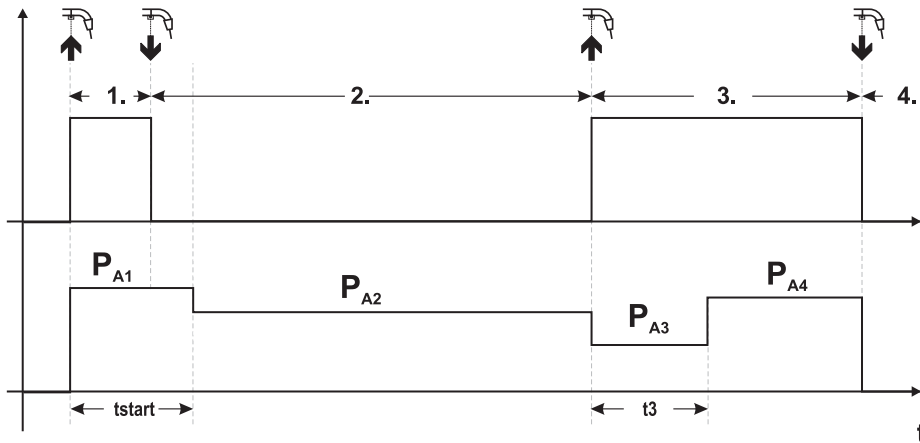
Figure 5-41

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}).
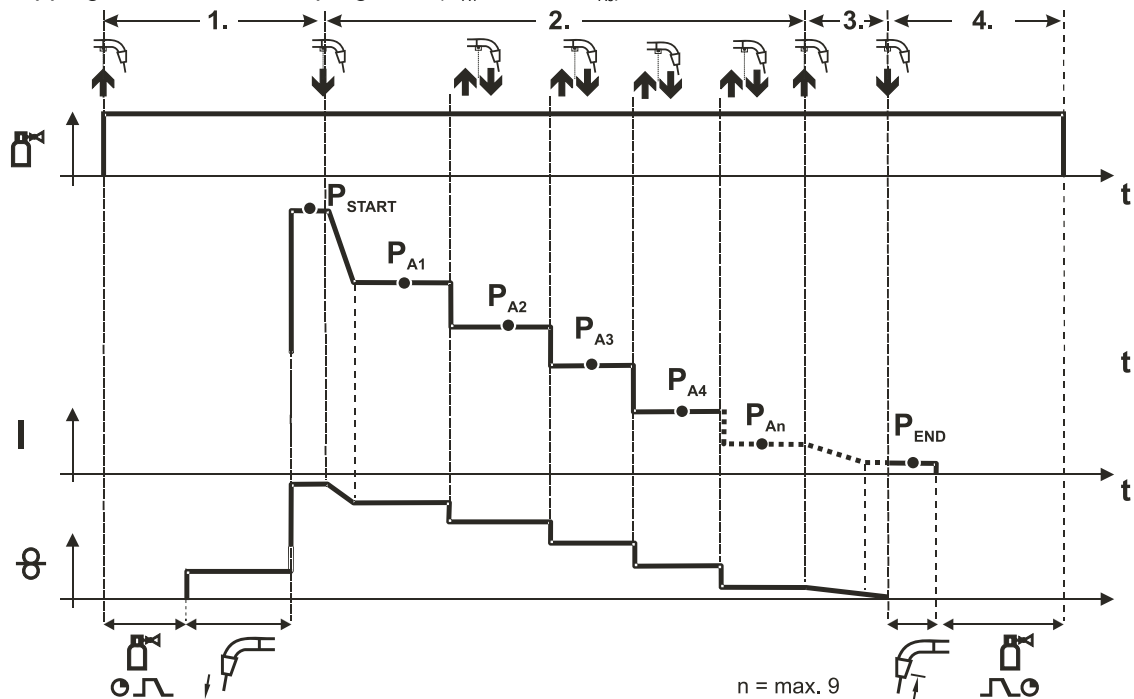
Figure 5-42

☞ **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.

5.10.1.12 N cycle setting

☞ **The n cycle function should always be activated before the n cycle setting (see "Program changeover with standard torch (P8)".**

Operating element	Action	Result	Display
	3 sec	Select wire burn-back	0 r-bd
	1 x	Select N cycle setting	1 n-t
		Parameter setting (setting range 1 to 9)	4 n-t

5.10.1.13 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.

5.10.1.14 "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 Key switches 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.

5.10.1.15 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 = 300ms (factory setting)

2 = 600ms

5.10.1.16 JOB list switching (P12)

☞ **Factory setting for parameter P12**

• PHOENIX 301,351,421 PROGRESS KG	0
• PHOENIX 333 PROGRESS KG	1
• PHOENIX 303 PROGRESS coldArc KG	1
• PHOENIX PROGRESS 4,4L	0
• PHOENIX PROGRESS DRIVE 4L coldArc	1
• PHOENIX EXPERT DRIVE 4,4L	1

Value	Designation	Explanation
0	Task-oriented JOB list	The JOB numbers are sorted by welding wires and shielding gases. JOB numbers may be skipped during selection where relevant.
1	Actual JOB list	JOB numbers correspond to the actual memory cells. Each JOB can be selected; no memory cells are skipped during selection.
2	Actual JOB list, JOB changeover active	As for the actual JOB list. JOB changeover is also possible with accessory components, such as the PowerControl 2 torch.

☞ **When switching between the actual and task-oriented JOB lists, the assignment of the welding tasks to the JOB numbers will change!**
   • The "JOB list" sticker is no longer valid!
In the appendix you will find pictures of both JOB lists. See "JOB list sticker" chapter.

All JOB number specifications in these instructions relate to the factory settings.

5.10.1.17 Creating user-defined JOB lists
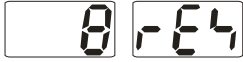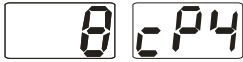
☞ **A consecutive memory range where accessories such as the PowerControl 2 torch can be used to switch between JOBs will be created.**
• Set special parameter P12 to "2".
• Set "Program or Up/Down function" changeover switch to "Up/Down" position.
• Select an existing JOB which is closest to the required result.
• Copy JOB to one or more target JOB numbers.
If any JOB parameters need to be changed, select the target JOBs in sequence and change the parameters individually.

• Set special parameter P13 to the lower limit and
• Set special parameter P14 to the upper limit of the target JOBs.
• Set "Program or Up/Down function" changeover switch to "Program" position.
JOBs can be changed over in the specified range using the accessory component.

5.10.1.18 Copying JOBs, "Copy to" function

☞ **The possible target range is between 129 - 169.**
  • **First configure special parameter P12 to P12 = 2 or P12 = 1!**

Operating element	Action	Result	Display
JOB-LIST	1 x	Select JOB list	8 Job
(wire feed knob) m/min	(turn/press)	Select the source JOB	8 Job
-	-	Wait for around 3 seconds until the JOB has been transferred	40 08
JOB-LIST	1 x > 5s	Keep button pressed for around 5s	8 rE4
(knob) V	(turn/press)	Setting to copy function ("Copy to")	8 cP4
(knob) m/min	(turn/press)	Select JOB number of the target JOB	129 Job
JOB-LIST	1 x	Save — The JOB is copied to the new position	

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.

5.10.1.19 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.

5.10.1.20 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.

5.10.1.21 Software key switch (SCH)

The key switch function allows the welding machine to be locked using the software. This is useful on units that do not have a key switch (e.g. PHOENIX 401 BASIC).

6 Commissioning

6.1 General

Warning – Risk from electrical current!

Follow the safety instructions on the opening pages entitled "For your safety".

Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off.

6.2 Area of application – proper usage

These welding machines are suitable exclusively for MIG/MAG, TIG and MMA welding.

Any other use is regarded as "improper" and no liability is assumed for any damage arising therefrom.

We can only guarantee smooth and trouble-free operation of the machines when used in conjunction with the welding torches and accessories from our range.

6.3 Installation

Ensure that the machine is set up in a stable position and is appropriately secured.

With modular systems (power source, transport vehicle, cooling module), observe the operating instructions for the relevant machine.

Set up the machine so that there is sufficient room to adjust the operating elements.

When lifting the wire feed unit, the wire spool should be removed (please see the operating instructions for the transport vehicle for more information on crane work).

6.4 Mains connection

The operating voltage shown on the rating plate must match the mains voltage.

For mains fuse protection, please refer to the "Technical Data" chapter.

The correct mains plug must be attached to the mains supply lead on the machine.

The connection must be made by a qualified electrician in compliance with the relevant local laws and regulations.

The phase sequence for three-phase machines is optional and has no effect on the fans direction of rotation.

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

6.5 Machine cooling

To obtain an optimal duty cycle from the power components, the following precautions should be observed:

- Ensure that the working area is adequately ventilated,
- Do not obstruct the air inlets and outlets of the machine,
- Do not allow metal parts, dust or other objects to get into the machine.

6.6 Adding coolant

☞ **Only for machines with integrated cooling module:**
The unit is supplied ex works with a minimum level of coolant.
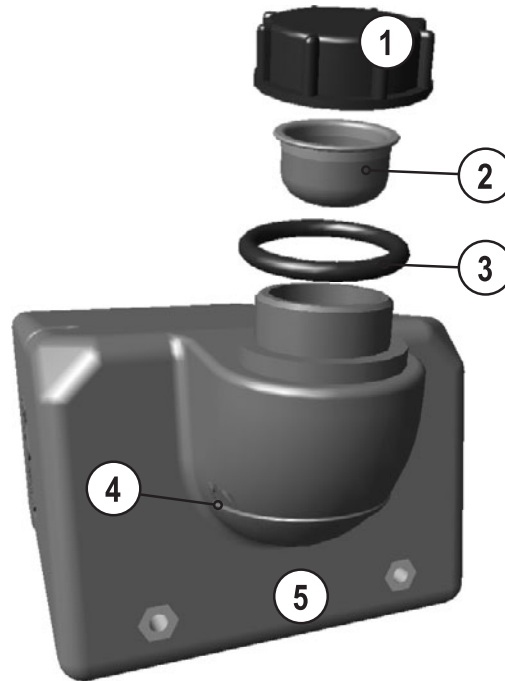
Figure 6-1

Item	Symbol	Description
1		**Coolant tank cap**
2		**Coolant filter sieve**
3		**O-ring (conical nipple)**
4		**"Min" mark** Minimum coolant level
5		**Coolant tank**

- Unscrew and remove the coolant tank sealing cover.
- Check filter sieve insert for dirt, clean if necessary and reinsert into position.
- Top up coolant to the filter sieve insert, close sealing cover again.

⚠️ **After the initial filling, wait for at least one minute when the machine is switched on so that the tube package is filled with coolant completely and without bubbles.**
With frequent changes of torch and during the initial filling process, the cooling unit tank should be topped up as necessary.

☞ **The level of coolant must never fall below the "min" mark on the tank.**

The sieve must always be inserted in the filling pipe before filling.

Mixing with other liquids or the use of other coolants voids our manufacturer's guarantee.

6.6.1 List of coolants

The following coolants may be used (for item nos., please see the Accessories chapter):

Coolant	Temperature range
KF 23E (Standard)	-10°C to +40°C
KF 37E	-20°C to +10°C
DKF 23E (for plasma machines)	0°C to +40°C

☞ **Observe the safety data sheets.**

Coolant must be disposed of in accordance with official regulations (German waste code number: 70104)!

Coolant must not be disposed of together with household waste.

Coolant must not be discharged into the sewerage system.

Recommended cleaning agent: water, if necessary with cleaning agent added.

6.7 Workpiece lead, general

Remove paint, rust and dirt from clamping and welding areas with a wire brush. The workpiece clamp must be mounted near the welding point and must be fixed in such a way that it cannot come loose of its own accord.

Structural parts, pipes, rails etc. may not be used as return leads for the welding current unless they are part of the actual workpiece.

Correct current connection must be ensured when using welding benches and appliances.

6.8 MIG/MAG welding

Warning – Risk from electrical current!

If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables. The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.

Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off.

Follow the safety instructions on the opening pages entitled "For Your Safety"!

We can only guarantee the perfect functioning of our machines when used with our range of accessory components.

6.8.1 Intermediate tube package connection

6.8.1.1 Welding machine
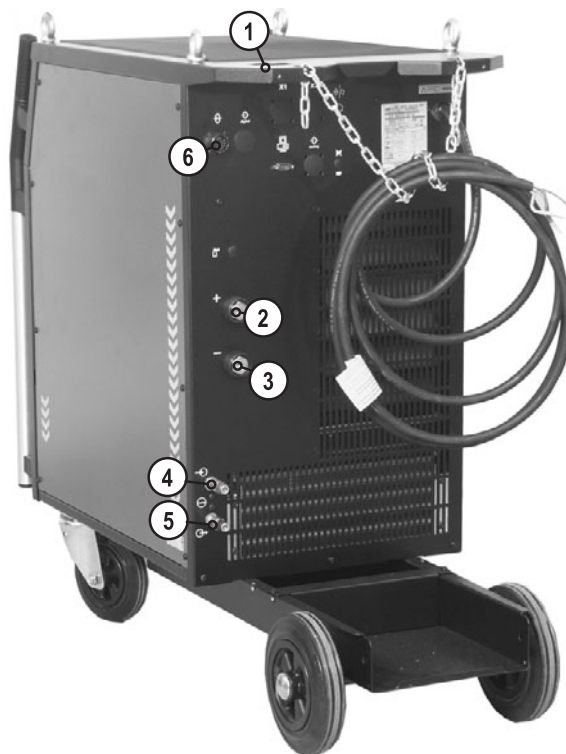
Figure 6-2

Item	Symbol	Description
1	⚇	**7-pole connection socket (digital)** Wire feed unit connection
2	**+**	**Connection socket, "+" welding current** • MIG/MAG welding: Welding current to "WF" central connection/torch
3	**—**	**Connection socket, "-" welding current** • MIG/MAG cored wire welding: Welding current to "WF" central connection/torch
4		**Rapid-action closure coupling, red (coolant return)**
5		**Rapid-action closure coupling, blue (coolant supply)**
6		**Intermediate tube package strain relief**

• Insert the end of the tube package through the strain relief of the tube package and lock by turning to the right.

• Insert the welding current cable plug into the relevant welding current connection socket and lock by turning to the right:
  – MIG/MAG cored wire: Welding current "-" connection socket
  – MIG/MAG standard: Welding current "+" connection socket

• 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).

☞ **Only for machines with integrated cooling module:**
• Lock connecting nipples of the cooling water tubes into the corresponding rapid-action closure couplings:
  Return line red to rapid-action closure coupling, red (coolant return) and
  supply line blue to rapid-action closure coupling, blue (coolant supply).

6.8.1.2 Wire feed unit

⚡ **The green/yellow earth cable must not be connected to the welding machine or wire feed unit (this is used for a different machine series)!**
Remove the earth cable or push it back into the tube package.
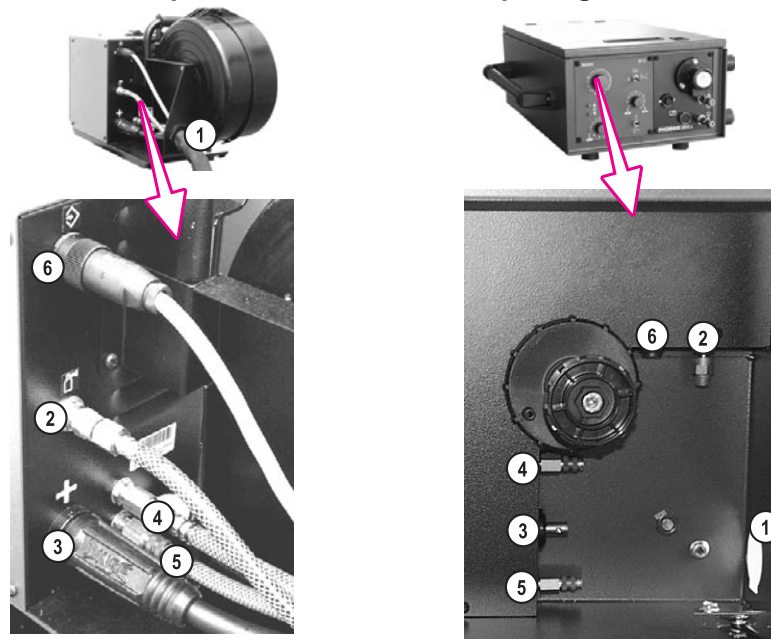
Figure 6-3

Item	Symbol	Description
1		**Intermediate tube package strain relief**
2	⌀⋈	**Connecting nipple G¼, shielding gas connection**
3	✚	**Connector plug, welding current "+"** Welding current connection on wire feed unit
4	⊖→	**Rapid-action closure coupling, red (coolant return)**
5	→⊕	**Rapid-action closure coupling, blue (coolant supply)**
6	⬖⇒	**7-pole connection socket (digital)** • Control lead for wire feed unit

- Insert the end of the intermediate tube package through the strain relief and secure the lock by turning to the right.
- Insert the plug on the welding current lead into the "+" welding current connection socket and lock.
- Lock the connecting nipples on the cooling water tubes into place in the appropriate rapid-action closure couplings:
  Connect the red return line to red rapid-action closure coupling (coolant return) and
  the blue supply line to the blue rapid-action closure coupling (coolant supply).
- Insert the plug of the control cable into the 7-pole connection socket (digital) and secure with the crown nut (the plug only permits one position).
- Connect the crown nut on the shielding gas lead to the G¼" connecting nipple, connect the shielding gas.

☞ **A pilot static tube is factory-fitted onto the wire feed unit for a gas flow rate of 0-16 l/min. For applications where a higher flow rate is required, a pilot static tube of 0-25l/min (see accessories) should be fitted.**

6.8.2 Welding torch connection

⚠️ **We can only guarantee correct functioning of our machines when used with our range of welding torches.**

The correct spirals or cores must be used for the relevant wire diameter and wire type.

Welding torch with insulatated liner:

☞ **A capillary tube must be installed in the central connection.**

Welding torch with Teflon or plastic core:

☞ **The capillary tube must be removed from the central connection.**

Preparing the welding torch for the welding task:

- Shorten the Teflon core and surrounding guide pipe so that the distance to the drive roller is as short as possible.
- The Teflon core and the guide pipe must not be deformed.
- Deburr the Teflon core and the guide pipe.
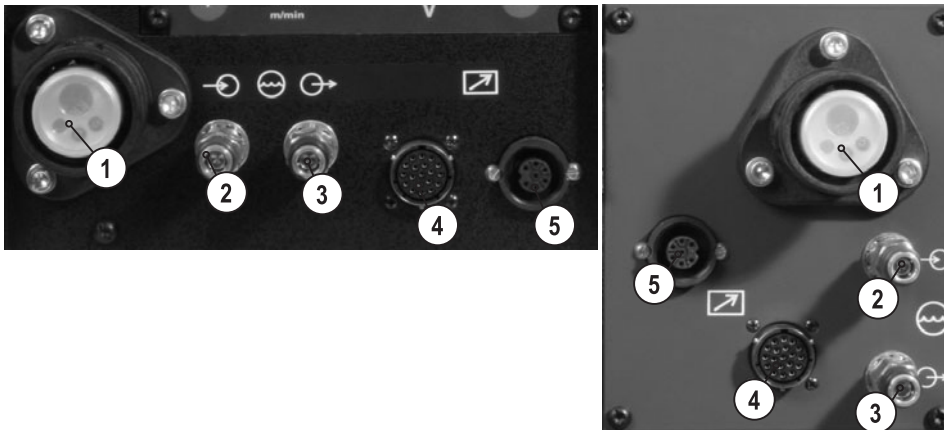
Figure 6-4

Item	Symbol	Description
1		**Euro-central connector (welding torch connection)** Welding current, shielding gas and torch trigger included
2		**Rapid-action closure coupling, red (coolant return)**
3		**Rapid-action closure coupling, blue (coolant supply)**
4	↗	**19-pole connection socket (analogue)** For connecting analogue accessory components (remote control, welding torch control lead, intermediate drive, etc.)
5	↗	**7-pole connection socket (digital)** For connecting digital accessory components (remote control, welding torch control lead, etc.)

- Insert the central plug for the welding torch into the central connector and screw together with crown nut.
- Lock the connecting nipples on the cooling water tubes into place in the appropriate rapid-action closure couplings:
  connect the red return line to red rapid-action closure coupling (coolant return) and
  the blue supply line to the blue rapid-action closure coupling (coolant supply).
- Depending on the type of torch used, insert the torch control lead plug into either the 7-pole connection socket (digital) or the 19-pole connection socket and lock.

☞ **Only MIG/MAG torches with special functions (additional control lead):**

- Insert the torch control lead plug into either the 7-pole connection socket (digital) or the 19-pole connection socket (depending on the version) and lock.

6.8.3 Connection for workpiece lead

Figure 6-5

Item	Symbol	Description
1	✚	**Connection socket, "+" welding current**
		• MIG/MAG cored wire welding: Workpiece connection
		• TIG welding: Workpiece connection
		• MMA welding: Workpiece or electrode holder connection
2	▬	**Connection socket, "-" welding current**
		• MIG/MAG welding: Workpiece connection
		• TIG welding: Welding current connection for welding torch
		• MMA welding: Workpiece or electrode holder connection

• Insert the workpiece lead connector plug into the welding current connection socket and lock by turning to the right:
  − MIG/MAG cored wire: Welding current "+" connection socket
  − MIG/MAG standard: Welding current "-" connection socket

6.8.4 Fixing of the pin reel (adjustment of the pre-tensioning)

⚠️ **As the spool brake at the same time also secures the wire spool retainer, the following working steps are to be carried out for every spool change and before every adjustment of the spool brake.**
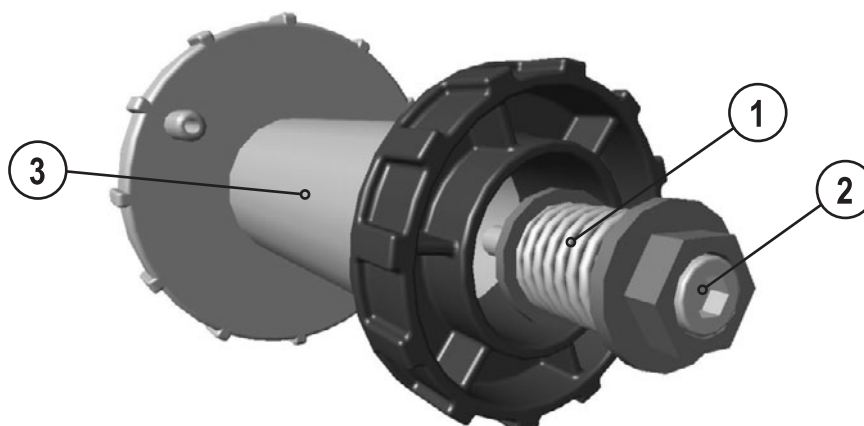
Figure 6-6

Item	Symbol	Description
1		**Securing and braking unit**
2		**Allen screw** Securing the wire spool retainer and adjustment of the spool brake
3		**Spool holder retainer**

- Loosen the Allen screw of the securing and braking unit till the screw comes out of the thread in the spool holder retainer (but do not screw it out completely to prevent losing it).
- Pre-tension the securing and braking unit in the spool holder retainer by making at least 4 complete turns of the Allen screw (4 x 360°) in the clockwise direction.

6.8.5 Inserting the wire spool

⚠ **The pretensioning of the pin reel shall be checked before each wire spool replacement and before the adjustment of the spool brake, see chapter on fixing of the pin reel (adjustment of the pretensioning)!**

☞ **Standard D300 pin reels can be used. Adapters (see accessories) are required when using standardised basket coils (DIN 8559).**
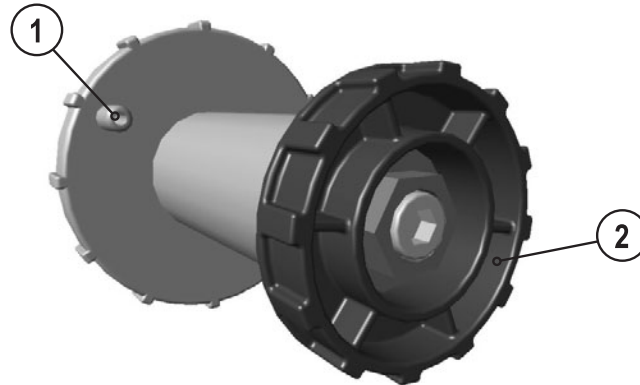
Figure 6-7

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.

6.8.6 Changing the wire feed rollers

☞ **To ensure optimum wire feed, it is essential that the wire feed rollers match the wire electrode diameter used (change if necessary).**

The wire feed rollers are only suitable for two wire diameters (factory setting 0.8 mm or 1.0 mm). Turning the WF rollers changes between the two wire diameters.

- Slide new drive rollers into place so that the diameter of the wire electrode printed on the wire feed roller is visible. Screw the drive rollers in place with knurled screws.
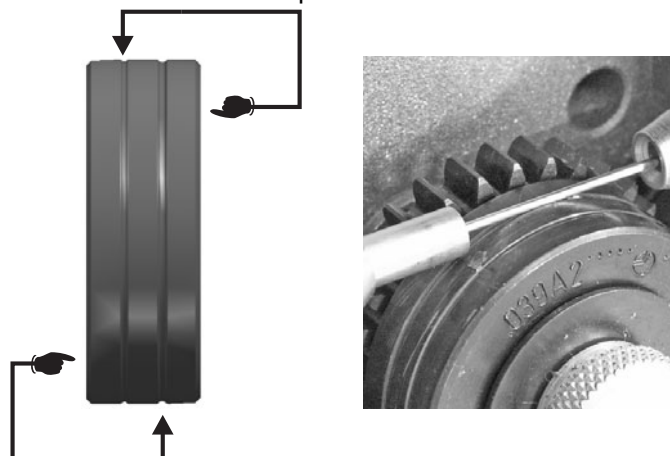
Figure 6-8

6.8.7 Inching the wire electrode

☞ **To ensure optimum wire feeding, it is essential that the wire feed rollers match the applied wire electrode diameter and the type of material used (exchange if necessary).**

Slide new drive rollers into place so that the diameter of the wire electrode printed on the wire feed roller is visible. Screw the drive rollers in place with knurled screws.

DRIVE 4L   DRIVE 4
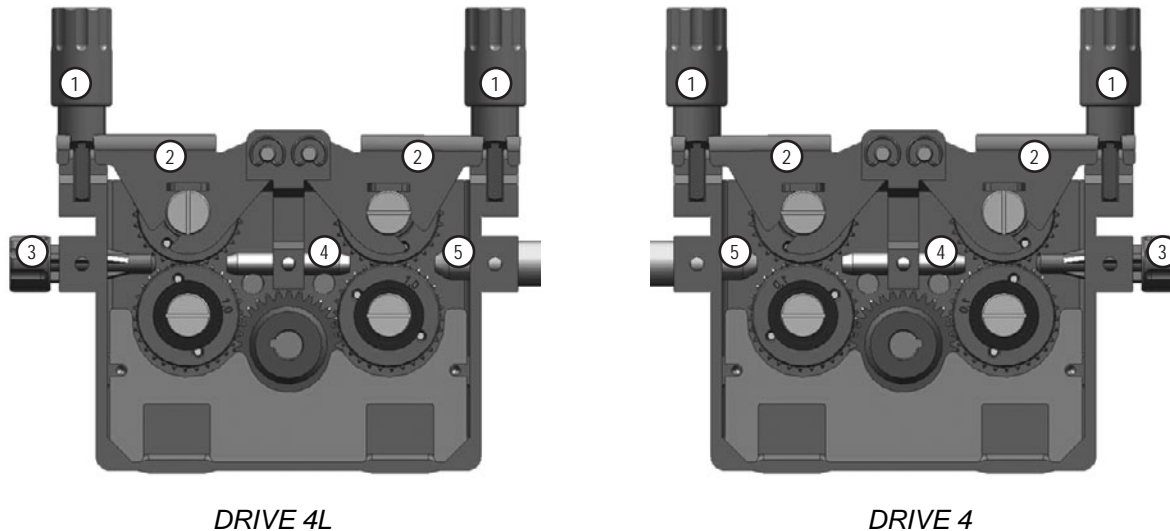
Figure 6-9

Item	Symbol	Description
1		**Pressure units**
2		**Clamping units**
3		**Wire inlet nipple**
4		**Guide tube**
5		**Capillary tube or Teflon core**

- Extend and lay out the torch tube package.
- Unfasten pressure units and fold out (clamping units and counter-pressure rollers will automatically flip upwards).
- Unwind welding wire carefully from the wire spool and insert through the wire inlet nipple over the drive roller grooves and the guide pipe into the capillary tube and Teflon core using guide pipe.
- Press the clamping element with the counter-roller back downwards and fold the wire units back up again (wire electrode should in the groove on the drive roller).

☞ **The clamping pressure must be set on the adjusting nuts of the pressure units so that the wire electrode is conveyed but will still slip through if the wire spool jams.**
- Press the wire inching button until the wire electrode projects from the welding torch.

For wire feed units with control M3.70, the inching process is started directly on the control by pressing the 🔴 **key button.**

The inching speed can be selected in two stages (ramp function), see also chap. Function specification / special parameters.

⚠ **Caution, risk of injury!**
Never point welding torch at people or animals!

6.8.8 Spool brake setting

⚠ **The pretensioning of the pin reel shall be checked before each wire spool replacement and before the adjustment of the spool brake, see chapter on fixing of the pin reel (adjustment of the pretensioning)!**
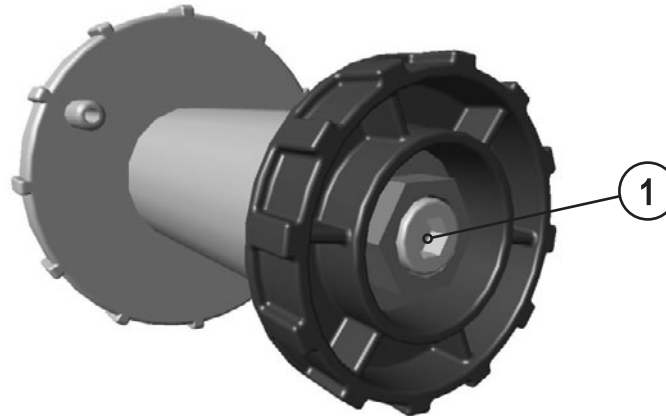
Figure 6-10

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 spool brake only to the point where the wire spool no longer runs on when the trigger "wire inching" is released! The wire spool must not jam!**

⚠ **If the Allen screw is now loosened by as much as it was previously tightened, a renewed tightening of the pin reel will be necessary, see chapter "Fixing of the pin reel (adjustment of the pretensioning)".**

6.9 TIG welding

⚡ **Warning – Risk from electrical current!**

If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables. The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.

Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off.

Follow the safety instructions on the opening pages entitled "For Your Safety"!

We can only guarantee the perfect functioning of our machines when used with our range of accessory components.

6.9.1 Welding torch connection

Figure 6-11

Item	Symbol	Description
1		**Euro-central connector (welding torch connection)** Welding current, shielding gas and torch trigger included
2		**Rapid-action closure coupling, blue (coolant supply)**
3		**Rapid-action closure coupling, red (coolant return)**
4	▬	**Connection socket, "-" welding current** • MIG/MAG welding: Workpiece connection • TIG welding: Welding current connection for welding torch • MMA welding: Workpiece or electrode holder connection

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

• Insert the welding current plug on the combi torch into the "-" welding current connection socket and lock by turning to the right.

☞ **Only for machines with integrated cooling module:**
• Lock connecting nipples of the cooling water tubes into the corresponding rapid-action closure couplings:
Return line red to rapid-action closure coupling, red (coolant return) and
supply line blue to rapid-action closure coupling, blue (coolant supply).

6.9.2 Connection for workpiece lead

Figure 6-12

Item	Symbol	Description
1	➕	**Connection socket, "+" welding current**
		• MIG/MAG cored wire welding: Workpiece connection
		• TIG welding: Workpiece connection
		• MMA welding: Workpiece or electrode holder connection
2	➖	**Connection socket, "-" welding current**
		• MIG/MAG welding: Workpiece connection
		• TIG welding: Welding current connection for welding torch
		• MMA welding: Workpiece or electrode holder connection

• Insert cable plug on the workpiece lead into the welding current socket "+" and lock by turning to the right.

6.10 MMA welding

Caution: Risk of being crushed or burnt.

When replacing spent or new stick electrodes

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

Warning – Risk from electrical current!

If welding is carried out alternately using different methods and if a welding torch and an electrode holder remain connected to the machine, the open-circuit/welding voltage is applied simultaneously on all cables. The torch and the electrode holder should therefore always be placed on an insulated surface before starting work and during breaks.

Connection and welding leads (e.g. electrode holder, welding torch, workpiece lead, interfaces) may only be connected when the machine is switched off.

Follow the safety instructions on the opening pages entitled "For Your Safety"!

We can only guarantee the perfect functioning of our machines when used with our range of accessory components.

6.10.1 Connecting the electrode holder and workpiece lead

Figure 6-13

Item	Symbol	Description
1	✚	**Connection socket, "+" welding current** • MIG/MAG cored wire welding: Workpiece connection • TIG welding: Workpiece connection • MMA welding: Workpiece or electrode holder connection
2	▬	**Connection socket, "-" welding current** • MIG/MAG welding: Workpiece connection • TIG welding: Welding current connection for welding torch • MMA welding: Workpiece or electrode holder connection

- Insert cable plug of the electrode holder into either the "+" or "-" welding current connection socket and lock by turning to the right.
- Insert cable plug of the workpiece lead into either the "+" or "-" welding current connection socket and lock by turning to the right.

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

6.11 Shielding gas supply

6.11.1 Connecting the shielding gas supply
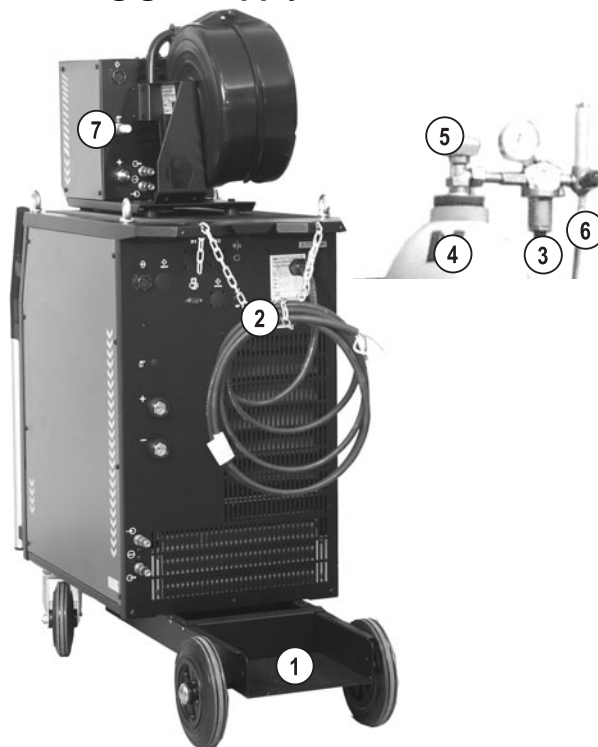
Figure 6-14

Item	Symbol	Description
1		**Cylinder bracket**
2		**Safety chain**
3		**Pressure reducer**
4		**Shielding gas cylinder**
5		**Cylinder valve**
6		**G ¼" crown nut**
7		**Connecting nipple G¼, shielding gas connection**

⚠️ **No dirt must be allowed to enter the shielding gas supply as this would cause blockages.**
All shielding gas connections must be gastight!

• Place the shielding gas cylinder in the cylinder holder and secure it from tipping over using the securing chain!

• Before connecting the pressure reducer to the gas cylinder, open the cylinder valve briefly to blow out any dirt.

• Mount the pressure reducer onto the gas cylinder valve.

• Fit the gas hose and G1/4" crown nut onto the relevant connection on the pressure reducer.

• Fit the gas hose and G1/4" crown nut onto the relevant connection on the welding machine, and fit the wire feed unit (if present on this version).

6.11.2 Gas test

- Slowly open the gas cylinder valve.
- Open the pressure reducer.
- Switch on the power source at the main switch.
- Press the gas test key button briefly.
  The shielding gas will then flow for approx. 25 sec.
  Pressing the key button again briefly will pause the test.
- Set the relevant shielding gas quantity for the application on the pressure reducer.

☞ **For wire feed units with control M3.70, the gas test is conducted by pressing the 🔴 button.**

6.11.3 "Rinse tube package" function

This function is only available for machine control M3.70.

Operating Element	Action	Result
🔴	👆 5 sec.	Select rinse tube package. Shielding gas flows continuously until the Gas Test button is pressed again.

6.11.4 Setting the shielding gas quantity

☞ **Notes on welding aluminium**

A two-stage pressure reducer should always be used for aluminium welding.
A pilot static tube for a gas flow of 0–16 l/min is fitted on each wire feed unit as standard. For applications where a higher gas flow rate is required (e.g. for aluminium), a pilot static tube for a flow of 0–25 l/min (see accessories) should be used.

☞ **Consequences of incorrect shielding gas settings**

- Insufficient shielding gas:
  Inadequate gas protection, the indrawn air results in pores in the weld seam.
- Excessive shielding gas:
  Turbulence can be caused, allowing air to enter and cause pores in the weld seam.

7 Maintenance and testing

⚠️ **The maintenance, cleaning and testing work described below must be conducted correctly and on an annual basis in order to be entitled to claim under the EWM warranty.**

7.1 General

Under the indicated environmental conditions and normal operating conditions, this machine is largely maintenance-free and requires minimum care. However, a number of points should be observed to guarantee fault-free operation of your welding machine. Among these are regular cleaning and checking as described below, depending on the level of contamination in the environment and the usage time of the welding machine.

⚠️ **Cleaning, testing and repairing of the welding machines may only be carried out by competent, capable personnel. A capable person is one who, due to training, knowledge and experience, is able to recognise the dangers that can occur during testing of welding power sources as well as possible subsequent damage and who is able to implement the required safety procedures.**

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

7.2 Cleaning

Before cleaning, carefully disconnect the machine from the mains. DISCONNECT THE MAINS PLUG!
(Switching off or removing the fuse does not provide adequate insulation protection.)
Wait 2 minutes until the capacitors are discharged. Remove the casing cover.
The individual components should be handled as follows:

Power source:	Depending on the amount of dust, blow out using oil- and moisture-free compressed air.
Electronics:	Do not blast electronic components or circuit boards with compressed air but instead use suction from a vacuum cleaner for cleaning purposes.
Coolant:	Check for impurities and replace if necessary.
	Caution! Mixing with other liquids or the use of other coolants voids our manufacturer's guarantee.

7.3 Test

The test should be conducted in accordance with IEC/DIN EN 60974-4 "Arc welding equipment – Inspection and testing during operation" in accordance with the German Ordinance of Operational Safety. This standard is firstly, international, and secondly, specific to arc welding equipment.

☞ **The former term of repetition test has been replaced due to a change in the corresponding standard with "Inspection and testing during operation".**

In addition to the regulations on the test given here, the relevant local laws and regulations must also be observed.

7.3.1 Test equipment

☞ **Due to the special conditions of inverter arc welding equipment, not all test equipment is suitable for testing in accordance with VDE 0702 to the full extent!**
EWM as a manufacturer offers all appropriately trained and authorised EWM sales partners the appropriate test equipment and measuring devices conforming to VDE 0404-2, which evaluate the frequency response conforming to DIN EN 61010-1 Appendix A – Measuring Circuit A1.

You as the user are tasked with ensuring that your EWM machines conform to the standard IEC/DIN EN 60974-4 and are tested with the relevant test equipment and measuring devices given above.

☞ **The following description of the test is only a brief overview of the products to be tested. For details on the test points or in the event of any queries, please refer to IEC/DIN EN 60974-4.**

7.3.2 Scope of the test

a) Visual inspection
b) Electrical test: measurement of
- open circuit voltage
- insulation resistance, or alternatively
- leakage currents
- protective conductor resistance
c) Functional test
d) Documentation

7.3.3 Visual inspection

The key areas in the test are:

1. Torch/stick electrode holder, welding current return lead clamp
2. Power supply: leads including plugs and strain relief
3. Welding current circuit: leads, plugs and couplings, strain relief
4. Casing
5. Operating, message, safety and adjustment devices
6. Other, general condition

7.3.4 Measuring the open circuit voltage
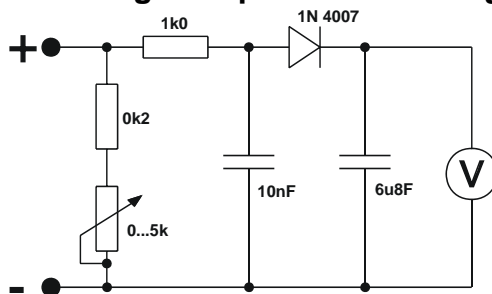
Measuring circuit according to DIN EN 60974-1

Connect the measuring circuit to the welding current sockets. The voltmeter must display mean values and have an internal resistance ≥ 1 MΩ. In the case of step switch controlled devices, set the maximum output voltage (step switch). Adjust the potentiometer from 0 kΩ to 5 kΩ during the measurement. The measured voltage should not deviate from that specified on the rating plate by more than +/- 5% and may be no greater than 113 V (for devices with VRD: 35 V).

7.3.5 Measurement of insulation resistance

The mains switch must be on so that the insulation in the interior of the machine can also be checked through to the transformer. If a mains contactor is fitted, this should be bridged or the measurement must be carried out on both sides.

The insulation resistance must not be less than:

Mains current circuit	against	Welding current circuit and electronics	5 MΩ
Welding current circuit and electronics	against	Protective conductor circuit (PE)	2.5 MΩ
Mains current circuit	against	Protective conductor circuit (PE)	2.5 MΩ

7.3.6 Measuring the leakage current (protective conductor and contact current)

Note: Even if the leakage current measurement according to the standard is only an alternative to the insulation resistance measurement, EWM recommends always performing both measurements, especially following repair work. The leakage current is based for the greater part on a physical effect other than the insulation resistance. For this reason, it may not be possible to uncover a dangerous leakage current using the insulation resistance measurement.

These measurements cannot be performed with a normal multimeter. Even test devices for VDE 0702 (especially older devices) are generally only intended for 50/60Hz. With inverter welding machines, however, significantly higher frequencies occur, which can interfere with some measuring devices, and result in others measuring the frequency incorrectly.

A test device must meet the requirements of VDE 0404-2. For the frequency response measurement, please refer to DIN EN 61010-1 Appendix A – Measuring circuit A1.

☞ **For these measurements the welding machine must be switched on and supplying open circuit voltage.**
1. Protective conductor current: < 5mA
2. Leakage current from the welding sockets separately to PE: < 10mA

7.3.7 Measurement of protective conductor resistance

Measure between the plug earthed contact and accessible live parts, e.g. casing screws.
During the measurement, the connection lead must be moved across the entire length, especially near the casing and plug inlet points. This should uncover any interruptions in the protective conductor. All conductive parts of the casing accessible from outside should also be tested to ensure a correct PE connection for safety class I.

The resistance must not exceed a mains connection lead 0.3Ω up to 5m in length. For longer leads, the permissible value increases by 0.1Ω per 7.5m of lead. The maximum permissible value is 1Ω.

7.3.8 Functional test of the welding machine

Safety devices, selector switches and command units (if fitted) and the entire machine or the entire system for arc welding, must be functioning perfectly.

1. Main switch
2. Emergency stop devices
3. Voltage reducing device
4. Gas solenoid valve
5. Message and control lamps

7.3.9 Documentation of the test

The test report must contain:
- the designation of the tested welding equipment,
- the date of the test,
- the test results,
- the signature, name of technician and the relevant institution,
- the name of the test equipment.

A label with the date of the test must be affixed to the welding machine to show that the test has been passed.

7.4 Repair Work

Repair and maintenance work may only be performed by qualified authorised personnel; otherwise the right to claim under the warranty is void. In all service matters, please contact your EMW sales partner. Returns of defective equipment subject to warranty may only be made through your EWM sales partner. In the event of problems or queries, please contact the EWM Service Department directly (+49 (0) 2680 181 0). Use only genuine spare parts and replacement parts when replacing. When placing an order, please quote the type designation and item number, as well as the type, serial number and item number of the relevant equipment.

We hereby confirm that the servicing and maintenance instructions given above and the test described above have been completed correctly.	
Date/Stamp/Signature of EWM sales partner	Date/Stamp/Signature of EWM sales partner
Date of next maintenance work and test	Date of next maintenance work and test
Date/Stamp/Signature of EWM sales partner	Date/Stamp/Signature of EWM sales partner
Date of next maintenance work and test	Date of next maintenance work and test
Date/Stamp/Signature of EWM sales partner	Date/Stamp/Signature of EWM sales partner
Date of next maintenance work and test	Date of next maintenance work and test

7.5 Disposing of equipment

This machine does not belong in household waste, in accordance with the German Law on Electrical Equipment Waste.

In Germany, waste equipment from private households can be disposed of free of charge at local community collection points. Your administrative office will be pleased to inform you of the options. EWM participates in an approved waste disposal and recycling system and is registered in the Used Electrical Equipment Register (EAR) under number WEEE DE 57686922.

☞ **In addition, within Europe the machine can also be returned to your EWM sales partner.**

7.5.1 Manufacturer's declaration to the end user

- In accordance with European guidelines (Directive 2002/96/EC from the European Parliament and the Council of 27.01.03), it is no longer permissible to dispose of used electrical and electronic equipment in unsorted household waste collections. It must be kept separate from other waste. The symbol on the wheeled bins indicates the requirement to separate this waste.
  Help to protect the environment and ensure that this equipment, when you no longer want to use it, is disposed of in the relevant system of separated waste disposal.
- In Germany, (German Law on the Distribution, Return and Environmentally-Friendly Disposal of Electrical and Electronic Equipment (ElektroG) of 16.03.05) you are required to take old equipment to a waste collection point separated from household waste. The public waste disposal contractor (local authorities) have set up collection points for this purpose where old equipment from private households in your area can be collected for you free of charge.
  It is also possible that the legally responsible waste disposal company will collect old equipment from private households.
- Please obtain the relevant information from your local waste calendar or from your town council or local authority on the options available in your area for returning or collecting old equipment.

7.6 Meeting the requirements of RoHS

We, EWM HIGHTEC Welding GmbH Mündersbach, hereby confirm that all products supplied by us which are affected by the RoHS Directive, meet the requirements of the RoHS (Directive 2002/95/EC).

8 Warranty

8.1 General Validity

3-year warranty

on all new EWM machines*:

- Power sources
- Wire feeds
- Cooling units
- Trolleys

* If these are operated with genuine EWM accessories (such as intermediate tube package, remote control, remote control extension cable, coolant, etc.).

1-year warranty on:

- Used EWM machines
- Automation and mechanisation components
- Remote control
- Inverters
- Intermediate tube packages

6-month warranty on:
- Spare parts supplied separately (such as circuit boards, ignition units)

Manufacturer/supplier warranty on:
- All additional parts used by EWM, but manufactured by other companies (e.g. motors, pumps, fans, torches, etc.)

Non-reproducible software errors and parts subject to mechanical ageing are excluded from the warranty (e.g. wire feed unit, wire feed rollers, replacement and spare wire feed parts, wheels, solenoid valves, workpiece leads, electrode holders, connection tubes, replacement torches and spare torch parts, mains and control leads, etc.).

These terms shall apply without affecting the customer's legal rights to a warranty and subject to our General Terms and Conditions of Business and our terms on the warranty declaration. Agreements to the contrary must be confirmed by EWM in writing.

Our General Terms and Conditions of Business are available for access anytime online at www.ewm.de.

8.2 Warranty Declaration

Your 3-year warranty

Regardless of statutory warranty rights and based on our General Terms and Conditions, EWM HIGHTEC WELDING GmbH provides a 3-year warranty for its welding products starting on the date of purchase. Different warranty periods apply to accessories and spare parts; please see the "General Validity" section for these periods. Parts subject to wear are naturally exempt from the warranty.

EWM guarantees the error-free condition of the products in terms of materials and processing. If the product proves to be defective in terms of materials or processing within the warranty period, you are entitled to free repair or to replacement with an appropriate product, at our discretion. On receipt by EWM the returned product becomes the property of EWM.

Condition

The prerequisite for receiving the full 3-year warranty is simply to operate the products in accordance with the EWM operating instructions observing the relevant legal recommendations and guidelines and having annual maintenance work and testing conducted by an EWM sales partner (see "Maintenance and testing" chapter). This is because only machines that are maintained regularly function correctly in the long term.

Making a claim

When making a claim under the warranty, please contact your EWM authorised sales partner only.

Warranty exclusions

No warranty claims can be accepted if the EWM products in question are not operated using genuine EWM accessories (such as intermediate tube package, remote control, remote control extension cable, coolant, etc.). The warranty does not apply to products that are damaged due to accidents, misuse, improper operation, incorrect installation, use of force, disregard of the specifications and operating instructions, inadequate maintenance (see chapter "Maintenance and testing"), exterior influences, acts of God or personal misfortunes. Furthermore, it is not valid in the case of improper changes, repairs or modifications. In addition, a claim for warranty does not exist in the case of partially or completely dismantled products and interventions by persons who are not authorised by EWM, as well as in the case of normal wear.

Limitation

All claims regarding fulfilment or non-fulfilment on the part of EWM from this declaration in connection with this product are limited as follows to the replacement of the actual damages. EWM's liability stemming from this declaration in connection with this product is fundamentally limited to the amount that the purchaser originally paid for the original purchase. This limitation does not apply to personal injuries or damage to property caused by negligent behaviour on the part of EWM. In no way will EWM be responsible for lost profits, indirect or subsequent damage. EWM is not liable for damages based on the claims of third parties.

Place of jurisdiction

If the person making the claim is a business person, the sole place of jurisdiction for all disputes resulting directly or indirectly from the contractual relationship shall be the headquarters or the branch office of the supplier, at the discretion of the supplier. The purchaser gains ownership of the products supplied as replacements within the framework of the warranty adjustment at the time of the exchange.

9 Operating problems, causes and remedies

9.1 Error messages (power source)

All machines are subject to rigorous production and final checks. If, despite this, anything fails to work at any time, please check machine using the chart below. If none of the fault rectification procedures described leads to the correct functioning of the machine, please inform your authorised dealer.

⚠ **A welding machine error is indicated by an error code being displayed (see table) on the display on the machine control.**

In the event of a machine error, the power unit is shut down.
- If multiple errors occur, these are displayed in succession.
- Document machine errors and inform service staff as necessary.

Error	Category			Possible cause	Remedy
	a)	b)	c)		
Error 1 (Ov.Vol)	-	-	x	Mains – excess voltage	Check the mains voltages and compare with the welding machine connection (see Technical data, chapter 1)
Error 2 (Un.Vol)	-	-	x	Mains – undervoltage	
Error 3 (Temp)	x	-	-	Welding machine - excess temperature	Allow the machine to cool down (main switch to "1")
Error 4 (Water)	-	-	x	Coolant level low	Top up the coolant Leak in the coolant circuit > rectify the leak and top up the coolant Coolant pump is not working > check excess current release on air cooling unit
Error 5 (Wi.Spe)	-	x	-	Error in WF case, tachometer error	Check the wire feed unit Tachometer generator not issuing a signal, M3.00 defective > information service dept.
Error 7 (Se.Vol)	-	-	x	Secondary excess voltage	Inverter error > inform Service
Error 8 (no PE)	-	-	x	Earth fault between welding wire and earth line (PHOENIX 300 only)	Separate the connection between the welding wire and case or an earthed object
Error 9 (fast stop)	x	-	-	Fast shut-down triggered by BUSINT X10 or RINT X11	Rectify error on robot
Error 10 (no arc)	-	x	-	Arc interruption Fast shut-down triggered by BUSINT X10 or RINT X11	Check wire feed
Error 11 (no ign)	-	x	-	Ignition error after 5 seconds Triggered by BUSINT X10 or RINT X11	Check wire feed

Category legend for error reset

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

b) Error message can be reset using the following button:

PHOENIX	EXPERT	RC	CAR EXPERT	PROGRESS
1 x 🖎	Ⓢ	●SP Enter	⊥	

c) Errors can only be reset by switching the machine on and off again.

10 Accessories, options

10.1 General accessories

Type	Designation	Item no.
KF 23E-10	Coolant (-10°C), 10 litres	094-000530-00000
KF 37E-10	Coolant (-20°C), 10 litres	094-006256-00000
AK300	Adapter for K300 basket coil	094-001803-00001
DM1 32L/MIN	Manometer pressure reducer	094-000009-00000
G1 2M G1/4 R 2M	Gas hose	094-000010-00001
GS16L G1/4" SW 17	Pilot static tube	094-000914-00000
GS25L G1/4" SW 17	Pilot static tube	094-001100-00000
PHOENIX 301		
5POLE/CEE/16A/M	Machine plug	094-000712-00000
WK50QMM 4M KL	Workpiece cable, clamp	092-000003-00000
MIG 40 G 3M	MIG welding torch, gas	094-003415-00000
50QMM MIG G 1M	Intermediate hose package, gas	094-000579-00000
50QMM MIG G 5M	Intermediate hose package, gas	094-000579-00001
50QMM MIG G 10M	Intermediate hose package, gas	094-000579-00002
MIG 452 W 4M HDH	MIG welding torch, water flex.	094-011056-00104
ZWIPA 50QMM MIG W 1M	Intermediate hose package, water	094-000405-00000
ZWIPA 50QMM MIG W 5M	Intermediate hose package, water	094-000405-00001
ZWIPA 50QMM MIG W 10M	Intermediate hose package, water	094-000405-00002
EH50 4M	Electrode holder	092-000004-00000
PHOENIX 351;401;421		
5POLE/CEE/32A/M	Machine plug	094-000207-00000
WK70QMM 4M Z	Workpiece cable, grip	092-000013-00000
MIG 40 G 3M	MIG welding torch, gas	094-003415-00000
MIG SB 400G G 3M	MIG welding torch, gas	094-003413-00000
70QMM MIG G 1M	Intermediate hose package, gas	094-000580-00000
70QMM MIG G 5M	Intermediate hose package, gas	094-000580-00001
70QMM MIG G 10M	Intermediate hose package, gas	094-000580-00002
MIG 452 W 4M HDH	MIG welding torch, water flex.	094-011056-00104
ZWIPA 70QMM MIG W 1M	Intermediate hose package, water	094-000406-00000
ZWIPA 70QMM MIG W 5M	Intermediate hose package, water	094-000406-00001
ZWIPA 70QMM MIG W 10M	Intermediate hose package, water	094-000406-00002
EH70QMM 4M	Electrode holder	092-000011-00000
PHOENIX 521		
5POLE/CEE/32A/M	Machine plug	094-000207-00000
MIG 452 W 4M HDH	MIG welding torch, water flex.	094-011056-00104
ZWIPA 95QMM MIG W 1M	Intermediate hose package, water	094-000407-00000
ZWIPA 95QMM MIG W 5M	Intermediate hose package, water	094-000407-00001
ZWIPA 95QMM MIG W 10M	Intermediate hose package, water	094-000407-00002
EH95QMM 4M	Electrode holder	092-000010-00000

10.2 Wire feed rollers

10.2.1 V-Nut wire conveyors

Type	Designation	Item no.
FE 2DR4R 0,6+0,8	Drive rollers, 37mm, 4-roller, steel	092-000839-00000
FE 2DR4R 0,8+1,0	Drive rollers, 37mm, 4-roller, steel	092-000840-00000
FE 2DR4R 0,9+1,2	Drive rollers, 37mm, 4-roller, steel	092-000841-00000
FE 2DR4R 1,0+1,2	Drive rollers, 37mm, 4-roller, steel	092-000842-00000
FE 2DR4R 1,2+1,6	Drive rollers, 37mm, 4-roller, steel	092-000843-00000
FE/AL 2GR4R	Counterpressure rollers, smooth, 37mm	092-000844-00000

10.2.2 U-Nut wire conveyors

Type	Designation	Item no.
AL 4ZR4R 0,8+1,0	Twin wire feed rollers, 37mm, 4-rollers, for aluminium	092-000869-00000
AL 4ZR4R 1,0+1,2	Twin wire feed rollers, 37mm, 4-rollers, for aluminium	092-000848-00000
AL 4ZR4R 1,2+1,6	Twin wire feed rollers, 37mm, 4-rollers, for aluminium	092-000849-00000
AL 4ZR4R 2,4+3,2	Twin wire feed rollers, 37mm, 4-rollers, for aluminium	092-000870-00000

10.2.3 Wire feed rollers for cored wire

Type	Designation	Item no.
ROE 2DR4R 0,8/0,9+0,8/0,9	Drive rollers, 37mm, 4-roller, cored wire	092-000834-00000
ROE 2DR4R 1,0/1,2+1,4/1,6	Drive rollers, 37mm, 4-roller, cored wire	092-000835-00000
ROE 2DR4R 1,4/1,6+2,0/2,4	Drive rollers, 37mm, 4-roller, cored wire	092-000836-00000
ROE 2DR4R 2,8+3,2	Drive rollers, 37mm, 4-roller, cored wire	092-000837-00000
ROE 2GR4R	Counterpressure rollers, knurled, 37mm	092-000838-00000

10.2.4 Conversion sets

Type	Designation	Item no.
URUE VERZ>UNVERZ FE/AL 4R	Conversion kit, 37mm, 4-roller drive on non-toothed rollers (steel/aluminium)	092-000845-00000
URUE AL 4ZR4R 0,8+1,0	Conversion kit, 37mm, 4-roller drive for aluminium	092-000867-00000
URUE AL 4ZR4R 1,0+1,2	Conversion kit, 37mm, 4-roller drive for aluminium	092-000846-00000
URUE AL 4ZR4R 1,2+1,6	Conversion kit, 37mm, 4-roller drive for aluminium	092-000847-00000
URUE AL 4ZR4R 2,4+3,2	Conversion kit, 37mm, 4-roller drive for aluminium	092-000868-00000
URUE ROE 2DR4R 0,8/0,9+0,8/0,9	Conversion kit, 37mm, 4-roller drive for cored wire	092-000830-00000
URUE ROE 2DR4R 1,0/1,2+1,4/1,6	Conversion kit, 37mm, 4-roller drive for cored wire	092-000831-00000
URUE ROE 2DR4R 1,4/1,6+2,0/2,4	Conversion kit, 37mm, 4-roller drive for cored wire	092-000832-00000
URUE ROE 2DR4R 2,8+3,2	Conversion kit, 37mm, 4-roller drive for cored wire	092-000833-00000

10.3 Remote control / connection cable

Type	Designation	Item no.
PHOENIX R10	Remote control with WF speed correction	090-008087-00000
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
PHOENIX R20	Program changeover remote control	090-008263-00000
PHOENIX R40	Remote control, 10 programs	090-008088-00000
FRV5-L 7POL	Extension/connecting cable	092-000201-00003
FRV10-L 7POL	Extension/connecting cable	092-000201-00000
FRV20-L 7POL	Extension/connecting cable	092-000201-00001

10.4 Options

Type	Designation	Item no.
ON FSB WHEELS W/T/P	Retrofit option for locking brake for machine wheels	092-002110-00000
ON DK DRIVE L T/P	Retrofit option for TETRIX/PHOENIX DRIVE 4 L star handle	092-002112-00000
ON DK PHOENIX DRIVE 4	Retrofit option star handle PHOENIX DRIVE 4	092-002280-00000
ON HOSE/FR MOUNT DK	Optional holder for tubes and remote control for machines with star handle	092-002117-00000
ON HOSE/FR MOUNT	Optional holder for tubes and remote control for machines without star handle	092-002116-00000
ON FILTER T/P	Retrofit option contamination filter for air inlet	092-002092-00000
ON RMSDDV1	Optional wheel assembly retrofit kit Drive4/4S	090-008035-00000
ON RMSDV2	Optional wheel assembly retrofit kit for DRIVE4L	090-008151-00000
ON TOOL BOX	Retrofit option tool box	092-002138-00000
ON HOLDER GAS BOTTLE <50L	Retrofit option holding plate for gas bottle <50 L	092-002151-00000
ON SHOCK PROTECT	Ram protection retrofit option	092-002154-00000

10.5 Computer communication

Type	Designation	Item no.
PC300.NET	PC300.Net welding parameter software set incl. cable and SECINT X10 USB interface	090-008265-00000
CD-ROM PC300.NET	PC300.Net Update on CD-ROM	092-008172-00001
WELDQAS1 Mobil	Stationary welding data monitoring and docu set for one welding machine	090-008214-00000
WELDQAS2 Mobil	Mobile welding data monitoring and docu set for two welding machines	090-008217-00000
FRV5-L 7POL	Extension/connecting cable	092-000201-00003
FRV10-L 7POL	Extension/connecting cable	092-000201-00000
FRV20-L 7POL	Extension/connecting cable	092-000201-00001
PC INTX10 SET	Q-DOC 9000 documentation interface	090-008093-00000
PCV10-L 10M 9POL	Cable between PC/interface	094-001206-00002

11 Circuit diagrams

☞ **Original format circuit diagrams are located inside the machine.**

11.1 PHOENIX 301 EXPERT forceArc
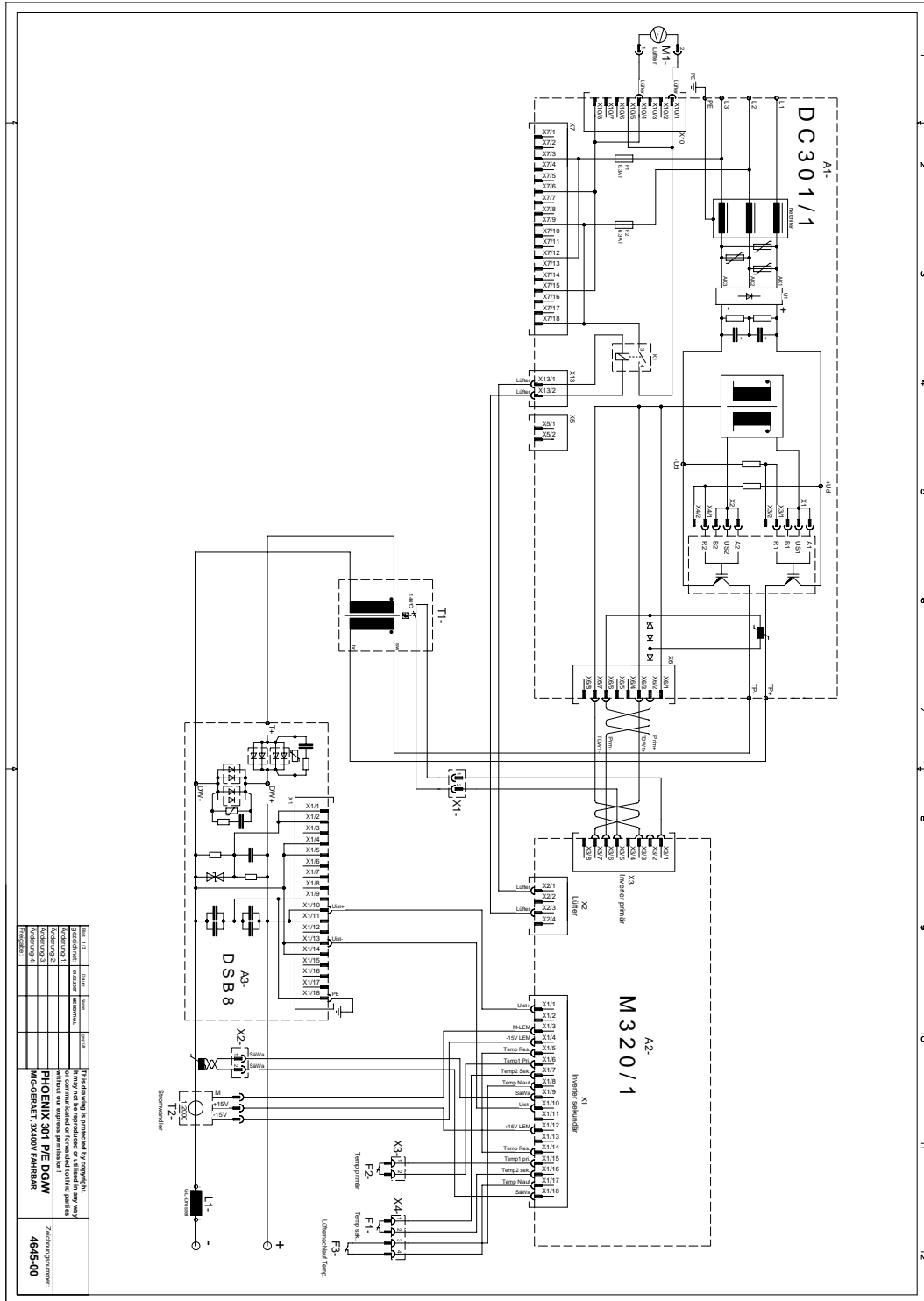
Figure 11-1
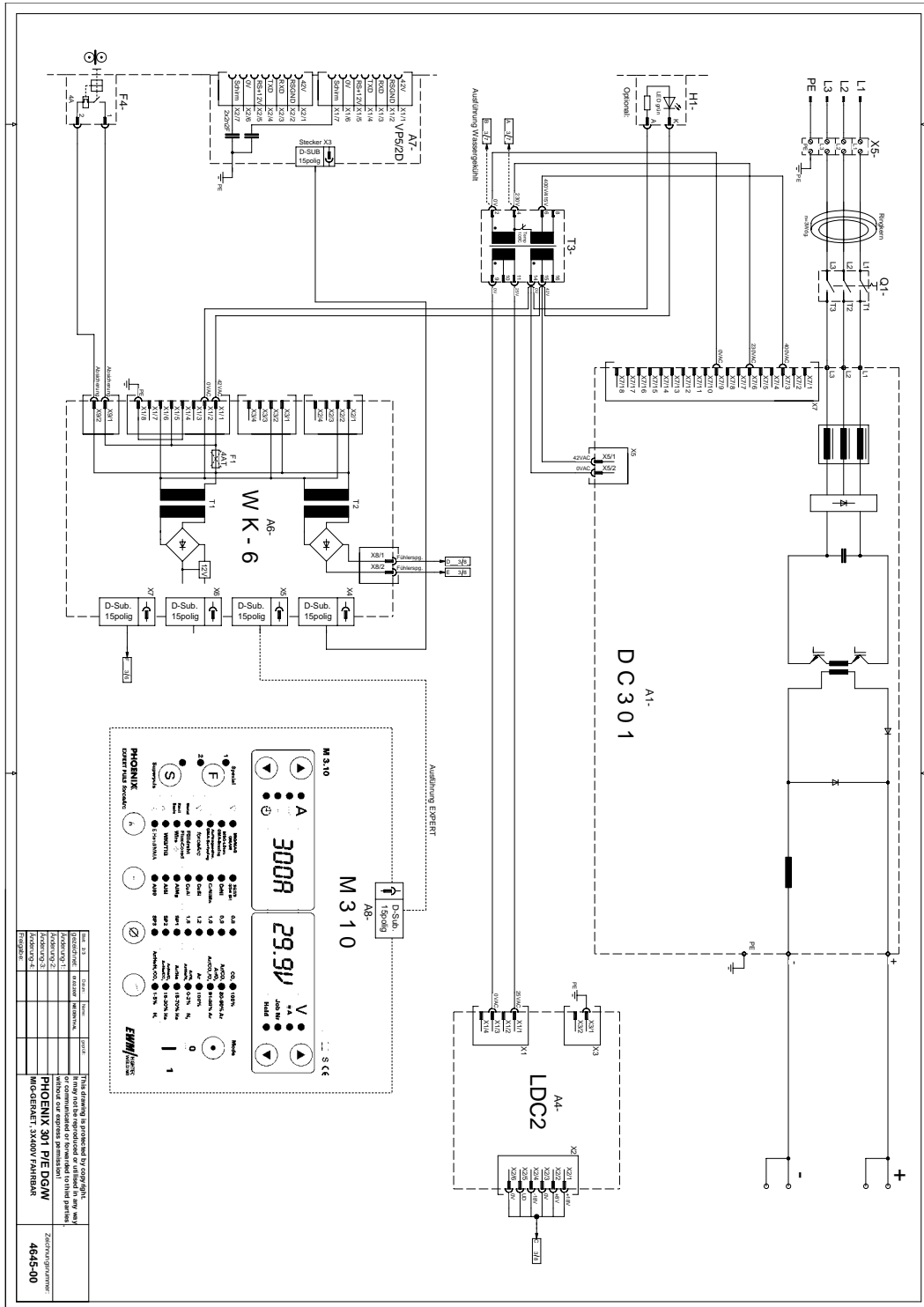
Figure 11-2
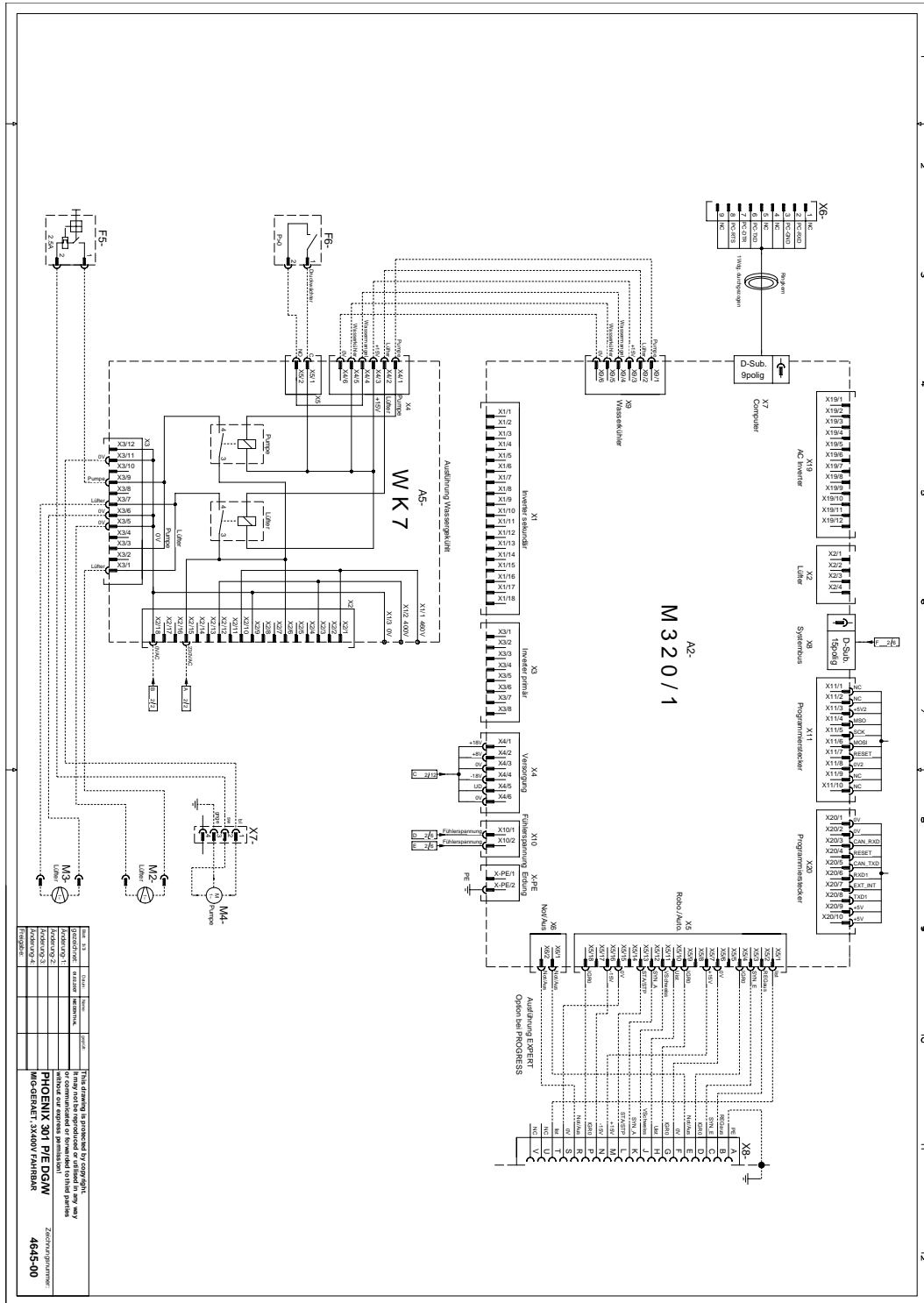
Figure 11-3

11.2 PHOENIX 351 EXPERT forceArc
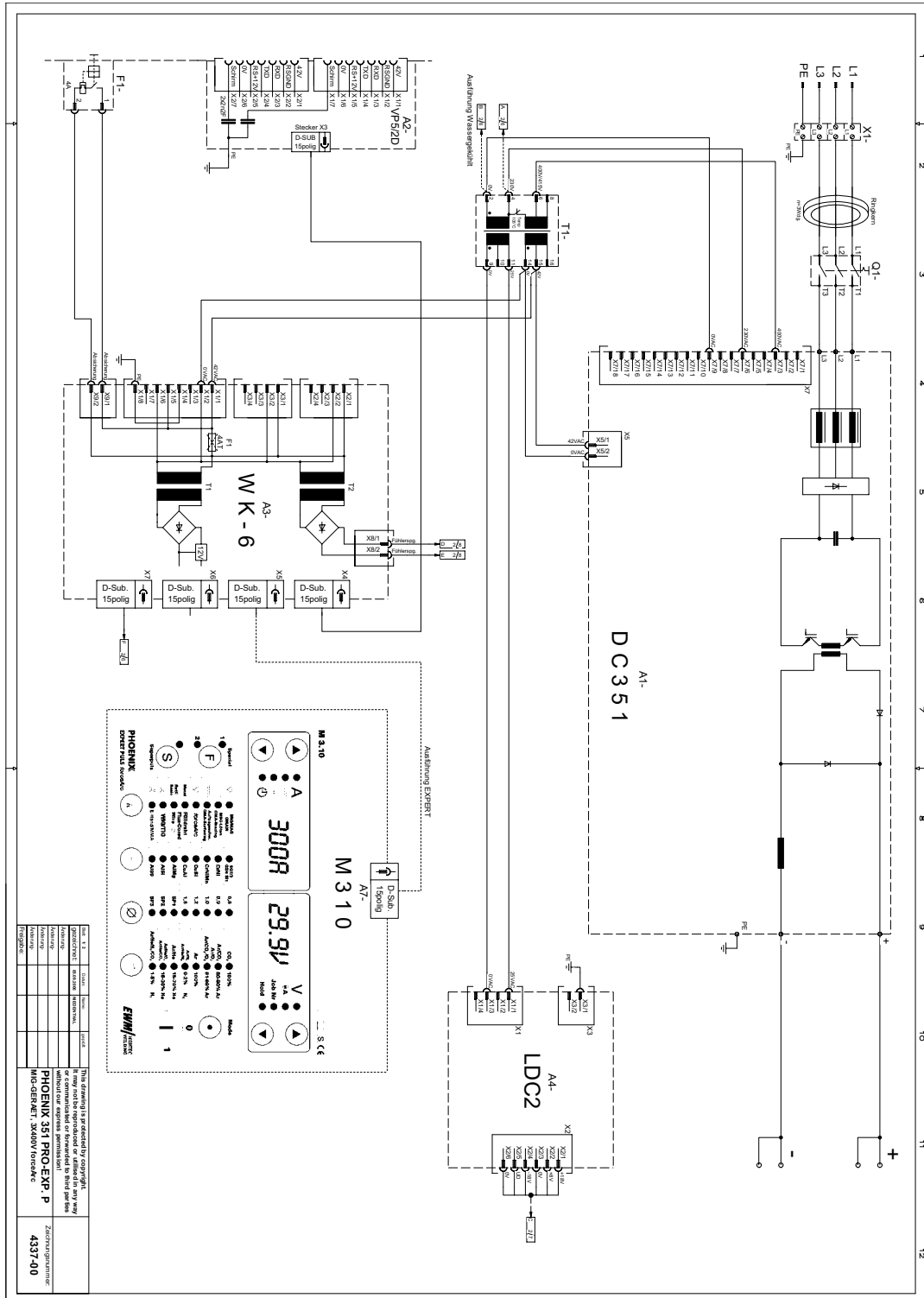
Figure 11-4
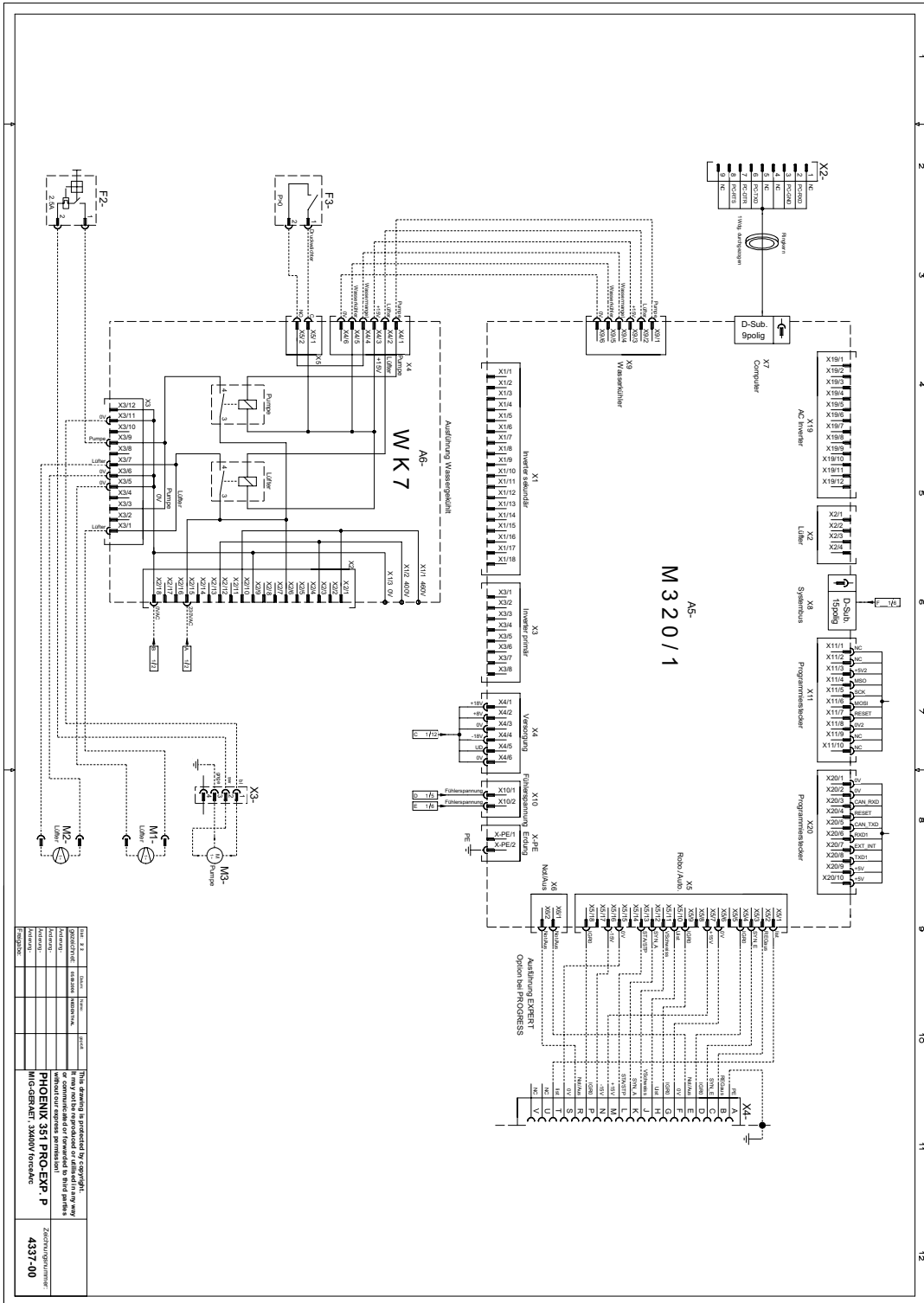
Figure 11-5

11.3 PHOENIX 421 EXPERT forceArc
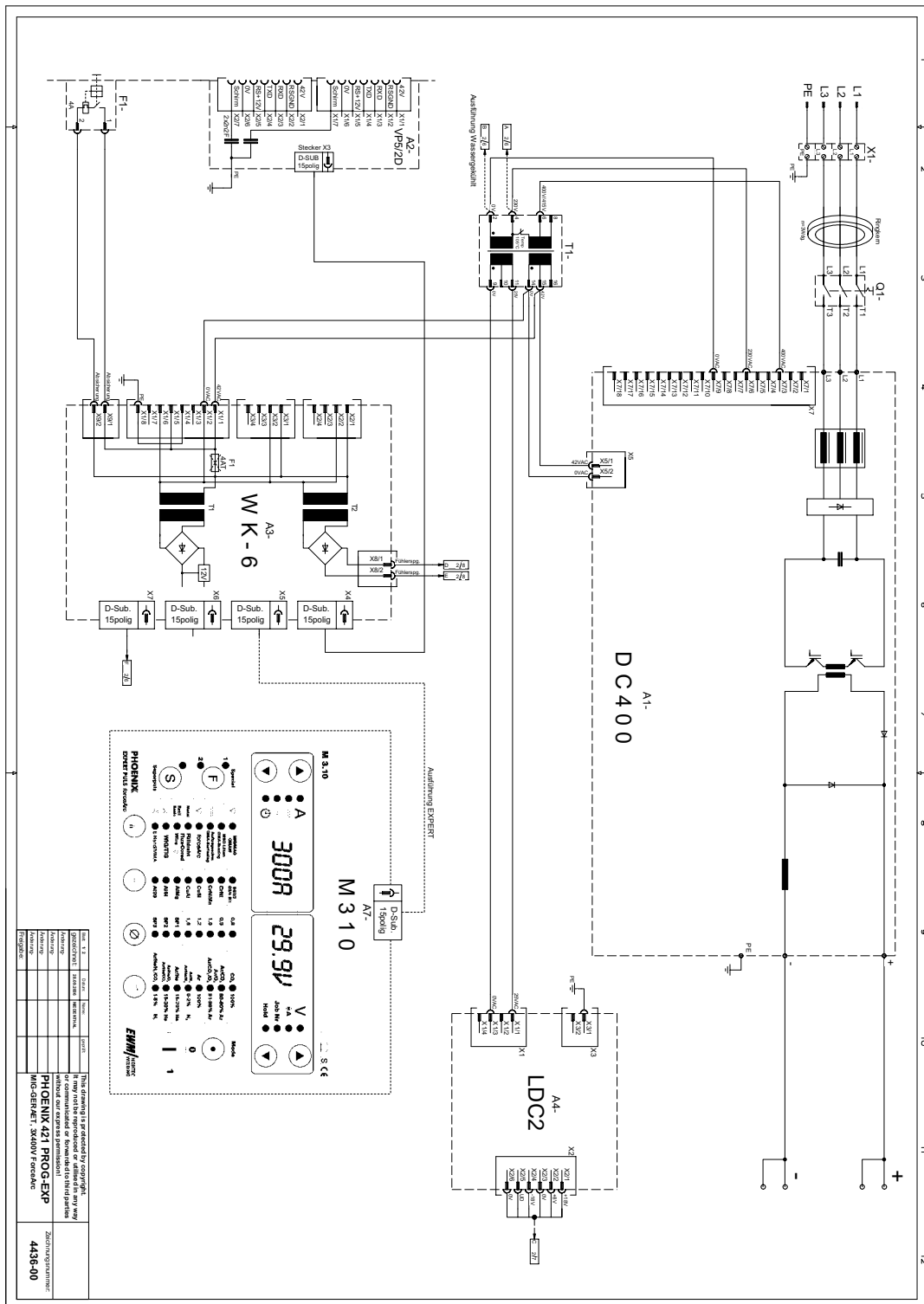
Figure 11-6
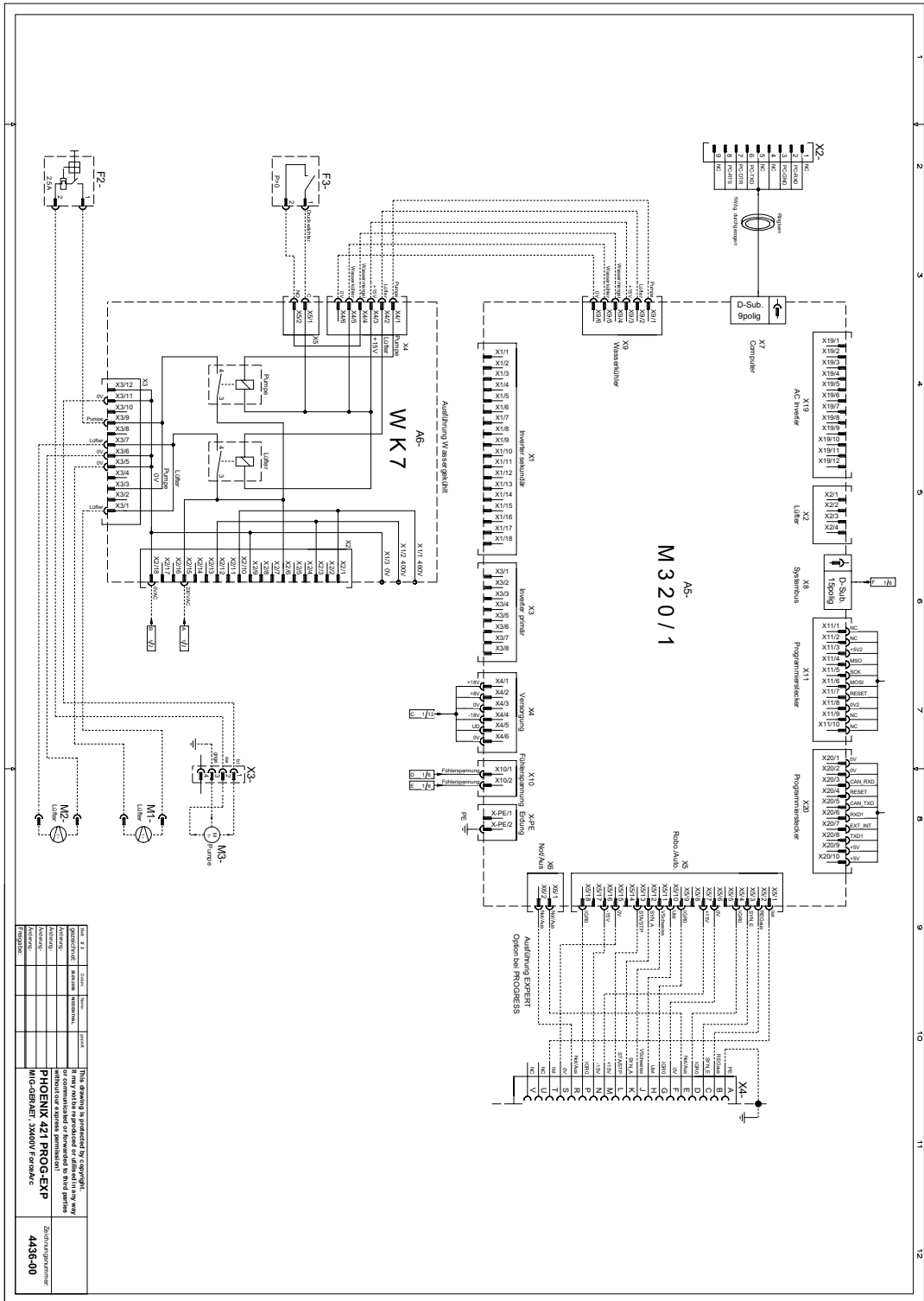
Figure 11-7

11.4 PHOENIX 521 EXPERT forceArc
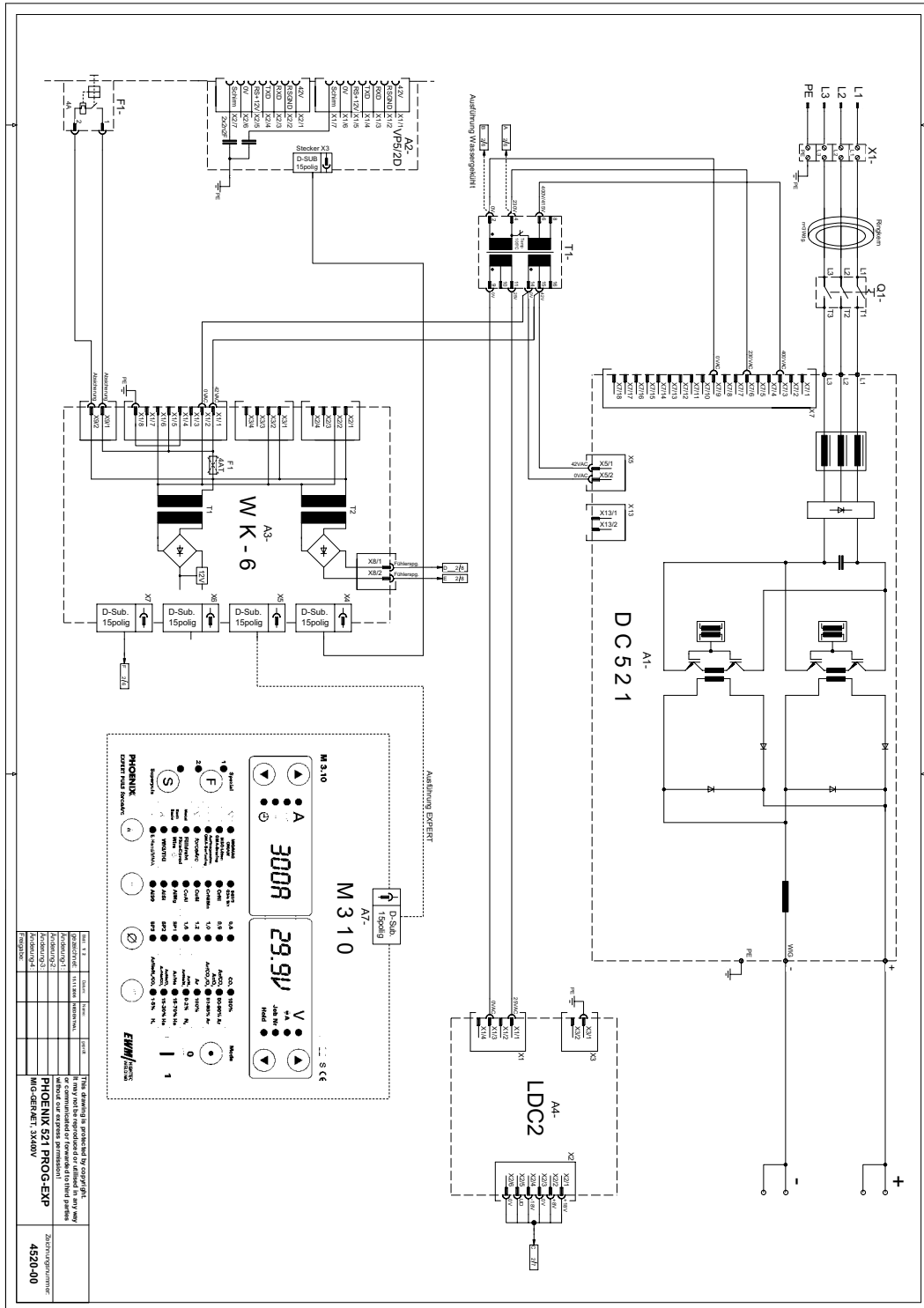
Figure 11-8
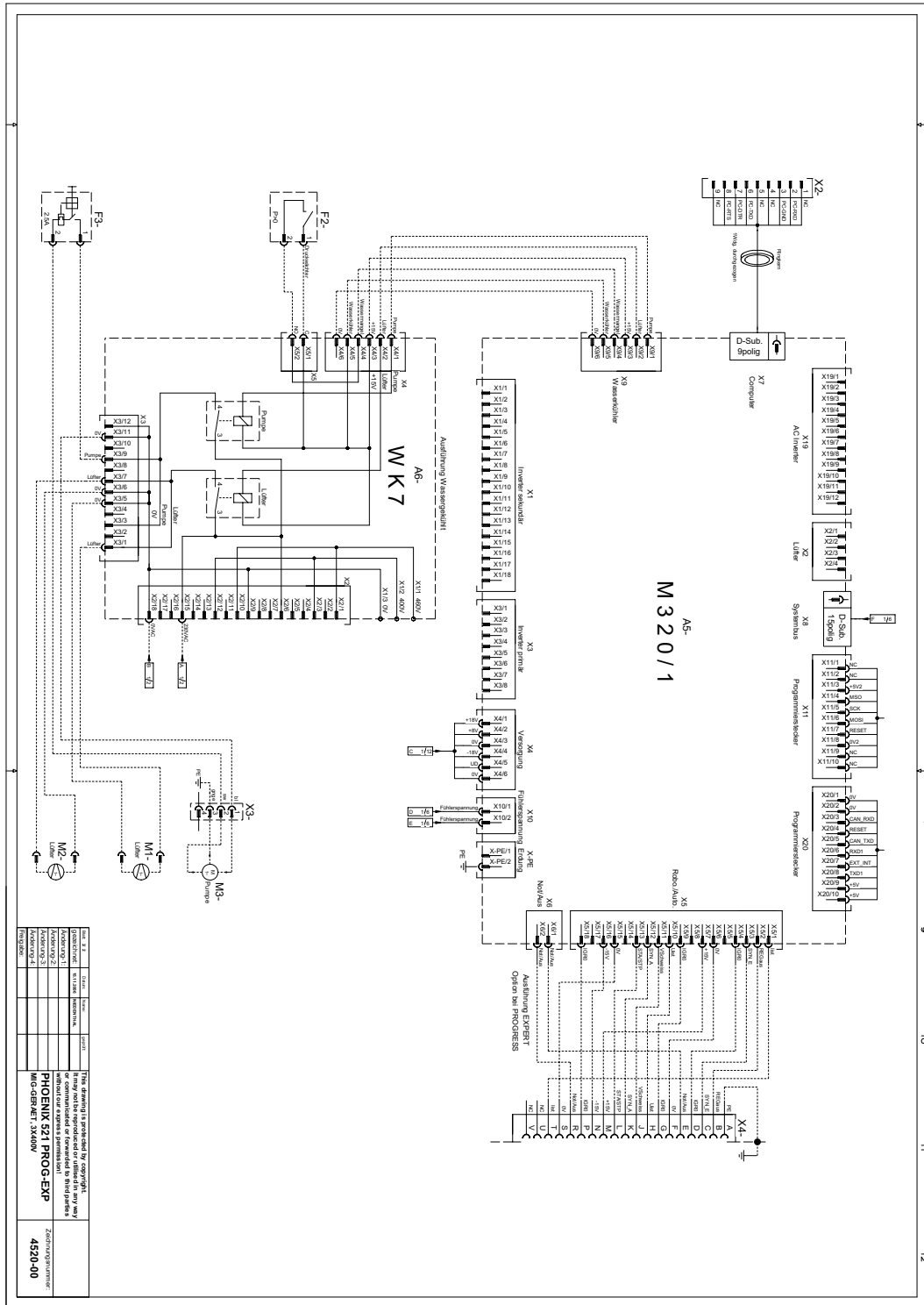
Figure 11-9

11.5   PHOENIX DRIVE 4; 4L; PHOENIX EXPERT DRIVE 4; 4L
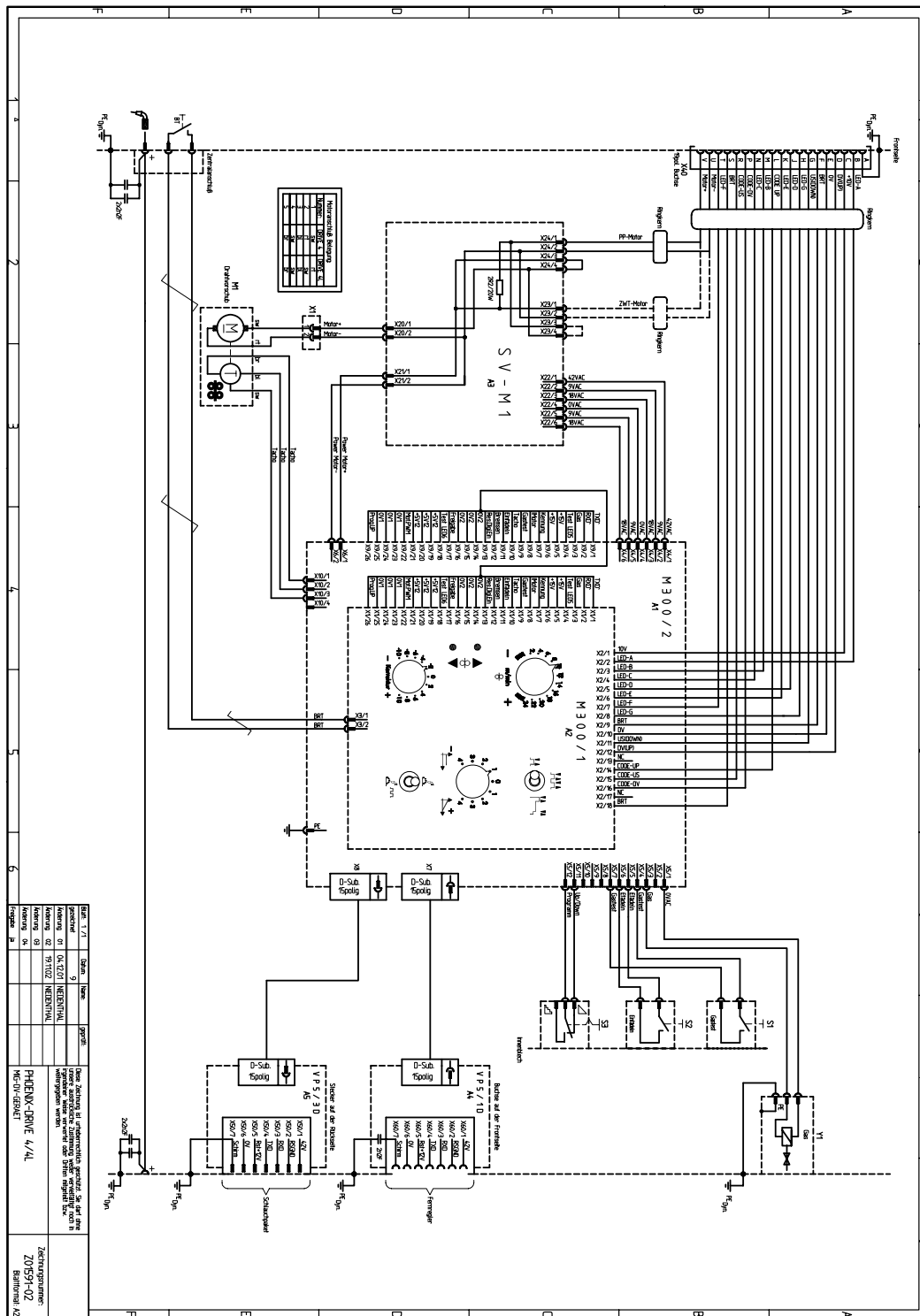
Figure 11-10
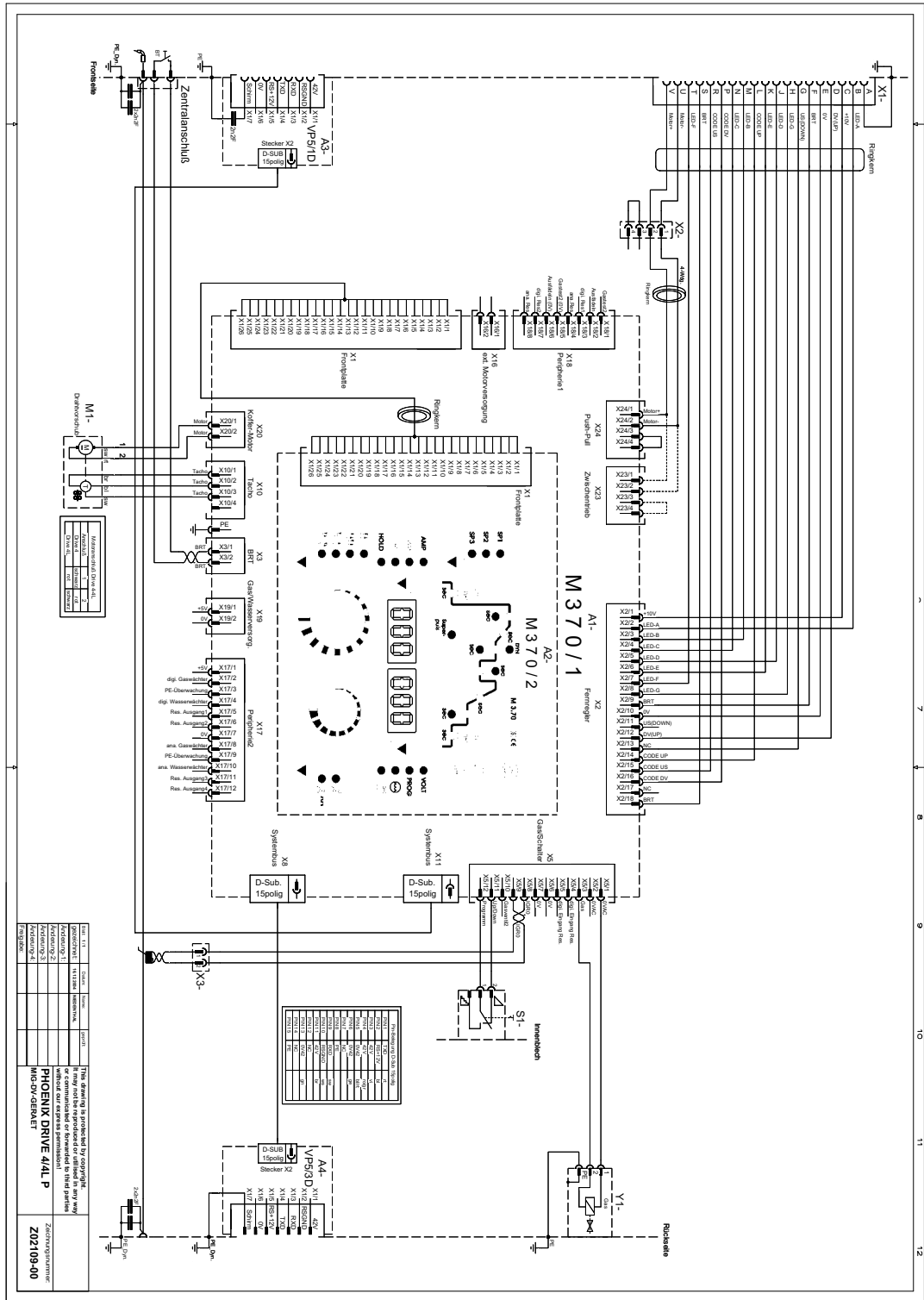
Figure 11-11

11.6 PHOENIX EXPERT DRIVE 4HS
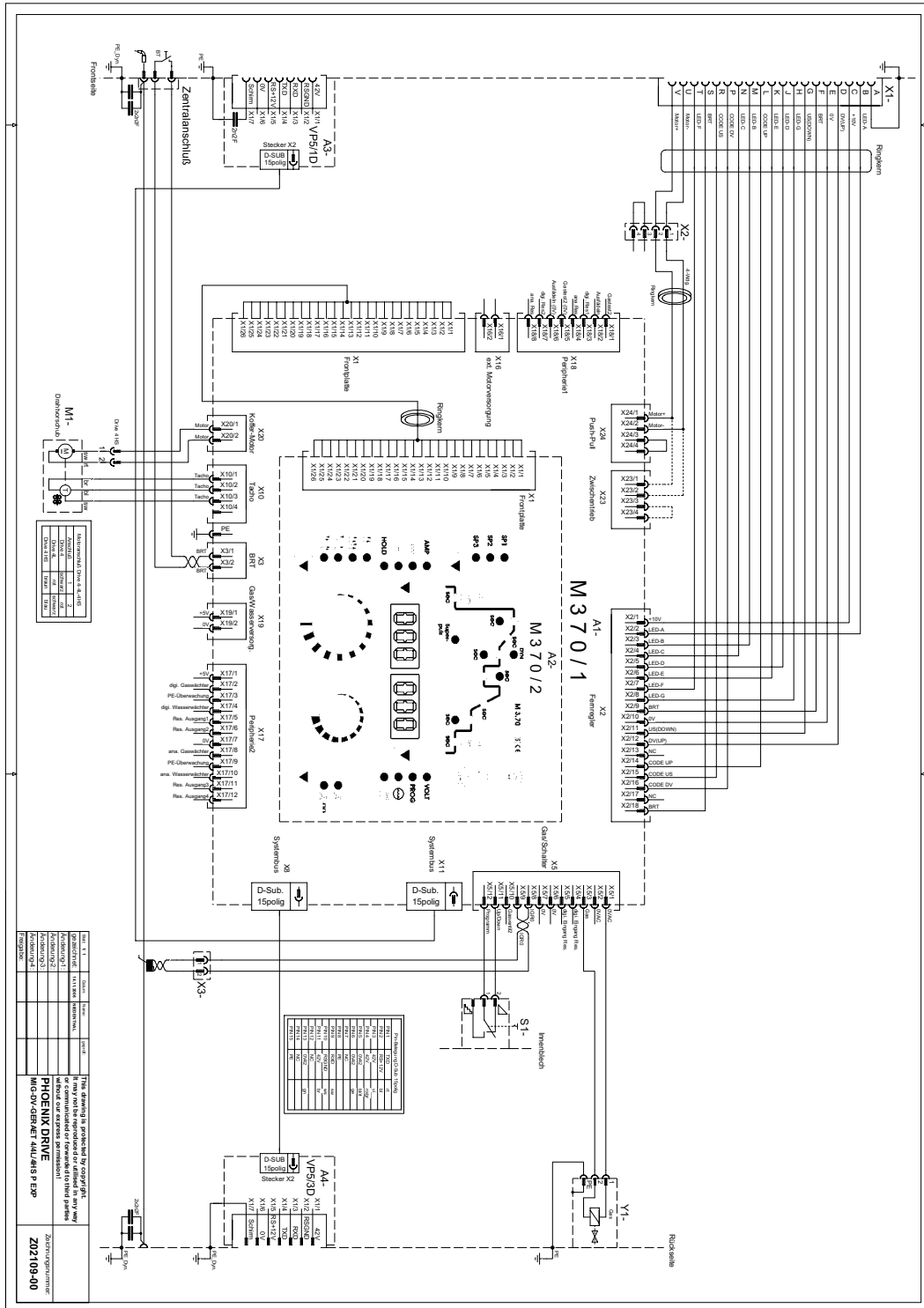
Figure 11-12

12 Appendix A

12.1 Declaration of Conformity

EWM HIGHTEC® WELDING
SIMPLY MORE

EG - Konformitätserklärung
EC – Declaration of Conformity
Déclaration de Conformité CE

Name des Herstellers:
Name of manufacturer:
Nom du fabricant:

EWM HIGHTEC WELDING GmbH
(nachfolgend EWM genannt)
(In the following called EWM)
(nommé par la suite EWM)

Anschrift des Herstellers:
Address of manufacturer:
Adresse du fabricant:

Dr.- Günter - Henle - Straße 8
D - 56271 Mündersbach – Germany
info@ewm.de

Hiermit erklären wir, daß das bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits-anforderungen der unten genannten EG- Richtlinien entspricht. Im Falle von unbefugten Veränderungen, unsachgemäßen Reparaturen Nichteinhaltung der Fristen zur Wiederholungsprüfung und / oder unerlaubten Umbauten, die nicht ausdrücklich von EWM autorisiert sind, verliert diese Erklärung ihre Gültigkeit.	We hereby declare that the machine below conforms to the basic safety requirements of the EC Directives cited both in its design and construction, and in the version released by us. This declaration shall become null and void in the event of unauthorised modifications, improperly conducted repairs, non-observance of the deadlines for the repetition test and/or non-permitted conversion work not specifically authorised by EWM.	Par la présente, nous déclarons que le poste, dans sa conception et sa construction, ainsi que dans le modèle mis sur le marché par nos services ci-dessous, correspondent aux directives fondamentales de sécurité énoncées par l´CE et mentionnées ci-dessous. En cas de changements non autorisés, de réparations inadéquates, de non-respect des délais de contrôle en exploitation et/ou de modifications prohibées n'ayant pas été autorisés expressément par EWM, cette déclaration devient caduque.

Gerätebezeichnung:
Description of the machine:
Déscription de la machine:

_____

Gerätetyp:
Type of machine:
Type de machine:

_____

Artikelnummer EWM:
Article number:
Numéro d´article

_____

Seriennummer:
Serial number:
Numéro de série:

_____

Optionen:
Options:
Options:

keine
none
aucune

Zutreffende EG - Richtlinien:
Applicable EU - guidelines:
Directives de la CE applicables:

EG - Niederspannungsrichtlinie (2006/95/EG)
EC – Low Voltage Directive (2006/95/EG)
Directive CE pour basses tensions (2006/95/EG)

EG- EMV- Richtlinie (2004/108/EG)
EC – EMC Directive (2004/108/ EG)
Directive CE EMV (2004/108/EG)

Angewandte harmonisierte Normen:
Used co-ordinated norms:
Normes harmonisées appliquées:

EN 60974 / IEC 60974 / VDE 0544
EN 50199 / VDE 0544 part 206
GOST-R

Hersteller - Unterschrift:
Manufacturer's signature:
Signature du fabricant:

M. [signature]

Michael Szczesny ,   Geschäftsführer
managing director
gérant

01.2007

13 Appendix B

13.1 JOB Mapping

PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr. / Job-no.	MIG/MAG — Material	Gas / gas	Draht-⌀ (mm)	Auftragschweißen / GMA-Surfacing — Material	Gas / gas	Draht-⌀ (mm)	Metall-Fülldraht / Metal-Flux-Cored Wire — Material	Gas / gas	Draht-⌀ (mm)	Rutil-Fülldraht / Rutil-Flux-Cored Wire — Material	Gas / gas	Draht-⌀ (mm)	Basisch-Fülldraht / Basic-Flux-Cored Wire — Material	Gas / gas	Draht-⌀ (mm)
1	SG2/3	CO_2	0,8	SG2/3	CO_2	0,8	SG2/3	CO_2	0,8	SG2/3	CO_2	0,8	SG2/3	CO_2	0,8
2	SG2/3	CO_2	0,9	SG2/3	CO_2	0,9	SG2/3	CO_2	0,9	SG2/3	CO_2	0,9	SG2/3	CO_2	0,9
3	SG2/3	CO_2	1,0	SG2/3	CO_2	1,0	SG2/3	CO_2	1,0	SG2/3	CO_2	1,0	SG2/3	CO_2	1,0
4	SG2/3	CO_2	1,2	SG2/3	CO_2	1,2	SG2/3	CO_2	1,2	SG2/3	CO_2	1,2	SG2/3	CO_2	1,2
5	SG2/3	CO_2	1,6	SG2/3	CO_2	1,6	SG2/3	CO_2	1,6	SG2/3	CO_2	1,6	SG2/3	CO_2	1,6
6	SG2/3	80-90% Ar	0,8												
7	SG2/3	80-90% Ar	0,9												
8	SG2/3	80-90% Ar	1,0												
9	SG2/3	80-90% Ar	1,2												
10	SG2/3	80-90% Ar	1,6												
11	SG2/3	91-99% Ar	0,8	SG2/3	91-99% Ar	0,8	SG2/3	91-99% Ar	0,8	SG2/3	91-99% Ar	0,8	SG2/3	91-99% Ar	0,8
12	SG2/3	91-99% Ar	0,9	SG2/3	91-99% Ar	0,9	SG2/3	91-99% Ar	0,9	SG2/3	91-99% Ar	0,9	SG2/3	91-99% Ar	0,9
13	SG2/3	91-99% Ar	1,0	SG2/3	91-99% Ar	1,0	SG2/3	91-99% Ar	1,0	SG2/3	91-99% Ar	1,0	SG2/3	91-99% Ar	1,0
14	SG2/3	91-99% Ar	1,2	SG2/3	91-99% Ar	1,2	SG2/3	91-99% Ar	1,2	SG2/3	91-99% Ar	1,2	SG2/3	91-99% Ar	1,2
15	SG2/3	91-99% Ar	1,6	SG2/3	91-99% Ar	1,6	SG2/3	91-99% Ar	1,6	SG2/3	91-99% Ar	1,6	SG2/3	91-99% Ar	1,6
16	SG2/3	100% Ar	0,8	SG2/3	100% Ar	0,8	SG2/3	100% Ar	0,8	SG2/3	100% Ar	0,8	SG2/3	100% Ar	0,8
17	SG2/3	100% Ar	0,9	SG2/3	100% Ar	0,9	SG2/3	100% Ar	0,9	SG2/3	100% Ar	0,9	SG2/3	100% Ar	0,9
18	SG2/3	100% Ar	1,0	SG2/3	100% Ar	1,0	SG2/3	100% Ar	1,0	SG2/3	100% Ar	1,0	SG2/3	100% Ar	1,0
19	SG2/3	100% Ar	1,2	SG2/3	100% Ar	1,2	SG2/3	100% Ar	1,2	SG2/3	100% Ar	1,2	SG2/3	100% Ar	1,2
20	SG2/3	100% Ar	1,6	SG2/3	100% Ar	1,6	SG2/3	100% Ar	1,6	SG2/3	100% Ar	1,6	SG2/3	100% Ar	1,6
21	SG2/3	Ar/He/CO_2 15-30% He	0,8	SG2/3	Ar/He/CO_2 15-30% He	0,8	SG2/3	Ar/He/CO_2 15-30% He	0,8	SG2/3	Ar/He/CO_2 15-30% He	0,8	SG2/3	Ar/He/CO_2 15-30% He	0,8
22	SG2/3	Ar/He/CO_2 15-30% He	0,9	SG2/3	Ar/He/CO_2 15-30% He	0,9	SG2/3	Ar/He/CO_2 15-30% He	0,9	SG2/3	Ar/He/CO_2 15-30% He	0,9	SG2/3	Ar/He/CO_2 15-30% He	0,9
23	SG2/3	Ar/He/CO_2 15-30% He	1,0	SG2/3	Ar/He/CO_2 15-30% He	1,0	SG2/3	Ar/He/CO_2 15-30% He	1,0	SG2/3	Ar/He/CO_2 15-30% He	1,0	SG2/3	Ar/He/CO_2 15-30% He	1,0

06.08.2007

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-no.	MIG/MAG			Auftragsschweißen / GMA-Surfacing			Metall-Fülldraht / Metal-Flux-Cored Wire			Rutil-Fülldraht / Rutil-Flux-Cored Wire			Rutil-Fülldraht / Rutil-Flux-Cored Wire			Basisch-Fülldraht / Basic-Flux-Cored Wire		
	Mat.	Gas	Ø (mm)	Mat.	Gas	Ø	Mat.	Gas	Ø	Mat.	Gas	Ø	Mat.	Gas	Ø	Mat.	Gas	Ø
24	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2
25	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	SG2/3	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6
26	CrNi	CO_2	0,8	CrNi	CO_2	0,8	CrNi	CO_2	0,8	CrNi	CO_2	0,8	CrNi	CO_2	0,8	CrNi	CO_2	0,8
27	CrNi	CO_2	1,0	CrNi	CO_2	1,0	CrNi	CO_2	1,0	CrNi	CO_2	1,0	CrNi	CO_2	1,0	CrNi	CO_2	1,0
28	CrNi	CO_2	1,2	CrNi	CO_2	1,2	CrNi	CO_2	1,2	CrNi	CO_2	1,2	CrNi	CO_2	1,2	CrNi	CO_2	1,2
29	CrNi	CO_2	1,6	CrNi	CO_2	1,6	CrNi	CO_2	1,6	CrNi	CO_2	1,6	CrNi	CO_2	1,6	CrNi	CO_2	1,6
30	CrNi	80-90% Ar	0,8	CrNi	80-90% Ar	0,8	CrNi	80-90% Ar	0,8	CrNi	80-90% Ar	0,8	CrNi	80-90% Ar	0,8	CrNi	80-90% Ar	0,8
31	CrNi	80-90% Ar	1,0	CrNi	80-90% Ar	1,0	CrNi	80-90% Ar	1,0	CrNi	80-90% Ar	1,0	CrNi	80-90% Ar	1,0	CrNi	80-90% Ar	1,0
32	CrNi	80-90% Ar	1,2	CrNi	80-90% Ar	1,2	CrNi	80-90% Ar	1,2	CrNi	80-90% Ar	1,2	CrNi	80-90% Ar	1,2	CrNi	80-90% Ar	1,2
33	CrNi	80-90% Ar	1,6	CrNi	80-90% Ar	1,6	CrNi	80-90% Ar	1,6	CrNi	80-90% Ar	1,6	CrNi	80-90% Ar	1,6	CrNi	80-90% Ar	1,6
34	CrNi	91-99% Ar	0,8															
35	CrNi	91-99% Ar	1,0															
36	CrNi	91-99% Ar	1,2															
37	CrNi	91-99% Ar	1,6															
38	CrNi	100% Ar	0,8	CrNi	100% Ar	0,8	CrNi	100% Ar	0,8	CrNi	100% Ar	0,8	CrNi	100% Ar	0,8	CrNi	100% Ar	0,8
39	CrNi	100% Ar	1,0	CrNi	100% Ar	1,0	CrNi	100% Ar	1,0	CrNi	100% Ar	1,0	CrNi	100% Ar	1,0	CrNi	100% Ar	1,0
40	CrNi	100% Ar	1,2	CrNi	100% Ar	1,2	CrNi	100% Ar	1,2	CrNi	100% Ar	1,2	CrNi	100% Ar	1,2	CrNi	100% Ar	1,2
41	CrNi	100% Ar	1,6	CrNi	100% Ar	1,6	CrNi	100% Ar	1,6	CrNi	100% Ar	1,6	CrNi	100% Ar	1,6	CrNi	100% Ar	1,6
42	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	0,8
43	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,0
44	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,2
45	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6	CrNi	Ar/He/O_2, Ar/He/CO_2, 15-30% He	1,6

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr. / Job-no.	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)	Verfahren / process	Material	Gas / gas	Draht-Ø (mm)
46	MIG/MAG	CrNi	1-5% H₂	0,8	Auftragsschweißen / GMA-Surfacing	CrNi	1-5% H₂	0,8	Metall-Fülldraht / Metal-Flux-Cored Wire	CrNi	1-5% H₂	0,8	Rutil-Fülldraht / Rutil-Flux-Cored Wire	CrNi	1-5% H₂	0,8	Basisch-Fülldraht / Basic-Flux-Cored Wire	CrNi	1-5% H₂	0,8	MIG/MAG	CrNi	0-2% N₂	0,8
47	MIG/MAG	CrNi	1-5% H₂	1,0	GMA-Surfacing	CrNi	1-5% H₂	1,0	Metal-Flux-Cored Wire	CrNi	1-5% H₂	1,0	Rutil-Flux-Cored Wire	CrNi	1-5% H₂	1,0	Basic-Flux-Cored Wire	CrNi	1-5% H₂	1,0	MIG/MAG	CrNi	0-2% N₂	1,0
48	MIG/MAG	CrNi	1-5% H₂	1,2	GMA-Surfacing	CrNi	1-5% H₂	1,2	Metal-Flux-Cored Wire	CrNi	1-5% H₂	1,2	Rutil-Flux-Cored Wire	CrNi	1-5% H₂	1,2	Basic-Flux-Cored Wire	CrNi	1-5% H₂	1,2	MIG/MAG	CrNi	0-2% N₂	1,2
49	MIG/MAG	CrNi	1-5% H₂	1,6	GMA-Surfacing	CrNi	1-5% H₂	1,6	Metal-Flux-Cored Wire	CrNi	1-5% H₂	1,6	Rutil-Flux-Cored Wire	CrNi	1-5% H₂	1,6	Basic-Flux-Cored Wire	CrNi	1-5% H₂	1,6	MIG/MAG	CrNi	0-2% N₂	1,6
50	MIG/MAG	CrNiMn	CO₂	0,8	GMA-Surfacing	CrNiMn	CO₂	0,8	Metal-Flux-Cored Wire	CrNiMn	CO₂	0,8	Rutil-Flux-Cored Wire	CrNiMn	CO₂	0,8	Basic-Flux-Cored Wire	CrNiMn	CO₂	0,8				
51	MIG/MAG	CrNiMn	CO₂	1,0	GMA-Surfacing	CrNiMn	CO₂	1,0	Metal-Flux-Cored Wire	CrNiMn	CO₂	1,0	Rutil-Flux-Cored Wire	CrNiMn	CO₂	1,0	Basic-Flux-Cored Wire	CrNiMn	CO₂	1,0				
52	MIG/MAG	CrNiMn	CO₂	1,2	GMA-Surfacing	CrNiMn	CO₂	1,2	Metal-Flux-Cored Wire	CrNiMn	CO₂	1,2	Rutil-Flux-Cored Wire	CrNiMn	CO₂	1,2	Basic-Flux-Cored Wire	CrNiMn	CO₂	1,2				
53	MIG/MAG	CrNiMn	CO₂	1,6	GMA-Surfacing	CrNiMn	CO₂	1,6	Metal-Flux-Cored Wire	CrNiMn	CO₂	1,6	Rutil-Flux-Cored Wire	CrNiMn	CO₂	1,6	Basic-Flux-Cored Wire	CrNiMn	CO₂	1,6				
54	MIG/MAG	CrNiMn	80-90% Ar	0,8	GMA-Surfacing	CrNiMn	80-90% Ar	0,8	Metal-Flux-Cored Wire	CrNiMn	80-90% Ar	0,8	Rutil-Flux-Cored Wire	CrNiMn	80-90% Ar	0,8	Basic-Flux-Cored Wire	CrNiMn	80-90% Ar	0,8				
55	MIG/MAG	CrNiMn	80-90% Ar	1,0	GMA-Surfacing	CrNiMn	80-90% Ar	1,0	Metal-Flux-Cored Wire	CrNiMn	80-90% Ar	1,0	Rutil-Flux-Cored Wire	CrNiMn	80-90% Ar	1,0	Basic-Flux-Cored Wire	CrNiMn	80-90% Ar	1,0				
56	MIG/MAG	CrNiMn	80-90% Ar	1,2	GMA-Surfacing	CrNiMn	80-90% Ar	1,2	Metal-Flux-Cored Wire	CrNiMn	80-90% Ar	1,2	Rutil-Flux-Cored Wire	CrNiMn	80-90% Ar	1,2	Basic-Flux-Cored Wire	CrNiMn	80-90% Ar	1,2				
57	MIG/MAG	CrNiMn	80-90% Ar	1,6	GMA-Surfacing	CrNiMn	80-90% Ar	1,6	Metal-Flux-Cored Wire	CrNiMn	80-90% Ar	1,6	Rutil-Flux-Cored Wire	CrNiMn	80-90% Ar	1,6	Basic-Flux-Cored Wire	CrNiMn	80-90% Ar	1,6				
58	MIG/MAG	CrNiMn	91-98% Ar	0,8																				
59	MIG/MAG	CrNiMn	91-98% Ar	1,0																				
60	MIG/MAG	CrNiMn	91-98% Ar	1,2																				
61	MIG/MAG	CrNiMn	91-98% Ar	1,6																				
62	MIG/MAG	CrNiMn	100% Ar	0,8	GMA-Surfacing	CrNiMn	100% Ar	0,8	Metal-Flux-Cored Wire	CrNiMn	100% Ar	0,8	Rutil-Flux-Cored Wire	CrNiMn	100% Ar	0,8	Basic-Flux-Cored Wire	CrNiMn	100% Ar	0,8				
63	MIG/MAG	CrNiMn	100% Ar	1,0	GMA-Surfacing	CrNiMn	100% Ar	1,0	Metal-Flux-Cored Wire	CrNiMn	100% Ar	1,0	Rutil-Flux-Cored Wire	CrNiMn	100% Ar	1,0	Basic-Flux-Cored Wire	CrNiMn	100% Ar	1,0				
64	MIG/MAG	CrNiMn	100% Ar	1,2	GMA-Surfacing	CrNiMn	100% Ar	1,2	Metal-Flux-Cored Wire	CrNiMn	100% Ar	1,2	Rutil-Flux-Cored Wire	CrNiMn	100% Ar	1,2	Basic-Flux-Cored Wire	CrNiMn	100% Ar	1,2				
65	MIG/MAG	CrNiMn	100% Ar	1,6	GMA-Surfacing	CrNiMn	100% Ar	1,6	Metal-Flux-Cored Wire	CrNiMn	100% Ar	1,6	Rutil-Flux-Cored Wire	CrNiMn	100% Ar	1,6	Basic-Flux-Cored Wire	CrNiMn	100% Ar	1,6				
66	MIG/MAG	CrNiMn	Ar/He/O₂ 15-30% He	0,8	GMA-Surfacing	CrNiMn	Ar/He/O₂ 15-30% He	0,8	Metal-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	0,8	Rutil-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	0,8	Basic-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	0,8				
67	MIG/MAG	CrNiMn	Ar/He/O₂ 15-30% He	1,0	GMA-Surfacing	CrNiMn	Ar/He/O₂ 15-30% He	1,0	Metal-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	1,0	Rutil-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	1,0	Basic-Flux-Cored Wire	CrNiMn	Ar/He/O₂ 15-30% He	1,0				

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-no.	Verfahren / process	GMA-Surfacing — process	Material	Gas	Wire Ø (mm)	MIG/MAG — Material	Gas	Wire Ø (mm)	Metal Flux-Cored Wire — Material	Gas	Wire Ø (mm)	Rutil Flux-Cored Wire — Material	Gas	Wire Ø (mm)	Basic Flux-Cored Wire — Material	Gas	Wire Ø (mm)	MIG/MAG — Material	Gas	Wire Ø (mm)
68	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,2	AlMg	100% Ar	0,8	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,2	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,2	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,2			
69	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,6	AlMg	100% Ar	1,0	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,6	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,6	CrNiMn	Ar/He/O2, Ar/He/CO2, 15-30% He	1,6			
70	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	1-5% H2	0,8	AlMg	100% Ar	1,2	CrNiMn	1-5% H2	0,8	CrNiMn	1-5% H2	0,8	CrNiMn	1-5% H2	0,8	CrNiMn	0-2% N2	0,8
71	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	1-5% H2	1,0	AlMg	100% Ar	1,6	CrNiMn	1-5% H2	1,0	CrNiMn	1-5% H2	1,0	CrNiMn	1-5% H2	1,0	CrNiMn	0-2% N2	1,0
72	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	1-5% H2	1,2	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	0,8	CrNiMn	1-5% H2	1,2	CrNiMn	1-5% H2	1,2	CrNiMn	1-5% H2	1,2	CrNiMn	0-2% N2	1,2
73	MIG/MAG	Auftragsschweißen / GMA-Surfacing	CrNiMn	1-5% H2	1,6	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,0	CrNiMn	1-5% H2	1,6	CrNiMn	1-5% H2	1,6	CrNiMn	1-5% H2	1,6	CrNiMn	0-2% N2	1,6
74	MIG/MAG	MIG/MAG	AlMg	100% Ar	0,8	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,2												
75	MIG/MAG	MIG/MAG	AlMg	100% Ar	1,0	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,6												
76	MIG/MAG	MIG/MAG	AlMg	100% Ar	1,2															
77	MIG/MAG	MIG/MAG	AlMg	100% Ar	1,6															
78	MIG/MAG	MIG/MAG	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	0,8															
79	MIG/MAG	MIG/MAG	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,0															
80	MIG/MAG	MIG/MAG	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,2															
81	MIG/MAG	MIG/MAG	AlMg	Ar/N2, Ar/He/N2, 0-2% N2	1,6															
82	MIG/MAG	MIG/MAG	AlSi	100% Ar	0,8	AlSi	Ar/He 15-70% He	0,8												
83	MIG/MAG	MIG/MAG	AlSi	100% Ar	1,0	AlSi	Ar/He 15-70% He	1,0												
84	MIG/MAG	MIG/MAG	AlSi	100% Ar	1,2	AlSi	Ar/He 15-70% He	1,2												
85	MIG/MAG	MIG/MAG	AlSi	100% Ar	1,6	AlSi	Ar/He 15-70% He	1,6												
86	MIG/MAG	MIG/MAG	AlSi	Ar/N2, Ar/He/N2, 0-2% N2	0,8															
87	MIG/MAG	MIG/MAG	AlSi	Ar/N2, Ar/He/N2, 0-2% N2	1,0															
88	MIG/MAG	MIG/MAG	AlSi	Ar/N2, Ar/He/N2, 0-2% N2	1,2															
89	MIG/MAG	MIG/MAG	AlSi	Ar/N2, Ar/He/N2, 0-2% N2	1,6															
90	MIG/MAG	MIG/MAG	A99	100% Ar	0,8	A99	Ar/He 15-70% He	0,8												
91	MIG/MAG	MIG/MAG	A99	100% Ar	1,0	A99	Ar/He 15-70% He	1,0												

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr. / Job-no.	Verfahren / process	Material	Gas / gas	Draht-durch-messer / wire dia-meter (mm)	Verfahren / process	Material	Gas / gas	Draht-durch-messer / wire dia-meter (mm)	Verfahren / process	Material	Gas / gas	Draht-durch-messer / wire dia-meter (mm)	Verfahren / process	Material	Gas / gas	Draht-durch-messer / wire dia-meter (mm)
92	MIGMAG / MIGMAG	A99	100% Ar	1,2	MIGMAG / MIGMAG	A99	Ar/He 15-70% He	1,2								
93	MIGMAG / MIGMAG	A99	100% Ar	1,6	MIGMAG / MIGMAG	A99	Ar/He 15-70% He	1,6								
94	MIGMAG / MIGMAG	A99	Ar/N₂ 0-2% N2	0,8												
95	MIGMAG / MIGMAG	A99	Ar/HeN₂ 0-2% N2	1,0												
96	MIGMAG / MIGMAG	A99	Ar/N₂ 0-2% N2	1,2												
97	MIGMAG / MIGMAG	A99	Ar/HeN₂ 0-2% N2	1,6												
98	Auftragsschweißen / GMA-Surfacing	CuSi	100% Ar	0,8	MIGMAG / MIGMAG	CuSi	100% Ar	0,8	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	0,8	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	0,8
99	Auftragsschweißen / GMA-Surfacing	CuSi	100% Ar	1,0	MIGMAG / MIGMAG	CuSi	100% Ar	1,0	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,0	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,0
100	Auftragsschweißen / GMA-Surfacing	CuSi	100% Ar	1,2	MIGMAG / MIGMAG	CuSi	100% Ar	1,2	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,2	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,2
101	Auftragsschweißen / GMA-Surfacing	CuSi	100% Ar	1,6	MIGMAG / MIGMAG	CuSi	100% Ar	1,6	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,6	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He 15-70% He	1,6
102	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He/CO₂ 15-30% He	0,8	MIGMAG / MIGMAG	CuSi	Ar/He/CO₂ 15-30% He	0,8								
103	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He/CO₂ 15-30% He	1,0												
104	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He/CO₂ 15-30% He	1,2												
105	Auftragsschweißen / GMA-Surfacing	CuSi	Ar/He/CO₂ 15-30% He	1,6												
106	Auftragsschweißen / GMA-Surfacing	CuAl	100% Ar	0,8	MIGMAG / MIGMAG	CuAl	100% Ar	0,8	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	0,8	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	0,8
107	Auftragsschweißen / GMA-Surfacing	CuAl	100% Ar	1,0	MIGMAG / MIGMAG	CuAl	100% Ar	1,0	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,0	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,0
108	Auftragsschweißen / GMA-Surfacing	CuAl	100% Ar	1,2	MIGMAG / MIGMAG	CuAl	100% Ar	1,2	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,2	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,2
109	Auftragsschweißen / GMA-Surfacing	CuAl	100% Ar	1,6	MIGMAG / MIGMAG	CuAl	100% Ar	1,6	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,6	Auftragsschweißen / GMA-Surfacing	CuAl	Ar/He 15-70% He	1,6
110	MIG-Löten / MIG-Brazing	CuSi	91-99% Ar	0,8	MIG-Löten / MIG-Brazing	CuSi	Ar/He/CO₂ 15-30% He	0,8								
111	MIG-Löten / MIG-Brazing	CuSi	91-99% Ar	1,0	MIG-Löten / MIG-Brazing	CuSi	Ar/He/CO₂ 15-30% He	1,0								
112	MIG-Löten / MIG-Brazing	CuSi	91-99% Ar	1,2	MIG-Löten / MIG-Brazing	CuSi	Ar/He/CO₂ 15-30% He	1,2								
113	MIG-Löten / MIG-Brazing	CuSi	91-99% Ar	1,6	MIG-Löten / MIG-Brazing	CuSi	Ar/He/CO₂ 15-30% He	1,6								
114	MIG-Löten / MIG-Brazing	CuSi	100% Ar	0,8	MIG-Löten / MIG-Brazing	CuSi	Ar/He 15-70% He	0,8								
115	MIG-Löten / MIG-Brazing	CuSi	100% Ar	1,0	MIG-Löten / MIG-Brazing	CuSi	Ar/He 15-70% He	1,0								
116	MIG-Löten / MIG-Brazing	CuSi	100% Ar	1,2	MIG-Löten / MIG-Brazing	CuSi	Ar/He 15-70% He	1,2								

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Item No.: 099-004833-EWM01

PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr./ Job-no.	Verfahren / process	Material / material	Gas / gas	Draht-durch-messer /Wire dia-meter (mm)	Verfahren / process	Material / material	Gas / gas	Draht-durch-messer /Wire dia-meter (mm)
117	MIG-Löten / MIG-Brazing	CuSi	100% Ar	1,6	MIG-Löten / MIG-Brazing	CuSi	Ar/He 15-70% He	1,6
118	MIG-Löten / MIG-Brazing	CuAl	91-99% Ar	0,8	MIG-Löten / MIG-Brazing	CuAl	Ar/He/CO₂ 15-30% He	0,8
119	MIG-Löten / MIG-Brazing	CuAl	91-99% Ar	1,0	MIG-Löten / MIG-Brazing	CuAl	Ar/He/CO₂ 15-30% He	1,0
120	MIG-Löten / MIG-Brazing	CuAl	91-99% Ar	1,2	MIG-Löten / MIG-Brazing	CuAl	Ar/He/CO₂ 15-30% He	1,2
121	MIG-Löten / MIG-Brazing	CuAl	91-99% Ar	1,6	MIG-Löten / MIG-Brazing	CuAl	Ar/He/CO₂ 15-30% He	1,6
122	MIG-Löten / MIG-Brazing	CuAl	100% Ar	0,8	MIG-Löten / MIG-Brazing	CuAl	Ar/He 15-70% He	0,8
123	MIG-Löten / MIG-Brazing	CuAl	100% Ar	1,0	MIG-Löten / MIG-Brazing	CuAl	Ar/He 15-70% He	1,0
124	MIG-Löten / MIG-Brazing	CuAl	100% Ar	1,2	MIG-Löten / MIG-Brazing	CuAl	Ar/He 15-70% He	1,2
125	MIG-Löten / MIG-Brazing	CuAl	100% Ar	1,6	MIG-Löten / MIG-Brazing	CuAl	Ar/He 15-70% He	1,6
126								
127	WIG / TIG							
128	E-Hand / MMA							
129	Spezial-Job1							
130	Spezial-Job2							
131	Spezial-Job 3							
132								
133								
134								
135								
136								
137								
138								
139								
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							
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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr./ Job-no.	Verfahren / process	Material / material	Gas / gas	Draht-durch-messer /wire dia-meter (mm)	Verfahren / process (Block)
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
159					
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					Block3/ Job9
169					
170					
171					
172					
173					
174					
175					
176					
177					
178					
179	force/Arc	SG2/3	80-90% Ar	1,0	
180	force/Arc	SG2/3	80-90% Ar	1,2	
181	force/Arc	SG2/3	80-90% Ar	1,6	
182					
183					
184					
185					
186					
187	MIG/MAG / MIG/MAG	SG2/3	80-89%	Manuell > 8m/s	

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr. / job-no.	Verfahren / process	Material / material	Gas / gas	Draht-durch-messer /Wire dia-meter (mm)	Verfahren / process
188	MIGMAG / MIGMAG	SG2/3	80-89%		Manuell < 8m/s
189	force/Arc	SG2/3	80-90% Ar	0,8	
190	force/Arc	SG2/3	91-99% Ar	0,8	
191					
192					
193					
194					
195					
196					
197					
198					
199	High Speed	SG2/3	91-99% Ar	1,2	
200	High Speed	SG2/3	91-99% Ar	1,0	
201					
202					
203					
204					
205					
206	Auftragsschweißen	CrNiMn	91-99% Ar	0,8	
207	Auftragsschweißen	CrNiMn	91-99% Ar	1,0	
208	Auftragsschweißen	CrNiMn	91-99% Ar	1,2	
209	Auftragsschweißen	CrNiMn	91-99% Ar	1,6	
210	Auftragsschweißen	CrNi	91-99% Ar	0,8	
211	Auftragsschweißen	CrNi	91-99% Ar	1,0	
212	Auftragsschweißen	CrNi	91-99% Ar	1,2	
213	Auftragsschweißen	CrNi	91-99% Ar	1,6	
214	Auftragsschweißen	SG2/3	80-90% Ar	0,8	
215	Auftragsschweißen	SG2/3	80-90% Ar	0,9	
216	Auftragsschweißen	SG2/3	80-90% Ar	1,0	
217	Auftragsschweißen	SG2/3	80-90% Ar	1,2	
218	Auftragsschweißen	SG2/3	80-90% Ar	1,6	
219	Metall-Fülldraht	CrNiMn	91-99% Ar	0,8	
220	Metall-Fülldraht	CrNiMn	91-99% Ar	1,0	
221	Metall-Fülldraht	CrNiMn	91-99% Ar	1,2	
222	Metall-Fülldraht	CrNiMn	91-99% Ar	1,6	
223	Rutil/Basic-Fülldraht	CrNiMn	91-99% Ar	0,8	
224	Rutil/Basic-Fülldraht	CrNiMn	91-99% Ar	1,0	

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr. / Job-no.	Verfahren / process	Material / material	Gas / gas	Draht-durch-messer /wire dia-meter (mm)
225	Rutil/Basic-Fülldraht	CrNiMn	91-99% Ar	1,2
226	Rutil/Basic-Fülldraht	CrNiMn	91-99% Ar	1,6
227	Metall-Fülldraht	CrNi	91-99% Ar	0,8
228	Metall-Fülldraht	CrNi	91-99% Ar	1,0
229	Metall-Fülldraht	CrNi	91-99% Ar	1,2
230	Metall-Fülldraht	CrNi	91-99% Ar	1,6
231	Rutil/Basic-Fülldraht	CrNi	91-99% Ar	0,8
232	Rutil/Basic-Fülldraht	CrNi	91-99% Ar	1,0
233	Rutil/Basic-Fülldraht	CrNi	91-99% Ar	1,2
234	Rutil/Basic-Fülldraht	CrNi	91-99% Ar	1,6
235	Metall-Fülldraht	SG2/3	80-90% Ar	0,8
236	Metall-Fülldraht	SG2/3	80-90% Ar	0,9
237	Metall-Fülldraht	SG2/3	80-90% Ar	1,0
238	Metall-Fülldraht	SG2/3	80-90% Ar	1,2
239	Metall-Fülldraht	SG2/3	80-90% Ar	1,6
240	Rutil/Basic-Fülldraht	SG2/3	80-90% Ar	0,8
241	Rutil/Basic-Fülldraht	SG2/3	80-90% Ar	0,9
242	Rutil/Basic-Fülldraht	SG2/3	80-90% Ar	1,0
243	Rutil/Basic-Fülldraht	SG2/3	80-90% Ar	1,2
244	Rutil/Basic-Fülldraht	SG2/3	80-90% Ar	1,6
245	forceArc	Al99	100% Ar	1,2
246	forceArc	Al99	100% Ar	1,6
247	forceArc	AlMg	100% Ar	1,2
248	forceArc	AlMg	100% Ar	1,6
249	forceArc	AlSi	100% Ar	1,2
250	forceArc	AlSi	100% Ar	1,6
251	forceArc	CrNi	91-99% Ar	1,0
252	forceArc	CrNi	91-99% Ar	1,2
253	forceArc	CrNi	91-99% Ar	1,6

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PHOENIX M3.10 / M3.11 / M3.40 JOBs

Job-Nr./ Job-no.	Verfahren / process	Material/ material	Gas / gas	Verfahren / process Draht-durch-messer /Wire dia-meter (mm)
254	force Arc	SG2/3	91-99% Ar	1,0
255	force Arc	SG2/3	91-99% Ar	1,2
256	force Arc	SG2/3	91-99% Ar	1,6

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