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## **(GB)** Operating instructions

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### **Welding machines for TIG and MMA welding**

**TETRIX 301, 351, 421, 521 COMFORT activArc**



**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.**



**The machines bear the conformity mark and thus comply with the**

- EC Low Voltage Directive (2006/95/ EG)
- EC EMC Directive (2004/108/ EG)



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



**The content of the operating instructions does not constitute grounds for any claims on the part of the buyer.**

**The copyright to these operating instructions remains with the manufacturer.**

**Reprinting, including extracts, only with written approval.**



Mündersbach, 25 February 2009

Dear customer,

Thank you for your order.

Premium quality – made in Germany and with a three-year warranty.

The machines from EWM are impressive, with innovative technology, exceptional user-friendliness and the most up to date inverter and control systems. This makes welding possible that is simple, efficient and resource-saving as well as being highly economical!

Perfection doesn't happen by coincidence: Every single component is 100% tested and the machine is "free welded" before it is delivered.

Our comprehensive service offer and the highly developed modern EWM quality management system guarantee worldwide premium quality "Made in Germany" and a three-year warranty.

Continual further development and optimisation has made us Germany's market leader in the manufacture of light arc welding machines. We have manufacturing, training and service locations throughout the world to advise you and provide you with a comprehensive range of services.

The accompanying operating instructions contain everything about commissioning the machine, notes regarding safety, maintenance and care, technical data as well as information regarding the warranty. It is very important to observe all our instructions in order to achieve optimal welding results with the machine and to ensure many years of safe operation.

Thank you for the trust that you have placed in us. We look forward to a long-term and, above all, successful partnership with you.

Yours faithfully

EWM HIGHTEC WELDING GmbH

A handwritten signature in black ink, appearing to read 'B. Szczesny', is positioned above the printed name.

Bernd Szczesny  
Executive management

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

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## 2 Safety instructions

### 2.1 Notes on the use of these operating instructions



#### DANGER

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

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



#### WARNING

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

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



#### CAUTION

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

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

#### CAUTION

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

- The safety information includes the "CAUTION" keyword in its heading without a general warning symbol.
- The hazard is explained using a symbol at the edge of the page.

#### NOTE



**Special technical points which users must observe.**








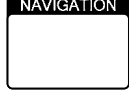





- Notes include the "NOTE" keyword in the heading without a general warning symbol.
- Notes are highlighted using a "hand" symbol at the edge of the page.

# Safety instructions

Notes on the use of these operating instructions

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

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

Symbol	Description
	Press
	Do not press
	Turn
	Switch
	Switch off machine
	Switch on machine
	ENTER (enter the menu)
	NAVIGATION (Navigating in the menu)
	EXIT (Exit the menu)
	Time display (example: wait 4s/press)
	Interruption in the menu display (other setting options possible)
	Tool not required/do not use
	Tool required/use



## 2.2 General



### DANGER



#### Electric shock!

**Welding machines use high voltages which can result in potentially fatal electric shocks and burns on contact. Even low voltages can cause you to get a shock and lead to accidents.**

- Do not touch any live parts in or on the machine!
- Connection cables and leads must be free of faults!
- Switching off alone is not sufficient! Wait for 2 minutes until the capacitors have discharged.
- Place welding torch and stick electrode holder on an insulated surface!
- The unit should only be opened by specialist staff after the mains plug has been unplugged!
- Only wear dry protective clothing!



#### Electromagnetic fields!

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

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



#### Do not carry out any unauthorised repairs or modifications!

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

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

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



### WARNING



#### Risk of accidents if these safety instructions are not observed!

**Non-observance of these safety instructions is potentially fatal!**

- Carefully read the safety information in this manual!
- Observe the accident prevention regulations in your country.
- Inform persons in the working area that they must observe the regulations!



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

**Arc radiation results in injury to skin and eyes.**

**Contact with hot workpieces and sparks results in burns.**

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



#### Explosion risk!

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

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



## WARNING



### Smoke and gases!

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

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



### Fire hazard!

Flames may arise as a result of the high temperatures, stray sparks, glowing-hot parts and hot slag produced during the welding process.

**Stray welding currents can also result in flames forming!**

- Check for fire hazards in the working area!
- Do not carry any easily flammable objects such as matches or lighters.
- Keep appropriate fire extinguishing equipment to hand in the working area!
- Thoroughly remove any residue of flammable substances from the workpiece before starting welding.
- Only continue work on welded workpieces once they have cooled down.  
Do not allow to come into contact with flammable material!
- Connect welding leads correctly!



## CAUTION



### Noise exposure!

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

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

## CAUTION



### Obligations of the operator!

**In the European Economic Area (EEA), the relevant national version of the basic guidelines must be followed and observed!**

- National version of the basic guidelines (89/391/EEC) as well as the relevant individual guidelines.
- In particular the Directive (89/655/EEC) on the minimum regulations for safety and health protection when staff members are using equipment during work.
- The accident prevention regulations of the relevant country (e.g. in Germany, BGV D 1).
- Check at regular intervals that users are working in a safety-conscious way!



### Damage due to the use of non-genuine parts!

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

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



### Electromagnetic interference!

**The machines are intended to be used in industrial areas, according to IEC 60974-10. If they are used in residential areas, for example, problems may occur with ensuring electromagnetic compatibility.**

- Check whether interference is caused to other machines!

## 2.3 Transport and installation



### WARNING



#### **Incorrect handling of shielding gas cylinders!**

**Incorrect handling of shielding gas cylinders can result in serious and even fatal injury.**

- Observe the instructions from the gas manufacturer and in any relevant regulations concerning the use of compressed air!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- Avoid heating the shielding gas cylinder!



### CAUTION



#### **Risk of tipping!**

**There is a risk of the machine tipping over and injuring persons or being damaged itself during movement and set up. Tilt resistance is guaranteed up to an angle of 10° (according to IEC 60974-1, -3, -10).**

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



#### **Damage due to supply lines not being disconnected!**

**During transport, supply lines which have not been disconnected (mains supply leads, control leads, etc.) may cause hazards such as connected equipment tipping over and injuring persons!**

- Disconnect supply lines!

### CAUTION



#### **Equipment damage when not operated in an upright position!**

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

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

- Only transport and operate in an upright position!

### 2.3.1 Lifting by crane



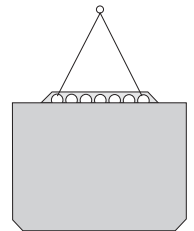
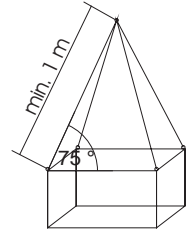
#### **DANGER**



##### **Risk of injury during lifting by crane!**

**When lifting the equipment by crane, serious injuries can be inflicted by falling equipment or add-on units.**

- Transport on all lifting lugs at the same time (see Fig. Lifting principle)!
- Ensure that there is an even load distribution! Only use ring chains or suspension ropes of the same length!
- Observe the lifting principle (see Fig.)!
- Remove all accessory components before lifting (e.g. shielding gas cylinders, tool boxes, wire feed units, etc.)!
- Avoid jerky movements when raising or lowering!
- Use shackles and load hooks of the appropriate size!



*Fig. Lifting principle*



##### **Risk of injury due to unsuitable ring screws!**

**In case of improper use of ring screws or the use of unsuitable ring screws, persons can be seriously damaged by falling equipment or add-on components!**

- The ring screw must be completely screwed in!
- The ring screw must be positioned flat onto and in full contact with the supporting surfaces!
- Check that the ring screws are securely fastened before use and check for any damage (corrosion, deformation)!
- Do not use or screw in damaged ring screws!
- Avoid lateral loading of the ring screws!

## 2.4 Ambient conditions

### CAUTION



#### **Equipment damage due to dirt accumulation!**

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

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



#### **Non-permissible ambient conditions!**

**Insufficient ventilation results in a reduction in performance and equipment damage.**

- Observe the ambient conditions!
- Keep the cooling air inlet and outlet clear!
- Observe the minimum distance of 0.5 m from obstacles!



#### **Installation site!**

**The machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!**

- The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.
- Safe operation of the machine must be guaranteed at all times.

### 2.4.1 In operation

**Temperature range of the ambient air:**

- -20 °C to +40 °C

**Relative air humidity:**

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

### 2.4.2 Transport and storage

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

- -25 °C to +55 °C

**Relative air humidity**

- Up to 90% at 20 °C

### 3 Technical data

#### NOTE



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

#### 3.1 TETRIX 301-521

TETRIX	301		351		421		521	
Setting ranges								
Welding current	5 A to 300 A		5 A to 350 A		5 A to 420 A		5 A to 520 A	
Welding voltage (TIG)	10.2 to 22.0 V		10.2 to 24.0 V		10.2 to 26.8 V		10.2 to 30.8 V	
Welding voltage (MMA)	20.2 to 32.0 V		20.2 to 34.0 V		20.2 to 36.8 V		20.2 to 40.8 V	
Duty cycle	25 °C	40 °C	25 °C	40 °C	25 °C	40 °C	25 °C	40 °C
60%DC	-	300 A	-	350 A	-	420 A	-	520 A
80%DC	300 A	-	-	-	420 A	-	520 A	-
100%DC	270 A	250 A	350 A	300 A	380 A	360 A	450 A	420 A
Load alternation	10 min. (60% DC $\triangle$ 6 min. welding, 4 min. break)							
Open circuit voltage	98 V						79 V	
Mains voltage (tolerances)	3 x 400 V (-25 % to +20 %)							
Frequency	50/60 Hz							
Mains fuse (safety fuse, slow-blow)	3 x 16 A		3 x 25 A		3 x 35 A			
Mains connection lead	H07RN-F4G4						H07RN-F4G6	
Max. connected load								
TIG	8.3 kVA		10.6 kVA		14.2 kVA		20.2 kVA	
MMA	12.0 kVA		15.0 kVA		19.5 kVA		26.8 kVA	
Recommended generator rating	16.4 kVA		20.5 kVA		27.0 kVA		38.0 kVA	
cosφ	0.99							
Insulation class/protection classification	H/IP 23							
Ambient temperature	-20 °C to +40 °C							
Machine/torch cooling	Fan/gas or water							
Cooling capacity at 1 l/min	1500 W							
Max. flow rate	5 l/min							
Coolant outlet pressure	max. 3.5 bar							
Max. tank capacity	12 l							
Coolant	Ex works: KF 23E (-10°C to +40°C) or KF 37E (-20°C to +10°C)							
Workpiece lead	50 mm <sup>2</sup>		70 mm <sup>2</sup>				95 mm <sup>2</sup>	
Dimensions L/W/H	1100 x 455 x 950 mm							
Weight	105 kg		117 kg		120 kg		128.5 kg	
Constructed to standards	IEC 60974-1, -2, -3, -10 S / C €							

## 4 Machine description

### NOTE



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

### 4.1 TETRIX 301-521

#### 4.1.1 Front view

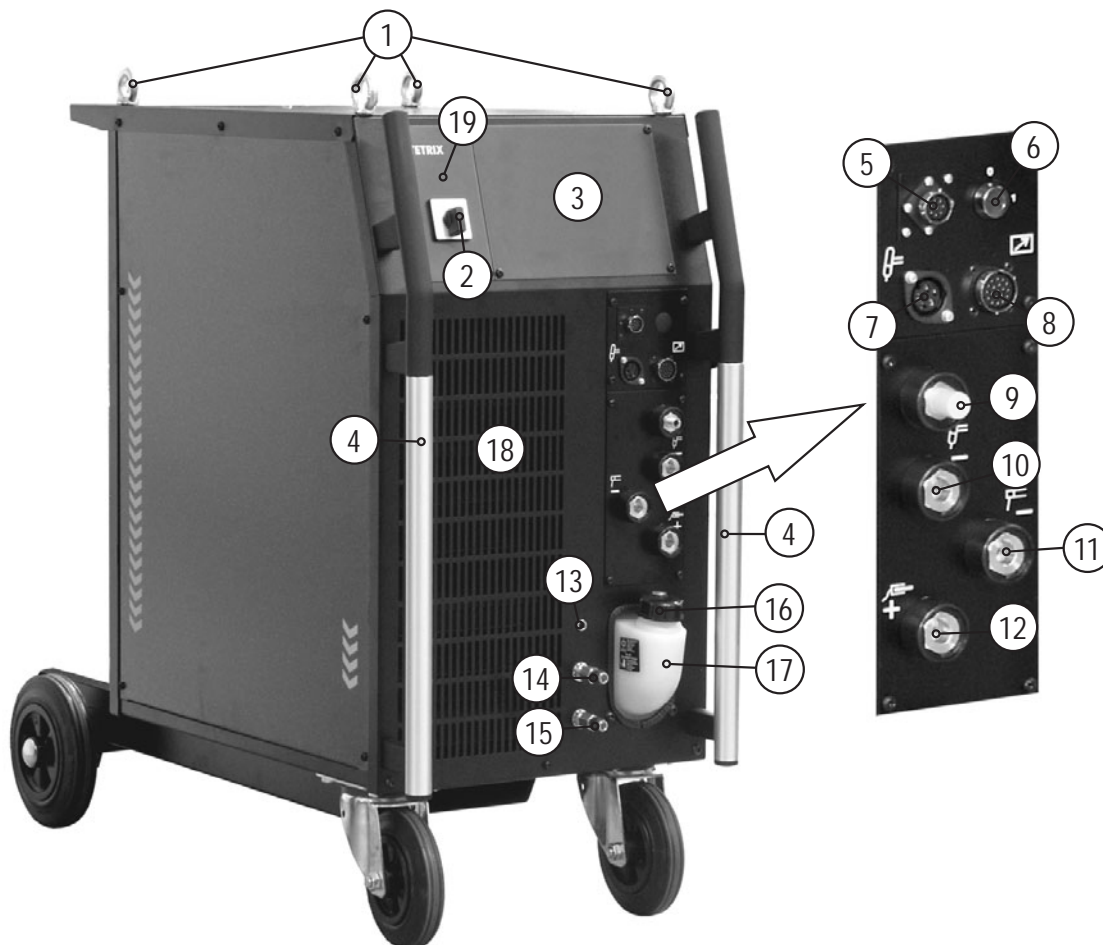














Figure 4-1



Item	Symbol	Description
1		<b>Lifting lug</b>
2		<b>Main switch, machine on/off</b>
3		<b>Machine control</b> See Machine control – operating elements chapter
4		<b>Carrying handle</b>
5		<b>Connection socket, 8-pole / 12-pole</b> 8-pole: TIG Up/Down or potentiometer torch control lead 12-pole: Control lead for TIG up/down torch with LED display (option)
6		<b>Key switch for protection against unauthorised use</b> Position "1" > changes possible, Position "0" > changes not possible. Please take note of chapter "Key switch"
7		<b>Connection socket, 5-pole</b> Standard TIG torch control lead
8		<b>Connection socket, 19-pole</b> Remote control connection
9		<b>G1/4" connecting nipple, "-" welding current</b> Shielding gas connection (with yellow insulating cap) for TIG welding torch
10		<b>Connection socket, "-" welding current</b> TIG welding torch connection
11		<b>Connection socket, "-" welding current</b> Electrode holder connection
12		<b>Connection socket, "+" welding current</b> Connection for workpiece lead
13		<b>Automatic cut-out of coolant pump key button</b> press to reset a triggered fuse
14		<b>Rapid-action closure coupling, red (coolant return)</b>
15		<b>Rapid-action closure coupling, blue (coolant supply)</b>
16		<b>Coolant tank cap</b>
17		<b>Coolant tank</b>
18		<b>Cooling air inlet</b>
19		<b>Operating state display</b> Lights up when the machine is switched on and ready for operation.

## 4.1.2 Rear view

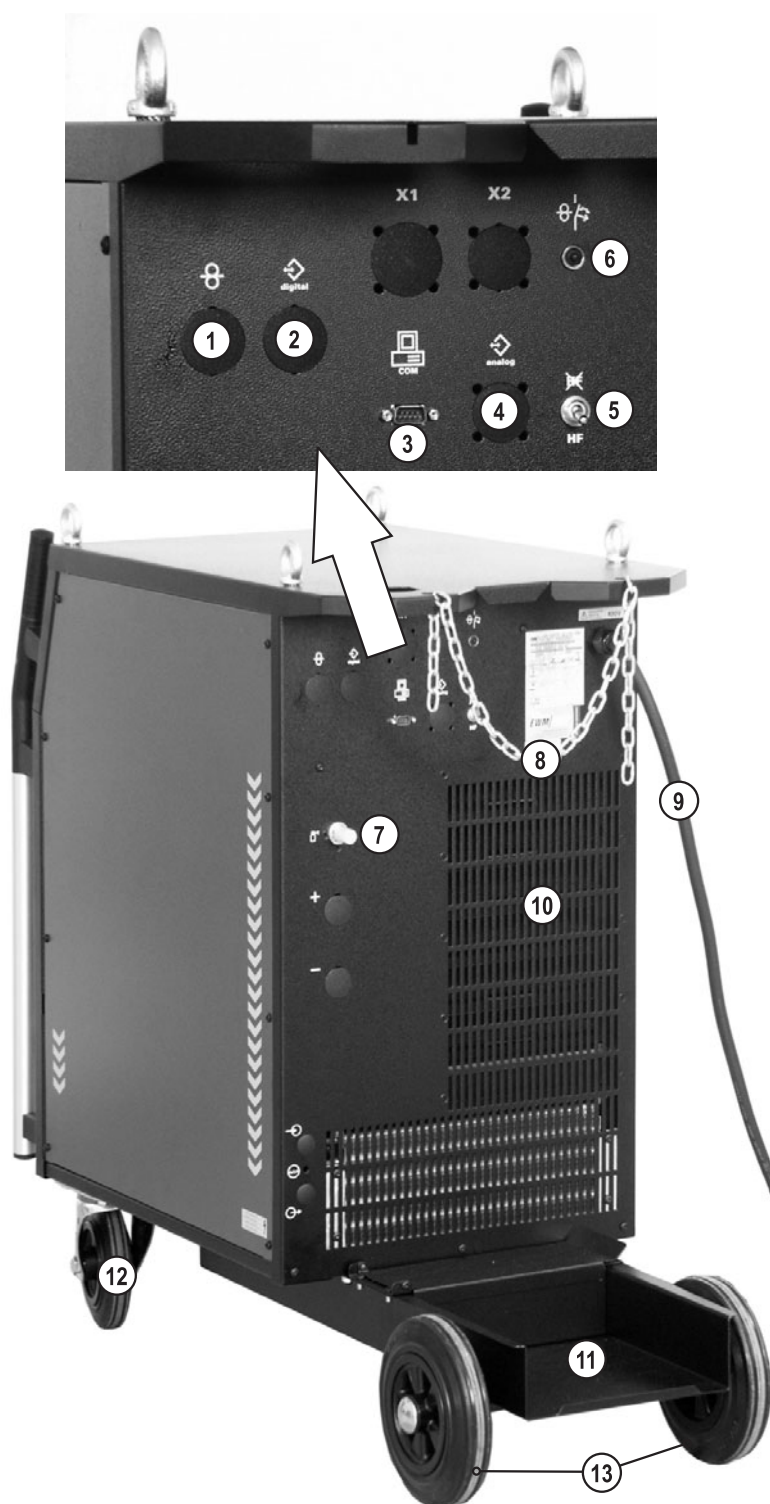










Figure 4-2

Item	Symbol	Description
1		<b>7-pole connection socket (digital)</b> Wire feed unit connection
2		<b>7-pole connection socket (digital)</b> For connecting digital accessory components (documentation interface, robot interface or remote control, etc.).
3		<b>PC interface, serial (D-SUB connection socket, 9-pole)</b>
4		<b>Automation interface, 19-pole (analogue)</b> (see Function Specification chapter)
5		<b>Ignition type changeover switch</b>  = Liftarc (contact ignition) <b>HF</b> = HF ignition
6		<b>Key button, automatic cutout</b> Wire feed motor supply voltage fuse (press to reset a triggered fuse)
7		<b>G<sup>1</sup>/<sub>4</sub>" connecting nipple</b> Shielding gas connection on the pressure reducer
8		<b>Safety chain</b>
9		<b>Mains connection cable</b>
10		<b>Cooling air outlet</b>
11		<b>Cylinder bracket</b>
12		<b>Conveyor rolls, guide castors</b>
13		<b>Conveyor rolls, fixed castors</b>

## 4.2 Machine control – Operating elements

### NOTE



Machine control provides the user with up to 8 welding tasks (JOBS).

JOB 0 represents manual operating mode. This is where you can change/optimize all parameters directly in machine control (see chapter "Operating concepts").

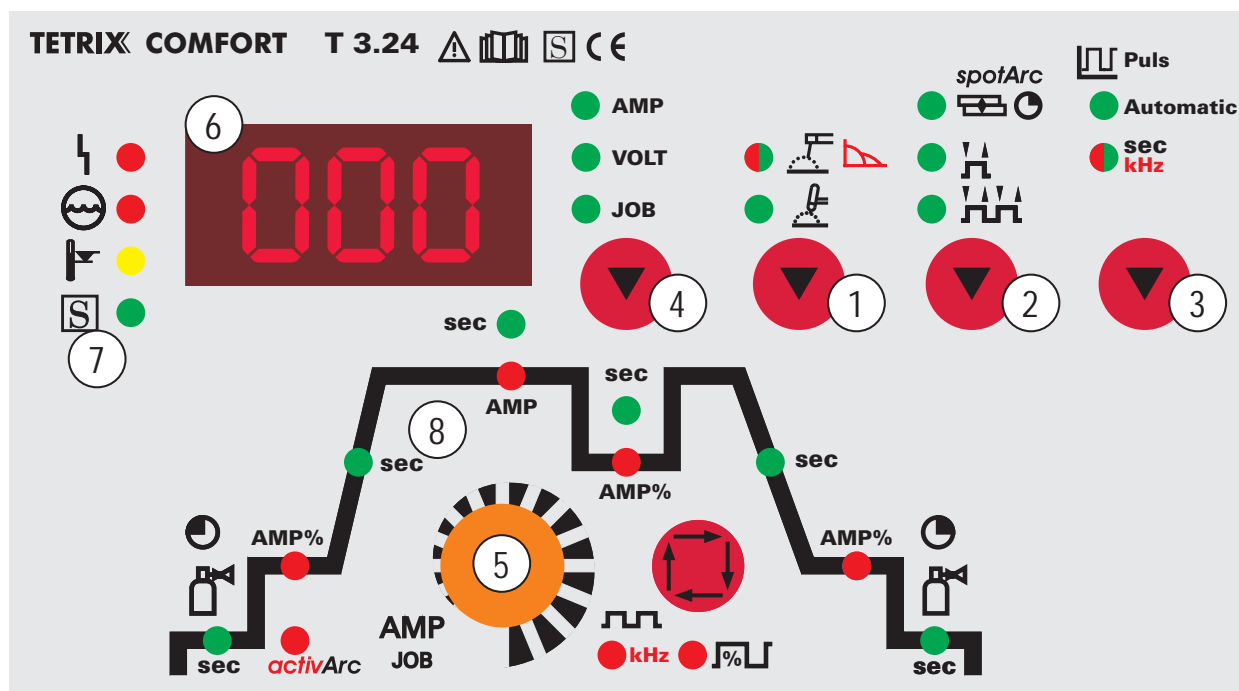










Figure 4-3

Item	Symbol	Description
1		<b>Welding process button</b> MMA welding, lights up in green / arcforce setting, lights up in red TIG welding
2		<b>Operating mode button</b> spotArc (spot time setting range 0.01 sec. to 20.0 sec.) Non-latched Latched
3		<b>TIG pulses key button</b> Automatic TIG automated pulses (frequency and balance) sec kHz TIG pulses with times, lights up in green / Fast TIG DC pulses with frequency and balance, lights up in red
4		<b>Display changeover button</b> AMP Welding current display VOLT Welding voltage display JOB JOB number display

Item	Symbol	Description
5		<b>Welding parameter setting rotary dial</b> Setting all parameters such as ignition, welding, end current, gas pre-flow and gas post-flow times, pulse edges, etc.
6		<b>Three-figure LED display</b> Welding parameter display (see also chap. "Welding data display").
7		<b>Error/status indicators</b>  Collective interference signal light (see Operating problems chapter)  Water deficiency signal light (welding torch cooling)  Excess temperature signal light   safety sign signal light
8		<b>Function sequence (see next chapter)</b>

## 4.2.1.1 Function sequence

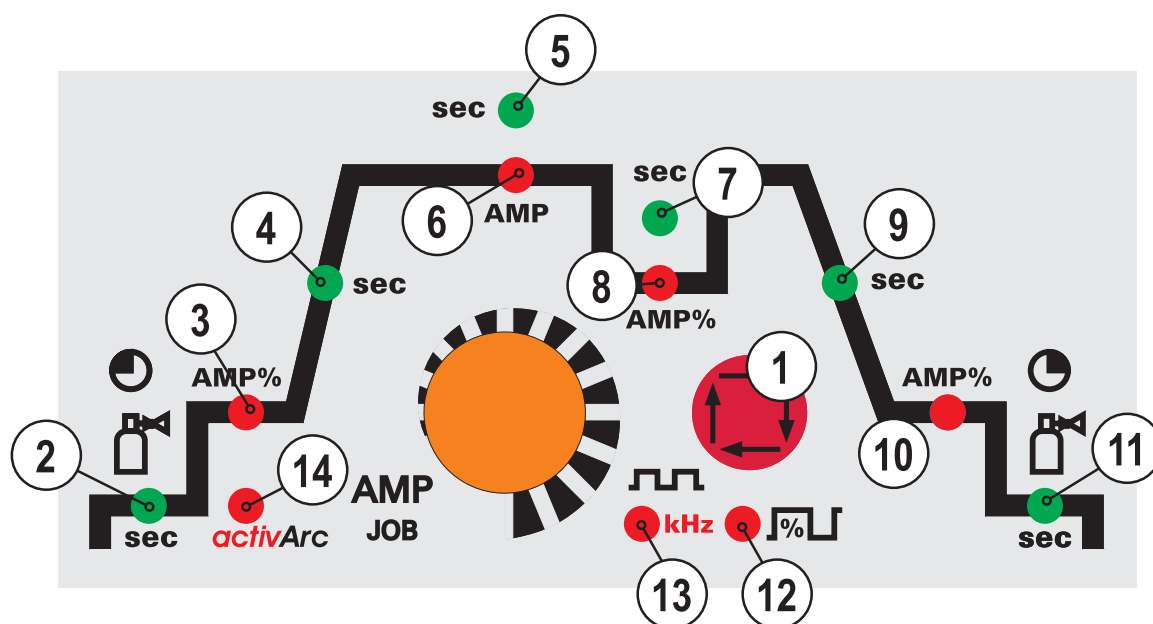









Figure 4-4

Item	Symbol	Description
1		<b>Select welding parameters button</b> This button is used to select the welding parameters depending on the welding process and operating mode used.
2		<b>Gas pre-flow time (TIG)</b> , absolute setting range 0.0 sec to 20.0 sec (0.1s increments).
3		<div> <b>Ignition current (TIG)</b>                      Percentage of the main current.                      Setting range 1 % to 200 %                      (1 % increments). There are no pulses during the ignition current phase.                 </div> <div> <b>Hotstart current (MMA)</b>                      Percentage of the main current. Setting range 1 % to 200 %                      (1 % increments).                 </div>
4		<div> <b>Up-slope time (TIG)</b>                      Setting ranges: 0.00 s to 20.0 s                      (0.1 s increments).                      The up-slope time can be set separately for non-latched and latched.                 </div> <div> <b>Hotstart time (MMA)</b>                      Setting ranges: 0.00 s to 20.0 s                      (0.1 s increments).                 </div>
5		<b>Pulse time / slope time from AMP% to AMP / Spot time</b> <ul style="list-style-type: none"> <li>Pulse time setting range: 0.01 s to 20.0 s                      (0.01 s increments &lt; 0.5 s; 0.1 s increments &gt; 0.5 s)                      Die Pulszeit gilt für die Hauptstromphase (AMP) beim Pulsen.</li> <li>Slope time (tS2) setting range: 0.0 s to 20.0 s                      (see chapter "Advanced settings")</li> </ul>
6		<div> <b>Main current (TIG) / pulse current</b>                      I min to I max (1 A increments)                 </div> <div> <b>Main current (MMA)</b>                      I min to I max (1 A increments)                 </div>
7		<b>Pulse pause time / slope time from AMP to AMP%</b> <ul style="list-style-type: none"> <li>Pulse pause setting range: 0.01 sec to 20.0 sec                      (0.01 sec increments &lt; 0.5 sec; 0.1 sec increments &gt; 0.5 sec)</li> <li>Slope time (tS1) setting range: 0.0 sec to 20.0 sec                      (see chapter "Advanced settings")</li> </ul> The pulse time applies to the secondary current phase (AMP%)

Item	Symbol	Description
8		<b>Secondary current (TIG) / pulse pause current</b> Setting range 1 % to 100 % (1 % increments). Percentage of the main current.
9		<b>Down-slope time (TIG)</b> 0.00 sec to 20.0 sec (0.1 sec increments). The down-slope time can be set separately for non-latched and latched.
10		<b>End-crater current (TIG)</b> Setting range 1 % to 200 % (1 % increments). Percentage of the main current.
11		<b>Gas post-flow time (TIG)</b> Setting ranges: 0.00 sec to 40.0 sec (0.1 sec increments).
12		<b>Balance TIG DC pulses (15 kHz)</b> Setting range: 1% to +99% (1% increments).
13		<b>Frequency TIG DC pulses (15 kHz)</b> Setting range: 50 Hz to 15 kHz
14		<b>activArc TIG welding process</b> <ul style="list-style-type: none"> <li>Switch activArc on or off</li> <li>Correct the activArc characteristic (setting range: 0 to 100)</li> </ul>

## 5 Functional characteristics

### NOTE



Machine control provides the user with up to 8 welding tasks (JOBS).  
JOB 0 represents manual operating mode. This is where you can change/optimize all parameters directly in machine control (see chapter "Operating concepts").

### 5.1 Operating concepts

The welding task (JOB) can be selected in two ways:

- Manual, standard operation (JOB "0")
- JOB operation, saved welding tasks (JOB 1 to 7)

#### 5.1.1 Manual, standard operation (JOB 0)

### NOTE



No changes can be made to the basic welding parameters during the welding process.

"Manual, standard operation (JOB 0)" is set by default on delivery and every time the machine control is reset. This means that the welder repeatedly makes all the required welding settings and re-adjusts them for each individual welding task.







Operating element	Action	Result
		Select and display welding process
		TIG welding
		TIG activArc welding
		MMA welding, lights up in green/arcforce setting, lights up in red
		Select and display operating mode
		spotArc (spot time setting range 0.01 sec. to 20.0 sec.)
		Non-latched
		Latched
		Select and display pulse procedure
		TIG automated pulses (frequency and balance)
		TIG pulses with times, lights up in green/fast TIG DC pulses with frequency and balance, lights up in red
		Select welding parameter in the functional sequence
		Set welding parameters



## 5.1.2 Save welding tasks (JOBS)

You can select, change and save the required welding parameters for recurring welding tasks (JOBS) in up to 7 JOBS (JOB 1 to JOB 7).

### 5.1.2.1 Displaying and changing the JOB number

Operating element	Action	Result	Display
		Select JOB display	JOB number
		Change the JOB number	JOB number
		If the display switchover is pressed or if there is no keyboard input for 5 seconds, the new JOB will be active	JOB number

### NOTE



The procedure for setting welding tasks is the same as described under "Manual, standard operation (JOB 0)". A JOB can only be switched if no welding current is flowing.

The up-slope and down-slope times can be set separately for non-latched and latched.

## 5.1.3 Welding data display

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

Parameter	Before welding (nominal values)	During welding (actual values)
Welding current	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Welding voltage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
JOB number	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Parameter times	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Parameter currents	<input checked="" type="checkbox"/>	<input type="checkbox"/>

### 5.1.3.1 Welding parameter setting

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

## 5.2 TIG welding

### 5.2.1 Arc ignition

#### 5.2.1.1 HF ignition

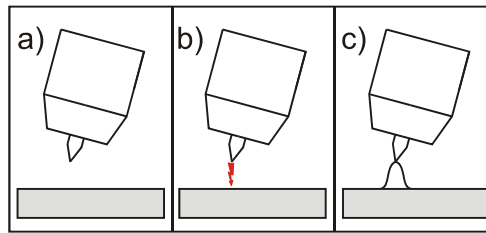


Figure 5-1

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

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

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

#### 5.2.1.2 Liftarc ignition

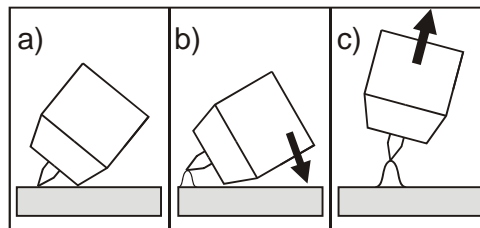


Figure 5-2

**The arc is ignited on contact with the workpiece:**

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

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

### 5.2.2 Automatic cut-out

#### NOTE



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

**During the ignition phase (ignition fault)**

- If there is no welding current within 3s after starting the welding.

**During the welding phase (arc interruption)**

- If the arc is interrupted for longer than 3s.

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

## 5.2.3 Function sequences/operating modes

The "Select welding parameter" button and the "Welding parameter setting" rotary transducer can be used to control all the parameters for the TIG process:

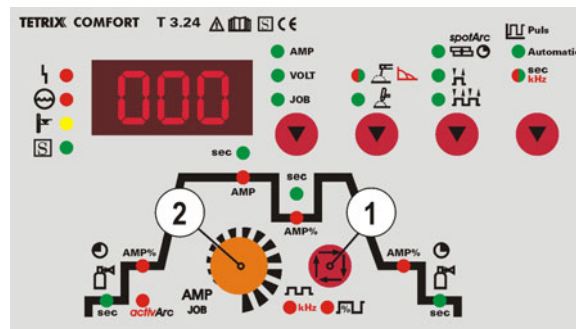


Figure 5-3

Item	Symbol	Description
1		<b>Select welding parameters button</b> This button is used to select the welding parameters depending on the welding process and operating mode used.
2		<b>Welding parameter setting rotary dial</b> Setting all parameters such as ignition, welding, end current, gas pre-flow and gas post-flow times, pulse edges, etc.

### 5.2.3.1 Explanation of symbols

Symbol	Meaning
	Press torch trigger 1
	Release torch trigger 1
I	Current
t	Time
	Gas pre-flows
I <sub>start</sub>	Ignition current
t <sub>Up</sub>	Up-slope time
tP	Spot time
AMP	Main current (minimum to maximum current)
AMP%	Secondary current (0% to 100% of AMP)
t1	Pulse time
t2	Pulse pause time
ts1	TIG pulses: Slop time from main current (AMP) to secondary current (AMP%)
ts2	TIG pulses: Slop time from secondary current (AMP%) to main current (AMP)
t <sub>Down</sub>	Down-slope time
I <sub>end</sub>	End-crater current
	Gas post-flows

## 5.2.3.2 Non-latched mode

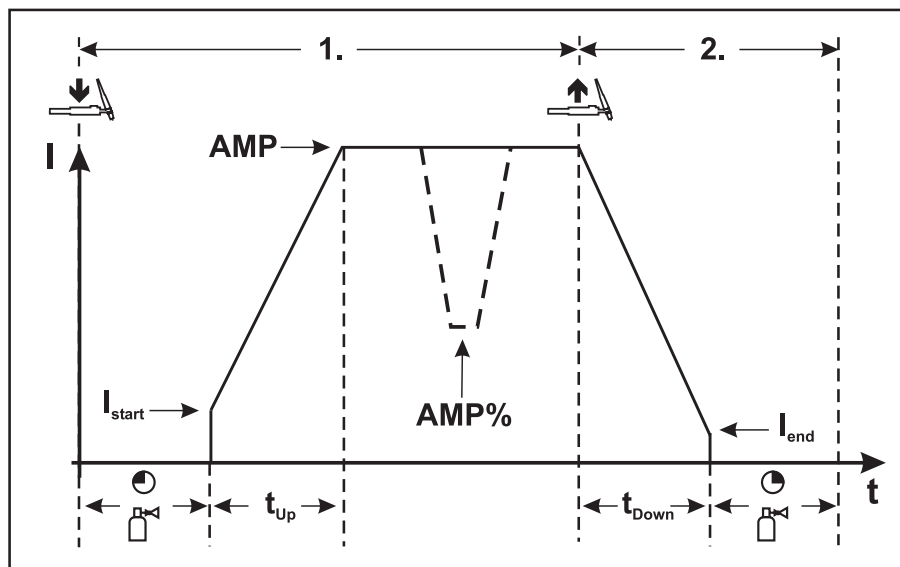


Figure 5-4

### 1st cycle:

- Press and hold torch trigger 1.
- The gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.
- The welding current flows and immediately assumes the value set for the ignition current  $I_{start}$ .
- HF is switched off.
- The welding current increases with the adjusted up-slope time to the main current AMP.

If torch trigger 2 is pressed in addition to torch trigger 1 during the main current phase, the welding current drops at the slope time set ( $t_{S1}$ ) to the secondary current AMP%.

After torch trigger 2 is released, the welding current rises at the slope time set ( $t_{S2}$ ) back to the main current AMP.

### 2nd cycle:

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

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

- The main current reaches the end-crater current  $I_{end}$ , the arc extinguishes.
- The set gas post-flow time elapses.

### NOTE



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

### 5.2.3.3 Latched mode

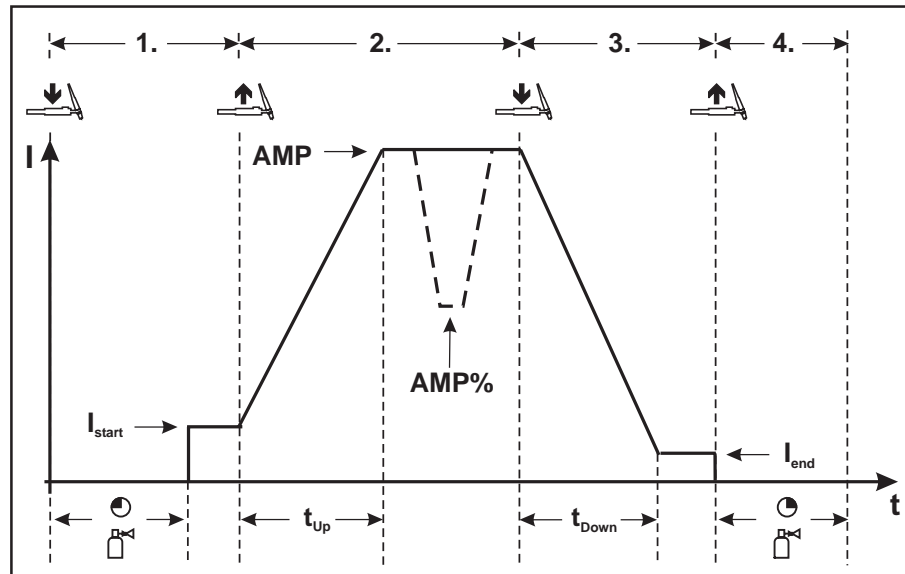


Figure 5-5

#### Step 1

- Press torch trigger 1, the gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.
- Welding current flows and immediately assumes the ignition current value set (search arc at minimum setting). HF is switched off.

#### Step 2

- Release torch trigger 1.
- The welding current increases with the set up-slope time to the main current AMP.

#### Switching from main current AMP to secondary current AMP%:

- Press torch trigger 2 or
- Tap torch trigger 1 \*

The slope times can be set (see chapter "Advanced settings", section "Setting slope times for secondary current AMP% or pulse edges").

#### Step 3

- Press torch trigger 1.
- The main current drops with the set down-slope time to the end-crater current  $I_{end}$  (minimum current).

#### Step 4

- Release torch trigger 1, the arc extinguishes.
- The set gas post-flow time begins.

#### Immediate termination of the welding procedure without down-slope and end-crater current:

- Briefly press the 1st torch trigger (3rd and 4th step).  
The current drops to zero and the gas post-flow time begins.

### NOTE



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

## 5.2.3.4 SpotArc

The TIG SpotArc function is activated with the pulse variant automated frequencies by default, because this combination produces the most effective results. The user can of course combine the function with other pulse variants depending on the selected welding process. Pulse time (t1) and pulse break time (t2) can be set independently, but the spot time (tP) should be much greater than the pulse time in order to achieve an appropriate result.

### Selecting and setting TIG spotArc

Operating element	Action	Result
<div><div>spotArc</div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div></div></div></div>	<div><div></div></div>	<div><div>spotArc</div><div>Signal light <div><div></div><div></div><div></div></div> comes on</div><div>The spot time can be set for approx. 4 sec. using the Welding parameter setting rotary dial. (Spot time setting range 0.01 sec. to 20 0 sec.) Afterwards the display switches back to current/voltage. If the button is pressed again, the display switches back to the parameter and can be changed with the rotary dial accordingly. The spot time can also be set in the function sequence.</div></div>
<div><div></div></div>	<div><div></div><div></div></div>	<div>Set spot time (tP)</div>
<div><div><div></div><div>Puls</div></div><div><div></div><div>Automatic</div></div><div><div></div><div>sec kHz</div></div><div><div></div></div></div>	<div><div></div></div>	<div><div>The TIG spotArc process is switched on with pulse variant TIG automated pulses by default. The user can select other pulse variants:</div><div><div><div></div><div>Automatic</div></div>TIG automated pulses (frequency and balance)</div><div><div><div></div><div>sec kHz</div></div>TIG pulses with times, lights up in green/ fast TIG DC pulses with frequency and balance, lights up in red</div></div>

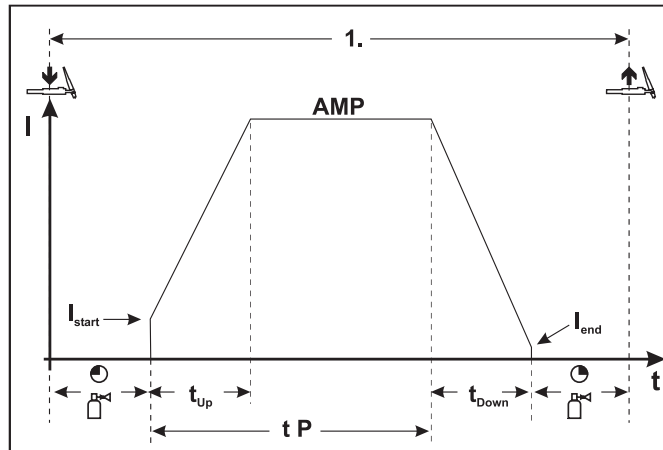


Figure 5-6

### Sequence:

- Press and hold torch trigger 1.
- The gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.
- The welding current flows and immediately assumes the value set for the ignition current  $I_{start}$ .
- HF is switched off.
- The welding current increases in the adjusted up-slope time to the main current AMP.

### NOTE



The process ends when the set SpotArc time elapses or if the torch trigger is released prematurely.

### NOTE



The process ends when the set spotArc time elapses or if the torch trigger is released prematurely.

### spotArc/pulse variants table:

Process	Pulse variants	
TIG DC	Automatic	Automated pulses (factory setting)
	sec kHz (lights up in green)	Pulses (thermal pulses)
	sec kHz (lights up in red)	kHz pulse (metallurgic pulses)
	No pulses	

### NOTE



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

## 5.2.3.5 Non-latched operation, version C

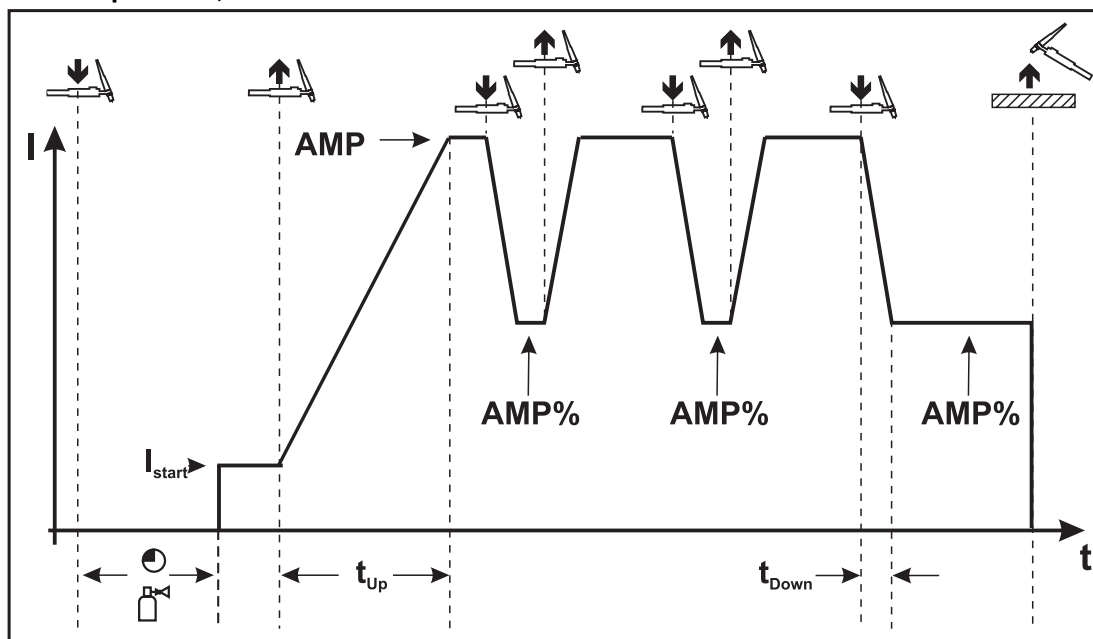


Figure 5-7

### 1st cycle

- Press torch trigger 1, the gas pre-flow time elapses.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.
- Welding current flows and immediately adopts the ignition current value set (search arc at minimum setting). HF is switched off.

### 2nd cycle

- Release torch trigger 1.
- The welding current increases in the set up-slope time to the main current AMP.

### NOTE



Pressing torch trigger 1 starts the slope (tS1) from main current AMP to secondary current AMP%. Releasing the torch trigger starts the slope (tS2) from the secondary current AMP% back to the main current AMP. This process can be repeated as often as required.

The welding process is ended by the arc interruption in the secondary current (removing the torch from the workpiece until the arc is extinguished).

The slope times can be set (see chapter "Advanced settings", section "Setting slope times for secondary current AMP% or pulse edges").




This operating mode needs to be activated (see chapter "Advanced settings" in the "TIG non-latched operating mode, C version") section.



## 5.2.4 Pulses, function sequences

### NOTE

 The function sequences in pulses basically behave in the same way as in standard welding, but during the main current phase there is a continual switching back and forth between the pulse and pause currents at the relevant times.

### 5.2.4.1 Non-latched mode

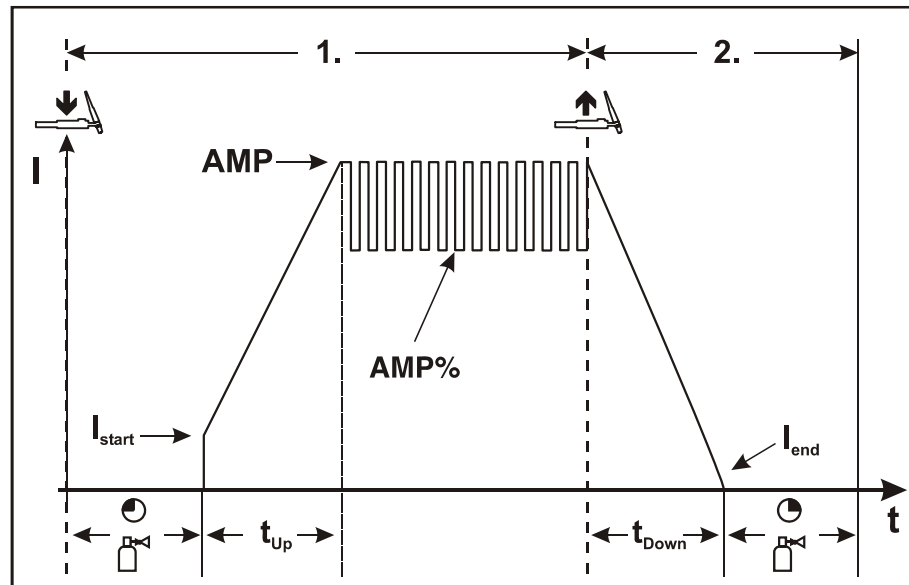


Figure 5-8

### 5.2.4.2 Latched mode

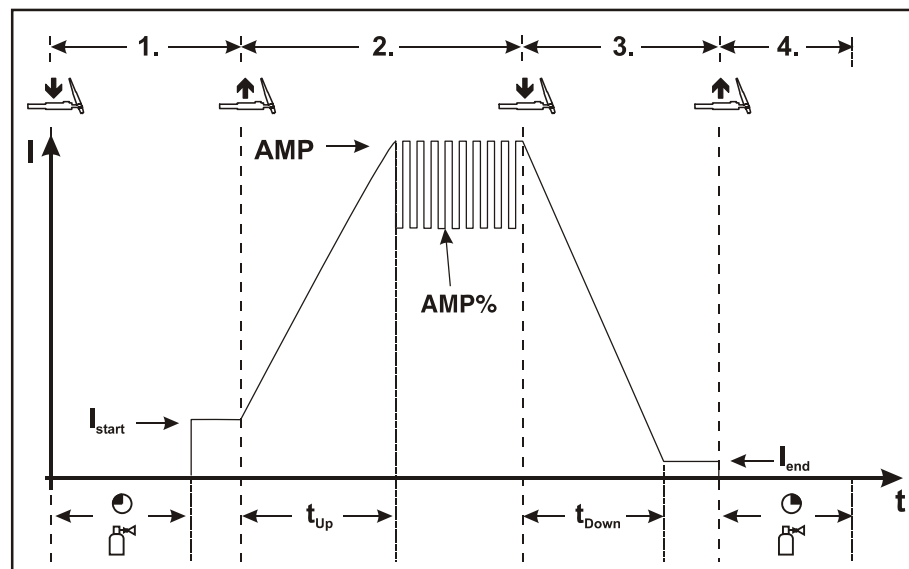



Figure 5-9

## 5.2.5 Pulse variants

### NOTE

 The machines have an integrated pulse device.  
With pulses, the machine switches back and forth between the pulse current (main current) and pause current (secondary current).

### 5.2.5.1 Pulses (thermal pulses)

With thermal pulses, the pulse and pause times (frequency up to 200 Hz) and the pulse edges (ts1 and ts2) are entered in seconds on the control.

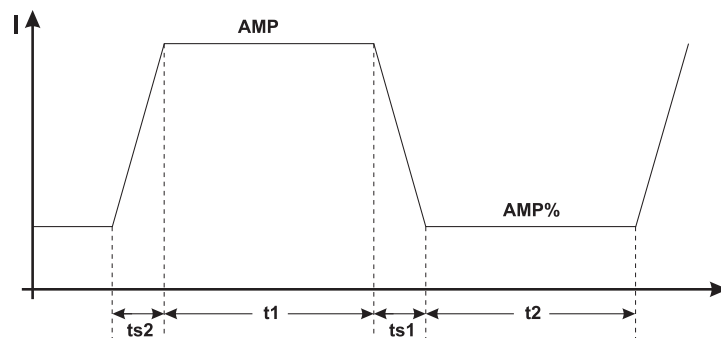























Figure 5-10

Operating element	Action	Result	Display
 Puls  Automatic  SEC  kHz		Select TIG pulses function Signal light lights up in green	-
		Select pulse time "t1" LED "Pulse time" comes on (see chapter "Function sequence")	0.10
		Set pulse time "t1"	0.10
		Select break time "t2" LED "Pulse break time" lights up (see chapter "Function sequence")	0.10
		Set break time "t2"	0.10
	 2 s	Select slope times "ts1" and "ts2"	0.01
		Set slope time "ts1"	0.01
		Switch between slope times "ts1" and "ts2"	0.01
		Set slope time "ts2"	0.01

### 5.2.5.2 KHz pulses (metallurgic pulses)

The kHz pulses (metallurgic pulses) use the plasma pressure produced at high currents (arc pressure) which is used to achieve a constricted arc with concentrated heat feeding. The frequency can be infinitely adjusted from 50 Hz to 15 kHz and the pulse balance from 1-99 %. In contrast to thermal pulses, the pulse edge times are not required.

#### NOTE

 **The pulse process continues during the up-slope and down-slope phases!**

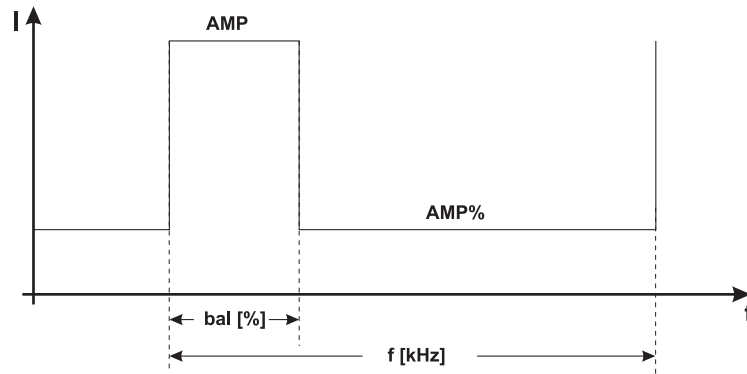
























Figure 5-11

Operating element	Action	Result
    		Select kHz pulses Press "TIG pulses" button until the   signal light lights up in red
		Select balance  Setting range: 1% to 99% (1% increments)
		Select frequency   Setting range: 50 Hz to 15 kHz (0.01 kHz increments)

### 5.2.5.3 Automated pulses









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

Operating element	Action	Result
    		Select TIG automated pulses Press the "TIG pulses" button until the TIG automated pulses signal light  <b>Automatic</b> comes on

## 5.2.6 TIG activArc welding

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











TIG activArc combined with pulse variant "TIG automated pulses" or "kHz pulses (metallurgic pulses)" improves the positive properties of the process further depending on the task.

Operating element	Action	Result	Display
	x x 	Select activArc parameter Press until  <b>activArc</b> LED flashes	
		• Switch parameter on	
		• Switch parameter off	

### Parameter setting







The activArc parameter (control) can be adjusted specifically for the welding task (panel thickness). These parameters have been modified for the welding current level at the factory.

- The "activArc" process must be selected first (activArc signal light is on permanently).

Operating element	Action	Result	Display
	4 sec. 	Select activArc parameter value	
	x x 	Select activArc parameter value Press until  <b>activArc</b> LED flashes	
		Set parameter value <ul style="list-style-type: none"> <li>Increase parameter value (A/V)</li> <li>Decrease parameter value (A/V)</li> </ul>	

## 5.2.7 Shielding gas setting

### 5.2.7.1 Gas test




Operating element	Action	Result
	x x 	Press the "Select welding parameter" button until the "activArc" LED  <b>activArc</b> flashes.
	5 sec. 	Press the "Select welding parameter" button and hold for approx. 5 sec. The gas pre-flow time LED (TIG)  <b>sec</b> will come on, shielding gas flows for approx. 20 sec.

## 5.2.8 Welding torch (operating variants)

Different torch versions can be used with this machine.

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

**Explanation of symbols for operating elements:**

Symbol	Description
 BRT 1	Press torch trigger
 BRT 1	Tap torch trigger *
 BRT 2	Tap * and press torch trigger

### 5.2.8.1 Tap torch trigger (tapping function)

#### NOTE



**Pressing the torch trigger briefly to change a function, e.g. changing over from main to secondary current.**

**The function is used in torch modes 1-6 (factory setting). The function is deactivated in torch modes 11-16 (for more in-depth information, see Torch mode setting chapter).**

5.2.9 Torch mode and up/down speed setting

The user has the modes 1 to 6 and modes 11 to 16 available. Modes 11 to 16 include the same function options as 1 to 6, but without tapping function for the secondary current.

The function options in the individual modes can be found in the tables for the corresponding torch types. The welding process can of course be switched on and off in all modes using torch trigger 1 (TT 1).

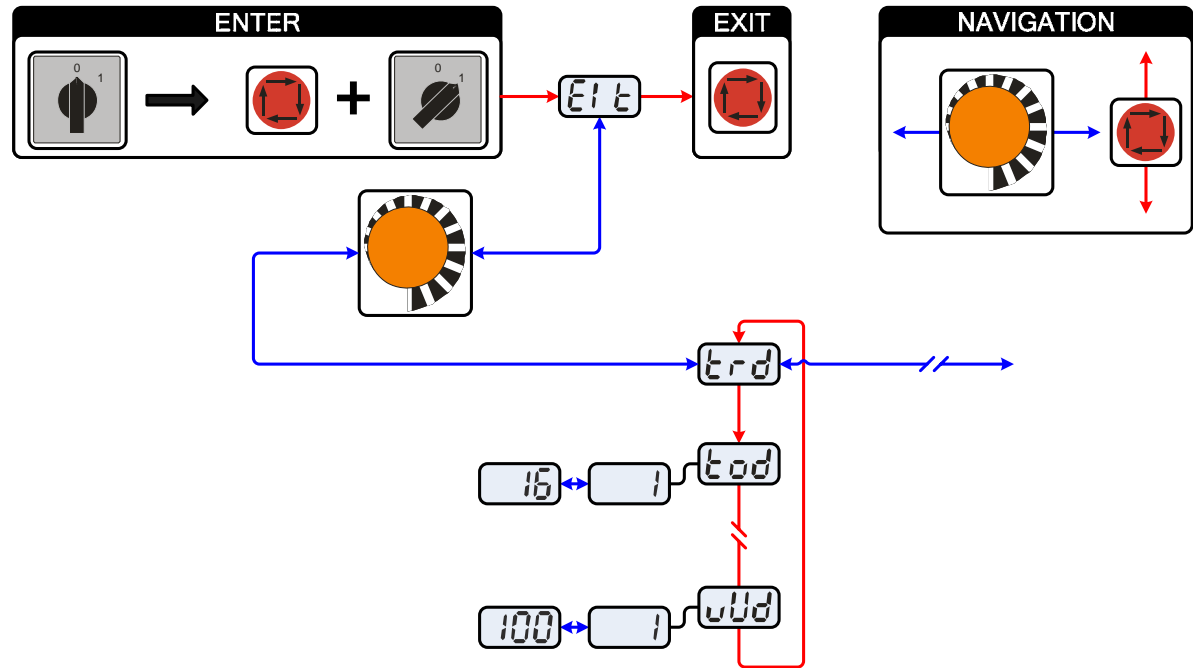


Figure 5-12





Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Torch configuration menu</b> Set welding torch functions
	<b>Torch mode</b> <ul style="list-style-type: none"><li>Modes 1-6: with tapping function (factory setting 1)</li><li>Modes 11-16: without tapping function</li></ul>
	<b>Up-/Down speed (not available in modes 4 and 14)</b> Increase value = rapid current change (factory setting 10) Reduce value = slow current change

NOTE



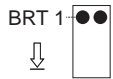
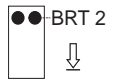
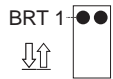
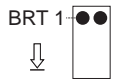
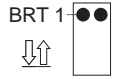
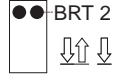
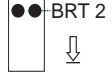
Only the modes listed are suitable for the corresponding torch types.

## 5.2.9.1 Standard TIG torch (5-pole)

Standard torch with one torch trigger:

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


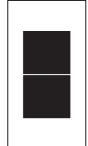











Standard torch with two torch triggers:

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

# Functional characteristics

TIG welding



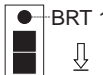
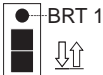
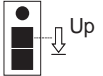
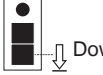
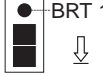
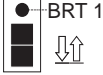
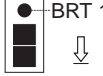
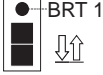

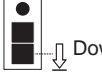
## Standard torch with one rocker (MG rocker, two torch triggers)

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



















### 5.2.9.2 TIG up/down torch (8-pole)

Up/down torch with one torch trigger

Diagram	Operating elements	Explanation of symbols
		TT 1 = torch trigger 1
Functions	Mode	Operating elements
Welding current on/off	<b>1</b> (factory-set)	
Secondary current (tapping mode) / (Latched mode)		
Increase welding current, infinite adjustment (up function)		
Reduce welding current, infinite adjustment (down function)		
Welding current on/off	<b>2</b>	
Secondary current (tapping mode)		
Welding current on/off	<b>4</b>	
Secondary current (tapping mode) / (Latched mode)		
Increase welding current by an increment (see chapter "Setting the first increment in modes 4 and 14")		
Reduce welding current by an increment (see chapter "Setting the first increment in modes 4 and 14")		

## Up/down torch with two torch triggers







Diagram	Operating elements	Explanation of symbols
		TT 1 = torch trigger 1 (left) TT 2 = torch trigger 2 (right)
Functions	Mode	Operating elements
Welding current on/off	<b>1</b> (factory-set)	BRT 1 
Secondary current		 BRT 2
Secondary current (tapping mode) / (Latched mode)		BRT 1 
Increase welding current, infinite adjustment (up function)		 Up
Reduce welding current, infinite adjustment (down function)		 Down
Welding current on/off	<b>2</b>	BRT 1 
Secondary current		 BRT 2
Secondary current (tapping mode)		BRT 1 
Welding current on/off	<b>4</b>	BRT 1 
Secondary current		 BRT 2
Secondary current (tapping mode)		BRT 1 
Increase welding current by an increment (see chapter "Setting the first increment in modes 4 and 14")		 Up
Reduce welding current by an increment (see chapter "Setting the first increment in modes 4 and 14")		 Down
Gas test	<b>4</b>	 BRT 2 > 3 s

## 5.2.9.3 Potentiometer torch (8-pole)








### NOTE

 The welding machine needs to be configured for operation with a potentiometer torch (see chap. "Configuring TIG potentiometer torch")

#### Potentiometer torch with one torch trigger:

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

#### Potentiometer torch with two torch triggers:

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

## 5.2.9.4 RETOX TIG torch (12-pole)

### NOTE



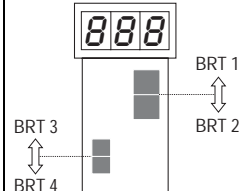
 For operation with this welding torch, the welding machine must be equipped with the retrofit option "ON 12POL RETOX TIG" (12-pole torch connection socket)!

Diagram	Operating elements	Explanation of symbols
		TT= torch trigger
Functions	Mode	Operating elements
Welding current on/off	1 (ex works)	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Increase welding current (up function)		TT 3
Reduce welding current (down function)		TT 4
Modes 2 and 3 are not used with this type of torch or, respectively, are not appropriate.		
Welding current on/off	4	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Raise welding current in stages (setting the first increment)		TT 3
Decrease welding current in stages (setting the first decrement)		TT 4
Switchover between Up-Down and JOB changeover		TT 2 (tapping)
Increase JOB number		TT 3
Decrease JOB number		TT 4
Welding current on/off	6	TT 1
Secondary current		TT 2
Secondary current (tapping function)		TT 1 (tapping)
Increase welding current, infinite adjustment (up function)		TT 3
Reduce welding current, infinite adjustment (down function)		TT 4
Switchover between Up-Down and JOB changeover		TT 2 (tapping)
Increase JOB number		TT 3
Decrease JOB number		TT 4

### 5.2.10 Setting the first increment

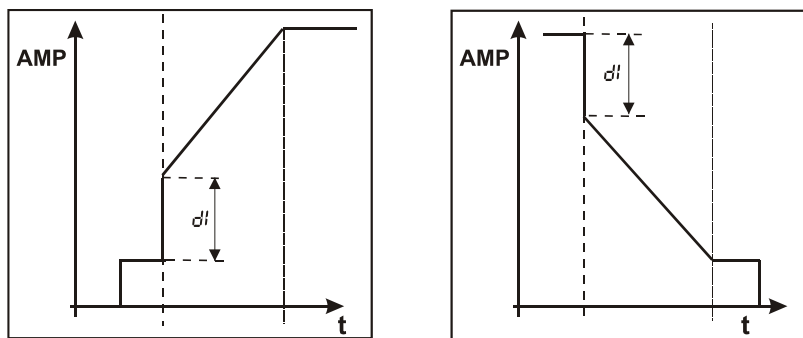


Figure 5-13

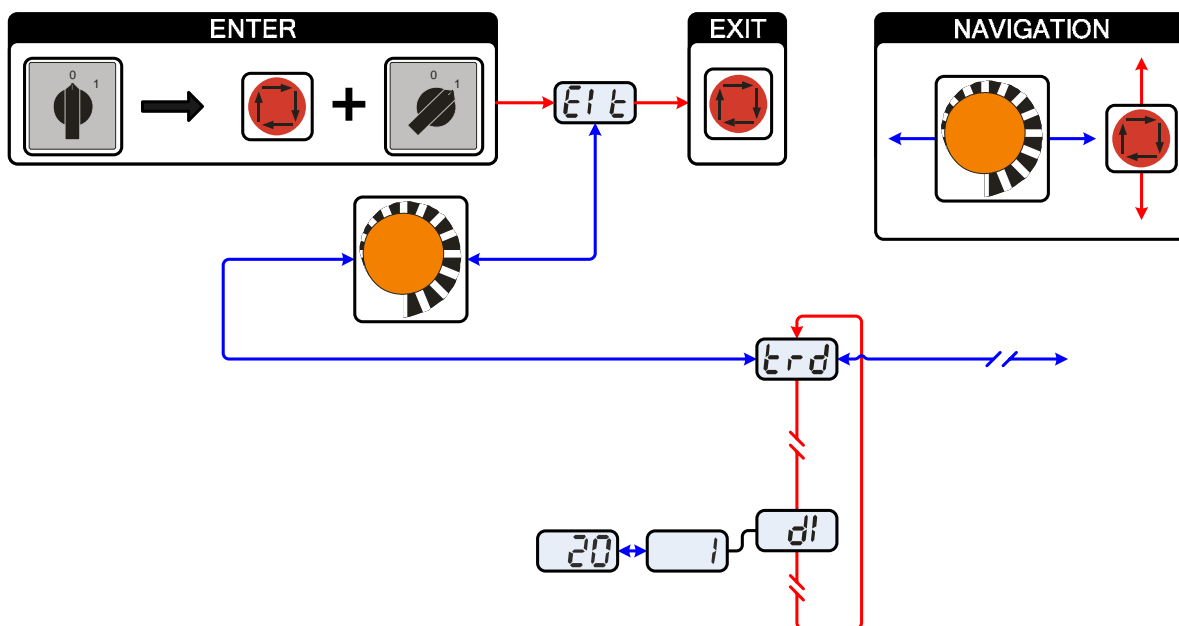


Figure 5-14







Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Torch configuration menu</b> Set welding torch functions
	<b>Setting the first increment</b> Setting: 1 to 20 (factory setting 1)

#### NOTE

This function is only available when using up/down torches in modes 4 and 14!

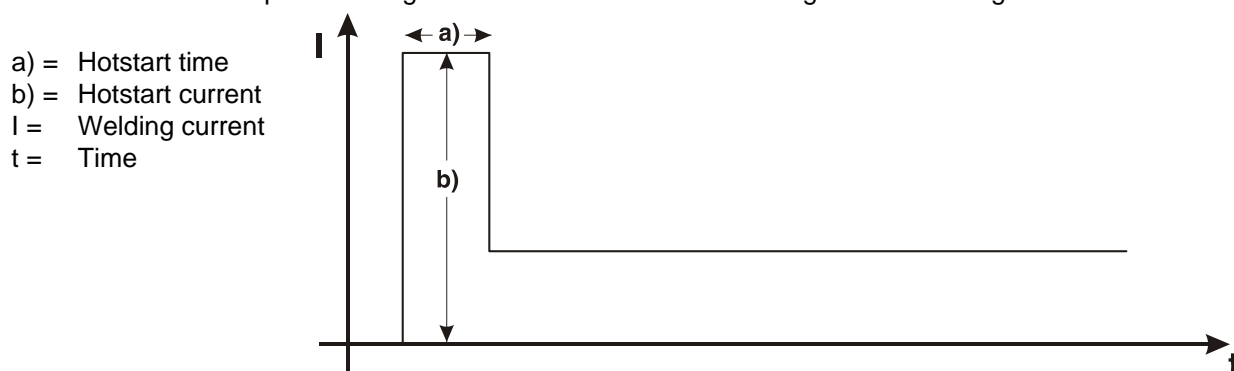
## 5.3 MMA welding

### 5.3.1 Selection and adjustment








Operating element	Action	Result	Displays
		Select MMA welding process The   signal light lights up in green	Display shows the last current value used for welding.
		Set welding current	Welding current is displayed.

### 5.3.2 Hotstart







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



#### 5.3.2.1 Hotstart current




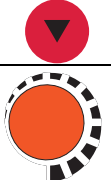


Operating element	Action	Result	Displays
		Select hotstart current welding parameter Press until hotstart current signal light  AMP% comes on	
		Set hotstart current The factory setting is a value as a percentage of the selected main current. To set an absolute value for the hotstart current, see chapter "Advanced settings".	

## 5.3.2.2 Hotstart time

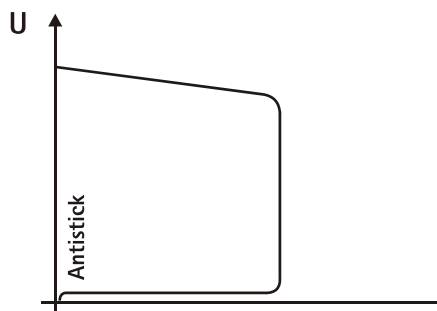
Operating element	Action	Result	Displays
		Select hotstart time welding parameter Press until hotstart time light ● sec comes on	
		Set hotstart time	

## 5.3.3 Arcforce

Shortly before the electrode threatens to stick, the arcforcing device sets an increased current designed to prevent the electrode sticking.

Operating element	Action	Result	Displays
		Select arcforcing welding parameter The ● signal light lights up in red	
		Set arcforcing -40 = low current increase > soft arc 0 = default setting +40 = high current increase > aggressive arc	

## 5.3.4 Antistick



**Anti-stick prevents the electrode from annealing.**

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

## 5.4 Key switch

### NOTE



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

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.

Key position 1 = All parameters can be set

Key position 0 = The following operating elements/functions cannot be changed:

- "Welding process" button
- Parameter values in the function sequence can be displayed but not changed

## 5.5 Remote control

### NOTE



**The remote control is operated on the 19-pole remote control connection socket.**

- If required, extension cables are available in different lengths (see chapter Accessories).
- 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.

### 5.5.1 Manual remote control RT 1



#### Functions

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

### 5.5.2 Manual remote control RTP 1



#### Functions

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

### 5.5.3 Manual remote control RTP 2



#### Functions

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

### 5.5.4 RTP 3 manual remote control



#### Functions

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



### 5.5.5 Foot-operated remote control RTF 1



#### Functions

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

**ActivArc welding is not possible in combination with the RTF 1 foot-operated remote control.**

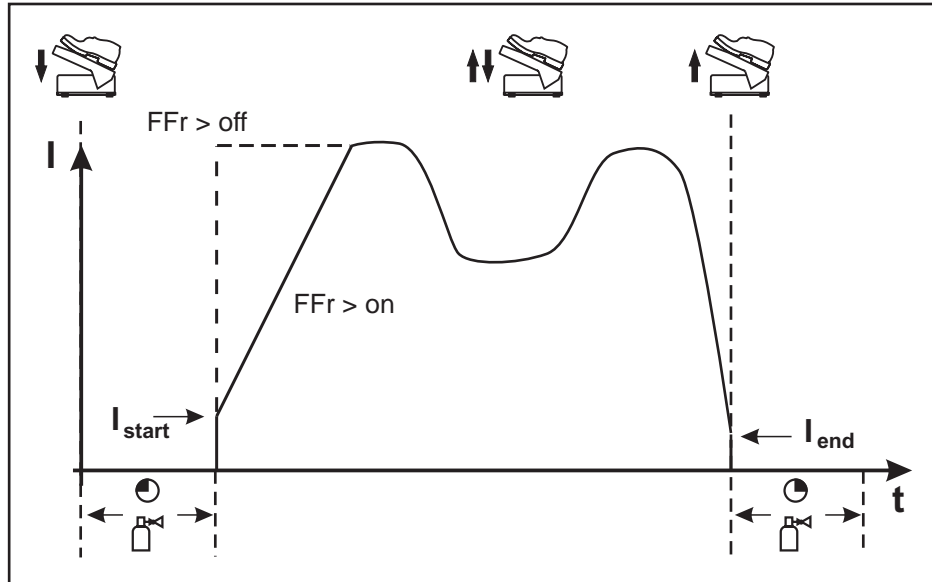


Figure 5-15

Symbol	Meaning
	Actuate foot-operated remote control (start welding process)
	Operate foot-operated remote control (set welding current according to application)
	Release foot-operated remote control (end welding process)
<b>FFr</b>	RTF ramp function
on	Welding current runs in a ramp function at the specified main current
off	Welding current goes immediately to the specified main current

#### NOTE



**The RTF ramp function can be switched on and off in the machine control sub-menu (see "Advanced settings > ramp function RTF" chapter).**

## 5.6 Interfaces for automation

### CAUTION



**Damage to the machine due to improper connection!**

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

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

### 5.6.1 TIG interface for mechanised welding

Pin	Signal shape	Designation		Diagram	
A	Output	PE	Connection for cable screen		X6
B	Output	REGaus	For servicing purposes only		B
C	Input	SYN_E	Synchronisation for master/slave operation		C
D	Input (no c.)	IGRO	Current flows signal I>0 (maximum load 20mA / 15V) 0V = welding current flowing		D
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 T320/1 in the welding machine. Contact open = welding current off		E
	Output				F
F	Output	0V	Reference potential		G
G	-	NC	Not assigned		H
H	Output	Uist	Actual welding voltage, measured on pin F, 0-10V (0V = 0V, 10V = 100V)		J
J		Vschweiss	Reserved for special purposes		K
K	Input	SYN_A	Synchronisation for master/slave operation		L
L	Input	Str/Stp	Start / stop welding current, same as torch trigger. Only available in non-latched operating mode. +15V = start, 0V = stop		M
M	Output	+15V	Voltage supply +15V, max. 75mA		N
N	Output	-15V	Voltage supply -15V, max. 25mA		P
P	-	NC	Not assigned		R
S	Output	0V	Reference potential		S
T	Output	list	Actual welding current, measured on pin F; 0-10V (0V = 0A, 10V = 1000A)		T
U		NC			U
V	Output	SYN_A 0V	Synchronisation for master/slave operation		V

### 5.6.2 Remote control connection socket, 19-pole

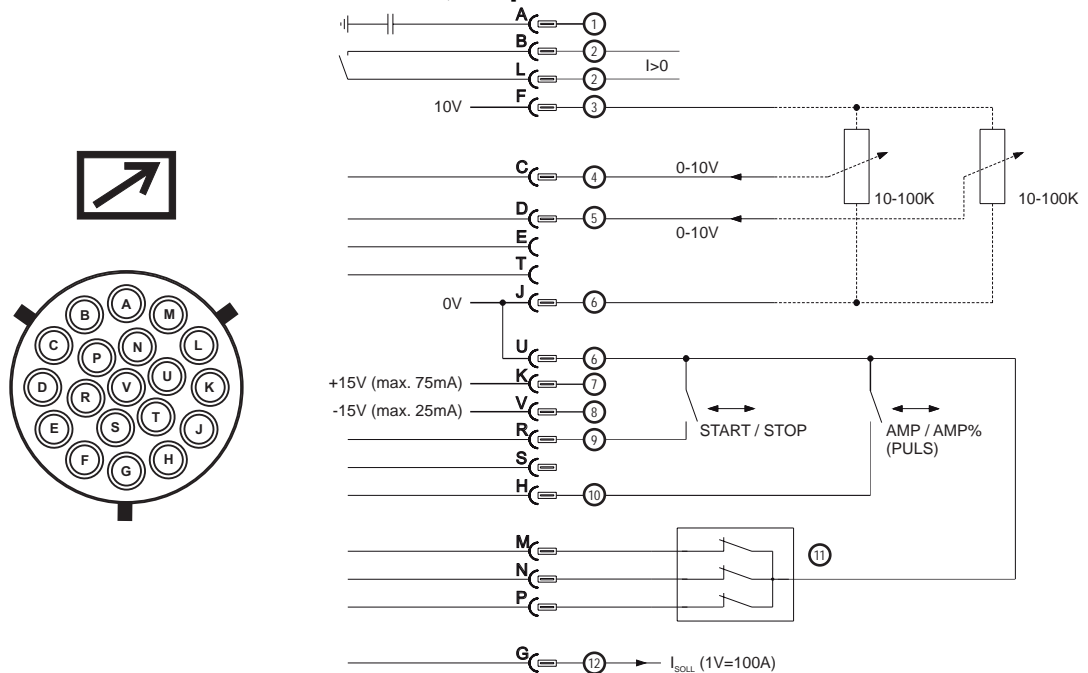


Figure 5-16

Pos.	Pin	Signal shape	Designation
1	A	Output	Connection for cable screen (PE)
2	B/L	Output	Current flows signal $I > 0$ , galvanically isolated (max. $\pm 15V/100mA$ )
3	F	Output	Reference voltage for potentiometer 10V (max. 10mA)
4	C	Input	Control value specification for main current, 0-10V ( $0V = I_{min}$ , $10V = I_{max}$ )
5	D	Input	Control value specification for secondary current, 0-10V ( $0V = I_{min}$ , $10V = I_{max}$ )
6	J/U	Output	Reference 0V
7	K	Output	Power supply +15V, max. 75mA
8	V	Output	Power supply -15V, max. 25mA
9	R	Input	Start/Stop welding current
10	S	Input	Switching between MMA and TIG welding
11	H	Input	Switching between main and secondary welding currents (pulses)
12	M/N/P	Input	Activation of control voltage specification Set all 3 signals to reference potential 0V to activate external control voltage specification for main and secondary currents
13	G	Output	Measured value $I_{SETPOINT}$ (1V = 100A)

5.7 Advanced settings

5.7.1 Setting slope times for secondary current AMP% or pulse edges

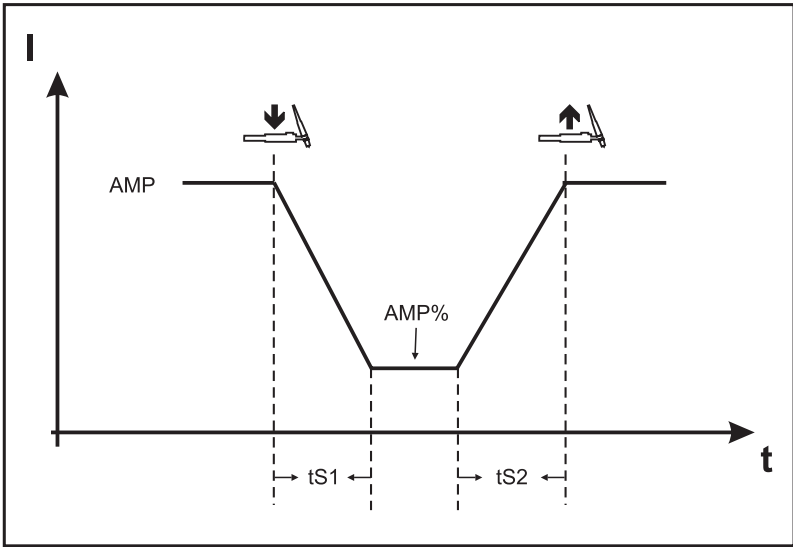


Figure 5-17

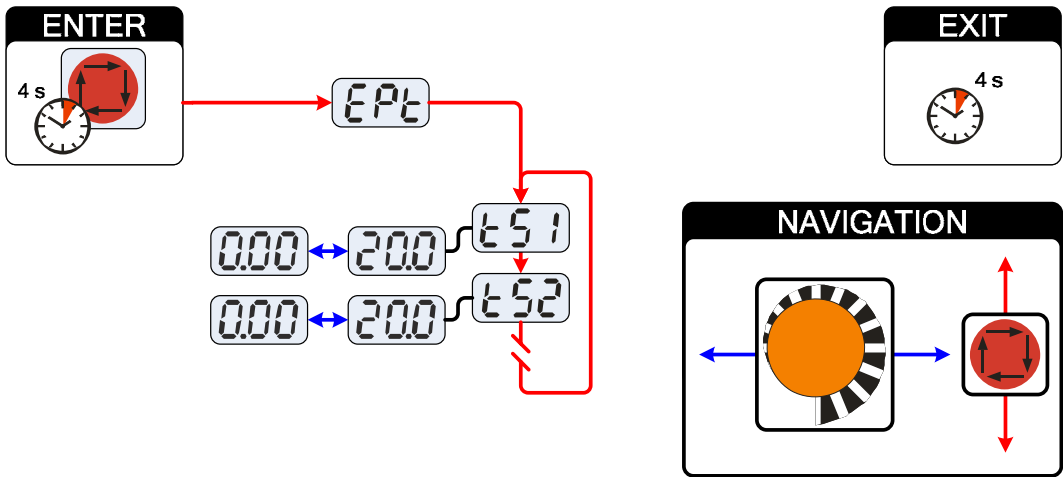


Figure 5-18

Display	Setting/selection
EPt	Expert menu
tS1	Slope time tS1 (main current to secondary current) Setting: 0.00 s to 20.0 s (factory setting 0.01 s)
tS2	Slope time tS2 (secondary current to main current) Setting: 0.00 s to 20.0 s (factory setting 0.01 s)

### 5.7.2 TIG non-latched operating mode, C version

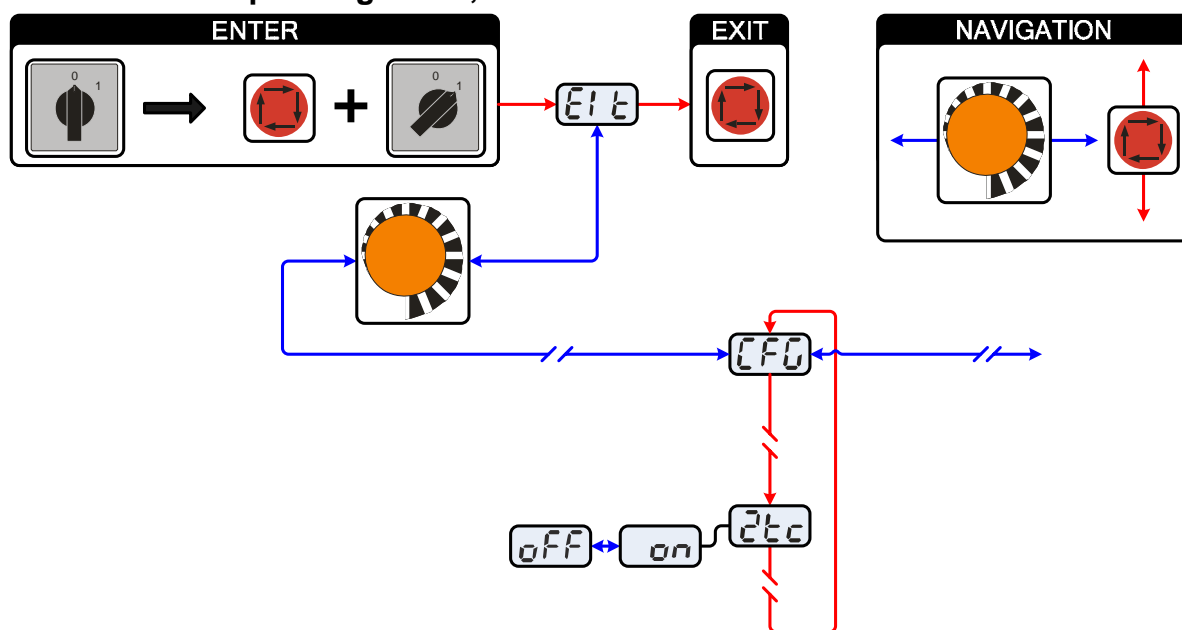



Figure 5-19

Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Machine configuration</b> Settings for machine functions and parameter display
	<b>Non-latched operation (C version)</b> <ul style="list-style-type: none"> <li>on = on</li> <li>off = off (factory setting)</li> </ul>

5.7.3 Configuring the TIG potentiometer torch connection



**DANGER**

**Risk of injury due to electrical voltage after switching off!**  
**Working on an open machine can lead to fatal injuries!**  
**Capacitors are loaded with electrical voltage during operation. Voltage remains present for up to two minutes after the mains plug is removed.**


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



**WARNING**

**Risk of accidents if these safety instructions are not observed!**  
**Non-observance of these safety instructions is potentially fatal!**

- Carefully read the safety information in this manual!
- Observe the accident prevention regulations in your country.
- Inform persons in the working area that they must observe the regulations!



**CAUTION**

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

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

When connecting a potentiometer torch, jumper JP27 on PCB T320/1 inside the welding machine should be unplugged.

Welding torch configuration	Setting
Prepared for TIG standard or up/down torch (factory setting)	<input checked="" type="checkbox"/> JP27
Prepared for potentiometer torches	<input type="checkbox"/> JP27

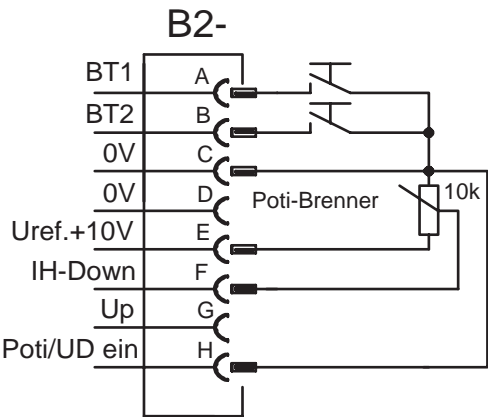


Figure 5-20

## 5.7.4 Welding current display (ignition, secondary, end and hotstart currents)

The welding currents for secondary current, ignition current and end current (expert menu) can be displayed as percentages (factory setting) or absolute values on the machine display.

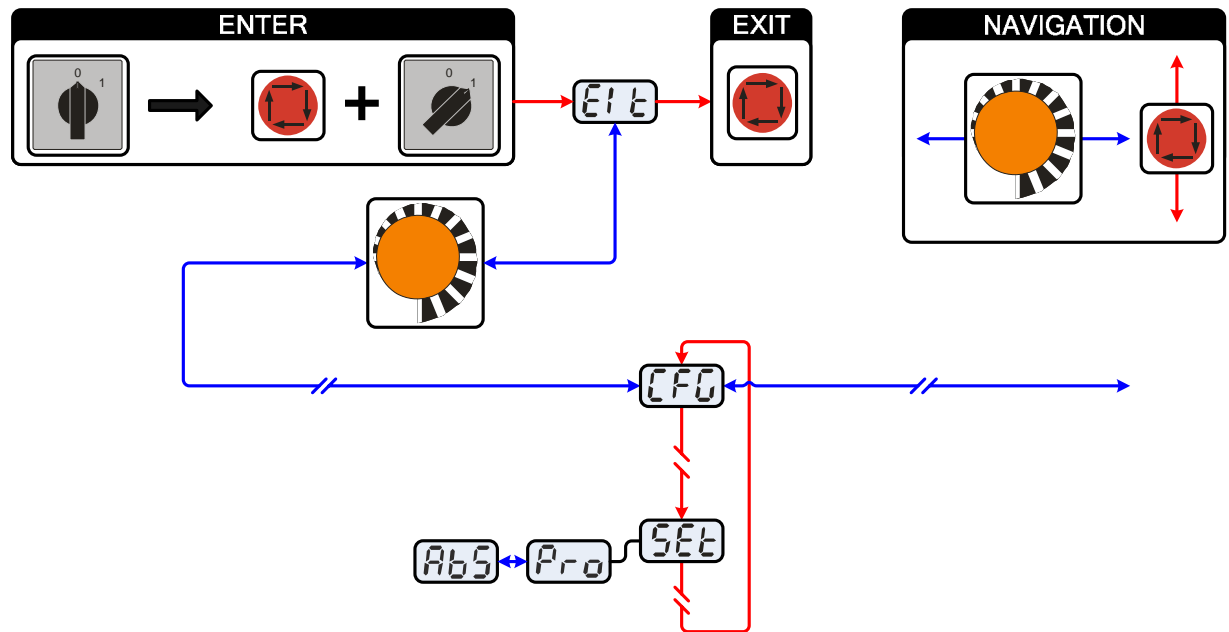


Figure 5-21

Display	Setting/selection
Elt	<b>Exit the menu</b> Exit
CFD	<b>Machine configuration</b> Settings for machine functions and parameter display
Set	<b>Welding current display (ignition, secondary, end and hotstart currents)</b> <ul style="list-style-type: none"> <li>Pro = welding current display as a percentage of the main current (factory setting)</li> <li>Abs = absolute welding current display</li> </ul>

### 5.7.5 Ramp function foot-operated remote control RTF 1

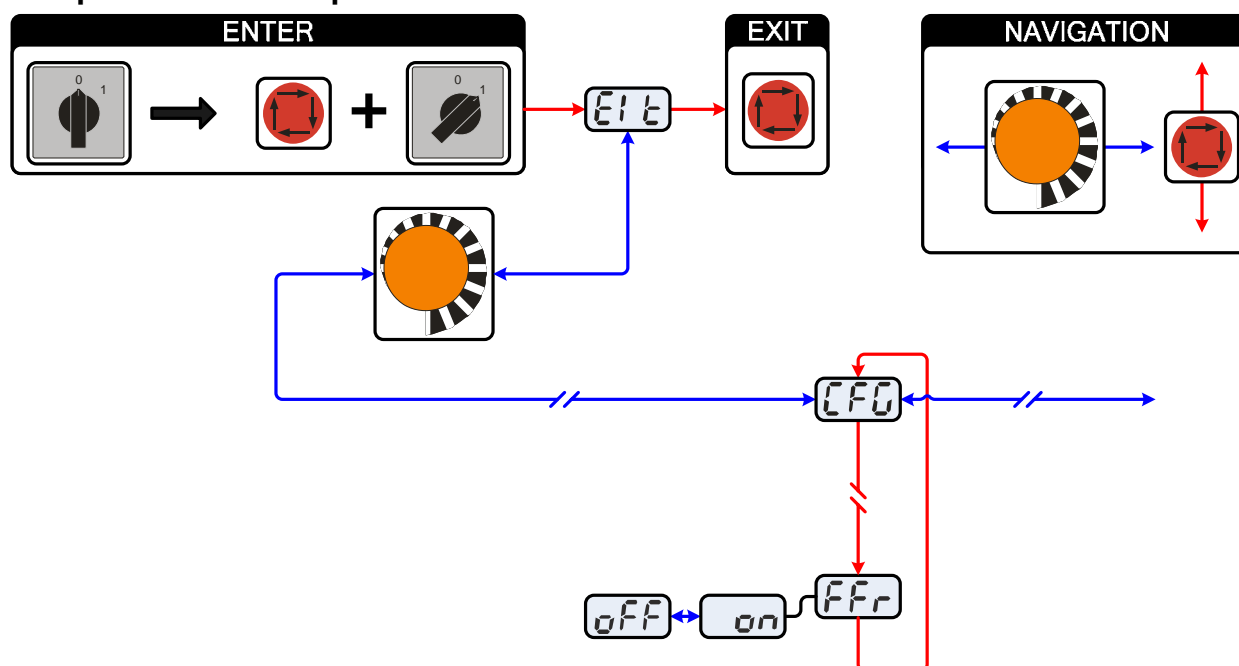







Figure 5-22

Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Machine configuration</b> Settings for machine functions and parameter display
	<b>Ramp function Remote control RTF 1</b> The ramp function can be switched on and off
	<b>Switch on</b> Switching on machine function
	<b>Switch off</b> Switching off machine function



## 5.8 Menus and sub-menus on the machine control

### 5.8.1 Direct menus (direct access to parameters)

Functions, parameters and their values can be accessed directly, e.g. can be selected by pressing a button once.

### 5.8.2 Expert menu (TIG)

The expert menu includes functions and parameters which are either not set on the machine control, or which do not require regular setting.

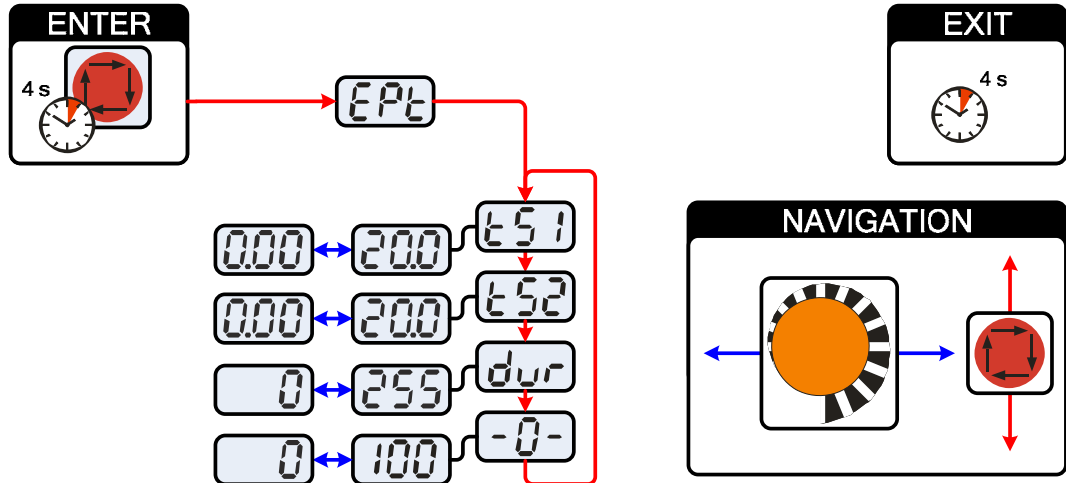


Figure 5-23

Display	Setting/selection
<b>EPl</b>	<b>Expert menu</b>
<b>tS1</b>	<b>Slope time tS1 (main current to secondary current)</b> Setting: 0.00 s to 20.0 s (factory setting 0.01 s)
<b>tS2</b>	<b>Slope time tS2 (secondary current to main current)</b> Setting: 0.00 s to 20.0 s (factory setting 0.01 s)
<b>dur</b>	<b>Wire return</b> <ul style="list-style-type: none"> <li>• Increase value = more wire return</li> <li>• Reduce value = less wire return</li> </ul> Parameter can also be set after connecting a TIG cold wire feed unit. Setting: 0 to 255 (factory setting 50).
<b>-0-</b>	<b>activArc parameter</b> Parameter can also be set after activating TIG activArc welding. Display shown = factory setting.

### NOTE



#### ENTER (enter the menu)

- Keep the "welding parameters" button pressed for 4 s.

#### Navigating in the menu

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

#### EXIT (leave the menu)

- After 4 s, the machine will return automatically to the ready-to-operate status.

## 5.8.3 Machine configuration menu

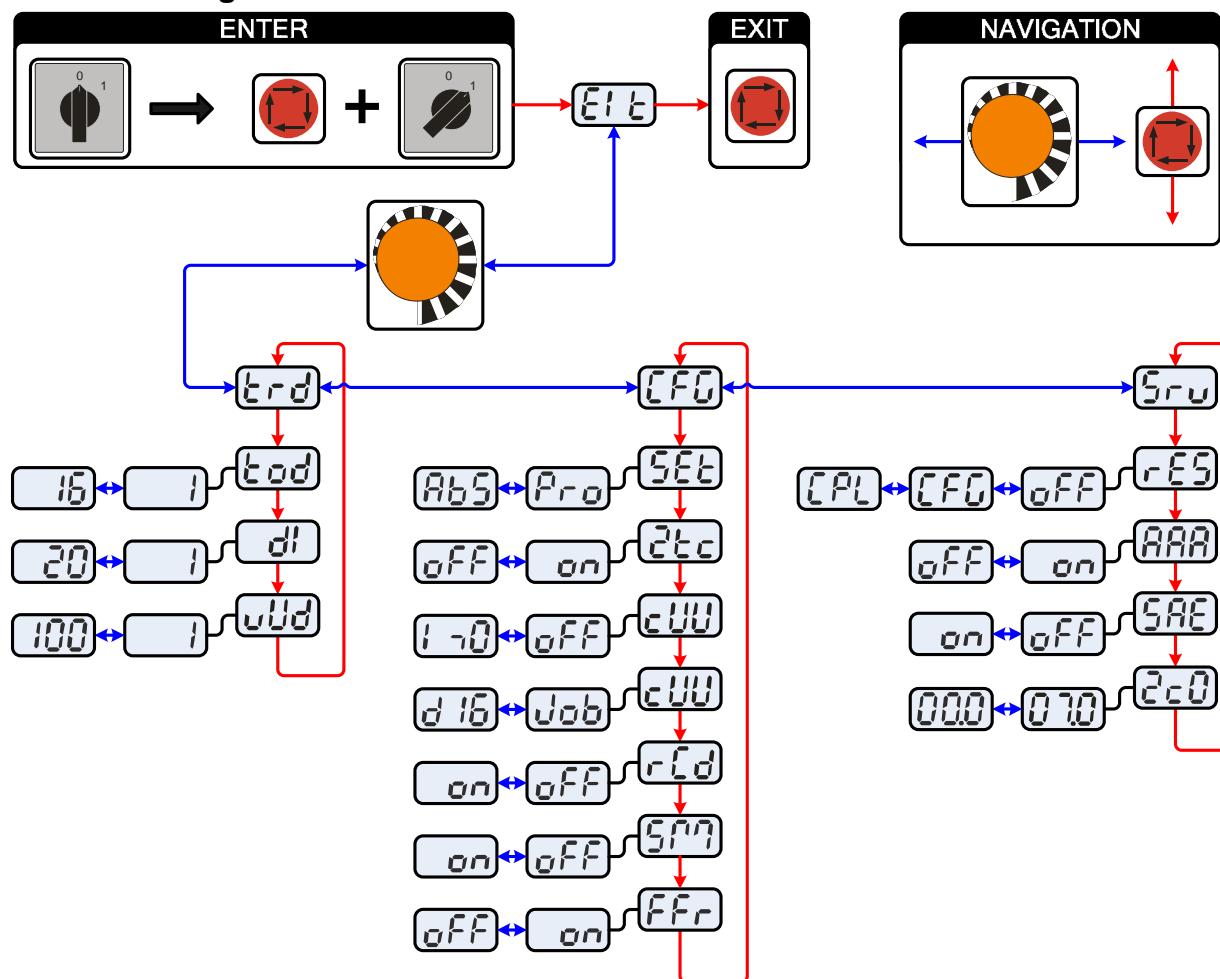


Figure 5-24

### NOTE



#### ENTER (enter the menu)








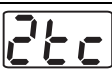








- Switch off machine at the main switch
- Press and hold the "welding parameters" button and switch the machine on again at the same time.

#### NAVIGATION (navigating in the menu)

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




#### EXIT (leave the menu)

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

Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Torch configuration menu</b> Set welding torch functions
	<b>Torch mode</b> <ul style="list-style-type: none"> <li>Modes 1-6: with tapping function (factory setting 1)</li> <li>Modes 11-16: without tapping function</li> </ul>
	<b>Setting the first increment</b> Setting: 1 to 20 (factory setting 1)
	<b>Up-/Down speed (not available in modes 4 and 14)</b> <ul style="list-style-type: none"> <li>Increase value = rapid current change (factory setting 10)</li> <li>Reduce value = slow current change</li> </ul>
	<b>Machine configuration</b> Settings for machine functions and parameter display
	<b>Welding current display (ignition, secondary, end and hotstart currents)</b> <ul style="list-style-type: none"> <li>Pro = welding current display as a percentage of the main current (factory setting)</li> <li>Abs = absolute welding current display</li> </ul>
	<b>Non-latched operation (C version)</b> <ul style="list-style-type: none"> <li>on = on</li> <li>off = off (factory setting)</li> </ul>
	<b>TIG cold wire welding, operating mode</b> <ul style="list-style-type: none"> <li>l&gt;0 = cold wire mode for automated applications, wire is conveyed when current flows</li> <li>2t to 4t = operating mode non-latched to latched</li> <li>off = cold wire is turned off, wire electrode is not conveyed (factory setting)</li> </ul>
	<b>TIG cold wire welding, wire electrode diameter</b> Not required with TIG welding (manual). <ul style="list-style-type: none"> <li>JOB = diameter of the wire electrode will be taken from the previously selected JOB (factory setting)</li> <li>dx = wire thickness 0.6 to 1.6 mm</li> </ul>
	<b>Power display switching (MMA)</b> <ul style="list-style-type: none"> <li>on = actual value display</li> <li>off = setpoint value display (factory setting)</li> </ul>
	<b>spotMatic</b> Variation of operation mode spotArc, ignition with workpiece contact <ul style="list-style-type: none"> <li>on = on</li> <li>off = off (factory setting)</li> </ul>
	<b>Ramp function Remote control RTF 1</b> The ramp function can be switched on and off
	<b>Service menu</b> Modifications to the service menu may only be carried out by authorised maintenance staff!
	<b>Reset (reset to factory settings)</b> <ul style="list-style-type: none"> <li>off = aus (factory setting)</li> <li>CFG = Reset the values in the machine configuration menu</li> <li>CPL = Complete reset of all values and settings</li> </ul> The reset is performed when leaving the menu (EXIT).
	<b>activArc voltage measuring</b> <ul style="list-style-type: none"> <li>on = function on (factory setting)</li> <li>off = function off</li> </ul>

# Functional characteristics

Menus and sub-menus on the machine control

Display	Setting/selection
	<b>Error output to mechanised welding interface, contact SYN_A</b> <ul style="list-style-type: none"><li>• on = function on</li><li>• off = function off (factory setting)</li></ul>
	<b>Software version query (example)</b> 07=        System bus ID 02c0=    Version number System bus ID and version number are separated by a dot.
	

## 6 Commissioning

### 6.1 General

#### **DANGER**



**Risk of injury from electric shock!**

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

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

#### **CAUTION**



**Risk of burns on the welding current connection!**

**If the welding current connections are not locked, connections and leads heat up and can cause burns, if touched!**

- Check the welding current connections every day and lock by turning in clockwise direction, if necessary.

#### **CAUTION**



**Using protective dust caps!**

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

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

### 6.2 Installation

#### **CAUTION**



**Installation site!**

**The machine must not be operated in the open air and must only be set up and operated on a suitable, stable and level base!**

- The operator must ensure that the ground is non-slip and level, and provide sufficient lighting for the place of work.
- Safe operation of the machine must be guaranteed at all times.

### 6.3 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.

## 6.4 Area of application – proper usage



### WARNING



#### Hazards due to improper usage!

**Hazards may arise for persons, animals and material objects if the equipment is not used correctly. No liability is accepted for any damages arising from improper usage!**

- The equipment must only be used in line with proper usage and by trained or expert staff!
- Do not modify or convert the equipment improperly!

### CAUTION



#### Damage due to the use of non-genuine parts!

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

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

These welding machines are only suitable for

- TIG direct current welding with HF or Liftarc ignition and
- MMA direct current welding.

## 6.5 Workpiece lead, general



### CAUTION



#### Risk of burns due to incorrect connection of the workpiece lead!

**Paint, rust and dirt on the connection restrict the power flow and may lead to stray welding currents.**

**Stray welding currents may cause fires and injuries!**

- Clean the connections!
- Fix the workpiece lead securely!
- Do not use structural parts of the workpiece as a return lead for the welding current!
- Take care to ensure faultless power connections!

## 6.6 Mains connection

### **DANGER**



**Hazard caused by improper mains connection!**

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

- Only use machine with a plug socket that has a correctly fitted protective conductor.
- If a mains plug must be fitted, this may only be carried out by an electrician in accordance with the relevant national provisions or regulations (any phase sequence for three-phase machines)!
- Mains plug, socket and lead must be checked regularly by an electrician!

### 6.6.1 Mains configuration

#### **NOTE**



The machine may be connected to TN, TT or IT networks with a protective conductor (as available).

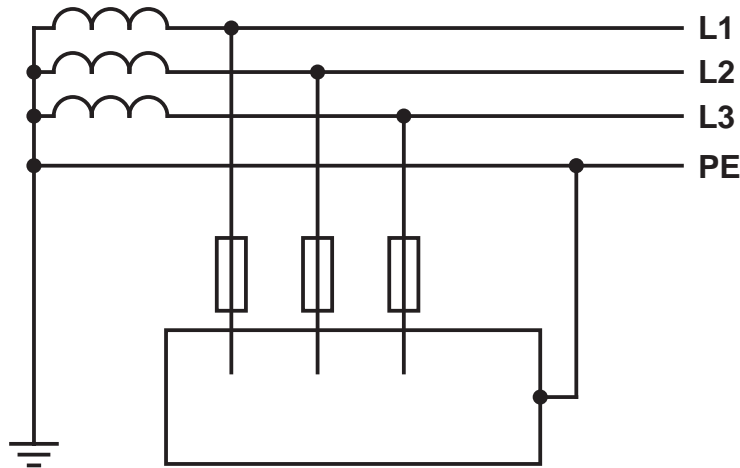


Figure 6-1

#### Legend

Item	Designation	Colour code
L1	Outer conductor 1	black
L2	Outer conductor 2	brown
L3	Outer conductor 3	grey
PE	Protective conductor	green-yellow

### **CAUTION**



**Operating voltage - mains voltage!**

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

- For mains fuse protection, please refer to the "Technical data" chapter!

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

## 6.7 Welding torch cooling system

### 6.7.1 General

#### CAUTION



##### Coolant mixtures!

**Mixtures with other liquids or the use of unsuitable coolants result in material damage and renders the manufacturer's warranty void!**

- Only use the coolant described in this manual (overview of coolants).
- Do not mix different coolants.
- When changing the coolant, the entire volume of liquid must be changed.



##### Insufficient frost protection in the welding torch coolant!

**Depending on the ambient conditions, different liquids are used for cooling the welding torch (see overview of coolants).**

**Coolants with frost protection (KF 37E or KF 23E) must be checked regularly to ensure that the frost protection is adequate to prevent damage to the machine or the accessory components.**

- The coolant must be checked for adequate frost protection with the TYP 1 frost protection tester (see accessories).
- Replace coolant as necessary if frost protection is inadequate!

#### NOTE



**The disposal of coolant must be carried out according to official regulations and observing the relevant safety data sheets (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.

### 6.7.2 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



### 6.7.3 Adding coolant

The unit is supplied ex works with a minimum level of coolant.

#### NOTE



**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.

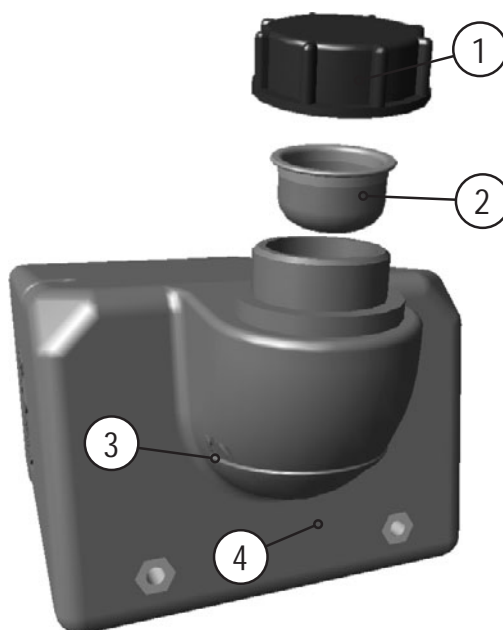


Figure 6-2

Item	Symbol	Description
1		Coolant tank cap
2		Coolant filter sieve
3		"Min" mark Minimum coolant level
4		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.

#### NOTE



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

## 6.8 TIG welding

### 6.8.1 Welding torch connection

The TIG welding torch is to be equipped to suit the relevant welding task!

- Fit suitable tungsten electrodes and
- an appropriate shielding gas nozzle.
- Observe the operating instructions for the TIG welding torch!

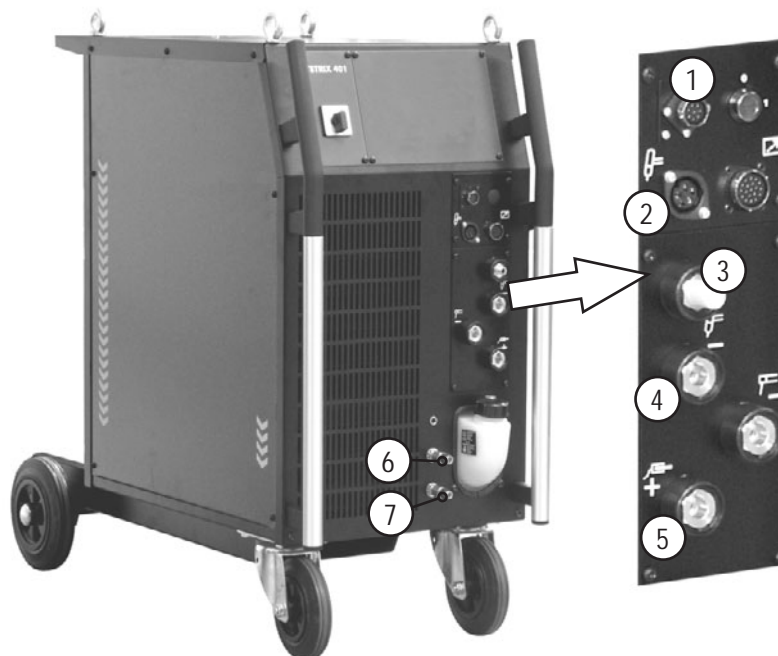








Figure 6-3

Item	Symbol	Description
1		<b>Connection socket, 8-pole / 12-pole</b> 8-pole: TIG Up/Down or potentiometer torch control lead 12-pole: Control lead for TIG up/down torch with LED display (option)
2		<b>Connection socket, 5-pole</b> Standard TIG torch control lead
3		<b>G<math>\frac{1}{4}</math>\" connecting nipple, “-” welding current</b> Shielding gas connection (with yellow insulating cap) for TIG welding torch
4		<b>Connection socket, “-” welding current</b> TIG welding torch connection
5		<b>Connection socket, “+” welding current</b> Connection for workpiece lead
6		<b>Rapid-action closure coupling, red (coolant return)</b>
7		<b>Rapid-action closure coupling, blue (coolant supply)</b>

- Insert the welding current plug on the welding torch into the welding current connection socket and lock by turning to the right.
- Screw welding torch shielding gas connection tightly onto the G $\frac{1}{4}$ " connection nipple, welding current "-".
- Insert the welding torch control lead plug into the connection socket for the welding torch control lead (5-pole with standard torch, 8-pole with up/down or potentiometer torch and 12-pole with up/down torch with LED display) and tighten.
- Lock connecting nipples of the cooling water tubes into the corresponding rapid-action closure couplings:  
Return line red to rapid-action coupling red (coolant return line) and supply line blue to rapid-action coupling blue (coolant supply line).

### 6.8.2 Connection for workpiece lead

- Insert the cable plug on the work piece lead into the "+" welding current connection socket and lock by turning to the right.

### 6.8.3 Torch connection options and pin assignments

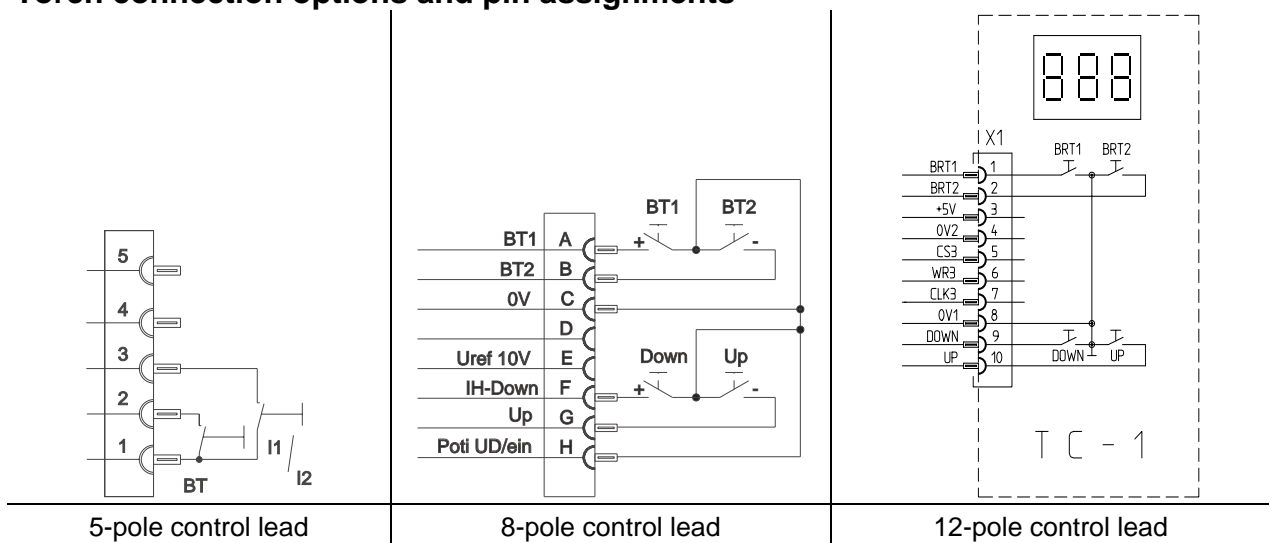


Figure 6-4

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

#### **WARNING**



#### **Incorrect handling of shielding gas cylinders!**

**Incorrect handling of shielding gas cylinders can result in serious and even fatal injury.**

- Observe the instructions from the gas manufacturer and in any relevant regulations concerning the use of compressed air!
- Place shielding gas cylinders in the holders provided for them and secure with fixing devices.
- Avoid heating the shielding gas cylinder!

#### **CAUTION**



#### **Faults in the shielding gas supply.**

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

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

## 6.8.4.1 Connecting the shielding gas supply

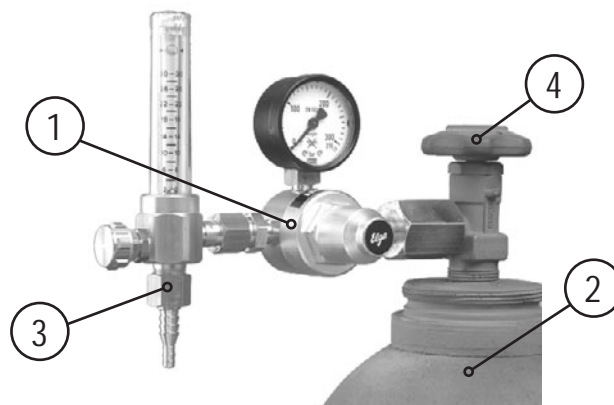



Figure 6-5

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

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

### NOTE

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

- Tighten the pressure reducer screw connection on the gas bottle valve to be gas-tight.
- Screw gas hose connection crown nut onto the output side of 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).

#### 6.8.4.2 Setting the shielding gas quantity



#### CAUTION



##### Electric shocks!

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

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

#### NOTE



##### Rule of thumb for the gas flow rate:

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

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



##### Incorrect shielding gas setting!

**If the shielding gas setting is too low or too high, this can introduce air to the weld pool and may cause pores to form.**

- Adjust the shielding gas quantity to suit the welding task!

- Slowly open the gas cylinder valve.  
Conduct a gas test (see chapter "Function specification / gas test")
- Set the required amount of shielding gas on the pressure reducer, about 4 - 15 l/min depending on the current strength and the material.

### 6.9 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.



#### CAUTION



##### Shielding gas connection!

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

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

6.9.1 Connecting the electrode holder and workpiece lead

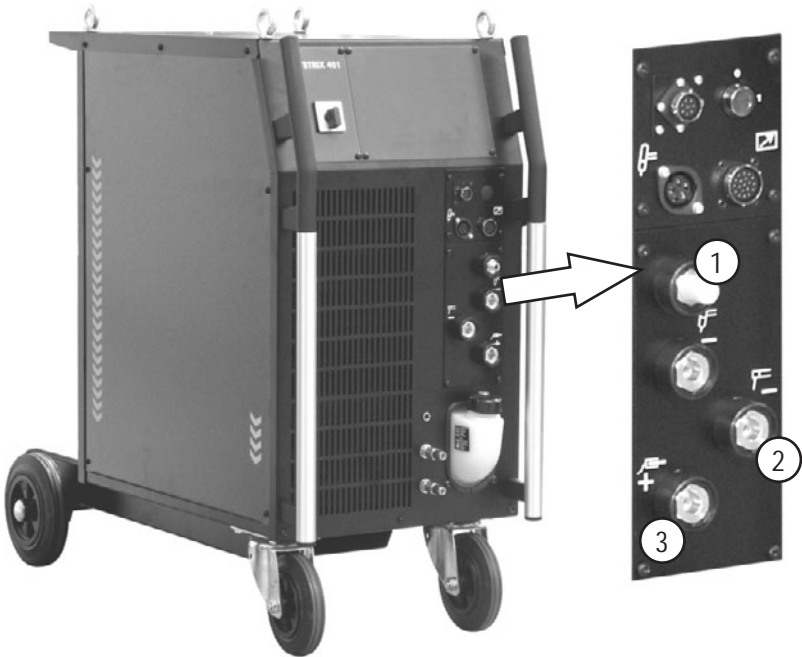


Figure 6-6

Item	Symbol	Description
1		<b>G1/4" connecting nipple, "-" welding current</b> Shielding gas connection (with yellow insulating cap) for TIG welding torch
2		<b>Connection socket, "-" welding current</b> Electrode holder connection
3		<b>Connection socket, "+" welding current</b> Connection for workpiece lead

- 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.

**NOTE**



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

## 6.10 PC interface

### CAUTION



Equipment damage or faults may occur if the PC is connected incorrectly!  
Not using the SECINT X10USB interface results in equipment damage or faults in signal transmission. The PC may be destroyed due to high frequency ignition pulses.

- Interface SECINT X10USB must be connected between the PC and the welding machine!
- The connection must only be made using the cables supplied (do not use any additional extension cables)!

### NOTE



Please note the relevant documentation of the accessory components.

## 7 Maintenance and testing

### NOTE



The maintenance, cleaning and testing work described below must be conducted correctly and on an annual basis in order to qualify for claims under the EWM warranty.

### 7.1 General

When used in the specified environmental conditions and under normal operating conditions, this machine is largely maintenance-free and requires a minimum of care.

There are some points, which 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 pollution level of the environment and the length of time the unit is in use.

### NOTE



The welding machine may only be cleaned, tested and repaired by competent, capable persons!

A capable person is one who, because of his training, knowledge and experience, is able to recognise the dangers that can occur while testing welding power sources as well as possible subsequent damage and who is able to implement the required safety procedures.

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



### DANGER



**Risk of injury from electric shock!**

**Cleaning machines that are not disconnected from the mains can lead to serious injuries!**

- Disconnect the machine completely from the mains.
- Remove the mains plug!
- Wait for 2 minutes until the capacitors have discharged.

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 clean them with a vacuum cleaner instead.

Coolant: Check for impurities and replace if necessary.

### NOTE



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



## 7.3 Test

### NOTE



**Additional machines and add-on parts (e.g. cooling units, wire feed devices, welding torches,...) should be tested together with the welding power source.**

Some points, such as: insulation and protective conductor resistance, can be tested directly at the same time and it can be ensured that the total leakage current from the welding power source, additional machines and add-on parts does not exceed the limits.

For this reason, the full process of testing the welding power source is described below. If additional machines or add-on parts are tested individually, the test points are to be adjusted if necessary (e.g. no open circuit voltage measurement).

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 not only an international standard but is also specific to arc welding equipment.

### NOTE



**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

### NOTE



**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.

### NOTE



**The following description of the test is only a brief overview of the points to be tested.  
For details about 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

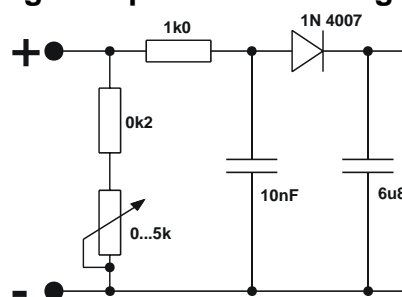
- a) Visual inspection
- b) Electrical test: measurement of
  - open circuit voltage
  - insulation resistance, or alternatively
  - leakage currents
  - protective conductor resistance
- c) Functional test
- d) Documentation

### 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



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

*Measuring circuit according to  
DIN EN 60974-1*

### 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 M $\Omega$
Welding current circuit and electronics	against	Protective conductor circuit (PE)	2.5 M $\Omega$
Mains current circuit	against	Protective conductor circuit (PE)	2.5 M $\Omega$

### 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 50/60 Hz. 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.

#### NOTE



**For these measurements, the welding machine must be switched on and supplying open circuit voltage!**

1. Protective conductor current: < 5 mA
2. Leakage current from the welding sockets separately to PE: < 10 mA

### 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  $0.3\Omega$  up to 5m in length. For longer leads, the permissible value increases by  $0.1\Omega$  per 7.5m of lead. The maximum permissible value is  $1\Omega$ .

### 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 warranty is void. In all service matters, always consult the dealer who supplied the machine. Return deliveries of defective equipment subject to warranty may only be made through your dealer. When replacing parts, use only original spare parts. When ordering spare parts, please quote the machine type, serial number and item number of the machine, as well as the type designation and item number of the spare part.

<b>We hereby certify that we have correctly followed the above-mentioned servicing and maintenance guidelines and the above-mentioned repetition test conforming to E VDE 0544 207.</b>	
<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>	<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>
<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>	<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>
<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>	<div>Date / Stamp / Signature</div> <div>Date of next repetition test</div>

## 7.5 Disposing of equipment

### NOTE



#### Proper disposal!

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

- Do not dispose of in household waste!
- Observe the local regulations regarding disposal!



### 7.5.1 Manufacturer's declaration to the end user

- According to European provisions (guideline 2002/96/EG of the European Parliament and the Council of January, 27th 2003), used electric and electronic equipment may no longer be placed in unsorted municipal waste. It must be collected separately. The symbol depicting a waste container on wheels indicates that the equipment must be collected separately.  
This machine is to be placed for disposal or recycling in the waste separation systems provided for this purpose.
- According to German law (law governing the distribution, taking back and environmentally correct disposal of electric and electronic equipment (ElektroG) from 16.03.2005), used machines are to be placed in a collection system separate from unsorted municipal waste. The public waste management utilities (communities) have created collection points at which used equipment from private households can be disposed of free of charge.
- Information about giving back used equipment or about collections can be obtained from the respective municipal administration office.
- EWM participates in an approved waste disposal and recycling system and is registered in the Used Electrical Equipment Register (EAR) under number WEEE DE 57686922.
- In addition to this, returns are also possible throughout Europe via EWM sales partners.

## 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](http://www.ewm.de).

#### NOTE



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

## 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

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

### 9.1 Error messages (power source)

#### NOTE



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

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

Error message	Possible cause	Remedy
Err 3	Speedometer error	Check wire guide/tube package
	Wire feed unit not connected	<ul style="list-style-type: none"> <li>• Switch off cold wire mode in the device configuration menu (off status)</li> <li>• Connect wire feed unit</li> </ul>
Err 4	Temperature error	Allow machine to cool down.
	Error in emergency stop circuit (interface for mechanised welding)	<ul style="list-style-type: none"> <li>• Check the external shut-down equipment</li> <li>• Check plug-in jumper JP 1 on PCB T320/1</li> </ul>
Err 5	Overvoltage	Switch off the machine and check mains voltages
Err 6	Undervoltage	
Err 7	Coolant error (only if cooling module connected)	Check coolant level and refill if necessary
Err 8	Gas error	Check gas supply
Err 9	Secondary overvoltage	Switch the machine off and on again. If the error persists, inform the service dept.
Err 10	PE error	
Err 11	FastStop position	Edge "Acknowledge error" signal (0 to 1) via robot interface (if available)
Err 51	Error in emergency stop circuit (interface for mechanised welding)	<ul style="list-style-type: none"> <li>• Check the external shut-down equipment</li> <li>• Check plug-in jumper JP 1 on PCB T320/1</li> </ul>





9.3 Display machine control software version

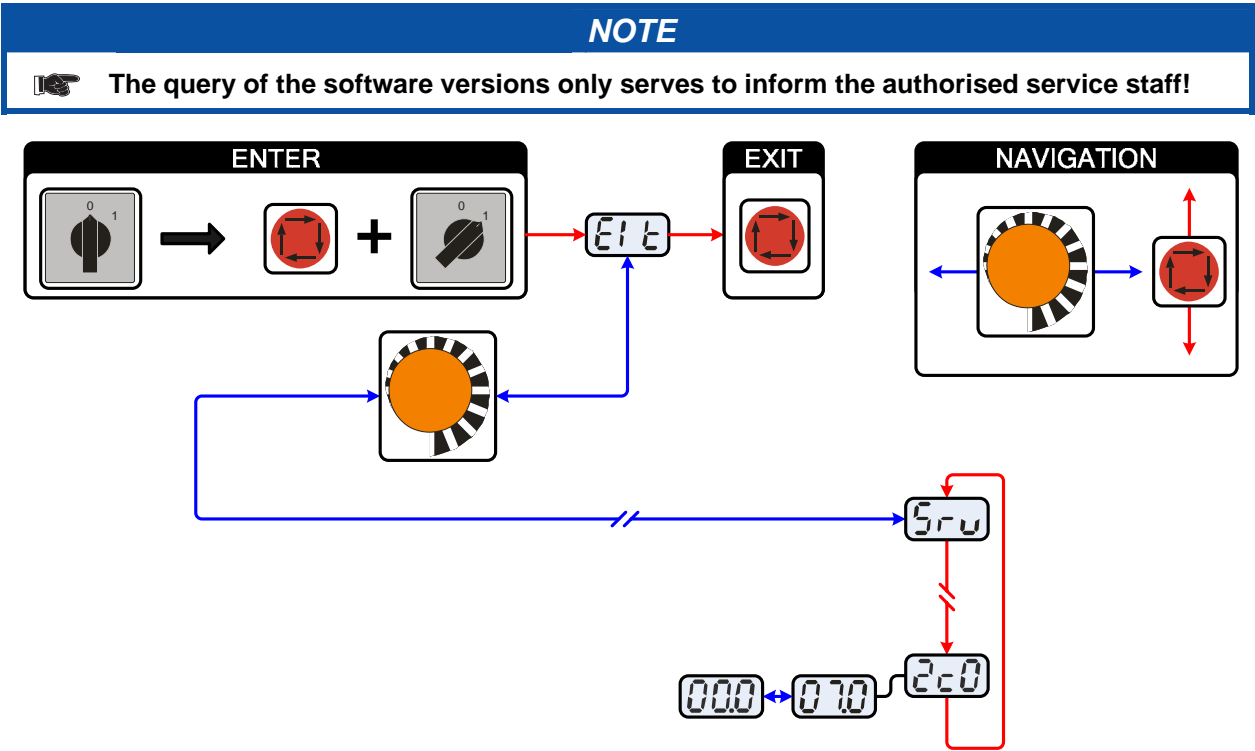


Figure 9-2

Display	Setting/selection
	<b>Exit the menu</b> Exit
	<b>Service menu</b> Modifications to the service menu may only be carried out by authorised maintenance staff!
	<b>Software version query (example)</b> 07= System bus ID 02c0= Version number System bus ID and version number are separated by a dot.

## 9.4 General operating problems

Problem	Possible cause > remedy
Machine control without displaying the signal lights after switching on	<ul style="list-style-type: none"> <li>Phase failure &gt; check mains connection (fuses)</li> </ul>
no welding performance	<ul style="list-style-type: none"> <li>Phase failure &gt; check mains connection (fuses)</li> </ul>
various parameters cannot be set	<ul style="list-style-type: none"> <li>Entry level is blocked &gt; disable access lock (see chapter entitled "key switch")</li> </ul>

### 9.4.1 Interface for mechanised welding



#### WARNING



**No function of the external shut-down devices (emergency stop switch)!**

If the emergency stop circuit has been realised using an external shut-down device via the interface for mechanised welding, the device must be set for this setup. If this is not observed, the power source will ignore the external shut-down devices and will not shut down!

- Disconnect jumper 1 on PCB T320/1 (TETRIX) or M320/1 (PHOENIX)!

## 10 Accessories, options

### 10.1 Welding torch, electrode holder and workpiece lead

#### 10.1.1 TETRIX 301

Type	Designation	Item no.
TIG 260 WD 4M 5P 2T	TIG welding torch, 4m, water-cooled, double pressure	094-010990-00600
TIG 260 WD 4M 8P 2T UD	TIG welding torch, 4m, water-cooled, double pressure, U/D	094-010989-00000
TIG 260 WD 4M 12P RETOX HFL	TIG welding torch, 4 m, water cooled, RETOX, flex., leather	094-010990-10700
WK50QMM 4M KL	Workpiece cable, clamp	092-000003-00000
EH50 4M	Electrode holder	092-000004-00000

#### 10.1.2 TETRIX 351, 421

Type	Designation	Item no.
TIG 450 WD 4M 5P 2T	TIG welding torch, 4 m, water-cooled, double pressure	094-010994-00600
TIG 450 WD 4M 8P 2T UD	TIG welding torch, 4 m, water-cooled, double pressure, U/D	094-010994-00200
TIG 450 WD 4M 12P RETOX HFL	TIG welding torch, 4 m, water cooled, RETOX, flex., leather	094-010993-10700
WK70QMM 4M Z	Workpiece cable, grip	092-000013-00000
EH70QMM 4M	Electrode holder	092-000011-00000

#### 10.1.3 TETRIX 521

Type	Designation	Item no.
TIG 450SC WD 4M 5P 2T HFL	TIG welding torch, 4 m, water-cooled, double pressure, flexible, leather	094-011016-10600
TIG 450SC WD 4M 8P 2T UD HFL	TIG welding torch, 4 m, water-cooled, double pressure, U/D, flexible, leather	094-011015-00000
TIG 450SC WD 4M 12P RETOX HFL	TIG welding torch, 4 m, water-cooled, RETOX, flex., leather	094-011016-10700
WK95QMM 4M Z	Workpiece lead, tongs	092-000171-00000
EH95QMM 4M	Electrode holder	092-000010-00000

### 10.2 Remote controls and accessories

Type	Designation	Item no.
RTF1 19POLE 5M	Foot-operated remote control current with connection cable	094-006680-00000
RT1	Remote control current	090-008097-00000
RTP1	Remote control spots/pulses	090-008098-00000
RTP2	Remote control spots/pulses	090-008099-00000
RTP3	spotArc remote control for spots/pulses	090-008211-00000
RA5 19POL 5M	Remote control e.g. connection cable	092-001470-00005
RA10 19POL 10M	Remote control e.g. connection cable	092-001470-00010
RA20 19POL 20M	Remote control e.g. connection cable	092-001470-00020
RV5M19 19POLE 5M	Extension cable	092-000857-00000

### 10.3 Options

Type	Designation	Item no.
ON 7POL	Optional 7-pole retrofit connection socket Accessory components and digital interfaces	092-001826-00000
ON 19POL 500	Optional 19-pole retrofit connection socket Accessory components and analogue A interface	092-001951-00000
ON 12POL RETOX TIG	Optional 12-pole retrofit connection socket	092-001807-00000
ON FILTER T/P	Retrofit option contamination filter for air inlet	092-002092-00000
ON HOSE/FR MOUNT	Optional holder for tubes and remote control for machines without star handle	092-002116-00000
ON FSB WHEELS W/T/P	Retrofit option for locking brake for machine wheels	092-002110-00000
ON KEY SWITCH	Optional retrofit kit for key switch	092-001828-00000
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

### 10.4 General accessories

Type	Designation	Item no.
KF 23E-10	Coolant (-10 °C), 9.3 l	094-000530-00000
KF 23E-200	Coolant (-10°C), 200 litres	094-000530-00001
KF 37E-10	Coolant (-20 °C), 9.3 l	094-006256-00000
KF 37E-200	Coolant (-20 °C), 200 l	094-006256-00001
TYP 1	Frost protection tester	094-014499-00000
DM1 32L/MIN	Manometer pressure reducer	094-000009-00000
G1 2M G1/4 R 2M	Gas hose	094-000010-00001

#### 10.4.1 TETRIX 301

Type	Designation	Item no.
5POLE/CEE/16A/M	Machine plug	094-000712-00000

#### 10.4.2 TETRIX 351-521

Type	Designation	Item no.
5POLE/CEE/32A/M	Machine plug	094-000207-00000

### 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

## 11.1 TETRIX 301 COMFORT



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

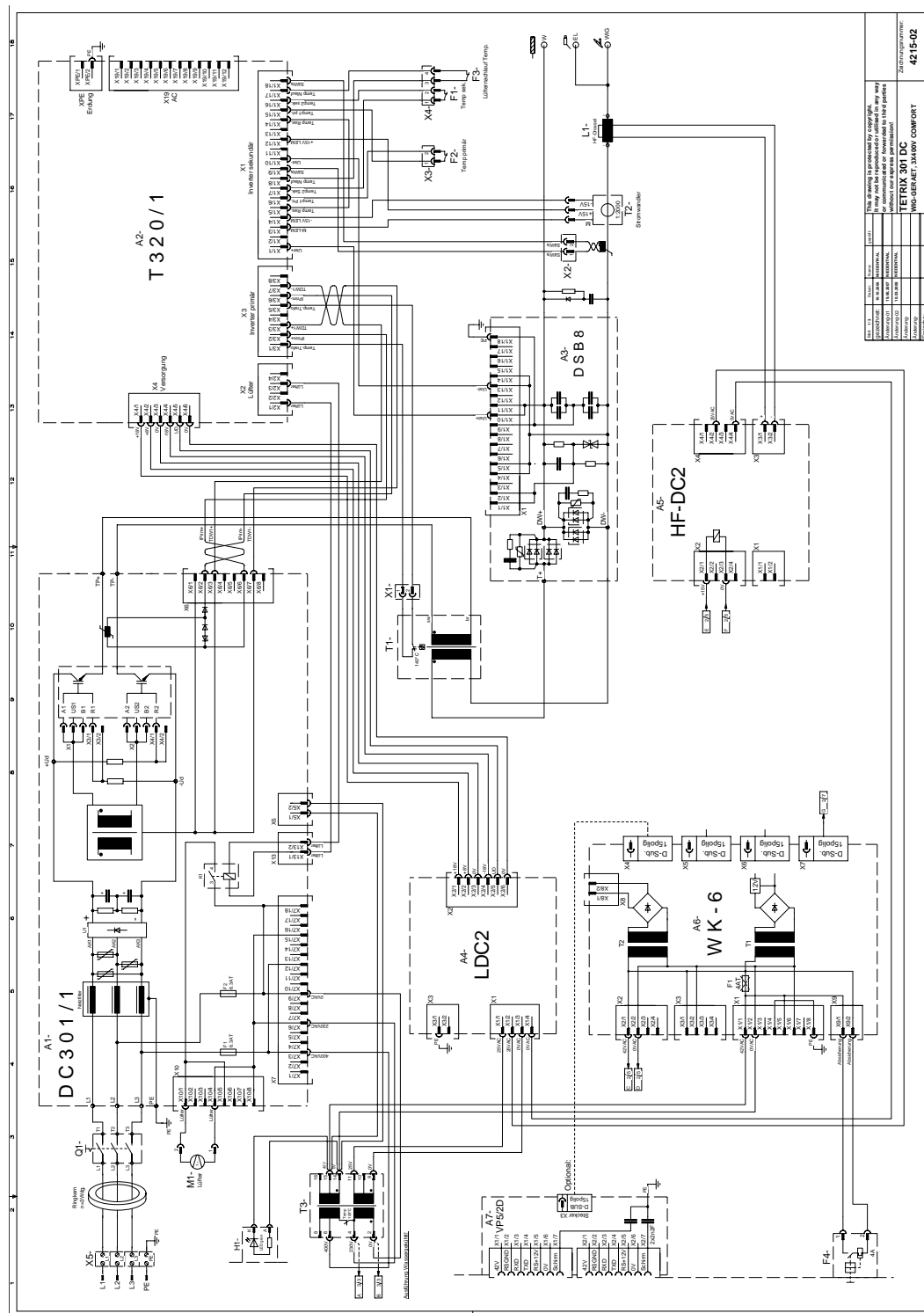
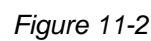


Figure 11-1



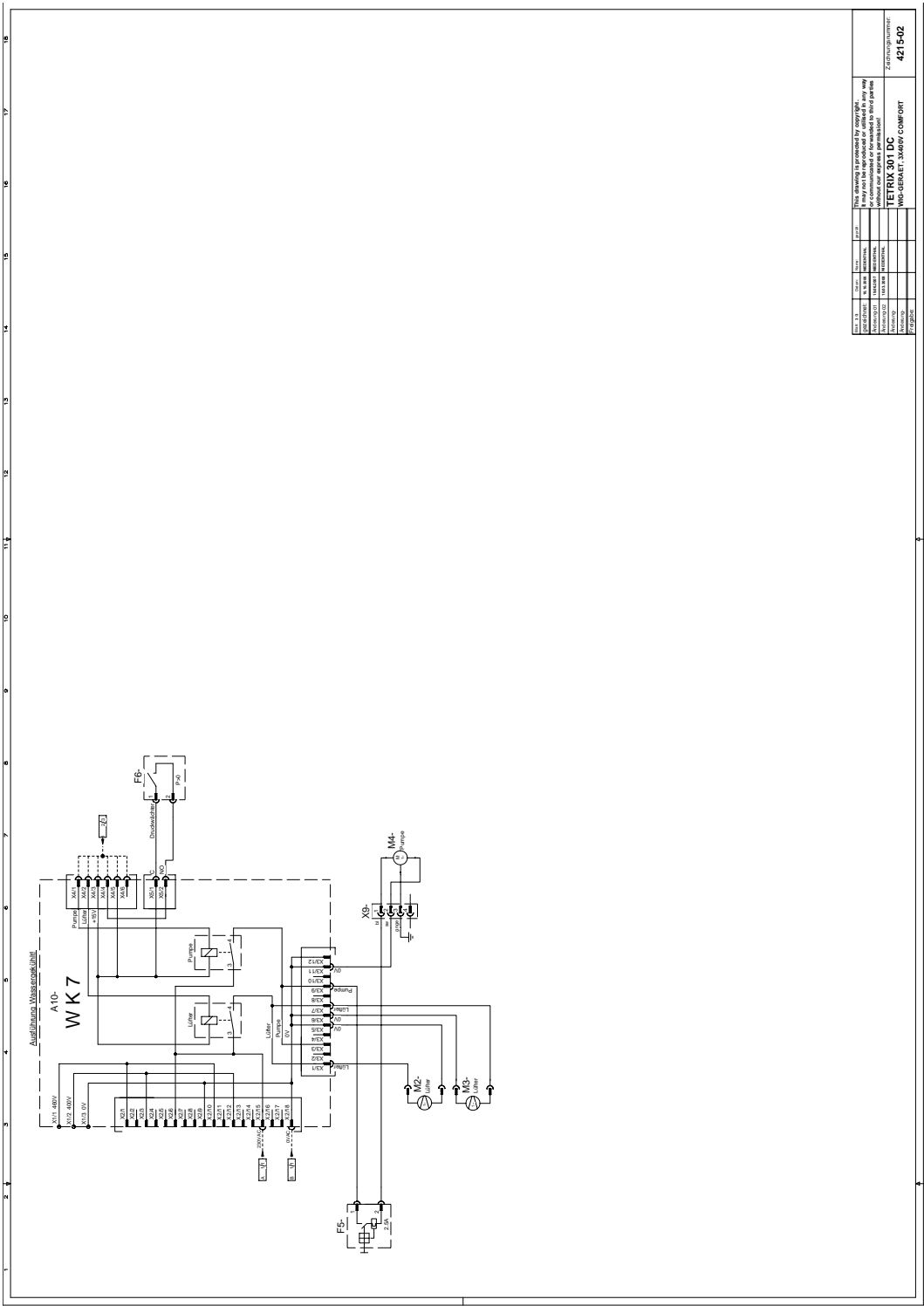


Figure 11-3

Rev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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Rev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Rev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Rev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Rev.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	1



## 11.2 TETRIX 351 COMFORT

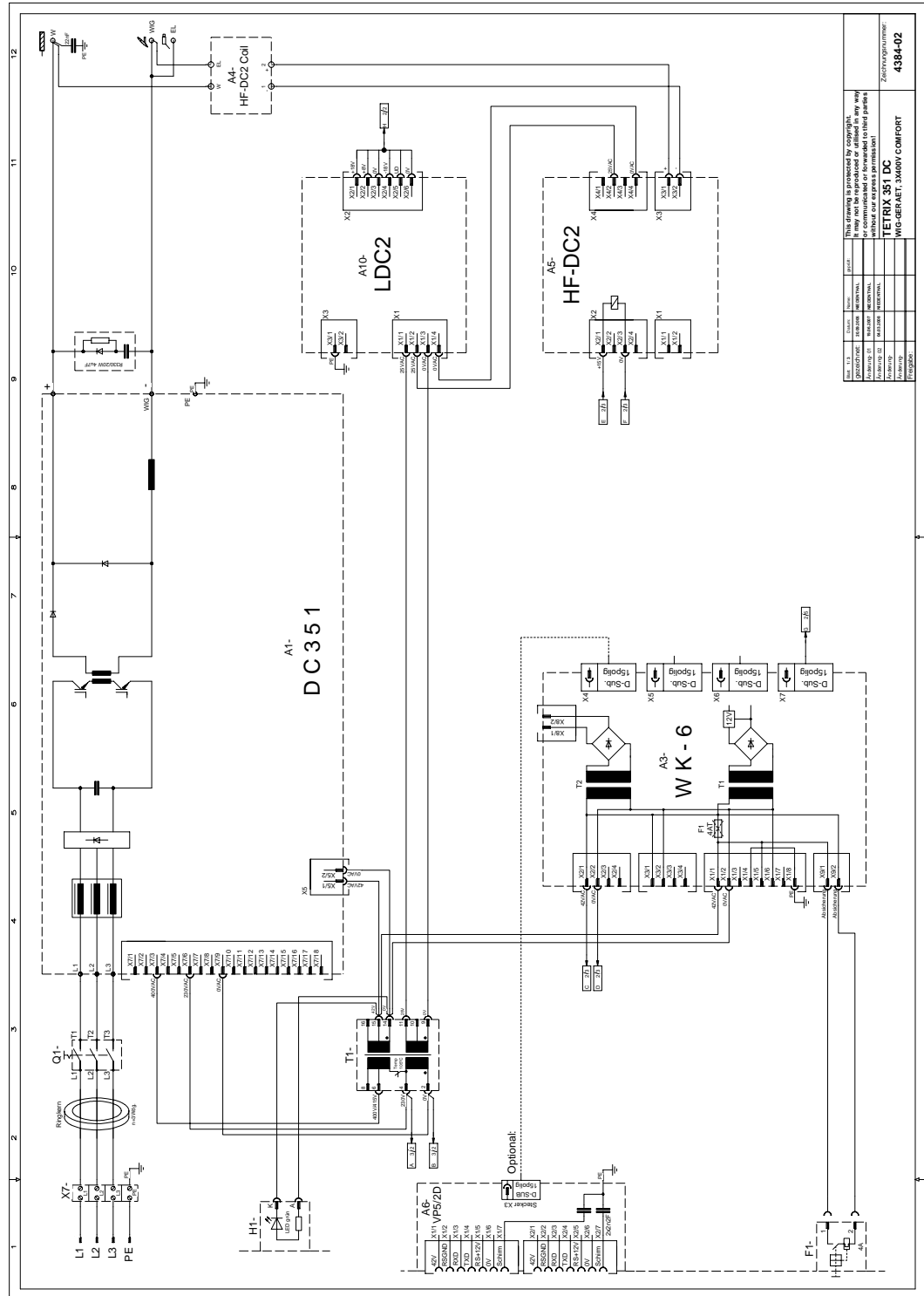


Figure 11-4

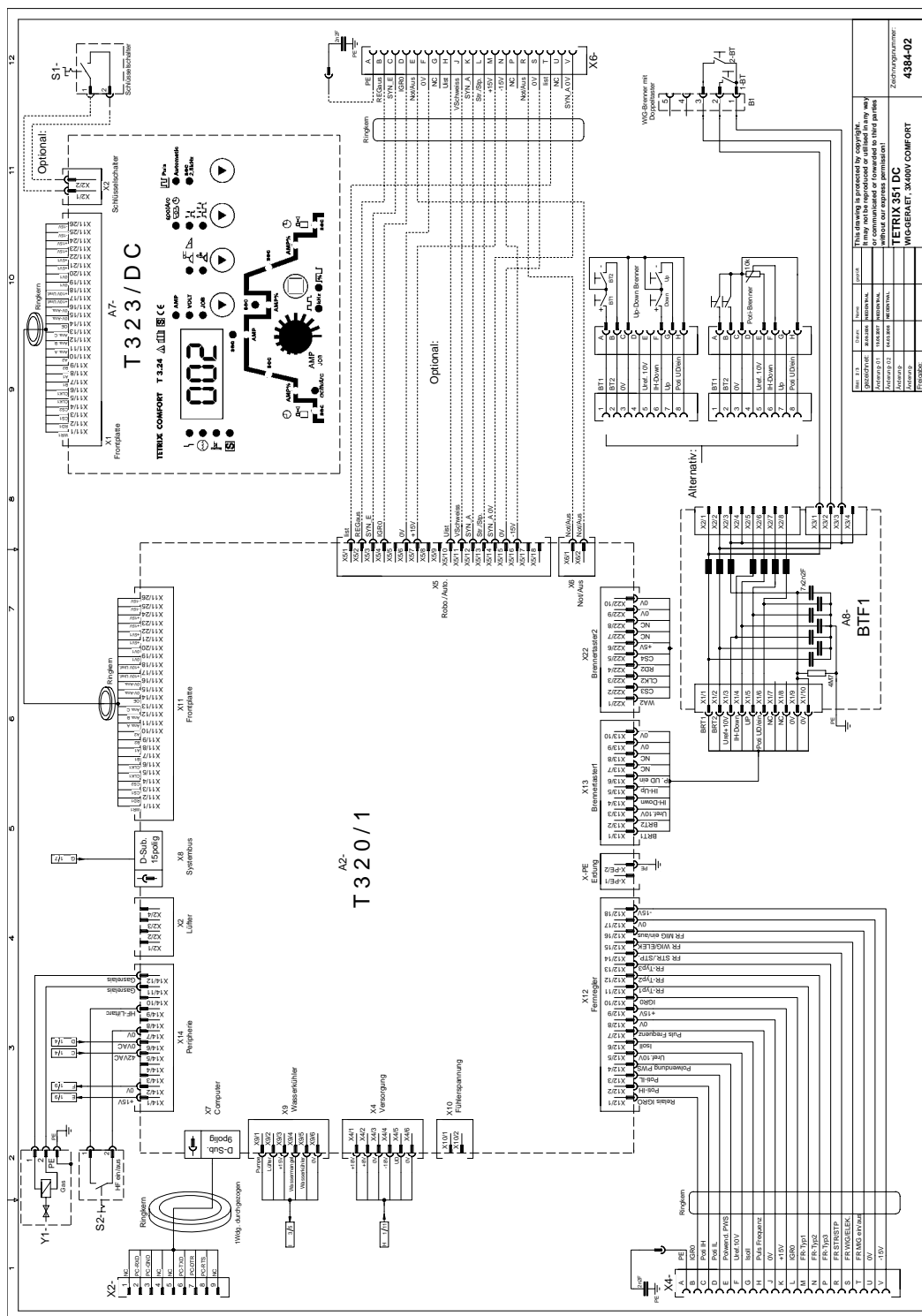
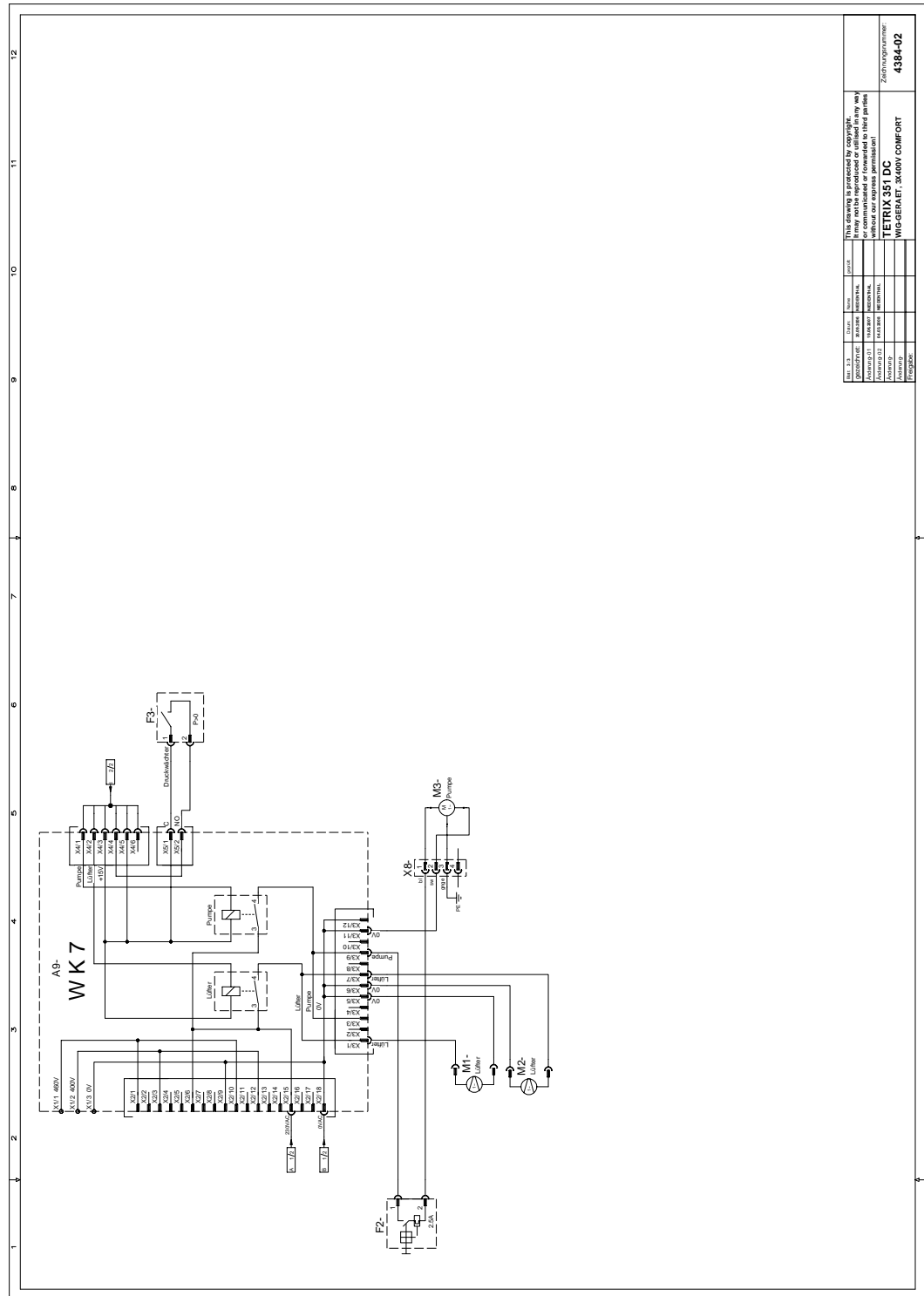


Figure 11-5



### 11.3 TETRIX 421 COMFORT

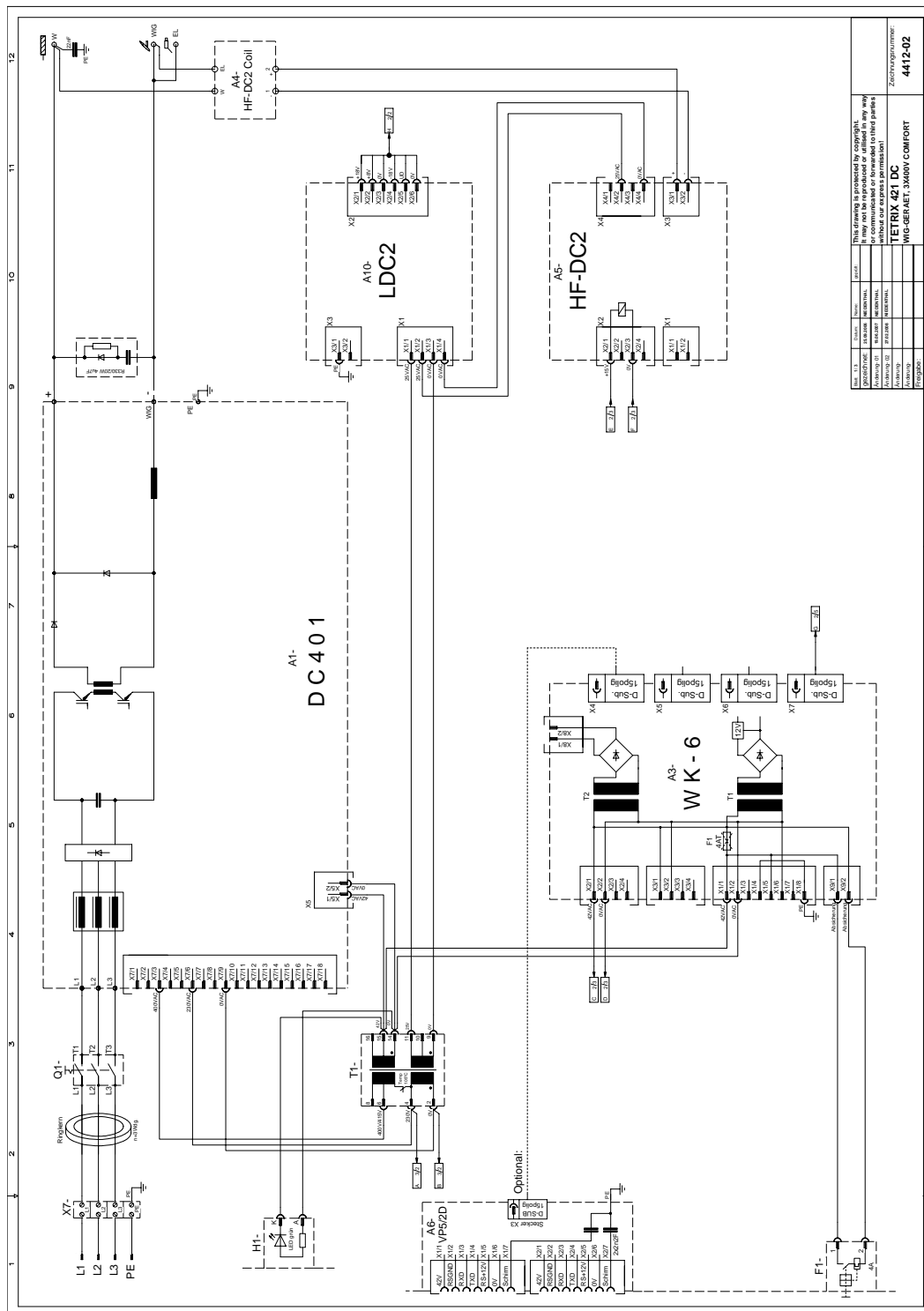
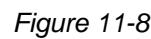


Figure 11-7



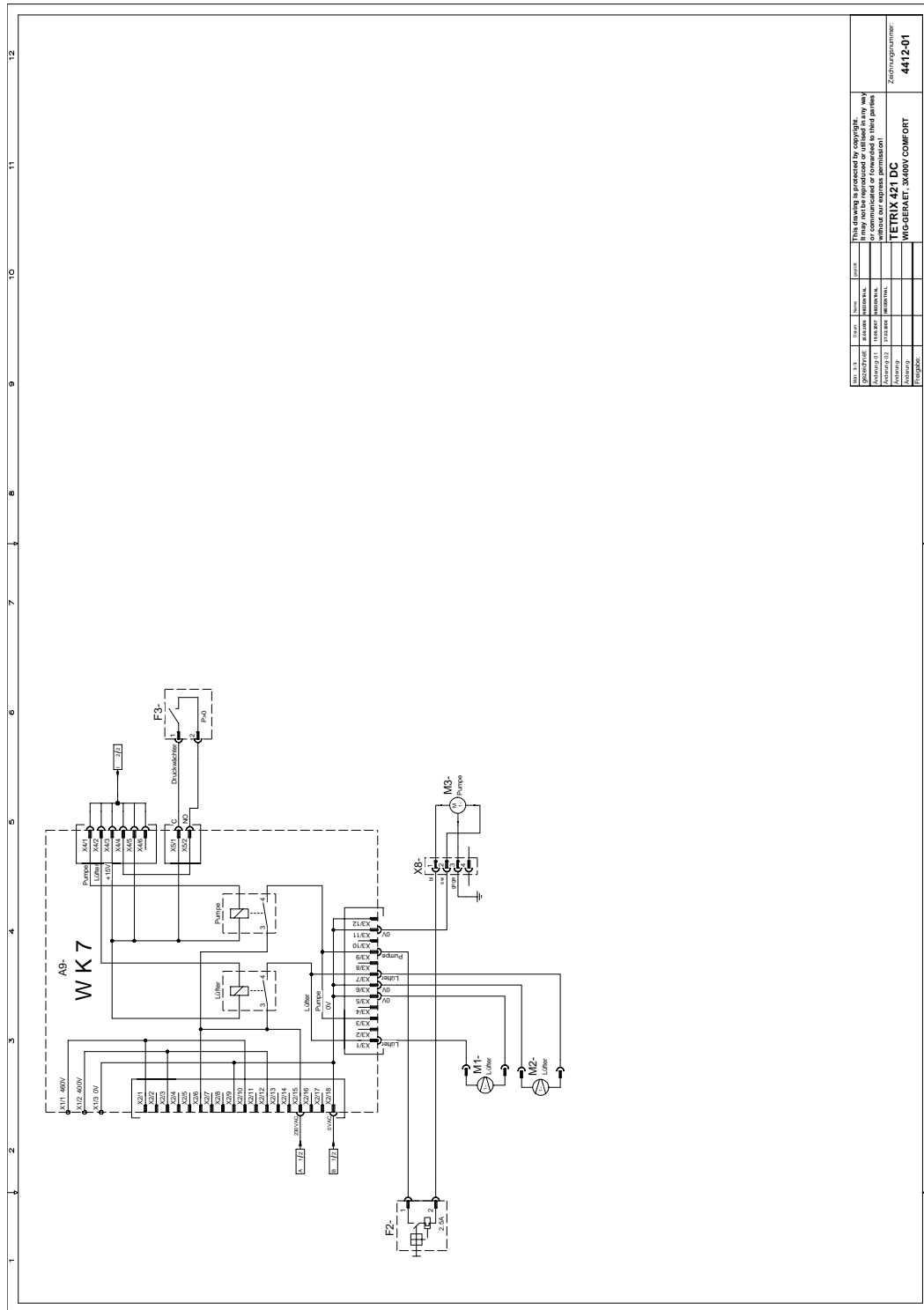


Figure 11-9

## 11.4 TETRIX 521 COMFORT

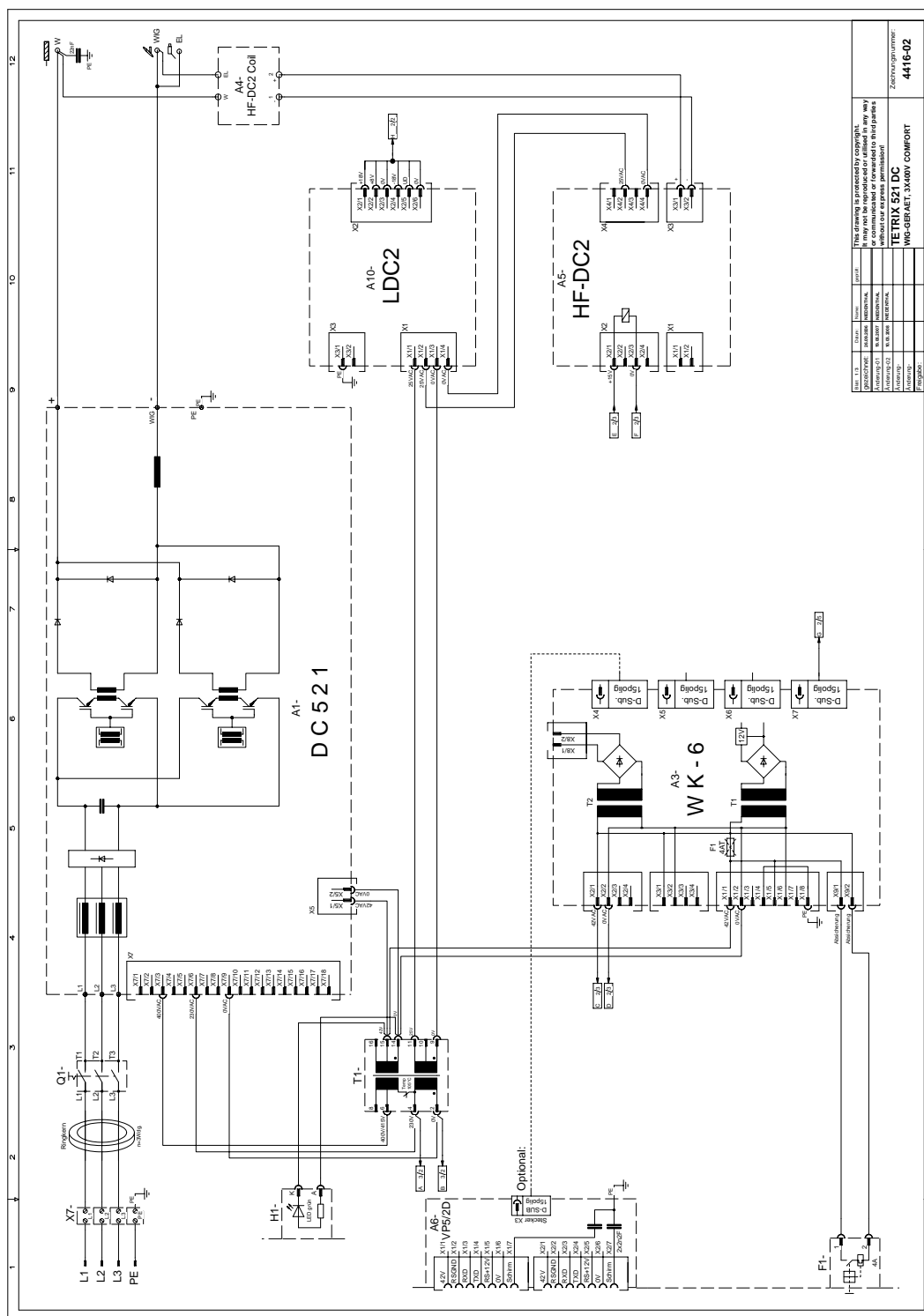
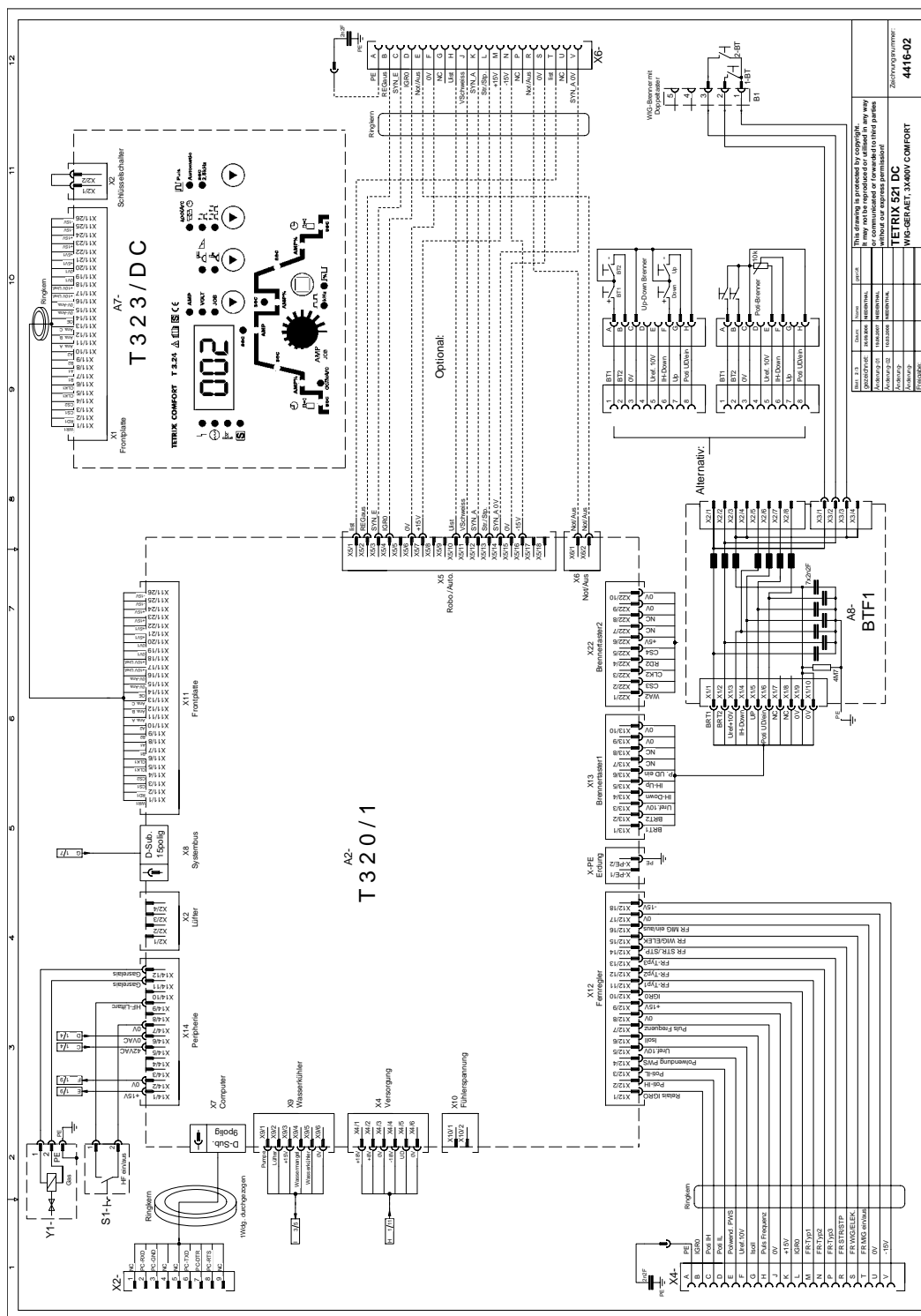
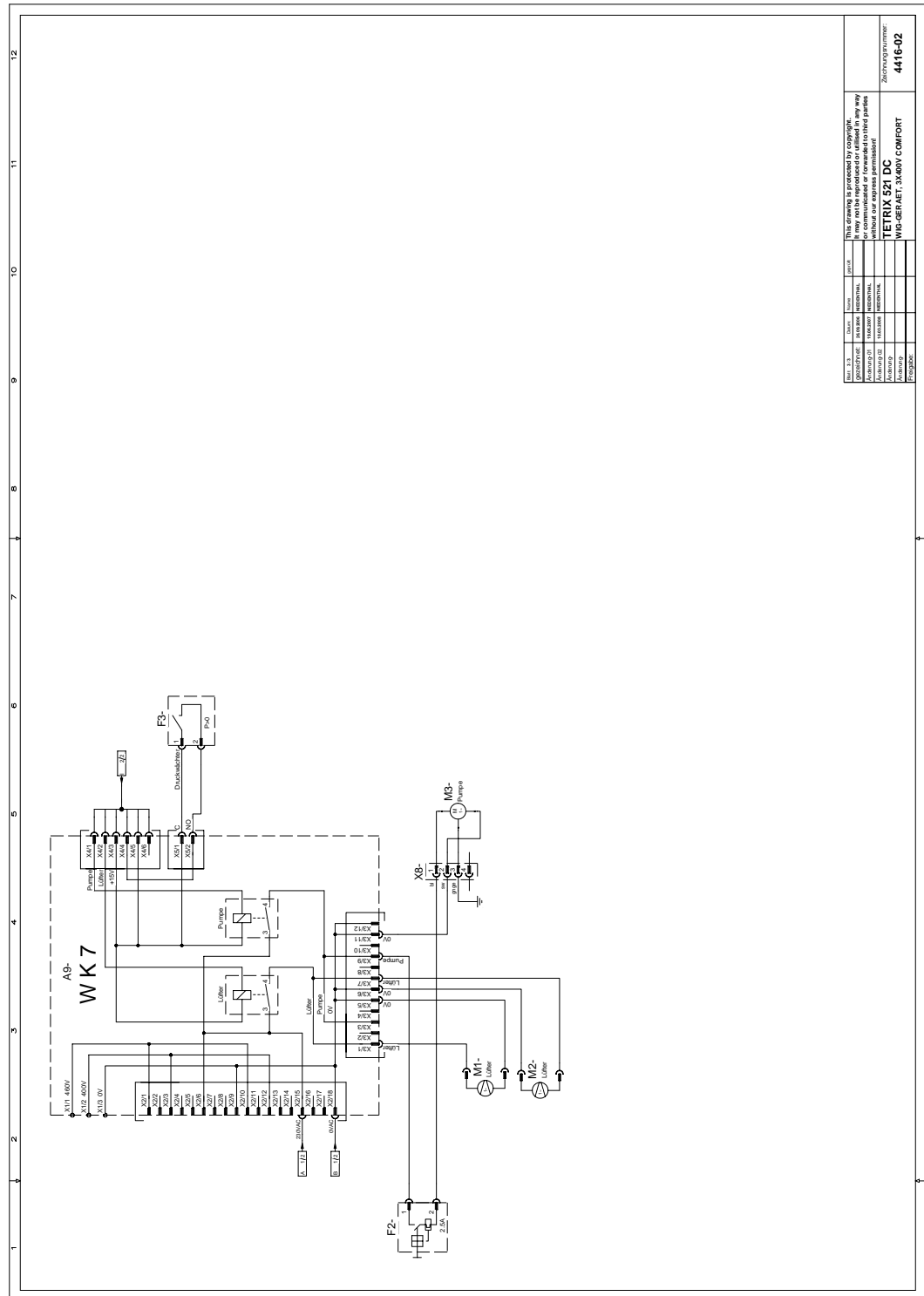


Figure 11-10







Item No.: 099-000089-EWM01

## 12 Appendix A

### 12.1 Declaration of Conformity

<b>EWM</b> HIGHTEC® WELDING <b>SIMPLY MORE</b>		<b>EG - Konformitätserklärung</b> EC – Declaration of Conformity Déclaration de Conformité CE
<b>Name des Herstellers:</b> Name of manufacturer: Nom du fabricant:	<b>EWM HIGHTEC WELDING GmbH</b> (nachfolgend EWM genannt) (In the following called EWM) (nommé par la suite EWM)	
<b>Anschrift des Herstellers:</b> Address of manufacturer: Adresse du fabricant:	<b>Dr.- Günter - Henle - Straße 8</b> <b>D - 56271 Mündersbach – Germany</b> <b>info@ewm.de</b>	
<b>Hiermit erklären wir, daß das bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheitsanforderungen 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.</b>	<p>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.</p> <p>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, correspond 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.</p>	
<b>Gerätebezeichnung:</b> Description of the machine: Description de la machine:		
<b>Gerätetyp:</b> Type of machine: Type de machine:		
<b>Artikelnummer EWM:</b> Article number: Numéro d'article		
<b>Seriennummer:</b> Serial number: Numéro de série:		
<b>Optionen:</b> Options: Options:	<b>keine</b> none aucune	
<b>Zutreffende EG - Richtlinien:</b> Applicable EU - guidelines: Directives de la CE applicables:	<b>EG - Niederspannungsrichtlinie (2006/95/EG)</b> EC – Low Voltage Directive (2006/95/EG) Directive CE pour basses tensions (2006/95/EG) <b>EG- EMV- Richtlinie (2004/108/EG)</b> EC – EMC Directive (2004/108/ EG) Directive CE EMV (2004/108/EG)	
<b>Angewandte harmonisierte Normen:</b> Used co-ordinated norms: Normes harmonisées appliquées:	EN 60974 / IEC 60974 / VDE 0544 EN 50199 / VDE 0544 part 206 GOST-R	
<b>Hersteller - Unterschrift:</b> Manufacturer's signature: Signature du fabricant:	 <b>Michael Szczesny , Geschäftsführer</b> managing director gérant	
01.2007		