GB

OPERATING INSTRUCTIONS
TIG inert gas welding equipment

INVERTIG i 260-450 DC and AC/DC HIGH

REHM SCHWEISSTECHNIK

Operating instructions

Name TIG welding systems

Type

INVERTIG i 260 DC and AC/DC HIGH
INVERTIG i 310 DC and AC/DC HIGH
INVERTIG i 350 DC and AC/DC HIGH
INVERTIG i 450 DC and AC/DC HIGH

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Subject to change.

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1 Introduction

1.1 Foreword

Dear Customer,

You have purchased a REHM inert gas welding system, a renowned German brand name.

We thank you for the confidence you have placed in our quality products.

Only components of the highest quality are used in INVERTIG i 260-450 welding systems.

To allow long service life even under the toughest conditions, all REHM equipment is manufactured using only parts that comply with our strict quality demands.

INVERTIG i 260-450 welding systems have been developed and designed according to the generally accepted rules for technology and safe operation. All relevant legal regulations have been observed and complied with. Conformity is declared and is marked with the CE symbol.

REHM welding systems are manufactured in Germany and therefore bear the "Made in Germany" quality label.

REHM strives to immediately take advantage of technical progress and reserves the right to adapt the design of the welding equipment at any time to the latest technical requirements.

These operating instructions are for various INVERTIG i 260-450 devices. Illustrations, explanations, and functions are described for the INVERTIG i 450 AC/DC as examples. Depending on the type of machine purchased and its equipment and accessories, some functions may not be available on it. Those functions are indicated in the relevant section.

In addition to the accessories and options described in these operating instructions, extensive accessories for such applications as automation are also available.

1.2 General description

Figure 1: *INVERTIG i 350 AC/DC*
(Figure does not illustrate standard equipment)

1.2.1 The principle of the TIG inert gas welding process

In TIG welding, the arc burns freely between a tungsten electrode and the workpiece. The inert gas is a noble gas such as argon, helium or a mixture of these.
One pole of the power source is connected to the tungsten electrode, the other to the workpiece. The electrode is the current conductor and arc carrier (continuous electrode). The filler material is introduced in the form of a rod or wire by hand or a separate cold wire feed unit. The tungsten electrode, the weld pool and the molten end of the filler material are protected against the ingress of atmospheric oxygen by inert shielding gas that escapes from the protective gas nozzle arranged concentrically around the electrode.

1.2.2 Intended use

INVERTIG i 260-450 welding machines may be used only for TIG or electrode welding as intended.

REHM welding machines are designed for welding various different metallic materials such as unalloyed and alloyed steels, stainless steels, copper, titanium and aluminium. Please also observe the special rules that apply to your applications.

REHM welding machines are designed for use in hand-held and machine-guided operation.

Except when REHM expressly states otherwise in writing, REHM welding machines are for sale to commercial/industrial users only and are intended for their use only. The machines may be operated only by persons trained in the use and maintenance of welding equipment.

Welding power sources may not be installed in areas with increased electrical risk.

This manual contains rules and guidelines for the intended use of your system. Only compliance with these guidelines shall be considered as proper use. Risks and damage incurred due to any other use is the responsibility of the operator. Use under special requirements may necessitate the observance of particular regulations.

If in doubt, ask your responsible safety officer or contact the REHM customer service department.

The special instructions listed in the supplier documentation for intended use must be observed.

National regulations also apply, without restriction, to system operation.

Welding power sources may not be used to defrost pipes.

Intended use also includes compliance with the prescribed assembly, disassembly and reassembly, commissioning, use, maintenance, and disposal measures. Please pay particular attention to the information in Section 2 Safety instructions and Section 12.5 Proper disposal.

The system may be operated only under the aforementioned conditions. Any other use is considered unintended use. The operator bears the consequences of unintended use.

1.3 Symbols used

Typographic distinctions

•Enumerations preceded by a bullet point: General enumerations

❒ Enumerations preceded by a square: Work or maintenance steps that must be performed in the order listed.

➔ **Section 2.2, Warning symbols on the system**
Cross reference: here to Section 2.2, Warning symbols on the system

Bold text is used for emphasis

Note!

... indicates practical tips and other particularly useful information.

Safety symbols

The safety symbols used in this manual: ➔ **Section 2.1**

2 Safety instructions

2.1 Warning symbols in these operating instructions

Warnings and symbols

This or a symbol that more accurately specifies the risk can be found in all of the safety instructions given in these operating instructions where there is danger to life and limb.

One of the signal words below (Danger!, Warning!, Caution!) is used to indicate the severity of the risk:

Danger! …warning of immediate danger.

Death or serious injury may result if the warning is not heeded. The hazard is illustrated with a pictogram in the margin.

Warning! ... of a potentially dangerous situation.

Death or serious injury may result if the warning is not heeded.

Caution! … warns of a potentially harmful situation.

Slight or minor injuries or property damage may result if the warning is not heeded.

Important!

Notice of a potentially harmful situation. The product or an object in the vicinity may be damaged if the warning is not heeded.

Materials that are hazardous to health and/or the environment. Materials/operating materials that must be handled and/or disposed of in a legally compliant manner.

2.2 Warning symbols on the system

Labelling of hazards and hazard sources on the system.

Danger!

Risk of electrical shock!

Non-observance mas result in death or injury.

2.3 Notes and requirements

Hazards of non-compliance

The system was developed and designed according to the generally accepted rules of technology.

Nevertheless, residual dangers to operator life and limb or the risk of damage to the system or other property may still arise during system use.

Safety equipment must never be dismantled or put out of operation, since doing so will result in hazards, and the intended use of the system will no longer be guaranteed. The dismantling of safety devices for equipping, repairing, and maintenance is described in detail. The safety devices must be refitted immediately on completion of such work.

When using external aids and agents (for example, solvents for cleaning) the user of the system is responsible for ensuring the safety of the unit.

All safety instructions and warnings and the nameplate on/near the system must be kept visible and legible.

Safety information

Safety information serves to promote occupational health and safety and prevent accidents. It must be adhered to.

In addition to the safety instructions listed in this section, the safety instructions contained in the current text must also be observed.

Beside the advice given in these operating instructions, the general safety and accident prevention regulations (in Germany, among others UVV BGV A3, TRBS 2131 and BGR 500 Chapter 2.26 (previously VGB 15): "Welding, cutting and allied processes" and particularly the conditions for arc welding and cutting contained therein or the corresponding national regulations) must be observed.

Also observe the safety information signs on the factory floor of the operator.

REHM welding machines are, except when this is expressly stated in writing by REHM, only for sale to commercial/industrial users and are only intended to be used by commercial/industrial users.

INVERTIG i 260-450 welding systems are designed in accordance with EN 60974-1 Arc welding equipment – welding power sources for overvoltage category III and pollution degree 3 and in accordance with EN 60974-10 Arc welding equipment – electromagnetic compatibility (EMC) and may be used only on mains supply systems which have a three-phase four-wire system with earthed neutral conductor.

EMF measures:

Electromagnetic fields can be harmful to health in ways that are as yet unknown:

- Effects on the health of those nearby, such as those that need pacemakers or hearing aids
- Those who have pacemakers must consult their physician spending time in areas near the device and the welding process.
- Welding cables should be kept as far as possible from the welder’s head/trunk
- Do not carry welding cables or hose packs over your shoulder or wrap them around your body.

This Class A equipment is not intended for use in residential areas in which power is supplied from a public low-voltage supply network. Such environments could entail difficulties ensuring electromagnetic compatibility because of interference from wires and radiation. The welding equipment does not comply with IEC 61000-3-12:2011. If the unit is to be connected to a public low-voltage supply network, it is the responsibility of the welding equipment constructor or user, after consultation with the supply network operator, to ensure that the installation can be connected.

INVERTIG i 260-450 welding systems may be used only

- as intended
- in an absolutely perfect condition

WARNING

Dangerous nature of this machine

INVERTIG i 260-450 welding systems have been subjected to a safety test and acceptance. In the event of incorrect operation or misuse, there is a danger to

- operator life and limb,
- the machine and other material assets of the operator
- the efficient work of the machine

All persons involved in the installation, commissioning, operation, maintenance and repair of the machine must

- be appropriately qualified
- strictly observe these operating instructions.

Your safety is at stake!

Operating personnel qualification

INVERTIG i 260-450 welding systems may be operated only by persons who are trained and instructed in the use and maintenance of welding equipment. Only qualified, assigned and trained personnel may work on and with the system.

The operator is responsible for third parties in the work area. The responsibility for this machine must be precisely defined and adhered to. Unclear responsibilities are a safety risk.

The operating company must

- make the operating instructions accessible to the operator and
- ensure that the operator has read and understood them.

Connect a lockable switch in front of the machine to prevent unauthorised operation.

Purpose of the document

These operating instructions contain important information on how this unit can be operated safely, properly and economically. A copy of the operating instructions must be constantly at hand in a suitable place at the site of use of the system. Before using the system be sure to read the information compiled in these operating instructions. These include important instructions on use of the equipment that enable the full technical advantages of the REHM equipment to be exploited. See also the information on repair and maintenance, operating safety and functional reliability.

These operating instructions are not a substitute for practical instruction by REHM service personnel.

Documentation for any additional options, such as automation cases and special hardware for automated welding, must also be observed.

Changes to the system

No mounting or incorporation of additional equipment or changes to the system are permitted. Doing so will invalidate any warranty and liability claims.

Third-party intervention and disabling of operation of safety devices invalidates all warranty claims.

Environmental conditions

Operation and storage of the unit outside the specified range is considered to be improper. The manufacturer is not liable for any resulting damage.

Ambient air temperature range:

- In operation: -10°C to +40°C (14 °F to 104 °F)
- During transport and storage: -20°C to +55°C (-4 °F to 131 °F)

Relative humidity:

- to 50% at 40°C (104 °F)
- to 90% at 20°C (68 °F)

Ambient air:

Free of unusual amounts of dust, acids, corrosive gases or substances, etc., unless they are produced during welding.

Altitude above sea level: Up to 2000m (6500 ft)

Requirements of the mains supply

High-power units can affect the mains voltage due to their high power consumption. There may therefore be connection restrictions, requirements for maximum permissible mains impedance, or requirements for minimum necessary available power at the connection point to the general mains supply for certain unit types (see technical data). If this is the case, the unit's user – after consulting the power supplier if necessary – must ensure that the unit may be connected.

3 Unit description

Figure 2: INVERTIG i 350 AC/DC
Front view (Figure does not illustrate standard equipment)

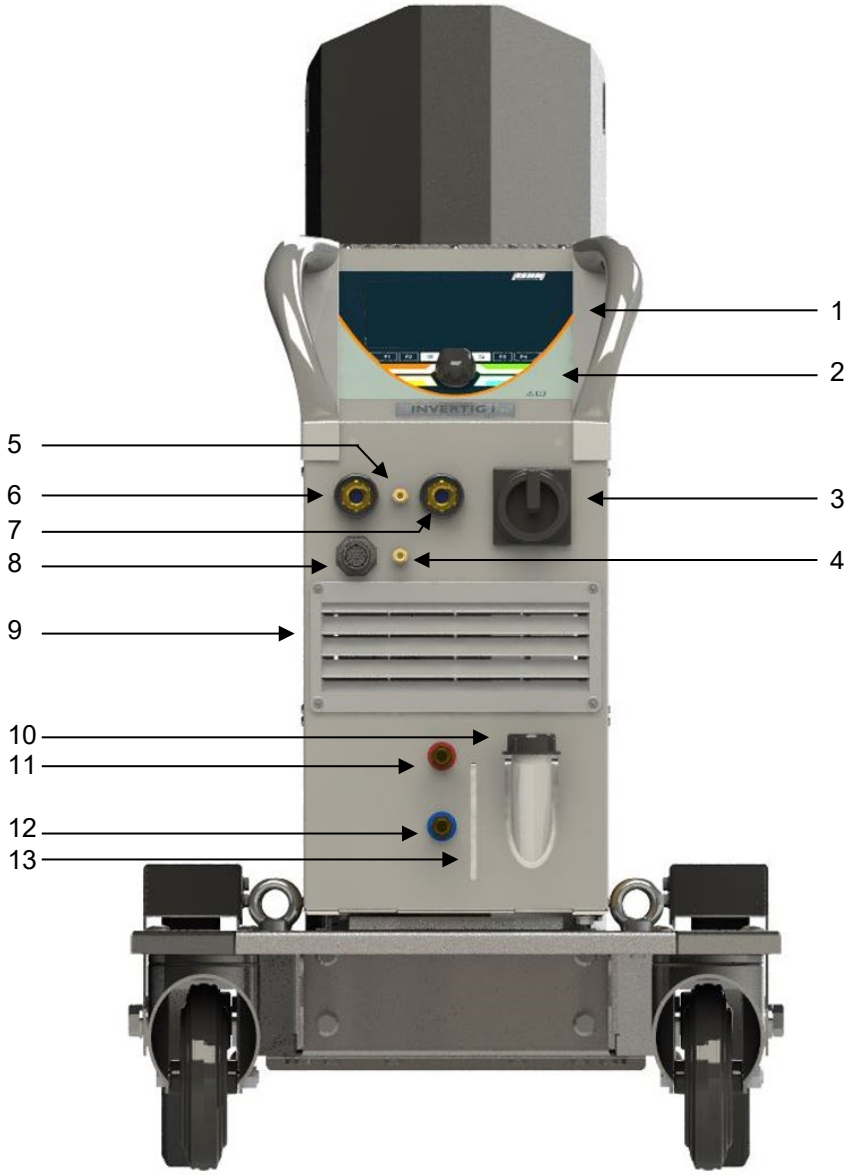


Figure 3: INVERTIG i 350 AC/DC
Front view (Figure does not illustrate standard equipment)

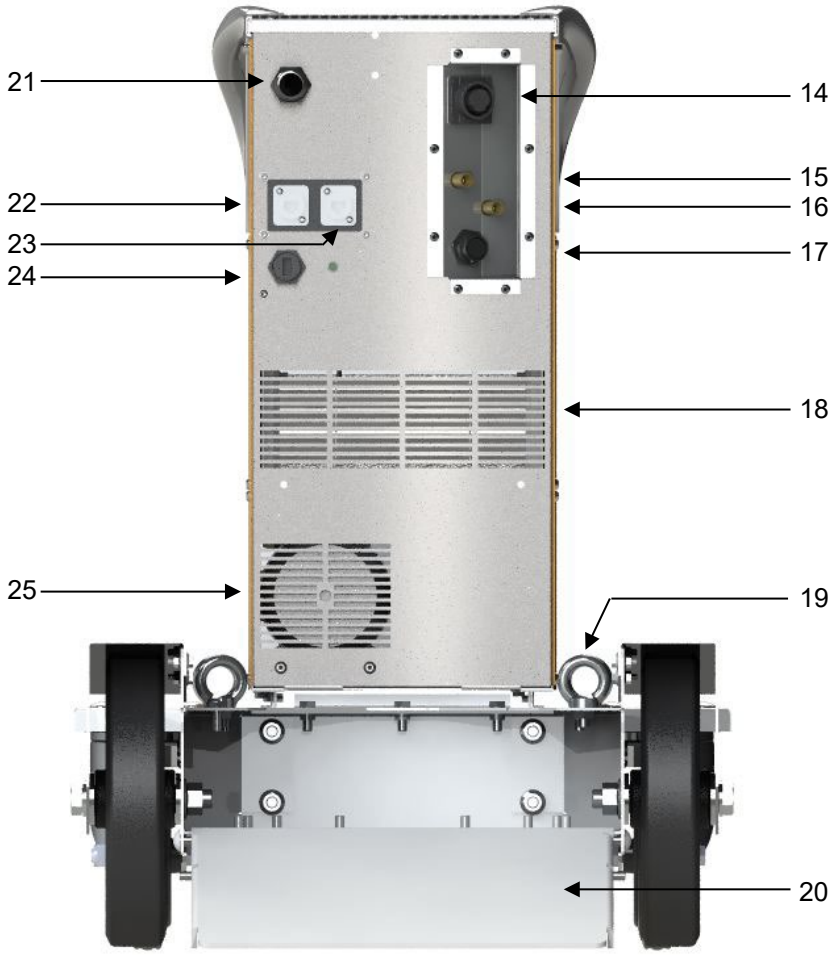


Figure 4: *INVERTIG i 260-450*
Rear view
(Figure does not illustrate standard equipment)

No.	Symbol	Function/description
1		Control panel – See "Description of controls"
2		Control panel push and rotary encoder
3		Main switch for switching on/off the welding power source
4		Inert gas connection for TIG welding torch
5		Second inert gas connection for TIG welding torch/backing (option)
6		Torch connection; “negative” current socket
7		Ground cable socket; "positive” current socket
8		Remote control socket
9		Cooling air inlet
10		Inlet Filling Coolant Water cooling unit
11		Connection coolant return (red)
12		Connection coolant supply (Blue)
13		Viewing window Stand Coolant Water cooling unit
14		Interface for cold wire (option)
15		Inert gas bottle connection
16		Second inert gas bottle connection (option)
17		CAN interface (19-pin)
18		Cooling air outlet
19		Crane lifting lugs
20		Advanced trolley (option, non-standard)
21		Power supply cable
22		CAN interface (option) Only for connecting external BDE or other CAN devices. Not for Ethernet!
23		Interface for Ethernet (option)
24		USB socket
25		Cooling air outlet

Table 1 Legend for functional elements on the front and back

4 Functional description

4.1 Operating element overview

Figure 5: INVERTIG 450 i operating elements and main screen

4.2 Control panel description

4.2.1 Operating elements

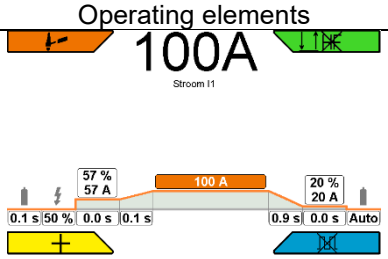
<table>
<tr><th>Operating elements</th><th>Function</th></tr>
<tr><td> 

Fig. 6 Main screen</td><td>Main screen

Operation via rotary encoder with push-knob and buttons for menu selection in the 4 corners of the screen</td></tr>
<tr><td> 

Fig. 7 Function buttons</td><td>Function buttons (from left to right)
<table>
<tr><td>1</td><td colspan="2">Quick Choice</td></tr>
<tr><td>P2</td><td colspan="2">Quick Choice</td></tr>
<tr><td>☰</td><td>Submenu
“Submenu” (12)</td><td>List of all submenus</td></tr>
<tr><td>REHM</td><td>Main screen
“Home”</td><td>Jumps directly to the first screen page</td></tr>
<tr><td>↩</td><td>Back
“Back”</td><td>Always jumps back one level</td></tr>
<tr><td>P3</td><td colspan="2">Quick Choice</td></tr>
<tr><td>P4</td><td colspan="2">Quick Choice</td></tr>
</table>
The QUICK CHOICE buttons
Hold for 3s:
Save current settings as a job on this button

Hold for less than 1s:
Call up saved job</td></tr>
<tr><td> 
Fig. 8 Corner function buttons</td><td>Corner menu selection buttons

Direct menu buttons for the selection menus located in the 4 screen corners; arranged around the rotary encoder.</td></tr>
<tr><td> 
Fig. 9 Rotary encoder with push-knob</td><td>Rotary encoder with push-knob

Moves the pointer (cursor) on the screen clockwise or anti-clockwise.
Positions reached are highlighted in colour and are activated by pressing the rotary encoder knob.</td></tr>
</table>

4.2.2 Operating elements

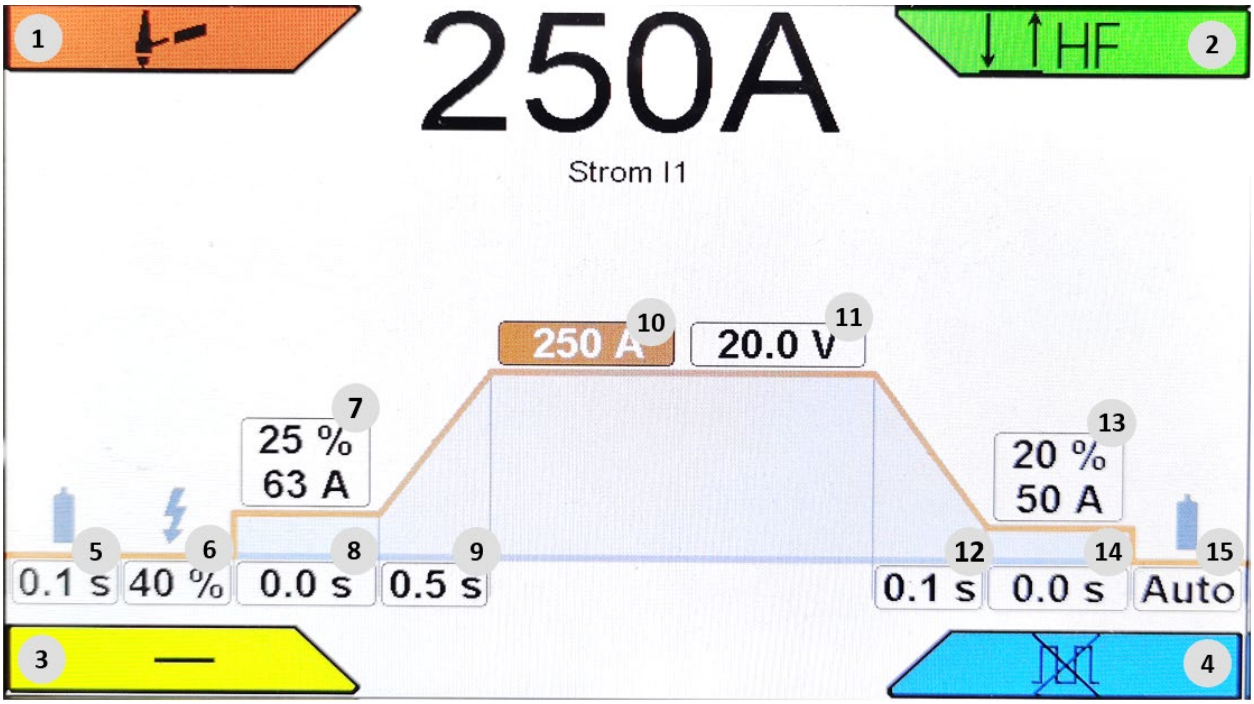
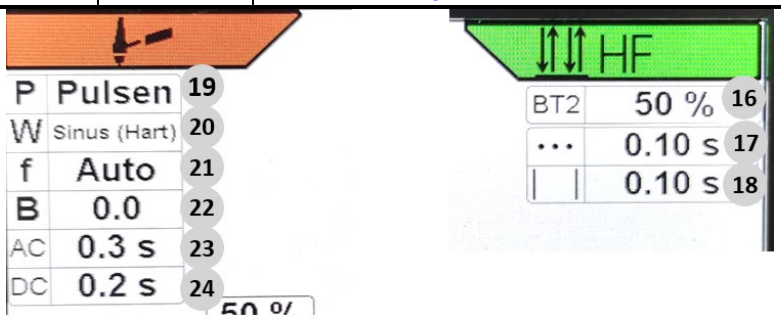


Figure 10: Screen functions

No.	Symbols	Description/functions
BF1		**Corner menu welding processes**
		TIG
		E-Hand
BF2		**Corner menu operating modes (press once)** Not all are available for every ignition type
		Two-cycle
		Four-cycle
		Spot
		Two-cycle interval
		Four-cycle interval
BF2/2		**Ignition type corner menu (press twice)**
	HF	HF on (ignition with high frequency)
		LiftArc (ignition without high frequency by means of contact ignition)
BF3		**Corner menu polarity**
	DC-	Direct current negative
	DC+	Direct current positive
	AC	Alternating current
	DUAL.WAVE	Alternating current/direct current negative

No.	Symbols	Description/functions
BF3		**Corner menu polarity**
	DC-	Direct current negative
	DC+	Direct current positive
	AC	Alternating current
	DUAL.WAVE	Alternating current/direct current negative
BF4		**Corner menu welding process**
		Pulse off
		Time pulses
		HYPER.PULS
		Current curve functions
BF5		Gas pre-flow time 0.1s – 10.0s
BF6		Ignition energy 10% – 100%
BF7		Starting current 1% – 200% 3 A … 500 A
BF8		Starting current time 0.1s – 10.0s (Two-cycle; interval: Two-cycle; interval: Four-cycle; spot)
BF9		Starting current Slope Time 0.1s – 10.0s
BF10	I1	Current I1 3A – 500A
BF11	U	Voltage for current I1 (voltage indicator setup screen)
BF12		End current Slope Time 0.1s – 10.0s
BF13		End current 1% – 200% 3 A … 500 A
BF14		End current time 0.1s – 10.0s
BF15		Gas post-flow time Auto (calculated value, no display) 0.1s – 150.0s

		Special functions
		
BF16	BT2	Second current/torch trigger 1% – 200%
BF17		Interval welding time Spot welding time 0.01s – 30.0s
BF18		Interval pause time 0.01s … 5.0s

BF19	"Pulsing	Access to Pulse menu	
BF20	W	AC current form	Auto Sine Triangle Rectangle Hard sine
BF21	f	AC frequency	Auto 30 Hz – 300 Hz
BF22	B	AC balance	-5.0 – +5.0
BF23	AC	DUAL.WAVE AC time	0.1s – 10.0s
BF24	DC	DUAL.WAVE DC time	0.1s – 10.0s

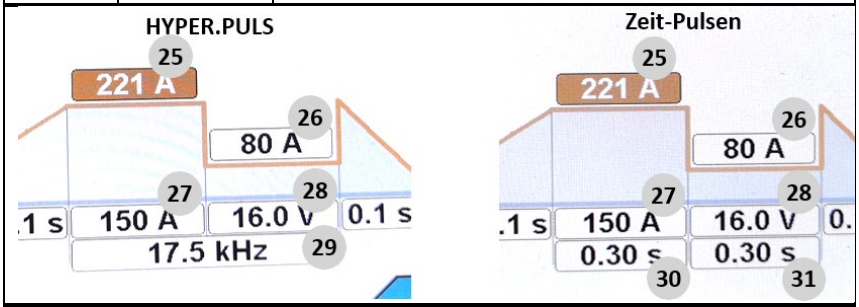
		Pulse functions	
			
BF25	I1	Pulse current I1	3A – 500A
BF26	I2	Pulse current I2	3A – 500A
BF27		Pulse current average value mathematical average value according to I1, I2, t1, and t2	3A – 500A
BF28	U	Voltage for pulse current average value	
BF29	F	HYPER.PULS frequency	0.10 Hz – 17.5 kHz
BF30	t1	Time pulses Time I1	0.01s – 5.0s
BF31	t2	Time pulses Time I2	0.01s – 5.0s

Table 2 Operating elements main screen

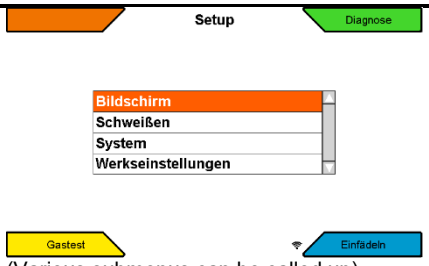
No.	Symbols	Description/functions
BF32		Submenu buttons
		
BF33		Job memory function (programs)
		Quick-storage keys
BF34 – BF37	1-4	Short button press: Load job Long button press: Save job
BF38		Setup (Settings)
		 (Various submenus can be called up)
BF39		Language
BF40		"Home" and "Back" return button
BF41		Fault message
BF42		Links in the characteristic curve info bar Operation and excess temperature display

Table 3 Other control functions and submenus

4.3 Switching on

INVERTIG i 260-450 welding systems are started with the main switch. The screen shows the Rehm logo and the unit type for approximately 10 seconds. The display then switches to the main screen [Fig. 6 Main screen]. The last active welding parameters are set. The unit is then ready for operation.

4.4 Peculiarities of the operating panel

The processor control provides active support to facilitate faster and easier operation:

All set parameters are saved when the unit is switched off. When the unit is switched back on the stored parameters are automatically activated.

The currently set parameters and settings are always displayed.

Note! Due to equipment variants or software or equipment updates, functions may be available on your INVERTIG i 260-450 that are not described in these operating instructions or that are not included in your welding system.

5 Functions

5.1 Welding processes corner menu (top left)

The [BF1] corner menu is used to select the welding processes

- TIG (tungsten inert gas welding)
- MMA manual arc welding

Turning and pressing the rotary encoder [Fig. 9] selects and confirms the process. Pressing the “Back” or “Rehm” button [BF40] returns to the main screen [Fig. 6].

5.1.1 TIG

For TIG welding, connect the torch to the socket provided. Plug the control plug into the socket and lock it. Gas supply for the torch is connected with the quick coupling. The ground cable from the workpiece is connected to the ground socket.

5.1.2 MMA

Use this welding process for MMA (electrode manual metal arc welding). Connect the electrode holder and ground cable to the sockets according to the desired polarity. As soon as the welding process is activated, idle voltage is available for welding.

5.2 Operating mode corner menu (top right)

The Operating modes menu [BF2] is activated by pressing the button at the top right of the keypad Fig. 9. This allows the selection of the following operating modes:

1. Two-cycle
2. Four-cycle
3. Spot
4. HYPER.SPOT#
5. Two-cycle interval
6. Four-cycle interval

Not all operating modes are available for all ignition types. The following table shows what operating modes are available for each ignition type.

Ignition type / Operating mode	High-frequency	LiftArc	Touch-HF#
Two-cycle	X	X	X*
Four-cycle	X	X	
Spot	X	X	X*
HYPER.SPOT	X	X	X*
Two-cycle interval	X		
Four-cycle interval	X		

*) For the Touch-HF ignition type, the procedures have been adapted to the ignition type. For details, see the operating mode description for Touch-HF.

#) Only with the Ultra version.

5.2.1 Two-cycle operating mode with HF ignition

Two-cycle operating mode procedure:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ After the set gas pre-flow time has expired, the arc is ignited with high-frequency ignition
  - ❒ The welding current automatically adjusts to the selected slope-up time, starting from the set starting current and rising to the preselected value for I1
- ❒ Second cycle – release the torch trigger
  - ❒ Current reduces over the set end current slope time to the preselected end current and is maintained for the set end current time.
  - ❒ After the end current time has expired, the arc goes out automatically.
  - ❒ The inert gas is switched off after the gas post-flow time has expired.

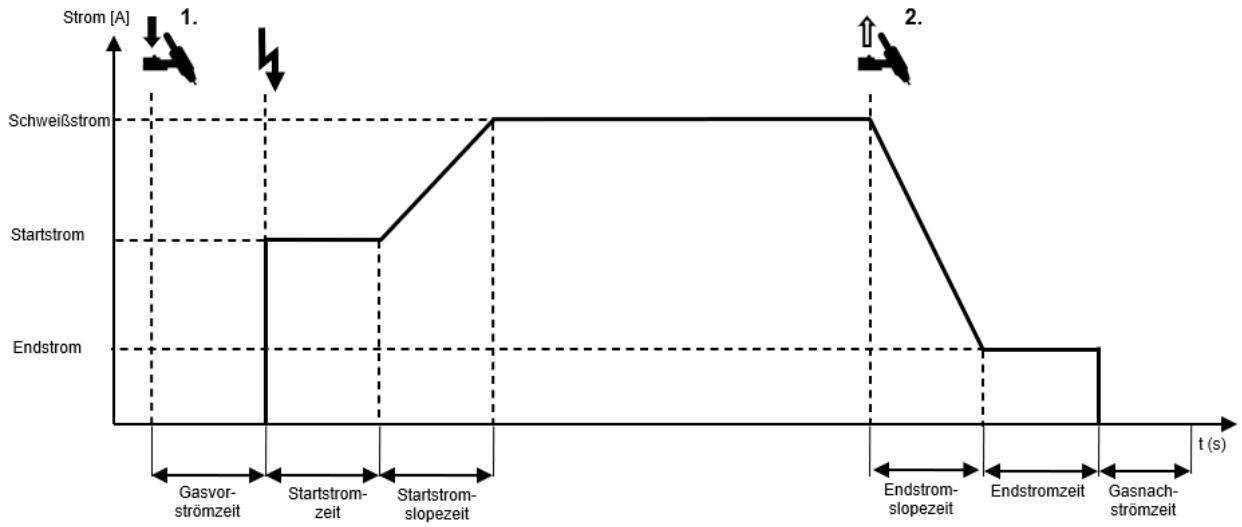


Figure 11: Procedure for two-cycle operating mode with HF ignition

5.2.2 Four-cycle operating mode with HF ignition

Four-cycle operating mode procedure:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ After the gas pre-flow time has expired, the arc is ignited with high frequency.
  - ❒ The welding current flows with the set starting current value.
- ❒ Second cycle – release the torch trigger
  - ❒ The welding current is changed from the starting current value to the value set for welding.
- ❒ Third cycle – press the torch trigger
  - ❒ For the duration of the end current slope time, the welding current is reduced to the value set for the end current.
- ❒ Fourth cycle – release the torch trigger
  - ❒ The arc goes out
  - ❒ The inert gas is switched off after the gas post-flow time has expired.

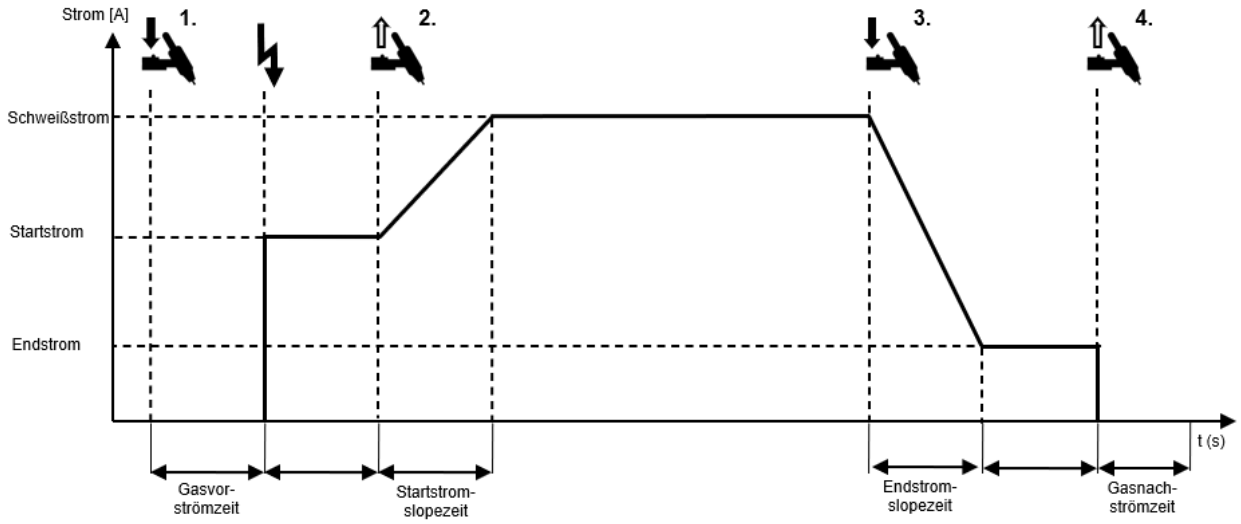


Figure 12: Procedure for four-cycle operating mode with HF ignition

5.2.3 Spot operating mode with HF ignition

Procedure for Spot operating mode with HF ignition:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ After the set gas pre-flow time has expired, the arc is ignited with high-frequency ignition
  - ❒ The welding current automatically adjusts to the selected starting current slope time, starting from the set starting current and rising to the preselected value for welding current
  - ❒ The welding current flow is at the set value set for welding
  - ❒ The spot welding time is running
  - ❒ After the set spot welding time has expired, current within the end current slope time is set to the end current value.
  - ❒ After the end current time has expired, the arc goes out.
  - ❒ The inert gas is switched off after the gas post-flow time has expired.
- ❒ Second cycle - Release the torch trigger
  - ❒ Releasing the torch trigger during the spot welding time terminates the welding process immediately, and the inert gas is switched off after the gas post-flow time has expired.

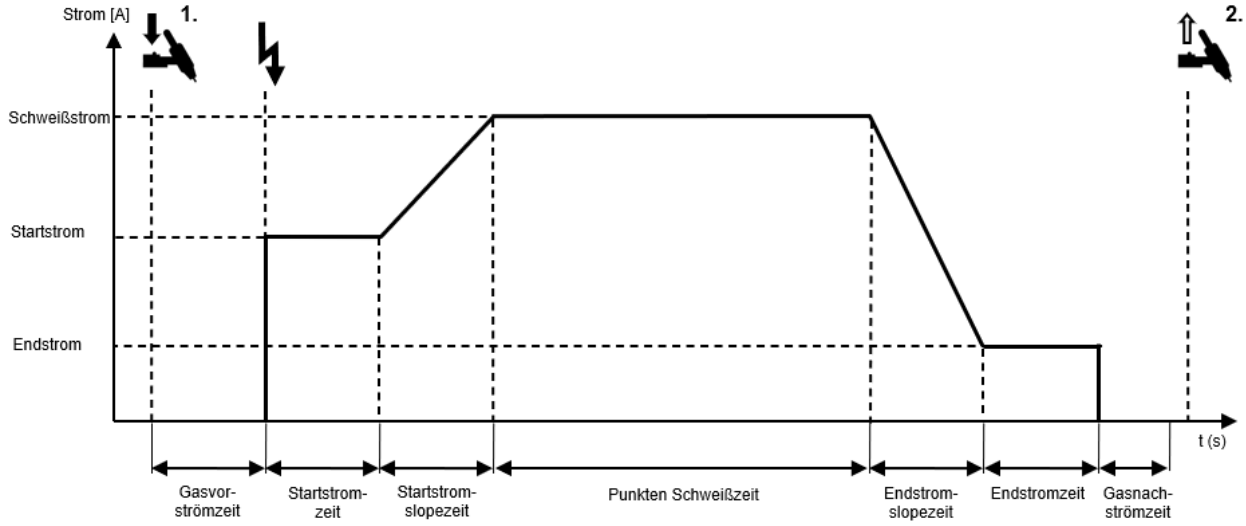


Figure 13: Procedure for Spot operating mode with HF ignition

5.2.4 HYPER.SPOT operating mode# with HF ignition

Procedure for the HYPER.SPOT operating mode with HF ignition:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ After the set gas pre-flow time has expired, the arc is ignited with high-frequency ignition
  - ❒ The welding current adjusts immediately to the preselected value.
  - ❒ The welding current flow is at the set value set for welding
  - ❒ The HYPER.SPOT welding time is running
  - ❒ After the HYPER.SPOT welding time has expired, the arc goes out.
  - ❒ The inert gas is switched off after the gas post-flow time has expired.
- ❒ Second cycle - Release the torch trigger
  - ❒ Releasing the torch trigger during the HYPER.SPOT welding time terminates the welding process immediately, and the inert gas is switched off after the gas post-flow time expires.

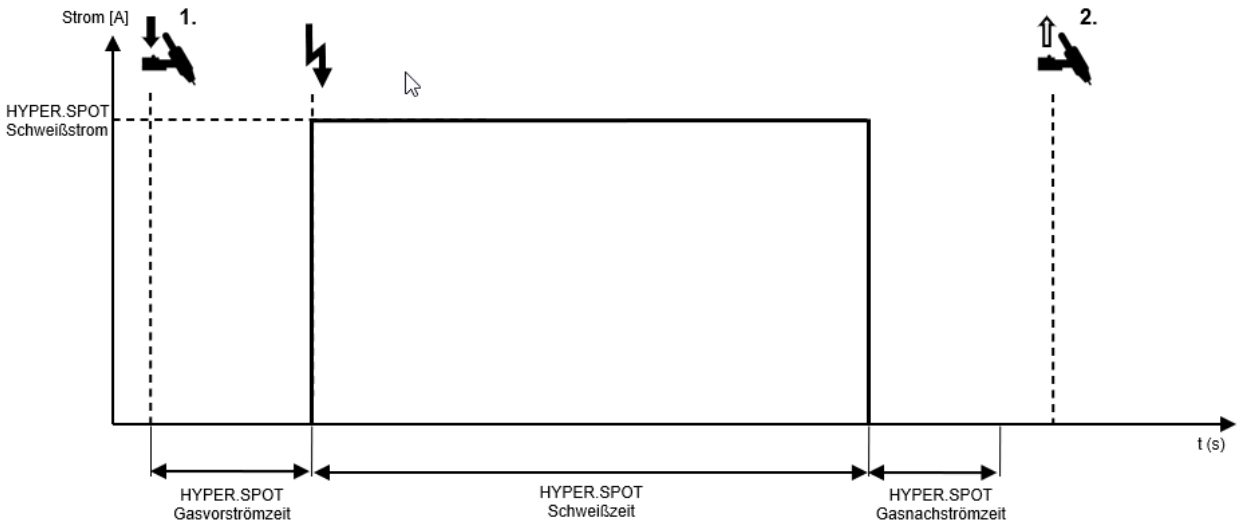


Figure 14: Procedure for the HYPER.SPOT operating mode with HF ignition

#) Only with the Ultra version.

5.2.5 Two-cycle interval operating mode with HF ignition

Procedure for two-cycle interval operating mode with HF ignition:

❒ First cycle – press the torch trigger
- ❒ The inert gas solenoid valve opens
- ❒ After the set gas pre-flow time has expired, the arc is ignited with high-frequency ignition
- ❒ The welding current automatically adjusts to the selected starting current slope time, starting from the set starting current and rising to the preselected value for welding current
- ❒ The welding current flow is at the set value set for welding
- ❒ The interval welding time is running
- ❒ After the interval welding time has expired, the welding current is reduced over the end current slope time to the end current value.
- ❒ After the end current time has expired, the arc goes out.
- ❒ The pause time is running
- ❒ After the pause time has expired, the welding process is restarted and the welding process runs again.

❒ Second cycle – release the torch trigger
- ❒ For the duration of the end current slope time, the welding current is reduced to the value set for the slope-down current.
- ❒ After the end current time has expired, the arc goes out.
- ❒ The inert gas is switched off after the gas post-flow time has expired.

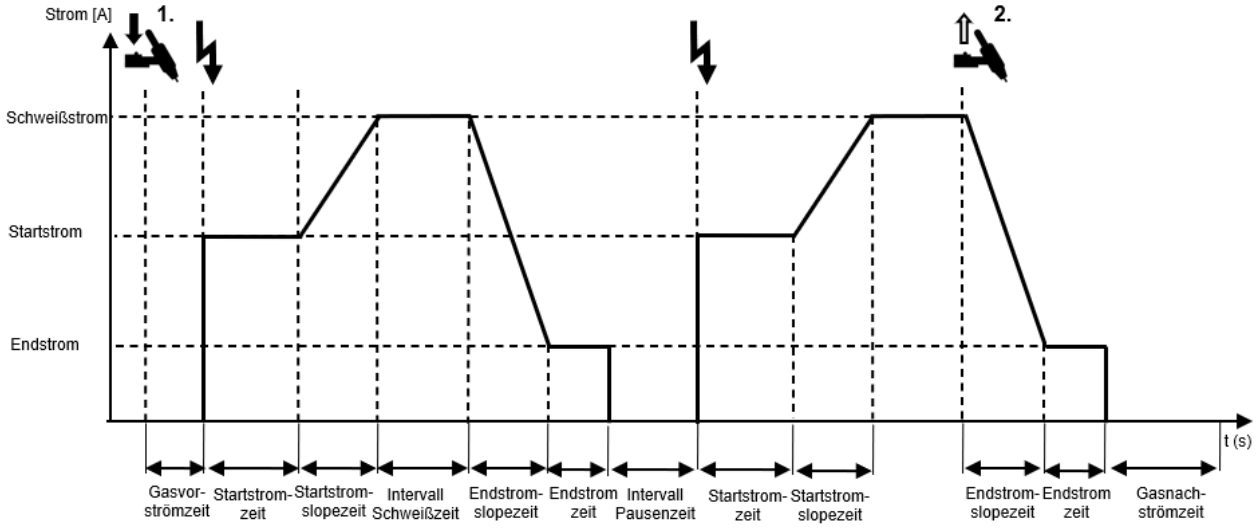


Figure 15: Procedure for two-cycle interval operating mode with HF ignition

5.2.6 Four-cycle interval operating mode with HF ignition

Procedure for four-cycle interval operating mode with HF ignition:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ After the set gas pre-flow time has expired, the arc is ignited with high-frequency ignition
  - ❒ The welding current adjusts to the starting current value.
- ❒ Second cycle – release the torch trigger
  - ❒ The welding current is changed from the starting current value in the starting current slope time to the value set for welding.
  - ❒ The interval welding time is running.
  - ❒ After the interval welding time has expired, the welding current is reduced over the end current slope time to the end current value.
  - ❒ After the end current time has expired, the arc goes out.
  - ❒ The interval pause time is running
  - ❒ After the pause time has expired, the welding process is restarted and the welding process runs again.
- ❒ Third cycle – press the torch trigger
  - ❒ Within the end current slope time, the welding current is reduced to the end current value.
  - ❒ The end current value is maintained.
- ❒ Fourth cycle – release the torch trigger
  - ❒ The welding process ends
  - ❒ The inert gas is switched off after the gas post-flow time has expired.

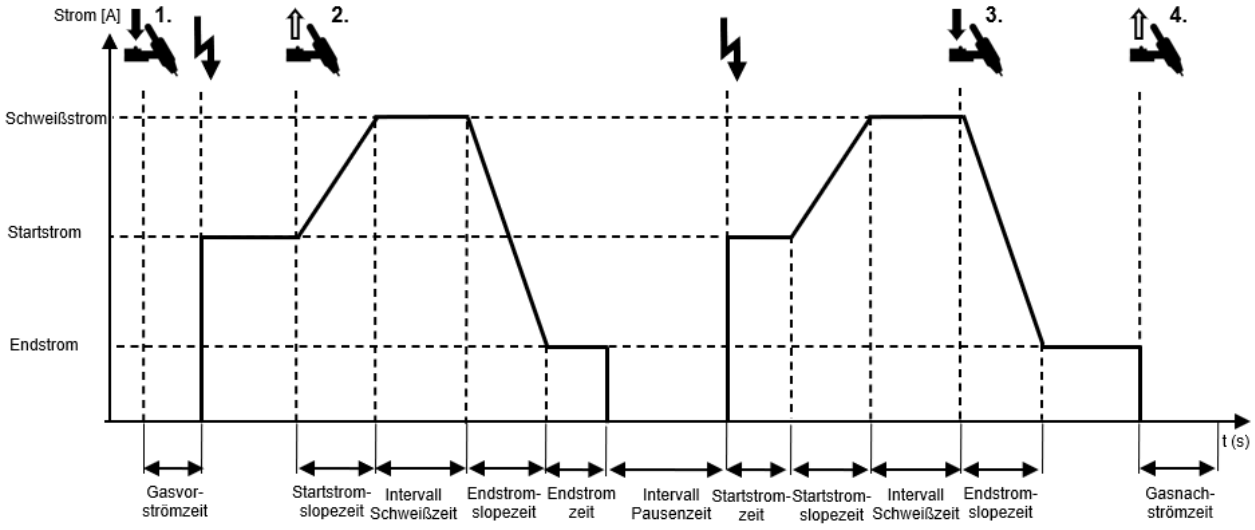


Figure 16: Procedure for four-cycle interval operating mode with HF ignition

5.2.7 Two-cycle operating mode with LiftArc ignition

Procedure for two-cycle operating mode with LiftArc ignition:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ Attach the electrode to the workpiece
  - ❒ When the gas pre-flow time expires, the power unit is switched on
  - ❒ Little current flows so as not to damage the electrode
  - ❒ Lift the electrode from the workpiece
  - ❒ The arc is ignited
  - ❒ After starting current time has expired, welding current is changed from the starting current value to the value set for welding within the starting current slope time.
- ❒ Second cycle – release the torch trigger
  - ❒ Within the end current slope time, the welding current is set to the end current.
  - ❒ After the end current time has expired, the arc goes out.
  - ❒ The inert gas is switched off after the gas post-flow time has expired.

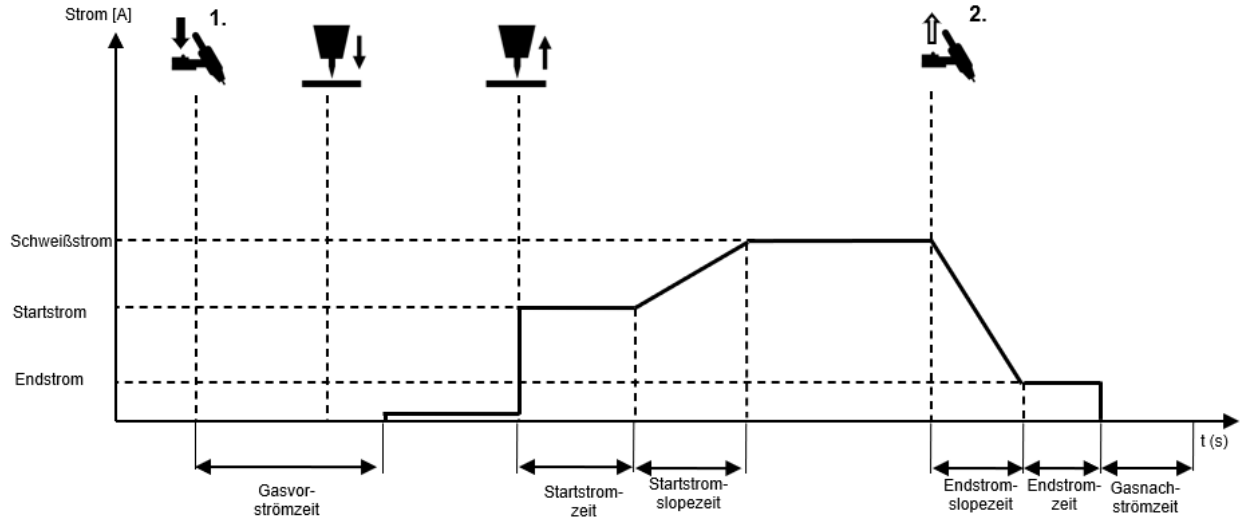


Figure 17: Procedure for two-cycle operating mode with LiftArc ignition

5.2.8 Four-cycle operating mode with LiftArc ignition

Procedure for four-cycle operating mode with LiftArc ignition:

- ❒ First cycle – press the torch trigger
  - ❒ The inert gas solenoid valve opens
  - ❒ Attach the electrode to the workpiece
  - ❒ When the gas pre-flow time expires, the power unit is switched on
  - ❒ Little current flows so as not to damage the electrode
  - ❒ Lift the electrode from the workpiece
  - ❒ The arc is ignited
  - ❒ Starting current is flowing.
- ❒ Second cycle – release the torch trigger
  - ❒ Within the starting current slope time, the welding current is changed from the starting current value to the value set for welding.
- ❒ Third cycle – press the torch trigger
  - ❒ Within the end current slope time, the welding current is reduced to the end current.
  - ❒ End current is flowing.
- ❒ Fourth cycle – release the torch trigger
  - ❒ The arc goes out
  - ❒ The inert gas is switched off after the gas post-flow time has expired.

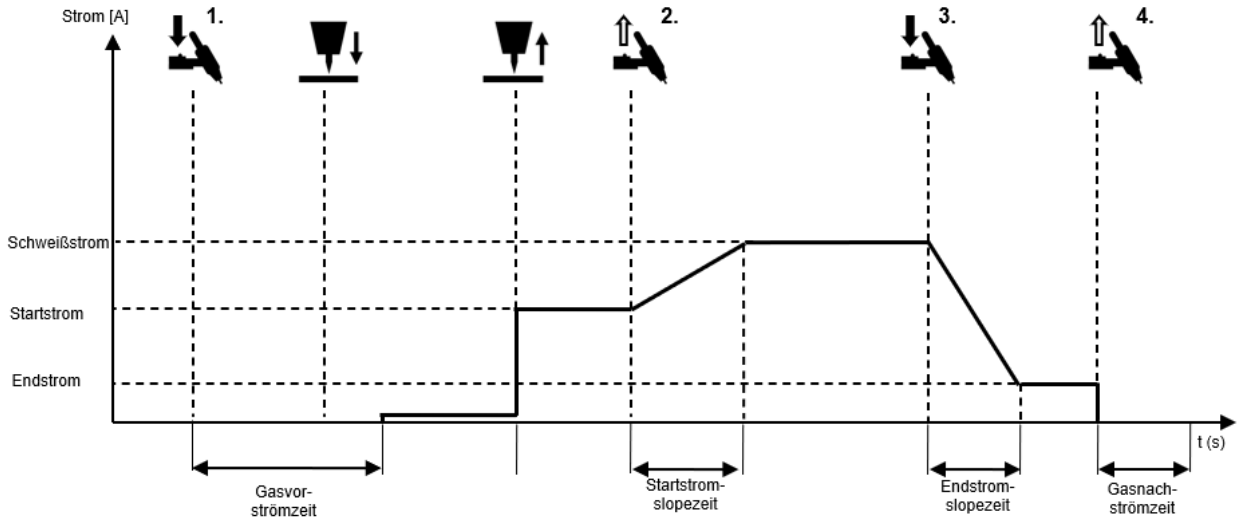


Figure 18: Procedure for four-cycle operating mode with LiftArc ignition

5.2.9 Spot operating mode with LiftArc ignition

Procedure for Spot operating mode with LiftArc ignition:

❒ First cycle – press the torch trigger
- ❒ The inert gas solenoid valve opens
- ❒ Attach the electrode to the workpiece
- ❒ When the gas pre-flow time expires, the power unit is switched on
- ❒ Little current flows so as not to damage the electrode
- ❒ Lift the electrode from the workpiece
- ❒ The arc is ignited
- ❒ After starting current time has expired, welding current is changed from the starting current value to the value set for welding within the starting current slope time.
- ❒ After spot welding time has expired, the welding current is reduced to end current within the end current slope time.
- ❒ After the end current time has expired, the arc goes out.
- ❒ The inert gas is switched off after the gas post-flow time has expired.

❒ Second cycle – release the torch trigger prematurely
- ❒ Releasing the torch trigger during the spot welding time terminates the welding process immediately, and the inert gas is switched off after the gas post-flow time expires.

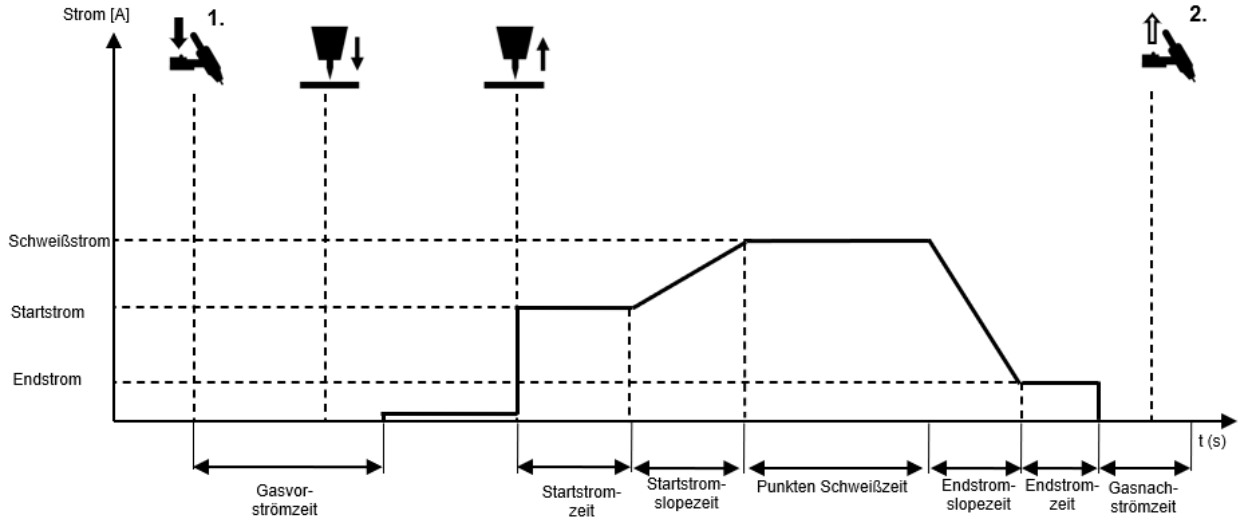


Figure 19: Procedure for Spot operating mode with LiftArc ignition

5.2.10 HYPER.SPOT operating mode# with LiftArc ignition

Procedure for Spot operating mode with LiftArc ignition:

❒ First cycle – press the torch trigger
- ❒ The inert gas solenoid valve opens
- ❒ Attach the electrode to the workpiece
- ❒ When the gas pre-flow time expires, the power unit is switched on
- ❒ Little current flows so as not to damage the electrode
- ❒ Lift the electrode from the workpiece
- ❒ The arc is ignited
- ❒ Welding current flows.
- ❒ After the HYPER.SPOT welding time has expired, the arc goes out.
- ❒ The inert gas is switched off after the gas post-flow time has expired.

❒ Second cycle – release the torch trigger prematurely
- ❒ Releasing the torch trigger during the Spot welding time terminates the welding process immediately, and the inert gas is switched off after the gas post-flow time expires

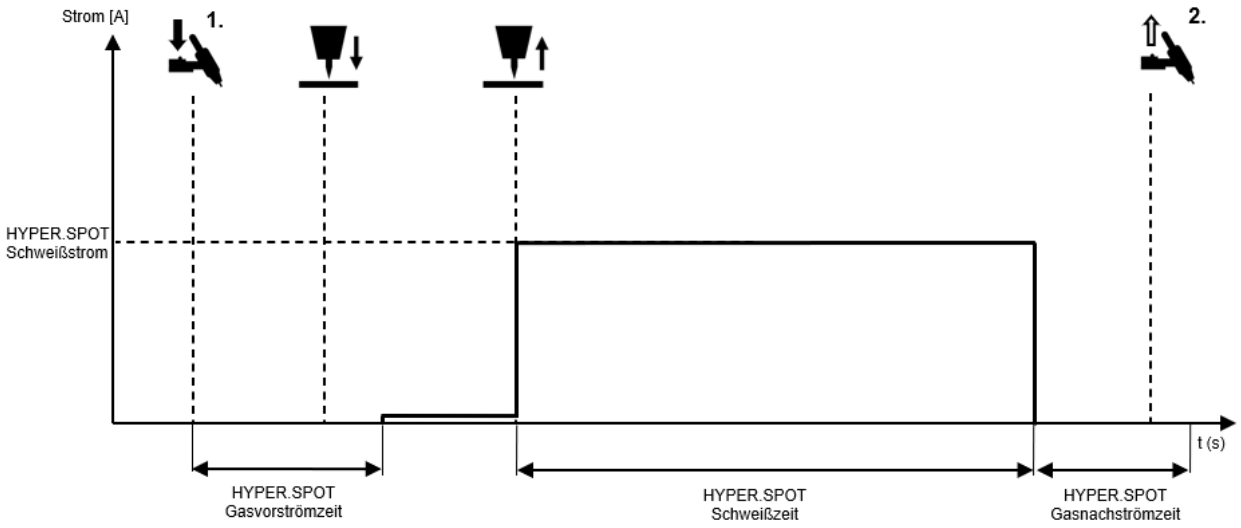


Figure 20: Procedure for the HYPER.SPOT operating mode with LiftArc ignition

#) Only with the Ultra version.

5.2.11 Touch-HF operating mode# Two-cycle operating mode with HF ignition

The Touch-HF ignition type is specifically designed to ignite the arc without the torch trigger being actuated. This is especially advantageous when the arc must be positioned with great precision for intricate components.
#) Only with the Ultra version.

❒ Process release for Touch-HF

Setup: "'Touch-HF' ignition mode"	
Individual	For release, press the torch trigger briefly and release it; release for 30s; release before each welding operation; observe the information on the operating interface.
Continuous	For release, press the torch trigger briefly and release it; release for 30s and for 30s after the end of the last welding operation; observe the information on the operating interface.
Without torch trigger	Release is always active; especially suited to work with torches with no torch triggers.

❒ Procedure for arc ignition without torch trigger

- ❒ Attach the electrode to the workpiece and position it
- ❒ The gas valve is opened
- ❒ Lift the electrode from the workpiece
- ❒ At this point, gas pre-flow time begins
- ❒ After the gas pre-flow time has expired, the arc is ignited with HF
- ❒ Starting current is flowing.
- ❒ After the starting current time expires, current is changed to welding current within the starting current slope time.

❒ First cycle – press the torch trigger

- ❒ Within the end current slope time, the welding current is reduced to the end current.
- ❒ End current is flowing.

❒ Second cycle – release the torch trigger

- ❒ The arc goes out
- ❒ The inert gas is switched off after the gas post-flow time has expired.

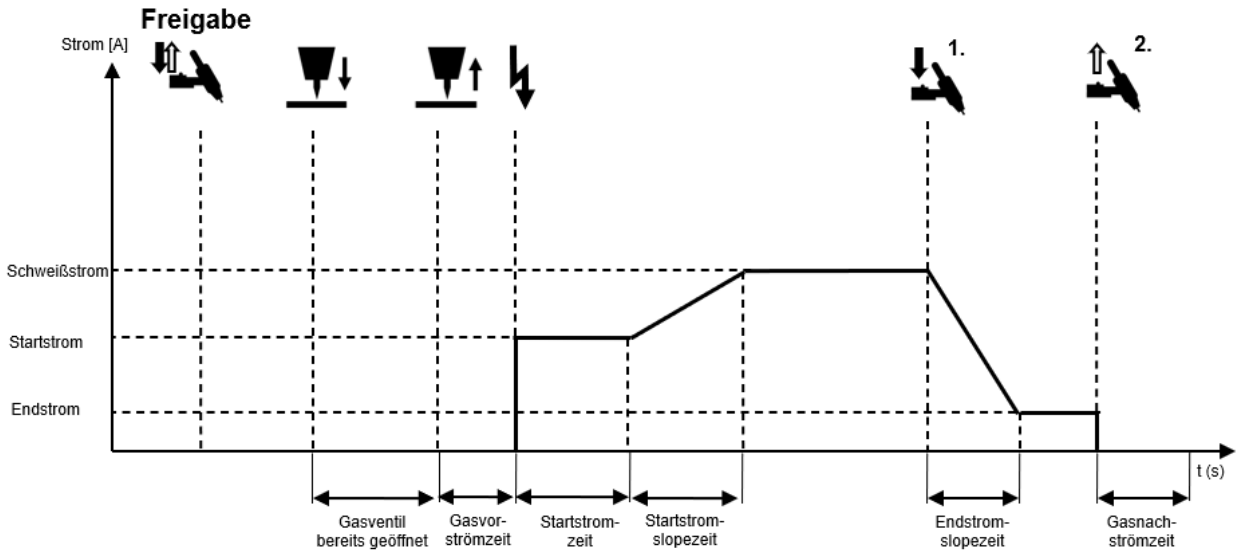


Figure 21: Procedure for 2T Touch-HF operating mode with HF ignition

5.2.12 Touch-HF operating mode# Spot with HF ignition

❒ Process release for Touch-HF

Setup: "'Touch-HF' ignition mode"	
Individual	For release, press the torch trigger briefly and release it; release for 30s; release before each welding operation; observe the information on the operating interface.
Continuous	For release, press the torch trigger briefly and release it; release for 30s and for 30s after the end of the last welding operation; observe the information on the operating interface.
Without torch trigger	Release is always active; especially suited to work with torches with no torch triggers.

Procedure for Touch-HF spot operating mode with HF ignition:

❒ Procedure for arc ignition without torch trigger

- ❒ Attach the electrode to the workpiece and position it
- ❒ The gas valve is opened
- ❒ Lift the electrode from the workpiece
- ❒ At this point, gas pre-flow time begins
- ❒ After the gas pre-flow time has expired, the arc is ignited with HF
- ❒ Starting current is flowing.
- ❒ After the starting current time expires, current is changed to welding current within the starting current slope time.
- ❒ After the spot welding time has expired, the current is reduced over the end current slope time to the end current value.
- ❒ After the end current time has expired, the arc goes out.
- ❒ The inert gas is switched off after the gas post-flow time has expired.

❒ Actuate the torch trigger

- ❒ If the torch trigger is actuated during spot welding time, the welding process ends immediately

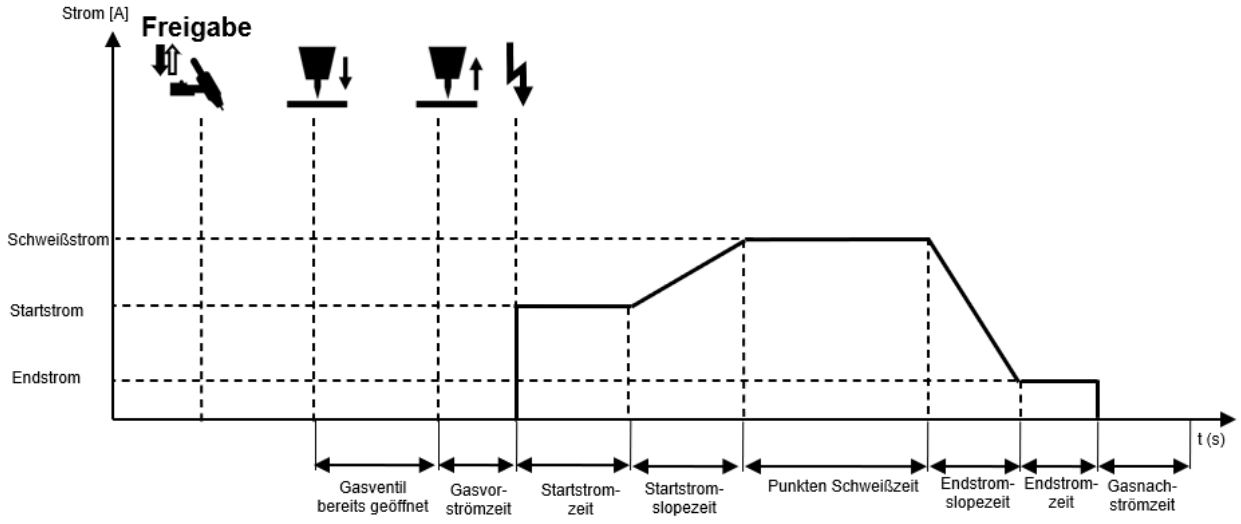


Figure 22: Procedure for Touch-HF spot operating mode with HF ignition

#) Only with the Ultra version.

5.2.13 Touch-HF HYPER.SPOT operating mode with HF ignition

❒ Process release for Touch-HF

Setup: "'Touch-HF' ignition mode"	
Individual	For release, press the torch trigger briefly and release it; release for 30s; release before each welding operation; observe the information on the operating interface.
Continuous	For release, press the torch trigger briefly and release it; release for 30s and for 30s after the end of the last welding operation; observe the information on the operating interface.
Without torch trigger	Release is always active; especially suited to work with torches with no torch triggers.

Procedure for Touch-HF HYPER.SPOT operating mode with HF ignition:

❒ Procedure for arc ignition without torch trigger
- ❒ Attach the electrode to the workpiece and position it
- ❒ The gas valve is opened
- ❒ Lift the electrode from the workpiece
- ❒ At this point, gas pre-flow time begins
- ❒ After the HYPER.SPOT gas pre-flow time has expired, the arc is ignited with HF
- ❒ HYPER.SPOT welding current is flowing.
- ❒ After the HYPER.SPOT welding time has expired, the arc goes out.
- ❒ The inert gas is switched off after the HYPER.SPOT gas post-flow time has expired

❒ Actuate the torch trigger
- ❒ If the torch trigger is actuated during HYPER.SPOT welding time, the welding process ends immediately

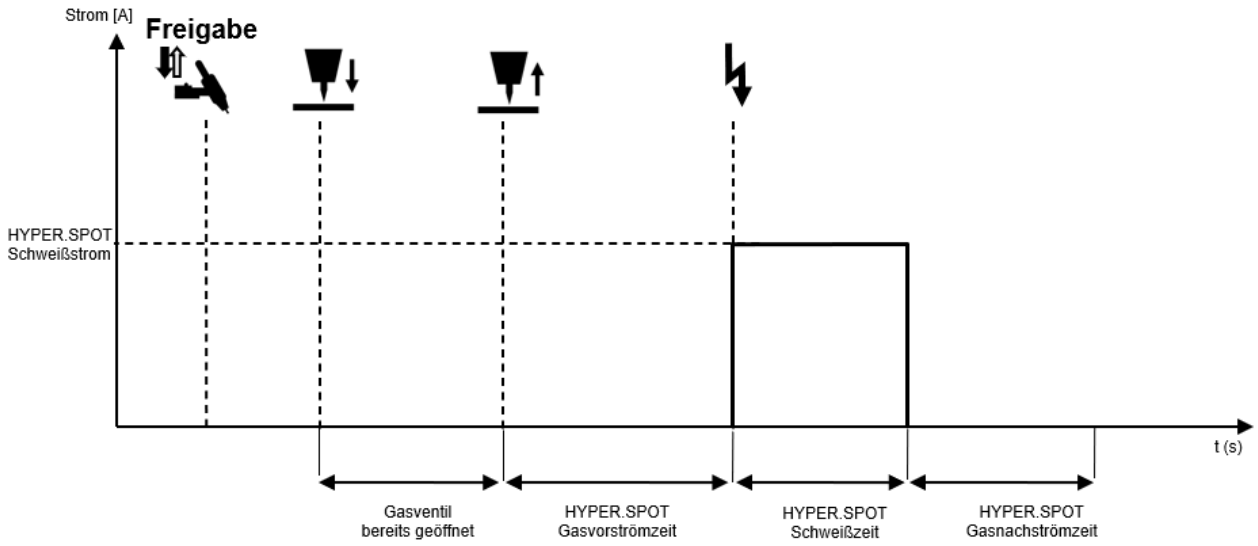


Figure 23: Procedure for Touch-HF HYPER.SPOT operating mode with HF ignition

#) Only with the Ultra version.

5.3 Polarity corner menu

In the Polarity corner menu [BF3], electrode polarity can be selected for AC/DC systems. The following settings can be selected:

- DC-
- DC+
- AC
- DUAL.WAVE

The setting is made by turning and pressing the rotary encoder.

5.3.1 Direct current negative (DC-)

In TIG welding with negative pole the negative pole is applied to the left output socket for the TIG torch. Direct-current TIG welding usually uses this setting.

During electrode welding with negative pole, the electrode holder is also connected to the left output socket. The electrode is welded with negative polarity. During electrode welding, the polarity selected for the electrode depends on the type of electrode used (observe the electrode manufacturer's instructions).

5.3.2 Direct current positive (DC+)

In TIG welding with positive pole the plus pole is applied to the left output socket for the TIG torch.

In DC TIG welding the positive electrode is subject to a very high thermal load, which can result in the electrode melting and damage even at low current.

When electrode welding with plus pole the electrode holder is also connected to the left output socket. When setting the DC positive electrode welding is performed with the electrode as the positive pole. When electrode welding the polarity selected for the electrode depends on the type of electrode being used (observe the electrode manufacturer's instructions).

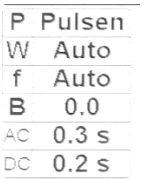
5.3.3 Alternating current (AC)

During AC welding, polarity at the output terminals is constantly alternating between positive and negative polarity. During TIG welding, the torch is normally connected to the left output socket. Alternating current allows welding of aluminium and aluminium alloys.

5.3.4 DUAL.WAVE (DC-/AC)

The Dual Wave process from REHM is a combination of AC and DC welding. When welding this is automatically set by the processor controller at 0.2 seconds DC and then 0.3 seconds AC. The selected values for the welding current I1 or I2, frequency, and balance are taken into account for purely DC or AC welding.

The Dual Wave process enables better control of the weld pool and is used in difficult welding positions, when welding workpieces of different thicknesses and in the processing of thin sheets of aluminium and aluminium alloys.



5.4 Welding process corner menu

Five additional welding processes are available for the TIG welding process. These differ fundamentally in the material transition of the filler material, the heat input and the arc length. Depending on welding system equipment and filler material, various processes are available.

The welding process corner menu [BF4] is used to select:

- Pulse off
- HYPER.PULS
- Time pulses
- Automatic pulse#
- Balling#

#) Only with the Ultra version.

5.4.1 Time pulses

The setting of the I1-pulse time t1 and the I2-pulse time t2 determines the duration that current I1 or current I2 remains active until switching to the other current. Both pulse times can be set independently of each other. The times and welding current peaks should be matched so that the base material is melted during the high current phase and solidified during the low current phase.

- Reduced heat input
- Better weld pool control
- For vertical weld seams
- For large gaps
- Thin sheet welding

5.4.2 HYPER.PULS

The flow of the welding current during HYPER.PULS is the same as that during time pulses. However, the periods during which current I1 and I2 are active are very short. Therefore, a description with pulse frequency is expedient and customary.

- Better weld pool control
- Narrow arc
- Deep fusion penetration

5.4.2 Automatic pulse#

To achieve good results quickly, select the Automatic pulse setting, where the prescribed values for pulse times/frequencies and currents are stored.

- Find good results fast
- Better weld pool control

5.4.3 Balling#

In preparation for AC arc welding, a DC+ pulse is applied once to a newly-ground electrode.

- Preparing the electrode for AC arc welding and DUAL.WAVE welding

- Optimal balling
- Function adjusted to electrode diameter

5.5 Quick Choice buttons

The four Quick Choice buttons [BF34-BF37] can be used to quickly and easily store and call up jobs.

To store the current settings for the entire system, the relevant button is held for 3s. The display switches to job view.

To call up a job, short-press the relevant Quick Choice button. The display switches to job view. Now the stored job can be used. Jobs are stored in the folder.

5.6 Submenu

Pressing the "Submenus" button [BF32] accesses a selection list (drop-down list) for the existing submenu. Various menus can currently be selected from this list. These menus may change with updates. Depending on system equipment, some settings will not be available.

The submenus can be exited in three ways, with the return button [BF40]:

1. One level back by acknowledging a setting
2. One level back by pressing the "**Back**" button
3. Completely back to the main screen with the button "**Main menu**" (*Rehm*).

5.7 Current curve functions

With the welding parameters, the user can individually set the most important parameters for welding, such as gas pre-flow time, creep, etc.

Some welding parameters are active only when certain welding processes/functions are selected.

5.7.1 Parameter settings

Welding parameters are for the most part selected and processed directly in the illustrated welding curve with the push and rotary encoder [Fig. 9]. The representation and setting options depend on the unit type and the preselected welding process.

The cursor can be moved clockwise or anti-clockwise. The main display always shows the value and function of the cursor position.

5.7.2 Setting the TIG welding parameters

For processing, a parameter field is activated by rotating the rotary encoder to move the cursor to the adjustable value field [parameter field] in the screen display. The selected field is highlighted in orange. Pressing the encoder activates the field, which is then highlighted in blue.

If the parameter field is active, the set value appears as a large display at the top centre of the screen (Fig. 24). In addition, a bar display appears in the status field Figure, which shows the set value in the permissible value range.

The welding parameters are described in detail below in a sequence that follows the TIG parameter curve. Fewer parameters may be displayed, depending on functions, operating mode, and welding system equipment, and the current curve adjusts individually and dynamically.

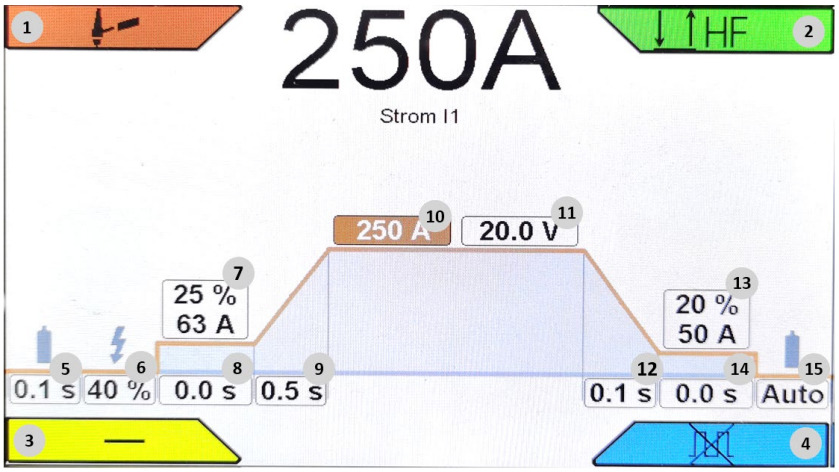


Figure 24: Current curve

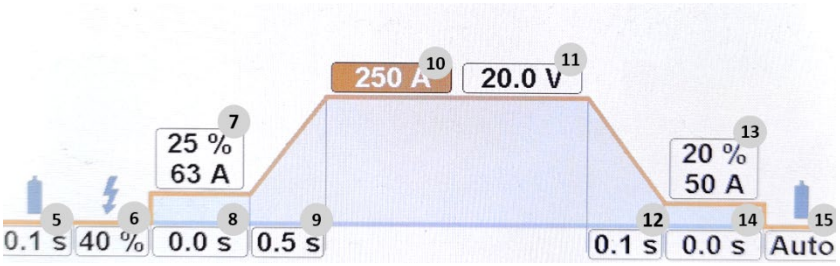


Figure 25: TIG parameter details

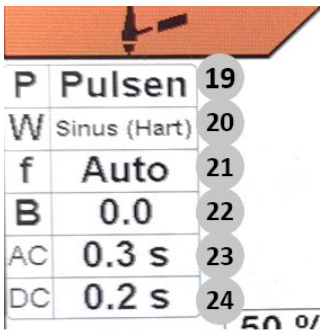


Figure 26: TIG parameter details, AC

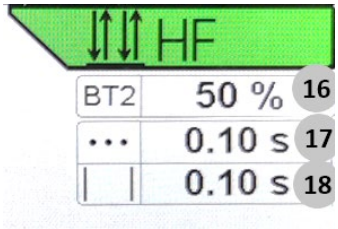


Figure 27: Operating mode details

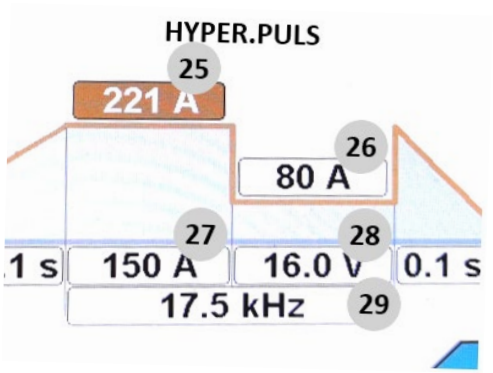


Figure 28:
TIG parameter details, HYPER.PULS

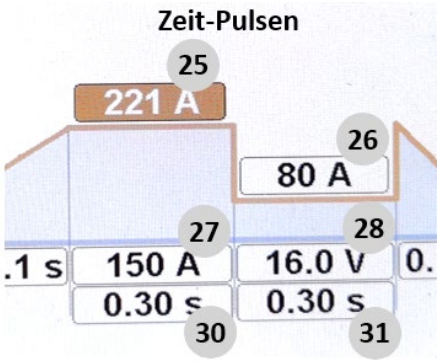


Figure 29:
TIG parameter details, time pulses

5.7.3 Explanation of welding parameters

BF 5 gas pre-flow time

The gas pre-flow time is the period of time after activating the torch trigger of torch to start the welding process and the opening of the inert gas valve before the arc is ignited. Then the arc is ignited in the inert gas mantle, whereby the electrode and the workpiece is protected from burning out.

If the welding process is restarted during gas post-flow time, processor control automatically sets gas pre-flow time to 0 seconds. This speeds up the reignition, which helps to save time for such procedures as tack welding.

BF 6 Ignition energy

The ignition energy can be infinitely adjusted between 10 and 100% when igniting for high-frequency or LiftArc. The processor control always sets a preselection for the required ignition process irrespective of the value selected for ignition energy. This preselection can be adapted to the selected electrode (type and diameter) and the relevant welding task by adjusting the ignition energy with the correct polarity.

A low ignition energy should be selected when welding thin material and with small electrode diameters.

With AC welding systems from an ignition energy setting of 90% a “power ignition” is performed, whereby ignition is facilitated in harsh environments.

BF 7 Starting current

The starting current is the welding current that is first set after the ignition process. The setting is infinitely variable between 1% and 200% of the selected welding and pulse current I1. The value range is limited by the maximum unit flow. Example: Starting current 40% and welding current I1 100A produces a starting current of 40A.

Starting current adjustment allows:

- A reduction of the electrode load by a gradual increasing of the current.
- A search arc for four-cycle welding for approaching the start of the seam
- Heat input reduction at the beginning of the seam for edges or heat accumulation
- An increase in heat input at values above 100%

BF 8 Starting current time

The starting current time is the time in which welding is with starting current. Starting current time takes effect only in the 2T, Interval 2T, and Spot operating modes.

BF 9 Starting current slope time

The current slope-up time is the period in which the welding current increases linearly from the starting current to the preselected welding current I1. During two-cycle welding, the current slope-up time begins immediately after the arc is ignited. During four-cycle welding, the slope-up time begins with the release of the torch trigger with the starting current phase.

BF 10 Welding current I1

The setting range for welding current I1 depends on the selected operating mode and type of machine.

BF 11 Welding voltage U1

Welding voltage is displayed for information only and should be viewed as a guideline. Voltage depends greatly on the welder, welding circuit, and welding task. After welding, real voltage is displayed as a hold value.

BF 12 End current slope time

The end current slope time is the period in which the welding current decreases linearly to the end current. For two-cycle welding, the end current slope time begins immediately after release of Torch Trigger 1. With four-cycle welding, slope-down time begins during welding with the actuation of Torch Trigger 1. The slow slope-down of the welding current prevents the occurrence of end craters and their cracks. Releasing the torch trigger in four-cycle operation immediately ends slope-down.

BF 13 End current

The end crater current is the welding current to which the welding current is reduced when the welding process is ended. The setting is infinitely variable between 1% and 200% of the selected current I1 (example: end crater current 40% and welding current I1 100A -> end crater current 40A). In the system application, the percentage amount can be set to a fixed value. Selecting the appropriate end crater current enables:

- Prevention of notches and end crater cracks at the end of the weld seam due to rapid cooling of the weld pool
- Manual pulsing (see Section 3.6.8)
- Welding with reduced current at the end of the weld seam at edges or for heat accumulation.

BF 14 End current time

End current is held for end current time in the 2T, Interval 2T, and Spot operating modes.

BF 15 Gas post-flow time

The gas post-flow time is the time after the arc extinguishes before the inert gas valve closes. The post-flow of inert gas protects the workpiece and the tungsten needle from oxygen in the atmosphere until they have cooled. But the pre-selected gas post-flow time is effective only when welding has taken place. The accidental actuation of the torch trigger does not result in the expiration of gas post-flow time. This gas management function reduces inert gas consumption.

BF 16 Torch Trigger 2 second current

With twin-current control the user can work with 2 different, pre-set currents when using a torch with 2 triggers. During welding, a switch can be made between the current I1 and second current BT2 values. There are several options for activating

second current BT2. Settings can be made in the Welding sub-point to Setup. Values are expressed in % or amperes.

- Tap BT1 (behaves like 4T)
- Hold BT2 (behaves like 2T)
- Tap BT2 (behaves like 4T)

Switching example:

- From high-current to low-current or vice-versa, for example when changing the welding position.
- manual pulsing
- Starting at high current I1 for warming the workpiece, then welding with low-current I2
- Starting with low-current I1 at an edge on the workpiece, then welding with high-current I2.

BF17 Interval welding time/spot welding time

The Spot welding time or Interval welding time settings menu is displayed when the Interval or Spot operating mode is selected.

BF18 Interval pause time

The Pause time interval settings menu is displayed when Interval operating mode is selected.

BF19 Pulse menu

The Pulse menu can be called up for detailed pulse welding settings.

BF20 AC current form

Sine, rectangle, triangle, and hard sine waveforms can be selected. In the Auto setting, the waveform is set automatically.

- Sine: noise-optimized current form
- Triangle: Higher penetration than with sine
- Rectangle: Highest penetration, low electrode load, highest arc stability
- Hard sine: Optimum between sine and rectangle; high arc stability, pleasant sound

BF21 AC frequency

The frequency value determines how fast the output polarity reversal takes place one after the other. The setting range extends from 30 Hz to 300 Hz. For example, at a frequency of 200 Hz the polarity reversal at the output socket from plus to minus and back occurs every 5ms (=0.005 seconds). The welding current drops to zero with every polarity reversal, ignites again in the opposite direction and increases to the set welding current. The sinusoidal shape used in this processor-controlled process results in significant noise reduction and technical welding benefits during AC welding. REHM recommends the automatic frequency control setting. The automatic frequency control automatically adjusts AC frequency to the current. At low welding current, the AC arc is focused. This achieves reliable root formation in thin sheets with fillet welds, for instance. The load on tungsten electrodes is reduced at higher currents. The result is a long service life and optimum economy. The automatic frequency control is especially advantageous for work with the remote foot control.

BF22 AC balance

The AC balance setting option is only available with AC current welding with TIG. It ranges from -5 to +5 and enables the arc to be influenced as well as the penetration and cleaning when welding aluminium over a very large range. In the

centre position (0) the negative and positive welding current is equally distributed over time.

With an increasing positive value the share of the positive welding current increases (up to +5.0) and the negative share reduces. The cleaning of the weld pool is improved by the positive share. The arc is wider and heat penetration less deep.

With an increasing negative value the share of the negative welding current increases (up to -5.0) and the positive share reduces. This makes the arc more narrow and generates a deeper weld penetration at the same time as a low electrode load. The use of the highest possible negative value whilst maintaining a sufficient cleaning effect is recommended. The pause time interval settings menu is displayed when Interval operating mode is selected.

BF23 DUAL.WAVE AC time

During this time, the unit welds in the AC mode set above and with the set AC parameters.

Value range: 0.1 – 10 sec.

BF24 DUAL.WAVE DC time

During this time, the unit welds in the DC mode set above

Value range: 0.1 – 10 sec.

BF25 Pulse current I1

In pulse mode, this current is used as a set value for the first pulse phase and time pulse t1.

Changes to pulse current I1 have no effect on pulse current I2. But the average pulse current value is constantly recalculated according to the mathematical relationship.

BF26 Pulse current I2

In pulse mode, this current is used as a set value for the second pulse phase and time pulse t2.

Changes to pulse current I2 have no effect on pulse current I1. But the average pulse current value is constantly recalculated according to the mathematical relationship.

BF27 Pulse current average value

The average pulse current value makes it easy to shift performance during pulse welding. If this value is changed, pulse current I1 and pulse current I2 are changed at the same time. It will happen so that the percentage relationship between pulse current I1 and pulse current I2 remains constant.

BF28 Voltage for pulse current average value

Welding voltage is displayed for information only, reflects the average pulse current value, and should be viewed as a guideline. Voltage depends greatly on the welder, welding circuit, and welding task. After welding, real voltage is displayed as a hold value.

BF29 HYPER.PULS frequency

During HYPER.PULS welding, this value is displayed. The flow of the welding current is the same as conventional pulsing. However, the periods during which current I1 and I2 are active are always the same. Because these periods are typically very short, a description with pulse frequency is expedient and customary. Setting range: 0.1 Hz – 18 kHz

Pulses of such short duration bring about a more narrow arc and deeper penetration. The current average value is always shown in the main display field because of the rapid alternations. This means that for welding current I1 = 100A and I2 = 50A, the indicator shows 75A.

BF30 Time pulses Time I1

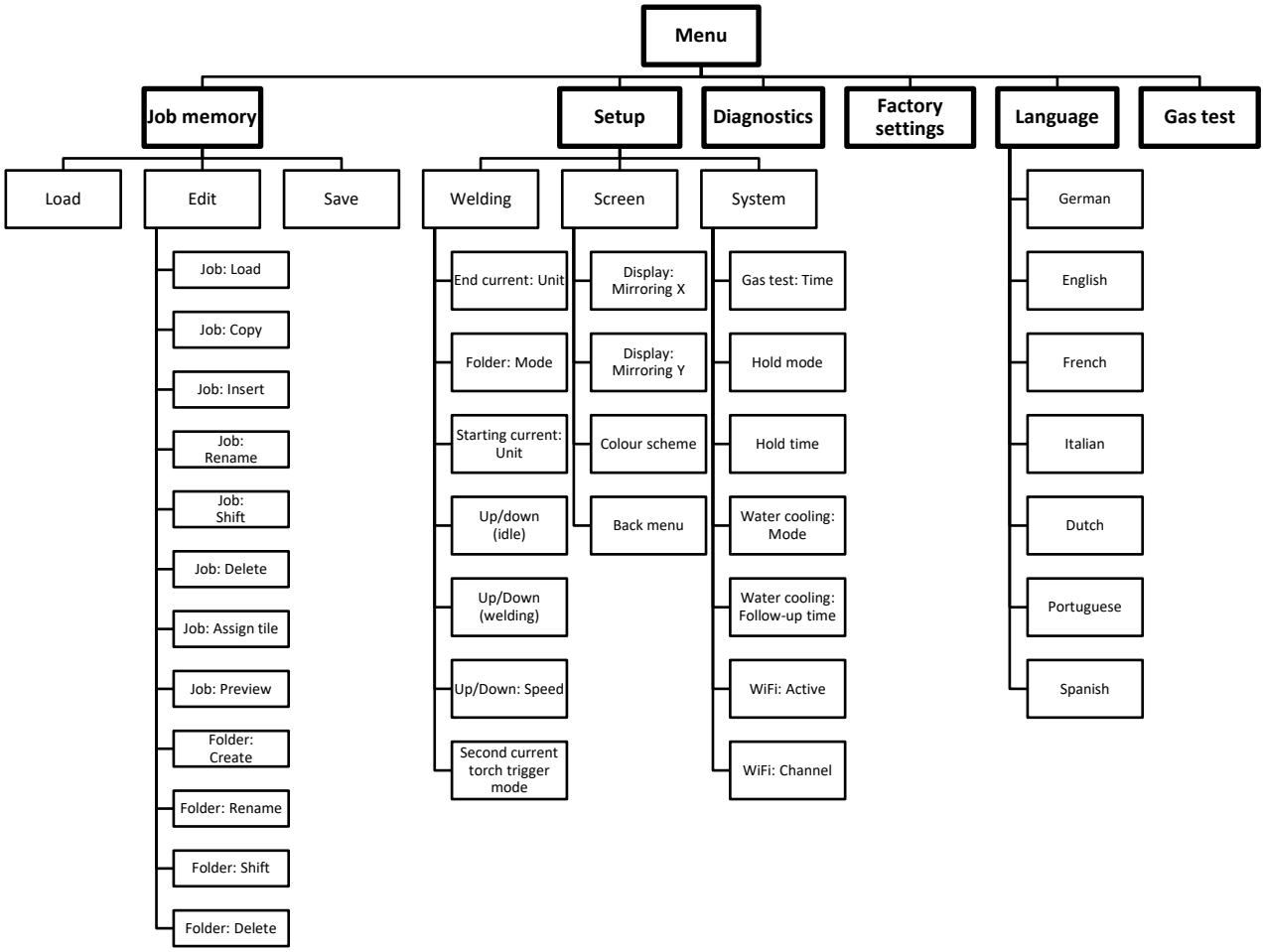
The time pulse t1 value reflects the time in which welding current I1 is applied.

BF31 Time pulses Time I2

The time pulse t1 value reflects the time in which welding current I2 is applied.

5.8. Submenus

Pressing the [BF32] button calls up the submenu. There, individual settings for the welding unit can be adjusted. The menu structure is organized as follows:



5.8.1 Job memory

The Jobs submenu allows loading, saving and deleting of up to 500 jobs. The jobs can be saved and loaded under a freely selectable name in a freely selectable folder. Once the unit settings for recurring welding tasks have been determined, they can be quickly recalled and reset on the welding unit.

Figure 30: Job submenu

5.8.1.1 Save job

- ❒ Carry out the required machine setting
- ❒ Pressing the "Submenus" button [BF32] accesses a selection list (drop-down list) for the existing submenu.
- ❒ Select the job memory view by turning and pressing the rotary encoder.
- ❒ Select a folder and display its contents by turning and pressing the rotary encoder.
- ❒ To create a new job, position the cursor on the folder name.
- ❒ To overwrite a job, position the cursor on the job to be overwritten.
- ❒ Select the Save function by pressing the key on the top right.
- ❒ The following query may appear: Save as a new job or overwrite?
- ❒ Enter the required name in the job memory by turning and pressing the rotary encoder (e.g. name of an employee, name of a customer and/or material). The job name can be up to 40 characters long.
- ❒ The job is saved by selecting and pressing the "ok" field.
- ❒ Press the "Home" button [BF40] to return to the main screen.

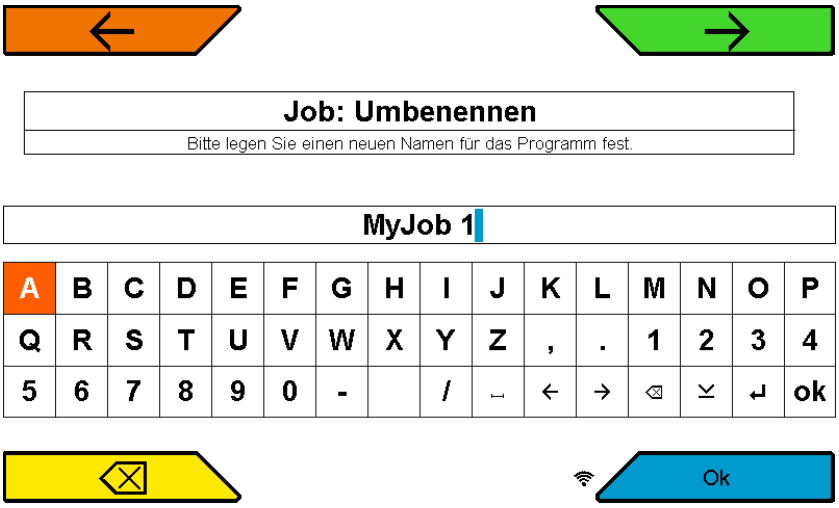


Figure 31: Submenu Job / Text input

Symbol	Function
	Add a space
	Cursor left
	Cursor right
	Delete letter to the left of the cursor
	Lower-case
	New line

Table 4 Explanation symbols Text input

5.8.1.2 Load job

- ❒ Pressing the "Submenus" button [BF32] accesses a selection list (drop-down list) for the existing submenu.
- ❒ Select the job memory view by turning and pressing the rotary encoder.
- ❒ Select and open the desired job folder by turning and pressing the rotary encoder. Select the desired job by turning it.
- ❒ To call up a preview of the selected job's settings, press the rotary encoder.
- ❒ Select the Load function by pressing the Corner menu key.
- ❒ Press the "Home" button to return to the main screen.
- ❒ Job mode is shown on the main screen

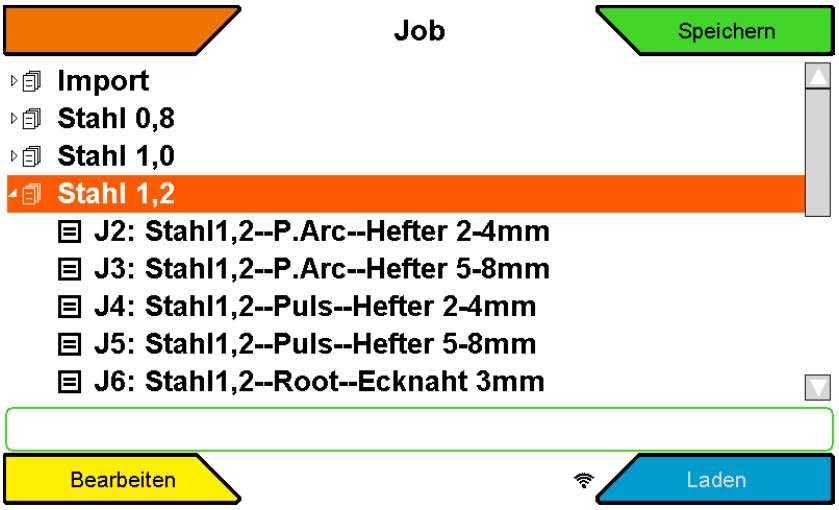


Figure 32: Job memory/status bar view showing selected job

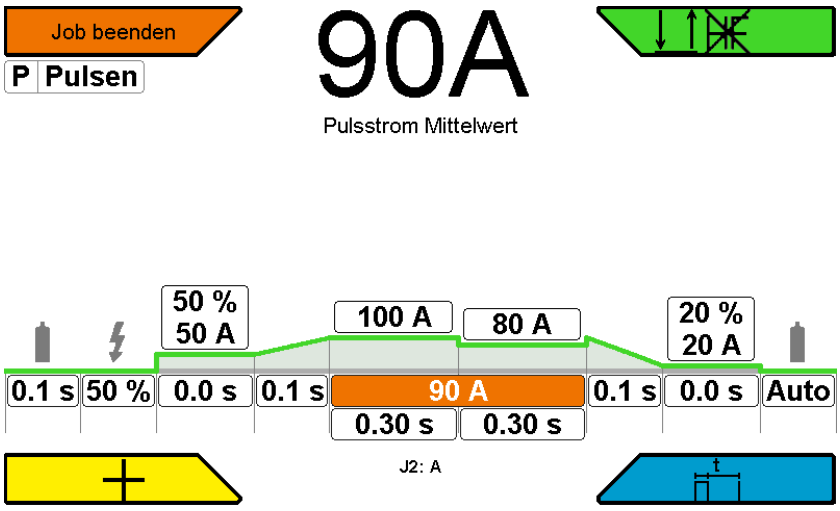


Figure 33: Main view with active job

If parameters are changed, the previously selected job is ended.
Exception: Operating mode selection

5.8.1.3 Editing jobs and folders

- ❒ Pressing the "Submenus" button [BF32] accesses a selection list (drop-down list) for the existing submenu.
- ❒ Select the desired function by turning and pressing the rotary encoder.
- ❒ Press the "Home" button to return to the main screen.

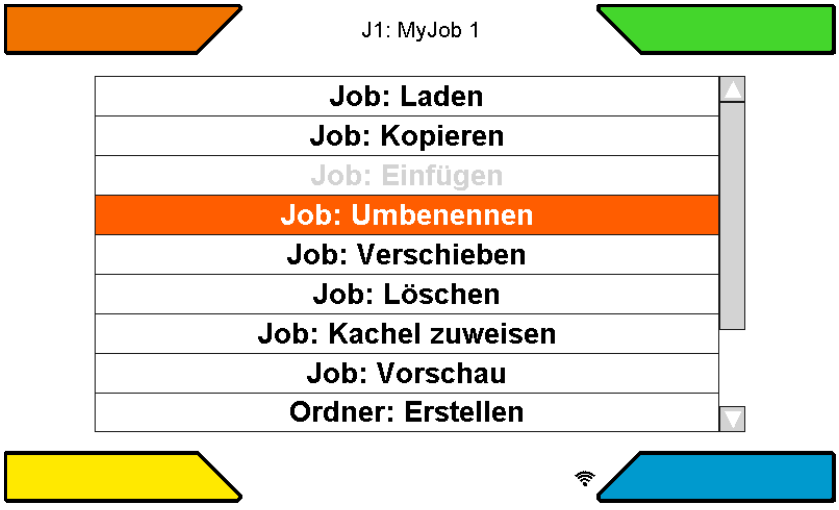


Figure 34: Editing jobs and folders

Job: Load

You can load the selected job by pressing this function

JOB: Copy

Pressing this function saves the selected job to the clipboard. A copy of the job can then be added to a different folder.

JOB: Insert

This function is enabled only when a job has previously been copied to the clipboard. The job in question is copied to the relevant folder.

Job: Rename

The name of the selected job can be changed.

JOB: Shift

This function can be used to move a job within a folder.

JOB: Delete

The selected job is deleted.

JOB: Preview

Enables a job's preview in which the most important settings can be read. The job is not loaded.

Folder: Create

This function can be used to create a new folder.

Folder: Rename

The name of the selected folder can be changed.

Folder: Shift

The sequence of folders can be changed

Folder: Delete

A folder can be deleted. Only empty folders can be deleted.

5.8.2 Setup submenu

Functions and processes can be defined very conveniently and clearly in the Setup submenu.

❒ The required setting is selected by turning the push and rotary encoder [Fig. 9]. The settings are logically structured in various subfolders. Some settings depend on characteristic curve, process, welding system equipment, etc.

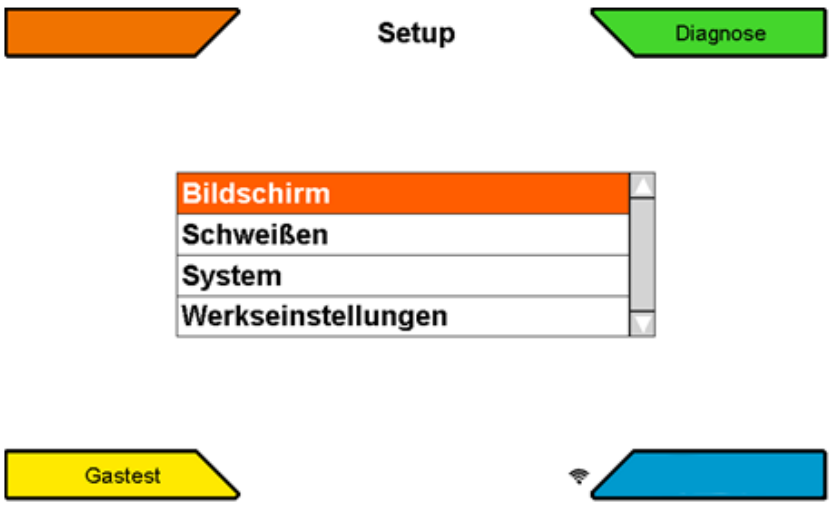


Figure 35: Setup submenu [BF32]

Name	Setting possibility	Description
Screen		
Display: Mirroring X	No/Yes	Only factory setting
Display: Mirroring Y	No/Yes	Only factory setting
Colour scheme	Light/Dark	
Menu back	1s-2:00 min	
Welding		
End current: Unit	Percent/absolute	
Folder: Mode	Rolling/limiting	
Starting current: Unit	Percent/absolute	
Up/Down (Idle)	Various welding parameters can be set here.	Examples: Starting current, job, current I1, current I2, power, ignition energy, second current BT, etc.
Up/Down (welding)	Various welding parameters can be set here.	Examples: Starting current, job, current I1, current I2, power, ignition energy, second current BT, etc.
Up/Down: Speed	1	very slow
	7	very fast
Second current torch trigger	Setting in % or amperes	
Second current torch trigger unit	% or amperes	
Second current torch trigger mode	Tap second current BT1	
	Press second current BT2	
	Tap second current BT2	
	Inactive	
System		
Gas test: Time	0.1s – 60.0s	
Hold: Mode	Inactive/Action/ Action and time	
Hold: Time	10s-2:00 min	
Water cooling mode	Off/Auto/On	Off: Permanently off Auto: Activated with welding current On: Continuously on
Factory settings		
Factory setting	Welding parameters are reset to the factory settings.	This does not affect: Job

Table 5 Setup submenu

5.8.3 Language menu

The available languages are displayed as flags in a selection list. Use the cursor to select a language and confirm by pressing the rotary encoder. The language becomes active immediately. The selected language is illustrated by a box with cross.

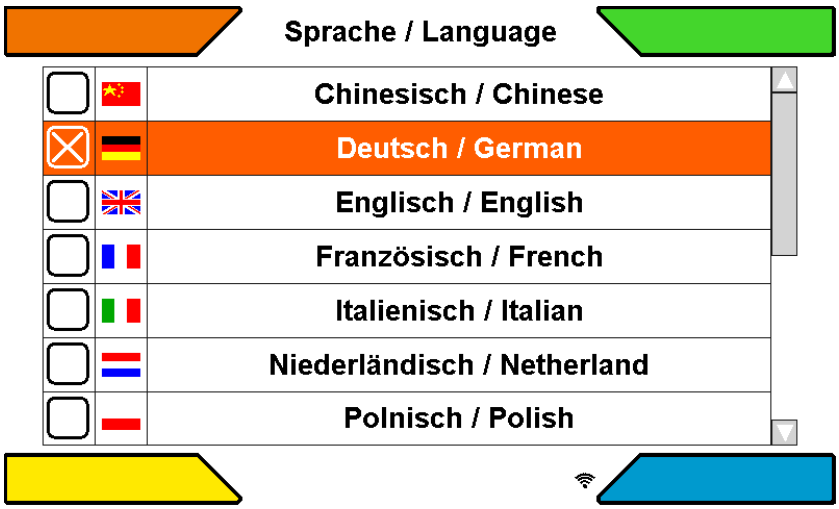


Figure 36: Language selection submenu

6 Control lamps

Symbol	Description
Operation/ excess temperature 	The symbol **OPERATION** in black indicates that there is an idle voltage at the torch or electrode holder. The symbol is located on the left in the characteristic curve info bar The symbol illuminates red and flashes in the event of excess temperature.
	The power unit is switched off and no output voltage is available as long as this symbol flashes red. After the unit has cooled down, the LED is extinguished and welding can be resumed automatically.

7 Other functions

7.1 Gas  test

The "gas test" is used to set the required gas quantity at the pressure reducer. This enables the desired gas flow to be set without voltage.

The Gas test function is displayed in the bottom left corner menu as soon as the [BF 32] button is pressed.

The gas test is automatically terminated after 20 seconds. The gas test can be aborted prematurely by pressing the "Gas test" button or the torch trigger.

7.2 Water recirculation cooling

Depending on equipment variant, standard INVERTIG i 260-450 welding system equipment includes a water recirculation cooling system for the welding torch. A flow monitor in the cooling water return monitors the flow rate and provides an error message if the flow rate falls below the critical limit of 0.4 l/min. This protects the welding torch from overheating due to insufficient water cooling.

7.3 Temperature monitoring of the power units

The welding current is automatically switched off if the permissible temperature of the power components transformer and transistor switch is exceeded. This is indicated by the Operation control lamp and by an error message on the main screen. After the power components have cooled down, the system automatically switches back to the operating state (without power).

7.4 External cooling of the power units

INVERTIG i 260-450 welding system power units are designed for high operational reliability. Optimum heat dissipation with minimum noise generation is achieved by the targeted placement of the cooling fan and the power components.

7.5 Fan and water pump control

Depending on equipment variant, INVERTIG i 260-450 welding systems have a demand-oriented fan and water pump control. The fan and the water pump switch on immediately at the start of welding. After welding process completion, a follow-up time of seven minutes is set; it can be changed in the Setup submenu (ULTRA only). The fan and the water pump then go into standby. This reduces noise emission, wear, and energy consumption.

To ensure perfect torch cooling during the first welding process, the water pump is automatically activated after switching on the mains switch until cooling water flows for 10 seconds in the return flow.

8 Accessories and options

These operating instructions are based on the accessories approved by REHM. Other accessories and wear parts are listed in the extensive welding accessories catalogue.

8.1 Unit versions, accessories and options

INVERTIG i 260-450 **welding system unit versions**				
Power class / Type	260 A	310 A	350 A	450 A
INVERTIG DC	142 2526	142 2531	142 2535	142 2545
INVERTIG AC/DC	142 2528	142 2533	142 2537	142 2547

Accessories: Torch including component kit and Rehm Quick Connect. More are available upon request.		
Length / Type	4.0 m	8.0 m
WIG R TIG-251w 19 UD HF	7636220	7636225
WIG R TIG-251w 19 DD HF	7636260	7636265
WIG R TIG-301w 19 UD HF	7636230	7636235
WIG R TIG-301w 19 DD HF	7636270	7636275
WIG R TIG-451w 19 UD HF	7636290	7636295
WIG R TIG-451w 19 DD HF	7636280	7636285

Accessories: Torch wear parts sets	
TIG Ø 2.4 mm water component kit for TIG R TIG-301w and 251w	7730424
TIG Ø 2.4 mm water component kit for TIG R TIG-451w	7730430
Wear parts set for R TIG 251W, R TIG 301W, RAB R TIG 301W	7700440

Accessories: Miscellaneous	
Ground cable 35 mm² 4 m 13 mm 400 A clamp	7810102
Ground cable 50 mm² 4 m 13 mm 500 A clamp	7810109
Ground cable 70 mm² 4 m 13 mm 600 A clamp	7810104
Ground cable 95mm² 4m 13mm 600A earth clamp	7810150
Optimator Argon/CO2 20 pressure reducer	7967932
Pressure reducer with content and work pressure gauge, 200bar, 32l/min.	7530500
Torch and hose pack holder	1180214
Floor mounting	1381100
Profi trolley (for 50 l bottles)	1381101
Advanced trolley (for 50 l bottles) with loading ramp and parking brake	1381102
Operating panel cover	1381108
Toolbox	1381143
Air filter attachment	1381144
RCL 5L coolant	1680075
RCL 25L coolant	1680077
Gas hose	2200100

Inert gas filter 1/4" mounting between the gas hose and pressure reducer	7501111

9 Commissioning

9.1 Safety instructions

Carefully read the operating instructions, in particular the ➔ **Section 2 Safety,** before commissioning and before beginning work with this welding power source.

WARNING

REHM welding equipment may be operated only by persons who are trained and instructed in its use and maintenance and in welding system safety regulations.

When welding, always wear protective clothing and ensure that other persons in the vicinity are not endangered by the UV radiation emitted by the welding arc.

9.2 Working under elevated electrical risk in accordance with the regulations from IEC 974, EN 60 974-1, TRBS 2131 and BGR 500 Section 2.26 (previously VGB 15) (S)

REHM – INVERTIG i 260-450 welding systems comply with the above-mentioned regulations. It must be noted that for work under increased electrical hazard, the welding power source must not be placed in this area. Regulations EN 60 974-1, TRBS 2131 and BGR 500 Section 2.26 (previously VGB 15) must be observed.

9.3 Setting up the welding unit

CAUTION

Place the *REHM* welding unit so that the welder has sufficient space in front of the unit to adjust and operate the controls.

Transport the unit only under compliance with the applicable accident prevention regulations.

During movement and set-up, the device can tip, injure personnel, or suffer damage. Safety against tipping is ensured up to an angle of 10° (in compliance with the IEC 60974-2).

• Set up or transport the device on a firm, level surface!
• Use suitable means to secure attachments!
• During transport, secure the external wire feed devices with lashing straps to prevent uncontrolled rotation!

Operating the device in a non-upright position may damage it!
Devices are designed for upright operation!
Operation in non-approved positions/orientations can damage the device.

• Transport and operate the device only when it is in the upright position!

WARNING

CAUTION: For suspended transport (on ropes or chains, for instance), INVERTIG i welding systems may be attached with crane eyelets only. Fastening to the handles or other parts of the system is not permitted.

Injury hazard during attachment to a crane!

When the device is attached to a crane, the possibility of the device or its attachments falling poses an injury hazard!

- Multiple system components (current source, wire feed device, cooling unit, etc.)
  must not be attached to a crane at the same time!
  Each system component must be attached separately!
- Remove all supply lines and cables and accessory components
  Remove crane (torch, inert gas bottle,
  tool box, cold wire unit, remote control, etc.)!
- Properly close and lock housing covers or protective flaps
  before attaching the device to a crane!
- Use the proper position and a sufficient number of properly
  dimensioned load handling attachments! Observe the crane principle
  (see figure)!
- For devices with crane eyelets: Always attach all crane eyelets
  at the same time!
- Avoid jerky movement!
- Ensure that the load is evenly distributed! Ensure that all suspension gear is of the same length!
- No personnel may remain in the danger area below the device after it has been lifted!
- Comply with the occupational health and safety and accident protection regulations
  of the country in which you are working!

Similar image

Unsuitable crane eyelets pose an injury hazard!

If crane eyelets are used improperly, or unsuitable eyelets are used, the possibility of the device or its attachments falling poses a severe injury hazard!

- The crane eyelets must be screwed in completely!
- The crane eyelets must be flat on their seating and contact it at all points!
- Check the crane eyelets for seating and noticeable damage (corrosion, deformation) before using them!
- Damaged crane eyelets must not be used or screwed in!
- Avoid lateral loading of the crane eyelets!

Danger! Electrical voltage!

Do not use the welding unit outside in the rain!

9.4 Connecting the welding unit

Connect the REHM welding power source to the power supply only in accordance with the applicable VDE regulations and observe the regulations of the relevant professional associations.

When connecting the unit observe the instructions concerning the power supply voltage and local mains fuse. Automatic circuit breakers and fuses must always be sized for the stated source current. The necessary information can be found in➔ Section 16, Technical Data.

Always switch off the unit when not in use.

Place the inert gas bottle on the bottle bracket provided on the unit and secure with the safety chain. Screw the bottle pressure reducer tightly on the thread, attach the gas hose to the pressure reducer and check the connection for tightness. Always close the bottle valve after completing work. Observe the regulations of the respective professional associations.

9.5 Cooling the welding unit

Place the REHM welding unit so that the air entry and exit ports are not obstructed. The machine can achieve the specified duty cycle only with sufficient ventilation.

Ensure that no metal parts, grinding dust, dust or other foreign bodies can enter the unit.

9.6 Water cooling for TIG welding torches

In INVERTIG i 260-450 welding systems with water cooling (-W/-WS), the torch is water-cooled.

The water level in the tank must be checked before commissioning. If the water level is lower than 3/4 of tank capacity, cooling water must be refilled. The "REHM – Coolant RCL" special coolant (order no. 1680075, 5 litres and 1680077, 25 litres) developed and tested by *REHM* is the prescribed coolant. The cooling water level must be checked at regular intervals.

INVERTIG i 260-450 welding systems are equipped with a flow monitor which issues an error message (see Section 13) if water flow is too low.

9.7 Connecting the welding cables

REHM welding units are equipped with quick-connect plugs and sockets for connecting the ground cable. In order to achieve optimum welding results, ensure that all welding cable connections are tight and that the insulation is not damaged. The contact transition surfaces must be kept clean and free from tarnishing in order to avoid increased contact resistances, which cause distortions in the welding result and local overheating in the connections.

9.8 Connecting the torch

To connect the TIG welding torch, the housing has a socket with the torch connection symbol.

If water-cooled torches are used, the cooling water hoses are connected via quick couplings. These are colour-coded (red = return, blue = flow).

Important!

When a gas-cooled torch is used on a water-cooled system, the water connections must be connected via a hose bridge, or the water cooling must be set to "Off" in the Setup submenu so that the water pump is not damaged.

10 Operation

10.1 Safety instructions

Carefully read the operating instructions, especially ➔ **Section 2, Safety,** before commissioning and before beginning work with this welding power source.

Warning!

REHM welding equipment should be operated only by persons who are trained and instructed in the use, maintenance and the safety regulations concerning welding systems.

10.2 Checks before switching on

The following are required:

- the system is properly placed in accordance with ➔ **Section 10, Commissioning**,
- all connections (inert gas, torch connection, ground cable, polarity selection plug) are properly made in accordance with ➔ **Section 10**, **Commissioning**,
- the scheduled periodic maintenance work has been performed in accordance with ➔ **Section 13**, **Maintenance**,
- the safety equipment and the system components (in particular the torch connection hoses) have been checked by the operator and are functional and ready for use,

- the operator and the assisting persons are wearing the appropriate protective clothing, and the work area has been secured so that no uninvolved persons are endangered.

10.3 Connecting the ground cable

Warning!

Ensure that welding current cannot flow through lifting device chains, crane cables, or other electrical conductors.

Ensure that ground cables are connected to the workpiece as close as possible to the welding site. Grounding cables that are connected to distant points reduce the efficiency and increase the risk of electrical shock and vagrant currents.

Serious risks during welding

Fire and explosion
Materials can be ignited by the electric arc, hot slag, secondary flames or thermal radiation.
So remove all combustible materials from the area where welding will be performed and keep a fire extinguisher handy as a preventative measure.
There is an explosion risk from the combustible materials particularly due to leaking hoses and containers.
Welding activities are forbidden if the risk of an explosion cannot be ruled out.

Harmful substances
Gasses, vapours, smoke and dust can be absorbed by the body through respiration, swallowing or through the skin.
In particular, avoid welding galvanised and coated workpieces or workpieces that have been treated with degreasing agent.
The workplace must be set up with respect to the process, materials, and conditions of use so that respiratory air is kept free of contaminants (see BGV A3).
If necessary, suitable ventilation or extraction must be provided to ensure that the permissible limits (MAK = maximum permissible concentrations of noxious compounds in the workplace) are not exceeded.

Noise
During welding work, noise is generated from grinding, the arc, and, to a lesser extent, by the welding system. Noise generated by the welding process depends heavily on the selected welding process, the position of the welding torch, the base material, and the surroundings. The noise level can be reduced through noise insulating measures or encapsulation.

Important:
Noise pressure above 85dB(A) can result in damage to hearing and the human nervous system.
Therefore, is this noise level is exceeded personal hearing protection must be worn.

Optical radiation
Light emitted from the electric arc can glare and dazzle.
Ultraviolet radiation can result in conjunctivitis and burns to the skin. Therefore always wear the correct personal protective equipment. Ensure that the protective filter for the eyes conforms to the valid regulations (such as DIN EN 166, DIN EN 169 or DIN EN 379) and that the correct protection level has been selected for the intended work. The levels of protection stated in the tables must never be fallen short of. Selecting a protective filter that is too low causes flickering of the eyes and eye damage.

Electrical hazard
Contact with the welding current circuit can result in a dangerous electric shock. Always ensure sufficient protective measures against this risk.

Always wear:
- proper protective welding gloves
- closed, where possible dry protective clothing
- Safety shoes with an undamaged rubber sole

Always use only items of equipment and welding equipment that are in perfect condition.
Avoid direct contact with live parts.
Live parts (such as the welding torch and welding cable connections) are not free of current when operated in “Rod electrode welding” mode, and in the “MSG welding” mode are free of current only depending on the welding torch trigger signal. Change the wire electrodes only with the current source disconnected.
Always switch off the welding system during longer breaks in the work and never leave the welding system unattended.

Mechanical hazard
Ensure that the welding unit and a cold wire unit are operated only with the housing closed. There is a risk of trapping fingers between the feed rollers or the rotating wire coil and parts of the housing.

Working under elevated electrical risk
All *REHM inert gas welding systems* are suitable for working under elevated electrical risk and therefore carry the S mark.
Increased electrical risk exists where:
- contact between electrically conductive components and unprotected parts of the body is unavoidable (kneeling, lying, leaning),
- the room for free movement between electrically conductive components is less than 2 m (accidental contact),
- the workplace is wet, damp, or hot, increasing the risk of electric shock.

Protective measures against increased electric risk:
- Use a *REHM* welding power source with the S mark,
- use insulating intermediate layers (such as rubber mats),
- do not place the welding system in restricted spaces,
- use only suitable personal protective equipment in perfect condition.

Handling errors
Handling errors can occur in welding systems or devices and protective equipment for inert-gas welding.
Only qualified or specially instructed persons who are familiar with the equipment and the process may be assigned welding work.
Errors can also occur during operation or handling of the welding system itself. This function and operating manual must therefore be carefully read and followed by all persons who work with this welding system. The function and operating manual must be kept so that it is immediately at hand for all welders and the maintenance personnel. The best suited place for keeping this manual is at the welding system itself. Improper handling invalidates the right to claim under the warranty.

10.4 Practical instructions for use

The following practical instructions for use can provide only an overview of the various applications of *REHM* INVERTIG i 260-450 welding systems. If you have any questions about special welding tasks, materials, inert gases or welding equipment, please refer to the relevant specialist literature or to the *REHM* specialist dealer.

Weldable materials

REHM INVERTIG i 260-450 welding systems can be used to weld a wide variety of materials, including unalloyed and alloyed steels, stainless steels, and aluminium.

Inert gas

For welding **steel and stainless steel**, argon of a purity of 99.996 (Ar 4.6) or higher is primarily used.

Pure argon also serves as an inert gas for **aluminium**.

The amount of **inert gas required** depends on gas nozzle diameter and size, welding current height, and air movement at the workplace. The required gas quantity is about 3 – 10 l/min.

Rule of thumb for gas adjustment:

Gas nozzle diameter 3.0 mm = 3 l/min. gas quantity

Gas nozzle diameter 5.0 mm = 5 l/min. gas quantity

Gas nozzle diameter 8.0 mm = 8 l/min. gas quantity

Practical instructions for use

The practical instructions for use listed below can provide only an overview of the uses for REHM TIG welding systems. For questions concerning special welding tasks, materials, inert gases, or welding fixtures, refer to topic-specific publications or specialist recommendations by manufacturers.

With TIG welding, a differentiation is made between those materials that can be welded using DC current and those materials that can be welded using AC current. Besides unalloyed, alloyed and high-alloy steel DC current can also be used to weld copper, nickel, titanium and their alloys. AC current is generally used to weld aluminium and its alloys.

Various types of tungsten electrodes are offered and used for TIG welding. The difference between them is the share of doping elements in the tungsten electrode. Their compositions are listed in DIN EN ISO 6848 (previously EN 26848) and usually consist of thorium oxide, cerium oxide, zirconium oxide or lanthanum oxide. The advantages of oxide-containing tungsten electrodes are:

- improved ignition properties
- more stable arc
- higher current capacity
- longer service life

REHM supply its torches with WC 20 (grey) tungsten electrodes as standard. The most frequently used electrode diameter and their capacities can be found in the relevant specialist publications. Please consider that the values given are mainly established by machines, which do not have by far the balance range of REHM TIG units. All guidelines state that a specific electrode is exposed to a current that is too high if it drips or takes on a brush-like appearance. You have the choice between lower current or, with AC operation, using a larger minus portion in the balance setting.

When welding with DC the electrode is ground to a point.

With the REHM TIG welding system, work in the AC range with balance adjustments in the negative range using a pointed electrode is also possible. This offers the advantage that the arc is even more concentrated and effective. In most cases this increases the welding speed.

When grinding the electrode take care that the direction of grinding is in the longitudinal direction of the electrode. For this task use a hazard-reducing grinding apparatus with extraction.

In TIG welding the inert gas is mainly argon. Helium, argon-helium mixture, or argon-hydrogen mixture is used for special applications. Igniting the arc becomes more difficult and the heat input increases with an increasing portion of helium. The quantity of inert gas required depends on the electrode diameter, size of the gas nozzle, welding current strength and the movement of air depending on the working place. For a workpiece of 4 mm thickness and argon as an inert gas, an initial reference value for aluminium is about 8 litres/minute and for steel and chrome-nickel steel about 6 litres/minute. If helium is used the required quantity is significantly higher.

The standard length of the TIG welding torch is 4m and 8m. However, longer torches can be used with these machines. The matching tungsten electrode, clamping sleeve and gas nozzle must be selected depending on the welding task and the current strength. When using a torch with two triggers it is possible to switch the current between the two adjustable values during welding.

Welding additives are added in rod form when welding manually. The correct tungsten must be selected depending on the base material. However, excellent results can be achieved if the weld pool of two parts is allowed to run together, as in the case of corner seams.

With AC welding the negative pole is usually on the electrode. The negative pole is the cooler pole, so tungsten electrode current capacity and service life are much greater than with positive pole welding.

With AC welding the capacity of the electrode is strongly affected by the balance setting. The balance setting is used to distribute the positive and negative share of the welding current between the electrode and the workpiece. During the positive half-wave the aluminium oxide skin is destroyed and a high temperature occurs on the electrode. During the negative half-wave the electrode cools down and the aluminium is heated. As only a short plus pulse is required to break the aluminium oxide skin, the REHM TIG system can be worked with a high negative share.

This has many advantages:

1. The temperature load on the electrode is reduced
2. The electrode can be subjected to a stronger current
3. The electrode current range increases
4. Welding can be performed with a pointed electrode
5. The arc is narrower
6. Penetration is deeper
7. The weld seam thermal influence zone is lower
8. The welding speed is higher
9. Heat input into the workpiece is reduced

A high-voltage ignition device is installed in the REHM INVERTIG i 260-450 systems as standard for contactless welding arc ignition. The high voltage causes the path between the tungsten electrode and the workpiece to become so electrically ionised that the welding arc can jump the gap. A higher oxide content in the electrode and a closer distance to the workpiece positively influence the ignition response.

With DC and AC welding, the arc can be ignited by the installed program control both with and without high voltage. Proceed as follows:

The HF setting is positioned at “Off”, the tungsten electrode is brought into contact with the workpiece, then the torch trigger is actuated and the electrode is lifted from the workpiece by tipping the torch over the gas nozzle. The ignition of the arc without high-voltage is an advantage if, for example, welding is necessary in a crankcase or repair welding is to be performed on an electronically controlled machine, on which the high-voltage ignition equipment could cause a fault to the control sequence.

REHM TIG systems are particularly suitable as welding current sources for electrode welding due to their fast and precise control dynamics. The current strength and polarity settings are specified by the electrode manufacturer. Positive pole welding is used when welding with basic electrodes.

More information can be found in the book series from

DVS-Verlag GmbH

Aachener Str. 172

40223 Düsseldorf

www.dvs-verlag.de

11 Faults

11.1 Safety instructions

Warning!

If a fault occurs that represents a hazard to persons, systems, and/or the environment, switch off the system immediately and secure it against restarting.

Restart operations with the system only after the fault has been eliminated and there is no hazard for persons, machines, and/or the environment.

Faults must be eliminated only by qualified persons who observe all safety instructions. ➔ Section 2

Before restarting, the system must be approved by qualified personnel.

11.2 Table of faults

REHM control panel is not working The screen has no display

Cause:	Remedy:
No mains power supply (possible mains fuse)	Check mains voltage
Mains plug cable is defective	Check

TEMPERATURE control lamp is lit up

Cause:	Remedy:
Permitted temperature in the power unit has been exceeded. Leave to cool, ensure free air circulation, clean the machine if necessary	
Maximum duty cycle exceeded	Allow system to cool down
Ambient temperature too high	Provide cooling
Air inlet or outlet contaminated	Clean, ensure free air supply
Air inlet or outlet covered	Remove cover, ensure free air
Fan defective	*Service required!*

Welding current does not reach the set value or does not occur

Cause:	Remedy:
Ground cable connected poorly or not at all	Check

No inert gas

Cause:	Remedy:
Bottle empty	Check
Pressure reducer defective	Check
Hose kinked	Check
Machine gas valve defective	*Service required!*

Arc sputters and jumps

Cause:	Remedy:
Electrode and workpiece do not reach working temperature	Use thinner electrodes
Electrode is poorly sharpened	Grind electrode
Electrode not suitable	Change electrode

Arc has a strange colour

Cause:	Remedy:
Too little or no inert gas	Check inert gas supply
Incorrect inert gas	Use appropriate inert gas
Electrode dirty	Grind

Water-cooled torch gets too hot

Cause:	Remedy:
Water hoses kinked	Check water hoses for correct position
Too little or no cooling water in the tank	Check cooling water level
Water pump defective	*Service required!*

No high voltage pulse

Cause:	Remedy:
HF ignition is set to off	Switch HF ignition on
No inert gas present	Check
Ground cable poorly connected	Check
Electrode dirty	Grind
Electrode not suitable	Change electrode
Gas pre-flow time too long	Reduce gas pre-flow time or wait until time expires.
High-voltage flashover in the torch	Change the torch
Connection between torch and ground cable reversed	Connect correctly

Electrode burns off

Cause:	Remedy:
No inert gas	Check
Current load too high	Use a thicker electrode
Pulse share too high with AC current welding	Use balance to increase the negative share
Connection between torch and ground cable reversed	Connect correctly
Electrode welding is set	Set TIG welding

Arc breaks away on ignition

Cause:	Remedy:
Ignition energy set loo low	Set the ignition energy or use thinner electrode

Electrode is worn or dirty Grind electrode

11.3 Error messages

Error number	Error	Cause	Elimination
1 000	Mains undervoltage	Mains voltage is below the tolerance range	Switch the unit off and check the mains voltage
2 000	Mains overvoltage	Mains voltage is above the tolerance range	Switch the unit off and check the mains voltage
22,000 to 22,009	Communication error control system/power unit	The bus communication between control system and power unit is faulty	Switch the current source off and on again. If the error occurs again → Contact service
23,000 to 23,243	Communication error current source	Bus current source communication is faulty	Switch the current source off and on again. If the error occurs again → Contact service
30,000 to 30,400	Data record Welding characteristic curves	Data record for welding characteristic curves is not available or not compatible	Switch the current source off and on again. If the error occurs again → Contact service
35,000	Data record Job	Data record for Job is not available or not compatible	Load job again. If the error occurs again → Contact service
40,000 to 42,105	Permitted temperature in the power unit exceeded	Permitted temperature in the power unit has been exceeded	Allow the current source to cool down
71 000	Coolant flow	• Coolant monitor detects low coolant flow • Coolant monitor blocked by dirt • No water-cooled torch connected	• Immediately switch off the current source • Check that the connecting cable is plugged in • Check the coolant level • Check the connections on the water-cooled torch • Eliminate interruptions in the coolant circuit • Bleed the coolant circuit • Check the pump • connect water-cooled torch
77,000 to 77,001	Excess coolant temperature	Temperature of the coolant is too high	• Let the water cooler cool down • Top-up coolant
> 100,000	Service call	An analysis of the cause can be made by the service technician	Contact service

12 Maintenance and repair

12.1 Safety instructions

Warning!

Maintenance and repair work may be performed only by persons who have been trained by REHM. Please contact your REHM dealer. When replacing parts, use only REHM original spare parts.

If maintenance or repair work is performed on this unit by persons who have not been trained and authorised to carry out the work by REHM, then claims against REHM become void.

Before cleaning work begins, the welding unit must be switched off and disconnected from the mains supply.

Before maintenance work the welding system must be switched off and disconnected from the mains supply and secured against unintended reconnection.

Supply lines must be shut off and vented free of pressure.

The warning notices listed in ➔ Section 2 “Safety” must be observed.

The welding system and its components must be maintained in accordance with the requirements of the maintenance table.

Insufficient or improper maintenance or repair may result in operating faults. Periodic maintenance of the system is therefore essential. No constructive change or additions may be made to the system.

12.2 Maintenance table

The maintenance intervals are recommended by REHM for standard requirements (for example, single shift operation, use in a clean and dry environment). The precise maintenance intervals are specified by your safety officer.

Activity	**Section**	**Interval**
Cleaning the inside of the unit	14.3	at least twice per year
Checking cooling water and the cooler	14.4	daily
Functional test of the safety equipment by operating personnel		daily
Visual system check with special focus on connection cables, torch hoses, ground cables, and polarity selection plugs		daily
Have the connecting lines and torch hoses checked by qualified personnel; log the checks in the logbook provided. **Perform checks more regularly depending on the country-specific laws.**		every six months
Have the complete welding system checked by qualified personnel; log the checks in the logbook provided. **Perform checks more regularly depending on the country-specific laws.**		annually

12.3 Cleaning the inside of the unit

If the *REHM* welding unit is used in a dusty environment, the inside of the unit must be cleaned at regular intervals by blowing out or vacuuming.

The frequency of this cleaning depends on the respective conditions of use, however, it should be carried out at least twice a year. Use only clean, dry air to blow out the unit or use a vacuum cleaner.

12.4 Cooling water check

The water level in the tank must be checked daily on machines with built-in water recirculation cooling.

If the water level is lower than 3/4 of tank capacity, cooling water must be refilled. The special coolant "REHM - Coolant" (order no. 1680075, 5 litres and 1680077, 25 litres) developed and tested by *REHM* is specified as the coolant.

As part of this check, the degree of contamination in the cooling water should also be checked. To ensure the proper torch cooling the cooler should be cleaned by blowing out or sucking out.

Coolants are hazardous to the environment; they must not be drained into the sewage system.
Dispose of these agents at appropriate collection points for hazardous substances.

If maintenance or repair work is performed on this unit by persons who have not been trained and authorised to carry out the work by *REHM*, then and claims against *REHM* become void.

12.5 Proper disposal

For EU countries only!

Do not dispose of electric appliances in domestic waste!

In accordance with the European Directive 2012/19/EU concerning old electrical and electronic devices and its transposition into national law, used electrical appliances must be collected separately and recycled in an environmentally friendly manner. Follow any regional regulations!

13 Circuit diagrams

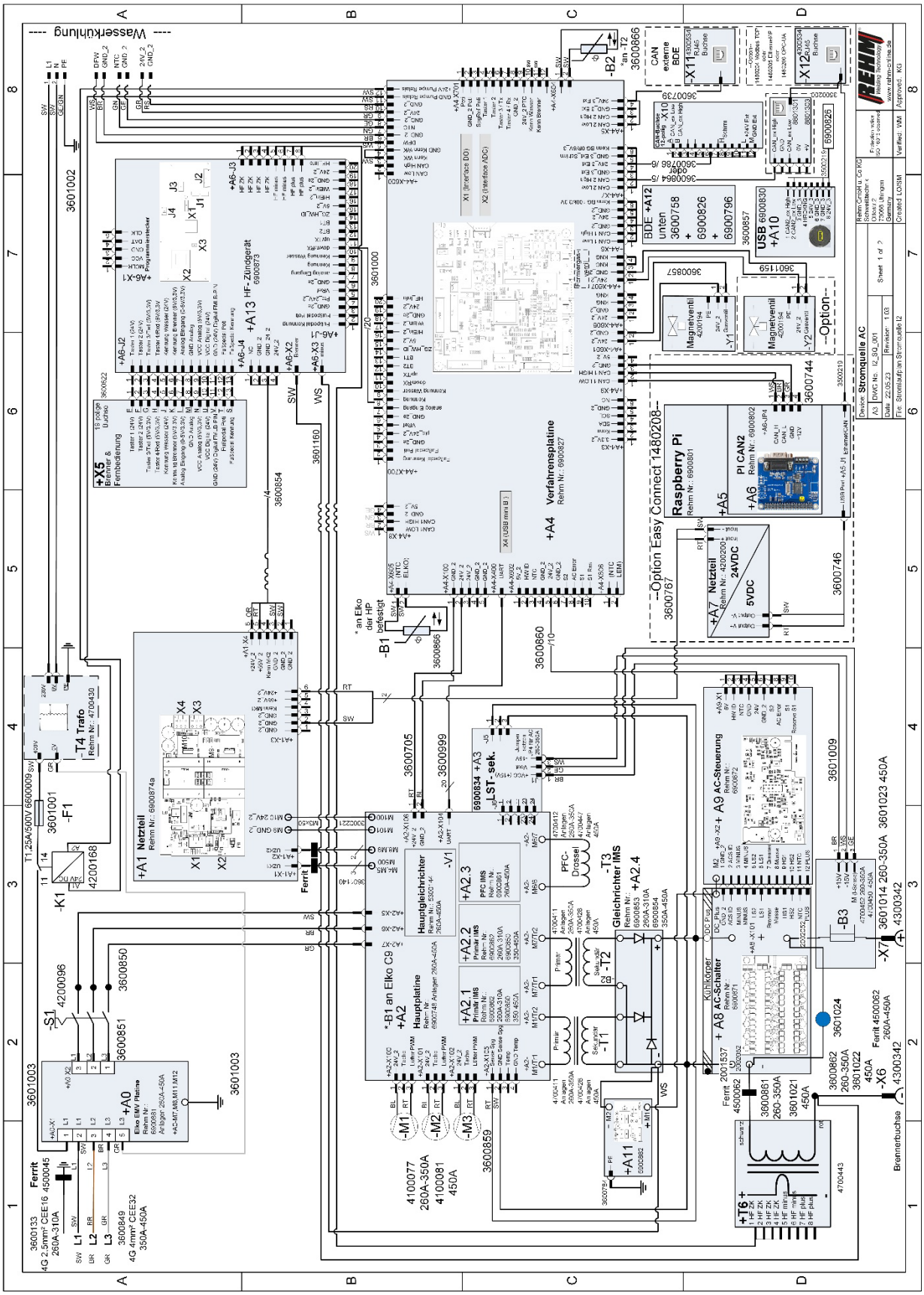


Figure 37: INVERTIG i 260-450AC

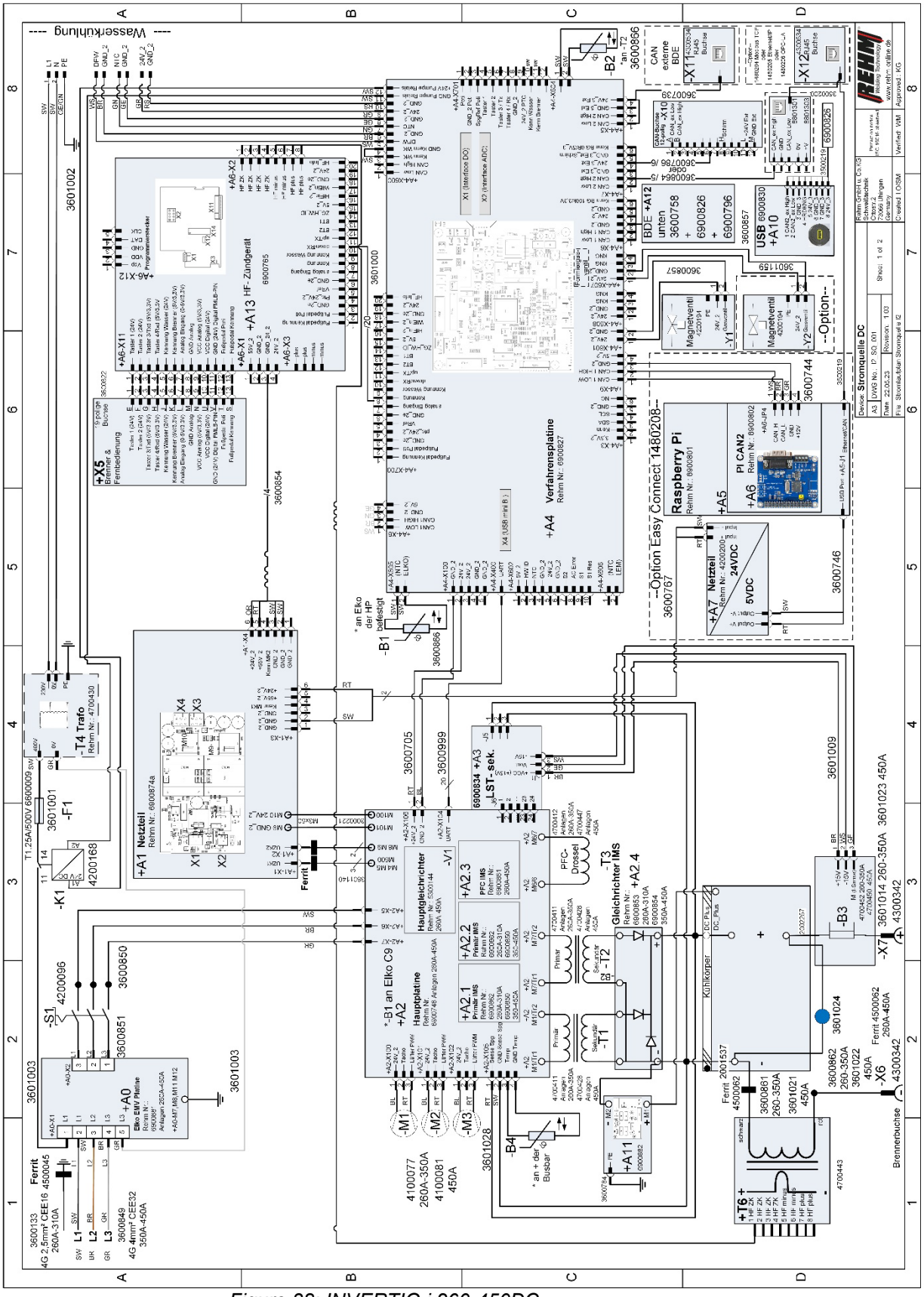


Figure 38: INVERTIG i 260-450DC

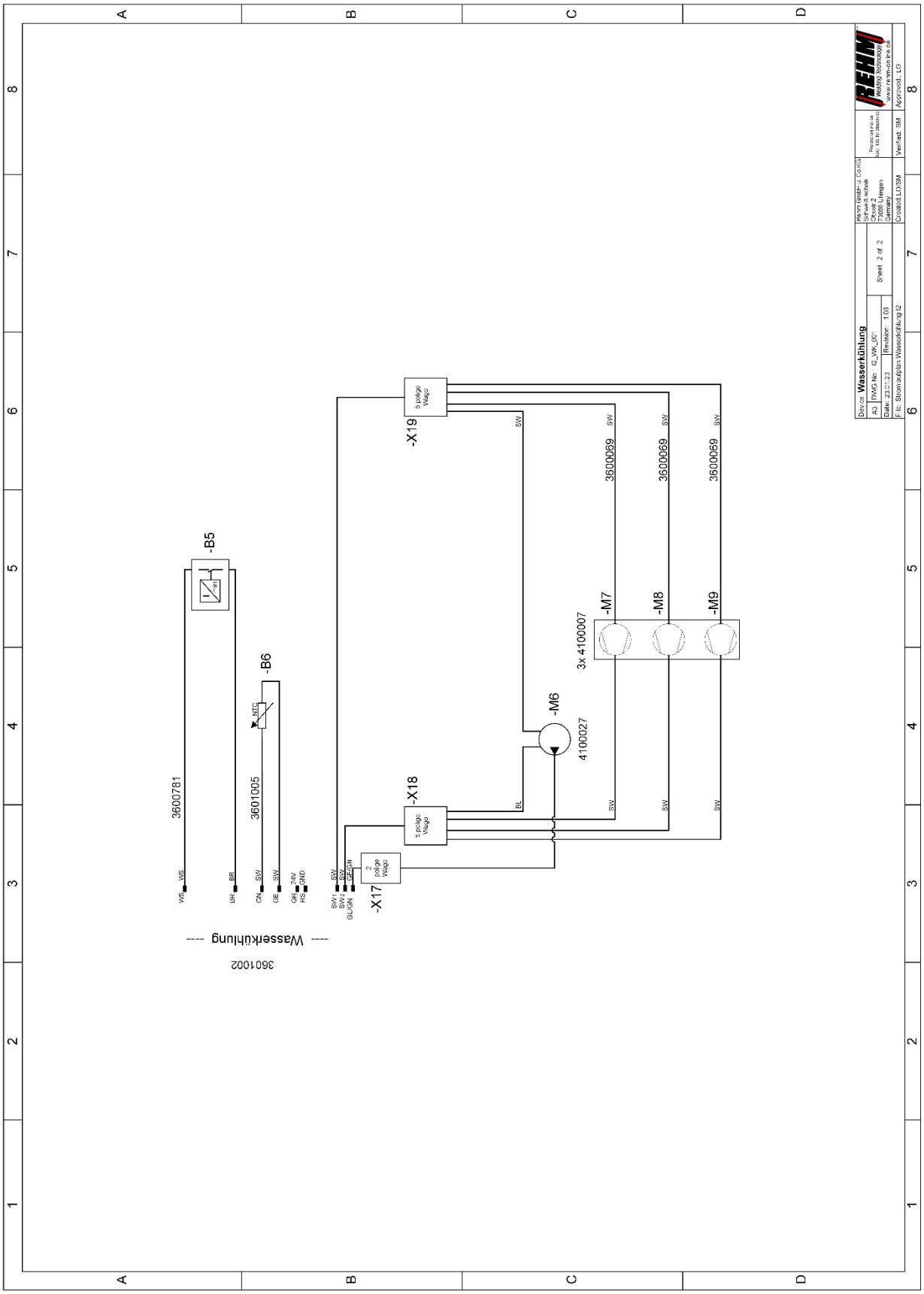


Figure 39: INVERTIG i water cooling

13.1 Components and spare parts

Item	Name	Part *	Comments	Item number
+ A0	ELKO EMV circuit board	E	260A-450A	690 0881
+ A1	Power supply	E	260A-450A	690 0874
+ A2	Main board	E	260A-450A	690 0748
+ A2.1/A2.2	Primary IMS	E	260A-310A 350A-450A	690 0862 690 0850
+ A2.3	PFC IMS	E	260A-450A	690 0861
+ A2.4	Rectifier IMS	E	260A-310A 350A-450A	690 0853 690 0854
+ A3	Power unit control system	E	260 A 310 A 350 A 450 A	222 3305 222 3306 222 3307 222 3308
-	Complete 260A DC power unit	E	260 A DC	222 3309
-	Complete 260A AC power unit	E	260 A AC	222 3310
-	Complete 310A DC power unit	E	310 A DC	222 3311
-	Complete 310A AC power unit	E	310 A AC	222 3312
-	Complete 350A DC power unit	E	350 A DC	222 3313
-	Complete 350A AC power unit	E	350 A AC	222 3314
-	Complete 450A DC power unit	E	450 A DC	222 3315
-	Complete 450A AC power unit	E	450 A AC	222 3316
+ A4	Process circuit board	E	260A-450A	690 0827
+ A5	Raspberry-PI-3	E	-	690 0801
+ A6	PI CAN2	E	-	690 0802
+ A7	Power supply	E	-	420 0200
+ A8	IMS AC I2	E	260A-450A	690 0871
+ A9	AC control system I2	E	260A-450A	690 0872
+ A10	USB	E	-	690 0830
+ A11	EMC	E	-	690 0882
-	BDE, complete 7-inch INVERTIG i	E	260A-450A	220 3251
+ A12	BDE GD I2	E	-	690 0826
+ A13	ZG I2	E	AC DC	690 0873 690 0765
-B1/-B2	Temperature sensor	E	-	360 0866

Item	Name	Part *	Comments	Item number
- B3	Current converter	E	260A-450A DC & 450AC 260A-350A AC	470 0450 470 0452
- B5	Flow monitor	E	-	360 0781
- F1	T 1.25A/500V	E	-	660 0009
- K1	Relay	V	-	420 0168
- M1/M2/M3	Fan 80x80x38mm	V	260A-350A AC & DC 450A AC & DC	410 0077 410 0081
- M6	Water pump	V	230V/AC	410 0027
-M7, -M8, -M9	Fan Ø 120mm	V	230V/AC	410 0007
- S1	Main switch	E	-	420 0069
- T1/T2	Transformer	E	260A-350A 450 A	470 0411 470 0428
- T3	Choke	E	260A-350A 450 A	470 0412 470 0447
- T4	Transformer	E	-	470 0430
- T6	HF transformer	E	-	470 0443
- V1	Main rectifier	E	260A-450A	530 0144
- X5	19p torch socket	E	-	360 0622
- X6	Mounting socket, negative	E	-	430 0342
- X7	Mounting socket positive	E	-	430 0342
- X10	CAN socket 12p	E	-	360 0786
- X11	CAN RJ45	E	-	360 0739
- Y1	Solenoid valve	E	-	420 0194

* E = spare part; V= wear part

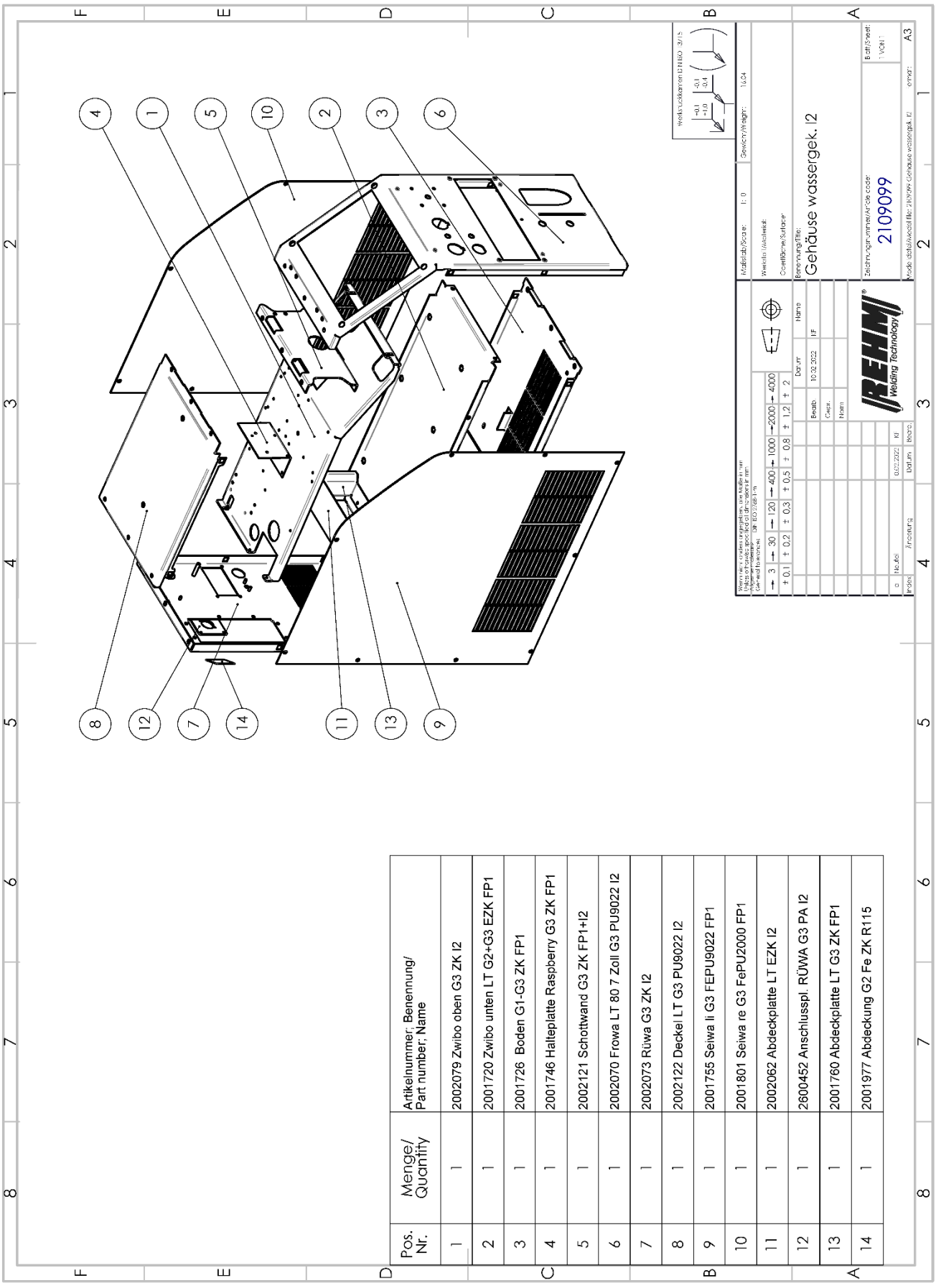


Figure 40: INVERTIG i housing

16 Technical data

Technical data		**INVERTIG i**			
Power class		***260 DC/AC***	***300 DC/AC***	***350 DC/AC***	**450 *DC/AC***
Setting range	[A]	5-260	5-300	5-350	5-450
Duty cycle (ED) at Imax. (40°C)	[%]	80	80	80	80
Welding current at 100% ED	[A]	230	290	340	400
Idle voltage, approximate	[V]	89	89	89	89
Power supply	[V]	3x400	3x400	3x400	3x400
Mains voltage tolerance	[%]	+15 – -25	+15 – -25	+15 – -25	+15 – -25
Power consumption at I max The AC system data can be set here. DC may then have a bit less.	[kVA]	6.5/6.6	8.5/8.6	10.2/10.3	15.1/15.2
Idle power consumption	[W]	27	27	27	27
Power factor λ[a]	[-]	0.99	0.99	0.99	0.99
Efficiency at Imax (40 °C)	[%]	85/80	85/80	85/80	85/80
Fuse (slow-blow)	[A]	16	16	32	32
Protection type[b]	[IP]	23	23	23	23
Weight incl. trolley					
Compact gas-cooled	[kg]	46	46	49	49
Compact water-cooled (W)	[kg]	56	56	59	59
With separate wire feed case gas-cooled (S)	[kg]	57	57	60	60
With separate water-cooled (WS) wire feed case	[kg]	70	70	73	73
Dimensions without trolley (LxWxH)					
Gas-cooled, water-cooled	[mm]	570x330x580			
Dimensions with Advanced trolley (LxWxH)					
Gas-cooled, water-cooled	[mm]	900x560x1020			
Dimensions with Professional trolley (LxWxH)					
Gas-cooled, water-cooled	[mm]	950x611x1100			

Subject to technical changes through further development.

a) Power factor λ = Describes the ratio of active power to apparent power

b) Degree of protection = Extent of protection provided by the housing against ingress of solid foreign bodies and water (IP23 = protection against solid foreign bodies > 12.0 mm ∅ and against water spray 60° from above)

17 INDEX

T

W

EC declaration of conformity

For the following named products

TIG welding systems
REHM INVERTIG i 260 – 350 DC HIGH
REHM INVERTIG i 260 – 350 AC/DC HIGH

it is hereby confirmed that they comply with the essential protection requirements which are laid down in the Directive **2014/30/EU** (EMC Directive) of the council on the approximation of the laws of the Member States relating to electromagnetic compatibility and in the Directive **2014/35/EU** relating to electrical equipment designed for use within certain voltage limits.

The above products comply with the requirements of this directive and with the safety requirements for arc welding units in accordance with the following product standards:

EN 60 974-1*
Arc welding equipment - Part 1: Welding power sources

EN 60 974-2*
Arc welding equipment - Part 2: Liquid cooling systems++-622222

EN 60 974-3*
Arc welding equipment – Part 3: Arc striking and stabilizing devices

EN 60974-10*
Arc welding equipment – Part 10: Electromagnetic compatibility (EMC) requirements

* in the production version

According to Directive **2006/42/EU** Article 1, Paragraph 2, the above-mentioned products fall exclusively within the scope of Directive **2014/35/EU** relating to electrical equipment designed for use within certain voltage limits. The named products have also been developed according to the Ecodesign Directive (**2009/125/EC**), Regulation **EU 2019/1784**, Directive **2011/65/EU** (RoHS), and Directive **2012/19/EU** (WEEE) with the exception of Annex III, Exemption 6 c Brass.

This declaration is given for the manufacturer:

REHM GmbH u. Co. KG Schweißtechnik
Ottostr. 2
73066 Uhingen

Uhingen, 1/7/2023

submitted by

R. Stumpp

Managing Director

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