GB

REHM Welding Technology

OPERATING INSTRUCTIONS

TIG inert gas welding units

TIGER 180 DC / AC/DC ULTRA/HIGH
TIGER 230 DC / AC/DC ULTRA/HIGH

REHM SCHWEISSTECHNIK

Operating instructions

Name TIG inert gas welding equipment

Type

TIGER 180 AC/DC ULTRA
TIGER 180 DC ULTRA
TIGER 180 AC/DC HIGH
TIGER 180 DC HIGH
TIGER 230 AC/DC ULTRA
TIGER 230 DC ULTRA
TIGER 230 AC/DC HIGH
TIGER 230 DC HIGH

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1 Introduction

1.1 Foreword

Dear Customer,

You have purchased a REHM inert gas welding system and in doing so have acquired a noteworthy branded appliance. We thank you for the trust you have placed in our quality products.

Only the highest quality components are used in the development and manufacture of REHM TIGER welding systems. To enable a long service life even under the toughest conditions all REHM welding systems are manufactured using only parts that comply with strict REHM quality demands. The TIGER welding machines were designed and developed according to the generally recognized safety regulations. All of the relevant statutory provisions have been complied with and certified with the declaration of conformity and the CE mark.

REHM welding systems are manufactured in Germany and carry the "Made in Germany" quality mark.

As REHM always strive to immediately take advantage of technical progress the right is reserved to adapt and modify the design of this welding unit to current technical requirements at any time.

1.2 General description

Fig. 1: TIGER

Fig. 2: TIGER with integrated Water cooling

1.2.1 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 Scope of application of TIG welding equipment

TIGER DC welding machines are DC sources. They are suitable for welding all carbon and alloy steels, stainless steels and non-ferrous metals.

TIGER AC / DC welding machines are AC and DC sources. They can be used for processing all carbon and alloy steels, stainless steels, non-ferrous metals, aluminium and aluminium alloys.

1.2.3 Intended use

TIGER welding machines may be used only for TIG or electrode welding as intended.

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

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

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 these. The machines may only be operated by persons who 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 damages 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 competent 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 the operation of the system.

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 make particular note of the information in Section 2 Safety information and Section 8.4 Proper disposal.

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

1.3 Symbols used

Typographic distinctions

- Enumerations proceeded by a bullet point: General enumerations

❒ Enumerations proceeded 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**, 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 information

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 if not heeded.

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 or the environment. Materials / - operating materials that must be handled or disposed of in a legally conformant way.

2.2 Warning symbols on the system

… identify hazards and hazards 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 by the generally accepted rules of technology.

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

Safety equipment must never be dismantled or put out of operation as this will result in dangerous hazards and the intended use of the system is no longer 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 instruction

The occupational safety and health regulations serve as safety references. They must be observed.

The special safety instructions given in the main text must also be observed in addition to the safety instructions given in this section.

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.

Applications

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 these.

TIGER TIG inert gas welding systems may only be used

- as intended
- in an absolutely perfect condition

TIGER inert gas welding equipment is 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) for Group 2 Class A and should be suitable for use in all areas, except residential areas that are connected directly to a public low-voltage supply system. It may possibly be difficult to ensure electromagnetic compatibility in these areas due to both conducted and radiated interference. For this purpose the use of appropriate measures to meet the requirements (filters for mains connection, shields such as shielded cables, the shortest possible welding cables, earthing of the workpiece, potential equalization) and assessment of the environment (such as computers, controllers, radio and television broadcasters, adjacent people, for example required in the use of cardiac pacemakers) are required. The responsibility for any fault lies with the user. For more information and recommendations, see, inter alia, DIN EN60974-10: 2008-09, Annex A.

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 on the mains supply

The unit may be connected and operated from a single phase 2-wire system with earthed neutral conductor.

For TIGER 180 AC/DC and TIGER 180 DC
Caution: This unit does not meet the requirements of EN / IEC 61000-3-12.
If the unit is to be connected to a public power supply then
it may be necessary, after consultation with the operator of the supply network, to ensure that the unit can be connected.
This is the responsibility of the operator or the user of the unit.

For TIGER 230 AC/DC and TIGER 230 DC
The unit complies with IEC61000-3-12.

Qualification of the operating personnel

REHM welding equipment should 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.

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 RHEM 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 the practical teaching by the REHM service personnel.

Documentation for any additional operation that may be present must also be observed.

Changes to the system

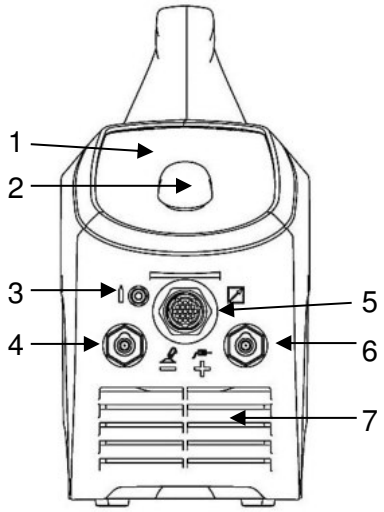
Changes to the system or the mounting or incorporation of additional equipment is not permitted. Doing so will invalidate any warranty and liability claims.

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

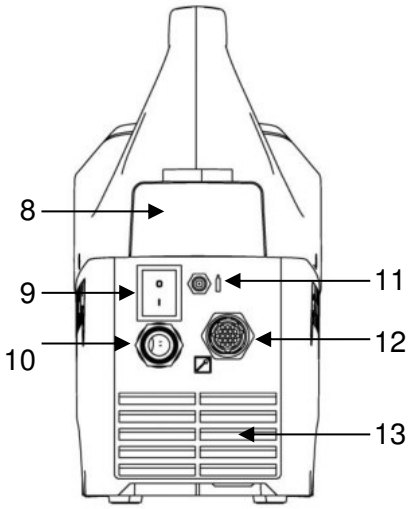
3 Unit description

TIGER without water cooling

Front view

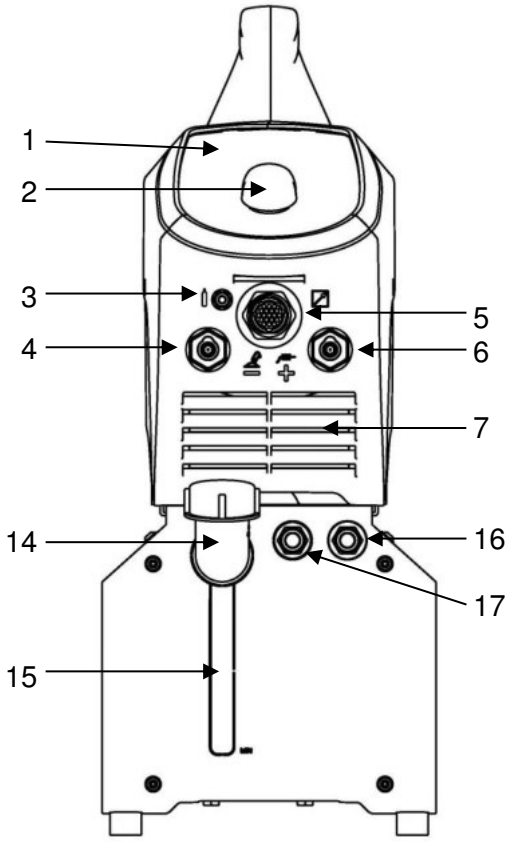


Rear view



TIGER with integrated water cooling

Front view



Rear view

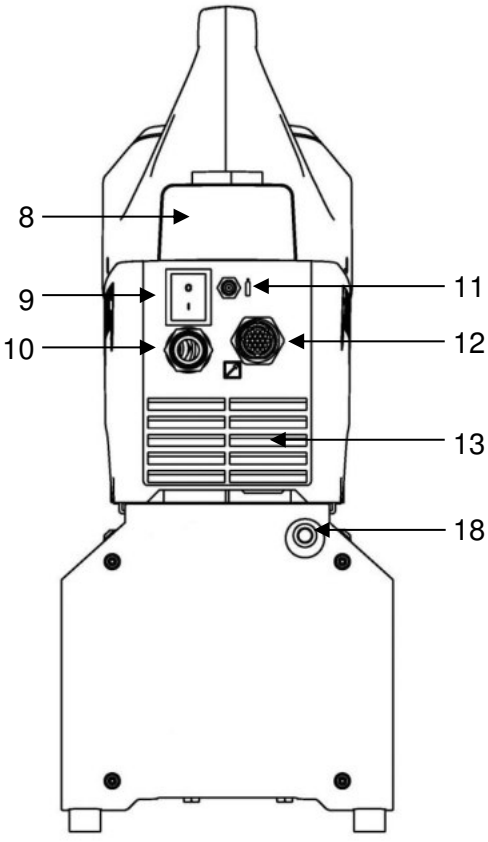
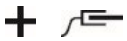


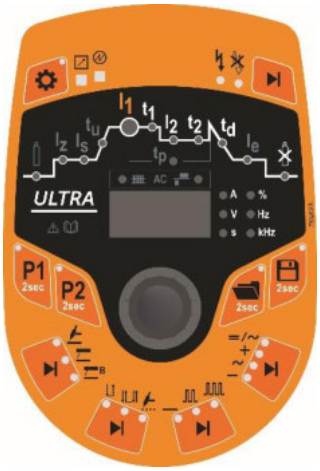
Fig 3: Unit description

No.	Symbol	Function / description
1		Control panel - See "Description of controls"
2		Control panel push and rotate knob
3		Shielding gas connection - TIG welding torch
4		Current socket "negative" TIG: TIG welding torch Electrode: Workpiece or electrode holder
5		Torch / remote control jack
6		Current socket "positive" TIG: workpiece Electrode: Workpiece or electrode holder
7		Cooling air inlet
8		Drawer – storage for electrodes, gas nozzles, etc.
9		Main switch - On / Off
10		Power cable
11		Shield gas feed connection - shield gas cylinder
12		Remote control socket - Optional
13		Cooling air outlet
14		Coolant inlet to coolant filling
15		Coolant level window
16		Connection coolant return (red)
17		Connection coolant supply (Blue)
18		Fuse water cooling unit

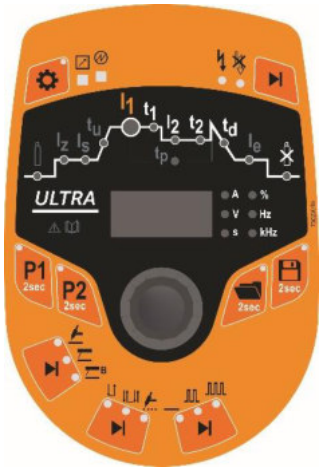
4 Function description

4.1 Overview of the operating panel

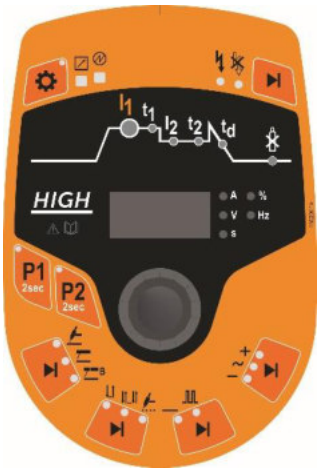
Ultra AC/DC



Ultra DC



High AC/DC



High DC

Fig. 4: Overview of the operating panel

4.2 Description of the controls

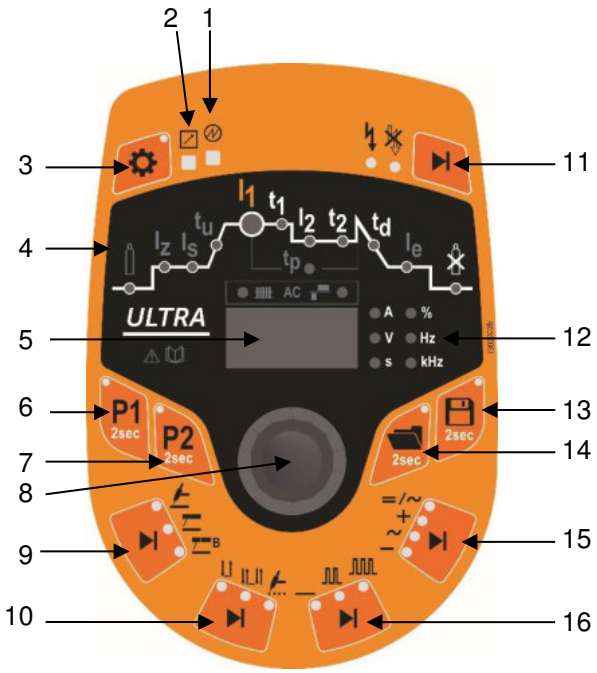


Fig. 5: Controls

No.	Symbol	Description / function	Ultra AC/DC	Ultra DC	High AC/DC	High DC
1		Operating and temperature displays	✓	✓	✓	✓
2		Remote control display	✓	✓	✓	✓
3		Special parameter button	✓	✓	✓	✓
4		Welding parameters				
		Gas pre-flow time	✓	✓	–	–
	Iz	Ignition power	✓	✓	–	–
	Is	Starting current	✓	✓	–	–
	tu	Slope-up time	✓	✓	–	–
	I1	Welding current I1	✓	✓	✓	✓
	t1	I1-Pulse time t1	✓	✓	✓	✓
	I2	Welding current I2	✓	✓	✓	✓
	t2	I2-Pulse time t2	✓	✓	✓	✓
	tp	Spot time	✓	✓	–	–
	td	Slope-down time	✓	✓	✓	✓
	Ie	End-crater current	✓	✓	–	–
		Gas post flow time	✓	✓	✓	✓
		AC balance	✓	–	–	–
		AC frequency	✓	–	–	–
5		Digital display 3 digit	✓	✓	✓	✓

No.	Symbol	Description / function	Ultra AC/DC	Ultra DC	High AC/DC	High DC
6	**P1**	Program 1 - Quick Choice button	✓	✓	✓	✓
7	**P2**	Program 2 - Quick Choice button	✓	✓	✓	✓
8		Push and rotate knob (R pilot)	✓	✓	✓	✓
9		Button process				
		TIG welding	✓	✓	✓	✓
		Electrode welding	✓	✓	✓	✓
		Electrode booster function	✓	✓	✓	✓
10		Operating mode button				
		2 cycle	✓	✓	✓	✓
		4 cycle	✓	✓	✓	✓
		Spot	✓	✓	✓	✓
11		Ignition button				
		HF on	✓	✓	✓	✓
		HF off	✓	✓	✓	✓
12		Units				
	A	Amp	✓	✓	✓	✓
	V	Volt	✓	✓	✓	✓
	S	Second	✓	✓	✓	✓
	%	Percent	✓	✓	✓	✓
	Hz	Hertz	✓	✓	✓	✓
	kHz	Kilohertz	✓	✓	–	–
13		Save program	✓	✓	–	–
14		Load program	✓	✓	–	–
15		Polarity button				
		DC negative pole (DC)	✓	–	✓	–
		Alternating current (AC)	✓	–	✓	–
	+	DC positive pole (DC)	✓	–	✓	–
	=/~	Dual Wave	✓	–	–	–
16		Pulse button				
		without pulse	✓	✓	✓	✓
		convectional pulse	✓	✓	✓	✓
		high-frequency pulse	✓	✓		

4.3 Switch on

The TIGER welding system is started with the mains switch. All LEDs illuminate for approximately 1 second. Next the software version and the machine type are displayed in the digital display for approximately 3 seconds. After 3 seconds expires all of the settings from the last welding process are run through in sequence and the set values displayed. This process can naturally be interrupted at any time. This is done by pushing any control or a torch button. The welding system is now 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 at the mains switch. When the unit is switched back on the parameters used during the last welding process are set. An arc must be struck for any changes to the parameters to be saved when the unit is switched off.

Only the current parameters are shown, for example if the TIG parameters when electrode welding are 2/4 cycle, HF on/off etc., is suppressed. This also applies to the parameters for frequency and balance when DC welding.

After switching on the unit all settings are run through sequentially and the set values displayed. This gives an immediate overview. This process can naturally be interrupted at any time. This is done by pushing any control or a torch button.

If the rotary switch [8] or button is not actuated for 20 seconds, then the unit returns automatically to welding current I1. The basic state therefore always displays the most important values; current I1 and the same starting position when operating.

4.5 Push button welding process

The selection of the desired welding process TIG welding, electrode welding and electrode BOOSTER is made with the push button [9], whereby the LEDs indicate the selected welding process by illuminating.

4.5.1 TIG welding

The setting of the welding parameters for TIG welding is performed as described in Section 4.5.

4.5.2 Electrode welding

The settings for electrode welding is performed as described in Section 4.5.

The electrode is simultaneously the arc carrier and the additional material. It consists of an alloyed or non-alloyed core wire and a coating. The coating has the task of protecting the weld pool from the harmful ingress of air and stabilizing the arc. It also forms slag, which protects and forms the weld seam. Electrode welding can be used to weld almost all metals. Electrode welding is a common, easily handled welding process.

When setting up for electrode welding care must be taken that no TIG torch is fitted. If this is not the case the digital display shows the error number “E021” (see Section 7.3)

4.5.3 Electrode BOOSTER function

The settings for the electrode booster is performed as described in Section 4.5

In this mode the power supply fuse monitoring is switched off. The maximum welding power emitted by the “TIGER 180” is 150A and with “TIGER 230” 180A. If a higher setpoint is selected, this is automatically reduced to 150A or 180A.

When setting up the electrode booster function care must be taken that no TIG torch is fitted. If this is not the case the digital display shows the error number “E021” (see Section 7.3)

4.6 The welding parameters

The press and rotate switch [8] is used to select the welding parameters [4] shown in the welding curve for TIG welding with AC current. Using both the LEDs and the 3 digit digital display [5], the setting options are always selected and set using the same principle /see section 4.6.1)

4.6.1 Setting the welding parameters

- ❒ Turn the push and rotate knob [8] to the desired setting option. The currently selected setting option is indicated by the associated LED illumination and the associated value appearing in the digital display [5].
- ❒ Press the push and rotate knob [8] to select the desired setting option; the LED flashes.
- ❒ Turn the push and rotate knob [8] until the desired value is set.
- ❒ Press the push and rotate knob [8] to select another setting option or to leave welding parameter.

In the following the welding parameters are described according Fig. 5 to their sequence.

4.6.2 Gas pre-flow time

The settings for the gas pre-flow time [4] is performed as described in Section 4.6.1. The gas pre-flow time is the period of time after activating the torch trigger of torch 1 to start the welding process and the opening of the protective gas valve before the arc is ignited. Then the arc is ignited in the protective gas mantle, whereby the electrode and the workpiece is protected from burning out.

If the welding process is restarted during the gas post flow time, then the gas pre-flow time is automatically set to 0 seconds by the processor control. This speeds up the reignition, which helps to save time.

4.6.3 Ignition energy I_z

The settings for the ignition energy I_z [4] is performed as described in Section 4.6.1. The ignition energy can be infinitely adjusted between 10% and 100% when igniting for high-frequency or Lift Arc.

The processor control always sets a preselection for the required ignition process irrespective of the value selected for ignition energy I_z. This preselection can be adapted to the particular electrode (type, diameter) and the respective welding task by adjusting the ignition energy.

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.

4.6.4 Starting current I_s

The settings for the starting current I_s [4] is performed as described in Section 4.6.1. The starting current is the welding current that is first set after the ignition process. The setting can be infinitely adjusted between 10% and 200% of the selected current I_1 (but a maximum of Imax), for example: Starting current 40% and welding current I_1 100A -> starting current 40A). Selecting the appropriate starting current enables:

- Lower load on the electrode through increasing current flow
- Search arc for 4 cycle welding for approaching the start of the seam
- Welding with reduced current at the beginning of the seam at edges or sires of heat accumulation.
- Faster heat induction at values above 100%

4.6.5 Current slope-up time t_u

The settings for the current slope-up time t_u [4] is performed as described in Section 4.6.1. The current slope-up time is the period in which the welding current increases linearly from the start current to the preselected current I_1. During 2 cycle welding the current slope-up time begins immediately after the arc is ignited. During 4 cycle welding the slope-up time begins with the release of the torch trigger 1 with the start of current flow.

4.6.6 Welding current I_1

The settings for the welding current I_1 [4] is performed as described in Section 4.6.1. The setting range for welding current I_1 depends on the selected mode and type of machine.

4.6.7 I_1-Pulse time t_1

The settings for the I_1-pulse time t_1 [4] is performed as described in Section 4.6.1. TIG welding with the pulse function can be basically divided into two areas:

1. Conventional pulsing with pulse times between 0.1 and 0.5 seconds
2. High-frequency pulsing with pulse frequencies between 10 Hz and 17.5 Hz.

The selection of the welding processes conventional pulse and high-frequency pulse is made with the push button [8] (see Section 4.9)

With TIG pulse welding an automatic continuous switching between the currents I_1 and I_2 occurs during the welding process. In this the selection of which current is the high current and which the low current can be freely chosen. Fig. 6 shows the current flow when pulsing.

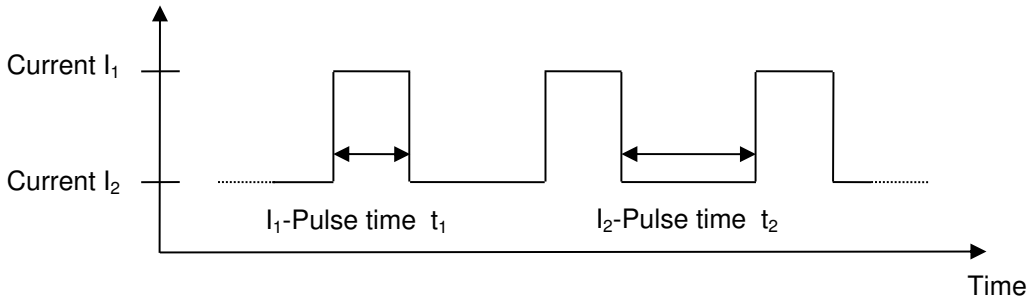


Fig. 6: Welding current when pulsing

During welding the pulse can be switched off and switched back on by actuating the torch trigger 2. If torch trigger 2 is actuated during pulsing welding current the pulses are switched off and welding continues with welding current I_2. As an example, this can be used so that the lower welding current I_2 is used until a new additional material has taken hold and the welding is continued with pulsing welding current by actuating the torch trigger 2 a second time.

Conventional pulsing: Pulses with pulse times from 0.5 to 5.0 seconds

The setting of the I_1-pulse time t_1 and the I_2-pulse time t_2 determines the duration that current I_1 or current I_2 remains active until switching to the other current. The actual output welding current is always shown on the indicating instrument.

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. In difficult situations (particularly in out of position welding and large gap bridging) and with thin sheet welding TIG pulse welding enables the weld pool to be controlled better than with constant welding current.

High frequency puling: with a pulse frequency of 10 Hz to 17.5 Hz.

The flow of the welding current is the same as conventional pulsing. However, the periods during which current I_1 and I_2 are active are always the same. As this period is very small a description with pulse frequency is expedient and customary.

The following correlations apply for the conversion of the pulse frequency for the each of pulse time t 1 and t 2:

Total pulse time = I_1-pulse time t_1 + I_2-pulse time t_2 = 1 / pulse frequency
I_1-pulse time t_1 = I_2-pulse time t_2 = 0.5 * total pulse time

Example:
Pulse frequency = 50 Hz
Total pulse time = I_1-pulse time t_1 + I_2-pulse time t_2 = 1 / Hz = 20 ms = 0.02 s
I_1-pulse time t_1 = 0.5 * total pulse time = 0.01s
I_2-pulse time t_2 = 0.5 * total pulse time = 0.01s
This means that the current when welding has the value current I_1 for 0.01 s (= 10 ms), then for 0.01 s (= 10 ms) the value current I_2, then once again for 0.01 s (= 10 ms) the value current I_1, etc.

Pulses of such short duration bring about a more narrow arc and deeper penetration.

The current average value is always shown in the digital indicator instrument because of the rapid alternations. This means that for welding current I_1 = 100A and I_2 = 50A the indicator shows 75A.

4.6.8 Welding current I_2

The settings for the welding current I_2 [4] is performed as described in Section 4.6.1. The use of welding current I_2 only makes sense with TIG welding and therefore is only displayed when TIG welding. Welding current I_2 is used for pulsing (see Section 4.6.7) and for twin-current control:

Twin-current control:

General function:

Twin-current control enables the user to work with 2 different, pre-set currents when using a torch with 2 triggers. This makes it possible to switch between the two values I_1 and I_2 when welding.

Switching to I_2 is effective for as long as torch trigger 2 is actuated. When torch trigger 2 is released the system immediately switches back to I_1.

Switching example:

- ❒ From high-current to low-current or vice-versa, for example when changing the welding position.
- ❒ Manual pulsing (see Section 4.6.10)
- ❒ Starting at high current I_1 for warming the workpiece, then welding with low-current I_2.
- ❒ Starting with low-current I_1 at an edge on the workpiece, then welding with high-current I.

Switching is possible in both 2 and 4 cycle modes without pulsing.

The current I_2 is set either by activating the setting option I_2, or also very quickly and easily by actuating torch trigger 2 before the welding process. When the torch trigger 2 is held down the current value I_2 is shown in the digital display and can be altered by turning the push and rotate knob.

4.6.9 I_2-Pulse time t_2

The setting is performed according to I_1-pulse time t_1 [4] (see Section 4.6.7).

4.6.10 Current slope-down time t_d

The settings for the current slope-down time t_d [4] is performed as described in Section 4.6.1. The current slope-down time is the period in which the welding current decreases linearly to the end-crater current. With 2 cycle welding the current slope-down time begins immediately after release of torch trigger 1. With 4 cycle welding the 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.

Manual pulsing:

If, with the TIG 2 cycle function, torch trigger 1 is actuated during the slope-down time, then the welding current immediately jumps to the value used for welding. The average energy is infinitely variable and can be directly selected depending on the time at which the torch trigger is actuated during slope-down.

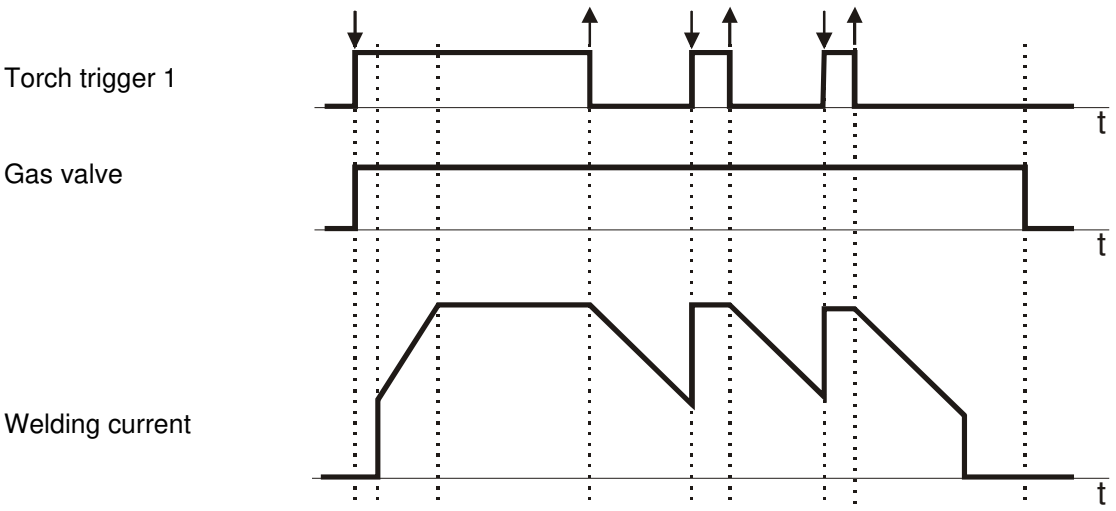


Fig. 7: Process for manual pulsing

4.6.11 End crater current I_e

The setting of the end crater current I_e [4] is performed as described in Section 4.6.1. 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 10% and 100% of the selected current I_1 (for example: End crater current 40% and welding current I_1 100A -> end crater current 40A). 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 4.6.10)
- Welding with reduced current at the end of the weld seam at edges or for heat accumulation

4.6.12 Gas post flow time

The setting for the gas post flow time [4] is performed as described in Section 4.6.1. The gas post flow time is the time after the arc extinguishes before the protective gas valve closes. The post flow of protective gas protects the workpiece and the tungsten needle from attack by oxygen in the atmosphere until they have cooled down. The pre-selected gas post flow time is, however, only effective when welding has taken place. The accidental actuation of the torch trigger does not result in the running of the gas post flow. This gas management function reduces gas consumption.

4.6.13 TIG spot welding time t_p

The settings for the TIG spot welding time t_p [4] is performed as described in Section 4.6.1. The TIG spot time is the time that the welding process is running during TIG spot welding (see Section 4.7.3).

4.6.14 AC balance ( )

The setting of AC balance [4] is performed as described in Section 4.6.1. 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 negative value the share of the negative welding current increases (up to -5) 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. With an increasing positive value the share of the positive welding current increases (up to +5) 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. The use of the highest possible negative value whilst maintaining a sufficient cleaning effect is recommended.

4.6.15 AC frequency (Hz)

The setting of the frequency Hz [4] is performed as described in Section 4.6.1. The frequency setting option is only available with AC current welding with TIG. 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 sinus form used in this processor controlled process results in a significant noise reduction and technical welding benefits when AC welding.

The REHM patented automatic frequency control can be selected as a special feature for TIG AC current welding. To activate, the setting for the frequency is switched to "On", which switches on under 30 Hz.

The automatic frequency control developed by REHM combines the benefits of a very stable arc in the lower welding current range with the benefits of a high electrode capacity in the high current range. The AC frequency is automatically adjusted to the actual momentary value of the welding current.

Normally, the selection of automatic frequency control makes setting the frequency superfluous. This setting option provides unlimited flexibility other than a few special application-specific cases where it is desirable to use a frequency that is different to that selected by the automatic frequency control.

4.6.16 Digital display

The 3-digit display [5] provides a quick and clear display of the welding parameters, all relevant information and also error messages (see Section 7). The LEDs [12] to the right of the digital display indicate the selected units by illuminating.

4.6.17 Push and rotate knob (R-Pilot)

The push and rotate knob [8] is centrally located and can be operated by a right handed or left handed operator. The special receptacle provides very good protection against mechanical stress. The push and rotate knob has no end stop so over rotation is not possible.

4.7 Operating mode

The push button [10] is used to select between the operating modes 4 cycle, 2 cycle and TIG spot welding, whereby the LEDs indicate the selected operating mode by illuminating.

4.7.1 4 cycle operating mode

In the 4 cycle operating mode the need to permanently actuate the trigger is omitted, enabling the torch to be guided for a longer period without fatigue.

Sequence of the 4 cycle operating mode:

❒ 1st cycle: operate the torch trigger

The protective gas solenoid valve opens
After the set gas pre-flow time has expired the arc is ignited
The welding current is at the value set for the starting current

❒ 2nd cycle: Release the torch trigger

The welding current automatically reaches the preset values for I_1 after the selected slope-up time.

❒ 3rd cycle: Actuate the torch trigger

The current reduces to the set end crater value at the preselected current slope-down time.
The welding current flow is at the set end crater value

❒ 4th cycle: Release the torch trigger

The arc extinguishes
The inert gas flow is in accordance with the selected gas post-flow value.

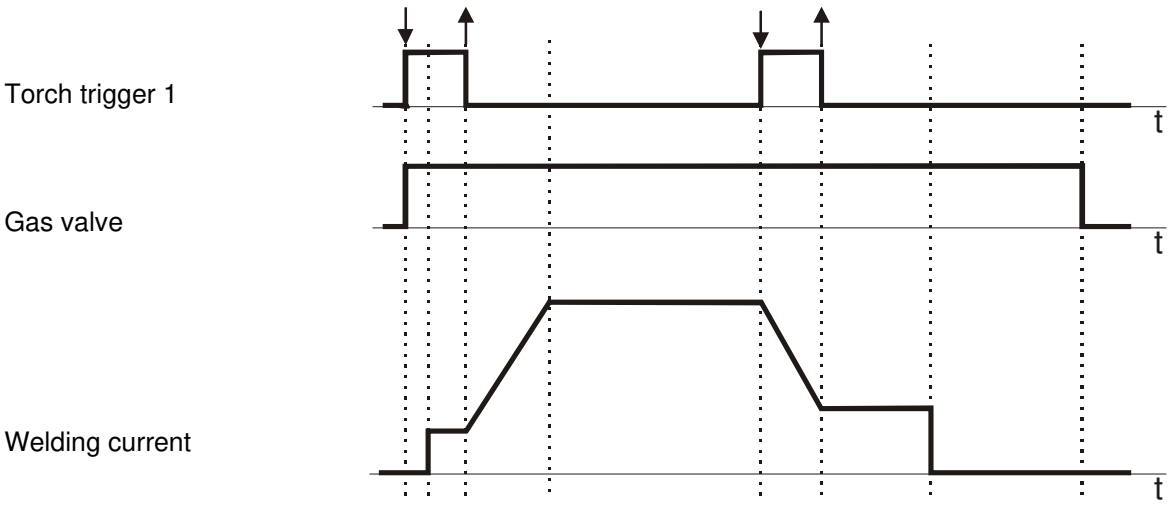


Fig. *8*: *Process for 4 cycle welding*

Peculiarities:

to the 2nd cycle	Actuating the torch trigger a second time during slope-up of the current extinguishes the arc and the protective gas continues to flow according to the selected gas post-flow time.
to the 3rd Cycle	The arc can be switched off during the slope-down period. Releasing the torch trigger before reaching the end crater current extinguishes the arc and the protective gas continues to flow for the set post flow time.

4.7.2 2 cycle operating mode

The 2 cycle mode is recommended for fast, controlled tacking and manual spot welding.

❒ 1st cycle: Actuate the torch trigger

The protective gas solenoid valve opens
After the set gas pre-flow time has expired the arc is ignited
The welding current automatically adjusts to the selected slope-up time, starting from the set starting current and rising to the preselected value for I_1.

❒ 2nd cycle: Release the torch trigger

The current reduces to the set end crater value at the preselected current slope-down time and then automatically switches off.
The inert gas flow is according to the selected gas post-flow value.

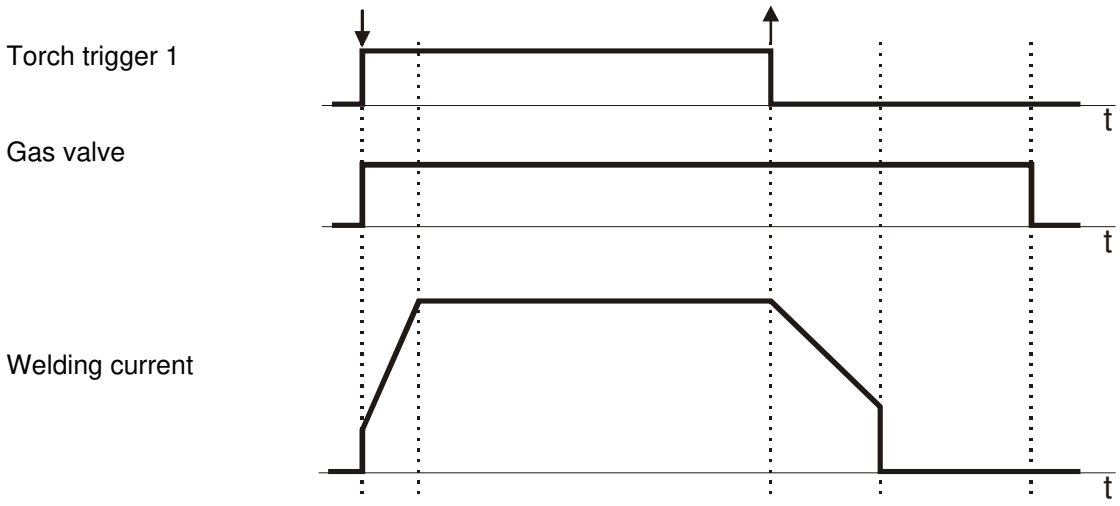


Fig. 9: Process for 2 cycle welding

Peculiarities:

to the 2nd cycle	Actuating the torch trigger a second time during slope-down of the welding current jumps the welding current back to I_1. This process is also known as manual pulsing (see Section 4.6.10). Actuating the torch trigger 2 (BT2) extinguishes the arc.

4.7.3 TIG spot welding

The spot welding mode is recommended for welding with a fixed spot welding time from 0.01 seconds.

The stationary welding process runs with a fixed spot welding time, unless the trigger is released prematurely during the welding.

The program runs to the end after expiry of the set spot welding time or after releasing the torch trigger during the welding.

The lower heat input into the materials being welded enables TIG welding with low distortion and only slight discolouration.

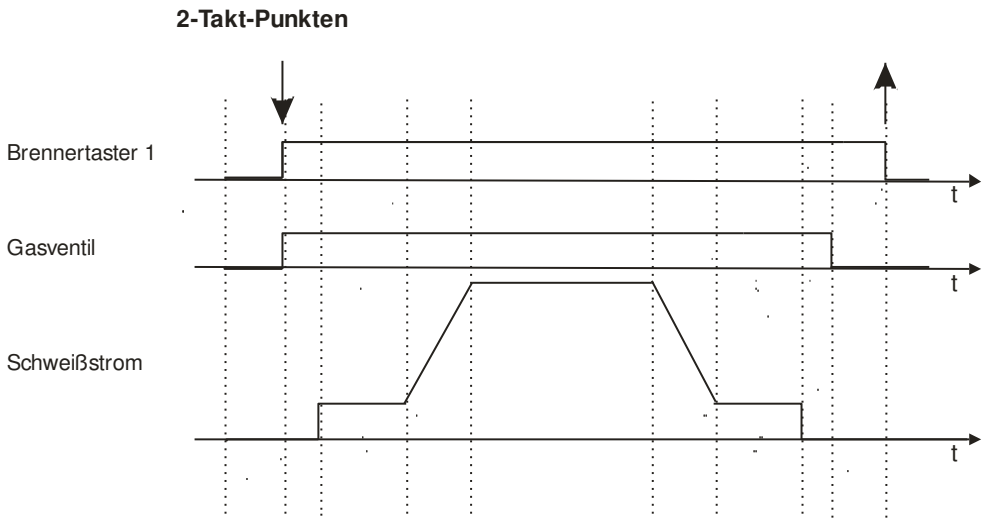


Fig. 10: TIG spot welding

❒ 1st cycle Operate the torch trigger

The set gas pre-flow time expires, the gas valve opens. After the gas pre-flow time has expired the arc is ignited. The welding current automatically adjusts to the starting current. After expiration of the current slope-up time the welding current reaches the preselected value I1. The set spot welding time expires. After the spot welding time expires the current reduces according to the preselected slope-down time to the value set for the end crater current and automatically switches off after expiry of the end current time.

❒ 2nd cycle Release the torch trigger

The inert gas flow is according to the selected gas post-flow value.

4.8 High-frequency (HF) ignition

The push button [11] is used to select the HF arc ignition for TIG welding, whereby the LED display shows whether the high frequency is on or off.

4.8.1 Welding with HF ignition

REHM TIG welding machines are equipped with RF igniter. HF ignition is automatically switched off in the "electrode" setting.

HF ignition makes contact-free ignition of the arc between the electrode and workpiece through pre-ionization of the air gap for DC and AC welding possible, whereby tungsten inclusions and therefore welding defects are prevented. In either case, the HF ignition unit is automatically switched off again after ignition. Re-ignition of the arc described in Section 4.6.15 when AC welding is performed without using the HF ignition unit. This reduces the electrical noise emission and even enables AC welding without HF ignition, as is already known for DC welding (see Section 4.8.2).

The RF igniter is operational when set to RF On "↯". To ignite the arc, the electrode is kept approx. 3-5 mm above the workpiece. By actuating the torch trigger the path is ionized by a high-voltage pulse and arcing occurs. Contactless ignition enables the prevention of tungsten inclusions in the welded seam. When welding the HF ignition is automatically switched off after ignition.

4.8.2 Welding without HF ignition

When welding with direct or alternating current contact ignition (lift arc) can be used. For this the high frequency is turned off. To ignite the arc, the electrode is placed on the workpiece and the torch trigger actuated. On lifting the electrode the arc program-controlled ignition takes place without wear occurring to the pointed electrode. This option can be used to advantage when working on sensitive electronic devices (for example, in hospitals, repair welding on CNC machines), where there is the risk of interference originating from high voltage pulses.

4.9 “Pulsing

The push button [16] is used to select the welding process without pulses, with conventional pulses and with high-frequency pulses, whereby the LEDs indicate the selected pulse type by illuminating.

4.10 Polarity

The push button [15] is used to select the polarity of the DC negative pole (DC), alternating current (AC), direct current positive pole (DC) and Dual Wave, whereby the LEDs indicate the selected polarity by illuminating.

When electrode welding it must be noted that on all TIGER DC welding systems the left output socket is always negative. Insert the electrode holder in the output socket in accordance with the electrode manufacturer's instructions and adjust.

4.10.1 DC negative minus pole (-)

In TIG welding with direct current negative pole the minus pole is applied to the left output socket for the TIG torch. TIG welding with direct current is usually welded with this set-up.

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

4.10.2 Alternating current (~)

When AC welding the polarity at the output terminals is constantly changing back and forth between positive and negative polarity. When TIG welding the torch is normally connected to the left output socket. The use of alternating current enables the welding of aluminium and aluminium alloys.

4.10.3 DC positive positive pole (+)

In TIG welding with direct current 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 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).

4.10.4 Dual Wave (=/~)

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 I_1 or I_2, the frequency and the 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.

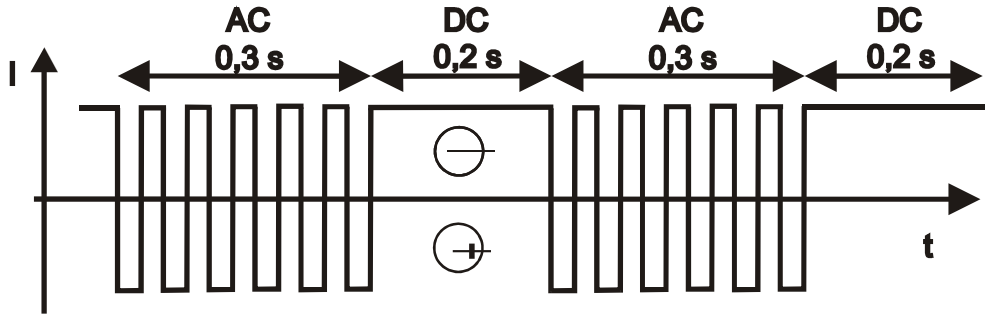


Fig.11: Welding current process with the dual-wave method

4.11 Load and save programs

Loading and saving of 100 programs is performed using the push buttons Load [14] for loading and the Save [13] for saving. The programs can be stored and loaded under an arbitrary number. In this process the values for all adjustment options offered by the machine are saved or loaded for each program.

Therefore, once the unit settings are determined for recurring welding tasks they can be recalled at the welding units in seconds. This saves time and ensures consistent quality.

The individual welding unit base settings such as the start and end crater current, ignition energy, etc., for use by multiple people can be saved for each person and quickly duplicated.

One special feature of the TIGER welding system is the rapid loading and storing of 2 programs, P1 [6] and P2 [7].

4.11.1 Fast setting P1 and P2 (Quick choice buttons)

The push buttons P1 [6] and P2 [7] enable the user to quickly load and save programs.

To load program 1 or program 2 briefly press button P1 [6] or button P2 [7]. The push button selected illuminates.

To save the machine settings performed press and hold push button P1 [6] or push button P2 [7] for approximately 2 seconds. When the values are saved the digital display [5] disappears for approximately 0.5 seconds. The selected push button illuminates, the program is now saved under this push button.

With the up/down torch program 1 or program 2 can be called up (see Section 4.14 Special parameters).

4.11.2 Load program

Programs ate loaded using the Load [14] push button.

- ❒ Briefly pushing the Load [14] push button illuminates the indicator LED “Pxx” for loading the program.
- ❒ Select the desired program number using the push and rotate knob [8] (for example “P34”). Program numbers that are already assigned are shown in the digital display [5].
- ❒ Push and hold the Load [14] push button for approximately 2 seconds. When loading the digital display disappears [5] for approximately 0.5 seconds. The desired program in loaded.

4.11.3 Save program

Programs are saved using the Save [13] push button.

- ❒ Perform the desired machine settings (welding parameters) on the TIGER system.
- ❒ Briefly pushing the Save [13] push button illuminates the indicator LED “Pxx” for saving the program.
- ❒ Select the desired program number using the push and rotate knob 8. The program number is shown in the digital display [5]. If a program number has already been assigned a “P” always appears before the number (for example “P34”). A free program number is indicated with a “-“ before the number, (for example “-35”) or two dashes "--" (for example “—35”).
- ❒ Push and hold the Save [13] push button for approximately 2 seconds. The program is saved. When the values are saved the digital display [5] disappears for approximately 0.5 seconds. The desired program in saved.

Note: It is recommended that a table is created for managing the programs in which the respective program numbers and the associated task are listed.

4.12 Electrode welding

The welding current can be infinitely adjusted using the push and rotate knob [8].

4.13 Control lamps

	Control lamp REMOTE CONTROL ACTIVE [2] The LED illuminates when the remote control element is connected and active.

	Control lamp OPERATION (LED illuminates green) [1] The LED illuminates **green** If open-circuit voltage is connected to the torch or electrode holder.
	Control lamp TEMPERATUR (LED illuminates yellow) [1] If the temperature limit is reached the LED illuminates **yellow**. The power section is switched off and there is no output voltage as long as this LED remains yellow. With TIG welding the gas post flow time runs when the power section is switched off. Once the unit has cooled the LED goes out and welding can commence automatically.

4.14 Special parameters

Special parameters enable the user to make individual settings.

4.14.1 Overview of special parameters

	"0"	"1"	"2"	"3"
SP1	Potentiometer	Potentiometer	—	—
SP2	UP/DOWN	UP/DOWN I_1	UP/DOWN P1/P2	
SP3	"SINUS"	"TRIANGLE"	"RECTANGLE"	—
SP4	I_2	I_2	I_2	—
SP5	TIGER - COOL "OFF"	TIGER - COOL "ON"	TIGER - COOL "AUTO"	—
SP6	V	V Ø	V + Ø	—
SP7	0 7	UP/DOWN I_1		0 7
CLr	Clear All			

Fig. 12: Overview of special parameters

4.14.2 Setting special parameters

- ❒ Press the Special Parameter push button [3].
- ❒ The desired special parameter (SP1 to SP7 and CLr) can be selected and activated by turning and pressing the push and rotate knob [8]. The digital display flashes [5]. The selected special parameter can be adjusted by again turning the push and rotate knob and accepted by pressing the push and rotate knob [8].
- ❒ To exit the special parameters press the Special Parameters push button [3] once again.

4.14.3 Explanation of special parameters

- **Special parameter SP1 – Torch potentiometer**
  This special parameter is foreseen for use with a torch with a potentiometer.
  0 Torch potentiometer is inactive, this means that the potentiometer on the torch is not evaluated.
  1 Torch potentiometer is active, this means that the potentiometer on the torch is evaluated.

- **Special parameter SP2 – Up/down torch**
  This special parameter is foreseen for use with an up/down torch.
  0 Up/down torch is inactive, this means that the up/down function is not available.
  1 The up/down torch can be used to change the welding currents I_1 or I_2. When pulsing the relationship between I_1/I_2 is retained.
  2 The up/down torch can be used to call programs P1 and P2. Actuating the rocker changes from P2 (up) and P1 (Down).
  3 Control of the cold wire unit APUS 20 C

- **Special parameter SP3 – AC-waveform**
  Setting of an AC waveform in the polarity “Alternating Current (AC)”
  0 AC waveform "Sinus"
  Noise optimised
  1 AC waveform "Triangle"
  Improved penetration compared with the “Sinus” waveform
  2 AC waveform "Rectangle"
  Greatest possible arc stability and high penetration

- **Special parameter SP4 – I1 / I2 switching**
  0 static operation: BT2 = 0 → I1, BT2=1 → I2
  1 Push-to-run operation: BT2 = 0-1-0 → I2 then BT2 = 0-1-0 → I1
  (0 → button not pressed / I1 → button pressed)

- **Special parameter SP5 – TIGER water cooler unit operating mode**
  0 Off
  The pump and the fan are always switched off. This is recommended when electrode welding or when changing the torch.
  1 On
  The pump and the fan are always switched on.
  2 AUTO
  The pump and the fan are switched on as necessary when welding is taking place or when the temperature of the coolant is higher than 30°C. If the system does not cool below 30°C for a long period, (for example, if the ambient temperature is above 30°C) then the pump and the fan are switched off.

- **Special parameter SP6 – Voltage indicator**
  0 Voltage indicator off
  1 Average voltage is shown at the end of every weld.
  2 The actual voltage is shown when welding (the value is updated every 2 seconds) and at the end of every weld.

  Voltage detection range:

- **Special parameter SO7 – Adjustment speed Up/Down torch**
  Setting the welding current I_1 or I_2 adjustment speed using the up/down torch trigger.
  Value range: 0 (slow) to 7 (fast)

Note
This special parameter is active when special parameter 2 “up/down torch” is set to 1.

- **Special parameter factory setting CLr**
  When CLr is selected the digital display flashes. All parameters are reset to the factory settings. Programs 1 to 99 and the special parameters remain.

Welding parameters	**Factory settings**
Gas pre-flow time	0.1 s
Ignition current	50%
Starting current	50%
Slope-up time	0.1 s
Current I_1	100 A.
Current I_2	80 A.
Pulse time t_1	0.3 s
Pulse time t_2	0.3 s
Slope-down time	0.1 s
End-crater current	20%
Gas post flow time	5.0 s
AC frequency*	Automatic
AC balance*	0
Ignition	HF on
Operating mode	2 cycle
Polarity*	DC minus
EL current I_1	150 A.
Pulse type	Pulse off
Pulse frequency	500 Hz.
TIG spot welding	0.1 s
Electrode BOOSTER	Inactive

* not used for DC systems

4.15 Other functions

4.15.1 Torch functions for fast setting of the welding currents I_1 and I_2

Setting the welding current I_1 (before starting to weld)

Briefly (<0.5 seconds) actuating the torch trigger 1 selects the setting options for the welding current I_1 – the LED current I_1 [4] flashes. The value for welding current I_1 is shown in the digital display[5]. The value can be changed by turning the push and rotate knob [8].

By actuating the torch trigger 1 HF ignition pulses can be emitted depending on the setting.

Setting the welding current I_2 (before starting to weld)

Briefly actuating the torch trigger 2 selects the setting options for the welding current I_2 – the LED current I_2 [4] flashes. The value for welding current I_2 is shown in the digital display[5]. The value can be changed for I_2 by turning the push and rotate knob [8].

If no change is made to the welding current I_1 or I_2 for 2 seconds, the system jumps back to the previously selected welding parameters. Activation is possible from every welding parameter, for example if gas post-flow is selected.

4.15.2 Setting the welding current I_1 and I_2 with the up/down torch.

To do this the special parameter SP2 must be set to “1” (see Section 4.14, Special parameters).

Using the up/down torch the current I_1, I_2 can be controlled up or down before and during welding work. The set value is shown in the digital display [5].

Turning I_1 up and down is done by actuating Up/Down (hereby the LED for welding current I_1 flashes).

To turn I_2 up/down the welding current I_2 must be selected by actuating the torch trigger 2 (hereby the LED for welding current I_2 flashes). Turning I_2 up and down is done by actuating Up/Down.

The active currents I_1 or I_2 can be adjusted up and down at any time when welding. If Up/Down is not actuated for 2 seconds, the system jumps back to I_1 – LED current I_1 [4] illuminates).

If the welding current I_1 is adjusted up or down during pulsing the value welding current I_2 is changed at the same ratio, this means that the perceptual relationship between I_2 and I_1 remains constant when changes are made to I_1 (for example starting value I_1 = 100A, I_2 = 50A results in the final values of I_1 = 200A, I_2 = 100A).

4.15.3 Selection of programs P1 and P2 with Up/Down torch

To do this the special parameter SP2 must be set to “2” (see Section 4.14, Special parameters).

The Up/Down torch can be used to select the programs P1 and P2 before welding. When programs P1 [6] or P2 [7] are active the respective LEDs in the fast setting buttons illuminate.

4.15.4 Anti-stick function

If a permanent short-circuit is present during electrode welding, then after 0.3s the ant-stick function initiates and limits the current to approximately 20A. This prevents the electrode from glowing and the permanent short circuit can be solved easily by pulling out.

4.16 Foot-actuated remote controller TIGER 180/230

REHM participants: 7531051

The foot-activated remote controller TIGER 180/230 (see Section 10 - Accessories) can be used to match the welding current to the welding task during the welding work using the foot pedal. In doing so the current set at the machine is the current that is adjusted by actuating the pedal.

The foot-actuated controller is connected to the remote operating socket on the front side of the TIGER.

4.17 REHM TIG torch

The TIG torches (see Section 10 - Accessories) are matched to the TIGER electrical components. They offer many opportunities for remotely adjusting the current source (see Section 4.15.1,4.15.2 and 4.15.3). The use of other TIG torches with a remote control capability can result in functional faults or defects on the TIGER.

CAUTION:

When TIG torches with remote control capability of any type that are not explicitly recommended by REHM are used all warranty claims are void.

5 Commissioning

5.1 Safety information

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

When welding always wear protective clothing and take care to avoid other persons who may be in the vicinity being endangered by the UV radiation emitted by the welding arc.

5.2 Working under increased electrical hazard (IEC 874, EN 60974-1, TRBS 2131 and BGR 500 KAP. 2.26)

REHM TIG welding systems meet the regulations for working under increased electrical hazard in accordance with IEC 874, EN 60974-1, TRBS 2131 and BGR 500 KAP. 2.26)

For AC welding a safety unit is built into the electronic control. When AC welding this ensures that the arc is always only ignited with DC voltage and the change to AC current is only made after the welding current is flowing. The machine automatically switches off the HF and the welding current if the arc is suddenly torn away when welding. The machine is then in the basic condition.

It must be noted that for work under increased electrical hazard, the welding current source must not be placed in this area. Regulations EN 60974-1, TRBS 2131 and BGR 500 KAP 2.26 must be observed.

5.3 Placement and transportation of the welding unit

Place the REHM welding system so that the welder has sufficient space in front of unit to adjust and operate the controls. Secure the unit so that it is prevented from tipping over or falling down.

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

Instructions for placement and transport:

- Transport and operation only in the upright position!
- Transport the unit using only the grips and carrying strap provided.
- Place, operate and transport the unit on a firm, stable and level base
- Safety against tipping is ensured up to an angle of 10° (in compliance with the Standard IEC 60974-1)
- Avoid ambient air containing salt (sea air)!
- Keep entry and exit ports for cooling air free from obstruction!
- Maintain a minimum distance of 0.5m from obstacles!
- The unit is not suitable for crane transport.

Danger! **Electrical voltage!**

Do not use the welding unit in the open in the rain or snow!

5.4 Connecting the welding unit

Only connect the REHM welding current source to the power supply in accordance with the applicable VDE regulations and also observe the regulations of the respective 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 on the rating plate of your unit.

Always switch off the unit when not in use.

Screw the bottle pressure reducer tightly on the thread and check the connection for tightness. Always close the bottle valve after completing work. Observe the regulations of the respective professional associations.

5.5 Cooling the welding unit

Place the REHM welding unit so that the air entry and exit ports are not obstructed. The power section can only achieve the specified duty cycle with sufficient ventilation (see “Technical data”). Ensure that no grinding chips, dust or other metallic dust of foreign objects can enter the unit.

5.6 Guidelines for working with welding current sources

Only qualified or specially instructed persons who are familiar with the equipment and the process may be assigned with welding work. When welding always wear protective clothing and take care to avoid other persons who may be in the vicinity from being endangered. After finishing the welding work the unit should be left switched on for a few minutes so that the fan continues to run and residual heat is removed from the unit.

5.7 Connecting the welding leads and the torch

REHM TIG welding systems are equipped with quick connection devices for connecting the grounding cable and the TIG welding torch as well as the electrode cable. The connection is made by inserting and turning to the right. The protective gas hose is connected to the welding unit via a quick coupling. The torch trigger connector is inserted into the 19 pole socket.

Important!

To prevent unnecessary energy loss during welding ensure that all welding line connections are tightened and well insulated.

5.8 Connection of external components

The connection of external components is achieved via the standard 19 pole remote control socket on the front side of the TIGER. REHM accessories are available for this purpose as described in Section 10.

Only external components listed in this guide may be used. If external components other than those listed are used, the manufacturer's warranty is void.

Important!

When using the 19 pole remote control socket ensure that the guidelines for the use of serial bus systems are met. Particularly the regulations on electromagnetic compatibility (EMC). Use only the accessories provided by REHM.

To ensure that the initialisation of the external connections is always reliable, first the TIGER power supply switch and then the external devices are switched on.

6 Operation

6.1 Safety information

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

Working with and maintaining electric welding units is always associated with possible hazards. Persons who are not familiar with this type of system can injure themselves and others. For this reason operating personnel must be made aware of the following potential hazards and the safety measures to prevent possible damage or injury. Irrespective of this, the operator of a welding unit must inform themselves of the safety regulations applicable to the respective operation before starting work.

6.2 Electrical hazard

Connecting and maintenance works on the welding unit and their accessories may only be performed in agreement with the applicable VDE regulations and the regulations of the respective professional association.

- Never make contact with live metal parts with the naked skin or wet clothing
- When welding always wear gloves and a welder's hood with an approved protective filter.
- Ensure that everything that you must come into contact with when working, such as your clothing, your work area, the welding torch, the electrode holder and the welding unit are always dry. Never work in wet surroundings.
- Ensure good insulation by only wearing dry gloves and rubber soled shoes and stand on a dry, insulated base, in particular if you stand on metal when working or you are in an area of increased electrical hazard.
- Never use worn or damaged welding cables. Ensure that the welding cables are not overloaded. Only use items of equipment in perfect condition.
- Switch off the welding unit during longer periods of interruption.
- Do not wind the welding cables around parts of the housing and do not leave them wound into rings.
- Never leave a powered-up welding unit unattended.

6.3 Instructions for your personal safety

The effects of radiation from the electrical arc and the hot metal can result in serious injury to unprotected skin and eyes.

- Only use a welder's hood in perfect condition or automatic welding masks with an approved filter and leather gloves to protect eyes and skin from sparks and radiation from the arc (see TRBS 2131 and BGR 500 KAP. 2.26) Also wear similar protection even if you are only observing the welding work.
- Notify persons in the vicinity of the danger of arc radiation as well as hot metal sputter and parts and protect against these with non-flammable screens.
- Pressurised gas bottles are also a potential hazard. Therefore strictly comply with the safety instructions of the respective professional association and the supplier. Secure protective gas bottles from falling over. Never transport protective gas bottles without a protective cap
- During welding work noise levels of over 70 dBA can occur depending on the process and the environment, this can cause permanent hearing damage. Persons who remain in the working area must, if necessary, wear suitable hearing protection.

6.4 Fire protection

Hot slag or sparks can start a fire if they come into contact with combustible materials, fluids or gasses. Remove all combustible materials from the welding area and make sure that a fire extinguisher is at hand.

6.5 Ventilation

Workplaces must be setup under consideration of the processes, materials and conditions of use so that the air breathed by the user is kept free of substances harmful to health (see TRBS 2131 and BGR 500 KAP. 2.26)

Ensure that the welding area is perfectly ventilated either by natural or artificial ventilation.

Never perform welding work on workpieces treated with paint or degreasing agents that can result in harmful vapours.

6.6 Checks before switching on

It is preconditioned that

- ❒ the system is properly placed in accordance with ➔ **Section 5 Commissioning**,
- ❒ all connections (protective gas, torch connection) are properly made in accordance with➔ **Section 5, Commissioning**,
- ❒ the scheduled periodic maintenance work has been performed in accordance with Section 9, Maintenance,
- ❒ the safety equipment and the system components (in particular the torch connection hoses) have been checked by the operator, are functional and ready for use,
- ❒ the operator and the assisting persons are wearing the appropriate protective clothing and the securing of the work area has been completed so that no uninvolved persons are placed in danger.

6.7 Connecting the grounding cable

Warning!

➔ Section 6.2, Electrical hazard. Ensure that the welding current cannot flow through lifting device chains, crane cables or other electrical - conductors.

➔ Section 6.2, Electrical hazard. Ensure that grounding cables are connected to the workpiece as close as possible to the welding site. Grounding cables that are connected to distant points reduce the effectiveness and increase the risk of electrical shock and vagrant currents.

6.8 Practical instructions for use

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

Weldable materials

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 non-alloy, alloy 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.

Tungsten Electrodes

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 carrying capacity
- longer lifetime

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 it is also possible to work in the AC range with balance adjustments in the negative range using a pointed electrode. 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.

Protective gases

In TIG welding the protective 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 thermal input increases with an increasing portion of helium. The quantity of protective 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. With a workpiece of 4 mm thickness using argon as a protective gas an example reference value for aluminium is approximately 8 litres/minute and for steel and chrome-nickel steel approximately 6 litres/minute. If helium is used the required quantity is significantly higher.

TIG welding torch

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 with and without additional materials

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.

AC welding

With AC welding the negative pole is usually on the electrode. The negative pole is the cooler pole, this means that the current capacity and the service life of the tungsten electrodes is significantly longer than with positive pole welding.

DC welding

With DC 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 subject to a stronger current
3. The electrode current range increases
4. Welding can take place with a pointed electrode
5. The arc is narrower
6. The penetration is deeper
7. The thermal influence zone of the weld seam is lower
8. The weld speed is higher
9. The thermal input into the workpiece is reduced

Ignition with and without high-voltage (HF)

A high-voltage ignition device is installed in the REHM TIGER systems as standard for contactless ignition of the welding arc. 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.

Welding with rod electrodes

REHM TIG systems are particularly suitable as welding current sources for electrode welding due to their fast and precise control dynamics. The current strength setting and polarity depends on the electrode manufacture. 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

7 Faults TIG welding unit

7.1 Safety information

Warning!

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

Only restart operations with the system after the fault has been eliminated and no hazard exists for persons, machines and/or the environment.

Faults must only be eliminated by qualified persons under the observance of all safety instructions. ➔ Section 2

Before restarting the system must be released by qualified personnel.

7.2 Table of faults

REHM control panel is not working
The digital display instrument has no display and no LEDs illuminate.

Cause:	Remedy:
Mains power supply is missing (possible mains fuse)	Check the mains voltage
Mains cable of plug is defective	Check

Current slope-up time & current slope-down time are at “0.0” and cannot be altered.

Cause:	Remedy:
Remote foot control is plugged in	Times are controlled by the remote controller. Unplug the remote controller.

Current slope-up time & current slope-down times are not complied with

Cause:	Remedy:
Starting current is set at 100%	Reduce starting current
End crater current is set at 100%	Reduce the end crater current value

4 cycle cannot be set

Cause:	Remedy:
Remote foot control is plugged in	Unplug the remote foot control

Balance and frequency cannot be selected

Cause:	Remedy:
Polarity is not "~"	Only adjustable in the AC range

When switched on the system has different parameters than those when it was switched off

Cause:	Remedy:
Values are only saved after a successful welding process.	Execute welding process

No protective gas flows

Cause:	Remedy:
Bottle is empty or the gas hose is kinked.	Check
Pressure reduced is defective.	Check
Gas value on the machine is defective.	Service call
Blade terminal on the gas valve is loose.	Check
Welding process “Electrode”	Gas valve remains closed

Rotation of the fan is not audible

Cause:	Remedy:
Fan level is needs based – at lower temperatures the fan runs at a lower speed or switch off.	Check whether the fan switched to a higher speed when under greater load.
Fan defective.	Service call

No high voltage pulse

Cause:	Remedy:
HF ignition is set to off	Switch on the HF ignition
No protective gas present	Check
Grounding 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 the torch and the grounding cable reversed	Connect correctly

Welding current does not reach the set value or the arc does not burn.

Cause:	Remedy:
Grounding cable poorly connected	Check
Foot controller connected and not actuated.	Check
Hand remote control connected	Set the current on the remote control
No or incorrect protective gas	Check

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:
No or too little protective gas	Check
Electrode dirty	Grind

Electrode burns off

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

System does not pulse

Cause:	Remedy:
Pulse is not switched on	Set pulse time T1 and / or T2
Values for T1 and T2 are equal	Change the values

Arc breaks away on ignition

Cause:	Remedy:
Ignition energy set too low	Set the ignition energy or use thinner electrodes
Electrode is consumed or dirty	Grind electrode

7.3 Error messages

Error	Acknowledge			Error	Cause	Elimination
	A	B	C			
2	✓	-	-	Mains voltage	• Mains voltage outside the tolerance range	• Switch the unit off and check the mains voltage
18	-	✓	-	Condensation moisture	• Condensation / moisture on the inside of the unit	• Wait until the condensation / moisture has disappeared from the inside of the unit.
19	-	-	✓	Remote foot controller	• The foot controller is removed during welding.	• Do not remove the foot controller during welding.
21	-	✓	-	TIG torch in EL mode	• EL mode active with a TIG torch connected	• Remove the TIG torch • Switch to TIG mode
22	-	-	✓	Secondary short circuit	• When switching from TIG to electrode a short circuit is present on the welding socket.	• Eliminate the short circuit on the welding socket Eliminate the fault.
23	✓	-	-	Primary short circuit	• A short circuit is present on the welding socket when switching on. • Internal short circuit	• Eliminate the short circuit on the welding socket. • Service call
33	-	-	✓	Reversing pole current or reversing pole power is too high	• Welding circuit inductance too high	• Change the torch and grounding cable run. No loops and windings.
34	-	✓	-	Remote control connected to the torch socket	• Connected torch is not detected.	• Use a Rehm torch • Defective torch.
35	-	✓	-	Coolant overtemperature	• Temperature of the coolant > 65°C	• Let the water cooler cool down • Top-up coolant
48*	-	-	✓	Coolant flow	• Coolant monitor detects low coolant flow • Coolant monitor blocked by dirt	• 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
> 51				Service call	An analysis of the cause can be made by the service technician	

* Only for TIGER with an integrated water cooling unit

Acknowledge legend

A Fault message can be reset by switching off and back on again.
B Fault message will go out automatically when the fault is eliminated
C Fault message will go out when the fault is eliminated and the push and rotate knob [23] is actuated. If the fault is still present the fault message will reappear in the digital display [22] after 2 seconds.

8 Maintenance work

8.1 Safety information

Warning!

Maintenance and repair work may only be performed by persons who have been trained by REHM. Please contact your REHM dealer. When replacing parts only use 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 and claims against REHM for warranty or liability become void.

Before beginning cleaning work the 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 operating and maintenance instructions.

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.

8.2 Maintenance table

The maintenance intervals are the recommendation of 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	**Interval**
Cleaning the inside of the unit	depending on the conditions of use
Functional test of the safety equipment by the operating personnel	Daily
Visual system check, particularly the torch hoses	Daily

Activity	Interval
Check the function of the residual current circuit breaker	Daily (in flying constructions) otherwise monthly
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 compete welding system checked by qualified personnel; log the checks in the logbook provided. **Perform checks more regularly depending on the country-specific laws.**	Annually

8.3 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. Only use clean, dry air to blow out the unit or use a vacuum cleaner.

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.

8.4 Proper disposal

Only for EU countries

Do not dispose of electric appliances in domestic waste!

In accordance with the European Directive 2002/96/EC 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.

9 Technical data

		180 DC	230 DC	180 AC/DC	230 AC/DC
Mains voltage *U1* *[1]		1 x 230 V	1 x 230 V	1 x 230 V	1 x 230 V
Mains voltage tolerance					
	without water cooling	-15% / +10%	90V... 265 V	-15% / +10%	90V .. 265 V
	with water cooling	-15% / +10%	-15% / +10%	-15% / +10%	-15% / +10%
Mains frequency		50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz	50 Hz / 60 Hz
Mains fuse		16 A slow-blow	16 A slow-blow	16 A slow-blow	16 A slow-blow
Effective primary current $I1_{Eff}$		24.9 A	18.7 A	24.9 A	18.7 A
Max. primary current $I1_{max}$		26.8 A	25.3 A	26.8 A	25.3 A
Max. power at $I1_{max}$		6.1 kVA	5.8 kVA	6.1 kVA	5.8 kVA
cos φ		0.98	0.99	0.98	0.99
Recommended residual current circuit breaker		Type B	Type B	Type B	Type B
Open-circuit voltage		77 V	82 V	91 V	89 V
Setting range *I2*					
	TIG	4 A – 180 A	4 A – 230 A	4 A – 180 A	4 A – 230 A
	Electrode	20 A – 140 A	20 A – 150 A	20 A – 140 A	20 A – 150 A
	Electrode booster	20 A – 150 A	20 A – 180 A	20 A – 150 A	20 A – 180 A
Duty cycle (ED) at 40°C					
	35% ED		225 A		225 A
TIG	*40% ED*	180 A		180 A	
TIG	*60% ED*	160 A	180 A	160 A	180 A
TIG	*100% ED*	140 A	160 A	140 A	160 A
	40% ED		180 A		180 A
Electrode	*60% ED*	140 A	160 A	140 A	160 A
Electrode	*100% ED*	130 A	140A	130 A	140 A
Standard operating voltage					
	TIG	10.2 V – 17.4 V	10.2 V – 19.2 V	10.2 V – 17.4 V	10.2 V – 19.2 V
	Electrode	20.8 V – 26.6 V	20.8 V – 27.2 V	20.8 V – 26.6 V	20.8 V – 27.2 V
Peak voltage HF U_p		9.7 kV	9.7 kV	9.7 kV	9.7 kV
Generator power for $I2_{max}$		8.2kVA	8.2kVA	8.2kVA	8.2kVA
Generator type		Synchronous, asynchronous	Synchronous, asynchronous, inverter	Synchronous, asynchronous	Synchronous, asynchronous, inverter
Protection type *[2]		IP 23 S	IP 23 S	IP 23 S	IP 23 S

	180 DC	230 DC	180 AC/DC	230 AC/DC
Protection class				
without water cooling	2	2	2	2
with water cooling	1	1	1	1
Insulation class *3	F	F	F	F
EMV emissions class	A	A	A	A
Cooling type	AF	AF	AF	AF
Overvoltage category	III	III	III	III
Torch cooling				
without water cooling	Gas	Gas	Gas	Gas
with water cooling	Water	Water	Water	Water
Noise emission *4	< 70dB(A)	< 70dB(A)	< 70dB(A)	< 70dB(A)
Maximum protective gas pressure	6 Bar (87.02 psi)	6 Bar (87.02 psi)	6 Bar (87.02 psi)	6 Bar (87.02 psi)
Dimensions L x B x H				
without water cooling	480x160x320 mm	480x160x320 mm	480x160x320 mm	480x160x320 mm
with water cooling	480x215x530 mm	480x215x530 mm	480x215x530 mm	480x215x530 mm
Weight (without coolant)				
without water cooling	7.1 kg	7.5 kg	7.3 kg	7.9 kg
with water cooling	15.6 kg	16.0 kg	15.8 kg	16.4 kg
Standards	60974-1 60974-2 60974-9 60974-10 CE	60974-1 60974-2 60974-9 60974-10 CE	60974-1 60974-2 60974-9 60974-10 CE	60974-1 60974-2 60974-9 60974-10 CE

Water cooling	
Cooling power	
at 1 l/min (25°C)	600 W
at 1 l/min (40°C)	330 W
Max (25°C)	1000 W
Max (40°C)	500 W
Maximum flow rate	2,5 l/min
Maximum pump pressure	4.0 Bar 58.0 psi
EMC protection class	A
Tank content	1.5 l
Pump	Centrifugal pump
Monitoring flow	Error message below 0.5 l/min
Monitoring coolant	Error message above 65°C
Fuse	10 A slow-blow

1	Mains voltage	The unit may only be operated and connected with a grounded mains (grounded neutral and protective conductor).
2	Protection type	Protection type IP23 S - Protection of the unit against ingress of solid foreign bodies ∅ larger than 12 mm - Protection of the unit against spray water up to an angle of 60° from the vertical. The unit should be placed and operated outdoors in accordance with the protection class. The device is not to be operated, transported and stored in rain or snow.
3	Insulation class	Class of insulation materials used and their maximum continuous temperature (F = maximum permissible permanent temperature 155°)
4	Noise emission	Idle and operating with a standard load according to IEC 60974-1, at the maximum working point.

Subject to technical changes through further development.

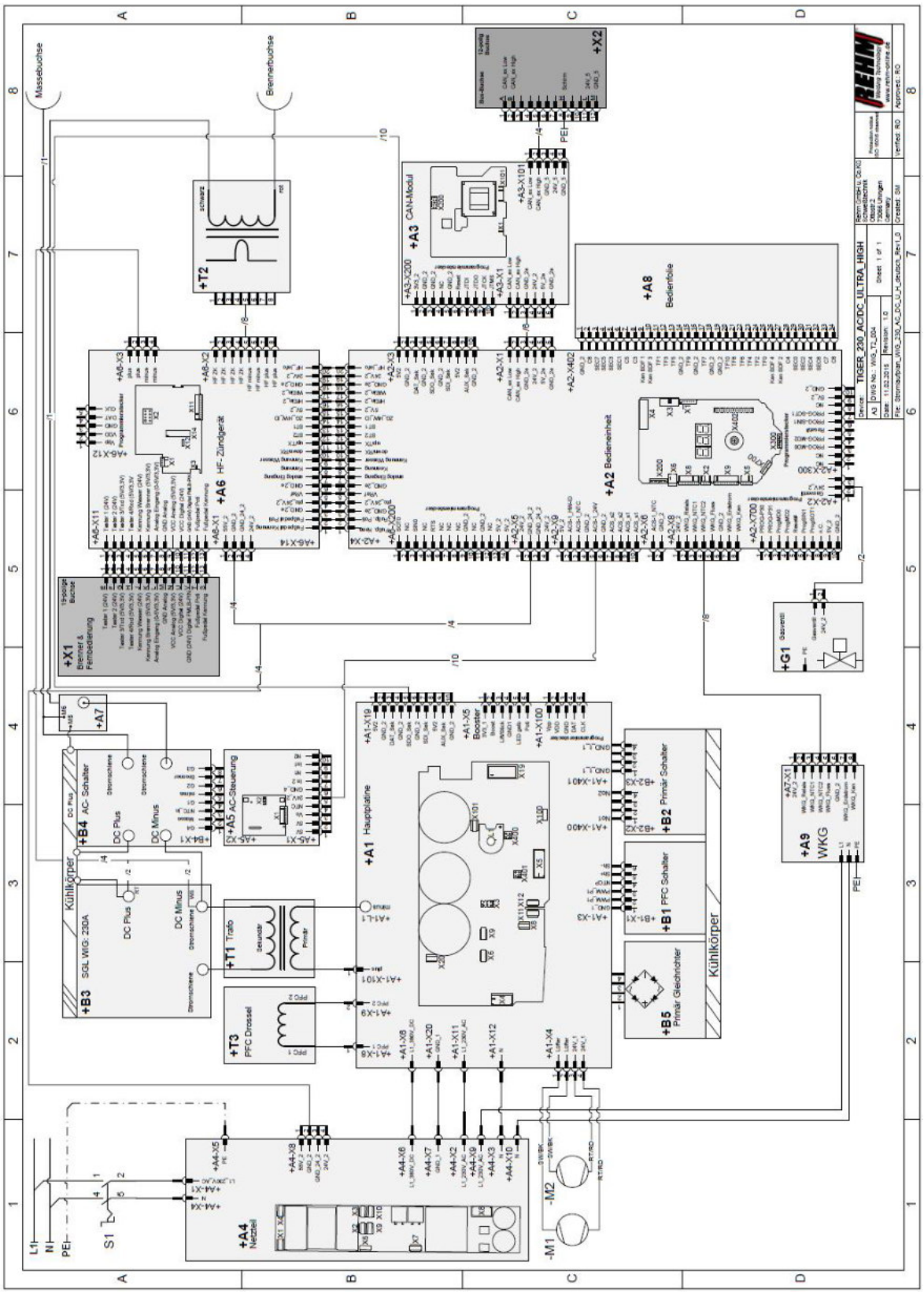
10 Accessories

REHM-part number	Name
Ground cable	
7810101	Ground cable 25 mm² 4 m 13 mm 400A clamp
Electrode cable	
7810201	Electrode cable 25 mm² 5m 13mm with 260A mount
Pressure reducer	
7830100	Pressure reducer with content and work pressure gauge, 200 bar, 32l/min
7830150	Pressure reducer with content and work pressure gauge, 200 bar, 32l/min, Netherlands version
Gas hose	
2200100	Gas hose 1.4m
7501111	Protective gas filter 1/4" mounting between the gas hose and pressure reducer
Welding torch	
TIG torch with 19 pin connector for TIGER 180/230, Gas cooled to max. 150A DC	
7633300	R TIG 140 19 4m UD HighFlex Leder
7633301	R TIG 140 19 8m UD HighFlex Leder
7631848	R SR 17 19 4m UD HighFlex Leder
7631849	R SR 17 19 8m UD HighFlex Leder
7631802	R TIG 150 19 4m UD GRIP-LITTLE HighFlex Leder
7631803	R TIG 150 19 8m UD GRIP-LITTLE HighFlex Leder
TIG torch with 19 pin connector for TIGER 180/230, Gas cooled to max. 240A DC	
7633400	R TIG 210 19 4m UD HighFlex Leder
7633401	R TIG 210 19 8m UD HighFlex Leder
7633133	AE 210 19 4m UD HighFlex Leder
7633134	AE 210 19 8m UD HighFlex Leder
7631850	R SR 26 19 4m UD HighFlex Leder
7631851	R SR 26 19 8m UD HighFlex Leder
631804	R TIG 200 19 4m UD GRIP HighFlex Leder
631805	R TIG 200 19 8m UD GRIP HighFlex Leder
Water cooling	
7633500	R TIG 250W 19 4m UD HighFlex Leder
7633501	R TIG 250W 19 8m UD HighFlex Leder
7633135	AQ 310W 19 4m UD HighFlex Leder
7633136	AQ 310W 19 8m UD HighFlex Leder
7631852	R SR 20W 19 4m UD HighFlex Leder
7631853	R SR 20W 19 8m UD HighFlex Leder
7631806	R TIG 260W 19 4m UD GRIP-LITTLE HighFlex Leder
7631807	R TIG 260W 19 8m UD GRIP-LITTLE HighFlex Leder
7631808	R TIG 260SC 19 4m UD GRIP HighFlex Leder
7631809	R TIG 260SC 19 4m UD GRIP HighFlex Leder

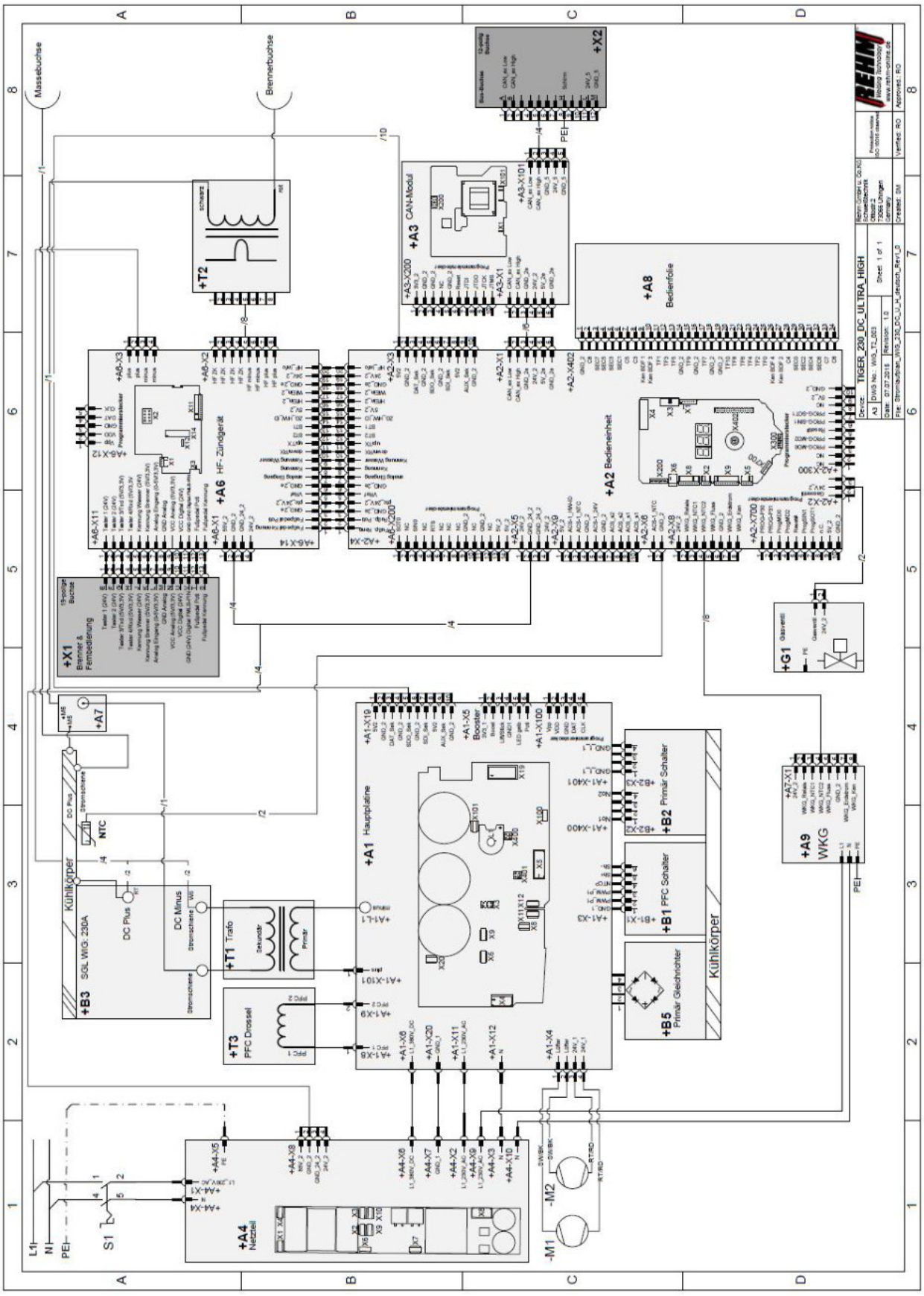
REHM-part number	Name
Torch wear parts sets	
7700435	Wear parts set R SR 17/26
7700440	Wear parts set R SR 20
7700426	Wear parts set R TIG 200
7700425	Wear parts set R TIG 150/260W
Remote control	
7531051	Remote foot-actuated controller TIGER 180/230
Fitting cases	
2600366	Fitting case for set (plastic, unequipped)
2600355	Aluminium transport box 850x350x350mm (LxWxH)
Coolant	
1680075	Coolant RCL 5 litre
1680077	Coolant RCL 25 litre
Adapter for accessories	
3600615	Torch duo cable 19-pin
3600650	Torch adapter cable INVERTIG.PRO to TIGER 180/230
3600628	Torch adapter cable TIGER 170/210 to TIGER 180/230 water cooled
3600629	Torch adapter cable TIGER 170/210 to TIGER 180/230 gas cooled

11 Circuit diagrams

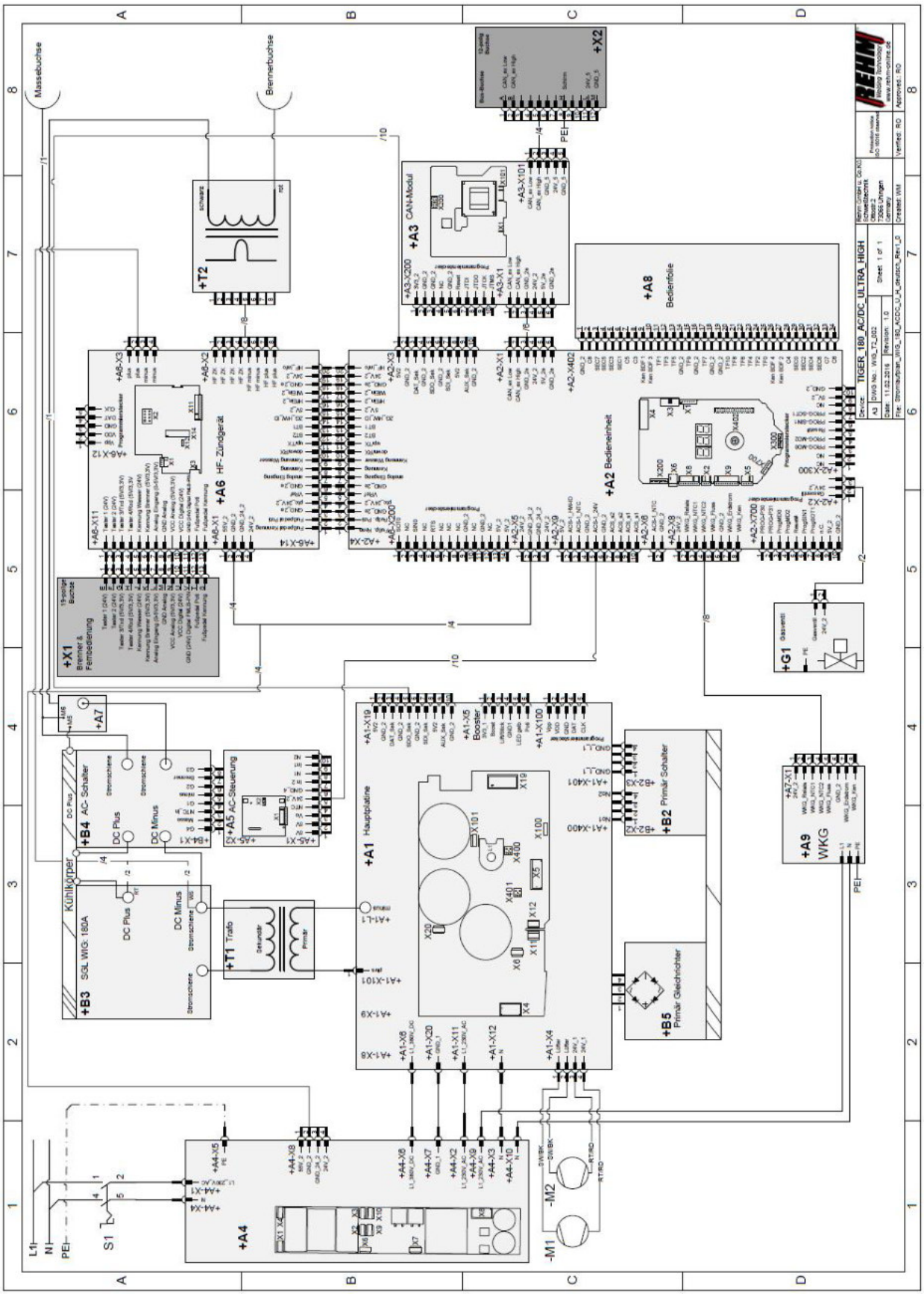
Circuit diagram TIGER 230 AC/DC



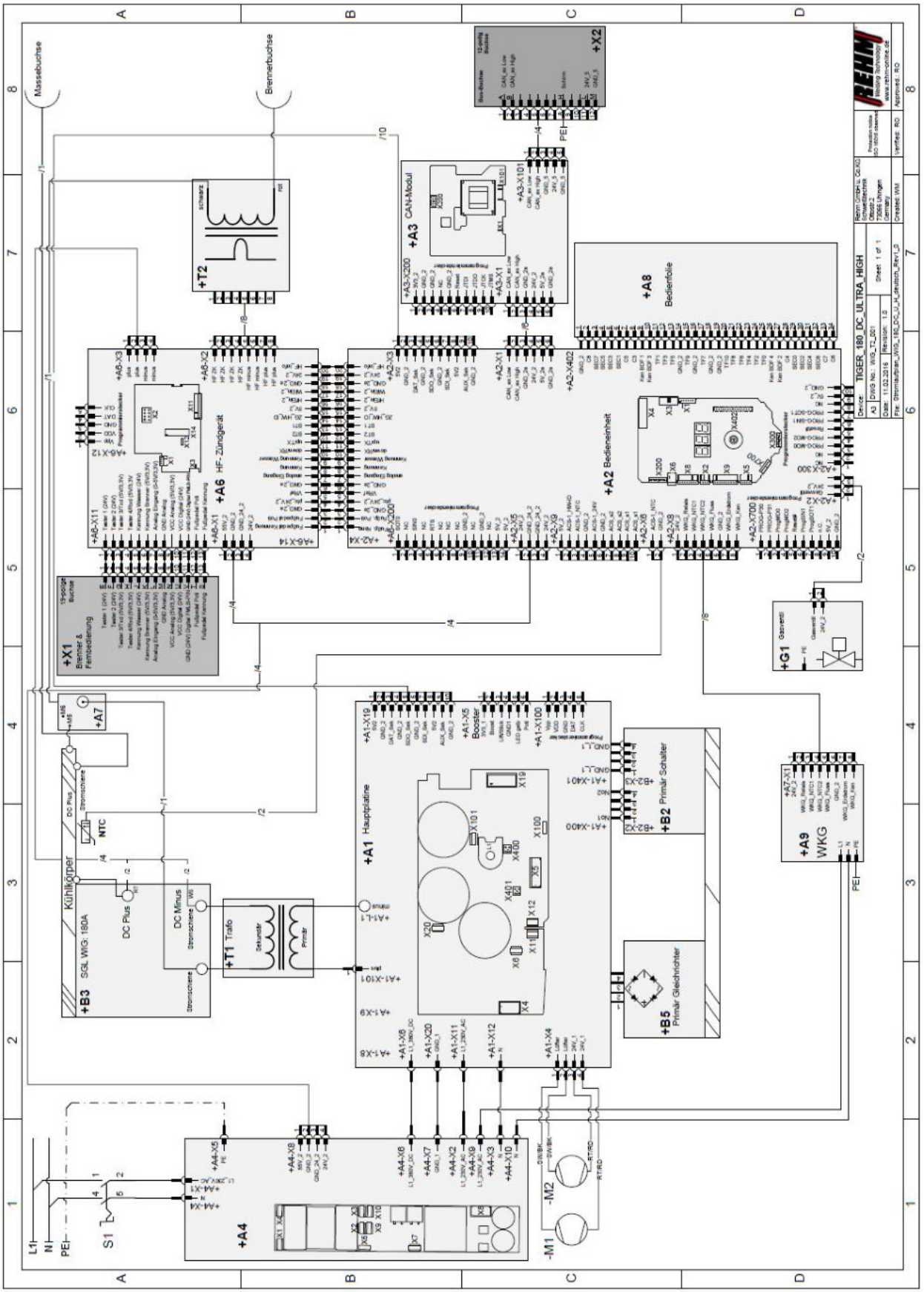
Circuit diagram TIGER 230 AC



Circuit diagram TIGER 180 AC/DC



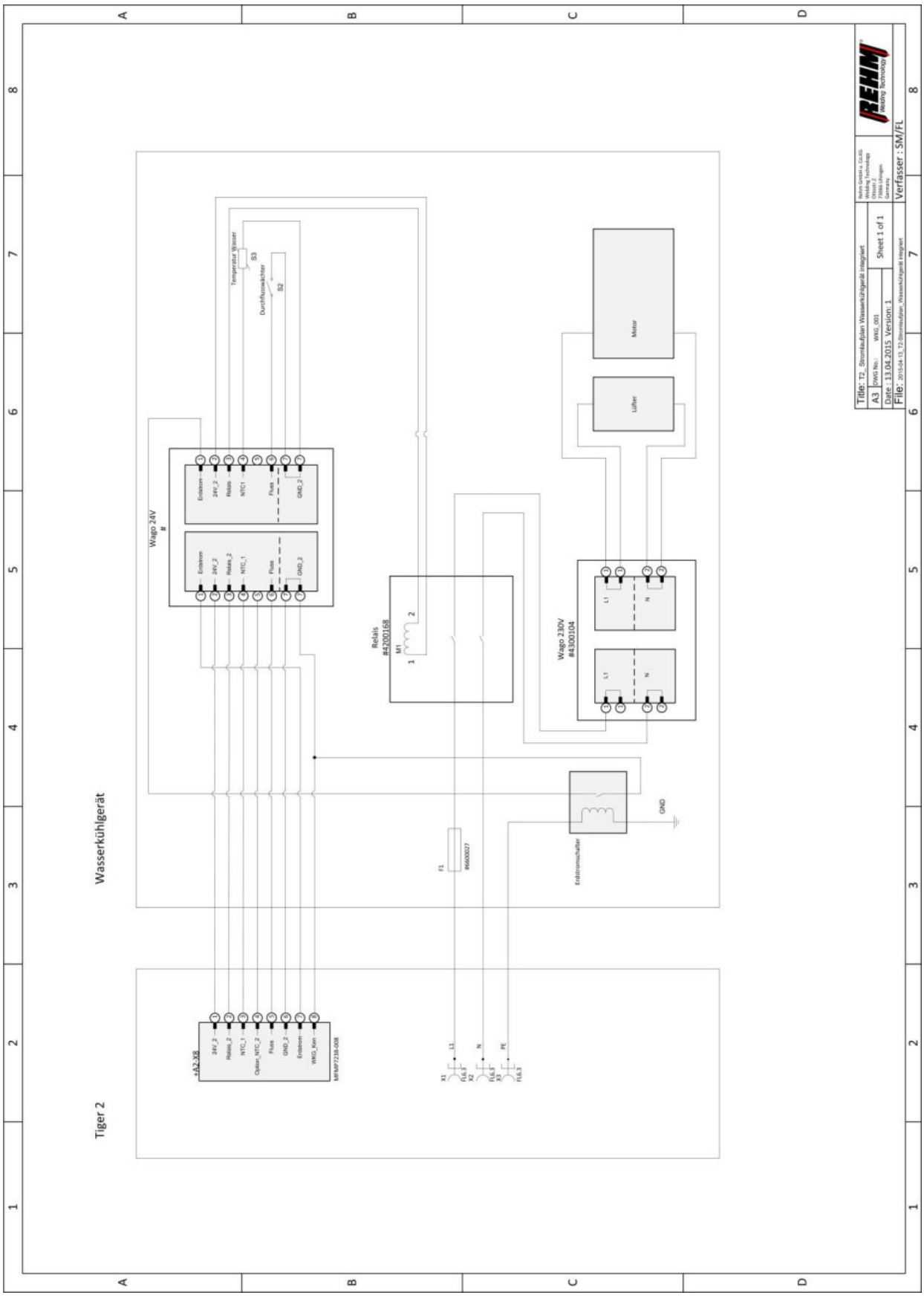
Circuit diagram TIGER 180 DC



Legend to the circuit diagram

Identifier	Name
A1	Main board
A2	Operating unit
A3	CAN-module
A4	Power supply
A5	AC control
A6	HF ignition device
A7	HF interference suppression
A8	Operation film
A9	Water cooling device
B1	PFC switch
B2	Primary switch
B3	Secondary rectifier
B4	AC switch
B5	Primary rectifier
G1	Gas valve
M1	Fan
M2	Fan
S1	Main switch
T1	Power transformer
T2	Ignition transformer
T3	PFC choke
X1	Torch & remote control socket
X2	iSystem socket

Circuit diagram TIGER water cooling unit



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EC declaration of conformity

For the following named products

TIG - protective gas - welding machine

TIGER 180 AC/DC ULTRA	**TIGER 230 AC/DC ULTRA**
TIGER 180 DC ULTRA	**TIGER 230 DC ULTRA**
TIGER 180 AC/DC HIGH	**TIGER 230 AC/DC HIGH**
TIGER 180 DC HIGH	**TIGER 230 DC HIGH**

it is hereby confirmed that they comply with the essential protection requirements which are laid down in the Directive **2004/108/EC** (EMC Directive) of the council on the approximation of the laws of the Member States relating to electromagnetic compatibility and in the Directive **2006/95/EC** relating to electrical equipment designed for use within certain voltage limits.

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

EN 60 974-1: 2013-06
Arc welding equipment - Part 1: Welding power source

EN 60 974-2: 2013-11
Arc welding equipment - Part 2: Liquid cooling systems

EN 60 974-3: 2014-09
Arc welding equipment - Part 3: Arc striking and stabilizing devices

EN 60974-10: 2008-09
Arc welding equipment - Part 10: Electromagnetic compatibility (EMC) requirements

according to the EC. Directive **2006/42/EC** article 1, paragraph 2 the above mentioned products fall exclusively within the scope of the directive **2006/95/EC** relating to electrical equipment designed for use within certain voltage limits.

This declaration is given for the manufacturer:

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

Uhingen, 28.04.2016

submitted by

R. Stumpp

Managing Director

REHM – Setting the pace in welding and cutting

The REHM range

- **REHM MIG/MAG inert gas welding units**
  SYNERGIC.PRO² gas- and water-cooled to 450 A
  SYNERGIC.PRO² water-cooled 500 A to 600 A
  MEGA.ARC stepless regulation to 450 A
  RP REHM Professional to 560 A
  PANTHER 202 PULS pulse welding unit with 200 A
  MEGA.PULS *FOCUS* pulse welding units to 500 A
- **REHM TIG inert gas welding units**
  TIGER, portable 100 KHz inverter
  INVERTIG.PRO TIG welding unit
  INVERTIG.PRO *digital* TIG welding unit
- **REHM MMA inverter technology**
  TIGER and BOOSTER.PRO 100 KHz electrode inverter
- **REHM plasma cutting units**
- **Welding accessories and additional materials**
- **Welding smoke extraction fans**
- **Welding rotary tables and positioners**
- **Technical welding consultation**
- **Torch repair**
- **Machine Service**

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Development, construction and production – all under one roof – in our factory in Uhingen. Thanks to this central organisation and our forward-thinking policies, new discoveries can be rapidly incorporated into our production. The wishes and requirements of our customers form the basis for our innovative product development. A multitude of patents and awards represent the precision and quality of our products. Customer proximity and competence are the principles which take highest priority in our consultation, training and service.

WEEE-Reg.-Nr. DE 42214869

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