EWM HIGHTEC WELDING GmbH
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Operating Manual

GB

inverter

TIG 300 CEL

300A, portable

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

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

- **EC Low Voltage Guideline (73/23/EEC)**
- **EC EMV Guideline (89/336/EEC)**

(The CE Mark is only required in EC member states)

In compliance with VDE 0544 (EN 60974-1), the machines can be used in environments with an increased electrical hazard.

 art. no.: 099-000048-EWM01 Revised: 28.08.2000

EG - Konformitätserklärung

EU - conformity declaration

Déclaration de Conformidité de U.E.

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

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

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

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

Hiermit erklären wir, daß das nachstehend bezeichnete Gerät in seiner Konzeption und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheitsanforderungen der unten genannten EG- Richtlinien entspricht. Im Falle von unbefugten Veränderungen, unsachgemäßen Reparaturen und / oder unerlaubten Umbauten, die nicht ausdrücklich von EWM autorisiert sind, verliert diese Erklärung ihre Gültigkeit.

We herewith declare that the machine described below meets the standard safety regulations of the EU- guidelines mentionned below in its conception and construction, as well as in the design put into circulation by us. In case of unauthorized changes, improper repairs and / or unauthorized modifications, which have not been expressly allowed by EWM, this declaration will lose its validity.

Par la présente, nous déclarons que la conception et la construction ainsi que le modéle, mis sur le marché par nous, de l´appareil décrit ci - dessous correspondent aux directives fondamentales de sécurité de la U.E. mentionnées ci- dessous. En cas de changements non autorisés, de réparations inadiquates et / ou de modifications prohibées, qui n´ont pas été autorisés expressément par EWM, cette déclaration devient caduque.

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

Gerätetyp:
Type of machine:
Type de machine:

Artikelnummer EWM:
Article number:
Numéro d´article

Seriennummer:
Serial number:
Numéro de série:

Optionen:
Options:
Options:

keine
none
aucune

Zutreffende EG - Richtlinien:
Applicable EU - guidelines:
Directives de la U.E. applicables:

EG - Niederspannungsrichtlinie (73/23/EWG)
EU - low voltage guideline
Directive de la U.E. pour basses tensions
EG- EMV- Richtlinie (89/336/EWG)
EU- EMC guideline
U.E.- EMC directive

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

EN 60974 / IEC 60974 / VDE 0544
EN 50199 / VDE 0544 Teil 206

Hersteller - Unterschrift:
Signature of manufacturer:
Signature du fabricant:

Michael Szczesny , **Geschäftsführer**
managing director
gérant

05.2000

Contents

Safety instructions

For Your Safety:

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

- **Before undertaking welding tasks, put on prescribed dry protective clothing, e.g. gloves.**
- **Protect eyes and face with protective visor.**

Electric shocks can be fatal

- **The machine may only be connected to correctly earthed sockets.**
- **Only operate with intact connection lead including protective conductor and safety plug.**
- **An improperly repaired plug or damaged mains cable insulation can cause electric shocks.**
- **The machine may only be opened by qualified and authorised personnel.**
- **Before opening, pull out the mains plug. Switching off is not sufficient. Wait for 2 minutes until capacitors are discharged.**
- **Always put down welding torch, stick electrode holder in an insulated condition.**

Even touching low voltages can cause you to jump and lead to accidents, so:

- **Safeguard yourself against falls, e.g. from a platform or scaffolding.**
- **When welding, operate earth tongs, torch and workpiece properly, not in ways for which they are not intended. Do not touch live parts with bare skin.**
- **Only replace electrodes when wearing dry gloves.**
- **Never use torches or earth cables with damaged insulation.**

Smoke and gases can lead to breathing difficulties and poisoning.

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

Workpiece, flying sparks and droplets are hot

- **Keep children and animals well away from the working area. Their behaviour is unpredictable.**
- **Move containers with inflammable or exposive liquids away from the working area. There is a danger of fire and explosion.**
- **Never heat explosive liquids, dusts or gases by welding or cutting. There is also a danger of explosion if apparently harmless substances in closed containers are able to build up excess pressure when they are heated.**

Take care to avoid fire hazards

- **Any kind of fire hazards must be avoided. Flames can form e.g. when sparks are flying, when parts are glowing or hot slag is present.**
- **A constant check must be kept on whether fire hazards have been created in the working area.**
- **Highly inflammable objects, such as matches and cigarette lighters for example, must not be carried in trouser pockets.**
- **You must ensure that fire extinguishing equipment - appropriate to the welding process - is available close to the welding work area and that easy access is possible.**

Safety instructions

Take care to avoid fire hazards

- **Containers in which fuels or lubricants have been present must be thoroughly cleaned before welding begins. It is not sufficient simply for the receptacle to be empty.**
- **After a workpiece has been welded, it must only be touched or brought into contact with inflammable material when it has cooled down sufficiently.**
- **Loose welding connections can completely destroy protective conductor systems of interior installations and cause fires. Before beginning welding work, ensure that the earth tongs are properly fixed to the workpiece or welding bench and that there is a direct electrical connection from the workpiece to the power source.**

Noise exceeding 70 dBA can cause permanent hearing damage

- **Wear suitable earmuffs or plugs.**
- **Ensure that other people who spend time in the working area are not inconvenienced by the noise.**

Secure gas cylinder

- **Place shielding gas cylinders in the holders provided for them and secure with safety chains.**
- **Take care when handling cylinders; do not throw or heat, guard against them toppling over.**
- **When moving by crane, take off the gas cylinder from the welding machine.**

Interference by electrical and electromagnetic fields is possible e.g. from the welding machine or from the high-voltage pulses of the ignition unit.

- **As laid down in Electromagnetic Compatibility Standard EN 50199, the machines are intended for use in industrial areas; if they are operated e.g. in residential environments problems can occur in ensuring electromagnetic compatibility.**
- **The functioning of heart pacemakers can be adversely affected when you are standing near the welding machine.**
- **Malfunctioning of electronic equipment (e.g. EDP, CNC equipment) in the vicinity of the welding location is possible.**
- **Other mains supply leads, trip leads, signal and telecommunications leads above, under and near the welding device may be subject to interference.**

Electromagnetic interference must be reduced to such a level that it no longer constitutes interference. Possible reduction measures:

- **Welding machines should be regularly maintained** (see Sect. “Maintenance and care”)
- **Welding leads should be as short as possible and run closely together on or near to the ground.**
- **Selective shielding of other leads and equipment in the environment can reduce radiation.**

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

Our operating instructions will provide you with an introduction into the safe use of the machine.

Therefore please read them closely and only start work when you are familiar with them.

Transport and set-up

- **Machines may only be moved and operated in an upright position.**

- **Before** moving, **pull out mains plug and place on the machine.**
- **Secure high-pressure shielding gas cylinder with safety chain to prevent it from toppling over.**

Environmental conditions:

The welding machine can be operated in a location where there is no risk of explosion at

- an **ambient temperature** of -10°C (plasma machines 0°C) to +40°C and
- a **relative air humidity** up to 50% at 40°C.
- where the surrounding air is free of **unusual** amounts of dust, acids, corrosive gases or substances etc., insofar as they do not occur during welding.
  Examples of **unusual** operating conditions:
  Unusual corrosive smoke, vapour, excessive oil vapour, unusual vibrations or jolts, excessive quantities of dust such as grinding dust etc., severe weather conditions, unusual conditions near the coast or on board ship.
- When setting up the machine, ensure that air inlets and outlets are unobstructed.
  The machine is tested to **Protection Standard IP23**, i.e.:
- Protection against penetration of solid foreign bodies ∅ > 12mm,
- Protection against water spray up to an angle of 60° to the vertical.

Notes on the use of these operating instructions

These operating instructions are arranged in Sections.

To help you find your way around more quickly, in the margins you will occasionally see, in addition to sub-headings, icons referring to particularly important passages of text which are graded as follows depending on their importance:

(Note): Applies to special technical characteristics which the user must note.

(Warning): Applies to working and operating procedures which must be followed precisely to avoid damaging or destroying the machine.

(Caution): Applies to working and operating procedures which must be followed precisely to avoid endangering people and includes the “Warning” symbol.

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

- Insert plug of welding current lead into socket **(Sect. 5, G2)** and lock.

Meaning of the diagram descriptions:

e.g. **(C1)** means: Item C / Figure 1 in the respective Section

e.g. **(Sect. 3, C1)** means: in Section 3 Item C / Figure 1

General

Congratulations!

You have purchased a modern, powerful, inverter technology welding machine.
Unlike conventional power sources it does not operate with 50Hz, but with a primary switched transistor power source with 50kHz.
The *inverter* ***TIG 300 CEL*** unit is characterised by

- excellent striking and welding characteristics for both TIG and electrode welding (down-hand safe when welding Cellulose electrodes),
- ergonomical, robust construction,
- and outstanding value for money.

The advantages of this welding unit:

Now you are using the advantages of this inverter technology:

- Less effort when moving from one workplace to another as the units size and weight are significantly reduced.
- Lower power consumption and smaller mains connections as high efficiency (no losses)
- Savings as complicated compensation units are not necessary and the high phase angle (cos. phi) saves mains power wastage.
- Reliability through robust design and high integration of the electronics used.
- High operational reliability thanks to thermal monitor integrated in the power section.
- Fast reaction control of the welding process. This means excellent welding and striking results and that all welding parameters can be exactly reproduced.
- Welding results independent of mains power fluctuations.
- Easily serviced design with the use of modern modular technology.

1 Technical Data

	inverter TIG 300 CEL
Welding Current setting range	5A-300A
max. Welding current at 45% Duty Cycle	300A
max. Welding current at 60% Duty Cycle	250A
max. Welding current at 100% Duty Cycle	190A
Load time	10 min.
Welding Voltage Electrode	10,1V- 22V
Welding Voltage Electrode	20,8V- 32V
max. Welding voltage	60V
Open circuit voltage	92V
Mains voltage, Tolerances	3 x 400 (+20%, -25%) or 3 x 415 (+15%, -25%)
Mains frequency	50Hz / 60Hz
Mains Fuse (slow blow out fuse)	3 x 16A
Mains connection cable	4 x 2,5mm^2
max. Connected Power	15,7kVA
Recommended Generator Power	22,1kVA
Work-piece cable	50mm^2
cosφ at I_{max}	0,99
Efficiency	91%
Ambient temperatures	-10°C to +40°C
Machine cooling	Fan
Torch cooling	Air
Insulation class	H
Type of protection	IP 23
Version	Decentralised
Size L/W/H	690mm x 290mm x 460mm
Weight without accessories	approx.: 40,5kg
S	In compliance with VDE 0544 (EN 60974-1), machines can be used in environments with an increased electrical hazard.

1.1 Range of application:

The machine is suitable for:

- DC TIG-welding with HF- and Liftarc-Ignition and
- DC MMA-welding (down-hand safe).

2 Description of the system components

2.1 The welding power source *inverter TIG 300 CEL*

Fig. 2/1: Front view

Pos.	Symbol	Description
A1		**Transport handle**
B1		**Logic control (Operating elements)**
C1		Connection socket 5 pole.: **Connection for torch control lead**
D1		**Gas connection G $^{1}/_{4}$":** With welding current "-" potential for TIG welding torch
E1	-	**Welding current socket "-":** Connection socket "-" potential for TIG welding torch
F1		**Welding current socket:** Connection socket for stick electrode holder.
G1		**Air inlet opening**
H1	+	**Welding current socket "+":** Connection socket for work-piece cable
I1		**Control socket 14pole:** Socket for remote control or welding torch control cable. Connection facility TIG-Poti torch: Option previously ex factory

2 Description of the system components

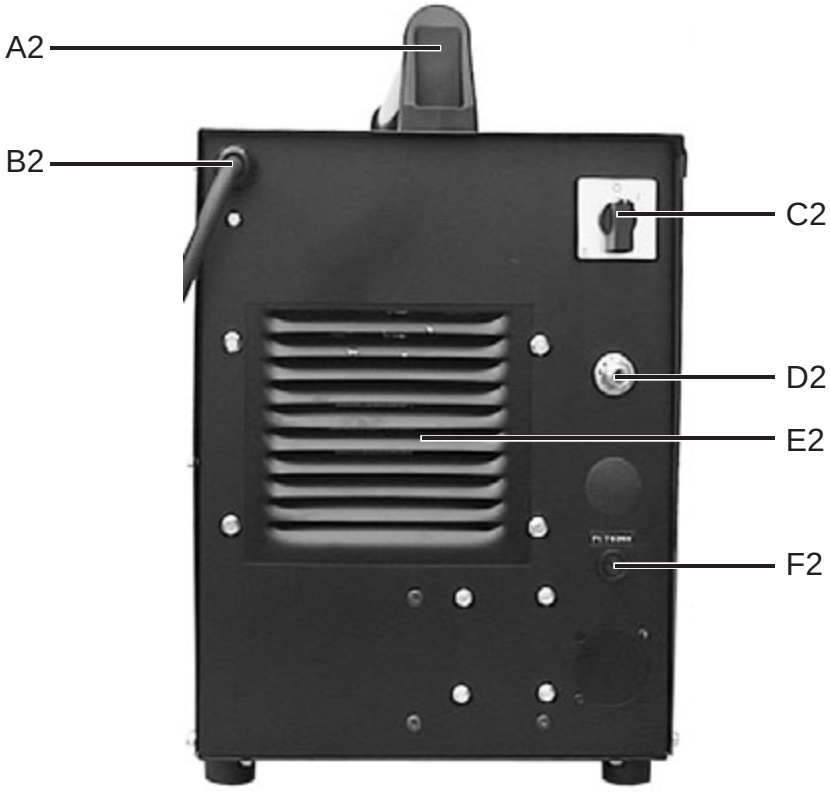
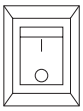


Fig. 2/2: Rear View

Pos.	Symbol	Description
A2		**Transport handle**
B2		**Mains cable**
C2		**Main switch:** machine "On/Off"
D2		**Gas connection G $^{1}/_{4}$":** Connection to pressure regulator / gas cylinder
E2		**Air outlet opening**
F2		**Fuse (F1; 0,315A slow-blow)**

3 Description of function Logic Control

3.1 Logic control

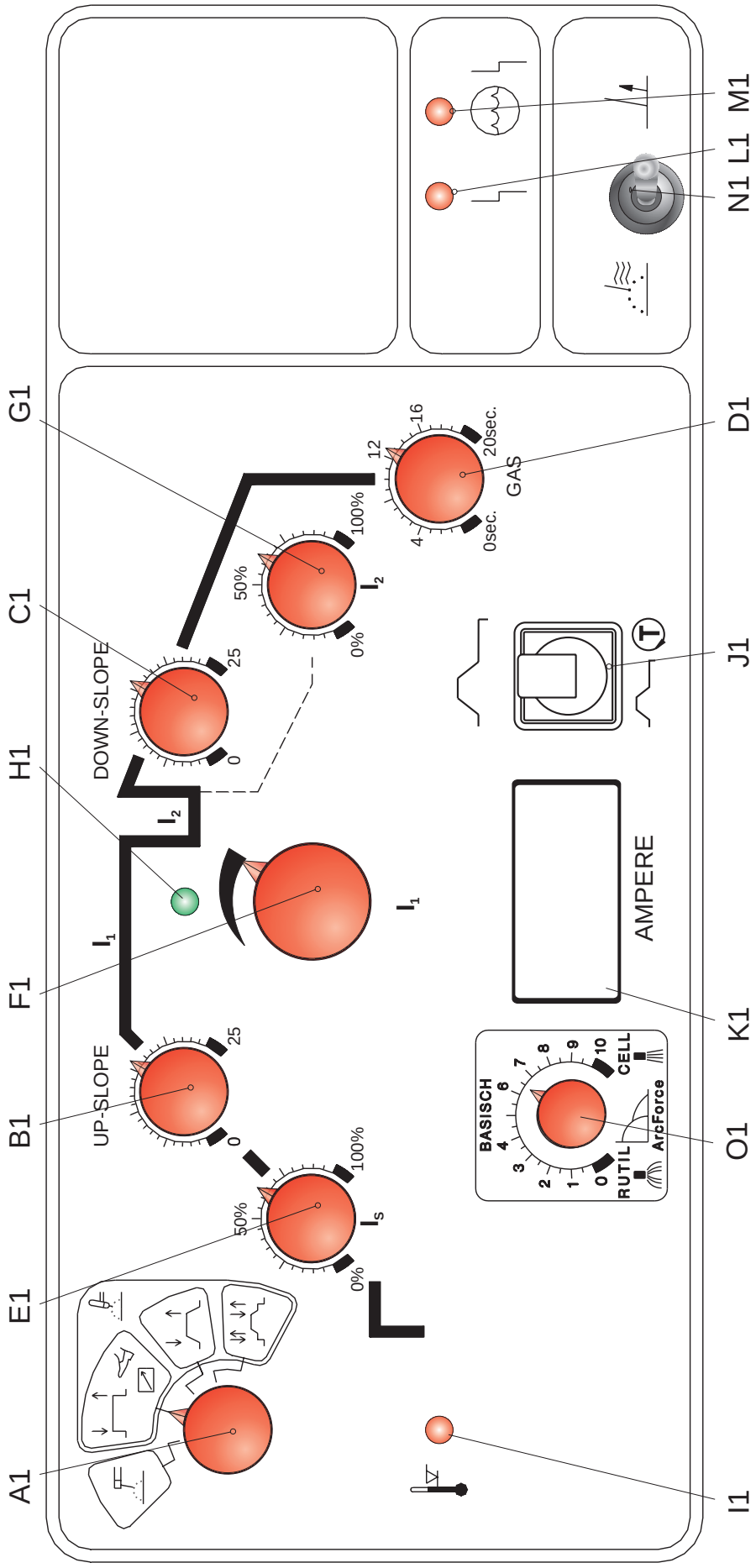


Fig. 1: **Logic control INTIG03**

3 Description of function Logic Control

A1

Rotary switch
The following operating modes can be preselected:

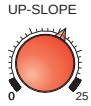
Non-latched operation without UP-SLOPE / DOWN-SLOPE

Non-latched operation with UP-SLOPE / DOWN-SLOPE

Latched operation with UP-SLOPE / DOWN-SLOPE

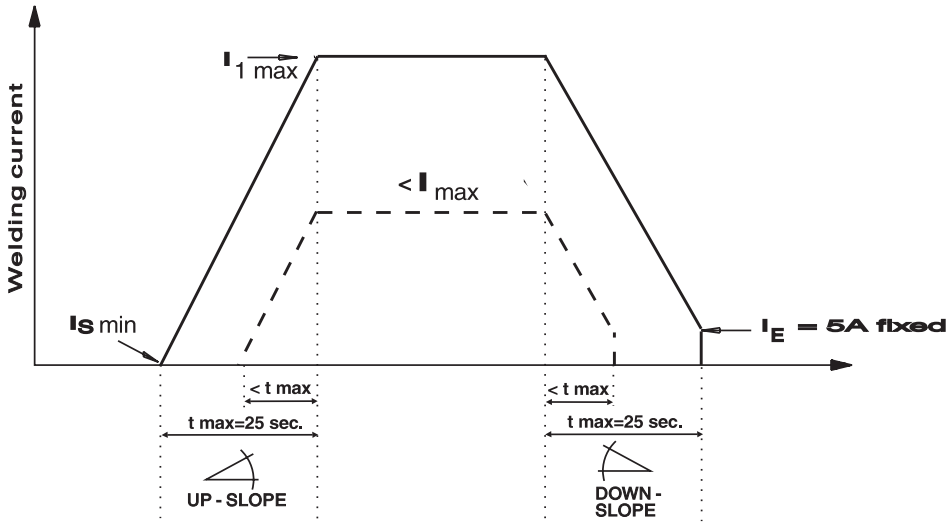
MMA operating mode

B1



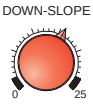
UP-SLOPE (current increase)
The increase in current from the ignition current I_s **(E1)** to the main current value I_1 **(F1)** can be infinitely adjusted between 0-25 sec with this rotary dial.

Definition of UP-Slope and DOWN-Slope:



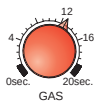
Rise and fall times are set as angles, the maximum times of 25 sec are reached when Is = minimum and I1 maximum are selected. A change e.g. in the welding current I1 (broken line) results in a shortening of the UP-Slope and DOWN-Slope times.

C1



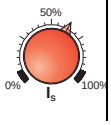
DOWN-SLOPE (current fall)
The fall in the main current I_1 **(F1)** to the end-crater current (minimum current) can be infinitely adjusted between 0 - 25 sec with this rotary dial.

D1



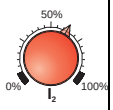
Gas post-flow time
Selects the gas post-flow time between 0-20 sec.
Note: The gas pre-flow time can be infinitely adjusted internally from 0.2-5 s.

E1

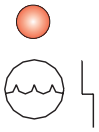
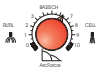


Ignition current
Setting of the ignition current I_s **(E1)** in per cent of the main current I_1 **(F1)** (search arc in 0% position)

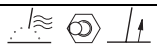
3 Description of function Logic Control

F1		**Main current I_1 (welding current)** For both TIG/plasma and MMA welding, the welding current I_1 can be infinitely adjusted with this rotary dial. DC operation 5A - maximum current
G1		**Secondary current** The secondary current I_2 **(G1)** is infinitely adjustable as a percentage of the main current I_1 **(F1)**. During the welding process, it is possible to switch from the main current I_1 to the secondary current I_2 set at any time using the 2nd torch trigger.
H1		**Green LED power unit On** Lights when the power unit is switched on.
I1		**Yellow LED (excess temperature)** Thermal monitors in the power unit trigger at excess temperature and the excess temperature indicator lamp lights. Welding can proceed without further measures after cooling.
J1		**Pre-selection switch (currentless test)** When this toggle switch is in position T, the current source is in the "currentless test" functioning mode. In this operating mode the power unit is blocked and the welding data and the UP- and DOWN-Slope times can be preset without the welding current. **Note: Welding is impossible!** **Latched operating mode example:** Torch trigger pressed (1st step) ⇒ Display: Ignition current I_S Release torch trigger (2nd step) ⇒ Display runs up to the main current I_1 in the UP-Slope time set Press secondary current button ⇒ Display: Secondary current I_2 Torch trigger pressed (3rd step) ⇒ Display runs down to the end-crater current DOWN-Slope time set Release torch trigger (4th step) ⇒ Display: Ignition current I_S
K1		**Digital ammeter** Displays the welding current at all times.

3 Description of function Logic Control

L1		**Red LED collective interference** If the collective interference LED lights, the power unit is automatically switched off. Because some interferences are only brief and spurious (e.g. mains voltage surges), the LED extinguishes again and the welding machine is ready for welding. If the collective interference LED continues to be lit after an appropriate waiting time, see the chapter on troubleshooting.
M1		**Red LED (water deficiency)** Indicates a water deficiency in water-cooled welding machines.
N1		**Changeover switch for selecting the ignition modes**  HF ignition: In HF welding, the arc is initiated without contact by a high-voltage ignition pulse.  Liftarc ignition: In welding with Liftarc ignition, on the other hand, the Tungsten electrode is in contact with the workpiece. The torch trigger is operated and a minimum current flows. The torch is now removed from the workpiece, the arc ignites and the welding current set flows according to the operating mode.
O1		**Rotary dial arcforcing device**

3.2 Function sequence of TIG non-latched operation without UP/DOWN-SLOPE

A1		**Set the rotary switch to the position (non-latched without slope)**
N1		**Set the changeover switch to the position (HF ignition on)**

1st step:

- Operate the torch trigger.
- The gas pre-flow time passes.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.

In plasma welding, the main current is ignited without contact by the pilot arc.

- The welding current flows and immediately assumes the value set for the welding current I_1.
- HF is switched off.

2nd step:

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

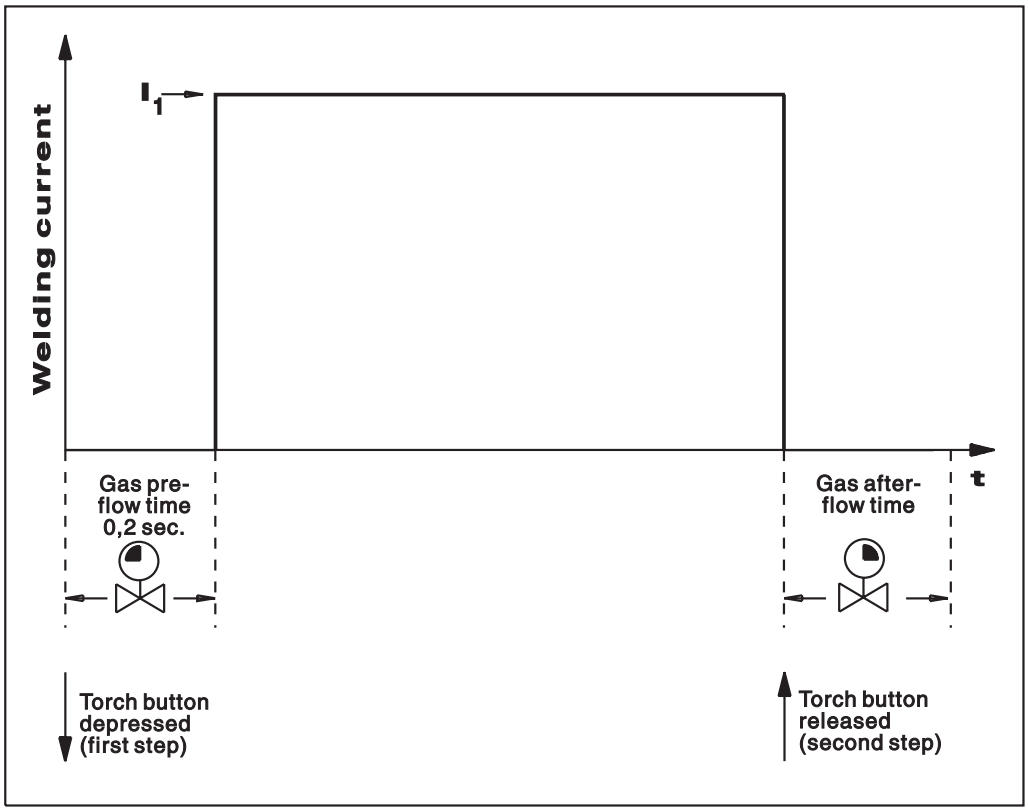
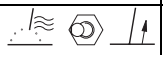


Fig. 2 Function sequence of non-latched operation without Slope

3 Description of function Logic Control

3.3 Function sequence of TIG non-latched operation with UP/DOWN-SLOPE

A1		**Rotary switch in the position (non-latched with slope)**
N1		**Changeover switch in the position (HF ignition on)**

1st step:

- Operate the torch trigger.
- The gas pre-flow time passes.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.

In plasma welding, the main current is ignited without contact by the pilot arc.

- The welding current flows and immediately assumes the value set for the ignition current I_s.
- HF is switched off.
- The welding current increases with the gradient set (UP-SLOPE) to the welding current I_1.

2nd step:

- Release the torch trigger.
- The welding current falls with the current gradient set (DOWN-SLOPE) to the end-crater current I_E (minimum current).
- The welding current reaches the end-crater current I_E the arc extinguishes.
- The gas post-flow time set begins.

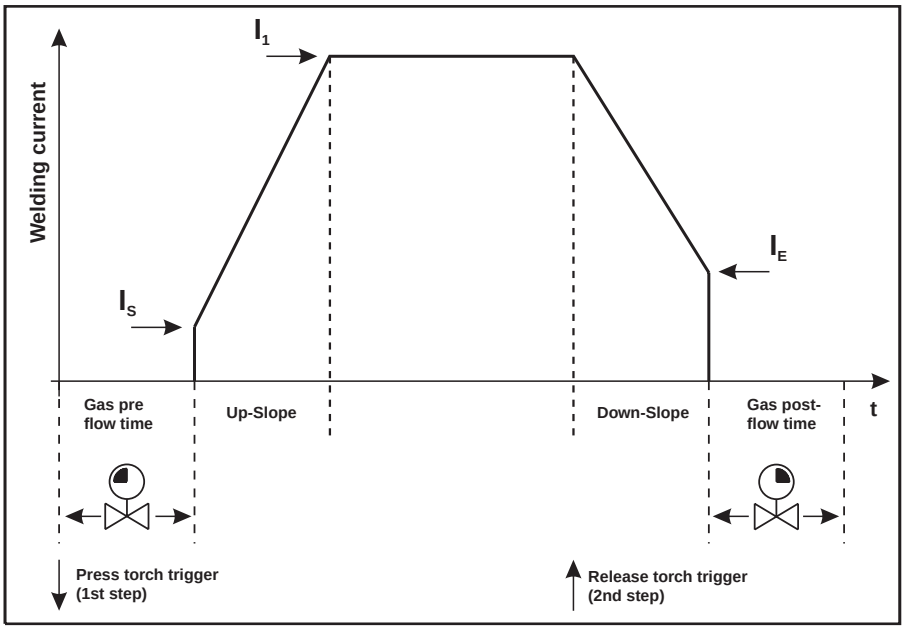
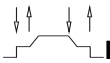


Fig. 3 Non-latched function sequence with Slope

3.4 Function sequence of TIG latched operation with UP/DOWN-SLOPE

A1		 **Rotary switch in the position (latched with slope)**
N1		**Changeover switch in the position (HF ignition on)**

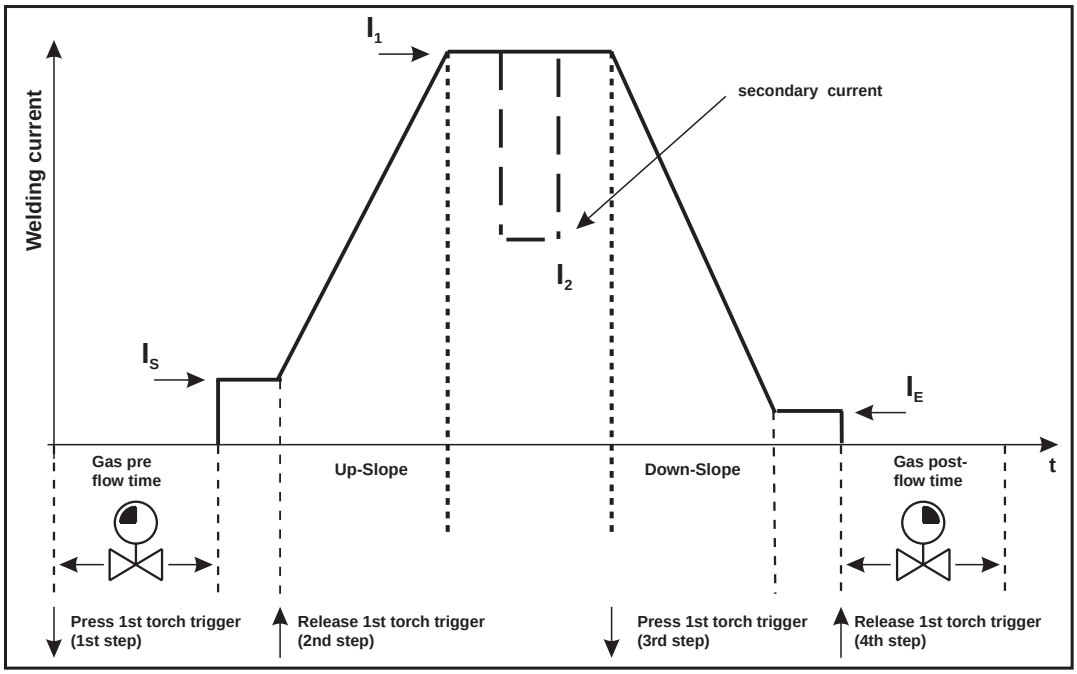


Fig. 4 Latched function sequence

1st step

- Operate the torch trigger.
- The gas pre-flow time passes.
- HF ignition pulses jump from the electrode to the workpiece, the arc ignites.

In plasma welding, the main current is ignited without contact by the pilot arc.

- Welding current flows and immediately assumes the ignition current value set (search arc at minimum setting).
- HF is switched off.

2nd step

- Release the torch trigger.
- The welding current increases with the gradient set (UP-SLOPE) to the welding current I_1.

With the second torch trigger, it is possible to switch to the secondary current operating point I_2 during welding.

3rd step

- Operate the torch trigger.
- The welding current falls with the gradient set (DOWN-SLOPE) to the end-crater current I_E (minimum current).

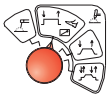
4th step

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

It is also possible to terminate the welding procedure immediately without DOWN-SLOPE and end-crater current by briefly operating the 1st torch trigger (3rd step). The current falls to zero and the gas post-flow time begins.

Automatic cut-out:
In latched operating mode, if no ignition of the arc occurs after operation and release of the torch trigger or if the arc is interrupted when the torch is moved away, an automatic cut-out occurs within 3 sec.
The HF, gas and open circuit voltage (power unit) are switched off.

3.5 MMA welding

A1		**Rotary switch in the position (electrode)**
F1		**Select welding current I_1 (5A - maximum current).**

If welding is performed alternately by different methods, e.g. TIG or MMA, and if a welding torch and an electrode holder are connected to the machine, the open circuit/welding voltage is applied simultaneously to both!
Therefore, always place the torch and the electrode holder on an insulated surface before starting work and during breaks.

3 Description of function Logic Control

This machine has the following features in MMA operation:

- **Arcforcing**

  Shortly before the electrode threatens to stick, the **arcforcing device** sets an increased current designed to prevent the electrode from sticking.
  The value of the increased current depends on the welding voltage and the setting on the arcforcing rotary dial **(Chap. 3, O1).**

  "Far left" position:

  Low arcforcing ⇒ gentle arc,
  little increased current before short-circuit.
  Used with stick electrodes enveloped with rutile.

  "Centre" position:

  Moderate arcforcing ⇒ normal arc,
  moderate increased current before short-circuit.
  Used with stick electrodes enveloped with basic material.

  "Far right" position:

  High arcforcing ⇒ severe arc,
  high increased current before short-circuit.
  Used with cellulose stick electrodes.

- **Automatic hotstart device**

  Brief increase in the welding current during ignition time in the millisecond range.

- **Hotstart**

  The hotstart current is infinitely adjustable from the minimum to the main current I_1 and the hotstart time from 0 - 2 sec with the additional remote control FR 35.
  The **hotstart device** makes it possible to ignite and re-ignite critical stick electrodes without difficulty.

- **Antistick**

  If the stick electrode sticks in spite of the **arcforcing device**, the machine automatically switches over to the minimum current within about 1 sec, so that overheating of the electrode is prevented. If the antistick device has responded, check the welding current setting and if necessary correct it.

3 Description of function Logic Control

3.6 Remote Control

Only remote controls described in this operating manual may be used!
Only connect and lock the remote control into socket (Chap. 2, I1) when the welding unit is switched off. All the remote control units described below fit the welding machine described in this operating manual.

Foot remote control FR 21

Functions	Stepless welding current adjustment as a percentage of the pre-set welding current I_1 set on the welding machine.
Commissioning	Insert the foot remote control plug into the remote control socket of the welding unit or of the FRA 40 before switching on.

Hand remote control FR 30

Functions	Stepless welding current adjustment as a percentage of the pre-set welding current I_1 set on the welding machine.
Commissioning	Insert the hand remote control plug into the remote control socket of the welding unit or of the FRA 40 before switching the welding machine on.

Hand remote control FR 30F

Functions	The welding current can be adjusted in two ranges (coarse / fine setting) as a percentage of the welding current I_1 set on the welding unit. (To have the exact welding current as given on the remote control scale, the main current setting knob I_1 on the welding machine must be set to maximum).
Commissioning	Insert the hand remote control plug into the remote control socket of the welding unit or of the FRA 40 before switching the welding machine on.
Special features	Coarse setting knob.

Hand remote control FRP 10

Functions	Operating switch “Pulse / Spot”. Stepless adjustment of Pulse/ Spot and Pause times. The Pulse current corresponds to the welding current I_1 the base current corresponds to the reduced current I_2 and these are set on the welding machine.
Commissioning	Insert the hand remote control plug into the remote control socket of the welding unit or of the FRA 40 before switching the welding machine on. Set operating mode switch on the welding unit to 2 step.
Special features	Connection possibilities for FR 21 or FR 30

3 Description of function Logic Control

Hand remote control FRP 15

Functions	Switch “Remote control ON / OFF” Operating Switch “Pulse ON / OFF ” stepless adjustment of Pulse and Pause times, Pulse current I_1 and Pause time I_2 are set as percentages of the pre-set welding current I_1 on the welding unit.
Commissioning	Insert the hand remote control plug into the remote control socket of the welding unit or of the FRA 40 before switching the welding machine on. The remote control must be switched on. Set operating mode switch on the welding unit to 2 step.
Special features	Connection possibilities for FR 21

Hand remote control FRA40

Functions	LED display of welding current. The welding current I_1 can be set as an absolute value from the minimum to the maximum current, i.e. independently of the welding current set on the unit. A toggle switch permits the selection of the control from the FRA 40 (switch upwards) or another remote control (switch downwards). More detailed information in the remote control operating manual.
Commissioning	Insert the hand remote control plug into the remote control socket of the welding unit. The user must set the measuring range to correspond to the maximum current of the welding machine(with DIP switches in the remote control; supplied from the factory set to 250A).
Special features	LED display of welding current. 10 Gang - helix - Potentiometer for exact setting of the welding current.

Hand remote control Hot-start FR 35

Functions	The welding current can be set independently of the welding current set on the front of the unit. Stepless adjustment of Hot-start current, Hot-start time (independently of the pre-set value on the welding unit). Operating switch for remote control ON / OFF.
Commissioning	Set Hot-start current and time to their maximum values on the welding unit. Insert the hand remote control plug into the remote control socket of the welding unit.
Special features	Connection and changeover possibilities for a further remote control e.g. FRA 40: The functions of the FR 35 hand remote control are then out of action and the welding current I_1 which can be selected depends upon the main welding current I_1- pre-set on the welding machine.

3.7 Automation Interface (Remote control connection socket) This welding unit is characterised by a high standard of safety.

This high standard of safety will also be maintained when using peripheral units for manual welding provided that these units fulfil the same criteria, especially as regards insulation from the mains supply.
This can be ensured by the use of transformers which comply with VDE 0551.
As standard, the welding machines are prepared for mechanised welding.
The remote control connection socket **(Chap. 2, I1)** in the power source has potential-free relay contacts and signal inputs available which can be used for mechanised applications.

Automation interface (EB3)

14 pole connection socket **(Chap. 2, I1)** on the front of the power source:

- External set values from the user
- Control signal torch trigger
- Current relay contact to user (potential-free)
- Connection for cable screening
- Power supply +/- 15V
- Selection set value input “Internal” / “External”

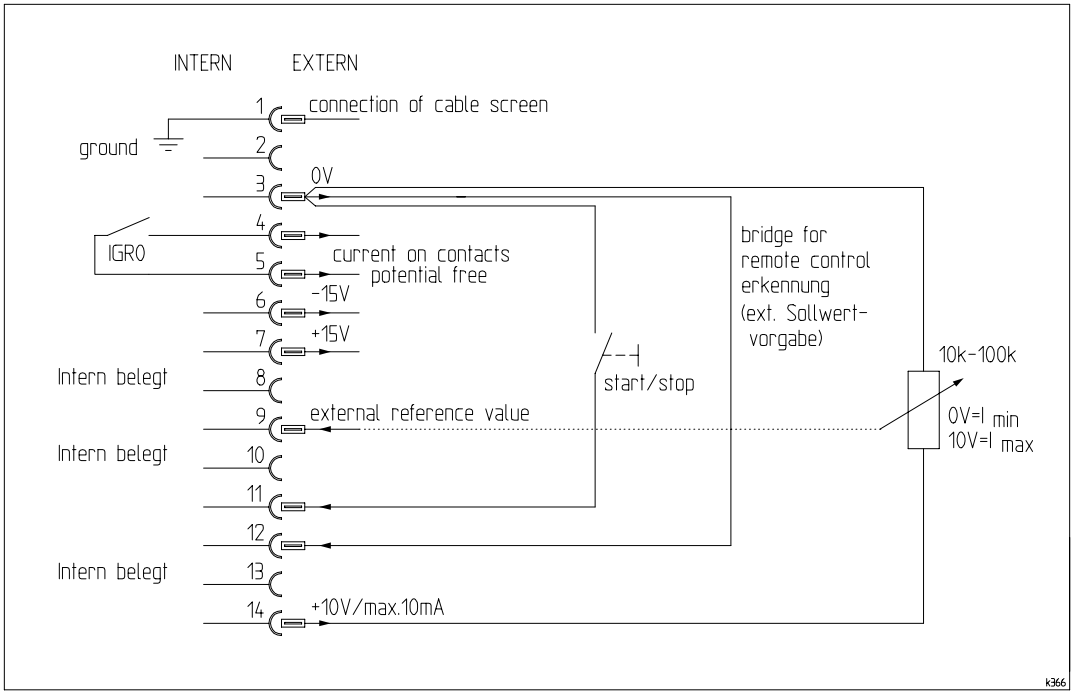
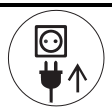
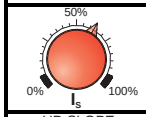
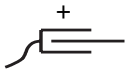
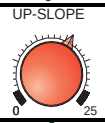
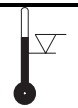
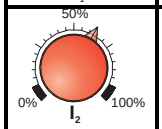
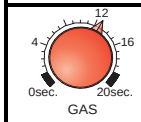
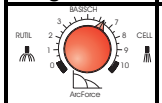


Fig. 3/5: Maschinenschnittstelle EB3

4 Summary Manual, the fastest way to start welding

	Preparations		Adjustment		Fault elimination
	Plug in the mains cable. (Remember fuse!)		• Select ignition current Is (% of I1).		<u>No HF ignition:</u> • Set toggle switch to HF position.
	• Insert workpiece lead, lock and attach conductively to the workpiece.		• Set current raising time to I1.		<u>No welding current</u> • Workpiece lead in "-" socket.
	• Connect welding torch		• Set welding current I1 (max. value for remote control).		<u>Excess temperature LED lights:</u> • Duty cycle exceeded > allow machine to cool
	• Establish the torch control connection with the Tuchel plug.		• Select secondary current I_2 (% of I_1) with 2nd torch trigger.		<u>Other faults:</u> • Fault inside the machine > notify the service department
	• Plug in the remote control connector plug		• Time of current fall to minimum current 5A		
	• Establish the shielding gas supply, open pressure reducer.		• Set the gas post-flow time.		
	• Switch on machine.		• Preset with "no-power test" key button and check torch trigger.		
	• Select the operating mode.		• Welding current flows: signal light lights, does not light > see fault elimination.		
			For electrode welding: • Set arcforcing		

5 Commissioning

5.1 Setting up the Welding Machine

Pay attention to the safety instructions “ For your safety” on the first page!

- Set up the machine so that there is enough room to adjust the operating elements.
- Take care that the unit is installed in a stabile position and appropriately secured.

5.2 Mains Connection

An appropriate mains plug must be connected to the power lead of the machine!
The connection must be made by a qualified electrician according to the applicable safety regulations (e. g. VDE)!
The sequence of phases is not important and has no influence on the fan direction!

The operating voltage shown on the data plate must correspond to the mains supply voltage! For mains fuses please refer to the technical data.

- Plug the switched off unit into the appropriate socket.

5.2.1 Reconnecting the mains voltage 400/415V at the control transformer

Pay attention to the safety instructions “ For your safety” on the first page!

The Faston plug (arrow) must be set on the transformer according to the mains voltage.

- **For 400V: Plug to pin 5 (works setting),**
- **For 415V: Plug to pin 6.**

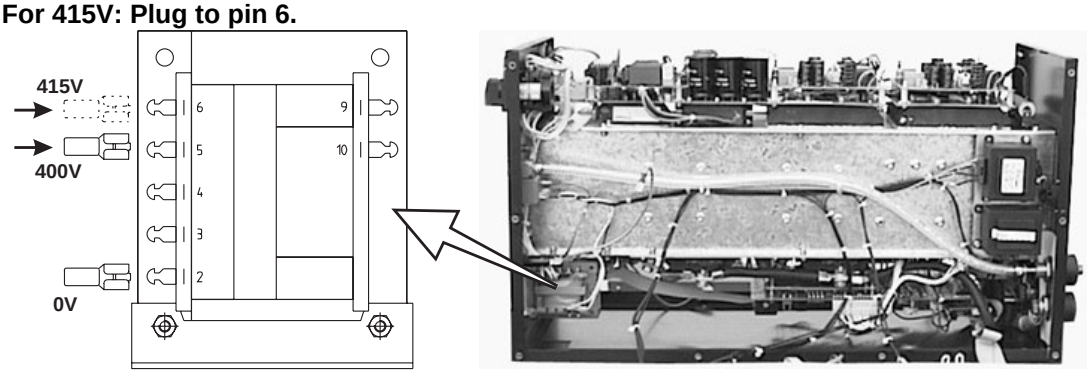
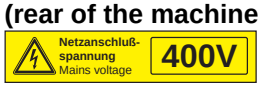


Fig.: Control transformer

Machines delivered to countries with mains voltages which deviate from the standard are marked with the following labels:

a) Indication of the mains voltage (at the end of the cable)

b) **Mains voltage on delivery (rear of the machine above the rating plate)**

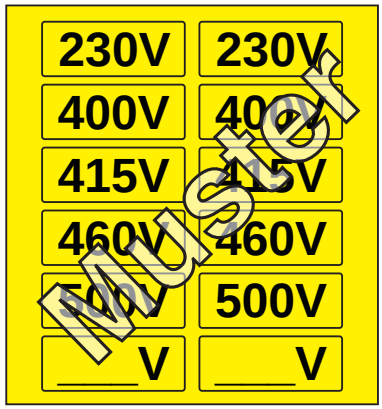


c) Special voltages, for marking according to rewiring on site (enclosed with the operating instructions)

After rewiring for 415V,

- **label c) must be taped over label b) and**
- **label a) must be removed from the end of the cable.**

c)



(art. no. label, see Chap. Accessories)

5.3 Cooling the Welding Machine

To achieve the optimum duty cycle from the power components, pay attention to the following conditions:

- Ensure that the workplace is adequately ventilated,
- The air inlets and outlets of the machine must be unobstructed,
- Metal particles, dust or other fine bodies may not gain access to the unit.

5 Commissioning

5.4 Work-piece cable

Remove rust, paint and dirt from the area where the clamp is and from the welding region with a wire brush! The workpiece clamp must clamped close tothe welding area and must be fixed so that it cannot release itself. Assembly aids, pipes, rails etc. may not be used as a return lead for the welding current unless they are the workpiece themselves! A perfect current connection must be ensured when working with welding benches or manipulators!

- Insert the workpiece cable plug into the welding current socket **(Chap. 2, H1)** and lock it by turning to the right.

MMA-welding:
The polarity depends upon the electrode manufacturers' data given on the electrode packet.

5.5 Electrode Connection (MMA welding)

- Insert the stick electrode holder plug into the welding current socket **(Chap. 2, F1)**."**+"** or **(Chap. 2, E1) "-"** and lock it by turning to the right.

The polarity depends upon the electrode manufacturers' data given on the electrode packet.

5.6 General information for the TIG welding torch connection.

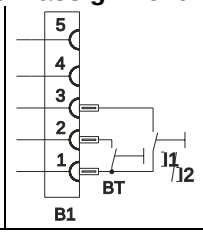
We can only guarantee the perfect functioning of our machines when they are used with our range of welding torches.

TIG welding torches with screened torch trigger cables may not be connected to this welding machine.

As standard this unit is supplied with **Torch trigger setting B1** and G1/4" gas connection (only for decentralised).

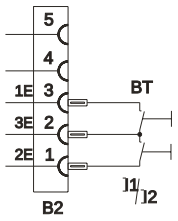
torch trigger pin assignment B1:

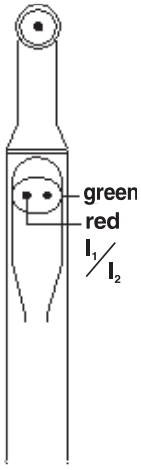
BT = Pin1/2,
I1/I2 = Pin1/3



torch trigger pin assignment B2:

BT = Pin 2/3,
I1/I2 =Pin 1/2





Rocking forwards=Torch on / off
Rocking backwards = I_1 / I2

5.6.1 TIG Welding Torch Connection

Prepare the welding torch for the job to be done (see operating manual).

- Plug welding current cable (if present) into the socket **(Chap. 2, E1)** and lock by turning it to the right.
- Insert the torch trigger plug into socket **(Chap. 2, C1)** and turn tight.
- Screw the gas connection onto the nipple G1/4" **(Chap. 2, D1)** (Welding current "**-**" potential).
- Engage the rapid-action closure nipple of the TIG torch in the rapid-action closure coupling for the coolant supply (blue) and return (red) lines (only for water-cooled torches).

5.7.2 TIG potentiometer welding torch

The welding machine must be equipped with the "potentiometer torch connection facility" option to be able to operate a TIG potentiometer welding torch.

Prepare welding torch according to the welding task in hand (see operating instructions of the torch).

- Plug the welding current cable (if it exists) into the socket **(Chap. 2, E1)** and lock by turning to the right.
- Plug the torch trigger plug into the socket **(Chap.2, C1)** and tighten.
- Plug the control cable plug into the socket **(Chap.2, I1)** and tighten.
- Screw the gas connection tightly to the connecting nipple G¼ **(Chap. 2, D1)** (welding current potential "-").
- Engage the rapid-action closure nipple of the TIG torch in the rapid-action closure coupling for he coolant supply (blue) and return (red) lines (only for water-cooled torches).

5.7 Shielding gas supply

Place the shielding gas cylinder and secure it against accidents with securing chains!

No impurities must be allowed to enter the shielding gas supply, as these would otherwise cause blockages. Before connecting the pressure reducer to the gas cylinder, open the cylinder valve briefly to blow out any dirt present. All shielding gas connections must be gastight!

- Screw the pressure regulator onto the cylinder valve.
- Connect the gas hose to the pressure regulator and to the G ¼" connection on the rear of the welding machine **(Chap. 2, D2)** ensuring a gas tight connection.

5.8 Arc-off test and setting the shielding gas quantity

- Switch machine on with main switch **(Chap. 3, J1).**
- Select 4 step operating mode with programme selection switch.
- Switch pre-selection switch (arc-off test) on  (to setting T).
- Press and release torch trigger.
- Open gas cylinder valve slowly.
- Carry out arc-off test and adjust welding current, UP - Slope, DOWN - Slope, reduced current etc. as necessary.
- Set the quantity of shielding gas needed at the pressure regulator, about 4 - 15l/min according to current level and material.
- Switch pre-selection switch (arc-off test) off (to setting 0)

6 Setting instructions (in Preparation)

7 Maintenance and care

ormal operating conditions these welding machines are largely maintenance-free and of care. However, a number of points should be observed to guarantee fault-machine. Among these are regular cleaning and checking, as of contamination in the environment and the usage time of

may only be carried out by
of the following tests the

7.1 Cleaning

To do this, carefully disconn
(Switching off or unscrewing the fuse i
minutes until the capacitors have disc

ts should be handled as follows:
amount of dust, blow out current source a

nponents with the compressed air

7.2 Repe

The following descri
instructions. If required, a cop

You are recommended to carry out a quarter
t after every repair. Test sequence:

- Mea
- Measurement of
- Measurement of the open circ
- Function test of the welding machine

correct condition

fer e7ternally visible faults (without opening
7ample, to the following points:

ulation faults, scorch or pressure marks.
lead, mains switch.

- Signs of a
- Damage to stop points a
- Improper interference and modificati
- The type plate and warning symbol must be pres

D

Die im Kapitel "Wartung und Pflege" aufgeführten Hinweise, Richtlinien und Normen wurden grundlegend überarbeitet und sind aus diesem Grund nicht mehr gültig!
Die relevanten Hinweise, Richtlinien und Normen finden Sie in den beiliegenden Ergänzungsblättern "Allgemeine Hinweise zu 3 Jahre Garantie", Art. Nr.: 099-000GAR-EWMxx.
Sollten die Dokumente nicht vorliegen, können diese über den autorisierten Fachhändler angefordert werden!
Außerachtlassung kann lebensgefährlich sein!

GB

The instructions, guidelines and standards given in the "Maintenance and Care" chapter have been completely revised and are therefore no longer valid!
The relevant instructions, guidelines and standards can be found in the enclosed supplements "General notes on the 3 year warranty",item no.: 099-000GAR-EWMxx.
If these documents are missing, they can be requested from your authorised specialist dealer!
Not observing these instructions can be potentially fatal!

F

Les consignes, directives et normes indiquées au chapitre « Maintenance et entretien » ont été mises à jour et ne sont donc plus valables !
Vous trouverez les consignes, directives et normes applicables dans les additifs « Consignes générales relatives à la garantie de 3 ans », à l´article : 099-000GAR-EWMxx.
Si vous ne possédez pas les documents, vous pouvez vous les procurer auprès de votre revendeur autorisé !
Le non-respect des consignes peut représenter un danger de mort !

I

Le istruzioni, direttive e norme presenti nel capitolo „Manutenzione e cura” sono state completamente riviste e per questo motivo non sono più valide!
Le istruzioni, direttive e norme rilevanti le trovate nell'aggiornamento qui allegato “Istruzioni generali sui 3 anni di garanzia”, Nr. Art.: 099-000GAR-EWMxx.
Se i documenti non fossero disponibili, possono essere richiesti al rivenditore autorizzato!
L'inosservanza delle istruzioni può comportare pericolo di vita!

7.2.2 Measurement of protective conductor resistance

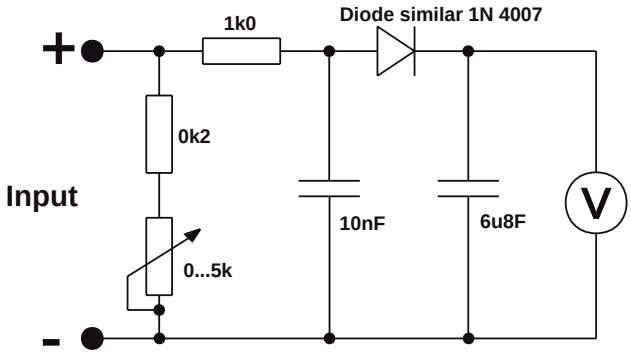
Measure between safety contact of the mains plug and metal parts which can be touched, e.g. casing screws.
During measuring, the entire length of the machine's connection lead, especially near the connection points, must be moved.
The resistance must be < 0.1Ω. The measurement must be performed using at least 200 mA.

7.2.3 Measurement of insulation resistance

The machine must be disconnected from the mains!
Open the welding machine and clean it carefully (as described below).
Switch on mains switch.

- **Insulation resistance mains current circuit - casing:** Measure from a connection of the mains plug to the casing. The resistance must be > 2.5 MΩ.
- **Insulation resistance welding current circuit - casing:** Measure between a welding socket and protective conductor. The resistance must be > 2.5 MΩ.
- **Insulation resistance mains current circuit - welding current circuit:** Measure from a connection of the mains plug to a welding current socket. The resistance must be > 5.0 MΩ.

7.2.4 Measurement of open circuit voltage (according to EN 60974-1 / VDE 0544 T1)



Meqsurement circuit for peak values

Connect the measuring circuit to the welding current sockets as shown in Fig. 1. The voltmeter must indicate the mean value. Adjust the potentiometer from 0kΩ to 5kΩ during the measurement.
The measured voltage must not deviate from that specified on the rating plate (U_0) by more than 10%.

7.2.5 Function test of the welding machine

Carry out a function test depending on the type of machine.

7.3 Repair work

Repair and maintenance work may only be performed by qualified personnel.

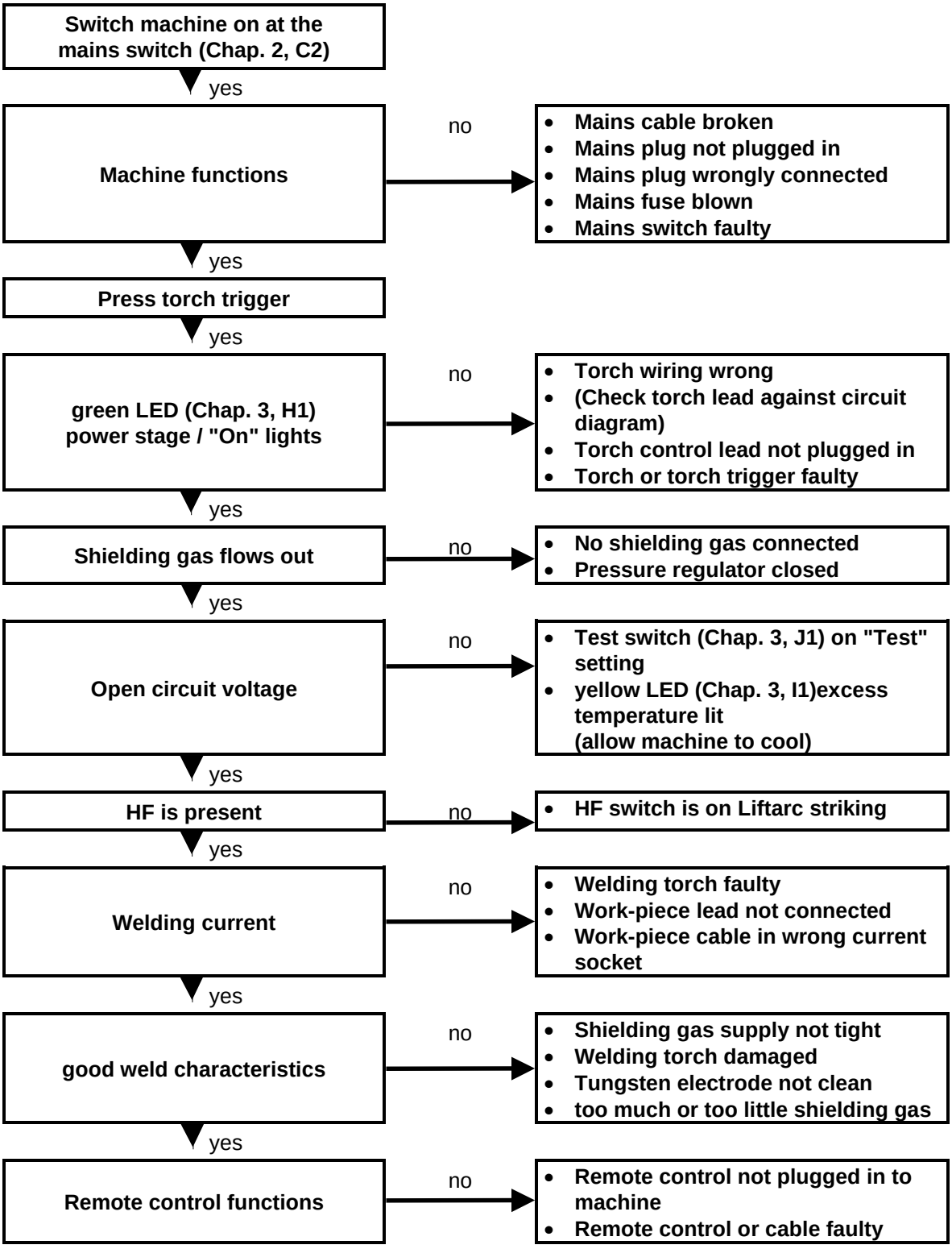
In all service matters, always consult your dealer.
Return deliveries of defective equipment subject to warranty may only be made through your dealer.

When replacing parts, use only original spare parts.
When ordering spare parts, the machine type, serial number and item number of the machine, as well as the type description and item number of the spare part must be quoted.

If maintenance or repair work is carried out on this machine by personnel who are not trained and authorised to undertake such work, the right to claim under the warranty lapses.

8 Operating Faults, their causes and cures

All machines are subjected to strict production and final inspection. If, despite this, something does not work at some time, please check the machine according to the following check-list. If none of the cures listed rectifies the fault then please contact an authorised agent.



9 Ersatzteilliste / Spare Parts List

9.1 *inverter* *TIG 300 CEL*, Vorder- und Rückseite / front and rear view

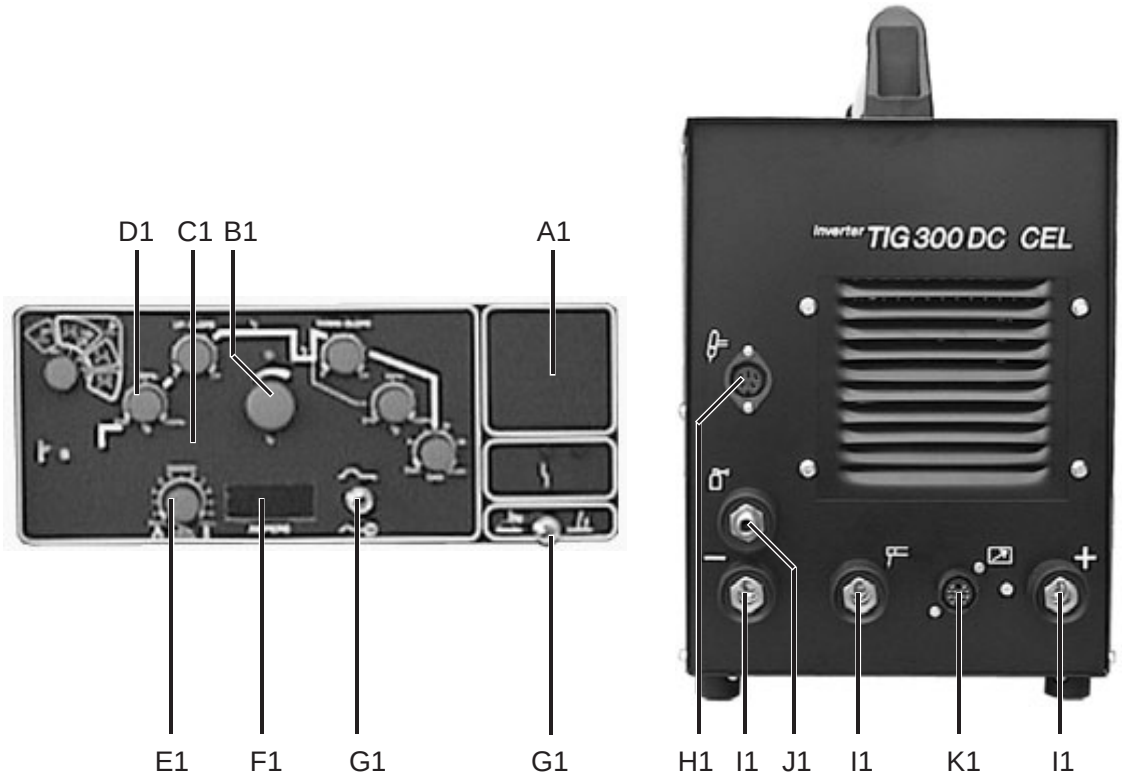


Abb. 9/1: Vorderseite / front side

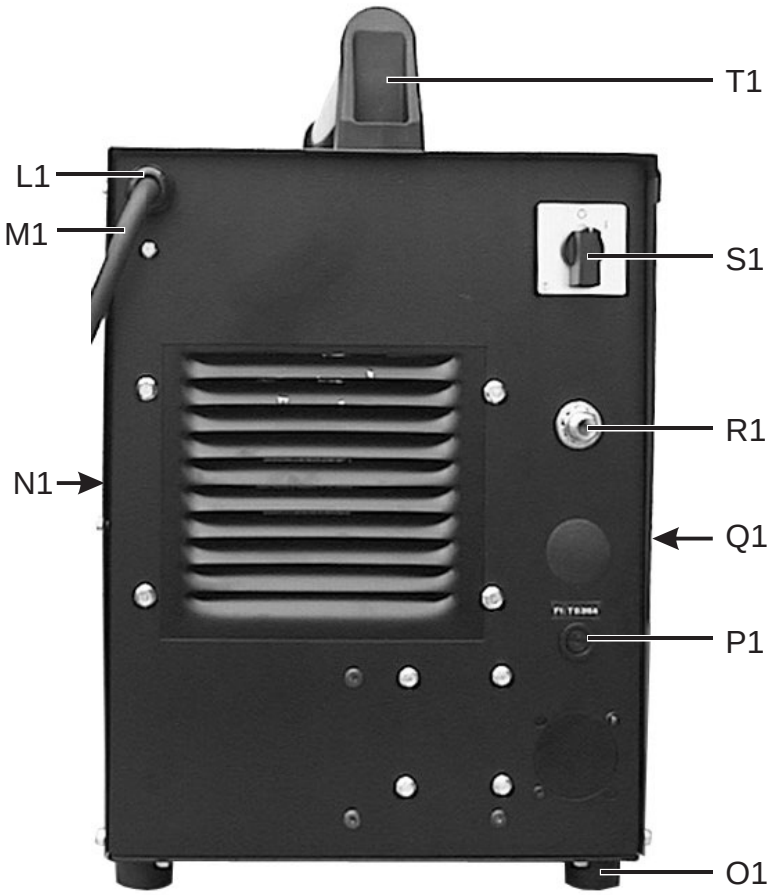


Abb. 9/2: Rückseite / rear view

9 Ersatzteilliste / Spare Parts List

Pos.	**Bezeichnung:**	Description	**Art. Nr. /** art. no.
A1	**Leiterplatte WIG-Steuerung DC-Teil ACTIG03/2**	TIG PCB control for the DC ACTIG03/2	040-000379-00002
B1	**Drehknopf ∅31mm**	Knob ∅31mm	074-000234-00000
	Deckel für Drehknopf ∅31mm	Cover for knob ∅31mm	074-000234-00001
	Pfeilscheibe für Drehknopf ∅31mm	Arrow indicator for knob ∅31mm	074-000234-00002
C1	**Leiterplatte WIG-Steuerung INTIG03/4**	PCB TIG control INTIG03/4	094-001545-00005
D1	**Drehknopf ∅23mm**	Knob ∅23mm	074-000315-00000
	Deckel für Drehknopf ∅23mm	Cover for knob ∅23mm	074-000315-00001
	Pfeilscheibe für Drehknopf ∅23mm	Arrow indicator for knob ∅23mm	074-000315-00002
E1	**Potentiometer**	potentiometer	044-001513-00000
F1	**LED-Anzeige (Strom) DVM1/1-1**	LED-display (current) DVM1/1-1	040-000385-00000
G1	**Kippschalter**	Toggle switch	094-001898-00000
H1	**Anschlußbuchse 5 polig**	Torch connection 5 pole	074-000233-00000
I1	**Schweißstrombuchse**	Welding current socket outlet	074-000232-00000
J1	**Gasanschluß ¼“**	Gas connection ¼“	094-000047-00001
K1	**Anschlußbuchse 14 polig EB3**	Connection socket 14-pole EB3	040-000408-00000
	Entstörplatine LC3/1	PCB for connection socket 14-pole LC3/1	040-000482-00000
L1	**Kabelverschraubung**	Cable inlet	094-003293-00000
	Gegenmutter	Lock nut	024-000205-00001
M1	**Netzkabel**	Mains cable	092-000661-00000
N1	**Gehäuseabdeckung**	Outer housing	094-003384-00008
O1	**Gummifüsse**	Rubber feet	094-002876-00000
P1	**Sicherungshalter mit Mutter**	Fuse holder with nut	094-000001-00000
	Sicherungskappe	Fuse cap	094-000001-00001
	Sicherung 0,63A/6,3X32MM/250V/träge	Fuse 0,63A/6,3X32MM/250V/out-fuse	094-005477-00000
Q1	**Seitenblech**	Side panel	094-005215-00000
R1	**Gasventil**	Gas valve	074-000227-00000
S1	**Hauptschalter EIN/AUS**	Mains ON/OFF switch	074-000279-00000
	Schaltergriff	Switch handle	094-001814-00000
T1	**Halterung für Griffstange**	Holder for hand grip	074-000237-00000
	Griffstange	Hand grip	074-000237-00013
o. Abb.	**Zentralanschluß**	Central connection	094-000316-00000
o. Abb.	**Kunststoffgehäuse für Zentralanschluß**	Plastic housing for central connection	094-001759-00000

9.2 *inverter* *TIG 300 CEL*, linke- und rechte Seite / left and right side

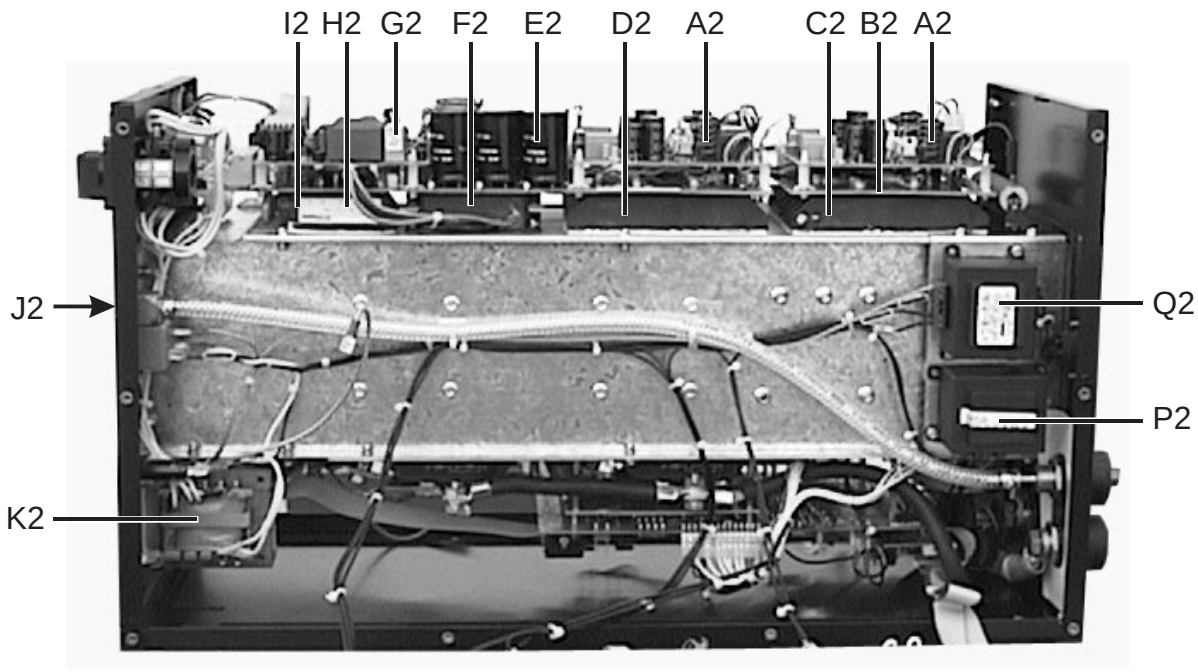


Abb. 9/3: linke Seite / left side

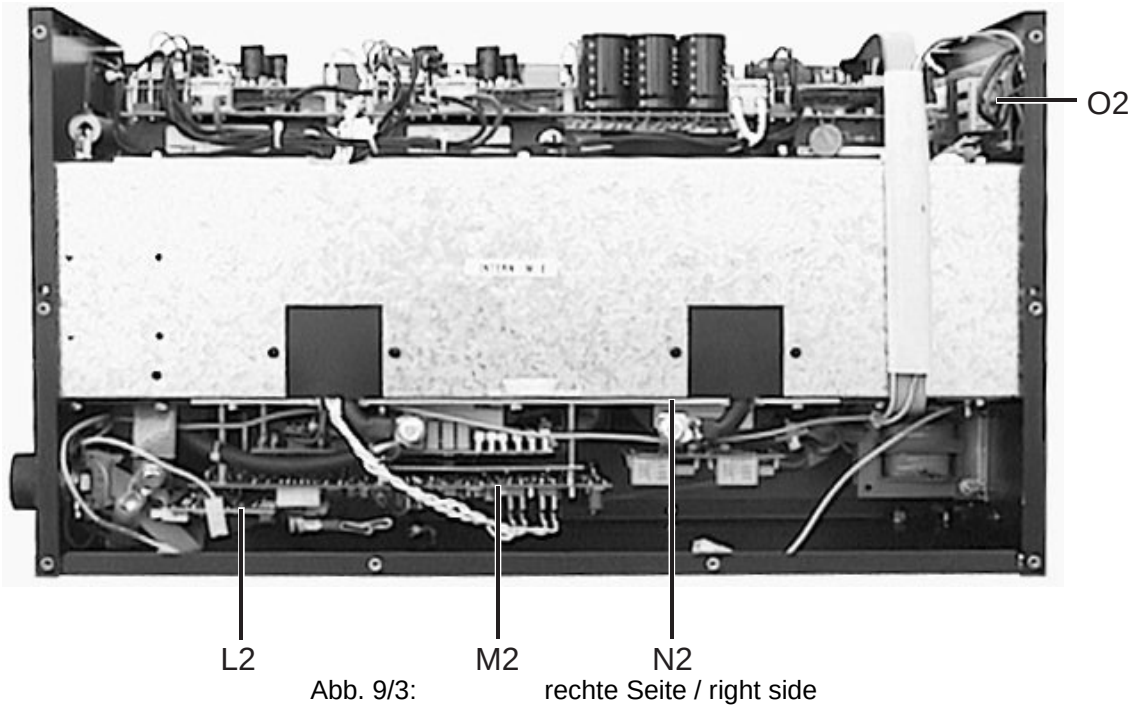


Abb. 9/3: rechte Seite / right side

9 Ersatzteilliste / Spare Parts List

Pos.	Bezeichnung:	Description	Art. Nr. / art. no.
A2	**Leiterplatte Treiberelektronik TRI4**	PCB for the driver electronics TRI4	040-000503-00000
B2	**Leiterplatte Primärschalter 2DW7,5**	PCB Primary switch 2DW7,5	042-000411-00000
C2	**Primärschalter Minus INV50/1000.6M**	Primary switch INV50/1000.6M	080-000294-00000
D2	**Primärschalter Plus INV50/1000.6P**	Primary switch INV50/1000.6P	080-000295-00000
E2	**Leiterplatte Durchflußwandler DW7,5/380/1**	PCB flow transducer DW7,5/380/1	040-000303-00000
F2	**Varistormodul Schutzbeschaltung für Netzgleichrichter SB460/6**	Varistormodule for power rectifier SB460/6	072-000292-00000
G2	**Sperrwandler SPW2/380V/1**	Isolating transformer SPW2/380V/1	040-000289-00000
H2	**Thyristormodul MTD55-14A**	Thyristor module MTD55-14A	064-000083-00014
I2	**Netzgleichrichter B6 75/16**	Mains rectifier B6 75/16	080-000204-00016
J2	**Lüfter**	Fan	074-000267-00000
K2	**Versorgungstrafo**	Supply transformer	094-002713-00003
L2	**Leiterplatte (Liftarczündung) LIFT1/DC/CEL**	PCB (Liftarc-Ignition) Lift1/DC/CEL	040-000434-00001
M2	**Leiterplatte Hauptregelungs-elektronik TRDC2/300/4**	PCB main regulation electronics TRDC2/300/4	040-000290-00023
N2	**Sekundär Diodenmodul SDK6XMDDM121-05 F02-01/1**	Secondary rectifier module SDK6XMDDM121-05 F02-01/1	auf Anfrage on demand
	Leiterplatte Schutzbeschaltung VAR1/1	PCB protection switching VAR1/1	040-000495-00000
	Leiterplatte Schutzbeschaltung DSB3/3	PCB protection switching DSB3/3	040-000357-00000
	Leiterplatte Schutzbeschaltung DSB1/2	PCB protection switching DSB1/2	040-000433-00000
O2	**Netzfilter NEF2/1**	Mains filter NEF2/1	040-000505-00000
P2	**Zündgerät HF-DC1/42**	Ignition unit HF-DC1/42	040-000309-00000
Q2	**HF-Filter HF1-3**	HF-filter HF1-3	040-000284-00000

10 Accessories

10.1 Option

Type, description	article no.
Opt. torch trigger pin assignment B2	KOS-F00002-00001

10.2 Torches / Electrode holder / work piece connection

Type, description	article no.
Opt. ASM poti welding torch for portable machines	092-001097-00001
TIG-welding torch SRT26 1poti GD, 4m	094-003425-00000
TIG-welding torch SRT20 1poti WD, 4m	094-003429-00000
TIG-weld.torch 20 WD 4m, double funct.switch suitable	094-000487-00000
electrode holder 50qmm, 4 m	092-000004-00000
work piece connection cable 50qmm, 4 m, (clamp)	092-000003-00000

For operation with a TIG poti torch the machine has to be equipped with the option „connection poti torch possible!“

10.3 Remote control and Accessories

Type, description	article no.
FR 30 remote control for main current, 5 m	090-008005-00000
FR 30 remote control for main current, 10 m	090-008005-00010
FR35 remote control for hot start, 5m	090-008044-00000
FR35 remote control for hot start, 10m	090-008044-00010
FRA40 remote control for main current display, 0,3m	090-008032-00000
FRP 10 remote control for pulsed welding, 5 m	090-008002-00000
FRP 10 remote control for pulsed welding, 10 m	090-008002-00010
FRP15 remote control for pulsed welding, 5 m	090-008045-00000
FRP15 remote control for pulsed welding, 10 m	090-008045-00010
FR21 foot operated remote current control, 5m	094-000051-00000
FRV10 connection & extension cables, 10 m	092-000005-00001

10.4 General Accessories

Type, description	article no.
TRW 7 trolley for transporting machine	090-008010-00000
DM2 pressure regulator Messer with flowmeter 16l/min	094-001980-00000
ADAP1 thread adapter G1/4 to G1/8	094-001650-00000
UK500 air blast closed loop cooler 1x230V (for water cooled torches)	090-008026-00004
UK500S air blast closed loop cooler 3x400V/16A (for water cooled torches)	090-008026-00006
KF23E-10 coolant 9,3l (frost protection down to -10°C)	094-000530-00000
KF23E-10 coolant 200l (frost protection down to -10°C)	094-000530-00001
KF37E-20 coolant 9,3l (frost protection down to -20°C)	094-006256-00000
Adhesive film label "400V cable"	094-007249-00000

11 **Schaltplan /** Circuit Diagram

(Schaltpläne befinden sich ebenfalls im Gerät) / (Circuit diagrams are also in the machine)