

## Operating Instructions



*inverter* **STICK-Schweißgeräte  
from 350A to 450A,  
portable**

*inverter* **STICK 350**

*inverter* **STICK 350 PWS**

*inverter* **STICK 450**



**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.**

**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 mentioned 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 modèle, 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 inadéquates 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

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# Safety instructions

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## 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 explosive liquids away from the working area. There is a danger of fire and explosion.
- Never heat explosive liquids, dusts or gases by welding or cutting. There is also a danger of 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

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## 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.

# Safety instructions

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## 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  $\varnothing > 12\text{mm}$ ,
  - 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

## About this machine manufactured in inverter technology

### **Congratulations.**

You have purchased a modern and efficient welding machine in inverter technology. In contrast to conventional welding current sources, it does not operate with 50Hz but with a 50kHz primary-switch transistor current source.

### **You can now exploit the advantages of this inverter technology:**

- Less effort in changing to another workplace because the machine dimensions and weight are substantially reduced.
- Lower current consumption and smaller mains ratings by higher efficiency (lower losses).
- No need for expensive compensating equipment by a high cos phi and a correspondingly smaller reactive current draw from the mains.
- Functional safety by robust construction and highly integrated electronic circuitry.
- High control dynamics for the welding process. Therefore, excellent welding and fusing results and absolute reproducibility of all welding parameters.
- Welding results independent of mains voltage fluctuations.
- Easy to service design by the use of modern, modular technology.
- Adjustable arcforcing to adapt to any stick electrode welding task.
- Pole exchange switch for flexible and rapid work even when the stick electrodes are changed.

# 1 Technical data

	<i>inverter STICK 350</i>	<i>inverter STICK 350 PWS</i>	<i>inverter STICK 450</i>
<b>Adjusting range Welding current / voltage</b>	5 A / 20.2 V - 350 A / 34 V		5 A / 20.2 V -450 A / 38 V
<b>Efficiency</b>	91%		
<b>Welding current at 60% DC of electrode</b>	350A		450A
<b>Welding current at 100% DC of electrode</b>	270A		350A
<b>Load alternation</b>	10min (60% DC $\triangle$ 6 min. welding, 4min. break)		
<b>Open circuit voltage</b>	109V		78V
<b>Mains voltage ( tolerances )</b>	3x400V (+ 20% to - 25% ) 3x415V (+ 15% to - 25% )		
<b>Mains frequency</b>	50 - 60Hz		
<b>Mains fuses, slow-blow</b>	3 x 25 A		3 x 35 A
<b>cos <math>\phi</math></b>	0,99		
<b>Ambient temperature</b>	-10° C to 40°C		
<b>Protection classification</b>	IP 23		
<b>Insulation class</b>	H		
<b>Dimensions L/W/H incl. handle</b>	550mm x 370mm x 520mm	550mm x 370mm x 590mm	550mm x 440mm x 520mm
<b>Weight</b>	48kg	60kg	62kg
<b>Built to</b>	VDE 0544 Part 1 (EN 60974-1)		

**S** In compliance with VDE 0544 (EN 60974-1), this welding machine can be used in environments with an increased electrical hazard.

## 2 Description of the machine

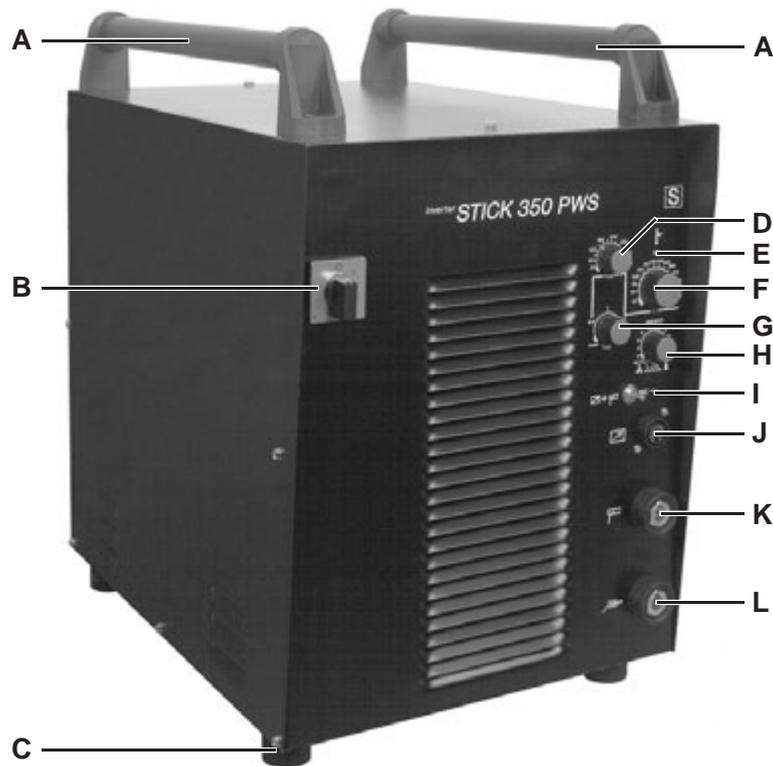
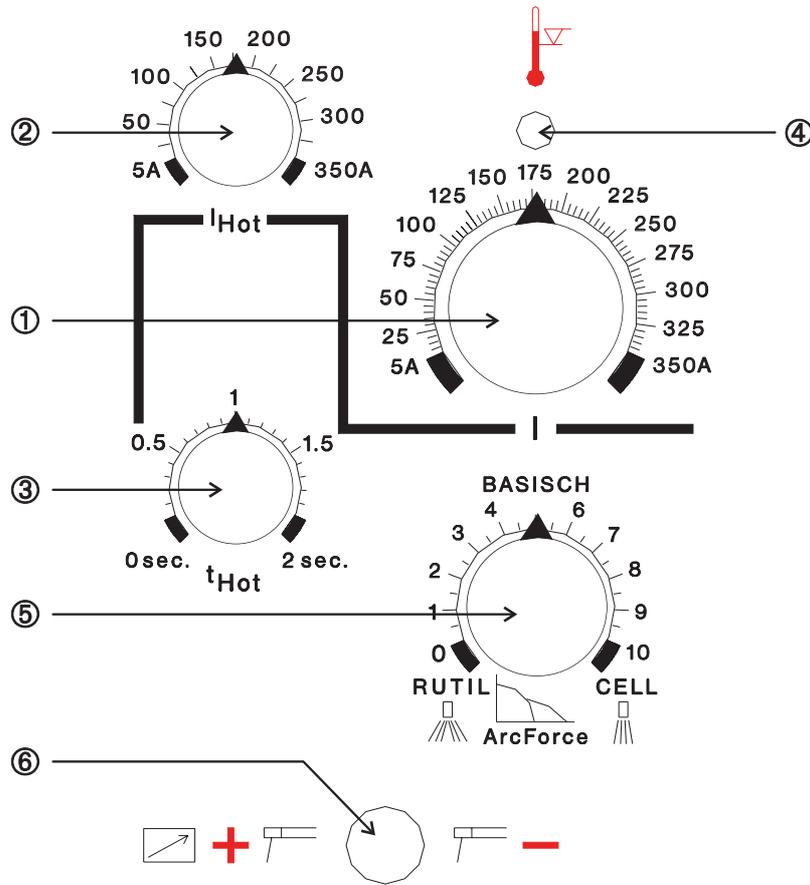


Fig. 1: Front view *Inverter* STICK 350 PWS

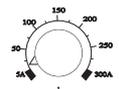
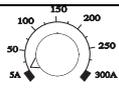
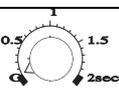
	A	Carrying handle
	B	Main power switch
	C	Rubber feet
	D	Hotstart current rotary dial
	E	Yellow LED, excess temperature
	F	Potentiometer for adjusting the welding current
	G	Hotstart time rotary dial
	H	Arcforcing rotary dial
	I	Pole changeover switch ( <i>inverter</i> STICK 350 PWS only)
	or	Changeover switch: Cableless remote control "ON/OFF" ( <i>inverter</i> STICK 350/450 KLR only)
	J	Remote control connection
	K	Welding current socket "-" (negative polarity in pole changeover switch position "-", <i>inverter</i> STICK 350 PWS only)
	L	Welding current socket "+" (positive polarity in pole changeover switch position "-", <i>inverter</i> STICK 350 PWS only)

### 3 Function specification

#### 3.1 Function specification (logic control)



**Fig. 2:**  
Logic control *Inverter STICK 350 PWS*

①		<p><b>Main current <math>I_1</math></b> The main current <math>I_1</math> can be adjusted infinitely from 5A to the maximum welding current.</p>
②		<p><b>Hotstart current</b> The hotstart device makes it possible to ignite and re-ignite critical stick electrodes without difficulty. Hotstart current setting <math>I_{Hot}</math> infinitely adjustable from 5A to the maximum welding current</p>
③		<p><b>Hotstart time</b> The hotstart time <math>t_{Hot}</math> is adjusted infinitely from 0sec. to 2sec. <b>Hotstart device</b> The <b>hotstart device</b> makes it possible to ignite and re-ignite critical stick electrodes without difficulty. The hotstart current and time are also externally adjustable with the remote control FR 35.</p>
④		<p><b>Signal light, excess temperature (yellow)</b> Indicates an excess temperature of the welding machine and extinguishes when this has cooled. Excess temperature occurs when the duty cycle is exceeded or if the ventilation slots are obstructed.</p>



### 3 Function specification

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#### 3.2 Function sequence MMA welding

When the stick electrode has been struck, the arc ignites at the adjusted **hotstart current**  $I_{Hot}$  and welds with this current until the expiry of the **hotstart time**  $t_{Hot}$ . The hotstart current then falls to the adjusted **main current**  $I_1$  and remains constant until welding is completed. (see process chart below)

If the electrode sticks in the welding pool for longer than 1 sec, the antistick device comes into effect. Check the welding current setting and correct according to the welding task.

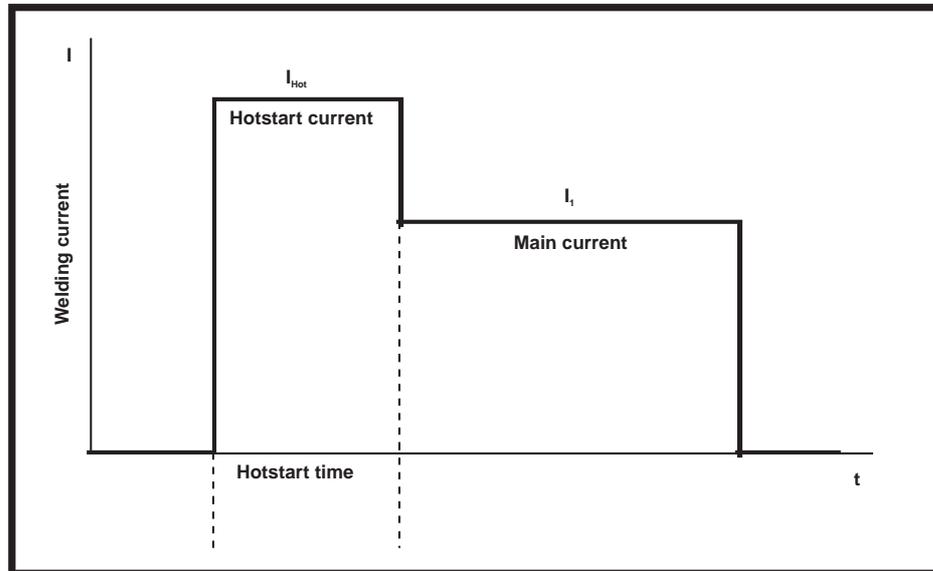


Fig. 3:  
Process chart for stick electrodes - welding with the hotstart device

## 3 Function specification

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### 3.3 Remote controls



Only the remote controls described in these operating instructions may be connected! Plug the remote control into the remote control socket of the welding machine (Chap. 2, J) and lock it only when the machine is switched off.

The remote control is detected automatically when the welding machine is switched on. See the operating instructions of the remote control for detailed information.

#### Foot-operated remote control FR 21



##### Functions

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.

#### Manual remote control FR 30



##### Functions

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.

#### Manual remote control FR 30F



##### Functions

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine. The welding current  $I_1$  is adjustable in 2 ranges for this (coarse/fine adjustment)

##### Features

- Large adjusting knob

#### Manual remote control FR 30 PWS



##### Functions

- Pole changeover switch to change the welding polarity. The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.

##### Commissioning:

- The pole changeover switch of the machine must be in position +.

### 3 Function specification

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#### Manual remote control FR 30F PWS



##### Functions

- Pole changeover switch to change the welding polarity.  
The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.  
The welding current  $I_1$  is adjustable in 2 ranges for this (coarse/fine adjustment).

##### Commissioning:

- The pole changeover switch of the machine must be in position +.

##### Features

- Large adjusting knob

#### Cableless manual remote control FR 30 KL



##### Functions

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.

##### Commissioning:

- The changeover switch of the welding machine must be in position ON (cableless remote control active)

##### Features

- Welding current adjustment without connecting cable

#### Manual remote control FRA 40



##### Functions

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.
- The machine can be switched from remote control FRA 40 (switch position up) to another remote control (switch position down) with the changeover switch.

##### Commissioning:

- Adjust the measurement range of the welding current display to the maximum current of the machine.  
(DIP switch in the remote control, setting when supplied: 250A)

##### Features

- LED welding current display.
- 10-turn helical potentiometer for accurate setting of welding current.
- Connection facility for further remote controls.

#### Manual remote control Hotstart FR 35



##### Functions

- Remote control "ON/OFF" (changeover switch on the remote control).
- Hotstart current and hotstart time infinitely adjustable.
- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current, i.e. regardless of the welding current selected on the machine.

##### Commissioning:

- The welding current  $I_1$  is adjustable in absolute values from the minimum to the maximum current depending on the welding current selected on the machine.
- Switch on the remote control.

##### Features

- Connection facility for remote control FRA 40.



**When the FR35 is in use, the hotstart current and time must be set to their minimum values on the welding machine.**

## 4 Commissioning

### 4.1 Setting up the welding machine



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

- Set up the machine so that there is enough room to adjust the operating elements.
- Ensure that the machine is set up in a stable position and appropriately secured.

### 4.2 Mains connection



The operating voltage shown on the rating plate must be consistent with the mains voltage!



For mains fuse, please refer to the technical data (Chap. 1)!

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

#### 4.2.1 Reconnecting the mains voltage 400/415V at the control transformer

(PWS only)



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

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

- For 400V: Connect plug to pin 4 (works setting),
- For 415V: Connect plug to pin 6.

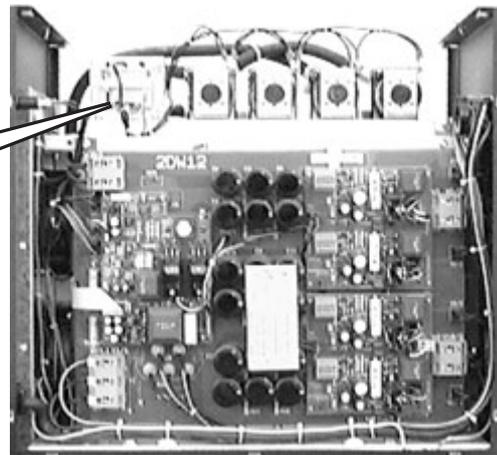
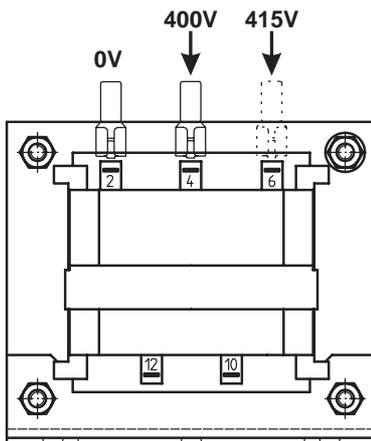


Fig.: Control transformer

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

- Indication of the mains voltage (at the end of the cable)
- Mains voltage on delivery (rear of the unit above the rating plate)

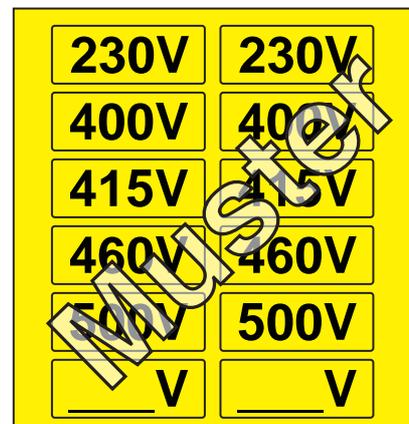


- Special voltages, for marking according to reconnecting on site (enclosed with the operating instructions)

After reconnecting 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 accessory list)

## 4 Commissioning

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### 4.3 Welding machine cooling system

Observe the following to attain the optimum duty cycle of the power units:

- Ensure that the working area is adequately ventilated,
- Do not obstruct the machine's air inlets and outlets,
- Metal parts, dust or other foreign bodies must not get into the machine.

### 4.4 Workpiece lead



**Remove paint, rust and dirt from clamping and welding areas with a wire brush! Attach the workpiece clamp in the immediate vicinity of the welding position! Structural parts, pipes, rails etc. may not be used as return leads for the welding current if they are not the workpiece themselves!**

**A perfect current connection must be ensured where welding benches and appliances are concerned!**

- Insert cable plug of the workpiece lead into the welding current socket "+" (**Chap. 2, Item L**) or "+" (**Chap. 2, Item M**) and lock by turning to the right.



**The polarity depends on the instructions of the electrode manufacturer.**

### 4.5 Electrode holder connection (MMA welding)

- Insert cable plug of the stick electrode holder into the welding current socket "+" (**Chap. 2, Item M**) or "-" (**Chap. 2, Item L**) and lock by turning to the right.



**The polarity depends on the instructions of the electrode manufacturer.**

## 5 Maintenance and care



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

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!**

**May only be carried out by authorised personnel. Only after the following tests the machine may be used.**

### 5.1 Cleaning

To do this, carefully disconnect the machine from the power supply.  
**(Switching off or unscrewing the fuse must be carried out by authorised personnel.)**



The instructions should be handled as follows:  
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!**

### 5.2 Repair



The following description of the repair work must be carried out by authorised personnel.  
You are recommended to carry out a quarterly maintenance check after every repair. Test sequence:

**The following description of the repair work must be carried out by authorised personnel. If required, a copy of the instructions must be provided. Failure to do so can be potentially fatal!**



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 !**



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!**

- Measurement of the open circuit voltage
- Measurement of the open circuit current
- Function test of the welding machine

**Correct condition**

externally visible faults (without opening the machine), for example, to the following points:  
• Insulation faults, scorch or pressure marks.  
• Lead, mains switch.

- Signs of damage to the stop points
- Damage to stop points
- Improper interference and modifications
- The type plate and warning symbol must be present

## 5 Maintenance and care

### 5.2.2 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  $< 0.1\Omega$ . The measurement must be performed using at least 200 mA.

### 5.2.3 Measurement of insulation resistance

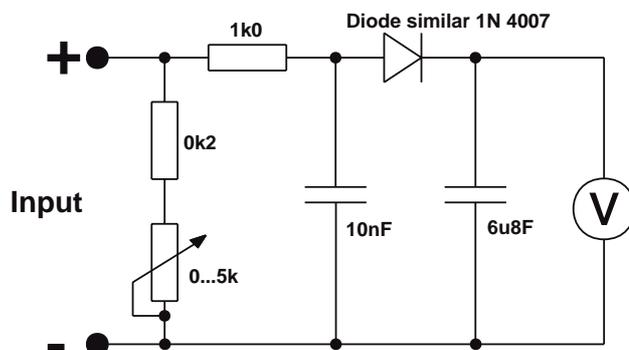
The machine must be disconnected from the mains!

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  $> 2.5\text{ M}\Omega$ .
- **Insulation resistance welding current circuit - casing:** Measure between a welding socket and protective conductor. The resistance must be  $> 2.5\text{ M}\Omega$ .
- **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  $> 5.0\text{ M}\Omega$ .

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



Measurement 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  $0\text{k}\Omega$  to  $5\text{k}\Omega$  during the measurement.

The measured voltage must not deviate from that specified on the rating plate ( $U_0$ ) by more than 10%.

### 5.2.5 Function test of the welding machine

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

## 5.3 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.

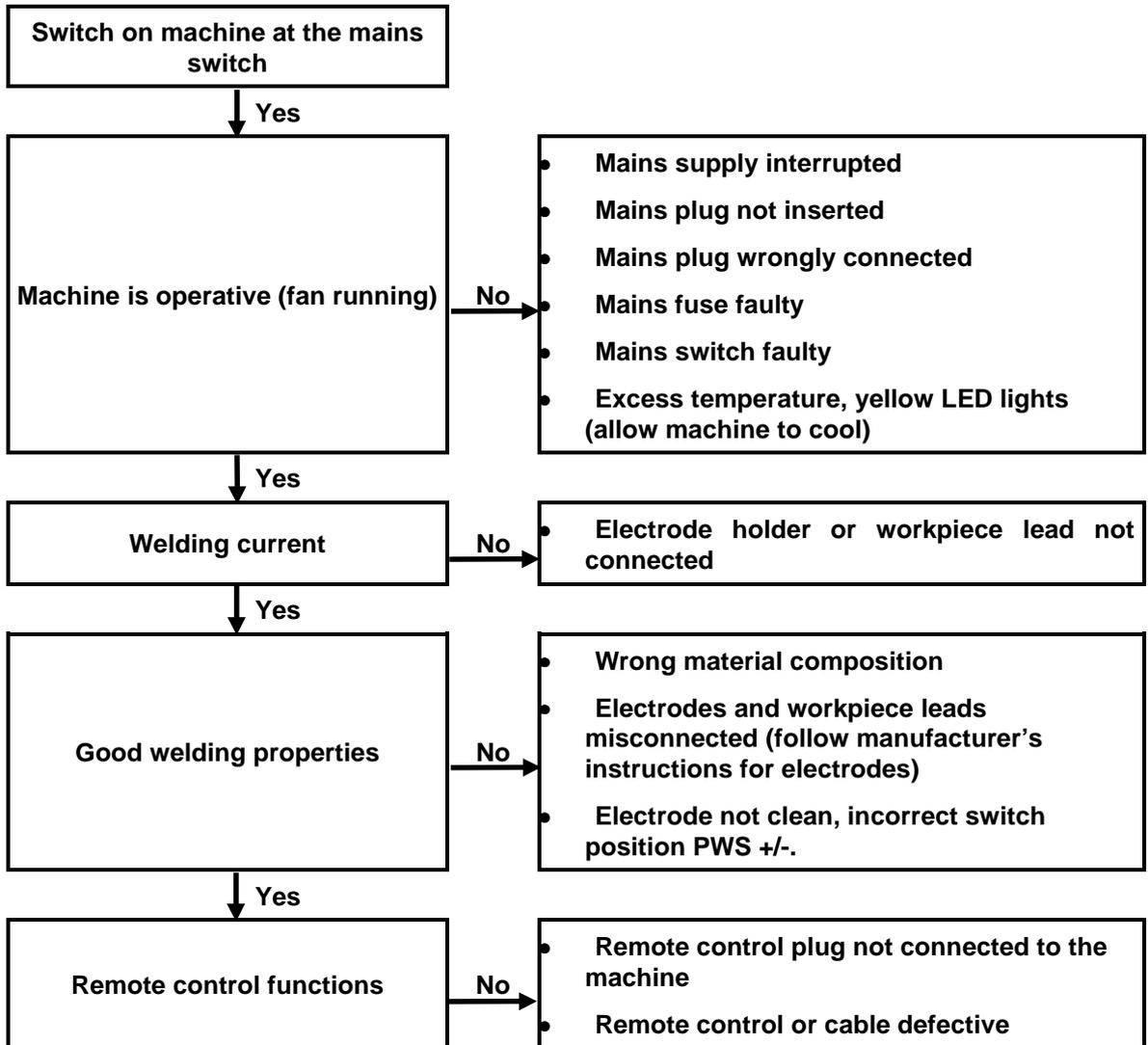
If maintenance or repair work is carried out on this machine by personnel who are not trained and authorised to undertake such work, the right to claim under the warranty lapses.

## 6 Operating faults, causes and remedies

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All machines are subjected to strict manufacturing and final inspection procedures. If, despite this, something fails to work at any time, please check machine using the following process chart. If none of the fault elimination procedures described leads to the correct functioning of the machine, please inform your authorised dealer.

### Customer checklist



## 7 Spare parts list

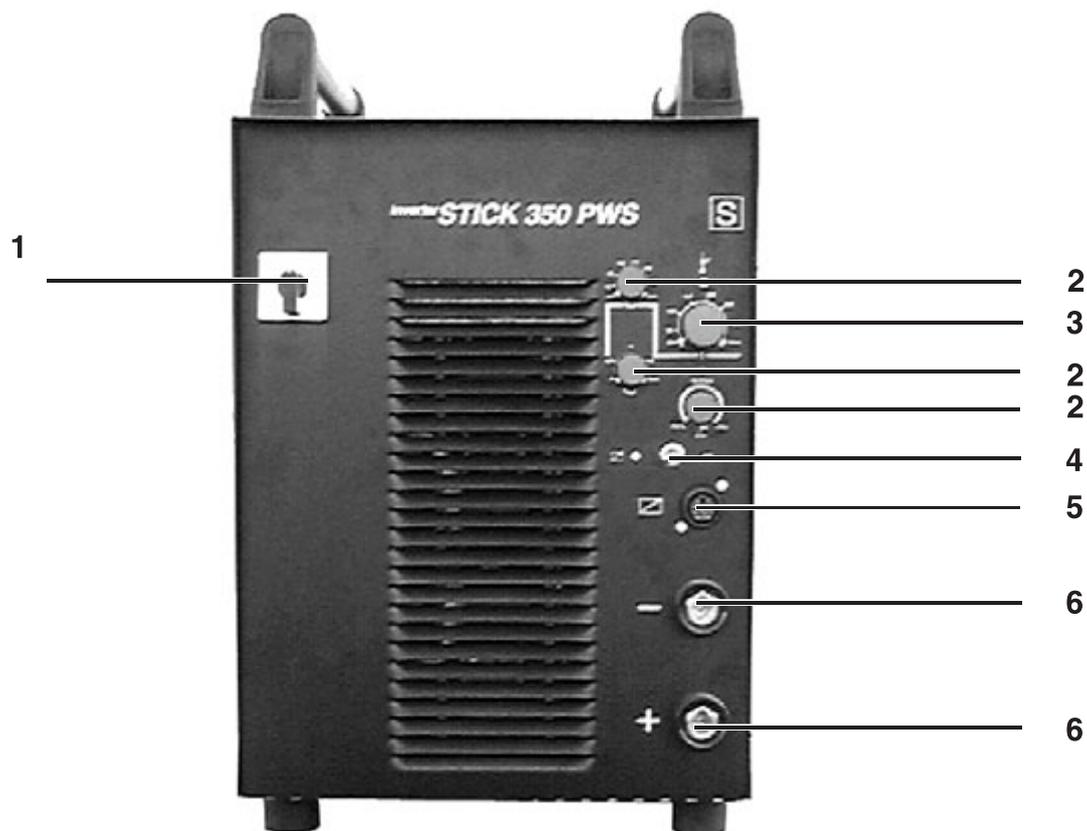


Fig. 1, front

	Designation	Type	STICK 350	STICK 350 PWS	STICK 450
1	Main switch	B2N-A-F15-B D200-F15-B-SI	074-000279-00001		094-000525-00000
	Switch knob		094-001814-00000		
2	Rotary dial	Ø23mm / 2523060	074-000315-00000		
	Rotary dial cover	Ø23mm / 4123002	074-000315-00001		
	Rotary dial arrow indicator	Ø23mm / 4223002	074-000315-00002		
3	Rotary dial	Ø31mm / 2531060	074-000234-00000		
	Rotary dial cover	Ø31mm / 4131002	074-000234-00001		
	Rotary dial arrow indicator	Ø31mm / 4231002	074-000234-00002		
4	Changeover switch:	000100.2901	-	044-001939-00000	-
	(KLR units only)	1631/1pole OFF	094-001898-00000	-	094-001898-00000
5	PCB connector board	EB 3	040-000408-00000		
6	Socket built-in	DIXBE/70-95qmm	074-000232-00000	074-000517-00000	

## 7 Spare parts list

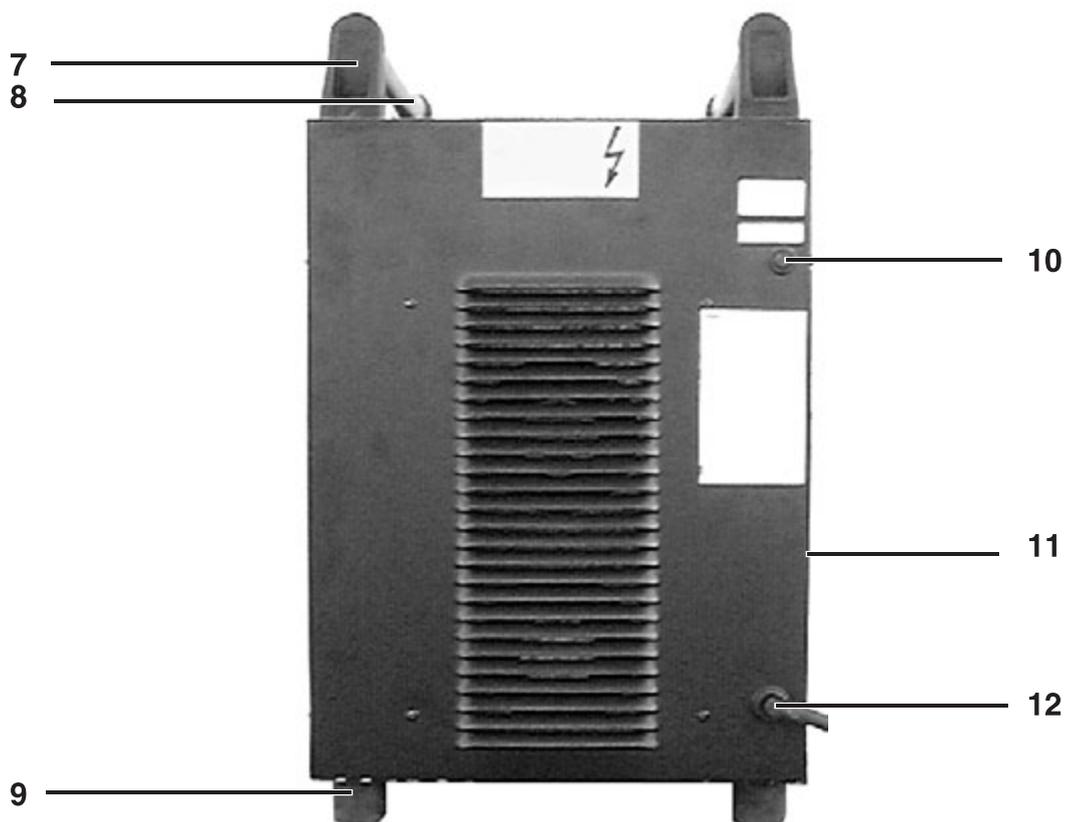


Fig. 2, rear

	Designation	Type	STICK 350	STICK 350 PWS	STICK 450
7	Grip	1095 - 07		074-000237-00000	
8	Tube: steel	1095-12-03/30x1.5x440mm		074-000237-00008	
9	Feet: rubber	40x35/M8/thread height 7mm		074-000223-00000	
10	Fuse	1.25A slow-blow/250V	-	094-000430-00000	-
11	Angular casing		094-004226-00006	094-003584-00007	094-000840-00005
12	Cable rubber	4x2.5qmm/HO7RN-F 4x4qmm/HO7RN-F	094-000365-00000		094-000404-00000
13	Label, mains connection voltage		-	094-007249-00000	-

## 7 Spare parts list

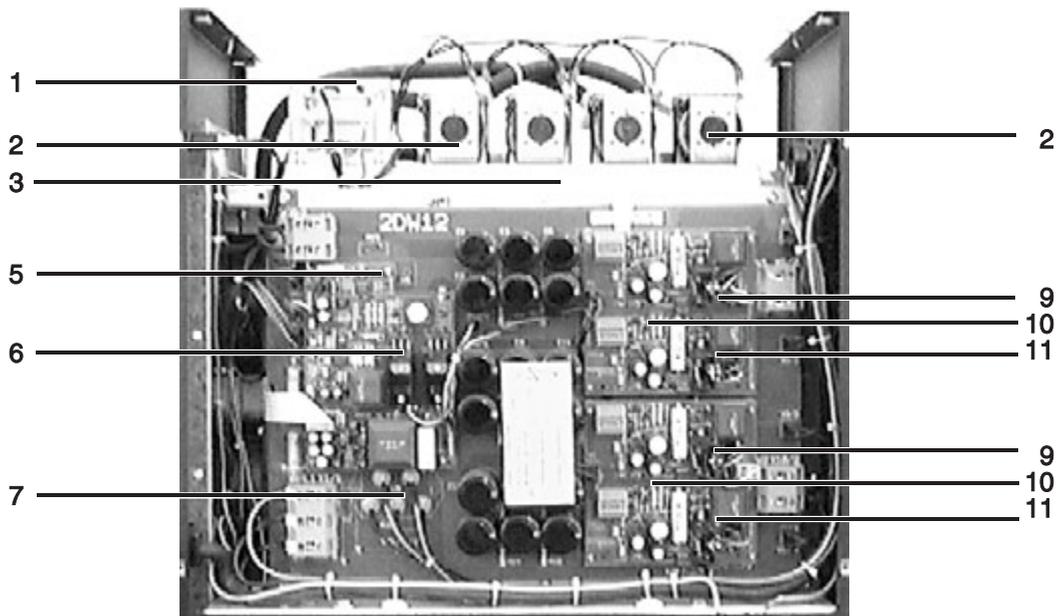


Fig. 3, side view left

	Designation	Type	STICK 350	STICK 350 PWS	STICK 450
1	IND control transformer	EI84a/60VA	-	094-000615-00001	-
2	Switch: Magnet	EL-MA/320/EBC	-	094-000722-00000	-
3	Inverter kit	STICK DC 34V/350A-3x400V/415V-L STICK DC 38V/450A-3x400V/415V-L	070-000079-00001		070-000059-00001
5	Thyristor diode module	MTD55-14A	064-000083-00014		
6	PCB power supply unit blocking converter	SPW2/380V/1	040-000289-00000		
7	Isodul / primary rectifier	B6 75/16	080-000204-00016		
9	Multidul Darlington transistor	INV50/1000-6M	080-000294-00000		
10	PCB inverter driver electronics	TRI4	040-000503-00000		
11	Multidul Darlington transistor	INV50/1000-6P	080-000295-00000		

## 7 Spare parts list

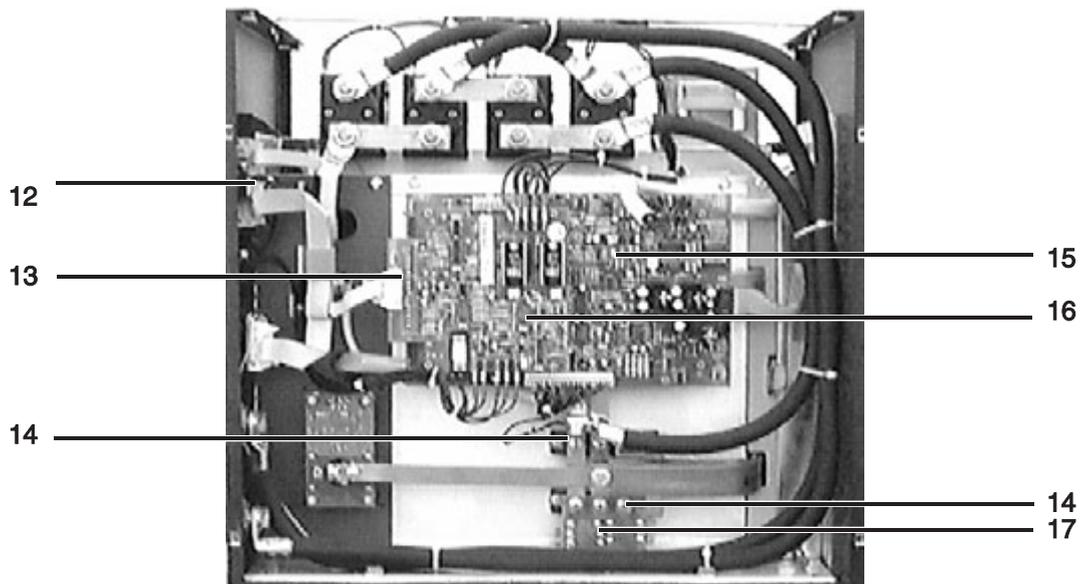


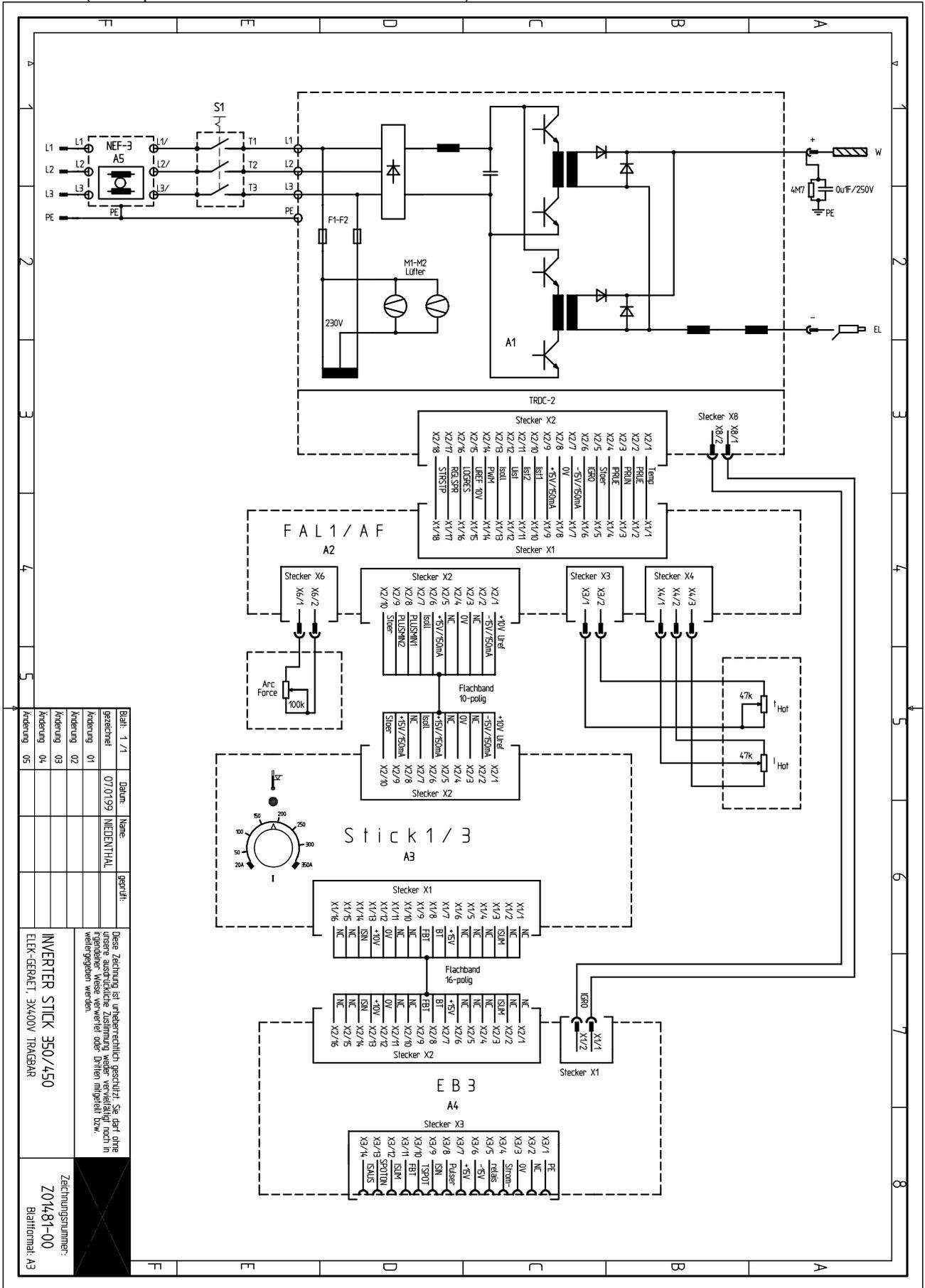
Fig. 4, side view right

	Designation	Type	STICK 350	STICK 350 PWS	STICK 450
12	PCB welding electronics	STICK 1/3		040-000415-00000	
13	PCB welding electronics	FAL 1/AF		040-000470-00001	
14	Isodul diode - fast	MDDM120-04F02		080-000257-00004	
15	PCB protective wiring	DSB 3/4 DSB 3/1	040-000427-00000		040-000297-00000
16	PCB Inverter control stack	TRDC2/350/7 TRDC2/450/1	040-000290-00016		040-000290-00012
17	PCB protective wiring	DSB1/2 DSB1/1	040-000433-00000		040-000298-00000

# 8 Schaltpläne / Circuit Diagrams

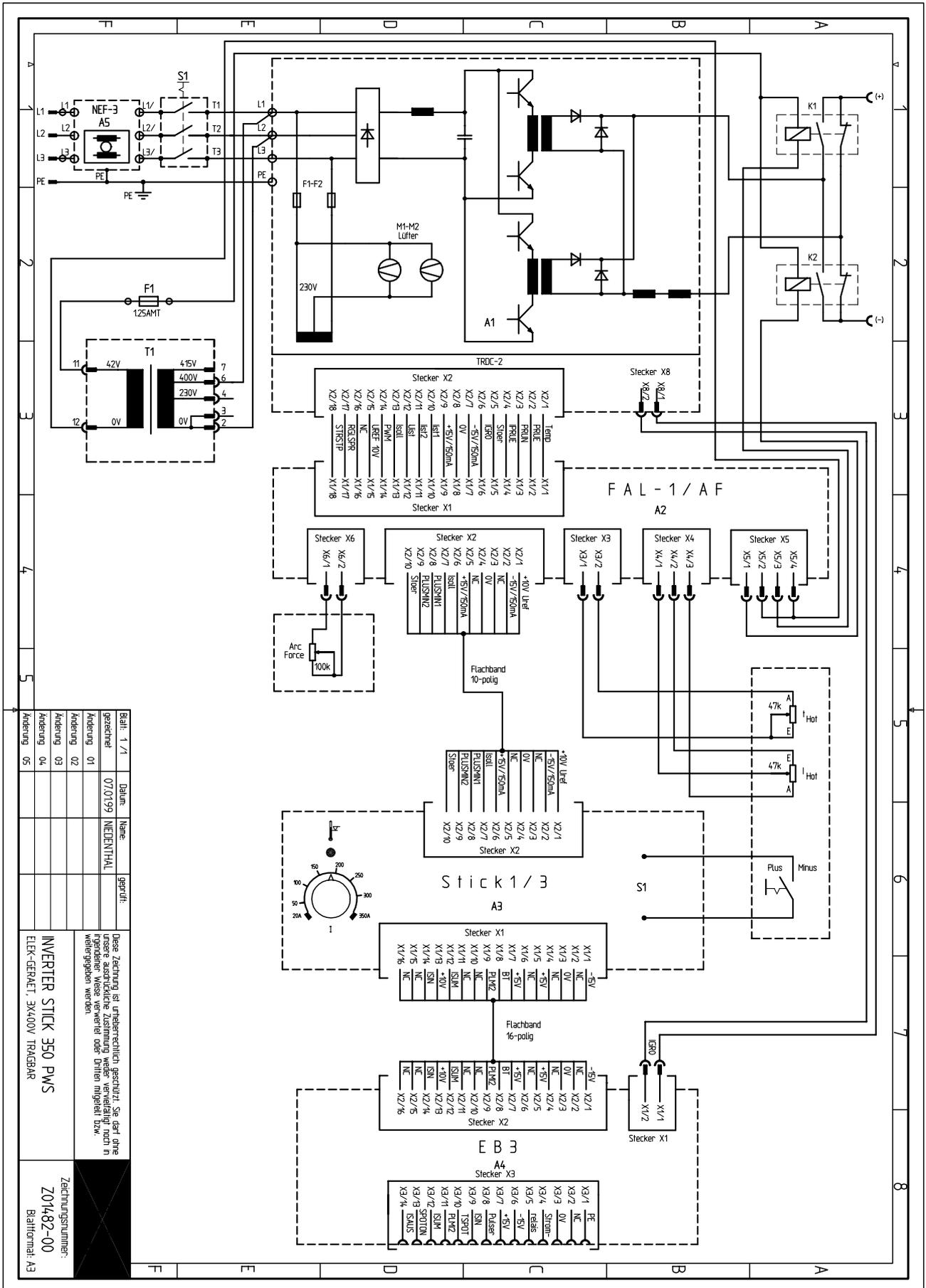
## 8.1 inverter **STICK 350 / 450**

(Schaltpläne befinden sich ebenfalls im Gerät)



# 8 Schaltpläne / Circuit Diagrams

## 8.2 inverter **STICK 350 PWS**



Beit. 1/1	Datum	Name	geprüft
gezeichnet	07/01/99	NEUBERTHAL	
Änderung 01			
Änderung 02			
Änderung 03			
Änderung 04			
Änderung 05			

Diese Zeichnung ist urheberrechtlich geschützt. Sie darf ohne unsere ausdrückliche Zustimmung weder vervielfältigt noch in irgendeiner Weise verwendet oder Dritten mitgeteilt bzw. weitergegeben werden.

**INVERTER STICK 350 PWS**  
 ELEK-GERÄT; EK400V TRAGBAR

Zeichnungsnummer:  
**Z01482-00**  
 Blattmaß: A3

