

## Operating instructions



### *Inverter* **STICK Welding Machines** *from 250A to 350A, portable*

*inverter* **STICK 250 H-2**

*inverter* **STICK 350 CEL**

*inverter* **STICK 350 CEL KLR**

*inverter* **STICK 350 CEL PWS**



These operating instructions must be read before commissioning.  
Failure to do so may be dangerous.

Machine may only be operated by personnel familiar with the appropriate safety regulations.



The machines bear the conformity mark and thus comply with the

- EC Low Voltage Directive (73/23/EEC)
- EC EMC Directive (89/336/EEC)



Geräte können entsprechend IEC 60974, EN 60974, VDE 0544 in Umgebung mit erhöhter elektrischer Gefährdung eingesetzt werden.

**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](mailto: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:



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

### **Designed use**

This machine is manufactured according to the current state of the art and current regulations and standards. It is to be operated only for the designed use (see Chap. Commissioning/Area of application).

### **Use not as designed**

This machine may be a hazard to persons, animals and property, however, if it is

- not used as designed
- used by unskilled persons who have not been trained,
- modified or converted improperly



**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.**

Any person involved in operation, maintenance and repair of this machine must read and follow these operating instructions, especially the safety precautions. Where appropriate, this must be confirmed by signature.

Furthermore, the

- relevant accident prevention regulations,
- generally recognized safety regulations,
- regionally specific provisions etc. are to be adhered to.



**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.**
- **The machine must not be used to defrost pipes.**



**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.**

# Safety instructions

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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.
- 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.

# Safety instructions

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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.



When setting up the machine, tilt resistance is only guaranteed up to an angle of 15° (as specified in EN 60974).

## 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

# 1 Technical data

<i>Inverter</i>	<b>STICK 250 H-2</b>	<b>STICK 350 CEL</b>	<b>STICK350CELPWS</b>
<b>Welding current</b>	5A - 250A	20A - 350A	
<b>Welding voltage</b>	20.2V -30V	20.2V -34V	
<b>Max. welding voltage</b>	40V	60V	
<b>Duty cycle (40°C) Max. welding current at 30%DC</b>	-	350A	
<b>60%DC</b>	250A		
<b>100%DC</b>	190A		
<b>Load alternation</b>	10min (60% DC $\triangle$ 6 min welding, 4min break)		
<b>Open circuit voltage</b>	106V	92V	
<b>Mains voltage (tolerances)</b>	3 x 400V (+20% to -25%) 3 x 415V (+15% to -25%)		
<b>Mains frequency</b>	50 / 60Hz		
<b>Mains fuse, safety fuse - slow-blow</b>	3 x 16A	3 x 25A	
<b>Mains connection lead</b>	H07RN-F4G1.5	H07RN-F4G2.5	
<b>Max. connected power</b>	10.5kVA	17.8kVA	
<b>Recommended generator rating</b>	14kVA	23.7kVA	
<b>cos<math>\phi</math> at I<sub>max</sub></b>	0.99		
<b>Efficiency</b>	89%	91%	
<b>Insulation class</b>	H		
<b>Protection classification</b>	IP 23		
<b>Ambient temperature</b>	-10°C to +40°C		
<b>Machine cooling</b>	fan		
<b>Workpiece lead <math>\leq</math>5m</b>	35mm <sup>2</sup>	50mm <sup>2</sup>	
<b>Total weight</b>	26kg	35.5kg	37.5kg
<b>Dimensions (LxWxH) incl. handle</b>	540x230x460mm	690x230x460mm	
<b>Constructed to (standards)</b>	IEC 60974 / EN 60974 / VDE 0544 EN 50199 / VDE 0544 Teil 206 S / C $\epsilon$		

## 2 Description of the machine

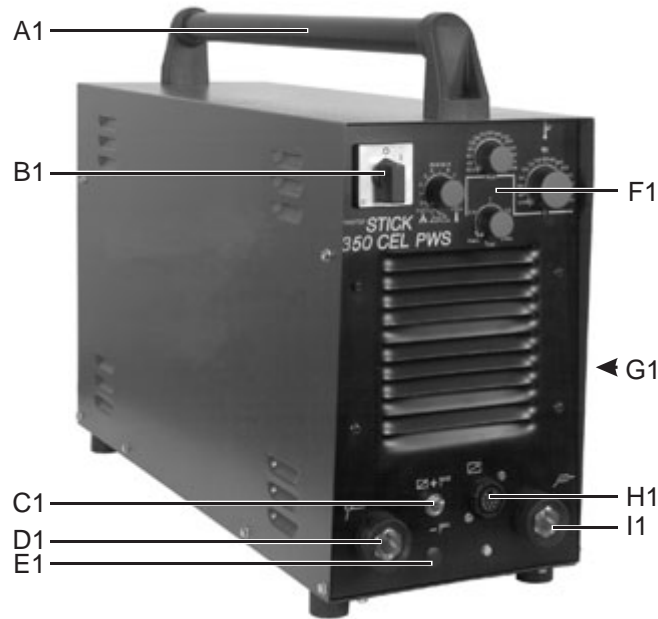








Fig. 1: Front view of *Inverter* STICK 350 CEL PWS

Item	Symbol	Description
A1		<b>Carrying handle</b>
B1		<b>Main switch</b>
C1		<p><b>Pole changeover switch (STICK 350 CEL PWS only)</b></p> <p>Position <math>- \overline{\text{FF}}</math> means :            negative welding voltage potential ( - ) at welding current socket <math>\overline{\text{FF}}</math>            positive welding voltage potential ( + ) at welding current socket <math>\overline{\text{FF}}</math></p> <p>Position <math>\square + \overline{\text{FF}}</math> means :            positive welding voltage potential ( + ) at welding current socket <math>\overline{\text{FF}}</math>            negative welding voltage potential ( - ) at welding current socket <math>\overline{\text{FF}}</math></p> <p><b>It is only possible to change the polarity when no welding current is flowing.</b></p>
D1		<p><b>Welding current socket +</b></p> <p>+ Positive polarity at pole changeover switch position <math>\square + \overline{\text{FF}}</math> (STICK 350 CEL PWS)            - Negative polarity at pole changeover switch position <math>- \overline{\text{FF}}</math> (STICK 350 CEL PWS)</p>
E1		<b>Cableless remote control changeover switch "ON/OFF" (STICK 350 CEL KLR)</b>
F1		<b>Logic control</b> (see chap. 3)
G1		<b>Fuse (at the rear of the machine)</b>
H1		<b>Remote control connection</b>
I1		<p><b>Welding current socket -</b></p> <p>- Positive polarity at pole changeover switch position <math>- \overline{\text{FF}}</math> (STICK 350 CEL PWS)            + Negative polarity at pole changeover switch position <math>\square + \overline{\text{FF}}</math> (STICK 350 CEL PWS)</p>

# 3 Function specification

## 3.1 Logic control

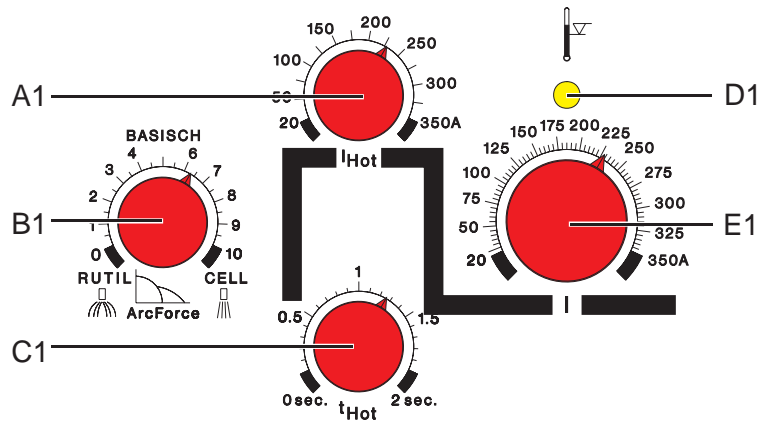
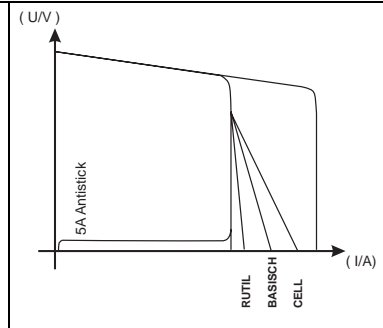


Fig. 1: Logic control

Item	Symbol	Description
A1		<p><b>Hotstart current</b> Hotstart current <math>I_{Hot}</math> infinitely adjustable from the minimum to the maximum welding current. The hotstart device makes it possible to ignite and re-ignite critical stick electrodes easily.</p>
B1		<p><b>Adjustable arcforcing</b> Shortly before the electrode threatens to stick, the <b>arcforcing device</b> sets an increased current designed to prevent the electrode from sticking. The value of the increase in current depends on the welding voltage and the setting on the arcforcing potentiometer. Excellent welding properties are achieved with all difficult electrodes thanks to the adjustable arcforcing.</p> <p><b>"Far left"</b> position: Minimal arcforcing <math>\Rightarrow</math> gentle arc, slight increase in current before short-circuit. Used with rutile, coated stick electrodes.</p> <p><b>"Centre"</b> position: Moderate arcforcing <math>\Rightarrow</math> normal arc, moderate increase in current before short-circuit. Used with basic, coated stick electrodes.</p> <p><b>"Far right"</b> position: Strong arcforcing <math>\Rightarrow</math> hard arc, great increase in current before short-circuit. Used with cellulose stick electrodes.</p>
C1		<p><b>Hotstart time</b> Hotstart time <math>t_{Hot}</math> infinitely adjustable from 0 sec. - 2 sec. The hotstart device ensures that critical stick electrodes can be ignited and re-ignited easily. The hotstart current and time can also be adjusted externally using the FR 35 remote control.</p>
D1		<p><b>Yellow LED (excess temperature)</b> Thermal monitors in the power unit shut down at excess temperature and the excess temperature indicator lamp comes on. After cooling, welding can proceed without any further measures.</p>
E1		<p><b>Main current <math>I_1</math> (welding current)</b> The welding current <math>I_1</math> can be infinitely adjusted from the minimum to the maximum welding current.</p>



### 3 Function specification

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#### 3.2 Antistick

If the stick electrode sticks despite the **arcforcing device**, the machine automatically switches over to the minimum current within about 1 second to prevent the electrode overheating. If the antistick device has been triggered, check the welding current setting and correct if necessary.

#### 3.3 Functional sequence for MMA welding

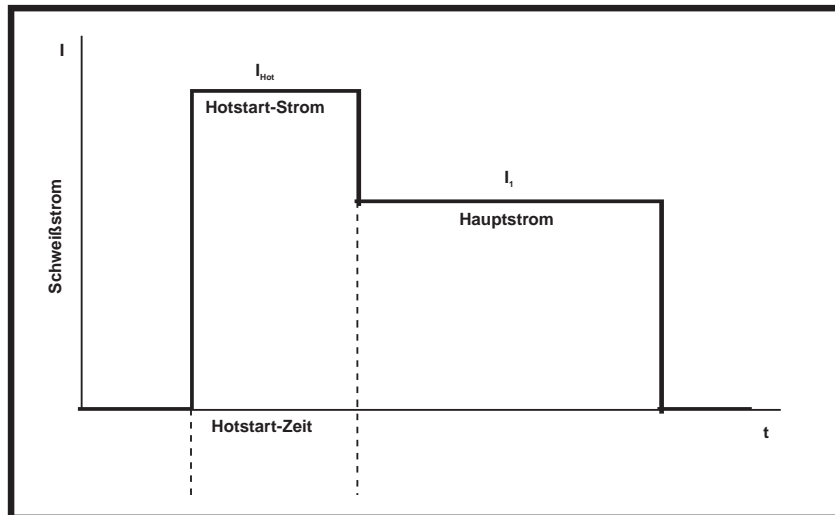


Fig. 2 Stick electrode flow chart – welding with hotstart device

- Strike the stick electrode on the workpiece.
- The stick electrode ignites the arc at the set **hotstart current**  $I_{Hot}$  and welds with this current until the **hotstart time**  $t_{Hot}$  elapses.
- The hotstart current drops to the set main current  $I_1$  and remains constant until the end of the welding process (see flow chart)
- If the stick electrode sticks in the welding pool for longer than 1 second, the antistick device comes into force and the welding current is reduced to the minimum current. Check the welding current setting and correct as necessary according to the manufacturer's instructions.

## 3 Function specification

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### 3.4 Remote control



Only the remote controls described in these operating instructions should be connected! Plug the remote control into the remote control socket (chap. 2, H1) 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 for the remote control for more detailed information.

#### FR 21 foot-operated remote control



##### Functions

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.

#### FR 30 manual remote control



##### Functions

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.

#### FR 30F manual remote control



##### Functions

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine. In this process, the welding current  $I_1$  can be adjusted in 2 ranges (coarse/fine adjustment).

##### Commissioning:

- Features
- Large adjusting knob

#### FR 30 PWS manual remote control



##### Functions

- Pole changeover switch for changing the welding polarity. The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.

##### Commissioning:

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

#### FR 30F PWS manual remote control



##### Functions

- Pole changeover switch for changing the welding polarity. The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine. In this process, the welding current  $I_1$  can be adjusted in 2 ranges (coarse/fine adjustment).

##### Commissioning:

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

##### Features

- Large adjusting knob, 2 setting ranges

### 3 Function specification

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#### FR 30 KL cableless manual remote control



##### Functions

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.

##### Commissioning:

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

##### Features

- Welding current adjustment without connecting cables (the welding machine must be equipped accordingly for operation).

#### FRA 40 manual remote control



##### Functions

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.
- The machine can be switched from FRA 40 remote control (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 on delivery: 250A)

##### Features

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

#### Hotstart FR 35 manual remote control



##### 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 to any value from the minimum to the maximum current regardless of the welding current selected on the machine.

##### Commissioning:

- The welding current  $I_1$  can be set to any value from the minimum to the maximum current regardless of the welding current selected on the machine.
- Switch on the remote control.


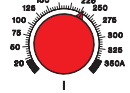
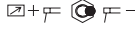
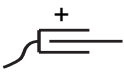
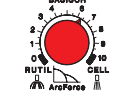


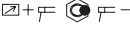

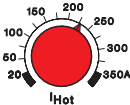

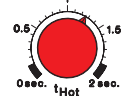
##### Features

- Connection facility for the FRA 40 remote control.



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

## 4 Quick start – the shortest way to welding (observe safety instructions)

Preparations		Setting		Fault elimination	
	<ul style="list-style-type: none"> <li>Plug in the mains plug. (Remember fuse!)</li> </ul>		<ul style="list-style-type: none"> <li>Set welding current <math>I_1</math>.</li> </ul>		<b>Poor welding properties</b> <ul style="list-style-type: none"> <li>Incorrect polarity setting on the pole changeover switch.</li> </ul>
	<ul style="list-style-type: none"> <li>Insert workpiece lead, lock and attach to conduct to the workpiece.</li> </ul>		<ul style="list-style-type: none"> <li>Set arcforcing.</li> </ul>		<b>Excess temperature LED is on:</b> <ul style="list-style-type: none"> <li>Duty cycle exceeded &gt; allow machine to cool</li> </ul>
	<ul style="list-style-type: none"> <li>Connect electrode holder</li> </ul>		<ul style="list-style-type: none"> <li>Preselect polarity with the pole changeover switch (PWS machines only).</li> </ul>		
	<ul style="list-style-type: none"> <li>Plug in the remote control connector plug</li> </ul>		<ul style="list-style-type: none"> <li>Set hotstart current.</li> </ul>		
	<ul style="list-style-type: none"> <li>Switch on machine.</li> </ul>		<ul style="list-style-type: none"> <li>Set hotstart time.</li> </ul>		

## 5 Commissioning

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### 5 Commissioning

#### 5.1 Area of application

The machines are used exclusively for stick electrode direct current welding.

##### 5.1.1 Proper usage

These welding machines are suitable only for MMA direct current welding for rutile, basic and cellulose electrodes.

Any other use is regarded as "improper" and no liability is assumed for any damage arising therefrom.

We can only guarantee smooth and trouble-free operation of the machines when used in conjunction with the cooling units, welding torches and accessories from our range!

#### 5.2 Setting up the welding machine



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

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

#### 5.3 Mains connection



**The correct mains plug must be attached to the mains supply lead on the machine. The connection must be made by an electrician in compliance with current VDE regulations. Any phase sequence can be used!**



**The operating voltage shown on the rating plate must match the mains voltage! For mains fuse protection, please refer to the "Technical data" chapter.**

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

#### 5.4 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 air inlets and outlets on the machine,
- No metal parts, dust or other foreign bodies are permitted to enter the machine.

#### 5.5 Workpiece lead



**Remove paint, rust and dirt from clamping and welding areas with a wire brush. Attach the workpiece collet or clamp directly next to the welding position. Structural parts, pipes, rails etc. may not be used as return leads for the welding current unless these parts are the actual workpieces.**

**A perfect current connection must be ensured for welding benches and appliances.**

- Insert cable plug on the workpiece lead into the welding current socket (**chap. 2, E1 or I1** depending on the polarity of the electrode) and lock by turning to the right.



**MMA welding:**

**The polarity depends on the instructions from the electrode manufacturer given on the electrode packaging.**

#### 5.6 Electrode holder connection

- Insert cable plug of the stick electrode holder into the "+" welding current socket (**chap. 2, E1 and I1** depending on the polarity and electrode) and lock by turning to the right.



**The polarity depends on the instructions from the electrode manufacturer given on the electrode packaging.**

(+ Positive polarity at pole changeover switch position , **STICK 350 CEL PWS only**)  
(- Negative polarity at pole changeover switch position , **STICK 350 CEL PWS only**)

## 6 Maintenance and care

Under normal operating conditions, these welding machines are largely maintenance-free and require a minimum of care. However, a number of points should be observed to guarantee the safe operation of your welding machine. These include regular cleaning and checking, as well as the level of contamination in the environment and the amount of dust.

**D**



**Welding machines may only be carried out by qualified personnel. This must be confirmed by any one of the following tests, which must be carried out by qualified personnel.**

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!  
**Außerrachtlassung kann lebensgefährlich sein!**

### 6.1 Cleaning

Ensure that the machine is switched off and unplugged from the mains!  
**MAINS!**  
(Switching off or unscrewing the fuse must be carried out by qualified personnel.)



**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!**

### 6.2 Repairs



The following descriptions apply to the repair of the machine. It is recommended to conduct quarterly checks and repairs. Test sequences must be carried out after every repair. Test sequences must be carried out after every repair.

**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 !**

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

**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!**

- Signs of damage to stop points
- Damage to stop points
- Non-permitted interference and modification
- The type plate and warning symbol must be preserved

### 6.2.2 Measurement of protective conductor resistance

Measure between safety contact of the mains plug and exposed, touchable metal parts, screws. During measuring, the machine connection cable must be moved along the entire length, especially near the connection points.  
The resistance should be < 0.1Ω Measurement should be carried out with a minimum of 200 mA.

## 6 Maintenance and care

### 6.2.3 Measurement of insulation resistance

Disconnect the machine from the mains. Remove the mains plug!  
Open the machine and clean carefully (as described above).  
Switch on mains switch.

- **Insulation resistance mains current circuit-casing**

Switch on mains switch.

a) Step switch controlled machines:

The machine must be opened. Measure the insulation resistance from the main fuse input and mains fuse output to the casing. At the mains fuse input it is necessary to measure from each connection, at the mains fuse output only from one connection.

The resistance must be  $> 2.5 \text{ M}\Omega$ .

b) Inverter machines:

Measure from one phase of the mains plug to the housing.

The resistance should be  $> 2.5 \text{ M}\Omega$ .

- **Insulation resistance welding current circuit-casing**

Measure between a welding socket and protective conductor.

The resistance should be  $> 2.5 \text{ M}\Omega$ .

- **Insulation resistance mains current circuit welding-current circuit**

Switch on mains switch.

a) Step switch controlled machines:

Measure the insulation resistance between the mains fuse output and a welding current socket.

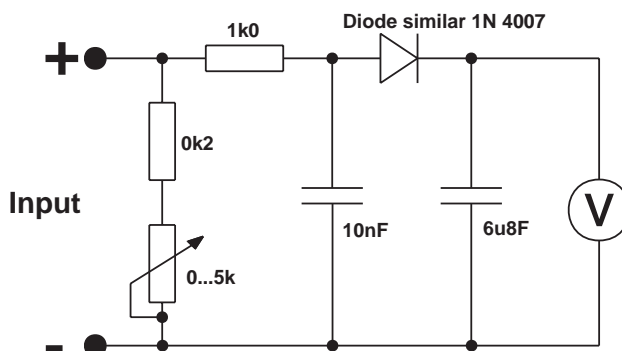
The resistance must be  $> 5 \text{ M}\Omega$ .

b) Inverter machines:

Measure between a phase of the mains plug and a welding current socket.

The resistance must be  $> 5.0 \text{ M}\Omega$ .

### 6.2.4 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 should show 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% and must be no higher than 113V.

### 6.2.5 Functional test of the welding machine

Conduct a functional test depending on the type of machine.

## 6.3 Repair work

Repair and maintenance work may only be performed by trained specialist staff.

In all service matters, always consult the dealer who supplied the machine.

Return deliveries of defective equipment subject to warranty may only be made through your dealer.

When replacing parts, use only original spare parts.

When ordering spare parts, 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.

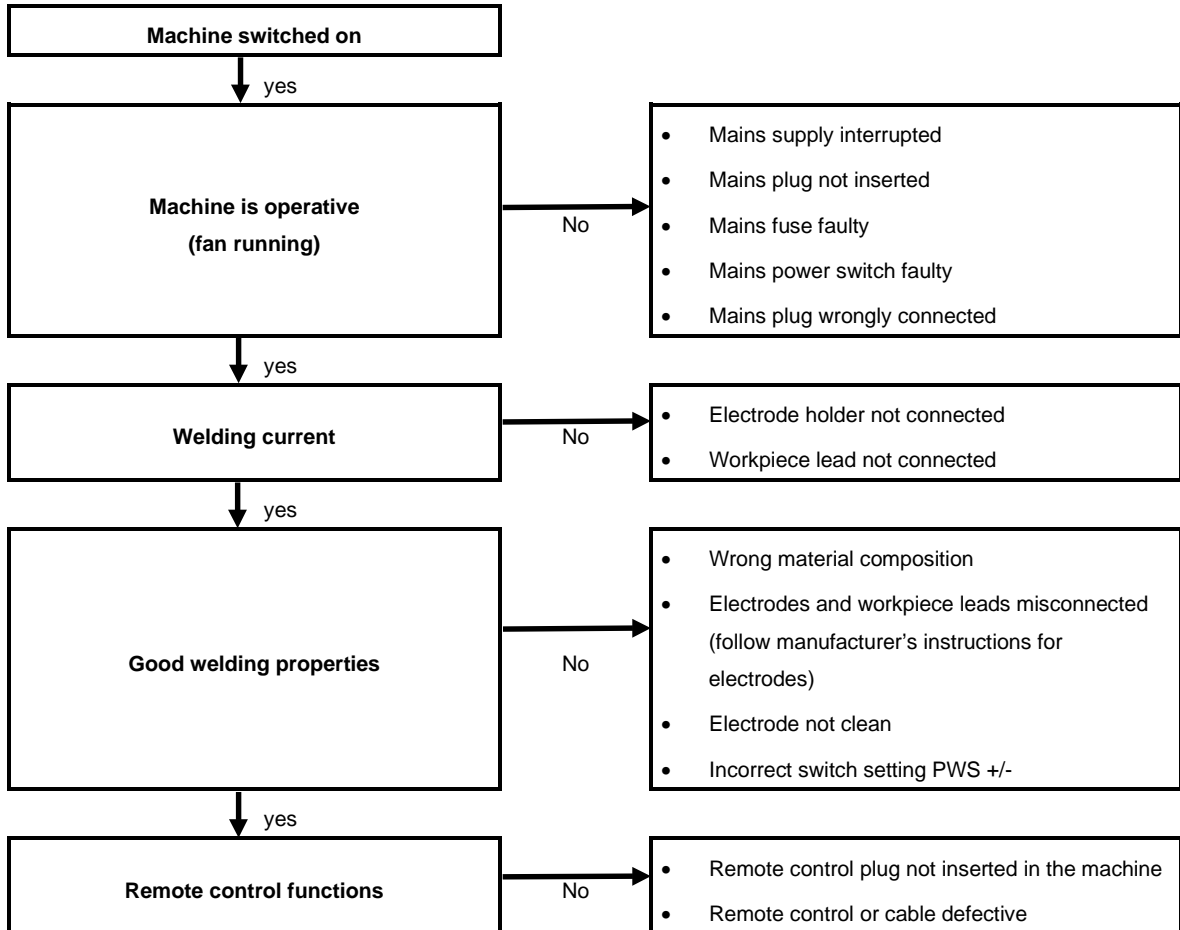
If repair or maintenance work is carried out on this machine by personnel who are not trained and authorised to undertake such work, the right to claim under the warranty becomes void.

# 7 Operating faults, causes and remedies

## 7 Operating faults, causes and remedies

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 results in the correct functioning of the machine, please contact your authorised dealer.

### 7.1 Customer checklist



## 8 Ersatzteilliste / Spare Parts List

## 8 Ersatzteilliste / Spare Parts List

### 8.1 Vorderseite / front side

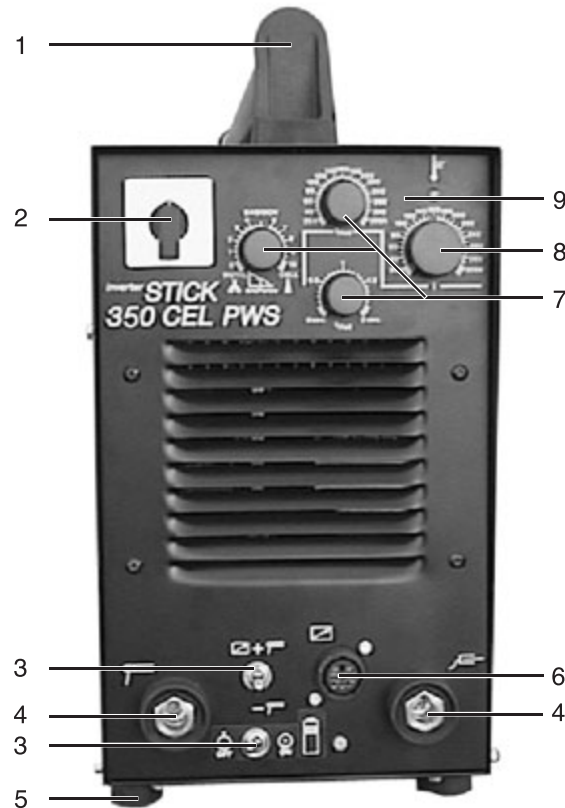


Abb. / picture 1

Pos.	Bezeichnung	Description	<i>inverter</i> STICK 250H-2	<i>inverter</i> STICK 350
1	Halterung für Griffstange	Holder for hand grip	074-000237-00000	
	Griffstange	Hand grip	074-000237-00005	074-000237-00013
2	Hauptschalter EIN/AUS	Mains switch ON/OFF	074-000279-00000	
	Schalter Switch	knob griff	094-001814-00000	
3	Kippschalter	Toggle switch	094-001898-00000	
4	Schweißstrombuchse	Welding current socket outlet	074-000232-00000	
5	GummifüÙe	Rubber feet	094-002876-00000	
6	Anschlußbuchse 14-polig EB3	Connection socket 14-pole	040-000408-00000	
7	Drehknopf Ø23mm	Knob	074-000315-00000	
	Deckel für Drehknopf Ø23mm	Cover for knob	074-000315-00001	
	Pfeilscheibe für Drehknopf Ø23mm	Arrow indicator for knob	074-000315-00002	
8	Drehknopf Ø31mm	Knob	074-000234-00000	
	Deckel für Drehknopf Ø31mm	Cover for knob	074-000234-00001	
	Pfeilscheibe für Drehknopf Ø31mm	Arrow indicator for knob	074-000234-00002	
9	PCB Steuerelektronik STICK1/3	PCB control	040-000415-00000	

## 8 Ersatzteilliste / Spare Parts List

### 8.2 Rückseite / rear view

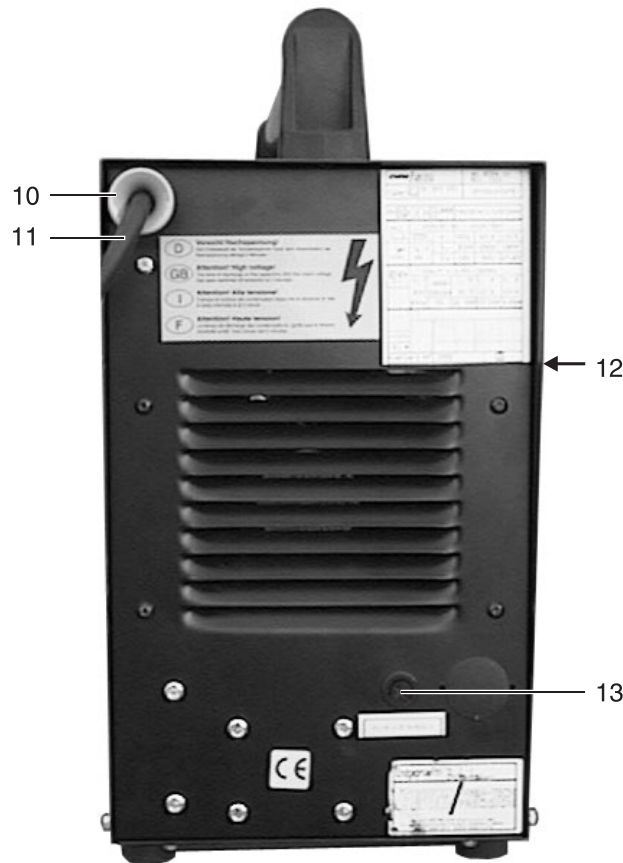


Abb. / picture 2

Pos.	Bezeichnung	Description	<i>inverter</i> <b>STICK 250H-2</b>	<i>inverter</i> <b>STICK 350</b>
<b>10</b>	Kabelverschraubung	Cable gland	094-003293-00000	
	Kabelverschraubung Mutter	Cable gland nut	024-000205-00001	
<b>11</b>	Netzkabel	Mains cable	092-000661-00000	092-000662-00000
<b>12</b>	Gehäusedeckel	Housing cover	094-002817-00002	094-002744-00003
<b>13</b>	Sicherungshalter mit Mutter (nur PWS)	Fuse holder with nut (only PWS)	-	094-000001-00000
	Sicherungskappe (nur PWS)	Fuse cap (only PWS)	-	094-000001-00001
	Sicherung (nur PWS)	0,5AT Fuse (only PWS)	-	094-000202-00000

## 8 Ersatzteilliste / Spare Parts List

### 8.3 *inverter* **STICK 250H-2**

#### 8.3.1 Rechte Seite / right side

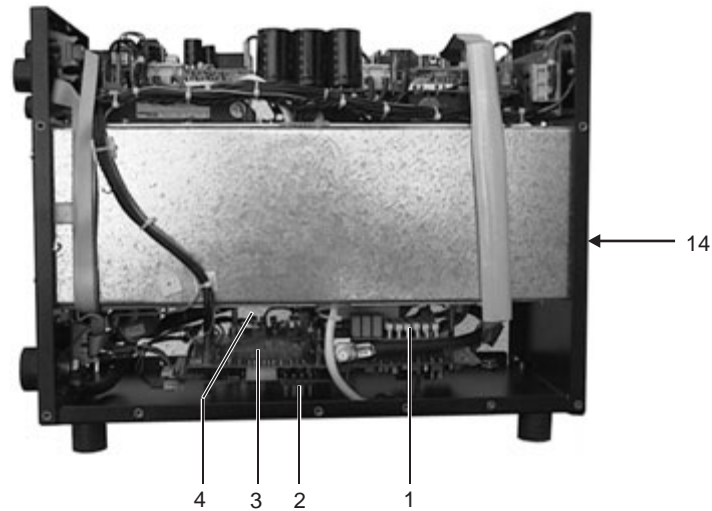


Abb. / picture 3

Pos.	Bezeichnung:	Description:	STICK 250H-2
1	Leiterplatte Schutzbeschaltung	PCB contactor switching	040-000531-00000
2	PCB Schweißelektronik	PCB welding electronic	040-000470-00001
3	PCB Inverter Steuersatz	PCB inverter control stack	040-000290-00022
4	Sek. Diodenkühler	Sec. diode cooler	072-000154-00000
	Leiterplatte Schutzbeschaltung	PCB contactor switching	040-000495-00000
	Leiterplatte Schutzbeschaltung	PCB contactor switching	040-000531-00000
	Diodenmodul (3xbestückt)	PCB for the driver electronics	080-000257-00004
14	Lüfter	Fan	074-000267-00000

#### 8.3.2 Von oben / from the top

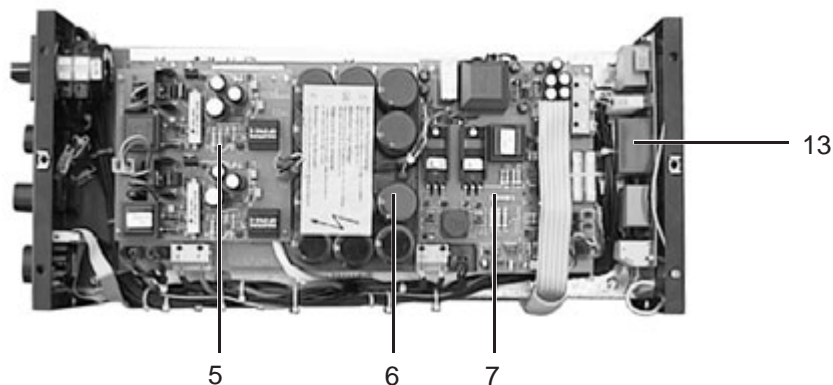


Abb. / picture 4

Pos.	Bezeichnung	Description	STICK 250H-2
5	PCB Treiberelektronik TRI4	PCB for the drive electronics	040-000503-00000
6	Inverter Steuersatz Primärseite DW7,5/380/1	Inverter control stake primary side	040-000303-00000
7	Leiterplatte Sperrwandler SPW2/380V/1	Primary control PCB	040-000289-00000
13	Netzfilter NEF2	Mains filter	040-000505-00000

## 8 Ersatzteilliste / Spare Parts List

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### 8.3.3 Linke Seite / left side

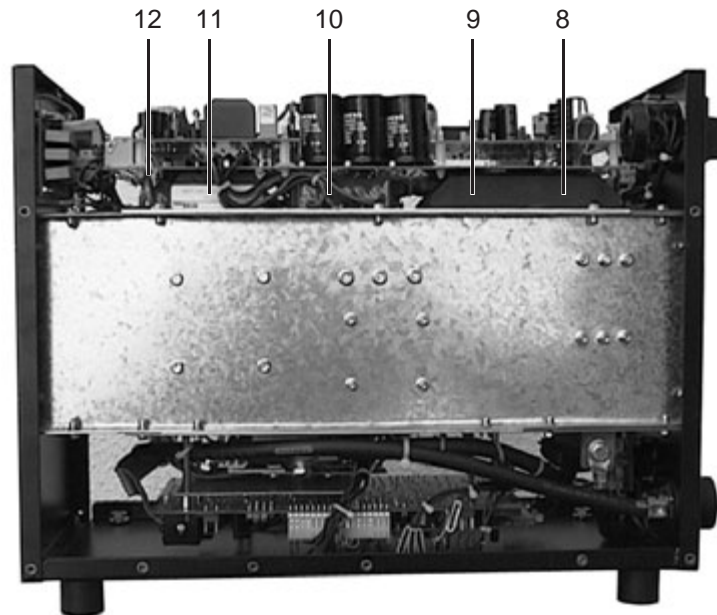


Abb. / picture 5

Pos.	Bezeichnung	Description	STICK 250H-2
8	Primärschalter Minus INV50/1000.6M	Primary switch	080-000294-00000
9	Primärschalter Plus INV50/1000.6P	Primary switch	080-000295-00000
10	Varistor Schutzbeschaltung für Netzgleichrichter SB460/6	Varistor modules, protective circuit for mains rectifier	072-000292-00000
11	Thyristor Dioden Modul MTD55-14A	Thyristor diodes module	064-000083-00014
12	Netzgleichrichter B6 75/16	Mains rectifier	080-000204-00016

## 8 Ersatzteilliste / Spare Parts List

### 8.4 <sup>inverter</sup> STICK 350 / 350CEL / 350CEL PWS

#### 8.4.1 Rechte Seite / right side

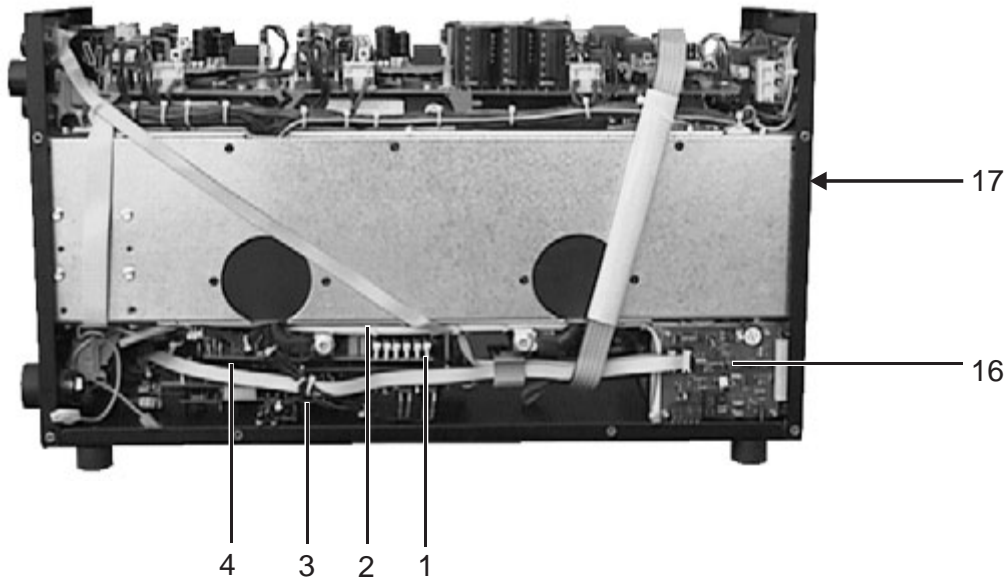


Abb. / picture 6

Pos.	Bezeichnung	Description	STICK 350
1	Leiterplatte Schutzbeschaltung DSB3/4.1	PCB contactor switching	040-000427-00001
2	Sekundär Diodenkühler SDK6XMDDM 121-04 F02-01/1	Secondary diode cooler	072-000417-00000
	Leiterplatte Schutzbeschaltung VAR1/1	PCB contactor switching	040-000495-00000
	Leiterplatte Schutzbeschaltung DSB3/4.1	PCB contactor switching	040-000427-00001
	Leiterplatte Schutzbeschaltung DSB1/2	PCB contactor switching	040-000433-00000
	Diodenmodul (6x)	diode modules (6x)	080-000297-00004
3	PCB Schweißelektronik FAL1/AF/1	PCB welding electronics	040-000470-00001
4	PCB Inverter Steuersatz TRDC2/300/3	PCB inverter control stack	040-000290-00024
16	Steuerelektronik für Handregler HDR- Q1 (optional) FST-Q1	control elektronik for hand operator remote control HDR-Q1 (optional)	094-002476-00000
17	Lüfter	Fan	074-000267-00000

## 8 Ersatzteilliste / Spare Parts List

### 8.4.2 Von oben / from the top side

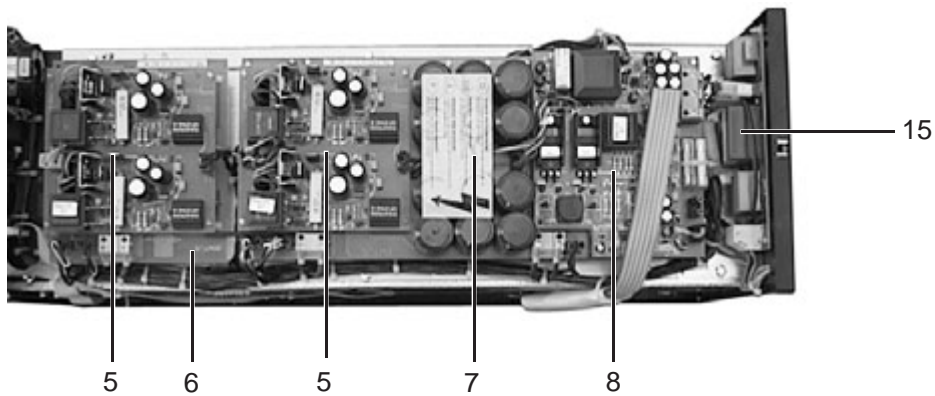


Abb. / picture 7

Pos.	Bezeichnung	Description	STICK 350
5	Leiterplatte Treiberelektronik TRI4	PCB for the driver electronics	040-000503-00000
6	Leiterplatte Primärschalter 2DW7.5	PCB primary switch	042-000411-00000
7	Inverter Steuersatz Primärseite DW7,5/380/1	Inverter control stake primary side	040-000303-00000
8	Leiterplatte Sperrwandler SPW2/380V/1	Primary control PCB	040-000289-00000
15	Netzfilter NEF2	Mains filter	040-000505-00000

### 8.4.3 Linke Seite / left side side

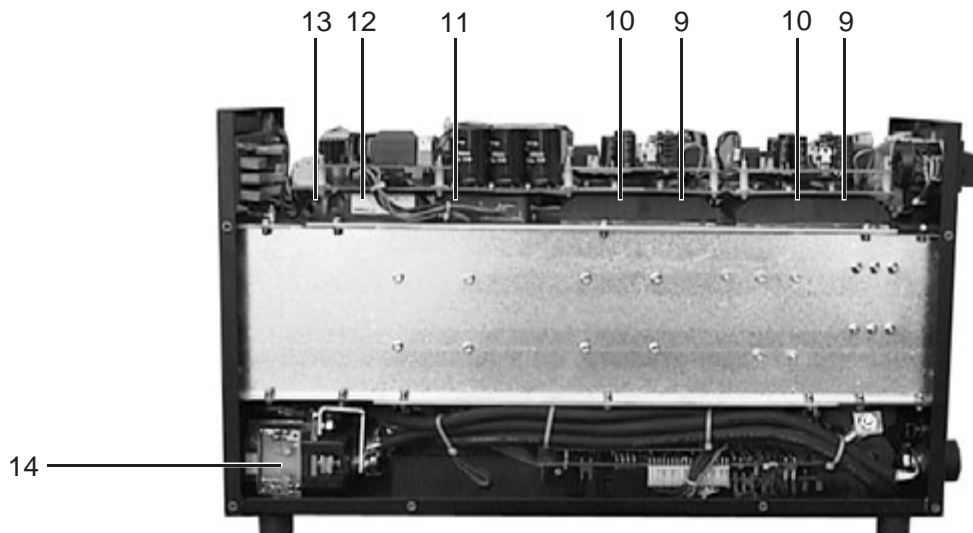


Abb. / picture 8

Pos.	Bezeichnung	Description	STICK 350	STICK 350 PWS
9	Primärschalter Minus (2xbestückt) INV50/1000.6M	Primary switch	080-000294-00000	
10	Primärschalter Plus (2xbestückt) INV50/1000.6P	Primary switch	080-000295-00000	
11	Varistor Schutzbeschaltung für Netzgleichrichter SB460/6	Varistor modules, protective circuit for mains rectifier	072-000292-00000	
12	Thyristor Dioden Modul MTD55-14A	Thyristor diodes module	064-000083-00014	
13	Netzgleichrichter B6 75/16	Mains rectifier	080-000204-00016	
14	Magnetschalter	Magnet switch	-	094-002757-00000

## 9 Accessories

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## 9 Accessories

### 9.1 Remote control

#### 9.1.1 STICK 250 H-2 / 350 CEL / 350 CEL / 350 CEL KLR / 350 CEL PWS

Designation	Description	Item No.
FR30	Electric remote control with holding magnet, 5m	090-008005-00000
FR30	Electric remote control with holding magnet, 10m	090-008005-00010
FRF30	Electric remote control with holding magnet, 5m	090-008057-00000
FRF30	Electric remote control with holding magnet, 10m	090-008057-00010
FR35	Hotstart remote control with holding magnet, 5m	090-008044-00000
FR35	Hotstart remote control with holding magnet, 10m	090-008044-00010
FRA40	Electric remote control display, 0.3m	090-008032-00000
FR 21	Foot-operated electric remote control, 5m	094-000051-00000
FRV 10	Connection cable extension, 10m	092-000005-00001

#### 9.1.2 STICK 350 CEL PWS

Designation	Description	Item No.
FR30PWS	Electric remote control with holding magnet, 5m	090-008039-00000
FR30PWS	Electric remote control with holding magnet, 10m	090-008039-00010
FRF30 PWS	Remote control with holding magnet, 5m	090-008061-00000
FRF30 PWS	Remote control with holding magnet, 10m	090-008061-00010

### 9.2 General accessories

#### 9.2.1 STICK 250 H-2

Description	Item No.
16A CEE plug	094-000712-00000
Workpiece lead, 35mm <sup>2</sup> , 4m, pole binder	092-000008-00000
Electrode holder, 35mm <sup>2</sup> , 4m	092-000052-00000

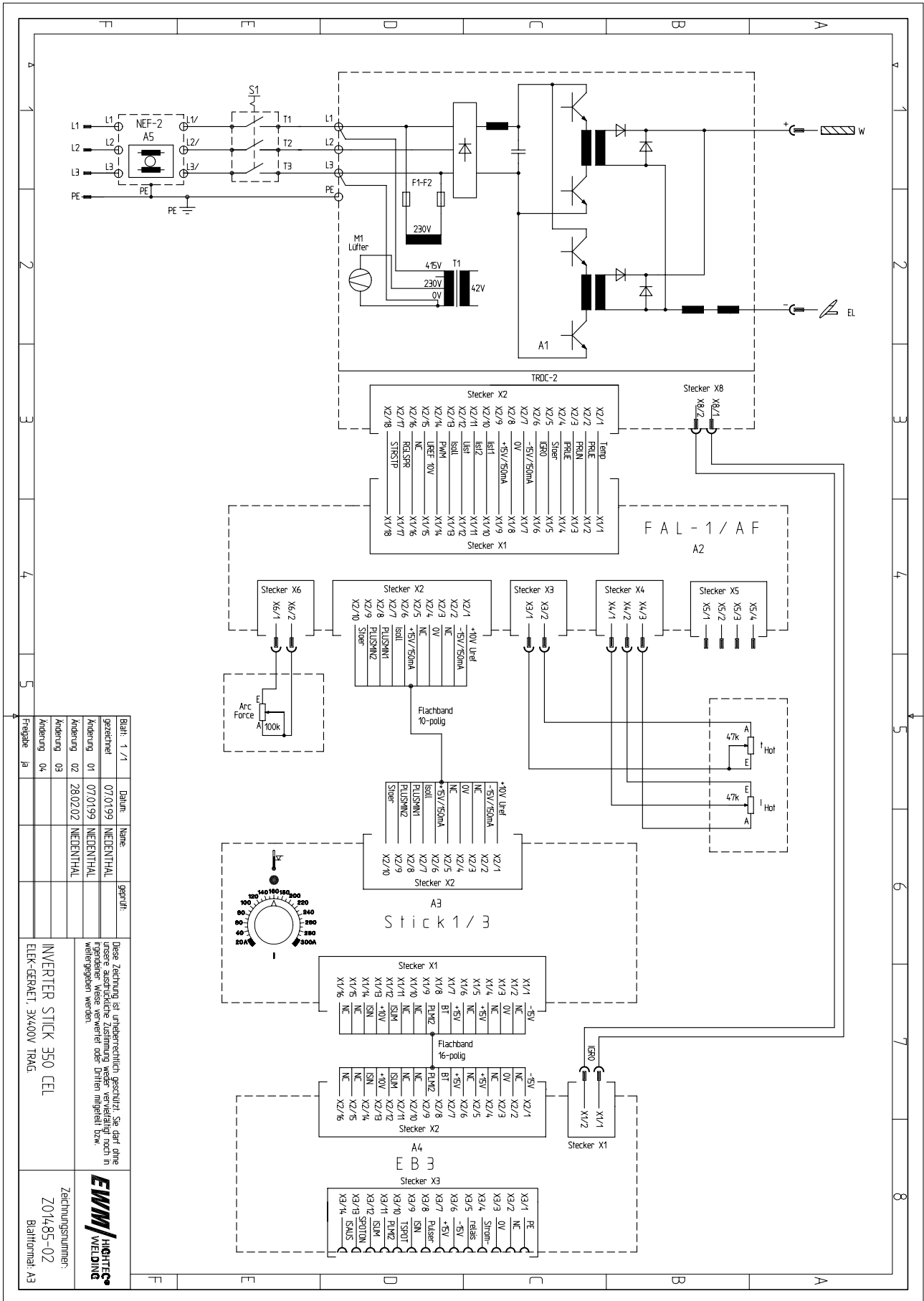
#### 9.2.2 STICK 350 CEL / 350 CEL / 350 CEL KLR / 350 CEL PWS

Description	Item No.
32A CEE plug	094-000207-00000
Workpiece lead, 50mm <sup>2</sup> , 4m, pole binder	092-000003-00000
Electrode holder, 50mm <sup>2</sup> , 4m	092-000004-00000



# 10 Schaltpläne / Circuit Diagrams

## 10.2 STICK 350 CEL



Revizija	Datum	Ime	Opis
01	07.01.199	NEDENTHAL	
02	28.02.02	NEDENTHAL	
03			
04			
Freigegeben	ja		

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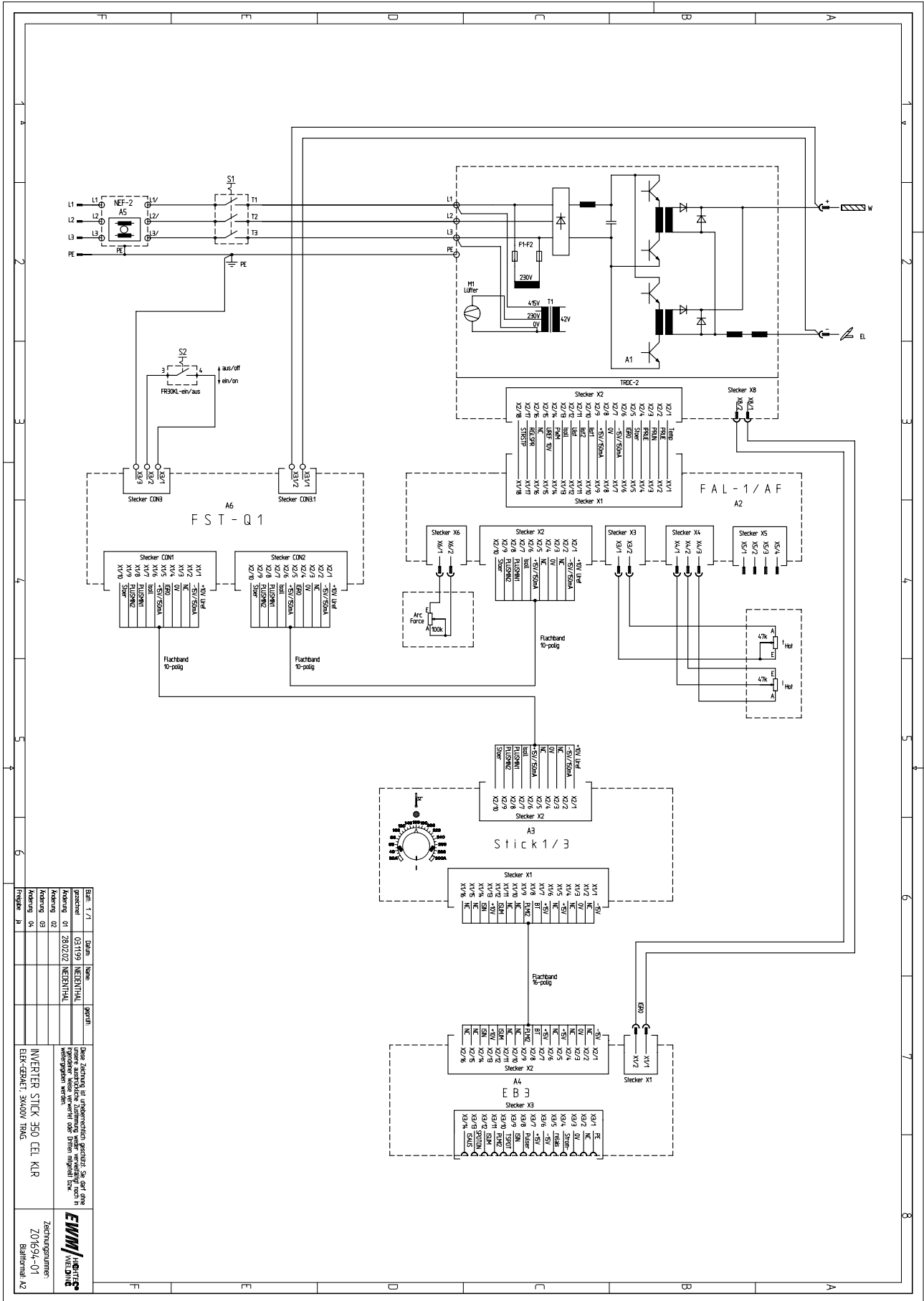
INVERTER STICK 350 CEL  
ELEK-GERÄT, 3x400V TRAG

Zeichnungsnummer:  
**Z01485-02**  
Blattformat: A3

**EWING/HIGHTEC**  
WELDING

# 10 Schaltpläne / Circuit Diagrams

## 10.3 STICK 350 CEL KLR



Blatt 1/1	Blatt	Namen	geprüft
Revision 01	03/11/91	NEBENTHAL	
Revision 02	28/02/92	NEBENTHAL	
Revision 03			
Revision 04			
Revision 05			
Revision 06			
Revision 07			
Revision 08			
Revision 09			
Revision 10			
Revision 11			
Revision 12			

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INVERTER STICK 350 CEL KLR

ELK-GERÄTE, 3X400V TRAG

Zeichnungsnummer: Z0694-01  
Blatttotal: 12

