ELEKTRA BECKUM®

(D) **Betriebsanleitung Plasma-Schneidgeräte**

(GB) **Operating Instructions Plasma Cutting Machines**

(NL) **Gebruiksaanwijzing Plasma-snij-apparaten**

(E) **Instrucciones de servicio Cortadoras Plasma**

600 DP
900 DP
1200 DP
1204 DP

English only

115 111 4780 / D/GB/NL/E / 1697 - 2.4

(D)	**Achtung!**	Lesen Sie diese Anleitung vor der Installation und Inbetriebnahme aufmerksam durch.
(GB)	**Attention!**	Carefully read through these instructions prior to installation and commissioning.
(NL)	**Attentie!**	Lees deze instructies voor de installatie en ingebruikname aandachtig door.
(E)	**Atención!**	Lea atentamente estas instrucciones antes de la instalación y puesta en marcha.

Contents

1 General
2 Safety Precautions
3 Specifications
4 Operation
5 Principle of Plasma Cutting
5.1 Pilot Arc
5.2 Taking the Machine into Operation
6 Consumables
6.1 Replacing Electrodes and Cutting Tips
7 Principal Machine Components
8 Cut Quality Faults
9 Spare Parts Lists
10 Exploded View Drawings
11 Trouble Shooting
12 User Responsibility
13 Wiring Diagrams

1 General

This Plasma Cutting Machine is a quality product made by Elektra Beckum AG. Its standard features are simple operation, advanced electronic safety devices, all-copper windings, thermal overload protection, fan cooling, cooling gas post-flow, automatic checking of the compressed air pressure and last, but not least, a robust housing with a scratch-resistant, electro-static powder-coated finish.
Most economical in operation, the precise and exact cuts, the low heat distortion of the material cut and its manifold applications will soon let the plasma cutting machine become indispensible.
Low-carbon steel, high-carbon steel, stainless steel, copper, aluminium, brass, any kind of metal is cut with ease.
The advanced electronic control of every Elektra Beckum plasma cutting machine provides for a maximum of operator safety. Between the electrode (the torch) and the work a no-load voltage of up to 300V may be present. Since neither the torch nor the work are electrically insulated, an electronic safety device provides for the operator's safety.
Do not operate this plasma cutting machine until you have read and understand the instructions in this manual.
We reserve the right to change design and specifications without prior notice and without obligation to backfit or supply backfit parts or components.

2 Safety Precautions

These safety precautions are for your protection. Failure to observe may result in personal injury.

Contrary to manual arc welding machines a plasma cutting machine operates with a much higher no-load and open-circuit voltage. If the path of current by accident runs through the operator's body, it can cause severe burns or fatal shock. Any voltage in excess of 52 V 20 mA is potentially lethal. Plasma torches typically operate at voltages of up to 300 V.
To protect the operator from electric shock all Elektra Beckum plasma cutting machines are equipped with an electronic safety control, which prevents activation of the cutting current **while the torch is not in contact with the work.**
This safety control also constantly monitors all machine components for correct functioning and immediately cuts off the cutting current in the event of a fault being detected.

Protection against Electrical Shock

- Never touch live metal parts with bare skin or wet clothes.
- Always safety earth the plasma cutting machine.
- Do not use worn or damaged cables. Maintain equipment well.
- When standing on metal or in damp area make certain that you are well insulated.

Personal Protection

- For protection from heat, sparks,rays and electrical shock wear appropiate apparel such as face shield, welder's apron, insulating gloves and shoes.
- Keep everything dry, including clothes, work area and equipment.

Protection from Gases and Toxic Fumes

Plasma cutting may generate toxic and nitrogeneous gases, fumes and nitrogen monoxides.
When cutting galvanized, leaded or lead paint coated metals or material having been treated with halogen, solvents or degreasing agents toxic fumes are generated.

- Work only in well ventilated places.
- When working in confined spaces keep well ventilated. Use of respiratory equipment is recommended.

Eye Protection

The brass crown sufficiently screens off direct ultra-violet rays, so protective eyewear with lenses and side shields shade A6 is sufficient protection. This also applies when cutting with the torch directly on the work. When preparing weld edges and gouging the eyes are directly exposed to ultra-violet rays. For this type of work wearing a welding helmet with lenses shade A9 is strongly recommended.

Fire Prevention

Hot slag or sparks can cause fire when getting in contact with combustible solids, liquids and gases. Fuel, lubricant and solvent containers must not be cut, even when they are empty. The same applies to hollow spaces containing combustible materials.

- Remove all inflammable and combustible material from the work area.

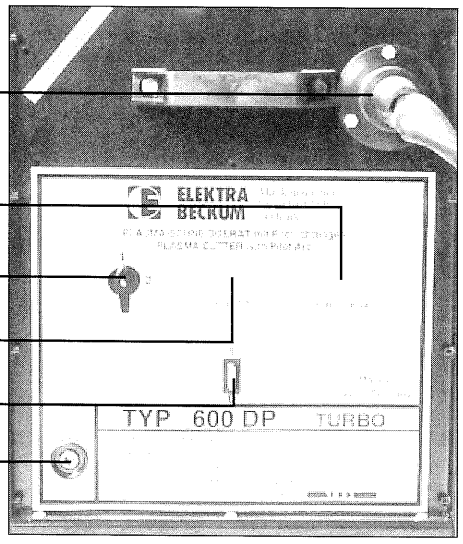
3 Specifications

	600 DP		900 DP		1200 DP	
Mains voltage:	**3~380/415V 50/60 Hz** or 3~230 V 50/60 Hz		**3~380/415V 50/60 Hz** or 3~230 V 50/60 Hz		**3~380/415V 50/60 Hz** or 3~230 V 50/60 Hz	
Input capacity:	380/415 V: 14 kVA 220 V: 14 kVA		380/415 V: 25 kVA 220 V: 25 kVA		380/415 V: 30 kVA 220 V: 30 kVA	
	Step 1	**Step 2**	**Step 1**	**Step 2**	**Step1**	**Step 2**
No-load voltage:	215 V	255 V	195 V	325 V	203 V	307 V
Open circuit voltage:	110 V	95 V	96 V	90 V	110V	88 V
Cutting current:	45 A	60 A	45 A	90 A	60 A	120 A
Current draw:	14 A	21 A	12 A	39 A	16 A	46 A
Duty cycle:	75 %	50 %	75 %	50 %	75 %	50 %
cos phi:	0.67	0.61	0.45	0.45	0.45	0.45
Insulation class:	F		F		F	
Protection class:	IP 21		IP 21		IP 21	
Cooling:	F		F		F	
Mains fuse, time-lag:	20 A		35 A		50 A	
Cut capacity steel:	max. 12 mm		max. 22 mm		max. 35 mm	
Cut capacity aluminium:	max. 8-9 mm		max. 15 mm		max. 25 mm	
Air consumption:	ca. 120 ltr/min		ca. 200 ltr/min		ca. 200 ltr/min	
Air pressure required:	4.5 - 5 bar		4.5 - 5 bar		4.5 - 5 bar	
Water vapor at 20 °C:	max. 30 %		max. 30 %		max. 30 %	
Air oil contents:	max. 0.01 mg/m³		max. 0.01 mg/m³		max. 0.01 mg/m³	
Dimensions lxwxh:	650 x 570 x 370 mm		750 x 800 x 510 mm		750 x 800 x 510 mm	

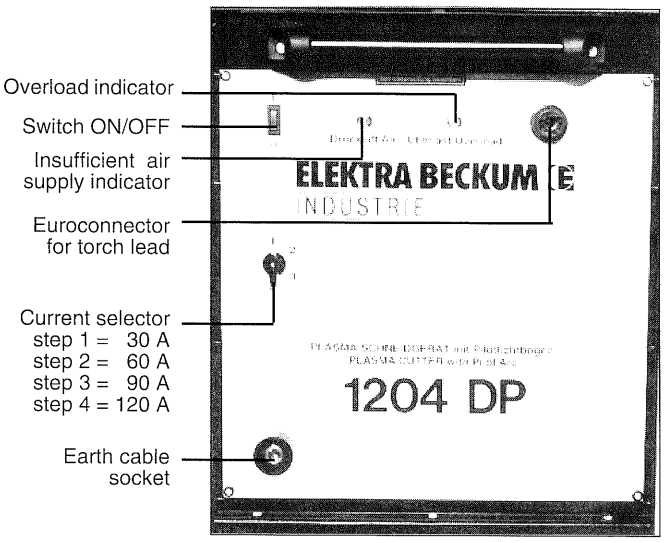
	1204 DP			
Mains voltage:	3~380/415V 50/60Hz or 3~230 V 50/60 Hz			
Input capacity:	380/415 V: 30 kVA 220 V: 30 kVA			
	Step1	**Step 2**	**Step 3**	**Step 4**
No-load voltage:	307 V	307 V	307 V	307 V
Open circuit voltage:	110 V	110 V	95 V	88 V
Cutting current:	30 A	60 A	90 A	120 A
Current draw:	11,5 A	23 A	34,5 A	46 A
Duty cycle:	100 %	100 %	90 %	75 %
cos phi:	0.45			
Insulation class:	F			
Protection class.	IP 21			
Cooling:	F			
Mains fuse, time-lag:	50 A			
Cut capacity steel:	max. 5 mm	max. 12 mm	max. 22 mm	max. 35 mm
Cut capacity aluminium.	max. 3 mm	max. 8-9 mm	max. 15 mm	max. 25 mm
Air consumption:	ca. 220 ltr/min			
Air pressure required:	4.5 - 5 bar			
Water vapor at 20°C:	20 %			
Air oil contents:	max. 0,01 mg/m³			
Dimensions lxwxh:	750 x 800 x 510 mm			

Model 1204 DP offers four different cutting current settings to match the thickness of the material to be cut. This results in considerable power saving when cutting thin plate. The cutting range, from thin plate to a max. of 35 mm material thickness, makes this model the ideal choice for situations where material of different thickness is regularly worked with. All electronic components are specially protected from dust and moisture.

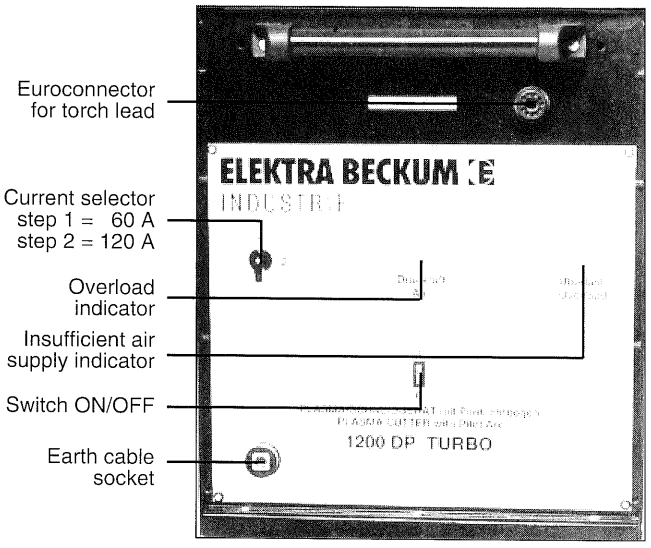
4 Operation



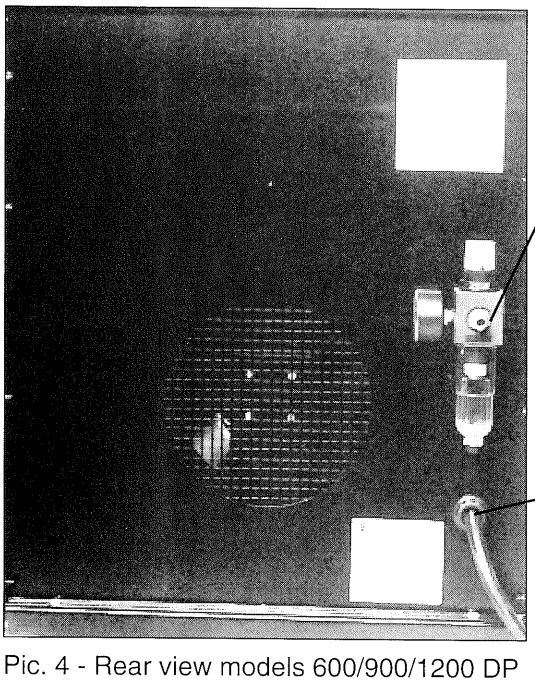
Pic. 1 - Model 600 DP



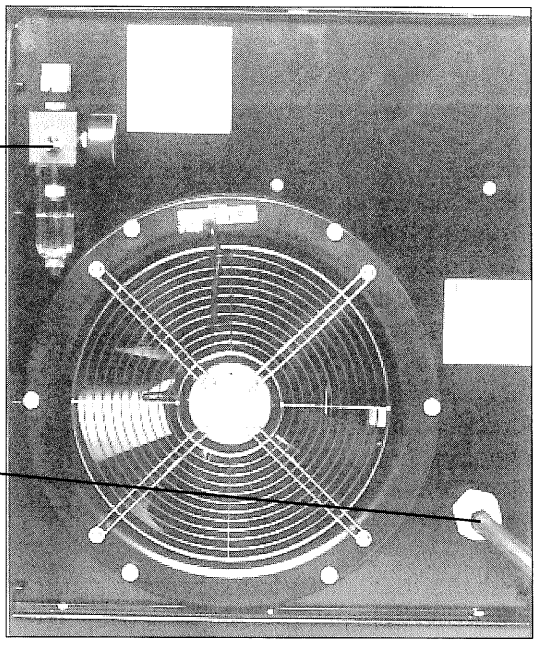
Pic. 2 - Model 1204 DP



Pic. 3 - Model 900 DP/1200 DP



Pic. 4 - Rear view models 600/900/1200 DP



Pic. 5 - Rear view model 1204 DP

5 Principle of Plasma Cutting

Plasma cutting is an arc-cutting process involving the constriction of the arc. This mechanical constriction,by means of the cutting tip with a very small orifice, causes the gas to heat up to extremely high temperatures (up to 25000°C) so that its molecules disintegrate and some of the electrons are split from the atom. This ionizes the gas and it becomes electroconductive, a state which is referred to as plasma. This plasma beam quickly vaporizes metal and its high kinetic energy effectively ejects the melted material from the kerf.

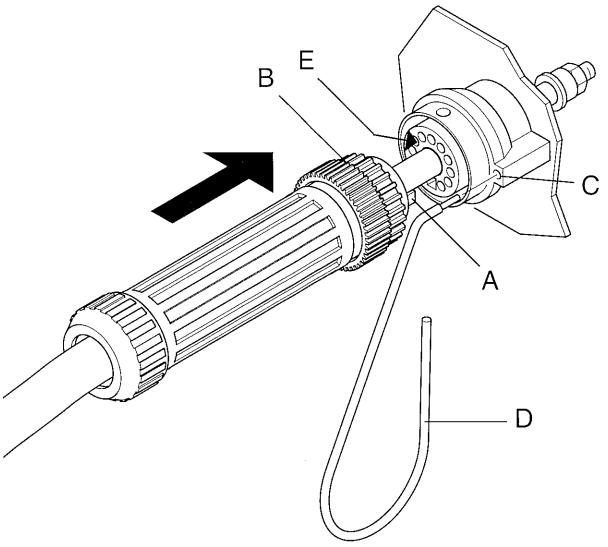
5.1 Pilot Arc

The pilot arc makes cutting painted or coated material simple, without the need to clean the surface for good electrical conduction. The pilot arc is ignited between the torch's electrode and the cutting tip by high frequency. The cooling gas blows the pilot arc from the tip as a needle-shaped flame, which burns through the paint or coating. The main arc can then start between the work and the electrode.

5.2 Taking the Machine into Operation

1. Attach the male connector (torch side) to the female one (machine side). Make sure that the positioning pin (A) aligns with the corresponding notch.
2. In order to fasten the ring (B), disengage the anti-rotation device by pressing it on proper hole (C) with the enclosed tool (D). Fasten the threaded ring (B).
3. Complete tightening the ring at 5 to 8 Nm torque, at which the distance between the parts is approximately 34 mm.

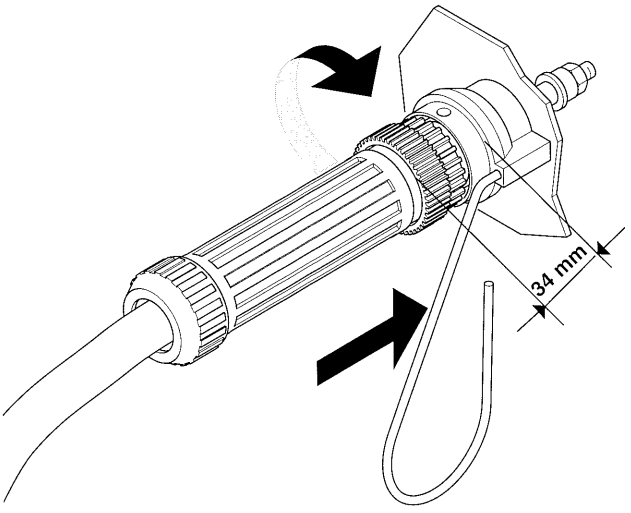
To disconnect torch remove anti-rotation device first by attaching enclosed tool (D) to hole (C).



Troubleshooting:
In case of air leaks, make sure that

- The adaptor is tightened, if not complete operation (steps 1 - 3).
- The o-ring (E) set inside of female adaptor (machine side) is not damaged; if necessary replace it.

The plasma central adaptor is a safety device and should be replaced when damaged.



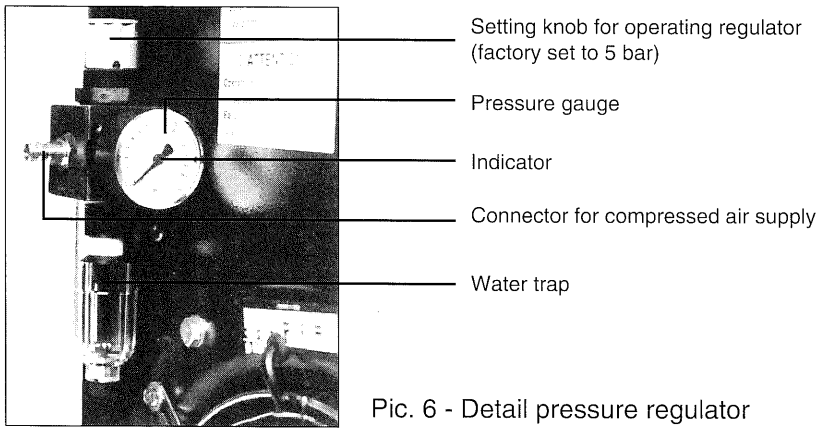
Connect machine to compressed air source and set pressure regulator to 5 bar. It is important to have a constant working pressure of 4.5 - 5 bar. A higher pressure reduces the cutting capacity drastically. **Be sure that the air supplied is dry and free from condensate and oil.** Connect power cable to a properly earthed three-phase outlet.

Important! If a plug of different standard has to be installed see wiring diagram for correct connection of the power cable leads. Machine operates on 3 phases and earth.

Attach earth clamp to work, ensuring good conductance. If necessary remove paint, coating or rust first. Switch machine on and select desired cutting current. Position torch and activate the torch's trigger switch.

Notice! To prevent personal injury and excessive wear of electrode and plasma shroud do not start the pilot arc unless the torch is placed firmly onto the work.

With material of more than 5 mm thickness the arc should be started at the edge of the work, or edge of a hole drilled for that purpose, as the molten material will not be blown through the work when starting the cut, but will splash back against the torch. This would very quickly damage the plasma shroud and electrode.
Select feed rate so that the sparcs are ejected from the kerf in a 15-20° angle of the direction of progression.



Pic. 6 - Detail pressure regulator

6 Consumables

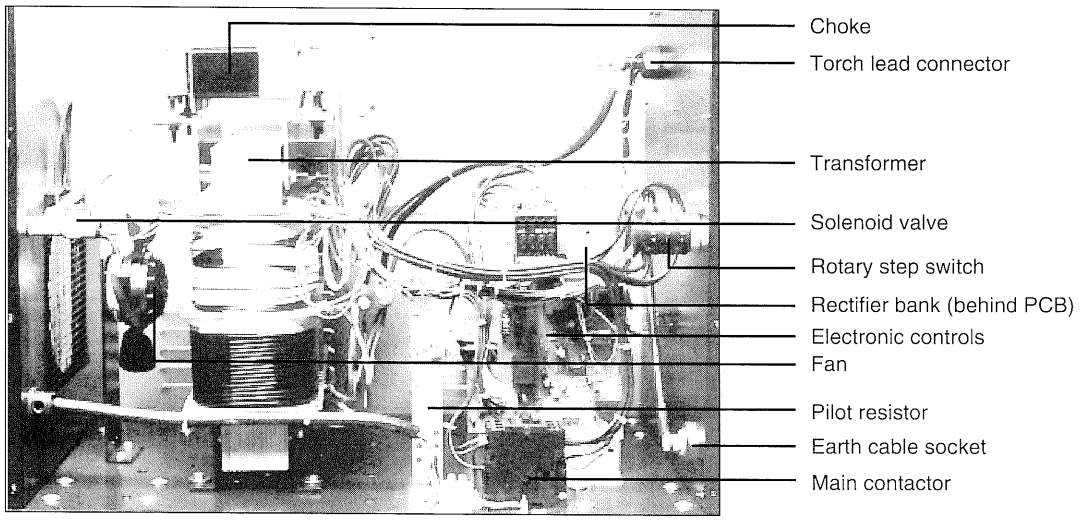
Electrode, cutting tip, shroud and spring guide are directly exposed to the high radiant heat of the arc. They need to be cleaned regularly. Check for erosion of the electrode's tip, which should not be more than 1.0 - 1.5 mm or else the hafnium core may be blown from the electrode, causing a short circuit between electrode and tip. This in turn would ruin the torch body. The tip should be changed if the orifice diameter becomes enlarged or distorted, resulting in poor ignition and cutting capacities.
Blackening of the electrode and tip indicates soiled compressed air. Elektra Beckum does not accept any liability for excessive wear of consumables resulting from the use of soiled air.
Worn electrodes, worn tips as well as damp and oily air significantly reduce the arc starting capabilities.

Important! A broken shrouds presents a danger of severe personal injury. Replace immediately!

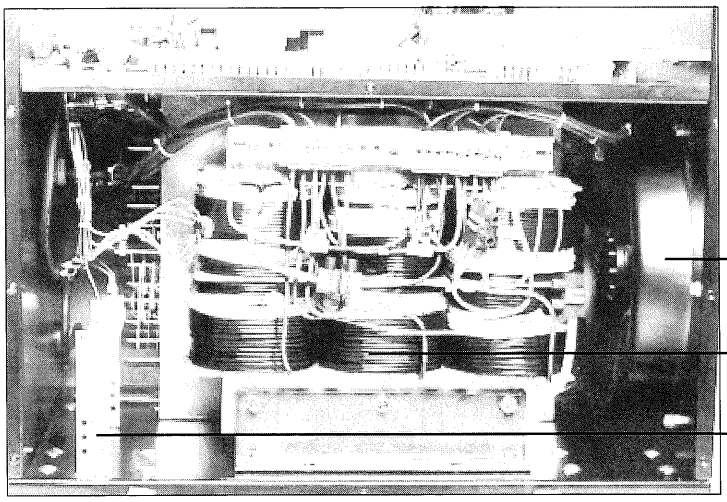
6.1 Replacing Electrodes and Cutting Tips

In order to positively prevent accidents by electric shock, the shroud is fitted with a safety circuit. Only with the shroud correctly fitted to the torch head can the trigger switch circuit be closed
Always disconnect machine from power before servicing! Remove the shroud to deactivate the trigger switch. Replace tip or electrode, as required. Replace shroud, making sure it is correctly fitted as otherwise the trigger switch will not work.

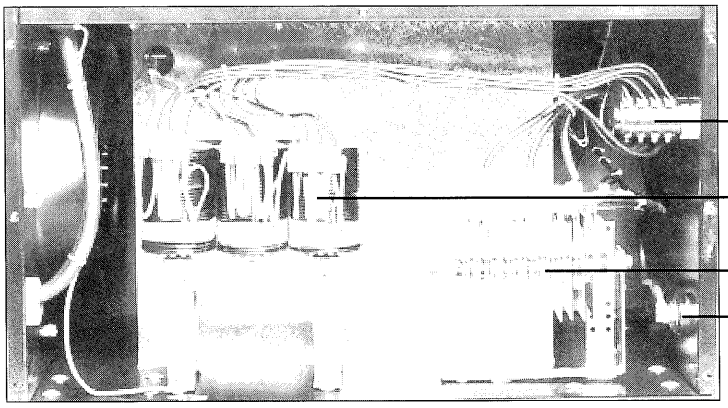
7 Principal Machine Components



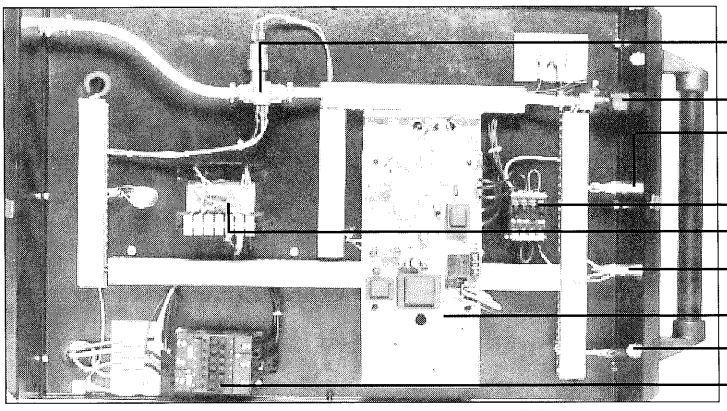
Pic. 7 - Components models 600, 900 and 1200 DP



Pic. 8 - Components Plasma 1204 DP



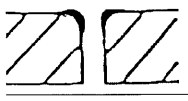
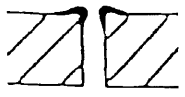
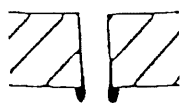
Pic. 9 - Components Plasma 1204 DP

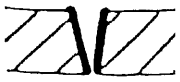
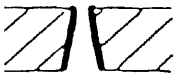
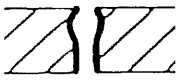
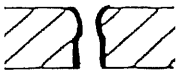


Pic. 10 - Top view of controls Plasma 1204 DP

8 Cut Quality Faults

In addtition to cutting speed, cut quality is of critical importance in plasma cutting. Before attempting a detailed analysis of faults in cut quality, the electrode and plasma tip should be checked for wear. If they are worn, replacement can only improve the cut quality.Other reasons for a poor cut quality and their remedies are listed below.

Fault	Structural Steel	Stainless Steel	Aluminium
	excessive speed & torch distance	as with structural steel	as with structural steel
	excessive torch distance, incorrect plasma gas composition	as with structural steel	as with structural steel
	excessive speed & plasma gas flow	low speed and excessive plasma gas flow	excessive speed & plasma gas flow

Fault	Structural Steel	Stainless Steel	Aluminium
	excessive speed & torch distance, inadequate plasma gas flow	as with structural steel	as with structural steel
	rare	rare	excessive plasma gas flow
	rare	excessive plasma gas flow	inadequate plasma gas flow, low cutting speed
	excessive speed	excessive speed, inadequate plasma gas flow	rare
	electrode tip not centered, plasma tip worn	as with structural steel	as with structural steel

9 Spare Parts Lists

9.1 Plasma Cutting Machines 600 DP, 900 DP, 1200 DP, 1204 DP

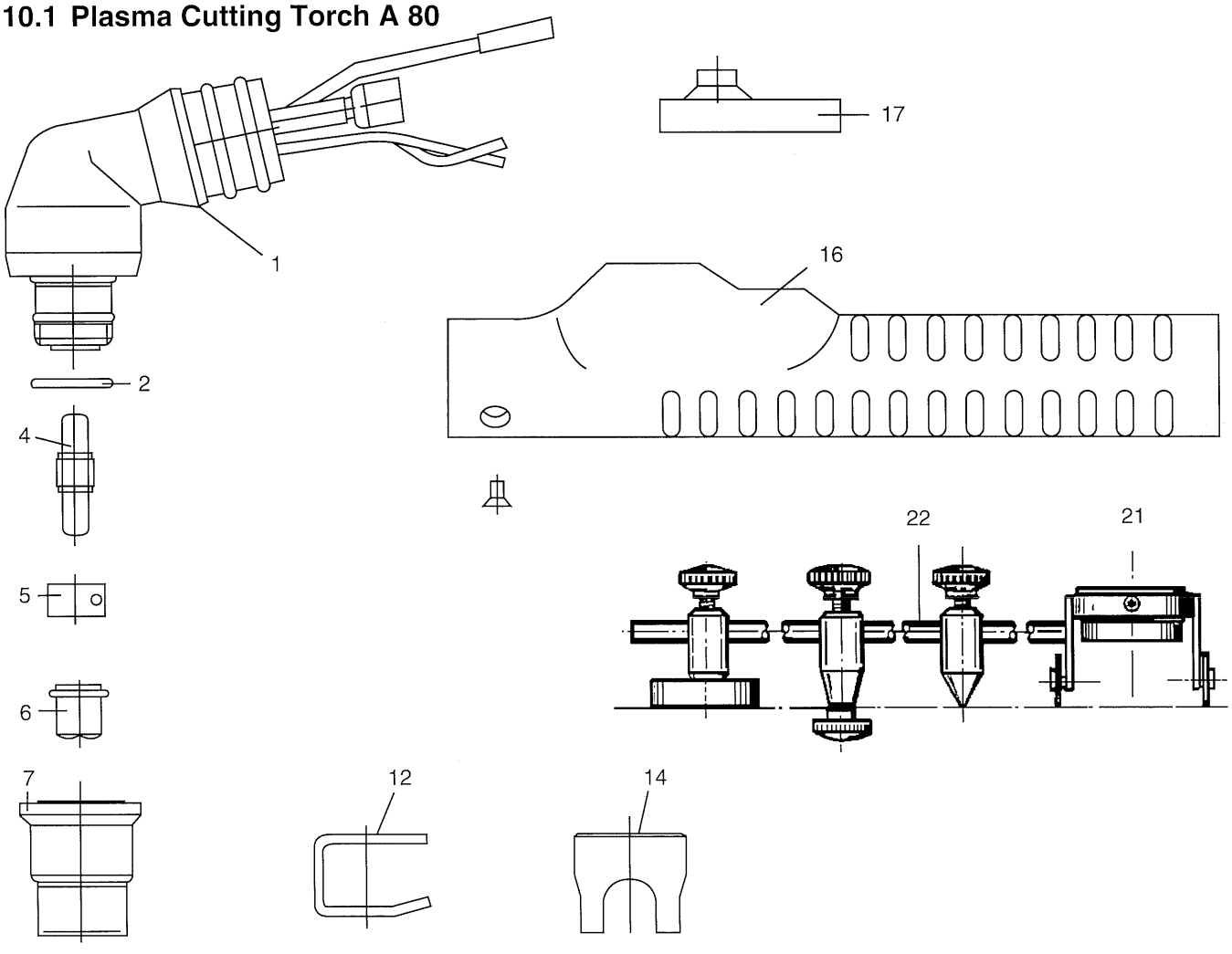
Description	Stock-No.	600 DP	900 DP	1200 DP	1204 DP
Tube resistor 8.2 W - 3.5 W	805 100 9976	x			
Tube resistor 4.7 W	805 110 2941		x	x	x
Printed Circuit Board 900-1204	810 610 2890		x	x	x
Printed Circuit Board 600	810 600 7501	x			
Rectifier bank DB 380/505-110/115	805 308 1160	x			
Rectifier bank DB 380/505-100	805 310 3015		x		
Rectifier bank DB 380/505-200/230	805 310 2906			x	x
Contactor B 16-40-00	810 404 2873	x			
Contactor B 9-40-00	810 403 8140		x	x	x
Contactor B 30-30-00	810 4102884		x	x	
Contactor B 50-30-00	810 4133 429				x
Cable ass'y w/9-pin panel connector 600	845 008 1567	x			
Cable ass'y w/9-pin panel connector 900-1200	845 010 4320		x	x	
Cable ass'y w/9-pin panel connector 1204	845 013 3443				x
Neon control light, yellow	860 112 1000	x	x	x	x
Switch ON/OFF with neon control light	811 105 9692	x	x	x	x
2-step rotary switch	811 508 1250	x			
4-step rotary switch S225 3~ 380 V	811 513 3196				x
4-step rotary switch 3~ 220 V	811 514 6689				x
Selector switch S225 3~ 380 V	811 210 2680		x	x	
Rotary switch A256 3~ 220 V	811 204 8155		x	x	
Insulated panel socket 25 mm^2	821 507 1309	x			
Insulated panel socket 50 mm^2	821 507 1317		x	x	x
Cable plug 25 mm^2	821 503 7887	x			
Cable plug 50 mm^2	821 503 7895		x	x	x
Earth clamp 200 A	090 200 1220	x			
Earth clamp 400 A	090 200 1239		x	x	x
Fan 220 V	804 106 5703	x			
Fan 220/240 V 25 W	804 102 2796		x	x	
Fan	804 113 3237				x
Filter pressure regulator R 1/4", small	782 011 7373	x			
Filter pressure regulator R 1/4", large	782 000 9228		x	x	x
Solenoid valve	805 200 8264	x	x	x	
Solenoid valve	805 213 3662				x
Diaphragm pressure switch R 1/4" preset 4.5 bar	810 100 8844	x	x	x	x
Choke 380/220 V 900-1200	100 213 2296		x	x	
Choke 380/220 V 1204	100 213 3110				x
Pilot transformer	100 200 3364		x	x	x
Plasma torch A 60	090 201 4896	x			
Plasma torch A 90	090 201 1374		x		
Plasma torch A 120	090 201 1382			x	x
Robot torch P 140 (straight type)	090 201 1390			x	x
Welding visor c/w shaded lens	090 200 1255	x			
Welding visor c/w shaded lens	090 200 5528		x	x	x

9.2 Plasma Torches A 80, A 90, A 120, P 140

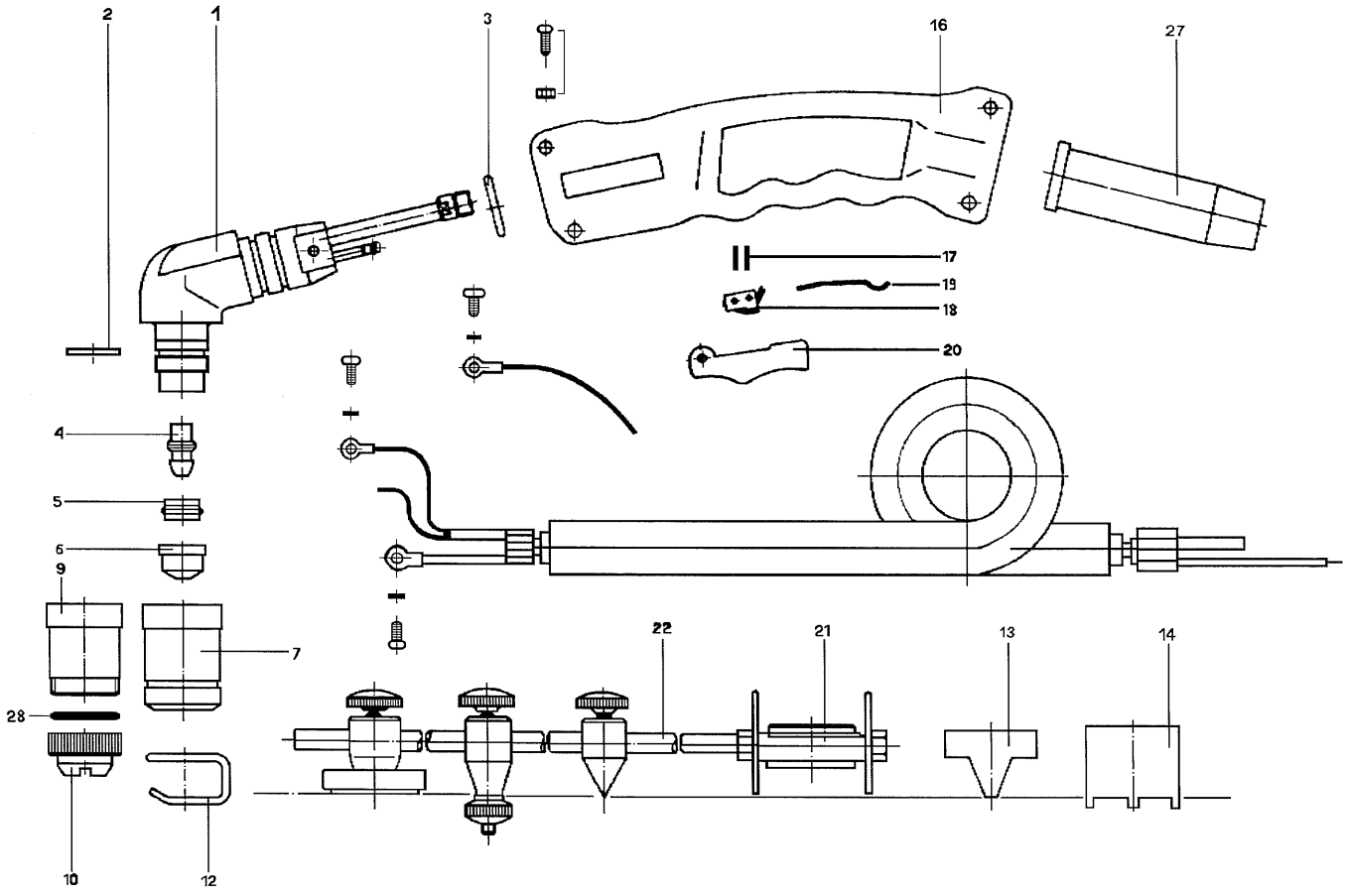
Pos.	Description	600 DP A 80 Stock-No.	900 DP A 90 Stock-No.	1200/1204 DP A 120 Stock.no	1200/1204 DP P 140 Stock.no.
1	Torch body	132 762 4462	132 714 3634	132 714 3642	132 714 3650
2	O-ring	132 718 0807	132 714 3669	132 714 3669	132 714 3669
3	O-ring		132 714 3677	132 714 3677	132 714 3685
4	Plasma electrode	132 718 0785	132 714 3693	132 714 3693	132 714 3693
5	Air regulator ring, brown	132 718 0793	132 714 3707	132 714 3707	312 714 3707
6	Tip Ø 1.0	132 718 0777			
	Tip Ø 1.1 40-60 amp		132 714 3715	132 714 3715	132 714 3715
	Tip Ø 1.4 50-80 amp		132 714 3723	132 714 3723	132 714 3723
	Tip Ø 1.7 70-120 amp		132 714 3731	132 714 3731	132 714 3731
	Tip Ø 1.9 110-140 amp		132 714 3740	132 714 3740	132 714 3740
7	Shroud, standard	132 762 4438	132 714 3758	132 714 3766	132 714 3766
9	Shroud with Insulating ring and contact guide		090 201 6627	090 201 6635	
10	Contact guide		132 714 3790	132 714 3790	
12	Spring guide	132 718 0742	132 714 3804	132 714 3804	
13	Corner guide		090 201 1358	090 201 1358	
14	Brass crown guide	090 201 4993	090 201 1366	090 201 1366	
16	Handle ass'y	132 762 4446	132 714 3839	132 714 3839	132 714 3847
17-20	Trigger switch ass'y	132 762 4454	132 714 3855	132 714 3855	132 714 3855
21	Straight Cutting guide	090 201 4900	090 201 1340	090 201 1340	
22	Circular cutting guide	090 201 4918	090 201 1331	090 201 1331	
27	Torch lead support		132 714 3863	132 714 3863	
	Euro connector (not shown)		132 710 6526	132 710 6526	
28	Insulating ring		132 719 9125	132 719 9125	

10 Exploded View Drawings

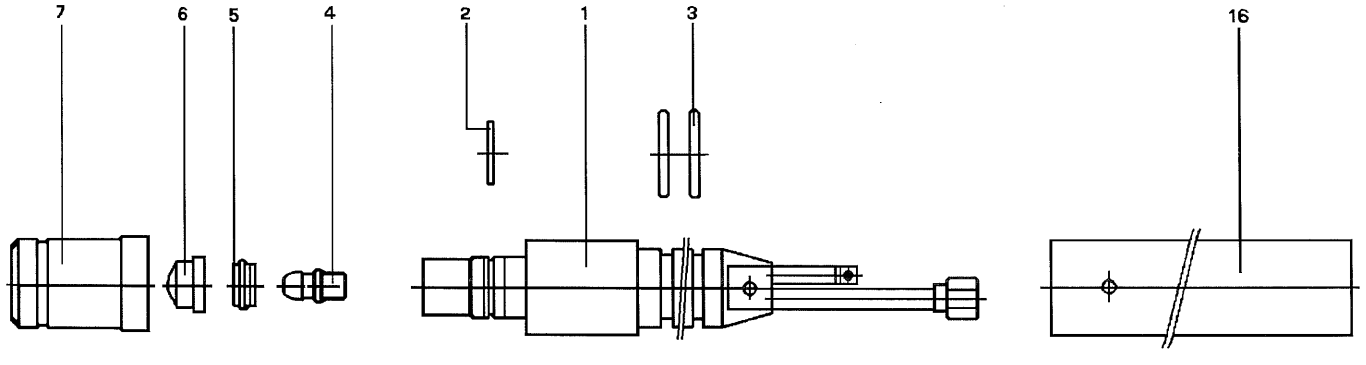
10.1 Plasma Cutting Torch A 80

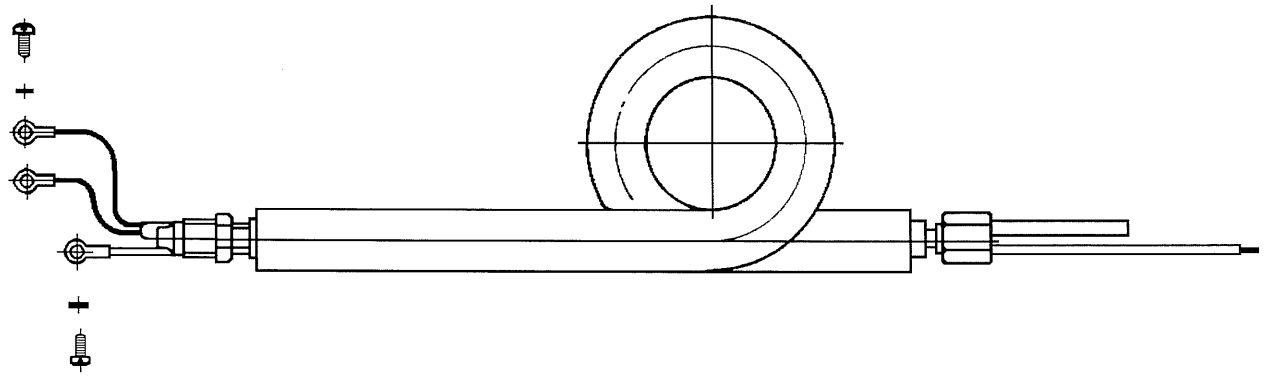


10.2 Plasma Cutting Torch A 90/A 120



10.3 Plasma Cutting Torch P 140





11 Trouble Shooting

Always disconnect machine from power before servicing torch or other parts.
Danger of personal injury from high voltage electrical shock!

Fault	Remedy
Arc does not start	Check compressed air supply. Set pressure regulator at 4.5 - 5 bar. Check power supply for all three phases. If moist and/or oily air has been used, remove plasma tip. Wipe electrode and tip with a clean cloth until dry. **Notice:** Use of moist or oily air increases the danger of short circuits in the torch and voids manufacturer's warranty. Clean/dry air with suitable filters or refrigerated air dryers in the supply line.
No ignition after continuous cutting and following pause	Remove plasma tip, clean electrode and inside of plasma tip.
No ignition when torch is placed onto work	Remove spatters from between shroud and spring guide, clean or replace shroud or sprinf guide, as may be required.
Arc does not start immediately after it has extinguished	Wait for gas post flow to stop (approx. 4 sec.), then start arc. Check tip and electrode for wear, replace if necessary.
Poor cut quality	Check cutting tip orifice and electrode for erosion, replace if necessary.
Constant gas flow from torch	Broken trigger switch or short circuit in trigger switch circuit.

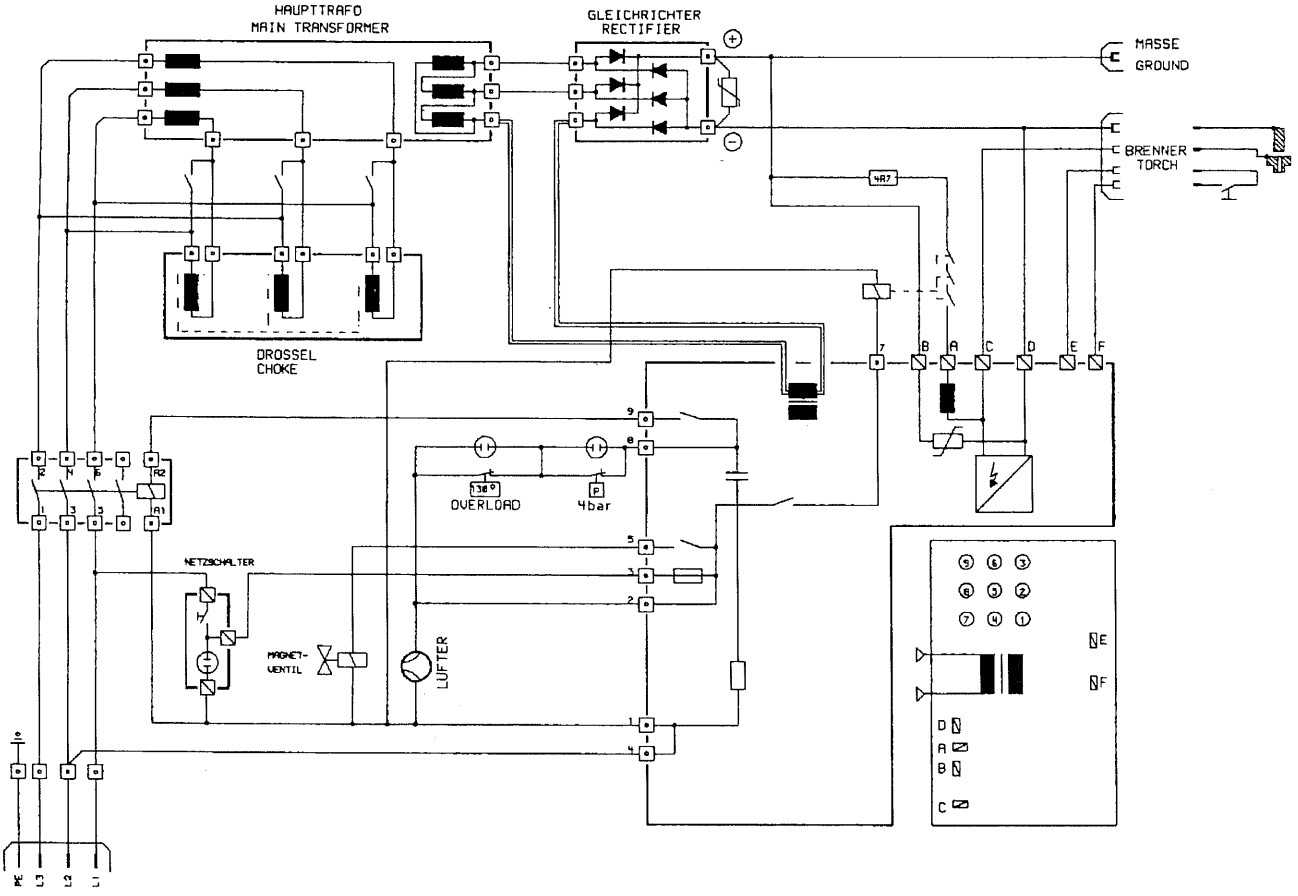
12 User Responsibility

This machine will perform in conformity with the description contained in the instructions provided. This machine must be checked periodically. Defective equipment (including service leads) should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated, should be replaced immediately. Should such repair or replacement become necessary, it is recommended that such repairs are carried out by qualified persons approved by the Elektra Beckum AG or their representatives.

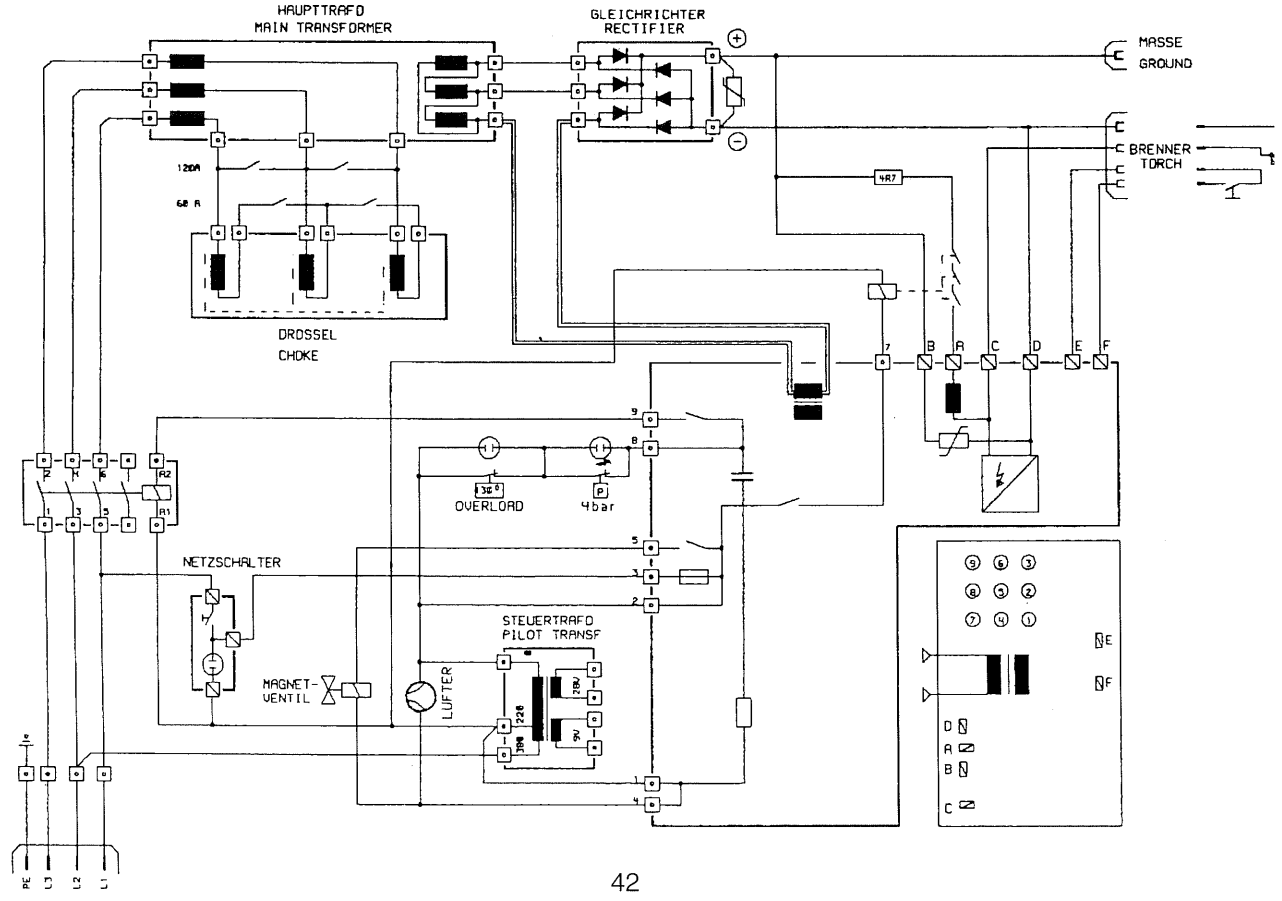
This machine or any of its parts should not be altered or changed from standard specifications. The user of this machine shall have the sole responsibility for any malfunction which results from improper use or unauthorized modification from standard specifications, faulty maintenance, damage or improper repair by anyone other than qualified person approved by Elektra Beckum AG or their representatives.

13 Schaltpläne / Wiring Diagrams / Schakelschema's / Diagramas de circuitos

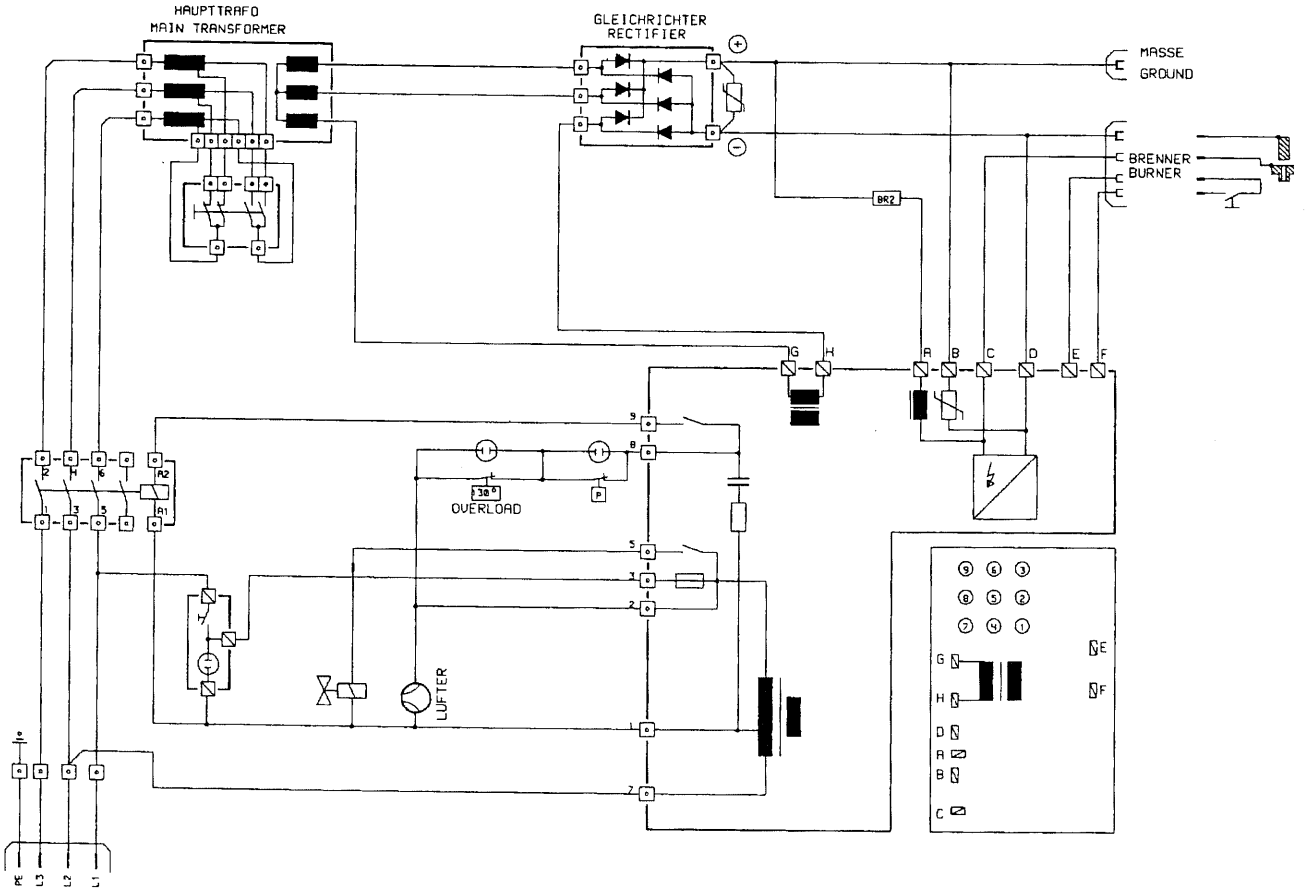
Stromlaufplan Plasma 900/1200 DP mit Drossel 3 x 230 Volt
Stroomloopschema plasma 900/1200 DP met smoorinrichting 3 x 230 volt
Esquema de los circuitos amperimétricos Plasma 900/1200 DP con estrangulador 3 x 230 voltios



Stromlaufplan Plasma 900/1200 DP mit Drossel 3 x 400 Volt
Stroomloopschema plasma 900/1200 DP met smoorinrichting 3 x 400 volt
Esquema de los circuitos amperimétricos Plasma 900/1200 DP con estrangulador 3 x 400 voltios



Stromlaufplan Plasma 600 DP
Stroomloopschema plasma 600 DP
Esquema de los circuitos amperimétricos Plasma 600 DP



Stromlaufplan Plasma 1204 DP - 4 Stufen
Stroomloopschema plasma 1204 DP - 4 standen
Esquema de los circuitos amperimétricos Plasma 1204 DP - 4 etapas