

1. Construction

The machine body is made from grey, the front from transparent PVC. A removable intermediate bottom plate divides the machine's interior into the spray room and the liquid sump.

There are two full cone nozzles mounted diagonally in the spray room. Their position and spray angle allow to have a shadow free etching of the hole usable surface.

The machine's cover can be removed. It carries the board holder. To the rear left there is the timer panel mounted like a head on top of the machine. The magnetic coupled liquid pump is sitting at the back of the etching compartment.

Splash:

The rinsing chamber is located to the right of the machine body. The taps for the etching liquid and the rinse water are located under their corresponding tanks and can be easily accessed.

Splash Centre: To the right side of the machine there are several vertical tanks of approx. 10 litres content each. The first tank from the left is the first static rinse, to be used after etching. Next comes a combined static and spray rinse tank. This contains two horizontal spray bars that are activated by a foot pedal and a solenoid valve. This rinse tank has a bottom outlet and an adjustable overflow outlet. It is used after swtching as well as after developing, see below. The spray rinse should be active just when the board is pulled out from the tank.

The third tank may serve for developing presensitized PCB material or for stripping negative laminated boards. A small pump recirculates the liquid permanently as long as the main switch is on. (Attention, this pump must not run dry!) This tank is equipped with a board lift device, an L shaped PVC part with a handle hole. The meaning is that you may pull the PCB out of the caustic liquid without contact to your hands. The suction hole for the pump is covered by a filter disk.

The last tank is free for example to put in a chemical tinning system. If not in use, still please fill in water.

The drain valves for the etchant and for the other tanks are located underneath each of them. In the rinse tanks there are small pieces of PVC tubes. These serve to retain any muddy residues from the outlets. If you want to empty the tanks entirely, just pull these pieces of tube out of the openings.

The Splash Centre comes with a standard safety tray that is dimensioned in a way that in case of an accident, it can take up the entire liquid from all the tanks.

2. Operation

The control panel is covered and dirt protected by a transparent lid. The lid's handle is also an actuator for the timer start/stop button.

2.1 Mains

The illuminated switch in the upper left corner of the panel activates the main supply for the pump and the heater.

2.2 Heater

The illuminated switch in the lower right corner of the panel controls the heater circuit. A thermostat is mounted to the machine. It keeps the etching liquid's temperature with an accuracy of better than 2 °C. When the pre-set temperature of 45 °C is reached, the lamp in the control switch turns off. Additionally, a non-reversible over heat fuse protects the machine.

2.3 Timer

The timer has four control elements: The display A, the button B to the right of the display, the button C, labelled Start/Stop and the turn knob D. The button C can be actuated also by the transparent lid's handle.

2.3.1 Time of the day

Press the B button and hold. Turn the D knob to set the time of the day.

2.3.2 Etching time

Turn the D knob to select the desired etching time. The range is from 1 second to 99 minutes in different step widths. The selected time will appear on the display A.

2.3.3 Start, stop, repeat

The etching process starts as soon as a time was set and the C button is pressed. The remaining time is continually monitored on the display A. Etching is interrupted by either a) pressing the C button or b) by lifting the board holder. In both cases, you can press the C button to continue.

After the pre-set etching time, the display A turns off and the pump motor stops. A buzzer sounds up for several short times, thus indicating completion. The last set time is redisplayed by pressing the C button once again. Use the D knob to readjust and press the C once more to restart. The cover protection switch immediately interrupts the etching process as soon as the board holder is being lift.

2.4 Feeding

The machine can take at a time either 1 board of 210 x 300 mm or 3 boards of 100 x 160 mm. The left side of the board holder is fixed to the machine's cover. This pivot allows to either put the board holder in it's horizontal operation position or to put it vertically for feeding/discharging boards. We have chosen this principle to allow that the liquid can easily drop off from the boards (saving rinse water) and that the dropped of liquid immediately returns into the machine.

The board holder has two bars mounted on titanium pins. They can be adjusted in height and thus allow adaptation to different board sizes.

The upper (or, when set vertically, the left) bar carries three clamps. These allow to mount the boards to the holder without necessity to slide the entire bars for and back. To feed a board, proceed as follows: Keep the board with your right hand, insert it into the clamp(s), keep it there with your left hand and make it snap into the right bar's PVC teeth. To dismount, proceed in reverse order.

The Splash Centre has in front of the tanks, on the surrounding frame, two small pieces of dark grey PVC. These provide a stand for the board holder, so you have both hands free for placing the PCBs in the holder.

2.5.1 Rinsing - Splash

After retracting the boards from the holder, immerse them into the rinsing tank and move them slightly for and back. On the upper right of the rinsing tank, there is a slotted bar. Put the rinsed boards there to allow them to drip off. We recommend that you wear thin latex gloves when handling the boards. There is space to put the gloves on the frontal or the right side of the rinsing tank's surrounding.

2.5.2 Rinsing - Splash Centre

The machine provides multiple rinse technique. The first tank is a static rinse that accepts most of the metal salts sitting on the board after etching. The next tank is a combined static and spray rinse. Here you immerse the board into the rinse water, then you press the foot switch and while pulling the PCB upwards, the spray rinse gives it a final cleaning. What you get is a triple rinse in two tanks. This allows to reach the minimum requirements for environmentally safe rinse techniques: Each rinse step dilutes the remaining copper concentration by a factor of 10, so the water going through the overflow is purified by a factor of 1000.

2.6 Drying - Splash Centre

Run the boards through the two tissue rollers on the right of the unit by turning the handle. (The drying result will be better after the tissues have already wetted)

3. Etching liquid

The machine is suitable for all common known etching liquids, but for technical and ecological reasons, we strongly recommend that you use ferric or copper chloride. The use of sodium- or ammonium persulfate cannot be recommended. Due to their little performance and capacity, these chemicals would violate the environmental protection regulations of many European countries.

When using regenerating etchants, care must be taken that no chemical reaction produces over heat. For the same reason, fresh liquid should be prepared outside of the machine. This applies specially for diluting sublimed ferric chloride in water!

4. Filling

Slightly lift the PVC border which surrounds the cover and take it off. You may then remove the entire cover, together with the board holder. (In order to also dismount the intermediate bottom plate, the nozzle tubes can be pulled off vertically.) Pour the liquid into the machine. The sump takes about 24 litres. The liquid level should just reach the intermediate bottom plate. After the first fill-up, there will most certainly remain air inside the pump. This must be removed. To do so, lift the machine on its front end for about 10 cm and operate the pump for about 10 seconds. If necessary, repeat for two or three times.

5. Cleaning

A valve tap is mounted below the tank. This is used to remove the etching liquid from the machine. Remove the cover as described above in order to access the inner of the machine. This will make it easy to manually remove residues from the sump. If you use ferric chloride, the following hint will help you to change the liquid without any necessity for manual cleaning: With increasing saturation, ferric chloride changes its colour from a transparent to a "milky" green-brown. This indicates that there are copper salts which tend to fall out and form residues. To avoid this, add hydrochloric acid (about 15% conc.) in portions of 0.5 l until the liquid takes a "clear" aspect. This "refresh" operation should be done only once per each filling. So be prepared to change the liquid within short.

ATTENTION: Never add hydrochloric acid to fresh ferric chloride! Else, chloride vapour might exhaust. To remove spots of ferric chloride from clothes and other, we offer RX3, a special and very efficient "stain remover" chemical.

6. Maintenance

Except for the above mentioned cleaning operation, no special maintenance is required for this machine. If the spray nozzles were removed, they must be readjusted by turning them left or right until the spray area exactly centres the board holder.

The liquid temperature is factory set to 45 °C. If necessary, it can be changed. Remove the electric compartment's cover on the lower left of the machine to access the thermostat.

7. Set up

1. Check the machine for any possible transport damage and, if necessary, immediately inform your transport agent and us.
2. Carry the machine to its location by lifting it on two opposite sides of the support feet.
3. If the floor is not even and straight, level out the machine so that it stands safe.
4. Check that the tap valves are all shut.
5. Fill the machine with water until the intermediate bottom plate is just covered.
6. Connect the machine to the power supply. (Be sure that all necessary protection devices are active.)
7. Turn on the main and the heater switch and check that they are both lit. The heating element will take an orange colour when operational.
8. Put the board holder in its horizontal position, set the timer to 10 seconds and proceed as mentioned above to remove air from the pump. Important: The pump must not run dry for more than some seconds.
9. Check the lid protection switch by slightly lifting the board holder.
10. Turn the machine off, allow to cool down and replace the water with ready set up etching liquid. The machine is now ready for use.

8. Safety

The machine is built from parts which are safety proof according to common electric standards. Nevertheless, it is the user's responsibility to take all safety precautions when working with the machine. We also recommend that you periodically check the function of the lid protection switch. All handling of etching liquid requires that you wear the common known protectives like gloves etc.

With respect to the corrosivity of etching liquids, an exhaustion for the surrounding air should be installed near to the top of the machine.

Important: The timer has a built-in self test feature. This is activated by pressing the start button for several short times. The self test also turns on the pump for some seconds, but does not respect the lid switch. For this reason, the self test must not be invoked!

9. Environment

Prior to operating the machine, be informed on all applying environmental protection legislation of your country. Used etching liquid contains copper and must be treated as special waste. In most countries, this applies also for the rinse water. We recommend that you collect dirty rinse water and use it to set up fresh etching liquid. In accordance to anti pollution laws, the final cleaning of the boards normally requires a cascade rinsing unit, or further wet process steps, like chem. tinning or resist stripping, as a first substitute. Any attempt to neutralize the etchant or the rinse water is NOT recommendable to other than approved chemists.

10. Warranty

We warrant the machine to be free of defects in material and workmanship under normal use according to this manual for a period of 12 months from the day of purchase. Defective parts will, at our choice, be repaired or replaced. Old parts must be returned to us. If defective parts cannot be exchanged at the customer's location, the machine must be returned to us for repair, shipment prepaid.

All parts subjected to wear and the heater element are excluded from this warranty. Any direct or indirect damage resulting from over-heat or from chemical reaction shall void all warranty claims. This applies also to defects caused by non-observance of this manual.

We do not warrant that the functionality of the machine will meet the customer's requirements or that the operation of the machine will to this regard be error free.

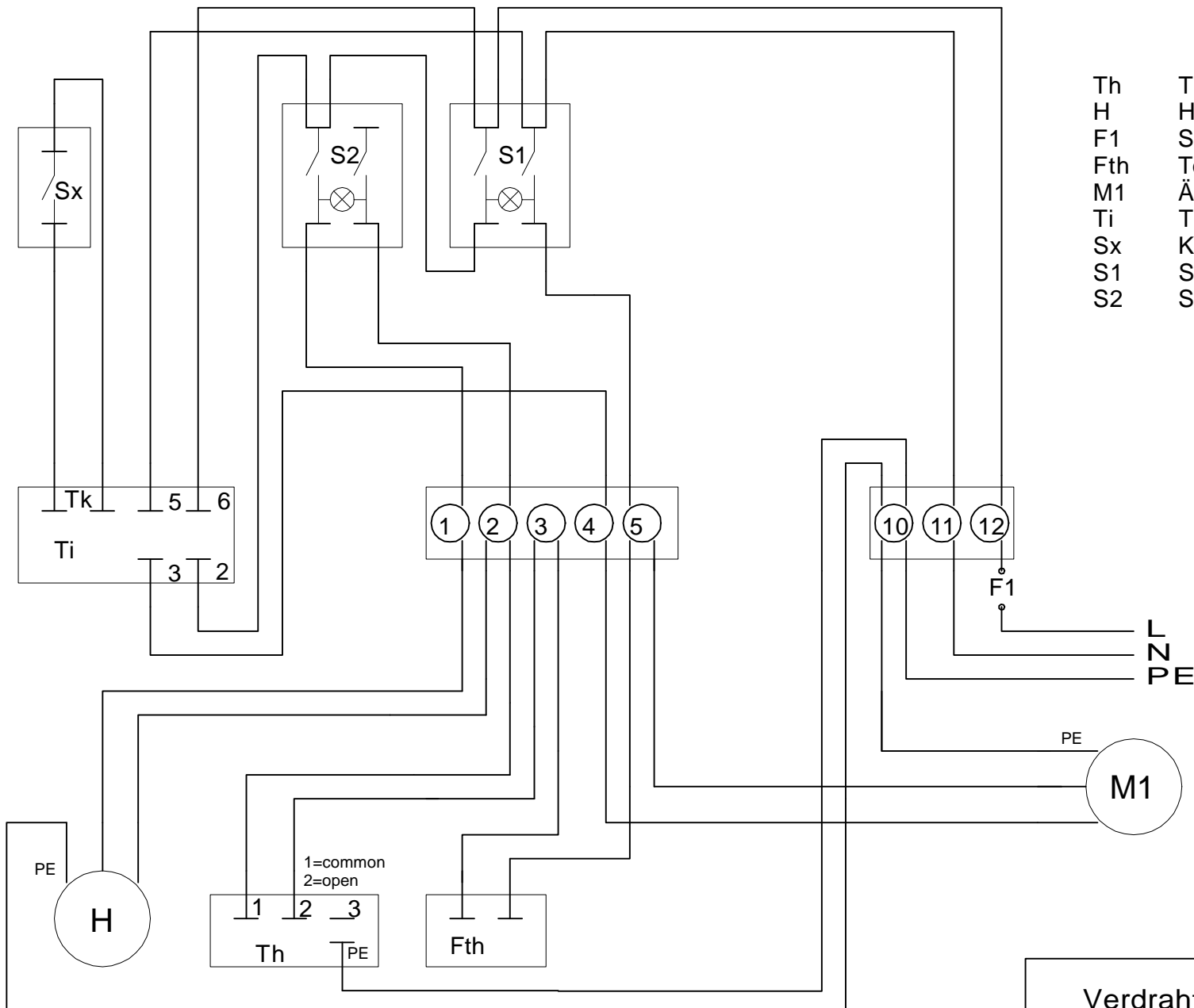
In no event will we be liable to the customer for any incidental, consequential, or indirect damages of any kind, including loss of profit and prosecution for environmental pollution, even if we could have been aware of the possibility of such damages.

11. Technical Data

H x W x D	approx. 120 x 66 x 60 cm (Splash), 120 x 100 x 67 cm (Splash Centre)
Weight	approx. 30 kg (Splash), 46 kg + 25 kg (Splash Centre + tray)
Filling	Etchant 24 l, rinse- / treatment tanks approx. 10 l
Power supply	230 V 50 Hz 1500 W
Materials	PVC, Titanium, PP, Viton

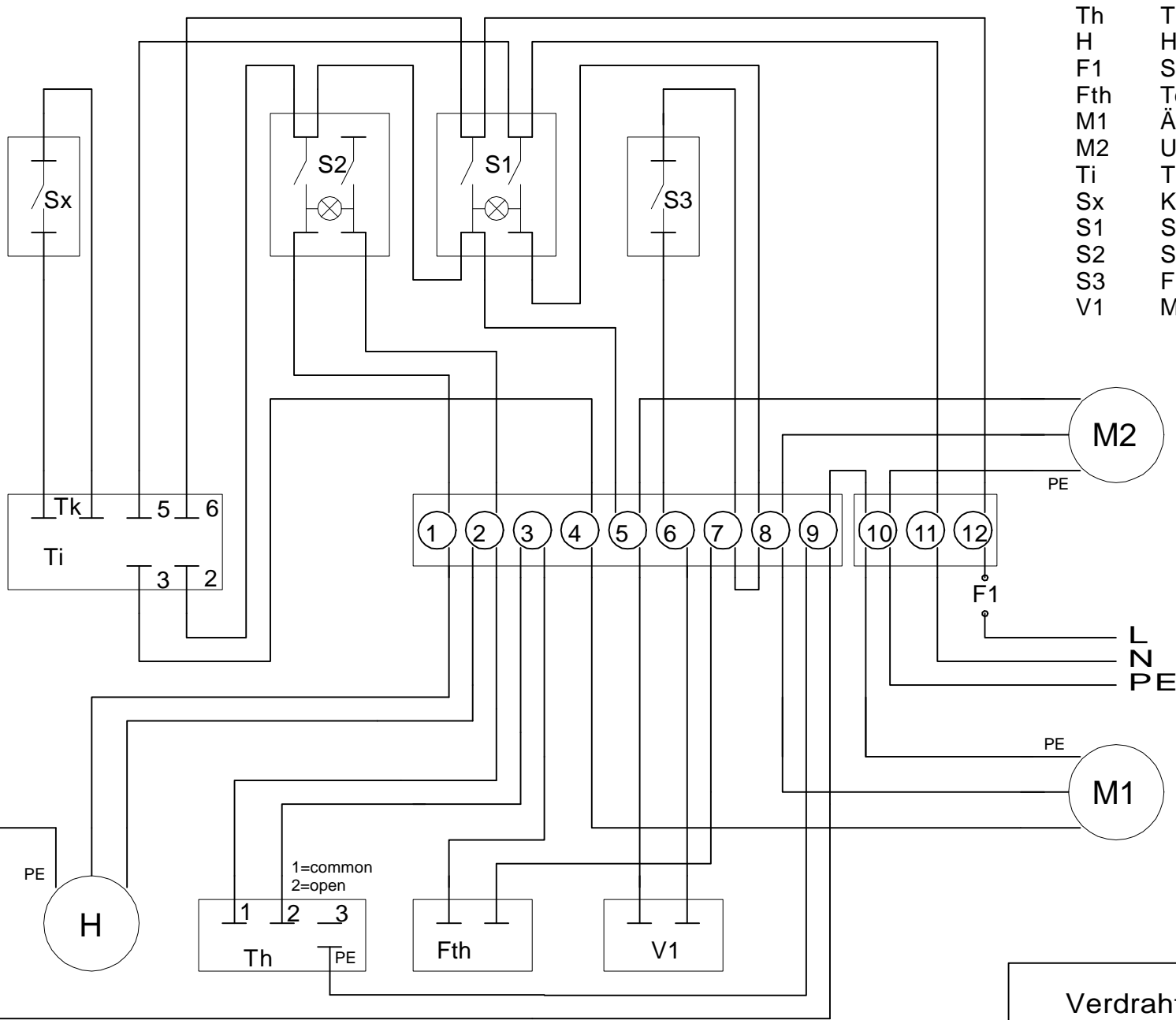
Technical modifications reserved without prior announcement.

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- Th Thermostat
- H Heizung - Heater
- F1 Sicherung - Fuse
- Fth Temp. Sicherung - Thermal fuse
- M1 Ätzmittelpumpe - Etching pump
- Ti Timer
- Sx Klappenschalter - Lid switch
- S1 Schalter Netz - Mains switch
- S2 Schalter Heizung - Heater switch

Verdrahtungsplan - Wiring diagram
 Splash 09/2002 ->
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- Th Thermostat
- H Heizung - Heater
- F1 Sicherung - Fuse
- Fth Temp. Sicherung - Thermal fuse
- M1 Ätzmittelpumpe - Etching pump
- M2 Umwälzpumpe - Flow pump
- Ti Timer
- Sx Klappenschalter - Lid switch
- S1 Schalter Netz - Mains switch
- S2 Schalter Heizung - Heater switch
- S3 Fußschalter - Foot switch
- V1 Magnetventil - Solenoid valve

Verdrahtungsplan - Wiring diagram
 Splash Center 09/2002 ->
 (c) Bungard Elektronik 09/2002

Security Information

With respect to the European Community Edict 89/392/EEG (Machines) the following information is given as a supplement to the manual of the following machines:

HA 205, JET 34d, SPLASH and DL500

0. Application

The machines are manufactured by Bungard Elektronik, Rilke Straße 1, 51570 Windeck, Germany and are brought into circulation in European countries via local distributors or agents.

The machines are determined for chemical / physical treatment of printed circuit boards. For this purpose, each machine is filled with an aqueous solution of one of the following chemicals: Sodium Carbonate, Sodium Hydroxide, Ferric Chloride. Any other type of application is permissive only with our consent.

The machines are not determined to be connected or combined with other machines. They may be used only in suitable locations and by qualified operators. Children and animals must be kept off!

1. Electrical security

The switch labelled NETZ or I/O cuts the machines from mains supply. The main circuit must be equipped with fuses and RCD protectors as required.

The machines do not have a protective device against incidental restart after power failure, because to our knowledge this does not produce risks to the operator.

The liquids used in the machines are mostly conductive. Each contact between liquid and parts under tension will seriously impair electrical safety! In any such case the machine must be immediately disconnected from mains supply and qualified remedy must be taken.

2. Protection against contact

As a protection against contact with liquids being propelled out of the machine, there is a security switch mounted to the lid / cover. This switch acts on the timer to stop the pump. **DL 500:** Security switch cuts the pump circuit directly.

WARNING: When handling chemical liquids, either during normal operation or during service, you must wear protective glasses, gloves and shirts. In case of danger a breath mask may be required. It is necessary to periodically and with great care check that the lid protection is operational. Special care must also be taken when filling or emptying the machine.

The location where the machine is mounted must be straight and even. In general, it will be necessary that the machine is put in a security tub or that the floor has a coating. All material must be resistant to the chemicals being used.

3. Noise emission

The A-rated noise pressure level of the machines is less than 70 db(A).

4. Vapour emission

Due to the fact that there is liquid with a nominal temperature of 45 °C being pulverized in the machines, there are aerosols or vapours leaving the machine when the lid / cover is opened (i. e. to feed the machine). **DL 500:** An air exhaust connection is mounted to the rinsing compartment at the rear of the machine. **Others:** In prevention, an air exhaust should be installed near to the lid to suck the surrounding air. It is not permissive to extract air directly from the machine. Refer to security data sheets or other information to determine the maximum permissible concentration at the workplace for the chemicals under use.

5. Other security information

The instructions for use of the machines contain other relevant security details.

5. Documentation

Our distributor / reseller in your country is encouraged and in charge of translating the German and / or English manual coming with the machine into your native language.

EG-Konformitätserklärung
Declaration of conformity
Déclaration de conformité

Wir (Name des Anbieters)
We (Suppliers Name)
Nous (Nom du Fournisseur) Bungard Elektronik

Anschrift
Address
Adresse Rilke Straße 1
D-51570 Windeck

erklären in alleiniger Verantwortung, daß die Produkte
declare under sole responsibility, that the products
déclarons sous notre seule responsabilité, que les produits

Bezeichnung / Typ
Name / type
Nom / type

Entwicklergerät HA 205
Belichtungsgerät HELLAS
Ätzmaschinen JET 34d, DL500
Ätzmaschine Splash, Splash Center
Laminator RLM 419p, RLM 426p
Rollverzinner RT 12R
Bürstmaschine RBM 300, 400, 402
Multilayerpresse RMP210
Tauchbeschichter RDC 10, 12
Bohr- und Fräsmaschine BUNGARD CCD
Durchkontaktierungsanlage COMPACTA
Abwasserreinigungsanlage IONEX

mit den Anforderungen der Normen
fullfil the requirements of the standards
satisfont aus exigences des normes

EN 50 081-1, EN 50082-1
EN 55014, EN 55015
EN 60204 Teil / Part 1

und den wesentl. Schutzzielen der
and the basic requirements of
et des exigences de base de la

Richtl. / Directive 89/392 Anh. / App. I

übereinstimmen und damit den Bestimmungen der folgenden EG-Richtlinien entsprechen:
and therefore correspond to the regulations of the folowing EU-Directives:
et, ainsi, correspondent aux règlements des Directives du Conseil:

89/336/EWG, 89/392/EWG, 73/23/EWG



Dietmar Bungard

Windeck, 01.04.96

Ort und Datum der Ausstellung
Place and Date of Issue
Lieu et date d'établissement

Name und Unterschrift des Befugten
Name and signature of authorized person
Nom et signature de la personne autorisée

Diese Erklärung entspricht EN 45 014
This declaration corresponds to EN 45 014
Cette déclaration correspond à EN 45 014