

Installation

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Hygiene instructions

To guarantee healthy and agreeable working conditions, both for persons working on the spark erosion machines and for persons working in the same premises, some elementary rules of hygiene relative to this machining process must be respected.

Operators, foremen and even heads of enterprises must respect the rules described below.

Charmilles Technologies disclaims all responsibility if these rules are not respected.

- Metal particles.
- Various products arising from additive breakdown.

The following directions must be followed:

- Inhalation of smoke due to machining must be avoided under all circumstances.
- The smoke sensor must be connected to a sufficiently powerful vacuum system, (200 m³/h) providing a suction rate, measured in the machining area, of more than 1 m/s; also, the mobil protection must be in a low position.

Comment

A control device is fitted to the smoke sensor; if suction power is not sufficient, it is impossible to start machining.

- Renewal of the air in the premises must be guaranteed; the reason for this is to avoid the creation of a dangerous noxious atmosphere, without omitting the air volume vented by the smoke clearing system, which must be replaced.

Dielectric

- Gloves must be worn to avoid prolonged contact of the skin with the dielectric.
- You must wash your hands after they have been in contact with the dielectric.
- The eyes must be protected against splashes of dielectric.
- Do not swallow the dielectric.

Elimination of waste

In no case must waste resulting from EDM machining of metals be discharged to the sewers or dumped with household refuse or on unauthorized tips.

By waste is understood used dielectric, machining sludge, used filter cartridges, etc.

For elimination and storage of such waste, we recommend that you contact the appropriate local authorities to find out about the regulations in force and how they can be applied in your works.

Smoke

The emanations from the dielectric are essentially gases and fumes arising from the thermal decomposition of the oil during electrical discharge machining. They are of various kinds and include:

- Solid or vapour phase polycyclic aromatic hydrocarbons.
- Aromatic and paraffinic hydrocarbons.
- Oil mists.

Safety instructions

To ensure optimum safety conditions, both for personnel and the equipment, the safety regulations described below must be respected.

These rules concern risk of electrocution, explosion, fire and pollution.

These apply to the use of the machine, the behavior of personnel, and the premises equipment.

Premises

- The premises in which a spark erosion machine, using a dielectric whose flash point is lower than 100°C, operates, is considered as a fire hazard.

Therefore, the electrical installation in the premises must meet the requirements of the safety standards in force.

For West Germany, standart VDE 0100 T 720.

Positioning

The emergency stop button is mounted on the generator. The operator must be able to reach it without having to move too far.

That is why the machine-generator distances indicated on the installation layout drawing must be complied with. (See drawing page 1.9)

Connection of generator to electrical mains

- For electrical mains with isolated neutral, a differential circuit-breaker must be incorporated into the generator connection circuit.

Machine

- The cooling system must operate permanently in order to prevent overheating of the dielectric fluid.
- Two safety thermostats control the dielectric temperature in the work tank; if the temperature becomes too high, these thermostats stop machining operations. One of thermostats is fixed, and corresponds to a temperature of 38°C. The other is adjustable, and is works adjusted for 40°C.
- The presence of flames and naked lights are prohibited within a radius of 5 meters around the machine. Also, smoking is prohibited.
- A halon fire extinguisher must be at hand in the immediate proximity of the machine.
- For unsupervised machining, a halon fire extinguishing installation must be provided.
- **Machining without supervision is not recommended.**

Dielectric

- **The user of dielectrics having a flash point of less than 57°C is prohibited.**
- The dielectric used on spark erosion machines must be identifiable by its designation, and its flash point must be known. (See table page 2.16)

The following information must be stated on a notice board placed on the front of the work tank:

- dielectric type
- dielectric flash point
- dermatological risks
- safety instructions.

- Before starting the dielectric pump, make sure that the filler valve and the work tank door are closed.
The door closing system must be locked.
- When machining, it is mandatory that the part be covered by a minimum of 40 mm of dielectric fluid, but the electrode holder must not be immersed in the fluid.
- If the dielectric fluid overflows, it must not be allowed to seep into the floor nor be drained off.
- Gasses produced by machining must not be allowed to become trapped in the hollow parts of the work-piece or electrode (risk of explosion).
- To avoid direct contact with the powered electrode, lower the movable protection device (risk of electrocution).

Utilisation

- The machine must only be used by a qualified person; this person will have been acquainted with safety and hygiene problems during annual training sessions.

Maintenance

- When working inside the generator cabinet or on the electrical parts of the machine, the master switch must be "tripped out" and locked by means of a combination lock.

Modifications

- Any modification made to the equipment without the intervention or authorization of Charmilles Technologies is the customer's sole responsibility.
In such cases, Charmilles Technologies disclaims all responsibility.

Safety

Technical Data Sheet

Machine

Max. distances between table surface and:

- C20 spindle nose
- ITS spindle nose
- P100 spindle nose
- 3R spindle nose
- Isolated interface

Z axis slide travel

Maximum weight of electrodes

Dimensions (height x length x width)

Weight

Frame type

Permissible relative humidity

Sound emitted by the machine :

- Maximum continuous level at the work station (equivalent to the weighted acoustic pressure A)

ISOCUT

without	with
365 mm	350 mm
350 mm	335 mm
390 mm	375 mm
360 mm	345 mm
430 mm	—
250 mm	250 mm
25 kg	10 kg
2080 x 1000 x 960 mm	
780 kg	
Stabilized iron in C form	

Leq = 70 dB(A)

Table and machining tank

Table dimensions (length x width)

Travels: lengthwise X
crosswise Y

Vernier resolution

Work-piece maximum weight

Tee attaching slot:

- number
- dimensions
- Spacing between slots

Machining tank effective dimensions (height x length x width)

Dielectric max/min level

Machining tank front opening

400 x 300 mm
300 mm
250 mm
2 µm
200 kg
3
12 mm
100 mm
180 x 600 x 400 mm
220/90 mm
610 mm

Dielectric unit

Capacity

Filtering system

Filler pump flow rate

Dimensions (height x length x width)

Empty weight

200 l. (180 kg)
4 FRAM cartridge filter
40 l/min
530 x 975 x 750 mm
122 kg

Generator, Control Cabinet

Generator type

Machining current

Discharge times (A)

Interval time (B)

Anti-arc protection (programmable)

Dimensions (height x length x width)

Weight

Isopulse
25 A (option: 50A)
0.8 µs to 3200 µs
0.8 µs to 1600 µs
Standard
1107 x 560 x 560 mm
144 kg

Power Supplies

Voltages

Number of phases and frequency (optional)

Cos PHI

Maximum electrical power required by generator

200 - 208 - 380 V
3, 50 (60) Hz
0,87
32 A 3 kVA
64 A 5 kVA
≥ 6 l/min/< 15°C
5 - 6 bars

Water: flow rate/temperature

Compressed air (for ITS tools)

For the enlarged worktank option, see the "Options" chapter

Technical Data Sheet

Sitting of the equipment

Floor

The floor must be flat, horizontal and capable of supporting the weight of the equipment (the weight of each item of equipment is given in the technical data sheet).

Vibrations must not be applied to the machine from the floor. If a source of heavy vibration is located near the machine, we recommend that another location be chosen. If this is not possible, we recommend that the machine is to be installed on an independent slab, isolated from that producing the vibrations.

The machine frame rests on 3 anti-vibration pads, which are efficient for slight vibration.

To compensate for floor flatness faults, adjust the 4 adjustable pads on the tank (see Installation).

Location

It is difficult, without knowing the room where the machine would be installed to specify the best emplacement.

We shall limit ourselves to stating some hazards to be avoided:

- Avoid throughfares.
- Avoid crowded premises.
- Avoid the direct effect of sunlight through windows and glazing.
- Avoid sources of heat.
- Avoid drafts, in particular natural or forced ventilation openings, through which a seasonable variable air temperature may be received.

Atmosphere

The air must be clean and dustfree.

- Avoid premises in which the air is charged with abrasive particles (grinding machine shops, etc.)
- Avoid premises in which the atmosphere can contain aggressive and corrosive chemical product vapors (chemical laboratory, surface treatment shops, etc.).
- Avoid damp saturated atmospheres.
- Ambient air temperature: 30°C maximum.

Preference should be given to an air conditioned and quiet premises in which the operator and machine can work under best conditions.

Electrical Mains

Provide a three-phase electrical connection with earthing connection. (See "Putting into service - Connection to mains").

Water Mains

Provide a cold water supply and a drain connection.

Flow rate ≥ 6 l/min
Temperature $< 15^{\circ}\text{C}$

**Choice
of Premises**

Power required for 32 A generator	3 kVA
Power required for 64 A generator	5 kVA
Possible three-phase mains	200 - 208 - 380 V
* Permissible variations	+ 10% - 15%
Permissible "microbreaks"	5 ms

*** Note**

The machine performances are guaranteed for a mains voltage variation of ± 5% only.

Evacuation of smoke

Smoke resulting from machining must be vented from the premises. Therefore, a clearing installation must be provided, one end of which is to be connected to the machine smoke sensor, and the other to an air vent.

Suction rate: 200 m³/h minimum
Connecting tube: I.D. 80 mm

This installation must provide a smoke suction rate at the base of the sensor of the order of 1 m/s.

Air Main

If the machine is equipped with an ITS type tool-holder, a compressed air input is required.

Pressure 5 - 6 bars

Recommendations

The arrangement of the various items forming the system must be such that the operator can easily gain access to the machine work area and the generator control panel.

Moreover, to facilitate servicing, it is recommended to allow free passage around the machine, and in front of and behind the generator.

**Choice
of Premises**

Packing + Transport

Packing

The equipment is packed in a single package. The machine and its tank, the generator and various accessory packages are attached to a wooden pallet which forms the base of the package.

Depending on the destination or the method of transport used, this pallet will either be covered by a tarpaulin or with a crate.

The overall dimensions are:

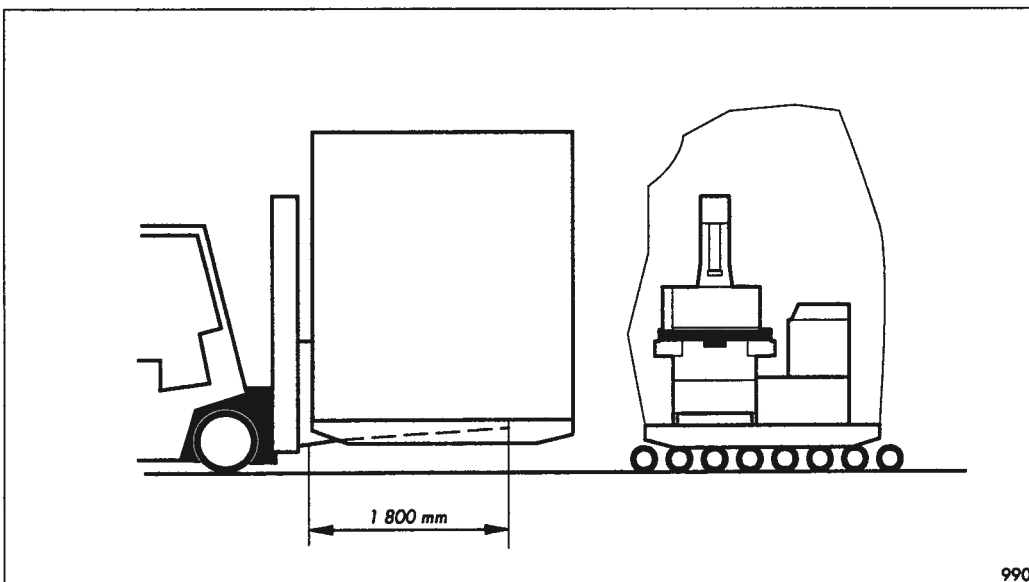
	Tarpaulin-covered package	Crated package
Length (mm)	2,164	2,164
Width (mm)	1,708	1,708
Height (mm)	1,840	2,317
Weight (kg)	1,115	1,315

Transport

The crate or tarpaulin-covered pallet is to be loaded using:

- A block and tackle
- A forklift, with a minimum range of 1 800 mm, so that the crate remains stable.

Transportation of the crate to the location in which the machine is to be installed is to be made using a motor-powered or manual forklift, using rollers if necessary.



**Packing
+ Transport**

Unpacking

Unpacking consists of removing the equipment from the wooden pallet on which it was transported.

If the packing consists of a crate, first of all remove the top part of the crate, then the sides.

Conversely, if the packing consists solely of a wooden pallet, remove the protective covering from the equipment.

Then, check the shock detector located behind the machine pillar; if this is red, stop unpacking and contact your CHARMILLES TECHNOLOGIES agent.

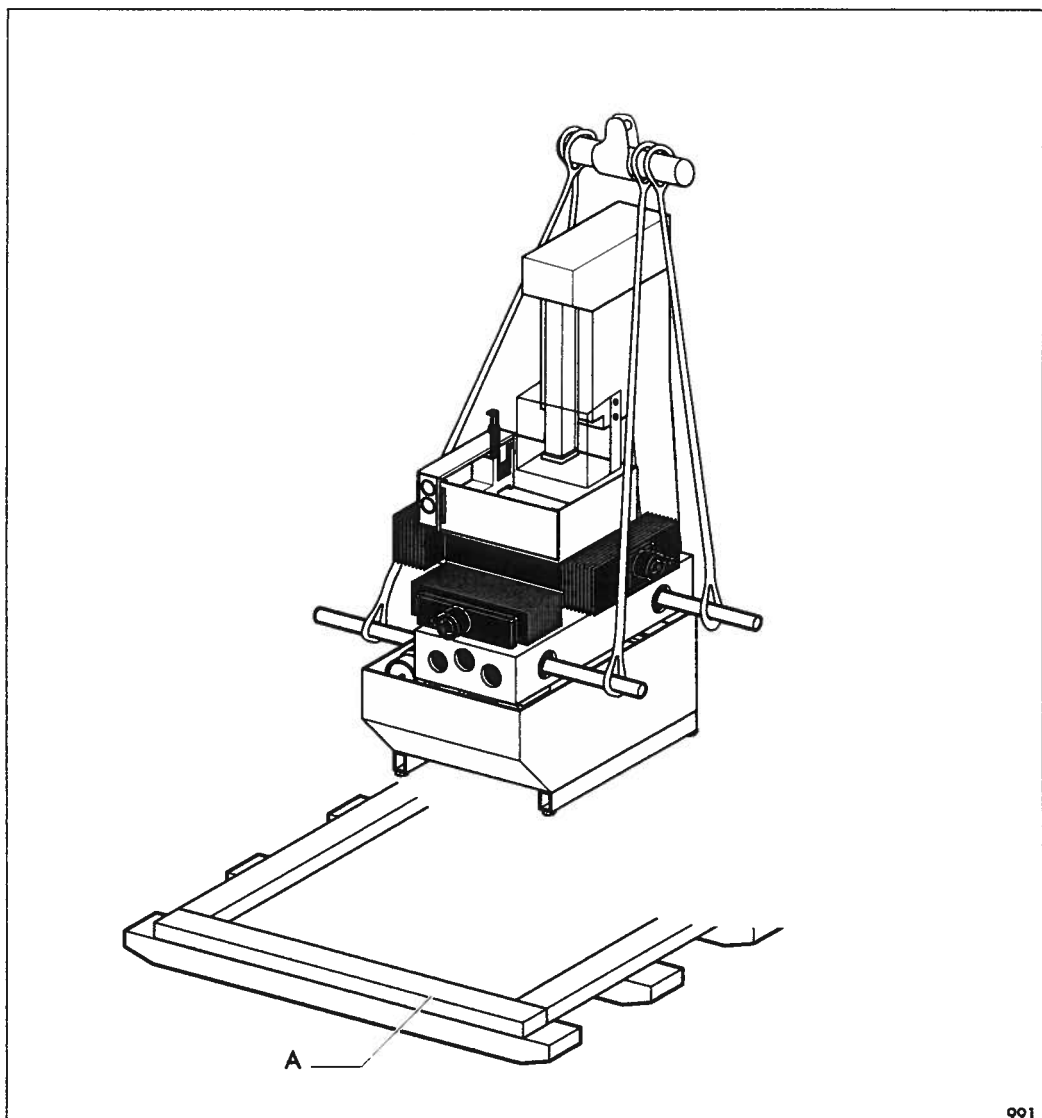
Next, remove the various packages; then the generator, using the bar fixing it on the pallet.

To remove the machine + tank assembly, there are several possible methods:

- remove wooden bar "A" (see drawing) or identical bar at the back of the machine, thus providing passage for the forklift fork under the tank.
- using the block and tackle, which is attached to the bars fixing the tank on the pallet.
- using the block and tackle attached to the bars, which have been previously run through the framework holes, as shown on the drawing below.

To obtain access to the frame, it is necessary to remove the tank side cover panels.

The drawings represent the machine equipped with the standard worktank.



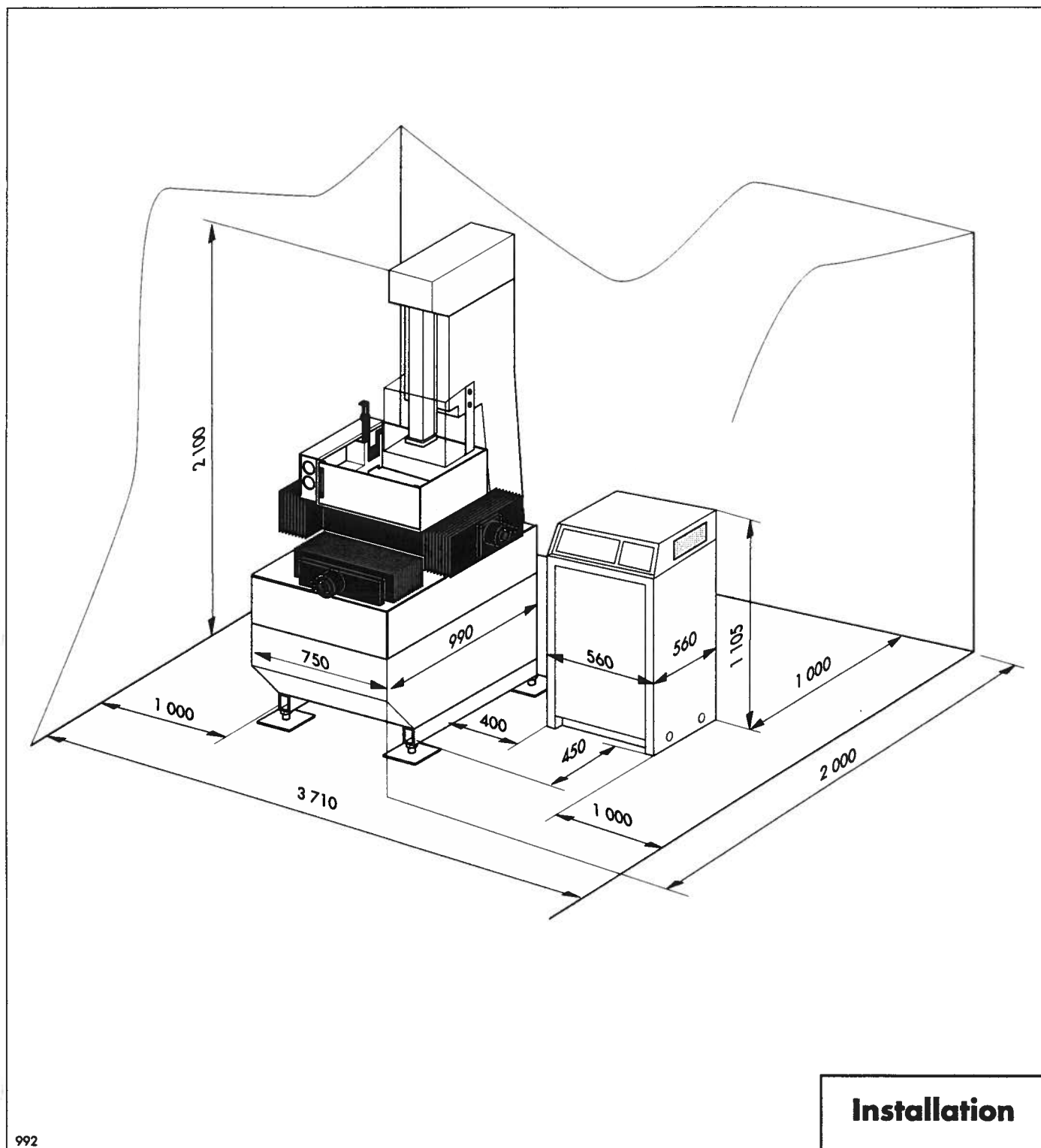
**Packing
+ Transport**

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Installation

After having unpacked the machine and the generator, place them on their locations, which have been previously marked out on the floor.

The drawing below shows a recommended installation method. We also show the minimum distance to be respected between the machine, the generator and the walls of the premises.

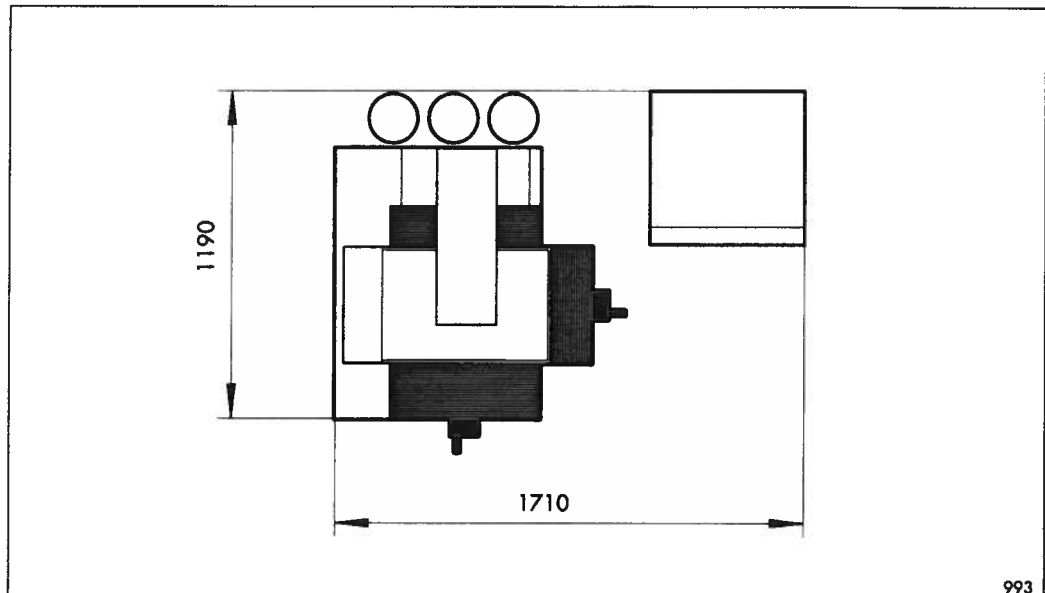


Installing the machine

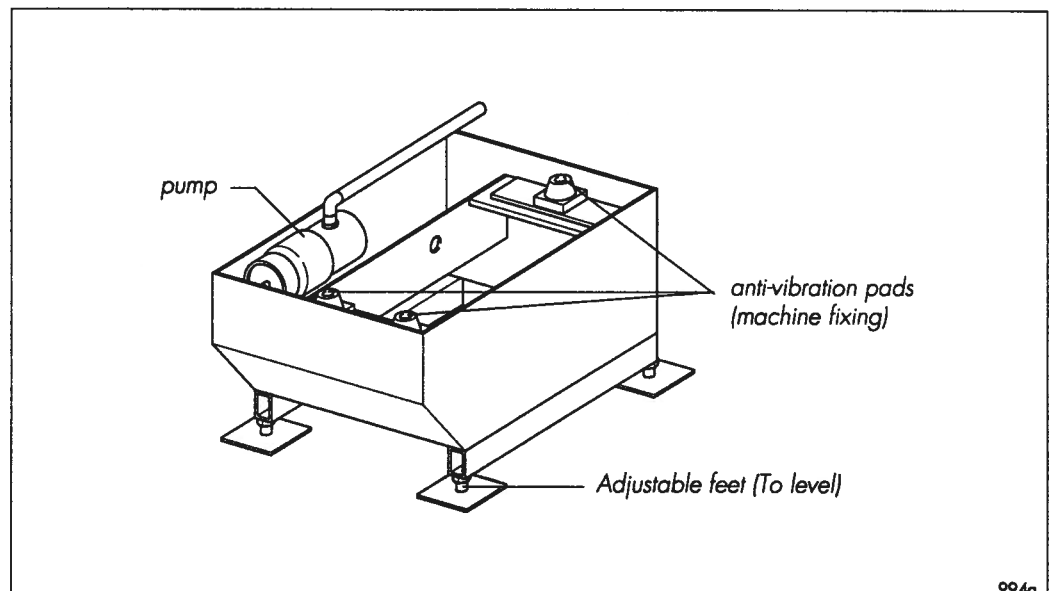
The machine is to be installed according to the following procedure:

- install the steel plates, on which the four adjustable legs of the tank are to rest, at the locations specified.
- Install the machine
- Carefully inspect the machine + tank assembly, to ensure that it has not been damaged during transport.
- **Removal of protection:** carefully clean all parts coated with "Tectyl" using kerosine or benzine; in particular, this applies to moving parts, preventing infiltration of the "Tectyl + cleaning product + dust" mixture.

Floor area occupied by the machine and generator.



Main parts of tank



Installation

Installation Levelling

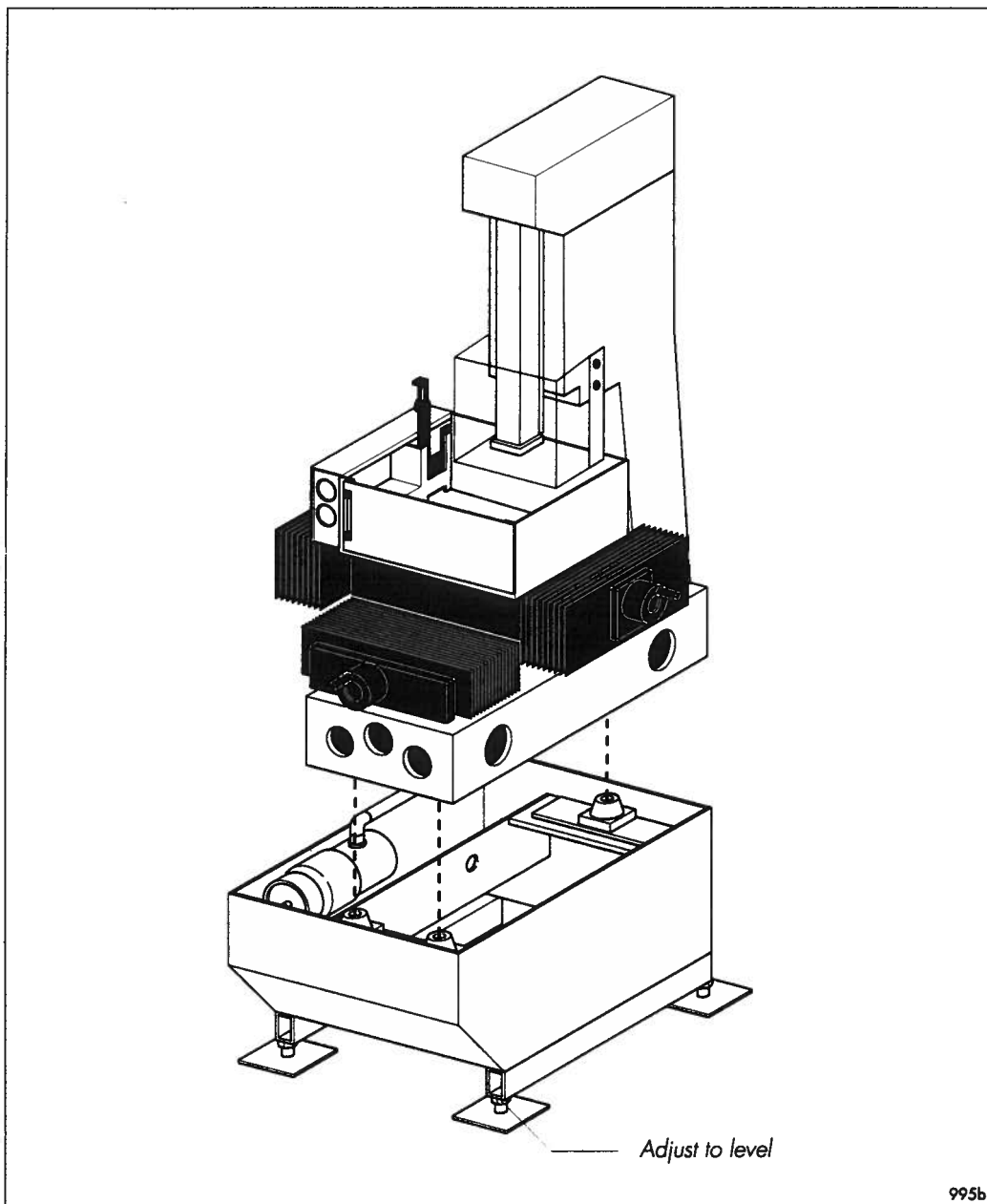
The machine is to be levelled by means of the four adjustable legs on the dielectric tank, using the machining table as a reference.

To facilitate draining of the machining tank, a slight slope should be allowed along the X and Y axes. Towards the left hand rear of the worktank

Installation of generator

Install the generator in its location.

- Open the front and rear doors and check the various electrical units inside the generator to ensure that these have not been damaged during transport.



The drawing on the left shows the manner in which the machine frame rests on the tank.

Installation

Putting into service

Electrical connections

Machine - generator connection

All the interconnecting cables pass through the sheath on the machine, to which they have already been connected.

For connection to the generator, proceed as follows:

- open the generator rear door
- attach the sheath from the machine to the generator, to its lefthand side

Using the diagrams below, connect the various cables to their respective connectors.

- To connect the machining cable, partially unscrew the part B attaching screw, and the central screw on part A.

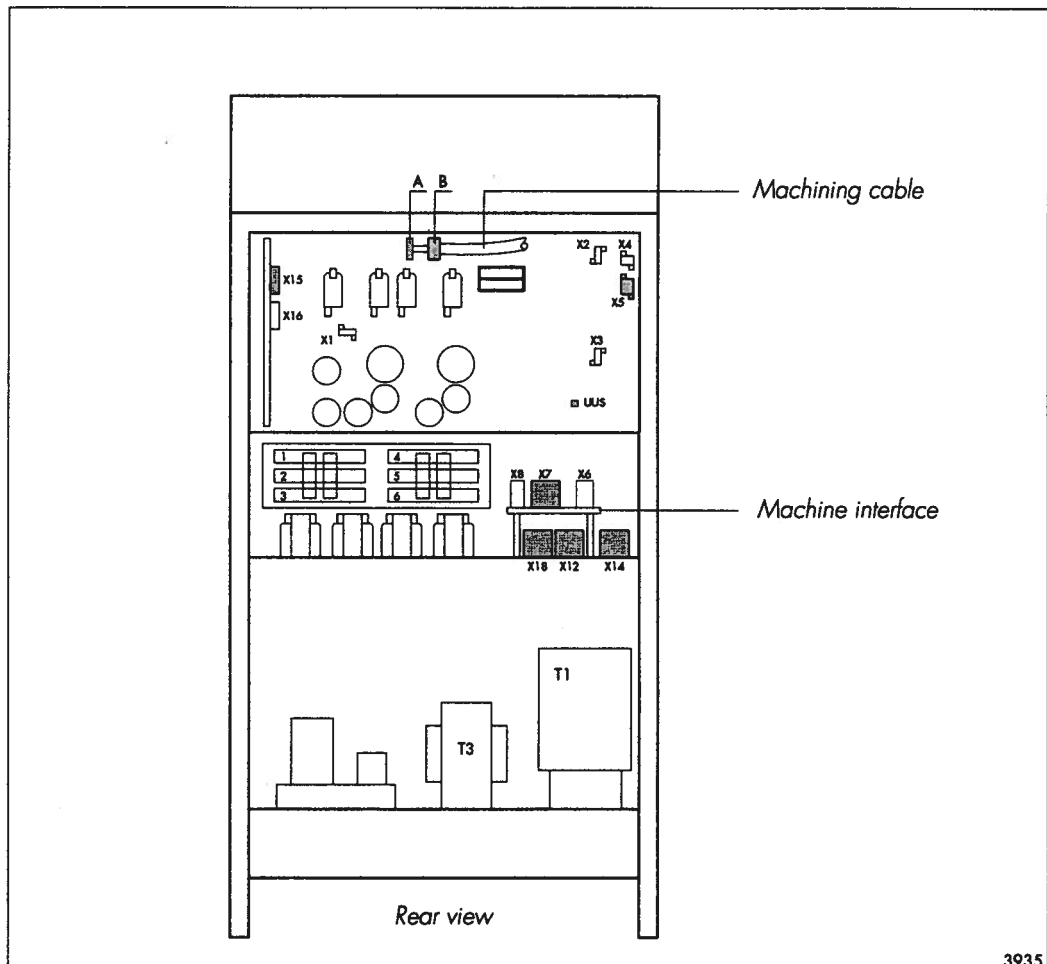
Fit the cable, with the outside conductor in part B and the center conductor in part A. Tighten the attaching screws of B and the center screw of A.

Check that parts A and B are not short-circuited by a strand of wire.

- Connect the other cables to their respective connectors referring to the identification labels.

Remarks

- for further details see also diagram No. 832464

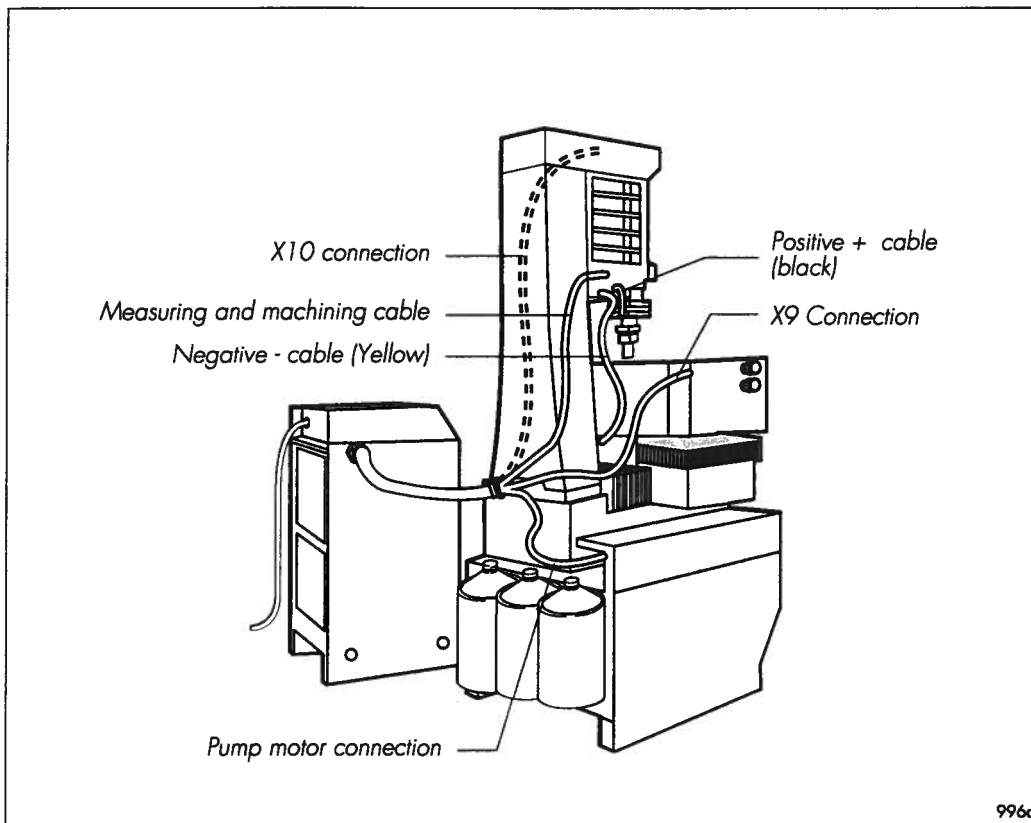


Putting into service

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Pump motor and transformer connection checks

Check that the connections of the motor and the primary voltages of transformer T1, T2 and T3 correspond to the connected mains voltage.



Notes

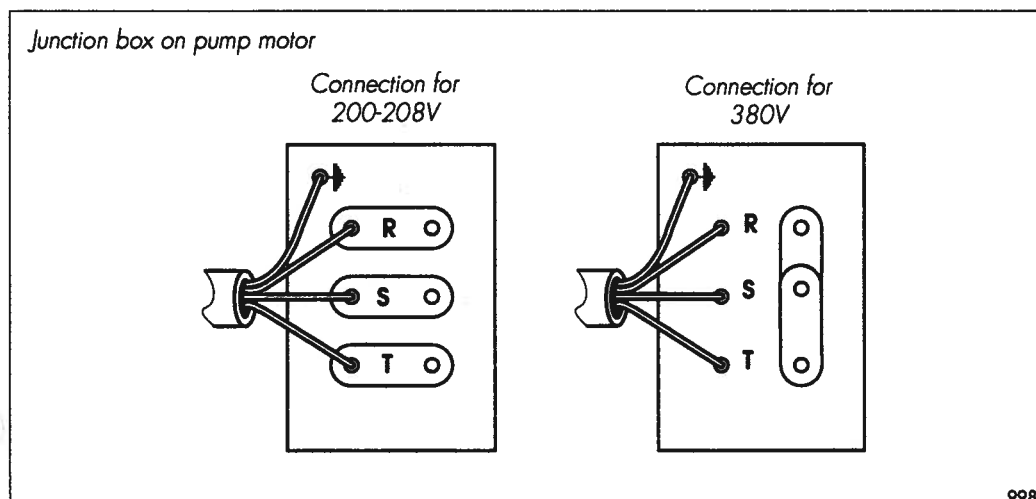
- It may be necessary to cross over two phases during checking of motor rotation direction.
- The transformers are accessible via the front or rear of the generator. See chapter 3: "Installation of main electrical components".

Connection to mains

Connection to the mains is made using cable leading to the rear top lefthand corner of the generator.

Maximum absorbed power 5 kVA

Input fuses 20 A



**Putting into
service**

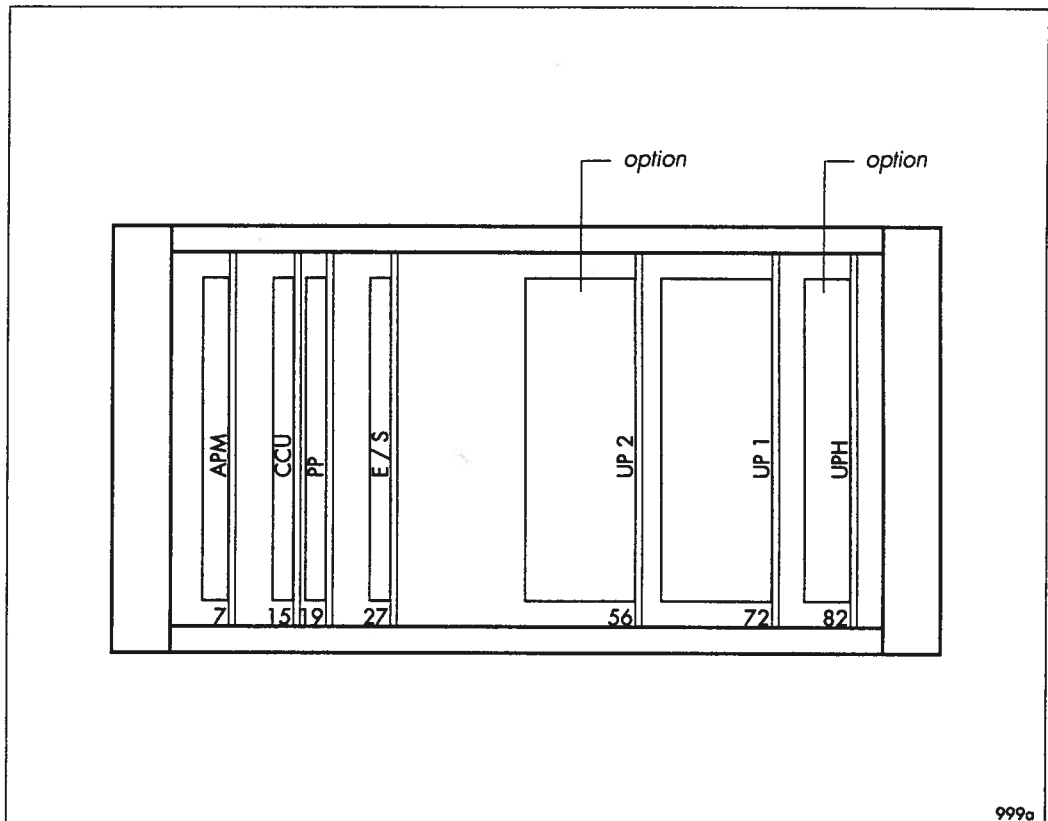
Installation of electronic PCB's

For transportation, the PCB's having a certain weight are packed separately; these must therefore be fitted.

When performing this operation, refer to the drawing on the generator intermediate plate, which shows the position of each PCB, together with the numbers given on each card extractor (see drawing below).

Proceed as follows:

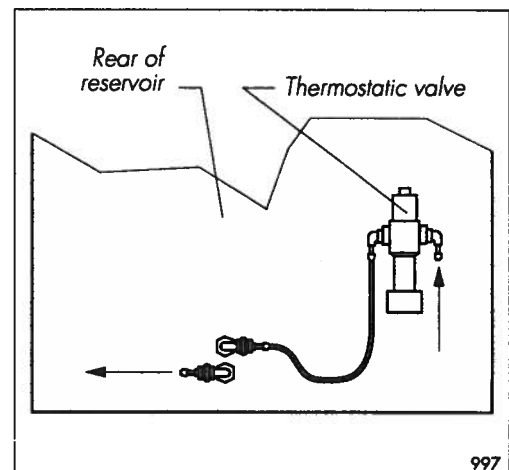
- Open the generator front door
- Remove each PCB one after the other and examine the male or female connectors, to check for damage due to transport. Check the connector positions.
- Install the separately packed PCB's.



Connection to water main

Connection of the dielectric cooling system to the cold water main is made as follows:

- Connect the entry of the thermostatic valve to the water main through a tube of 13 mm inside diameter.
- Connect the outlet of the cooling system to the drain via a tube with an inside diameter of 13 mm.



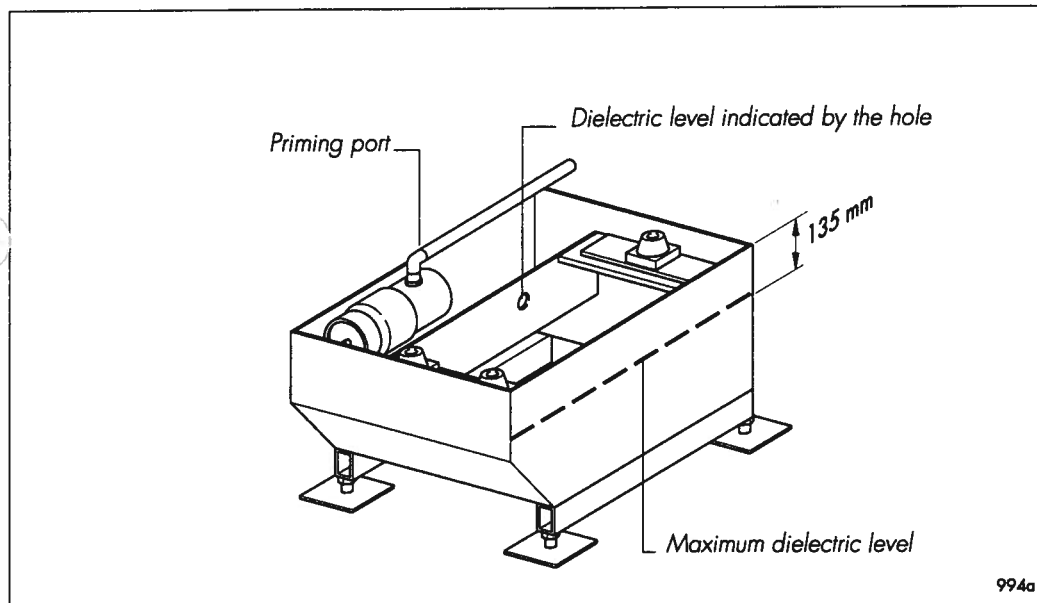
Putting into service

Filling the tank - Priming the pump

For the pump to operate correctly on putting into service, it is necessary that it be filled to ensure priming. To do this, pour 1 litre of dielectric into the pump through the priming port.

A more simple method is described below:

- close the machining tank drain valve
- open the machining tank filler valve
- close the machining tank door.
- fill the tank by pouring dielectric into the machining tank.



The tank is full when the dielectric level is located at the marker hole, i.e. 135 mm from the top edge.

Checks

Before declaring the installation "Operational", the following checks must be performed:

- Check the tripout current of the main circuit-breaker (Q (Q1) (combined with emergency stop) on the control front panel; to gain access to the adjusting knob, it is necessary to remove the circuit-breaker front plate.

Setting for 200 V - 208 V:	8 A
Setting for 380 V:	6.3 A

- Engage the main circuitbreaker.
- Switch on the installation via the main switch.
- Check the + 5 V, 1 V, + 12 V and - 12 V voltages (see "+ 5.1 V/+ 12 V/- 12 V power supply adjustments" in the "Maintenance" chapter).
- Check the pump direction of rotation: if necessary, cross over two phases either at the mains end or at the motor.
- Check tank filling, injections and draining.
- Check the setting of the dielectric cooling system thermostatic valve. The knurled knob sets the valve operating temperature; by moving the knob from 1 to 5, the temperature increases, and by moving it from 5 to 1, the temperature decreases. The setting must be such that when the dielectric temperature in the machining tank exceeds 20°C, water flows from the cooling circuit outlet.
- Check the "Manual" mode.
- Check the "Machining" mode by means of a test. voir "Liste des dessins et schéma" chap.9 dessin N° 431866.

The temperature and valve setting are tested over a period of 24 hours; we recommend that a thermometer be left in the machining tank, and that the temperature be checked during machining.

Putting into service

Clamping equipment

delivered with the machine

Quantity	N° CT	Description
2	257 055	Clamp
2	248 603	Jack
16	243 934	Spacer
1	9 498 062	Double-ended fork wrench 17/19
2	2 57 0 51	Stud M10 x 125
2	2 57 0 52	Stud M10 x 200
2	9 201 015	Washer M10 dia. 10.5/21 x 2
2	9 077 004	Nut T12 (M10)
2	9 088 015	Nut M10

**Clamping
equipment**

List of main parts

N° CHARMILLES	Description
Z axis assembly	
430 039 257 015	BBC motor Castellated belt
Machining tank assembly	
430 094 430 148 445 792 4 461 120 441 528 257 141	Pressure gauge 0-600 mbars Vacuum meter Level tester Fixed temperature thermostat (38°C) Injection solenoid valve Suction pipe
Tank assembly	
2 680 460 2 680 470 343 310 257 037	Dielectric pump 50 Hz with nozzle Dielectric pump 60 Hz with nozzle Filler tube, dia. 30/37 mm, Drain tube, dia. 60/65 mm
Generator assembly	
8 528 550 8 528 760 8 525 700 8 525 710 8 525 730 8 549 820 8 527 090 8 549 510	PCB- power unit UP1 - UP2 PCB - high voltage power unit UPH PCB - Z axis motor power amplifier APM PCB pilot - protection PP PCB inputs / outputs PCB - machine interface PI CCU PI cable head

**List of
main parts**

