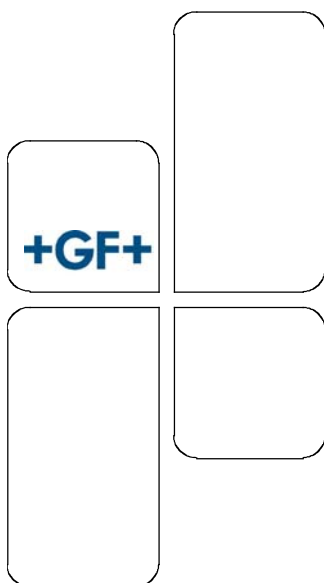




AgieCharmilles

FO 350/550
DPControl

C User manual
C2 Installation

C2.1

Technical data, Place of installation, Connections, Transport

04.2011

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2011

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Valid from SW X_X_X.

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Introduction

FO 350/550 sinking machines are high precision spark-erosion machines. All parts are carefully inspected individually and the most important parts are very carefully checked by our metrology department.

This manual is intended to enable you to appropriately prepare the location for the equipment you are going to receive. Herein, you will find useful information for transport and the review of a certain number of rules concerning installation of the various units, together with information which will show you the full measure of the machine performances.

The § Hygiene instructions gives the instructions concerning any numerical control machining centre and, in particular, the GF AgieCharmilles machining centre.

To guarantee healthy and agreeable working conditions, both for persons working on the EDM machines and for persons working in the same premises, it is indispensable to follow some elementary rules of hygiene and safety relative to this machining process.

The operators, foremen and even the enterprise heads are obliged to apply the rules described below.

If these rules are not followed, GF AgieCharmilles cannot, in any way, be held responsible.

The § Choice of room in which the machine operates § and § Connection values concern you directly, since preparation of the premises, together with the cooling water, compressed air and electricity connections are your responsibility.

The § Transport and unpacking of the machine and § Equipments placing will enable you to prepare putting into service of the machine, therefore enabling GF AgieCharmilles personnel to have your machine operating rapidly, and therefore to devote more time to training your personnel.

The § Technical data describes the main technical characteristics of the machine, thus enabling work to be prepared before the machine arrives.

1. Technical data

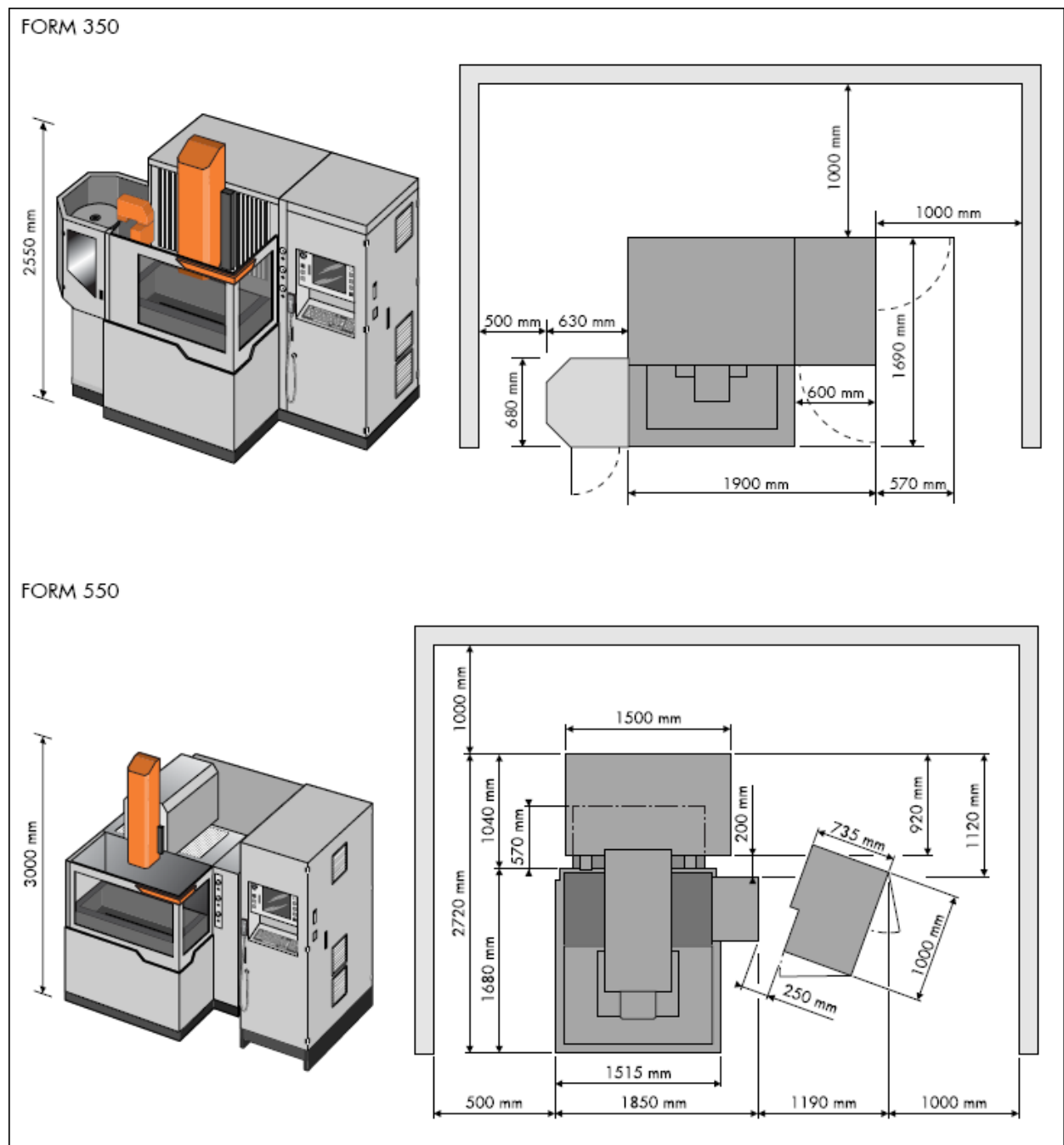
Machine	FO 350	FO 550
Tipo di basamento:	"L"	"L"
Frame material:	Stabilised cast iron	Stabilised cast iron
Dimensions (HxLxW)::	2550 x 1900 x 1690 mm (100.4 x 74.8 x 66.5 in)	3000 x 3040 x 2750 mm (118.11 x 119.68 x 108.26 in)
Machine weight without dielectric with C axis	2350 Kg (5180 lbs)	4400 Kg (9700.33 lbs)
Maximum distance from table surface to spindle nose:		
• Isolated interface	500 mm (19.68 in)	600 mm (23.62 in)
• Erowa ITS chuck	450 mm (17.72 in)	550 mm (21.65 in)
• System 3R MACRO chuck	437 mm (17.20 in)	597 mm (21.14 in)
• Hirschmann H5 chuck	444 mm (17.48 in)	544 mm (21.41 in)
• ITS Compact chuck	435 mm (17.12 in)	535 mm (21.06 in)
• 3R Combi chuck	437 mm (17.20 in)	537 mm (21.14 in)
Maximum weight of electrodes without C axis:	50 kg (110.2 lbs)	100 kg (220.4 lbs)
Table	FO 350	FO 550
Table dimensions (LxW):	500 x 400 mm (19.68 x 15.75 in)	750 x 600 mm (29.52 x 23.62 in)
Part maximum weight:	500 kg (1102 lbs)	1600 kg (3527.4 lbs)
T-shaped attaching grooves:		
• number	3	5
• dimension	12 mm (0.47 in)	12 mm (0.47 in)
• spacing between grooves	125 mm (4.92 in)	125 mm (4.92 in)
Movements	FO 350	FO 550
Travels:		
• X	350 mm (13.78 in)	600 mm (23.62 in)
• Y	250 mm (9.84 in)	400 mm (15.74 in)
• Z	300 mm (11.81 in)	450 mm (17.71 in)
• C (option)	360°	
Measurement resolution:	0.1 µm (0.000004 in)	
Positioning increment:	1 µm (0.00004 in)	
Maximum speed (manual mode):	3600 mm/min (142 in/min)	
C axis rate of rotation:	from 2 to 100 tr/min	
Electrode inertia with C axis:	2000 kg.cm ² (683 lbs.in ²)	
Dielectric	FO 350	FO 550
Work tank:		
• work tank dimensions (HxLxW)	370 x 800 x 550 mm (14.57 x 31.50 x 21.65 in)	470 x 1220 x 870 mm (18.5 x 48.03 x 34.25 in)
• capacity	160 l (42.27 gal)	500 l (132 gal)
• min/max dielectric level	100/310 mm (3.94/12.20 in)	145/440 mm (5.7/17.32 in)
Reserve tank:		
• dimensions (HxLxW)	350 x 980 x 1490 mm (13.78 x 38.58 x 58.66 in)	1160 x 1500 x 930 mm (45.66 x 59.05 x 36.61 in)
• capacity	410 l (108.31 gal)	1000 l (264.15 gal)
• filtering system	4 paper cartridges	8 paper cartridges 2 x 4
• filler pump maximum flow rate	190 l/min (50.19 gal/min)	400 l/min (105.66 gal/min)
Flushing:		
• injection (pressure)	1x through part, 2x lateral and 1x through electrode	
• suction	through part	
Electrical equipment cabinet	FO 350 and FO 550	
Type of diskette used:	1.44 MB	

2. Requirements for the place of installation

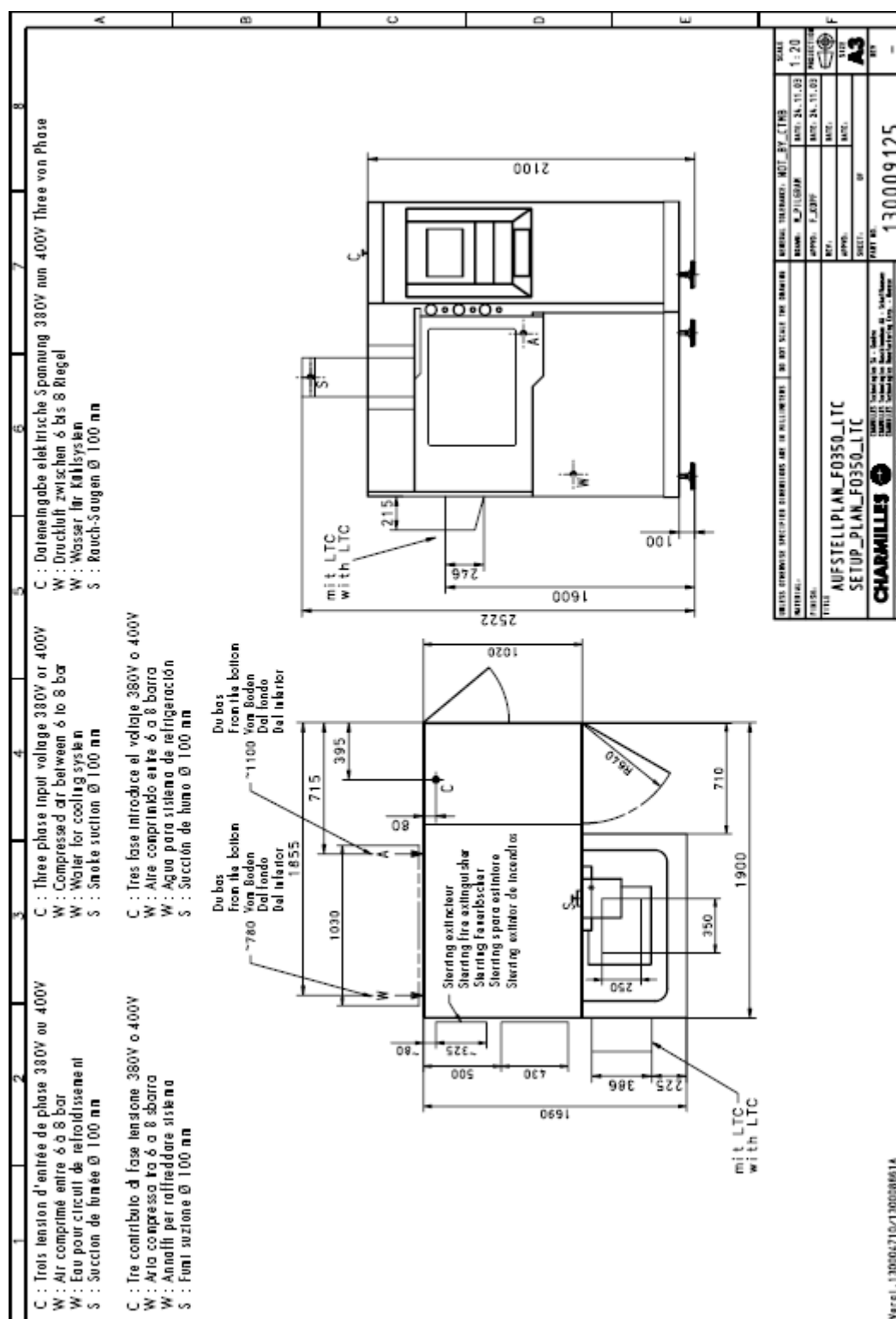
2.1 Equipments placing

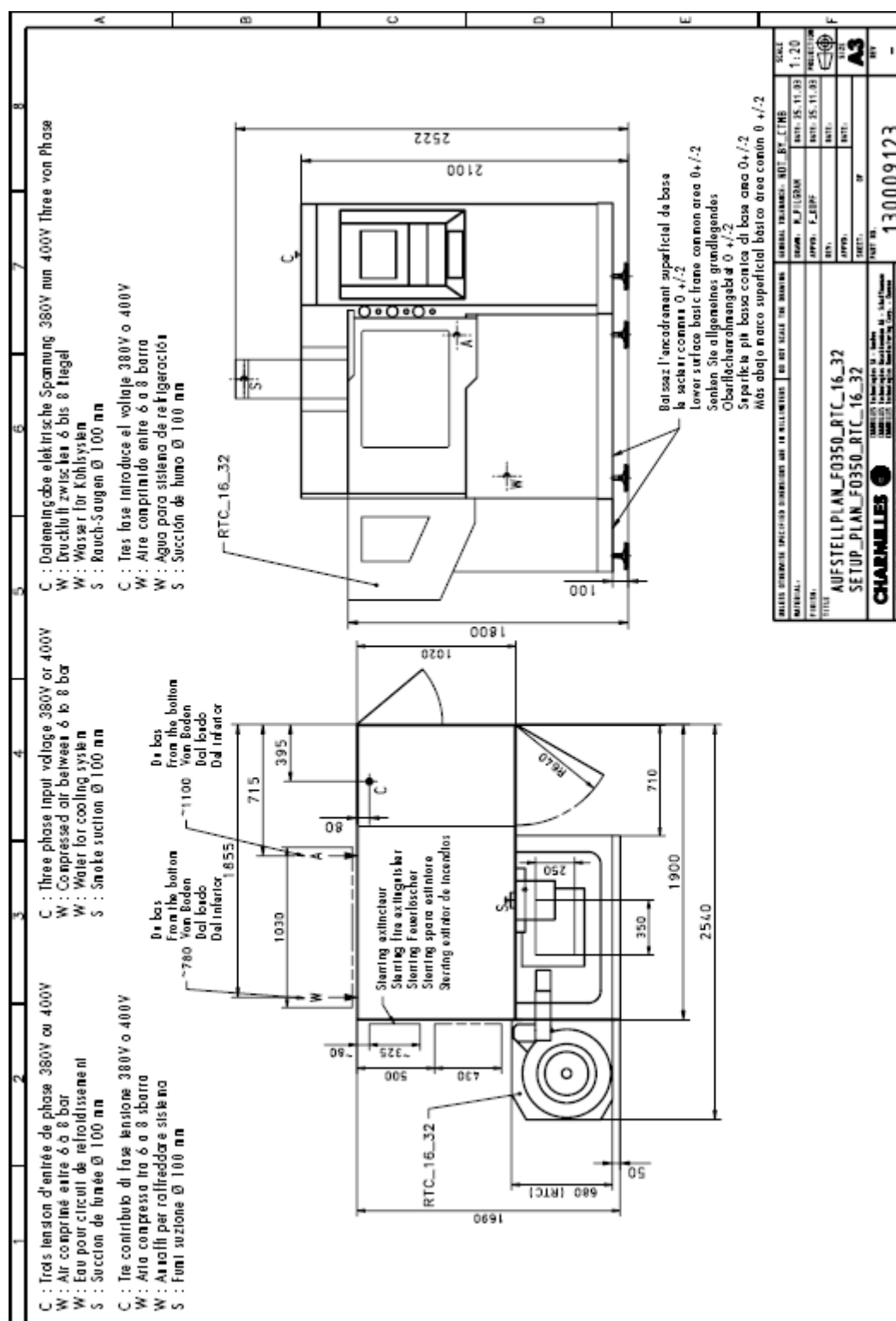
Machine layout

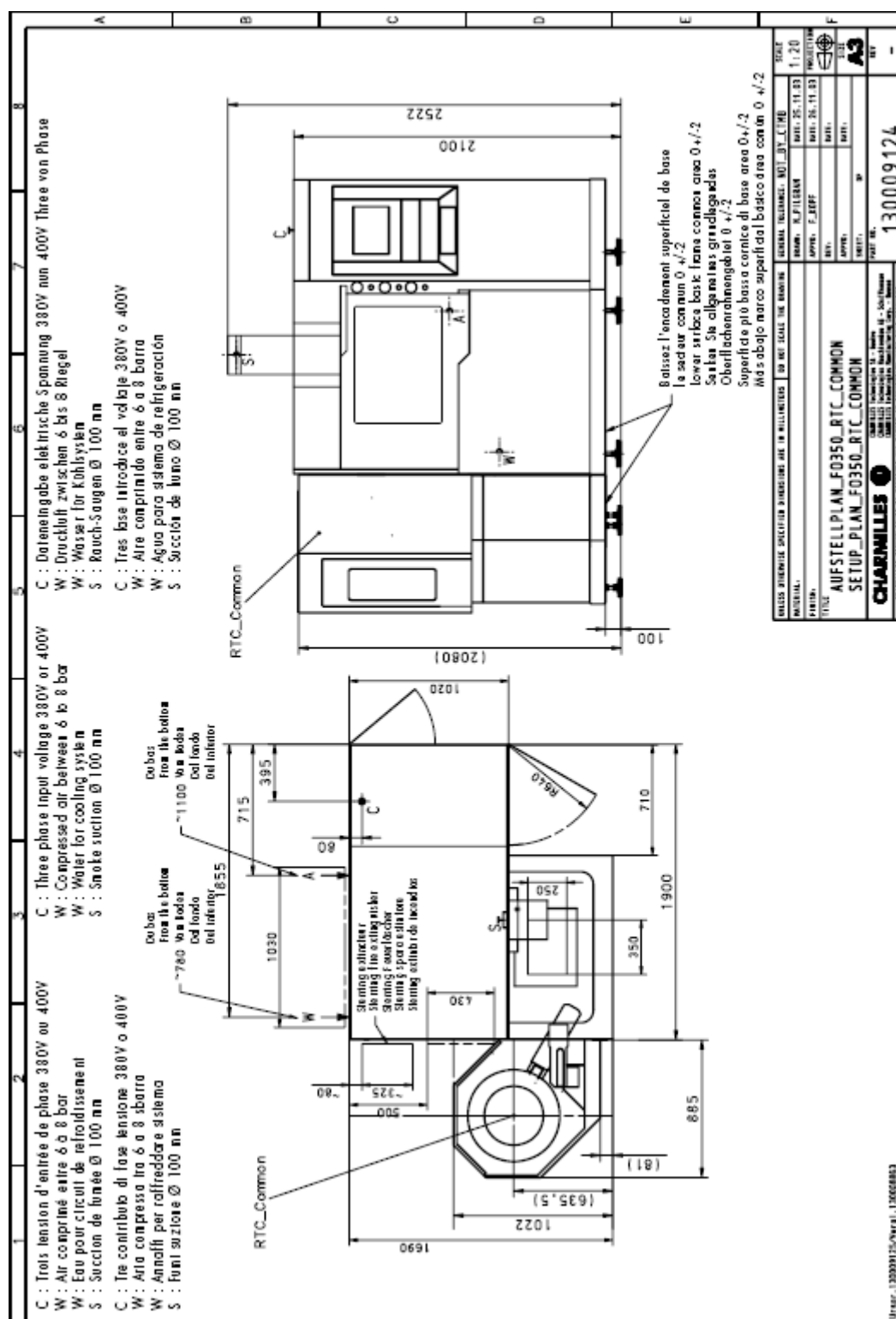
Transport path for forklift (fork length 2100 mm (82.7 in)).



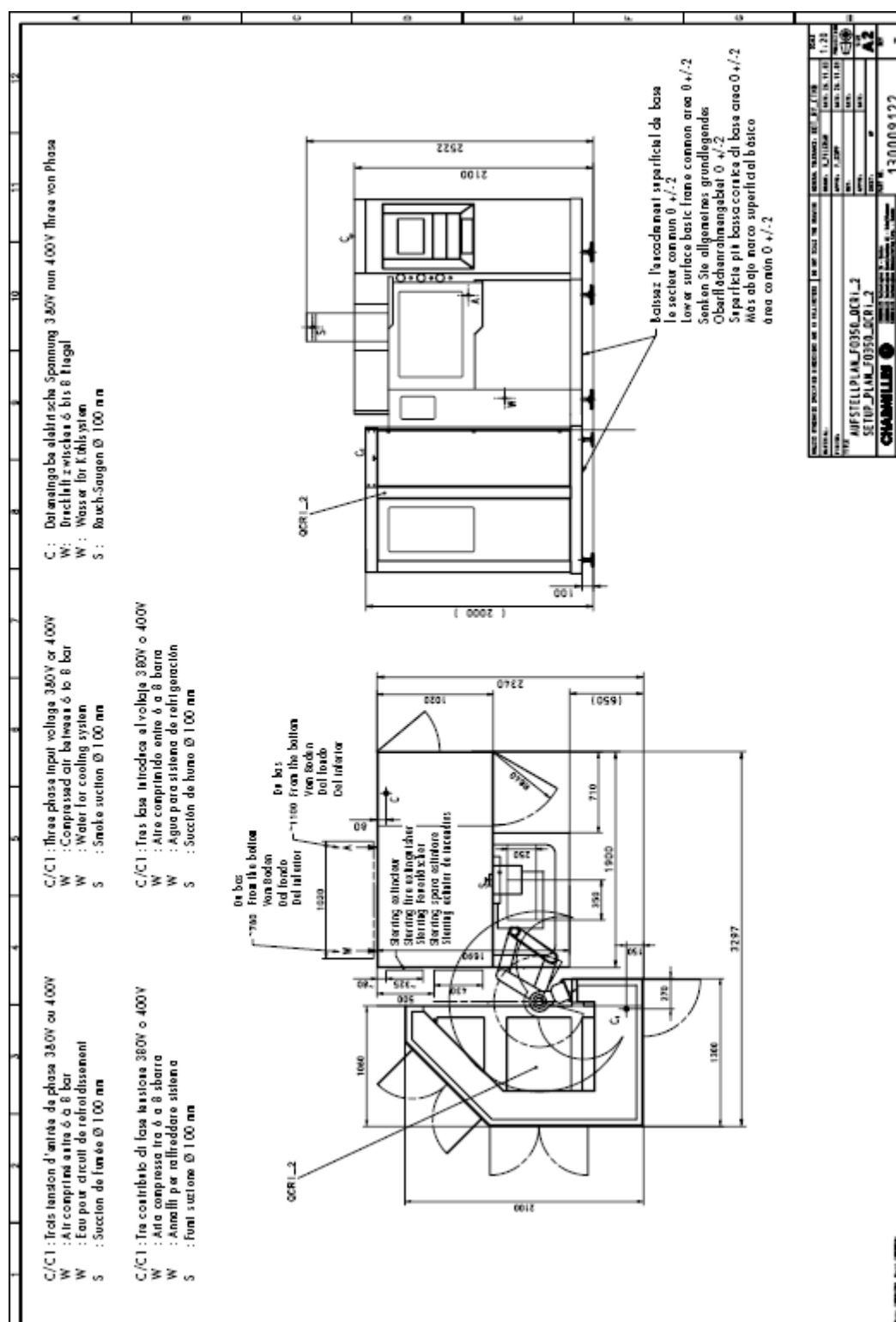
2.2 Size FO 350 LTC



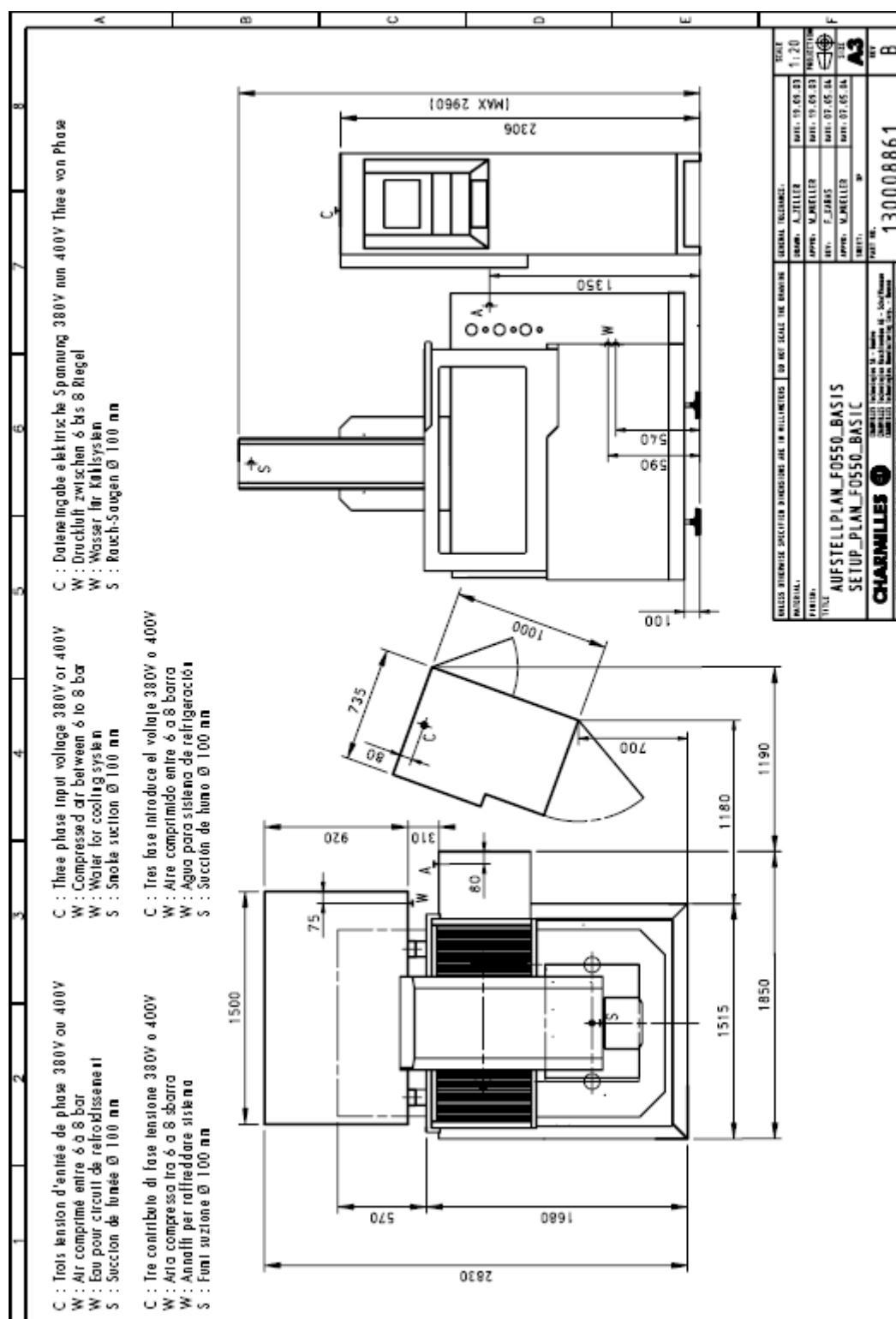




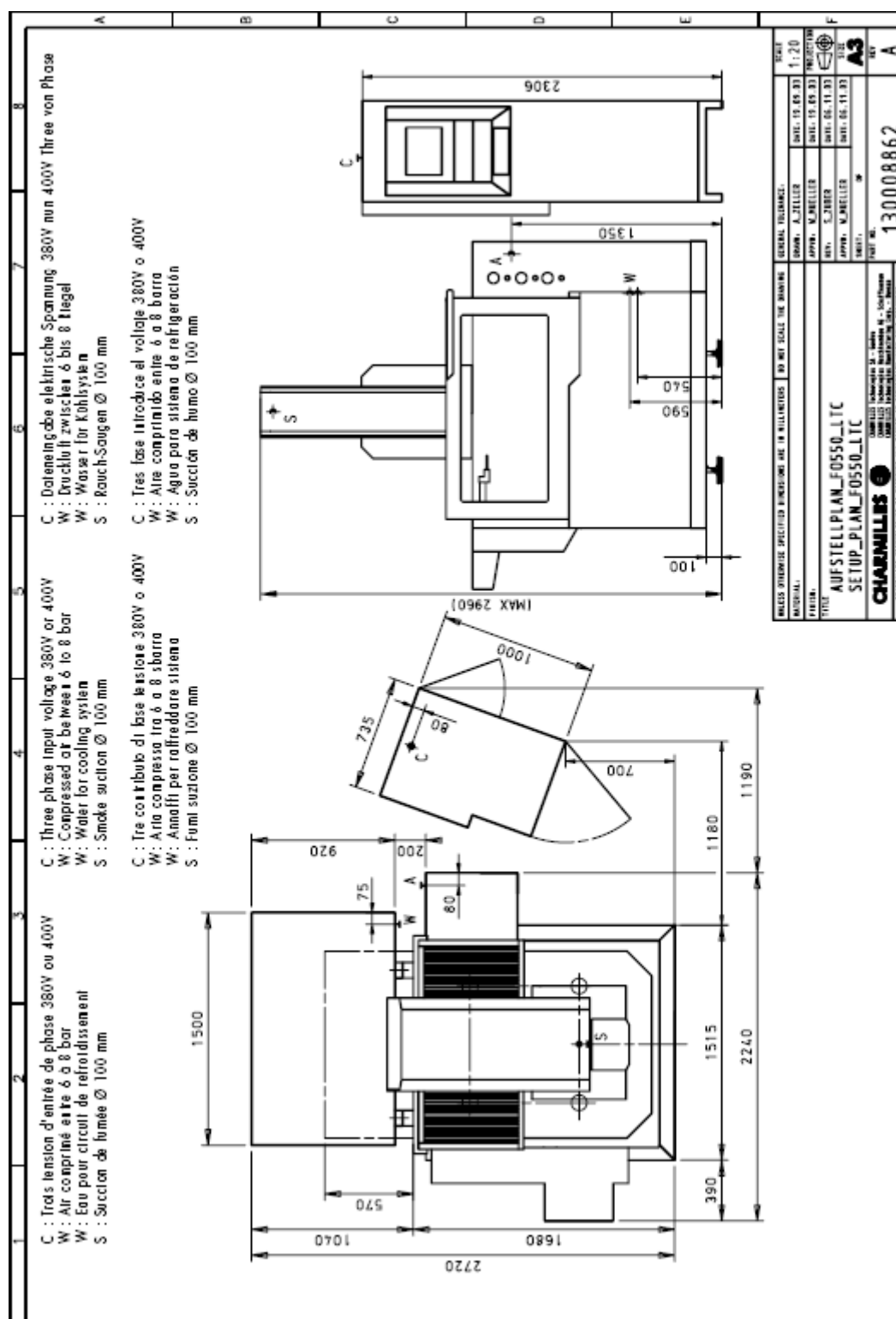
2.5 Size FO FO 350 OCR 2



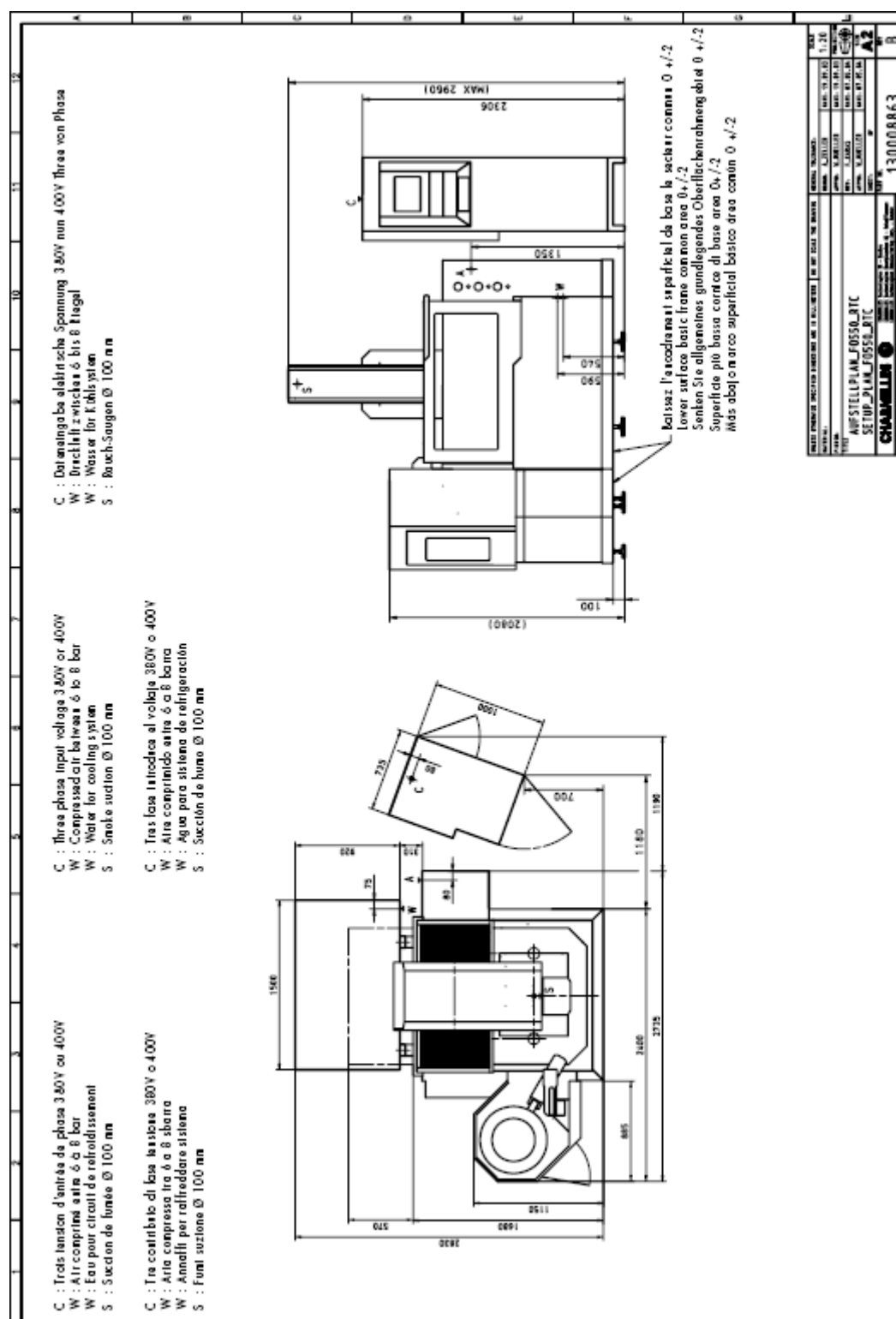
2.6 Size FO 550 BASE



2.7 Size FO 550 LTC



2.8 Size FO 550 RTC



2.9 Connection values

Three-phase electrical mains with an earthing connection must be provided in advance..

Electricity:	FO 350 and FO 550
• Mains frequency	50 Hz or 60 Hz
• Three-phase input voltage	380/400 V
• Options	204/220/240/440/480/575 V
• Permissible variations	From +10% to -15%
• Permissible micro-breaks	4 ms
• Total installed power	64 A = 7.5 kVA, 128 A = 10 KVA
• Absorbed current on power-on	Approximately 10 x nominal I
• Nominal I	204 V 20.8 A
	220 V 19.3 A
	240 V 17.7 A
	380 V 11.2 A
	400 V 10.6 A
	420 V 10.1 A
	440 V 9.7 A
	480 V 8.9 A
• Cos ϕ	575 V 7.4 A
	0.8

Water: (option Dielectric cooling unit)	FO 350 and FO 550
• Flow rate required	6 l/min (1.6 gal/min)
• Temperature	10 °C < T < 15 °C (50°F < T < 59°F)
• Tube	...

Air:	FO 350 and FO 550
• Pressure range	6 < p < 8 bars (87 < p < 116 PSI)
• Flow rate	1 l/min (0.26 gal/min)
• Pipe for quick fitting	Ø 4/6 mm

Fume suction:	FO 350 and FO 550
The installation of a fume suction system it is obligatory and it is to connect to the pipe union that is found aloft on the back part to the head of the equipment. The fume suction system it will have to be in operation for all through the machining.	
Fume suction system installation specifications:	
• Suction rate	200 m ³ /h
• Connection tube (non-flammable)	Ø 100 mm (3.94 in) inside

General data	FO 350 and FO 550
Permissible ambient temperature range:	
• for guaranteed precision	20° C ± 1° C (68° F ± 2° F)
• for equipment operation	between 15 and 30° C (between 59 and 86°F)
permissible humidity factor:	between 40 and 80%
Machine maximum operating noise:	Leq. 78 dB A
Weighted A acoustic pressure equivalent continuous level at work station	

2.10 Environment

The choice of the place of installation is very important for a precision machine tool, since the accuracy of the workpiece produced depends on this.

2.10.1 Choice of room in which the machine operates

Renewal of the premises ambient air must be guaranteed so as to prevent a harmful and dangerous atmosphere from being created, without omitting the volume of air evacuated by suction of fumes must be replaced.

Since an EDM machine uses a dielectric whose flash point is lower than 100°C (212°F), the premises in which the machine operates is considered as a fire hazard premises. Due to this, the electrical installation in this premises shall meet the requirements of safety standards in force.

For Germany, standard VDE 0100 T 720.

2.10.2 Dimensions of the room

The arrangement of the various units forming the system must be such that the operator can easily access the working area of the machine and the cabinet front panel.

Moreover, to facilitate maintenance, provide passage around the sides of the machine and at the front and the back of the cabinet.

The layout of the units is given in § 2.1, with the general overall dimensions of the machining centre.

The diagram enables the surface area of the floor globally occupied by the system to be determined (allowing for operator spaces and maintenance).

2.10.3 The floor

The floor must be flat, horizontal and support the weight of the equipment, given in the technical description. The floor must not transmit vibrations to the machine. If there are vibrations in the immediate proximity of your machine, we strongly recommend attaching the machine to an independent slab isolated from the workshop floor (see Nature of soil note). The machine rests on 4 adjustable pads. To compensate for floor flatness faults, each pad can be adjusted over 25 mm (1 in).

The adjustment method is given below under § Flow-off slope > Levelling the machine.

Nature of room floor

Knowing that the maximum load of the machine is 1,800 daN/m² (20.89 lbs/sq ft), here are some permissible load indications according to the nature of the soil, according to European standards in force.

Permissible loads according to nature of soil If the construction of a foundation block is considered necessary, this must have the following characteristics:

- The weight of the foundation block must be approximately 3 times the weight of the machining centre.
- The surface area must be calculated so that the static load on the soil (in kg/cm²) is less than the load permitted for the soil (table below).
- The top surface of the foundation block extends by 20 to 30 cm (7.87 to 11.81 in) from the contour of the machining centre chassis.
- To prevent vibrations being transmitted by the soil to the walls, an elastic layer is inserted between the foundation block and the soil (layer of sand or felt, cork or rubber slabs).

Materials used

- 2 parts gravel and washed sand.
- 4 parts crushed stone.

Nature of floor	Permissible load kg/cm ² (lbs/in ²)
Rocky	3 (42.67 lbs/in ²)
Argillaceous • dry hard clay • compact clay • wet clay • damp clay, alluvial soil	1.2 (17.06 lbs/in ²) 0.4 (5.69 lbs/in ²) 0.3 (4.26 lbs/in ²) 0.15 (2.13 lbs/in ²)
Sandy • gravel, coarse sand • fine dry sand • wet sand	1.2 (17.06 lbs/in ²) 0.5 (7.11 lbs/in ²) 0.25 (3.55 lbs/in ²)

2.10.4 Atmosphere

- The air must be clean and dust-free.
- Avoid premises in which the air is charged with abrasive particles (grinding machine room).
- Avoid premises in which the atmosphere may contain aggressive and corrosive chemical product vapours (chemical laboratories, surface treatment rooms, etc.).
- Avoid humidity-saturated atmospheres (relative humidity between 40 and 80%).

Permissible ambient temperature range

- For guaranteed precision: the temperature should remain between 19 and 25 °C (66 and 77°F) with a maximum variation of Ø 1 °C (Ø 2°F).
- For equipment operation: 15 to 30 °C (59 to 86°F).

2.10.5 Location

Without knowing the shape of the premises in which the machine is to be installed, it is difficult to define the best location.

We limit ourselves to indicating some dangers to be avoided:

- Avoid passageways.
- Avoid much-frequented premises.
- Avoid the effect of direct sunlight through windows and glazing.
- Avoid heat sources.
- Avoid air draughts, in particular ventilation outlets or air conditioning system grilles through which, depending on the season, variable air may be received.

2.11 Storage condition of the GF AgieCharmilles equipments

Storage before putting into service

If the FO 350/550 EDM machining centre is to be stored before putting into service for a period of more than 1 week:

- Store preferably in dry room (Humidity maximum 75% and without condensation with temperatures between –20° C and 60° C (between 68° F and 140° F).
- Leave the machine in its package.
- Place desiccant bags in the electrical equipment cabinet and under the machine cover.
- Do not degrease parts protected against rust.

The term of the packaging is 6 months from the date the machine is dispatched.

3. Safety instructions

3.1 Connection to electrical mains

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

3.2 Fumes

Emanations from the dielectric consist essentially of gases and fumes produced by the thermal decomposition of the oil during the spark erosion process.

These emanations are of different kinds and consist of:

- Polycyclic aromatic hydrocarbons (PAH) in the solid or vapor state.
- Aromatic hydrocarbon and paraffin vapors.
- Metallic particles.
- Various substances which may result from the breakdown of additives.

The following instructions must be respected:

- The smoke detector must be connected to a sufficiently powerful suction system capable of providing a suction rate, measured at the edge of the work tank, of at least 200 m³/h.
- The fume suction duct must be noninflammable.
- If the fume suction duct has a metal framework, the latter must be connected to ground.

The machines are equipped with a monitoring device in the smoke detector; if suction is insufficient, it is impossible to start machining.

3.3 Dielectric

The dielectric used on EDM machines must be identifiable by its designation.

A plate affixed to the front of the work tank is used for marking the following information thereon:

- Type of dielectric.
- Dielectric flash point.
- Dermatological risks.
- Safety instructions.

Note:

Dielectric fluids with a flash point below 60°C are forbidden.

Dielectric temperature:

To ensure maximum accuracy, the dielectric temperature should be set as same as the ambient temperature.

3.4 Hygiene instructions

- To prevent long contact of the skin with the dielectric, gloves must be worn.
- Wash the hands after any contact with the dielectric.
- Protect the eyes against possible dielectric splashes.
- Do not ingest dielectric.

3.5 Fire

3.5.1 Preventive measures

- To avoid any overheating of the dielectric liquid, the cooling system must be permanently in operation.
- Two safety thermostats control the dielectric temperature in the work tank, and will cause machining to stop if the temperature becomes too high.
- Both thermostats operate at a fixed temperature of 45°C (113°F).
- Within a radius of 5 meters around the machine, the presence of flames and exposed light bulbs is prohibited.
- Likewise, smoking is prohibited (install NO SMOKING signs).
- A CO₂ fire extinguisher must be located in the immediate proximity of the machine.
- In the case of non-supervised machining operations, an automatic CO₂ fire detection and extinguishing installation is compulsory.
- When machining, the part must be covered with a minimum of 40 mm of dielectric liquid, while avoiding immersion of the electrode holder.
- Gases produced by the machining process must not be allowed to collect in the hollow sections of the machined part or the electrode (risk of explosion).
- Utilize a dielectric recommended by GF AgieCharmilles and with a flash point higher than 60°C.

3.6 Protections

All of the lids and protective covers shall be kept in place when working with the machine.

After performing work, all the parts are to be reinstalled before machining.

If the safety instructions are not followed, GF AgieCharmilles may disclaim all responsibility in the event of an accident.

3.7 Dangers of electricity

When using the EDM sinking process, the electrode is under power and offers a risk of electrocution.

Consequently, avoid touching the electrode and avoid contact with the framework of the machine (risk of short-circuit).

Because of this

- Do not touch the electrode when the machine is operating.
- Keep the protective covers in place.

3.8 Maintenance

For any work performed inside the cabinet or the electrical parts of the machine, the master switch must be set to the Off position, and locked with a padlock. The master switch may be installed either on the door or inside the equipment.

Respect the safety signalling (colour pictograms) and, before performing any maintenance operation, consult the corresponding chapter.

Care is to be taken when handling packages of components and electronic modules to protect personnel from the destructive effects of electrostatic discharges.

3.9 Storage of diskettes

A document pocket is provided in the control cabinet to store the diagrams only.

If diskettes are stored in the cabinet document pocket, these will be subject to magnetic fields due to the proximity of the power supply transformers. This would result in the destruction of data.

For storage of the diskettes, refer to the diskette manufacturer's indications.

3.10 Modifications

Any modification made to the equipment without the intervention or authorisation of GF AgieCharmilles is considered the sole responsibility of the customer.

In such cases, GF AgieCharmilles disclaims all responsibility.

3.11 Elimination of wastes

Wastes resulting from the electrical discharge machining process must never be thrown into drains, dumps or left in the open.

General nature of wastes

- Used dielectric.
- Lubricating oil.
- Used filters, charged with machining metal residues and sludges.
- Various wear parts.

See also Flow chart for elimination of EDM machine wastes (Switzerland) in the chapter C1
§ 3.7 Disposal.

This diagram is of course valid for any other sinking EDM machining installation.

3.12 General recommendations

- If the dielectric overflows, this should not be allowed to sink into the ground nor drain off.
- Contact the competent local authorities so as to find out the various regulatory provisions applicable to the storage of wastes and their elimination.
- It is to be noted that in most cases, storage and elimination of wastes imply sorting according to the nature of the pollutants (plastic, metal, etc.).
- Consult the standards in force applicable to non-recyclable heavy materials.

4. Transport and unpacking of the machine

4.1 Unload the crate

Use a forklift with a reach of 2100 mm (82.7 in) to prevent the crate from tilting.

4.2 Transport the crate

- With a forklift.
- With rollers.

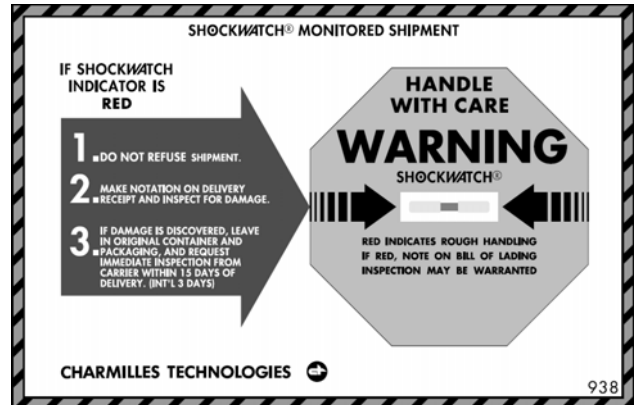
Unpacking consists in removing the installation as a whole from the wooden pallet on which it was transported.

- If the package consists of a crate, first of all remove the top part of the crate; remove the inside retaining wedges, then the sides of the crate.
- Conversely, if the package consists solely of a wooden pallet, remove the protective covering from the equipment.
- Then remove the various packages and machine units.

4.3 Unpacking instructions

4.3.1 Precautions to be taken before unpacking

- To draw the attention of transporters, we affix a WARNING label to the packages giving the instructions to be followed in the event of important shocks.
- If it is observed that the package is damaged (or shock watch red) on delivery, this must be noted on the goods reception voucher. If the damage seems heavy, leave the machine in its package and request an appraisal from the transporter.
- If the purchaser has taken out an insurance policy, he should inform the insurance company.
- In all cases, the local GF AgieCharmilles representative shall be informed and shall make the necessary arrangements with GF AgieCharmilles.



4.3.2 Unpacking the machine

For lifting the machine from the pallet you need a crane or a fork lift with a **capacity of min. 4.5 tonne**.

For lifting the machine by crane, fix the cable on the 4 loops which are already mounted on the machine.

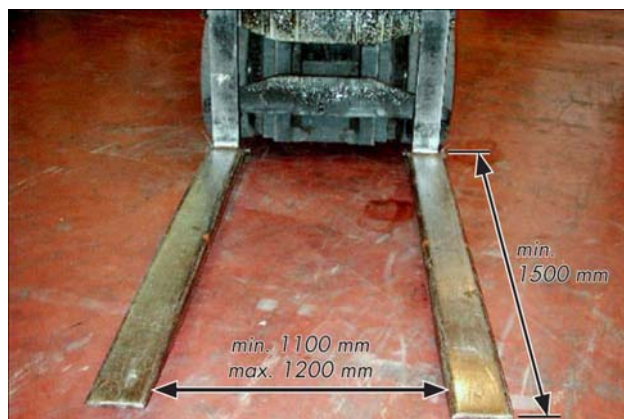


For lifting the machine by crane you also need a distance baem (about 740 mm) between the ca-bels, otherwise the cables will bend the cover of Y-axis.



To lift the machine from the pallet you need a fork lift with a **capacity of min. 4.5 tonne**.

- Fork distance min/max: 1100/1200 mm
- Length of fork: 1500 mm

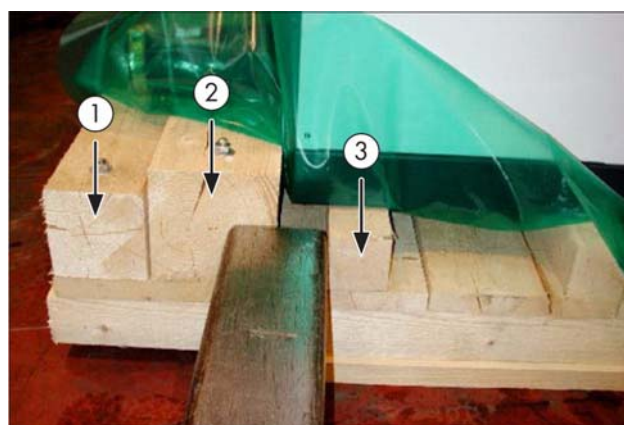


The fork lift can lift the machine only from the left side of machine.



Before lifting the machine by fork lift please re-move beam 1 and 2.

Use the beam 3 as a reference for the left fork.



4.3.3 Unpacking RTC

For lifting the RTC from the pallet you need a crane or a fork lift with a **capacity of min. 0.5 tonne**.

Before lifting the RTC by fork lift, remove all the side walls and the plastic.



Use the left and the right foot of the RTC as a reference.



For safety reason take a person to hold the RTC during lifting.



4.3.4 Transport to rom

Refer to the dimensions of the machine in the § Equipments placing respect. in the § Size.....
Also refer to the transport facilities required and choose the path accordingly.

4.3.5 Flow-off slope

Along the X axis, the slope shall be adjusted to 2-3 ‰ so as to facilitate flow-off of the dielectric to the drain system.

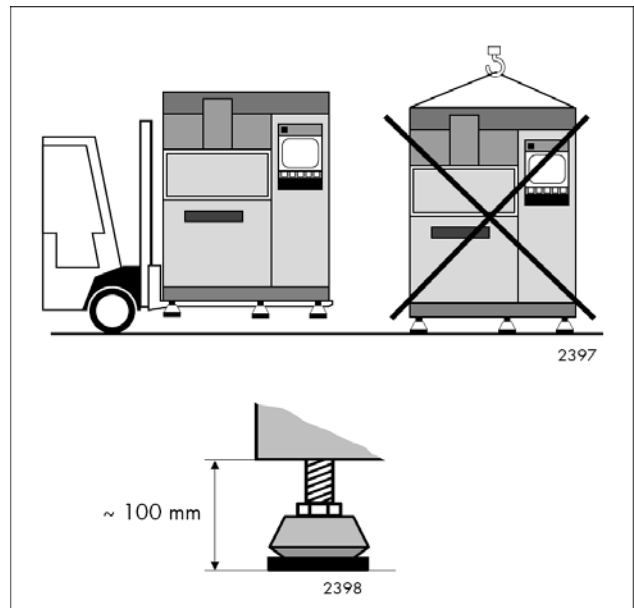
Levelling the machine

Adjustment of the 4 machine pads.

- Adjust the floor to machine distance at 100 mm (3.94 in) while lifting or lowering each feet (open fork wrench 36 mm (1.41 in)).
- Level the machine along the Y axis.
- Set a slope of 2-3 ‰ along the X axis.

Degreasing

- Carefully clean all the parts coated with TECTYL using petroleum or benzene, and in particular moving parts, preventing infiltrations of "TECTYL + cleaning agent + dust".



4.3.6 FO 350/550 machine installation check list

Choice and equipment of premises

• Dimensions:	length		width		height	
• Nature of floor:	permitted load		Kg/cm ²	(lbs/in ²)		
• Premises temperature:	T _{max}		T _{min}			
• Electrical equipment:	mains voltage					
	wire cross-section					
	input fuse					
	maximum variation (%)	+				
		-				
• Compressed air:	pressure					
	flow rate					
	tube length					
	Ø tube					
• Cooling system:	flow rate					
	temperature					
	pressure					
	Ø tube					
• Mains water:	flow rate					
	temperature					
	tube length					
	Ø tube					

Packing + transport

Storage of the machine for more than 1 week:	yes	
	no	
• Unpacking of units:	if problem →	
• Transport of units:	if problem →	
• Shock detectors:	if problem →	
• General appearance (rust, dents, paintwork):	good	
	mediocre	
• Levelling of machine:	yes	
	no	

Storage before putting into service

