



PATENTED

INSTRUCTION MANUAL

DPF-300

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WARNING

The information contained in this document is subject to change at the discretion of the company, without prior notice.

INTRODUCTION

DPF300 is a manual depaneling system designed to solve depaneling needs for small and medium production series. In these applications a simple tool would entail excessive labour but, at the same time, the small amounts of product do not justify the use of automatic depaneling systems that are much more expensive.

Among the particular features of DPF300 are the possibility to change the cutter quickly and the INTERCHANGEABLE GUIDE designed and patented by *Piergiacomini*.

The *guide* assists the operator throughout the PCB positioning and dragging phase and speeds up the process leading up to isthmus (tab) cutting.

The special design of the INTERCHANGABLE GUIDE avoids damage to the assembly in case of incorrect insertion, if the operator cannot insert the guide perfectly into the slot; thanks to its special shape, the assembly will be completely protected against accidents, in full compliance with the current safety standards in force.

Piergiacomini has designed and manufactured the new DPF300 to overcome any ***stress, break-off and tearing*** of PCB *fibres*; such phenomena often occur when using common blades or hand tools to separate the panels; as the complexity and miniaturisation of the printed circuit boards increases, this type of tools are less and less tolerated.

DPF300 cuts the isthmus with the **precision of an automatic machine** but with much lower costs.

The electric extraction system of DPF300, placed directly on the interchangeable guide, removes all the dust produced by the cutter, keeping the work area clean, in accordance with the regulations in force.

1. SAFETY RULES

1.1 MEANING OF THE SYMBOLS USED IN THIS MANUAL



An exclamation mark in an equilateral triangle indicates that there are work or maintenance instructions to be observed or situations that are or may become particularly dangerous. The type of risk to which the operator is subjected and the level of skill required is also indicated.

1.2 GENERAL REQUIREMENTS



Before performing any maintenance or adjustment work, make sure that the power supply system is disconnected.

ATTENTION: Piergiacomini Sud S.r.l. disclaims all liability for any damage caused by the removal or modification, without authorisation, of parts of the machine; servicing or adjusting the machine while it is running is also forbidden.

The machine must be used for depaneling FR4/CEM or ALUMINIUM PCBs only. Any other use is forbidden and will render the product warranty void.

Observe the instruction and warning labels on the machine.

The machine is built according to the safety criteria dictated by current regulations, indicated in the declaration of conformity attached to this manual.

1.3 IDENTIFICATION PLATES ON THE MACHINE



DPF-300 MACHINE DATA PLATE

It is the identification plate of the machine, bearing its main specifications and its Serial Number.

Located at the back of the machine.

Fig. 1

1.4 MEANING OF THE WARNING PLATES AFFIXED TO THE MACHINE

This symbol on the head baseplate indicates "DO NOT TOUCH" the cutter while it is running.



This symbol on the workbench indicates that the machine complies with standard CEI EN 61340-5-1 as regards the protection of electronic devices against electrostatic phenomena.



This symbol on the workbench indicates that eye and ear protection must be worn at all times while using the machine.



This symbol on the workbench indicates that protective gloves must be worn at all times while using the machine.



This symbol on the electric motor of the extraction system indicates that its surface may reach high temperatures. Do not touch this part during operation and wait for it to cool down after stopping the machine.



The lightning bolt symbol in an equilateral triangle alerts the user of the presence of "dangerous electricity" inside the product. This may constitute a risk of electrical discharges for the person who comes into contact with it.



This plate, located on the front side of the machine, above the workbench, prompts the operator to check the clogging of the suction filter constantly.



This plate, located on the front of the machine, precisely on the electrical panel, indicates that working on live electrical equipment is forbidden.

2. MACHINE DESCRIPTION

The machine (Fig.2) consists of steel frame with an ESD workbench on top, on which is installed the milling head (cutter).

The frame is supported by two steel feet and two ESD swivel wheels with brakes for practical positioning; the front side features an ESD connection port for the operator, thus rendering the machine compliant with standard IEC-61340-5-1.

A removable casing containing the electrical panel is fixed with screws to the bottom of the workbench; inside it there is the protective insulating casing of the motor spindle. On the front of the machine there are several control devices such as a disconnect switch, a power indicator light, the machine on/off switch and an emergency button.

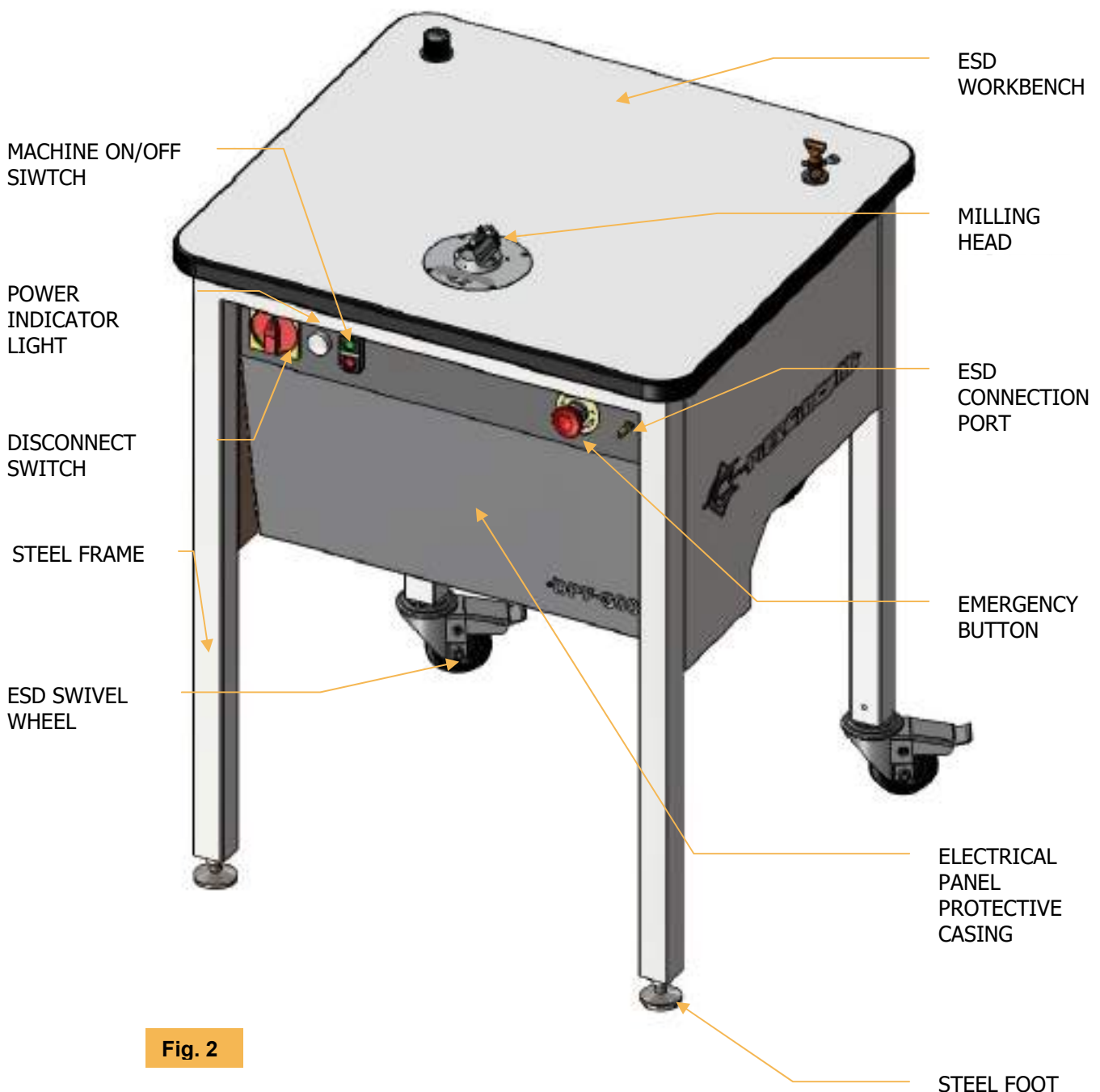


Fig. 2

The back of the machine features a protective casing fixed with 4 screws that can be removed when carrying out extraordinary maintenance work on the motor and the extraction system (Fig.3). Under the frame bedplate is installed a dust filter that features a special built-in filter cartridge, in accordance with EN 60335-269 and can be easily opened using the side clips.

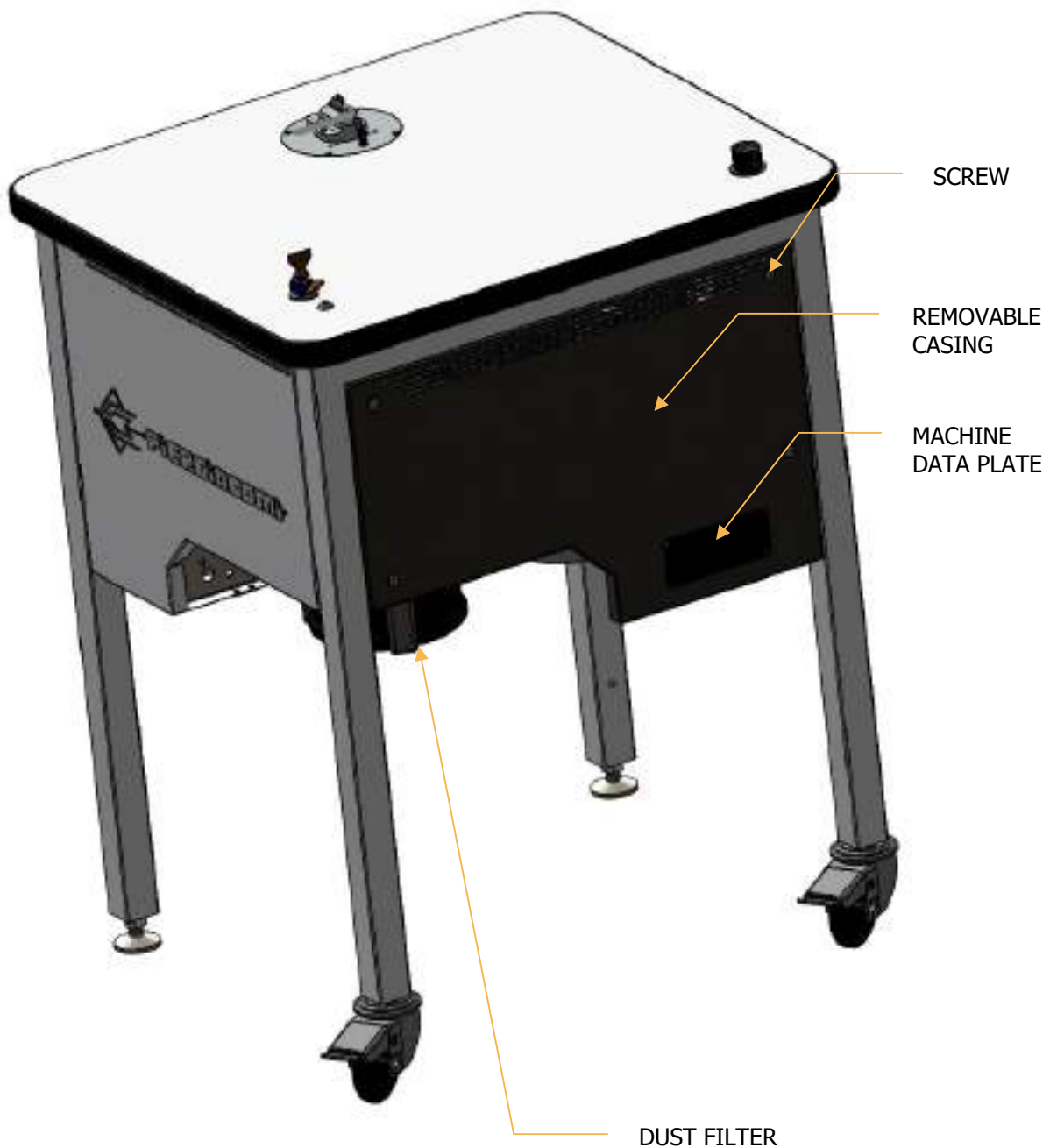
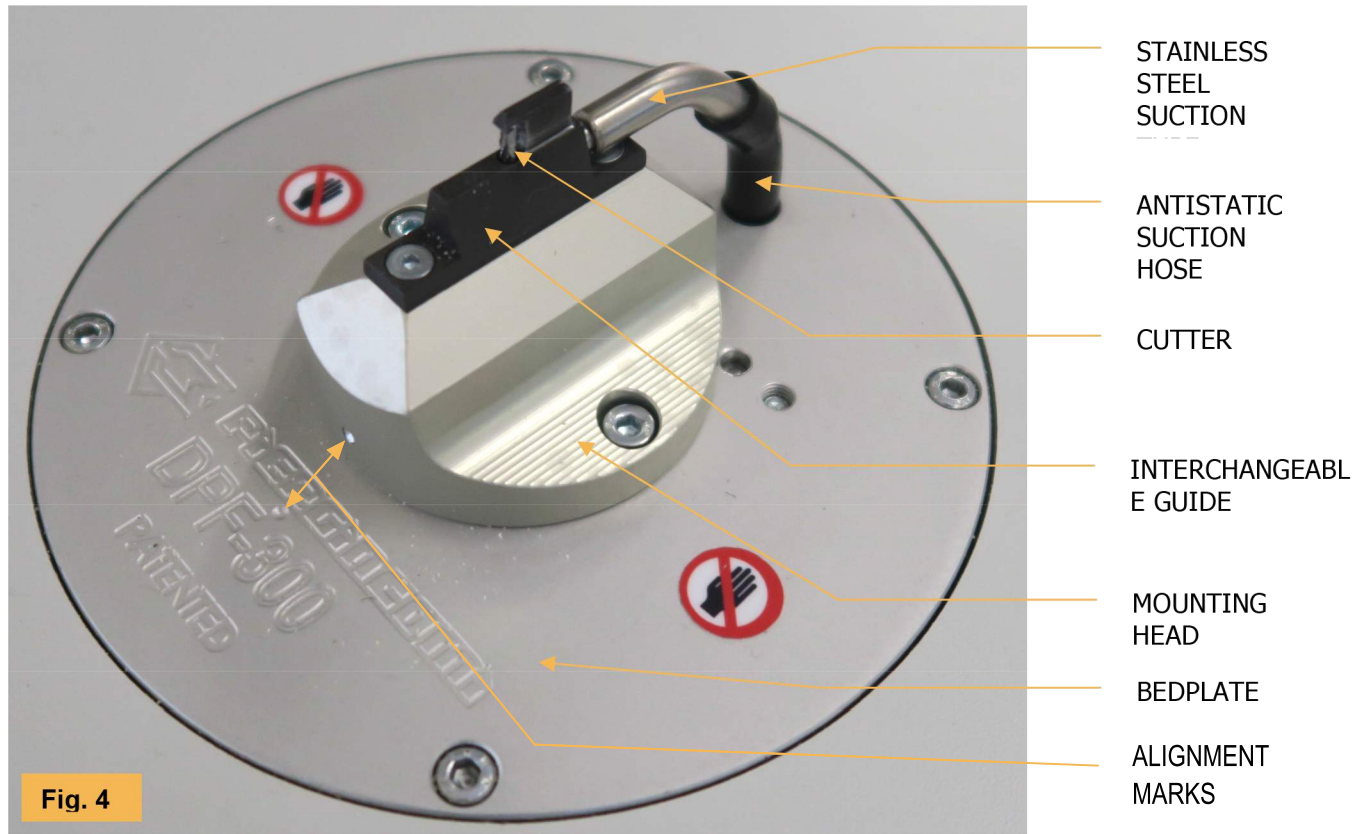


Fig. 3

The milling head consists of a bedplate and a mounting head on which is installed a hardened ground steel interchangeable guide (Fig.4).

The guide features a central slot along which the cutter moves and another slot, orthogonal to the previous one, used to remove the dust by means of a tube that is connected to the electric extraction system and the corresponding dust filter; the first section of the tube is made of stainless steel and then it continues with a black antistatic material.



On the workbench, in the top right corner, there is an additional suction hose (Fig. 5) that can be operated by means of the built-in valve and used to clean the workbench from any dust residues.

While on the left side of the workbench there is an ORANGE (Fig.6) indicator light that turns on when the machine is running.

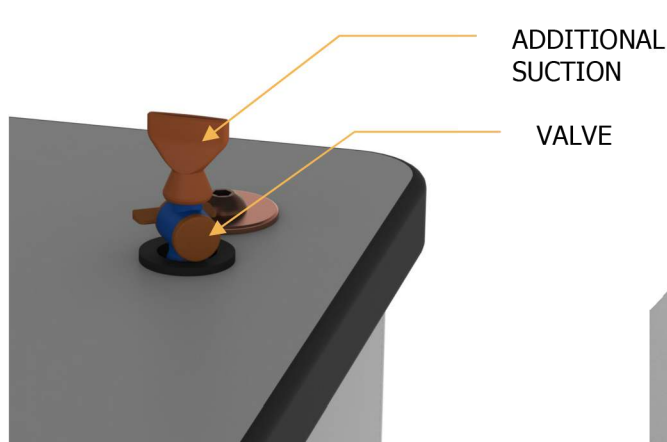


Fig. 5

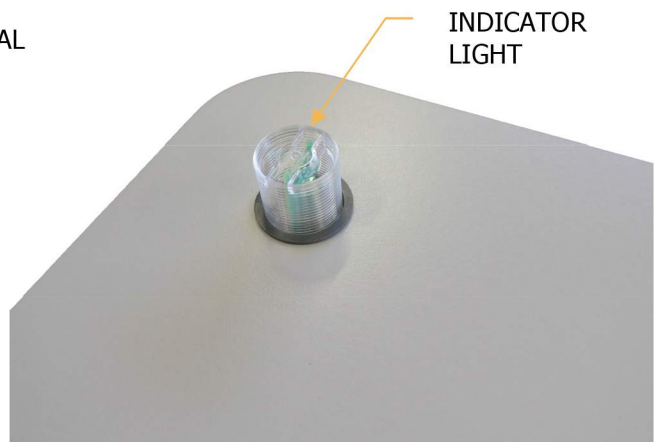


Fig. 6

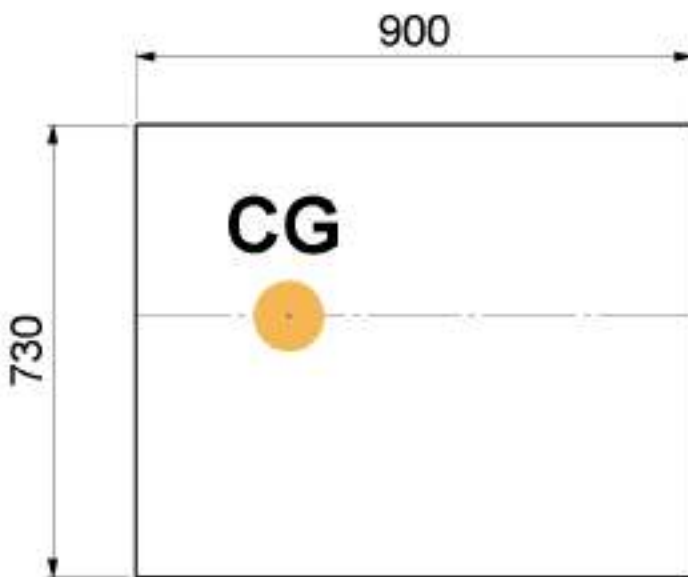
3. TRANSPORT AND STORAGE



CAUTION !! All transport operations are to be carried out with the utmost care by specially trained personnel.

3.1 TRANSPORTING THE MACHINE

The machine must be transported on a pallet, covered with a cardboard or placed in a wooden crate, respecting the total weight and dimensions indicated in Figure 7 below.



Pack. dim.
Approx. 900 x 730 x 112 (h) mm.

Total machine weight (including the packaging)
Wooden pallet and cardboard box: 90 Kg.
Wooden crate: 121 Kg.

Fig. 7

3.2 STORAGE CONDITIONS

If DPF-300 is not installed immediately after delivery, store the machine in its original packaging, under the following conditions:

- Non-operating temperature: -10°C +50°C
- Humidity: less than 80%, non-condensing

4. MACHINE INSTALLATION



CAUTION !! The installation of DPF-300 requires a thorough knowledge of the machine and must, therefore, be entrusted only to specially trained personnel.

4.1 SPACE NEEDED FOR MACHINE OPERATION

The drawing below (Fig.8) indicates the minimum space necessary for the correct operation and maintenance of DPF-300:

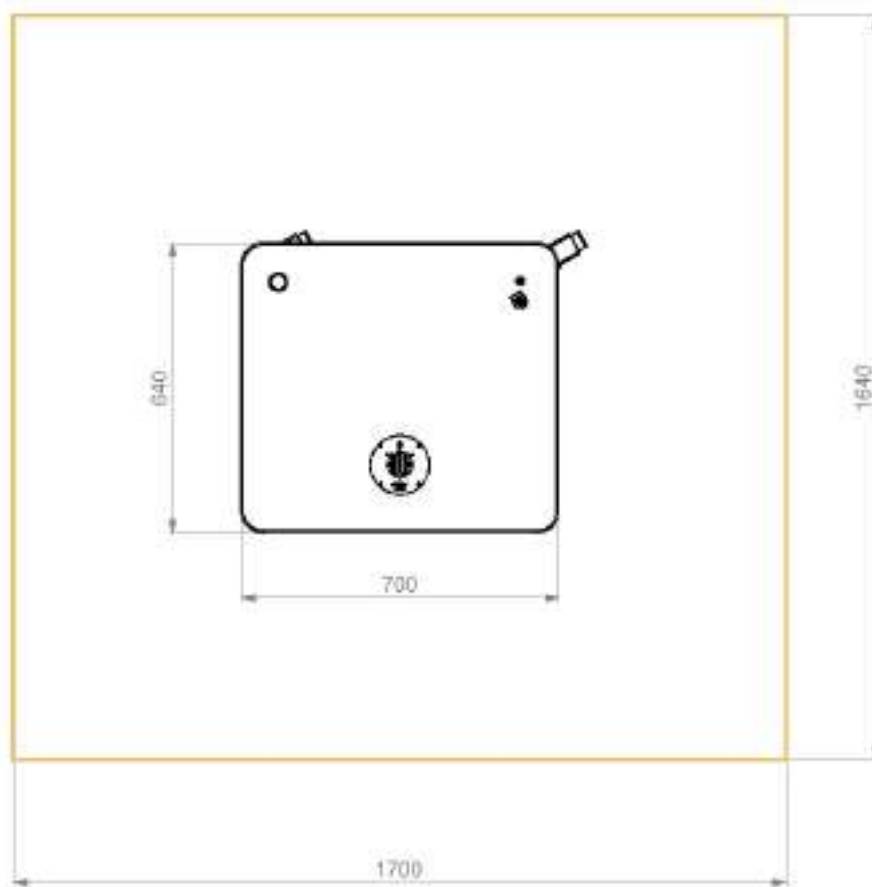


Fig. 8

4.2 CONDITIONS OF USE OF THE MACHINE

The main conditions of use of the machine with regard to the company systems are indicated in the paragraph below.

4.2.1 ENVIRONMENTAL CONDITIONS

- Operating temperature : 10 °C- 35 °C
- Non-operating temperature : 0°C-50°C
- Humidity : less than 70%, non-condensing
- Lighting conditions for the operator : high illuminance
not required

4.3 INSTALLATION PROCEDURE

The machine comes with all its parts already assembled and ready for use.

Before using the machine, perform the installation steps below:

- Adjust the height of the 2 feet making sure that they rest correctly on the ground and secure their position with the lock nuts;
- Lock the swivel wheels using the dedicated brake;
- Connect the machine to the mains (chap.4.3.1)Connect the machine to the mains;
- Install the cutter and the interchangeable guide of the required size, as indicated in chap.5;

4.3.1 CONNECTION TO THE MAINS

Connect the machine to a **230V** power supply line using the **2P+E** (Schuko) cable and socket supplied.

5. INSTALLING/REPLACING THE GUIDE AND THE CUTTER



Make sure that the system is disconnected from the power supply before carrying out any maintenance or adjustment work.

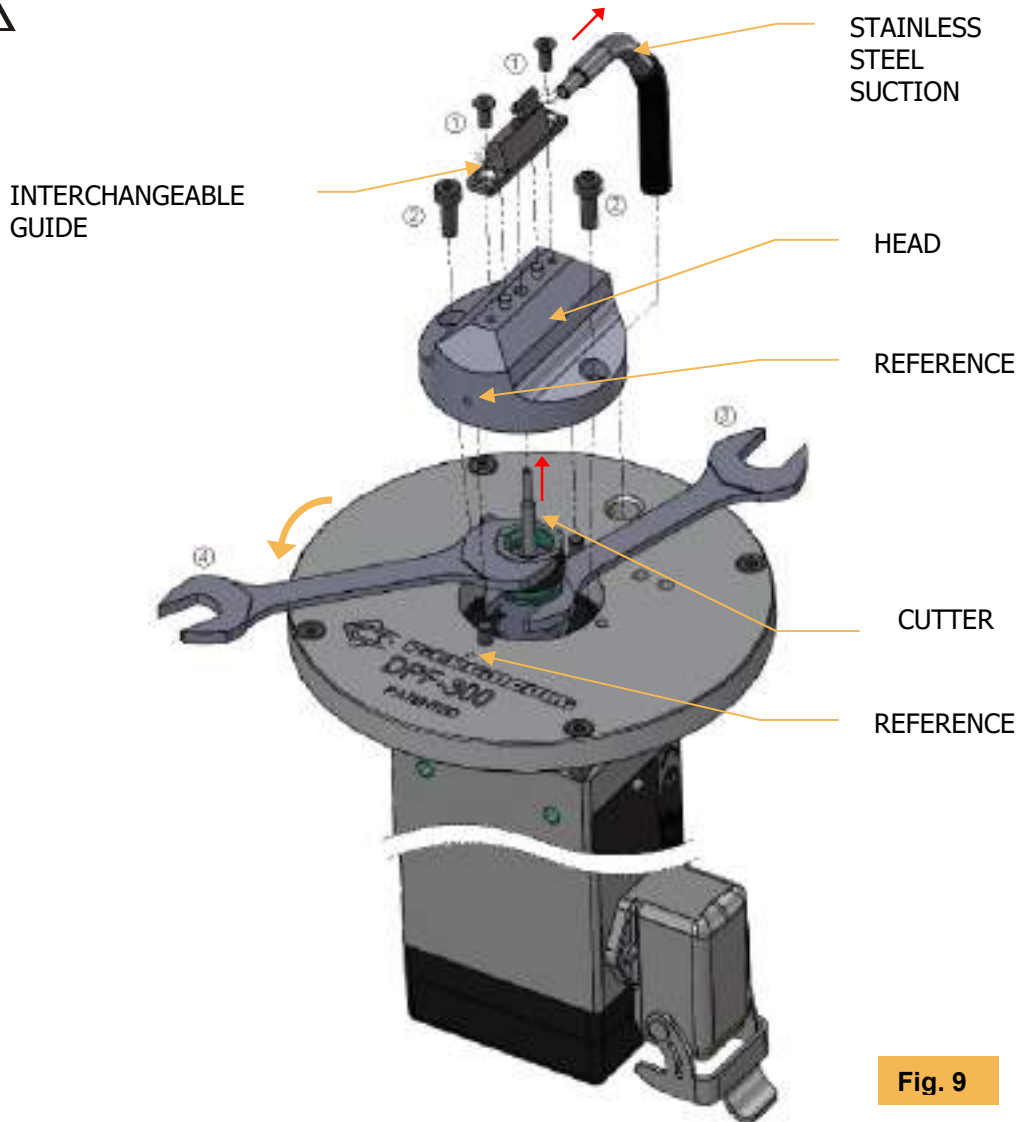


Fig. 9

Before using the machine, check the thickness of the isthmus to be cut and then install the interchangeable guide and cutter of the required size observing the steps below (Fig.9):

1. Remove the metal suction tube from the guide;
2. Loosen the 2 fixing screws **(1)** securing the interchangeable guide;
3. Pull out the interchangeable guide;
4. Loosen the 2 fixing screws securing head **(2)** and remove it;
5. Lock the spindle shaft using the 14mm wrench **(3)** included in the package;
6. Loosen the clamp using the 17mm wrench **(4)** included in the package; turn it counterclockwise;
7. remove the cutter and insert the new one; **push it in completely and tighten it vigorously;**
8. Perform the steps above in reverse making sure to respect the reference marks that indicate the correct orientation of the head.

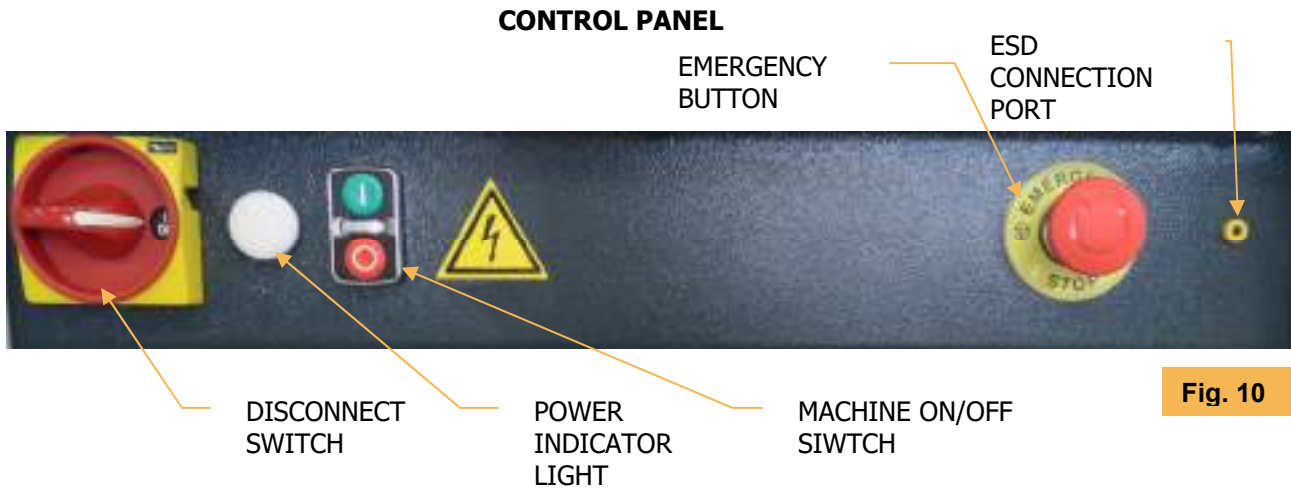
ATTENTION: the diameter of the cutter should **match** the thickness of the guide.

6. USING THE MACHINE



Always wear safety goggles, protective gloves and safety earmuffs when using the machine.

Once the machine has been installed correctly (Chap.4) and the appropriate interchangeable guide and cutter have been inserted (Chap.5), the machine can be operated from the front control panel Fig.10.



Switching on the machine Switch on the machine by turning the disconnect switch clockwise (the white power indicator light turns on) and then press the green button **I** on the switch to start the machine (the ORANGE indicator light on the workbench and the switch light turn on).

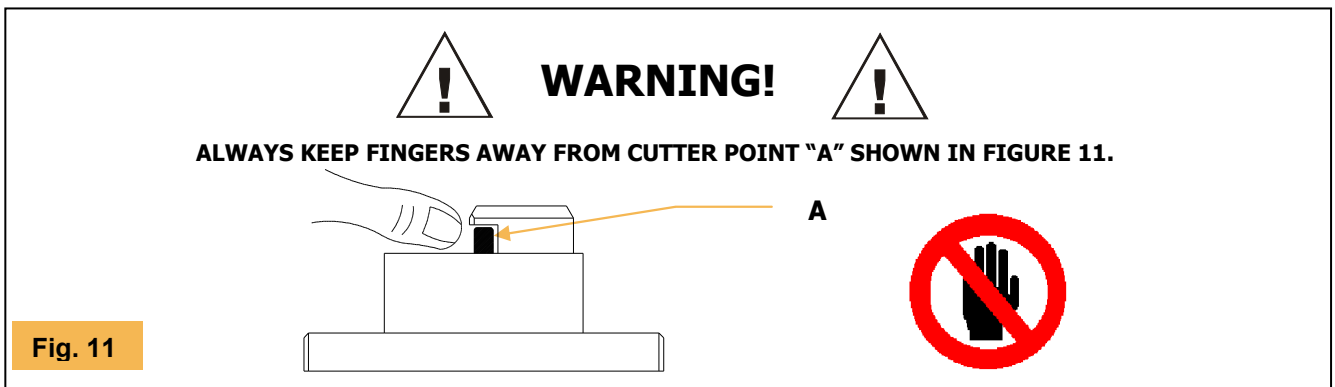
Switching off the machine Stop the machine by pressing the red button **O** on the switch. Turn the disconnect switch counterclockwise to disconnect the machine from the power grid.



In case of immediate danger, press the EMERGENCY button.



To connect the operator's wristband to the ESD system, use the banana connector on the right.



The operator must acquire a minimum of "practice" in order to use the machine correctly and satisfactorily.

6.1 OPERATIONAL PHASES

The sequence of figures below indicates how to use the machine correctly.

1. Place the PCB slot on the guide and insert the PCB into the slot until it rests on the guide.

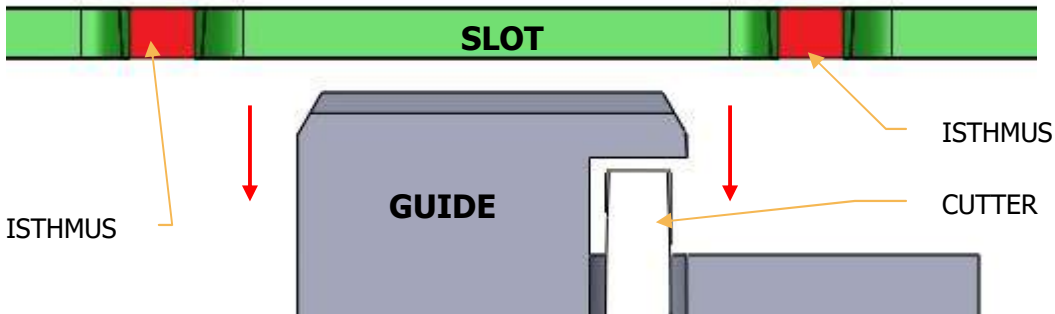


Fig. 12

2. Try to keep the PCB **orthogonal** to the guide (Fig.15-16). Slide the guide into the slot at an **adequate speed**, in the direction shown by the arrow until reaching the first isthmus to be removed.

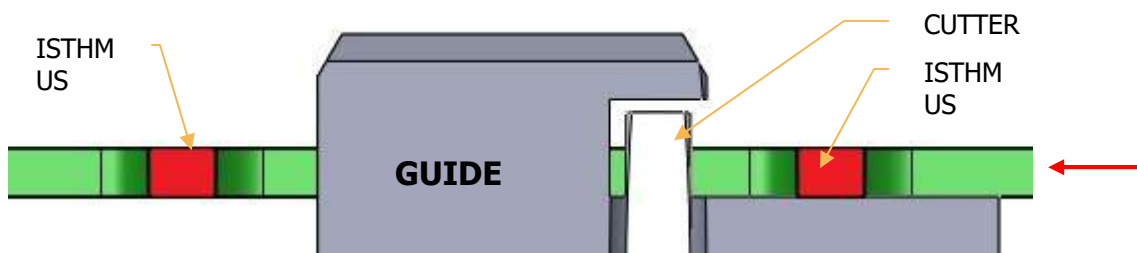


Fig. 13

3. Immediately after cutting the selected isthmus, remove the PCB from the guide and repeat the steps above. Or, if the next isthmus is very close to the one already cut and there is no need to rotate/flip the PCB, slide the guide inside the slot; please note that, in this case, the cutter might remove material from the walls of the slot if the board is not kept perfectly orthogonal to the guide.

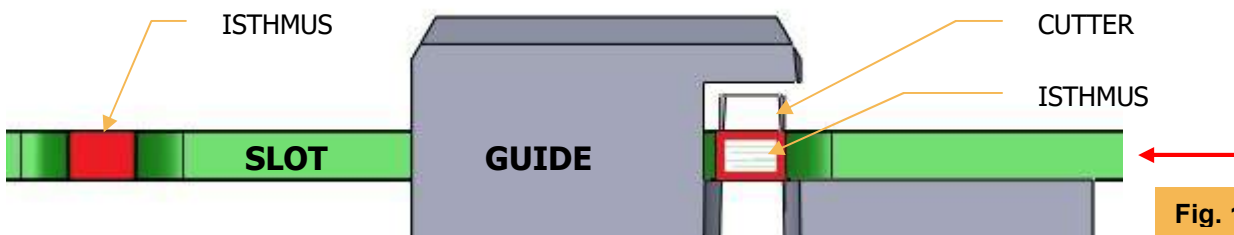


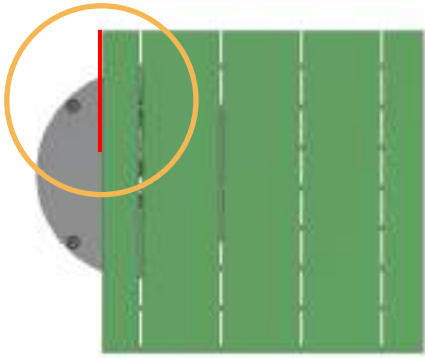
Fig. 14

N.B. Try to hold the PCB in place when cutting the last isthmus to make sure that it does not flip or rotate due to its instability, creating excessive residues.

6.2 PCB ORIENTATION

Below is indicated the correct orientation of the PCB in relation to the reference axis of the interchangeable guide, for the correct operation of the machine:

CORRECT



INCORRECT

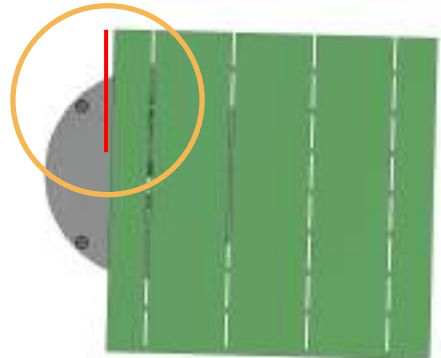
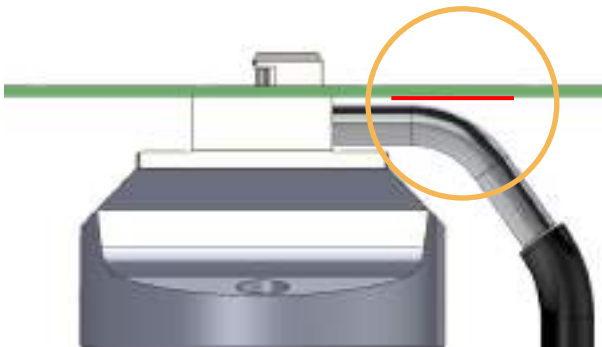


Fig. 15

CORRECT



INCORRECT

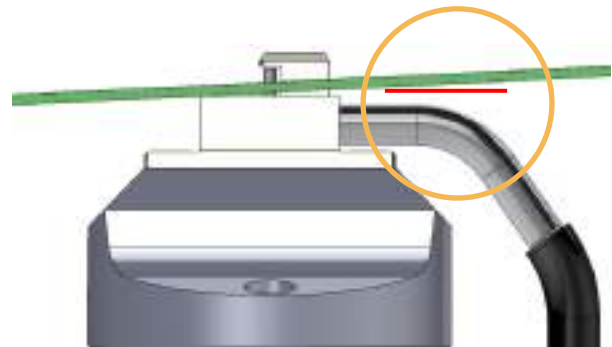


Fig. 16

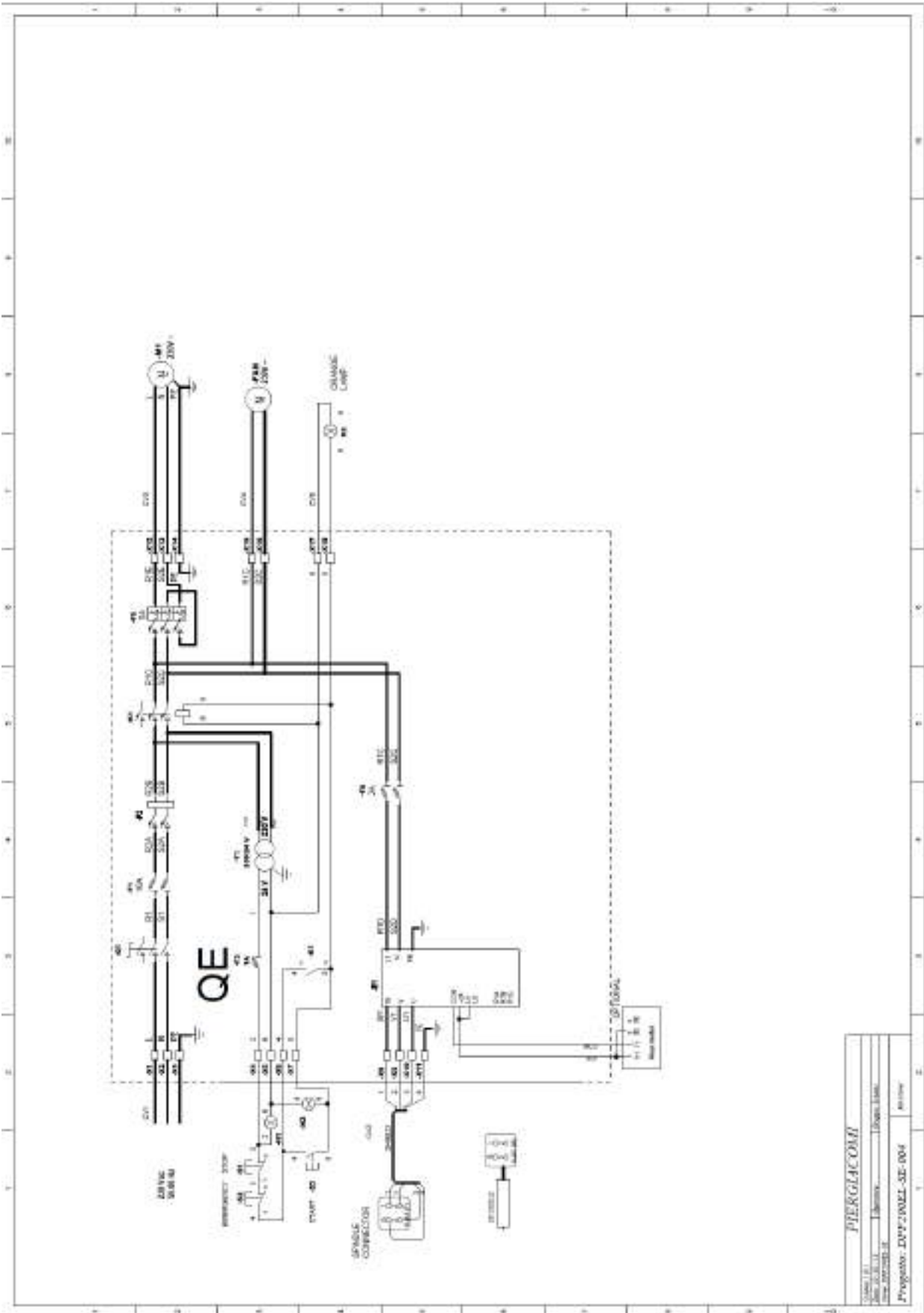
— Reference axis

7. ENVIROMENTAL IMPACT

The environmental impact of DPF-300 is minimal and has the following main characteristics:

- Dust pollution:*** the machine produces cutting dust that is collected by a special filter provided with a special filter cartridge.
- Oil pollution:*** the machine does not use and, therefore, does not release oil into the environment.
- Noise pollution:*** the machine is equipped with a motor spindle that may generate noise up to 80 dB(A) during cutting, measured at the operator position. The machine is equipped with a suction turbine that generates noise up to 70 dB(A), especially its rear side (that is equipped with a silencer), measured at the operator position.
- Heat pollution:*** the machine features a suction turbine located inside the frame, which generates hot exhaust air that comes out through the back of the turbine (equipped with a silencer); also, the turbine surfaces are subject to overheating any may reach temperatures of up to 55°C.

8. WIRINGDIAGRAM



9. MACHINE MAINTENANCE



Make sure that the system is disconnected from the power supply before carrying out any maintenance or adjustment work.

The machine is designed to allow easy maintenance; therefore, the electrical panel can be accessed from the front of the machine, via the protective casing that consists of a hinged door secured with the 3 screws indicated by the arrows (Fig.17). The motor spindle mount can also be accessed by removing the protective casing indicated in paragraph 9.3.



Remove the 4 screws from the machine back casing to access the compartment that houses the motor, the extraction system and the motor spindle compartment cooling fan.



9.1 ROUTINE MAINTENANCE

DAILY:

- General machine cleaning;
- Check the level of dust inside the filter and the clogging of the filter cartridge.
- Check the wear of the cutter.
- Check the wear of the interchangeable guide.
- Check the wear of the suction tube

N.B.: Do not clean the ESD workbench with alcohol-based detergents.
Do not use liquid detergents to clean the motor spindle

PERIODICALLY (every 20-30 days):

- Check the locking screws;
- Clean the rear exhaust silencer with compressed air.
- Clean the top of the motor spindle with compressed air by removing the aluminium head that secures the guide in place (see Chap.5).

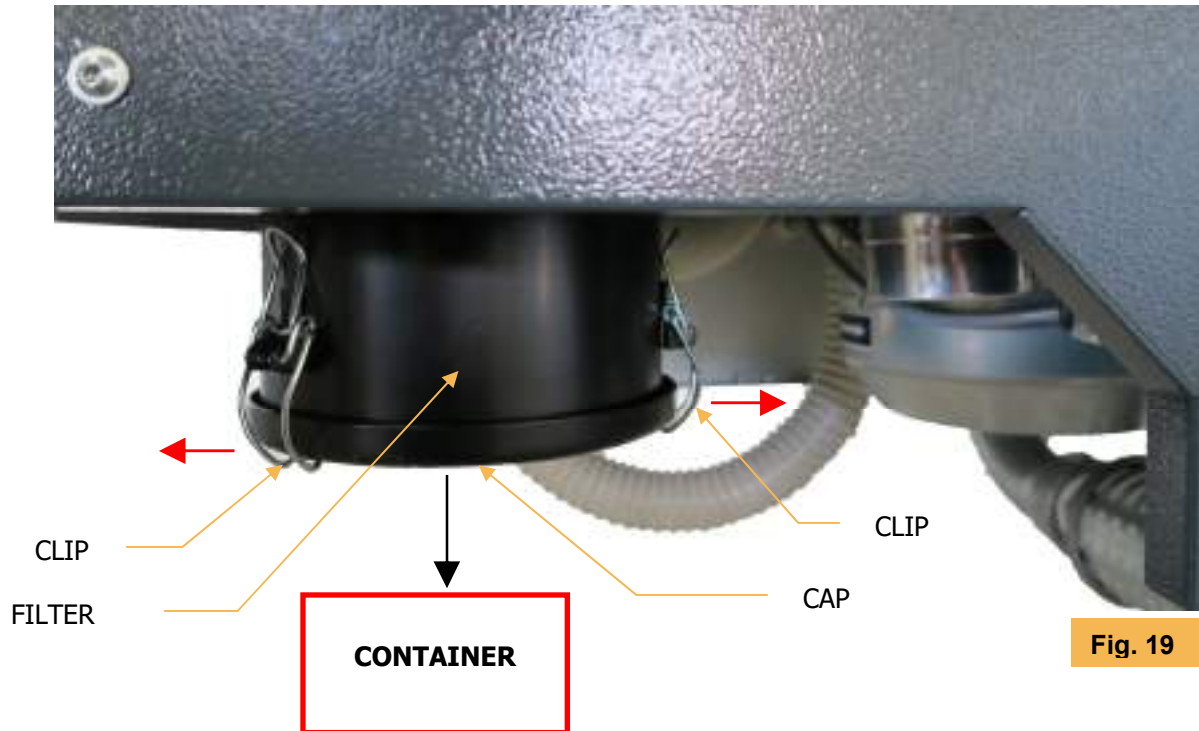
9.1.2 SPARE PARTS

- Interchangeable guide standard thickness 1.0-3.0 mm. Code DPF-GI-X.X
- FR4 Cutters (10pc. Pack) standard diameters 1.0-3.175 mm. Code DPF-FF-X.X
- FR4 Coated Cutters (10pc. Pack) available standard diameters 2.0/2.3 mm Code DPF-FF-X.XA
- ALUMINIUM Cutters (10pc. Pack) standard available 1.0-3.175 mm. Code DPF-FA-X.X
- ALUMINIUM Coated Cutters (10pc. Pack) standard available 1.5/1.6/2.0/2.4 mm. Code DPF-FA-X.XA
- Motor spindle with centring kit Code 2431BSBPER11RH
- Filter cartridge for 1-1/4" filter Code DPF-CAR-3.0
- Suction kit with regulator Code 21192-41489
- Suction hose Ø10 Code PVCRTAGEØ10
- Black antistatic hose Ø8 Code TAV-0806-B
- Stainless steel suction tube Code DPF200-TF-005

Custom interchangeable guides available on request.

9.2 DUST FILTER CLEANING

Always wear a **dust mask** and **protective gloves** when opening and cleaning the dust container.



The dust filter is located under the frame's rear compartment; it is suitably built and features a filter cartridge that complies with standard EN 60335-269 and can be easily accessed thanks to its special opening system.

To empty the dust filter, proceed as follows (Fig.19):

1. Place a container under filter to collect the dust;
2. Open the filter cap using the 3 clips around it;
3. Clean the filter cartridge with compressed air and remove any dust residues.
This operation must be carried out in a dedicated room;
4. Perform the steps above in reverse.

After performing step 3, if the filter cartridge is still clogged with dust, replace it with a new one (contact the technical support service).

N.B. If the machine is left running with a very clogged filter for long periods of time, the extraction system will become inefficient and, most importantly, the motor will overheat and may break down prematurely.

ATTENTION: Check the **level** of dust inside the filter constantly and make sure that the filter cartridge is not clogged with dust.

9.3 MOTOR SPINDLE MAINTENANCE



Make sure that the system is disconnected from the power supply before carrying out any maintenance or adjustment work.

To access the motor spindle, open the electrical panel following the instructions in chap.9. Then remove the 4 screw shown in Fig.20, that secure the protective casing, to access the motor spindle mount.

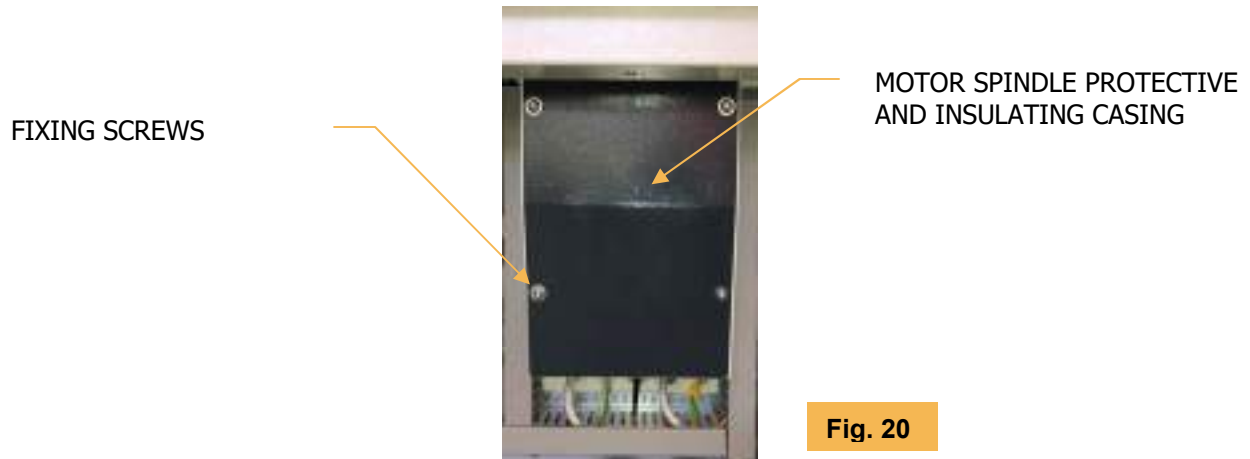


Fig. 20

- DO NOT LOOSEN THE SCREWS ON THE MOTOR SPINDLE MOUNT (Fig.21)

CAUTION: Any accidental tampering with the mount screws will require a new alignment of the INTERCHANGEABLE GUIDE-CUTTER assembly.

For any motor spindle fault, please contact our technical support department to better assess the problem encountered and determine whether the part must be overhauled or replaced

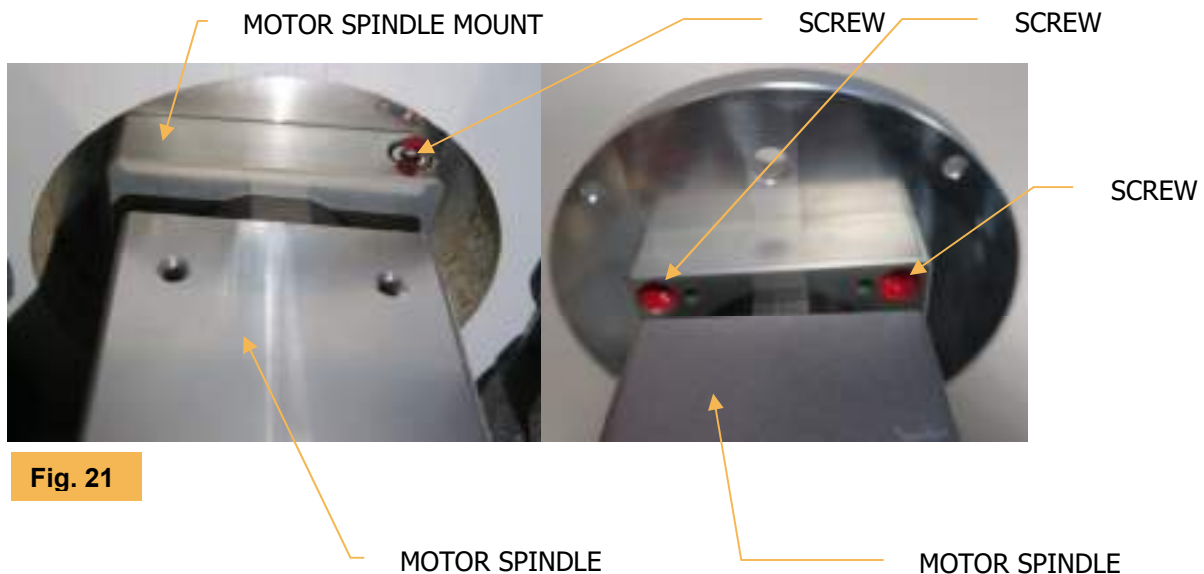


Fig. 21

10. TECHNICAL SPECIFICATIONS

10.1 GENERAL CHARACTERISTICS

Approx. dimensions	64 cm. (W) x 70 cm. (L) x 950 cm. (H)
Clearance	164 cm. (W) x 170 cm. (L)
Interchangeable guide material	Hardened ground steel.
Interchangeable guide thickness	Standard 1.0 - 3.0 mm.
Cutter diameter	Standard 1.0 - 3.175 mm.
Motor spindle power	0.27kW
Motor spindle speed	24.000 revolutions/min
Storage temperature	from -10°C to 40°C not met
Operating temperature	from 5°C to 40°C not met
Sound pressure	80 dB(A) - Uncertainty 3 dB(A) measured at the operator position Test FR4 thck.1.6mm / cutter 2mm < 2.5 m/s ²
Vibrations	Test FR4 thck.1.6mm / cutter 2mm < 2.5 m/s ²
Weight	73 Kg
Voltage	230V/50Hz
Input power	0.90 kW
Socket	230V SCHUKO 90 2P+E
Vacuum	28 kPa (280 mbar)
Suction Filter	1-1/4" connection
CE Marking	

10.2 CHARACTERISTICS OF THE PCBs TO BE SEPARATED

PCB thickness	Max. 4.0 mm.
Slot length (L)	Min. 11 mm.
Slot width (V)	standard 1.0 - 3.0 mm.
Slot width tolerance:	0 / - 0.02 mm.
Isthmus distance form components (C)	Min. 0.8-1 mm.
PCB Material	FR4 – CEM – ALUMINIUM*

*For aluminium PCBs, please contact Piergiacomini for the corresponding cutters.

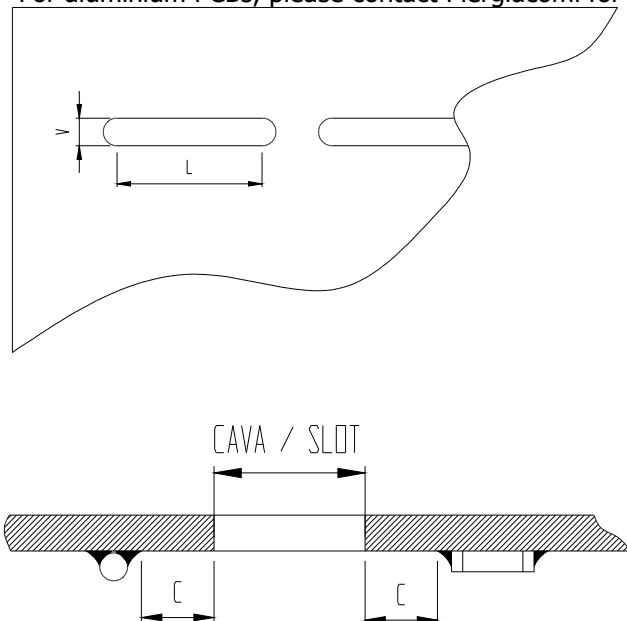


Fig. 22

11. WARRANTY CONDITIONS

DPF-200 is covered by a 12-month warranty starting from the date of delivery to the customer (the date of issue of the transport document).

The warranty covers all mechanical parts that are found to be defective, except for those subject to normal wear and tear (interchangeable guides, cutters, filter cartridge).

Any part found to be defective due to improper use or tampering shall be considered outside the warranty conditions.

12. TECHNICAL SUPPORT

TECHNICAL SUPPORT:

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DPF-300 DECLARATION OF CONFORMITY

MANUFACTURER: **PIERGIACOMI SUD s.r.l.** Via 81a Strada, 3
63076 MONTEPRANDONE (AP) – Italy

MACHINE DESCRIPTION: **DPF-300**
Milling machine with electric extraction system for
PCB separation

THE MACHINE **DPF-300** COMPLIES WITH THE ESSENTIAL REQUIREMENTS of the
following (harmonised) standards:

DIRECTIVE 2006/42/CE

UNI EN ISO 12100 Safety of Machinery - General principles for design -
Risk assessment and risk reduction.

UNI EN ISO 13857 Safety of machinery - Safety distances to prevent
hazard zones being reached by upper and lower limbs.

UNI EN ISO 14120 Safety of machinery - Guards - General requirements for the
design and construction of fixed and movable guards

UNI EN ISO 13849-1 Safety of machinery - Safety-related parts of control
systems - Part 1: General principles for design.

EN 60204-1 Safety of machinery Electrical equipment of machines.
Part 1: General requirements.

IEC EN 61340-5-1 Protection of electronic devices from electrostatic phenomena - General
requirements

DIN EN 60335-2-69 (ex BIA ZH 1/487) Safety of household and similar electrical appliances - Part 2:
Particular requirements for wet and dry vacuum cleaners, including power brush, for industrial and
commercial use.

DIRECTIVE 2014/30/UE EMC (Electromagnetic compatibility)

EN 61000-6-4 Part 6-4: Generic standards - Emission standard for industrial environments.

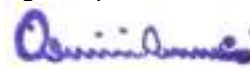
EN 61000-6-2 Part 6-2: Generic standards - immunity for industrial environments.

DIRECTIVE 2014/35/UE (Low Voltage)

All electrical materials and subsystems used in the construction of the DPF200 machine comply with Directive
2014/35 / UE.

Monteprandone 06 - 02 - 2018

Legal Representative



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