PATENTED

INSTRUCTION MANUAL
DPF-200

TABLE OF CONTENTS

This manual contains the following information:

NOTE

The information contained in this document is subject to modifications at the discretion of the Company without notice.

INTRODUCTION

The CHP DPF-200 is a manual router table for depaneling PCBs from a panel or multiblock. Please read all safety warnings and instructions before operating the machinery. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury. Keep this manual readily accessible for reference.

1. SAFETY WARNINGS

1.1 MEANING OF GRAPHIC SYMBOLS

The general warning symbol

This symbol located on the head base plate indicates "DO NOT PUT YOUR HANDS" on the milling machine during operation.

This symbol located on the work plane indicates that the surface is in compliance to CEI EN 61340-5-1 regulation concerning protection of electronic devices from electrostatic phenomena.

This symbol located on the head base plate indicates that during use of the machine it is mandatory to use always eye protection glasses and hearing protection headphone.

1.2 GENERAL PROVISIONS

Before performing maintenance or adjustment to the machine, make sure that the compressed air is disconnected and the machine is unplugged from the electrical outlet.

ATTENTION: American HAKKO Products, Inc. declines any liability for damages caused by the removal or modification, without authorization, of parts of the machine; it is also prohibited to carry out maintenance or adjustment during use of the machine.

The machine must be used exclusively for depaneling of FR4 or ALUMINIUM circuit board. Any other use is therefore prohibited and results the immediate termination of the warranty on the product.

Comply with the indications or the prohibitions highlighted on the machine.

The machine is manufactured according with the safety criteria dictated by current regulations, indicated in the statement of compliance Annexed to this manual.

1.3 IDENTIFICATION PLATES ON THE MACHINE

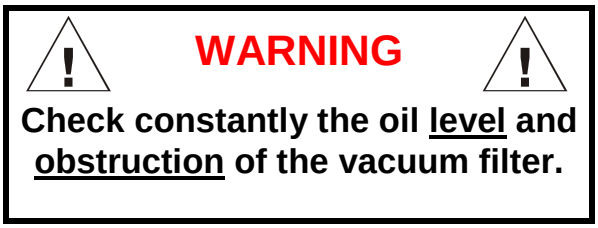
			CE	
Mod. DPF-200				
serial number 0000			55 kg	
115 V	-	60 Hz	14.2 A	0.63 Kw

Identification plate of the machine showing the main features and the serial number. It is located at the rear part of the machine.

Plate showing the maximum flow necessary for the compressed air and the pressure of the regulator. Also indicates the type of lubricating oil and the related adjustment of the lubricator.

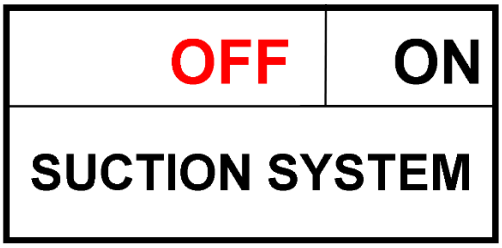
AIR PRESSURE 6.0 bar **MAX. CONSUMPT.**210 l/min (Use only dry air)	**OIL for NEBULIZERS** SAE#10 (Lubricator Adjustment: MIN)

1.4 MEANING OF THE WARNING PLATES ON THE MACHINE



This plate located on the front part of the machine and over the work plane indicates to check constantly the oil level of the lubricator.

This plate located on the front left part of the machine indicates the position of the compressed air connection with the required size of the supply air pipe.



This plate located on the front right part of the machine indicates the ON and OFF of the electrical suction system.

2. DESCRIPTION OF THE MACHINE

The machine (Figure1) is a steel structure, where in the upper part there is an ESD safe work plane on which the milling head is mounted. The structure rests on two steel feet and two ESD safe casters with brakes for convenient positioning, with addition of the EPB (Equipotential Bounding) 90° point, the machine complies with the IEC-61340-5-1 Standard.

Pneumatic control pedal with safety guard can be positioned as the operator's will. Below the work plane is a protective case for the milling head and for various supply pipes and is mounted by 2 knobs. On the front part there are adjustment devices such as the compressed air regulator, the lubricator for the micro-pneumatic mandrel and the ON - OFF switch of the electrical suction system.

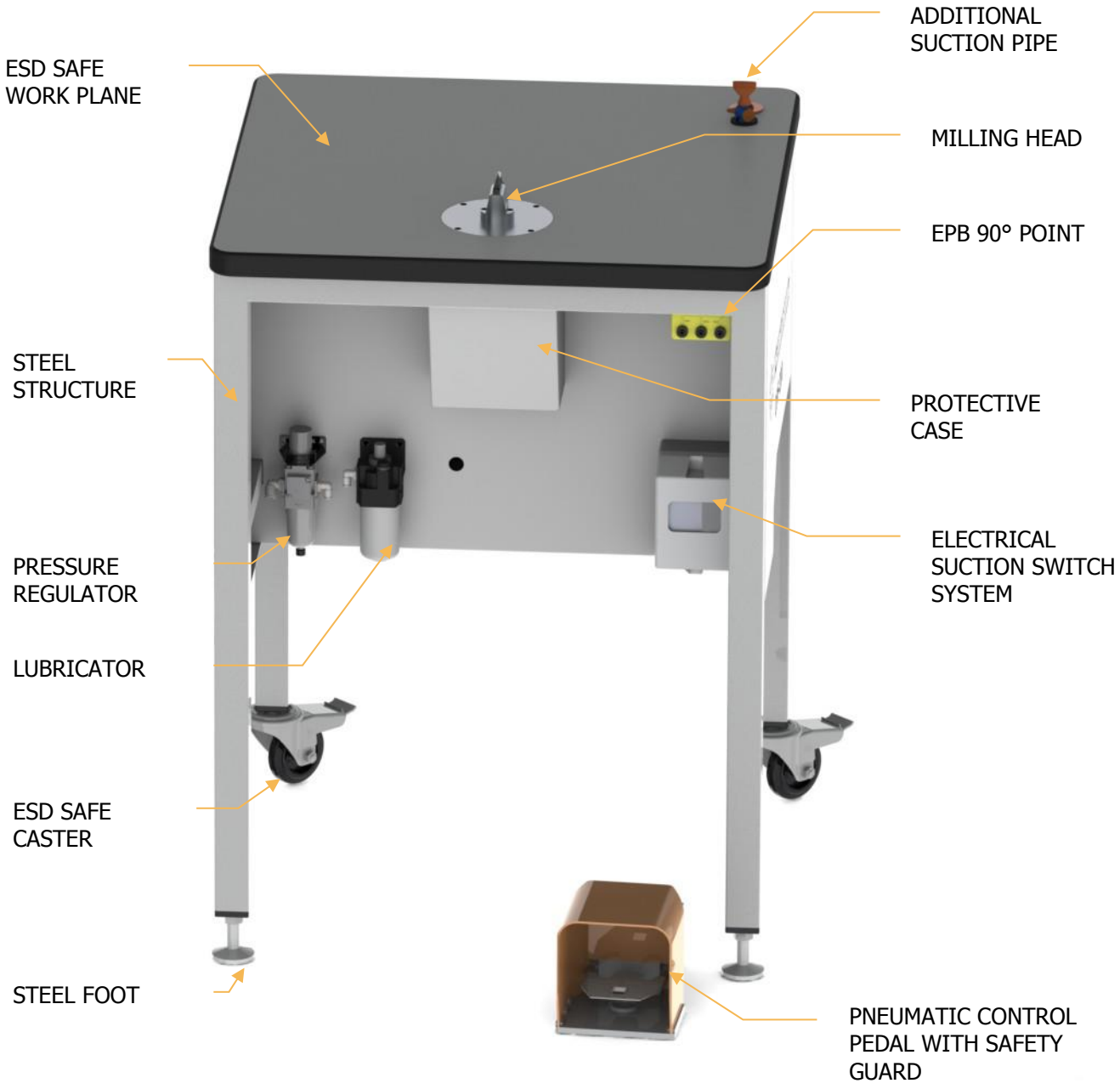


Figure 1

The cover on the back side can be removed for easy maintenance.
The dust filter is located under the base of the structure, the filter cartridge can be accessed by means of side clips.

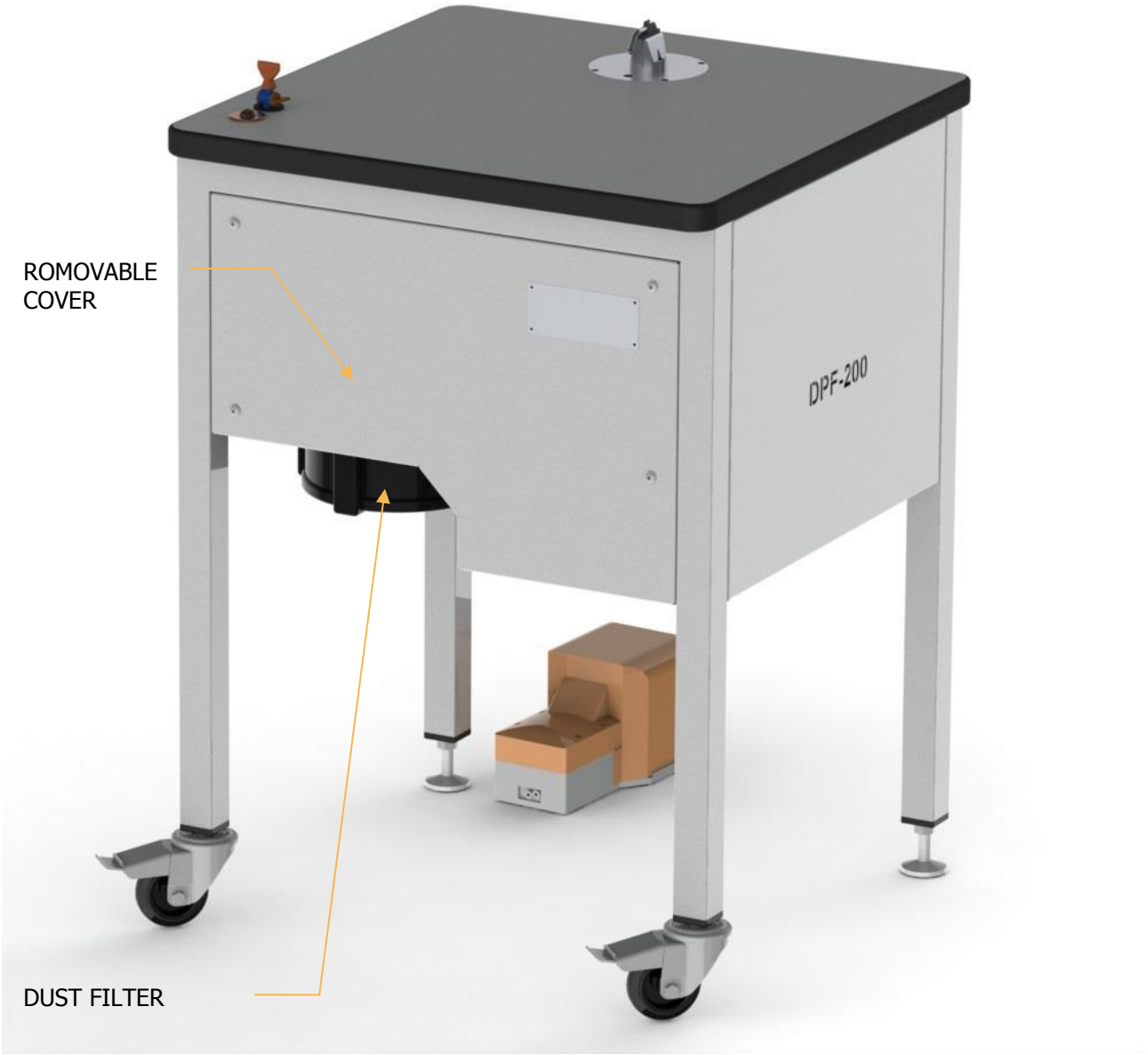


Figure 2

The milling head consists of a base (can be rotated 90° clockwise or counter-clockwise) and a support head on which an interchangeable guide made of hardened and ground steel is mounted.
On the rail there is a central hole exposing the dedicated milling bit, the suction pipe connected to a suction system and related dust filter.

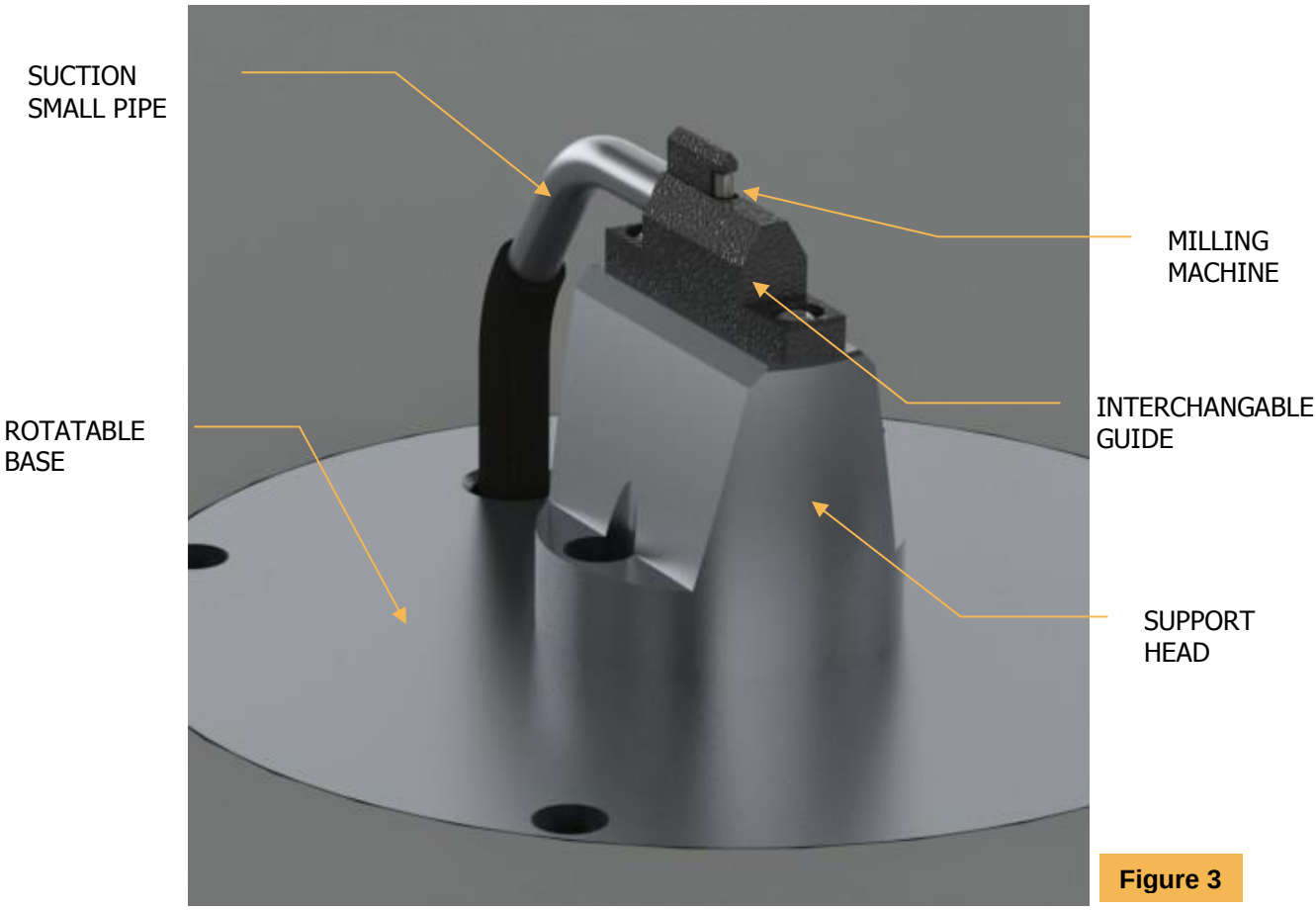


Figure 3

Additional suction pipe with air valve is located at the rear corner of the work plane, to be used to clean the work plane from any dust residues.

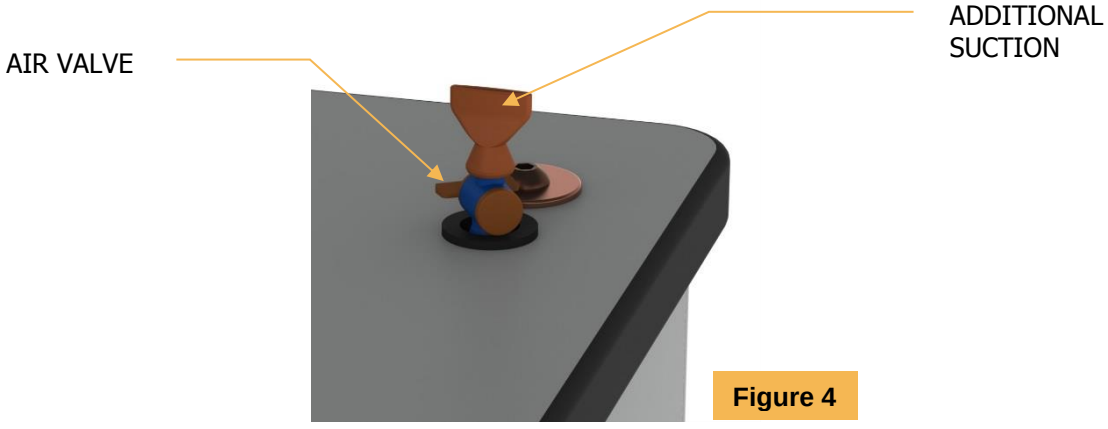


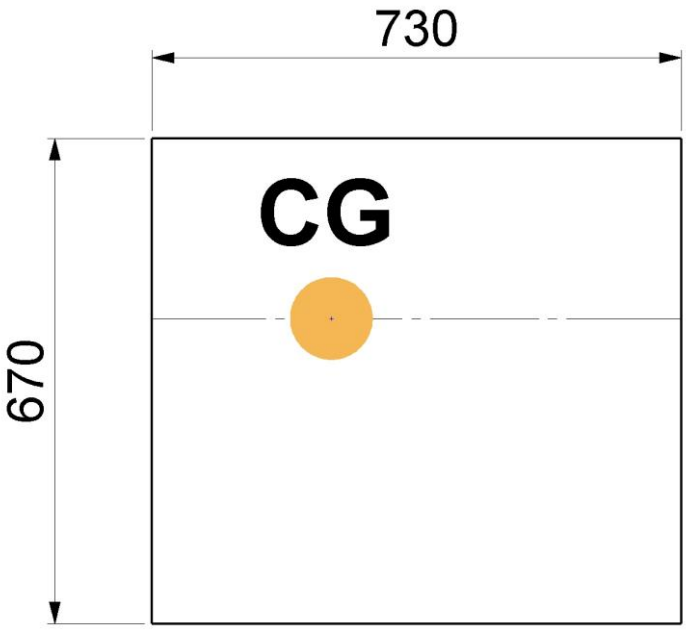
Figure 4

3. TRANSPORTATION AND STORAGE

ATTENTION!! All transport operations must be carried out with the utmost caution and by specially instructed personnel.

3.1 TRANSPORTATION

For transportation, the following Figure shows the machine lies sideways with dimensions.



Dim. of packaging: 730 x 670 x 1150 (h) mm.

DPF-200-E
Total Weight with packaging: 65 Kg.

Figure 5

3.2 STORAGE

DPF-200 should be stored under the following conditions in the original packaging:

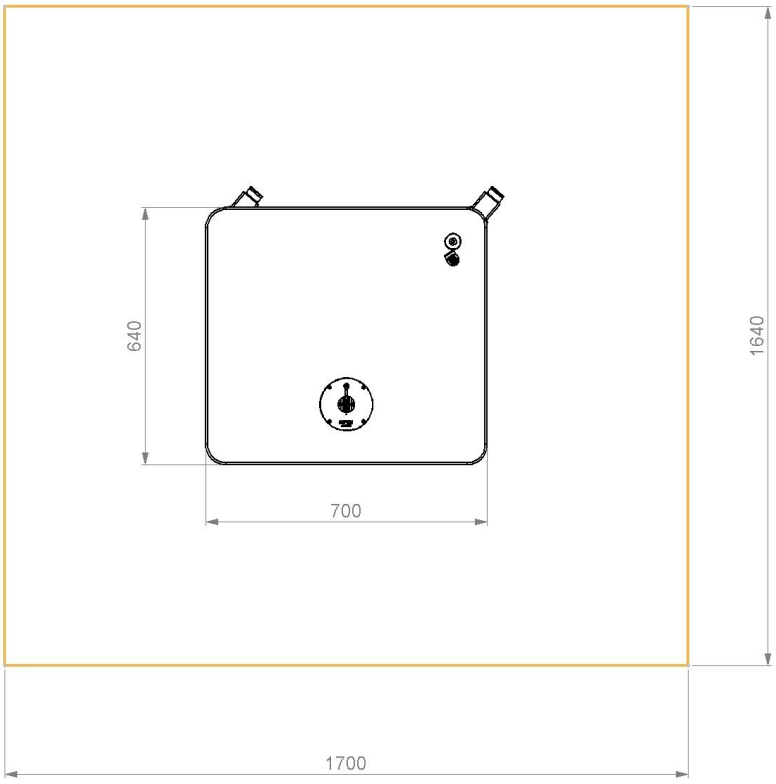
- Temperature when not in operation: -10 °C to +50 °C
- Humidity lower than 80% and without condensation

4. INSTALLATION OF THE MACHINE

ATTENTION!! The installation of the DPF-200 machine requires deep understanding of the machine and therefore must be assigned only to specially instructed personnel.

4.1 NECESSARY SPACE FOR OPERATION

The drawing shown below indicates the dimensions of the minimum space necessary for the correct and continuous operation of the DPF-200:



Unit: mm

Figure 6

4.2 OPERATING CONDITIONS

- Operating temperature : 10 °C to 35 °C
- Temperature when not working : 0 °C to 50 °C
- Humidity : lower than 70% and without condensation
- Illumination conditions for the operator : a high degree of illumination is not required

4.3 INSTALLATION PROCEDURE

The machine is supplied with parts assembled.

Before operating the machine, perform the following steps of installation:

• Adjust the height of the 2 front feet with the locking nuts and make sure they are levelled with ground

• Lock the casters through the supplied brake;

• Arrange the pedal in a position accessible only to the operator;

• Connect the machine to the pneumatic power (Chapter 4.3.1) and to the proper electrical power supply (Chapter 4.3.2).

• Install the milling bit and interchangeable guide as outlined in Chapter 5.

4.3.1 CONNECTION TO THE PNEUMATIC POWER

It is necessary to connect the machine to pneumatic power with an 6 mm diameter nylon pipe through the push-to-connect fitting which is on the lower left side of the machine and indicated by a special plate (Chapter 1.4).

ATTENTION! For compliance of the plant to the current regulations it is necessary to install air valve at the source of the pneumatic power (compressed air).

- Quantity of required air : **max. 210 l/min.**
  average 140 l/min. (intermittent use 30 to 40 cuts/min)
- Distribution pressure : **6.0 bar**

The air must not contain *impurities* and must be completely *dry*, the pneumatic micro-spindle requires lubricated compressed air supplied by the provided lubricator.

4.3.2 CONNECTION TO THE ELECTRICAL POWER

It is necessary to connect the machine to the electrical power with supply voltage of **120V with 20A circuit breaker**, through the provided cable and plug.

5. INSTALLATION & REPLACEMENT OF GUIDE AND MILLING BIT

Make sure that the compressed air supply and the electrical power supply are disconnected before performing maintenance or adjustment to the machine.

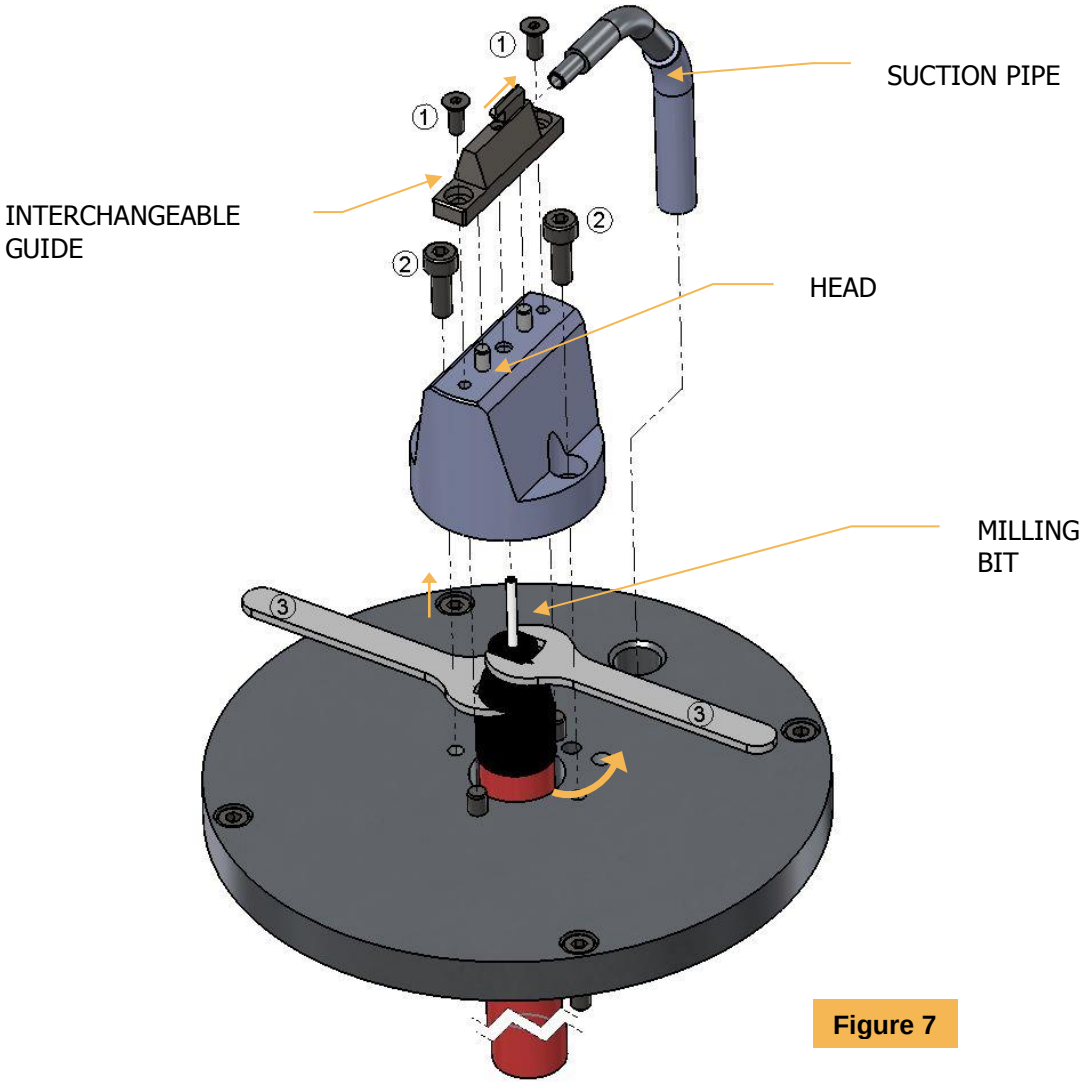


Figure 7

Confirm the width of the isthmus to be cut, then follow the steps to install proper milling bit and interchangeable guide:

1. Pull the small metallic suction pipe from the guide;
2. Unscrew the No. 2 fastening screws **(1)** on the interchangeable guide;
3. Remove the interchangeable guide;
4. Unscrew the No. 2 fastening screws **(2)** and remove the head;
5. Release the clamp of the micro-spindle using the supplied wrenches **(3)**, by inserting the left key into the locking slot and turning the right key in counter-clockwise direction to release the clamp;
6. Remove the milling bit and fully insert a new one;
7. Follow the listed steps above in reverse order.

ATTENTION: The diameter of the milling bit should be the same as the thickness of the guide.

6. ROTATION OF THE BASE

Make sure that the compressed air supply and the electrical power supply are disconnected before performing maintenance or adjustment to the machine.

If necessary, the DPF-200 base can be rotated by 90° clockwise or counter-clockwise.
It is recommended to use the head in the original direction as shown in Figure 8, a solution for which the machine has been designed where the performance in most cases is more practical, fast and accurate.

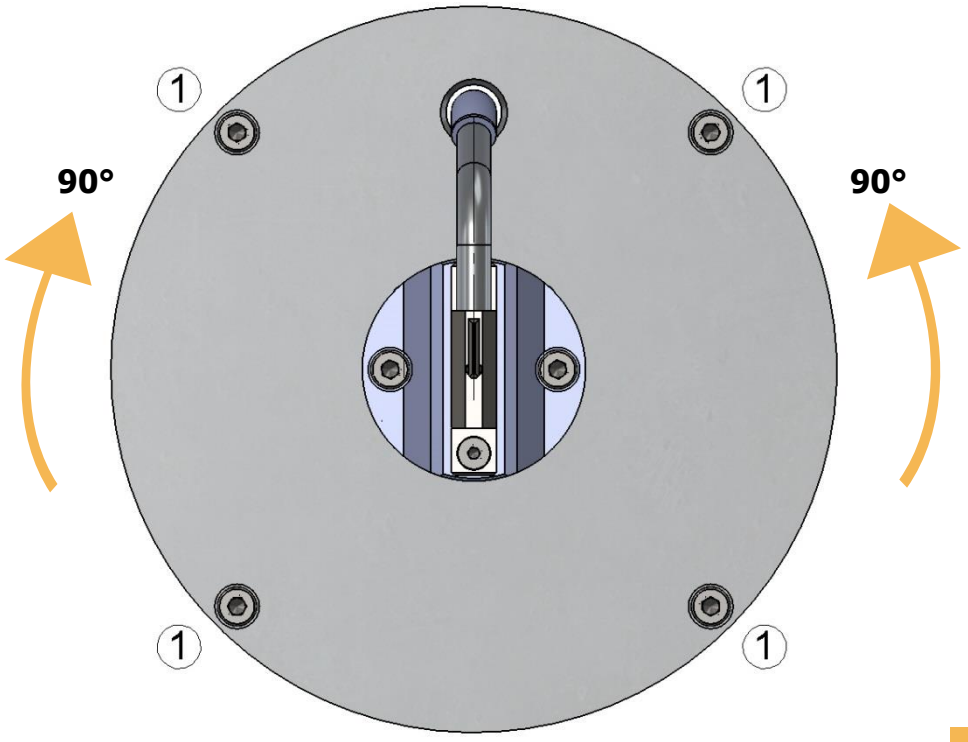


Figure 8

To rotate the whole base, carry out the following steps:

1. Unscrew the No. 4 fastening screws **(1)** of the circular base.
2. Rotate the head by 90° in the desired direction (clockwise or counter-clockwise).
3. Screw the No. 4 fastening screws **(1)** of the circular base.

ATTENTION: Do not rotate the base by 180°, which could cause malfunction of the vacuum pipe.

7. USE OF THE MACHINE

Once completed the installation (Chapter 4) and inserted the proper milling bit with corresponded guide (Chapter 5), the unit is not ready to use.

ATTENTION !

DO NOT INSERT FINGERS INTO POINT "A" OF THE MILLING BIT AS SHOWN IN FIGURE 9.

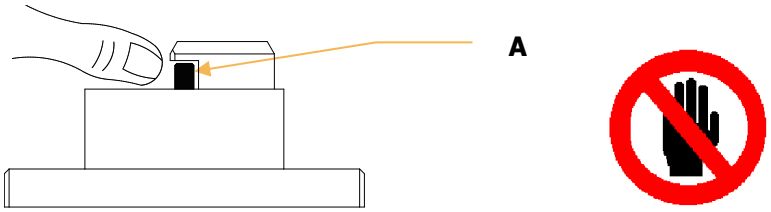


Figure 9

During the use of the machine always use the protection eye glasses and the hearing protection headphone.

7.1 OPERATION PROCEDURE

1. Position the slot of the PCB and insert PCB into the guide rail until it rests on the guide.

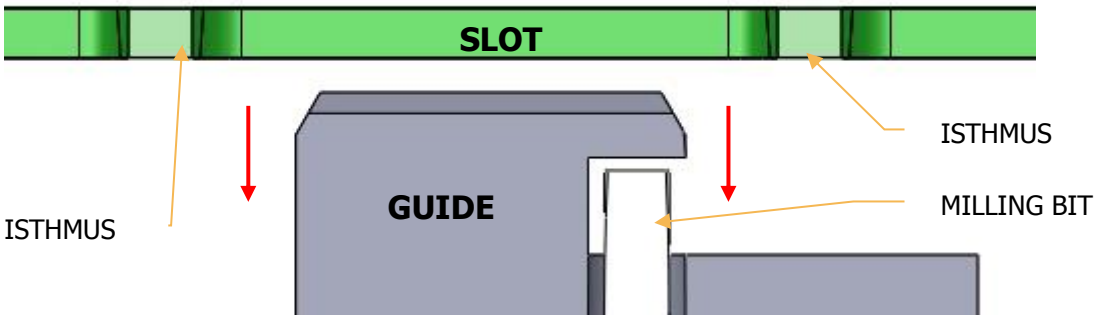


Figure 10

2. Try to keep the PCB **in line** with the guide (Figures 12-13). Press the foot pedal to drive the milling bit. Run the PCB with adequate speed in the direction shown by the red arrow so the right isthmus can be removed.

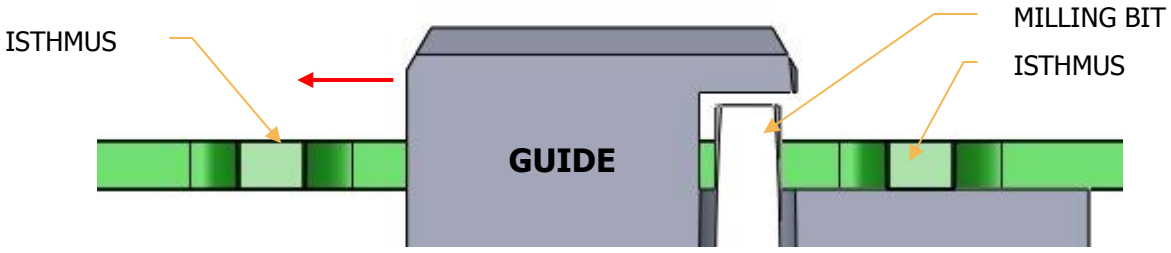


Figure 11

3. Immediately after cutting the selected isthmus, release the pedal and reposition the PCB. Repeat the previous steps to remove the next isthmus.

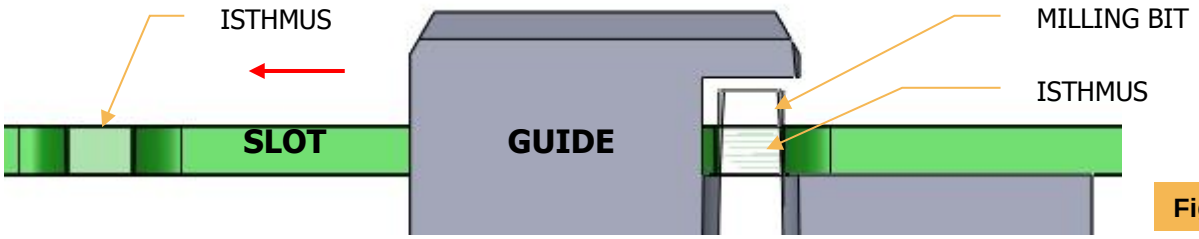


Figure 12

7.2 PCB ORIENTATION

Make sure the PCB is in line with the guide and sits horizontally as shown in figures below:

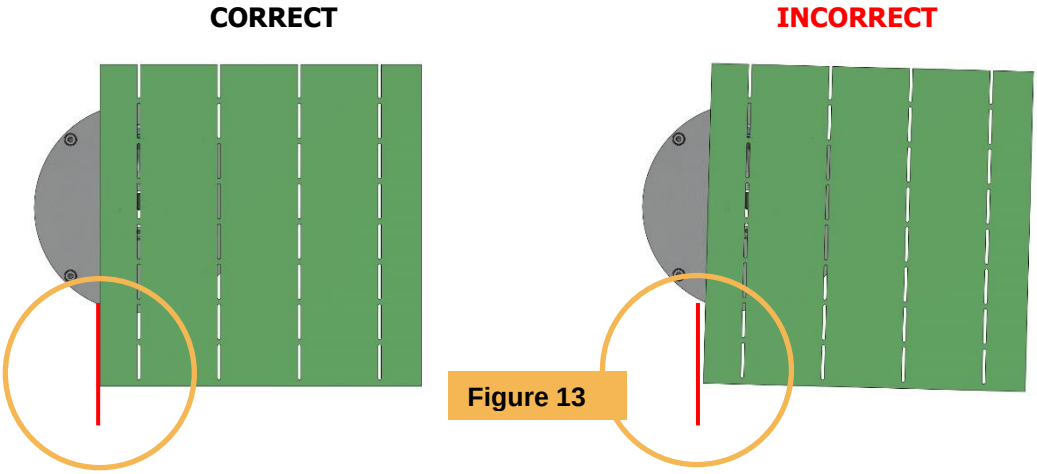


Figure 13

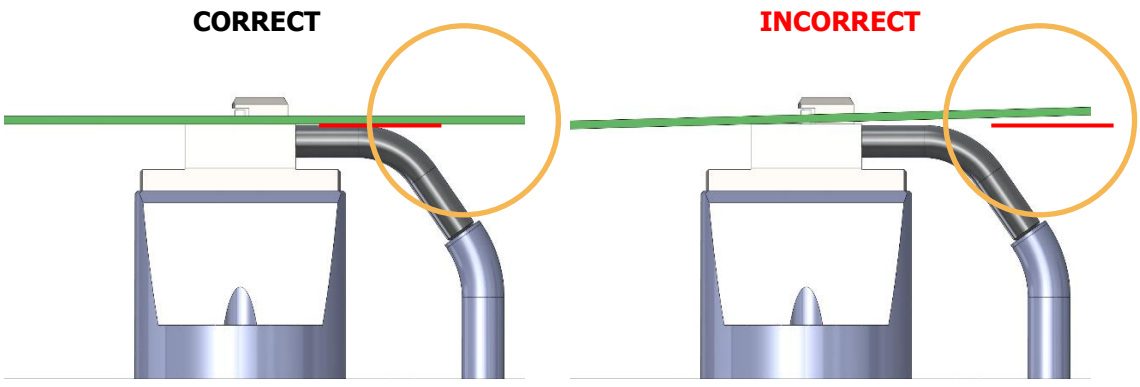


Figure 14

8. CLEANING THE DUST FILTER

When opening and cleaning of the dust filter, always use protection dust mask and gloves.

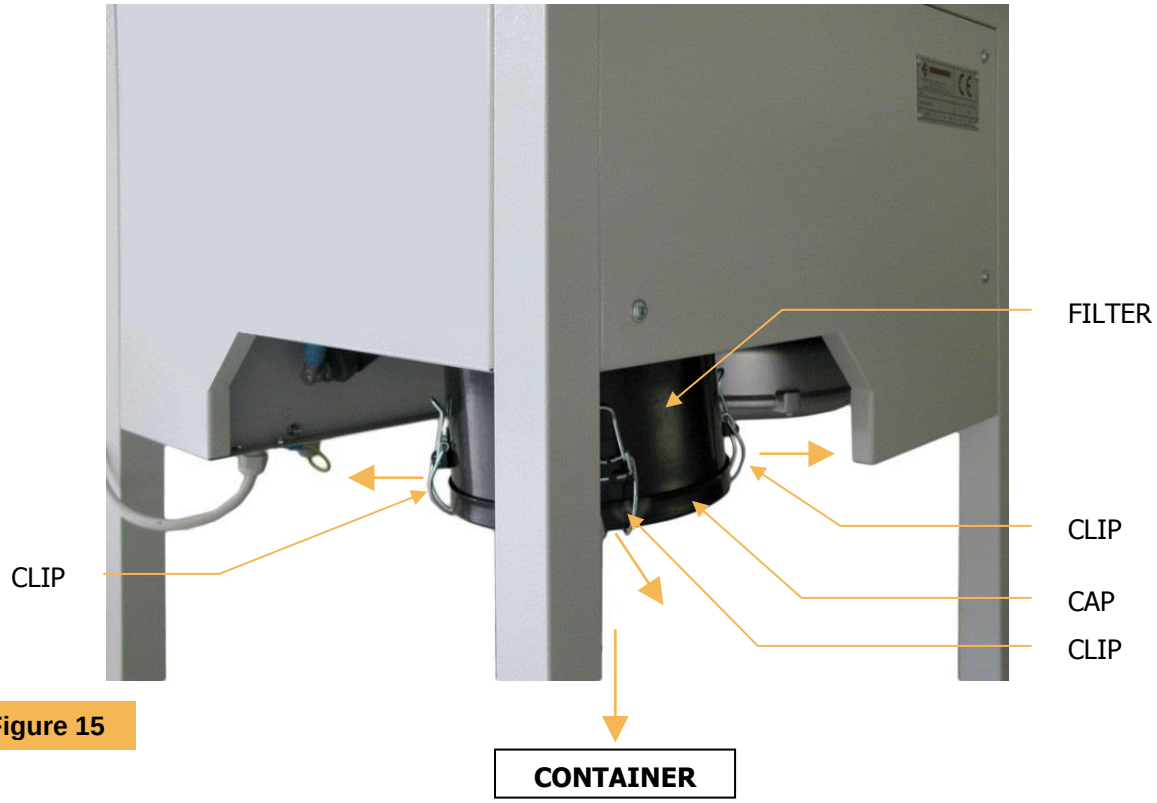


Figure 15

Under the rear compartment of the structure there is the specially made dust filter, which contains a filter cartridge accessible through an easy opening system.
Should it be necessary to empty the filter, proceed as follows (Figure 15):

1. Place a special container on the ground under the filter for disposal.
2. Open the filter cap by unlock the No. 4 clips shown around the part.
3. Clean the filter cartridge with compressed air and removing the residual dust.
4. Carry out the above listed steps in reverse.

If the filter cartridge were still clogged with dust after cleaning, the filter will need to be replaced.

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

9. REPLACEMENT OF THE MICRO-SPINDLE

Make sure that the compressed air supply and the electrical power supply are disconnected before performing maintenance or adjustment to the machine.

- DO NOT UNSCREW THE **FIXED SUPPORT** OF THE MICRO-SPINDLE AT ANY TIME.
- UNSCREW THE MOBILE SUPPORT **ONLY** WHEN REPLACING THE MICRO-SPINDLE

ATTENTIONE: Once replaced the micro-spindle, the centring of MILLING BIT- INTERCHANGEABLE GUIDE may need to be re-adjusted.

If the micro-spindle will need to be replaced (**please confirm with American Hakko Products, Inc.**), it must be proceeded according to the following steps (Figure 16):

1. Remove the milling bit from the micro-spindle (Chapter 5).
2. Unscrew the attachment of the micro-spindle on the lubricator (Chapter 2 - Figure 1).
3. Unscrew the No. 2 knobs and remove the protective case (Chapter 2 - Figure 1).
4. Unscrew the fastening screws **(1)** of the micro-spindle mobile support.
5. Extract the spindle downwards and remove the micro-spindle supply pipe.
6. Insert the new spindle, pay close attention to its centring. Do not fully fasten screws **(1)** at this point.
7. Insert the replaced milling bit into the new micro-spindle (Chapter 5) and install the dedicated head and guide.
8. Adjust the height of micro-spindle by turning the screws **(1)**, make sure that the milling bit does not come into contact with the interchangeable guide on the upper protection part. The recommended gap is 0.2 mm to 0.4 mm.
9. Fully fasten screws **(1).**
10. Adjust the speed regulation knob to the maximum, by rotating it in counter-clockwise direction.

Check the **centring of the milling bit with respect to the interchangeable guide**, by making sure the milling bit rotates freely without making contact with the guide.

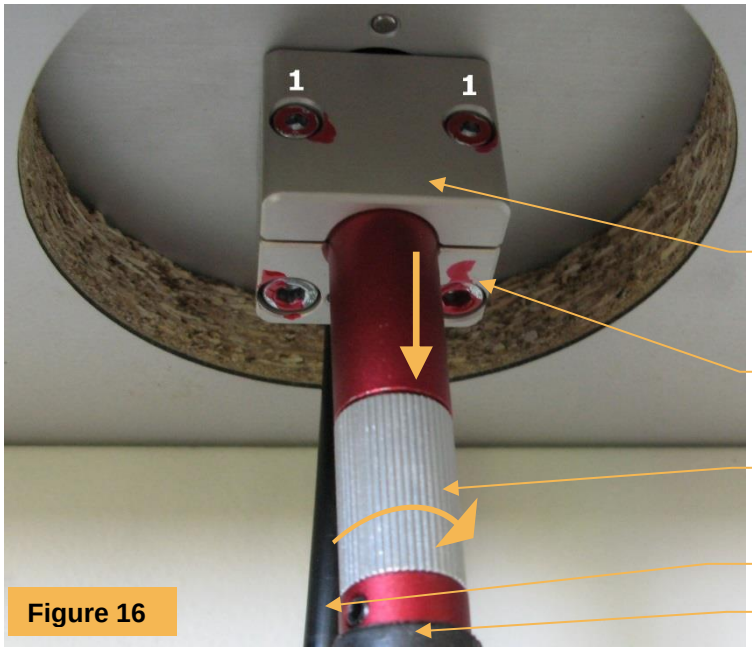


Figure 16

CENTRING MILLING MACHINE-GUIDE: Slightly unscrew the support screws (1) and manually adjust the micro-spindle before fastening the screws.

10. ENVIRONMENTAL IMPACT

The environmental impact of the DPF-200 is minimum. Below are the main breakdowns:

Pollution from dust: the machine produces dust from cutting, which is collected through a specific filter with a special filter cartridge.

Pollution from oil **:** the pneumatic installation of the machine uses oil only to lubricate the micro-spindle without releasing it into the environment due to the enclosed design with the protective case.

Pollution from noise: Detected on the operator site, the micro-spindle inside the unit can produce noise up to approximately 90 dB (A) during the cutting phase. The compressed air outputs are muted and contained within the structure. The suction turbine produces noise on the rear part of the machine (where a silencer is present), 70dB (A) detected on the operator site.

Pollution from heat: The suction turbine located inside the structure produces exhaust hot air on the rear part (where a Silencer is present) and the turbine surfaces temperature can heat up to 45°C.

11. PNEUMATIC DIAGRAMS

DPF-200-E

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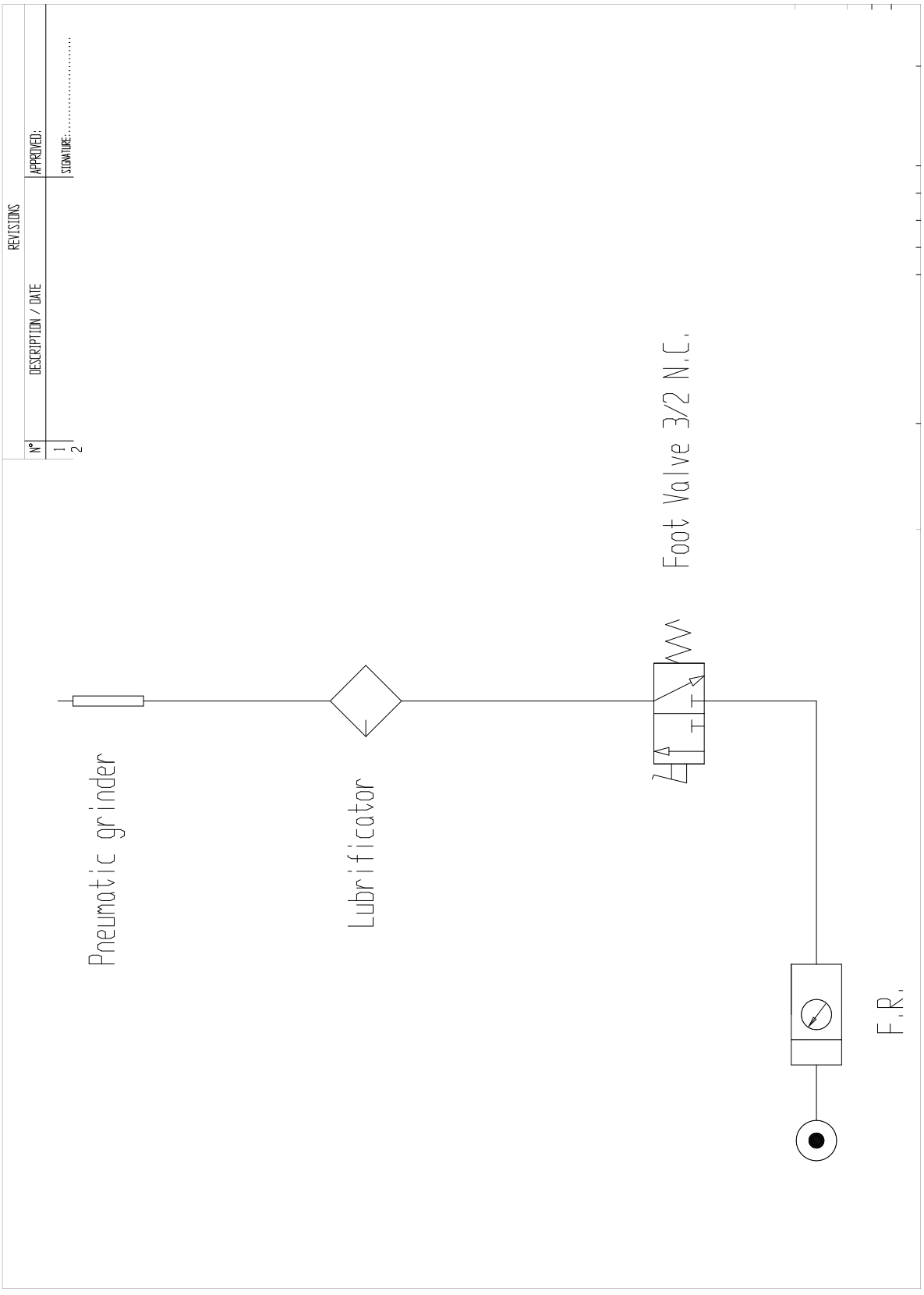
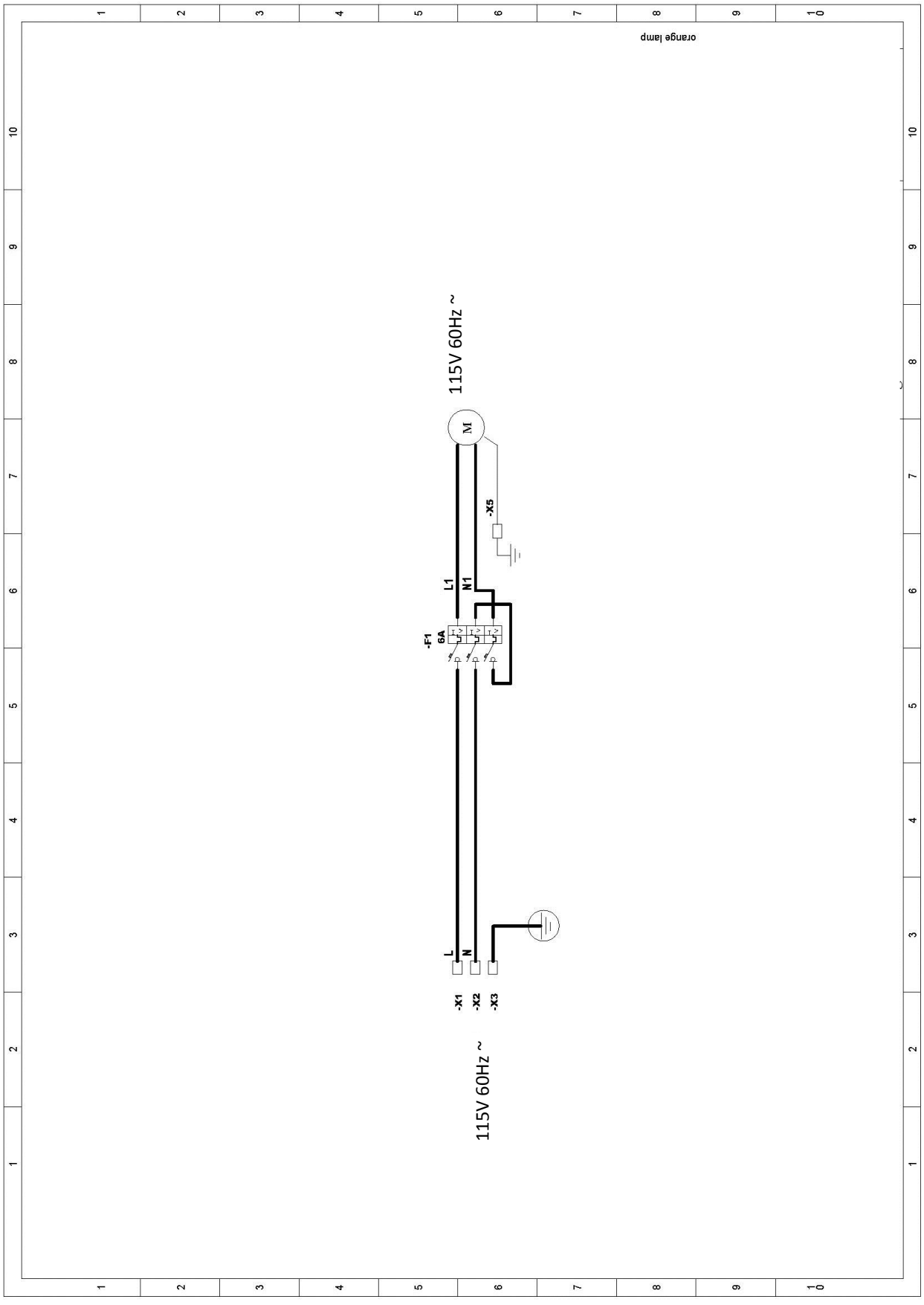


12. DPF-200 E ELECTRICAL DIAGRAM



13. MAINTENANCE OF THE MACHINE

Make sure that the compressed air supply and the electrical power supply are disconnected before performing maintenance or adjustment to the machine.

13.1 MAINTENANCE

DAILY:

- General cleaning of the machine;
- Check the level of the dust inside the filter and the clogging of the filter cartridge;
- Check the wear of the milling bit.
- Check the wear of the interchangeable guide.
- Check the level of the lubrication oil and adjust the dosage to minimum
  (Use oil for nebulisers SAE#10);

NOTE: Do not use detergent containing alcohol to clean ESD table

WEEKLY:
- Check the air pressure from the regulator gauge (6.0 bar);
- Discharge the condensation from the pressure regulator.

PERIODICALLY (every 20 to 30 days):

- Carry out a check of the docking screws.
- Check the maintenance of the pneumatic installation.
- Use compressed air for cleaning the rear exhaust silencer.
- Check the wear of the micro-spindle and/or whether the milling bit has an excessive play.
  After the first year, inspect (without detaching it from the support) the micro-spindle every 3 months if used every day. If anomalies are found, contact **American Hakko Products, Inc.** for the possible repair or replacement (see Chapter 9).

14. TECHNICAL SPECIFICATIONS

14.1 GENERAL CHARACTERISTICS

Approximate dimensions	64 cm. (L) x 70 cm. (W) x 95 cm. (H)
Necessary space	164 cm. (L) x 170 cm. (W)
Interchangeable guide material	Hardened and ground steel
Interchangeable guide thickness	Standard 1.5 to 2.5 mm.
Milling bit diameter	Standard 1.5 to 2.5 mm.
Micro-spindle speed	Max. 60,000 rpm.
Storing temperature	From –10 °C to +40 °C not present
Working temperature	From 5 °C to 40 °C not present
Noise pressure	90 dB(A) - Uncertainty 3 dB(A) detected on the operator position
Vibrations	< 2.5 m/s^2
EC Brand	
Weight	55 Kg
Voltage	120V/60Hz
Power	0.63 kW.
Depression (Vacuum)	22 kPa (220 mbar)
Supply pressure	6.0 bar (87 psi) – 6 mm Ø connection pipe.
Compressed air consumption	Max. 210 l/min. - Average 140 l/min.

14.2 PCB CHARACTERISTICS

PCB thickness	Max. 2.5 mm.
Slot length (L)	Min. 10.5 mm.
Slot width (V)	1.5 – 2.5 mm.
Slot width tolerance:	0 / - 0.02 mm.
Isthmus distance from components (C)	Min. 1 mm.
PCB material	FR4 – CEM – ALUMINIUM*

*For the separation of aluminium, contact American Hakko Products, Inc. for the milling bits specifications.

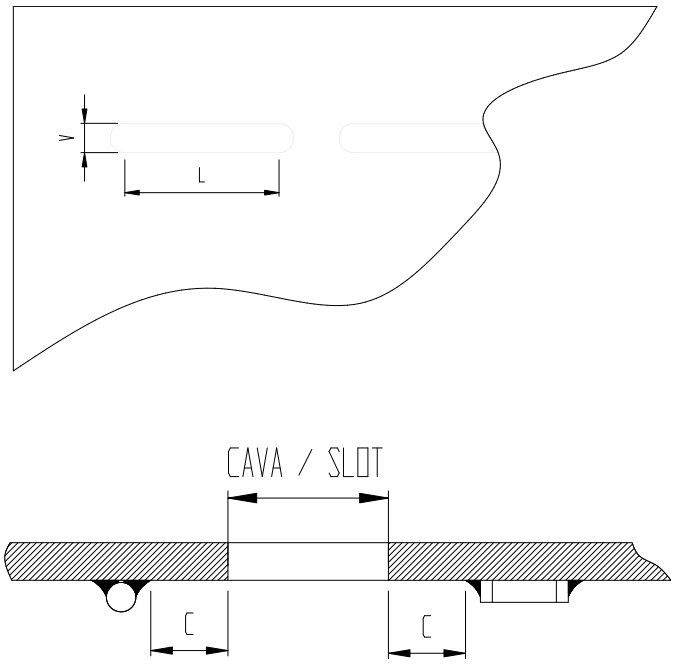


Figure 17

15. WARRANTY POLICY

The DPF-200 machine is covered by a 12 month warranty from the date of delivery of the machine to the customer (the date of issue of the Transport Document sets the validity of the warranty), provided that no warranty shall apply to products that have been damaged, altered, abused, improperly installed and/or maintained, repaired after purchase, or have had their identification markings removed or altered in anyway.

The warranty is valid on all the mechanical parts that prove to be defective with the exception of parts subject to wear under normal conditions of use (interchangeable guide, milling bits, micro-spindle, and filter cartridge).

16. TECHNICAL ASSISTANCE

American Hakko Products, Inc.
28920 Avenue Williams
Valencia, CA 91355
Tel : (800)88-42556
Fax: (661)294-0096

www.HakkoUSA.com
Support@HakkoUSA.com

DPF-200 E CONFORMITY DECLARATION

We, American Hakko Products, Inc., hereby declare that the DPF-200 E machine described in this manual is in conformity with the essential requisite of following standard or harmonised norms and correlated directives:

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 953: Safety of machinery. General requirements for the design and construction of fixed and movable guards.

UNI EN ISO 13849-1: Safety of the machinery. Safety related parts of control systems.

UNI EN 4414: Pneumatic fluid power. General rules and safety requirements for systems and their components.

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

EN 61340-5-1: Protection of electronic devices from electrostatic phenomena – General requirements.

DIRECTIVE 2014/30/UE EMC (Directive on electromagnetic compatibility)

EN 61000-6-4: EMC emission standard for industrial environments.

EN 61000-6-2: EMC immunity for industrial environments.

DIRECTIVE 2014/35/UE (Directive LVD)

All electrical material and electrical subsystems used in building of the DPF200 machine are conform to the Directive 2014/35/UE.

March 13, 2017

NOTES: