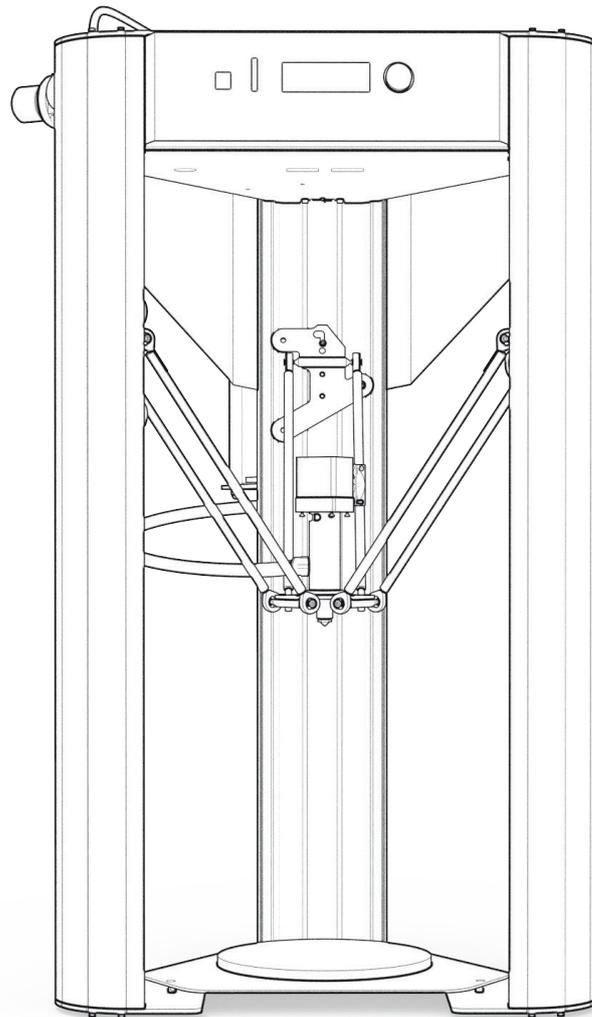


# **DELTA WASP 2040**

MANUAL OF USE AND MAINTENANCE



## **CLAY**

ORIGINAL INSTRUCTIONS



CE

## Disclaimer



### **IMPORTANT:**

We kindly advise to read carefully and comprehend totally the content in this manual of Use and Maintenance.

The missing acknowledgment of the manual can be cause of personal injury, worst quality results or damages to the printer Delta WASP 2040 Clay. Always make sure that the personal using the 3D printer knows and understands the content of the manual in order to the best results from DELTA Delta WASP 2040 Clay.

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Revision	Reason for the revision	Revision date

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# **INTRODUCTION**

Delta WASP Clay line features all the latest technological innovations in the world of digital ceramics developed by WASP.

The Manufacturer declines any responsibility for accidental damages caused by products when non-correctly used.

WASP certifies the use LDM WASP EXTRUDERS with ceramic materials, in case of use of the system with different kind of materials, warranty and support may not be valid anymore.

## **WARNING**

- Read accurately the instructions before the use
- Before any intervention in proximity or inside the work area pause the movements by pushing the yellow bottom on the right side of the frontal panel
- Make sure, before everything is in pressure, that the two caps are both tighten completely until the complete coverage of the tank fillet
- Check periodically that the fillet of the caps and of the tank are not consumed or damaged
- Always keep the fillet on the caps clean in order to avoid the uncorrect closure of the tank
- Periodically put some grease on the fillet of the caps and tank
- Check out the video tutorials at <https://www.youtube.com/watch?v=1DjVC5MxJr4>
- Do not introduce or lay hands or other parts of the body in proximity of the moving parts
- Keep far from the presence of children
- Do not overcome the 8 bars of pressure
- Do not point the pressurized tank without the cap against people
- Make sure that all the pipes are correctly plugged
- Check the if the fan on the left of the stepper motor is working or not
- Make sure that the extruder is not clogged
- Do not put fingers inside the extruder
- Do not eat the extruded materials
- Make sure that the pipes do not present any deformation
- Verify the waste of the pipes in the points of connection
- Do not replace parts if not original and supplied by Manufacturer
- Only properly formed staff can use the machine

# 0 PREMISES

## 0.1. Aim of the instruction manual



### IMPORTANT:

Before proceeding with the installing and starting of the printer, the technician, the user, the maintainer and the safety responsible must read and understand the actual manual.

The manual must be considered as a fundamental part of the printer. The correct use and maintenance of the machine depends on the informations contained here.

It contains instructions that must be acknowledged by the personal devoted to the use, maintenance and transport of the machine, supposing the adequate experience, preparation and professional abilitation as well as a psychophysical attitude.

For certain operations it may be necessary to ask for the intervent of personnel who. have achieved a specific preparation.

It must always be available for consultation, in copy and by the recipient, on the printer itself or in its immediate vicinity. In the second case the location of the manula must me indicated on the printer clearly.

It is susceptible of updates which, appropriately classified, will be transmitted to the employer in order to update the consultation copy (s).

- The recipient must ensure that the personnel authorized by him to start up, use, maintain and transport the printer have obtained adequate knowledge of the instructions contained in this manual.
- The recipient must check that the maintenance operations, prescribed in the appropriate chapter, are carried out and recorded promptly and effectively.
- We accept no responsibility for damage to persons or property resulting from improper use and / or omitted or inadequate maintenance.
- The recipient has the right to request further information.

In case of loss and/or damage of the present manual is responsibility of the recipient to ask for one or more copies.

## 0.2. How to read the manual of instructions

This manual is composed by:

### COVER WITH PRINTER IDENTIFICATION

By consulting the cover you trace to the printer model covered in the manual and to the printer serial number in your possession.

### ANALYTICAL INDEX

By consulting the index it is possible to identify to the chapter and to the paragraph on which all the notes relating to a given topic are reported.

### NUMERATION FIGURES

Each figure is numbered progressively, indicating with the first digit the reference chapter and with the second the progressive image (example Fig. 3.4 is the fourth figure of chapter three)

## 0.3. Storage of the manual of instructions

It is mandatory to keep this manual and all attached documents in an easily accessible place near the printer and known to all users (operators and maintenance personnel).

Operators and maintenance technicians must be able to quickly find and consult the manual in any situation.

The manual is an integral part of the printer for security purposes.

Therefore:

- It must be kept intact (in all its parts);
- It must follow the printer until its disposal (even in case of travel, sale, rental, rent, etc.);
- It must be kept up to date and report any changes made to the printer.

## 0.4. Updating the manual of instructions

This manual must be regularly updated by attaching additional or altered parts.

The sending of any additional parts is the responsibility of the Manufacturer; the user is responsible for the replacement of parts that may be altered as a result of use, making a request directly to the Manufacturer.

# 1 GENERAL INFORMATION

## 1.1. Manufacturer identification data

**CSP S.r.l.**  
 Viale Zaganelli, 26 - 48024 Massa Lombarda (RA) Italy  
 Tel. +39 0545 82966  
 info@3dwasp.com / www.3dwasp.com

## 1.2. Identification label

The printer is CE marked and complies with all relevant provisions:  
 Machinery Directive 2006/42 / EC, EMC Directive 2014/30 / EU and LVD Directive 2014/35 / EU  
 EN 55022  
 EN 55024  
 EN 60204-1

The marking can be identified by means of an identification plate of the Manufacturer as required by the Machinery Directive. In case of damage, the Recipient must commission a copy.



**1** Stampante 3D

**2** Modello: Delta WASP 2040 CLAY

**3** Volts: 230V 50/60Hz

**3** Potenza Max: 180W

**4** Anno di produzione: 2019

**5** Numero di serie:

MADE IN ITALY



**6** IT1606000009355

Advanced settings

Radius \_\_\_\_\_

Diagonal Rod \_\_\_\_\_

X \_\_\_\_\_

Y \_\_\_\_\_

Z \_\_\_\_\_

Offset: x \_\_\_\_\_ y \_\_\_\_\_

**Legend:**

1. Model
2. Voltage
3. Maximum power
4. Year of production
5. Serial number
6. Advanced settings

### 1.2.1. Position of the label on the printer



**IMPORTANT:**

The label of identification of the printer is placed on the back column of the printer near the socket for the supply of the machine

## 1.3. Testing

The printer is tested directly by the Manufacturer during the phase of mounting and post mounting.

## 1.4. Warranty

The printers built by CSP S.r.l. are covered by a warranty for a period of 12 months for companies or VAT and 24 months for individuals, according to the specifications set out in the sales contract.

If during the period of validity, defective operations or faults of parts of the printer that fall within the cases indicated in the warranty occur, CSP S.r.l. (after the appropriate checks) will repair or replace the defective parts. The defective parts under warranty are repaired or replaced free of charge by CSP S.r.l. .

The costs of transport and / or shipment are always charged to the Customer, as well as the return / return travel expenses related to the intervention of the Manufacturer's technicians at the Customer's premises.

The labor costs related to the intervention of the Manufacturer's technicians at the Customer's premises, for the removal of defects under warranty are the responsibility of the Manufacturer, except in cases where the nature of the defect is such that it can be easily removed on site by part of the Customer.

All consumables are excluded from the warranty, possibly supplied by the manufacturer together with the machines.



**NOTE:**

The guarantee lapses in the following cases:

- In case of default or other contractual non-fulfillment;
- Improper use of the printer
- Failure to comply with the standards and maintenance intervals
- Tampering
- The printer is returned to the Manufacturer in a different packaging from the one supplied at the time of purchase;
- Use of non-original spare parts, ie not supplied directly by the Manufacturer;
- Extraordinary interventions not carried out by personnel not sent by the Manufacturer;
- Any variation and / or non-observance of what is indicated in the technical documents and in this manual entails the forfeiture of the technical and functional guarantees, and release the Manufacturer of the printer from any responsibility.

## 1.6. General safety warnings



### CAUTION:

Any intervention must be performed on the printer requires particular caution on the part of the operator.



### NOTE:

Any intervention on the printer must be carried out in strict compliance with the operational skills (see paragraph 1.7.1 "Identification of Operational Staff"). CSP S.r.l. declines any responsibility in case of non-compliance with these skills.

The purpose of this chapter is to indicate which are the specific points and measures to avoid incurring any kind of accidents, which may be defined as residual risks, which are the minimum essential safety provisions to be maintained, which characteristics must have the personnel assigned to the normal assembly operations and which must be the characteristics of the maintenance personnel.

We are not responsible for unspecified operations, as they are considered strictly pertinent to technical assistance personnel or for operations performed differently from what we described in the documentation presented.

Possible operations on the printer can:

- Mechanics
- Electrical



### MECHANICAL NATURE INTERVENTIONS

Any intervention of a mechanical nature must be carried out in strict compliance with the directives required by current safety regulations. It is absolutely forbidden to perform any type of mechanical maintenance intervention on the printer during the operating cycle or in any case with parts of the printer moving.

Every mechanical adjustment operation must be carried out with the printer stopped and only and exclusively by the mechanical maintenance technician, qualified to operate in conditions of protection disconnected (see paragraph 1.7.1 "Identification of the operating personnel").

Maintenance work must only be performed with the printer disconnected from the mains and taking all the safety measures required by current regulations.



### ELECTRICAL NATURE INTERVENTIONS

Every electrical adjustment operation must be carried out taking all the safety measures required by current regulations.

### 1.6.1. Personal protective equipment

It is mandatory to use the specific personal protection devices (PPE) to the current operations made available by the company (in relation to the risk attached to the performance of certain processes), even if not directly concerning the use of the plant.

## 1.6.2. Operators for whom the manual is intended

The manual is written for:

- The operators involved in using the printer (in the continuation of the manual will be briefly called "users");
- Mechanical maintenance workers: trained and authorized operators for the maintenance of mechanical parts, pneumatic and oil-hydraulic systems;
- Electrician maintenance technicians: trained and authorized operators for the maintenance of electrical and / or electronic parts and systems;
- Qualified technicians (employees of the Manufacturer or authorized service center), special maintenance staff and operations of a complex and / or particular nature.



### ATTENTION:

The user must not perform operations reserved for maintenance personnel or qualified technicians. The manufacturer is not liable for damages deriving from failure to observe this prohibition. Users or qualified technicians.

## 1.6.3. Residual risks

### Residual risk of scalding

This risk exists during the removal phase of the filament from the extruder and during the removal of the piece from the plate.



### CAUTION:

Moving parts can crush and cut



### ATTENTION:

Watch your head when operating near the machine

### Residual risk of electrocution



### CAUTION:

It is present tension on the superior part of the printer.

## Maintenance / Cleaning

Maintenance / cleaning operations must be carried out by trained and authorized personnel. Operations must be performed in a safe stop condition, disconnecting the printer from power sources. Refer to chapter 7 "Ordinary and Extraordinary Maintenance".

## 1.6.4. Safety stickers

The safety stickers shown below are applied to the printer. Before using the printer, check the integrity of these adhesives and assimilate the instructions. Refer to paragraph 1.7 "Glossary and pictograms". If the meaning is not clearly understood, contact the Manufacturer.



### ATTENTION:

The labels and stickers applied to the printer must be replaced before they become illegible. If one or more plates (stickers) are missing or illegible, the operator must not use the printer until the new plates (stickers) have been applied.

Legend:

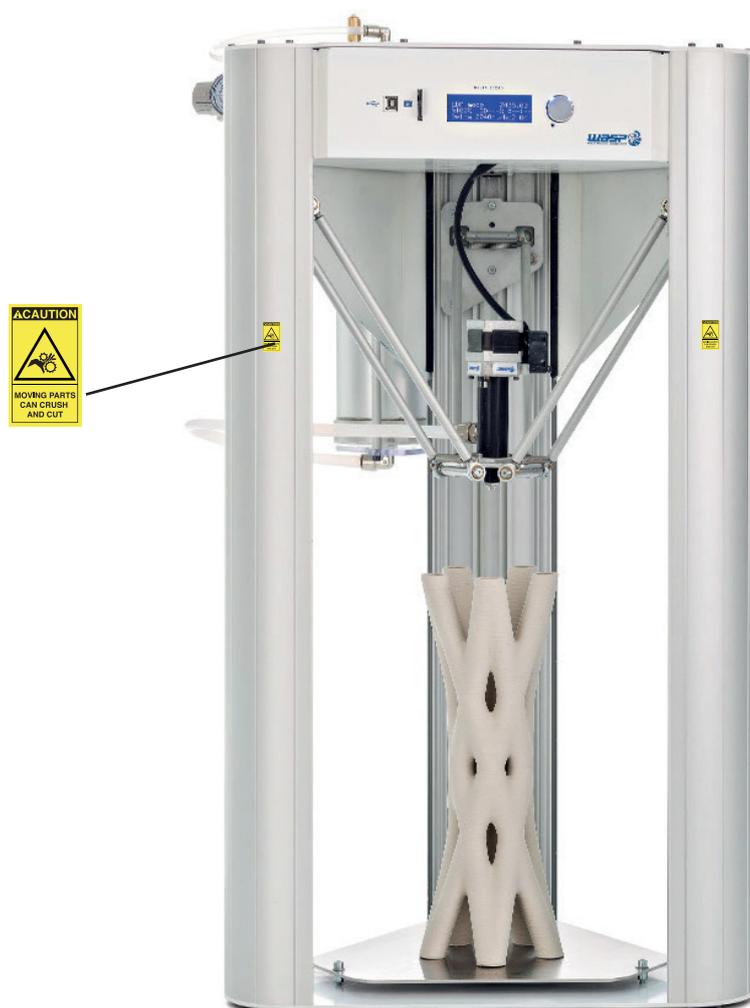


Fig. 1.6.4 - Safety stickers on the printer

Hot surfaces, pay attention not to touch when heated

## 1.7. Glossary and pictograms

### 1.7.1. Identification of operating personnel

The operator responsible for the operation or maintenance of the printer must possess the specific professional requirements for each intended operation.

The operator must be instructed and therefore be aware of the tasks entrusted to him who has responsibility for the job.

Below is a description of the professional profiles for the operators involved in the printer.

#### **User**

Qualified personnel, able to perform simple tasks, trained on using the printer.

It supervises the proper functioning of the same and the eventual first intervention in case an alarm condition occurs.

#### **Mechanical maintenance technician**

Qualified technician able to conduct the printer under normal conditions, to intervene on the mechanical parts to carry out all the necessary adjustments, maintenance interventions and repairs.

It is not enabled to work on electrical systems in the presence of voltage.

#### **Electrical maintenance engineer**

Qualified technician able to conduct the printer in normal conditions; it is in charge of all the electrical interventions of regulation, maintenance and repair. It is able to operate in the presence of voltage inside enclosures and

## 1.7.2. Editorial pictograms

To ensure a deeper knowledge of the printer, the text of this manual is accompanied by indications that complete it, providing additional information, indispensable attention or particularly significant hazards to consider; in this regard, the following notation is used:



### **DANGER:**

Indica situazioni o operazioni che devono obbligatoriamente essere eseguite o le informazioni alle quali occorre prestare particolare attenzione per evitare danni alle persone.



### **WARNING:**

Indicates situations or operations in which there is the possibility of causing damage to the printer, to the equipment connected to it.



### **ENVIRONMENTAL NOTE:**

Indicates situations or operations in which there is the possibility of causing damage to the environment.



### **NOTE:**

Indicate the notes, warnings, suggestions and other points on which you want to draw the reader's attention or complete the explanation with further information.

## Personal protective equipment (PPE)

The graphic symbols used in this manual are indicated below to indicate the need to wear certain PPE.



### **PROTECTIVE GAUNTLETS:**

Indicates the need to use suitable protective gloves to perform the described operation (possibly dielectrics for carrying out work on the electrical system).



### **SAFETY SHOES:**

Indicates the need to use safety shoes suitable for performing the described operation.



### **PROTECTIVE WORKWEAR:**

Indicates the need to use protective clothing to perform the operation described.

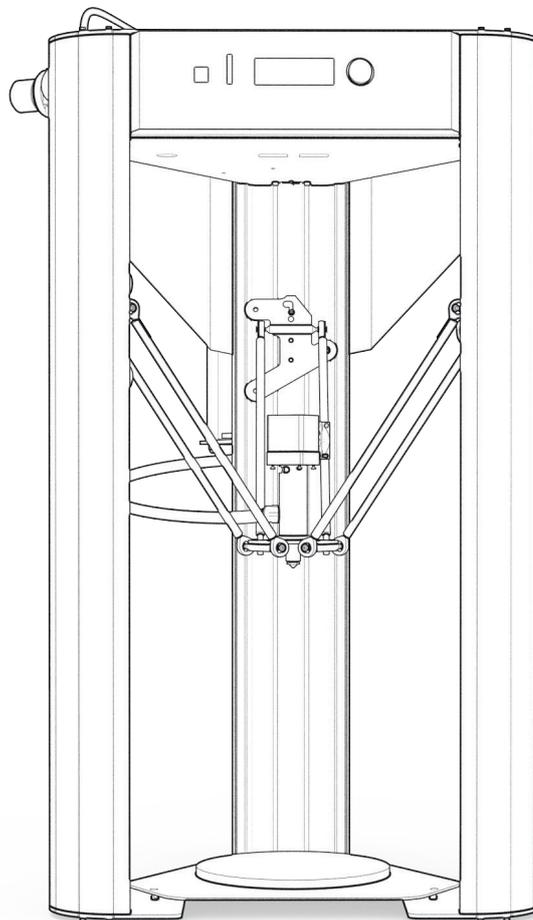


### **PROTECTIVE HELMET:**

Indicates the need to use a safety helmet to perform the operation described.

## **2 DESCRIPTION OF THE PRINTER**

The device described in this manual is a printer intended for 3D printing using fluid-dense material. The printer consists of an extruder with a screw mounted on a delta robot type structure and a work bed. The material is put under pressure and pushed towards the extruder where it is dosed in a controlled manner by a screw and poured through a nozzle that deposits very small quantities of material on the work bed. The material is deposited by the head layer upon layer according to instructions on the file made with the use of a slicing software. It is therefore possible to make any shape and any type of object within the limits of this technology.



**Fig. 2 - Printer**

## 2.1. Control panel



Fig. 2.1 - Control panel

### Legend:

1. Pressure gauge
2. USB type A door
3. SD card door
4. Operator display
5. Display control handle (Rotates left and right and is clickable)

## 2.2. Work area



Fig. 2.2 - Work area

### Legend:

1. Material tank
2. Tank holder
3. Double support arm
4. LDM Extruder
5. Material pipe
6. Printing bed
7. Extruder

## 2.3. Technical data

All WASP 3D printers are characterized by considerable strength and working precision. Their mechanics allows for greater precision and stability, guaranteeing greater production speeds. A further advantage is the possibility of restarting the production of the piece from the point where it should be interrupted for any reason.

General features	
Length	44 cm
Width	49 cm
Height	87 cm
Approximated weight	40 kg
Noisiness	< 60 db (A)
Mechanical features	
Frame and cover	Metal sheet and aluminium
Print bed	Aluminium
Movement	Rolling on anodized aluminum slide
Motors	Stepper Nema 17
Electrical features	
Input	220/240 V - 50/60 Hz
Absorbed power	180W
Use features	
Environment of use	20-30 °C
Warehouse	0-30 °C
Nozzle	Diameter 1.2mm
3D printing informations	
Technology	LDM
Cilindric build area	Ø 200 x 400 mm
Nozzle diameter	standard 1.2 mm
Layer resolution	max 50 micron
Axis precision	0,2 mm
Maximum speed	200 mm/s
Tank capacity	3 l
Suitable materials	Porcelain, Gres, Clay, ecc.
Interface and software	
Operative systems	Windows, Mac, Linux
Slicing software	Cura, SLic3r, Simplify3D
Software interface	Repetier Host, Pronter Face
File formats	.stl, .obj, .gcode
Interface	SD card, LCD display

## 2.4. Noisiness

The noise emitted by the printer only is inferior than 60 dB(A).  
The presence of more machines in the same area increases



### ATTENTION:

It is the responsibility of the customer to carry out an assessment of the noise risk of his activity as prescribed by the legislation in force in the place where the printer is installed, and to equip the operators with adequate Personal Protective Equipment (such as headphones for hearing protection).

## 2.5. Intended use of the printer

The printer has been designed and built to create objects with ceramic mixtures. It is possible to use materials such as porcelain, earthenware, stoneware, etc. Any use of the printer with materials other than those supplied will void the warranty and the responsibility of the Manufacturer.

## 2.6. Improper use of the printer

The following printer uses are prohibited:

- Using the printer to perform operations other than those for which it was designed and constructed described in paragraph 2.6;
- Failure to comply with safety regulations;
- Operation of the printer with procedures other than those described in this manual;
- Use components not provided for in the design phase;
- Failure to comply with established maintenance schedules;
- Perform work on the printer that involves the modification of components or parameters that affect the work cycle;
- Alter the extruder calibration;
- Use of the printer outside the permitted working temperatures;
- The use without authorization of non-original spare parts or components not approved by the Manufacturer;
- The execution of any modification or structural intervention without the Manufacturer's authorization;



### NOTE:

- Each of the improper uses or negligence previously listed causes:
- the immediate cancellation of the guarantee stipulated with the Manufacturer at the time of the purchase of the printer;
- the cancellation of the Manufacturer's Responsibility for damages caused to people, things or animals.



### ATTENTION

Improper use can damage the printer which consequently can cause dangerous situations for the personnel responsible for its operation and maintenance.

## 3 TRANSPORT AND HANDLING

### 3.1. General warnings

The reading of this chapter assumes, in order to use the printer safely, the knowledge of the contents of paragraph 1.6 "General safety warnings".

Furthermore, the specific requirements for safe interaction with the printer, related to this chapter, are detailed in the following paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



#### 3.1.1. Delivery of the printer

Upon receipt, make sure that:

- The printer has not been damaged during transport;
- Any packaging has not been tampered with consequent removal of parts from the inside;
- The supply corresponds to the order specifications.



**NOTE:**

If the printer needs to be stored for a certain period of time before installing it, it is recommended to protect it adequately and store it in a suitable environment (with a temperature between 5 ° C and 40 ° C and relative humidity between 20 % and 60% non-condensing) and protected from atmospheric agents in order to avoid deterioration.



**ATTENTION:**

During storage, never stack the boxes containing the equipment.

## 3.2. Unpackaging



### ENVIRONMENTAL NOTE:

Once the packaging has been removed from the printer it is recommended to keep it for any requests for assistance from the Manufacturer.

The printer will be delivered in a horizontally oriented wooden box.  
After removing the printer from the case, you must place the printer upright.



### NOTE:

To perform this procedure it is required the presence of three operators because two will take care of overturning it and the other will keep it steady on one side.

## 3.3. Content

The printer is supplied with:

- "Getting started" guide
- SD card
- Power cable
- Pipes
- Tank
- Tank support
- Material 10 kgs

## 3.4. Lifting and handling of the printer



### ATTENTION:

The weight of the printer is shown in paragraph 2.4 "Technical data". It is therefore necessary to use the lifting equipment whose expected flow is adequate for the weight to be lifted.



### ATTENTION:

As long as the printer is not completely raised, it is advisable to check the correct balance of the same. During lifting, all the area around the printer is considered dangerous.



### ATTENTION:

All small equipment that exceeds the weight of 25 kg must be transported with the appropriate equipment, or manually (if not exceeding 50Kg) by two qualified operators.

## 4 INSTALLATION

### 4.1. General warnings

The reading of this chapter assumes, in order to use the printer safely, the knowledge of the contents of paragraph 1.6 "General safety warnings".

Furthermore, the specific requirements for safe interaction with the printer, related to this chapter, are detailed in the following paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



**ATTENTION:**

A thermal magnetic protection device must be inserted upstream of the system.

#### 4.1.1. Placement

The printer must be installed in a suitable place, ie such as to allow normal operations of the printer, ordinary and extraordinary maintenance.

The installation site must not contain any kind of contaminants, dust, fumes, mists, etc.

It is therefore necessary to prepare the necessary operating space by referring to the dimensions (expressed in mm) given in paragraph 2.4 "Technical data".

The room must also be:

Equipped with the appropriate power supply line;

Installed in environments with brightness equivalent to that expected for industrial environments; as indicated by the regulations in force in the country of destination, with regard to safety in the workplace. Lighting must not cause visual disturbance on the transparent part of the door. The lighting must guarantee a perfect reading of the information given by the display.

The printer must be positioned on a stable and horizontal plane having a capacity suitable for the weight to be supported. Any unevenness must be included in the construction regulations.

The printer must be placed in an environment with foundations that prevent the transmission of environmental vibrations.

Once the printer is positioned, lock the front wheels with the brakes.



**ATTENTION:**

Do not place the printer near sources of heat, water or other free liquids.

Do not install the printer without the appropriate protections.



**NOTE:**

A good installation as well as giving greater rigidity to the printer, avoids vibrations and noises.

## 4.2. Electrical connection



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

It is up to the user to protect the cable mechanically against any crushing or sources of wear according to the type of installation made.



**ATTENTION:**

The printer must be powered by a 10A socket protected by a magnetothermic set at 30 mA.



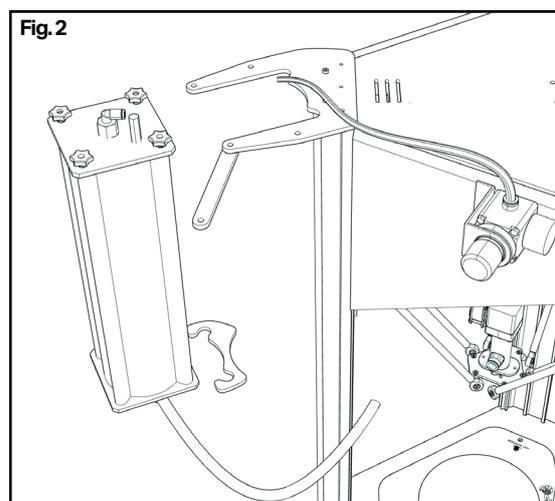
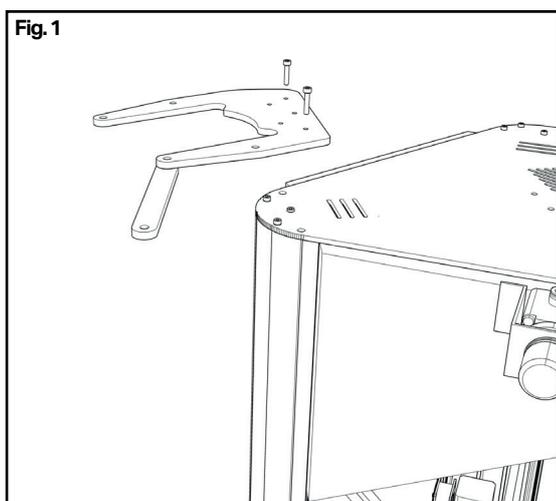
**NOTE:**

All the data concerning the electrical characteristics of the printer can be found in the manual, see paragraph 2.4 "Technical data".

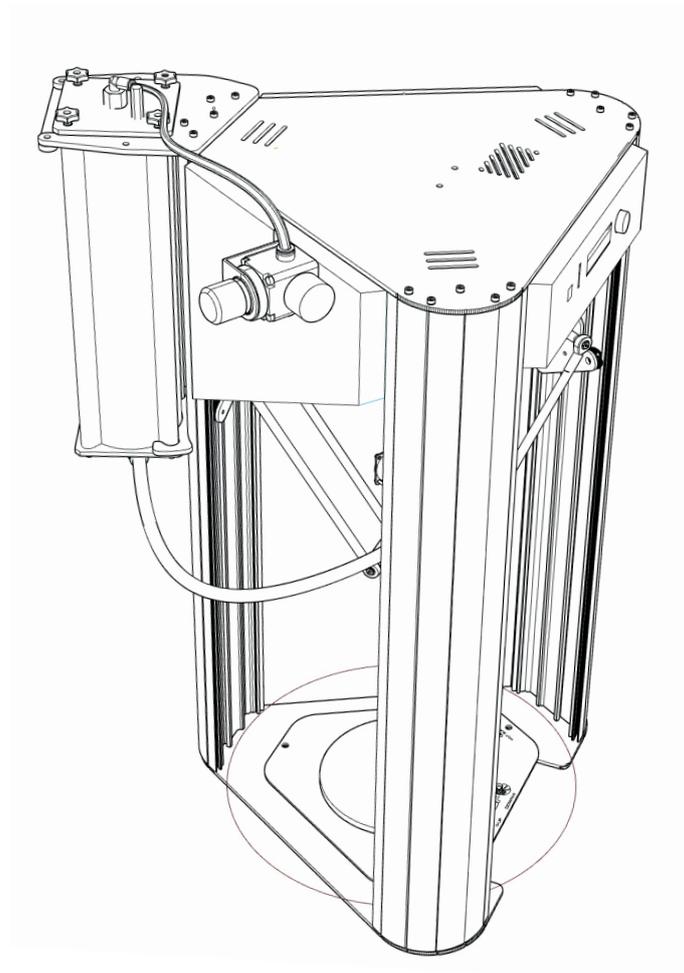
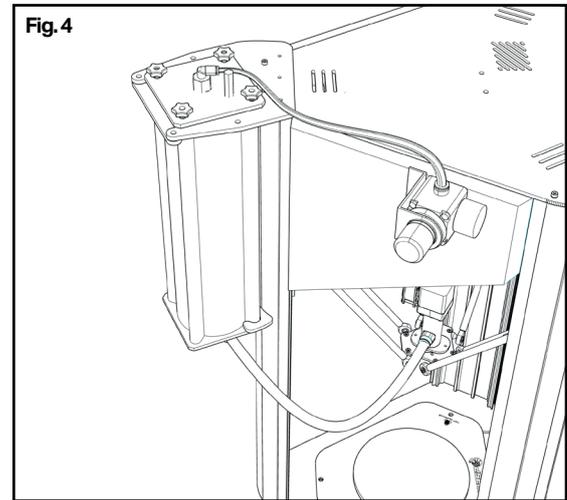
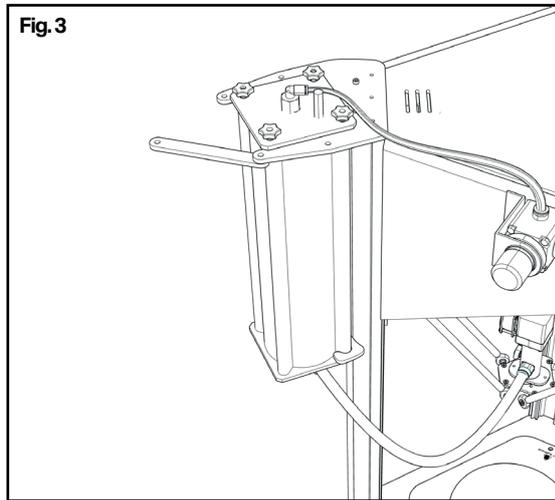
Before connecting the printer's power cord to the electrical outlet, check that the system's power consumption and voltages are suitable.

## 4.3. Tank installation

- Placing the tank support in Nylon on the back of the printer and fix it with the two screws (fig 1)
- Place the nylon spacer of the tank on the back column of the printer (fig 2) v



- Fix the tank on the support and lock it with the bayonet closure (Fig. 3)
- Lock the air pipe "A" and the teflon pipe "B" as in the figure (Fig. 4)



## 5 PREPARING TO USE THE PRINTER

### 5.1. General warnings

The reading of this chapter assumes, in order to use the printer safely, the knowledge of the contents of paragraph 1.6 "General safety warnings".

Furthermore, the specific requirements for safe interaction with the printer, related to this chapter, are detailed in the following paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



## 5.2. User interface

### 5.2.1. Main board



Fig. 5.2.1 - Main board

The main board appears when turning on the printer and when launching the print. It is intended to be the principal tool for the monitoring and control of the printer

#### Legend:

1. Technology
2. Feedrate
3. Operative information: position, feed, flow, state, autocalibration on/off
4. Process percentage
5. Z axis position
6. Time of work

## 1. Main menu

### Machine not printing

- Main menu: go back to main screen
- Prepare: allows managing various settings of the printer
- Advanced: allows managing advanced settings on the printer
- SD Card menu: access files inside inside the SD Card for printing (only with SD card)
- Free zeta system: Allows restarting the print from a certain height (only with SD card)
- Resurrection: in case of blackout allows recovering the print with the automatically saved coordinates (only with SD Card)
- Info: shows the firmware installed on the printer
- Main menu: Goes back to the previous menu
- Disable steppers: disables the motors leaving the printer free to move
- Auto home: for zeroing the axis1
- Move axis: allows moving the axis X, Y, Z, E of decided lengths
- Modify height: allows changing the distance between nozzle and printing bed
- Manual leveling: Allows the zeroing of the printer on the three points of regulation

### Machine printing

- Main menu: go back to main screen
- Tune: allows managing various settings of the printer
- Pause: allows pausing the print. Click the control handle to resume
- Change material: allows changing the material during the print.
- Stop & save: Allows stopping the print to resume it afterwards. A .ressurr file will be created in the original directory of the file. Select the .ressurr file and wait for the start.
- Stop print: Allows stopping definitely the printing of a .gcode
- Info: shows the firmware installed on the printer

### 5.2.2. Tune menu

- Main menu: go back to main screen
- Speed: allows setting the speed during the print
- Flow: allows setting the flow during the print

### 5.2.3. Advanced menu (machine not printing)

“Advanced” section contains information relative to the management of the printer. To be used only in case of real necessity.

- Main menu: go back to main screen
- Movement: Allows changing the settings relatives to movements and acceleration.
- Autoresurrection: enables the automatical Resurrection system
- Language: allows choosing between English and Italian.
- Save in EPROM: saving settings in EPROM
- Load from EPROM: loads all the settings from the EPROM
- Default settings: Resets the system loading default settings

## 5.3. First start

After linking correctly the printer to the current it's necessary to perform some operations so that the printer can work.

### Clamps on belts

Inside the printer there are three belts needed for moving the extruder during the print. To avoid movements of the extruders during the transport, on the belts are set some clamps, to be removed before the starting of the printer.

To perform the first print, proceed as described here:

- Place the support of the tank aligned with the two holes on the top of the printer
- Tighten the two screws in order to block the support
- Turn on the printer with ON/OFF button on the back of the printer
- Using the control handle select Menu>Prepare>Load material
- Wait for the extruder to move in the middle of the printer
- Grab the tank, with material loaded, and place it on the support
- Connect the nylon pipe (8 mm diameter) in the right connector
- Connect the PTFE pipe (12 mm diameter) in the right connector
- Pressurize the tank by rotating the pressure control on the left side of the printer
- Extrude the material with Menu>Extrude material
- Zero the machine with Menu>Prepare>Autohome
- Measure the distance between bed and nozzle with “Move axis”, then set it with Menu>Prepare>Modify height (0.5 mm is the distance advised between bed and nozzle)
- Perform a manual leveling screwing or unscrewing the three regulation screws until reaching the necessary planarity
- Launch the print with Menu>SD Card> file.gcode

## 6 FIRST USE OF THE PRINTER

### 6.1. General warnings

The reading of this chapter assumes, in order to use the printer safely, the knowledge of the contents of paragraph 1.6 "General safety warnings".

Furthermore, the specific requirements for safe interaction with the printer, related to this chapter, are detailed in the following paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

Pay particular attention during the various stages of the procedures, it is essential to wear gloves because there is a risk of burns.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



**NOTE:**

Inside the SD card supplied with the printer are provided:

- Free software for creating models to print
- Standard software configurations to be imported into the computer
- Sample file in ".gcode" format to be printed in 3D.

## 6.2. Printing bed



**NOTE:** The printer has been designed to print directly on the working surface so that the machine can be moved to proceed with new prints.

**NOTE:** Another option is printing directly on the bed of the printer. This bed needs to be calibrated on the first use.

To improve the adhesion of the first layers different kinds of beds can be used.

The Manufacturer provides small discs in marine multilayered. Depending on the applications other kinds of beds can be used. The Z axis value must be updated depending on the thickness of the bed.

## 6.3. First layer of the print



**NOTE:**

To make the adhesion of the first layer easier keep the distance with the bed at around 0.5 mm



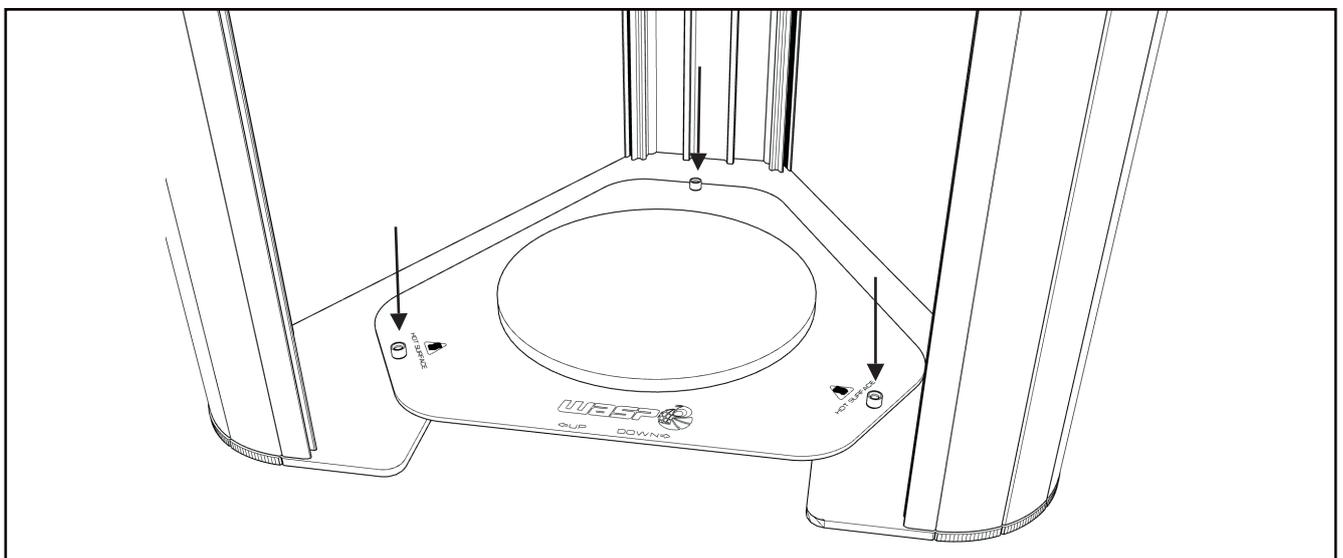
**ATTENTION:**

Parts in movement. Moving parts can crush and cut.

Before proceeding with manual leveling, it is necessary to set Z max value, with:

- Menu>Modify height (select unit)
- Get close to the printing bed and confirm the Z max value

With "Manual leveling" command it is possible to calibrate the planarity of the printing bed. Screw or unscrew the three screws of regulation checking the distance between nozzle and bed. By removing the bed of the printer it is possible to print directly on the table or other supports. Gypsum discs are advised.

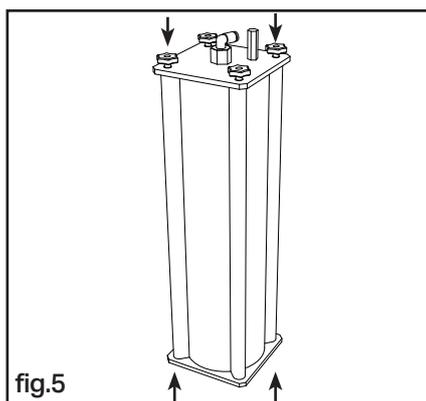
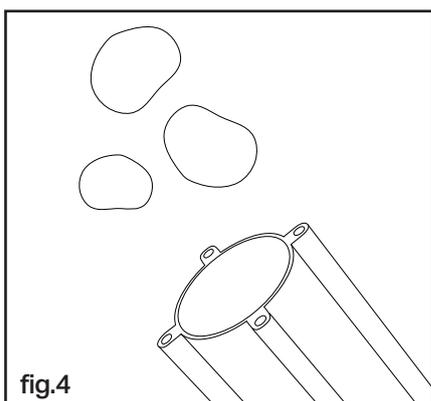
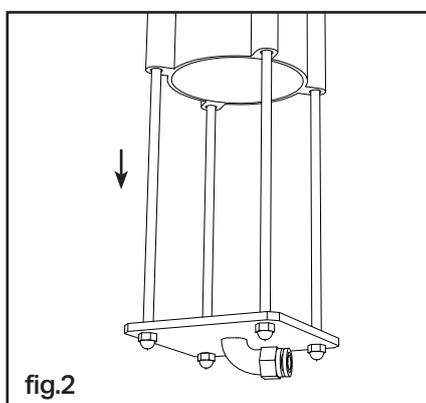
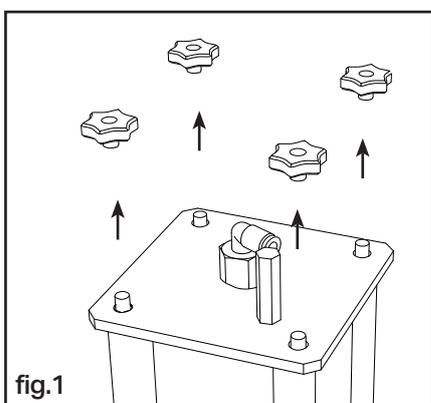


## 6.4. Loading of material

**NOTE:**

WASP provides a mixture to be fixed with water. The amount of water depends on the kind of extruder, nozzle and environmental conditions. Normally it is possible to use the following recipe: porcelaine 95%, water 5%. With the provided machine it is possible to print the majority of the mixtures.

1. Lay the mixture on a clean surface.
2. Add water (5% water 95% mixture) and mix until total absorption. If the material feels too dry add some water.
3. Subdivide the mixture in balls to be loaded inside the internal of the aluminum tank.
4. Untighten the handles on the cap of the aluminum tank (fig.1), then remove the base with the 4 bars (the side without valve)(fig.2).
5. Bring the nylon piston to the bottom to load the material (fig.4).
6. Insert and compress the various parts of material (fig.4).
7. Place and tighter the base using the handles (fig.5).



**NOTE:**

Make sure before putting in pressure that the two caps are perfectly touching and fitting on the tank in order to avoid air losses and failures. Make sure that the four handles are tighten well. Lubricate periodically the threaded bars and the internal of the handles.


**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



## 6.5. First print

To perform the print proceed as described:

- Turn on the compressor to the 8 bars.
- Screw the manometer in clockwise sense until around 5/6 bars (the necessary pressure varies depending on the consistency of the mixture).
- Extruder the material so Menu>Extrude material
- Begin the print selecting: Menu>Sd Card Menu>file.gcode

The print will automatically start and it's just necessary to wait until the end of the process. As the process is completed the extrude will come back to its zero position.


**ATTENTION:**

Remove the part only the printing is done

**NOTE:**


In the case it's necessary to interrupt the print during the printing phase there are two ways to proceed.

- **ON/OFF button:** by clicking this button on the back of the machine the process will stop in the safest way.
- **Pause command:** Menu>Pause, ideal for changing material and cleaning the nozzle

## 6.6. Free zeta system

Free Zeta system can recover a print by starting from a specified height

- Measure the Z value of the last printed layer with:  
Menu>Prepare>Muovi asse>10,1,0.1>Z axis
- Get very close of the printed object and take note of the Z value, then:
- Menu>Free Zeta System
- Insert Z value
- Select gcode
- Wait for the file to load

The operation (depending on the height and file) can take several minutes.

## 6.7. Resurrection system

Resurrection System is a system for recovering the prints in case of blackout or sudden lack of current. It automatically saves the coordinates in the point where the print stopped. To use this function select the voice "Resurrection" for the main menu and wait for the printer to restart.

## 7 MAINTENANCE

### 7.1. General warnings

The reading of this chapter assumes, for a safe use of the printer, the knowledge of what contained in chapter 1.6 "General safety warnings".

Moreover, the specific prescriptions for interacting in a safe way with the printer, relative to this chapter, are detailed in the next paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).

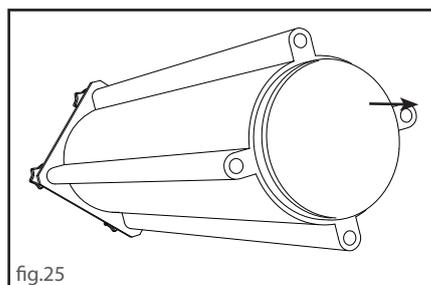
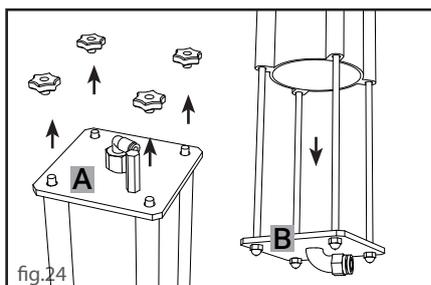
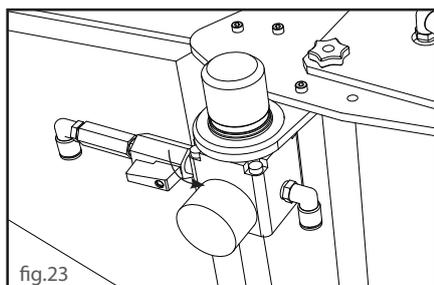


- Before operating on the printer make sure that this is in safety condition
- At the end of a maintenance intervention remove all the tools and cloths and avoid any stockpile of material
- Always pay attention not to ruin the nozzle and the connection pipes
- Do not wear rings, watches, bracelets, chains
- Periodically lubricate with grease the ball joints
- Never submerge in water or other liquids the motor on the extruder
- Clean with water and brushes the components of the extruder
- Verify periodically the wear of the connection pipes
- Check that there are no constrictions on the pipes
- Check that there are no obstacles inside the extruder
- Oil the threaded parts before screwing the black handles
- Check periodically that the threaded bars and the internal of the handles are not damaged.
- Clean and lubricate the nylon piston before each use
- Clean all the parts in contact with the mixtures after each use

### 7.2. Tank cleaning

The periodic maintenance and the correct use are fundamental factors to guarantee the functioning, safety and reliability of the machine. The interventions of maintenance are carried out by the mechanical technician that must operate in total accomplishment of the safety warnings contained in this manual.

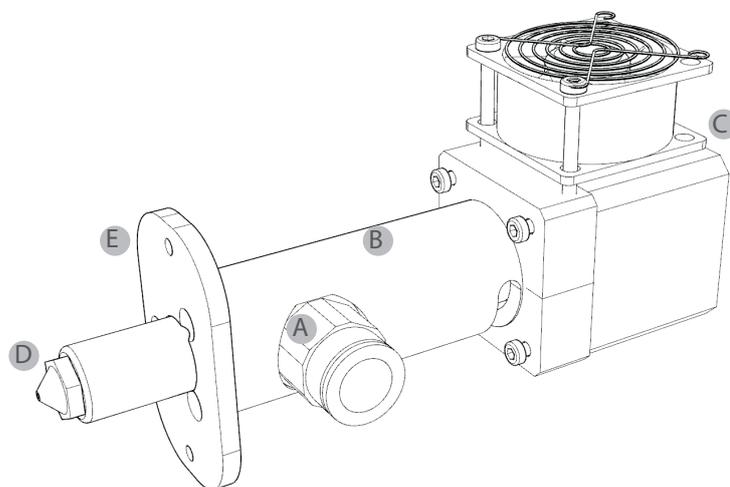
- Reduce to zero the pressure in the tank by turning counterclockwise the controller of the pressure (fig.23).
- Unscrew the handles from CAP A and then remove CAP B (fig.24). To make easier CAP A removal use a flat screwdriver as a lever.
- Place the tank to the bottom.
- With closed fist (or with the help of some tool) push the nylon piston to the external. (fig.25).
- Clean the piston with water and place it back in the tank.
- Remove the residual material that dried inside the TPE pipe hit it delicately to allow the detachment or push it with a little piston.



### 7.3. Extruder cleaning

At print finished it is necessary to cover with wet paper the nozzle to re-use it the following day. After around a week the a complete cleaning of the extruder will be necessary, following this procedure:

- remove LDM extruder from the printer
- unscrew pushfit "A" with a 19mm key and clean it with water
- unscrew extruder body "B" from motor "C"
- unscrew the three M3 screws from the aluminum board "E" (not obligated)
- To facilitate the procedure it is adviced the use of pipe cleaners



## 8 ADDITIONAL INSTRUCTIONS

### 8.1. General warnings

The reading of this chapter assumes, in order to use the printer safely, the knowledge of the contents of paragraph 1.6 "General safety warnings".

Furthermore, the specific requirements for safe interaction with the printer, related to this chapter, are detailed in the following paragraphs.



**ATTENTION:**

The operations related to these activities must be performed by authorized and professionally qualified personnel.



**ATTENTION:**

During operations, the operator must wear all the necessary Personal Protective Equipment (PPE).



### 8.2. Decommissioning and dismantling

In the event that the printer should be taken out of service for a prolonged period while waiting for the dismantling, it is advisable to indicate its presence, preventing unauthorized access to the printer. Before starting the dismantling operations, it is necessary to create around the printer a sufficiently large and orderly space in order to allow all the necessary movements without risk created by the surrounding environment.



**ATTENTION:**

Observe the requirements imposed by the laws in force and by the authorities in charge of the country in which the demolition takes place.

If the mechanical parts have to be dismantled, keep in mind that they consist of different types of material. The user is therefore obliged to consider disassembling the printer in its parts in order to facilitate a differentiated disposal aimed at recycling the various materials and products, in full compliance with all the regulations in force on the spot.



**NOTE:**

The dismantling of the printer must be performed by a qualified mechanical maintenance technician.



**ATTENTION:**

Before carrying out any type of disassembly on the printer, make sure that the power supply is disconnected.



**ATTENTION:**

Danger crushing hands, falling materials, cuts and abrasions. Obligation to use clothing appropriate to the operation to be performed.

**NOTE:**

It is absolutely necessary to apply the regulations in force in the country of destination, concerning the disposal of waste, so it is forbidden to disperse in the environment any type of processing residue, oils, etc .. subdividing the dismantled parts by type for a correct separate collection of materials.

**NOTE:**

Within the European Community, electrical equipment must be disposed of as prescribed by the European Community Directive 2012/19 / EU on waste electrical and electronic equipment (WEEE).

**ATTENTION:**

The user is obliged to dispose of the equipment in the consortia and collection centers for the treatment and recovery of "WEEE".

### 8.3. Instructions for emergency situations

**ATTENTION:**

In the event of a fire, the operator must immediately give the alarm and move away from the area to allow the intervention of trained personnel equipped with suitable protective and operational means.

**Electrical parts**

In case of fire of electrical parts, intervene with CO2 extinguishers to limit and limit the damages

**In general**

Use ABC + Nitrogen powder extinguishers to quickly extinguish fires delimited to parts or areas without electrical parts.





**CSP S.R.L.**

Viale Zaganelli, 26 - 48024 Massa Lombarda (RA) Italia

Tel. +39 0545 82966

[www.3dwasp.com](http://www.3dwasp.com) - [info@3dwasp.com](mailto:info@3dwasp.com)