

Printer
3D Olivetti S2

USER MANUAL

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INTRODUCTION

GENERAL SAFETY RULES

Important safety-related information is given in this section that must be observed when installing and using the printer: you must read attentively and follow these instructions and all other information provided in this manual.

SAFETY WARNINGS

Pictograms are applied to some parts of the printer as safety warnings, these must be attentively observed by anyone preparing to use the printer.



HOT SURFACES

The hot surfaces warning symbol warns of the presence of devices having elevated temperatures. Always exercise the greatest care and wear safety gloves when using the heated components



HIGH VOLTAGE HAZARD

Exercise great caution: live electrical equipment



MOVING PARTS

Presence of moving parts which must be approached with care



CRUSHING/PINCHING HAZARD

Do not introduce your hands into the machine while it is in function



GROUND TERMINAL

Equipment ground connection points



REMOVAL OF MECHANICAL GUARDS PROHIBITED

Do not open the front door during the printing process. Do not remove the protective bellows of the worm screw.



GLOVES

When carrying out printing preparatory procedures or maintenance routines, the device may be hot therefore you should also wear gloves to avoid potential burns.



READ INSTRUCTIONS

It is obligatory to read the User Manual found on the SD Card supplied with the product to obtain the correct operating instructions.

TRANSPORTATION AND INSTALLATION:

Lifting equipment must be used for transporting the 3D printer (such as a fork lift truck) together with belts. Make sure that the vehicle used for transportation and the lifting equipment are strong enough to withstand the weight of the printer and its packaging (approx. 120 Kg).

Personnel charged with handling the shipment must wear safety gloves.

When lifting or moving the 3D printer, or any of its parts, first make sure that the operating area is completely clear, leaving also a sufficiently large safety area around it to avoid damaging persons or objects that could come within the area for manoeuvring the load.

It is recommended that you use specialised personnel for the installation and following the instructions below:

- the printer must be placed on a surface (not supplied with the printer) able to support its weight which is stable, level and at a minimum height of 60 cm.
- the electronic parts are ventilated using fans. Make sure that there is sufficient free space around the printer to allow sufficient air to circulate for ventilation purposes. You should leave a distance of at least 60 cm from walls and other objects.
- do not position the printer near sources of heat, water or other freely moving liquids.
- do not expose the device to dust, rain, humidity or vapour.
- the temperature of the working environment should be maintained at around 20°C.
- by law the equipment must be grounded; use exclusively the power cord provided in the supply without extension cords.
- to protect the printer during transportation, the printing carriage is locked into position by bands: before starting printing cut and remove these bands.

USE

- The S2 printer is not suitable for use by persons under the age of 14 years, and always under the direct supervision of an adult. Make sure that children do not tamper or play with the equipment.
- **The printer is intended for use by operators with adequate training.**
- Use the power supply voltage specified in the technical specifications. The power cord must never be pulled, loaded with weights or brought into contact with sharp parts.
- Do not touch the equipment with body parts that are wet and always wear footwear.
- Do not smoke, use naked flames or create sparks near the printer.
- In the case of printer failure or malfunctioning, do not attempt to use it again until it has been repaired.
- In the case of an emergency, press the red coloured emergency stop button found on the right side of the printer.
- When the S2 printer is functioning, certain parts generate high temperatures (printhead, heated table); there are also moving parts which can cause injury if touched accidentally during operation. You must therefore observe carefully the following warnings:
 - Whenever any operation is carried out on the printer - whether for installation or maintenance purposes - always switch off and disconnect the equipment from the electrical socket. Also wait for all parts that may have become heated during the preceding operation to cool down.
 - **The machine must be used exclusively with the front door closed**; the printing process **IS NOT** interrupted automatically when the door is opened, therefore this rule must be observed with maximum attention.
 - The front door is fitted with a lock and key to prevent unauthorised access.
 - The key of the lock must be kept safe by those assigned responsibility for it.

-
- The heated parts must be left to cool for a certain length of time at the end of the printing process or when printing is interrupted: leave the machine to cool (for approx. 5 minutes) before attempting to access the printing area. It is good practice to check that the machine temperature shown on the front display (of the printhead and table) is under 40°C before carrying out any intervention. **Do not touch the printhead as it could be very hot after use.**
 - Do not wear rings, wristwatches, jewellery or loose/baggy clothes such as scarves, unbuttoned jackets, tops with open zips that could become entangled in the moving parts. Keep hair tied back.
 - **Do not insert your hands between the parts in movement.**
 - Do not use the printer for a different purpose from that for which it has been designed, as specified in the User Manual.
 - Do not attempt to clean the printer while is in operation. Clean the outside of the device with a soft cloth only without using corrosive chemical products, solvents or strong detergents, and only after having disconnected the device from all external power supplies and other cables.
 - It is recommended that the printer not be left unsupervised during printing
 - Make sure that the room where the printer is installed is well ventilated.
 - Do not leave objects or scrap inside the printer (such as lacquer, rags, wrenches used for maintenance, materials removed,...) before launching a printing job.
The printer is equipped with a pressure-sensitive mat that activates if it encounters an obstacle while the heated table is descending towards the bottom of the unit, causing the operation of the machine to be interrupted. After removing the obstacle, you can put the machine back into operation by pressing the special **reset** button on the right side of the printer.
 - You must exercise the greatest care when removing the worked piece from the glass table using sharp or pointed objects to avoid injuring yourself. The use of knives or cutters for removing worked pieces from the glass table is strongly discouraged, even in the case of small objects. Although the glass is tempered it is also fragile, so you must be very careful when handling it.
 - Remove the piece from the glass only after having waited the cooling time necessary (when the heated table has been used);
 - If required, clean or change the printing nozzle. The extruder must be hot to allow the residual material inside the head to soften and not create an obstruction during replacement : **operate always wearing heat protection gloves.**

MAINTENANCE OPERATIONS SAFETY STANDARDS

Printer maintenance must be carried out exclusively by operators with adequate training.

The principal rules to follow when carrying out maintenance operations on the printer are:

- Before carrying out any interventions on the printer, make sure that it is in a safe condition.
- Do not wear rings, wristwatches, jewellery or loose/baggy clothes such as scarves, unbuttoned jackets or tops with open zips that could get entangled in the moving parts. Keep hair tied back.
- Do not touch the equipment with wet body parts and never without shoes.
- Do not use naked flames or pointed/sharp instruments for cleaning.
- Do not smoke.
- Do not insert hands between parts in movement.
- When carrying out printer installation or maintenance operations, always switch off and disconnect the printer from the electrical socket. Wait for all parts that were heated during the previous operation to cool down. Leave the machine to cool (approx. 5 minutes) before attempting to access the printing area. It is a good rule to check that the machine temperature on the front display (of the printhead and table) is less than 40°C before any intervention. Do not touch the printhead as it could be very hot after use.
- If necessary, clean or replace the printing nozzle. The extruder must be hot to allow the residual material inside the head to soften and not create obstructions during replacement : **when operating always wear safety gloves as heat protection**
- Switch on the printer only when necessary and as instructed in the procedures in the Manual, remembering always to operate with maximum attention
- Do not attempt to clean the printer while is in operation. Clean the outside of the device with a soft cloth without using corrosive chemical products, solvents or other strong detergents. Before cleaning operations, disconnect the device from all external power supplies and any other cables that have been connected.
- Be very careful when attempting to remove the printed object from the glass table using sharp or pointed objects, so as not to injure yourself in the process. The use of knives or cutters for removing items from the glass table is strongly discouraged, even in the case of small objects. Although the glass is tempered it is also fragile so you must always be very careful when handling it.
- At the end of servicing operations, remove any tools or rags that have been used from inside the printer and eliminate all residues accumulated
- On finishing the servicing intervention, return the key of the lock to the person having responsibility for it.

PACKAGE CONTENTS

The following items are supplied in the Olivetti S2 Printer package:

- 1 S2 Printer
- 1 USB Cable, Type A-B
- 1 AC Power Cord
- 1 SD Card, 4GB or more
- 3 Allen Keys (1.5 mm, 2.5 mm, 5 mm)
- 3 Hex Wrenches, sizes 8, 10 and 12
- 1 PLA Bobbin, diameter 1.75 mm, weight 1Kg
- 1 Feeler Gauge, 0.07 mm
- 1 Spatula for extracting the printed pieces
- 1 CE, RAE, Safety Declarations leaflet
- Keys for opening the front door

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Chapter 1 – OVERVIEW

PRODUCT DESCRIPTION

The Olivetti 3D S2 printer exploits Fused Filament Fabrication (FFF) technology to create three-dimensional objects by depositing in sequence 2-D layers of material.

In this chapter the printer structure is described and an introduction is provided to the terminology used in the rest of the manual.

PRINTER STRUCTURE

The main machine controls can be found on the front of the printer with a door giving access to the inside of the printer.

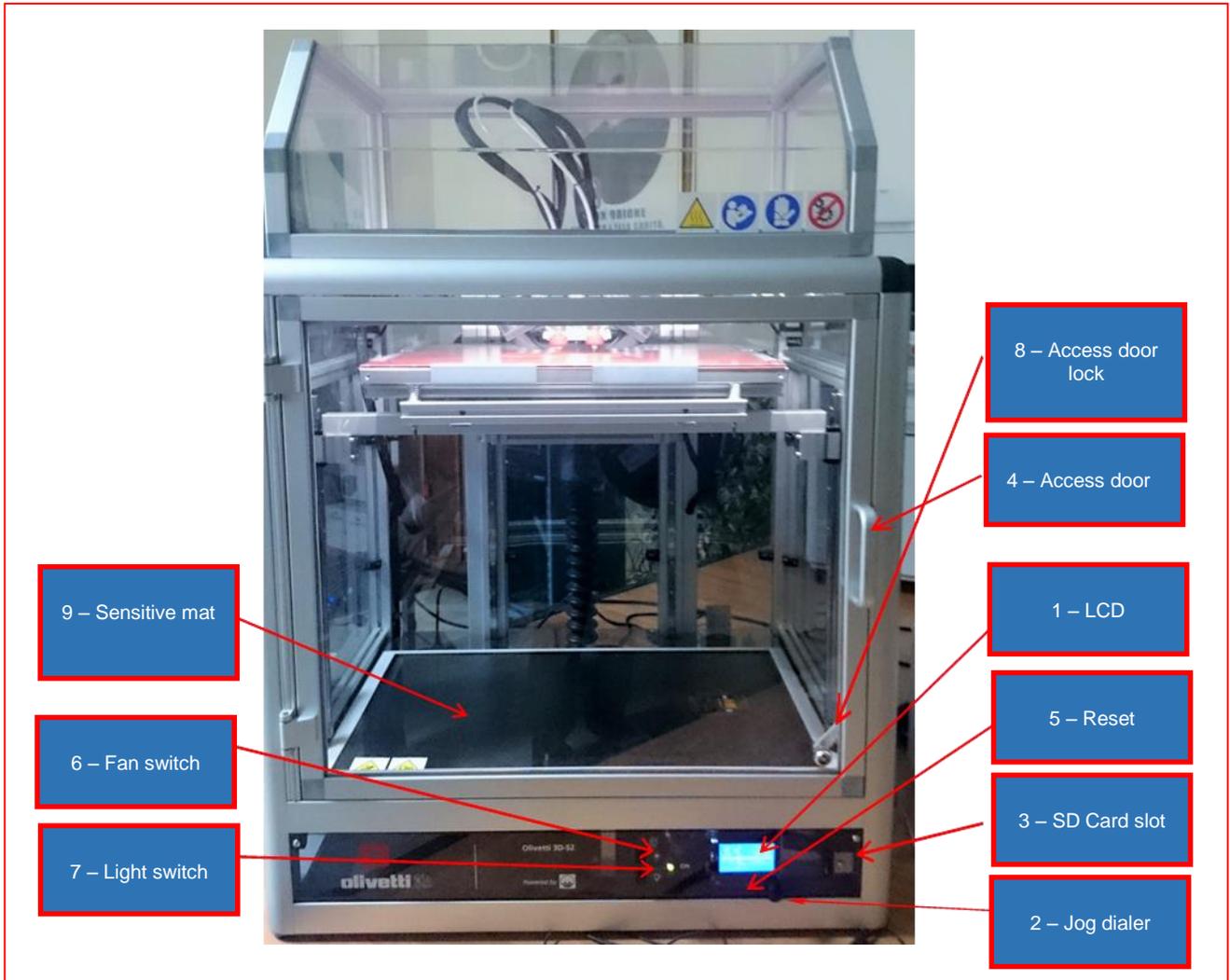


Figure 1-1 Front View

REFERENCE	DESCRIPTION
1	LCD Display
2	Jog Dialer
3	SD Card slot
4	Access Door
5	Reset
6	Switch for fan for cooling material
7	Internal light switch
8	Door lock
9	Sensitive mat

Opening the front door, the extruder assembly is well in view, composed of extruders 1 and 2.

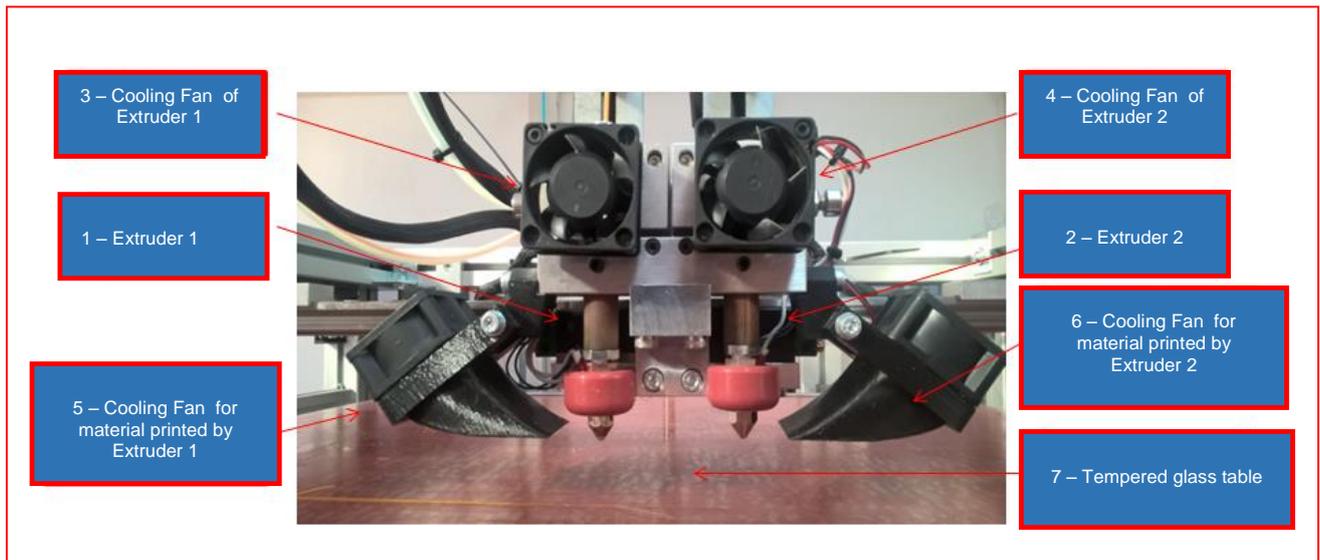


Figure 1-2 Complete extruder assembly

REFERENCE	DESCRIPTION
1	Extruder 1
2	Extruder 2
3	Extruder 1 Cooling Fan
4	Extruder 2 Cooling Fan
5	Cooling Fan for material printed by Extruder 1
6	Cooling Fan for material printed by Extruder 2
7	Tempered glass table

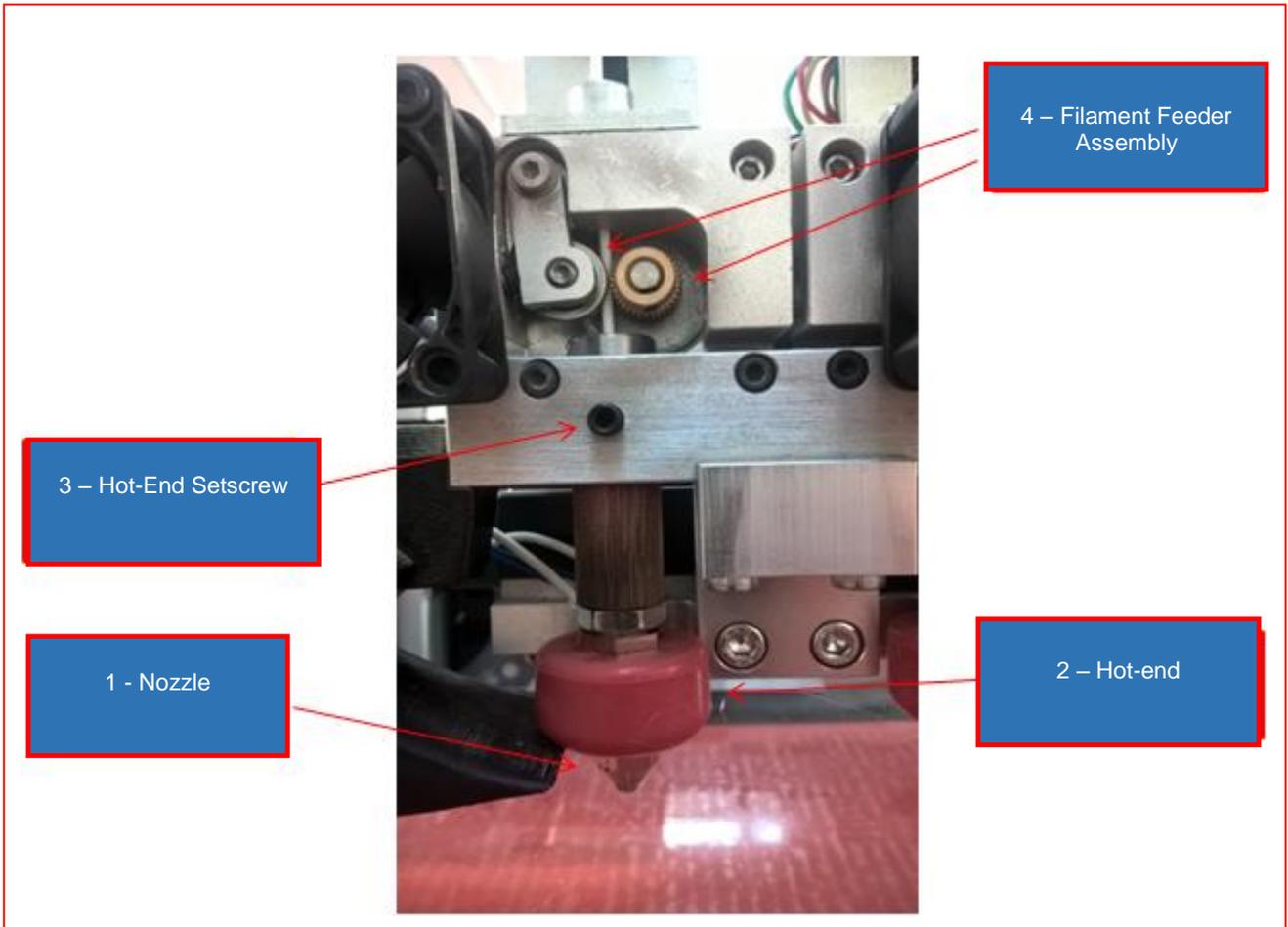


Figure 1-3 Hot-end assembly close-up

REFERENCE	DESCRIPTION
1	Nozzle
2	Hot-end
3	Hot-end Setscrew
4	Filament Feeder Assembly

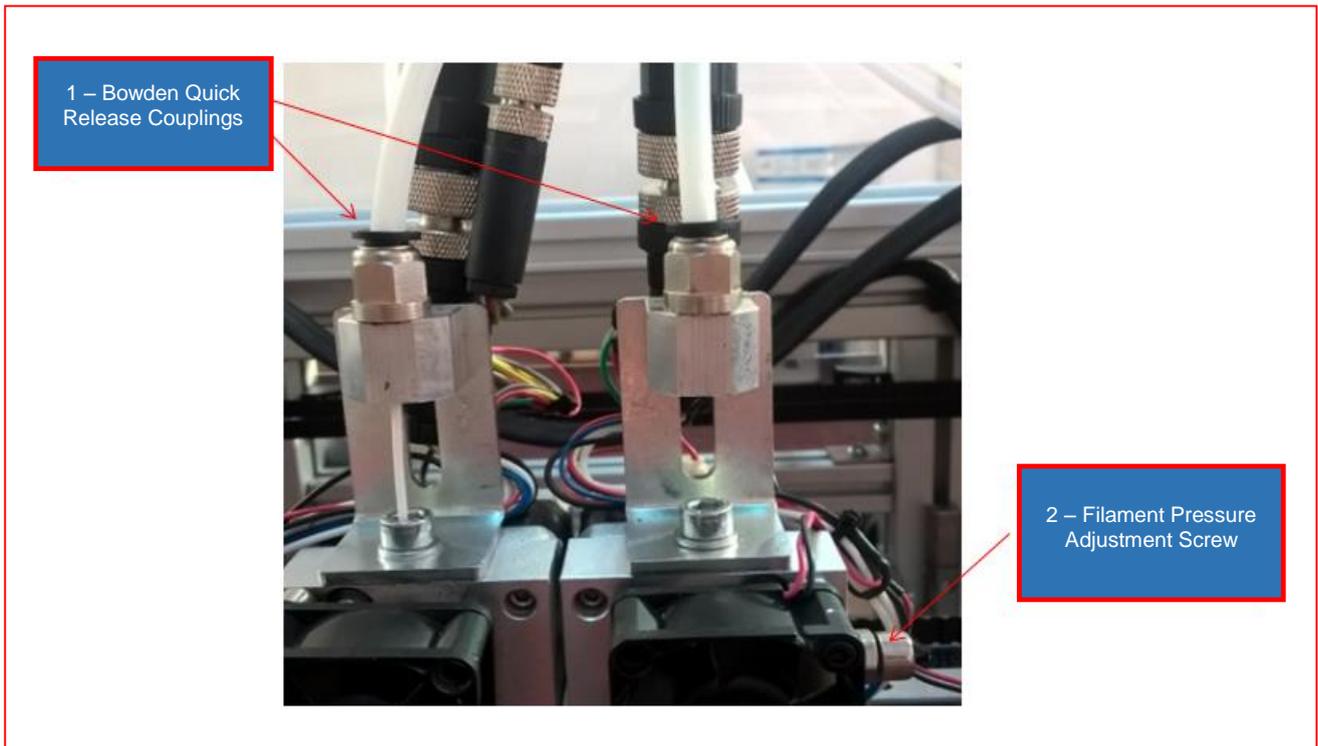


Figure 1-4 Feeder assembly terminals and pressure adjustment screw

REFERENCE	DESCRIPTION
1	Bowden quick release couplings
2	Filament pressure adjustment screw

The filament bobbins, power switch and USB port are located at the rear of the machine.

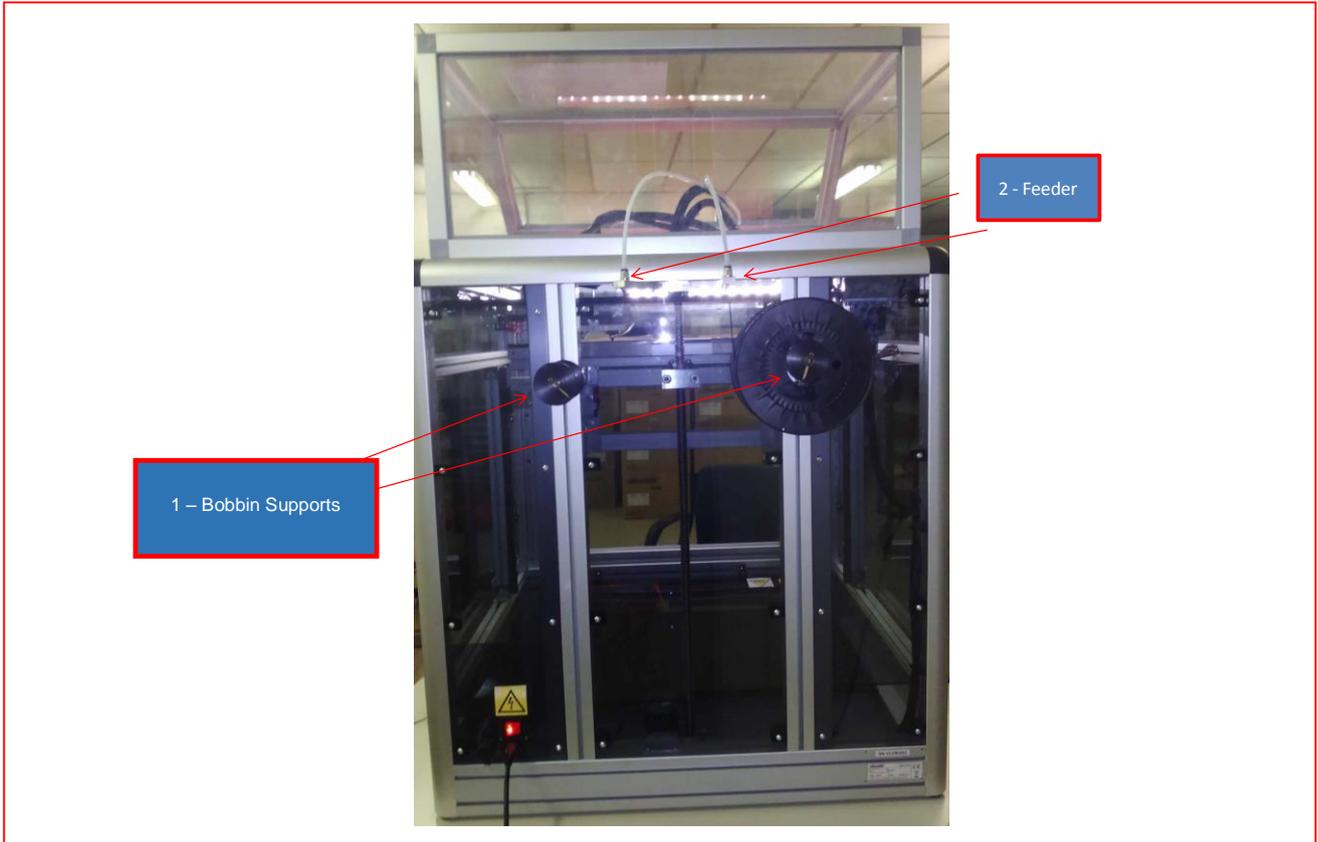


Figure 1-5 Rear view



Figure 1-6 Rear view close-up

REFERENCE	DESCRIPTION
1	Bobbin Supports
2	Feeder
3	Power-on Switch
4	Power Socket
5	USB Port

On the right side of the printer, there is the printer emergency stop button and a reset button for the sensitive mat.



Figure 1-7 Push-buttons on the right side of the printer

The emergency stop button can be pressed if you want to stop instantly all printer movement.

The reset button for the sensitive mat illuminates whenever the emergency safety functions enter into operation. It must be pressed again after the cause of the block has been removed to restore the normal printer operating status.

Printer axes orientation

The origin of the printer axes, referred to as the Home position, is the front left corner of the printing table.

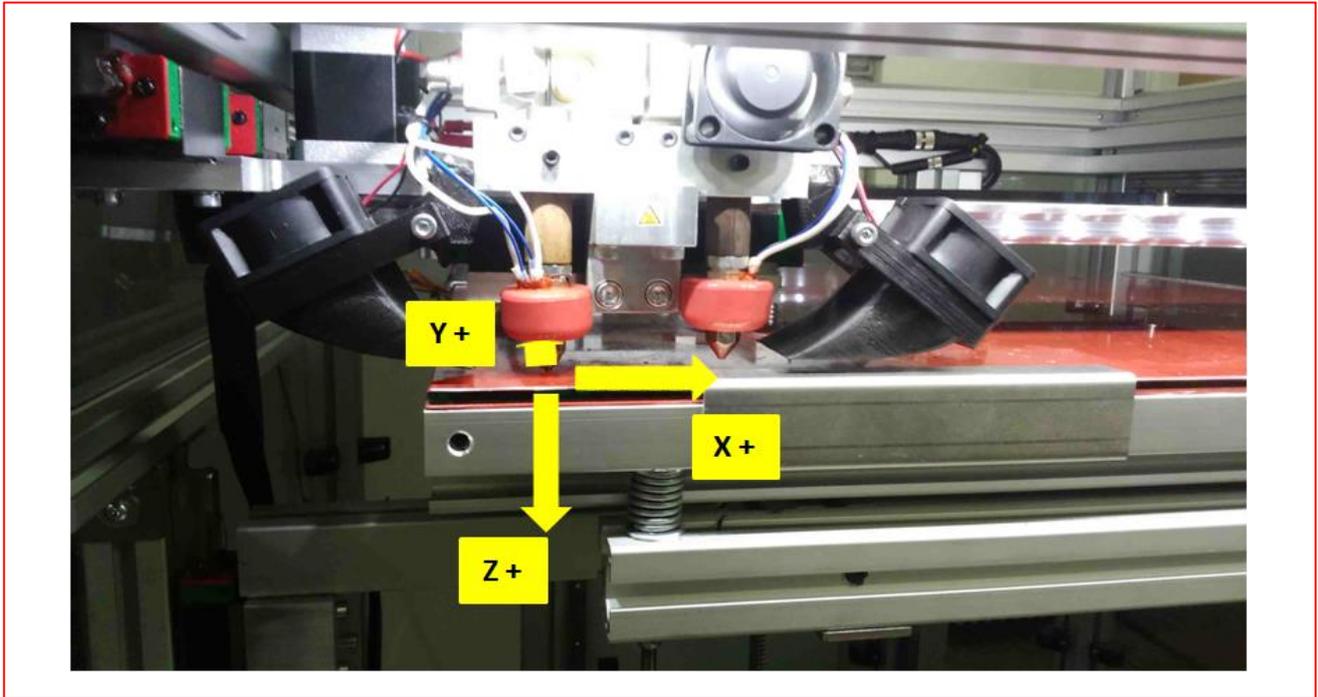


Figure 1-8 Olivetti S2 printer axes orientation

Starting from the origin, the orientation of the X axis is from left to right of the work table, the abscissa increasing in this direction. The orientation of the Y axis is from the front door to the rear of the machine, this representing the positive Ordinate direction. The Z axis, finally, is oriented vertically with respect to the printing table, the positive direction pointing downwards.

Chapter 2 - printer Preparation

PREPARING THE PRINTER

This chapter describes the procedures that must be followed to configure the Olivetti S2 printer correctly and set it up properly for the following printing phases.

Unblocking the extruder assembly

To protect the printer during shipment, the printing carriage is blocked into position using bands.

So before starting to print you must remove these bands.

Powering on the printer

Connect the printer to a 220V power supply using the cord provided and switch it on at the power switch.

LCD Display

When the printer is powered on, the LCD display illuminates.

On the display you can see the main printer status information.

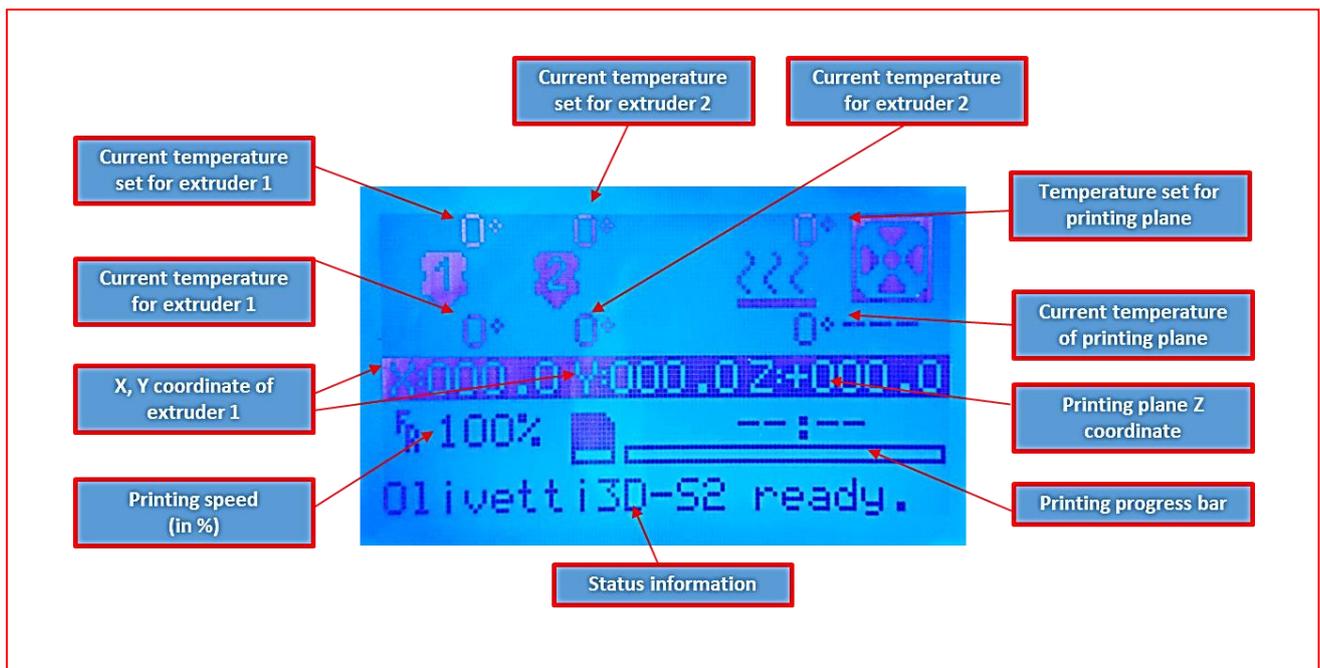


Figure 2-1 LCD display for Rest mode

Aligning the printing table

To obtain good printing quality it is of fundamental importance to ensure that the first layer deposited is distributed uniformly on the printing table.

For this purpose it is essential to ensure that the printing table is aligned correctly.

Although the printer has already been set up in the factory it may be necessary to repeat this operation due to the stresses caused by transportation.

To align the printing table:

1. Starting with the display in the Rest mode, press the jog dialer once and turn it to select the **Prepare** menu.

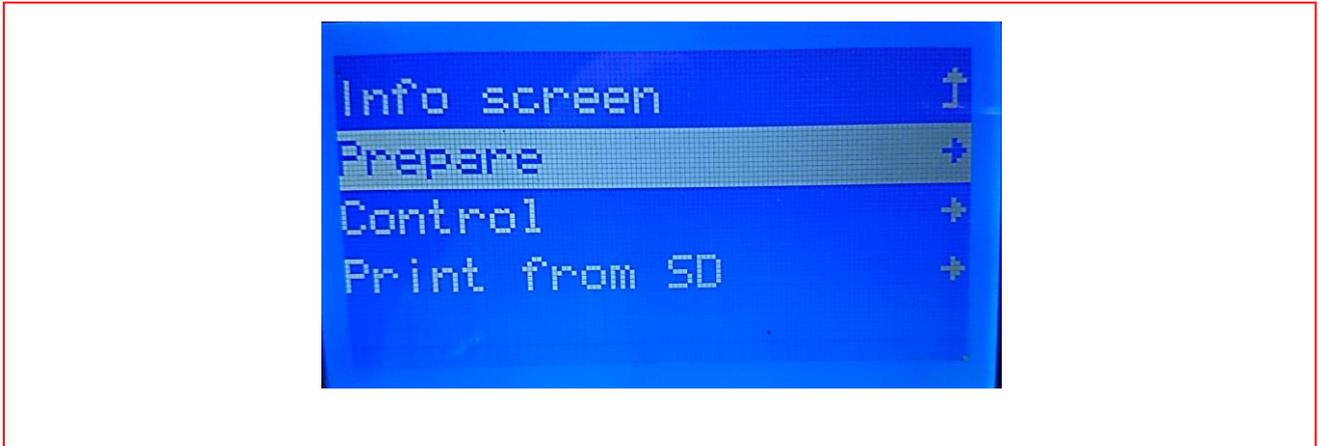


Figure 2-2 **Prepare** menu

2. Press the jog dialer to access the menu, then select the Bed Setting command.

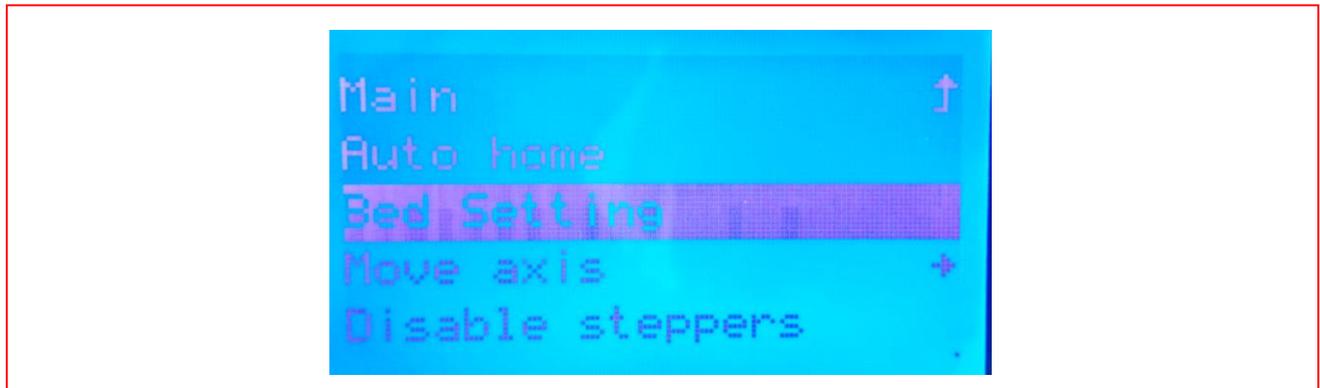


Figure 2-3 Bed Setting command

3. Press the jog dialer again. The LCD display becomes completely blue and the extruder assembly moves to the Home position.

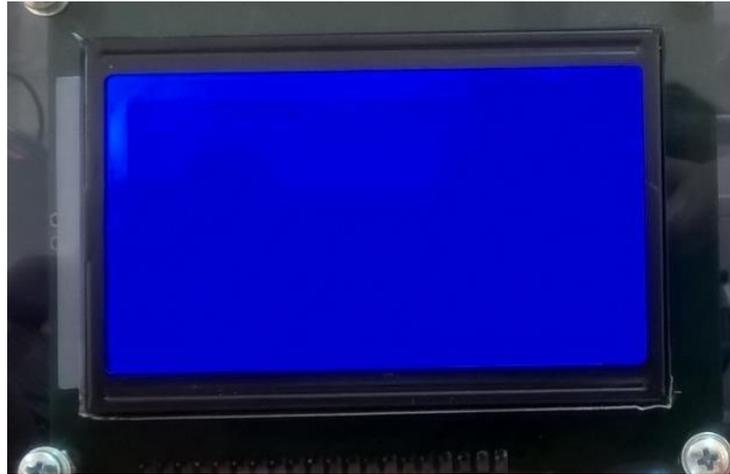


Figure 2-4 Blue-coloured display screen after Bed Setting is selected

4. Press the jog dialer again.
The extruder assembly moves to the first Adjustment position (there are 5 in total). Try to pass the 0.10 mm feeler gauge supplied between the Extruder 1 nozzle and the tempered glass. If the feeler gauge moves freely between the nozzle and the glass, you must work on the reference self-locking nut turning it in the clockwise direction until no light passes between the glass/ gauge/nozzle. In the opposite case – if the nozzle is too near the glass (i.e. feeler gauge cannot be inserted) - then work on the nut in the opposite direction (i.e. anti-clockwise), until the right amount of space is left between the nozzle and the table.

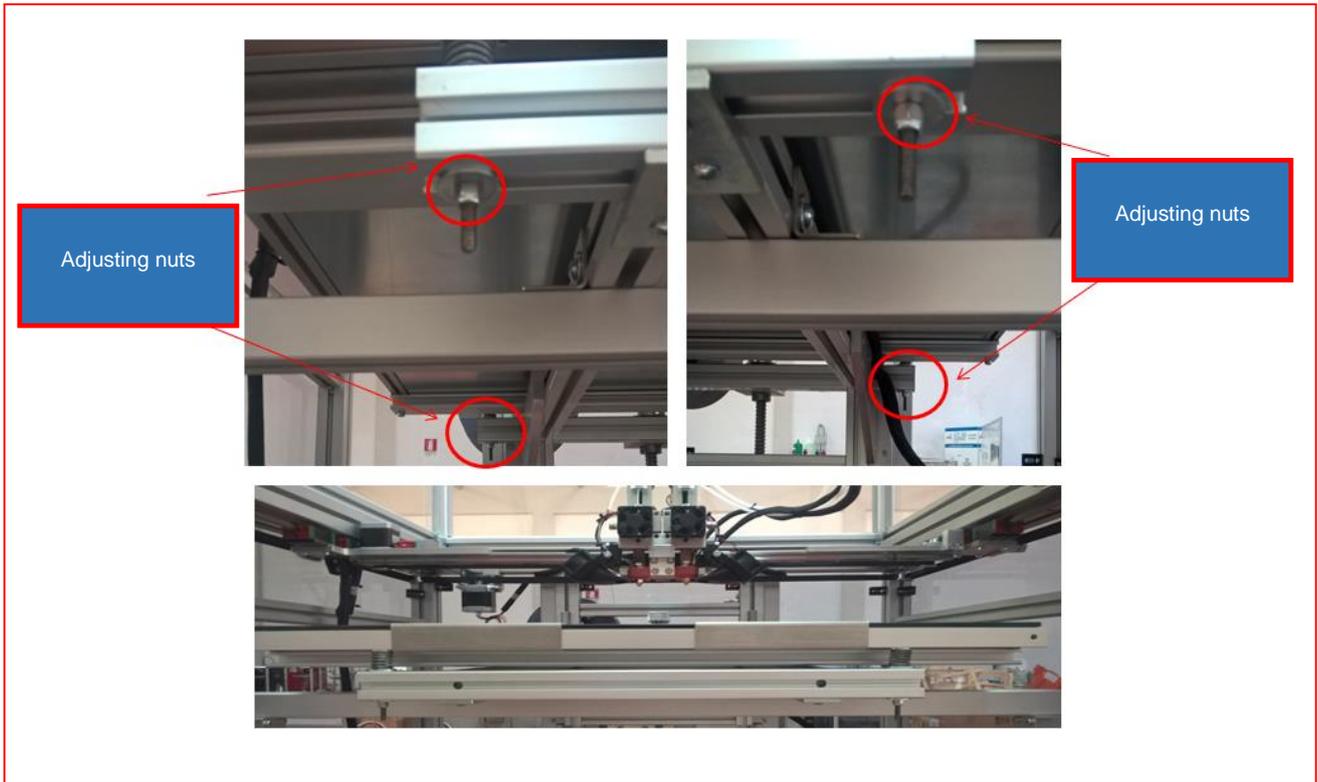


Figure 2-5 Adjusting nut positions

5. After the first adjustment is complete, press the jog dialer again. The extruder assembly moves to the second adjustment position.
6. Now repeat the adjustment as described at point 4, and press the jog dialer to bring the extruder assembly to the next adjustment position.
7. The total number of adjustment positions is 5 and, for each of these, the adjustment must be carried out as described at point 4.
8. After completing the adjustments, the extruder assembly returns to the Home position and the display returns to normal.



NOTE: Normally the first layer printed is deposited with a greater thickness than the following layers (setting the Slicing software appropriately). This expedient can compensate for any small misalignments.



NOTE: the flatness of the tempered glass cannot be guaranteed with centesimal accuracy therefore the first layer of the material printed may not be laid uniformly; consequently it is essential to ensure that the external lines are uniform in order to ensure good adhesion. The centesimal differences in height are compensated in the next 2-3 layers.



WARNING: Incorrectly executed height adjustment operations may result in bad printing quality or, in the worst case, a collision between the hot end and the printing table, causing damage to the machine.

The table below gives some examples of the types of problems that can be caused by incorrect alignment of printing table with suggestions for corrective actions.

Problem	Cause	Resolution
The nozzle touches the glass	The glass is too near to the nozzle	Adjust the printing table nuts to increase the distance between nozzle and printing table
The material is not able to flow out of the nozzle correctly	The glass is too near to the nozzle	Adjust the printing table nuts to increase the distance between nozzle and printing table
The material comes out of the nozzle, but the line printed for the first layer is extremely thin and "spread" widthwise	The glass is too near to the nozzle	Adjust the printing table nuts to increase the distance between nozzle and printing table
The material comes out correctly, but the "line" deposited is very narrow in width and has a cylindrical section; it detaches easily from the table when the next layer is printed	The glass is too far from the nozzle	Adjust the printing table nuts to reduce the distance between nozzle and printing table
The material comes out correctly but can be seen to "jump" slightly before sticking to the printing table	The glass is too far from the nozzle	Adjust the printing table nuts to reduce the distance between nozzle and printing table
The line that is "printed" for the first layer can be seen to change in thickness and width along the length	The glass is not aligned correctly: a thicker line indicates too little space between the nozzle and printing table, a thinner line indicates too large a space between the nozzle and the printing table.	Repeat the alignment operation for the printing table, followed by adjustment of the printing height

Adjusting the printing nozzle heights

To ensure correct printer operation and optimise printing quality, you must adjust the printing nozzle heights.

Although this adjustment has already been carried out in the factory, it may be necessary to repeat the operation due to the stresses of transportation.

To adjust the height of the nozzles, the first thing to do is to unblock the hot-end assemblies. To do this, turn the hex cap screws on the extruder block under the fans (using the 2.5 Allen key supplied).

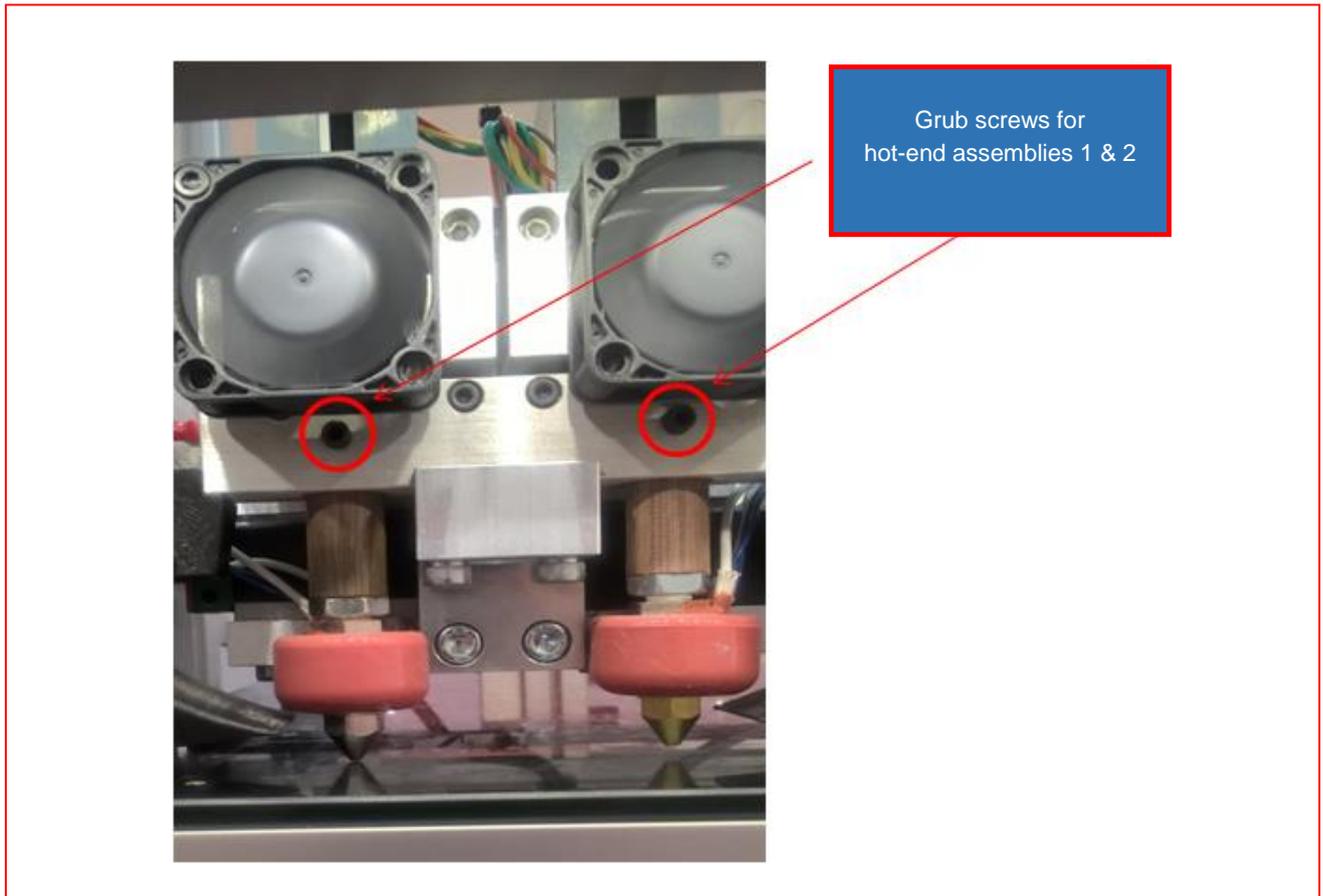


Figure 2-6 Grub screws for hot-end assemblies

After the grub screw is unscrewed, the hot-end block is free to move; adjust the nozzle to a distance of 0.10 mm from the tempered glass table.

This adjustment can be achieved by placing the 0.10 mm feeler gauge supplied between the nozzle and the table. Once the nozzle rests on the gauge, tighten the grub screw using the 2.5 Allen key to block the hot-end assembly again.

This operation must be carried out for the nozzles of both extruder 1 and extruder 2 (if you intend to print in two colours).

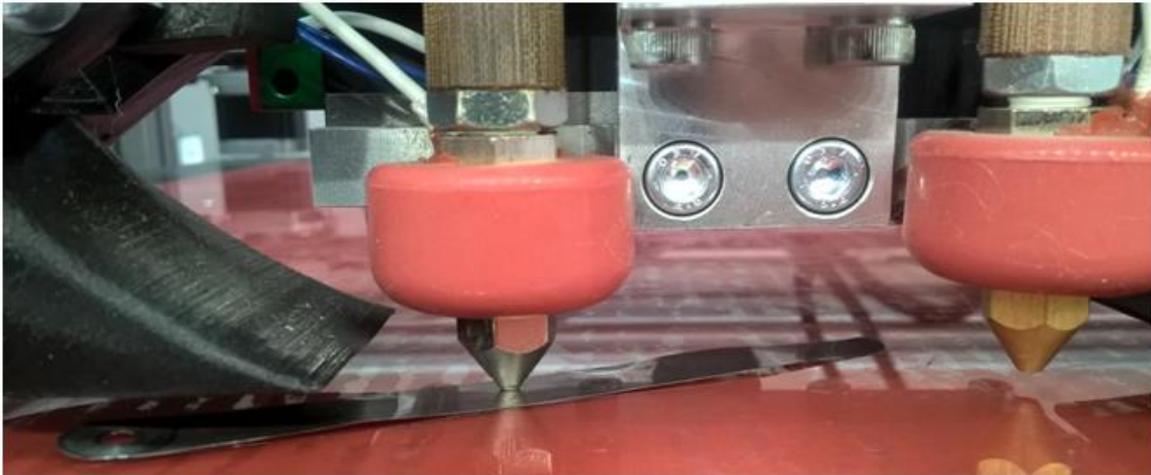


Figure 2-7 Using the 0.10 mm feeler gauge, adjust the distance between the nozzle and the table



WARNING: Incorrectly executed height adjustments may result in bad printing quality or, in the worst case, provoke a collision between the hot-end and the printing table, causing damage to the machine.



WARNING: The height adjustment operation must be carried out with the nozzles in a clean condition, free from plastic residues.

Adjusting the height of the second printing nozzle

The printer is supplied with a second extruder lifted up with respect to the printing plane of the first extruder. This is the configuration normally used when printing mainly in a single colour / material, to be sure that the second extruder is far from the printing plane and will not interfere with the printed workpiece.

If, on the other hand, printing is required using two colours, both extruders must be positioned at the same height on the Z axis; this signifies that the inactive head just "skirts" the part while printing with the other colour. To adjust the height of the second extruder, carry out for it the same steps described in the paragraph "Adjusting the printing nozzle heights".

Loading the filament bobbins

To load correctly the material filaments to be used for printing, follow the procedures below:

1. Insert the bobbin of material onto the special bobbin supports, keeping the thread oriented towards the lower opening of the feeder. This means that, when looking at the machine from the back, the bobbin for extruder 1 will rotate in a clockwise direction, while that for the extruder 2 will rotate in an anti-clockwise direction.

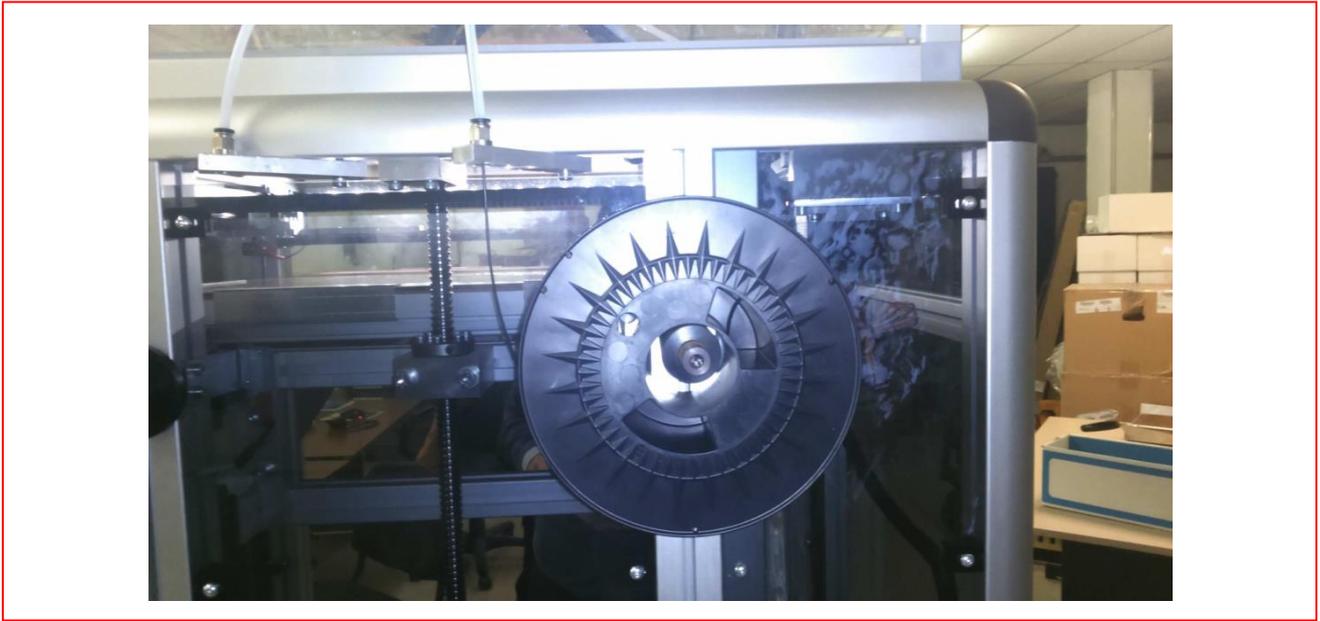


Figure 2-8 Positioning the material bobbin

2. Pass the filament inside the feeder until it appears at the filament feeding assembly on the front of the machine, inside the extruder assembly. As the filament is rather rigid, it tends to maintain its curvature even when unwound from the bobbin. To facilitate insertion of the filament into the feeder/output from the feeder, using slight pressure straighten with your fingers about 5 cm of the filament at the beginning.
3. If the filament does not come out easily, extract the filament duct from the feeder, pressing the bowden gently using two fingers of one hand, while pulling the duct out slowly with the other hand. Thread the filament through and feed it into the feeder assembly. Finally, with a little pressure, put the duct back into its place.

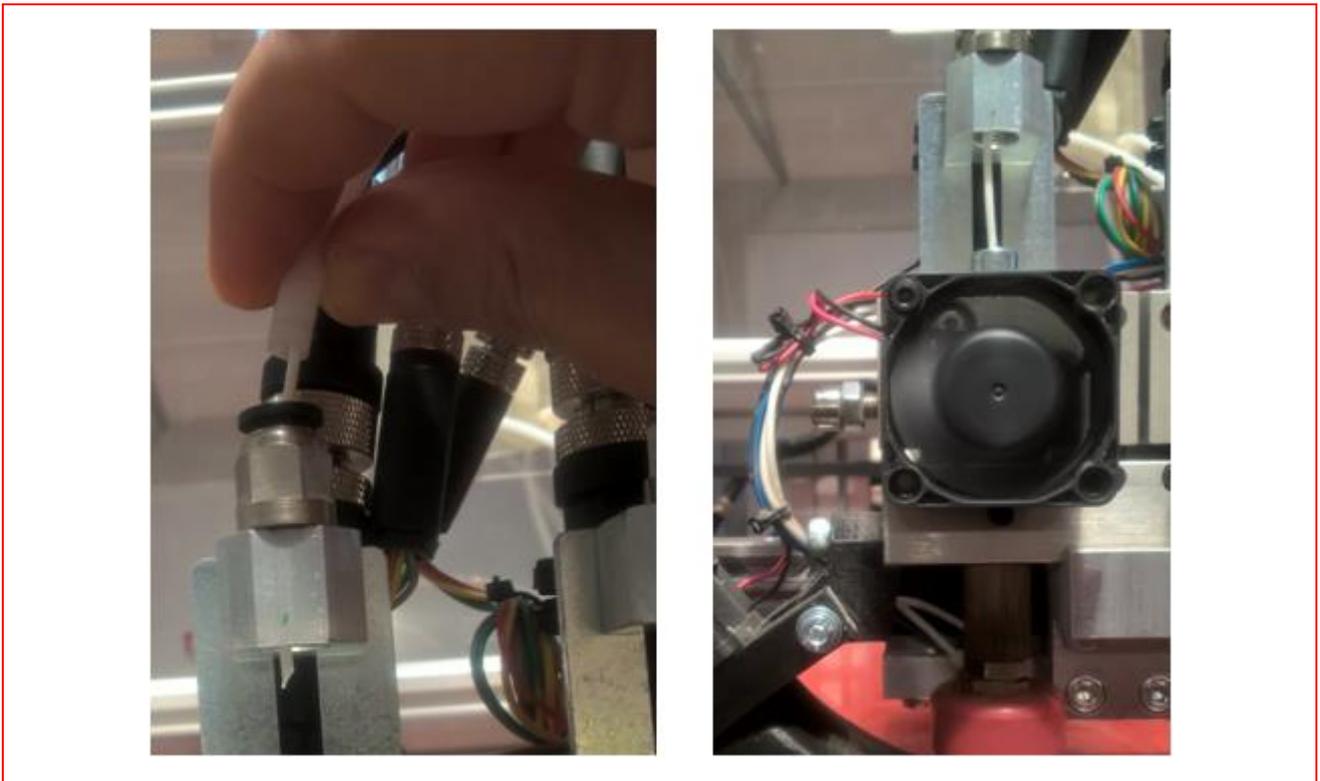


Figure 2-9 Extracting the feeder guide and inserting the filament

4. Adjust the temperature of the hot-end to the operating value for the type of filament loaded (for example, 200°C for PLA).
To adjust the temperature:
 - press once the jog dialer then select the **Control** menu.
 - turning the jog dialer, select the Temperature menu and press the dialer again.
 - to adjust the temperature of Extruder 1 select Nozzle or to adjust the temperature of Extruder 2 select Nozzle 2, then press the jog dialer.
 - at this point, by turning the jog dialer you can set the temperature to the value you want.
 - at the end press the jog dialer again to confirm.



Figure 2-10 Sequence of commands for adjusting the temperature

5. Rotate the extruder cooling fan to be able to see the filament feeder assembly.
6. Using Allen key 5 supplied, loosen the Allen screw fixing the contrast in the filament feeder assembly.

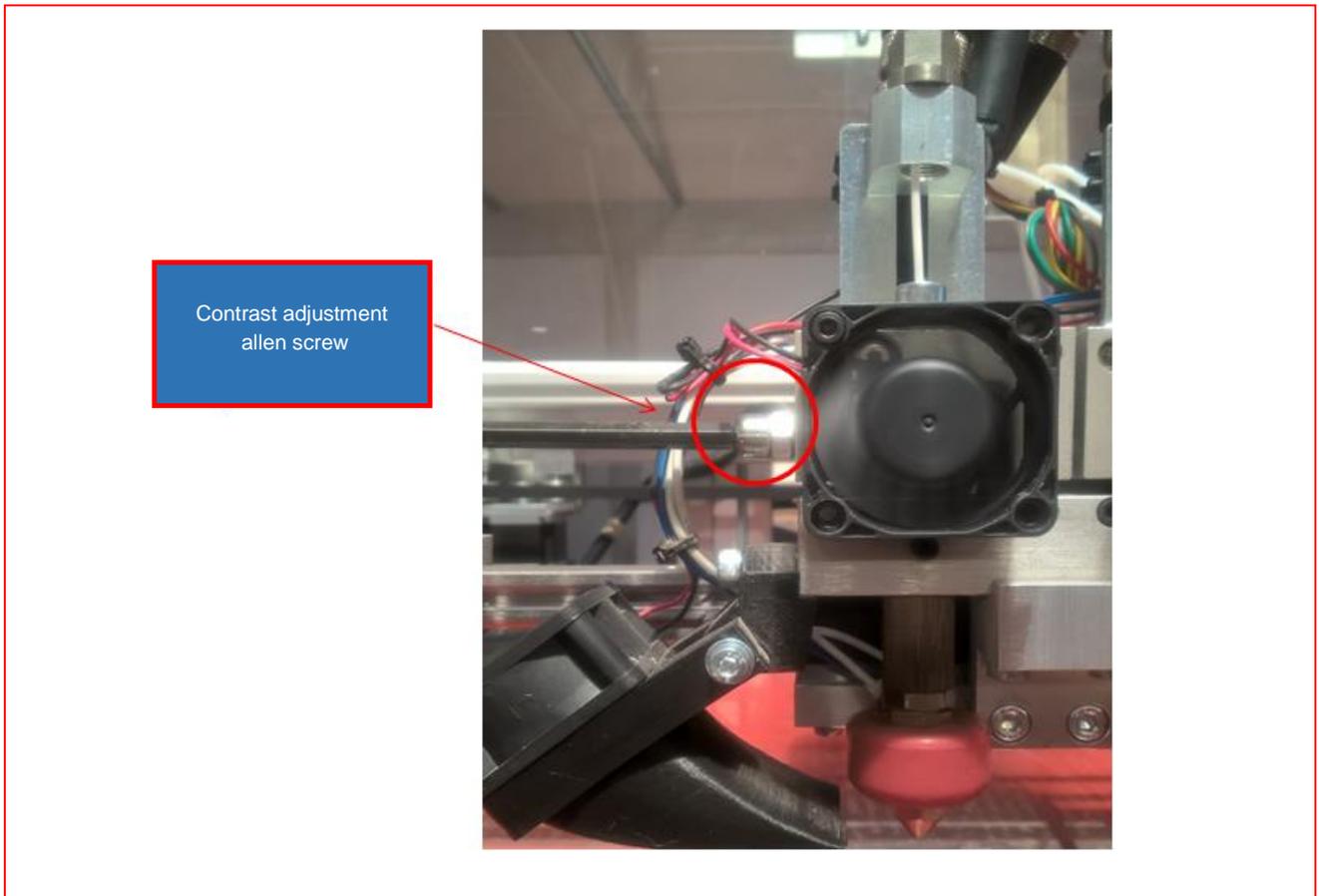


Figure 2-11 Allen screw for adjusting feeder assembly contrast

7. Thread the filament through the feeder assembly, pushing it through until about 10 cm comes out of printing nozzle.

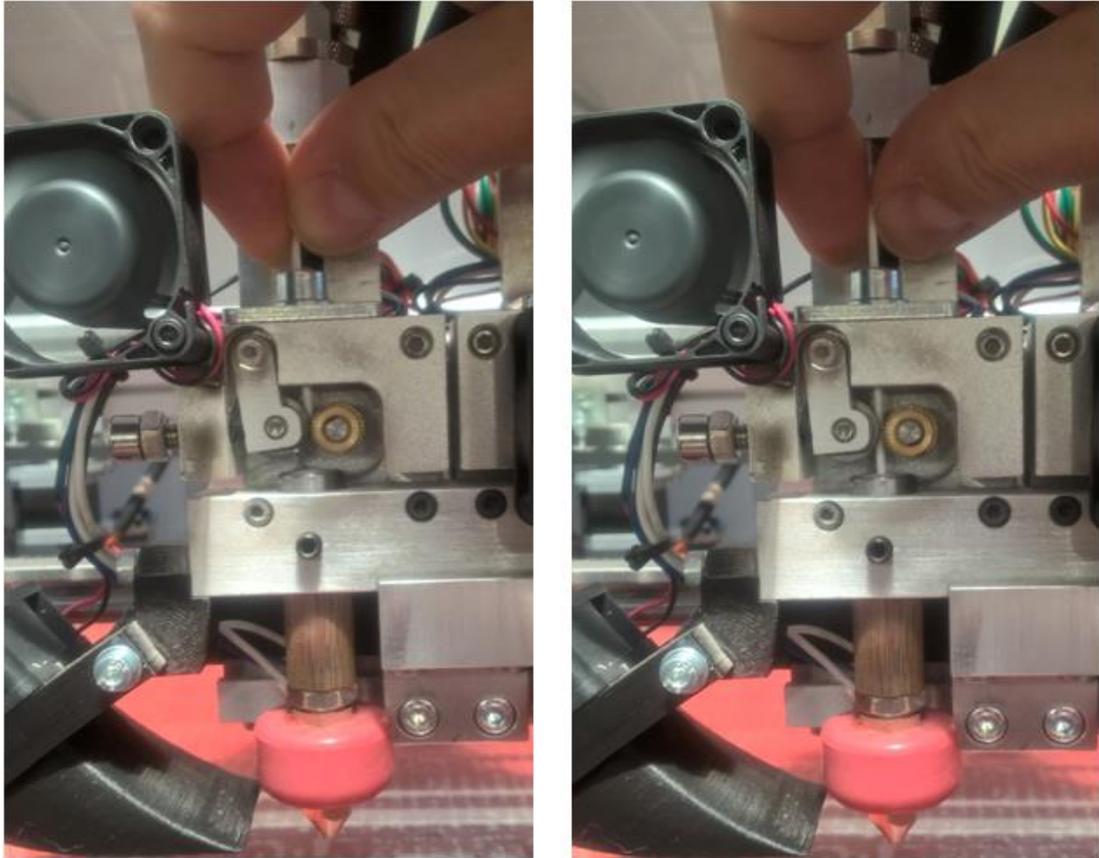


Figure 2-12 Inserting the filament into the hot-end

8. Tighten the allen screw again to restore the correct screw pressure to the gear and the thread feeder wheel. Put the cooling fan back into its correct position.



WARNING: When performing the first manual extrusion, residues may be found from previously printed materials; this is normal as the machine is tested before being packaged.

The following table describes some of the anomalies that may occur due to incorrect loading of the filament together with possible solutions.

Problem	Cause	Resolution
The filament is not fed by the feeder assembly. On eye inspection the filament is untouched without visible “notches” from the gear.	Not sufficiently tight, the filament is not pressed against the gear correctly.	Increase the tightness of the feeder assembly using the dedicated adjustment wheel.
The filament is fed by the feeder assembly, but occasionally unexpected “slips” occur, moreover the material is not extruded. On eye inspection the filament can be seen to be heavily “notched” or “consumed” by the gear.	Excessive tightness resulting in the filament being pressed too hard against the gear.	Reduce the tightness of the feeder assembly using the dedicated adjustment wheel

Preparing the printing table

The last operation before proceeding to print is preparation of the printing table.

The printing table is made of 5 mm thick tempered glass, which provides a smooth flat surface on which to construct the parts.

Plastic, however, does not stick to glass “naturally”, so to facilitate adhesion the use of normal hair lacquer is recommended to create a sticky veil onto which the plastic can stick.

Although there are other alternative methods for making the piece stick, such as adhesive masking tape, double-face adhesive tap or glue stick, hair lacquer continues to be the simplest fastest method for achieving the result desired.

To prepare the table, spray a light coating of lacquer as uniformly as possible using a crisscross pattern. Remember to use a ventilated room for this operation, far from inflammable objects and other objects that could become covered with hairspray.

Printing using dual extruders

The Olivetti S2 printer is able to print with both extruders 1 and 2 active, enabling you to print workpieces in two colours or composed of different materials.

To print in two colours and obtain good results, you must calibrate both extruders.

Although the Olivetti S2 printer has already been calibrated in the factory, you are advised to print the calibration piece provided on the SD card to make sure that transportation has not affected the initial set up.



WARNING: if you have difficulty recognising/reading the SD Card, check the position of the lock slider on the side of the card. The slider must be set to the unlocked position (so that both reading and writing are enabled).

To ensure correct calibration:

1. Load the material for printing into both feeders.
2. Select the file from the SD card.
3. Give the print command.
4. The printer proceeds to print a first square with extruder 1 and then a second square with extruder 2.
5. If the calibration between the two heads is perfect, the two squares will be perfectly superimposed, otherwise there will be an offset between them.

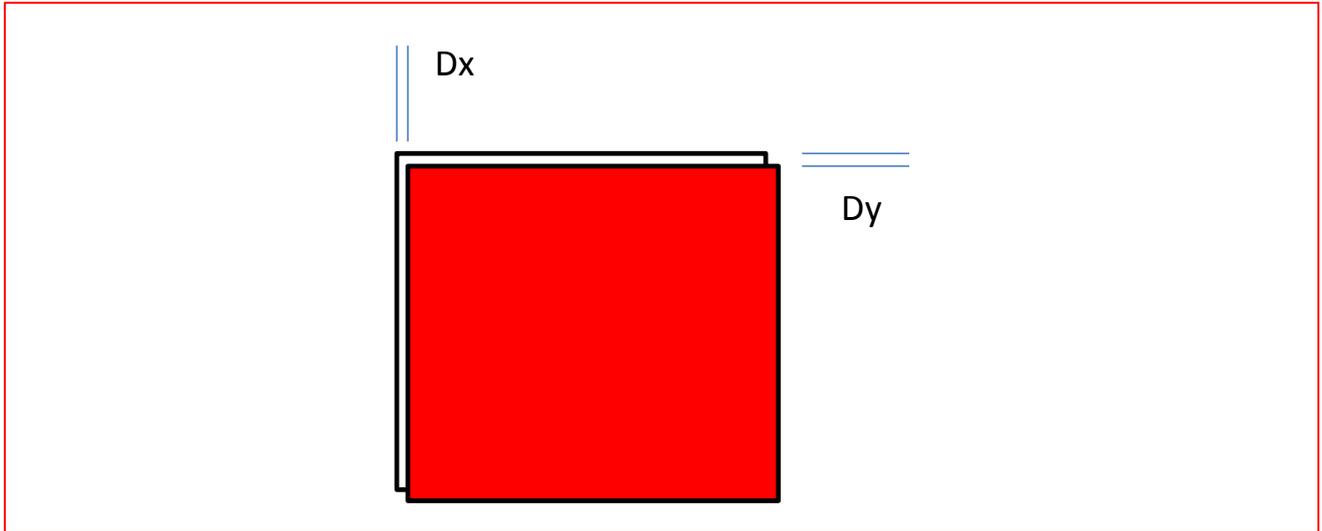


Figure 2-13 Printing squares which are slightly misaligned

6. To correct any misalignments, you must access the configuration file produced using Arduino IDE.
7. Run the Arduino IDE software.

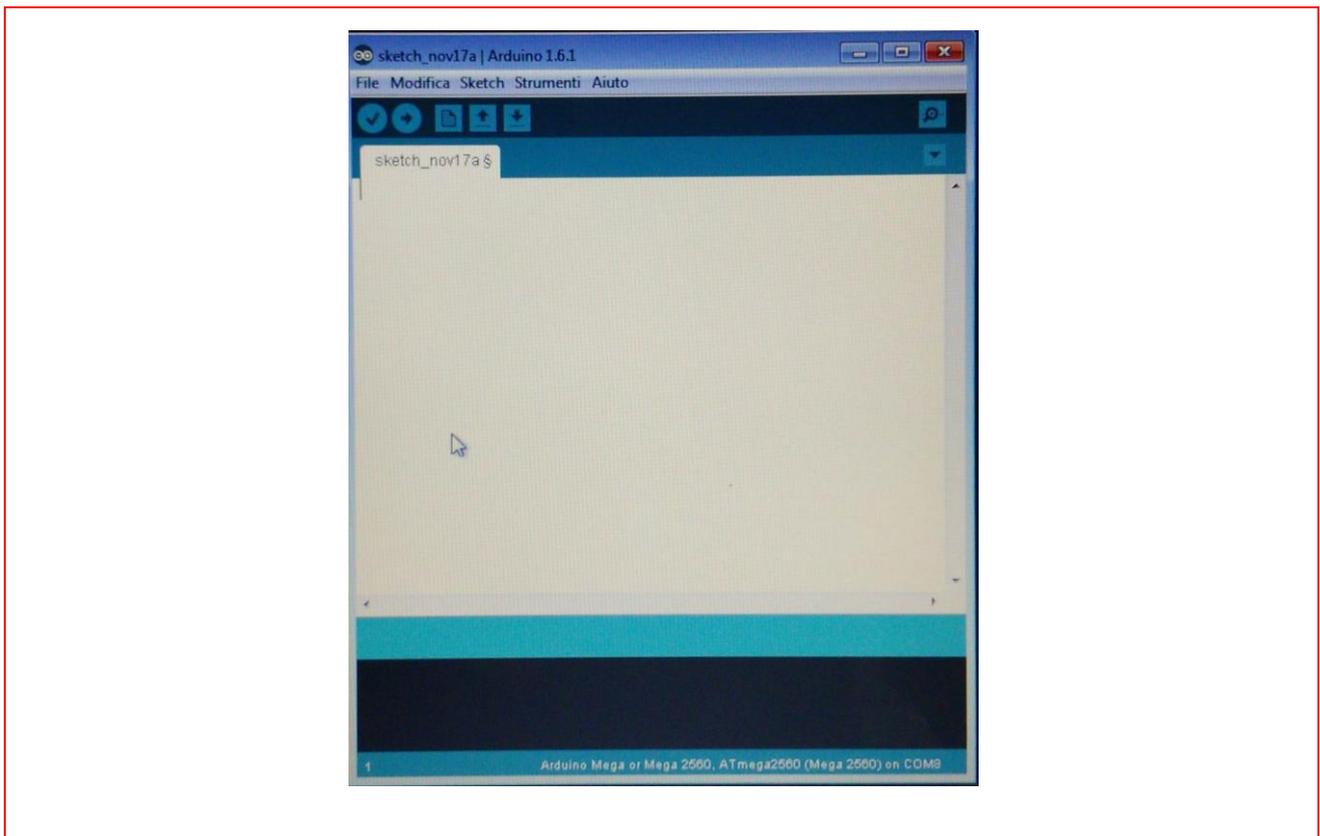


Figure 2-14 Arduino IDE SW

8. From the Arduino IDE File menu, select Open and choose the file firmware-S2.ino.

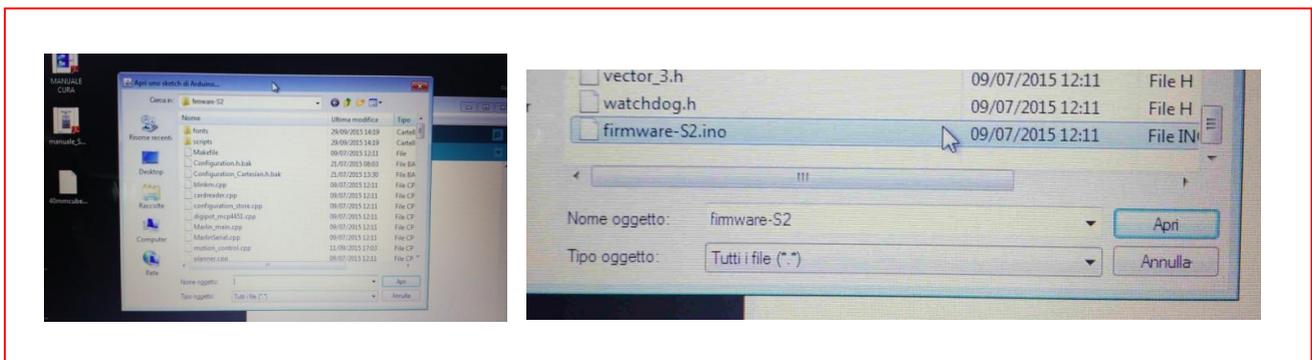
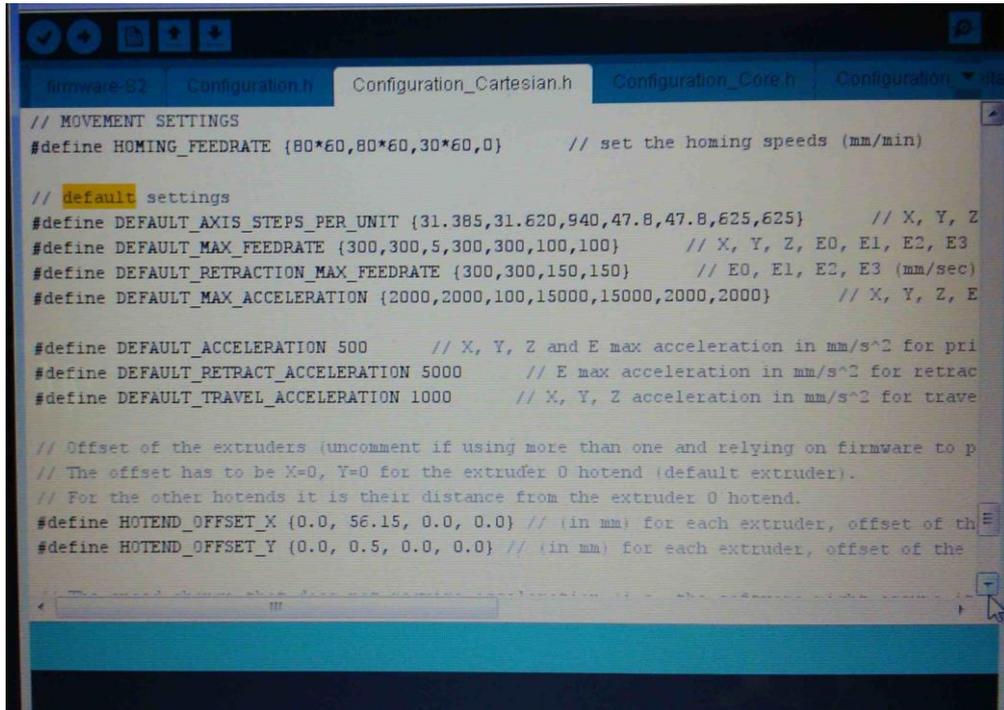


Figure 2-15 Opening the configuration file

9. After having opened the file, select the popup Configuration_Cartesian.h and position on the code line related to the default settings.



```

// MOVEMENT SETTINGS
#define HOMING_FEEDRATE {80*60,80*60,30*60,0} // set the homing speeds (mm/min)

// default settings
#define DEFAULT_AXIS_STEPS_PER_UNIT {31.385,31.620,940,47.8,47.8,625,625} // X, Y, Z
#define DEFAULT_MAX_FEEDRATE {300,300,5,300,300,100,100} // X, Y, Z, E0, E1, E2, E3
#define DEFAULT_RETRACTION_MAX_FEEDRATE {300,300,150,150} // E0, E1, E2, E3 (mm/sec)
#define DEFAULT_MAX_ACCELERATION {2000,2000,100,15000,15000,2000,2000} // X, Y, Z, E

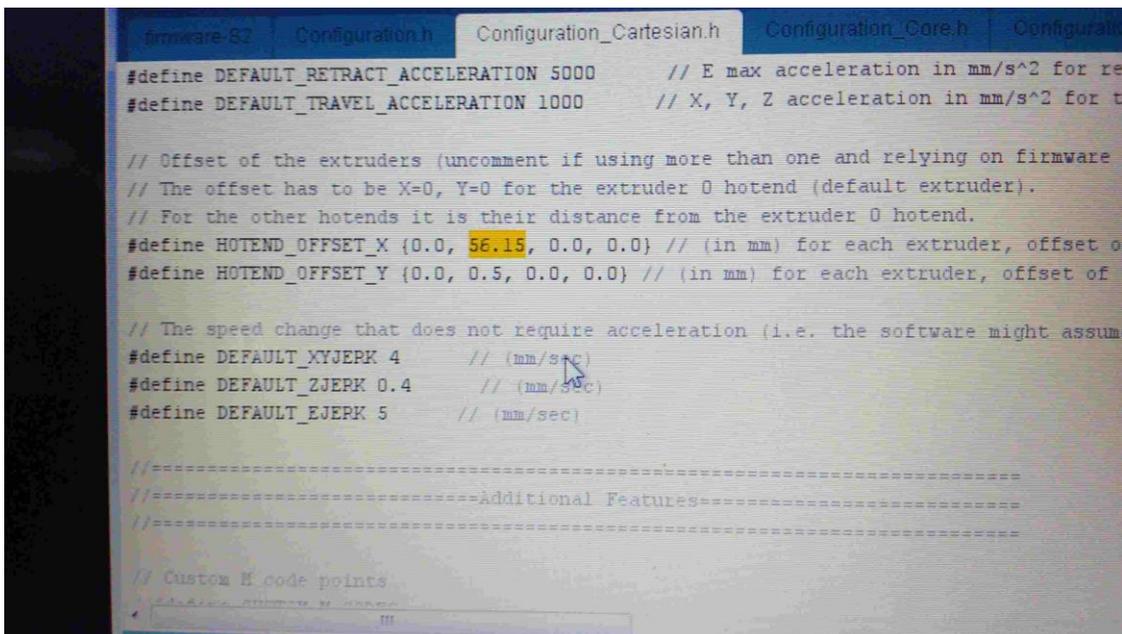
#define DEFAULT_ACCELERATION 500 // X, Y, Z and E max acceleration in mm/s^2 for pri
#define DEFAULT_RETRACT_ACCELERATION 5000 // E max acceleration in mm/s^2 for retrac
#define DEFAULT_TRAVEL_ACCELERATION 1000 // X, Y, Z acceleration in mm/s^2 for trave

// Offset of the extruders (uncomment if using more than one and relying on firmware to p
// The offset has to be X=0, Y=0 for the extruder 0 hotend (default extruder).
// For the other hotends it is their distance from the extruder 0 hotend.
#define HOTEND_OFFSET_X {0.0, 56.15, 0.0, 0.0} // (in mm) for each extruder, offset of th
#define HOTEND_OFFSET_Y {0.0, 0.5, 0.0, 0.0} // (in mm) for each extruder, offset of the

```

Figure 2-16 Default settings

10. Modify the offset value in the second element of the HOTEND_OFFSET_X vector by the small number of centimetres or tenths of centimetre necessary to compensate for the offset along the X axis observed when printing the square.



```

#define DEFAULT_RETRACT_ACCELERATION 5000 // E max acceleration in mm/s^2 for re
#define DEFAULT_TRAVEL_ACCELERATION 1000 // X, Y, Z acceleration in mm/s^2 for t

// Offset of the extruders (uncomment if using more than one and relying on firmware
// The offset has to be X=0, Y=0 for the extruder 0 hotend (default extruder).
// For the other hotends it is their distance from the extruder 0 hotend.
#define HOTEND_OFFSET_X {0.0, 56.15, 0.0, 0.0} // (in mm) for each extruder, offset o
#define HOTEND_OFFSET_Y {0.0, 0.5, 0.0, 0.0} // (in mm) for each extruder, offset of

// The speed change that does not require acceleration (i.e. the software might assum
#define DEFAULT_XYJERK 4 // (mm/sec)
#define DEFAULT_ZJERK 0.4 // (mm/sec)
#define DEFAULT_EJERK 5 // (mm/sec)

//=====Additional Features=====
//=====

// Custom M code points

```

Figure 2-17 X axis offset vector

11. Modify the offset value in the second element of the vector HOTEND_OFFSET_Y by the small number of centimetres or tenths of a centimetre necessary to compensate for the offset along the Y axis observed when printing the square.

```

Configuration_Cartesian.h
Configuration_Coprocessor.h

#define DEFAULT_RETRACT_ACCELERATION 5000 // E max acceleration in mm/s^2
#define DEFAULT_TRAVEL_ACCELERATION 1000 // X, Y, Z acceleration in mm/s^2

// Offset of the extruders (uncomment if using more than one and relying on firmware)
// The offset has to be X=0, Y=0 for the extruder 0 hotend (default extruder).
// For the other hotends it is their distance from the extruder 0 hotend.
#define HOTEND_OFFSET_X {0.0, 56.15, 0.0, 0.0} // (in mm) for each extruder, offset
#define HOTEND_OFFSET_Y {0.0, 0.5, 0.0, 0.0} // (in mm) for each extruder, offset

// The speed change that does not require acceleration (i.e. the software might
#define DEFAULT_XYJERK 4 // (mm/sec)
#define DEFAULT_ZJERK 0.4 // (mm/sec)
#define DEFAULT_EJERK 5 // (mm/sec)

//=====
//=====Additional Features=====
//=====

// Custom M code points

```

Figure 2-18 Y axis offset vector

12. Save the modified file and load it from the computer to the printer using the special Arduino IDE SW command.
13. Print a new test piece to see if the alignment has improved.
14. If further adjustments are necessary, modify the offset again as described in previous steps.



Figure 2-19 Correct test piece

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Chapter 3 – USING AND PRINTING WITH THE OLIVETTI S2 PRINTER

USING AND PRINTING WITH THE OLIVETTI S2 PRINTER

After having adjusted the printer and loaded the bobbin containing the filament, the printer is ready for use.



WARNING: if machine operation has been interrupted, for example due to use of the emergency push-button, or the presence of an obstruction under the heated table, printing must be started again from the beginning.

To unblock the emergency push-button on the right side of the printer, it must be rotated in a clockwise direction. If the block occurs because an obstruction is present under the heated table, remove it then put the machine back into operation by pressing the reset button on the right side of the printer.

Printing a test piece

On the SD card provided in the package, there is a file that can be used for executing a test print job and allowing you to gain confidence using the printer.



WARNING: if there is difficulty recognising/reading the SD Card, check the position of the lock slider on the side of the card. The slider must be set to the unlocked position (so as to enable both reading and writing).

To print the test piece:

1. Insert the SD CARD supplied in the package into the slot on the front of the printer
2. Select the SD Card menu to access the file manager.
3. Select the file to print (Logoolivetti1.gcode) by turning the jog dialer and then pressing it to confirm.
4. The machine now starts the automatic printing procedures reading the GCODE indicated and executing all the phases. You can follow the process from the info menu and, of course, through the transparent windows of the machine.

When the print job is run, the printer executes the following procedures:

1. Homing of all axes,
2. Heating of hot-end and of table (if required) until the requested temperature is reached
3. Extrusion of a part of the material for loading into the extrusion chamber
4. Movement in the printing zone, starting procedure for printing layer on layer.
5. On completion of the printing process, the machine sends the carriage to the Home position and switches off the heaters to allow the machine to return to normal environmental temperature.



NOTE: The printing format supported by the Olivetti S2 printer always has the extension .GCODE.

Creating an Olivetti S2 printable file

This paragraph describes the steps necessary for producing your own GCODE file for printing by the Olivetti S2 printer.

Creating a 3D model

The first thing to do is create a three-dimensional model of the object you want to print.

To create the model you can use both commercial 3D CAD drawing software or freely-available software such as, for example, OpenSCAD, Blender, SketchUp, FreeCAD.

Alternatively, you can also download ready-made 3D models, available free on Internet sites such as Thingiverse and GrabCAD.

There are various file formats for 3D models however it is recommended to generate or download models in the format .STL (STereoLithography) which is the format most commonly used, and is easily managed by the programs that you will have to use afterwards to generate the GCODE for printing in 3D.

Creating GCODE starting from a 3D model

Once the 3D model in STL format is ready, it must be further processed to transform it into GCODE and make it printable.

The transformation from the 3D model to GCODE takes place using a dedicated piece of software called Slicers.

These programs subdivide the 3D model into sections that the 3D printer is able to lay on the worktable.

Numerous slicers exist however those recommended in particular are Slic3r and Care, also the Repetier Host environment which, apart from having its own slicing software, also provides tools which are useful for resizing, copying and repositioning the model on the printing table.

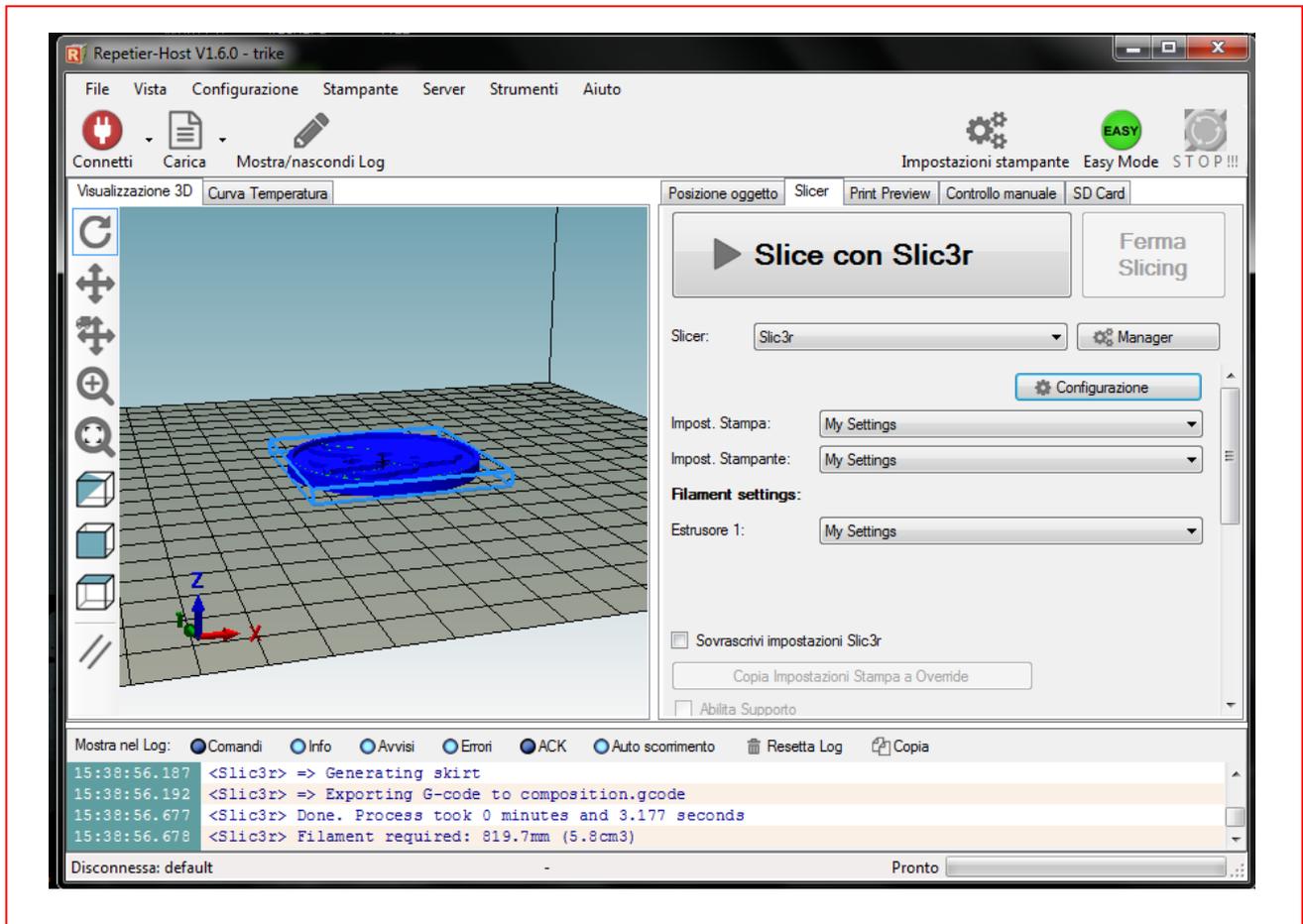


Figure 3-1 3D Model being converted inside Repetier Host

After having generated the GCODE file using the slicer, copy it onto the SD card for insertion into the Olivetti S2 printer for printing.



WARNING: if there is difficulty recognising/reading the SD Card, check the position of the lock slider on the side of the card. The slider must be set to the unlocked position (to enable both reading and writing).

GCODE printing

To continue with printing your GCODE, proceed as explained in the paragraph on printing the test piece, that is:

1. Insert the SD CARD supplied in the package into the slot on the printer front
2. Select the SD Card menu to access the file manager.
3. Select the file to print by turning the jog dialer then press to confirm
4. The machine now starts the automatic printing procedure reading the GCODE indicated and executing all the phases. You can follow the process from the Info menu or, of course, observing it through the transparent glass of the machine.

Overhang and generating supports

Portions of a model that cannot be printed using the FFF printing process without adequate supports underneath are defined as overhang.

As in FFF technology layers are deposited one on top of the other, each layer must have underneath an adequate support base.

If your 3D model has planes or surfaces that rise upwards with an inclination of over about 50° with respect to the vertical (40° from the table), the layer deposited may not have sufficient support underneath and may collapse downwards, compromising the printing quality.

To avoid the overhang problem, and when required, the slicing software can automatically generate material supports (based on parameters that can be set by the user).

This additional material must therefore be removed manually at the end of printing process.

Printing using two extruders

To print using both Olivetti S2 extruders, the first thing to do is check that the second extruder is calibrated correctly with respect to the first extruder following the procedures in the section on printer preparation.

Next generate a GCODE file starting from your STL file after having set all the slicing SW options to take into account use of the second extruder.

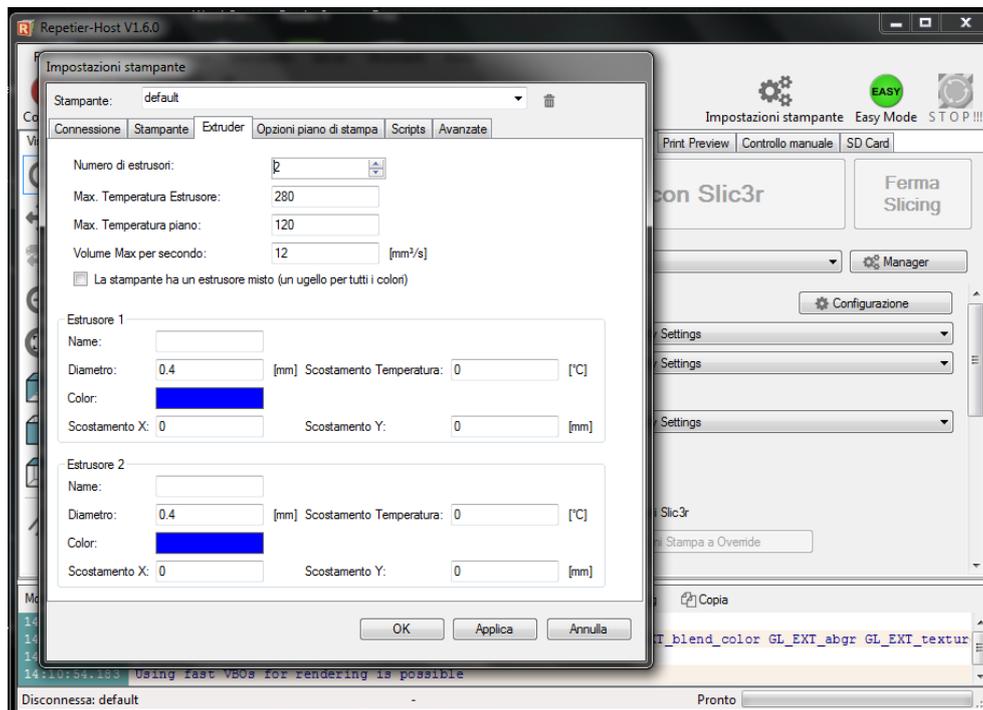


Figure 3-2 Dual extruders in slicing SW

Refer to the Slicing SW manual for the correct settings for the dual extruders and based on the type of result you want to obtain.

Once the GCODE is generated for the two extruders, all you have to do is issue the print command using the procedures already described for using a single extruder.

Suspending and interrupting printing

Using the menus you can suspend or cancel a print job after it has been started.

To suspend printing, press the jog dialer and access the menu. Rotate the jog dialer to select the Pause command then press the jog dialer again.

Printing is suspended and the extruder assembly stops at exactly the same point as printing was interrupted.

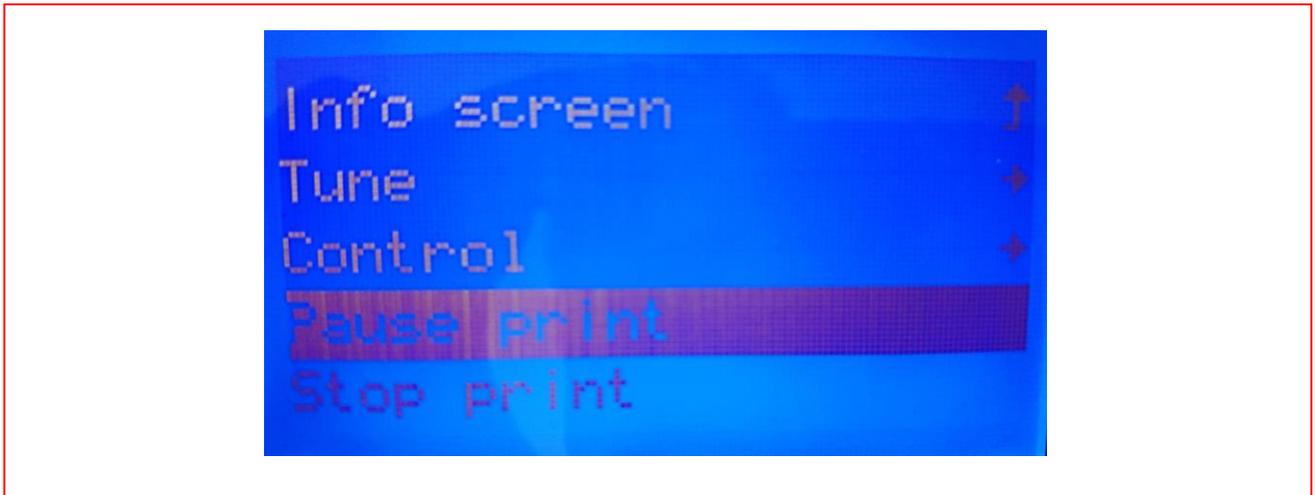


Figure 3-3 Suspension and interruption of printing

Once suspended the print, the display shows the initial page with the words “Pause print”; to restart printing all you have to do is press the jog dialer to confirm.



Figure 3-4 Initial page with the words “Pause print”

By selecting on **Tune** and **Control**, you can check and change the temperature of the nozzle and of the bed, and the filament flow



NOTE: During printing suspension, and due to the high temperature of the nozzle, the material may continue to flow causing the printed piece to become distorted.

To cancel a printing job, access the menu, using the jog dialer select Stop Printing, then confirm by pressing the jog dialer.

Printing is cancelled.

Note that the extruder assembly will remain stopped at the last position assumed before printing was cancelled. You must therefore either move the extruder manually using the menu commands or execute a homing procedure.

Extracting the printed pieces

Once printing is terminated, wait until the printing table reaches normal environmental temperature (if it has been heated) before removing the printed part using the spatula provided.

As the piece could be stuck to the printing table quite firmly, work slowly and carefully to avoid damaging it.

MENUS AND NAVIGATION

Using the Olivetti S2 printer user interface you can access all commands necessary for adjusting, servicing and printing.

Starting from the first page, you can access the Main menu by pressing the jog dialer at the bottom right of the LCD display.

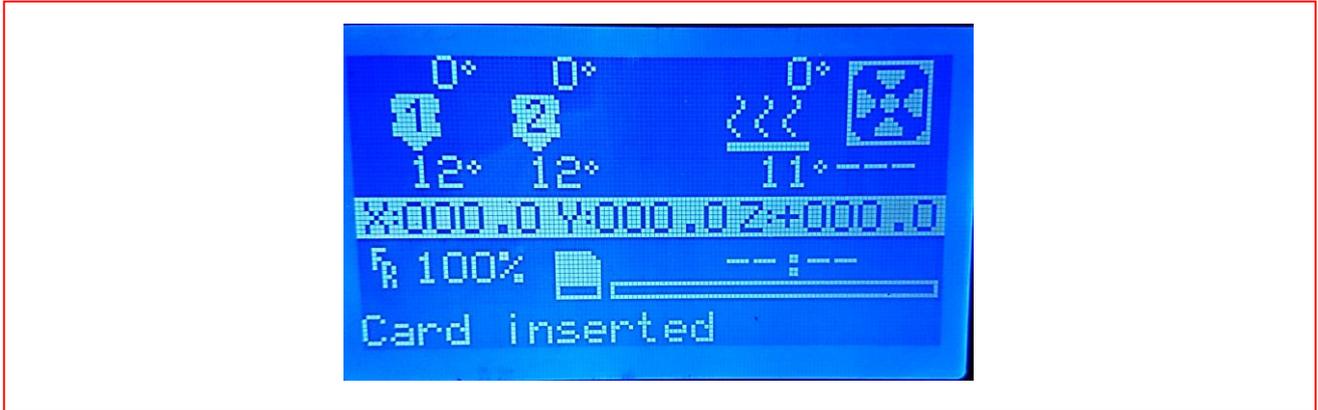


Figure 3-5 Initial page

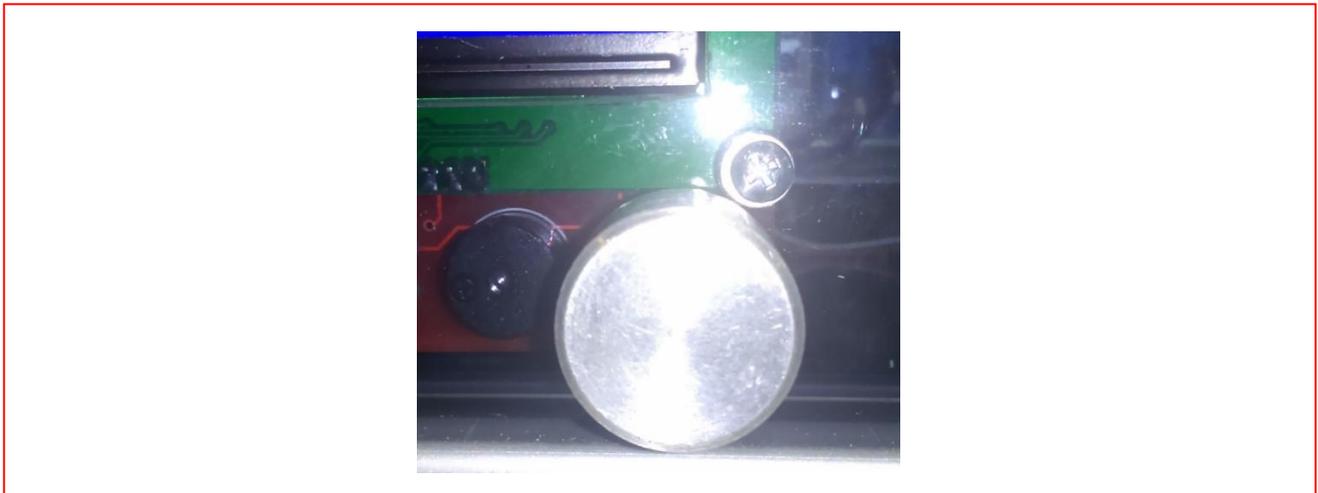


Figure 3-6 Jog dialer

You can navigate between the menus by turning the jog dialer either clockwise or anti-clockwise.

To confirm a given command or menu press the jog dialer.

MAIN MENU

You can access the Main menu by pressing the jog dialer once when the printer is in rest mode, displaying the initial page.

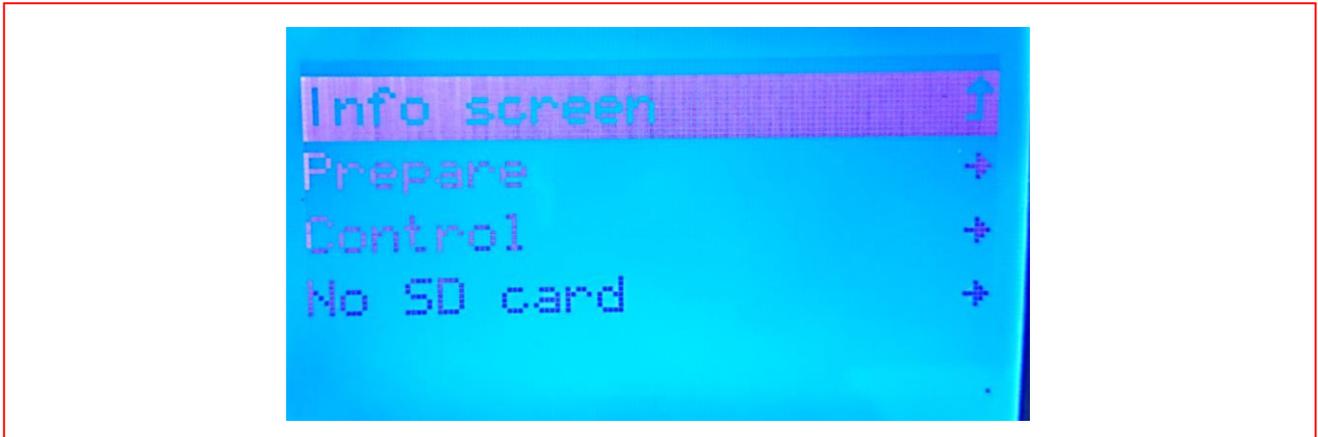


Figure 3-7 Main menu

From the Main menu you can return to the initial page by selecting the **Look** command using the jog dialer then pressing the jog dialer to confirm.

In any case, if the printer remains inactive for more than about 20 seconds it returns automatically to the initial page.

From the main menu you can access the following submenus:

- Prepare
- Control
- Print from SD

PREPARE MENU

The **PREPARE** menu allows you to carry out the main machine adjustments. From this menu, you can access the following submenus:

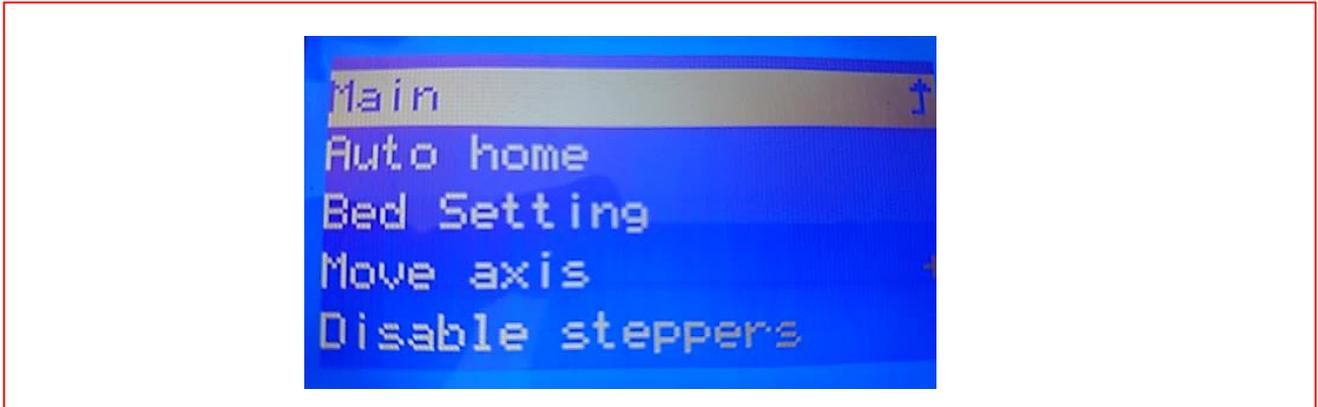


Figure 3-8 Prepare submenus

- Auto Home
- Bed Setting
- Move Axis
- Disable steppers

To move the printhead and the printing table to the rest position, use the jog dialer to select the Auto Home command then confirm by pressing the dialer again.

Using the Bed Setting command you can adjust the distance of the nozzles from the printing table, as previously described in the paragraph related to adjusting the printing table.

The Move Axis command can be used to move the printer axes.

Two types of movement are possible, fast and precision adjustments.

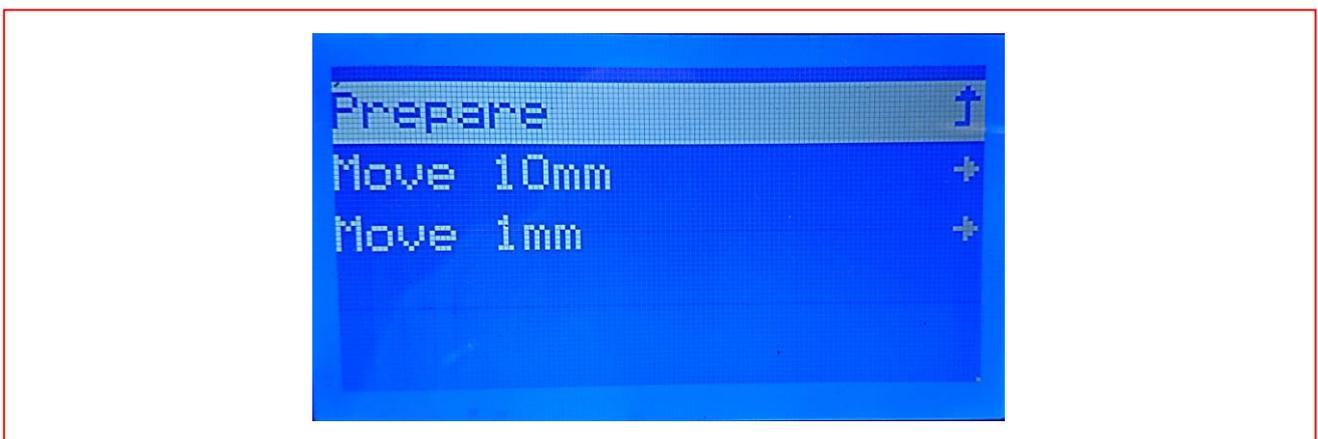


Figure 3-9 Axes adjustment commands

Selecting the **10 mm Move submenu** you can move the printhead rapidly along the X and Y axes.

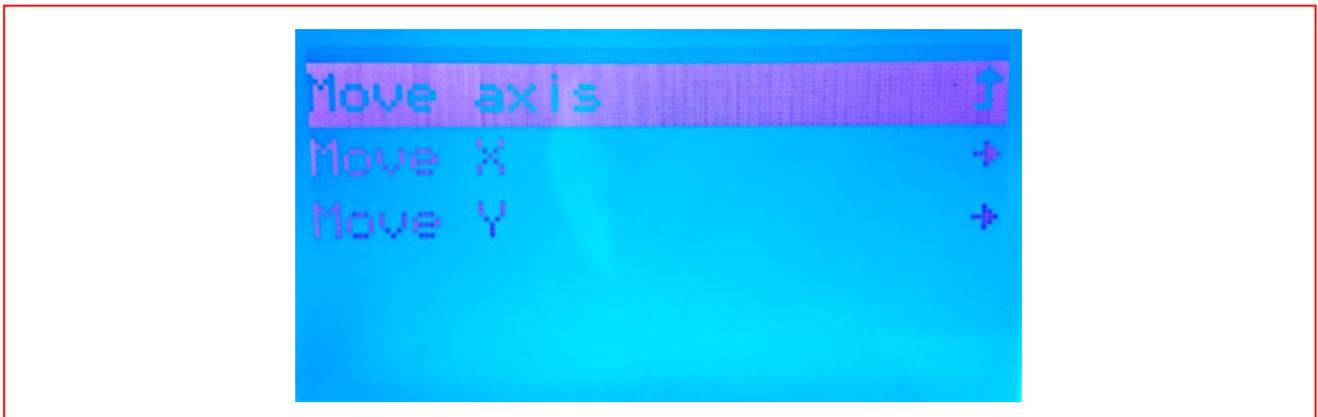


Figure 3-10 Fast adjustment menu

Selecting the **1 mm Move submenu** you can adjust all three axes, X, Y and Z (printing table), as well as move the motors that feed the filaments of extruders 1 and 2 (warning, to move the filaments, the extruder temperature must be set at 200 °C).

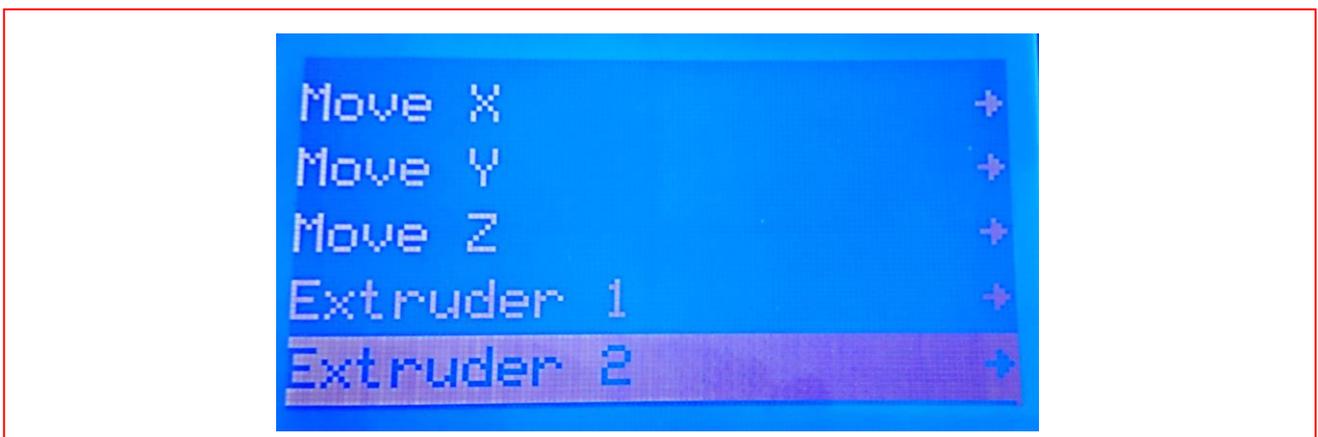


Figure 3-11 Precision adjustment menu

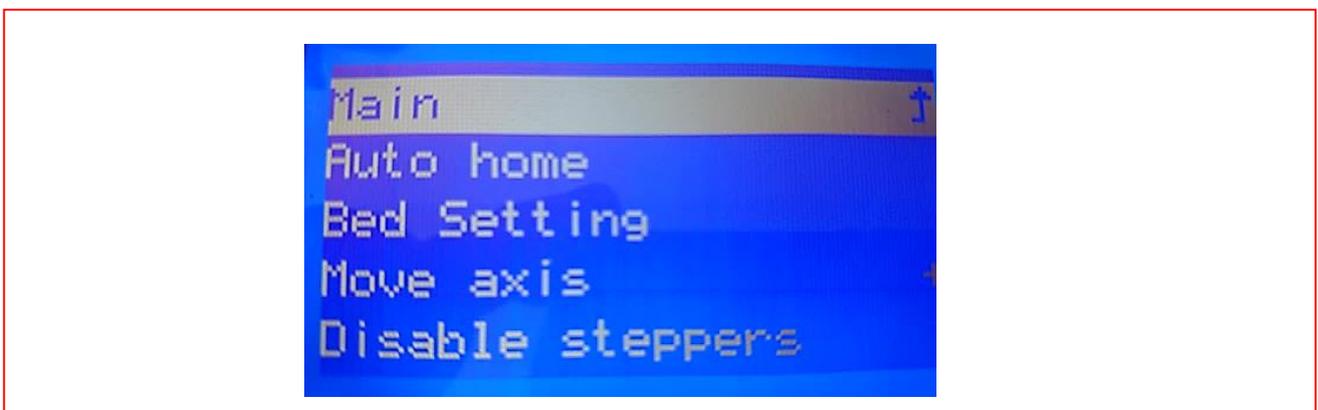


Figure 3-12 PREPARE submenus

Selecting the **Disable steppers** menu you can disarm the motors that control the movement of the X and Y axes, if you need to move them manually.
To disable the motors use the jog dialer to select Disable steppers then press the jog dialer.

To re-enable the motors again, just give the Auto Home command for the machine.



WARNING: move the axes slowly and carefully to avoid inducing extra currents that may damage the axes control cards.

CONTROL MENU

The Control menu allows you to access all the printer adjustment parameters and to modify them singly according to your needs.

The Control menu contains the following submenus:



Figure 3-13 Control menu and related submenus

- Temperature
- Movement
- Default Settings

Temperature

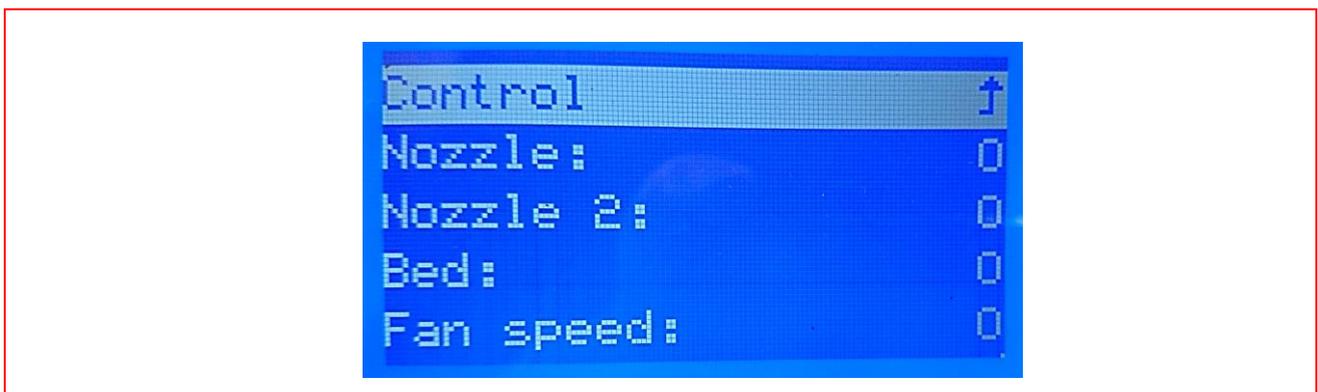


Figura 3-14 Temperature submenu

Accessing the Temperature menu, you can adjust the temperature of nozzles:

- Nozzle 1: to make this adjustment, move the jog dialer to the **Nozzle** command and confirm by pressing the dialer. Rotate the jog dialer to bring the temperature to the desired level, then press it to confirm; this causes the machine to heat the nozzle to the temperature set.
- Nozzle 2: similarly, select **Nozzle 2** to set the temperature for the second nozzle.

To adjust the temperature of printing table select **Table**.

The Fan speed command is optionally available and not provided with the basic printer configuration.

Movement

The Movement menu allows you:

- to adjust acceleration of printer movements.
- to enable/disable the printing abort if an axis reaches the Endstop point

You are advised not to modify the predefined parameter settings.

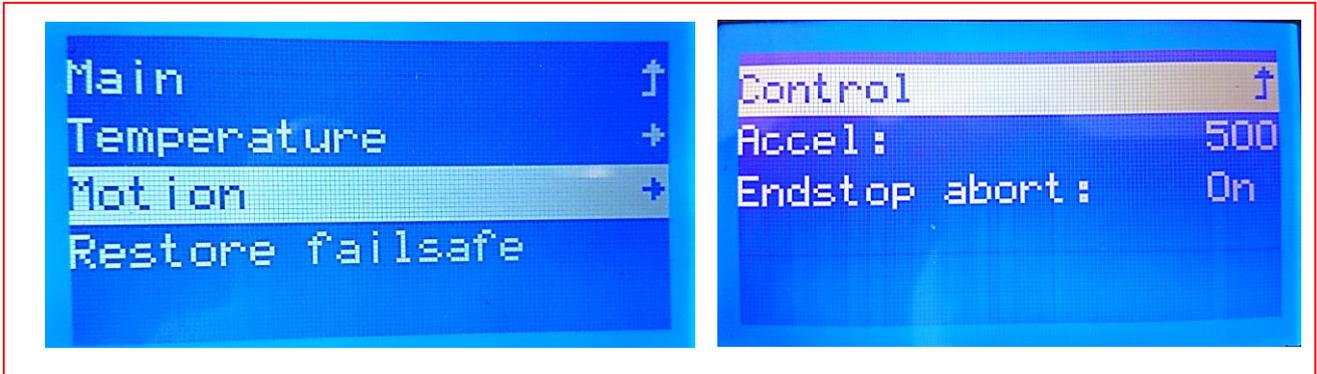


Figure 3-15 Axis movement parameter settings

Factory settings

The last command in the Control menu is Default Settings.

To reload the parameter settings configured in the factory, select this command using the jog dialer and then confirm.

SD Card menu

You can access the SD Card Menu from the Main menu.

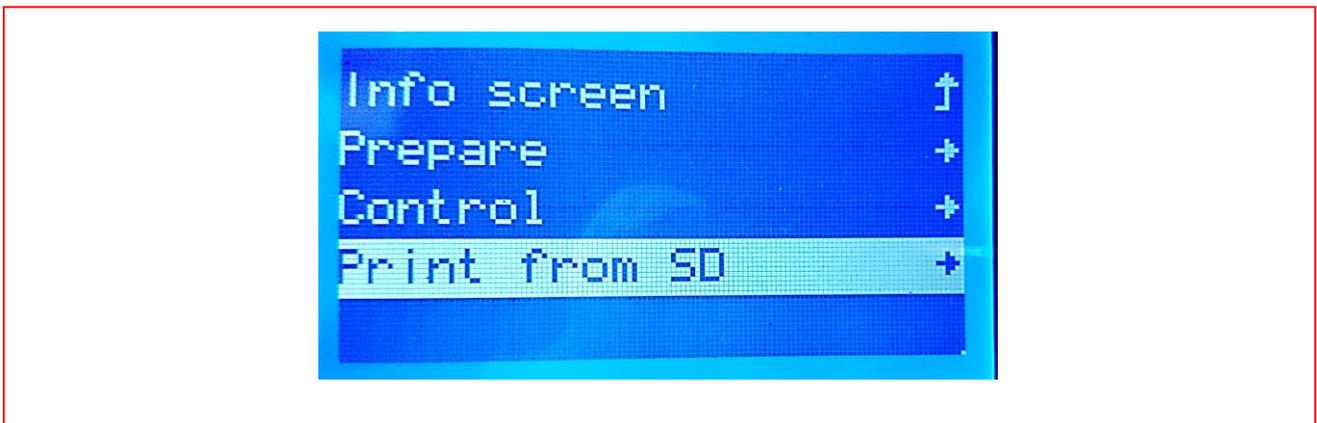


Figura 3-16 Main Menu

Selecting this menu using the jog dialer and confirming, you can display the contents of the SD card inserted. Navigating through the files available, you can select a file and launch its printing.

Appendix A – Olivetti S2 Labels

LABEL POSITIONS AND MEANINGS



Figure A-1 Front labels

SYMBOL	COLOUR	MEANING	MEANING
TRIANGLE	YELLOW	HAZARD	HOT SURFACES
CIRCLE	BLUE	REGULATION	READ INSTRUCTIONS
CIRCLE	BLUE	REGULATION	USE GLOVES
CIRCLE CROSSED THROUGH	RED	PROHIBITION	DO NOT REMOVE GUARDS

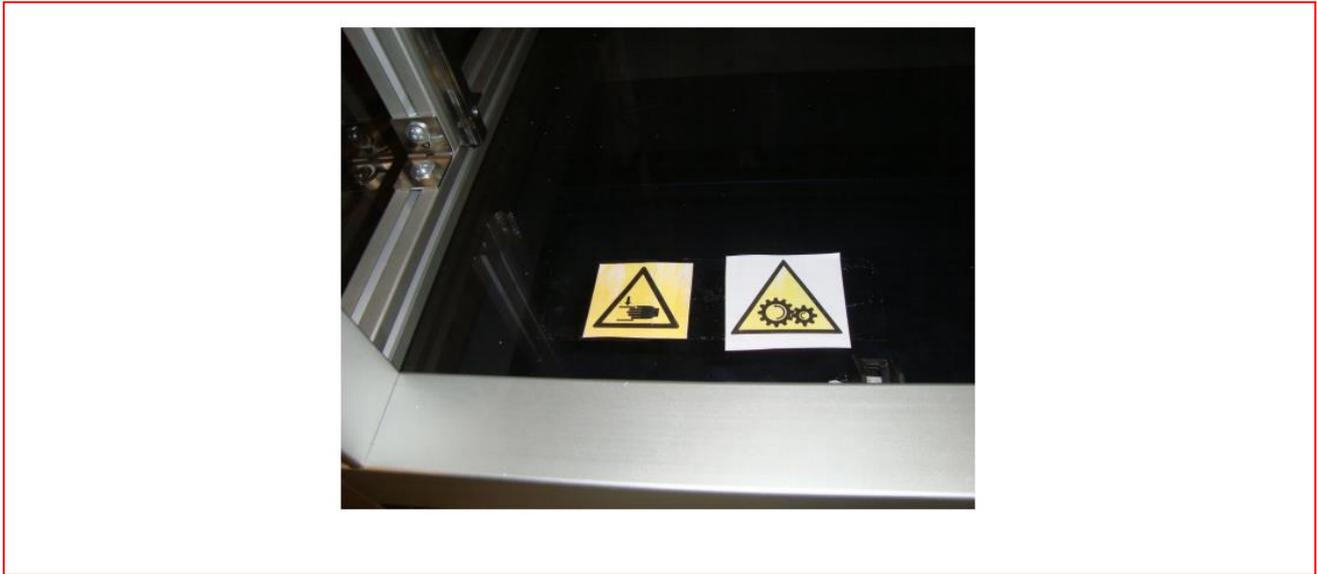


Figure A-2 Internal labels lower side

SYMBOL	COLOUR	MEANING	MEANING
TRIANGLE	YELLOW	HAZARD	PINCHING/CRUSHING
TRIANGLE	YELLOW	HAZARD	BODIES IN MOVEMENT



Figure A-3 Label on rear external switch

SYMBOL	COLOUR	MEANING	MEANING
TRIANGLE	YELLOW	HAZARD	VOLTAGE

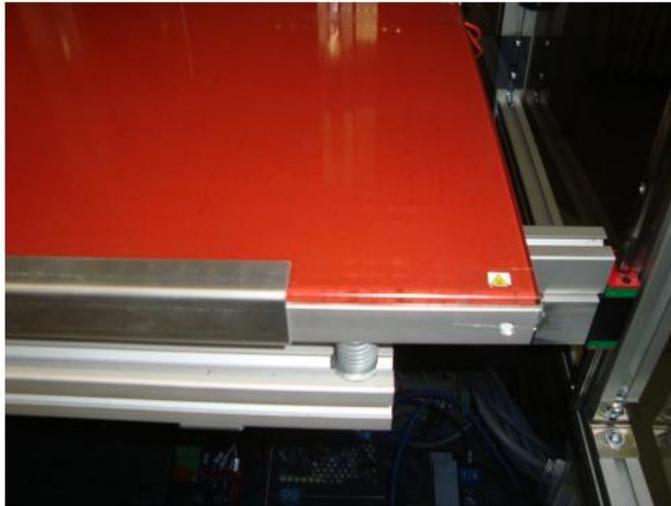


Figure A-4 Label on internal heated table

SYMBOL	COLOUR	MEANING	MEANING
TRIANGLE	YELLOW	HAZARD	HOT SURFACES

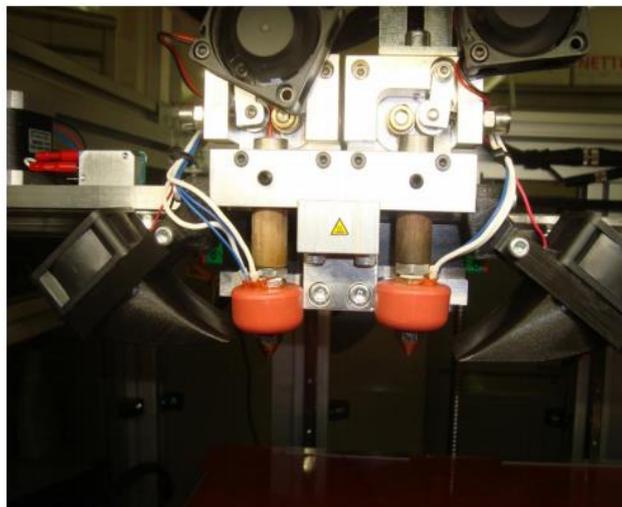


Figure A-5 Label on extruder block

SYMBOL	COLOUR	MEANING	MEANING
TRIANGLE	YELLOW	DANGER	HOT SURFACES

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Appendix B – Olivetti S2 printer care and maintenance

Cleaning the printing table

At the end of printing, and after having removed the printed piece, you are advised to clean the printing table, eliminating residues of hairspray or plastic that could still be present.

To clean the table you should use normal ethyl alcohol for household use (also known as “ethanol”), and a soft dry cloth.



NOTE: The printing table is made of 5 mm thick tempered glass; it is a safety, temperature-resistant, glass. However, when handling the glass you should pay maximum attention as it is very fragile. Use exclusively the glass provided with the machine.

Lubricating the axes and spindle nut

The linear guides are lubricated by the grease present in the recirculating ball slides.

The bearings can be injected with lithium-based machine grease through the hole on the slide side. This allows the grease to penetrate inside the ball recirculation chamber lubricating both the slide and the bar. You should also spread a little grease on the recesses at the sides of the guide using a dry clean cloth.

The spindle nut operates on a recirculating ball screw which guarantees long resistance over time. To reduce noise levels and improve operating smoothness, use a dry clean cloth to apply a little grease to the spindle nut.



WARNING: Use exclusively lithium-based grease. Solid lubricants, such as those based on molybdenum sulphide, must not be used.

Cleaning the feeders

The feeders normally do not need any servicing. However, from time to time it may be opportune to clean the filament feeder assembly to remove the residues of plastic that have accumulated during machine operation.

To remove plastic dust residues, use a small brush starting from the front slot of the feeder.

One fast efficient method is to use a jet of compressed air either from an air compressor or a compressed air canister normally used for cleaning keyboards and electronic equipment.

Cleaning and replacing the printing nozzles

Whenever you change the material used for printing, it is advised to replace the printing nozzle.

To replace the nozzle, the extruder must be hot - at its operating temperature - to allow the material residues inside the head to soften and not create obstructions during the replacement operation.



WARNING: when operating always wearing safety gloves to protect from heat.

To replace the printing nozzle:

1. Hold the hot-end block immobile using a 12 mm hex wrench.
2. Unscrew the nozzle using the 10 mm hex wrench.
3. Wrap the thread of the new nozzle with three turns of Teflon tape, being careful not to obstruct the material feeding hole.
4. Mount the new nozzle.
5. Perform the calibration procedure for the printing height as described in the paragraph "Adjusting the printing nozzle heights".

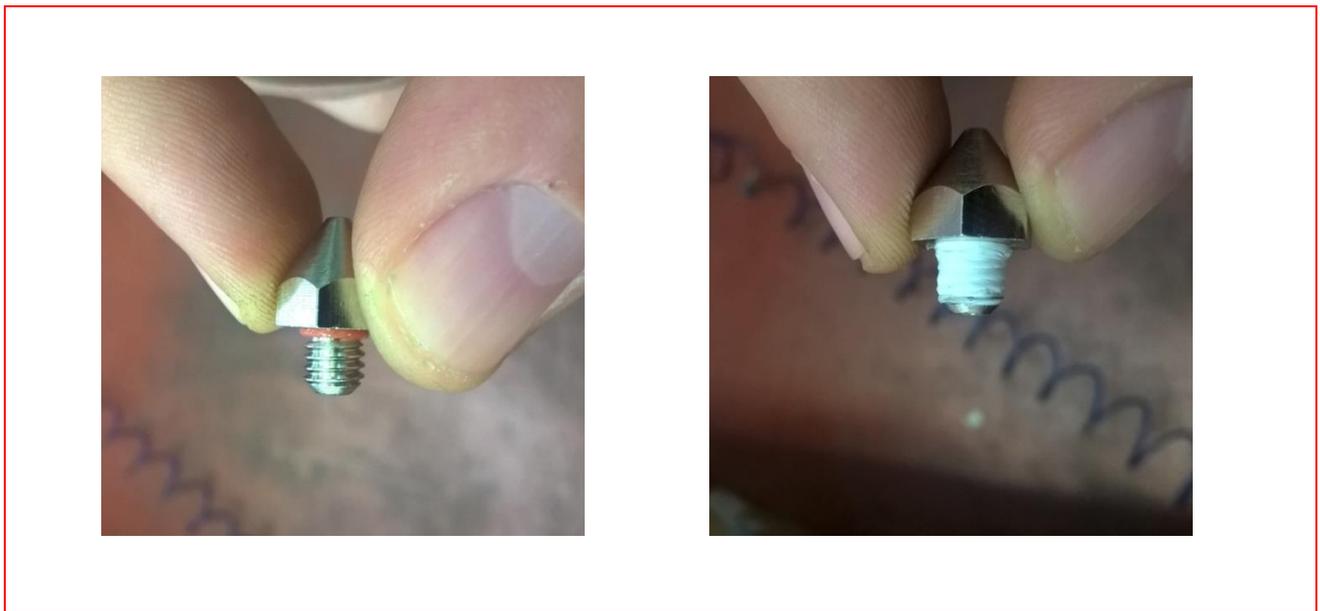


Figure B-1 Preparing the new printing nozzle

Under normal circumstances, it should not be necessary to clean the nozzle. However, should this become necessary, unmount the nozzle as described previously and use a pin of a smaller diameter than the nozzle to clean it.

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Appendix D - Olivetti S2 printer-compatible materials

The Olivetti S2 printer can print with filaments composed of the materials listed below.

PLA

Polylactic Acid is a Bio polymer of vegetable origin, which is completely recyclable, very versatile with good mechanical and elastic properties.

Having a shiny finish it is ideal for producing attractive objects that are pleasant to the touch. It also offers excellent resistance to ultraviolet light without variations in colour. Simple to print, it can also be sanded without difficulty.

This is a very versatile material that can be used in many fields of application, especially for producing detailed objects with an aesthetically-pleasing glossy surface.

SBC

The SBC (Styrene Butadiene Copolymer) is a material having similar mechanical properties to those of ABS. It is transparent and more elastic than ABS being excellent to work during printing. It has good mechanical resistance (although less than ABS) and is not hygroscopic. SBC is used in the biomedical field due to its non-invasiveness. Like ABS, SBC is subject to withdrawal and for this reason must be printed on a hot table. It is not advised for creating large-sized objects. In the 3D printing sector, SBC is often used as a support material for creating more complex printing works. SBC melts when immersed in limonene.

PLA LAYER

LOADED Polylactic Acid is a Bio polymer of vegetal origin, which is completely recyclable, very versatile and with good mechanical and elastic properties.

It has a shiny finish and characteristics that make the superimposition of layers almost unnoticeable. It is therefore ideal for producing attractive objects that are pleasant to the touch. It offers excellent resistance to ultraviolet light and is therefore not subject to colour variations. Simple to use for printing it is also sandable and, differently to normal PLA, has excellent heat resistance and greater mechanical resistance.

MONUMENTAL

Monumental is a filament containing mineral microdust that gives an Italian marble effect and has been researched and developed especially for architectural, design and archaeology sectors. A material of great aesthetic and tactile qualities for the production of static models having great scenic impact. Optimal workability post-printing.

Ideal material for use in architecture, civil engineering, design, art and archaeology sectors.

CARBONIUM

Carbonium is a polyamide filament with carbon microdust content.

Carbon, apart from being similar aesthetically to pieces in fibre, has greater resistance to loads and mechanical fatigue being tougher and more elastic.

Ideal for anyone needing to produce pieces having mechanical resistance, and which are fast and simple to work post printing. An ideal material for the automotive sector and for producing accessories for applications where lightness combined with resistance is required.

ULTRAFLEX

Superior, TPE-based, quality elastomer with optimal shape memory, returning quickly to its original form after bending, compressing or twisting. Operating range from -50° to $+120^{\circ}$. Suitable for use in many industrial fields due to its superior properties: fatigue resistance, oil-corrosion protection, resilience and elastic response. An ideal material for use in sectors such as sports footwear, automotive, industrial bumpers, high strength cases and sectors where elastic components are used for energy absorption.

WOOD

Polylactic Acid containing 46% wood dust. This filament finds use in innumerable applications in the different design areas. Easily printable it has a real wood feeling even from the point of view of smell. Excellent post-printing reworkability.

Working temperature

The table gives the extruder and work table temperatures according to the type of filament used.

FILAMENT TYPE	MATERIAL TEMP	TABLE TEMP
PLA	190°-210°	0°-44°
PLA LAYER	195°-210°	0°-44°
SBC	230°-245°	70°
MONUMENTAL	220°-235°	70°
ULTRAFLEX	225°-240°	50°
WOODFILL	190°-210°	0°
CARBONIUM	235°-250°	70°

Appendice E Files stored in the SD Card

The SD Card contains – in addition to this user manual – the following files:

1. PRINTING TEST FILES

- **cubo_test**, in .stl and .gcode formats
- **extraspring** (gear wheel), in .stl and .gcode formats
- **liberty**, in .stl, small gcode and large gcode formats
- **logoOlivetti**, in .stl, small gcode and large gcode formats
- **mec** (forma meccanica), in .stl and .gcode formats
- **offset_05**, in .gcode format
- **screw_nut**, in .stl and .gcode formats
- **woman_bust**, in .stl and .gcode formats

2. FILE DI SETTAGGIO

- **S2-PLA Default for CURA.ini**, default profile for Cura slicer, optimized for PLA prints.
- **README_LEGGIMI_LoadProfile.txt**, loading procedure of the above mentioned default profile for Cura slicer with Olivetti S2

PRODUCT DISPOSAL INFORMATION

Pursuant to Directive 2012/19/UE relating to the disposal of waste electrical and electronic equipment.

1. FOR EUROPEAN UNION (UE) COUNTRIES

It is prohibited to dispose of any electrical or electronic equipment as solid urban waste: separate collection methods must be in place. The abandonment of such equipment in locations that are not specifically authorised and designed for this purpose can be dangerous for both the environment and for public health. Offenders will be subject to the penalties and measures laid down by Law.

TO CORRECTLY DISPOSE OF OUR EQUIPMENT YOU CAN:

- a) Contact your Local Authorities who will be able to provide you with instructions and practical information on correct waste management, for example: location and opening times of waste disposal centres, etc.
- b) When purchasing a piece of new equipment from us, you can consign to our Reseller your used equipment of the same type as that purchased.

The crossed out wheellie bin symbol that appears on equipment signifies that:



- When the equipment has reached its end of life, it must be taken to a specially equipped disposal station where it will be processed separately from urban waste;
- Olivetti, a company registered in the Producers of Electrical and Electronic Apparatus registry, guarantees activation of procedures for the collection, treatment, recycling and disposal of equipment in conformity with the provisions of Directive 2012/19/UE.

2. FOR OTHER (NON UE) COUNTRIES

The treatment, collection, recycling and disposal of electrical and electronic equipment must be carried out in compliance with the Legislation in force in each Country.

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