

Allevi 3

User Guide - 1.1.2

BUILD WITH LIFE

Table of Contents

WELCOME	3
SPECIFICATIONS	4
WARNINGS	5
GETTING STARTED	7
WHAT'S IN THE BOX	8
PRINT BED DIMENSIONS	9
ALLEVI 3 DIAGRAM	10
SETTING UP YOUR PRINTER	11
SETTING UP YOUR SOFTWARE	13
CONNECTING TO YOUR PRINTER	15
START PRINTING	17
YOUR FIRST BIOPRINT	18
MAINTENANCE & TROUBLESHOOTING	24
TROUBLESHOOTING AND CONTACT US	25



| **WELCOME**



SPECIFICATIONS

MECHANICAL

Construction: Aluminum Frame

Build Surface: Tissue Culture Plates

XYZ Position Precision: 1 micron

Weight: 40 lbs (18.1 kg)

Dimensions: 18.4 x 15.2 x 14.2 in
46.7 x 38.8 x 36.0 cm

PRINTING

Print Technology: Extrusion Printing

Pressure Range: 1- 120 PSI (7- 827 kPa)

Pressure Variance: +/- 0.1 PSI

Build Volume: 3.5 x 2.4 x 5.1 in (42.8 in³)
9 x 6 x 13 cm (702 cm³)

ELECTRICAL

Power/Voltage Requirements: 6 Amp/
AC 110V - 220V

Desktop Adaptor

Supply Voltage: 24V DC, 16.7A

CORE PRINTHEAD

Max Temp (E1): 160°C

Min Temp: 4°C

LED Range: 365 nm and 405 nm

SOFTWARE

Bundle: Allevi Bioprint Online

Connectivity: WiFi, Ethernet,
Allevi Wireless Adapter

Supported File Types: STL, gcode

Operating System: Windows, MacOSX, Linux

BUILD PLATE

Max Temp: 60°C

Min Temp: Room temperature



WARNINGS



HOT SURFACE WARNING

This symbol indicates potential hot surfaces. The Allevi 3 and its extruder(s) can become hot during the printing process, whether heating or cooling. Always allow time for the extruder to cool before handling.



WASTE ELECTRICAL AND ELECTRONIC EQUIPMENT

This symbol indicates that when the end-user wishes to discard this product, it must be sent to separate collection facilities for recovery and recycling.



UV WARNING

This symbol indicates potential ultraviolet light exposure. The Allevi 3's extruder(s) can emit wavelengths of 365-405nm. Wear UV glasses when operating and avoid eye and skin exposure to unshielded product.



CE MARKING

This mark indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area.



SGS MARKING

This mark means a product has been independently tested and certified to meet recognized standards for safety or performance.





ENVIRONMENTAL CONDITIONS

The Allevi 3 should be operated in the following conditions:

- Indoor use
- Altitude of operation: $\leq 2000\text{m}$
- Operating temperature: 5- 40°C
- Relative humidity: 20-80% (up to 31°C), decreasing linearly to 50% at 40°C
- Pollution degree of the environment: Pollution degree 2

The Allevi 3 should be stored in the following conditions:

- Temperature: 5- 40°C
- Humidity: 20- 80% (up to 31°C), decreasing linearly to 50% at 40°C

• WARNINGS

- The Allevi 3 includes moving parts that can cause injury. Never reach inside the printer while it is in operation.
- Do not leave the printer unattended while it is in operation.
- Always wear safety goggles when using the printer.
- Do not mount the Allevi 3 on or near a surface of flammable material.
- There are possible hazards of explosion, implosion, or the release of toxic or flammable gases arising from materials being heated.
- If you are working with hazardous materials, you should set up the appropriate extraction system and/or ventilation requirements.
- You are responsible for appropriate decontamination in case of spillage of hazardous materials on or inside of the equipment.
- If the equipment is used in a manner not specified by Allevi, the protection provided by the equipment may be impaired.

MAINTENANCE AND CLEANING INSTRUCTIONS

- Recommended decontamination is spraying with 70% ethanol while the printer is powered down, turning your hood fan on for 30 minutes, and wiping down the printer after at least 10 minutes. Additionally, 30 minutes of UV decontamination may be used to supplement the ethanol wipe down.
- Do not over-spray ethanol directly into the electronics of the Allevi 3. Spray a towel, then wipe the printer down with the towel. Do not use decontamination or cleaning agents which could cause a hazard as a result of a reaction with parts of the equipment or with material contained in it.

SERVICE INSTRUCTIONS

Allevi bioprinters should be serviced by Allevi or Allevi-certified personnel.

To request servicing, email support.allevi3d@3dsystems.com

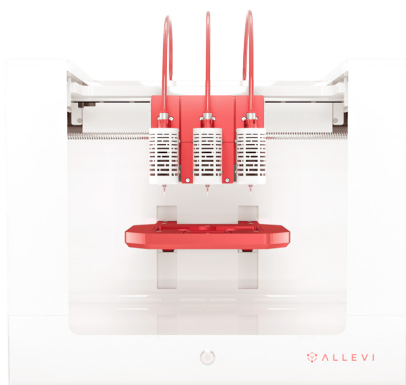




| GETTING STARTED



WHAT'S IN THE BOX



1 Allevi 3 bioprinter



2 Starter bioink kit



3 Power supply



4 Air compressor*



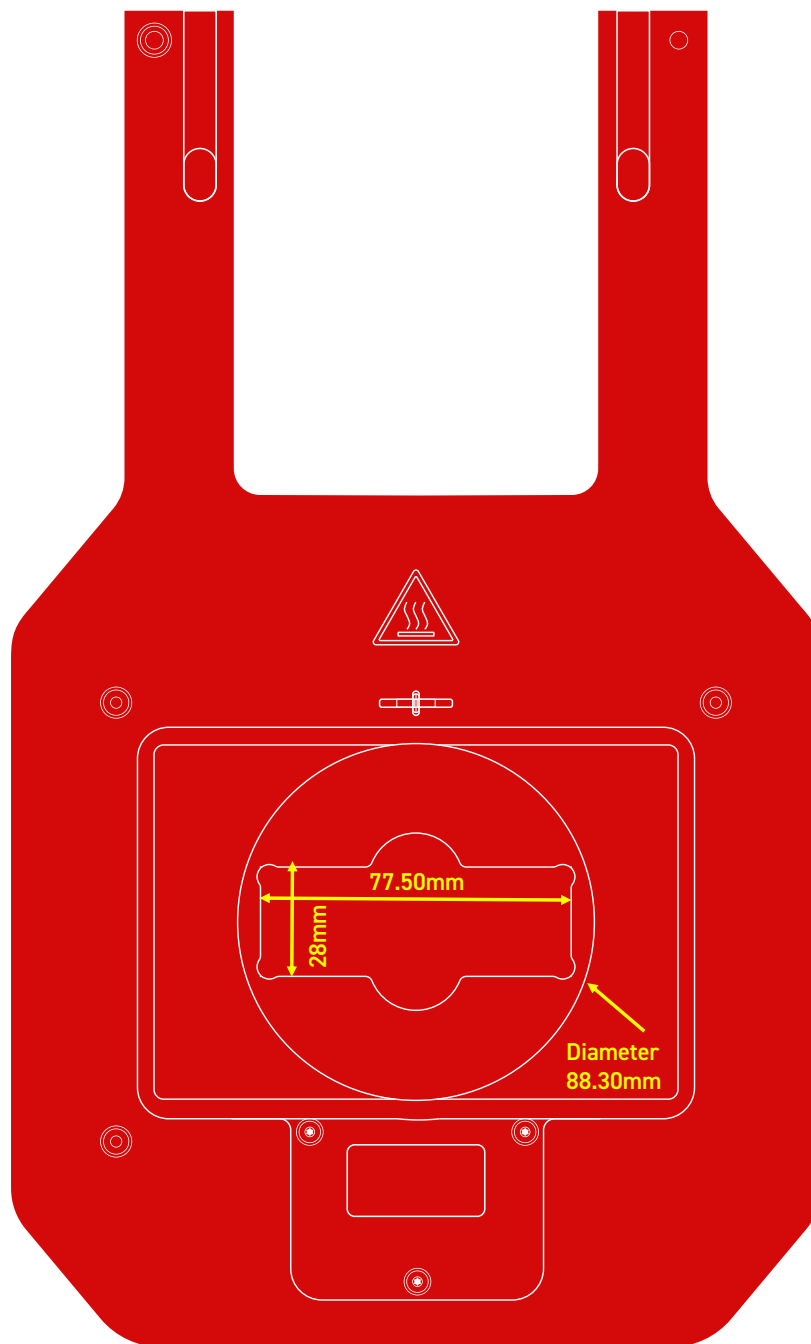
5 Compressor hose

*Air compressor arrives separately



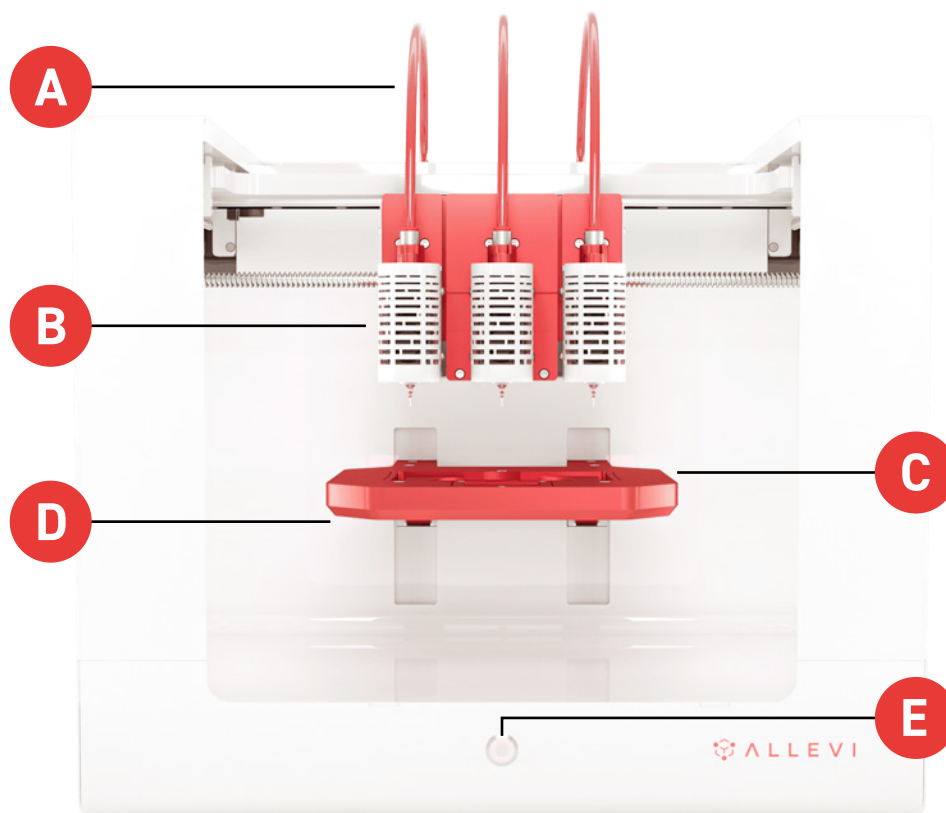


PRINT BED DIMENSIONS





ALLEVI 3 DIAGRAM



- A.** Air Compressor Lines
- B.** CORE™ printhead (heating and cooling)
- C.** Autocalibration pad
- D.** Build Plate (heating)
- E.** Power On/Off

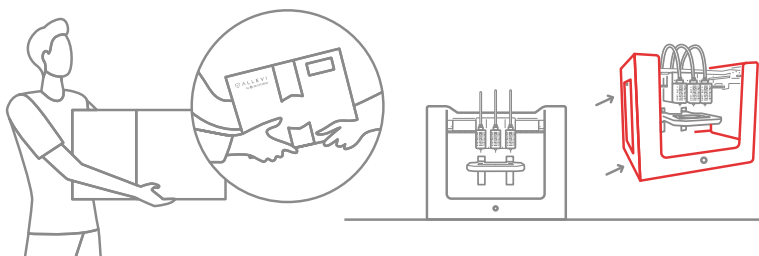


SETTING UP YOUR PRINTER

Step 1

Carefully remove your printer from the packaging by grasping the printer frame firmly with both hands. We recommend holding onto the packaging for future moving or shipping the printer.

CAUTION: The Allevi 3 weighs ~ 40 lbs (18.1 kg). Two people may be required to safely lift it. Always carry the printer by the frame/bottom.



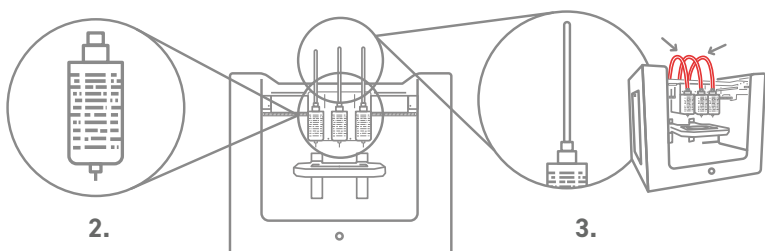
Step 2

Once the printer is securely placed on a flat surface, connect the CORE extruders to the gantry. Each CORE extruder is magnetized so each will snap into place.

! Note: You can operate the printer with the CORE print heads in many different configurations. We will discuss further in "Your First Bioprint" later in this manual.

Step 3

Connect the red plastic air hoses to the top of the frame, and the air input junction to the port on the back of the frame.



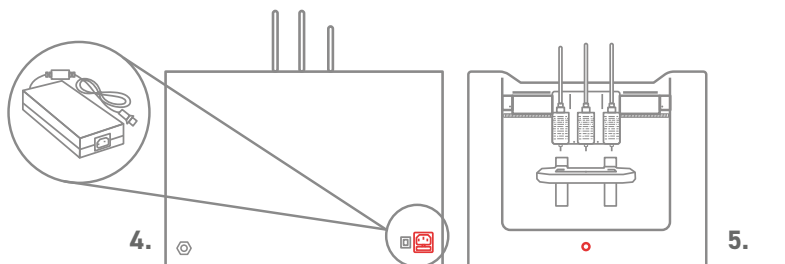
Step 4

Plug the power cable into the power port located on the right side of the back of the bioprinter. Then plug the other side into a wall outlet.



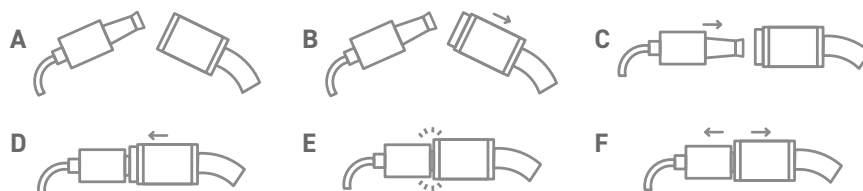
Step 5

Power on the bioprinter by pressing the power button located on front of the bioprinter. It will turn red.



Step 6

Connect the air compressor to the black air hose, and the air hose to the air input junction on the printer. The connection between the hose and the junction can be tricky. Follow this diagram:



A Gather both the air input junction (left) and the air hose (right). **B** Pull back the collar of the air hose. **C** Insert the air input junction in the air hose. **D** Slide the collar of the air hose back into place. **E** The connection should be formed! **F** Give the connection a light tug to ensure it is secure.

! Note: The air compressor must remain turned on for the entirety of the print.

Using the knob near the outlet valve, set the pressure on both gauges to 120 PSI. This will ensure you have plenty of pressure to use during printing. Any adjustment to your printing pressure is made in the software, so leave the air compressor on this setting. After use, turn the air compressor off.

! Note: The air compressor needs to be periodically drained to eliminate any condensation inside. To do so, refer to the air compressor manufacturer manual. This should be done following every day of use. Please refer to the air compressor manufacturer manual for all preventative maintenance.



SETTING UP YOUR SOFTWARE

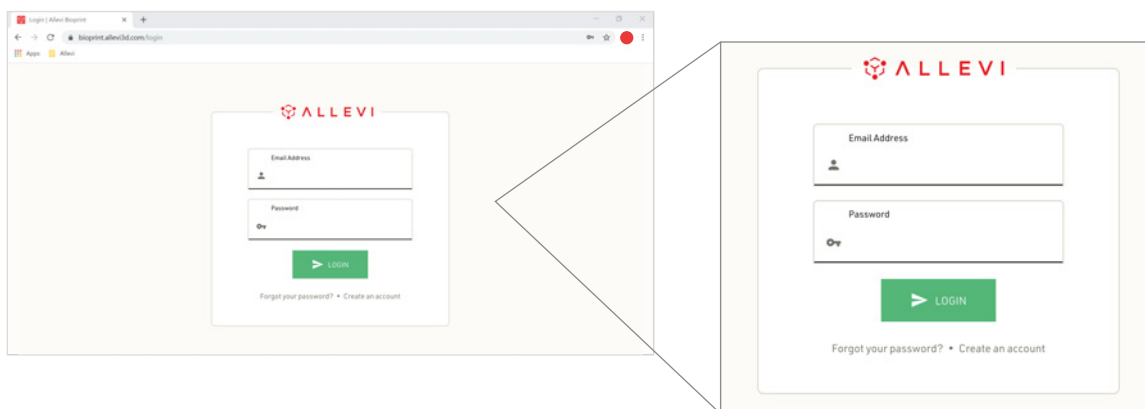
You can also follow a video at allevi3d.com/getting-started

Step 1

Go to bioprint.allevi3d.com. Our software runs out of a browser and requires no downloads. We recommend [Google Chrome](#) or [Firefox](#), but Safari and Edge are also acceptable.

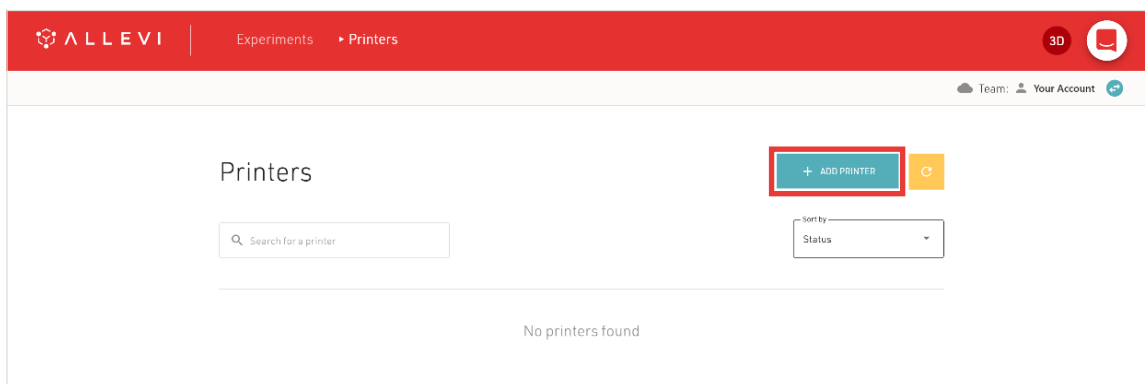
Step 2

Login to the software. To set up an account, click 'Create an account'.



Step 3

To register your printer, scroll down in your printer list and click 'Add printer'. If you're planning on having multiple users work with your printer, we would recommend that you first make a Team and add the printer to your Team. A guide to do this can be found [here](#).





Step 4

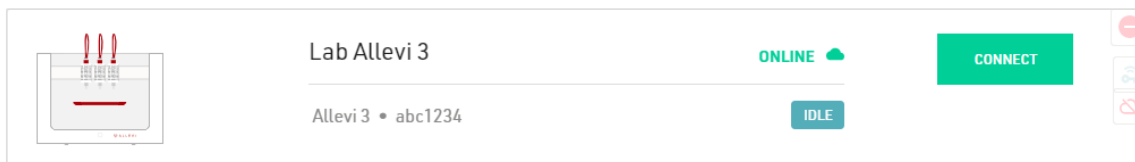
Type in your device serial number and click '**Add printer**'. Your serial number can be found on the back of your printer or in your onboarding email from the Allevi Support Team.

The screenshot shows a web browser window with the URL bioprint.allevi3d.com/register. The page has a red header with the Allevi logo and navigation links for 'Projects' and 'Printers'. A central form titled 'ALLEV I' prompts the user to 'Enter your printer's serial number to add it to your account'. The form includes a text input field labeled 'Serial Number' with a printer icon, a green 'ADD PRINTER' button, and a 'Cancel' link.

! Note: The serial number has 7 characters and should be limited to letters between a-f and numbers.

Step 5

Once your printer is registered, it will appear as an available printer in your printer list.





CONNECTING TO YOUR PRINTER

Ethernet connection:

To connect your Allevi bioprinter via ethernet, plug an ethernet cord to the port on the back of the printer and to an ethernet port in your lab. You need to power cycle with the ethernet connected.

Wi-Fi Connection:

With a Wi-Fi connection, your printer will be online.

Step 1

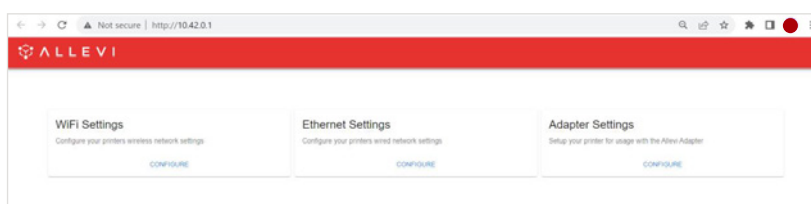
Open your WiFi settings and look for a network called “**Allevi Printer <serial number>**”. By connecting to the Allevi hotspot, your computer will briefly lose access to the Internet.

Step 2

Go to <http://10.42.0.1/> in your browser.

Step 3

Click Configure under ‘**Wifi Settings**’ and enter your network credentials on the next screen. The chosen WiFi network should be a private network without a ‘Click to accept’ intermediate page. Once the network has been successfully added, a green message will pop up at the bottom of the page. You can now close this window.



Adapter Connection:

With this connection method, your Allevi bioprinter will not be connected to the internet itself, but it will communicate with your computer via the Allevi Adapter.

Step 1

Download the official driver [here](#). Extract the downloaded .zip file and run the installer. This allows your computer to connect to two Wi-Fi networks at the same time.



Download the Allevi Client app [here](#). Extract the downloaded .zip and run the application. You'll need to keep this open whenever you are using your Allevi bioprinter.

Step 2

Plug your Allevi Adapter into your computer's USB port.

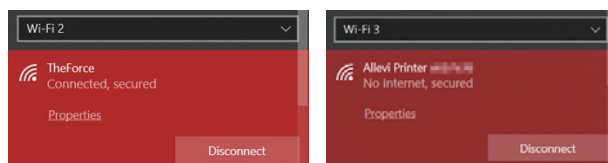
Step 3

Turn your printer on.

Step 4

In your Wi-Fi list, you should see a dropdown to select different Wi-Fi networks. The dropdown allows you to switch between "Wi-Fi 1" and "Wi-Fi 2"; however on some computers this may be called "Wi-Fi 2" and "Wi-Fi 3". See the screenshot below for an example. It does not matter what your networks are called, as long as they are connected as follows:

- **Wi-Fi 1:** Connect this to your home or work Wi-Fi network
- **Wi-Fi 2:** Connect this to the Allevi Printer Wi-Fi Access Point "Allevi Printer <serial number>"

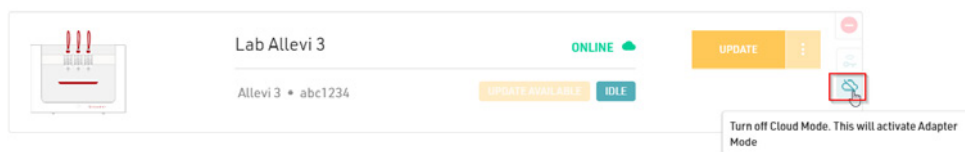


Step 5

Navigate to <https://bioprint.allevi.app> and log in as normal using your Bioprint credentials.

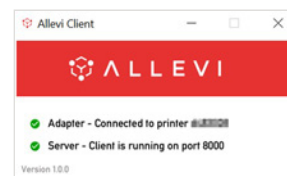
Step 6

On your printer dashboard, turn off your printer's Cloud Mode using the cloud icon and follow the system prompts. This will take 3-5 minutes to complete.



Step 7

If connection is successful, you will see the following state on the Allevi Client Application and a green Connect button in the printer dashboard.





| **START PRINTING**



YOUR FIRST BIOPRINT

The Allevi Bioprint Online software is the most comprehensive and versatile bioprinting software. If you prefer watching videos, visit allevi3d.com/getting-started and watch the 'Your First Bioprint' video.

Step 1

Store your jar of sample pluronic at 4° C until the pluronic is easily pourable.

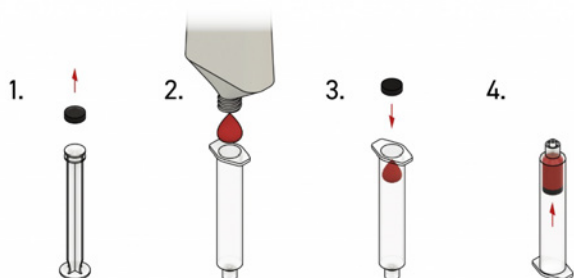
a) To load your syringe, remove the plunger from a printing syringe. Detach the rubber seal from the plunger and set it aside.

b) Add viscous biomaterial to the wide opening of the syringe barrel. If your material comes in a tube or another syringe, squeeze it out directly. You can also use a spatula to place some material in the barrel.

c) Place the rubber seal in the syringe barrel.

d) Use the plunger to push the rubber seal to move the material all the way to the tip of the syringe. Invert the syringe and push the plunger pointing the syringe upwards. This can also help reducing bubbles.

! Note: If you are using the syringe plunger, make sure it doesn't lock back into the rubber seal.



! Note: Bioinks may be loaded differently and use different needles depending on the type of material. View our [General Bioink Parameters](#) guide on Allevi Support.

Step 2

Remove the middle and right-most CORE extruders from the gantry. This print will only utilize one extruder so we only need the left-most extruder. In future prints, you will be required to calibrate all connected extruders, so we recommend only having as many extruders attached as you want to use.





Step 3

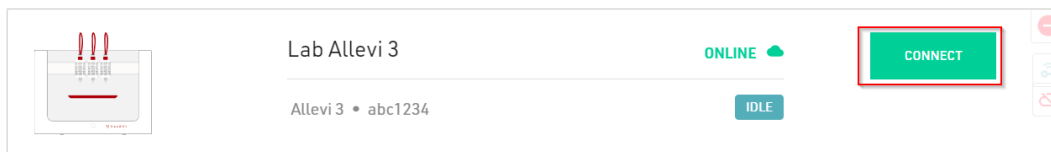
Attach a 30 gauge 0.25" (pink) needle to the pluronic syringe, and load syringe into the CORE print-head. Twist the cap under the shoulder screws to secure it. Make sure to press the syringe and the extruder together as they twist the cap under the shoulder screws.

Step 4

Turn on your printer. Yellow lights will stay on while the printer loads its firmware and connects to the Internet. You can connect to your printer once the yellow lights are off.

Step 5

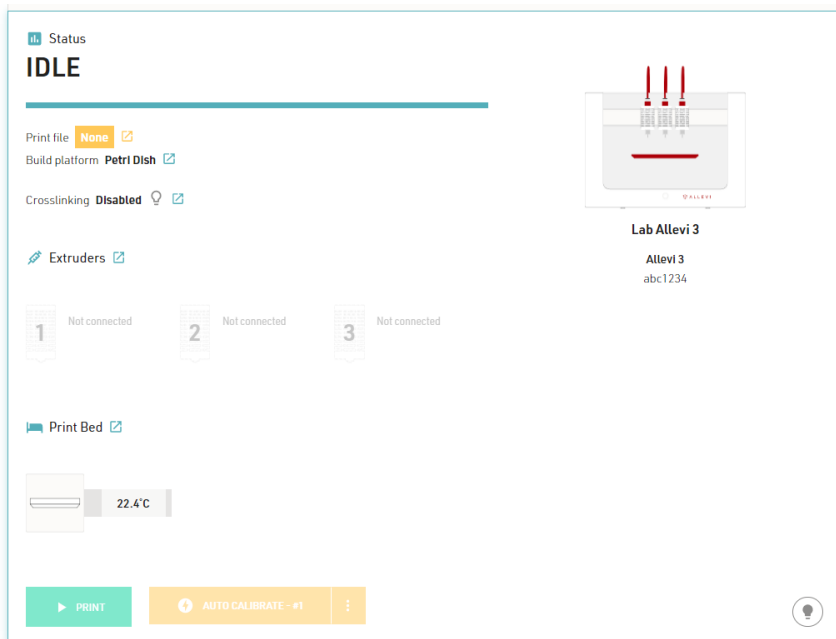
Login to bioprint.allevi3d.com. Select your printer from the printer list and click 'Connect'.



Step 6

This will bring you to your printer **Status** section. Here you can get an overview of your print settings. We recommend always autocalibrating first.

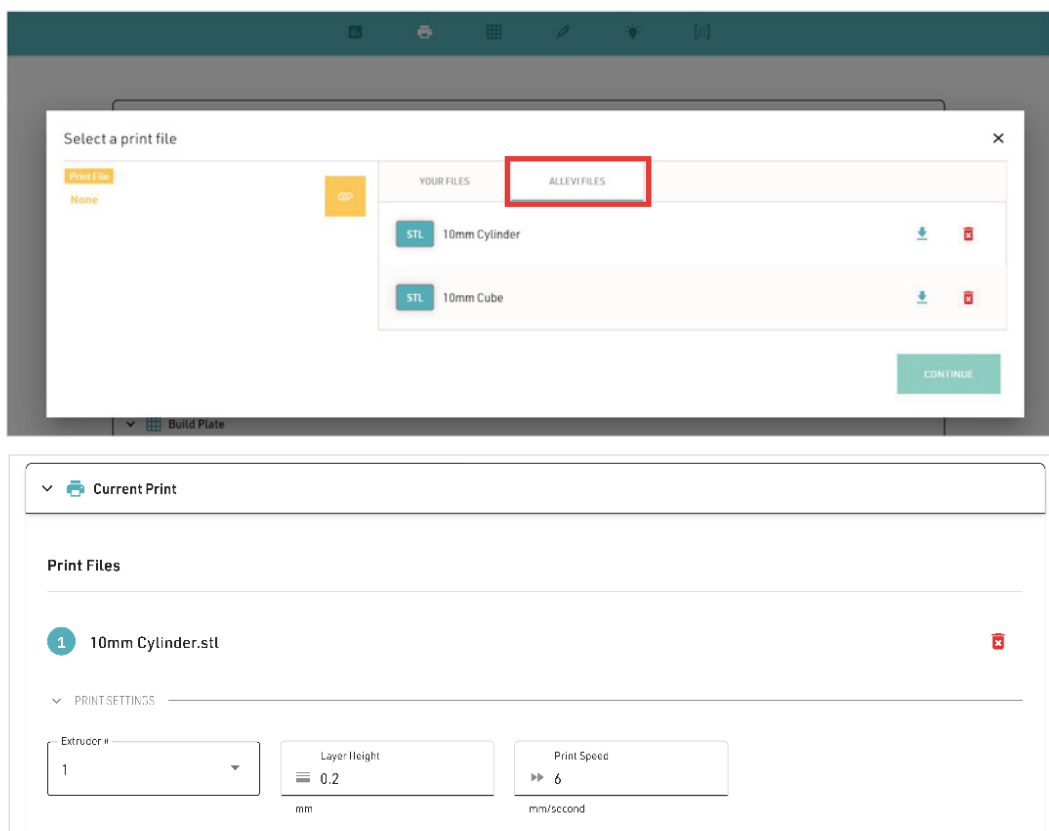
⚠ Always autocalibrate with a syringe and needle loaded in the printhead. Do NOT autocalibrate with a dish on the bedplate.





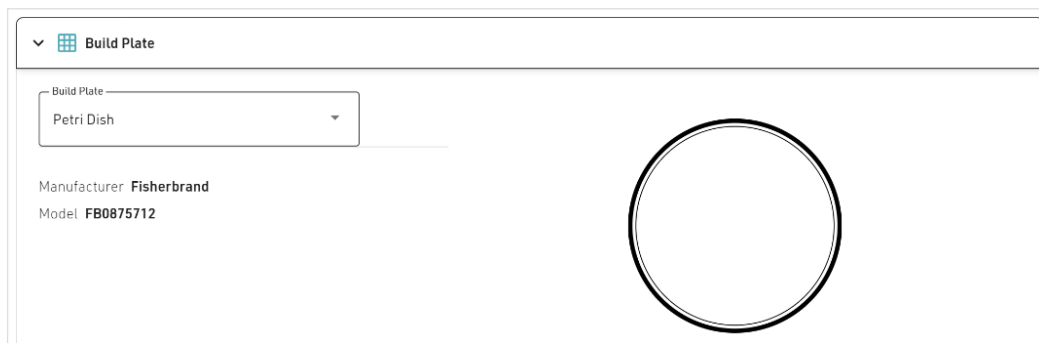
Step 7

The next section is your **Current Print** section. You can either upload STL or gcode files. We recommend starting with the cylinder or cube under “**Allevi Files**”.



Step 8

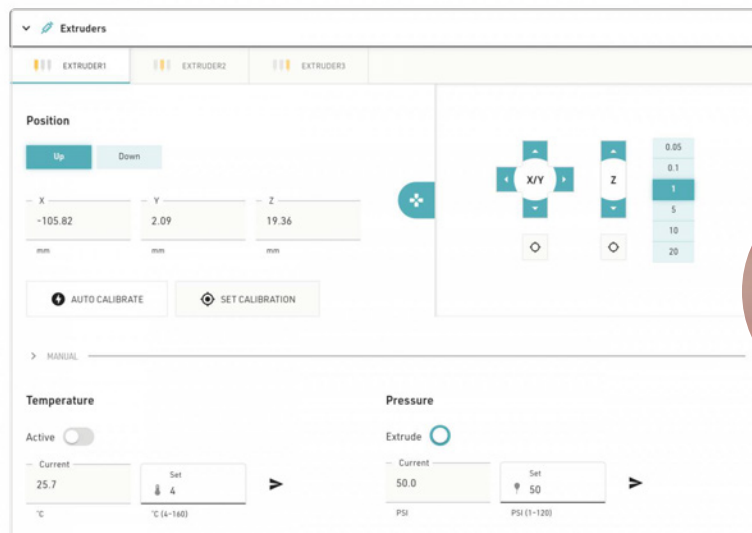
Next, choose your dish in the **Build Plate** section. For your first bioprint, we'll be using a petri dish. For wellplates, print files will automatically be replicated in all wells.






Step 9

The **Extruder** section allows you to move and calibrate your extruders. If you haven't already auto-calibrated, you can here. You can also manually calibrate.

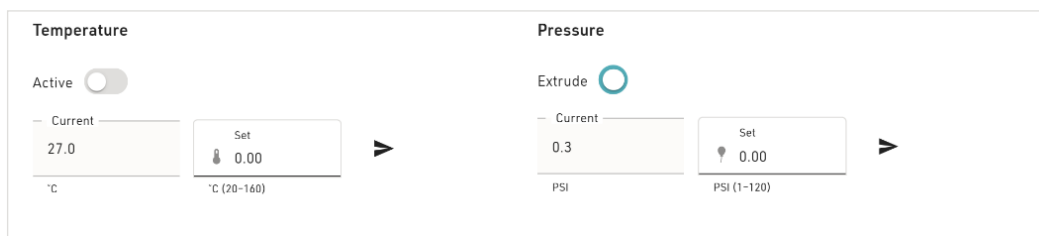


To manually calibrate the printer with the manual controls:

- First, autocalibrate with a syringe loaded.
- Press the button  to center the extruder over your chosen build plate.
- Use the up and down buttons to move the bed plate (Z) closer to the extruder as shown in the figure above in the red square. Use the step size buttons on the right to pick appropriate movement steps. It is usually best to start with large steps and then move to smaller steps as the bedplate gets close to the syringe tip. You should leave a small gap to avoid scraping the dish when the syringe is pressurized, but too large a gap will result in poor material adhesion. In the case of a petridish, you should be able to freely spin the dish, but you should not be able to lift the dish up.
- Click 'Set Calibration' to calibrate.

Step 10

In the **Extruder** section, you can also set extruder temperature, pressure, and test extrude by holding the button. For pluronic, set the pressure to 80 PSI and leave it at room temperature.





Step 11

Before starting the actual print, it is important to prime the syringe tip.

- a) First, lower the bedplate so that there is space between the syringe tip and any print surface. This will let you see how well the material flows when you extrude (ie. If there are bubbles or if you need to change the pressure slightly).
- b) Place a paper towel or wipe under the point of extrusion to catch any material.
- c) After setting the pressure, click and hold the extrude button. The ideal case is that the material flows in a continuous, steady, downward stream.
- d) If the material curls upward, or extrudes in an uncontrolled stream, try lowering the pressure by 2-3 PSI.
- e) If the material struggles to come out, or appears in discrete chunks try increasing the pressure by 2-3 PSI.

Step 12

For photocurable bioinks, the Allevi bioprinter offers both UV and visible light crosslinking, which can be changed using the UV/Visible toggle. There are three main settings for crosslinking: Always On, During Print, and Post Print. They use variables such as light intensity, layer frequency, and duration. For this print, leave these off.

▼ CrossLinking

During Print

Enabled ☐

Intensity 0.0
% (0-100)

Duration 0
Seconds

Frequency 1
x N Layers

After Print

Enabled ☐

Intensity 0.0
% (0-100)

Duration 0
Seconds

> MANUAL

Step 13

Once everything is ready to go, 'Print' to start building with life!



Status

PRINTING

Print file: 10mm Cube.stl

Build platform: Petri Dish

Crosslinking: Disabled

Extruders

124.4°C10.0 PSI

2Not connected

3Not connected

Print Bed

24.1°C

PAUSE

CANCEL

Lab Allevi 3

Allevi 3





MAINTENANCE & TROUBLESHOOTING



TROUBLESHOOTING AND CONTACT US

When you buy an Allevi bioprinter, you're not just getting a biofabrication platform; you're gaining the Allevi Advantage, which is all the experience and expertise Allevi has to offer. We regularly write and publish new protocols, product guides, and support articles on our website to help you be more successful with bioprinting.

Visit us at www.allevi3d.com and check out our:

- [Protocols](#) page for step-by-step bioprinting instructions!
- [Support](#) page for informational articles and troubleshooting guides!
- [Services](#) page for help accelerating your research!
- [Blog](#) for the latest in bioprinting news!

You can also visit the [Allevi YouTube channel](#) for video instructions.

Have more questions or need help?

Visit us on the [Allevi Support](#) page or email us at support.allevi3d@3dsystems.com





EC DECLARATION OF CONFORMITY (DoC)

We

Manufacturer: 3D Systems, Inc.
Address: 333 Three D Systems Circle Rock Hill, SC 29730

declare under sole responsibility for issuing this declaration of conformity in relation to the following Product(s):

Product Description: 3D Bioprinter
Model: Allevi 3
Serial Number:

For the above given Product(s) is hereby declared that it conforms to the essential requirements set out in community harmonization legislation mentioned below:

*Machinery Directive 2006/42/EC
Electromagnetic Compatibility Directive 2014/30/EU of 14 October 2014
Radio Equipment Directive 2014/53/EU of 16 April 2014
Restriction of use of certain Hazardous Substances Directive 2011/65/EU of 7 January, 2011, Directive EU 2015/863 of 21 March, 2015*

Statement about the relevant harmonized standards that have been used, or statement about the specifications in relation to which conformity is declared (Standard: Date of Issue):

EN 12100:2010	IEC 61010-1:2010+A1:2016
IEC 61010-2-010:2014	EN 55032:2015+A11:2020
EN 55035:2017+A11:2020	EN 61000-3-2:2014
EN 61000-3-3:2013	EN 301 489-3 V2.1.1:2017
EN 301 489-1 V2.2.3:2019	EN 300 328 V2.2.2:2019
EN 50581:2012	


Name of Person Authorized to compile the technical construction file: Jasper Vandendriessche
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Signed for and on behalf of:

San Diego, CA, USA
Place of issue

December 1, 2021
Date of issue


Doug Hoffman, Engineering Director

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