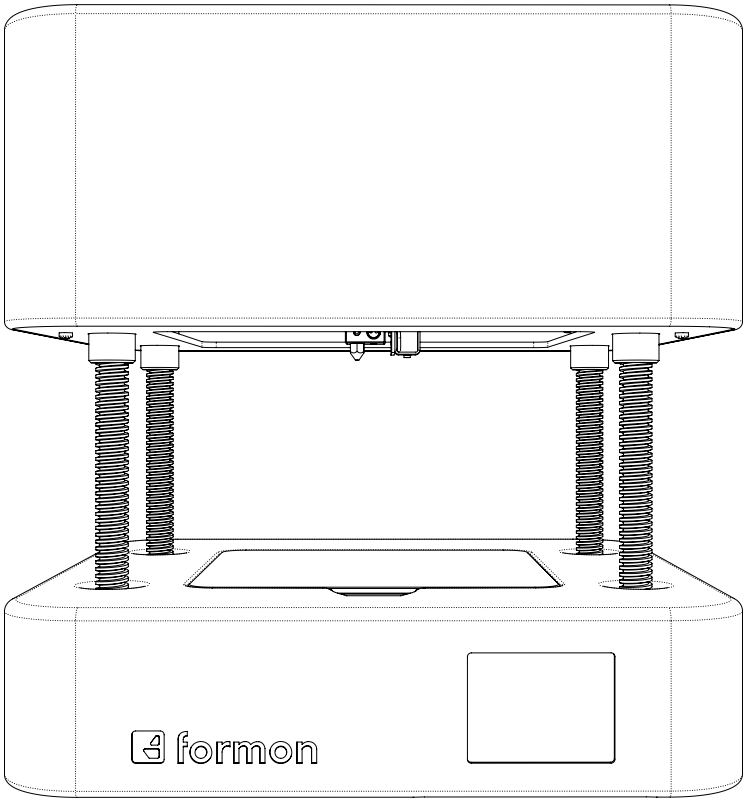
formon



FORMON CORE
USER MANUAL

LEGAL NOTICES

Please read and understand all the contents of this user manual. Failure to read the manual may lead to personal injury or damage. Always make sure that anyone who uses the 3D printer knows and understands the contents of this manual.

DISCLAIMERS

The instructions in this document have been carefully checked for accuracy and are presumed to be reliable. Formon LLC assumes no responsibility for inaccuracies and reserves the right to modify and revise this document without notice. You agree to be bound by any modifications and/or revisions. If you discover any discrepancy in this document, please contact the Formon team for up-to-date information.

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PRODUCT WARRANTY

Formon Core is covered by a limited warranty. For terms and conditions please visit formon3d.com/legal.

ITENDED USE

Formon Core is designed and built for fused deposition modeling only for PLA plastics. The small footprint and the ease-of-use of Formon Core make them great devices for indoor use in home/business environments. They are great devices for concept models and functional prototypes. The best results are achieved with the filaments provided by Formon, a lot of effort has been made in order to match material properties with device printing settings. The usage of all other filaments is strongly advised against.

TABLE OF CONTENTS

1. SAFETY AND COMPLIANCE

This part is about working safely with your Formon Core. Please read all the information carefully in order to prevent any possible accidents or injuries.

COMPLIANCE

SAFETY MESSAGES

Safety alert symbols in this manual indicate potential safety hazards that could harm you or others. Please read the safety messages carefully throughout the manual.

This sign warns of a situation that may cause material damage or injuries if you do not follow the safety instructions.

This sign provides additional information that are useful to do a certain task or to avoid problems.

GENERAL SAFETY INFORMATION

The print-head of the Formon Core generates high temperatures and has moving parts that can cause injury. Never put your hands inside the printer while the printer is in operation; when you turn it on and it calibrates; when its preparing for print; or while it is printing. The only time you're safe to put hands in is when the printer's startup calibration is over and you can take the built plate to apply adhesive, or after the print is finished and it is time to remove the print plate with the printed object.

Always control the printer with the touch screen display at the front.

Do not change or adjust anything on the Formon Core unless it is authorized by the manufacturer.

Do not leave Formon Core unattended during operation.

In case of emergency disconnect Formon Core from the socket outlet.

Do not store any item inside the printer.

Children should be under adult supervision when using Formon Core.

Always unplug the printer before performing any kind of maintenance or modifications.

HAZARDS

ELECTROMAGNETIC COMPATIBILITY (EMC)

ELECTRICAL SAFETY

MECHANICAL SAFETY

Formon Core contains moving parts. Do not touch the printer and do not put your hands inside while the top platform is moving upwards or downwards because the force of the vertical movement is big enough to give physical damage. Keep your hands out while the printer is in operation or while the top platform is moving.

RISK OF BURNS

The print-head can reach temperatures up to 210 ºC. Do not touch the print-head under any circumstance when it starts heating up or after the printing has finished. We strongly advise against reaching inside the machine while the printhead is still hot.

Allow the printer to cool down for 30 minutes before performing any maintenance or troubleshooting.

HEALTH AND SAFETY

Formon Core is designed to work only with Formon PLA filament. The use of other materials may damage the print-head. The use of materials other than PLA is prohibited. Printing with pure PLA is considered safe, although good room ventilation is still advised for possible unknown vapors released from coloring dyes in colored PLA.

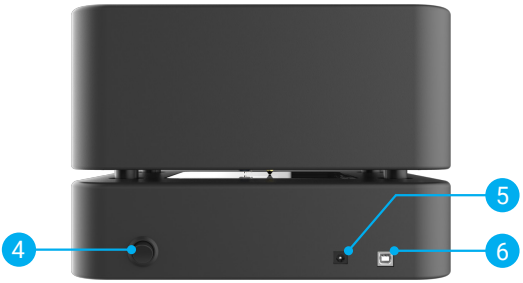
Only use your printer in a well-ventilated area.

2. INTRODUCTION

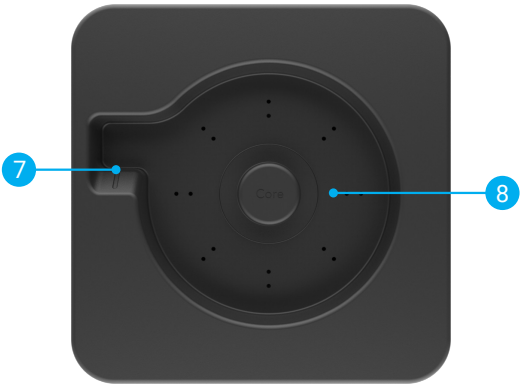
Thank you for choosing Formon Core. This user manual is designed to help you get familiar with Formon Core and see how easy and simple it is to start printing. Please follow the instructions carefully and experience the magic of 3D printing through Formon Core.

FORMON CORE AT A GLANCE

1. Top Platform with a removable plastic enclosure
2. Bottom Platform
3. Touch Screen Display



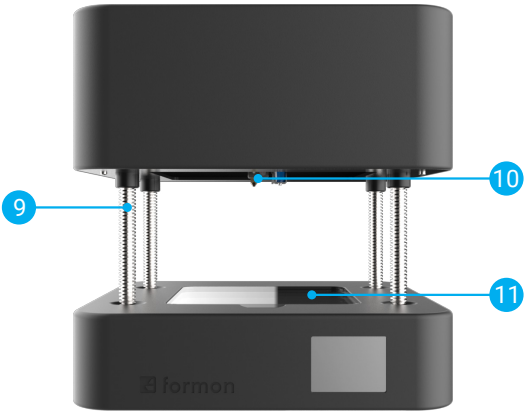
4. On/Off Power Switch
5. Power Adapter Input port
6. USB Input port



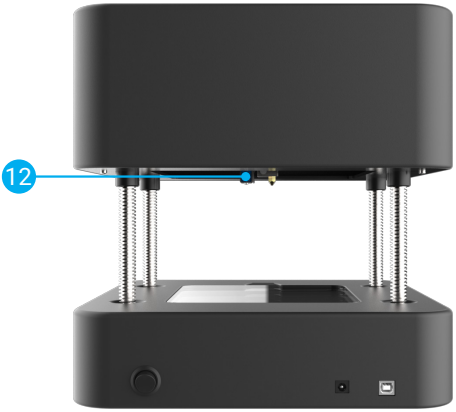
7. Insert Filament hole
8. Filament Spool holder

FORMON CORE AT A GLANCE

When you turn on Formon Core, during the calibration process and during the printing process the Top Platform moves upwards through the Z-Axis Spindles.



9. Z-Axis Spindles
10. Print-Head
11. Print Bed



12. Auto-Bed Leveling Solenoid

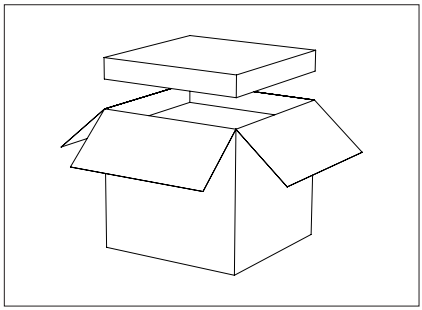
TECHNICAL SPECIFICATIONS

Printing	
Printing technology	Fused Deposition Modeling (FDM)
Build volume	140 x 130 x 100 mm 5.51 x 5.10 x 3.94 in
Layer resolution	
Positioning accuracy	12.5, 12.5, 5 micron
Filament diameter	1.75 mm (0.069 in) diameter
Extruder	Single extruder
Build plate leveling	Automatic leveling
Nozzle diameter	0.4 mm (0.015 in)
Filament detection	Automatic filament detection
Supported material	PLA
Supported material	Same as print material
Operating sound	
Software	
Supplied Software	Formon Scope
File types	.stl / .obj
Supported OS	Windows / Mac / Linux
Electrical	
AC Current	100 - 240 V , 50 Hz 70 Watt maximum
Connectivity	Wi-Fi, USB port
Temperature	
Ambient operation temp.	15° - 32° C (59° - 90° F)
Environment temp.	0° - 32° C (32° - 90° F)
Nozzle operation temp.	180° - 230° C (356° - 446° F)
Nozzle heat up time	< 2 min
Dimensions	
Desktop Space	300 x 300 x 215 mm 11.81 x 11.81 x 8.46 in
Packaging Dimensions	353 x 353 x 325 mm 13.9 x 13.9 x 12.8 in

3. SETTING UP

This part will guide you through the basic and the most important parts and operations of Formon Core. All you have to do is unpack, plug it in and follow the instructions on how to set it up and get started with Formon Core.

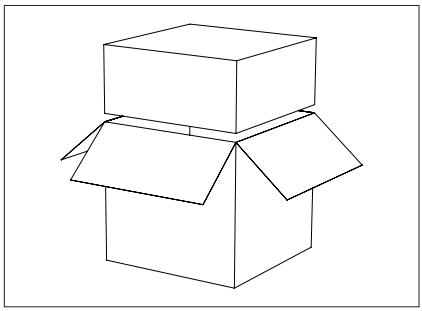
UNPACKING



1. Remove the Accessory Box

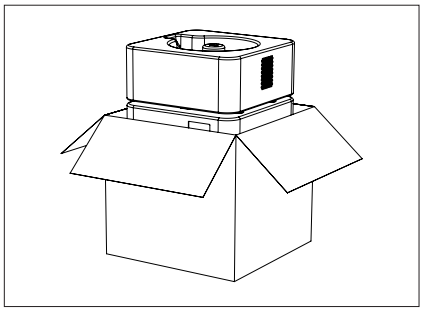
When you open the box, first remove the accessory box containing all the set up kit.

Check the next page for the accessory items list.



2. Remove the foam protection

After you have removed the set up kit box, pull the protective foam upwards and take it out of the box.

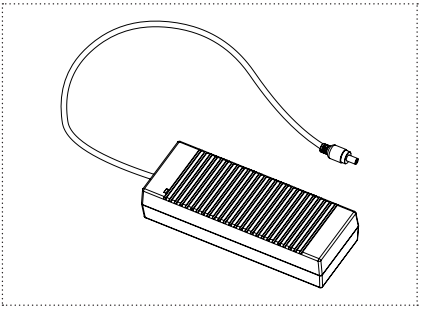


3. Remove Formon Core

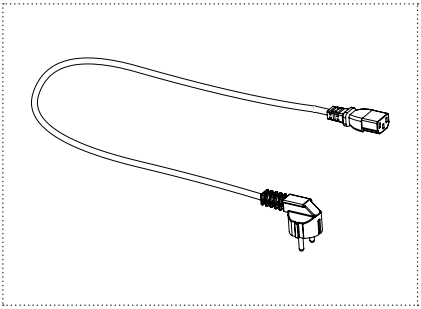
Now pull the printer carefully and slowly, using the belt handle on top of it. Place it on a secure flat surface and remove the pulling belt.

Be very careful while pulling the printer out. Any drop may cause damage that is not covered by the products warranty.

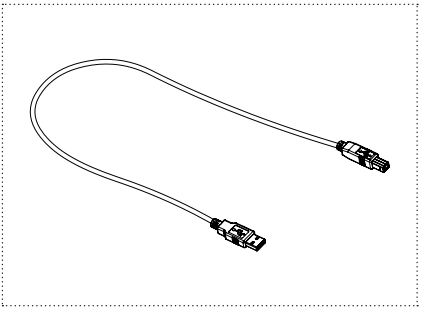
ACCESSORY CHECKLIST



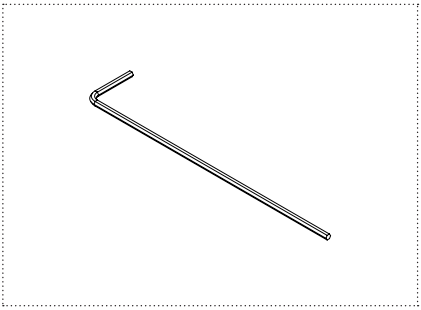
1. Power Adapter



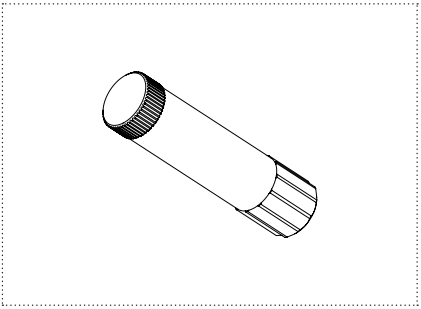
2. Power Cable



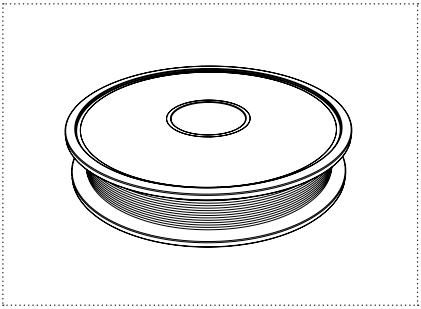
3. USB A-TO-B Cable



4. Hex Screwdriver

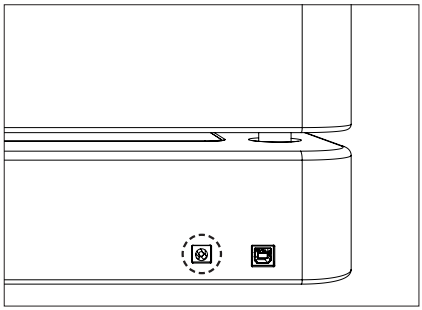


5. Glue Stick



6. PLA Filament Spool

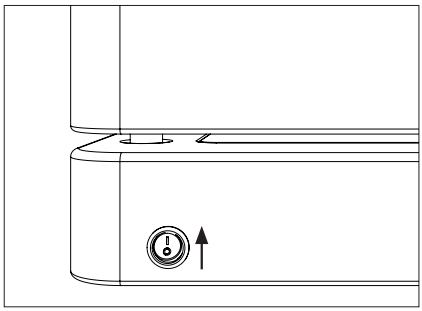
SETTING UP FORMON CORE



1. **Plug the power adapter** into the power input port at the back of Formon Core.

2. **Plug the power cord** into the power adapter and into an electrical outlet.

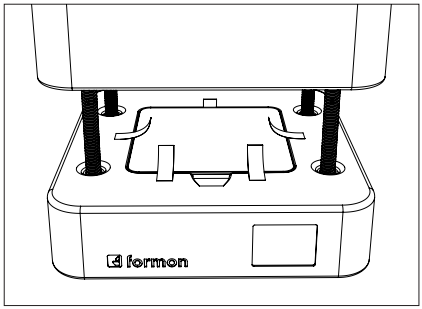
Make sure that the power switch is OFF before plugging the power cord into an electric outlet.



3. Turn the power switch **ON**.

4. Wait for the printer's automatic calibration process to finish.

During the printers calibration process, DO NOT place anything on the top platform, and make sure you DO NOT touch it while calibrating. The top platform will move upwards.

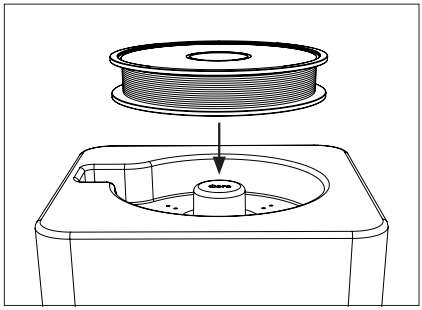


5. When the automatic calibration process is finished, you will see the message **Ready to Print** in the printer's touch screen display.

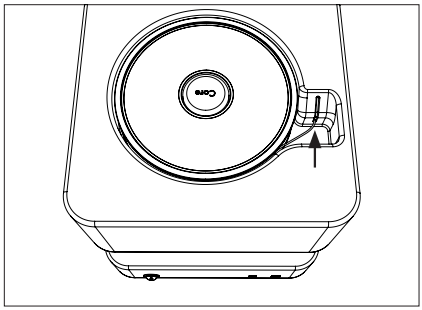
6. Now remove the shipping tape from the Print Plate.

LOADING FILAMENT

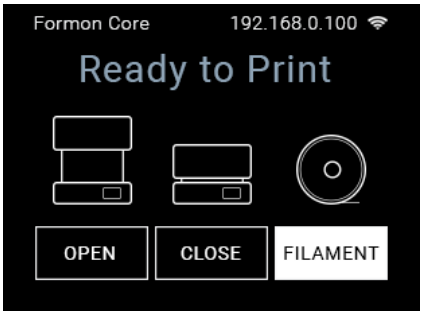
Make sure Formon Core is plugged in and turned ON then proceed to the loading filament process.



1. **Remove** the PLA filament spool from its vacuum bag and place it in the filament holder on top of Formon Core.



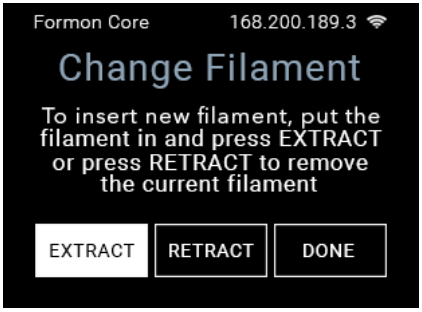
2. **Insert** the PLA filament in the filament hole and push it until you feel the resistance from the filament extruding motor.



3. On the **Ready to Print** screen find the **FILAMENT** button on the bottom right corner and press it.

LOADING FILAMENT

4. Pressing the FILAMENT button will redirect you to the Heating up screen and you will have to wait until the print-head is hot enough in order to extrude filament from the print nozzle.



5. After the print-head is heated up, you can insert the filament to the print-head by pressing and holding the EXTRACT button, which will pull the PLA filament towards the print head.

6. Hold it until the filament starts melting and starts coming out of the print-head nozzle. When you see PLA filament coming out of the print-head nozzle, press DONE.

While you press and hold the EXTRACT button, you can touch the PLA filament that is inserted in the filament hole on top of Formon Core, and check that the extruding motor is pulling it in. If the filament is not being pulled in, you can push it by your fingers until the motor drive gear starts pulling it.

If you want to remove the PLA filament, you will repeat step 3 and wait for the print-head to heat up. When the Change Filament screen pops up, press and hold the RETRACT button, which will push the PLA filament out of the print head so you can remove or change the filament spool.

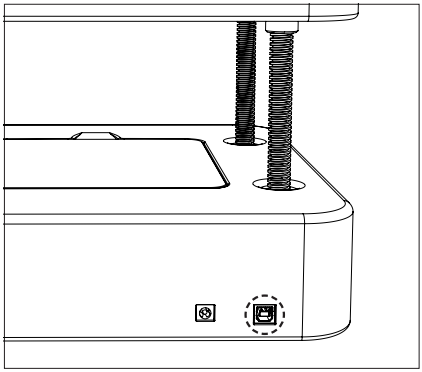
GET FORMON SCOPE

Now that you have set up Formon Core, its time to get the file preparation software called Formon Scope.

1. Go to formon3d.com/software.
2. Choose the appropriate operating system and download Formon Scope.
3. Once the installer has finished downloading, run the Formon Scope installer. Follow the installation instructions.

HOW IT WORKS

Formon Scope is Formon Core's native software. It streamlines 3D print preparation and file management. You can Arrange, Orient, Scale, Rotate and View your 3D models and prepare them for print. You can choose the print settings to modify your prints.



CONNECTING FORMON CORE TO PRINT

To *CONNECT VIA USB CABLE*, insert the USB cable in the printer, next to the power input port on the back of the printer. Formon Scope will automatically detect your printer and you are ready to print.

To *CONNECT VIA WIFI*, make sure that the printer is connected to your computer through the USB cable, and follow the instructions on the next page about *WI-FI CONFIGURATION*.

WI-FI CONFIGURATION

If you want to configure Wi-Fi in your printer, your computer must be connected to a Wi-Fi network.

1. **Open** Formon Scope.

2. Click on the arrow next to the logo on the top-left corner of the software. Select **Wi-Fi Configuration** from the drop-down menu and a pop-up window will appear through which you can configure the Wi-Fi connection of the printer.

3. The printer's name will appear on the top-left corner of your printer's display. Choose that name from the **SELECT PRINTER** drop down menu in Formon Scope. To change the name of your printer, write your preferred name on the input box **RENAME PRINTER**.

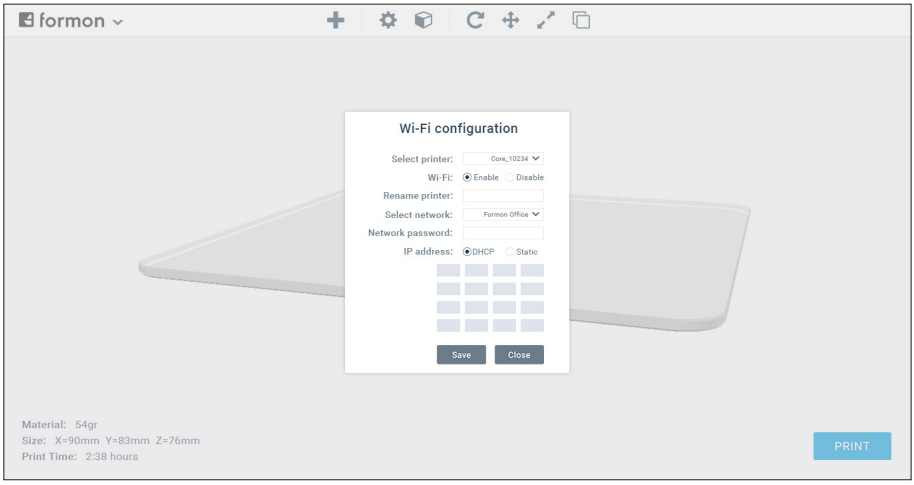
4. Click on the **ENABLE** button to enable Wi-Fi.

5. Choose your network's name from **SELECT NETWORK** drop-down list.

6. Write the password on **NETWORK PASSWORD** field for the selected network.

7. For automatic IP address choose **DHCP**, for static IP addres click STATIC and then write network details.

8. To save the configuration, click the **SAVE** button and then click **CLOSE**.



4. STARTING A PRINT

Congratulations! If you have followed all the previous instructions, now you are set to start your first print with Formon Core. This part will guide you through the preparations to start a print, using Formon Scope and the printing process feedback on the printers touch screen display.

FILE FORMAT AND KEY CONSIDERATIONS

FILE FORMAT

Formon Scope recognizes two types of 3D files: .stl files and .obj files.

These file formats describe the surface geometry of the 3D model that is called a mesh geometry, a surface built from a series of triangles.

Make sure, before saving your 3D model through any CAD software for printing, that you are saving the 3D model as one of the above file formats.

KEY CONSIDERATIONS

Watertight 3D models - Since the geometrical structure of the mesh geometry is composed of triangles, make sure that there is no open spaces between them, or that the 3D model has no holes on its surfaces. Ask yourself: if I were to put water inside my model, would it flow out? If that's the case then you need to find those holes and close them. This process is sometimes also called 'creating a manifold model'.

Wall thickness - Wall thickness is the distance between one surface of your model and its opposite sheer surface. Since the print-head nozzle has an extrusion hole of 0.4 mm, design your walls to be at least 0.8 mm thick or multiples of 0.4 mm: 1.2 mm; 1.6 mm and so on. Many printing problems can be traced back to the wall thickness issues, so make sure your models are designed appropriately.

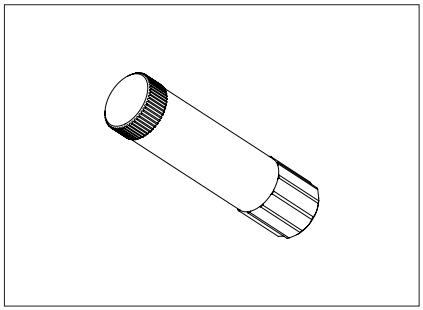
Warping - When the first layer of the print is large, during heating up and cooling down of the material, warping may occur. To reduce warping, make sure that you have applied even layers of glue on the print plate.

Overhangs - Overhangs are parts of the 3D model that extend beyond 45 degree angles. If your design contains overhangs, you will need to print the part using support which is explained later.

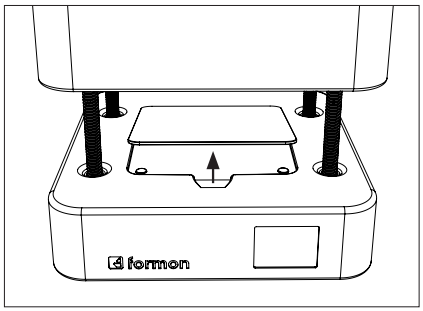
Surface details - If your model has intricate details lower than 0.8 mm in your 3D model surfaces, it is important to know that such features will generally struggle to clearly show through printing with FDM technology.

3D model orientation - When adding the 3D model with Formon Scope, think of the model orientation on the print plate. Since the printing process is through deposition of layers on top of other layers, part orientation may influence the part strength and part aesthetics.

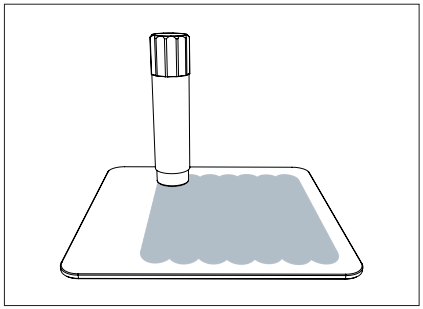
PREPARING FOR A PRINT



1. Take the **Glue Stick** from the accessory box.



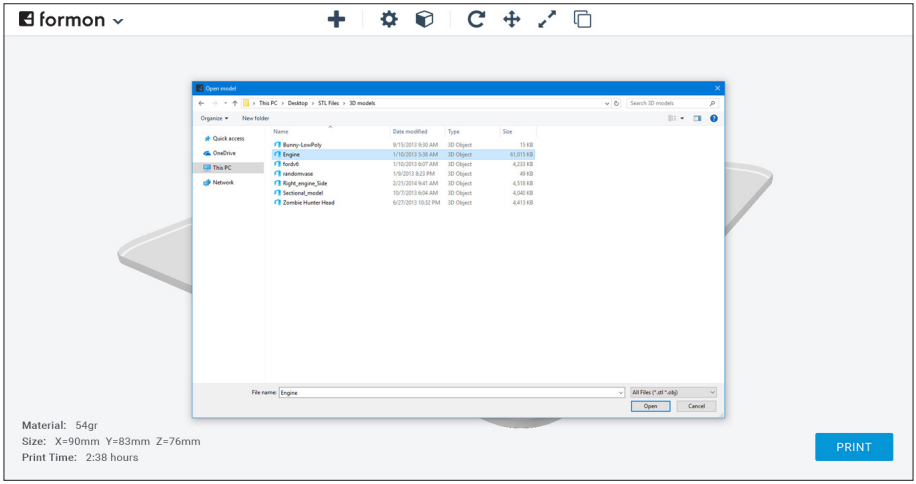
2. Take the **Print Plate** out of the printer.



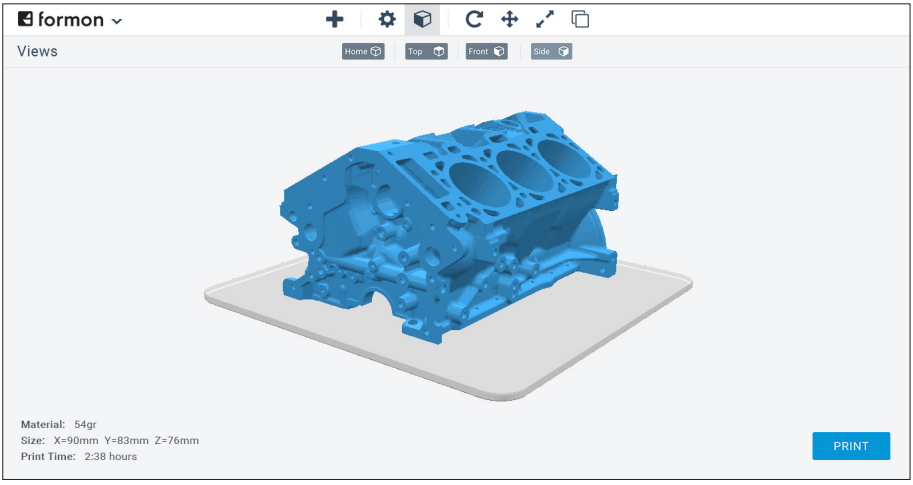
3. Apply a thin, even layer of glue before each new print on the the Print Plate on which the first layer of print will stick and put back the Print Plate in the printer.

If you don't apply the glue properly to the surface on which the first layer of the print will be extruded, your object will not stick to the Print Plate and you might end up with a failed and messy print.

USING FORMON SCOPE

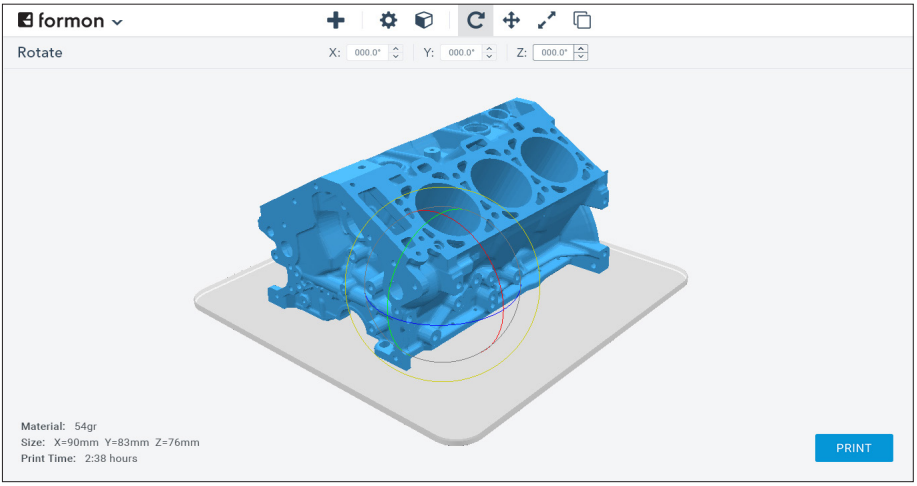


OPENING A 3D MODEL - To open the 3D model that you want to print, press the plus icon on the menu items.

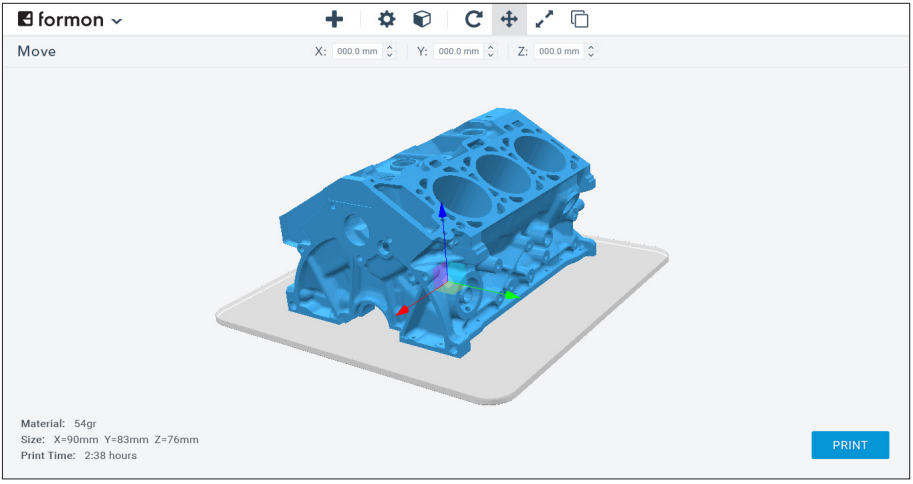


CHANGING THE VIEW - To change the view of the model in Formon Scope, click on the cube icon and select the view you prefer.

USING FORMON SCOPE

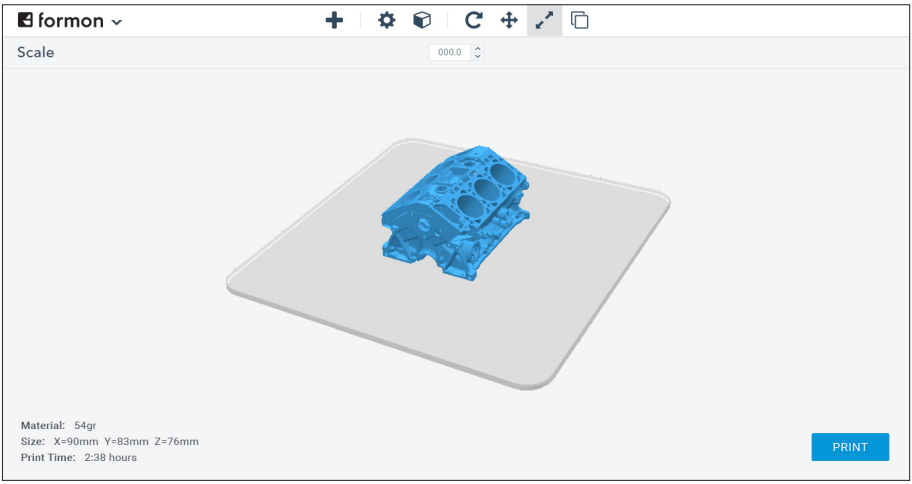


ROTATING THE 3D MODEL - To rotate the 3D model, click the rotate arrow icon, choose the rotation axis and write the rotation angle, or rotate it by dragging the controls that are displayed in the selected 3D model.

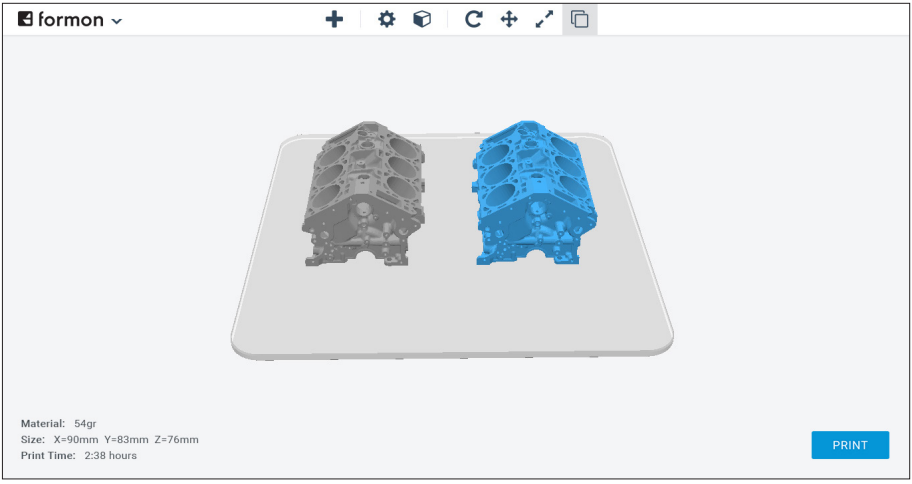


MOVING THE 3D MODEL - To move the 3D model, click the move arrow icon, choose the movement axis and write the desired value, or move the model by dragging the move controls that are displayed in the selected 3D model.

USING FORMON SCOPE

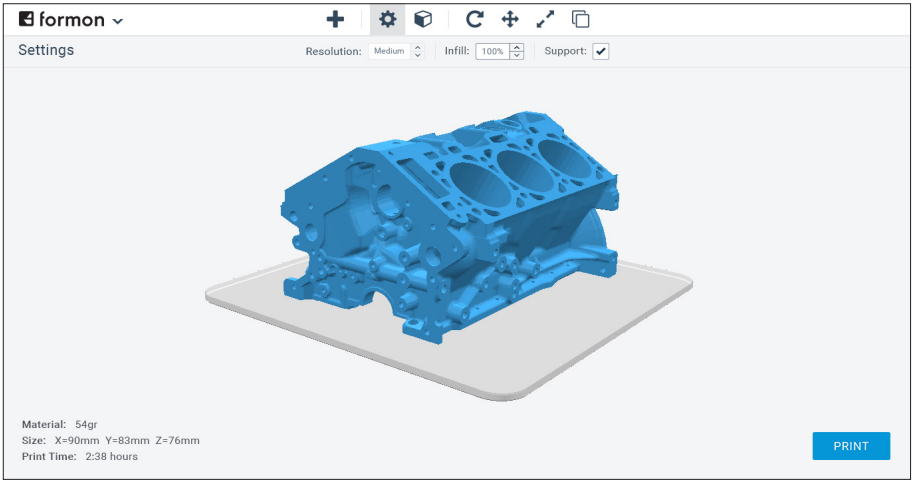


SCALING THE 3D MODEL - To scale the 3D model, click the scale icon and write the percentage value of scaling it up or down.



DUPLICATING 3D MODEL - To duplicate the 3D model, click the duplicate icon and drag the duplicated object by selecting the move icon to position it in the right place in the print plate.

USING FORMON SCOPE



CHOOSING THE PRINTING SETTINGS - In order to choose the print settings, click the settings icon (gear icon) and choose the print resolution, infill and support.

Resolution - You can choose the LOW, MEDIUM or HIGH resolution, which is the thickness of the printed layers. Choosing a higher resolution will result in prints with much better details and much smoother surfaces, but it takes much longer to print.
The thickness of the LOW resolution layers is 0.3 mm or 300 microns.
The thickness of the MEDIUM resolution layers is 0.2 mm or 200 microns.
The thickness of the HIGH resolution layers is 0.09 mm or 90 microns.

Infill - The infill refers to the structure that is printed inside an object. The infill percentage influences print weight, material usage, strength and print time. Generally speaking, the higher the infill percentage, the stronger the print, but the longer it takes to print. In most cases, 5% – 15% infill is sufficient. 100% infill is very rarely used.

Support - You can activate support by clicking the support check box. Support allows you to print models that have overhangs or bridges. It is an excess material automatically generated under print layers that require support beneath it to hold the printed layers up. Usually overhangs with an angle of more than 45 degrees require

Choosing higher resolutions and/or higher infill percentage directly affects the print time. It will take longer to print a higher resolution model than a lower resolution model. It will also take longer to print models with higher infill percentage.

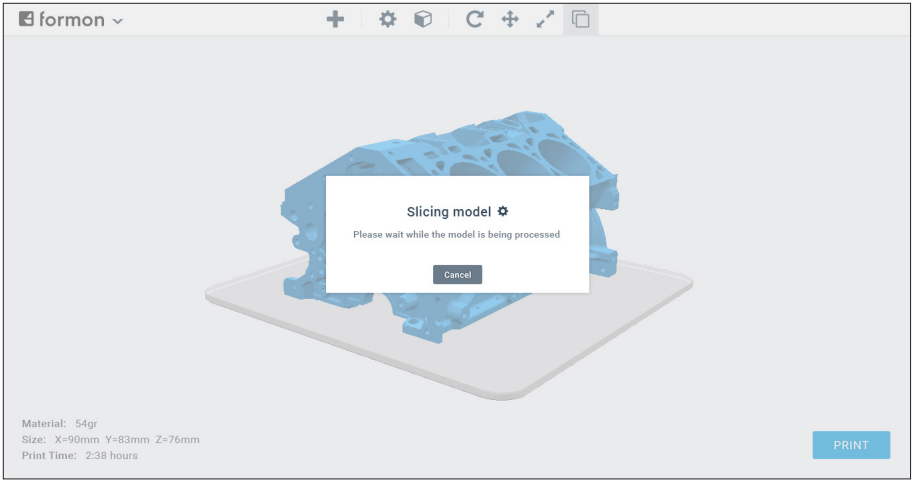
PRINTING PROCESS

Now that you have chosen the orientation, size, position and print settings of your 3D model, it is time to start printing.

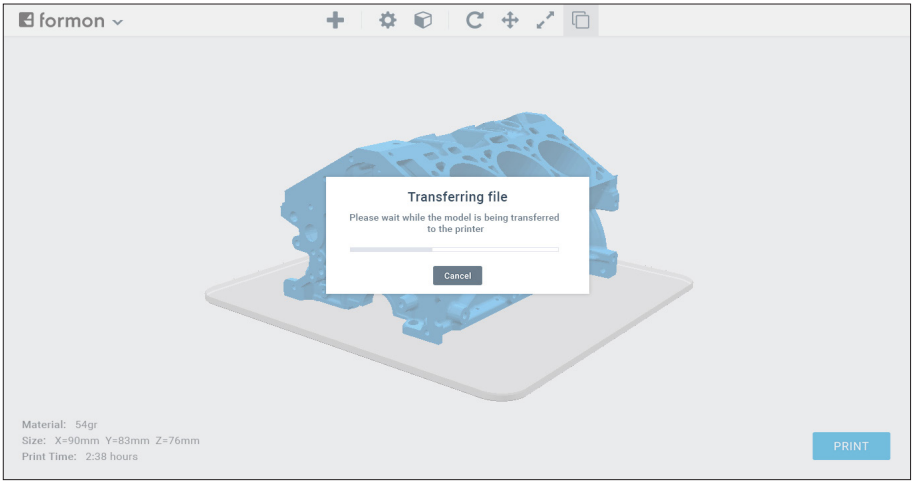
On the bottom-right corner of the Formon Scope click the PRINT button to start printing.

After you have clicked PRINT, Formon Scope will slice the 3D model on thin layers and transfer it to the printer. Find more about the printing process on the next pages.

PRINTING PROCESS

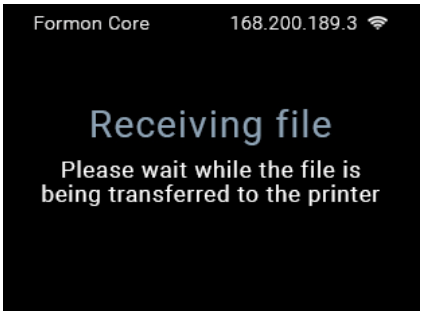


1. SLICING PROCESS - After you have clicked PRINT, the slicing process of the 3D model starts to prepare the file for printing with your chosen settings.

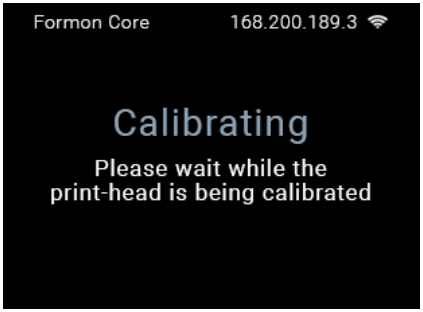


2. TRANSFERRING FILE - After the slicing process has finished, the file will be transferred to the printer.

PRINTING PROCESS

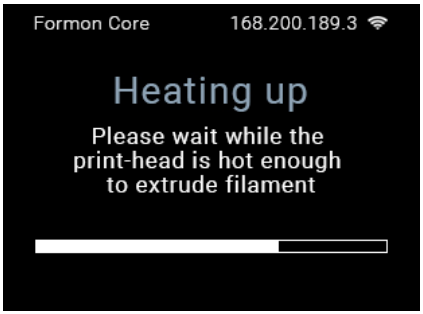


3. While the file is being transferred to the printer you will see this notification in the printer's touch screen display.



4. When the file is received by the printer, the CALIBRATION process of the print-head will start automatically.

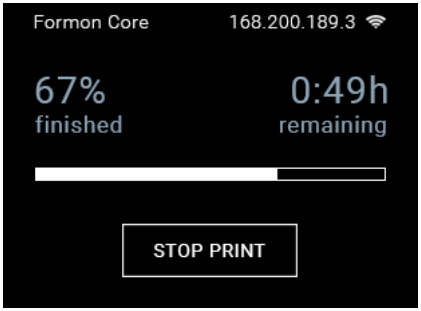
During the printer's calibration process, DO NOT place anything on the top platform or inside the printer, and DO NOT touch the printer while calibrating. The top platform will move upwards.



5. After the CALIBRATION process has finished the print-head will start HEATING UP in order to start extruding filament while printing.

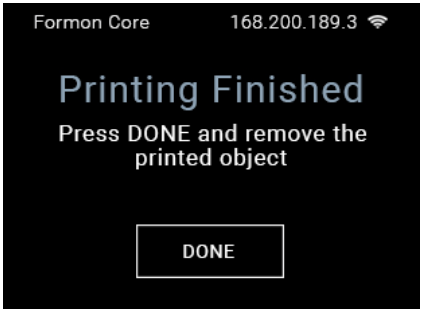
DO NOT reach inside with your hands to touch the print-head during this process.

PRINTING PROCESS



7. When the printing starts, you will see a PROGRESS BAR with the remaining time for the print to finish. You can stop the print from this screen by pressing the STOP PRINT button.

DO NOT reach to touch the printer and DO NOT touch anything inside the print area while the object is being printed.



8. Once the model has been printed, you can pres DONE button in this notification screen. When you press DONE, the printer will open up so you can take the print plate with the printed object out.

DO NOT reach to touch the print-head while taking the printed object out. It will be very hot and it might hurt you and cause damage.

If you stopped the printing process, this screen will appear on the touch screen display. You can click the DONE button and the printer will open up so you can remove the unfinished print.

5. HELP AND SUPPORT

There are a few issues that might occur while using Formon Core. If you encounter any of these issues, you can troubleshoot the issue by yourself by following the instructions found on the next pages and on formon3d.com/support.

SUPPORT AND MAINTENANCE

Many printing problems may trace back to the lack of maintenance of specific parts of the printer. Three main maintenance processes you might have to check once in a while are:

1. Cleaning the Print Plate - It is highly recommended that you apply a layer of glue before each print. But in order for the adhesion to be successful, you will have to clean the Print Plate with water and remove the old glue that you previously applied. Make sure that after every print you clean the Print Plate with water, remove the water with a dry cloth and apply a layer of glue only on a cleaned Print Plate before starting a print.

2. Cleaning the Print-Head - It is highly recommended that you check the Print-Head for filament clogs, after every third print and that you clean them up. If the filament does not extrude when you start a print or does not Retract when you want to change the filament, it might be an indication that the Print-Head is jammed.
Please visit formon3d.com/support for detailed instructions on how to clean the Print-Head.

3. Cleaning the Filament Extruder - If the filament does not Extrude when you start a print or does not Extract/Retract while inserting it, it might be an indication that the drive gear in the extruding motor has excessive filament and needs to be cleaned. It is recommended that you check once in a while if the drive gear is cleaned.
Please visit formon3d.com/support for detailed instructions on how to clean the extruder.

Visit formon3d.com/support for more detailed instruction on Maintenance processes.

SOFTWARE AND FIRMWARE UPDATES

Software and Firmware updates automatically appear in your Formon Scope. If there is any software/firmware update, a popup message will automatically appear on the Formon Scope screen asking if you would like to perform a software/firmware update.

Note: While performing a firmware update, please make sure the printer is powered on.

TROUBLESHOOTING

Below are a couple of printer specific issues you might encounter:

FILAMENT IS NOT EXTRUDING FROM THE PRINT-HEAD - If the printer runs out of the filament, the print-head or extruder jam may be the main cause of this problem. Follow these instructins to fix this problem:

1. Check if there's enough filament - *Please go to formon3d.com/support*
2. Clean the Print-Head - *Please go to formon3d.com/support*
3. Clean the Filament Extruder - *Please go to formon3d.com/support*

PRINT NOT STICKING TO THE BUILD PLATE - If the print is not sticking to the build plate, check if the build plate Glue Stick is applied evenly. If it is not, or if it has been applied earlier, clean the build plate with water and apply the Glue Stick again. Keep in mind that you have to clean the Print Plate before every print, and apply a new layer of glue on it before starting the print.

CANNOT EXTRUDE/EXTRACT THE FILAMENT WHEN INSERTING IT - Two issues can cause this problem: 1. Jammed Print-Head or 2. Jammed Filament Extruder.

1. Try inserting the filament by pressing the EXTRACT button on the change filament screen. If the filament is being extracted, but it is not extruding from the Print-Head this might be an indication that the Print-Head is jammed. A jammed print head means there are clogs created on the bottom of the Print-Head and they need to be removed. You can remove filament clogs by pushing the clogged filament to be extruded from the nozzle.
Please follow the detailed instructions on formon3d.com/support on how to Clean the Print-Head and DO NOT proceed with cleaning without checking and following the instructions online.

2. If you cannot insert the filament by pressing the EXTRACT button on the change filament screen, try pushing it with your fingers on the filament hole on top of the printer while pressing EXTRACT button. If it is not extracting by itself even after you have given it a push, it might be an indication that the filament extruder is jammed. Filament extruder jamming occurs if there is excess material around the filament drive gear in the filament extruder.
Please follow the detailed instructions on formon3d.com/support on how to Clean the Print-Head and DO NOT proceed with cleaning without checking and following the instructions online.

TROUBLESHOOTING

CANNOT RETRACT THE FILAMENT WHEN REMOVING IT - Two issues can cause this problem: 1. Jammed Print-Head or 2. Jammed Filament Extruder.

1. If you cannot remove the filament by pressing the RETRACT button on the change filament screen, try pulling it with your fingers from the filament hole on top of the printer while pressing RETRACT button. If pulling the filament by hand won't remove it, most likely the Print-Head is jammed. A jammed print head means there are clogs created on the bottom of the Print-Head and they need to be removed. You can remove filament clogs by pushing the clogged filament to be extruded from the nozzle.
Please follow the detailed instructions on formon3d.com/support on how to Clean the Print-Head and DO NOT proceed with cleaning without checking and following the instructions online.

2. If you cannot remove the filament by pressing the RETRACT button on the change filament screen but you can do it by pulling it, than it is highly likely the Filament Extruder is jammed.Filament extruder jamming occurs if there is excess material around the filament drive gear in the filament extruder.
Please follow the detailed instructions on formon3d.com/support on how to Clean the Print-Head and DO NOT proceed with cleaning without checking and following the instructions online.

PRINTED OBJECT IS STUCK TO THE BUILD PLATE - If you cannot remove the printed object from the build plate, take a thin metal craft spatula and carefully work the blade under the object while twisting the hand slightly. Be careful if you remove a stuck object using a knife or a sharp object because you can injure yourself and damage the build plate.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