

Ultimaker 3

Installation and user manual

Disclaimer



Please read and understand the contents of this installation and user manual carefully. Failure to read the manual may lead to personal injury, inferior results or damage to the Ultimaker 3. Always make sure that anyone who uses the 3D printer knows and understand the contents of the manual and makes the most out of the Ultimaker 3 or Ultimaker 3 Extended.

The conditions or methods used for assembling, handling, storage, use or disposal* of the device are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, injuries, damage, or expense arising out of or in any way connected with the assembly, handling, storage, use or disposal of the product.*

The information in this document was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness.

Intended use Ultimaker 3

Ultimaker 3D printers are designed and built for fused deposition modeling with Ultimaker engineering thermoplastics within a commercial/business environment. The mixture of precision and speed makes the Ultimaker 3D printers the perfect machine for concept models, functional prototypes and small series production. Although we achieved a very high standard in the reproduction of 3D models with the usage of Ultimaker Cura, the user remains responsible to qualify and validate the application of the printed object for its intended use, especially critical for applications in strictly regulated areas like medical devices and aeronautics. While being an open material platform, the best results will be achieved with Ultimaker certified material, while effort has been made to match material properties with machine settings.

* We comply to the WEEE-directive.

Table of contents

Disclaimer	2
Preface	4
Certifications	5
Safety and compliance	6
1.1 Safety messages	7
1.2 Hazards	8
Introduction	9
2.1 Main components Ultimaker 3 or Ultimaker 3 Extended	10
2.2 Specifications	11
Unpack and install	
the hardware	12
3.1 Unboxing	13
3.2 Installing the hardware accessories	15
Set up for first use	17
4.1 Print core installation	18
4.2 Loading materials	19
4.3 Set up Wi-Fi and update firmware	21
4.4 Installing Ultimaker Cura	22
Operation	23
5.1 Control and display	24
5.2 Materials	25
5.3 Preparing a print with Ultimaker Cura	26
5.4 Starting a print	28
5.5 Removing the print	30
5.6 Removing support material	31
5.7 Changing materials and print cores	33
5.8 Calibration	34
Maintenance	37
6.1 Updating the firmware	38
6.2 Material handling and storage	39
6.3 Maintenance schedule	40
6.4 Clean the printer	41
6.5 Lubricate the axles	44
6.6 Check for play on axles	45
6.7 Check the tension of the short belts	46
6.8 Check for debris in the front fan of the print head	47
6.9 Check the quality of the silicone nozzle cover	48
6.10 Lubricate the lead screw of the Z motor	49
6.11 Clean the print cores	50
6.12 Clean the feeders and replace the Bowden tubes	53
Troubleshooting	56
7.1 Error messages	57
7.2 Print core troubleshooting	58
7.3 Print quality issues	59

Preface

This is the installation and user manual for your Ultimaker 3 or Ultimaker 3 Extended. This manual contains chapters about the installation and use of the 3D printer.

The manual contains important information and instructions on safety, installation and use. Please read all information and follow the instructions and guidelines in this manual carefully. This ensures that you will obtain great quality prints and that possible accidents and injuries will be prevented. Make sure that everyone who uses the Ultimaker 3 or Ultimaker 3 Extended has access to this manual.

Every effort has been made to make this manual as accurate and complete as possible. The information is believed to be correct but does not aim to be all inclusive and shall be used only as a guide. Should you discover any errors or omissions, please bring this to our attention, so that we can make amendments. This will enable us to improve our documentation and service to you.

Certifications



UL 60950-1
CSA C22.2 No. 60950-1
E114168



CCAF17LP0190T0



R 201-170319



For the latest version of the CE document go to www.ultimaker.com

1. Safety and compliance

It is very important to work safely with your Ultimaker 3 or Ultimaker 3 Extended.

This chapter is about safety and hazards.
Please read all information carefully to prevent possible accidents and injuries.

1.1 Safety messages

This manual contains warnings and safety notices.



Provides additional information that is helpful to do a task or to avoid problems.



Warns of a situation that may cause material damage or injuries if one does not follow the safety instructions.

General Safety Information

The Ultimaker 3 or Ultimaker 3 Extended generates high temperatures and has hot moving parts that can cause injury. Never reach inside of the Ultimaker 3 or Ultimaker 3 Extended while it is in operation. Always control the printer with the button at the front or the power switch at the back. Allow the Ultimaker 3 or Ultimaker 3 Extended to cool down for 5 minutes before reaching inside.

Do not change or adjust anything on the Ultimaker 3 or Ultimaker 3 Extended unless the change is authorized by the manufacturer.

Do not store items in the Ultimaker 3 or Ultimaker 3 Extended.

The Ultimaker 3 or Ultimaker 3 Extended is not intended for use by persons with reduced physical and/or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning the use of the appliance by a person responsible for their safety.

Children should be under constant supervision when using the printer.

Intentional radio

This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

1.2 Hazards

Electromagnetic Compatibility (EMC)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Electrical Safety

-  The Ultimaker 3 has been tested according to the IEC 60950-1, which falls under the low voltage directive.
The Ultimaker 3 must be used in conjunction with the Meanwell power supply GST220AX and delivered power cord. In combination, they guarantee safe use in relation to short-circuit, overload, over-voltage and over-temperature. An earthed mains socket must be used. Be sure that the building installation has dedicated means for over-current and short-circuiting. For more information, please look at our website for the CB-report.
-  Always unplug the printer before doing maintenance or modifications.

Mechanical Safety

-  The Ultimaker 3 contains moving parts. No damage to the user will be expected from the drive belts. The force of the build plate is big enough to give some damage, so keep hands out of the reach of the build plate during operation.
-  Always unplug the printer before doing maintenance or modifications.

Risk of Burns

-  There is a potential risk of burns: the print head can reach temperatures up to 280 °C, while the heated bed can reach temperatures of 100 °C. Do not touch both with your bare hands.
-  Always allow the printer to cool down for 30 minutes before performing maintenance or modifications.

Health and Safety

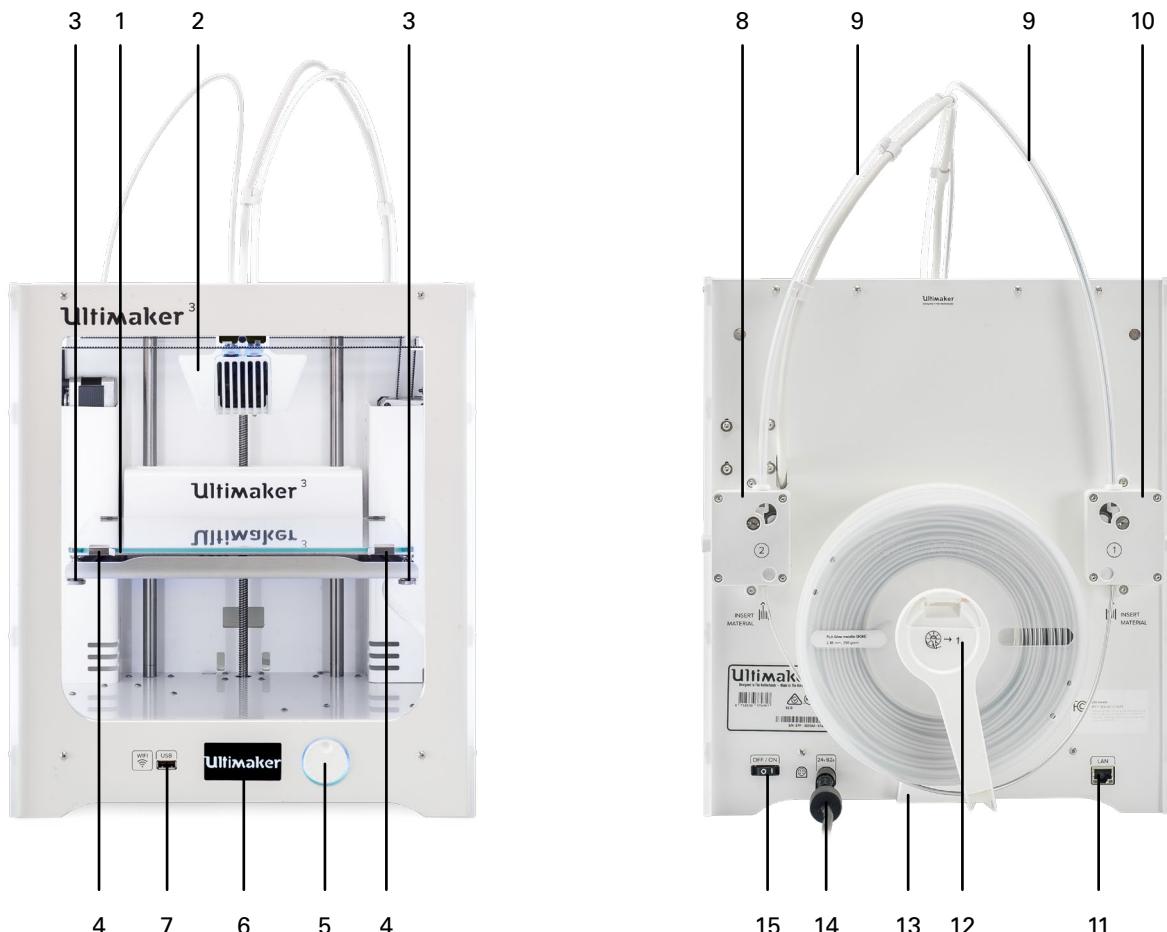
-  The Ultimaker 3 is designed for Ultimaker filament. These materials can be printed safely if the recommended temperatures and settings are used. We recommend to print all Ultimaker materials in a well-ventilated area. Please check the SDS of each specific material for more information.

Non-Ultimaker materials could release VOCs (volatile organic compounds) while processed in Ultimaker 3D printers (not covered by warranty). These can cause headaches, fatigue, dizziness, confusion, drowsiness, malaise, difficulty in concentration and feeling of intoxication. Usage of a fume hood is recommended. Look at the [SDS](#) of these materials for more information.

2. Introduction

Meet your Ultimaker 3 and learn what is possible with this 3D printer.

2.1 Main components Ultimaker 3 or Ultimaker 3 Extended



- 1. Build plate
- 2. Print head
- 3. Knurled nuts
- 4. Build plate clamps
- 5. Push/rotate button
- 6. Display
- 7. USB port
- 8. Feeder 2
- 9. Bowden tubes
- 10. Feeder 1
- 11. Ethernet port
- 12. Double spool holder with NFC cable
- 13. Cable cover
- 14. Power socket and cable
- 15. Power switch



The model displayed is the Ultimaker 3. The main components of the Ultimaker 3 Extended are the same and on the exact same position. The only difference between the two printers is the height of the housing. See Specifications for the different dimensions.

2.2 Specifications

Printer and printing properties

Technology	Fused deposition modeling (FDM)		
Print head	Dual-extrusion print head with an auto-nozzle lifting system and swappable print cores		
Build volume	Ultimaker 3	Ultimaker 3 Extended	
Left nozzle:	215 x 215 x 200 mm	215 x 215 x 300 mm	
Right nozzle:	215 x 215 x 200 mm	215 x 215 x 300 mm	
Dual material:	197 x 215 x 200 mm	197 x 215 x 300 mm	
Filament diameter	2.85 mm		
Layer resolution	0.25 mm nozzle: 150 – 60 micron 0.40 mm nozzle: 200 – 20 micron 0.80 mm nozzle: 600 – 20 micron		
XYZ accuracy	12.5, 12.5, 2.5 micron		
Print head travel speed	30 – 300 mm/s		
Build speed	< 24 mm ³ /s		
Build plate	Heated glass build plate		
Build plate temperature	20 – 100 °C		
Build plate leveling	Active leveling		
Supported materials	Nylon, PLA, ABS, CPE, CPE+, PC, TPU 95A, PP, PVA, Breakaway		
Nozzle diameter	0.25 mm, 0.40 mm, 0.80 mm		
Nozzle temperature	80 – 280 °C		
Nozzle heat up time	< 2 min		
Build plate heat up time	< 4 min (20 - > 60 °C)		
Operating sound	50 dBA		
Material recognition	Material recognition with NFC scanner		
Connectivity	Wi-Fi, LAN, USB port		
Monitoring	Live camera		

Physical dimensions

	Ultimaker 3	Ultimaker 3 Extended
Dimensions	342 x 380 x 389 mm	342 x 380 x 489 mm
Dimensions (with Bowden tube and spool holder)	342 x 505 x 588 mm	342 x 505 x 688 mm
Nett weight	10,6 kg	11.3 kg
Shipping weight	15,5 kg	16,8 kg
Shipping box dimensions	400 x 395 x 590	400 x 395 x 690

Power requirements

Input	100 – 240V 4A, 50 – 60Hz 221 W max.
Output	24 V DC, 9.2 A

Ambient conditions

Operating ambient temperature	15 – 31 °C, 10 – 90% RH non condensing
Non-operating temperature	See material specifications for optimal conditions 0 – 32 °C

Software

Supplied software	Ultimaker Cura, our free print preparation software Cura Connect, our free printer management solution
Supported OS	MacOS, Windows, and Linux
File types	STL, OBJ, X3D, and 3MF G and GCODE BMP, GIF, JPG and PNG

3. Unpack and install the hardware

Carefully unpack your Ultimaker 3 or Ultimaker 3 Extended and set up the hardware according to the instructions in this chapter.

3.1 Unboxing

The Ultimaker 3 comes in reusable, durable packaging, specially designed to protect your 3D printer.

Unpacking

Follow the steps below properly to unpack your Ultimaker 3.

1. Take the Ultimaker 3 out of the cardboard box.
2. Loosen the strap by opening the buckle.
3. Remove the top part of the Styrofoam packaging with the two spools of filament and factory test print in it.
4. Take out the Accessory Box.
5. Remove the Styrofoam part that is placed at the front bottom side of the Ultimaker 3.
6. Take the Ultimaker 3, remove the bottom Styrofoam part and place the Ultimaker 3 on a flat surface.
7. Cut the zip tie that secures the print head.
8. Remove the piece of tape from the print head.



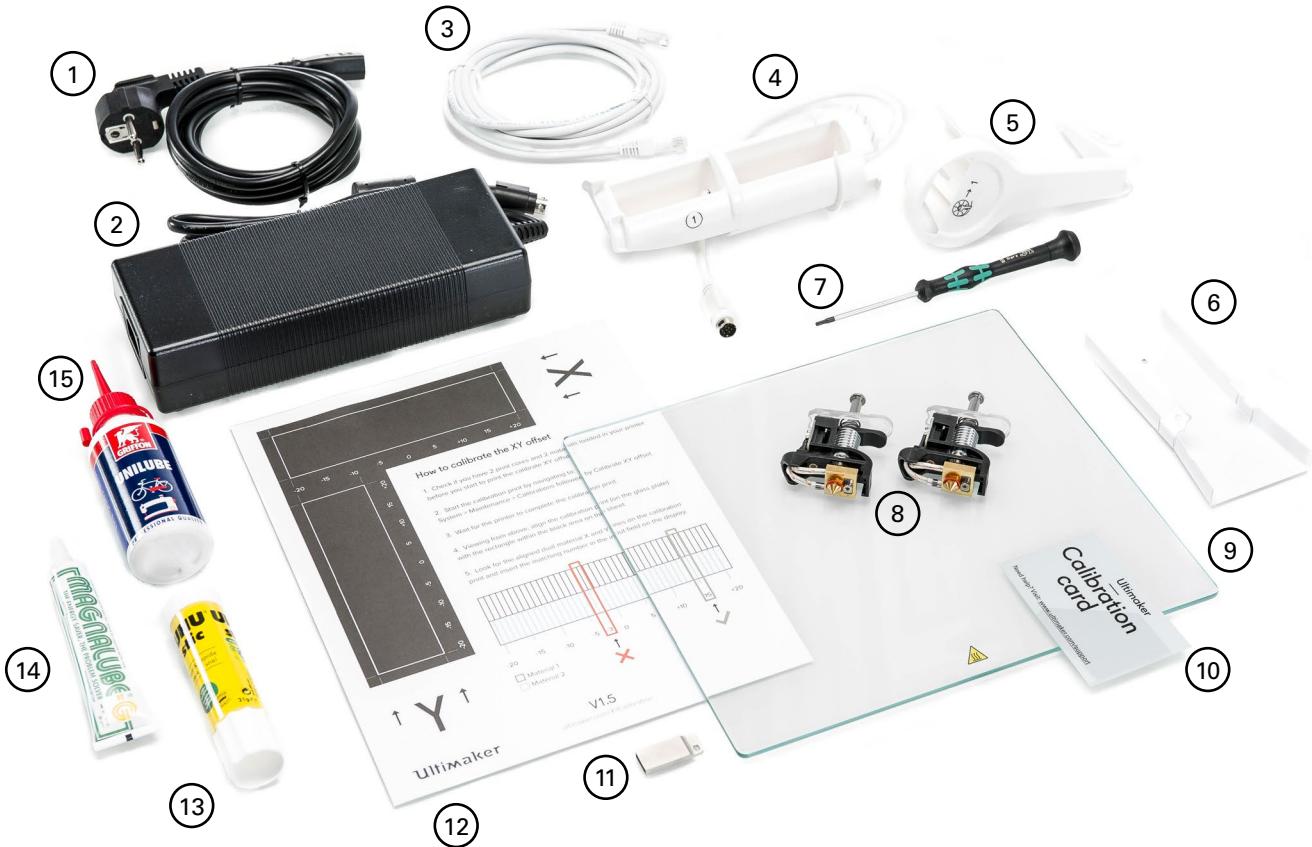
This is in the box

Besides the spools of PLA (350 g) and PVA (350 g), test print and a quick start guide, the Ultimaker 3 is supplied with several hardware accessories. Check if all these accessories are included before continuing.

1. Power cable (under the printer)
2. Power adapter
3. Ethernet cable
4. Spool holder with NFC cable
5. Material guide
6. Cable cover
7. Hex screwdriver
8. Print core AA 0.4 and print core BB 0.4
9. Glass plate
10. Calibration card
11. USB stick
12. XY calibration sheet
13. Glue stick
14. Magnalube (for lead screw Z motor)
15. Machine oil (for X/Y/Z axles)



Another print core AA 0.4 is placed in print head slot 1 of the Ultimaker 3.



3.2 Installing the hardware accessories

Placing and connecting the NFC spool holder

1. Gently place the printer on its left side.
2. Insert the spool holder into the back panel. First place the top part in the hole and push until it snaps into place.
3. Connect the NFC cable to the NFC socket. The flat side of the connector faces away from the bottom panel.
4. Guide the NFC cable through the notch in the back panel.



If you have an Ultimaker 3 you should coil the remaining cable up against the back panel, so that it fits behind the cable cover properly. This is not necessary for the Ultimaker 3 Extended.

5. Insert the cable cover into the back panel to keep the cable in place.
6. Gently place the Ultimaker 3 upright.



Placing the glass plate

1. Open the two build plate clamps at the front of the build plate.
2. Gently slide the glass plate onto the build plate and ensure that it snaps into the build plate clamps at the back.
3. Close the two build plate clamps at the front to secure the glass plate.



Leaving the build plate clamps open may damage your Ultimaker 3 when the build plate is raised.



Connecting the power supply

1. Connect the power cable to the power adapter.
2. Plug the power cable into the wall socket.
3. Connect the other side of the power adapter to the Ultimaker 3. The flat side of the connector needs to face downwards. Before you push the cable firmly into the port, you have to pull the sliding mechanism back. When the cord is in the printer you can let go to lock it into place.



The Ultimaker 3 is capable of using currents in the range of 230 V AC 50 Hz or 110 V AC 60 Hz. It should use an earthed wall socket to protect against over-current and the building should have dedicated means to protect against short-circuit.



4. Set up for first use

After installing the accessories, you have to set up the printer for the first use. This chapter will explain how to install print cores, load materials, set up Wi-Fi, update the firmware, and install Ultimaker Cura.

4.1 Print core installation

To perform the setup steps, turn on the printer with the power switch at the back. The welcome setup appears on the display. Rotate the button to navigate through the menus and press the button to confirm your selection.

Print cores

The Ultimaker 3 uses two print cores in the print head, which are interchangeable.

There are two types of print cores:

- Type AA: for printing build materials and Ultimaker Breakaway material
- Type BB: for printing water-soluble support material

Each Ultimaker 3 comes with two print cores AA 0.4 - of which one is already installed in print head slot 1 - and one print core BB 0.4. This means that it is possible to make prints with two build materials or with a build and support material.

The print cores contain information so that the printer always knows which print cores are installed and which materials can be used with this print core.

Installing the second print core

During the welcome setup the second print core must be installed. To do this, follow the steps on the display of the Ultimaker 3:

1. Open the print head fan bracket and press *Continue*.
2. The Ultimaker 3 will now automatically detect the print core (AA) that is placed in print head slot 1. Confirm to continue.
3. Install the print core BB in print head slot 2 by squeezing the levers of the print core and sliding it into the print head.

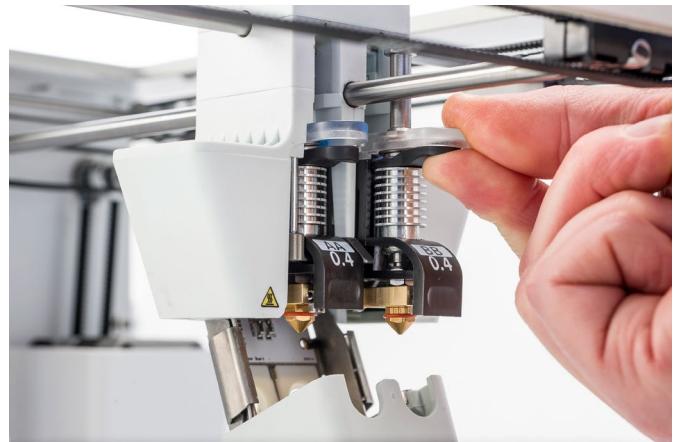
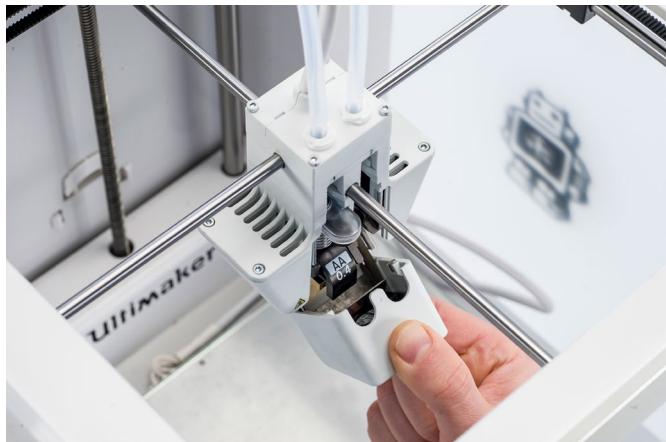


Do not touch the chip on the back side of the print core with your hands.



Make sure you keep the print core completely vertical while installing it so it will smoothly slide into the print head.

4. The Ultimaker 3 should now automatically detect the print core (BB) that is placed in print head slot 2. Confirm to continue.
5. Close the print head fan bracket and confirm to proceed with the setup procedure.



4.2 Loading materials

Before you can start printing on the Ultimaker 3, you need to load materials into the printer. For the first use it is recommended to use the spools of PLA and PVA that came with the Ultimaker 3.

Loading material 2

Material 2 will be loaded first, because this is the material that must be placed closest to the back side of the printer. Take the following steps to load the material.

1. Place the material 2 spool (PVA) on the spool holder. Make sure the end of the material points in a clockwise direction, so that the material can enter feeder 2 from the bottom.
2. Wait until the Ultimaker 3 has detected the material.
3. Insert the end of the material into feeder 2 and gently push it until the material is grabbed by the feeder and is visible in the Bowden tube. Select confirm to continue.

 Straighten the end of the material a bit so it can easily enter the feeder.

4. Wait for the Ultimaker 3 to heat up print core 2 and to load the material into the print head.
5. Confirm when the new material extrudes from the print head.
6. Wait a moment for print core 2 to cool down.



Loading material 1

Material 1 will be put on the material guide first before placing it on the spool holder to avoid tangling of the 2 materials during printing. Follow the below steps to load material 1.

1. Take the material guide and hold it with the outer part towards you.
2. Place the material spool with material 1 (PLA) on the material guide with the material in counter-clockwise direction.
3. Guide the end of the material through the hole in the material guide. When you have done this, select continue.
4. Place the material guide - with material 1 on it - on the spool holder, behind material 2 and wait until it is detected by the printer.
5. Insert the end of the material into feeder 1 and gently push it until the material is grabbed by the feeder and is visible in the Bowden tube. Select confirm to continue.
6. Wait for the Ultimaker 3 to heat up print core 1 and to load the material into the print head.
7. Confirm when the new material extrudes from the print head.
8. Wait a moment for print core 1 to cool down.



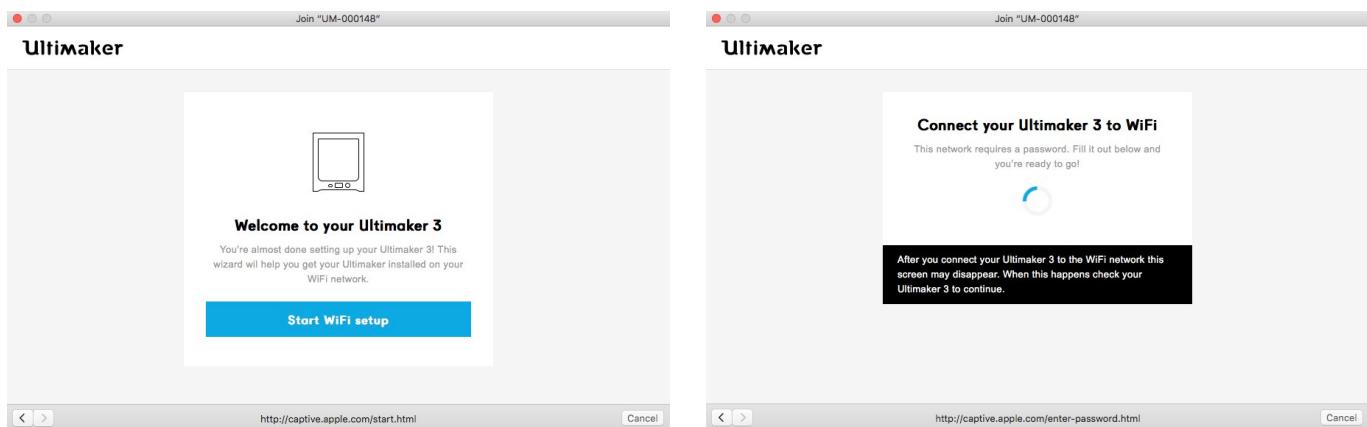
4.3 Set up Wi-Fi and update firmware

The Ultimaker 3 can print wirelessly over a network. To connect your Ultimaker 3 to a wireless network, you will need a computer or smartphone.

Setting up Wi-Fi

1. Wait until your Ultimaker 3 has created a Wi-Fi hotspot. This can take a minute.
2. Move to your computer or smartphone and connect it to the wireless network of the printer. The name of the network is shown on the display of the Ultimaker 3.
3. A pop-up will appear on the display of your computer. Follow the steps to connect the Ultimaker 3 to your local Wi-Fi network. The pop-up will disappear when you have completed these steps.

 If the pop-up does not appear, open a browser and browse to a website that is not yet known by your browser.



4. Go back to the Ultimaker 3 to continue with the setup for first use.

 Within some network environments the Ultimaker 3 may experience difficulties connecting wirelessly. When this happens, repeat the Wi-Fi setup from another computer or smartphone.

 If you skip this process you can always re-do the Wi-Fi setup after completing the welcome setup by going to System → Network → Run WiFi setup.

Updating the firmware

As a last step the Ultimaker 3 will check if the latest firmware version is installed. If not, it will get the latest firmware from the internet and install it. This will take several minutes.

4.4 Installing Ultimaker Cura

For the Ultimaker 3, we recommend our free software Ultimaker Cura to prepare your model for 3D printing. For novices, it makes it easy to get great results. For experts, there are over 200 settings to adjust to your needs.

For the Ultimaker 3 you must use Ultimaker Cura 2.3 or higher. It is recommended to always use the latest stable version.

System requirements

Accepted platforms

- Windows Vista or higher (64 bit)
- Mac OSX 10.7 or higher (64 bit)
- Linux Ubuntu 14.04, Fedora 23, OpenSuse 13.2, ArchLinux or higher (64 bit)



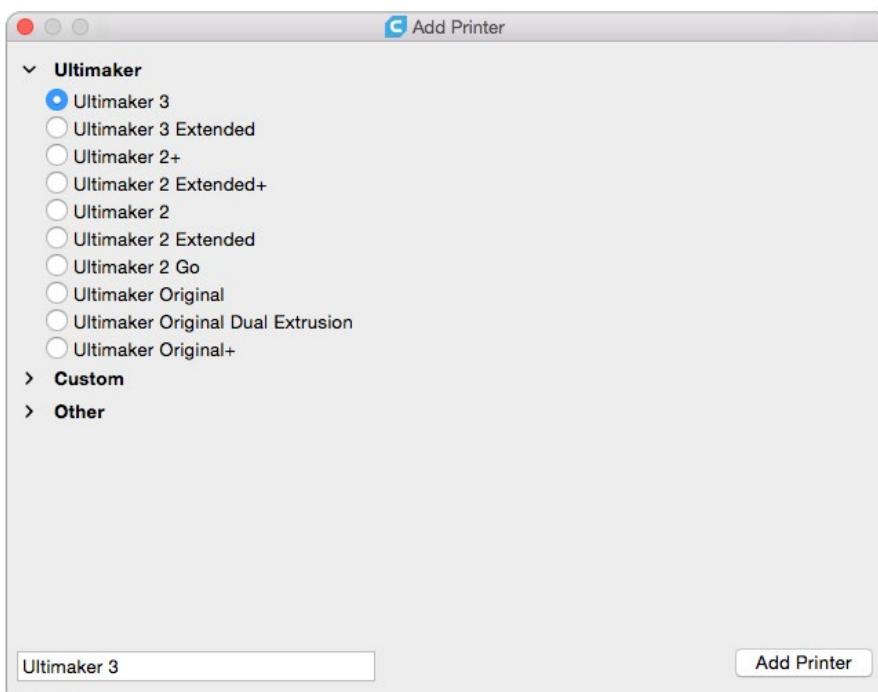
Windows 32 bit versions are only supported until Cura 2.3.

System requirements

- OpenGL 2 compatible graphics chip
- Intel Core 2 or AMD Athlon 64 or newer
- At least 4Gb of RAM (8Gb or more is recommended)

Installation

The Ultimaker Cura software can be found at www.ultimaker.com/software. After downloading, open the installer and run the installation wizard to complete the installation. When opening Ultimaker Cura for the first time, you will be asked to select your 3D printer, the Ultimaker 3 or Ultimaker 3 Extended. No other configuration is required and you can directly start using Ultimaker Cura.



5. Operation

After installation, it is time to start printing with your Ultimaker 3. This chapter provides information about the control and display, materials, Ultimaker Cura, starting the print, removing the print and support material, changing materials and print cores, and calibrations steps.

5.1 Control and display

Control

After switching on the Ultimaker 3 with the power switch at the back, the printer can be controlled easily with the button to the right of the display. The button allows the following actions:

- Rotate to scroll through a menu or to select an option.
- Push to confirm a selection or action.

When pushing the button you will hear a “beeping” sound to confirm the action. A blinking button means the Ultimaker 3 is waiting for user input.

Display and menus

The display at the front of the Ultimaker 3 shows all the necessary information for setting up and using your 3D printer. When turning on the Ultimaker 3 for the first time you will be guided through the welcome setup. When turning on your Ultimaker 3 after the first use, you will always see the Ultimaker logo first after which the main menu appears. The main menu offers three options: Print, Material/PrintCore and System.

Print

The Print menu allows you to select a print, when using a USB stick. While printing, the menu also allows you to tune the print, and perform other functions, such as changing settings.

Material/PrintCore

With the Material/PrintCore menu you can change, load and unload materials and print cores. Furthermore, you can move the material and manually set the temperature of each print core.

System

The System menu offers various options to control the network, build plate, print head, and frame light, and to perform maintenance and diagnostics tests. These options in the menu are especially useful when performing maintenance or troubleshooting your printer.

5.2 Materials

Material compatibility

As explained in chapter 4.1 Print core installation, the Ultimaker 3 comes with two print cores for build material (AA) and one print core for water-soluble support material (BB). The AA print cores can be used for printing PLA, ABS, CPE, CPE+, Nylon, PC, TPU 95A, PP and Breakaway. The BB print core can be used for PVA.

This compatibility is based on single-extrusion prints with a print core 0.4. If you are using 0.25 or 0.8 print cores, the compatibility is slightly different. The below overview shows you which material can be used with which print core.

	PLA	ABS	Nylon	CPE	CPE+	PC	TPU 95A	PP	PVA	Breakaway
Print core 0.25	✓	✓	✓	✓	✗	①	①	✓	✗	✗
Print core 0.4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Print core 0.8	✓	✓	✓	✓	①	①	✓	✓	✓	✗

✓ Officially supported ① Experimental ✗ Not supported

For an overview of possible dual-extrusion material combinations take a look at the table below.

	PLA	ABS	Nylon	CPE	CPE+	PC	TPU 95A	PP	PVA	Breakaway
PLA	✓	✗	✗	✗	✗	✗	✗	✗	✓	✓
ABS	✓	✗	✗	✗	✗	✗	①	✗	①	✓
Nylon	①	✗	✗	✗	✗	①	✗	✓	✓	✓
CPE	✓	✗	✗	✗	✗	✗	✗	✓	✓	✓
CPE+	①	✗	✗	✗	✗	✗	✗	①	✓	✓
PC	①	①	①	①	①	①	①	①	①	①
TPU 95A	①	①	①	①	①	①	①	①	①	①
PP	①	①	①	①	①	①	①	①	①	①
PVA	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗
Breakaway	✗	✗	✗	✗	✗	✗	✗	✗	✗	✗

✓ Officially supported ① Experimental ✗ Not supported

Although the Ultimaker 3 has an open material system, the use of Ultimaker material on the printer is recommended. All Ultimaker materials have been tested extensively and have optimized profiles in Ultimaker Cura to ensure the best print result. Using Ultimaker materials will also allow you to benefit from the NFC detection system. Ultimaker spools will automatically be recognized by the Ultimaker 3 and this information can be directly transferred to Ultimaker Cura when connected via the network. This allows for a seamless connection between the printer and Ultimaker Cura software.

Print settings

Each material requires different settings for optimal results. If you use Ultimaker Cura to prepare your model, these settings are automatically set correctly if the correct print core(s) and material(s) are selected.

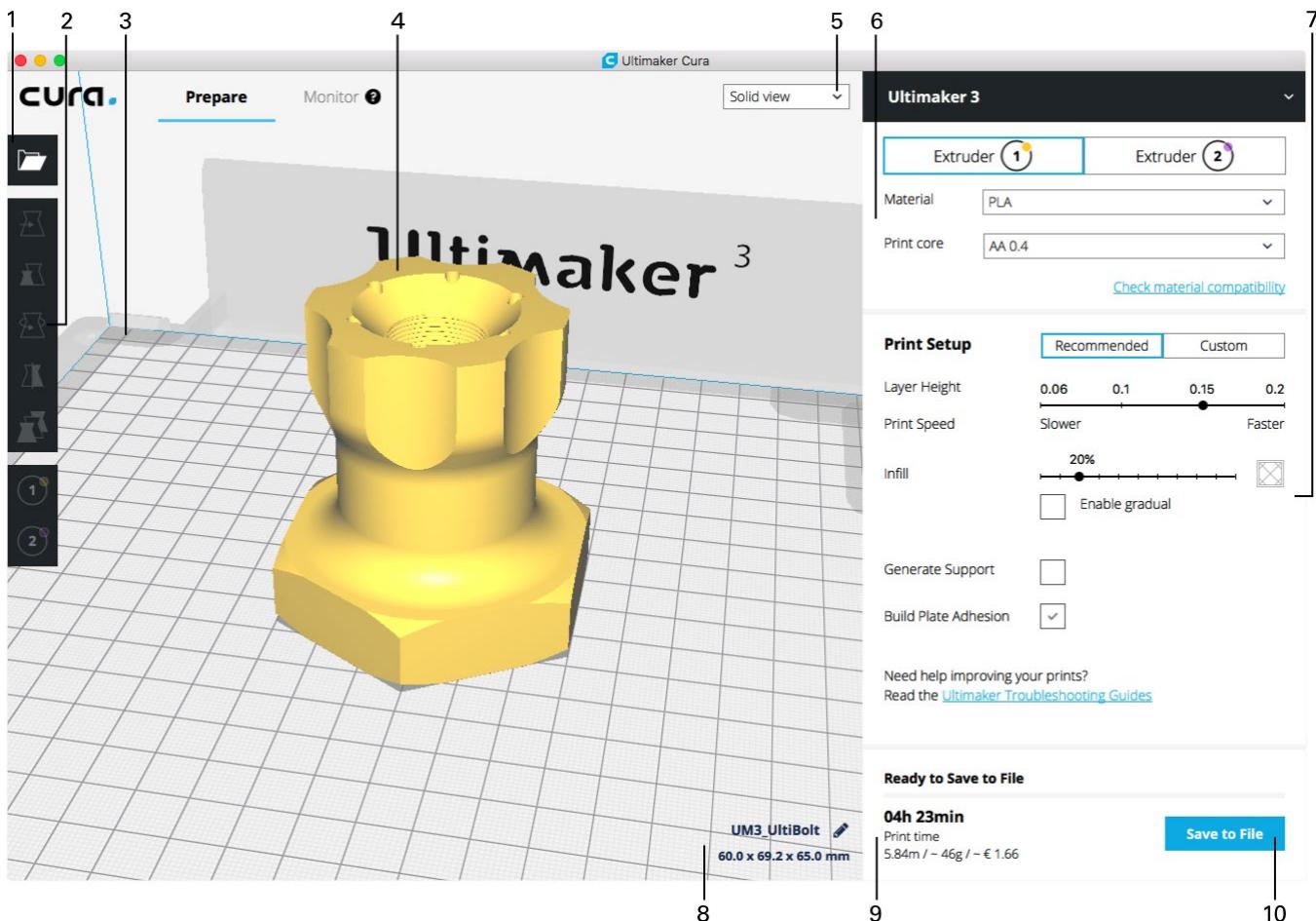
For all materials that are supported on the Ultimaker 3 it is also recommended to apply a thin layer of glue (using the glue stick from the Accessory Box) or an adhesion sheet to the glass plate before starting a print. This will make sure that your print adheres well to the glass plate.

For detailed instructions on which settings and adhesion method to use per material, take a look at the material manuals on www.ultimaker.com.

5.3 Preparing a print with Ultimaker Cura

Interface

After you have added the Ultimaker 3 in Ultimaker Cura, the main interface will become visible. Here is an overview of the interface.



1. Open file
2. Adjustment tools
3. Non-printable areas
4. 3D model
5. View mode
6. Printer, print core and material configuration
7. Print Setup (recommended mode)
8. Model information
9. Print job information (print time and material usage)
10. Save to file, SD card or print over network

Slicing a model

To slice a model in Ultimaker Cura:

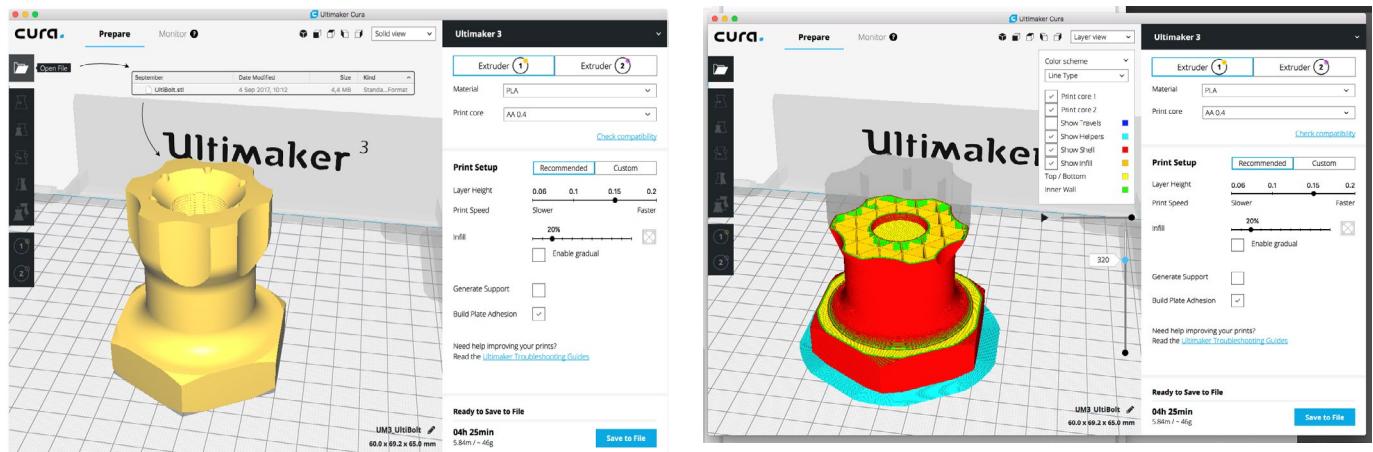
1. Load the model(s) by clicking the “Open File” folder icon.
2. In the Sidebar (right side of the screen), check if the print cores and materials are correct.
3. Use the Adjustment Tools to position, scale and rotate the model if desired.
4. Select your desired settings (layer height/print speed, infill, support and build plate adhesion) under “Print Setup”.

i When printing with support, you have the option to select the extruder that you want to use to print the support structure. This allows you to print your model with PVA or Breakaway support on your Ultimaker 3.

5. To view the result of the selected settings, change the view mode from “Solid view” to “Layer view”.
6. In the bottom right corner, select “Save to file”, “Save to USB” or “Print over network” depending on the printing method.

i If you create a dual-color print you have to assign material colors to the models and merge the models before finishing your slice.

For more instructions on how to use Ultimaker Cura, take a look at the [Ultimaker Cura manual](#) on our website.



5.4 Starting a print

Printing with Cura Connect

The Ultimaker 3 offers the possibility to print over a network, either via Wi-Fi or Ethernet. This can be done with Cura Connect in Ultimaker Cura when your Ultimaker 3 and computer are connected to the same network.

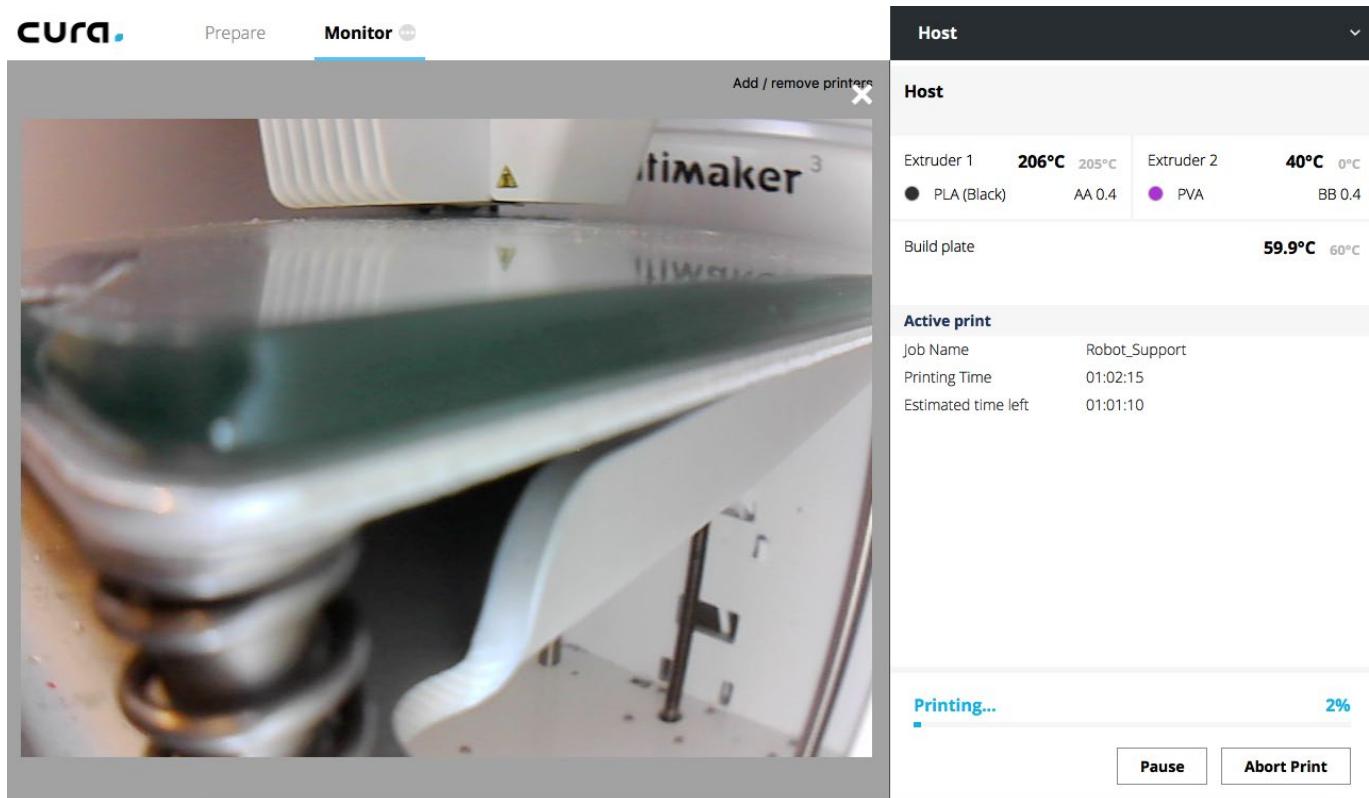
i To use Cura Connect your Ultimaker 3 should be equipped with firmware version 4.0 or higher.

To start a print via Cura Connect:

1. Connect your Ultimaker 3 to the network (if not done yet) via Wi-Fi or Ethernet:
 - Wi-Fi: Install Wi-Fi by going to System → Network → Run WiFi setup and follow the steps on the display.
 - Ethernet: Connect the LAN cable to socket on the back side of the Ultimaker 3.
2. Enable Wi-Fi or Ethernet in the network menu.
3. In Ultimaker Cura go to Settings → Printers → Manage printers.
4. Click on the “Connect via network” button.
5. Select your Ultimaker from the list of printers that are shown and click “Connect”. This printer is now the Cura Connect host.
6. Slice your 3D model in Ultimaker Cura.
7. Press “Print over network” to start the print.

i Once the print is running you can monitor it by opening the “Monitor” tab at the top of the screen in Ultimaker Cura. This allows you to view the progress of your prints and to control your Ultimaker 3(s) from a distance.

i When sending multiple print jobs, Cura Connect will automatically add them to a queue.
View the [Cura Connect manual](#) for a more elaborate description of all features.



Printing with USB

When it is not possible to print via a network, 3D print files can still be transferred to your Ultimaker 3 with a USB stick.

1. Place the USB stick in your computer.
2. Slice your 3D model in Ultimaker Cura. Ensure that the print core and material configuration in Ultimaker Cura match the configuration on your Ultimaker 3.
3. Save the print file (.gcode) via the “Save to removable drive” button to the USB stick.
4. Eject the USB stick in Ultimaker Cura and remove it from your computer.
5. Place the USB stick in the USB port on Ultimaker 3.
6. Go to Print and select the file you want to print.



Ultimaker 3 App

Besides using Ultimaker Cura or the USB stick, the Ultimaker 3 allows you to print directly from your smartphone or tablet using the Ultimaker 3 App. The Ultimaker 3 App can be downloaded from the App Store or Google Play. More information can be found on www.ultimaker.com/en/products/ultimaker-3-app.

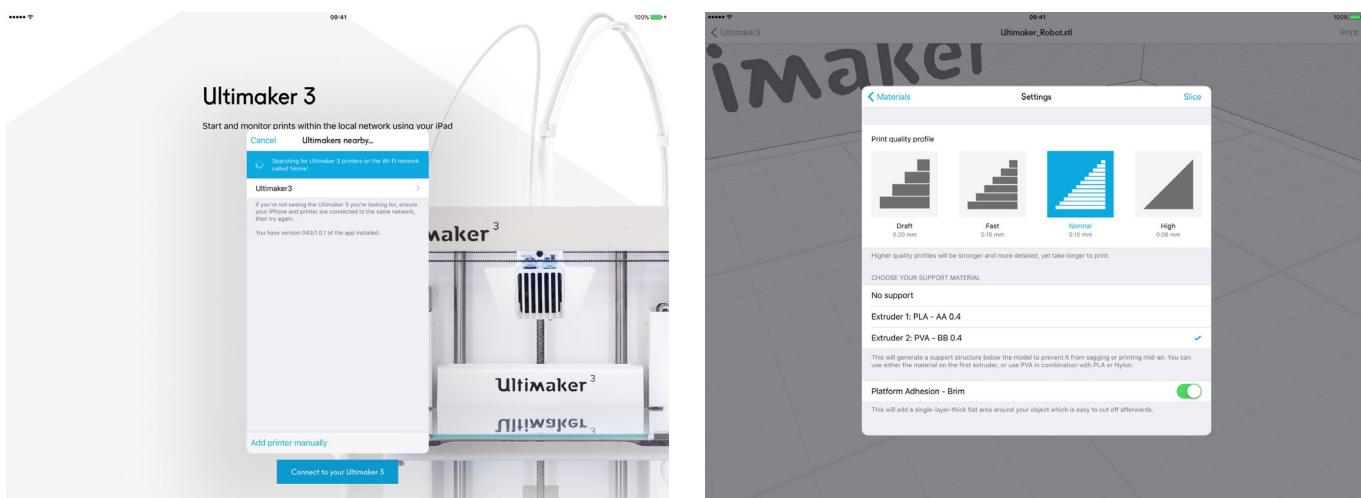
To print a model through the Ultimaker 3 App, follow these steps:

1. Connect to your Ultimaker 3 by selecting the model from the list, or manually add a printer with the IP address.



If you connect to a printer for the first time you need to authorize the connection on the printer.

2. Select “Start a new print”.
3. Load a 3D model from your device or YouMagine, or print the Ultimaker Robot.
4. Use the 3D preview function to check the model on the build plate and select “Print”.
5. Check the materials configuration and select “Next”.
6. Select a print quality profile, choose your support material and toggle your option for the brim function.
7. Slice the model by selecting the “Slice” button.
8. Start the print by selecting “Start print”.



5.5 Removing the print

Once your 3D print is finished it must be removed from the build plate. There are several methods to use, depending on how the print has adhered to the build plate.

Wait for cool down

If you printed directly on to the glass plate without using an adhesive and if the build plate was not leveled too tight, the print may easily be removed once it is cool. Simply allow the build plate and the print to cool down after printing. The material will contract as it cools and you can easily remove the print from the build plate.

Use a spatula

If your print doesn't remove from the build plate after cooling, you can use a spatula to remove the print. Place the spatula under the print and apply a small amount of force to remove the print.



Take the glass plate out of the printer to avoid damaging the build plate clamps.



Use water

If neither of these methods work, remove your print using water. Remove the glass plate and print from the Ultimaker 3. Be careful not to burn your fingers if the glass plate is still warm. Run cool tap water on the back side of the plate to cool quickly. The print material will contract more than with normal cool down. Once cool, the print can be popped off.

If glue was used on the glass plate, run lukewarm water over the print side of the plate to dissolve the glue. Once the glue is dissolved, it is easier to remove the print. If PVA was used, place the glass plate and print in water to dissolve the PVA as this makes print removal easier.

5.6 Removing support material

Dissolving PVA support

PVA support structures can be removed by dissolving the PVA in water. This takes several hours and leaves no trace afterwards.

1. Submerge the print in water

By putting a print with PVA in water the PVA will slowly dissolve. This process can be sped up by using:

- *Warm water.* Warm water will decrease the dissolving time. When using PLA for the build material, ensure that the water is no hotter than 35 °C, otherwise the PLA may be adversely effected. Never use water above 50 °C, as this increases risk of burning.
- *Stirring.* Use stirring/running water to decrease the dissolving time. Moving water enables the PVA to dissolve more quickly (in some cases under three hours, depending on the amount of support material used).
- *Pliers.* You can also speed up PVA dissolution by placing the print in water for approximately 10 minutes, then removing most of the support with pliers. When the print is placed back in the water, only the remaining parts of PVA will need to be dissolved. After the PVA supports are totally dissolved, rinse the print with water to remove any excess.

2. Rinse with water

After PVA supports are totally dissolved, rinse the print with water to remove any excess PVA.

3. Let the print dry

Let the print dry completely and apply additional post-processing to the build material if preferred.

4. Disposal of waste water

PVA is a biodegradable material, and in most cases disposing the water afterwards is easy. However, we recommend that you check local regulations for more concise guidance. The water can be disposed down the drain, providing the waste water distribution network is connected to a wastewater treatment plant. After disposal, run hot water from the tap for approximately 30 seconds to remove any excess saturated PVA water and to avoid longer-term clogging issues.

It is possible to use the water for more than one print, however, this might extend the dissolving time. Through repeated use, the water becomes saturated by previously dissolved PVA, so for the quickest result, fresh water is recommended.



Removing Breakaway support

Prints using Ultimaker Breakaway as support material will require post-processing to remove the support structures. This can be achieved by breaking the support structures from the build material.

1. Tear the inner support structure

Start by removing the walls of the support structure with a gripping plier. This allows you to quickly tear away the majority of the inner support structure.

2. Pull the Breakaway support from the build material

After removing most of the support structure, the remaining part(s) can be pulled from the build material. Use cutting pliers to grab the Breakaway support in a corner and try to carefully get underneath it, then bend it upwards. Repeat this for several corners, so that you can loosen the support from the model around the corners. After this, pull the Breakaway support from the model.

3. Peel the last traces from the model

Sometimes a final layer of the support material remains after pulling the Breakaway support from the build material. If this happens, use cutting pliers to peel it off from a loose edge. Any leftover traces on the model can be removed with tweezers.



5.7 Changing materials and print cores

Changing materials

Materials can be changed easily on the Ultimaker 3 by using the procedure from the menu. Besides changing a material you also have the option to only load or unload a material.

i Make sure compatible print cores are installed before you insert materials.

1. Go to the menu Material/PrintCore → Material [x] → Change.
2. Wait for the print core to heat up and reverse the material.
3. Remove the material from the feeder and spool holder.
4. Place the new material on the spool holder and wait until the Ultimaker 3 detects it.

i When using non-Ultimaker material, you can select a material manually.

5. Insert the material into the feeder and push it until the feeder grabs it.
6. Confirm that you have inserted the material into the feeder by pushing the button at the front side of the Ultimaker 3.
7. After the material has been forwarded, wait until it extrudes from the print head and then push on the button.

Changing print cores

Print cores can be changed easily on the Ultimaker 3 by using the procedure from the menu. Besides changing a print core you also have the option to only load or unload a print core.

1. Go to the menu Material/PrintCore → PrintCore [x] → Change.
2. Wait for the print core to heat up, reverse material and cool down again.
3. Open the print head fan bracket.
4. Remove the print core carefully by squeezing the levers and sliding the print core out of the print head.

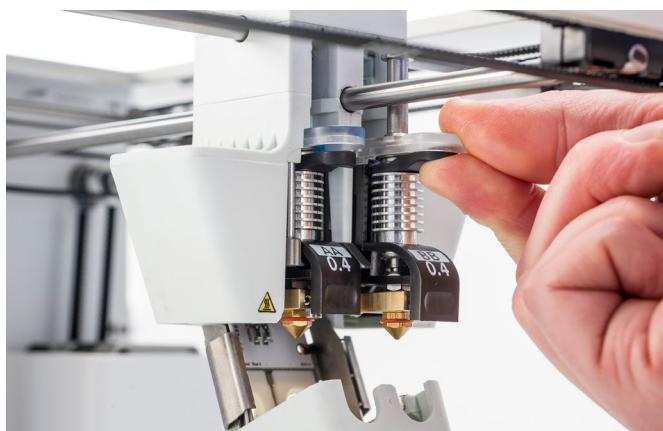
! Do not touch the chip on the back side of the print core with your hands.

5. Insert the new print core in the print head.

i Make sure you keep the print core completely vertical while removing or installing it so it will smoothly slide out of/into the print head.

6. Close the print head fan bracket.
7. Wait for the Ultimaker 3 to load the material into the print core and cool down again.

i It is not possible to change a material and print core at the same time. If you want to change both, you must first unload the material, then change the print core and after that load the new material.



5.8 Calibration

Build plate leveling

While using your Ultimaker 3 it is necessary to periodically calibrate the build plate for good adhesion of the print to the build plate. If the distance between the nozzles and build plate is too wide, your print won't adhere properly to the glass plate. On the other hand, if the nozzles are too close to the build plate, it can prevent the material extruding from the nozzles.

The Ultimaker 3 offers two ways of calibrating the build plate: active leveling and manual leveling. Active leveling is the preferred choice, as there's a reduced chance of human error.



Make sure there is no plastic on the nozzles and the glass plate is clean when you want to calibrate the build plate, or you might get inaccurate results.

Active leveling

During active leveling, the Ultimaker 3 will measure the distance between the tip of the nozzle and the build plate in several locations. These positions are stored in the printer, so it can compensate for inaccuracies of the build plate level during the initial layers of the print. It will do this by slightly adjusting the build plate height while printing.

To start active leveling:

- Go to System → Build plate → Active leveling.
- Wait for the printer to finish the leveling procedure. This will take a couple of minutes.



Do not touch the Ultimaker 3 during the active leveling procedure. This could affect the calibration process.

Manual leveling

If the level of the build plate is too far off (and active leveling cannot compensate for this), manual leveling can be done.

1. Go to System → Build plate → Manual leveling.
2. Wait for the Ultimaker 3 to perform its homing procedure and continue when the print head is in the center at the back of the build plate.
3. Rotate the button at the front until there is approximately 1 mm distance between the first nozzle and the build plate. Make sure that the nozzle is close to the build plate without touching it.
4. Adjust the front-right and front-left knurled nut to roughly level the front of the build plate. Again there should be a distance of approximately 1 mm between the nozzle and build plate.
5. Place the calibration card in between the nozzle and build plate when the print head is in the center back of the build plate.



Do not push on the build plate while fine-tuning with the calibration card. This will lead to inaccuracies.

6. Adjust the knurled nut in the middle back until you feel slight friction when moving the card.
7. Press "Continue". The print head moves to the second point.
8. Repeat step 5 "place the calibration card" and step 6 "adjust the build plate".
9. Press "Continue" again. The print head moves to the third point.
10. Repeat step 5 "place the calibration card" and step 6 "adjust the build plate".



After calibrating the build plate with the first nozzle, the second nozzle needs to be aligned as well, to ensure the heights of both nozzles are set correctly. For this it is only necessary to set the correct height by using the calibration card.

1. Place the calibration card between the second nozzle and build plate.
2. Rotate the button at the front of the Ultimaker 3 until it touches the calibration card and fine-tune it until you feel slight friction/resistance when moving the card.



There should always be a distance of 14 mm between the bottom of the heated bed and top of the base plate to prevent errors during active leveling.

Leveling frequency

The Ultimaker 3 will ask how often you want to level your build plate, once you have leveled it. These are the options:

- Every day
- Every week
- After startup
- Never
- Automatic (the frequency is determined by the printer based on printing hours)

You can always change the leveling frequency by going to System → Build plate → Frequency in the menu.

XY offset calibration

Besides the vertical offset, the horizontal distance between the nozzles in the X and Y direction also needs to be stored. The print cores that are supplied with the Ultimaker 3 are already calibrated, but when the printer detects a new combination you have to perform an XY offset calibration first. This calibration must only be done once; after this, the information is stored on the printer. A correct XY calibration will ensure that the two colors or materials align well.

To perform the calibration you will need the XY calibration sheet, which can found in the Accessory Box or download [here](#).



Ensure 2 print cores and materials are installed before starting the calibration.

To start the calibration:

1. Go to System → Maintenance → Calibration → Calibrate XY offset.
2. The Ultimaker 3 will now print a grid structure on the build plate. Wait until it is finished.
3. Once the Ultimaker 3 has cooled down, remove the glass plate from the printer and place it on the XY calibration sheet. Ensure the printed grid is exactly placed on the two rectangles on the sheet.
4. Find the aligned lines on the printed X grid and look which number belongs to these lines. Enter this number as the X offset value on your Ultimaker 3.
5. Find the aligned lines on the printed Y grid and look which number belongs to these lines. Enter this number as the Y offset value on your Ultimaker 3.



It is important that the printed XY offset print adheres well to the build plate and shows no signs of under-extrusion. If it does, it is recommended to repeat the calibration print.



Lift switch calibration

The switch bay is what enables lifting and lowering of the second print core. For successful dual-extrusion prints, it is important that the switching functions well. The lift switch is already calibrated when the Ultimaker 3 is shipped, but the calibration can also be performed manually.

To perform the switch bay calibration:

1. Go to System → Maintenance → Calibration → Calibrate lift switch.
2. Move the lift switch on the side of the print head to point towards you.
3. Move the print head so that the lift switch fits in the switching bay.
4. Wait for the print head to go to the home position and test the lift switch.
5. Did the lift switch lower and raise the print core? If so, press "yes" to complete the calibration. If not, select "no" to perform the calibration again.



6. Maintenance

In order to have a smoothly working Ultimaker 3 it is important to maintain it correctly. In this chapter the most important maintenance steps are described. Read this carefully in order to achieve the best results with your Ultimaker 3.

6.1 Updating the firmware

Periodically, a new version of the Ultimaker 3 firmware is released. To ensure that your Ultimaker 3 is equipped with the latest features it is recommended to update the firmware regularly. This can be done on the Ultimaker 3 (when connected to a network) or via USB.

Updating on the printer

To update the firmware via the network, take the following steps:

1. Connect the printer to the network via Wi-Fi or Ethernet.
2. Go to System → Maintenance → Update firmware.
3. Choose the "Stable" version.

The Ultimaker 3 will now get the latest firmware from the network and install it. This will take several minutes.

Updating via USB

Firmware can also be updated without an active network connection by taking the following the steps:

1. Download the new firmware files from www.ultimaker.com/firmware.
2. Put the firmware files on the USB stick.



Do not extract the files after downloading, but place them on the USB stick directly.

3. Place the USB stick in the USB port on the Ultimaker 3.
4. Go to System → Maintenance → Update firmware.
5. The Ultimaker 3 will detect it if there is a firmware file on the USB stick. Select the file to start the firmware update.

6.2 Material handling and storage

When you have multiple spools of material in use, or do not print with a material, it is very important that you store them properly. When stored incorrectly this may affect the quality and process-ability of the material.

To keep your materials in optimal condition it is important that you keep them:

- Dry and cool
- Out of direct sunlight
- In a resealable bag

The optimal storage temperature for PLA, Nylon, CPE, CPE+, PC, TPU 95A, PP and Breakaway is between -20 to +30° C. For ABS the advised temperature is between 15 and 25° C and for PVA 0 to 30 °C. Furthermore a relative humidity of below 50% is recommended for PVA, TPU 95A, PP and Breakaway. If these materials are exposed to a higher humidity the quality of the material can be affected.

You can store the material in a resealable bag, including the supplied desiccant (silica gel). For PVA it is advised to store the spool in a resealable bag with the supplied desiccant directly after printing to minimize moisture uptake.

6.3 Maintenance schedule

To keep your Ultimaker 3 in optimal condition we recommend the following maintenance schedule, based on 1,500 printing hours per year:

Every month	Every 3 months	Every year
Clean printer Lubricate axles	Check for play on axles Check tension of short belts Check for residue in front fan of print head Check quality of silicone nozzle cover Lubricate lead screw Z motor Clean print cores	Clean feeders and replace Bowden tubes



If the usage frequency is higher, we recommend performing more frequent maintenance on your machine to ensure optimal printing results

6.4 Clean the printer

For the best print results it is important to keep the Ultimaker 3 clean while using it. Therefore it is advised to not use the Ultimaker 3 in a room where it can easily be covered with dust and to remove small pieces of material that might be in the printer. Besides this, there are a few parts in the Ultimaker 3 that might require more regular cleaning.

Clean the glass plate

After printing, there might be excess glue stuck to the glass plate. This can cause an uneven print surface. Removing a print may also reduce the adhesion quality of a layer of glue, so it is advised to regularly clean the glass plate and reapply glue.

Before starting a new print, always check the surface of the glass plate. At least once a month, clean the plate thoroughly by taking the following steps:



Always make sure that the Ultimaker 3 is turned off and build plate has cooled down.

1. Manually place the build plate at the bottom of the Ultimaker 3.
2. Open the build plate clamps at the front, slide the glass plate forward and take it out of the printer.
3. Use lukewarm water and a sponge to remove the layer of glue. If necessary, some soap or detergent can also be used.
4. Dry the glass plate with a clean cloth.
5. Place the glass plate on the heated bed with the warning sticker facing upwards. Ensure that it snaps into the build plate clamps at the back and close the build plate clamps at the front side to secure it.



Leaving the build plate clamps open may damage your Ultimaker 3 when the build plate is raised.



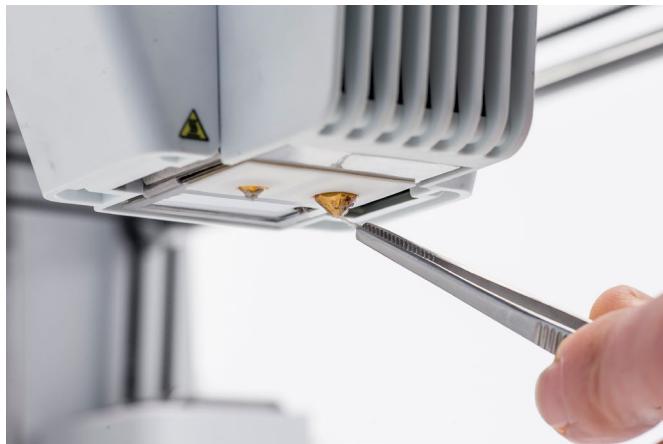
Clean the nozzles

While using the Ultimaker 3, material can get stuck to the nozzles. Although this will not damage your printer, it is recommended keep the nozzles clean in order to achieve the best print results.

Before starting a new print, always check the nozzles. At least once a month, remove the plastic from the outside of the nozzles by taking the following steps:

1. On the Ultimaker 3, navigate to Material/PrintCore > PrintCore 1 → Set temperature. Rotate the dial and set the temperature to 150 °C. Repeat this for print core 2 and make sure this print core is lowered.
2. Wait for the plastic on the outside to get soft. When the nozzles are hot, carefully remove the material with tweezers.

 Do not touch the nozzles and be careful while cleaning it as they will become hot.



Clean the feeders and Bowden tubes

After many hours of printing, or when material has been ground down, small filament particles can build up in the feeder. These can end up in the Bowden tubes or print cores, which can impact print quality.

Clean the feeders and Bowden tubes at least once a month, or after experiencing an issue with filament grinding.

Clean the feeders

1. Remove the material by navigating to Material/PrintCore → Material [x] → Unload. After this, turn off the printer.
2. Blow into the feeder to get the filament particles out. If necessary, use an air blower or compressor instead.



Clean the Bowden tubes

Particles in the Bowden tubes can impede smooth movement of the filament or mix colors. To clean them, the Bowden tubes have to be removed from the printer.

1. Remove the material by navigating to Material/PrintCore → Material [x] → Unload. After this, turn off the printer.
2. Place the print head in the front-right corner.
3. Use a fingernail to remove the clamp clips from the tube coupling collets at the print head and feeders.
4. Press down on the tube coupling collet in the print head and at the same time, pull the Bowden tube upwards, out of the print head. Repeat these steps for the feeder.

i The cable clips that hold the second Bowden tube to the print head cable do not have to be removed, you can leave them in place.

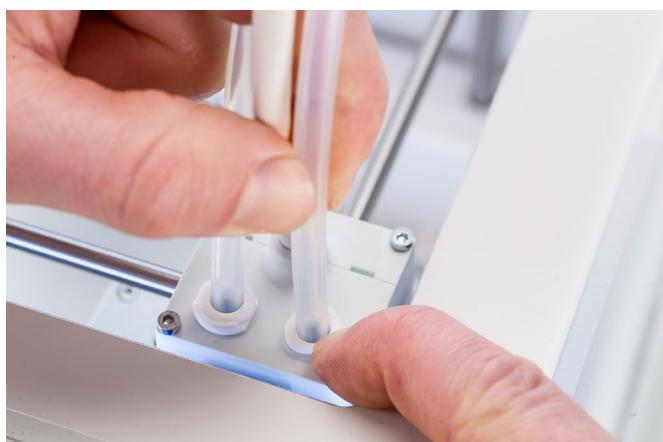
5. Cut off a small piece of sponge or ball up a piece of tissue.
6. Insert this into the feeder end of the Bowden tube and push it all the way through the tube with a length of filament. Do this for both Bowden tube, using a clean piece of sponge or tissue for each.

i To clean the tube most efficiently, make sure the sponge or ball of tissue is a tight fit inside the Bowden tube. Note that if it is too big it will be difficult to push through.

7. Insert the Bowden tube into the feeder by pressing down on the tube coupling collet in the feeder and pushing the Bowden tube all the way in. Secure the tube with the clamp clip. Repeat this for the other Bowden tube.

i Pay attention to the orientation of the first Bowden tube that was completely removed from the printer. One side is drilled out for easier entry of the filament; this side should be inserted into the feeder.

8. Insert the Bowden tube into the print head by pressing down on the tube coupling collet in the print head and pushing the Bowden tube all the way in. Secure the tube with the clamp clip. Repeat this for the other Bowden tube.



Inside of the printer

Small pieces of material can gather inside the printer, such as priming blobs. Remove these from the inside of the printer with a cloth or vacuum cleaner. Pay extra attention to the area around the Z limit switch as obstructions here can cause print problems.



Leaving larger objects on the bottom panel can lead to errors, as they prevent the build plate from homing properly.

6.5 Lubricate the axles

To make sure that your print head and Z stage can move smoothly at all times, it is advised to lubricate the axles periodically. If the axles feel dry, this can show in your prints as small ridges on surfaces. Apply some oil to the axles at least once a month.

A bottle of machine oil is included in the Accessory Box of your Ultimaker 3. This oil is specifically for the smooth axles of the Ultimaker 3. Only use the supplied machine oil, as using other oils or Magnalube may affect the coating of the axles, which can affect the performance of your Ultimaker 3.

X and Y axes

Apply a small drop of machine oil to each of the X and Y axes as well as both print head shafts. Manually move the print head around to equally distribute the oil.



Do not apply too much oil to the axles, as it might drip from the axles on to the glass plate, which will affect print adhesion. If a drop of oil does fall on the glass, make sure to clean it thoroughly before printing.

Z axes

Apply a small drop of machine oil to each of the Z axes. In the Ultimaker menu, go to System → Build plate. Select "Raise" and then "Lower" to move the build plate up and down in order to equally distribute the oil.



6.6 Check for play on axles

The four X and Y axes are locked in place by the pulleys. However, it is possible that one or more of the pulleys can become slightly loose over time, which could affect their alignment. If this is the case, there could be play on the X and/or Y axes which can cause issues with print quality.

It is recommended to check for play on the axles at least once every three months.

Start with the right X axle. Place the print head in the back-left corner of the printer to keep it out of the way. Hold the frame of the Ultimaker 3 with one hand, and firmly hold the right X axle with the other. Attempt to move the axle forwards and backwards; do not be afraid to apply too much force.

Repeat this for the other axles. Make sure to move the print head to the opposite side each time.



The axles should not move at all. If one of the axles does move, you can observe a ticking noise of the pulleys hitting the frame. In this case it is recommended to calibrate the print head. For instructions on how to do this, take a look at the [Ultimaker website](#).

6.7 Check the tension of the short belts

Maintaining correct tension on the short belts is important to ensure good print quality. The short belts transfer the movements of the X and Y motors to the print head. If the belts are too loose, the movements of the print head may not be accurate. This can cause print inaccuracies.

Over time, the belts may become slack. It is recommended to check the tension of the short belts at least once every three months.

Pluck the two short belts to check their tension. They should slightly resonate, like a guitar string. It should not be possible to press the belt against itself. Furthermore, the tension of the two belts should be equal.

To restore the tension, perform the following steps:

1. Loosen the Y motor by using the hex screwdriver to loosen the four bolts that hold the Y motor to the left panel. Do not remove the bolts, but the motor should be able to slide up and down.
2. Firmly press down on the motor with one hand. This ensures maximum tension on the short belt.
3. While still pressing the motor down, tighten the four bolts of the Y motor in a cross pattern. First tighten the top-left bolt, then the bottom-right, next the bottom-left and ending with the top-right. This ensures that the motor is attached straight.
4. Perform the above steps for the X motor that is attached to the back panel. Afterwards, check the tension of both belts again.



6.8 Check for debris in the front fan of the print head

The front fan cools the print cores during a print. This helps to prevent the heat from the nozzle traveling too far upwards.

The fan takes in air from the front of the print head and directs it towards the print cores. Sometimes the airflow causes thin strands of filament to be sucked into the fan during a print. If strands accumulate in the fan, they can obstruct the fan and prevent it from spinning.

To check the front fan, first gently open the front fan bracket. Blow into the front fan to see if it spins smoothly. If it does not move at all, or stops spinning abruptly, carefully clear any obstructions from the front fan with some tweezers.

 Make sure that the print cores are completely cooled and the printer is turned off before performing this check.

If the fan is still not spinning after removing visible filament residue, it should be replaced.

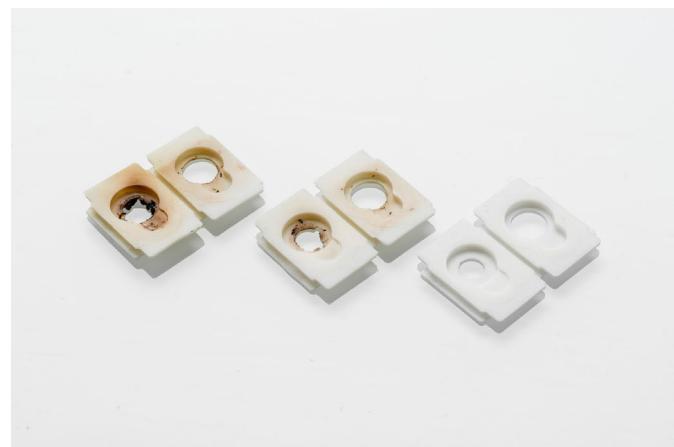
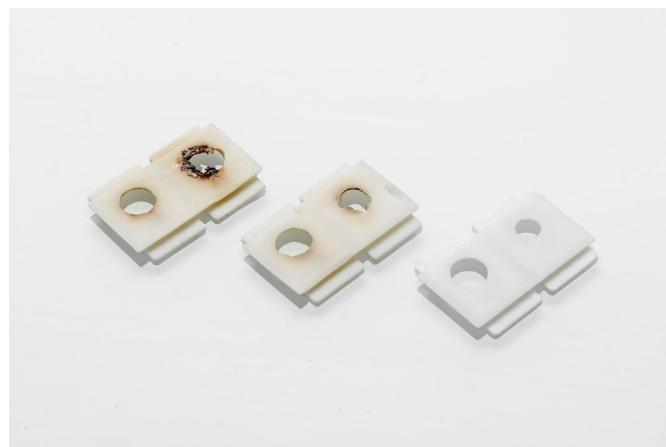


6.9 Check the quality of the silicone nozzle cover

The silicone cover shields the print cores from cold airflow from the fans, which helps the print cores to maintain a stable temperature while printing. The cover also helps to prevent backflow of material into the print head when something goes wrong during printing.

The silicone cover may wear over time due to the heat of the nozzles. It is recommended to check the quality of the cover at least once every three months.

Examine the bottom of the print head to see if the holes where the nozzles come through are still round and the cover still forms a good seal. Also gently open the fan bracket to check the other side of the silicone nozzle cover.



According to these images, it is highly recommended to replace the cover on the left and advisable to replace the cover in the middle. The cover on the right is in perfect condition and will not need to be replaced. Instructions on how to replace the silicone nozzle cover can be found on the [Ultimaker website](#).

6.10 Lubricate the lead screw of the Z motor

The lead screw is connected to the Z motor and controls the movements of the Z stage. To ensure smooth movement of the Z stage, it is recommended to periodically apply Magnalube to the lead screw.

Over time, Magnalube may need to be reapplied to maintain consistent and accurate movement of the Z stage. A tube of Magnalube is included in the Accessory Box of your Ultimaker 3.

1. Make sure that the build plate is positioned at the bottom of the Ultimaker 3.
2. Apply a small amount of Magnalube to the lead screw of the Z motor.
3. In the Ultimaker menu, go to System → Build plate.
4. Select “Raise” and then “Lower” to move the build plate up and down to evenly distribute the Magnalube.



Do not use Magnalube on the smooth axles, this will affect the working of your Ultimaker 3.



6.11 Clean the print cores

Regular maintenance of the BB print core should be performed once every three months. Using the Ultimaker cleaning filament is the most effective way to clean and unclog the BB print core on the Ultimaker 3. Ultimaker cleaning filament can be found in the Accessory Box of the printer, but if you don't have the Ultimaker cleaning filament at your disposal, you can use PLA instead.

Cleaning filament can be used to clean the print core on an Ultimaker 3 by applying hot and cold pulls. Hot pulls are used to get the biggest parts of dirt or carbonized material out of the print core and are especially necessary when a print core is clogged. With a cold pull, the remaining small particles will be pulled out, ensuring the print core is completely clean.

Preparation

1. Go to System → Maintenance → PrintCore cleaning to start the cleaning procedure.

i The print head will move to the front-right corner to prepare itself.

2. Select the print core you want to clean: print core 1 or print core 2.
3. Select the material you want to use for cleaning: Ultimaker cleaning filament or PLA filament.
4. Before continuing in the menu, carefully read the instructions on these pages in order to perform the next steps correctly. Confirm to continue.
5. Wait for the printer to heat up the print core and to retract the filament until its end is visible in the Bowden tube.

i If the material is not retracted there is chance that the material has been ground down and is stuck in the feeder. In this case, remove the material manually as described in the troubleshooting section on the [Ultimaker website](#).

6. Remove the Bowden tube from the print head. First, remove the clamp clip and then push down on the tube coupling collet while pulling the Bowden tube upwards, out of the print head. Confirm to continue.



Hot pull

1. Insert the filament (Ultimaker 3 cleaning filament or PLA) into the print head until you feel some resistance.
2. Hold the filament with pliers and gently apply pressure to the material for ± 1 second so that it extrudes from the nozzle or until it cannot be pushed any further.



The use of pliers is required to prevent injuries on your hands in case the material breaks.



Applying too much pressure to the material is almost impossible.

3. Pull the Ultimaker 3 cleaning filament out with a quick, firm pull.



4. Cut off the tip of the filament that you have just pulled out.
5. Check the color and the shape of the tip of the filament and compare it with the image below. The goal is to have a clean tip.



6. Repeat this procedure until there is no more degraded material visible on the tip of the cleaning filament. The tip of the filament should look as clean as the example on the right.
7. Once the tip of the filament is clean, manually flush some filament through the print core with pliers and take it out again. Confirm to continue.

Cold pull

1. Insert the filament into the print head by hand until you feel some resistance.
2. Hold the filament with pliers and gently apply pressure to extrude some material. Confirm to continue.
3. Maintain pressure on the filament with the pliers until the progress bar is completed.
4. Release the filament and wait until the print core has cooled down.
5. Grab the filament with pliers and pull it out with a quick, firm pull.



6. Take a look at the tip of the filament and see if it has a clean, cone-shaped tip like shown on the example to the right.

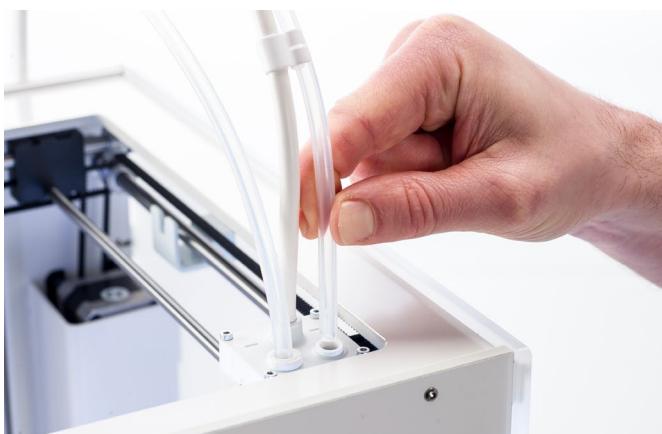


If the tip of the filament is not clean, go back to hot pull or cold pull to repeat the cleaning steps.

Reassembly



1. Reinsert the Bowden tube into the print head and secure with the clamp clip. Keep pressure on the Bowden tube while doing this. Confirm to continue.
2. Wait for the Ultimaker 3 to finalize the cleaning procedure.



6.12 Clean the feeders and replace the Bowden tubes

Clean the feeders

The feeders forward filament to the print head. To make sure that exactly the right amount of material is extruded, it is important that the feeder gears can turn smoothly.

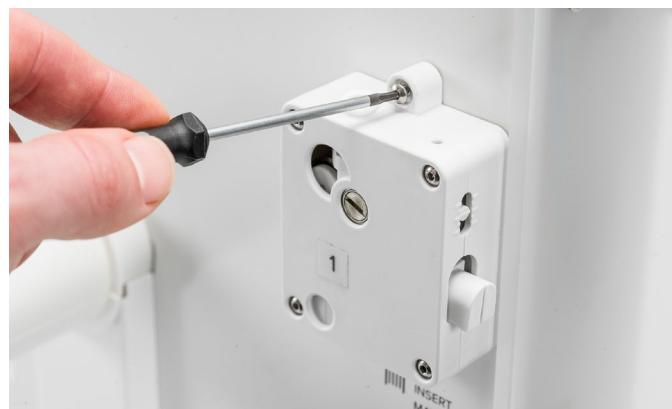
After many hours of printing, or when material has been ground down, there is a chance that there are small filament particles in the feeders. In addition to blowing out the particles once a month, it is recommended to also clean the inside of the feeders after one year of printing. In order to do this, the feeders have to be removed from the printer.



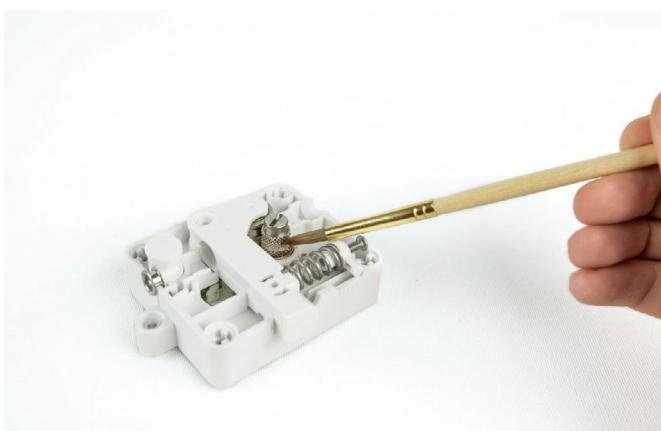
It is also recommended to replace the Bowden tubes after one year. While cleaning the feeders, follow the instructions to replace the Bowden tubes simultaneously.

The following steps need to be performed for both feeder 1 and feeder 2:

1. Remove the material by navigating to Material/PrintCore → Material [x] → Unload. After this, turn off the printer.
2. Remove the clamp clip from the feeder-end of the Bowden tube, press down on the tube coupling collet and pull the Bowden tube upwards out of the feeder.
3. Reduce the tension of the feeder by turning the bolt in the top of the feeder, until the indicator is at the highest mark.
4. Use the hex screwdriver to loosen the two bolts that hold the feeder to the back panel and slide the feeder backward away from the printer.



5. Open the feeder by removing the four bolts that hold the housing parts together. Place the two halves in front of you, making sure that all parts are in the back section of the feeder.
6. Use a clean cloth or a cotton swab to wipe all filament particles from the feeder parts. Use a paintbrush or an old toothbrush to clean the knurled wheel. Also clean the small gear attached to the feeder motor.
7. Apply a small amount of Magnalube to the gear attached to the feeder motor. There is no need to spread this out; the feeder will do this automatically when it turns.
8. Reassemble the feeder by placing the front section over the back section, making sure that all parts are still in place. Insert the four bolts and tighten them in a cross pattern, starting in the top-left corner.
9. Place the feeder back on the printer.
10. Insert the Bowden tube into the feeder by pressing down on the tube coupling collet in the feeder and pushing the Bowden tube all the way in. Secure the tube with the clamp clip.
11. Reset the tension of the feeder by turning the bolt in the top of the feeder, until the indicator is at the middle mark.



Replace the Bowden tubes.

The Bowden tubes guide the filament from the feeders to the print head.

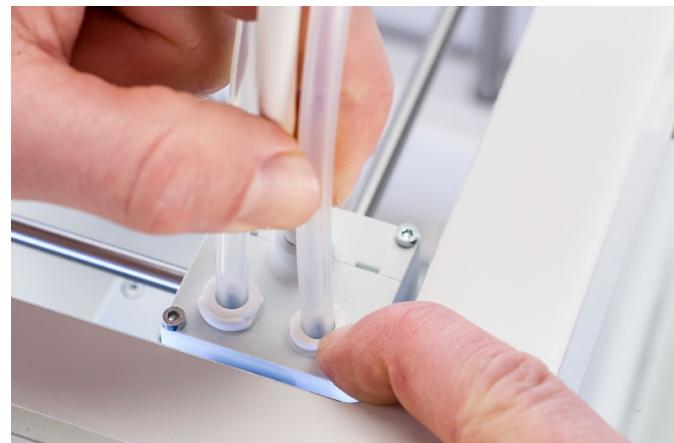
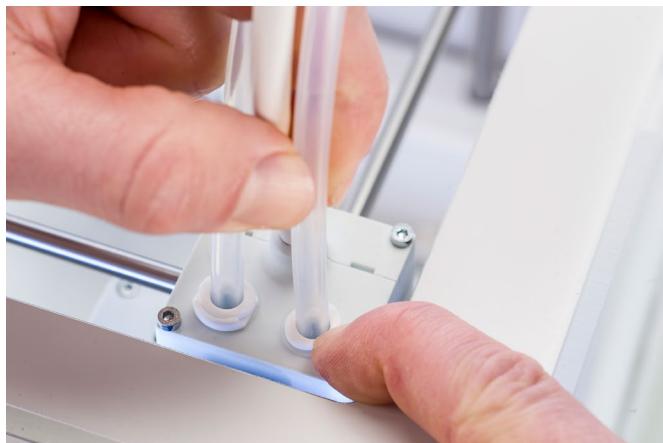
Forwarding improperly cut or ground down filament through the Bowden tube could scratch or damage the inside of the tube. If this happens, the filament can no longer be forwarded to the print head smoothly. This can lead to under extrusion or other print quality issues.

After removing a Bowden tube multiple times, the tube coupling collet can wear out. If this happens, the tube coupling collet will no longer have a firm hold on the Bowden tube. In this case, the Bowden tube will move up and down during prints which can negatively impact print quality.

If the Bowden tubes are permanently damaged, they need to be replaced. To maintain optimal print quality it is recommended to replace the Bowden tubes every year.

Disassembly

1. Remove the material by navigating to Material/PrintCore → Material [x] → Unload. After this, turn off the printer.
2. Place the print head in the front-right corner.
3. Use a fingernail to remove the clamp clips from the tube coupling collets at the print head and feeders.
4. Press down on the tube coupling collet in the print head and at the same time, pull the Bowden tube upwards, out of the print head. Repeat these steps for the feeder.
5. When removing the Bowden tube from Extruder 2 (right), loosen the four cable clips from the Bowden tube to remove it completely.



Reassembly

1. Take the new Bowden tube and note the two different sides. The side which is drilled should be inserted into the feeder. This allows easier access of the filament into the Bowden tube. The flat side should be inserted into the print head.
2. Insert the Bowden tube into the feeder by pressing down on the tube coupling collet in the feeder and pushing the Bowden tube all the way in. Secure the tube with the clamp clip.
3. Insert the Bowden tube into the print head by pressing down on the tube coupling collet in the print head and pushing the Bowden tube all the way in. Secure the tube with the clamp clip.
4. When replacing the Bowden tube from Extruder 2 (right), click the header cable clips onto the Bowden tube. Equally divide the clips over the Bowden tube.



7. Troubleshooting

There are a few printer specific issues that could occur while using your Ultimaker 3. If you run into one of these issues, you can troubleshoot it yourself with the help of the information on the next pages.

7.1 Error messages

This is the list with the most common error messages that can show up on the Ultimaker 3. For more information on troubleshooting these error messages please go to the error specific page on the Ultimaker website.

- An unspecified error has occurred. Restart the printer or go to ultimaker.com/ER11.
- Max temp. error on PrintCore {display_hotend_nr}. Go to ultimaker.com/ER12.
- Min temp. error on PrintCore {display_hotend_nr}. Go to ultimaker.com/ER13.
- Max temp. error on the build plate sensor. Go to ultimaker.com/ER14.
- Heater error on PrintCore {display_hotend_nr}. Go to ultimaker.com/ER15.
- The Z axis is stuck or the limit switch is broken. Go to ultimaker.com/ER16.
- The X or Y axis is stuck or the limit switch is broken. Go to ultimaker.com/ER17.
- There is a communication error with the print head. Go to ultimaker.com/ER18.
- There is an I2C communication error. Go to ultimaker.com/ER19.
- There was an error with the safety circuit. Go to ultimaker.com/ER20.
- There was a sensor error within the print head. Go to ultimaker.com/ER21.
- Active leveling correction failed. Manual level the build plate or go to ultimaker.com/ER22.
- An incorrect print temperature is specified. Go to ultimaker.com/ER23.
- An incorrect build plate temperature is specified. Go to ultimaker.com/ER24.
- The motion controller failed to be updated. Go to ultimaker.com/ER25.
- This print job is not suitable for this printer. Go to ultimaker.com/ER26.

If you encounter an error message that is not listed here, please go to the [Ultimaker website](#) for more information.

7.2 Print core troubleshooting

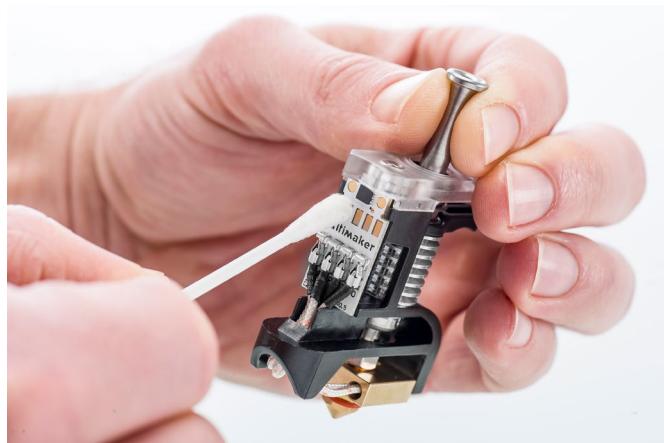
Clogged print core

If there is no material flowing from the print core for at least 10 minutes it could suggest that the print core got clogged due to some dirt or carbonized material. In this case, the print core should be cleaned by performing the hot and cold pull method.

Using the Ultimaker cleaning filament is the most effective way to clean and unclog a print core on the Ultimaker 3. If you don't have the Ultimaker cleaning filament at your disposal, you can use PLA. Take a look at chapter 6.11 Clean print cores for detailed instructions.

Print core not recognized

If a print core is not recognized by the Ultimaker 3, the printer will inform you about this. The main reason for this is dirty contact points on the PCB at the back side of the print core. When this happens, clean the contact points with a cotton swab and some alcohol.



7.3 Print quality issues

Poor build plate adhesion

When you experience problems with the adhesion of a print to the build plate, the following actions can be performed:

- Ensure that the correct material settings and adhesion method were used (see chapter 5.2 Materials).
- Re-calibrate the build plate manually and then do the active leveling (see chapter 5.8 Calibration).
- Check the Ultimaker Cura settings that were used, and try printing with one of the default Ultimaker Cura profiles.

Grinding PVA

Typically incorrect handling or storage of the material can lead to. PVA should be printed and stored at a low humidity to avoid problems while printing. We advise a humidity below 50% for storage and below 55% while printing. It is also recommended to keep the ambient temperature below 28 °C while printing. In a standard air conditioned office, this humidity and temperature should be easy to achieve.

When PVA is ground down by the feeder, there are three main causes.

- **Incorrect storage** PVA is a material that absorbs moisture relatively easily and therefore storing it correctly (resealable bag, with humidity below 50%) is important. If PVA absorbs too much moisture it will get soft and malleable/pliable and in some cases even sticky. This can cause problems in the feeder as it might not be able to forward the PVA properly anymore.
- **Coated Bowden tube** The Bowden tube can get coated on the inside due to incorrect printing conditions (mainly high humidity). If the humidity of the printing environment is too high (above 55%) and temperature is too high (above 28 °C) PVA might not be able to move easily through the Bowden tube. A solution for this is to clean the Bowden tube and dry it very well.
- **Clogged print core** High humidity can affect PVA quality, and lead to clogs in the print core. As a consequence, filament might get jammed, causing grinding in the feeder. When this happens, the print core should be cleaned by following the procedure described in chapter 6.11 Clean print cores.

For more information on how to resolve grinding issues, you can take a look at [this page](#).

Under-extrusion

In its simplest form, under-extrusion is when the printer is unable to supply the right amount of material. Your Ultimaker 3 is under extruding when you see missing layers, very thin layers, or layers that have random dots and holes in them.



Under-extrusion can have several causes:

- Use of low quality material or wrong material settings
- Feeder tension not set correctly
- Friction in the Bowden tube
- Small particles of material in the feeder or Bowden tube
- A partial clog in the print core

If your Ultimaker 3 is affected by under-extrusion, it is advised to take a look at [this page](#) for detailed troubleshooting instructions.

Warping

Warping occurs due to material shrinkage whilst 3D printing, which causes the corners of the print to lift and detach from the build plate. When plastics are printed, they firstly expand slightly but contract as they cool down. If material contracts too much, this causes the print to bend up from the build plate.



When your print is warping, make sure you have done the following:

- Level the build plate correctly (preferably active leveling)
- Apply a thin layer of glue to the glass plate
- Use the correct temperature settings
- Use one of the default Ultimaker Cura profiles

To troubleshoot this issue in more detail, take a look at the [Ultimaker website](#).

