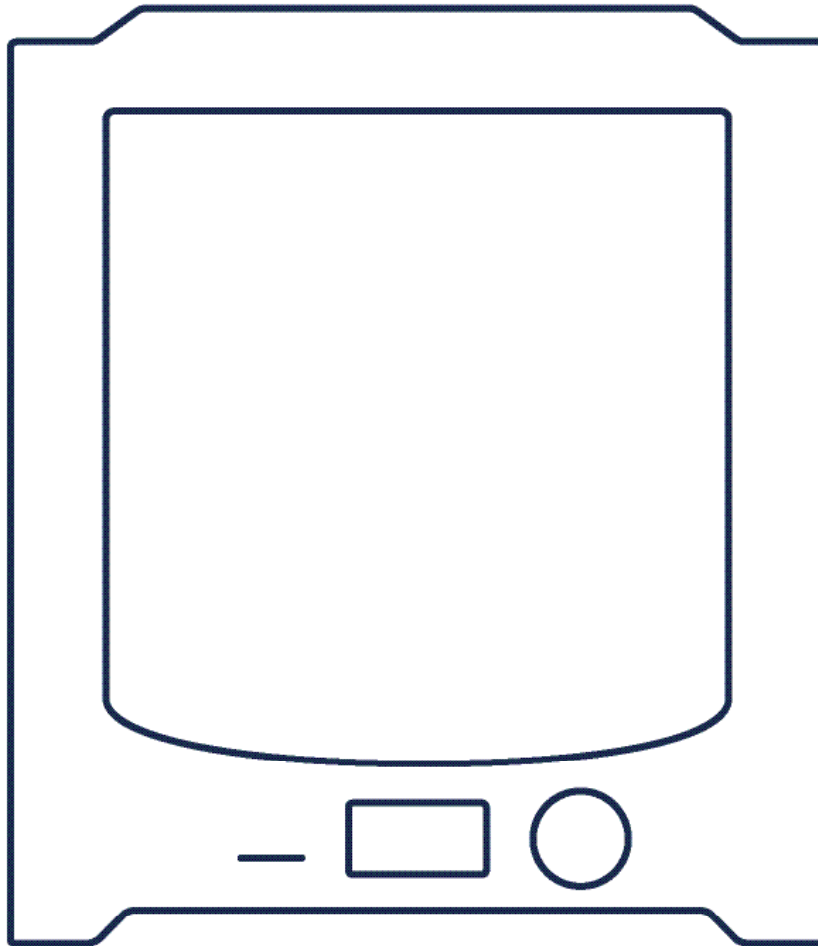


# Ultimaker<sup>2+</sup>

OUR MOST ADVANCED 3D PRINTER JUST GOT EVEN BETTER



## INSTALLATION AND USER MANUAL

Original manual V1.0

2016

# DISCLAIMER

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Please read and understand the contents of this installation and user manual. Failure to read the manual may lead to personal injury, inferior results or damage to the Ultimaker 2+. Always make sure that anyone who uses the 3D printer knows and understands the contents of the manual to make the most out of the Ultimaker 2+.

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 3D printers are designed and built for fused deposition modeling for various high quality plastics like PLA, ABS, CPE within a commercial/business environment. The mixture of precision and speed makes the Ultimaker 3D printers the perfect machines for concept models, functional prototypes and also the production of small series. Although we achieved a very high standard in the reproduction of 3D models with the usage of Cura, the user remains responsible to qualify and validate the application of the printed object for its intended use. While being an open filament platform the best results will be achieved with Ultimaker certified filament, while effort has been made in order to match material properties with machine settings.

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# PREFACE

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This is the installation and user manual for your Ultimaker 2+. The manual contains chapters about the installation, operation and maintenance of the Ultimaker 2+.

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 2+ 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 purport to be all inclusive and should 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.

---

# Ultimaker

## EC DECLARATION OF CONFORMITY

### FOR THE FOLLOWING

Product Models	3D-printer Ultimaker 2, Ultimaker 2 Extended, Ultimaker 2 Go, Ultimaker 2+, Ultimaker 2 Extended+
----------------	---

### MANUFACTURER

Ultimaker B.V.  
Watermolenweg 2  
4191PN Geldermalsen  
The Netherlands  
+31 (0)345 712 017  
Info@ultimaker.com

### YEAR OF AFFIXING CE MARKING: 2013

We hereby declare under our sole responsibility that the product above is in compliance with the essential requirements of the Machinery Directive (2006/42/EC), Electromagnetic Compatibility Directive (2004/108/EC), WEEE (2002/96/EC), RoHS (2002/95/EC), RoHS II (2011/65/EU) and Reach (1907/2006/EU)

By application of:

### STANDARD

EN ISO 12100: 2010  
EN 55022: 2011 Class A  
EN 55024: 2010  
EN 61000-4-2: 2009  
EN 61000-4-3: 2006 + A1: 2008 + A2: 2010  
EN 61000-4-4: 2004  
EN 61000-4-5: 2006  
EN 61000-4-6: 2009  
EN 61000-4-11: 2004

### TITLE

Safety of machinery  
Radiated Emissions Class A  
Radiation immunity  
Electrostatic discharge  
Radio-Frequency, Electromagnetic Field  
Electrical Fast Transient  
Immunity to surges  
Conducted Radio-frequency  
Voltage dips and interruptions

The technical documentation is kept at the Manufacturer's address.

For electrical safety aspects reference is made to the Mean Well EC-Conformity Declaration for the GS220AX power adaptors.

Siert Wijnia / CTO / Co-founder

Date of issue: 17-11-2015  
Place of issue: Geldermalsen



# 1

## SAFETY AND COMPLIANCE

It is very important to work safely with your Ultimaker 2+. This chapter is about safety and hazards. Please read all information carefully to prevent possible accidents and injuries.

# 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 you do not follow the safety instructions.

## GENERAL SAFETY INFORMATION

The Ultimaker 2+ generates high temperatures and has hot moving parts that can cause injury. Never reach inside the Ultimaker 2+ while it is in operation. Always control the Ultimaker 2+ with the button at the front or the power switch at the back. Allow the Ultimaker 2+ to cool down for 5 minutes before reaching inside.

Do not change or adjust anything on the Ultimaker 2+ unless the change is authorised by the manufacturer.

Do not store items in the Ultimaker 2+.

The Ultimaker 2+ is not intended for use by persons (including children) 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 Ultimaker 2+.



Always unplug the printer before performing maintenance or modifications.

# HAZARDS

---

## **ELECTROMAGNETIC COMPATIBILITY (EMC)**

For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

Note: 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 2+ operates on 24 volts (Extra-low-voltage) and is therefore outside the scope of the low-voltage directive. The power supply meets all CE mark regulations and is protected against short-circuit, overload, overvoltage and overtemperature. For more information concerning electrical safety aspects, please refer to the Mean Well EC-Conformity Declaration for the GS220AX power adapters. Only use the Ultimaker 2+ with power supplies and cables supplied by Ultimaker B.V.

## **MECHANICAL SAFETY**

The Ultimaker 2+ contains many moving parts, but the stepper motors do not have enough power to cause serious injuries and the moving gears have been covered. Still, it is advised to only reach in the machine when it is turned off.

## **RISK OF BURNS**

There is a potential risk of burns, as the print head can reach temperatures of up to 260°C and the heated bed can reach temperatures of up to 120°C. The nozzle of the print head is mostly surrounded by an aluminum cover to prevent contact, but we still advise against reaching into the machine when the print head and/or heated bed are hot.



Always let the printer cool down for at least 30 minutes before performing maintenance or modifications.

## **HEALTH**

The Ultimaker 2+ is designed to print with PLA and ABS filaments. The use of other materials is at your own risk.

When printing with ABS, small concentrations of Styrene vapor can be released. In some cases, this can cause headaches, fatigue, dizziness, confusion, drowsiness, malaise, difficulty in concentrating, and a feeling of intoxication. Therefore good ventilation is required, and long term exposure should be avoided. It is advisable to use a fume hood with active carbon filtering for ductless extraction. Fume extraction is mandatory for use in offices, classrooms, etc.

Printing with pure PLA is considered safe, although good 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

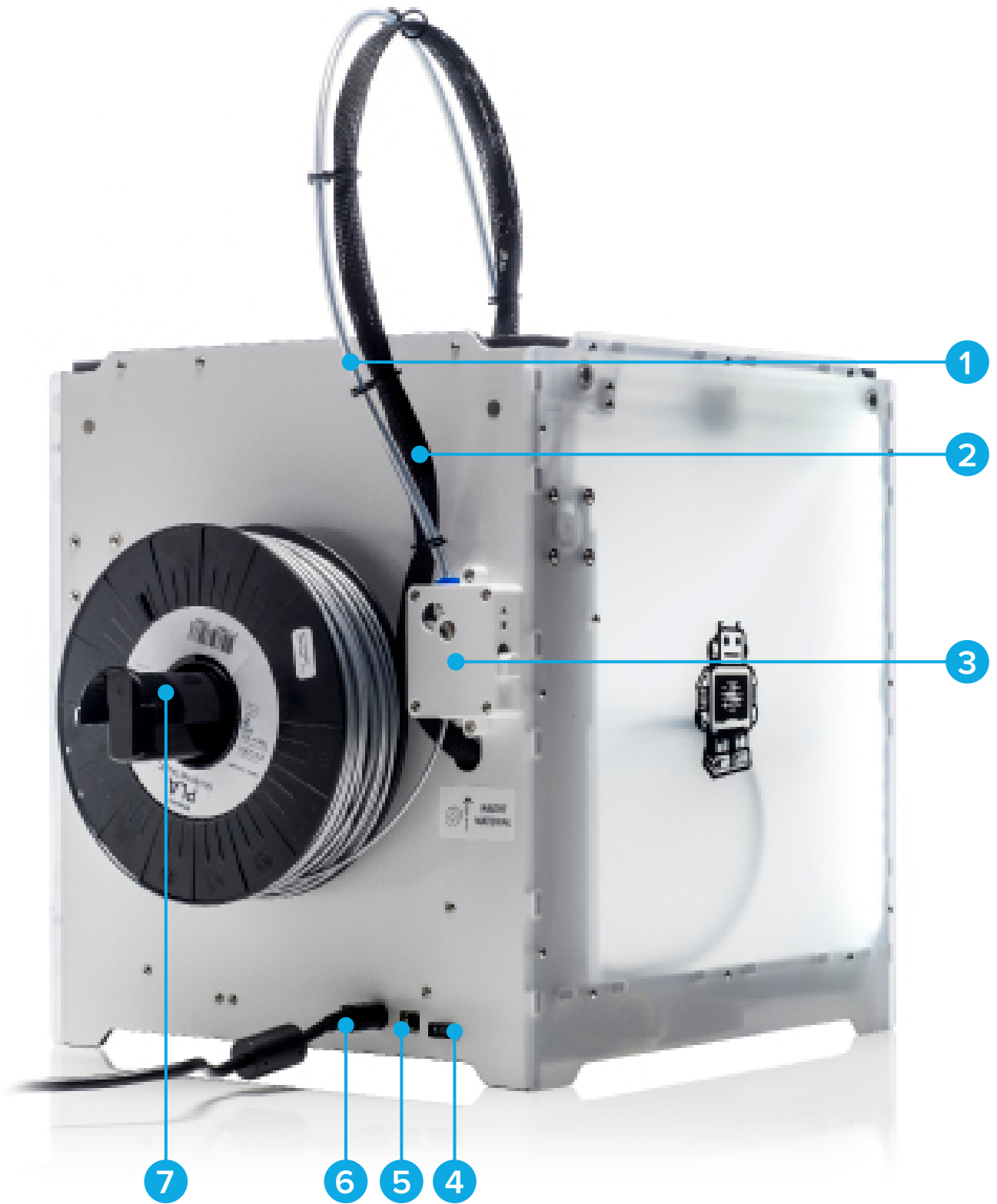
Meet your Ultimaker 2+, the 3D printer that produces high quality 3D prints.

# ULTIMAKER 2+ AT A GLANCE

---



- |               |                      |                      |
|---------------|----------------------|----------------------|
| 1 Build plate | 4 Print head cable   | 7 Display            |
| 2 Print head  | 5 Build plate clamps | 8 SD card slot       |
| 3 Bowden tube | 6 Push/rotate button | 9 Build plate screws |



- |                    |                   |                |
|--------------------|-------------------|----------------|
| 1 Bowden tube      | 4 Power switch    | 7 Spool holder |
| 2 Print head cable | 5 USB connector   |                |
| 3 Feeder           | 6 Power connector |                |

# SPECIFICATIONS

## PRINTER AND PRINTING PROPERTIES

Print technology	Fused Filament Fabrication (FFF)
Print head	Swappable nozzle
Build volume	223 x 223 x 205 mm
Filament diameter	2.85 mm
Layer resolution	0.25 mm nozzle: 150 to 60 micron
	0.4 mm nozzle: 200 to 20 micron
	0.6 mm nozzle: 400 to 20 micron
	0.8 mm nozzle: 600 to 20 micron
X, Y, Z accuracy	12.5, 12.5, 5 micron
Print head travel speed	30 to 300 mm/s
Extrusion speed	0.25 mm nozzle: up to 8 mm <sup>3</sup> /s
	0.4 mm nozzle: up to 16 mm <sup>3</sup> /s
	0.6 mm nozzle: up to 23 mm <sup>3</sup> /s
	0.8 mm nozzle: up to 24 mm <sup>3</sup> /s
Build plate	Heated glass build plate (20° to 100° C)
Supported materials	PLA, ABS, CPE, CPE+, PC, Nylon, TPU 95A (Open Filament System)*
Nozzle diameter	0.25, 0.4, 0.6, 0.8 mm
Nozzle temperature	180° to 260° C
Build plate temperature	50° to 100° C
Nozzle heat up time	~ 1 minute
Build plate heat up time	< 4 minutes
Average operating sound	50 dBA
File transfer	Standalone 3D printing from SD card
Build plate leveling	Manual, assisted leveling process

\*Ultimaker printers can be used with third party filament. However for the best printing results we recommend you use Ultimaker PLA, ABS or CPE.

## PHYSICAL DIMENSIONS

Dimensions (excluding bowden tube and spoolholder)	357 x 342 x 388 mm
Dimensions (including bowden tube and spoolholder)	493 x 342 x 588 mm
Nett weight	11.3 kg
Shipping weight	18.5 kg

## POWER REQUIREMENTS

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

## AMBIENT CONDITIONS

Operating ambient temperature	15° to 32° C
Nonoperating temperature	0° to 32° C

## SOFTWARE

Print preparation	Cura - Official Ultimaker Software (free) (prepared for nozzle size selection)
Supported OS	Mac OS X, Windows, Linux
Supported file types	STL, OBJ, DAE

# 3

## UNPACKING AND INSTALLATION

Carefully unpack your Ultimaker 2+ and set it up according to the instructions in this chapter.

# UNBOXING

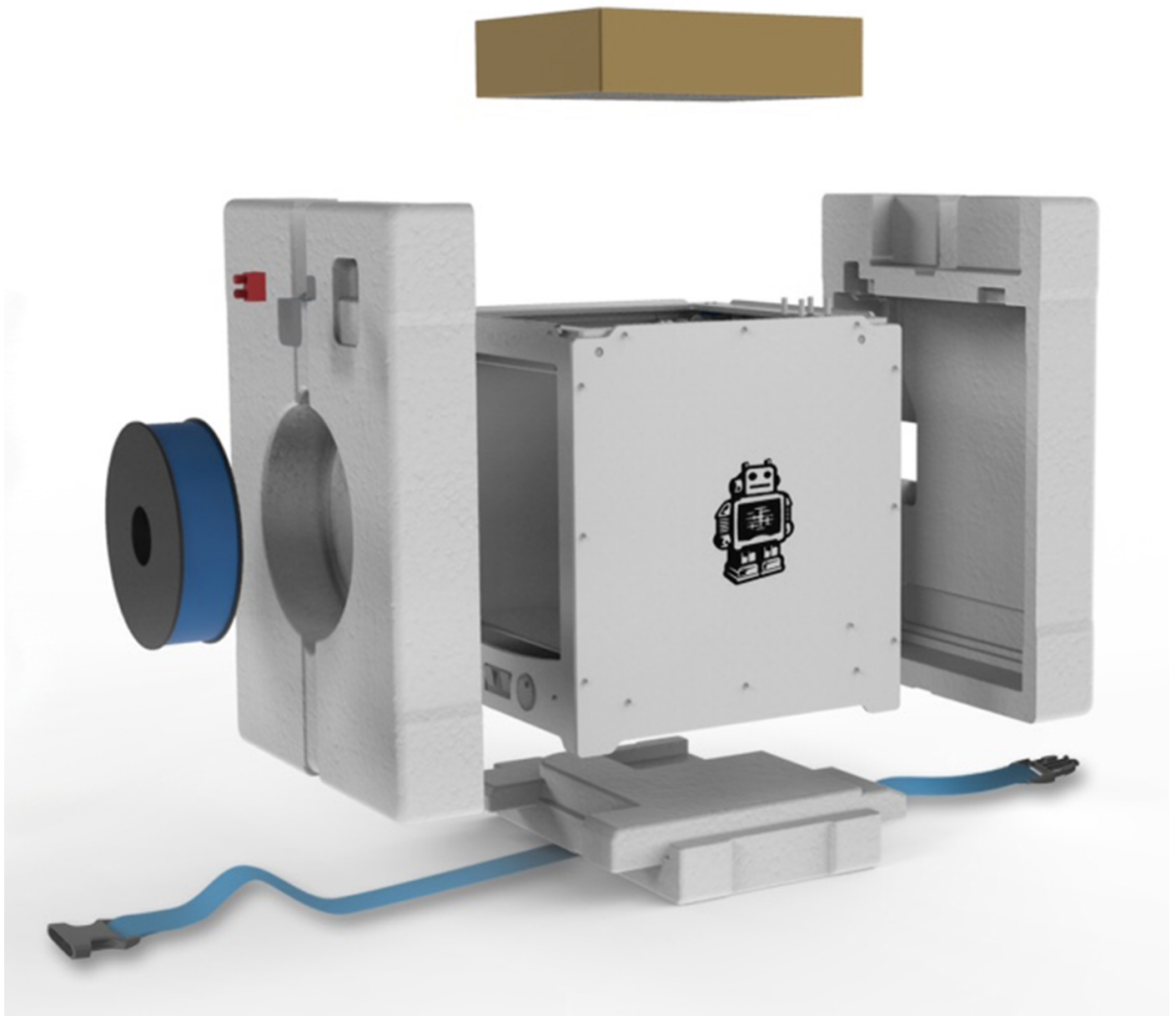
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The Ultimaker 2+ comes in reusable, durable packaging, specially designed to protect your Ultimaker 2+. Follow the steps below to unpack your Ultimaker 2+.

- 1 Open cardboard box, grab the belt and careful pull the Ultimaker 2+ out of the box.
- 2 Loosen the belt and take out the accessory box.
- 3 Take the spool with PLA filament and a test print done on your Ultimaker 2+ out of the foam.
- 4 Remove the foam packaging.
- 5 Place the Ultimaker 2+ on a flat surface.
- 6 Lift the build plate and remove the packaging material under the plate.
- 7 Cut the zip tie that secures the print head.



Hold the Ultimaker 2+ by the frame and do not hold it by the belts or axes while carrying it.



## THIS IS INCLUDED

The Ultimaker 2+ is supplied with an SD card in the 3D printer and several other accessories. Check if all these accessories are included before continuing.



- 1 0.75 kg filament
- 2 Power supply and cable
- 3 Glass plate
- 4 USB cable
- 5 Nozzle kit
- 6 Glue stick
- 7 Grease
- 8 Calibration card
- 9 Hex wrenches (1.5 mm, 2 mm, 2.5 mm)
- 10 Test print
- 11 Glass plate

# INSTALLATION

---

To install the Ultimaker 2+:

## PLACING SPOOL HOLDER

1. Take the spool holder and insert the top part in the hole at the back of the Ultimaker 2+.
2. Push the spool holder down until it snaps into place.



## PLACING GLASS PLATE

1. Open up the two build plate clamps at the front of the build plate.
2. Gently slide the glass plate onto the build plate and make sure 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.





---

## CONNECTING POWER SUPPLY

1. Connect the power cable to the power brick.
2. Plug the power cable into a wall socket and connect the other side of the power supply to the Ultimaker 2+. The flat side of the cable needs to point upwards.



Before connecting, make sure the power switch is in the “off” position. Only use the power supply that came with your Ultimaker 2+.

# 4

## OPERATION

After the installation, it's time to turn on your Ultimaker 2+ and start printing. This chapter provides information about the display, first use, how to level the bed, how to load and change the filament, the Cura software and how to change nozzles.

# DISPLAY AND CONTROLLER

---

The display at the front side of the Ultimaker 2+ shows all the necessary information for setting up and using your Ultimaker 2+. You can navigate through menus by rotating and/or pushing the button at the right side of the display. Rotate to select or control an action; push to confirm an action. When pushing the button you will hear a “beeping” sound to confirm the action. A blinking button means the Ultimaker 2+ is waiting for user input.

When turning on your Ultimaker 2+ 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” and “Maintenance”.

## PRINT

The “Print” menu allows you to select one of the print files from the SD card. Press the button to start.

## MATERIAL

In the “Material” menu, you can either change the filament on your Ultimaker 2+ or change the settings of material profiles. When selecting “Change”, the Ultimaker 2+ will start the procedure as described in “LOADING AND CHANGING FILAMENT” on page 22. In the “Settings” menu, you can select material profiles and change their settings in the “Customize” menu.

## MAINTENANCE

The “Maintenance” menu offers various options. By selecting “Build plate” you will be guided through the bed leveling steps. In the “Advanced” menu, several options can be selected in order to perform certain actions manually or change machine settings. These are the options:

- LED settings Change the settings of the LED lights in your Ultimaker 2+.
- Heatup nozzle Set custom temperature to manually heat up the nozzle.
- Heatup buildplate Set a custom temperature to manually heat up the heated bed.
- Home head Homes the head in the left back corner of the Ultimaker 2+.
- Lower buildplate Moves the build plate to the bottom of the Ultimaker 2+.
- Raise buildplate Moves the build plate to the top of the Ultimaker 2+.
- Insert material Heats up the nozzle after which you can insert filament.
- Move material Heats up the nozzle after which you can use the scroll wheel to forward the material.
- Set fan speed Set the speed of the two fans at the sides of the print head.
- Retraction settings Customize the settings for retraction.
- Version Shows the current firmware version on the Ultimaker 2+.
- Runtime stats Shows for how much time the Ultimaker 2+ has been on and printing.
- Factory reset A complete reset of your Ultimaker 2+ through which you can completely recalibrate it.

## FINE-TUNING

You can fine-tune the settings during the printing process. This allows you to get full control over the printing process and helps you achieving the best print results. You can do this by accessing the “Tune” menu during printing. The “Tune” menu basically shows you the same settings as in the “Advanced” menu, which means that you can change settings such as the temperature and speed of printing. Furthermore, it is possible to select “Pause”, after which you can change the filament in the middle of a print and resume again.



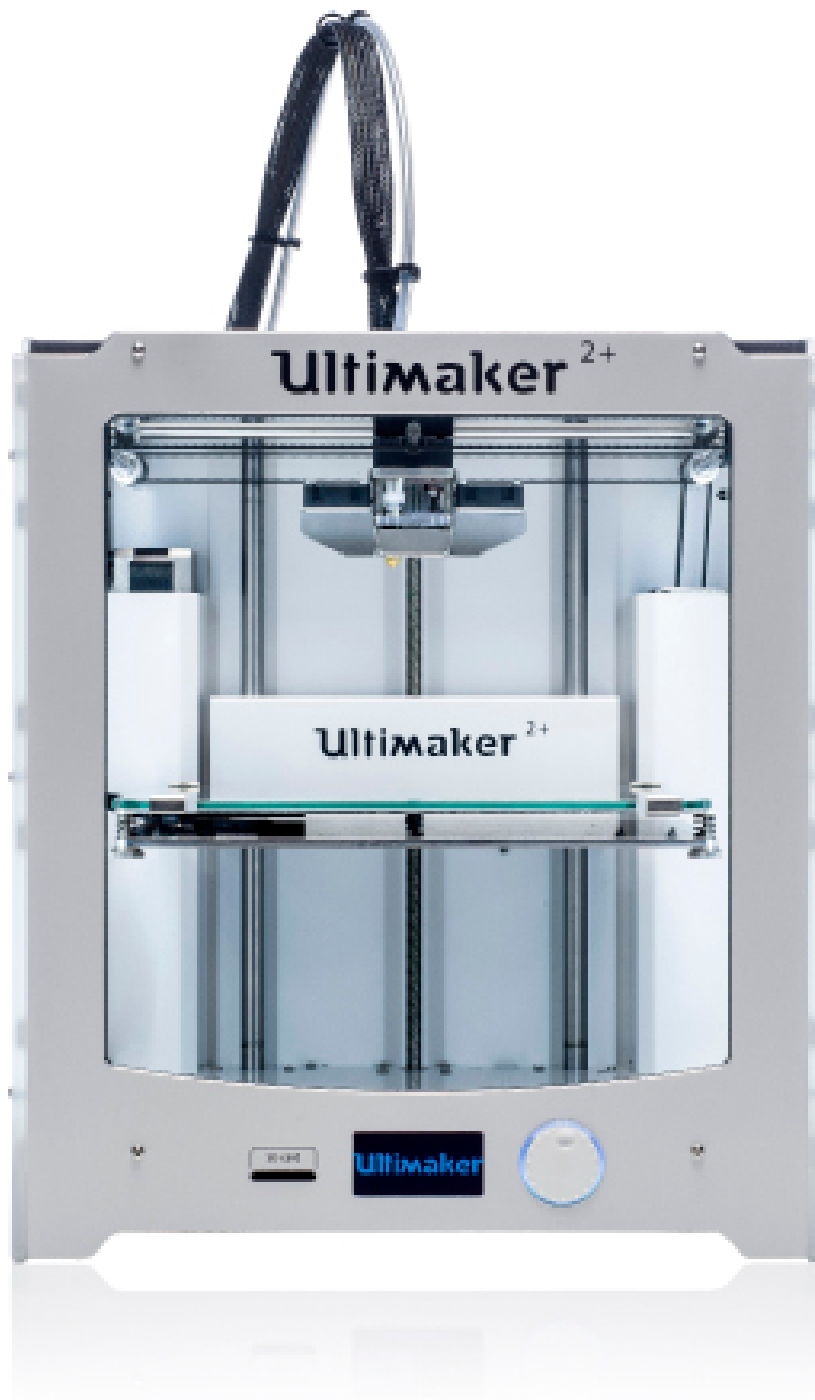
# FIRST USE

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When you turn on the Ultimaker 2+ for the first time, the display shows “Welcome”. The Ultimaker 2+ will guide you through some steps for calibrating the build plate. Follow the instructions shown in the display. The Ultimaker 2+ will do the “homing” first. This means that it will move the print head to the left back corner and the build plate towards the bottom, in order to set the origin point. After this, you can start the bed leveling.



If you do not see the configuration wizard, navigate to “Maintenance” > “Advanced” and confirm “Factory reset”.



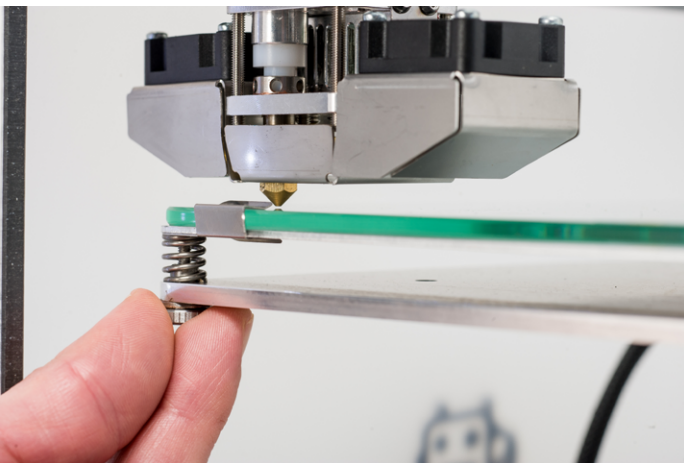
# BED LEVELING

For printing it is very important that the first layer is nicely squished into the glass plate and sticks well. If the distance between the nozzle and build plate is too big, your print will not stick properly to the glass plate. On the other hand, if the nozzle is too close to the build plate, it can prevent the filament from extruding from the nozzle. To get the correct distance between the build plate and the nozzle, you need to level the build plate. You must do that before using the Ultimaker 2+ for the first time and then periodically.

Always re-level the build plate when you notice that the plastic is not equally placed on the glass plate. After transportation of your Ultimaker 2+, it is also advised to re-level the build plate to ensure your 3D prints stick well to the build plate.

To level the build plate:

1. Go to “Maintenance” > “Build plate” to start the bed leveling process. (When using the Ultimaker 2+ for the first time, you can skip this step).
2. Wait for the Ultimaker 2+ to do 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 nozzle and the build plate. Make sure that the nozzle is close to the build plate without touching it.
4. Adjust the front left and front right build plate screw to roughly level the build plate at the front side. 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.
6. Adjust the build plate screws on the front left side, front right side and the middle of the back until you feel slight friction when moving the card.
7. Press “Continue”. The print head moves to the second point
8. Repeat step 4 “place the calibration card” and step 5 “adjust the build plate”.
9. Press “Continue” again. The print head moves to the third point.
10. Repeat step 4 “place the calibration card” and step 5 “adjust the build plate”.



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

# LOADING AND CHANGING FILAMENT

## LOADING

To load the filament:

1. Place the spool with the filament on the spool holder. Make sure to put it with the filament in counter-clockwise direction, so that the filament can enter the feeder from the bottom. Straighten the filament a bit so it can easily enter the feeder.
2. Wait a minute while the print head heats up. Heating up ensures that the filament melts when it goes through the nozzle.
3. Insert the end of the filament into the bottom of the feeder and push it until the filament is grabbed by the feeder.
4. Wait until the filament reaches the first black bowden tube clip and then press the button to continue. The Ultimaker 2+ will automatically load the filament through the bowden tube, into the print head.
5. Wait until the filament comes out of the nozzle.



Ensure that you do not touch the nozzle end during this procedure as it will become hot.



Ensure that the switch button on the right side of the feeder is in the middle. Then the tension on the feeder is set correctly.

Don't be surprised if the filament that initially comes out of the nozzle is not the color you expect. There is probably some residue from the test print left in the nozzle. Wait until you see the color of the filament that you loaded coming out of the nozzle.

## CHANGING

If you want to switch between different (colors of) materials, you first need to unload the filament that is already in the Ultimaker 2+, after which you can insert the new filament.

To remove the old filament:

1. Go to “Material” > “Change” in the main menu.
2. Wait a moment while the print head is heating up. Heating up the print head ensures that the filament melts when it goes through the nozzle.
3. When the nozzle is hot, the Ultimaker 2+ will automatically start turning the feeder wheel, through which the filament will be rewind completely. If the filament doesn't come out of the feeder completely, you can pull it out by hand.
4. Load the new filament as described above.

# STARTING A PRINT

---

## STARTING A PRINT

When the build plate has been leveled and the filament has been loaded, you can start your (first) print. We've placed some print files on the SD card to start with. Simply select one of the files and press the button to start.

After a print file has been chosen, the Ultimaker 2+ will prepare itself by homing the print head and build plate and heating up the build plate and nozzle. Please note that this can take up to 5 minutes.

While printing, the display will show the progress of the print and the remaining time for completion. When the print has finished, wait for the build plate to cool down and grab the print from the build plate.



Do not touch the print head/nozzle while it is heating, printing or cooling down. Temperatures can reach up to 260°C.



For good platform adhesion it is recommended to apply a thin layer of glue to the glass plate. For this, you can use the glue stick delivered with the Ultimaker 2+. Refer to "USING GLUE" on page 25 for detailed instructions.

# CURA SOFTWARE

---

For the Ultimaker 2+, we recommend our free Cura software to prepare your 3D print files. Cura quickly and accurately converts 3D models into 3D print files within seconds, showing you a preview of the print so you can be sure everything is as you would like it to be.

## INSTALLATION

The Cura software can be found at [www.ultimaker.com/software](http://www.ultimaker.com/software). After downloading, open the installer and run the installation wizard to complete the installation. When opening Cura for the first time, you will be asked to select your 3D printer, the Ultimaker 2+. No other configuration is required and you can directly start using Cura.

## USING CURA

To convert a 3D model to a print file in Cura:

1. Load a 3D model (STL, OBJ, DAE or AMF file) into Cura via the “Load” button.
2. Choose your desired settings and wait for Cura to slice the model.
3. After Cura has converted the file, save the print file (GCode) via the “Save” button. If the SD card has been inserted, it will directly save the file to the SD card.
4. Remove the SD card from your computer - make sure to remove it safely - and insert it into your Ultimaker 2+ to start printing.



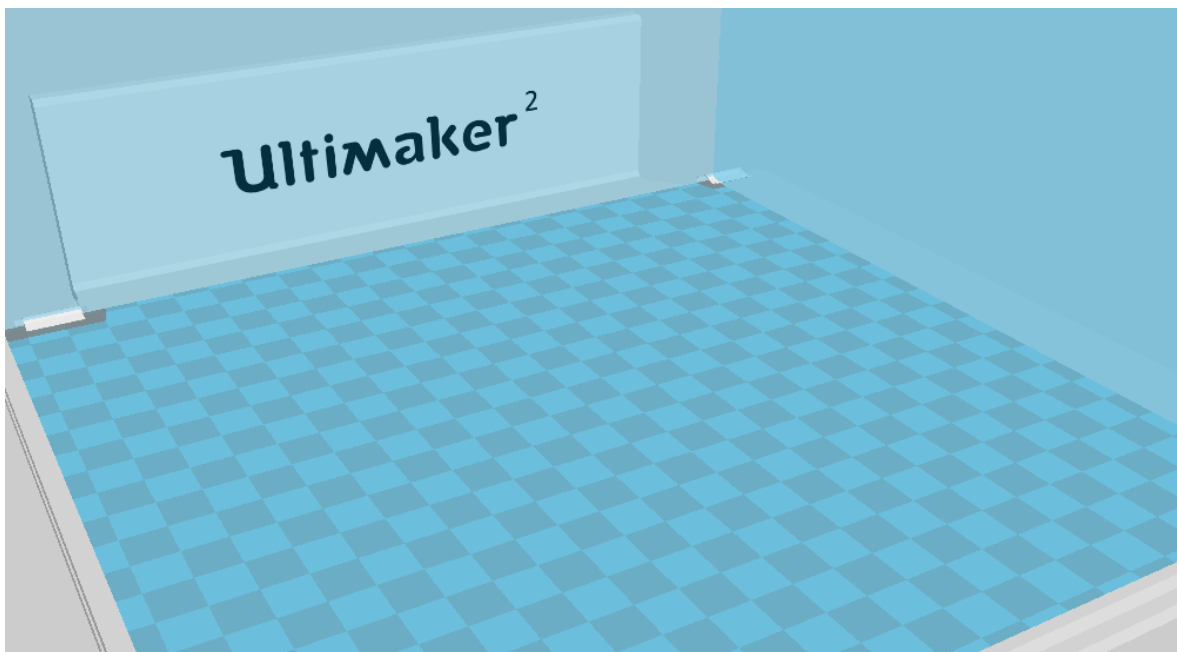
When using Cura for the first time, you will see the “Quickprint” profiles. This is perfect for beginners, but when you’re a more experienced user and want to have more control over the print settings you can also switch to the “Advanced” mode. For more information on using Cura, see the Cura support pages: [www.ultimaker.com/support/software](http://www.ultimaker.com/support/software)

## UPDATING FIRMWARE

Periodically, a new Cura version is released, including a new firmware version. Make sure to install the latest version of Cura and firmware once available in order to stay up to date. The latest version of Cura can always be found at [www.ultimaker.com/software](http://www.ultimaker.com/software).

To install the latest firmware on your Ultimaker 2+:

1. Connect the Ultimaker 2+ to your computer with the USB cable.
2. Connect the power supply and turn on the Ultimaker 2+.
3. Start Cura and go to “Machine” > “Install default firmware” (make sure the Ultimaker 2+ is selected in the “Machine” menu). Cura will now automatically upload the latest firmware to your Ultimaker 2+.





# USING GLUE

---

## USING GLUE

Although the heat of the heated bed already ensures the adhesion of your print to the glass plate, this is not always enough. For even better adhesion, in some cases it is desired to use glue on the glass plate as well.

## WHEN TO USE GLUE?

The use of glue depends on the material you are using and the size and shape of the model.

For ABS and CPE, we recommend always using glue, because these materials have more “warping”. This means that the plastic will curl up. Warping basically happens because of the properties of the plastic. Plastics have the tendency to shrink when cooling down fast (some plastics more than others), which could eventually lead to your print curling up at the corners. Since ABS and CPE have a relatively big shrinkage, you will need glue to prevent it from warping.

PLA on the other hand, has a much lower shrinkage and thus less warping. Because of this, it's often possible to print PLA directly on the glass plate, without glue. In this case you need to make sure that the glass plate is completely free from dust and oil though, because plastic won't stick well to a greasy surface. There are however situations in which glue on the glass plate is desired. If you want to print a model that has a big footprint, or with very thin parts at the bottom it's advised to use glue to prevent it from getting loose.

## HOW TO USE?

The glue stick that was delivered with your Ultimaker 2+ can be used for the glass plate. To use glue, simply put a thin, even layer on the glass plate. It is only necessary to apply glue to the print area.



To better distribute the glue over the platform, you can use a damp cloth. This way a very thin layer of glue will be left on the glass plate.



# CHANGING NOZZLES

---

A Nozzle Kit is supplied with the Ultimaker 2+. This kit contains three nozzle sizes (0.25 mm, 0.6 mm and 0.8 mm). The 0.4 mm nozzle is already installed on the Ultimaker 2+.

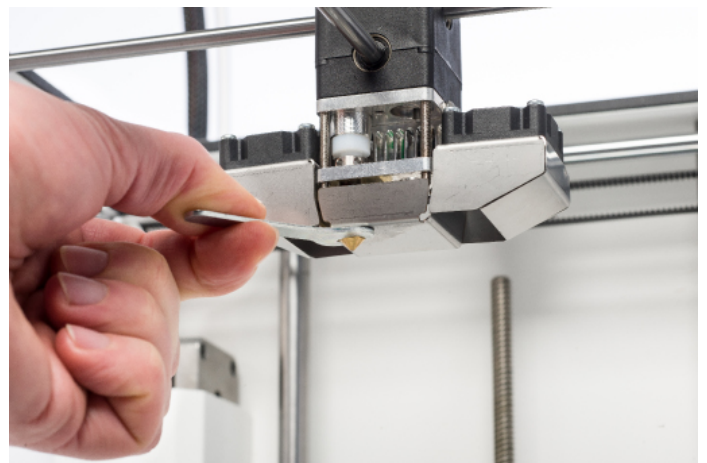
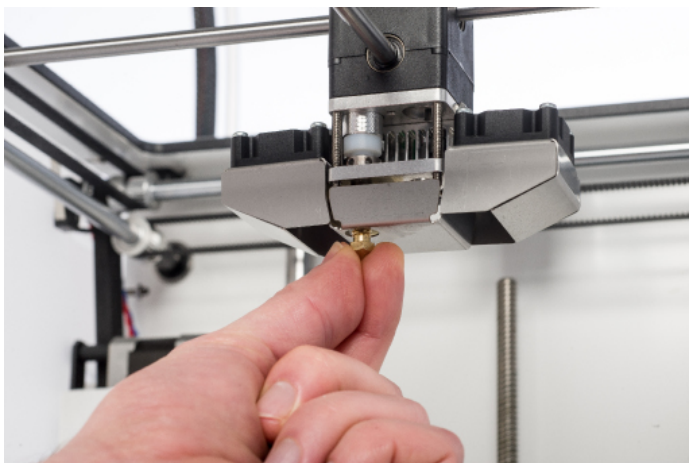
To replace the nozzle:

## REMOVING THE CURRENT NOZZLE

1. Remove the filament from the Ultimaker 2+ (via the “Material” > “Change” menu). See “LOADING AND CHANGING FILAMENT” on page 22.
2. Perform the Atomic Method before removing the currently installed nozzle. This minimizes the amount of leftover plastic that is locking down the nozzle and makes removal easier. It also cleans out that nozzle prior to storage, ensuring that no filament residue remains in the nozzle that may affect future prints. See “ATOMIC METHOD” on page 31.
3. Leave the temperature set to the last temperature that was used for pulling out the filament during the Atomic Method. (e.g. 90 degrees Celcius for PLA).
4. Use the wrench to unscrew the nozzle from the heater block. To unscrew it, you have to turn it counter-clockwise.

## INSTALLING A NEW NOZZLE

1. Select the desired nozzle and screw it manually into the heater block until hand-tight. Be careful, the heater block is still warm.
2. Use the wrench to tighten the nozzle completely. Turn it clockwise and don't use too much force (if you tighten it too much, it can break).



## SETTING UP IN CURA

Before being able to print with the newly installed nozzle, the setting in Cura needs to be changed. Enter the size of your installed nozzle, in millimeter, in the “Nozzle size” field.

# 5

## MAINTENANCE

In order to have a smoothly working Ultimaker 2+, it is important to maintain it correctly. This chapter describes the most important maintenance tips. Read them carefully in order to achieve the best results with your Ultimaker 2+.

# GLASS PLATE

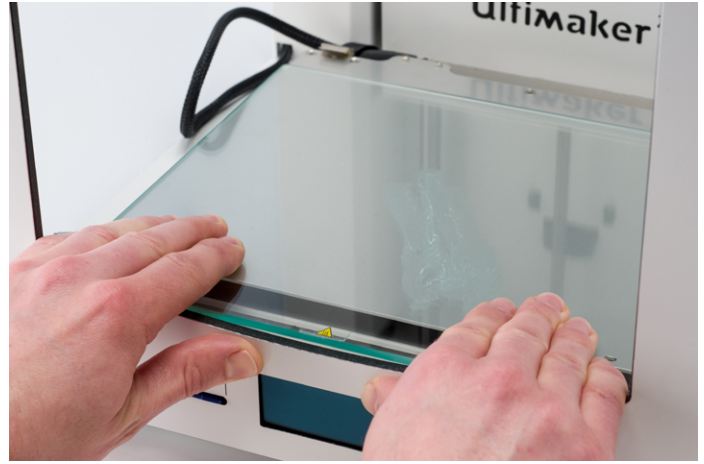
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## CLEANING THE GLASS PLATE

After a lot of printing, there might be too much excess glue stuck to the glass plate. This can cause an uneven print surface and it is therefore recommended to clean the glass plate once in a while. When doing this, always make sure that the Ultimaker 2+ is turned off and build plate has cooled down.

To clean the glass plate:

1. Move the build plate manually to the bottom of the Ultimaker 2+. This way possible damage on the print head or Z trapezoidal leadscrew is prevented.
2. Open up the build plate clamps at the front side.
3. Slide the glass plate to the front of the build plate until you can take it out of the Ultimaker 2+.
4. Remove any excess glue with some warm water and a cloth. If necessary, you can also use some soap to clean it.
5. Slide the glass plate onto the build plate until it snaps into place at the back of the build plate.
6. Close the build plate clamps at the front side by hand in order to secure it.



The glass plate is positioned on an electrical heating area, so make sure it is completely dry before placing it back.



To ensure a successful next print, we recommend to re-level the build plate after repositioning repositioned the glass plate.

# THE FEEDER

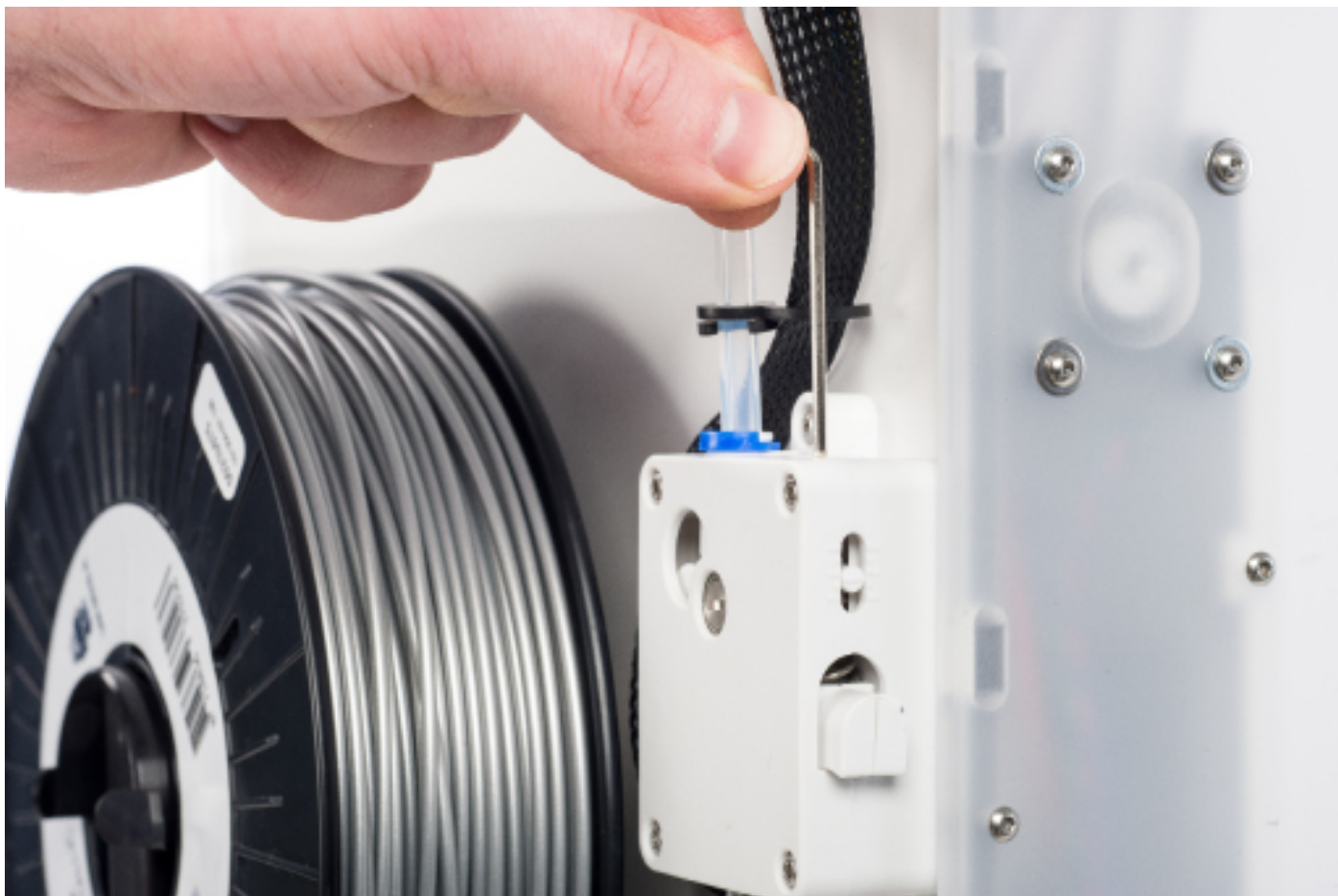
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Using the feeder in the right way and keeping it clean is important for a good extrusion. These are tips to maintain the feeder.

## FEEDER TENSION

In order to guide the filament properly through the feeder into the bowden tube and print head, it is important that the tension on the feeder is set correctly. If the tension is too high, it means that the knurled wheel of the feeder will dig into the filament, through which it flattens or gets stuck. This is called grinding.

To prevent grinding of the filament, ensure that the white insert clip at the right side of the feeder is set in the middle.



# LUBRICATING THE AXES

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To maintain your Ultimaker 2+ correctly and keep it running smoothly, it is recommended to lubricate the axes periodically.

## X AND Y AXES

When you notice small ridges on the surfaces of your 3D printed objects or feel that the X and Y axes are dry, it is advised to put a single drop of sewing machine oil onto the X and Y axes. This will help your Ultimaker 2+ to run smoothly. Sewing machine oil is not included in the Ultimaker 2+ package, but we highly recommend using only this to lubricate the X and Y axes.

## Z TRAPEZOIDAL LEADSCREW

Once every 6 months, the Z trapezoidal leadscrew has to be lubricated with Magnalube. This is the green grease that was delivered with your Ultimaker 2+. Spread 10 drops of grease over the entire threaded rod. With your next print, the Ultimaker 2+ will lubricate the axis by moving up and down.



Magnalube should be applied to the Z trapezoidal leadscrew only; do not put it on any of the other axes.



# ATOMIC METHOD

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After longer use of your Ultimaker 2+, you might notice that it cannot extrude enough plastic anymore. This so called under extrusion is usually shown by very thin or missing layers in a print. In most cases, it is caused by some dirt or carbonized material in the nozzle or another hot end part through which a (partial) blockage is created. When under extrusion appears, it is recommended to use the Atomic Method in order to clean the nozzle and other hot end parts. Below, the steps of this method are described.



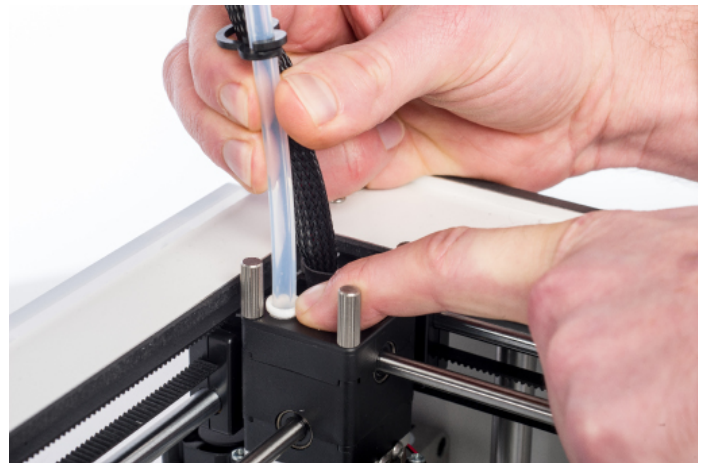
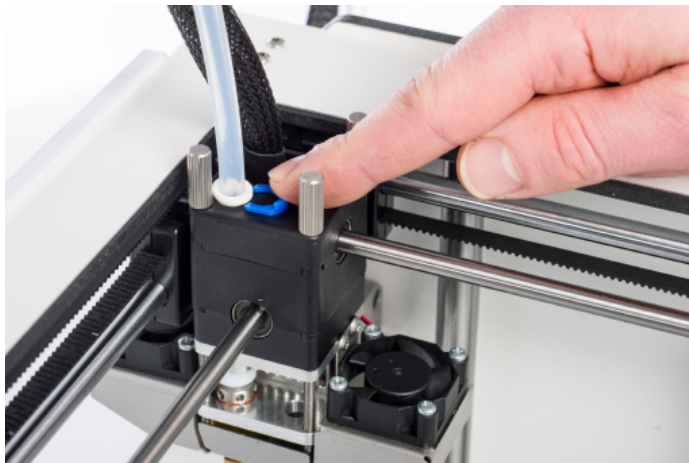
It is also advised to use the Atomic Method when switching from a material that needs a higher printing temperature to one that uses a lower printing temperature in order to make sure any residue from the previous filament is removed.

## REMOVING THE FILAMENT

1. Go to “Material” > “Change” in order to remove the filament. Instead of inserting new material, select “Cancel”.

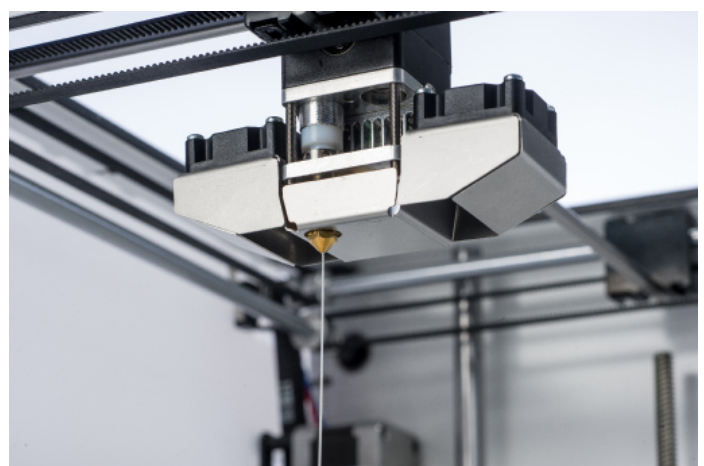
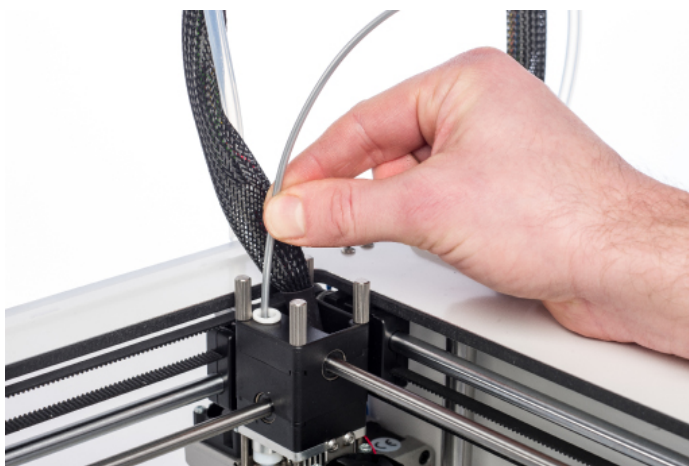
## REMOVING THE BOWDEN TUBE

1. Remove the (blue or red) clamp clip.
2. Press down the tube coupling collet and pull the bowden tube out of the print head.



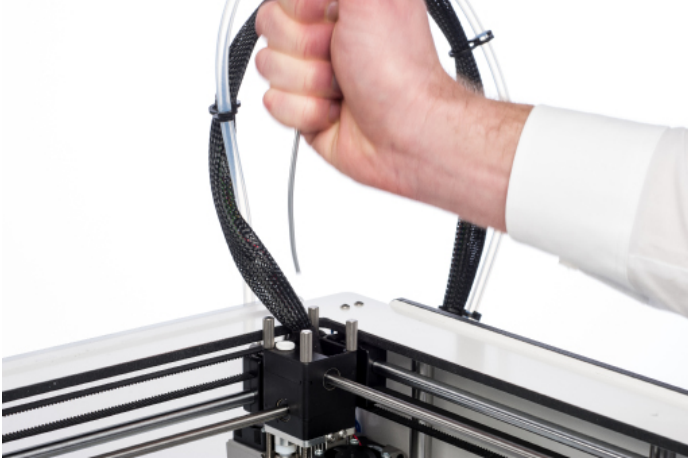
## HEATING UP AND PREPARING

1. Go to “Maintenance” > “Advanced” > “Heatup Nozzle” and set the temperature to 260 degrees.
2. Cut off approximately 20 cm of filament with a straight cut and try to straighten the filament as much as possible.
3. When the temperature is reached, insert the straightened piece of filament manually all the way down to the nozzle.
4. Push it slightly until either the new filament comes out of the nozzle or until the filament cannot be pushed any further.



## REMOVING THE NEW FILAMENT

1. Lower the temperature to 90 degrees (for PLA) or 110 degrees (for ABS).
2. Pull the filament out with a quick, firm pull, once the temperature has been reached.
3. Check the color and shape of the tip of the filament; the goal is to have a clean, cone-shaped tip.
4. Repeat “heating up and preparing” and “removing the new filament” until the filament comes out without any residue and has a cone-shaped tip.



## RE-ASSEMBLING

1. Insert the bowden tube through the tube coupling collet all the way down into the TFM coupler.
2. Place the clamp clip around the tube coupling collet so that it secures the bowden tube.





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## HELP & SUPPORT

There are a few printer specific issues that could occur while using your Ultimaker 2+. If you run into one of these issues, you can troubleshoot the issue yourself with help of the information on the next pages.

Of course, we also have local support teams in case you need personal support.

# TROUBLESHOOTING

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This chapter describes the most common issues and how to fix them. The next page gives an overview of possible error messages on the Ultimaker 2+. For more instructions, visit our website: [www.ultimaker.com/support](http://www.ultimaker.com/support).

## EXTRUSION PROBLEMS

Extrusion problems can have several reasons. The nozzle could be blocked, so no material can come out. It could also mean that the Ultimaker 2+ does not extrude enough plastic, leading to very thin or missing layers in a print. This is called “under extrusion”.

In most cases, extrusion problems are caused by some dirt or carbonized material in the nozzle (or another hot end part) through which a (partial) blockage is created. In order to solve this you can:

- Check if the filament has not grinded in the feeder. If it did, remove it from the machine first.
- Ensure that the white insert clip to set the tension on the feeder is in the middle.
- Try manually to extrude some material by using the ‘Move material’ option in the Advanced menu. You can put some extra force on it by manually pushing the material at the feeder while doing this.
- Use the Atomic Method to remove any dirt or carbonized material from the hot end.

After having used the Ultimaker 2+ for a longer time, it could also mean that the TFM coupler has deformed, causing friction to the filament. This consumable item has the tendency to wear over time due to the heat and pressure from the hot end. If none of the above described options works, it is advised to take a closer look at the TFM coupler. A deformed TFM coupler can be recognized by a (small) brim on the inside at the bottom.

## CANNOT CONNECT TO CURA

If Cura does not recognize your Ultimaker 2+ when you want to upload firmware, there is a problem with the connection due to software or hardware failure. In order to solve this you can:

- Make sure everything is connected properly (power supply and USB cable) and that the Ultimaker 2+ is turned on when uploading firmware. You can also try another USB cable.
- Check if the latest version of Cura is installed on your computer.
- Try connecting to a different computer, preferably with a different operating system.

## PRINT NOT STICKING TO BUILD PLATE

When prints do not stick to the build plate, a few things could be wrong. It could either mean that the first layer does not stick well enough or that the prints gets loose due to “warping” of the plastic. Warping basically happens because of the properties of the plastic. Plastics have the tendency to shrink when cooling down fast (some plastics more than others), which could eventually lead to your print curling up (at the corners). You will especially notice this behavior when printing ABS, which has a relatively big shrinkage.

In order to decrease the amount of warping and have a good first layer you can:

- Check if the heated bed is set to the correct temperature (60 °C for PLA and 90 °C for ABS).
- Make sure that the build plate is properly leveled.
- Clean the glass plate completely.
- Apply a thin layer of glue to the glass plate.
- Use the “Brim” feature in Cura to prevent warping. “Brim” will place a single layer thick flat area around your object, thus creating a bigger adhesion surface.

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## ERROR MESSAGES

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### ERROR - STOPPED TEMP SENSOR

This refers to a problem with the PT100 B sensor, which is the sensor that measures the temperature of the nozzle. It means that the sensor registers incorrect values and due to safety reasons it will prevent the nozzle from heating up. The most likely reason for this is connection problem, which could either happen due to a bad connection at the main board or damage of the sensor itself.

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### ERROR - STOPPED TEMP SENSOR BED

This error refers to a problem with the sensor of the heated bed. It means that the sensor registers incorrect values and due to safety reasons it will prevent the heated bed from heating up. The most likely reason for this is connection problem, which could happen due to a bad connection on the heated bed or main board, or damage of the sensor itself.

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### ERROR - HEATER ERROR

The heater error can appear when the sensor doesn't register a steady (increase in) temperature. This could mean that the heater cartridge is not connected properly and to prevent overheating of the nozzle it will therefore turn the heater cartridge off.

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### Z-SWITCH BROKEN or Z-SWITCH STUCK

If you get one of these errors it means that there is a problem with the Z limit switch. It either tells you that the Z limit switch can't be pressed or that something is preventing the lever of the switch from switching back.

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### X OR Y SWITCH BROKEN

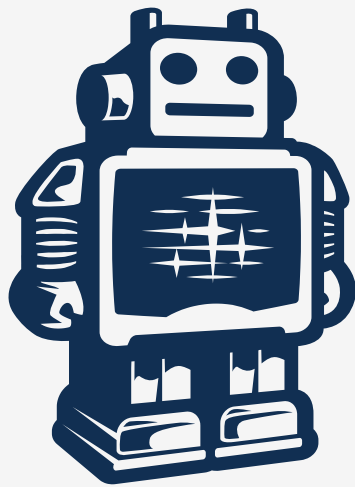
This error occurs when either the X or Y limit switch is not activated while the print head is homing.

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In case you run into any difficulties with your Ultimaker 2+ or need advice on using your Ultimaker 2+, please visit our website: [www.ultimaker.com/support](http://www.ultimaker.com/support).

The website is a great source of information for troubleshooting, solving issues on your own and getting more experienced with 3D printing. We also have a very active online community with experienced users who are willing to share tips and solutions and can help you getting the best out of your Ultimaker 2+.

If you ever need personal help resolving an issue with your Ultimaker 2+, you can also get in touch with one of our local support partners. See our website for contact details.



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