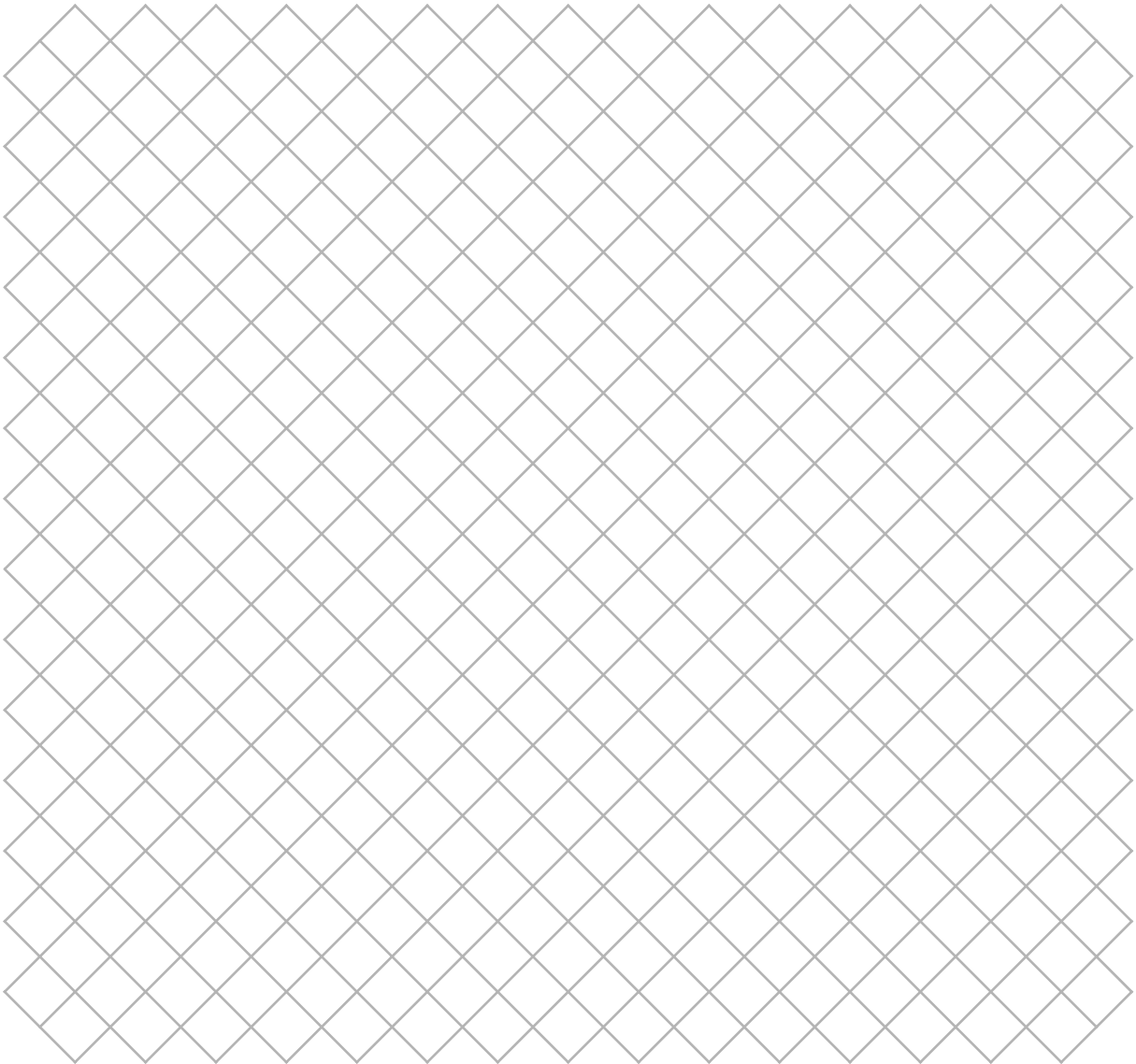
Ultimaker S3 and Ultimaker S5

Installation and user manual



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Disclaimer

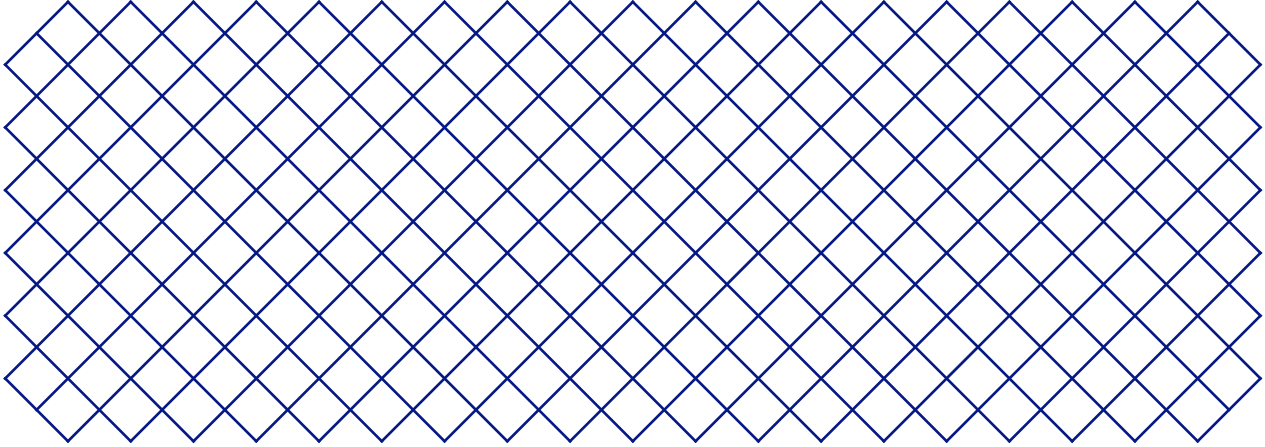
Please read and understand the contents of this installation and user manual carefully. Failure to read the manual may lead to personal injury, inferior results or damage to the Ultimaker printer or its peripherals. Always make sure that anyone who uses this 3D printer knows and understands the contents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

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.

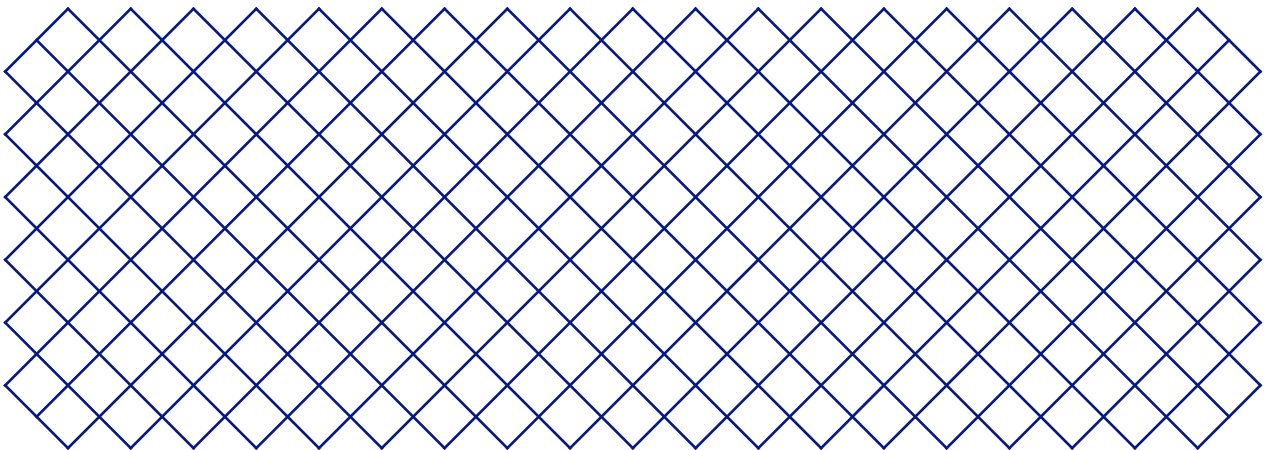
The information in this document was obtained from sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness.

Intended use

Ultimaker 3D printers are designed and built for fused filament fabrication with Ultimaker materials within a commercial/business environment. The mixture of precision and speed makes Ultimaker 3D printers a 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 materials, while effort has been made to match material properties with machine settings.



1. Safety and compliance



1.1 Safety messages

This guide contains warnings and safety notices.

The information provided below is applicable to the Ultimaker S3 and Ultimaker S5.

ⓘ 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 the safety instructions are not followed.

1.2 General safety information

- Ultimaker 3D printers generate high temperatures and have hot moving parts that can cause injury. Never reach inside Ultimaker 3D printer while they are in operation. Always control the printer with the touchscreen at the front or the power switch at the back. Allow the Ultimaker 3D printers to cool down for 5 minutes before reaching inside
- Do not change or adjust any parts of the products unless the change or adjustment is authorized by the manufacturer
- Do not store items inside Ultimaker products
- Ultimaker products are not intended for use by persons with reduced physical and/or mental capabilities, or lack of experience and knowledge, unless they are supervised or have been given instructions concerning the use of the appliance by a person responsible for their safety
- Children should be under constant supervision when using Ultimaker products

1.3 Hazards

Electromagnetic compatibility (EMC)

These devices may not cause harmful interference, and these devices must accept any interference received, including interference that may cause undesired operation.

An electrostatic discharge in some metallic parts of the devices may cause the interruption of the NFC communications, affecting the initial detection of the material spool. In these cases, a device restart should solve the problem

Electrical safety

⚠ Ultimaker products have been tested according to the IEC 60950-1 and/or IEC 62368-1. All relevant products have undergone and passed hi-pot testing before shipment. This test guarantees the right level of insulation against electrical shock. 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 visit our website for the CB-certificate. The Ultimaker 3D printers are powered by mains voltage, which is hazardous when touched. Only trained staff should remove the bottom cover.

⚠ Always unplug Ultimaker products before performing maintenance or modifications.

Mechanical safety

⚠ Ultimaker products are compliant with the Machine Directive 2006/42/EU. The EC declaration of conformity can be found on our website. The Ultimaker 3D printers contain moving parts. No damage to the user will be expected from the drive belts. The force of the build plate may cause minor injury, so stay out of the reach of the build plate during operation.

⚠ Always unplug the product before performing maintenance or modifications.

Risk of burns

⚠ There is a potential risk of burns: the print heads of the Ultimaker 3D printers can reach temperatures above 200 °C, while the heated bed can reach temperatures above 100 °C. Do not touch either of these parts with your bare hands.

⚠ Always allow the product to cool down for 30 minutes before performing maintenance or modifications.

1.4 Health and safety

⚠ 3D printing thermoplastics may result in the release of ultrafine particles (UFPs) and volatile organic compounds (VOCs) depending on the thermoplastic used and settings of the 3D printer.

Ultimaker products are designed for use with Ultimaker materials and are open for use with materials from third-party suppliers.

Ultimaker materials

Ultimaker materials can be printed safely without any filtering using the recommended temperatures and settings in a well-ventilated area (minimum refresh rate of 1.8 for a room size of 30.6 m^3). When multiple Ultimaker 3D printers are operated in a contained environment, emissions of UFPs and/or VOCs may vary. Please consider other safety measures, such as a filter, cabinet and/or dedicated ventilation system depending on your specific situation.

Third-party materials

Third-party material manufacturers can supply print profiles that contribute to reliable results with Ultimaker hardware (“The Ultimaker Material Alliance Program”).

The use of print profiles and materials from Ultimaker’s Material Alliances and/or other suppliers may require additional safety measures such as a filter for the safe usage of such materials. Please take the relevant information provided by the supplier of such filament/material into account at all times for safe operation. Please check the safety data sheet of each specific material for information.

Ultimaker cannot be held responsible for any adverse effects from the use and/or performance of these materials.

1.5 FCC / ISED regulatory notices

Modification statement

Ultimaker has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

Interference statement

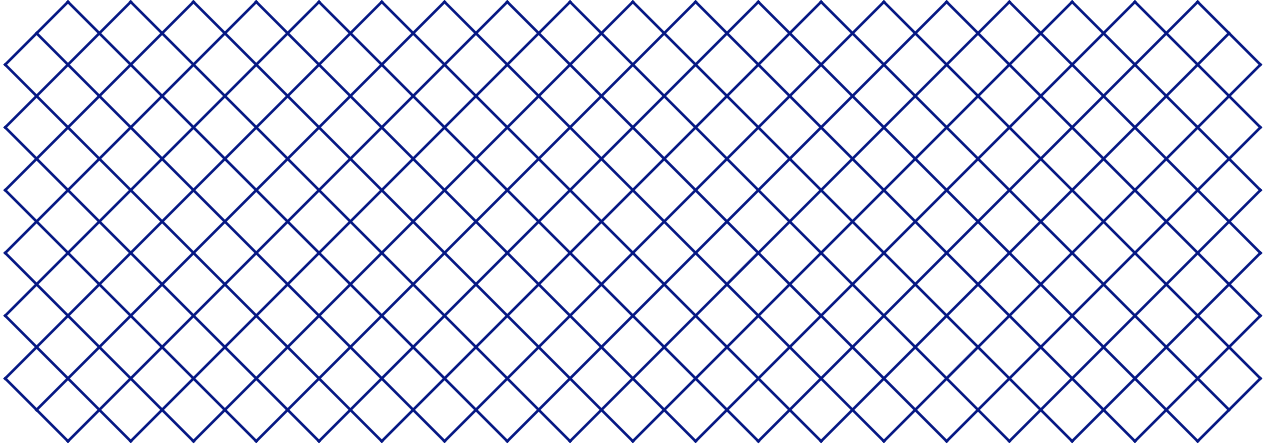
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Wireless notice

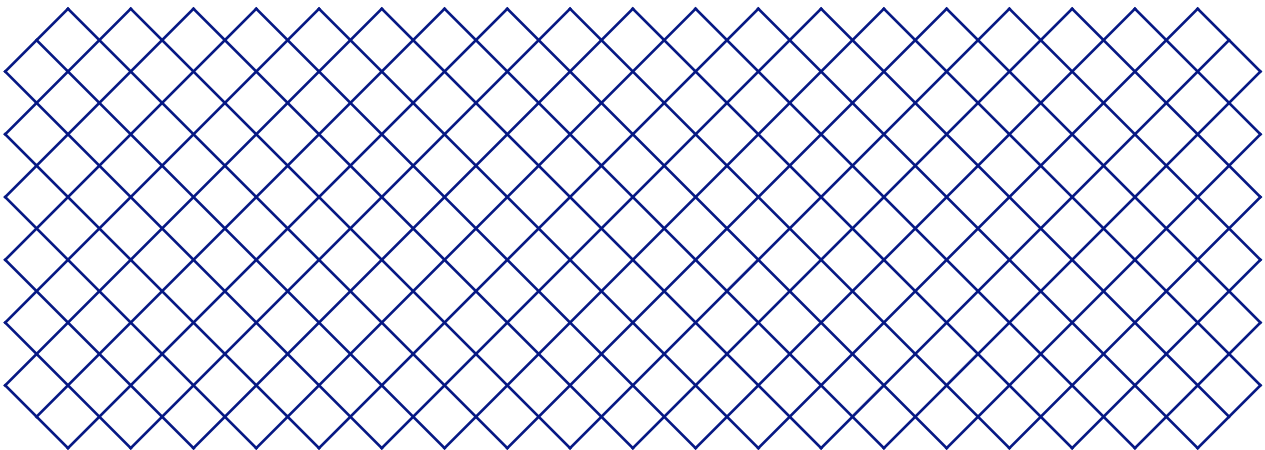
This device complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

FCC Class A digital device notice

This equipment has been tested and found to be compliant 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 or her own expense.

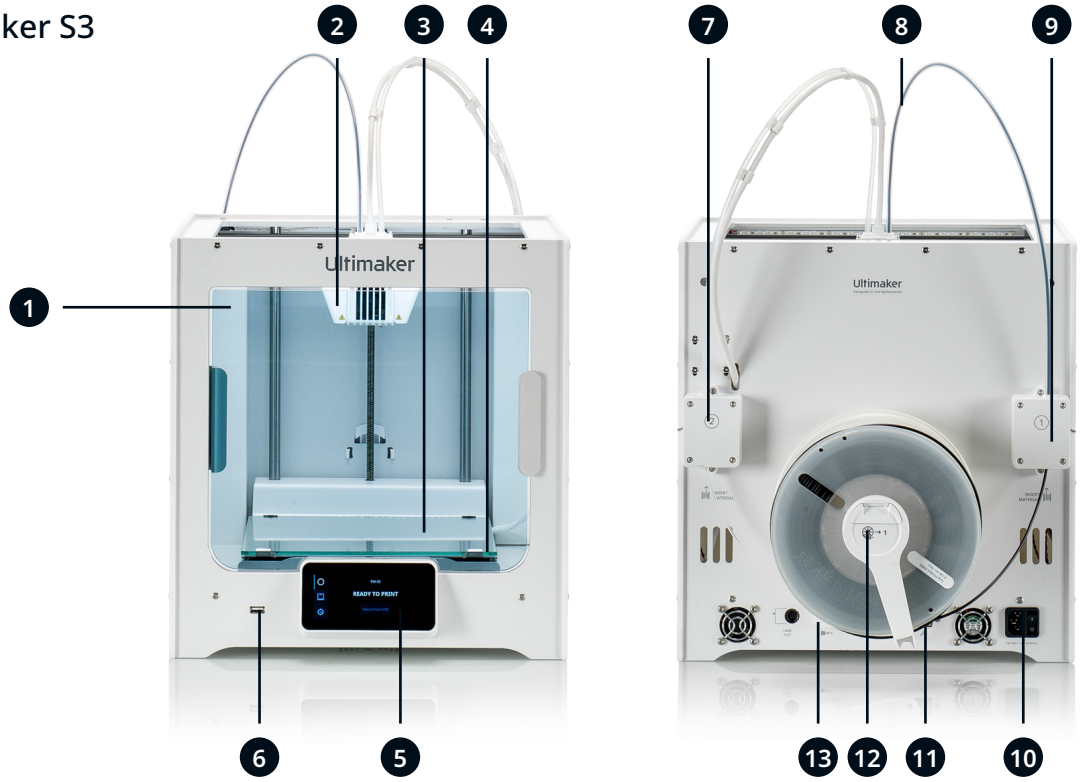


2. Introduction

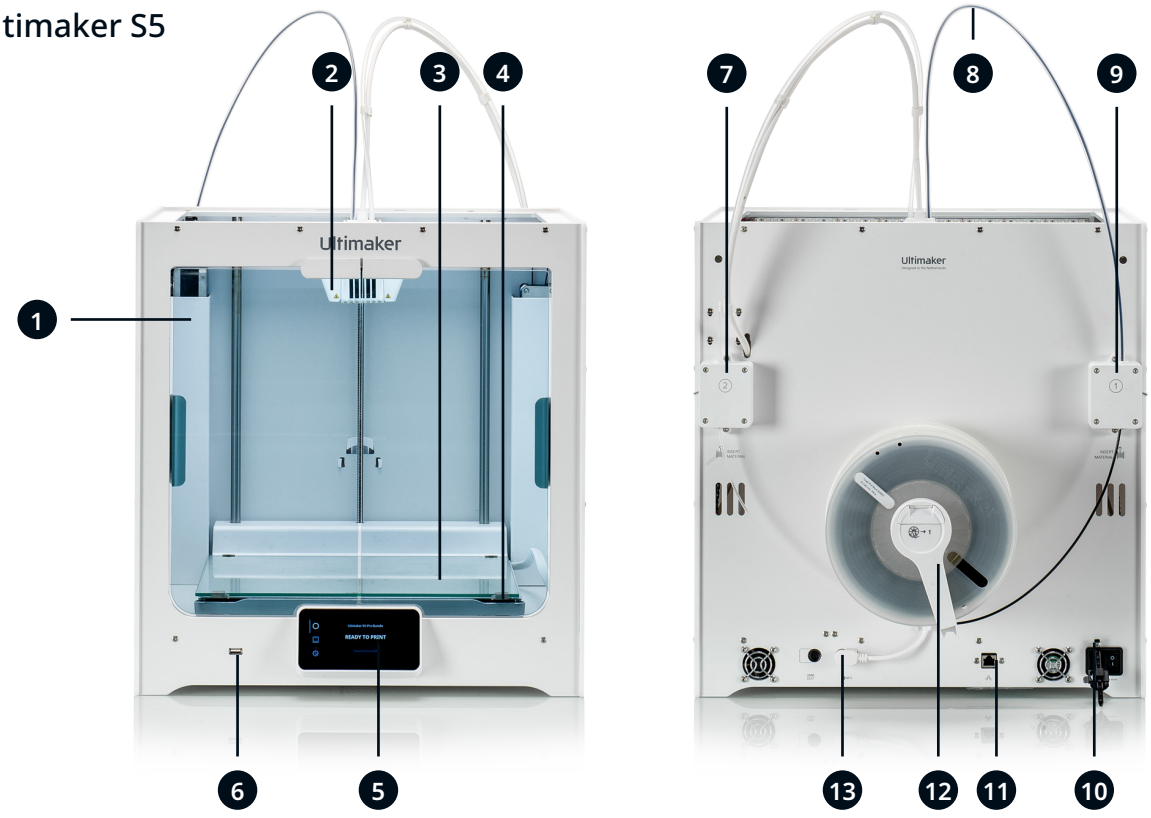


2.1 Main components

Ultimaker S3



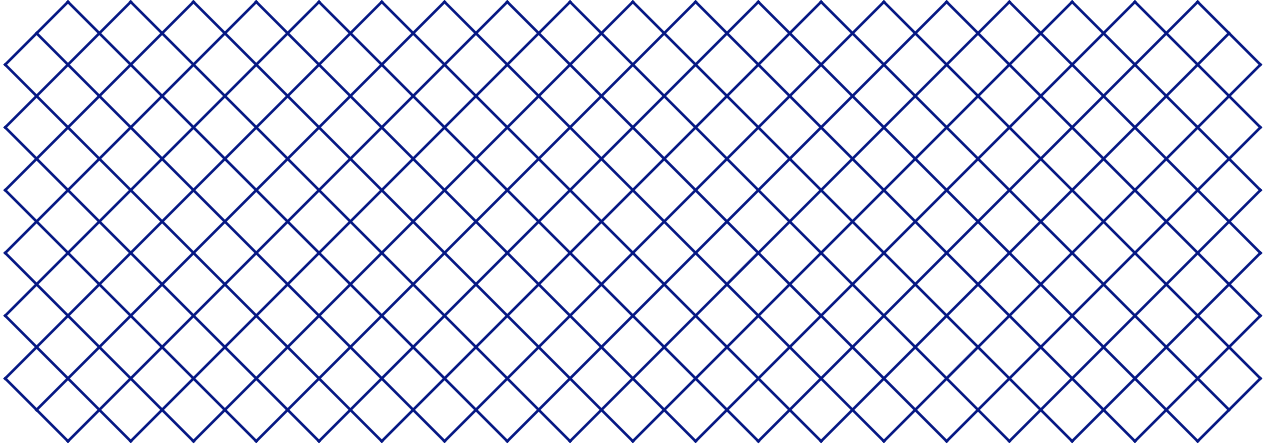
Ultimaker S5



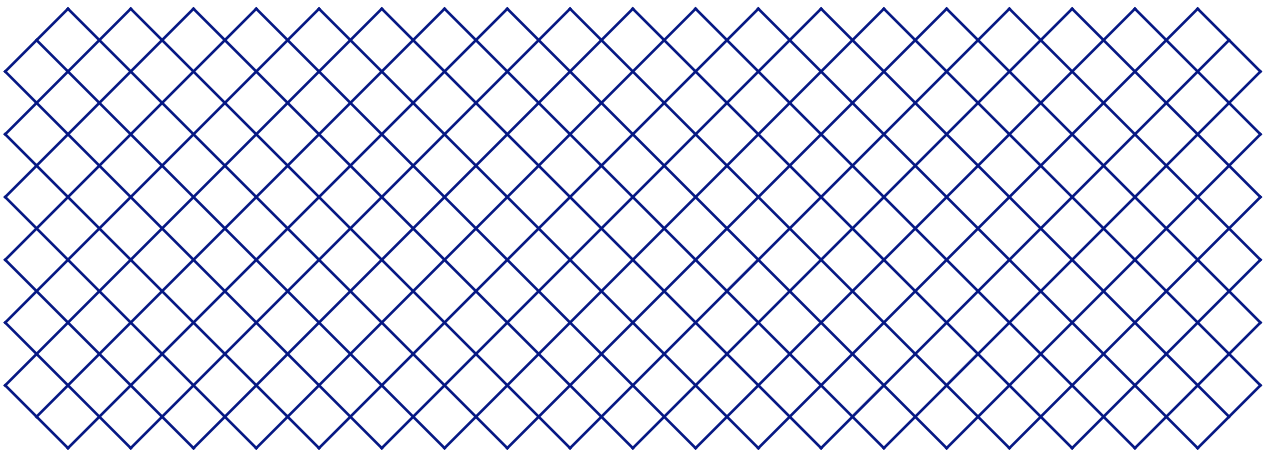
1. Glass door(s)
2. Print head
3. Build plate
4. Build plate clamps
5. Touchscreen
6. USB port
7. Feeder 2
8. Bowden tubes
9. Feeder 1
10. Power socket and switch
11. Ethernet port
12. Double spoolholder with NFC cable
13. NFC socket

2.2 Specifications

Properties	Technology	Fused filament fabrication (FFF)	
	Print head	Dual-extrusion print head with a unique auto-nozzle lifting system and swappable print cores	
	Build volume (XYZ)	**Ultimaker S3** 230 x 192 x 200 mm (9 x 7.4 x 7.9 in)	**Ultimaker S5** 330 x 240 x 300 mm (13 x 9.4 x 11.8 in)
	Layer resolution	0.25 mm nozzle: 150 - 60 micron 0.4 mm nozzle: 200 - 20 micron 0.6 mm nozzle: 300 - 20 micron 0.8 mm nozzle: 600 - 20 micron	
	XYZ resolution	6.9, 6.9, 2.5 micron	
	Build speed	<24 mm^3/s	
	Build plate	Heated glass build plate (20 - 140 °C)	
	Nozzle diameter	0.4 mm (included) 0.25 mm, 0.6 mm, 0.8 mm (sold separately)	
	Operating sound	< 50 dBA	
	Connectivity	Wi-Fi, LAN, USB port	
Physical dimensions	Dimensions	**Ultimaker S3** 394 x 489 x 637 (15.5 x 19.3 x 25.1 in) (inc. Bowden tubes and spool holder)	**Ultimaker S5** 495 x 457 x 520 (19.5 x 18 x 20.5 in) 495 x 585 x 780 (19.5 x 23 x 30.7 in) (inc. Bowden tubes and spool holder)
	Net weight	**Ultimaker S3** 14.4 kg (31.7 lbs)	**Ultimaker S5** 20.6 kg (45.4 lbs)
Electrical requirements	Voltage	100 - 240 VAC	
	Frequency	50 - 60 Hz	
	Power	**Ultimaker S3** Max. 350 W	**Ultimaker S5** Max. 500 W
Software	Supplied software	Ultimaker Cura, our free print preparation software Ultimaker Connect, our free printer management solution Ultimaker Cloud, enables remote printing	
	Supported OS	MacOS, Windows and Linux	
Warranty	Warranty period	12 months	



3. Installation



3.1 Unboxing

The Ultimaker S3 and Ultimaker S5 come in reusable, durable packaging, specially designed to protect your 3D printer. Follow the steps below properly to unpack your Ultimaker printer:

ⓘ It is recommended to remove the packaging with the box placed on the floor for safety. Please retain all packaging for warranty purposes.

1. Remove the plastic locking clips from the lower section of the box
2. Holding the handles, lift the upper section of the box to reveal the printer
3. Remove all foam and cardboard pieces from the top of the printer, including the materials
4. Place the printer on a flat surface

⚠ When placing the printer on a shelf or table, take proper measures to prevent the printer from falling.

⚠ According to the UL 60950-1 definition, the Ultimaker S5 is not considered portable. The printer must be lifted by at least two people during installation.

5. Remove the rubber door seals and carefully open the glass door(s)
6. Take out the accessory box, cardboard section, and foam pieces from inside the printer
7. Remove the plastic protection from the touchscreen

⚠ If the printer needs to be transported without the outer box, be aware of the weight and dimensions of the printer. Use proper transport means to do so this safely.

3.2 What's in the box

The Ultimaker S3 / S5 is supplied with several hardware accessories. Check if all these items are included before continuing:

Accessories

1. Glass build plate
2. Spool holder with material guide
3. Power cable
4. Ethernet cable
5. USB stick
6. Print core AA 0.4
7. Print core BB 0.4
8. XY calibration sheet
9. Calibration card
10. Nozzle cover (3x)

Consumables

11. Tough PLA
12. PVA
13. Glue stick
14. Oil
15. Grease

Tools

16. Hex screwdriver 2mm

3.3 Hardware installation

Connect the Bowden tubes (Ultimaker S5 only)

1. Remove the clamp clips from the print head and insert the Bowden tubes. The Bowden tubes connect to the corresponding numbers on the print head
2. Secure the Bowden tubes with the clamp clips
3. Fit the print head cable clips onto Bowden tube 2

Place and connect the NFC spool holder

1. Insert the spool holder into the back panel and push until it snaps into place
2. Secure the cable from the spool holder behind the cable clips in the back panel
3. Connect the cable to the NFC socket at the back of the printer

Place the glass build plate

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

Connect the power cable

1. Connect the power cable to the power socket at the back of the Ultimaker S3 / S5
2. Plug the other end of the cable into a wall outlet

3.4 Welcome setup

To perform the setup steps, turn on the printer with the power switch at the back. You will first be asked to select your preferred language. After this, the welcome setup will appear on the touchscreen. Follow the steps on the touchscreen and described on the next pages of this user manual.

ⓘ The language on the printer can always be changed by navigating to *Preferences* → *Settings* → *Language*.

Confirm that the glass build plate is installed

For the first use, it is recommended to print with the materials delivered with the printer: Tough PLA and PVA. In this step of the welcome setup, you must confirm that you have installed the glass build plate.

ⓘ A thin layer of glue should be applied to the glass build plate to ensure reliable adhesion.

Print core installation

Print cores
The Ultimaker S3 / S5 uses two print cores in the print head, which are interchangeable. There are three types of print cores:

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

Each Ultimaker S3 / S5 comes with two print cores AA 0.4 (one is already installed in print head slot 1) and one print core BB 0.4. This means that it is possible to print with two build materials or with a build and support material.

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

Install the second print core
During the welcome setup, the second print core must be installed. To do this, go to *Print core 2* and select *Start*. Follow the steps on the Ultimaker S3 / S5:

1. Carefully open the glass door(s) and the print head fan bracket and press *Confirm*
2. Install the second print core (BB 0.4) in print head slot 2 by squeezing the levers of the print core and sliding it into the print head until you hear a click

⚠ Do not touch the contact points on the back of the print core with your fingers.

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

3. Carefully close the print head fan bracket and *Confirm* to proceed with the welcome setup

Load materials

Before you can start printing on the Ultimaker S3 / S5, you need to load materials into the printer. For the first use, it is recommended to use the spools of Tough PLA and PVA that come with the printer.

Load material 2

Material 2 will be loaded first because it must be placed closest to the back of the printer. Select *Material 2* from the list shown on the touchscreen, select *Start*, then take the following steps to load the material:

1. Unpack the material and cut off the end, ensuring a short, sharp tip
2. Place the spool with material 2 (PVA) onto the spool holder and select *Confirm*. Make sure the end of the material points in a clockwise direction, so that the material can enter feeder 2 from the bottom
3. Wait until the printer detects the material and *Confirm*

ⓘ When using a third-party material, you can select the material type manually.

4. Insert the end of the material into feeder 2 and gently push it until the feeder grips it and the material is visible in the Bowden tube. Select *Confirm* to continue

ⓘ You can straighten the end of the material a bit so it can enter the feeder easier.

5. Wait for the Ultimaker S3 / S5 to heat up print core 2 and load the material into the print head
6. Confirm when the new material extrudes consistently from print core 2
7. Wait a moment for print core 2 to cool down

Load material 1

After completing these steps, load 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. Select *Material 1* from the list on the touchscreen, select *Start*, and follow the steps below:

1. Take the material guide and hold it with the outer part towards you
2. Place the spool on the material guide with the material in a counter-clockwise direction, and guide the end of the material through the hole in the material guide
3. Place the material guide with material 1 on it onto the spool holder behind material 2, and select *Confirm*
4. Wait until the Ultimaker S3 / S5 detects the material and select *Confirm*

ⓘ When using a third-party material, you can select the material type manually.

5. Insert the end of the material into feeder 1 and gently push it until the feeder grips it and the material is visible in the Bowden tube. Select *Confirm* to continue

ⓘ You can straighten the end of the material so it can enter the feeder easier.

6. Wait for the printer to heat up print core 1 and to load the material into the print head
7. Confirm when the new material extrudes consistently from print core 1
8. Wait a moment for print core 1 to cool down

Network installation

The Ultimaker S3 / S5 can connect to a local area network, using either Wi-Fi or Ethernet. To connect to a network, select *Network setup* from the welcome setup list. If you want to set up a wireless network connection, select *Wi-Fi setup*. If you want to use Ethernet, or don't want to set up network connectivity, select *Skip*.

Set up Wi-Fi
To connect your Ultimaker S3 / S5 to a wireless network, you will need a computer or a smartphone. Start the Wi-Fi setup and follow the steps on the touchscreen:

1. Wait until your printer has created a Wi-Fi hotspot. This may take a minute
2. Use a computer or smartphone to connect to the printer. The name of the Wi-Fi network is shown on the touchscreen of the printer
3. A pop-up will appear on the display of your computer or smartphone. Follow the steps to connect the printer 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 go to a website that is not yet known by your browser.

ⓘ Within some network environments the Ultimaker S3 / S5 may experience difficulties connecting wirelessly. When this happens, repeat the Wi-Fi setup from another computer or smartphone.

4. Go back to the Ultimaker printer and wait until the Wi-Fi setup is finished

ⓘ If you skip the Wi-Fi setup during the welcome setup, you can start it again by going to *Preferences → Network → Start Wi-Fi setup*.

Connect via Ethernet
You can set up a wired network connection after completing the welcome setup by performing the following steps:

1. Connect one end of an Ethernet cable to the Ethernet port at the back of the printer
2. Connect the other end of the cable to a network source (router, modem, or switch)
3. Enable Ethernet in the network menu by navigating to *Preferences → Network* and enabling Ethernet

3.5 Firmware update

After completing the welcome setup, the Ultimaker S3 / S5 will check if the latest firmware is installed. If an older version is detected, it will download the latest firmware and install it. This process may take several minutes to complete.

ⓘ You will only be prompted to install the latest firmware if the printer is connected to a network and an older firmware version is detected. If the printer is not connected to the network, go to ultimaker.com/firmware to check if an update is available.

3.6 Install Ultimaker Cura

After successfully setting up your printer, install Ultimaker Cura – Ultimaker's free print preparation and management software – on your computer. You can download Ultimaker Cura at ultimaker.com/software.

ⓘ For more information about Ultimaker Cura and system requirements, please consult the Ultimaker Cura user manual at ultimaker.com/manuals.

After downloading, run the installer to complete the installation of Ultimaker Cura. When opening Ultimaker Cura for the first time, you will be asked to select your 3D printer. Select the Ultimaker S3 or Ultimaker S5 profile, and you are ready to go. You can now directly connect to the printer and start using Ultimaker Cura.

ⓘ For best printing results, always use the latest version of Ultimaker Cura.

4. Operation

4.1 Touchscreen

You can control the Ultimaker S3 / S5 by using the touchscreen at the front of the printer.

When turned on for the first time, the Ultimaker S3 / S5 will run the welcome setup. After this, the main menu will be shown when the printer is turned on.

Interface

The main menu offers three options, represented by the following icons:

The status overview is automatically shown next to the main menu. From here, you can start a print from USB, or view the progress of the print while printing

The configuration overview shows the current configuration of the printer. Here you can see which print cores and materials are installed, as well as change the configuration

The preferences overview consists of three sub-menus: settings, maintenance, and network. In the printer settings menu, you can change general settings, such as the language. In the maintenance menu, you can perform the most important maitenance and calibration procedures, in addition to saving logs for diagnostics. The network menu allows you to change network settings or to perform the Wi-Fi setup

4.2 Materials

Material compatibility

The Ultimaker S3 / S5 comes with two AA print cores and one BB print core. The AA print cores can be used for printing build materials and Breakaway support material. The BB print core can be used for water-soluble support material (PVA).

The Ultimaker S3 / S5 support all Ultimaker materials that are currently available, of which most can be printed with the 0.25, 0.4 and 0.8 mm print core sizes. The print core CC Red 0.6 can be used for third party composite materials.

For an overview of possible dual-extrusion material combinations, please refer to the Ultimaker website.

All Ultimaker materials have been extensively tested and have optimized profiles in Ultimaker Cura to ensure the best print results. Therefore, it is advised to use one of the default profiles in Ultimaker Cura for the highest reliability. Using Ultimaker materials will also allow you to benefit from the NFC detection system. Ultimaker spools will automatically be recognized by the Ultimaker S3 / S5. This information can be directly transferred to Ultimaker Cura when connected to a network, allowing for a seamless connection between the printer and Ultimaker Cura software.

Print recommendations

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.

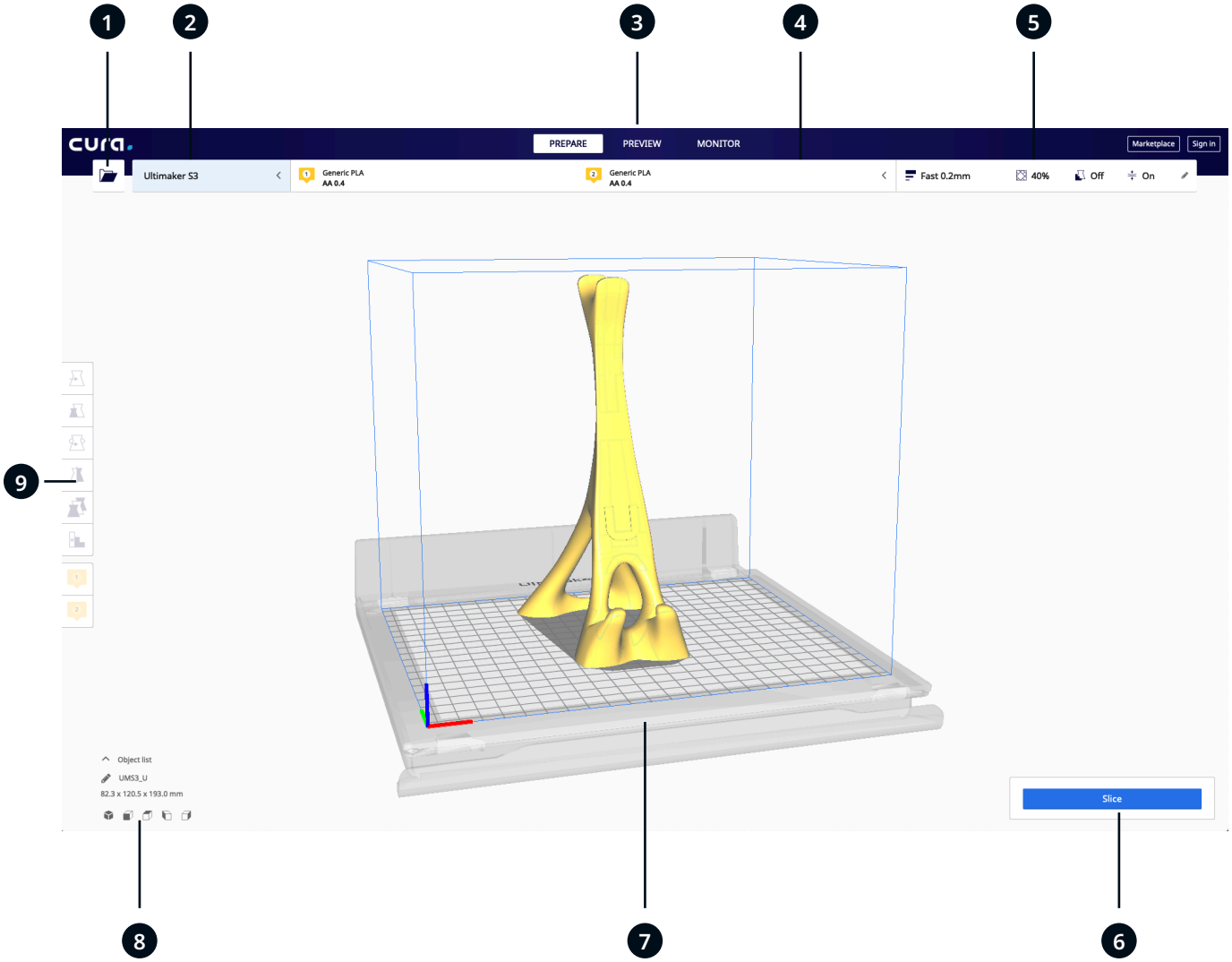
It is recommended to apply a thin layer of glue (using the glue stick from the accessory box) or an adhesion sheet to the glass build plate before starting a print. This will ensure that your print adheres reliably to the build plate, and also prevents the glass build plate from chipping when removing prints.

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

4.3 Preparing a print with Ultimaker Cura

Interface

After you have added the Ultimaker S3 / S5 in Ultimaker Cura, the main interface will become visible. Here is an overview of the user interface (UI):



UI elements:

1. Open file
2. Printer selection panel
3. Stages
4. Configuration panel
5. Print settings panel
6. Action panel
7. 3D viewer
8. Camera position tool
9. Adjustment tools

The Ultimaker Cura workflow is arranged in three stages, seen at the top of the interface. These are the prepare, preview, and monitor stage.

Prepare stage

Load a model and prepare it for slicing in the prepare stage of Ultimaker Cura.

1. Load the model(s) by clicking the ‘open file’ folder icon
2. In the configuration panel select the material type you wish to print with

ⓘ When printing with a networked printer, the loaded configuration is detected. You can select this configuration to prepare your print faster.

3. Use the adjustment tools to position, scale, and rotate the model as desired

ⓘ The adjustment tools are visible when a model is loaded and selected on the 3D viewer.

4. Select your desired settings (profile, layer height, infill, support and build plate adhesion) in the print settings panel

ⓘ 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 support, Breakaway support, or build material support.

5. When satisfied with your print settings and print strategy, press the *Slice* button on the action panel
6. When slicing is complete, the action panel will now direct you to the preview stage

Preview stage

The preview stage allows you to see exactly how your model will be printed. Use the different color schemes to get various information about your model. You can view the different line types, differentiate infill from skin, or use the X-ray view to detect gaps within your model.

When satisfied with your model print preview, the action panel guides you to print over the network if connected to a networked Ultimaker 3D printer.

ⓘ Alternatively, you can save the file to a USB for printing with offline printers.

For more information on the preview stage, see the Ultimaker Cura user manual found on the Ultimaker website.

Monitor stage

The monitor stage utilizes the Ultimaker Connect functionality so you can easily monitor the status of your networked Ultimaker printer.

When printing on a networked Ultimaker printer, you can send your print jobs directly from Ultimaker Cura to the printer. The status of the printer will change to printing, and you can begin to track the print’s progress. You can also queue multiple print jobs and view them in the print queue.

Ultimaker Cloud

The Ultimaker S3 / S5 benefits from integration with Ultimaker Cloud. To make the most out of your Ultimaker printer, you must first associate the printer with your Ultimaker account.

For more information on the Ultimaker cloud, visit mycloud.ultimaker.com.

4.4 Remove the print

Once your 3D print is finished it must be removed from the build plate. There are several methods to do this.

⚠ When using a brim, be aware of the danger of cutting yourself when removing the print from the build plate. Use a deburring tool to remove the brim once the print is taken from the build plate.

Wait for cooldown

If you printed directly onto the build plate, simply allow the build plate and the print to cool down after printing. The material will contract as it cools, allowing you to easily remove the print from the build plate.

Use a spatula

If your print is still adhered to the build plate after cooling, you can use a spatula to remove the print. Place the spatula under the print, parallel to the build plate, and apply a small amount of force to remove the print. A spatula can also be used to carefully remove remaining parts of the print from the build plate, such as the brim or support structures.

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

Use water

Remove the build plate from the printer, but be careful if it is still warm. Run cool tap water over the bottom of the plate to cool it quickly. Due to the contraction of the material, the print will easily pop off the plate.

Alternatively, you can run lukewarm water over the print side of the plate to dissolve the glue. If PVA was used, place the build plate and print in water to dissolve the PVA. This makes print removal easier.

Once the print has been removed and the build plate is placed back in the printer, select *Confirm removal* on the display of the Ultimaker S3 / S5. This will allow the next print job to start.

4.5 Remove support material

Dissolve PVA support

PVA support structures can be removed by dissolving the PVA in water. This takes several hours and leaves no trace afterwards. Follow the steps below and refer to the Ultimaker website for additional tips and information.

1. Submerge the print in water to let the PVA dissolve
2. Rinse the print with clean water to remove any excess PVA
3. Let the print dry completely
4. Dispose of the waste water

ⓘ PVA is a biodegradable material, and in most cases disposing the water afterwards is easy. However, it is recommended that you check local regulations for more comprehensive guidance. The water can be disposed of 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, water becomes saturated by previously dissolved PVA. For the quickest result, fresh water is recommended.

Remove 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. Follow the steps below and refer to the Ultimaker website for additional tips and information.

⚠ It is advised to wear protective gloves when the support structure contains sharp corners or when working with larger models.

1. Tear away the majority of the inner support structure using pliers
2. Use cutting pliers to grip the Breakaway support interface and pull it away from the model
3. Remove the last traces of the Breakaway support using cutting pliers or tweezers

4.6 Change the printer configuration

Change materials

Materials can be changed easily on the Ultimaker S3 / S5 by using the procedure from the menu. Besides changing a material, you also have the option to only load or unload a material. Make sure compatible print cores are installed before you insert materials.

1. Go to the configuration menu, select the material you want to use, and select *Change*
2. Wait for the print core to heat up and unload the material
3. Remove the material from the feeder and spool holder. *Confirm* to continue
4. Place the new material on the spool holder and *Confirm* to continue
5. Wait until the Ultimaker S3 / S5 detects the material

ⓘ When using a third-party material, you can select the material type manually.

6. Insert the end of the material into the feeder and gently push it until the feeder grips it and the material is visible in the Bowden tube. Select *Confirm* to continue
7. Wait for the Ultimaker S3 / S5 to heat up the print core and to load the material into the print head
8. *Confirm* when the new material extrudes consistently from the print core
9. Wait a moment for the print core to cool down

Change print core

Print cores can be easily changed on the Ultimaker S3 / S5 by using the procedure from the menu. Besides changing print cores, you also have the option to only load or unload a print core:

1. Go to the configuration menu, select the print core you want to change and select *Change*
2. Wait for the print core to heat up, unload the material, and cool down again
3. Open the glass door(s) of the Ultimaker S3 / S5 and the print head fan bracket and *Confirm* when completed
4. Remove the print core carefully by squeezing the levers and sliding the print core out of the print head

⚠ Do not touch the contact points on the back side of the print core with your fingers.

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

5. Insert a print core by squeezing the levers of the print core and sliding it into the print head slot until you hear a click

ⓘ It is possible that the print core includes a ring around the nozzle. Remove this nozzle ring before using the print core on the Ultimaker S3 / S5. Learn more about this on the Ultimaker website.

6. Carefully close the print head fan bracket and *Confirm* when completed
7. Wait for the Ultimaker S3 / S5 to load the material into the print core

4.7 Calibration

Build plate leveling

While using the Ultimaker S3 / S5, build plate calibration should be performed to ensure reliable 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 build plate. On the other hand, if the nozzles are too close to the build plate, it can prevent material from extruding.

⚠ Make sure there is no excess material below the tip of the nozzles and the build plate is clean before the start of a print or when you want to calibrate the build plate, or you might get inaccurate results.

Active leveling

Active leveling is automatically performed by the printer at the start of a print, to create a reliable first layer. During active leveling, the Ultimaker S3 / S5 will create a detailed heightmap of the build plate surface. This information is used to compensate for any inaccuracies of the build surface during the first layers of the print. It will do this by adjusting the build plate height while printing.

⚠ Do not touch the Ultimaker S3 / S5 during the active leveling procedure, as this could affect the calibration process.

Manual leveling

Perform manual leveling when the level of the build plate is too far out of range for active leveling to compensate for.

1. Go to *Preferences* → *Maintenance* → *Build plate* → *Manual leveling* and select *Start*
2. Wait while the Ultimaker S3 / S5 prepares the manual leveling procedure
3. Use the touchscreen controls to move the build plate 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. Select *Confirm* to continue
4. Adjust the front-right thumb wheel to roughly level the front of the build plate. There should be a distance of approximately 1 mm between the nozzle and build plate
5. Repeat step 4 for the front-left thumb wheel and select *Confirm* to continue
6. Place the calibration card inbetween the nozzle and build plate. Use the touchscreen controls to adjust the position of the build plate until you feel some resistance when moving the card. Select *Confirm* to continue

⚠ Do not apply force to the build plate while fine-tuning with the calibration card, as this will lead to leveling inaccuracies.

7. Place the calibration card between the nozzle and build plate in the front right corner. Adjust the thumb wheel until you feel some resistance when moving the card. Select *Confirm* to continue
8. Repeat step 7 for the front left corner and select *Confirm* to continue

ⓘ 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.

9. Place the calibration card in between the second nozzle and build plate. Use the controls to adjust the position of the build plate until you feel some resistance when moving the card. Select *Confirm* to continue
10. Wait for the printer to finish the manual leveling procedure

XY offset calibration

Besides the vertical offset, the horizontal distance between the nozzles in the X and Y direction also needs to be configured. The print cores that are supplied with the Ultimaker S3 / S5 are already calibrated, but when the printer detects a new combination, you will need to perform an XY offset calibration. 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 an XY calibration sheet, which can found in the accessory box or downloaded at ultimaker.com/XYcalibration.

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

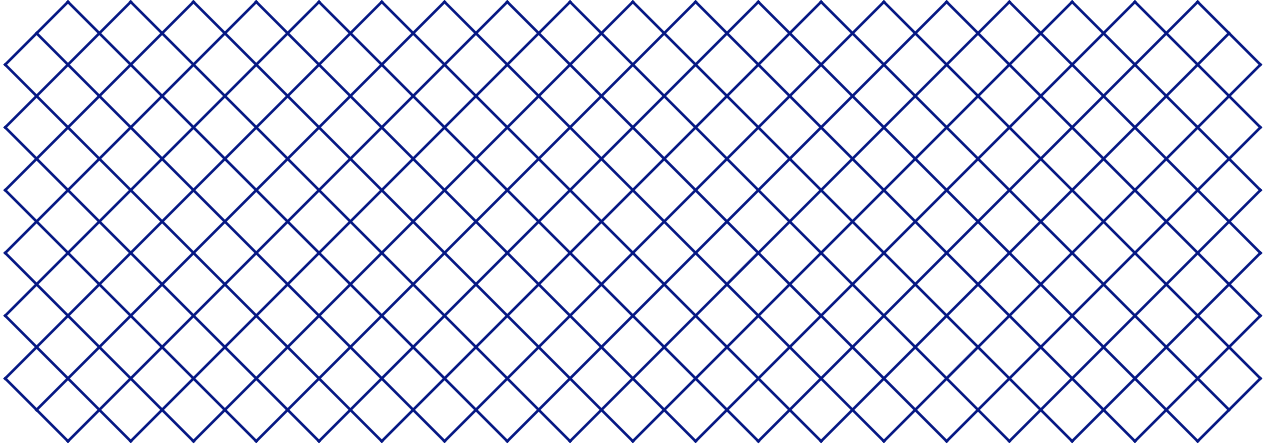
1. Go to *Preferences* → *Maintenance* → *Print head* → *Calibrate XY offset* and select *Start calibration*
2. The Ultimaker S3 / S5 will now print a grid pattern on the build plate. Wait until it is complete
3. Once the Ultimaker S3 / S5 has cooled down, remove the build plate from the printer and align it with the XY calibration sheet. Ensure the printed grid is precisely placed on the two rectangles on the sheet
4. Find the best aligned lines on the printed X grid and note which number corresponds to these lines. Enter this number as the X offset value on your Ultimaker S3 / S5
5. Find the best aligned lines on the printed Y grid and note which number corresponds to these lines. Enter this number as the Y offset value on your Ultimaker S3 / S5

ⓘ It is important that the printed XY offset pattern adheres well to the build plate and shows no signs of under-extrusion. If it did not print well, it is recommended to repeat the calibration print.

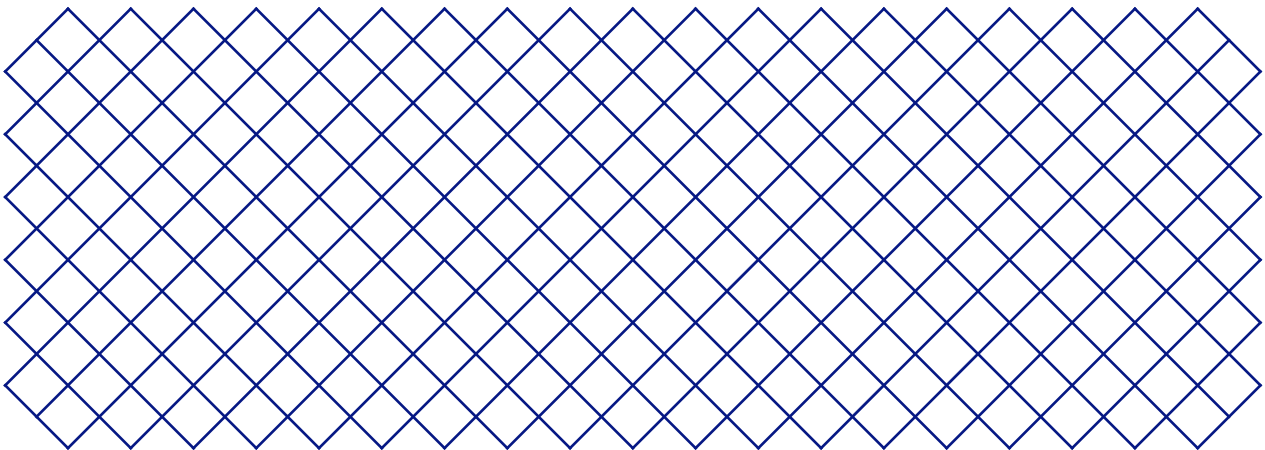
Lift switch calibration

The switch bay enables the second print core to be lifted and lowered. For successful dual-extrusion prints, it is important that print core switching functions well. The lift switch is already calibrated when the Ultimaker S3 / S5 is shipped, but calibration can also be performed manually if needed.

1. Go to *Preferences* → *Maintenance* → *Print head* → *Calibrate lift switch* and select *Start calibration*
2. Move the lift switch on the side of the print head to point towards you. Select *Confirm* to continue
3. Move the print head so that the lift switch fits in the switching bay. Select *Confirm* when completed
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



5. Maintenance



5.1 Update the firmware

Periodically, a new version of the Ultimaker S3 / S5 firmware is released. To ensure that your Ultimaker S3 / S5 is equipped with the latest features it is recommended to keep the firmware updated to the latest version.

Update over the network

If the Ultimaker S3 / S5 is connected to a network, it automatically checks for available firmware updates. When a new firmware is available, the printer will prompt you to download and install it via the touchscreen interface. Alternatively, check for updates manually by navigating to *System* → *Maintenance* → *Update firmware*.

⚠ Do not power off the printer during the firmware installation.

Update using a USB stick

If your Ultimaker S3 / S5 is not connected to a network, you can update to the latest firmware via USB. The firmware files are found on the Ultimaker website:

1. Navigate to ultimaker.com/firmware, and select your printer
2. Download the firmware image and store it in the root directory of your USB stick
3. Insert the USB stick into the USB port of the printer
4. Go to *Preferences* → *Maintenance* → *Update firmware* and select the new firmware in the update menu

5.2 Material handling and storage

Opened material spools must be stored properly when not in use. If material is stored incorrectly, it may affect its quality and usability.

The optimal storage temperature for PLA, Tough 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.

To keep your materials in optimal condition, opened spools should be stored:

- Cool and dry
- Out of direct sunlight
- In a resealable bag

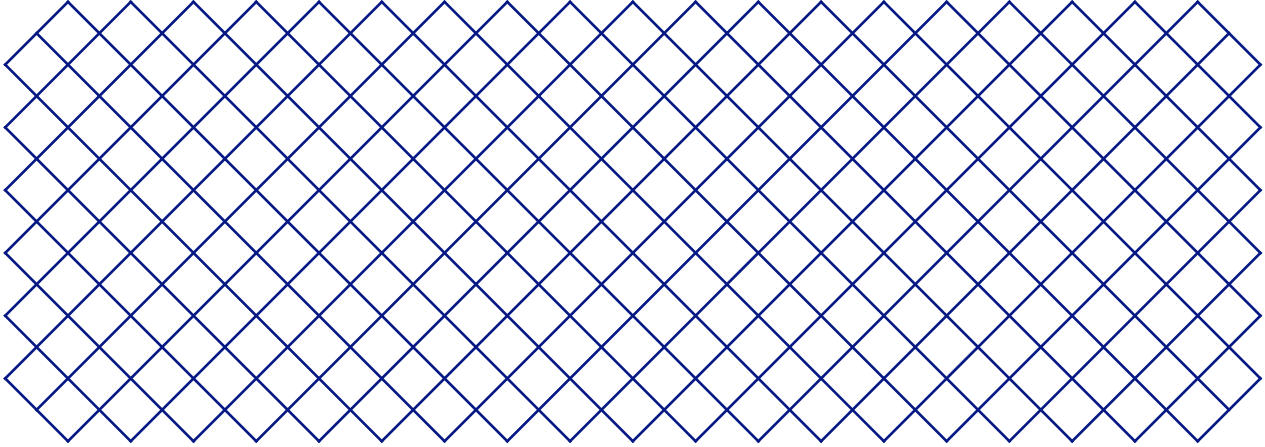
ⓘ To minimize moisture absorption, store the material in a resealable bag including the supplied desiccant (silica gel) directly after printing.

5.3 Maintenance schedule

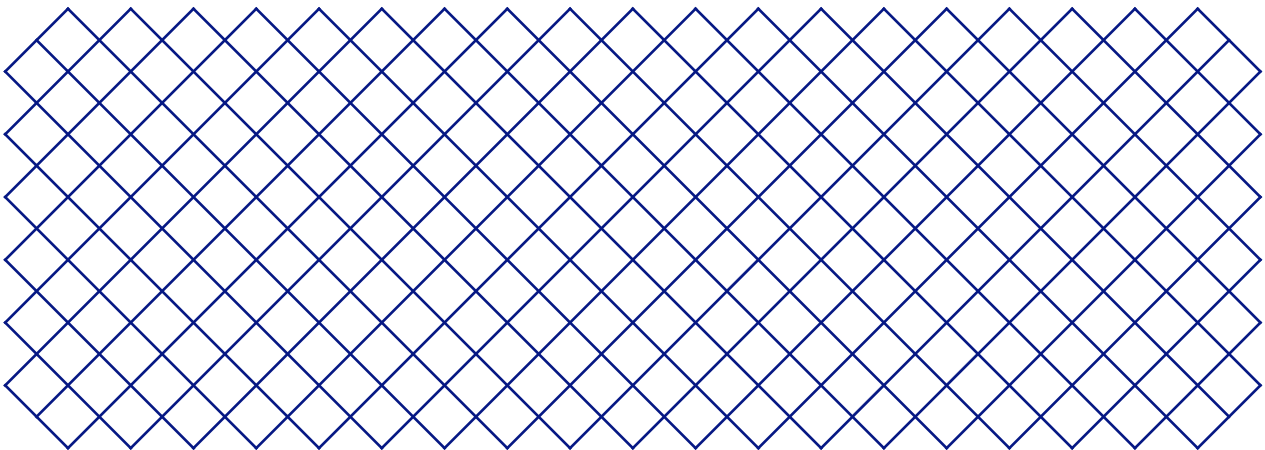
To keep your Ultimaker S3 / S5 in optimal condition, we recommend the following maintenance schedule, based on 1,500 printing hours per year.

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

Every month	Clean the printer	Keep the Ultimaker S3 / S5 clean for optimal printing results. This includes: • Cleaning the glass build plate • Removing degraded material from the outside of the nozzles • Removing particles from the inside of the Bowden tubes • Cleaning the inside and glass components
	Lubricate the axles	Apply a small drop of oil to the X, Y, and Z axles. Move the print head and build plate to equally distribute the oil ⚠ Only use the supplied oil, as other oils or grease may affect the coating of the axles ⓘ The X, Y and Z axles do not need lubrication for the first year of using the printer. After this, they should be lubricated monthly
Every three months	Check for play on the axles	The X and Y axles in the frame should only rotate, not move back and forth. Firmly attempt to move the axles individually. If there is play, follow the instructions on the Ultimaker website to correct it.
	Check the tension of the short belts	The short belts attached to the X and Y motors should be tight to correctly transfer the movement to the print head. If the belt tension is too low, follow the instructions on the Ultimaker website to correct it.
	Clean the front fan of the print head	Thin strands of filament could end up in the fan. Check this regularly by opening the front fan bracket. Remove any strands of filament with tweezers.
	Check the quality of the nozzle cover	The nozzle cover shields the print cores from cold airflow from the fans, helping the print cores 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. Check both sides of the cover for tears or damage from heat. If it is damaged, replace the nozzle cover according to the instructions on the Ultimaker website.
	Lubricate the lead screw of the Z motor	Apply a small amount of grease to the lead screw of the Z motor. Move the build plate up and down to equally distribute the grease.
	Clean the feeders	Small filament particles can gather on the feeder's knurled wheel. Unload the materials and open the feeders to clean the inside with a small brush. Follow the instructions on the Ultimaker website.
	Clean the print cores	The BB print core benefits from preventive cleaning every 400 printing hours. This removes any degraded material from the inside of the print core. Use Ultimaker cleaning filament or PLA for applying hot and cold pulls. Navigate to *Preferences* → *Maintenance* → *Print head* → *Print core cleaning* and select *Start* to begin the cleaning procedure and follow the instructions on the display.
Every year	Lubricate the feeder gear	Remove the feeder from the back panel to access the feeder gear. Clean it first, then apply a small amount of grease to the gear. Follow the instructions on the Ultimaker website.
	Replace the Bowden tubes	Materials can slightly scratch the inside of the Bowden tubes and the ends of the tubes can get damaged by the tube coupling collets. It is advised to replace them after one year of printing.
	Clean system fans	Check the fans at the back of the printer for dust and blow on the blades to clean them.
	Lubricate the door hinge(s)	Apply a small drop of oil to the door hinge(s) to ensure the doors open and close smoothly.



6. Troubleshooting



6.1 Error messages

When the printer detects that something is wrong, or when it reads values outside of the allowed range, an error will occur. The display will give a short description of the detected issue along with its unique error code. For example:

- This print job is not suitable for this printer. Go to ultimaker.com/ER42

Go to the specified page to learn more and for troubleshooting tips.

6.2 Print core troubleshooting

Clogged print core

If material does not flow consistently, the print core could be clogged with degraded material. In this case, the print core should be cleaned by performing the hot and cold pull method. Take a look at the Ultimaker website for detailed instructions.

Print core not recognized

If a print core is not recognized by the Ultimaker S3 / S5, 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.

⚠ Do not touch the contact points on the back of the print core with your fingers.

6.3 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 4.2, ‘Materials’)
- Thoroughly clean the build plate and re-apply the glue or adhesion sheet
- Check the Ultimaker Cura settings that were used, and try printing with one of the default Ultimaker Cura profiles

Warping

Warping occurs due to material shrinkage while printing, causing the corners of the print to lift and detach from the build plate. When plastics are printed, they first expand slightly, then contract as they cool down. If material contracts too much, the print will bend upwards from the build plate.

When your print is warping, follow the tips under ‘Poor build plate adhesion’. Additionally, read the design, material, and printing guidelines of the 3D model assistant on the Ultimaker website.

Grinding PVA

Incorrect material handling or storage can lead to grinding of the material. 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.

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

- **Incorrect storage.** Ensure that the PVA is stored in the recommended conditions
- **Coated Bowden tube.** Clean the Bowden tube and dry it very well
- **Clogged print core**. Clean the print core with hot and cold pulls

For more information on how to resolve grinding issues, take a look at the Ultimaker website.

Under-extrusion

In simple terms, under-extrusion is when the printer is unable to supply a sufficient amount of material. Your Ultimaker S3 / S5 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 (diameter inconsistency) or incorrect settings
- Feeder tension not correctly set
- 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 S3 / S5 is affected by under-extrusion, it is advised to take a look at the Ultimaker website for detailed troubleshooting instructions.

7. Warranty

7.1 General

Ultimaker grants a standard warranty on the Ultimaker S3 / Ultimaker S5 (“Product”) in the country where the product was purchased.

From the date the product is sold and delivered to an end-customer for the first time, as evidenced by the original customer’s purchase invoice, Ultimaker warrants the product is free from defects in material, design and workmanship for a period of twelve (12) months. Only the original purchaser is entitled to claim warranty and the warranty period is limited to his/her lifetime.

For a warranty claim to be valid (i) notification must be made before the end of the warranty period, (ii) conform to any additional stipulations of the warranty, as defined below, (iii) must be substantiated with the original customer’s purchase invoice, (iv) the serial number sticker must still be on the product(s) and (v) the product must be returned in the original packaging. Since customers will only be entitled to make a warranty claim on submission of the original invoice and packaging, we advise that both the invoice and official packaging are kept in a safe place. If the original packaging is not available anymore, the customer can purchase replacement packaging from a recognized Ultimaker reseller.

The customer – provided that they are a natural person who is not acting in the course of their profession or business – may claim the rights to which they are entitled under the warranty without prejudice to their rights or claims in accordance with the law.

7.2 Conditions

The Ultimaker warranty is granted under the explicit condition that:

- The product was sold, delivered and assembled by a recognized Ultimaker reseller (see ultimaker.com for addresses of the recognized Ultimaker resellers)
- The product was newly manufactured on the date of purchase and not sold as used, refurbished or manufacturing seconds
- Ultimaker’s latest software was installed and used in and with the product
- The Ultimaker’s installation and maintenance instructions as described in the manual for the product have been observed. Unless the manual contains ‘do-it-yourself’ assembly instructions for the product or part thereof and these have been followed up meticulously, the warranty will become invalidated if the product was at any time disassembled or reassembled by any other person than a recognized Ultimaker reseller

Customers are welcome and we encourage them to use third-party materials, accessories, etc. That in itself, does not void the warranty. If, however, the use of third-party elements, causes damage to the product, the part(s) affected by this damage is excluded from warranty.

If a part of the product is repaired or replaced during the warranty period, the warranty period still remaining for the entire product will apply to this part. However, repair and/or replacement will not extend the warranty period.

7.3 Notification

The Ultimaker resellers deal with this warranty on behalf of Ultimaker. Therefore, any notification on the basis of this warranty must be made to the Ultimaker reseller from whom the product was originally purchased, even if this is not in the customer's present country of residence.

Any warranty claim must first be recognized as justified, either by Ultimaker's reseller or by Ultimaker. If so, the reseller is obliged to rectify the defects free of charge according to this warranty. If the defect cannot be repaired, the reseller will, within the warranty period, replace the product free of charge by an identical product, or, if the product is no longer manufactured, by a similar replacement of the same value or offer an appropriate refund.

Depending on the country, the warranty may not automatically include costs incurred for shipping defective products for scrutiny and/or repair, nor for shipping costs of replacement or repaired product(s) back to claimant.

7.4 Exclusions

This warranty does not apply to and therefore does not cover:

- Any defect or damage caused by inappropriate, incorrect or improper use, installation, maintenance, operation and cleaning or normal wear and tear. For correct use, reference is made to the manual of the product
- Any other event, act, default or omission outside Ultimaker's control
- Failure of the product caused by an accident

In any event, Ultimaker is not liable for indirect or consequential damages, including but not limited to loss of use, loss of profit or revenue. Furthermore, Ultimaker's liability is limited to the purchase value of the product.

7.5 Applicable law and competent court

This warranty is exclusively governed by Dutch law. Any dispute arising out of or in connection with this warranty will be exclusively submitted to the jurisdiction of the court (Rechtbank) of Midden-Nederland, location Utrecht.