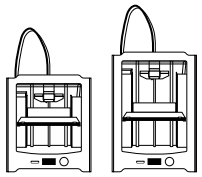
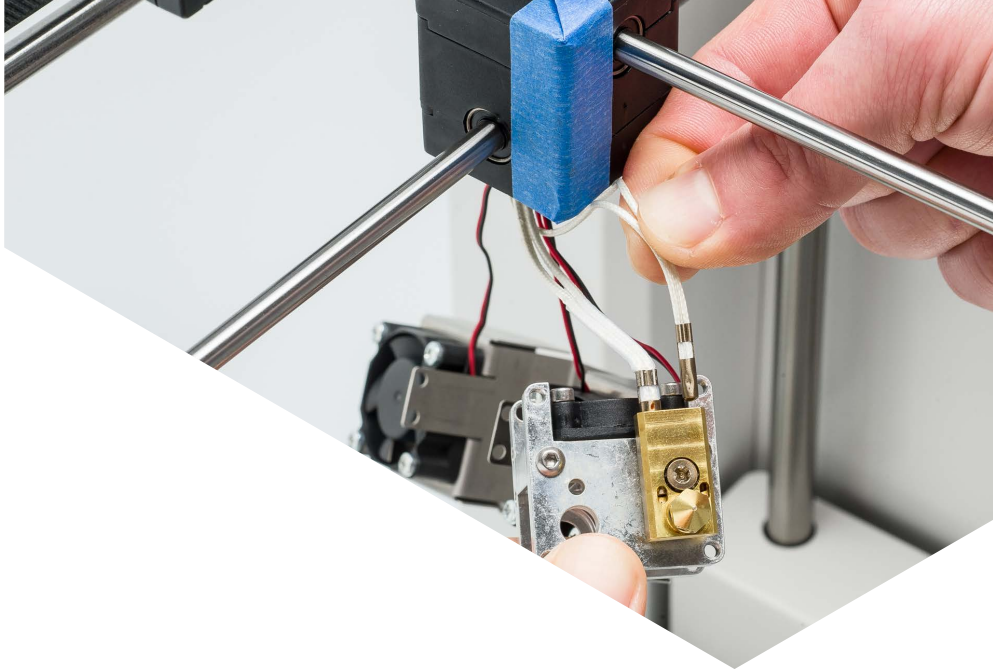


Repair manual

Replacing the PT100 sensor



Instructions

The PT100 sensor measures the temperature in the hot end. It provides fast and accurate feedback about the current temperature, ensuring optimal print quality.

If the PT100 is damaged, the Ultimaker 2+ may show the error message Error - Stopped Temp Sensor. If following the troubleshooting steps described on Ultimaker's Resource pages do not help, then the sensor should be replaced.

To replace the PT100 sensor, it first has to be taken out of the print head and disconnected from the electronics. The following steps describe how to correctly replace the PT100 sensor.

Caution: Make sure the filament is removed, the Ultimaker is turned off and power supply disconnected before you start the replacement. Ensure the nozzle is cooled to avoid burning yourself.

Equipment/supplies needed

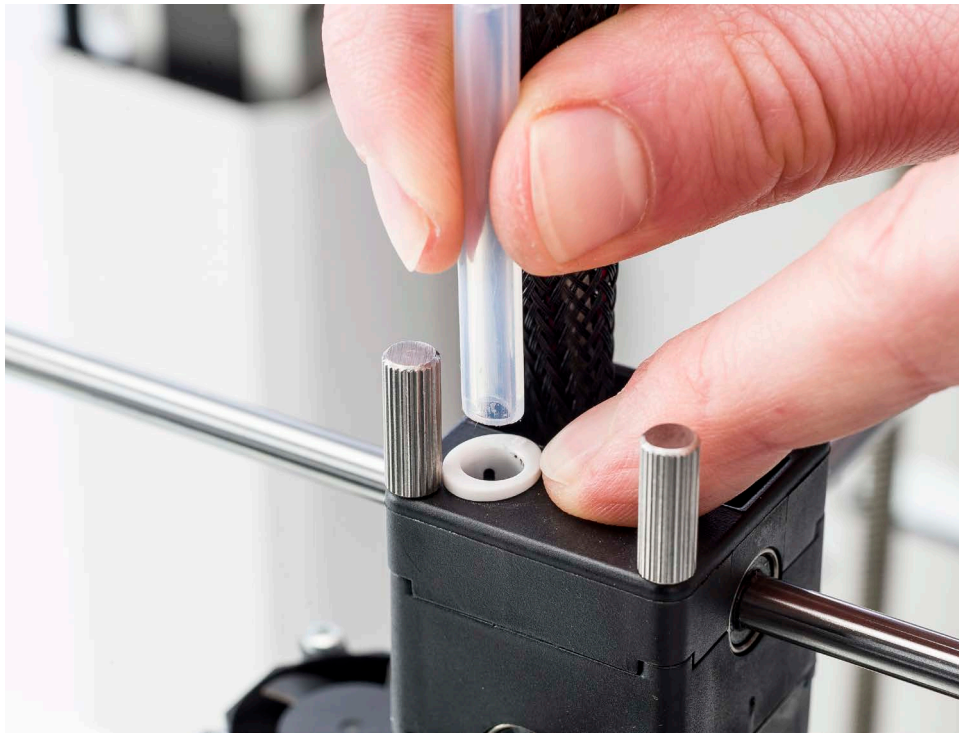
Tools
- 2.0 hex screwdriver
- Phillips screwdriver
- Blue tape
- Print head alignment aid

Parts
- 1x 2288 - PT100 sensor

Time
- 20 minutes

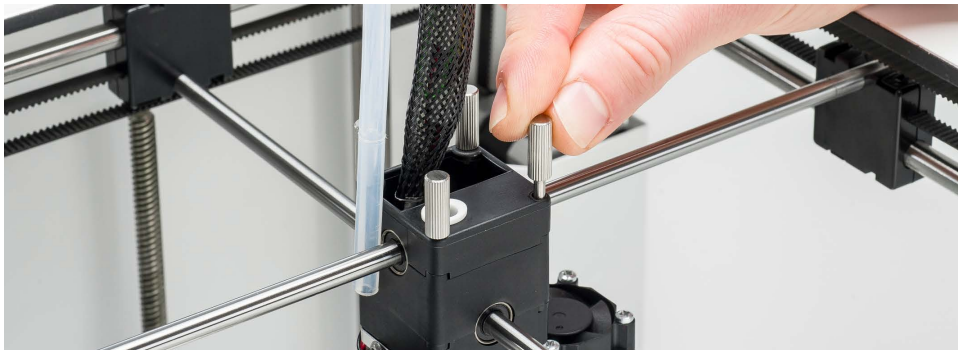
Disassembly

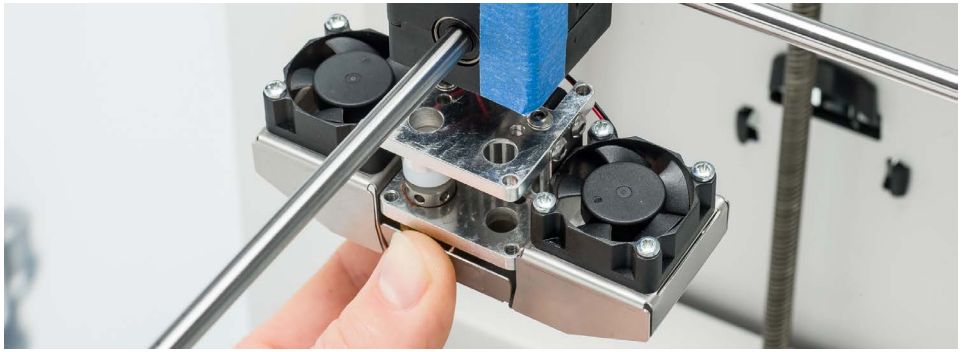
1. **Remove the clamp clip**
- Place the print head in the front-right corner.
- Use your fingernail to remove the blue clamp clip.

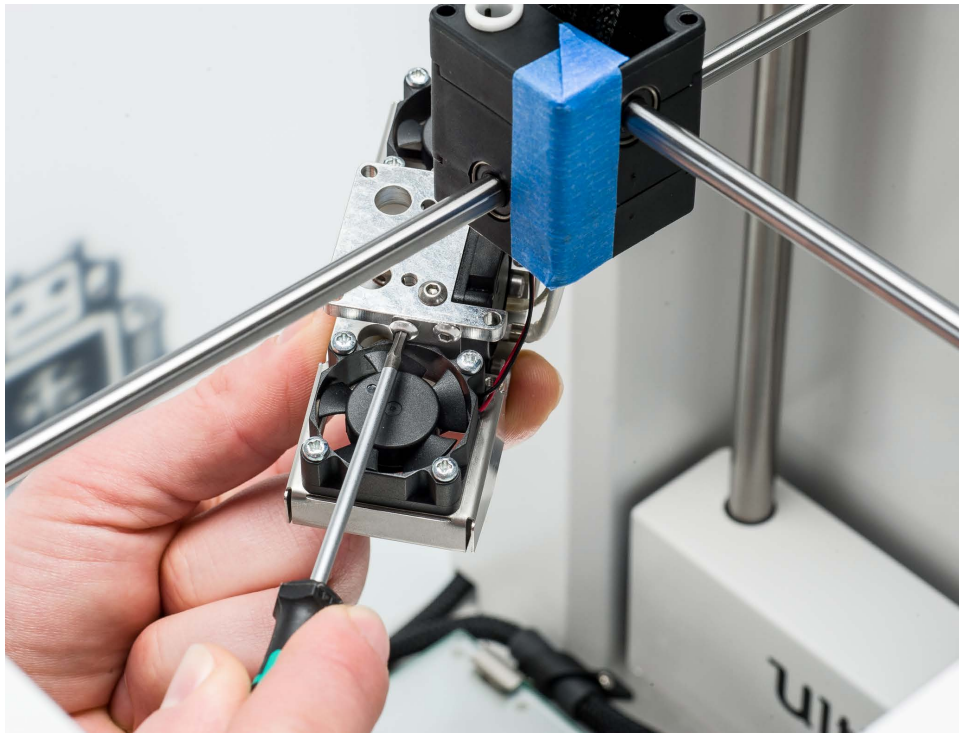


2. **Remove the Bowden tube**
- Press down on the white tube coupling collet.
- At the same time, pull the Bowden tube upwards, out of the print head.

Disassembly







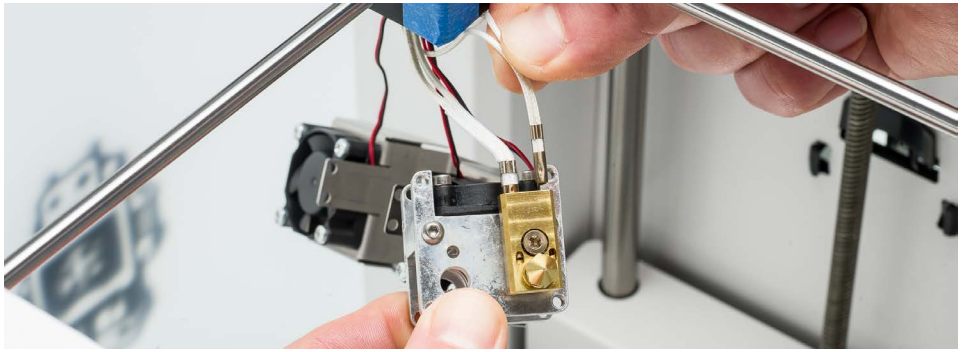
3. Remove the thumb screws

- Now put the print head in the middle of the printer for easier access.
- Loosen the four thumb screws and take them out of the print head.
- Put some tape around the three parts of the print head housing. This ensures that the parts stay together.

4. Remove the fan bracket

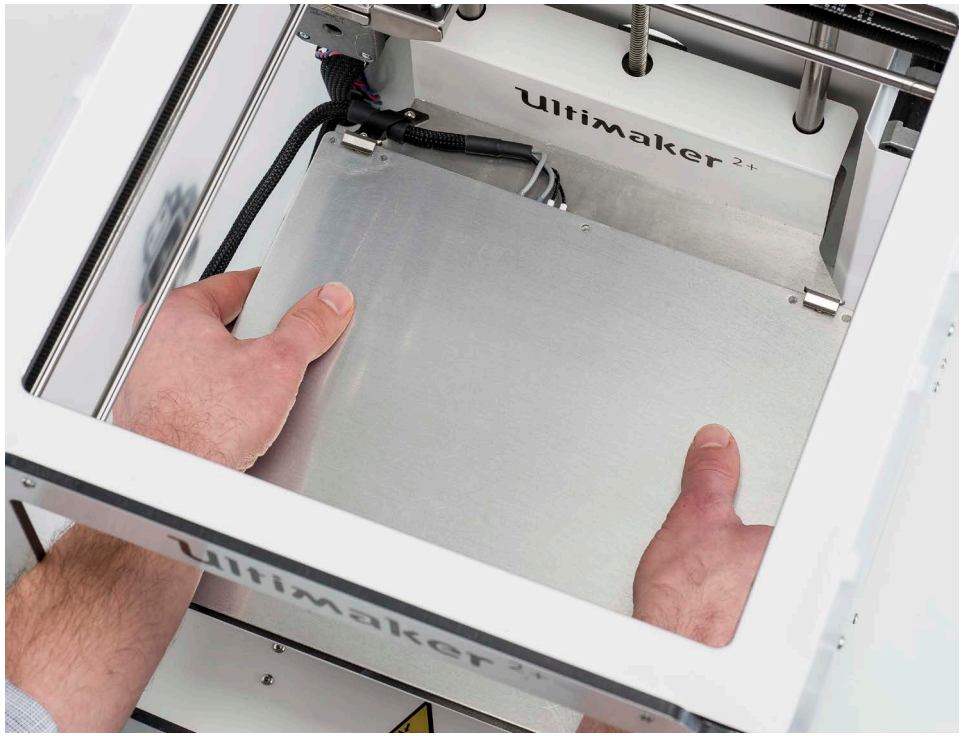
- The fan bracket is attached with two M3x4 bolts on either side of the hot end.
- Use the hex screwdriver to remove all four bolts.

Disassembly



5. Remove the sensor from the heater block

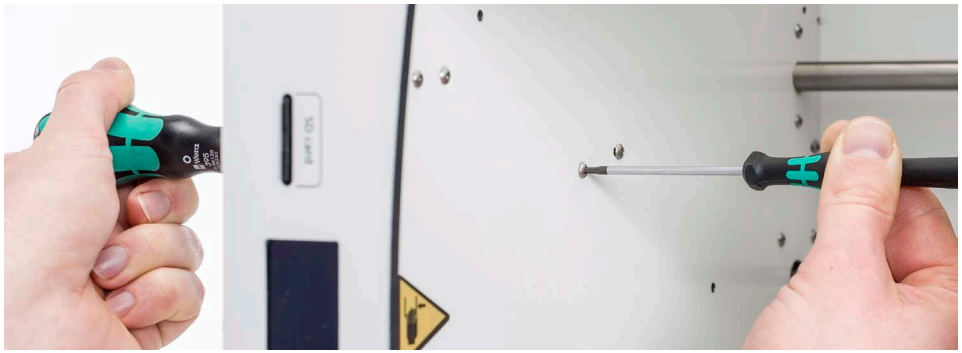
- Use a Phillips screwdriver to loosen the countersunk bolt at the bottom of the heater block.
- Pull the sensor out of the opening on the right side of the heater block, as seen from the back.



6. Put the printer on its side

- Manually move the Z stage all the way up.
- Gently place the Ultimaker 2+ on its right side.

Disassembly



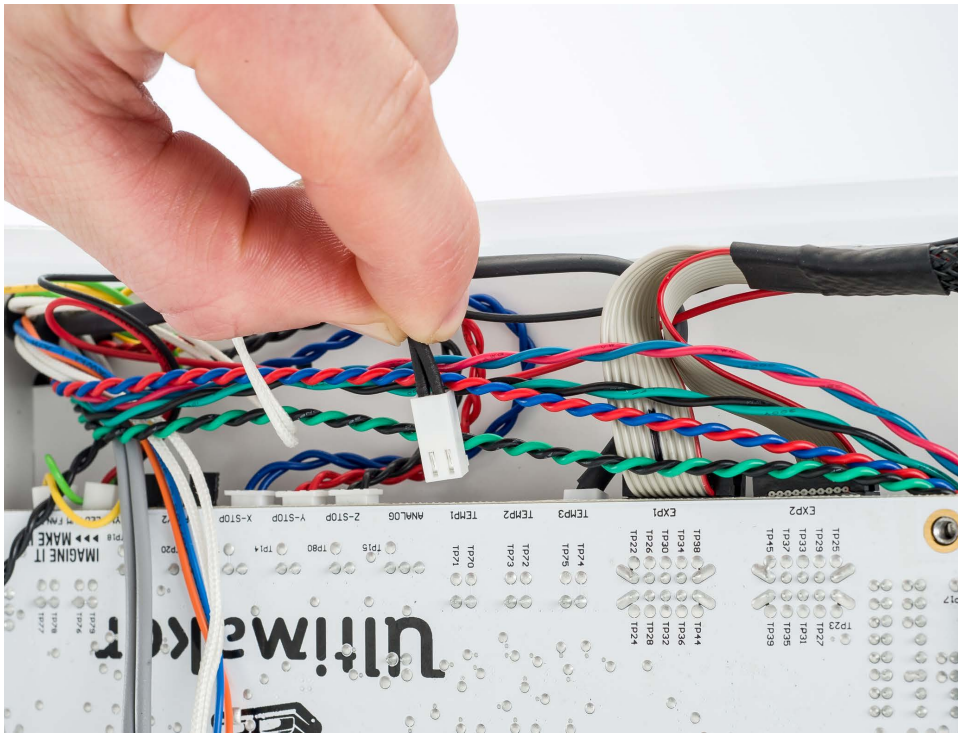
7. Loosen the mainboard cover

- Loosen the two M3x12 bolts that attach the mainboard cover from the inside of the printer, while holding the lock nuts in place with pliers or a socket wrench.

8. Remove the mainboard cover

- Pull the front of the cover away from the bottom panel.
- Then slide the mainboard cover towards the front of the printer.

Disassembly



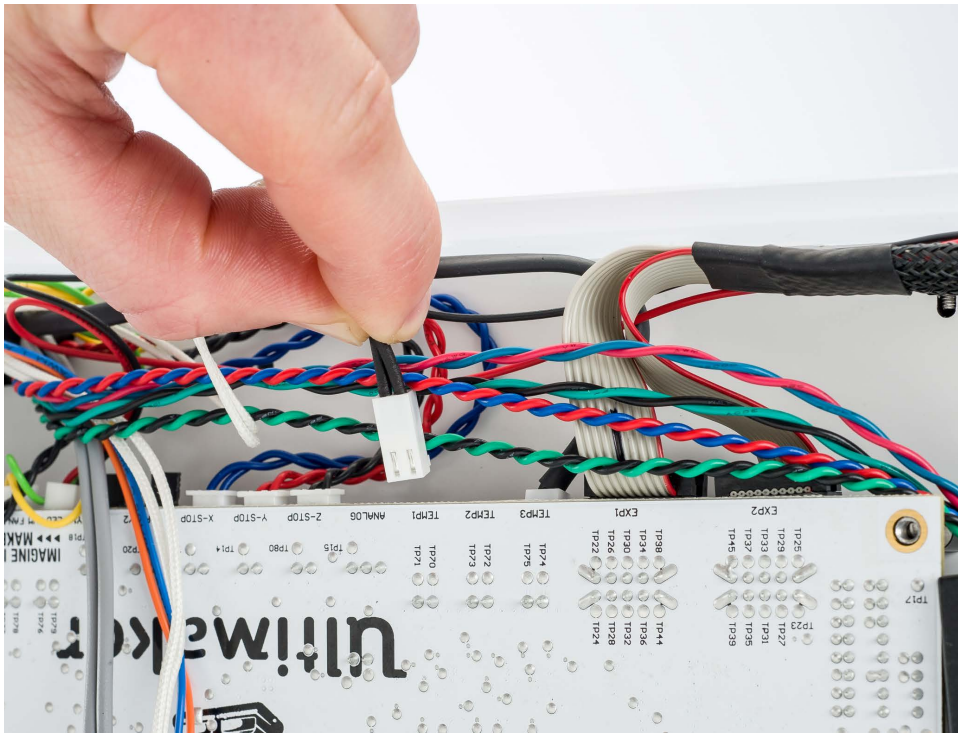
9. Disconnect the sensor

- Remove the sensor from ‘TEMP1’ on the mainboard.

10. Pull out the sensor

- Firmly hold the braided sleeve with one hand.
- With the other, take the end of the sensor at the electronics and pull it out through the braided sleeve.

Reassembly

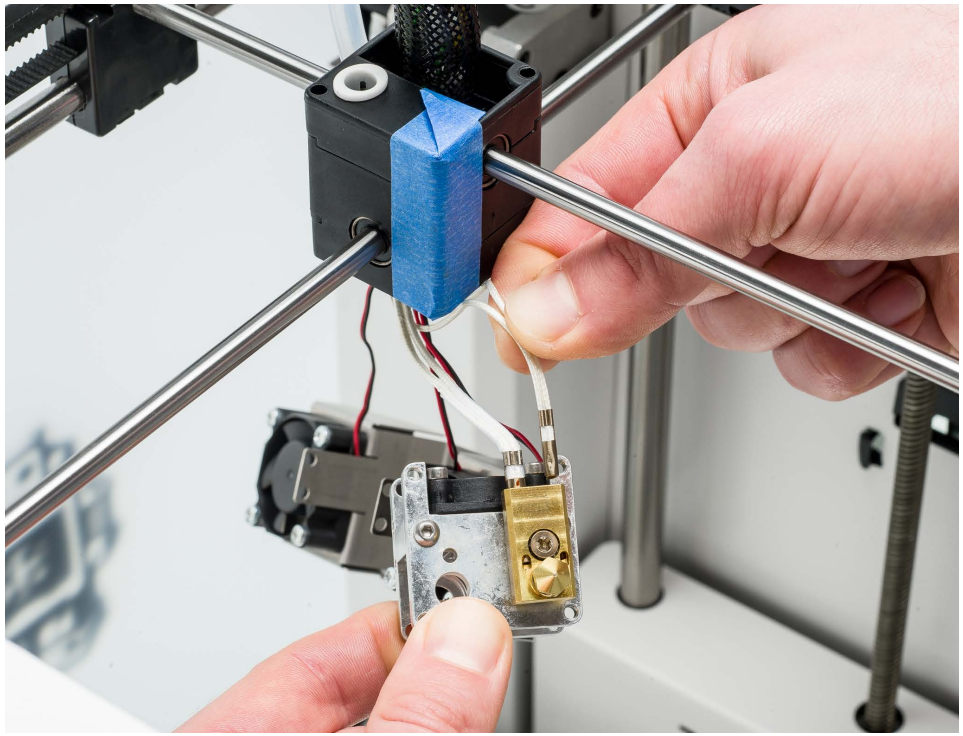


1. **Connect the new sensor**
- Take the plug of the new PT100 sensor and connect it to ‘TEMP1’ on the mainboard.

2. **Insert the sensor into the braided sleeve**
- Move the other end of the sensor through the hole in the corner of the bottom panel.
- Push the sensor through the shrink sleeve, into the braided sleeve.

Tip: *If you can’t access the end of the braided sleeve, you may need to remove the left motor cover. It is attached with two M3x10 bolts; one in the top of the left panel and one in the bottom of the back panel. Remove these bolts and take the motor cover out of the printer.*

Reassembly



3. **Forwards the wires through the braided sleeve**
- Push the sensor into the braided sleeve as far as possible.
- If the wires get stuck and can't be pushed any further, locate the metal end of the sensor inside the sleeve and pull it forward.
- Alternate between pushing and pulling if necessary, until it exits the print head.

4. **Insert the sensor into the heater block**
- Push the metal end of the sensor into the opening on the right side of the heater block, as seen from the back.
- Make sure the open side of the metal cuff is facing down.
- Use the Phillips screwdriver to tighten the countersunk bolt at the bottom of the heater block to secure the sensor.

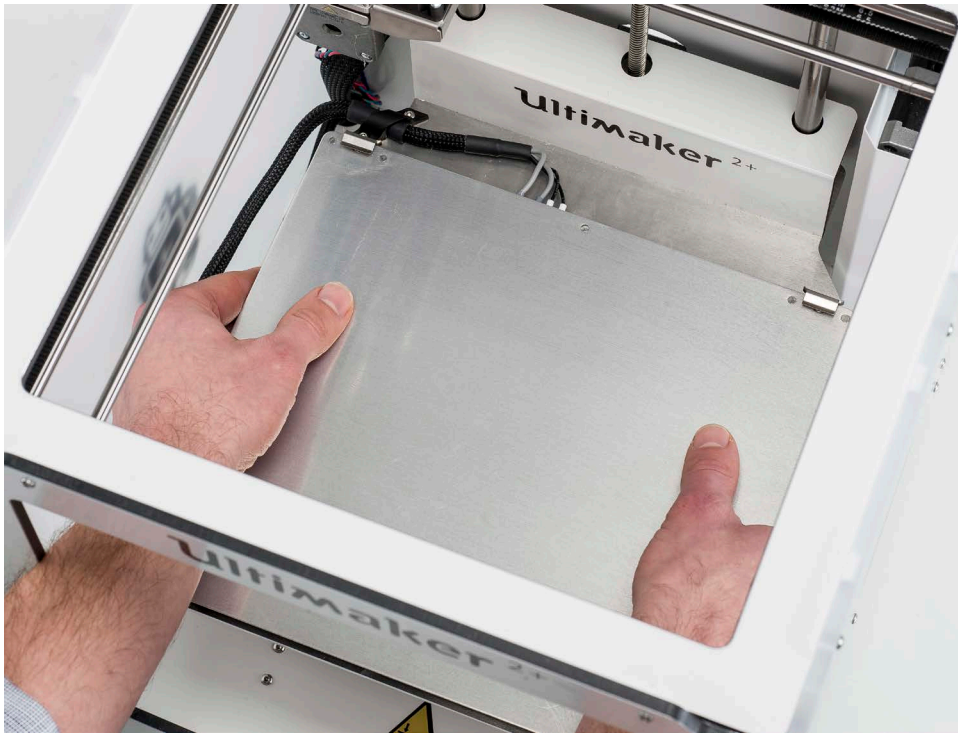
Tip: *Before tightening the countersunk bolt, make sure that the heater cartridge is still fully inserted. After tightening, gently pull at the heater and sensor to check if they are secure.*

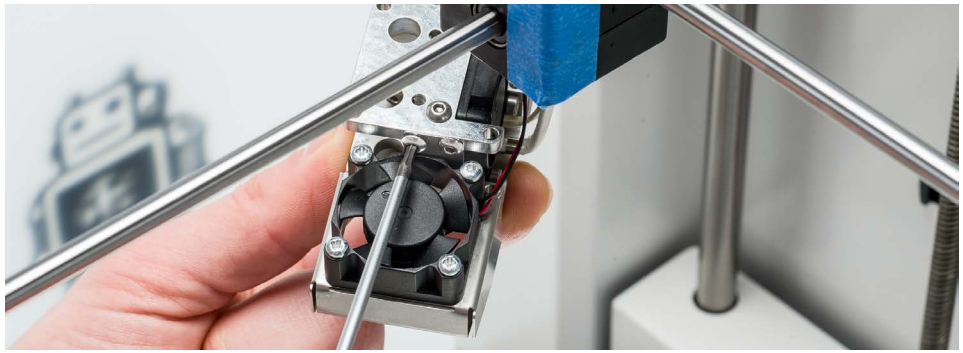
Reassembly

5. **Put the mainboard cover back in place**
- Slide the cover over the board at a slight angle and insert the two small tabs in the back panel. Make sure that no cables are stuck between the cover and the frame.
- Put the cover against the bottom panel, making sure that the two small tabs in the middle are inserted into the notches in the bottom panel and left panel.

6. **Secure the mainboard cover**
- Insert the two M3x12 bolts through the bottom panel from the inside of the printer.
- Hold the lock nuts in place with pliers or a socket wrench and tighten the two M3x12 bolts.

Reassembly





7. Place the printer upright

- Turn the Ultimaker 2+ upright again.
- Manually move the Z stage all the way down.

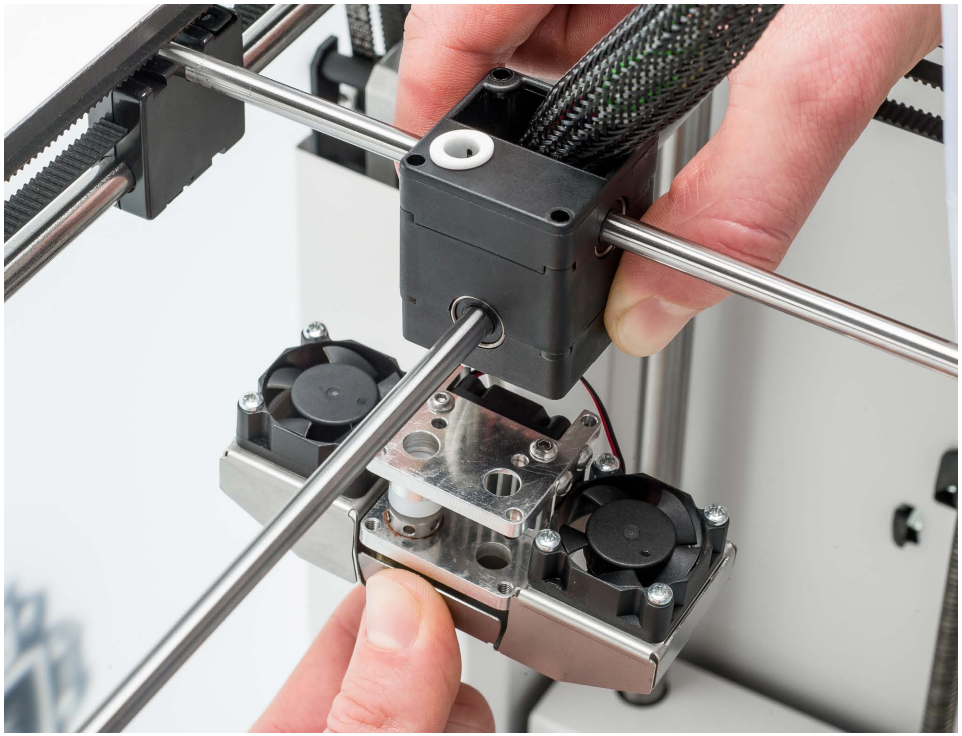
8. Attach the fan bracket to the hot end

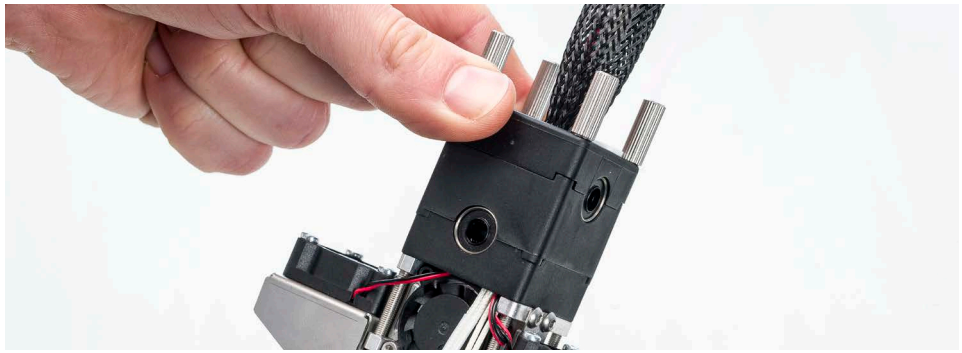
- Align the fan bracket with the hot end.
- Secure the fan bracket to the hot end with the four M3x4 bolts.

Caution: If the nozzle touches the sides of the hole in the fan bracket, the heat will spread throughout the complete bracket. This will make it harder for the Ultimaker 2+ to maintain its temperature during printing, which can lead to quality issues or error messages.

Tip: *To ensure that the nozzle is precisely in the middle of the hole in the fan bracket, first only loosely secure each of the four bolts. Look at the bottom of the print head to align the nozzle, then tighten the four bolts completely.*

Reassembly





9. Align the print head housing and the hot end

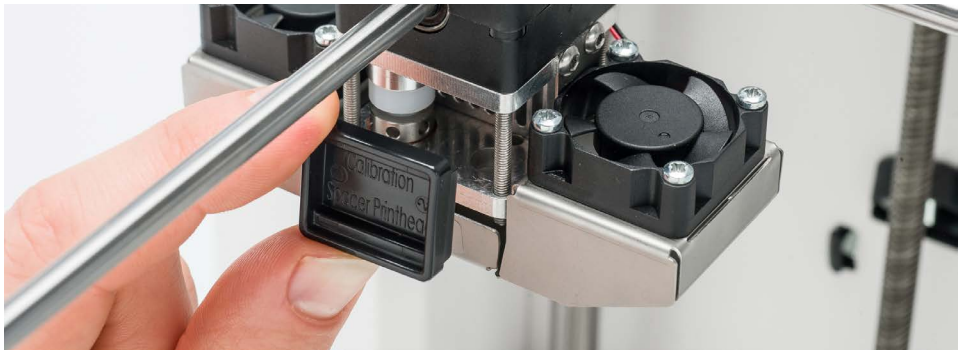
- Remove the tape from the print head housing.
- Move the hot end upwards to align it with the housing parts.

10. Attach the print head housing to the hot end

- Insert the four thumb screws.
- Screw them into the bottom aluminum plate, but only very loosely secure them.

Tip: *Make sure that all cables run neatly side by side and the fan wires are not behind the back two thumb screws.*

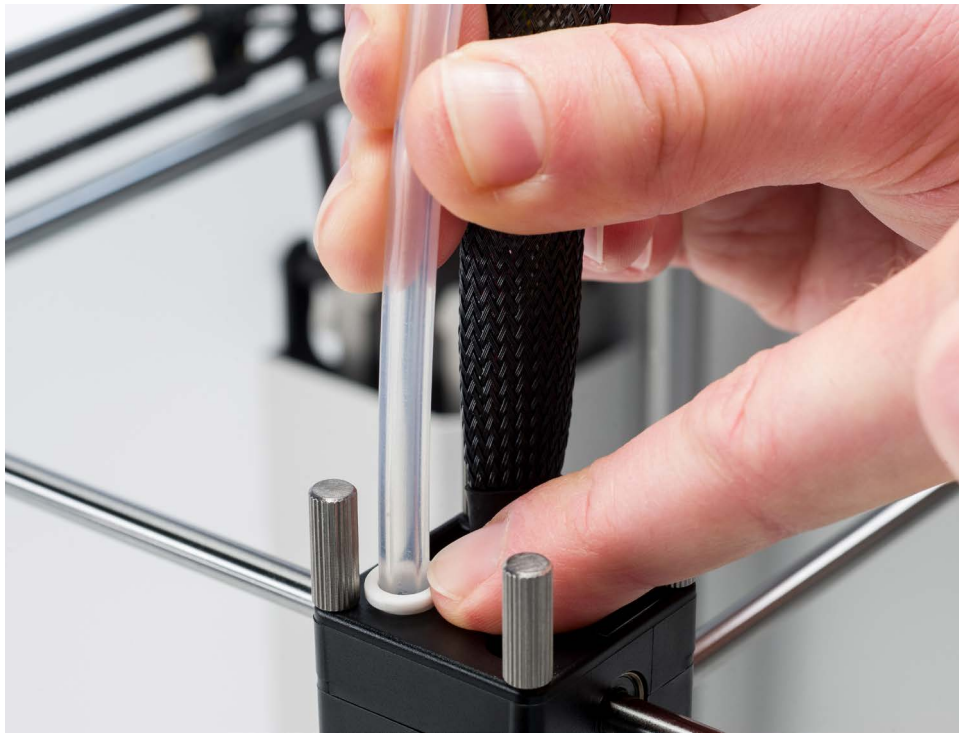
Reassembly



11. Tighten the thumb screws

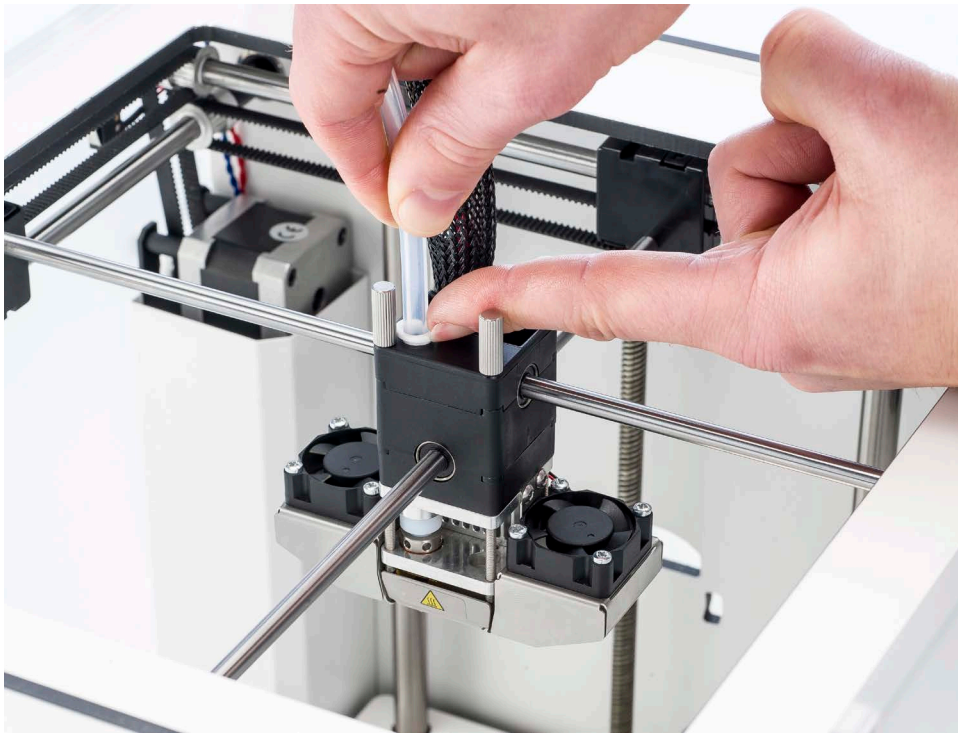
- Completely tighten the two thumb screws in the back by hand.
- To tighten the front two thumb screws, use the calibration spacer. Place the tool in between the aluminium plates of the hot end.
- Tighten the front two thumb screws until the tool fits securely between the plates, but can still easily be removed.

Caution: The print head alignment aid is very important to set the correct pressure on the hot end. Securing the print head too loosely may lead to leakages, while overtightening the thumb screws will decrease the lifespan of the TFM coupler.



12. Insert the Bowden tube

- Press down on the tube coupling collet in the print head.
- Push the Bowden tube all the way in.



13. Ensure the Bowden tube is correctly inserted

- Let go of the tube coupling collet and gently pull the Bowden tube, along with the tube coupling collet, approximately 2 mm upwards.
- Hold the tube coupling collet up with your fingernail.
- While holding the tube coupling collet up, push the Bowden tube down again.

Note: This step ensures that the end of the Bowden tube connects correctly to the TFM coupler. This prevents room between the parts as well as play on the Bowden tube.

14. Secure the clamp clip

- Place the blue clamp clip around the tube coupling collet to secure the Bowden tube.

Tip: *If you removed the left motor cover earlier, don't forget to put it back in place. Click the cover's tabs into the bottom panel and secure the cover in place with the two M3x10 bolts.*