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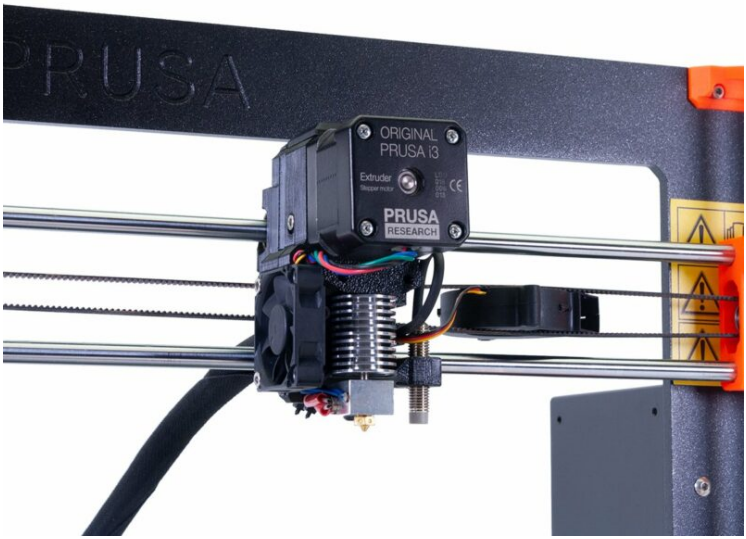
How to replace a heatbreak/heatsink/heaterblock (MK3S+/MK3S/MK2.5S/MMU2S)



help.prusa3d.com/g16104

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How to replace a heatbreak/heatsink/heaterblock (MK3S+/MK3S/MK2.5S/MMU2S)

STEP 1 Introduction

This guide will take you through the replacement of the **heatsink**, **heatbreak** and **heaterblock**.

- **The guide is compatible with printers:**
  - Original Prusa i3 MK3S+
  - Original Prusa i3 MK3S
  - Original Prusa i3 MK2.5S

  Some parts might slightly differ. However, it does not affect the procedure.
- All necessary parts are available in our eshop shop.prusa3d.com

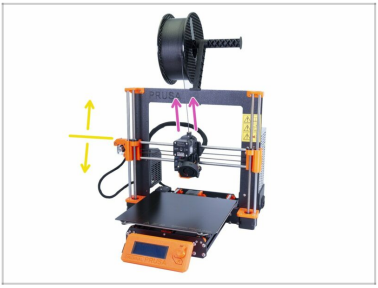
NOTE: Read the instructions carefully. Some steps may vary depending on the type of replacement part.

STEP 2 Tools necessary for this guide

- **To replace hotend parts, please prepare:**
- Needle-nose pliers for zip ties (1x)
- Wrench size 16 EU / 0.63"
- Allen keys - 2.5/2.0/1.5 mm (1x)
- Torque wrench (1x)
- Standard Socket size 7mm EU / 1/4" US (1x)
- Cloth or piece of fabric *15x15cm* (2x)

ⓘ The torque wrench has to be set to values around 2-3 Nm and is critical for the proper tightening of the nozzle. You can use a regular wrench, but there is a risk of damaging the hotend.

STEP 3 Prepare the printer

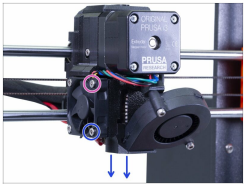
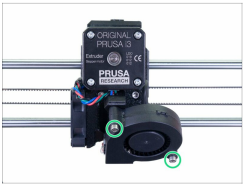
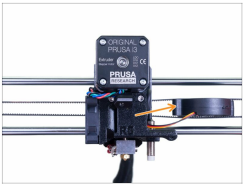


Make sure that:

- The filament is unloaded from the hotend (remove also the spool and the spool holder).
- X-axis with the extruder is slightly above the middle of the height (Z-axis) of the printer.

CAUTION: In some steps, you will need to preheat the printer. **Avoid touching the HOT parts!**

STEP 4 Partial disassembly of the extruder

⚠ **In this guide, we won't disassemble the extruder completely.** Thanks to the new design, it is enough to release the screws and move the plastic parts slightly apart.

- Release and remove the M3x14 screw from the hotend fan.
- Release and remove the M3x20 (M3x18) screw from the hotend fan. Note that the fan-shroud might fall off.

ⓘ Leave the other two screws holding the hotend fan in place. No need to remove them.

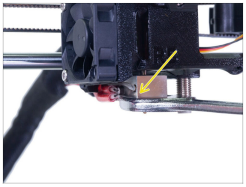
- Release and remove both screws and remove the Front print fan.
- Carefully insert the Front print fan in the X-axis belt.

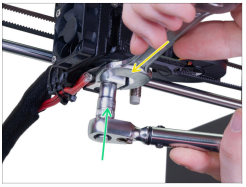
STEP 5 Preheating the nozzle

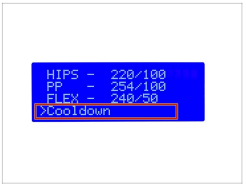
WARNING: This and the next step are not intended for the HEATSINK replacement! Skip to Protecting the heatbed

- On the printer's screen navigate to the **Settings**.
- Open the **Temperature** menu.
- Set the **nozzle** temperature to **275 °C** by turning the knob.

STEP 6 Releasing the nozzle





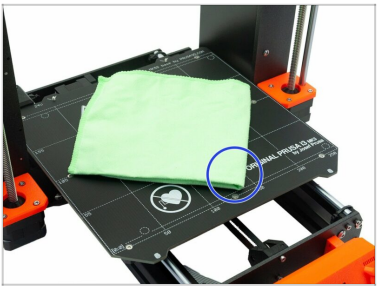


⚠ **WARNING:** Avoid touching the **HOT nozzle!!!**

- Set the torque wrench to 3 Nm (26.5 in-lb).
- Some torque wrenches are not intended for loosening. **Read the instructions for your torque wrench.** Alternatively, you can use a ratchet or a side wrench size 7 mm / 0.28".
- With one hand, hold the heaterblock using the wrench size 16 (0.63"). **Place the wrench under the cables to avoid damage.**
- With the other hand, use a torque wrench, place it on the nozzle and slightly loosen it. **Do not remove the nozzle at the moment.**
- Navigate to the Preheat menu and at the end of the menu select **Cooldown.**

⚠ **Wait for 15 - 20 minutes to ensure the hotend is cooled down completely before proceeding to the next step.**

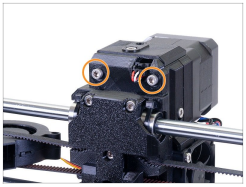
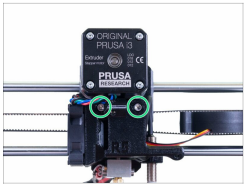
STEP 7 Protecting the heatbed

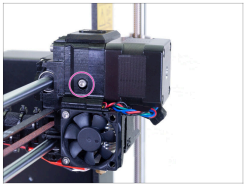


Turn the printer off and unplug it!

- **Before these steps, it is recommended to protect the heatbed!**
- Take off the flexible steel sheet.
- Use any cloth or piece of fabric, which is thick enough and cover the heatbed. This will ensure you won't damage (scratch) the surface during the disassembly.

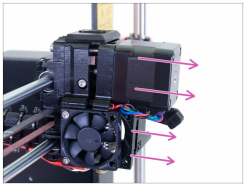
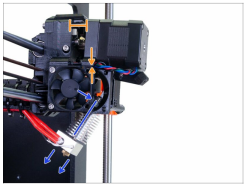
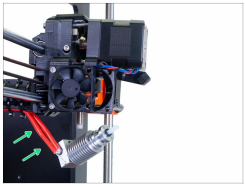
STEP 8 Partial disassembly of the extruder



- **In this guide, we won't disassemble the extruder completely.** Thanks to the new design it is enough to release the screws and move the plastic parts slightly apart.
- Release both screws, but don't remove them. We will use them to hold the extruder parts together.
- Release both screws, but don't remove them. Just make sure they won't block the motor from moving.
- Release the idler screw on the side to disengage it from the idler door.

STEP 9 Partial disassembly of the extruder

⚠ Before you move any parts, make sure there is enough slack in the extruder motor cable!!!

ⓘ If not, you have to cut the zip ties on the textile sleeve, open the box with electronics and make sure the motor cable is free to move.

- Carefully move the extruder apart. First, pull the motor, then the lower part with the print fan.
- Create a gap similar to the picture. Align the printed part holding the motor with the edge of the fan frame.
- Reach for the hotend and incline its upper part towards the motor, it should slide out.

ⓘ If the hotend is still stuck inside, release the screws more and extend the gap between the printed parts.

- **BE EXTRA CAUTIOUS** with the hotend cables!!! You can break them! Use a small force to pull the hotend out. Don't bend the cables.

STEP 10 Guidepost

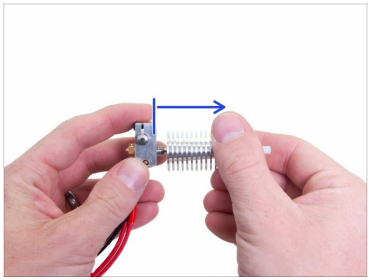


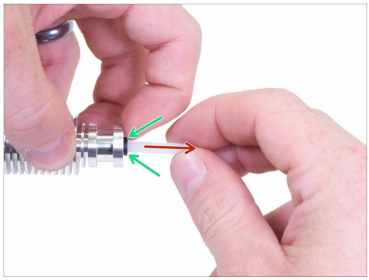
- **Choose the guide for the part you need to replace:**
  - Heatbreak replacement
  - Heatsink replacement
  - Heaterblock replacement

STEP 11 Heatbreak replacement - parts preparation


- **For the following steps, please prepare:**
  - New heatbreak (1x)
  - Thermal paste (1x)

STEP 12 Removing the PTFE tube

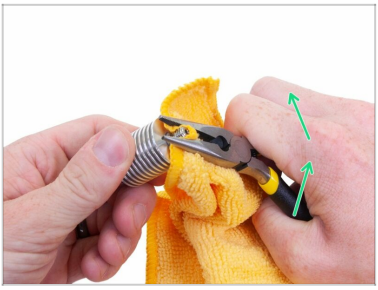




⚠ **Before you continue with this step, make sure the nozzle is loose.**

- Hold the heaterblock with one hand and start screwing the heatsink with the heatbreak out.
- With the heatbreak out, press the black plastic collet down to release the PTFE tube.
- Pull out the PTFE tube from the heatsink.

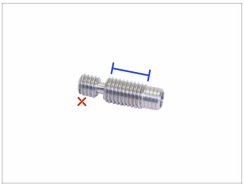
STEP 13 Removing the heatbreak

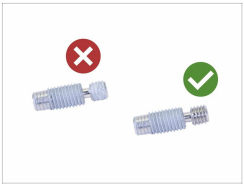


⚠ Use the second cloth to **protect the thread** of the heatbreak.

- Hold the heatsink and using pliers release and remove the heatbreak.
- We are done with removing the old heatbreak, let's move to the next step and install a new one ;)

STEP 14 Applying the thermal paste





- **Take the new heatbreak** and apply most of the content of the thermal paste package on the long thread. Spread it evenly with a paper towel.

⚠ **Do not apply the paste on the short thread!:**

- **Incorrect application:** the thermal paste is covering both threads of the heatbreak.
- **Correct application:** the thermal paste is covering on the long thread of the heatbreak.

ⓘ Applying the paste on the short thread can later lead to a gap between the heatbreak and the nozzle. The nozzle might then become clogged when the filament is loaded.

STEP 15 Placing the heatbreak back in

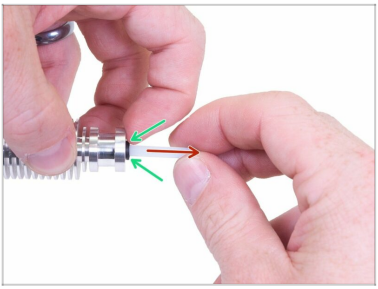
- Screw the long thread of the heatbreak (with the paste) into the heatsink. Ensure the entire thread is screwed in.
- After you screw the heatbreak in, clean the excess paste on the surface of the heatsink.
- **To finish the replacement process** jump to Reassembly of the hotend

STEP 16 Heatsink replacement - parts preparation

- **For the following steps, please prepare:**
  - New heatsink (1x)
  - Thermal paste (1x)

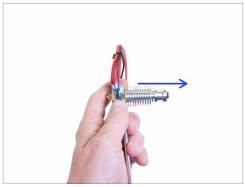
ⓘ The heatsink includes a new black plastic collet, don't use the old one.

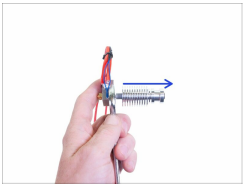
STEP 17 Removing the PTFE tube

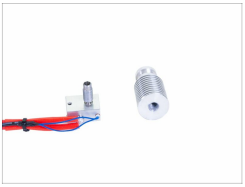


- Press the black plastic collet down to release the PTFE tube.
- Pull out the PTFE tube from the heatsink.

STEP 18 Removing the old heatsink







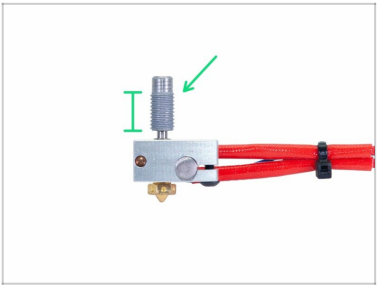
- Hold the heaterblock with one hand and start screwing the heatsink out.

⚠ **Avoid loosening the heatbreak from the heaterblock!**

ⓘ To hold the heaterblock firmly we recommend using the wrench size 16 (0.63"). **Keep the wrench away from the cables to avoid damage.**

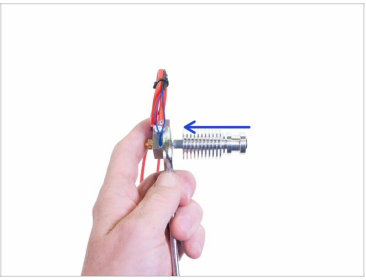
- We are done with removing the old heatsink, let's move to the next step and install a new one ;)

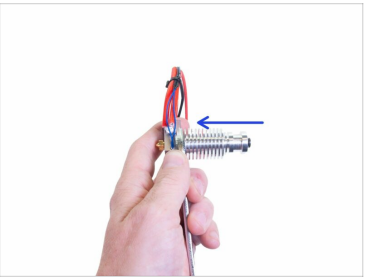
STEP 19 Applying thermal paste



- Before we install the new heatsink, clean the old thermal paste from the heatbreak.
- Apply most of the content of the thermal paste package on the longer heatbreak thread. Spread it evenly with a paper towel.

STEP 20 Reassembly of the hotend



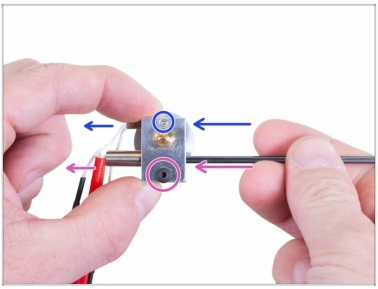


- **Screw the new heatsink** on the heatbreak. Make sure the heatbreak is all the way in the heatsink.
- After you screw the heatbreak in, clean the excess paste on the surface of the heatsink.
- **To finish the replacement process** jump to Assembling the PTFE tube

STEP 21 Heaterblock replacement - parts preparation

- **For the following steps, please prepare:**
  - New heaterblock (1x)

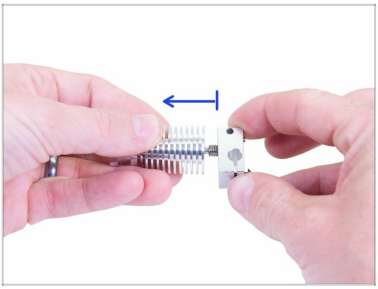
STEP 22 Disassembly of the hotend



⚠ **WARNING:** Do not pull the thermistor or heater cables. Follow the instructions!

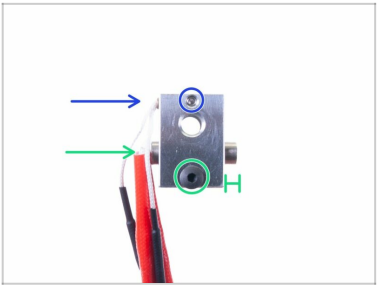
- Release the thermistor screw with the 1.5mm Allen key. Using the Allen key gently push the thermistor out.
- Release the heater screw with the 2.0mm Allen key. Using the Allen key gently push the heater out.

STEP 23 Disassembly of the hotend



- Remove the nozzle from the heaterblock and keep it for later use.
- Hold the heaterblock with one hand and start screwing the heatsink out.
- We are done with removing the old heaterblock, let's move to the next step and install a new one ;)

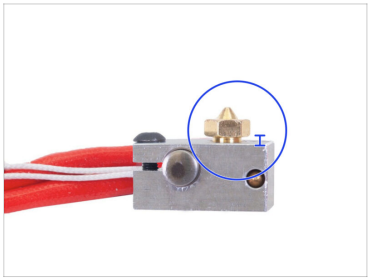
STEP 24 Reassembly of the hotend

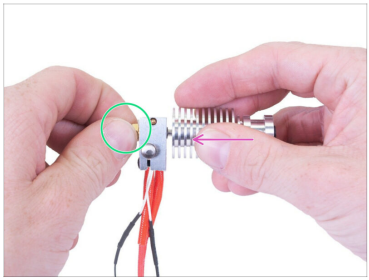


- Insert the thermistor to **the new heaterblock** and secure by tightening the lock screw.
- Then insert the heater to the heaterblock and secure it by tightening the black screw. **Make sure the heater hangs over on the right side**, see the picture.

⚠ Ensure both **thermistor and the heater** are **properly inserted** and **tightened!**

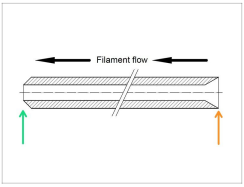
STEP 25 Reassembly of the hotend





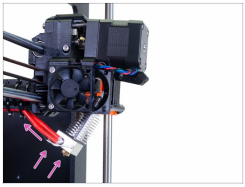
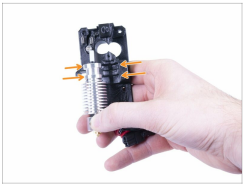
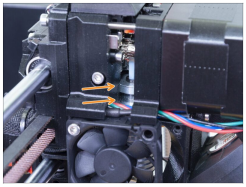
- Screw the nozzle slightly in the heaterblock. Create a gap about 0,5 mm (0.02 inch), see the picture.
- Secure the nozzle against movement with one hand.
- With the other hand, screw the heatbreak with heatsink into the heaterblock from the opposite side until it touches the nozzle inside. **Do not tighten anything by torque wrench at the moment.**

STEP 26 Assembling the PTFE tube



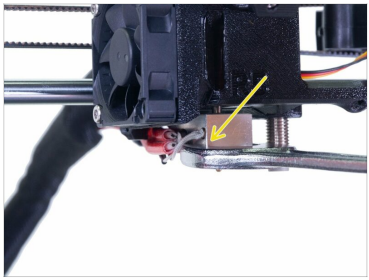

- Now it is time to insert the PTFE tube back in. Note, that each end of the tube is different:
  - One end of the tube has **"rounded" outer edge.** This end must be **inside the hotend.**
  - Look at the other end, where the tube is drilled inside, the shape of the **edge is "conical".** This is the side, where filament enters the tube. This part must be **outside the hotend**.
- Push the black collet in. Slide the tube all the way in and hold it!
- Using the other hand pull the collet out and only then release the tube!!! **THIS IS CRUCIAL** for the hotend to work properly.

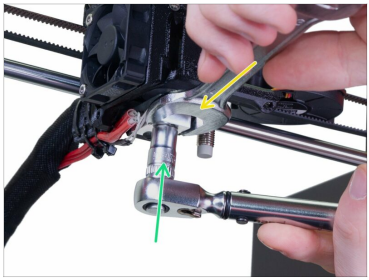
STEP 27 Reassembly of the extruder

- Place the hotend back inside the extruder. Ensure the orientation is the same as in the picture with cables on the left side.
- **IT IS CRUCIAL** to ensure the hotend fits to the extruder-body!!! The printed part is shaped according to the hotend. See the second and the third picture!

STEP 28 Tightening the nozzle





⚠ **WARNING: This step is not intended for the HEATSINK replacement!** Skip to the next step.

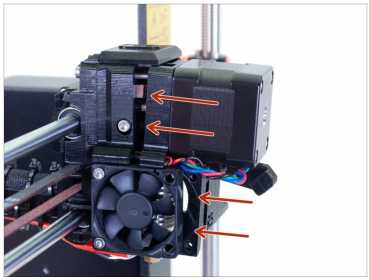
- Plug the printer in, turn it on and preheat the nozzle to 250 °C.

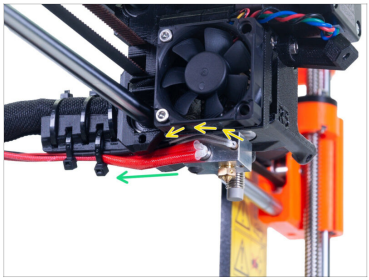
⚠ **WARNING:** Avoid touching the **HOT nozzle!!!**

- Set the torque wrench to 2.5Nm (22 in-lb).
- With one hand, hold the heaterblock using the wrench size 16 (0.63"). **Place the wrench under the cables to avoid damage.**
- With the other hand, use a torque wrench, place it on the nozzle and tighten it.
- Navigate to the Preheat menu and at the end of the menu select **Cooldown**.

⚠ **Wait for 15 - 20 minutes to ensure the hotend is cooled down completely before proceeding to the next step.**

STEP 29 Reassembly of the extruder

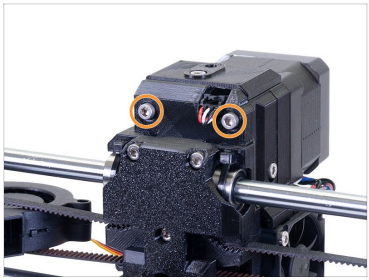


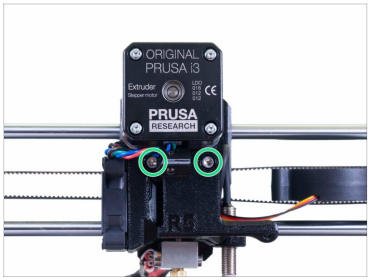


⚠ Carefully and slowly push all the parts together. **In case of any significant resistance, STOP** immediately and check, which part is blocking the movement.

- **Check once again the correct position of the hotend.** Look from below the extruder. The heater block should be oriented as shown in the picture.
- Make sure the hotend thermistor cables (thinner pair) are going above the heater cables. If not, guide them according to the picture.

STEP 30 Reassembly of the extruder

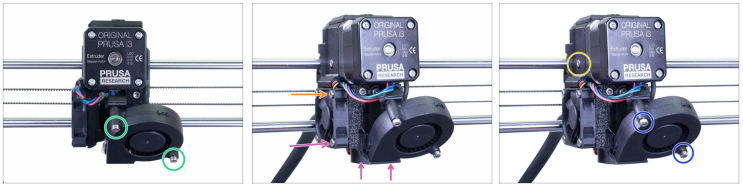




- Tighten both screws, but **ensure no cable is pinched** on both sides of the extruder.
- Repeat the same approach on the front side. Tighten both screws. **Ensure no cable is pinched.**

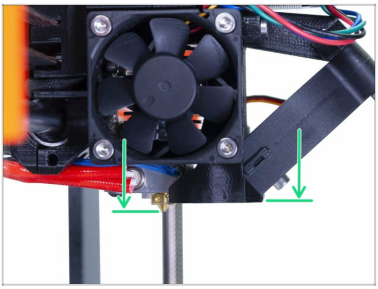
⚠ Ensure all the parts of the extruder are tight and not moving. **Pay special attention to the hotend!**

STEP 31 Reassembly of the extruder



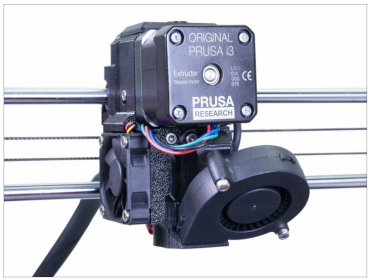
- Fix the fan in place using two M3x20 screws. Tighten both screws just slightly, we need to adjust other parts before fully tightening them.
- Use the M3x14 screw to fix the fan in place. Don't overtighten it, you can break the fan's plastic casing.
- Place fan-shroud back in the extruder. Fix it in place with the M3x20 (M3x18) screw.
- Once all parts are seated, tighten both screws on the front Print fan, but be careful, you can break the plastic casing.
- Tighten up the idler screw until it is approximately flush with the plastic part to set the idler tension.

STEP 32 Reassembly of the extruder



- Take a look from the side of the extruder. The nozzle should be slightly below the printed fan-shroud.
- The flat part of the fan shroud has to be parallel to the heatbed surface.
- Now, please follow the instructions for the First Layer Calibration (i3).

STEP 33 It is done!



- **Great job!**
- Heat the printer up and try it out ;)

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