Bear Lab

4. Adjustments

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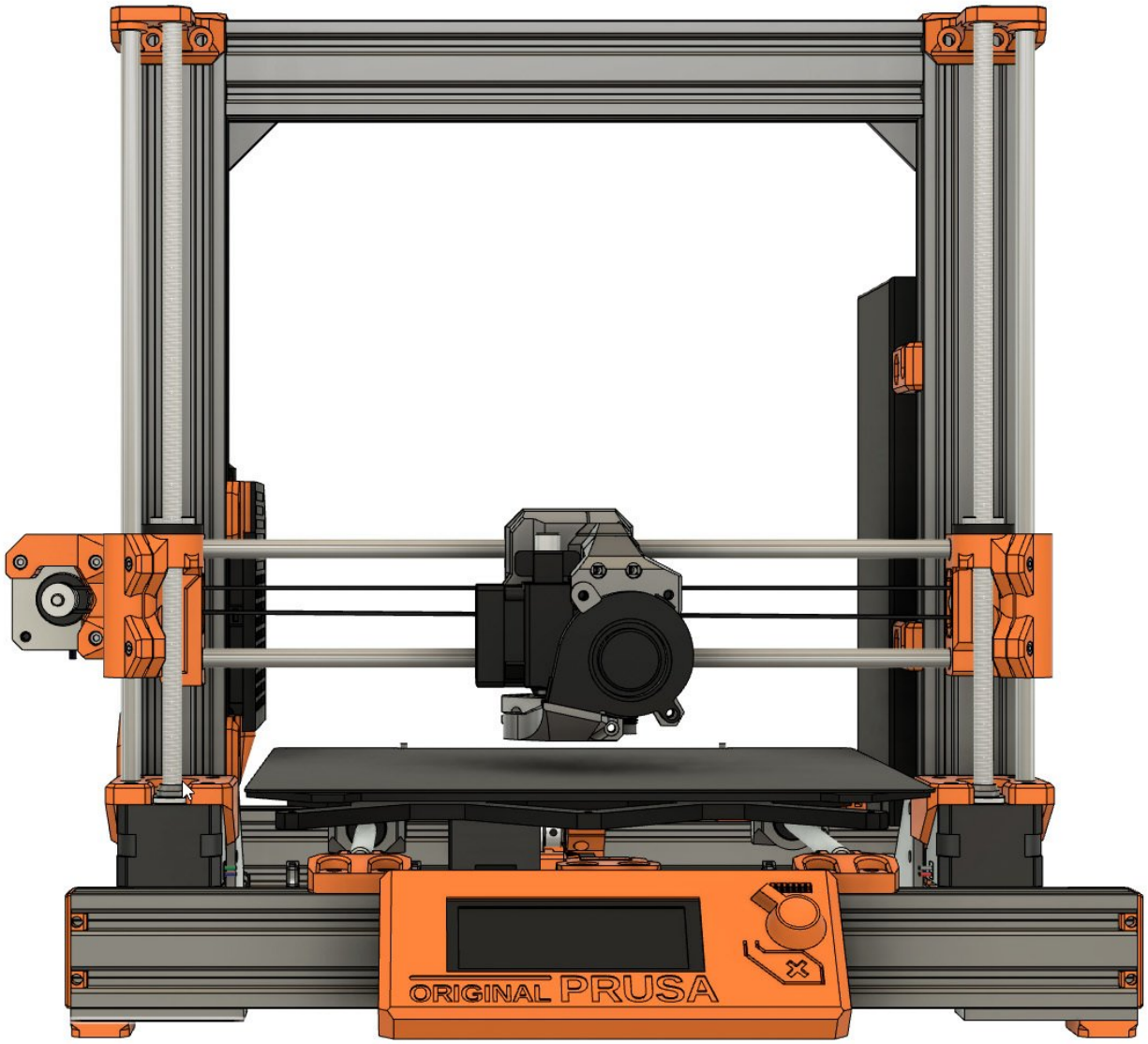
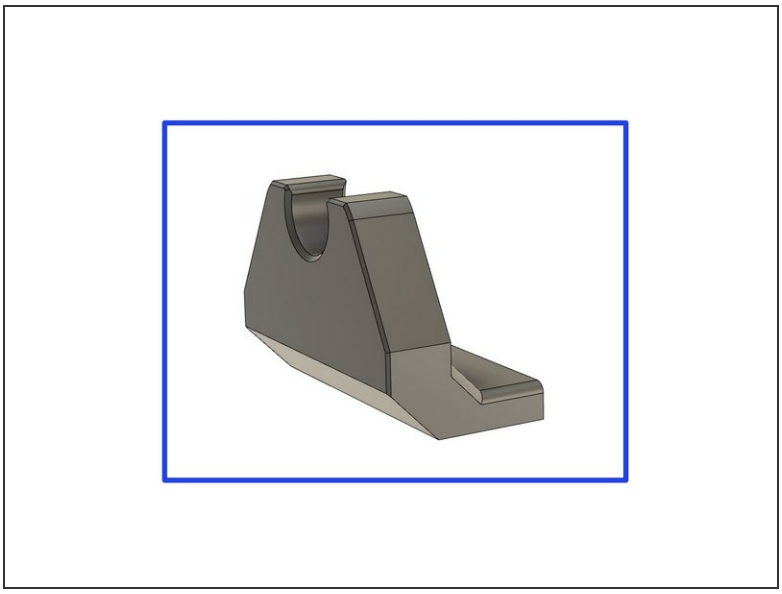
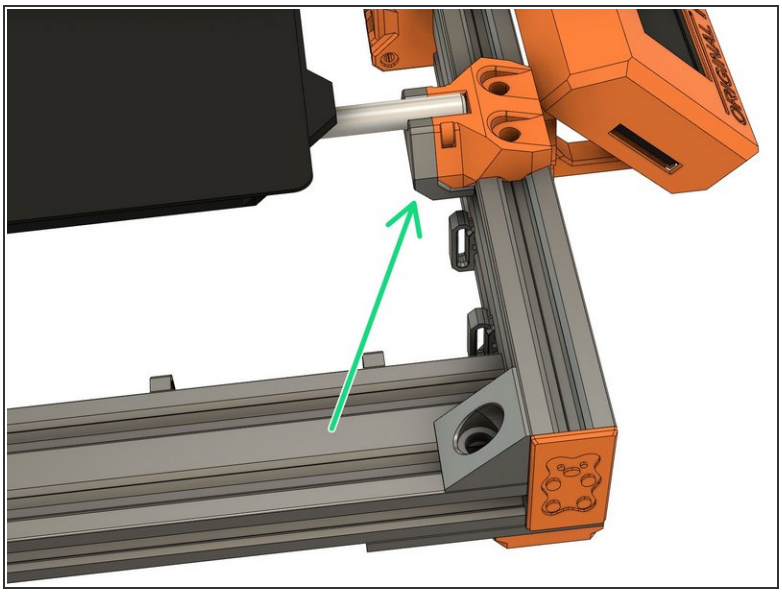


Step 1 — Y axis end stop



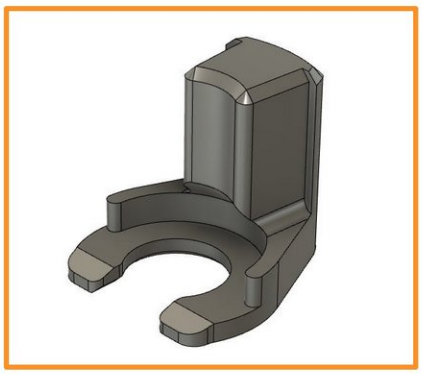


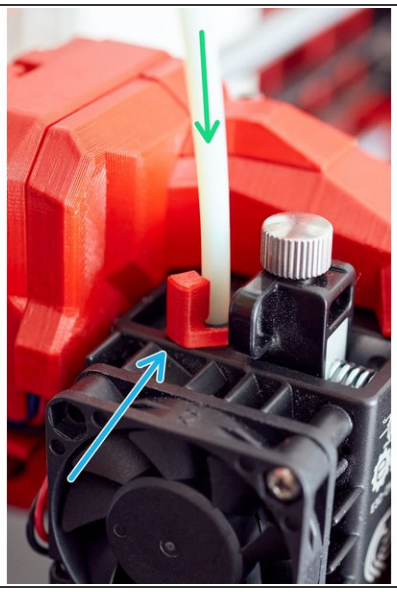
⚠ This step is only for Bear frame MK2.5(S) and MK3(S).

- *y_axis_end_stop*
- Clip the *y_axis_end_stop* on the left smooth rod, at the front, as shown in the image

ⓘ This part prevents the PINDA to crash into the screws on the back of the heated bed for MK2.5(S) and MK3(S)

Step 2 — PTFE collet clip

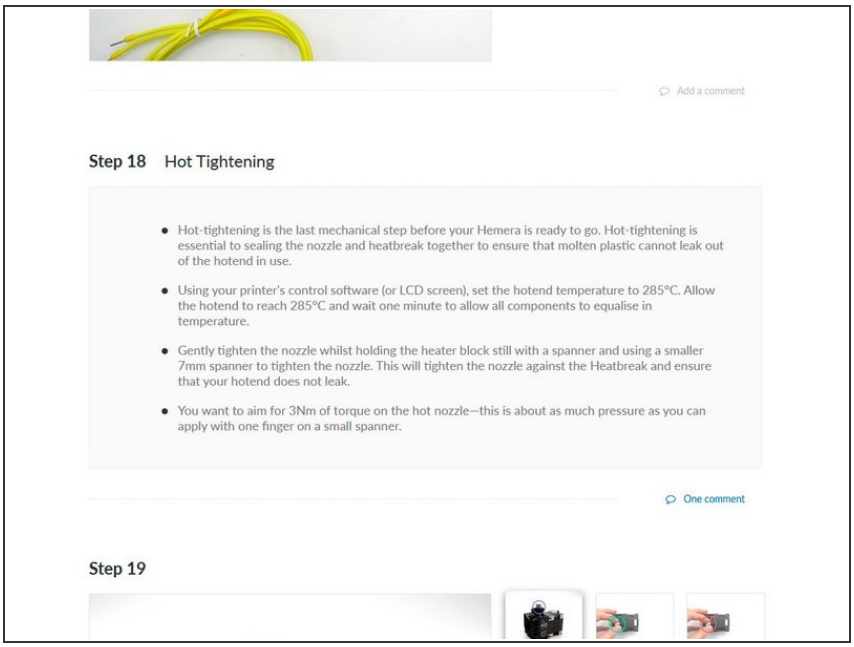




- *ptfe_collet_clip*
- Slide a PTFE tube into the collet. The length does not matter. The end needs to be cut flush.
- Move up the collet while keeping the PTFE in place. Clip the *ptfe_collet_clip* to secure the collet.

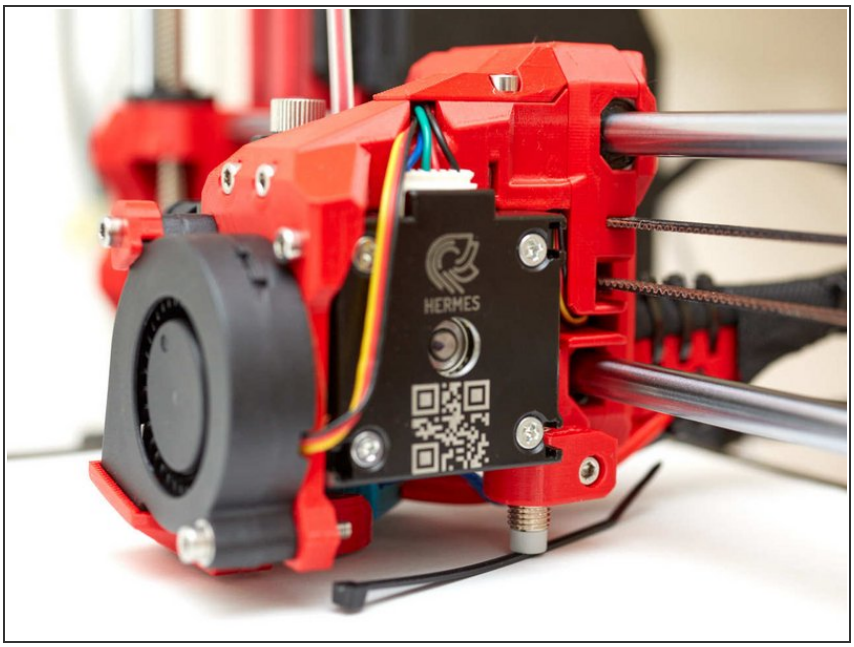
The *ptfe_collet_clip* isn't mandatory, you can use the Hemera without it. We recommend to use it if you like to have to have things tight and secure

Step 3 — Hot tightening the nozzle



- Hot-tighten the Hemera nozzle to 3Nm at 285°C. Follow the official instructions of the E3D Hemera assembly guide here (step 18): https://e3d-online.dozuki.com/Guide/02+-...

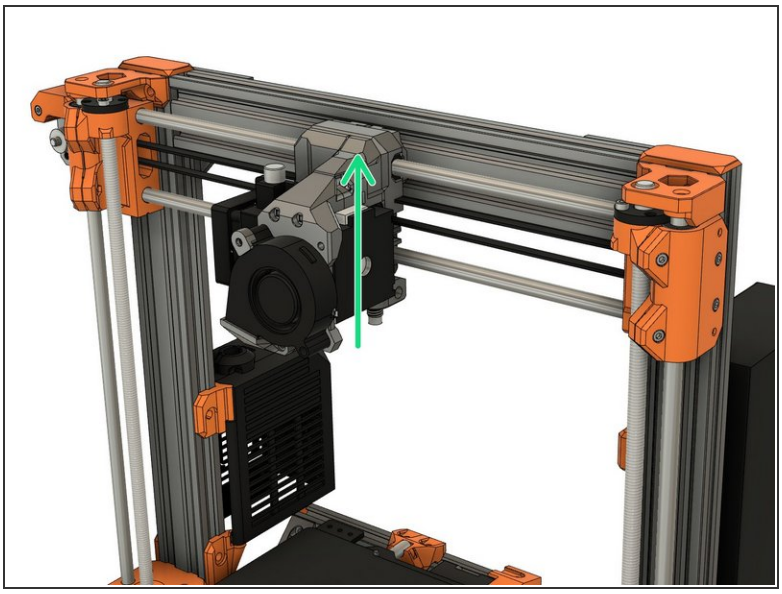
Step 4 — PINDA probe height adjustment

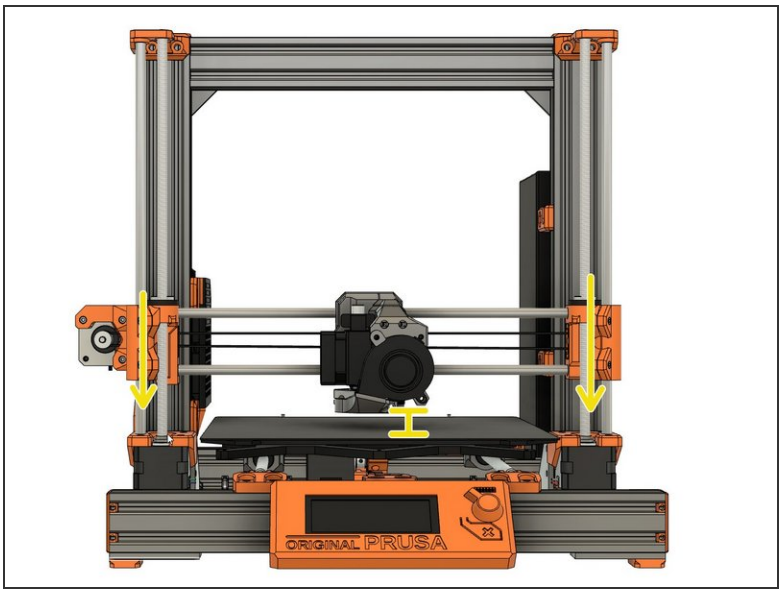


- Let the extruder cool down.
- Place a sheet of paper on the heated bed. Manually lower the X axis until the Hemera nozzle is touching the paper.
- Make sure the X axis is flat (you can slowly move the Hemera left and right while looking at the nozzle distance from the bed).
- Loosen the PINDA locking screw and place an object of 1mm thickness under the Pinda (like the middle section of a zip tie).
- Gently move the PINDA down until it is touching the zip tie.
- Tighten the PINDA locking screw to secure it in place.

ⓘ Use a plier if it is hard to reach the probe with your fingers during adjustment.

Step 5 — Trapezoidal nuts adjustment



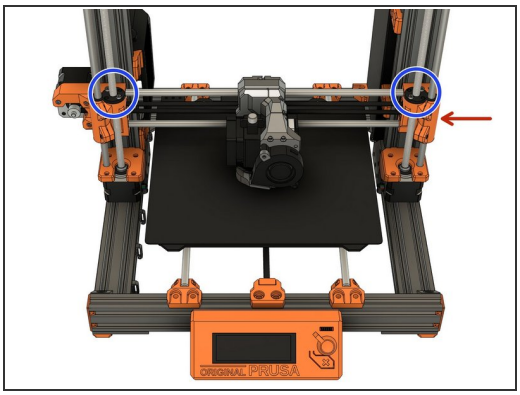
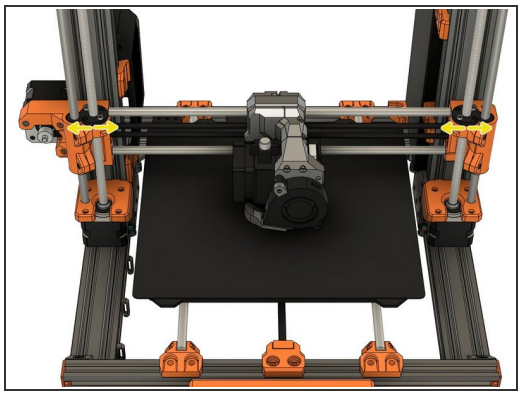
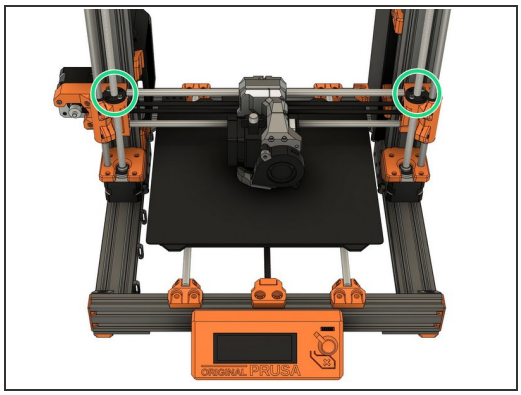


- Plug in and turn on the printer
- Using the screen menu, move the X axis up until it crashes into the Z tops. The stepper motors will skip, making a noise - this will not damage the motors
- Using the screen menu, move the X axis down until the nozzle is approximately 10mm from the heated bed

ⓘ If the X axis is stopping before crashing into the Z tops, move the X axis a little further down and power cycle your printer. You will then be able to complete the step

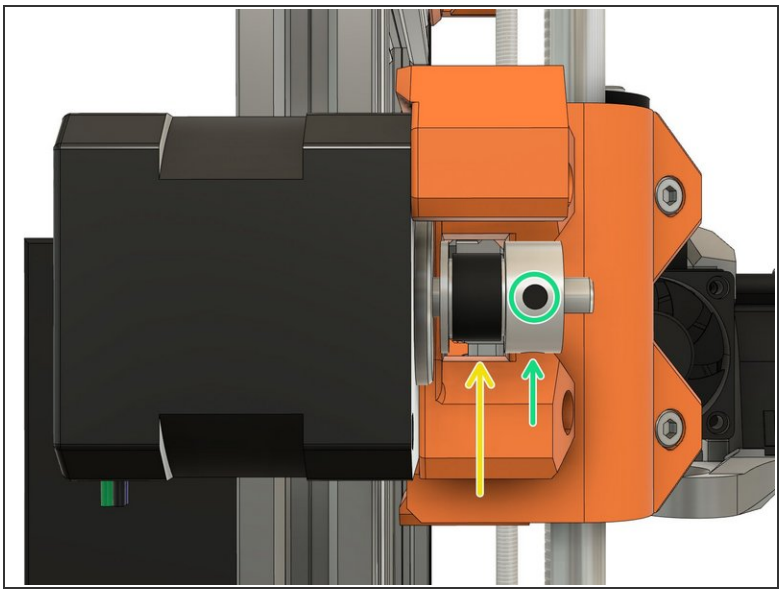
ⓘ It is possible that with the weight of the Hemera the X axis is moving down on one side **when the printer is off** for some time. If this happens, move the X up until it crashes as explained here. Note that his can also happen to stock Prusa printer (and so stock Prusa extruder)

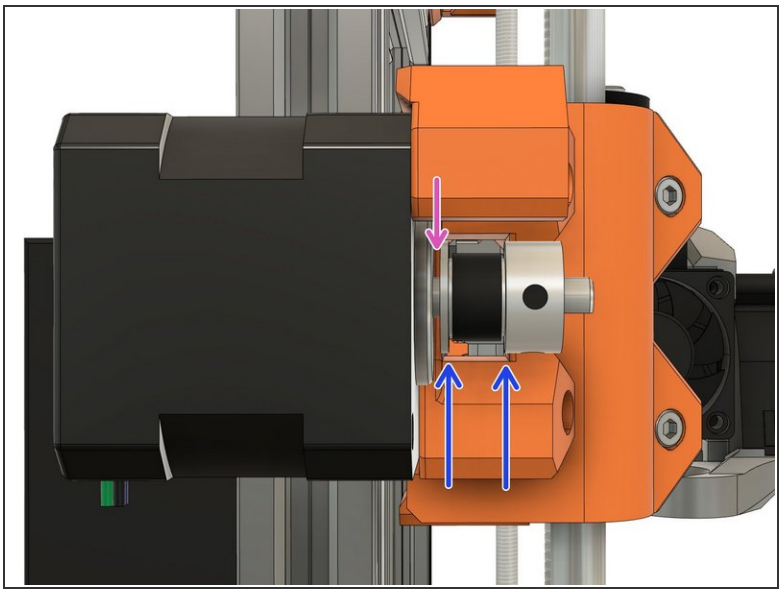
Step 6 — Trapezoidal nuts adjustment

- If you have applied tension to the belt, unscrew the belt tensioner on *x_end_idler* until the belt is relaxed.
- Loosen the screws that secure the trapezoidal nuts. This is to ensure that the Trapezoidal nuts 'self-centre' on the lead screws.
- Make sure the trapezoidal nuts are moving freely.
- Alternate between all 4 screws evenly while tightening (alternate between both sides during the process). Don't apply any lateral force on the trapezoidal nuts.

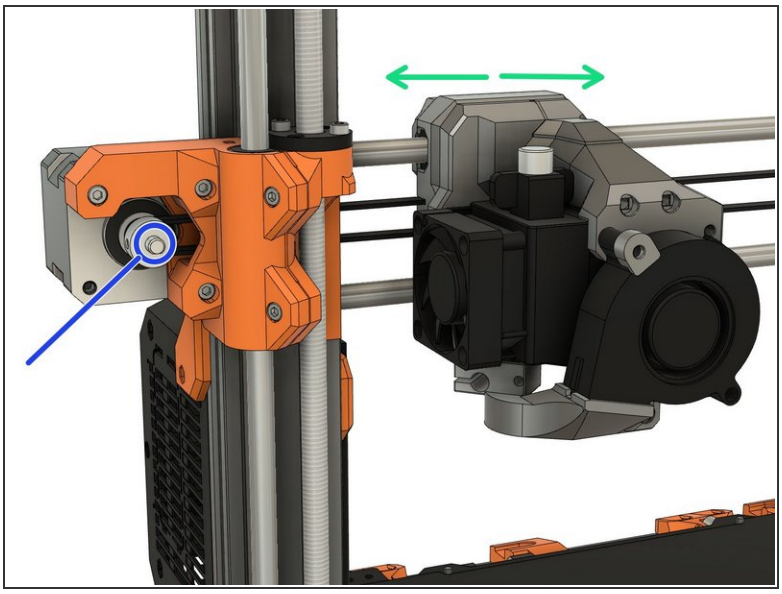
Step 7 — Belt tension

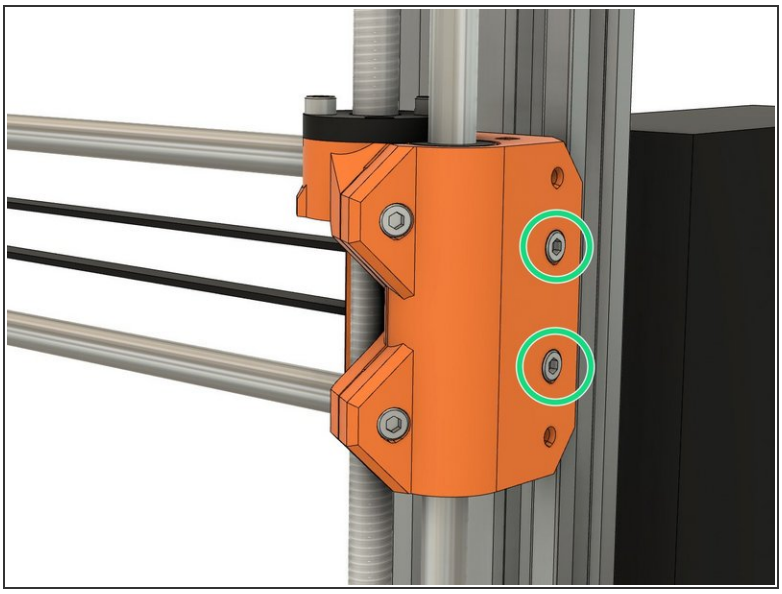




- Loosen the two pulley set screws a little.
- Align the pulley with the belt hole of the *x_end_motor*.
- Tighten the set screws alternately.
- Verify that the belt is not touching the *x_end_motor*.
- Verify that the drive pulley is not touching the X motor.

Step 8 — X smooth rods tension

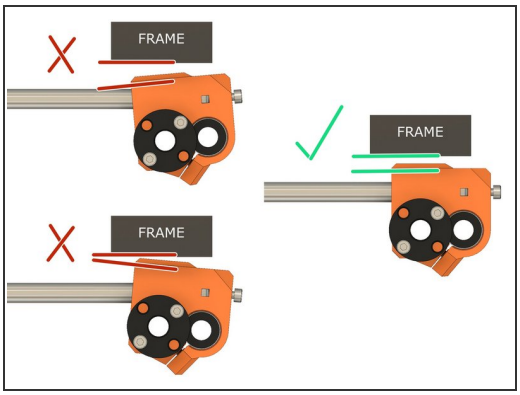


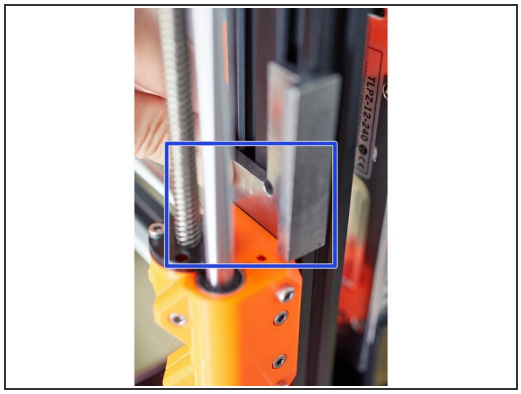


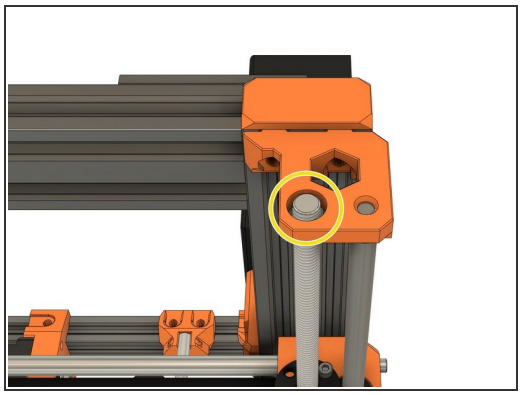
- Grip the X motor shaft with pliers to prevent it moving (grab the flat side of the shaft).
- Tension the belt, by tightening the screws in the *x_end_idler*. Do this while trying to move the extruder to the left or right. The belt should stay straight and should not bow up and skip over the drive pulley teeth.

ⓘ No need to be very precise with the belt tension here as the final tension will be improved in a further step.

Step 9 — X axis length



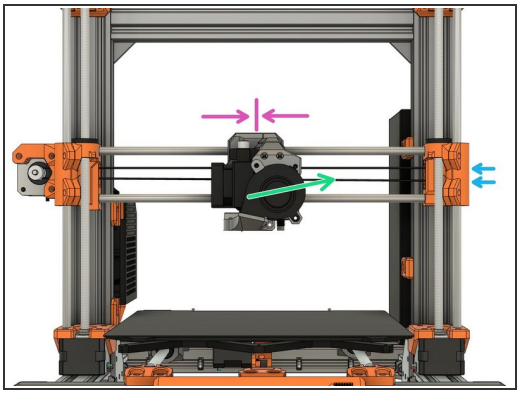




Not all X axis have the exact same length because of tolerances. This step will adjust the X end idler to your X axis length.

- Adjust both M3x10 screws to have the *x_end_idler* parallel to the frame.
  - First image, top left: shows when the X axis is too short. In this case you need to tighten the two M3x10 screws.
  - First image, bottom left: shows when X axis is too long. In this case you need to unscrew the two M3x10 screws.
- If you have difficulty to see if the x_end_idler is parallel to the frame you can use a thick ruler or a square like on the first image.
- It might happen that with excess tension on the M3x10 screws, the Z smooth rods will start to be off center on the Z tops. In this case release tension on the M3x10 screws even if the *x_end_idler* is not totally parallel to the frame.

Step 10 — Belt tension

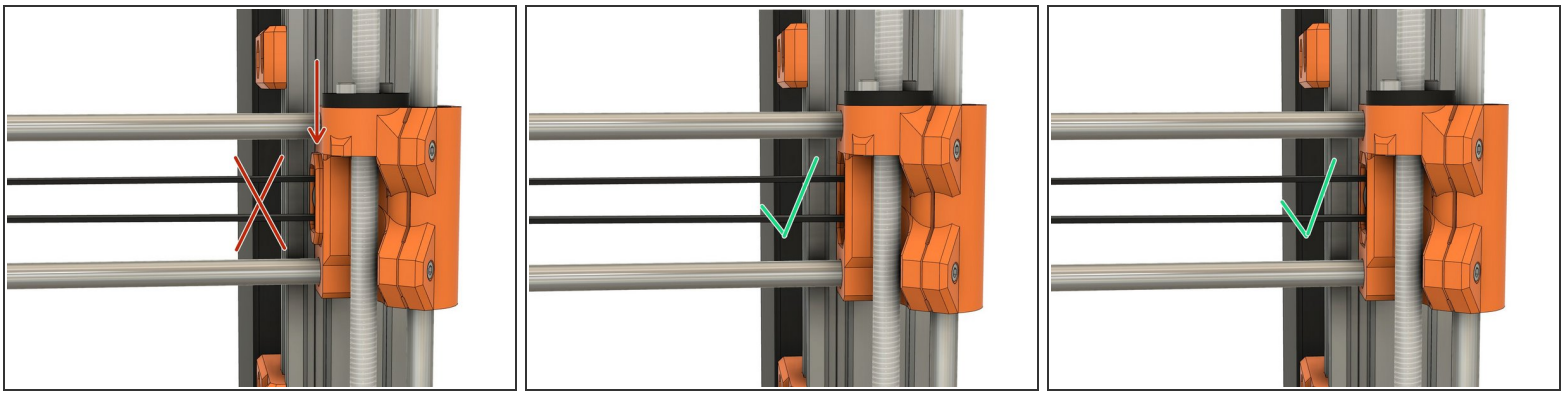


- Download and install the **Pano Tuner** application (developed by Kaleloft LLC) on your smartphone. Android Google Play link. Apple Store link.
- Turn off the printer (if your hotend is **higher than 50°C**, let the hotend cool down first until the **hotend fan stops spinning**)
- Launch the Pano Tuner app and place your smartphone on the heated bed. Make sure there is no noise in the room that could disrupt the measure (like a ceiling fan).
- Move the extruder to the middle of the X axis.
- Pinch the lower belt to make it vibrate. Don't pinch too much as it might touch the carriage and produce a wrong frequency
- Adjust the belt tension until you have a value around **90Hz**. Between each measurements, **move the extruder** to full left and right and then center it again.

⚠ It is very important to move left and right the extruder between each measures to relax some tension in the belt.

ⓘ If your belt is new, you can repeat this procedure after few prints. A new belt will loosen on the first hour of use.

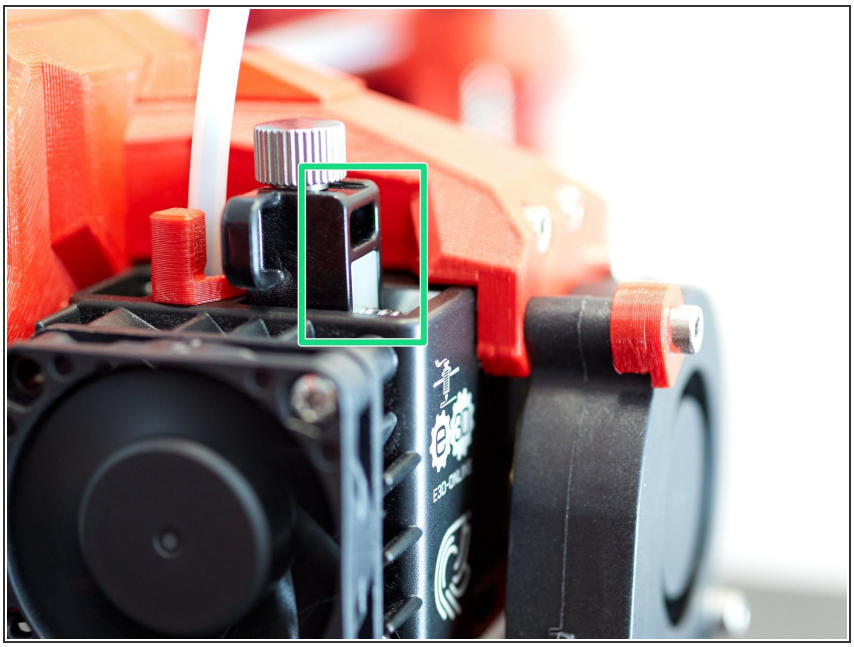
Step 11 — Belt tensioner verification



- Verify the *x_end_idler_tensioner* is not sticking out of the *x_end_idler*.

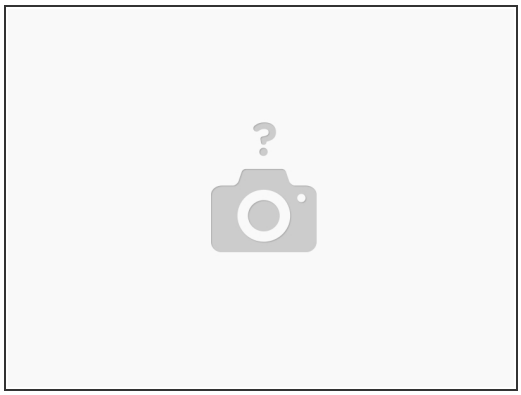
⚠ If *x_end_idler_tensioner* is sticking out then your X axis calibration might fail.

Step 12 — Extruder tension



- As a starting point to adjust the extruder tension, E3D recommends to rotate the tensions screw until the white part is flushed with the front of the black part.

Step 13 — Next chapter



- Congratulations you have finished this chapter :-)
- Go to the next chapter: 5. Software configuration

