



2. Y-axis assembly

Y-axis assembly

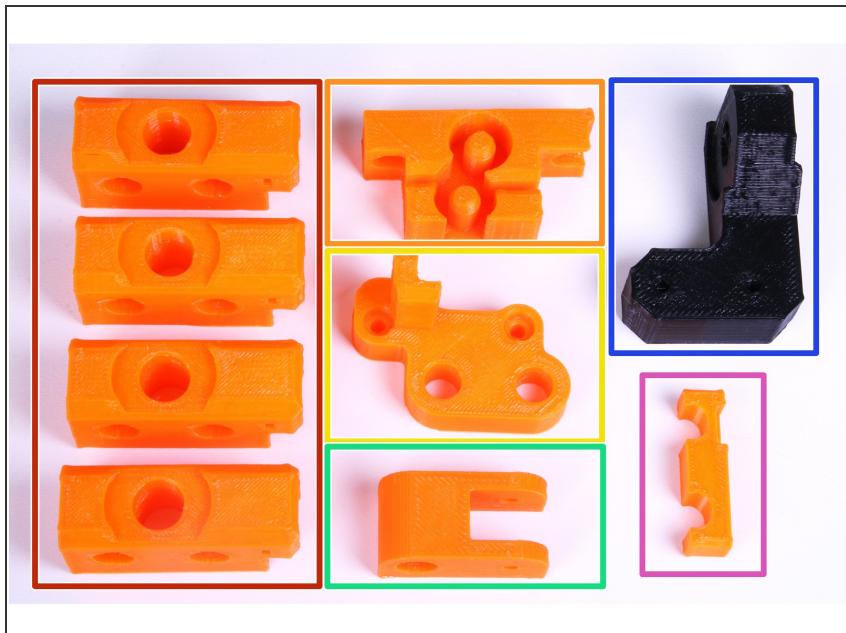
Written By: Josef Prusa

Step 1 — Get the necessary tools



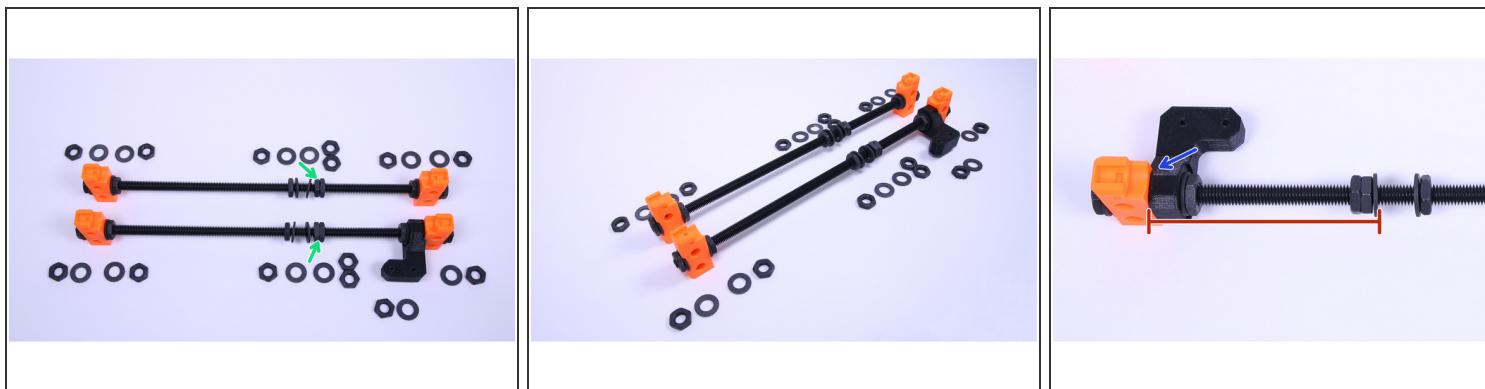
- 13/17mm spanners
- 3.6mm flathead screwdriver
- Needle-nose pliers
- 2.5 and 1.5mm Allen key

Step 2 — 3D printed parts



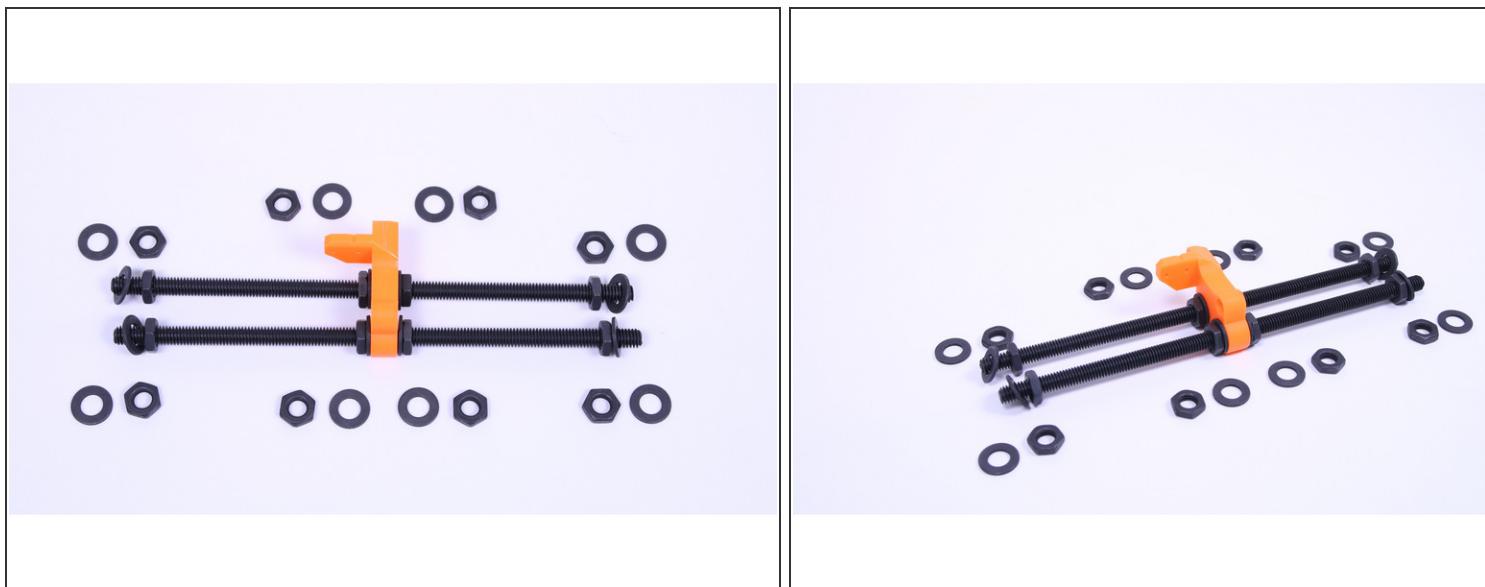
- Y-axis-corners
 - Y-belt-holder
 - Y-motor-holder
 - Y-idler
 - PSU-Y-part
 - Y-motor-distance
- ⓘ 3D printed parts can slightly differ from pictures. It won't affect the printer's assembly.

Step 3 — Assemble the Y-axis rods



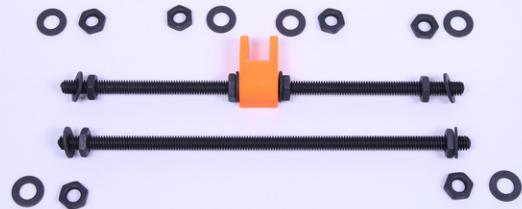
- 💡 Use M10n nuts (14 pcs) , M10w washers (12 pcs) and M10 threaded rods (2 pcs).
 - Screw the nuts on and place washers, Y-corners and PSU-Y-part on the threaded rod as shown in the picture.
- ⚠ Ensure initial 100mm distance between a washer after counter-nut and the Y-axis corner. Use the photo as a reference.
 - The 2 nuts have to be tightened against each other (counter-nut).
 - Note that there is no gap between parts, they have to fit together.
- ℹ For the initial position of Y-corners, you can temporarily mount the rods (see step 10, 11).

Step 4 — Assemble the Y-axis stage rear



- ☒ Use M8n nuts (8 pcs), M8w washers (8 pcs) and M8 threaded rods (2 pcs).
 - Screw the nuts and place washers and Y-motor-holder on threaded rod as shown in the picture.
 - ⓘ Y-motor-mount should be somewhere in the middle of the threaded rod. The precise position doesn't matter at this time.
- ⚠ Ensure the correct orientation of the Y-motor-holder.
- ⓘ 3D printed parts can slightly differ from pictures. It won't affect the assembly.

Step 5 — Assemble the Y-axis stage front



- ↗ Use M8n nuts (6 pcs), M8w washers (6 pcs) and M8 threaded rods (2 pcs).
 - Screw the nuts and place washers and Y-idler on threaded rod as shown in the picture.
 - ⓘ The Y-idler should be somewhere in the middle of the threaded rod. The precise position doesn't matter at this time.

Step 6 — Fully assemble the Y-axis stage

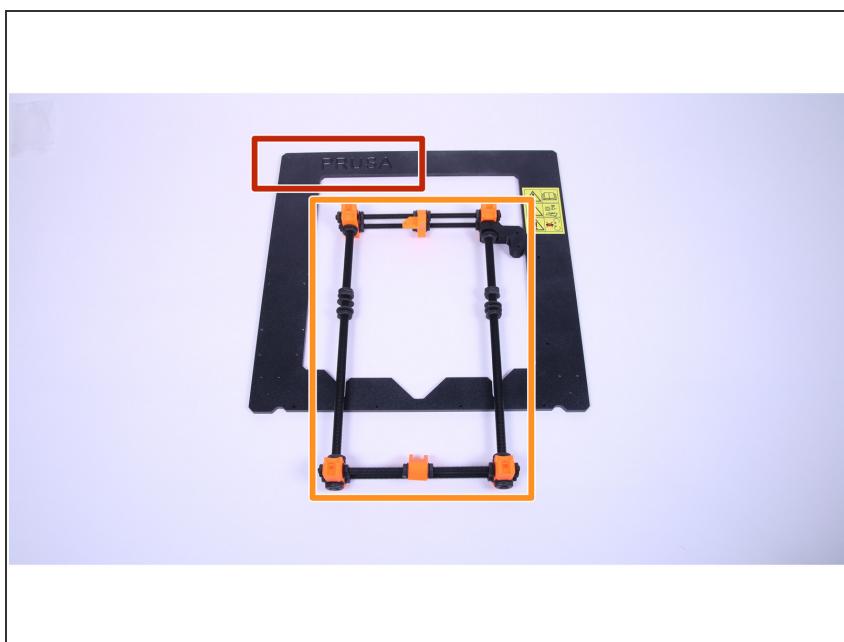


 Use M8n nuts (8 pcs) and M8w washers (8 pcs).

- Y-axis stage front
- Y-axis stage back
- Insert Y-axis stage front and back into Y-axis side elements and lock it with washers and nuts like in the picture.

 Ensure the correct placement. The Y-axis rear stage has to be closer to the double-nuts!

Step 7 — Preparing for Y-axis stage



● Prusa i3 frame

● Y-axis stage

Step 8 — Tighten the sides to the y-axis stage



- Insert the Y-axis stage into the frame as close to Y-corners as possible.
 - Adjust and tighten the M8n nuts.
 - Rotate the Y-axis stage and repeat.
- (i)** After adjusting, the Y-axis stage should cause minimum movement while inserted into the frame.
- ⚠** Tighten the M8n nuts gently or you'll risk damaging the 3D printed parts.
- ⚠** It is incredibly important that the axis is perfectly rectangular at this stage of construction, all rods need to be perfectly straight and level. If not, you'll have troubles calibrating later on!

Step 9 — VIDEO for step 8



- Insert the Y-axis stage into the frame as close to Y-corners as possible. Adjust and tighten the M8n nuts. Rotate the Y-axis stage and repeat.
 - Make sure Y-corners are vertical. If not, insert the spanners between the M8 threaded rods. Use any fabric to protect them from scratching. Push the spanners to straighten the corners.
- (i)* Video is available in an online (digital) version only.

Step 10 — Identifying the length of rods



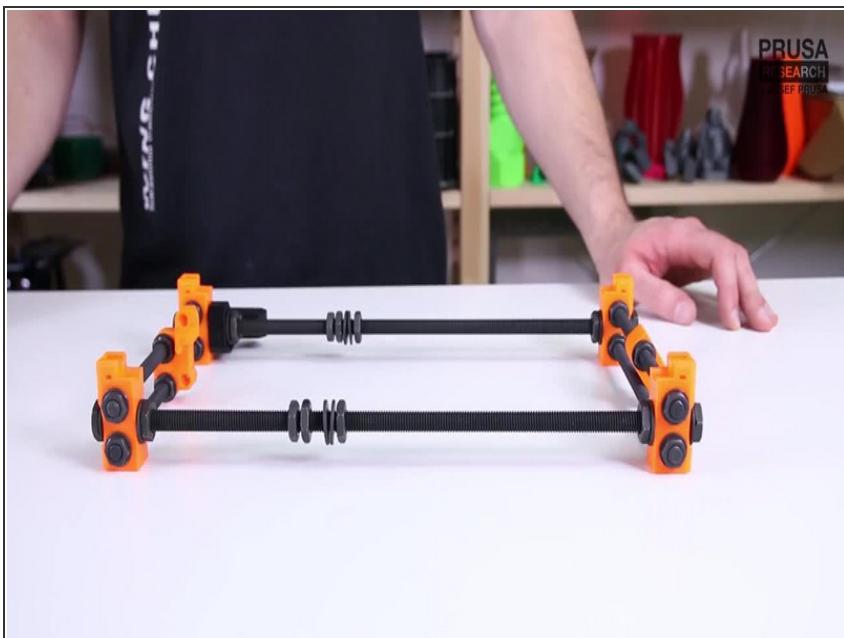
- In the following steps, use the mid-sized smooth rods (330 mm).
- (i)* Don't throw away included plastic spiral wraps, you will need them later for cable management.

Step 11 — Adjust the length of the Y-axis stage



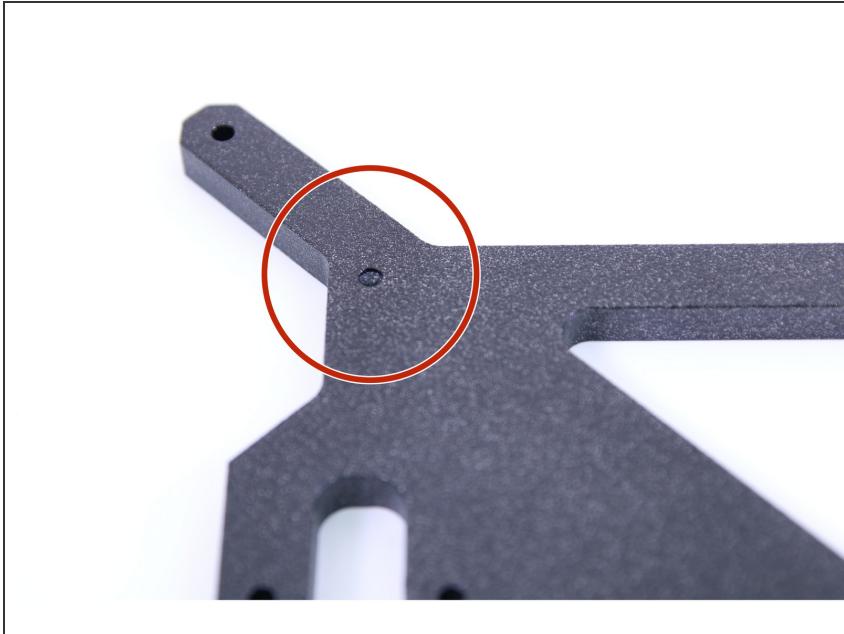
- Insert the two medium length 8mm smooth rods into the Y-axis stage.
 - Adjust and tighten the M10n nuts.
- i** After tightening the nuts, there shouldn't be any gap between 8mm rods and Y-axis corners.
- !** Retain 100mm distance between a washer after counter-nut and the Y-axis corner.
- Remove the 8mm rods.

Step 12 — VIDEO for step 11



- Insert the two medium length 8mm smooth rods into the Y-axis stage. Adjust and tighten the M10n nuts. After tightening the nuts, there shouldn't be any gap between 8mm rods and Y-axis corners. Retain 100mm distance between a washer after counter-nut and the Y-axis corner. Remove the 8mm rods.
- i** Video is available in an online (digital) version only.

Step 13 — Marker identification



- The marker (used in the next steps) is made as a countersunk hole, see the picture.

Step 14 — Correct bearing orientation



- When placing bearings onto the Y-carriage, make sure that they are oriented as shown in the picture. One of the tracks has to be in line with the cutout for the bearing!
- ⚠️** This orientation has to be followed in all 3 bearings on the Y-carriage!
- ⚠️** Marker on the Y-carriage must be facing the table (not visible)!

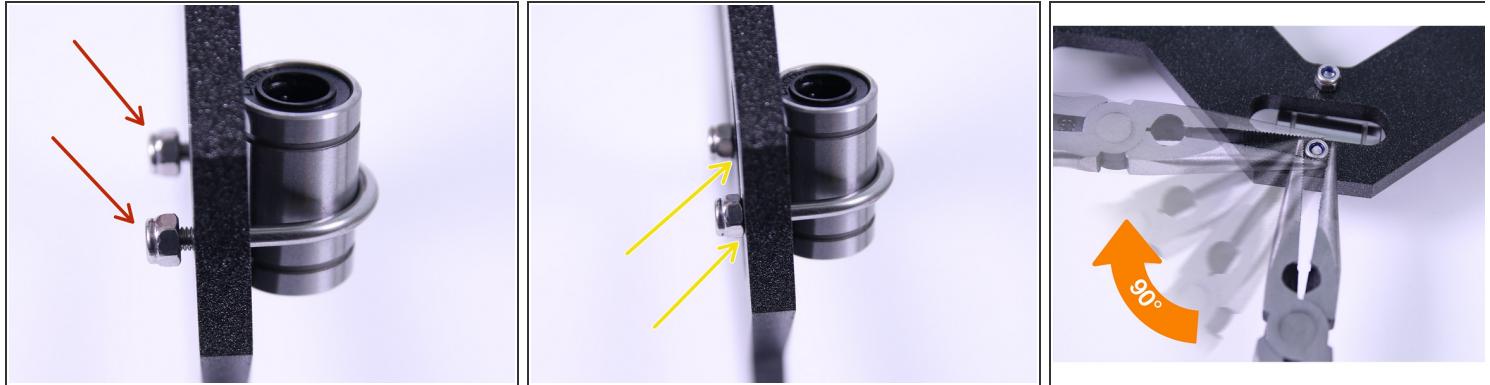
Step 15 — Assemble the Y-carriage



⚠ Begin by locating the marker, at this step the marker should be facing the table (not visible) and only then you can add the bearings. If you place bearings to the same side as marker, you will have issues later!

- Insert a 3x20x16 u-shaped bolt into the Y-carriage as shown on the picture.
- Place the linear bearings in cutouts.
- On side with two bearings slide bearings to the center, towards each other as close as possible.

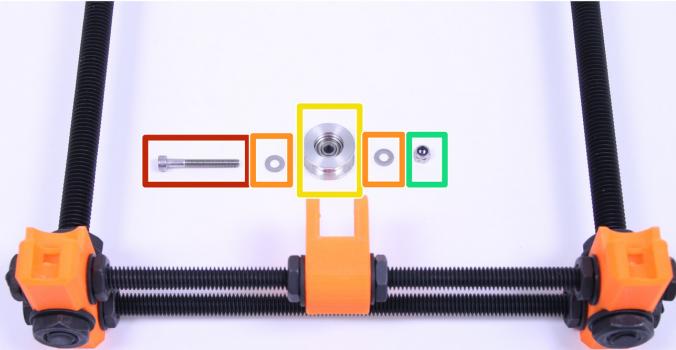
Step 16 — Tighten Y-carriage u-shaped bolts



(i) Use pliers to tighten the u-shaped bolts

- Step 1: place the nuts on the u-shaped bolt and insert a bearing.
 - Step 2: using pliers tighten the nuts until you reach the surface of the Y-carriage, then stop tightening!
 - Step 3: use pliers again and rotate with the nuts **only 1/4 of circle** to finish the tightening.
Tighten all six nuts this way.
- (i)** Previous version of manual stated 45° turn of the nut however, correct is 90° (see third picture).
- ⚠** Don't tighten the nuts more than is described above, or you will deform the bearings!

Step 17 — Assembly of the Y-idler



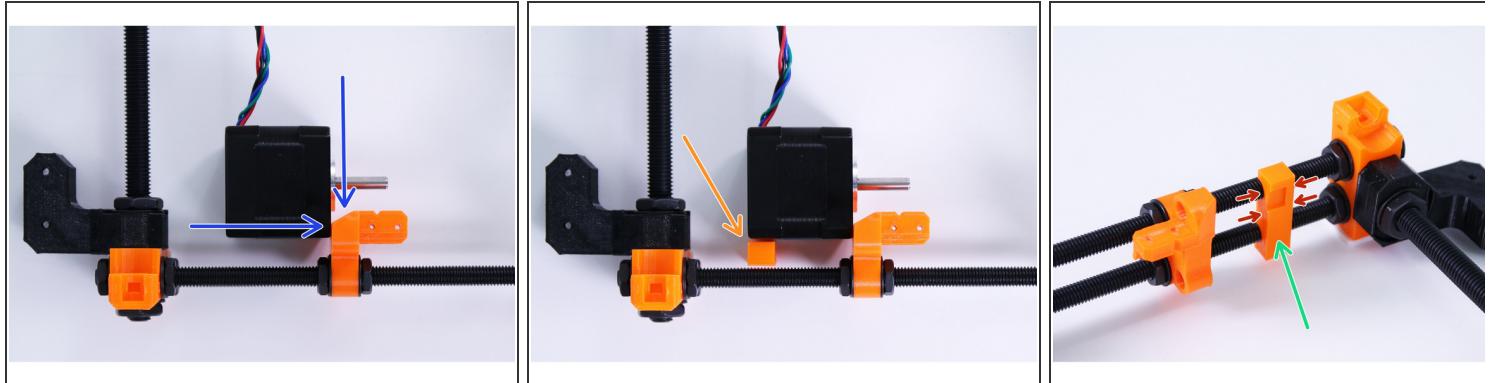
- M3x25 screw (1 pc)
- M3w washer (2 pcs)
- 623h bearing housing (1 pc)
- M3nN nylock nut (1 pc)

Step 18 — Tighten the Y-idler



- To tighten the Y-idler, use the pliers and 2.5mm Allen key.
- ⚠️** Tighten the screw gently, just half a turn max after the washers touch the 3D printed part.

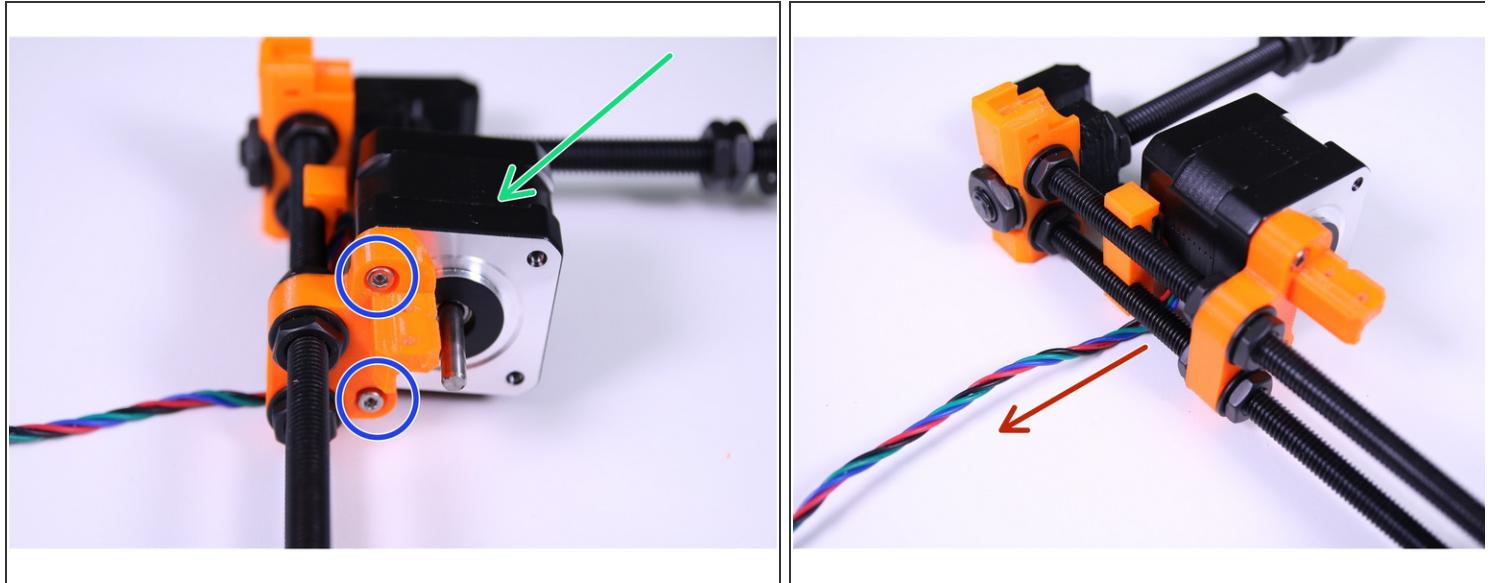
Step 19 — Y-motor-distance assembly



- Step 1: Place temporarily the motor in the frame next to the Y-motor-holder.
- Step 2: Take the Y-motor-distance and place it at the very end of the motor. Two half circle cuts on Y-motor- distance must be facing threaded rods.
- Step 3: Take the motor away and press the Y-motor-distance towards the threaded rods all the way in.

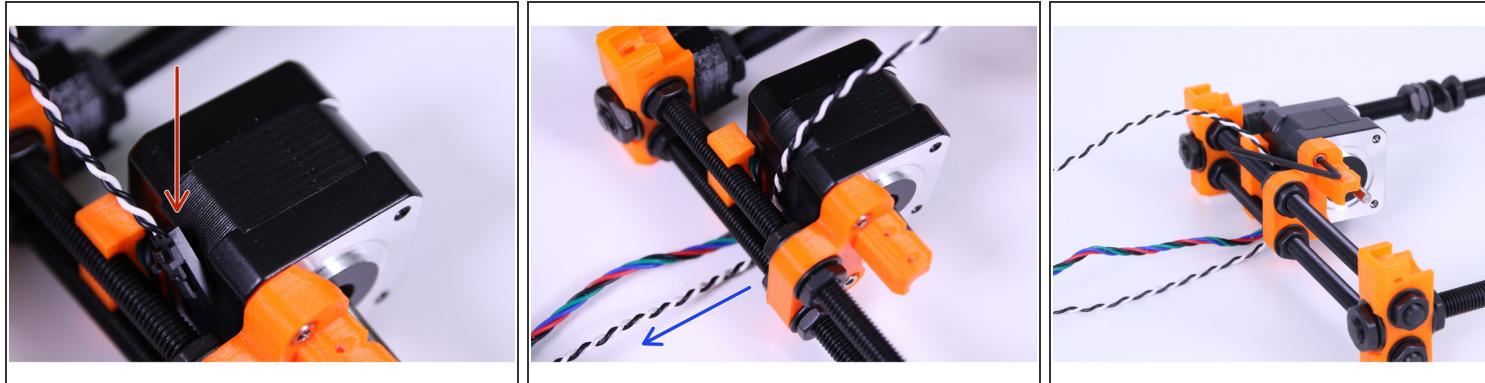
! Note the correct orientation of the cutout for motor wires, it's very important!

Step 20 — Y-axis motor



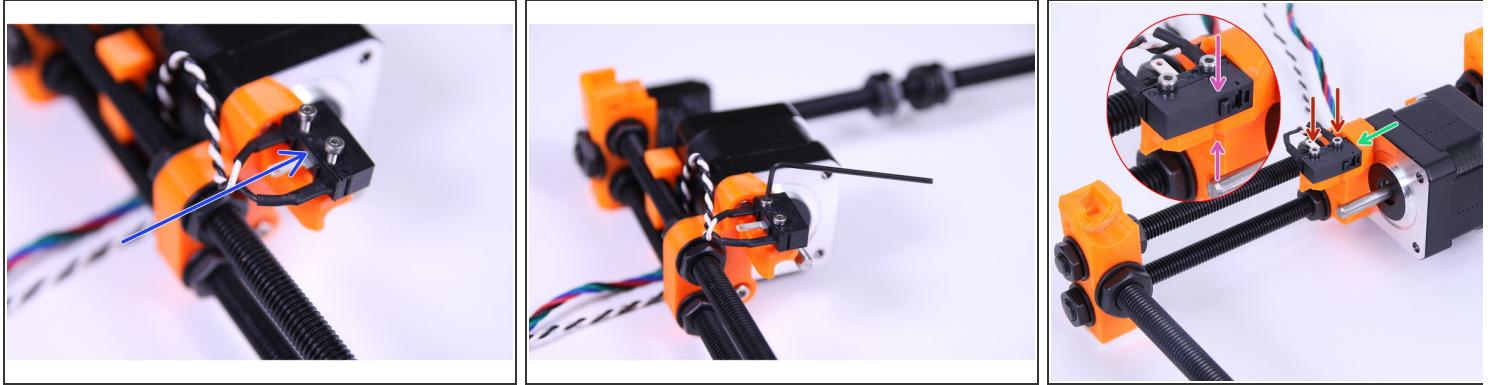
- Y-axis motor (the one labeled with Y axis)
 - M3x10 screw (2 pcs)
 - Motor cables must be facing threaded rods!
- ⚠ Don't tighten the motor yet, in the next step you need to add another cable from an endstop.

Step 21 — Adding the Y-endstop



- Insert the Y-endstop connector between the motor and threaded rods.
 - Pull gently the connector with the cable in the direction away from the frame (see the picture)
 - Using the 2.5mm Allen key, secure the motor to the 3D printed part.
- ⚠** Tighten the motor gently to avoid damage to the 3D printed part.
- (i)** Endstops are part of the box 2.3.4.5.SUP.

Step 22 — Tightening the Y-endstop



- M2x12 screw (2 pcs)

- Y-endstop

 Ensure the correct placement using marker on the printed part.

- Secure the endstop by two M2x12 screws and push it forward in the direction of the arrow.

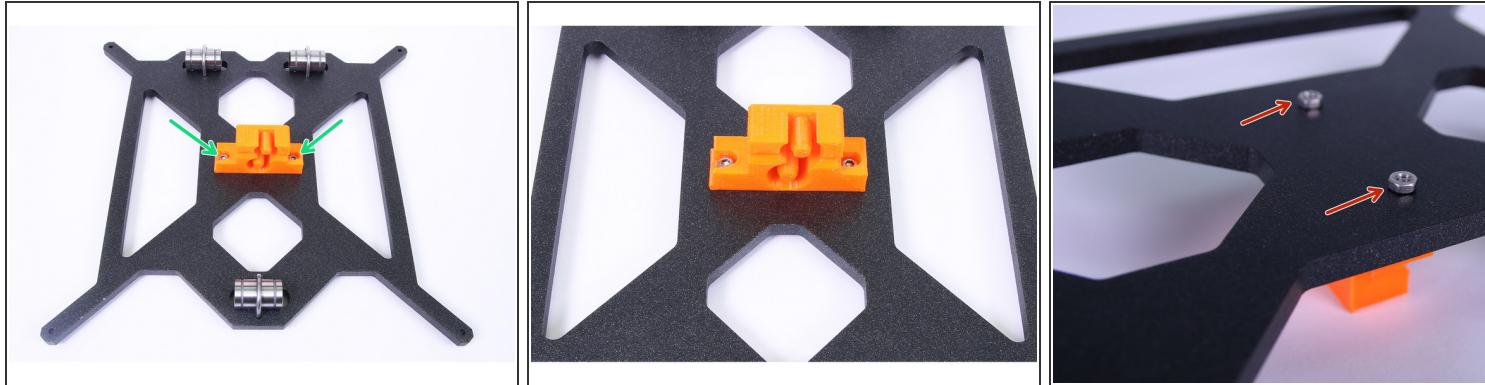
 To tighten the Y-endstop use 1.5mm Allen key. Use gentle force to avoid damage to the printed part.

Step 23 — Y-endstop cable guide



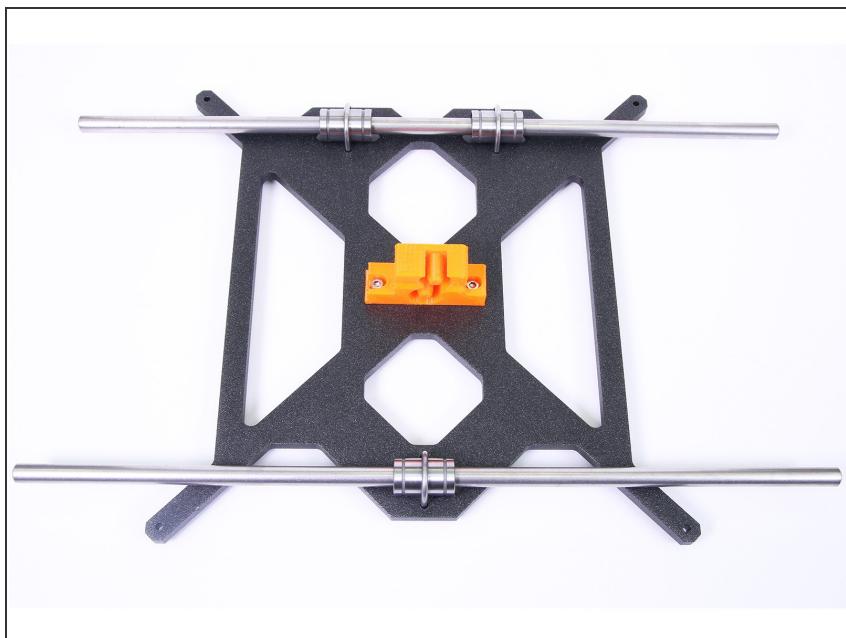
- Guide the wires from the Y-endstop to go side by side with motor cables as shown in the picture.

Step 24 — Assemble the Y-belt holder



- Place the Y-belt holder on the Y-carriage as shown in the picture.
 - M3x12 screw (2 pcs)
- ⚠** Be aware of the orientation of the Y-belt holder (belt entry should face towards single bearing).
- (i)** There's no thread in the Y-carriage, just push the screws all the way in.
- Assemble the M3 nuts on the screws from the opposite side of the Y-carriage as shown in the picture. Use nuts from 9.SPARE bag.
 - (i)** The nuts will be removed in Chapter 7.

Step 25 — Assemble the Y-carriage rods



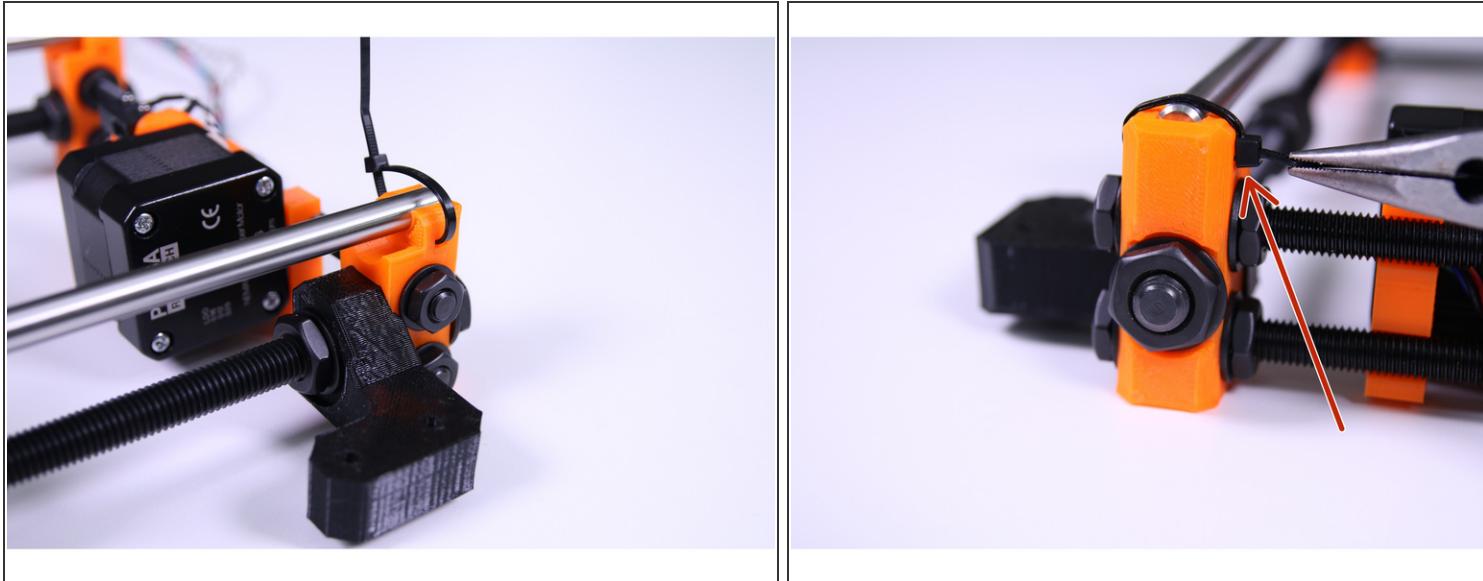
- Use the mid-sized smooth rods (330 mm)
- Insert the 8mm smooth rods into the linear bearings on the Y-carriage.
⚠ Be very careful! Insert the rod straight into the bearings, do not apply too much force and do not tilt the rod!
- Try to move slightly with the smooth rod after being placed through the bearings. If there is an increased friction, check the bearings are placed straight and not tilted.

Step 26 — Assemble the Y-axis stage



- Insert the assembled Y-carriage into the Y-axis stage.
⚠ Ensure the correct orientation of parts (the Y-motor mount on the right and the single bearing on the bottom).
- **Note the location of the Y-carriage orientation marker - it's important the Y-carriage is oriented as in the picture !**
- Insert zipties into the holes in Y-corners.
⚠ Ensure the correct orientation of zipties (head of the ziptie should be facing out from the Y-axis stage).
⚠ Press smooth rods (330 mm) all the way in the Y-corners holders. Don't use excessive force.

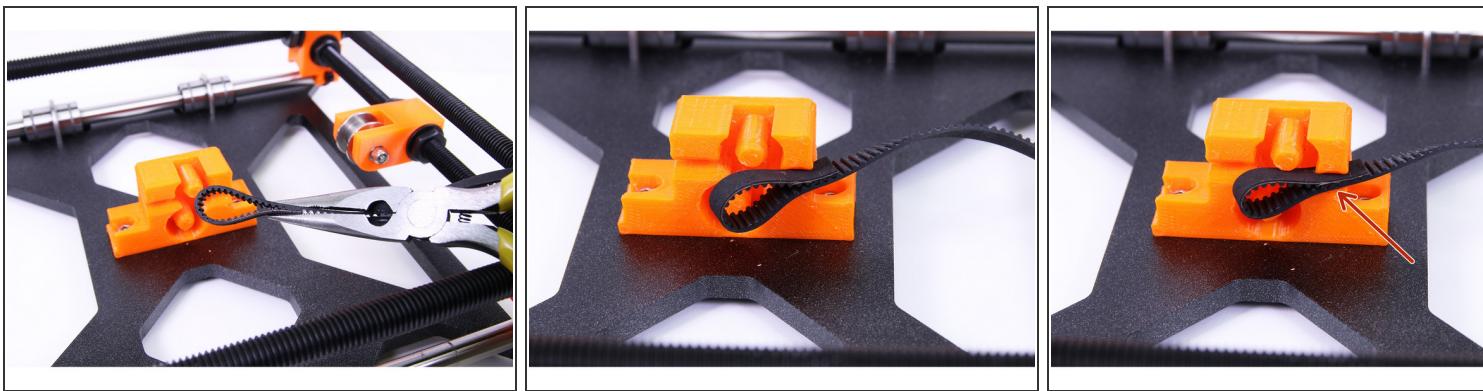
Step 27 — Tighten the zipties on the Y-axis stage



- Using pliers, tighten the zipties as shown in the picture.

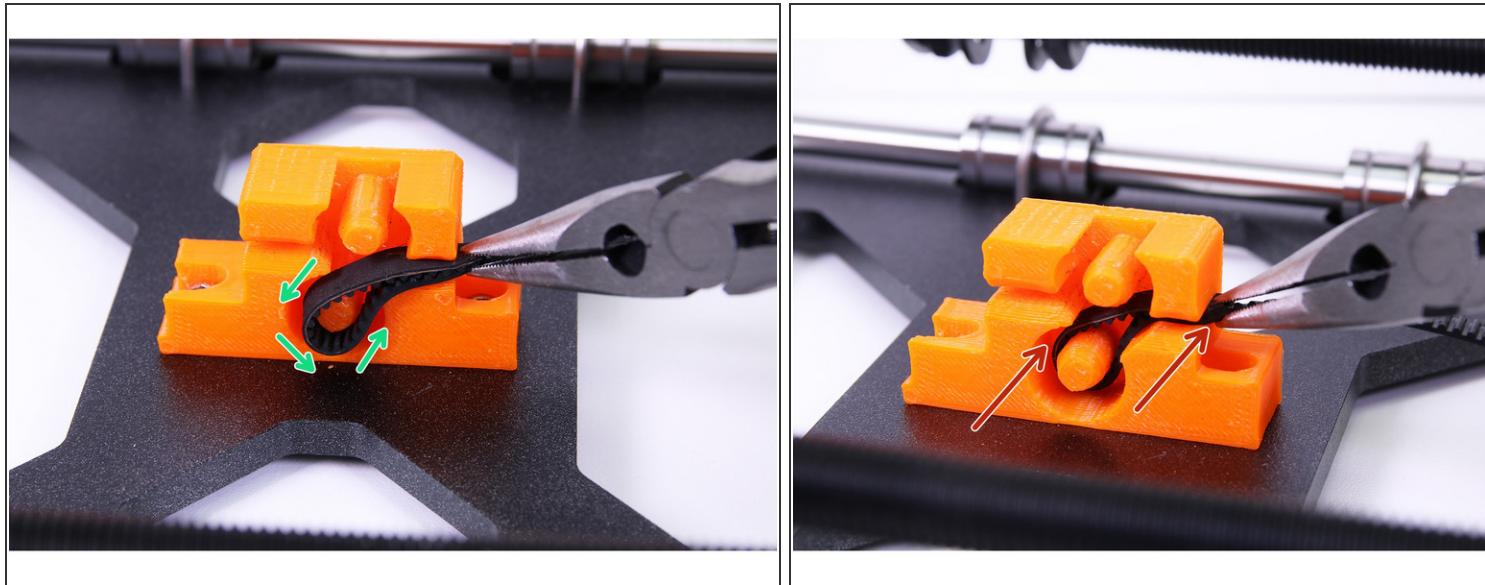
 Ensure the correct orientation of zipties connection.

Step 28 — Assemble the belt on the Y-axis, part 1



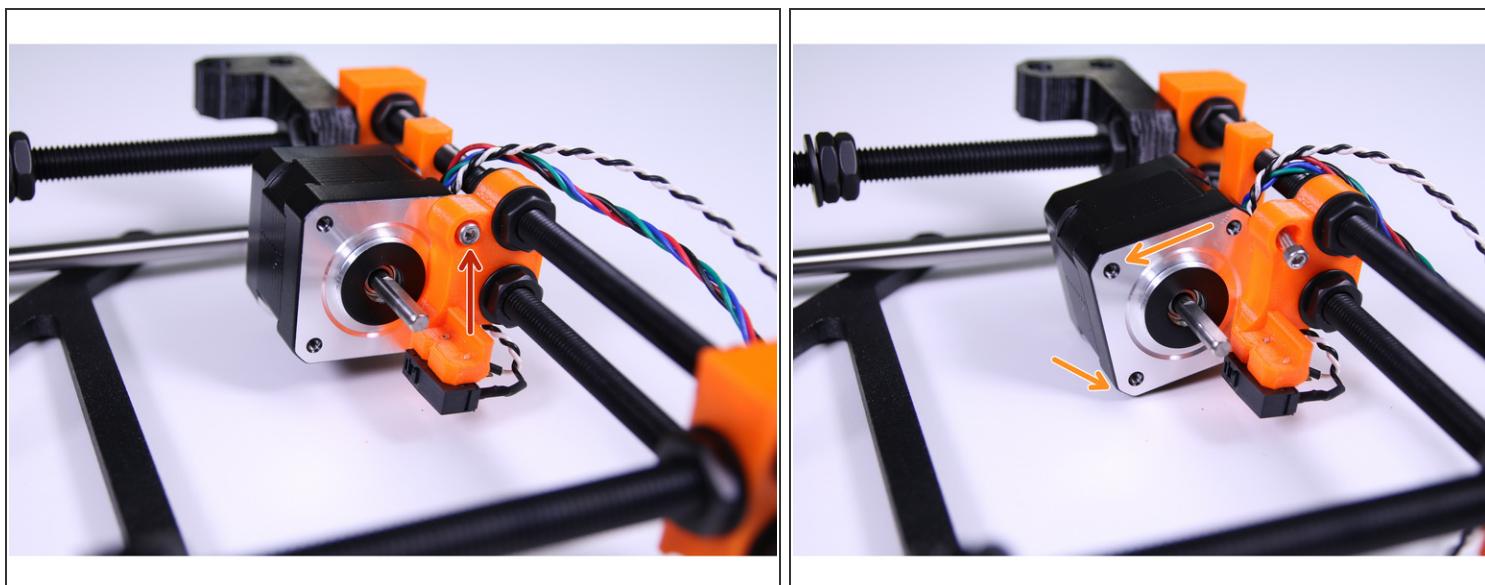
- Insert the Y-GT2 belt (shorter one) in the Y-belt holder as shown in the picture.
 - First insert the flat part of the belt in the holder.
-  A reference video is included at step 37 covering steps 29-36.

Step 29 — Assemble the belt on the Y-axis, part 2



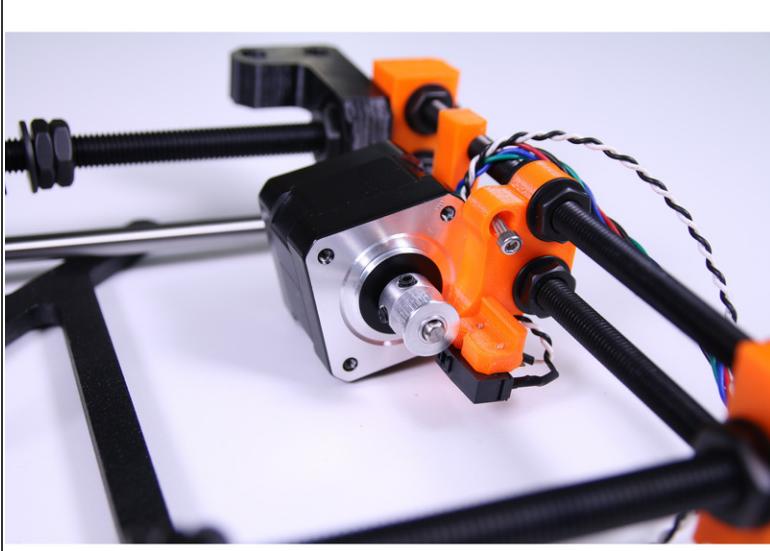
- Guide the belt around the pin as shown in the picture.
- Push the belt all the way into the belt holder.

Step 30 — Loosening the motor



- Undo the M3x10 screw.
- Rotate the motor until it hits the ground as shown in the picture.

Step 31 — Assemble the Y-motor pulley

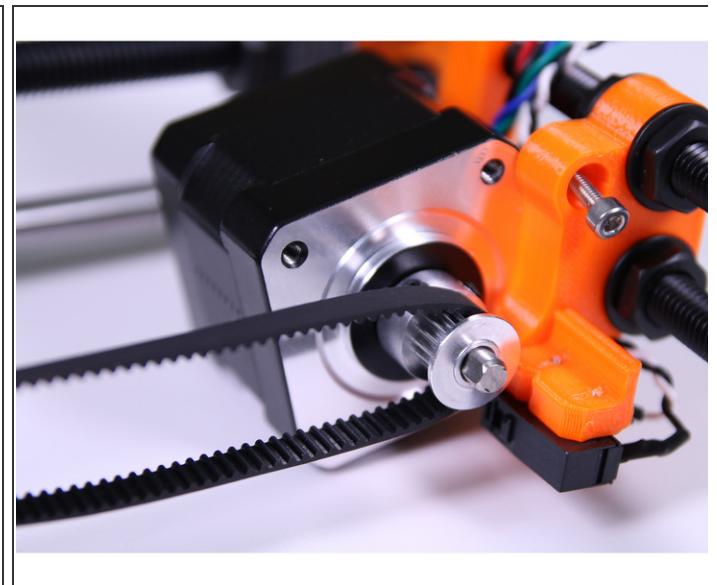


- Place a GT2-16 pulley on the Y-motor shaft as shown in the picture.

⚠ One of the screws must be facing directly against the pad (flat part) on the shaft. Note you don't have to remove the motor from the frame.

i Don't tighten it yet, we'll get to that later.

Step 32 — The Y-axis belt placement



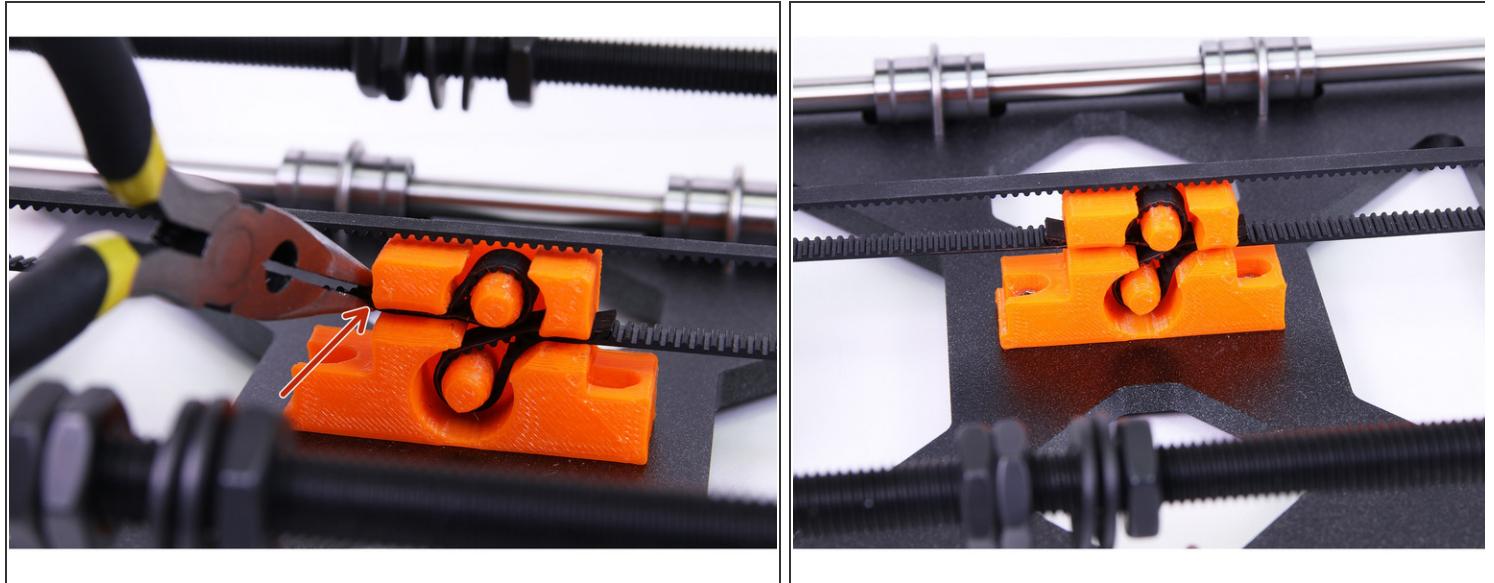
- Run the Y-axis belt through the Y-motor pulley and the Y-idler part.

Step 33 — Tighten the Y-axis belt, part 1



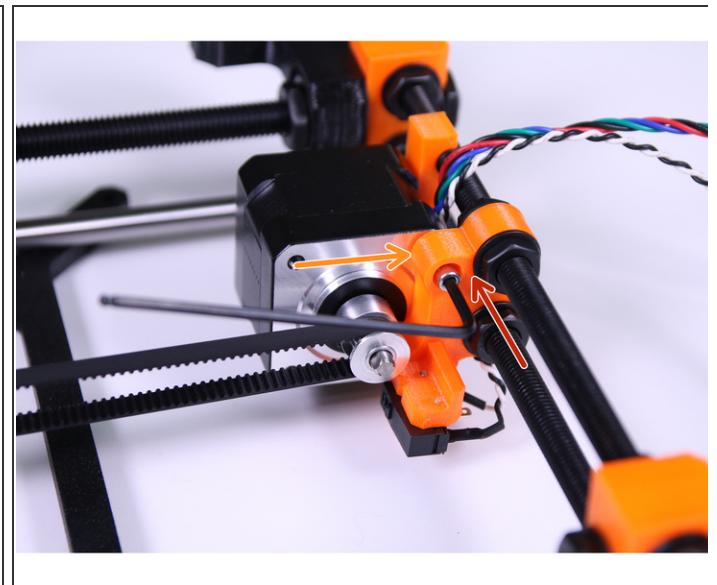
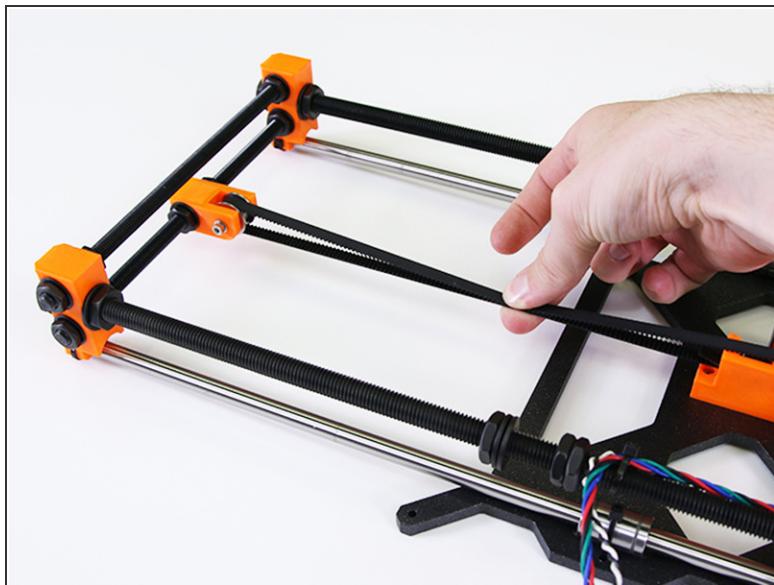
- Using the pliers, insert the belt and insert the flat part it into the Y-belt holder as shown in the picture.
- Then guide the belt around the bottom pit as shown in the second picture.

Step 34 — Tighten the Y-axis belt, part 2



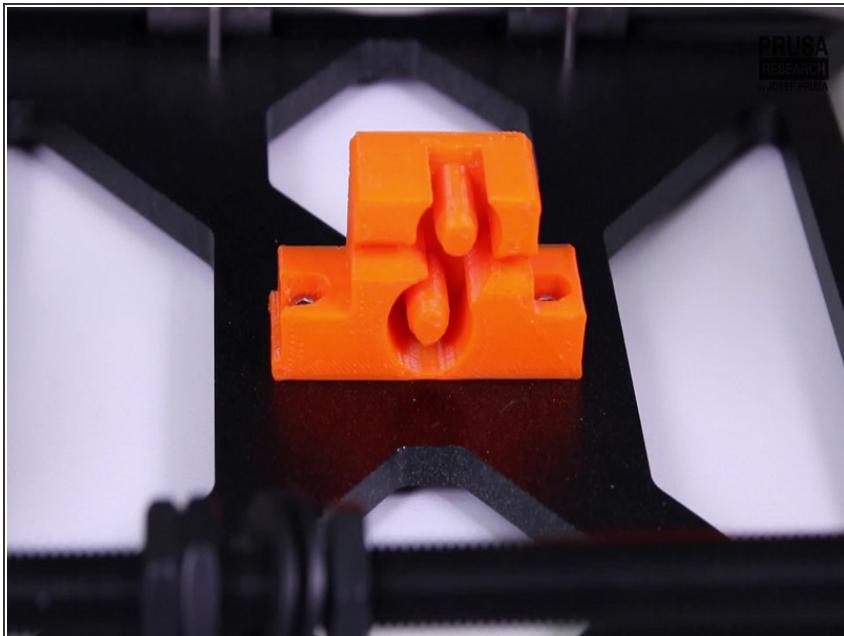
- Using the pliers insert the belt all the way into the belt holder.
- ⚠** Do not cut any excess of the belt, it should be evenly distributed on both sides as shown in the picture.
- ⚠** The belt shouldn't be tight at the moment.

Step 35 — Tensioning the belt



- Rotate the motor back.
 - Screw in the removed M3x10 screw.
- ⚠** If you have to apply too much force and experiencing troubles, rotate the motor back, repeat previous step while making the belt more loose.
- i** The belt should be quite tight, check it by pressing together both sides in the middle of the frame by gentle force.

Step 36 — Video for steps 29-36



- Insert the Y-GT2 belt (shorter one) in the Y-belt holder. Run the Y-axis belt through Y-idler part and the Y-motor pulley. insert the belt all the way into the belt holder.
- The belt should be quite tight, check it by pressing together both sides in the middle of the frame by gentle force.

Step 37 — Adjust the Y-idler



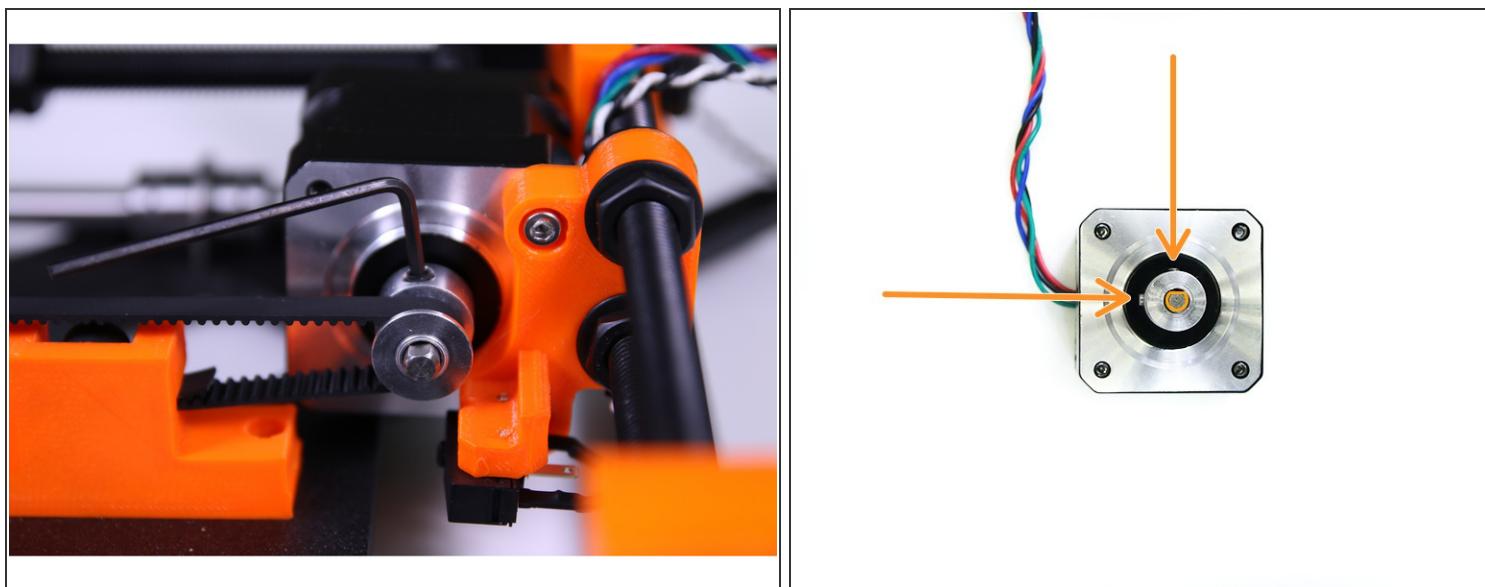
- Adjust the Y-idler as shown in the picture (623h bearing housing should be in axis with the belt).
 - Move the Y-carriage as close as possible to the Y-end-motor.
 - Before tightening the nuts, ensure the Y-idler is in horizontal position.
- ⚠** Tighten the M8n nuts gently to avoid damaging the 3D printed part.

Step 38 — Adjust the Y-motor-mount part



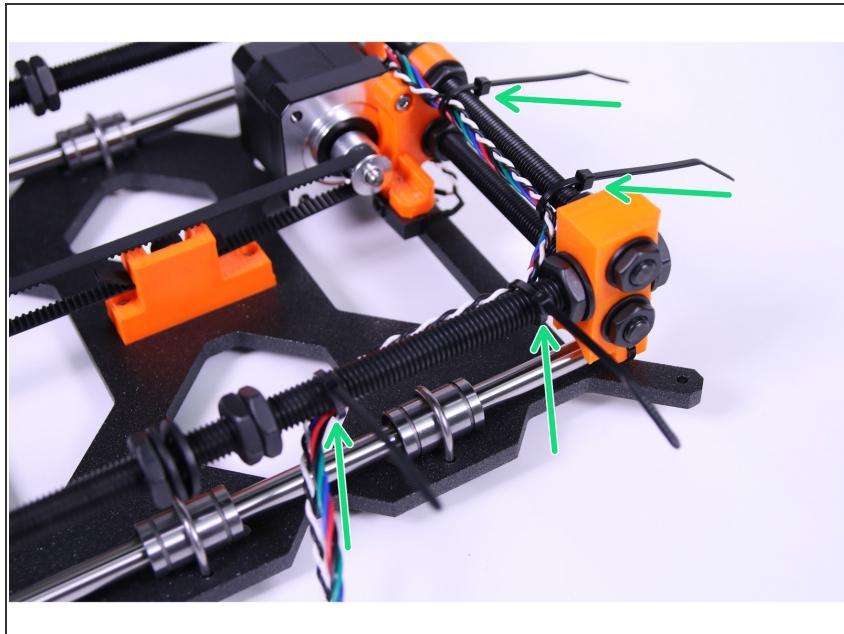
- Adjust the Y-motor-mount as shown in the picture (the belt must remain straight and the motor should not collide with the Y-belt holder part).
 - Make sure that you heard "click" sound and the Y-endstop is triggered.
- ⚠ The belt part of the pulley has to be in axis with the belt itself.
- ⚠ Tighten the M8n nuts gently to avoid damaging the 3D printed part.

Step 39 — Tighten the screws in the pulley



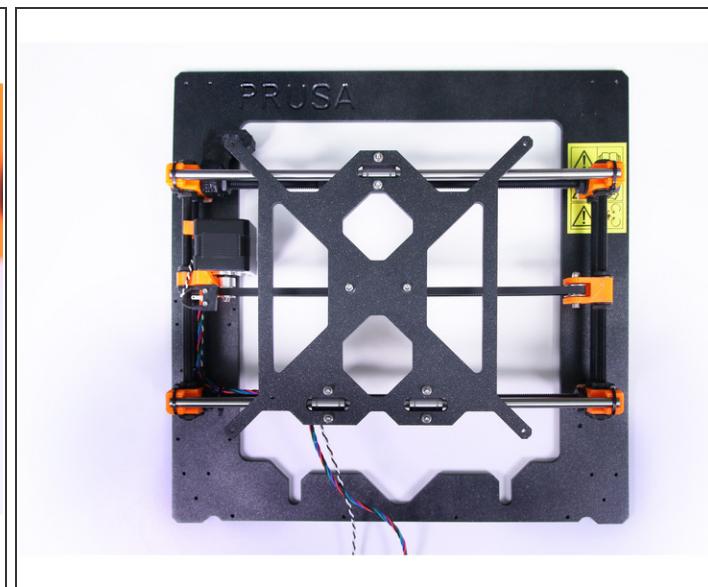
- Tighten the screws in the pulley.
- ⚠ One of the screws has to be tightened directly against the pad (flat part) on the shaft.
- ⚠ Keep a small gap between the motor and the pulley.

Step 40 — The Y-axis stage cable management



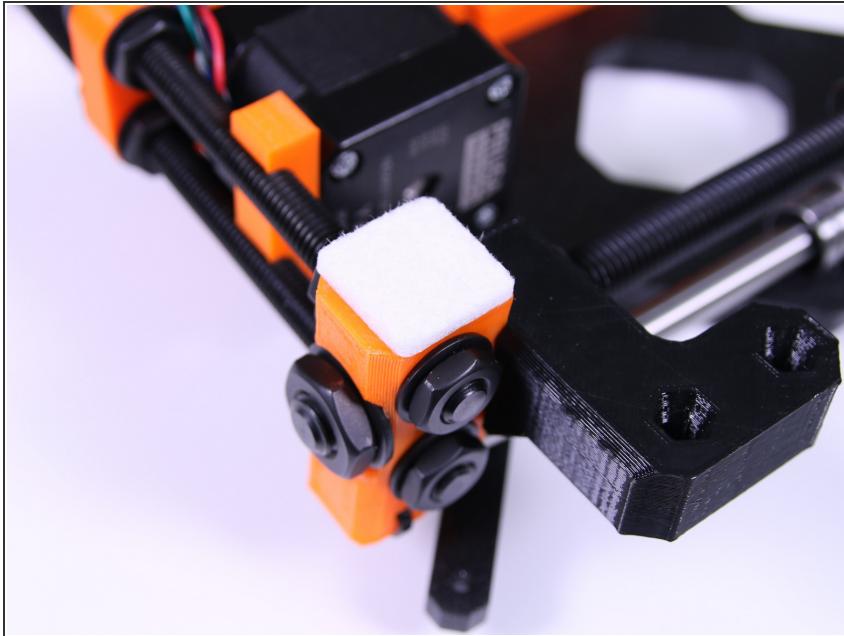
- Ziptie the cables to the threaded rods as shown in the picture.
 - Cut and discard excess ziptie.
- ⚠️** Tighten the zipties carefully to avoid damaging the wires.
- ⚠️** Be careful while cutting the zipties to avoid cutting the wires.

Step 41 — Levelling the Y-axis



- Place the assembled Y-axis on a flat surface.
 - Check if every corner is touching the ground.
 - If some corner is in the air, try twisting the axis slightly.
- (i)** You can also check it by tapping each corner and listen if it's making any noise.
- !** This is your last chance to ensure the Y-axis is perfectly angled and level. It'll save you a lot of hassle later!
- (i)** You can use aluminium frame for check, but be careful for possible scratches.

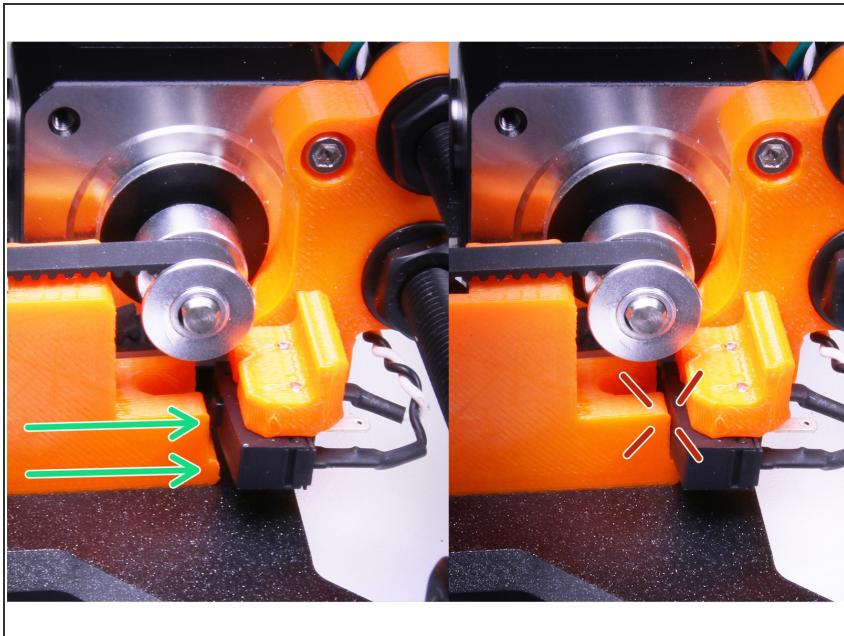
Step 42 — Secure the axis feet



- Stick the felt pad on each Y-corner.

(i) Felt pad is in the box 2.3.4.5.SUP

Step 43 — The Y-Endstop check



- Move the Y-carriage as close as possible to the Y-end-motor.
 - Make sure that you heard "click" sound and the Y-endstop is triggered as shown in the picture.
- (i)* The colors on the picture are a bit over-saturated to highlight the endstop button.

Step 44 — Double check the Y-carriage!



⚠ This is a crucial part of the assembly. Please check again you can see the marked part of the Y-carriage (as shown in the picture), otherwise your heatbed won't fit properly!

Step 45 — All done!



- Congratulations, you have assembled the Y-axis!
- You can continue by assembling the X-axis in the next chapter - [3. X-axis assembly](#)