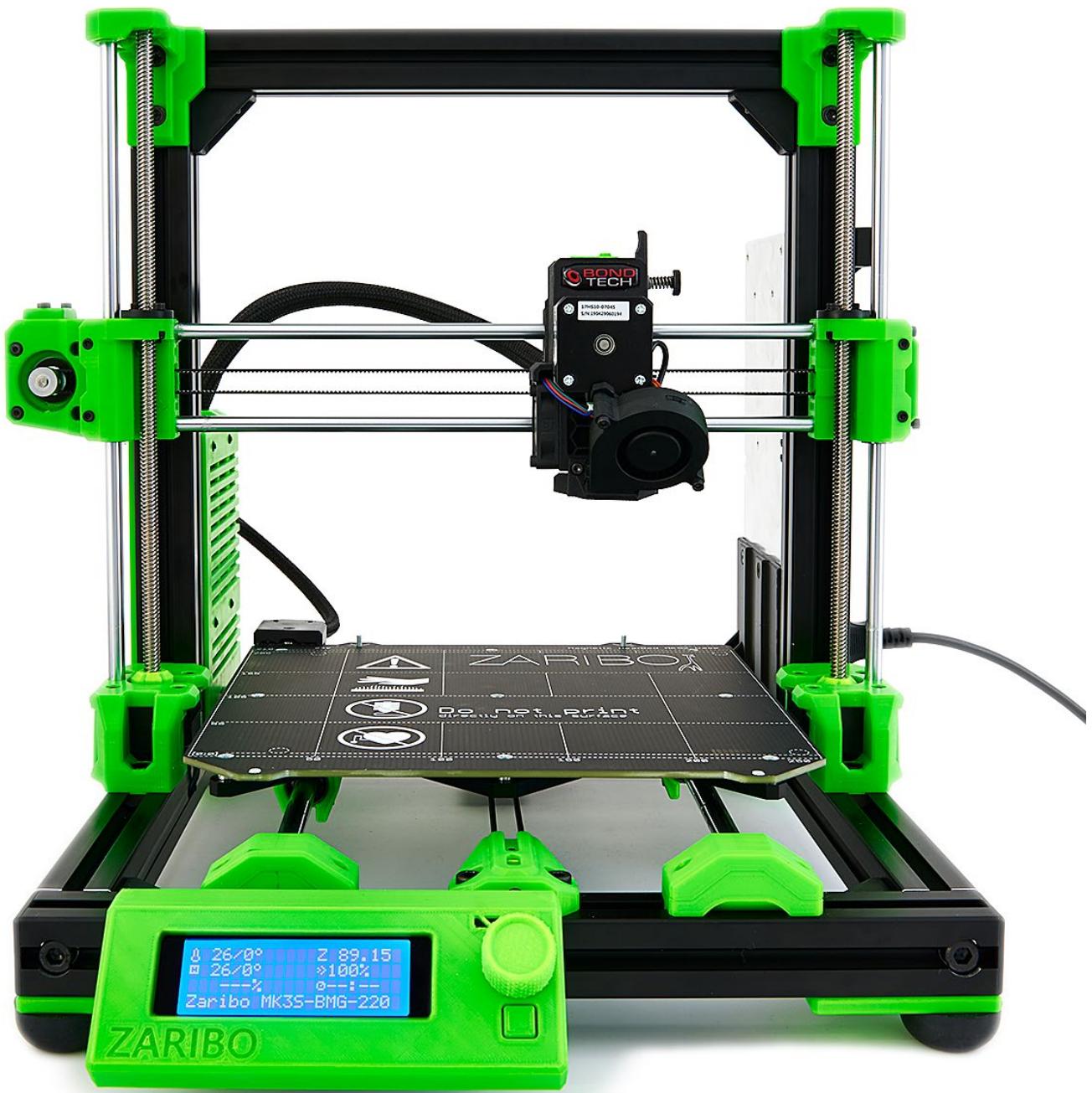


# Zaribo MK3 Rel. 3

Assembly Manual

Version 0.92

19.09.2019



ZARIBO  
Research & Development



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**USE AT YOUR OWN RISK:** Never leave your printer unattended!

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Photography: Henry Schadow, Wolfgang Schadow

# 1 DISCLAIMER:

This is a kit of components for assembly into a 3D Printer by the end user. Building and using the printer is potentially very dangerous as it involves electricity and high temperatures.

Building the printer will require physical dexterity and a good understanding of what you are doing. We have provided fully comprehensive build documentation to enable you to build your Zaribo 3d Printer Kit in a safe manner.

Ultimately, we cannot be responsible for your health and safety while building or operating the printer. With that in mind be sure you are confident with what you are doing prior to buying or building a 3d printer.

Building and operating involves electricity, so all necessary precautions should be taken and adhered to, the printer runs on 110V-220V, supplied by a certified power supply.

High temperatures are involved with 3D Printing, the extruder nozzle runs at 190-285 °C. The heated bed runs at up to 110 °C and the molten plastic extruded will initially be up to 280 °C. Special attention and care should be taken when handling these parts of the printer during operation.

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## 2 THANKS

There are many people who have contributed on one form or another to the project. We like to thank everybody who inspired or supported us. Many ideas were discussed in the facebook groups:

- Official Zaribo Facebook Group: <https://www.facebook.com/groups/1914969582138279/>
- German Zaribo Group: <https://www.facebook.com/groups/1914969582138279/>

Project Pages:

- Blog: <https://zaribo.com/blog>
- Thingiverse: <https://www.thingiverse.com/zaribocom>

Very special thanks to 3d-Gussner and Bernd Brinkert for their huge support and effort in providing and testing Zaribo firmware.

Thank you, Rebecca and Jason, from LDO Motors and Martin from Bondtech for the quality manufacturing and relationship.

Thanks to our other supplier: E3d, Microswiss, Slice Engineering, Misumi for delivering high quality products to us.

## 2.1 SOURCES

We give references that have influenced the design. Since the majority of plastic parts (even if much improved and somehow "new and different") have their roots in the initial design by Prusa Research we like to mention this a first and most influential reference.

- Prusa : <http://www.prusa3d.com>

Frame

- Prusa i3 MK2-X by davtr <https://www.thingiverse.com/thing:1692666>
- Haribo Project [https://github.com/PrusaMK2Users/3030\\_Haribo\\_Edition](https://github.com/PrusaMK2Users/3030_Haribo_Edition)

y-rodholder:

- they have been inspired by the design of Piotr Karkovski <https://www.thingiverse.com/thing:2830591>

## y-bearing holder

- the clamp mechanism is similar to one used on the x-axis. We like to mention that the first clamp design with insert for the carriage for the bearings holders was done by Vecko Kojchevski <https://www.thingiverse.com/thing:2930007>

## x-MotorHolder and X-Idler

- inspired by initial clamp design of Arnaud Rousseau <https://www.thingiverse.com/thing:2964026> hole design seen on some screen shoot of a bear part 😊Bear x-axis can be found here <https://www.thingiverse.com/thing:3716110>

## x-carriage

- earlier carriage design and references therein <https://www.thingiverse.com/thing:2770327>

## z-Top Holder

- hole design seen on some screen shoot of a bear part 😊Bear x-axis can be found here <https://www.thingiverse.com/thing:3716110>
- z-Motor Holder: the new motor holder was designed independently but we would like to point out that a similar design exists by Vecko Kojchevski <https://www.thingiverse.com/thing:2974255>

## Meanwell PSU-holder

- Tobias Reischl <https://www.thingiverse.com/thing:3373172>

## Extruder of Rel. 2 that still can be used instead of the Bondtech extruder

- MK3 Extruder and X Carriage: Vecko Kojchevski <https://www.thingiverse.com/thing:2843264>

## STL for PrusaSlicer as background

- thanks to Patrick Vosshans

## Earlier Releases were partly designed by or influenced by:

- Stefan Weber: y-belt tensioner: <https://www.thingiverse.com/thing:2666661>
- Jon Madden: Prusa MK2/S X-Carriage Adjustable Tensioner by: <https://www.thingiverse.com/thing:2770019>
- Vecko Kojchevski: <https://www.thingiverse.com/vekoj/designs>
- Murathan Araz <https://www.thingiverse.com/murathanaraz/designs>
- Ocie Ward

## 3 GENERAL NOTICE

Before you proceed with any of the construction steps, please do the following:

1. Make sure that the required parts (which are listed at the beginning of each chapter) are all present, correct and not damaged. If that isn't the case, please contact our support and we will provide you with a replacement as quickly as possible.
2. Though we remove it for you, check all plastic parts for support material just to be sure.
3. Make sure to have access to all the listed tools. Do not attempt to build without these as the use of incorrect tools may lead to breakage of parts or a faulty construction. If a tool that we use is optional, it will be noted at the corresponding step.
4. Orient all self securing nuts with the thicker end towards the screw.

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## 4 LIST OF TOOLS

### Necessary:

- ball-headed hex keys in sizes 2.5mm,, 5mm, 6mm
- hex keys in sizes 1.5mm, 2mm
- ratchet with 5mm and 6mm hex bits
- pliers
- calipers (at least 162mm width)
- wrenches in sizes 7mm, 16mm
- phillips and slotted screwdriver
- scalpel or cutter knife
- scissors
- permanent marker (thin)
- lighter
- right angle ruler

### Additionally recommended:

- smooth tongue-and-groove pliers
- cutting pliers
- rubber hammer
- 5.5mm nut driver
- common sense

# 5 ASSEMBLY INSTRUCTIONS

## 5.1 XY-FRAME

### 5.1.1 BASE FRAME ASSEMBLY



**Important:** Make sure that the surface that you are working on is perfectly flat. By using an uneven work surface, you risk building a skewed frame, which may lead to the printer not being able to be calibrated.

	<p>Prepare four corner brackets in the following way: Insert a M6 x 12mm screw to one of the holes of the bracket.</p>
	<p>Screw a T-nut on the M6 x 12mm screw. Leave it loose. Top and side view of the bracket.</p>
	<p>Lay out the extrusions so that the X-extrusions are (when viewed from above) horizontal and the Y-extrusions vertical. The X-extrusions should be oriented with the larger holes towards the outside. <b>The Y-extrusions should have the larger side of the hole facing downwards!</b> Insert two T-nuts into the top facing slot of the Y-extrusion on both sides. Insert a corner bracket into both Y-extrusions.</p>
	<p>Slot in the front X-extrusion into the two corner brackets. You don't have to fasten the screws at this point.</p>

	Repeat the last two steps on the back of the frame.
	<b>IMPORTANT:</b> slide in 2 T-nuts in the front slot of the front extrusions. They will be used to attach the LCD.
	Insert the M8 x 40mm into the front X-axis.
	Tighten the M8 x 40mm slightly.



Now use a right-angle ruler to press the extrusions flat on your build plate while tightening the M8 x 40mm screw.

DON'T tighten too much!

Do the same on the left side.



Repeat the last two steps on the back of the frame.

Now when the four M8 x 40mm screws are fastened the frame should lay flat on the build plate.

After this, the frame should be perfectly flat and not rock on a flat surface, like a badly made chair might do..



Now fasten the M6 x 12 of the corner brackets on Y-extrusions.

Don't fasten the screws on the x-Extrusions

	<p>Now loosen the four M8x40mm screws by about 2-3mm. Each corner bracket should now sit flush with the end of the corresponding Y-extrusion.</p>
	<p>Prepare the extrusion covers. The middle part is too long to fit on the end of the extrusions due to clearance issues with the M8x40mm screws. Trim the middle part of the extrusion end caps at about the halfway point. Be careful not to cut them too short, as they may lose their ability to hold onto the end of the extrusion. We recommend using cutting pliers. Trim all four end caps.</p>
	<p>After trimming, they should look like this.</p>

	<p>Now install the caps onto the ends of the two X-extrusions.</p> <p>The thickness of the cap is 2.8mm, which we will use to align the X-extrusions and the corner brackets.</p>
	<p>After pushing the caps onto the corners of the frame should look like this.</p> <p>Reminder: Note that at this point in time the M8x40mm screws are loose.</p>
	<p>Top view of a corner.</p>

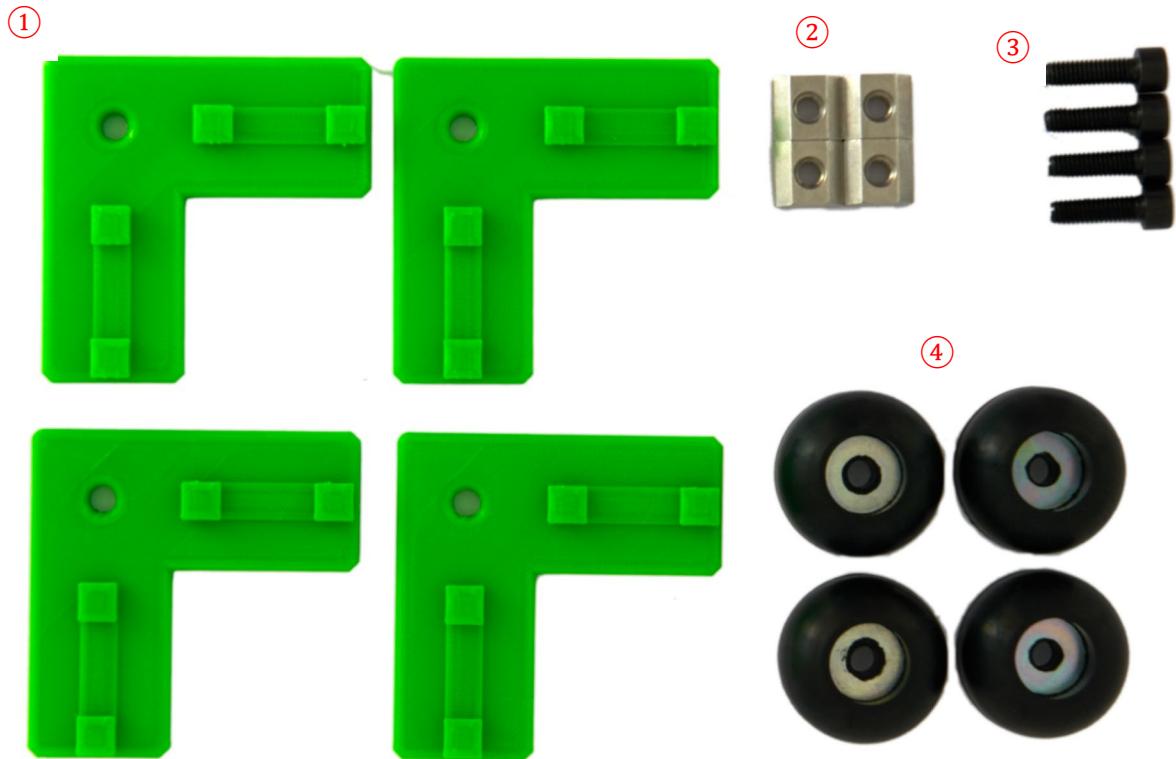
	Using something like a right-angle ruler to make sure that the two extrusions in one corner are aligned and that the extrusions are at a 90°angle in relation to each other
	
	<p>Now tighten the loose M6x12mm screw in the corner bracket, fastening the bracket to the X-extrusion. After repeating this for the other 3 corners, check thoroughly that the marked surfaces are indeed correctly aligned.</p> <p>While holding the frame in place steadily, fully tighten the eight M6 x 12mm screws of the corner bracket with a ratchet.</p> <p>It is incredibly important that the frame doesn't twist while tightening the screws.</p>

The following two steps are OPTIONAL: if you own calipers that are 300m long.

	Measure the distance between the two Y-extrusions at the front. This should be somewhere around 299.40 – 300.00mm.
	Now measure the rear part of the frame. The difference in length in comparison to the front should not exceed 0.1mm. The smaller the difference, the straighter the frame. Write down both measurements when you are done.

	Tighten the four M8 x 40mm. Don't overtighten them. This may bend the frame.
	Remove one of the end caps on the front and on the back of the frame
	<p>Insert <b>6 T-nuts</b> in upper slot of the front extrusion.</p> <p>Insert <b>8 T-nuts</b> in the upper slot of the rear extrusion.</p> <p>Now the top of your frame should look like this.</p> <p>Insert the two end caps back to the frame</p>

## 5.1.2 L-BRACKET AND FEET INSTALLATION



① L-bracket (4x)

② T-Nut (4x)

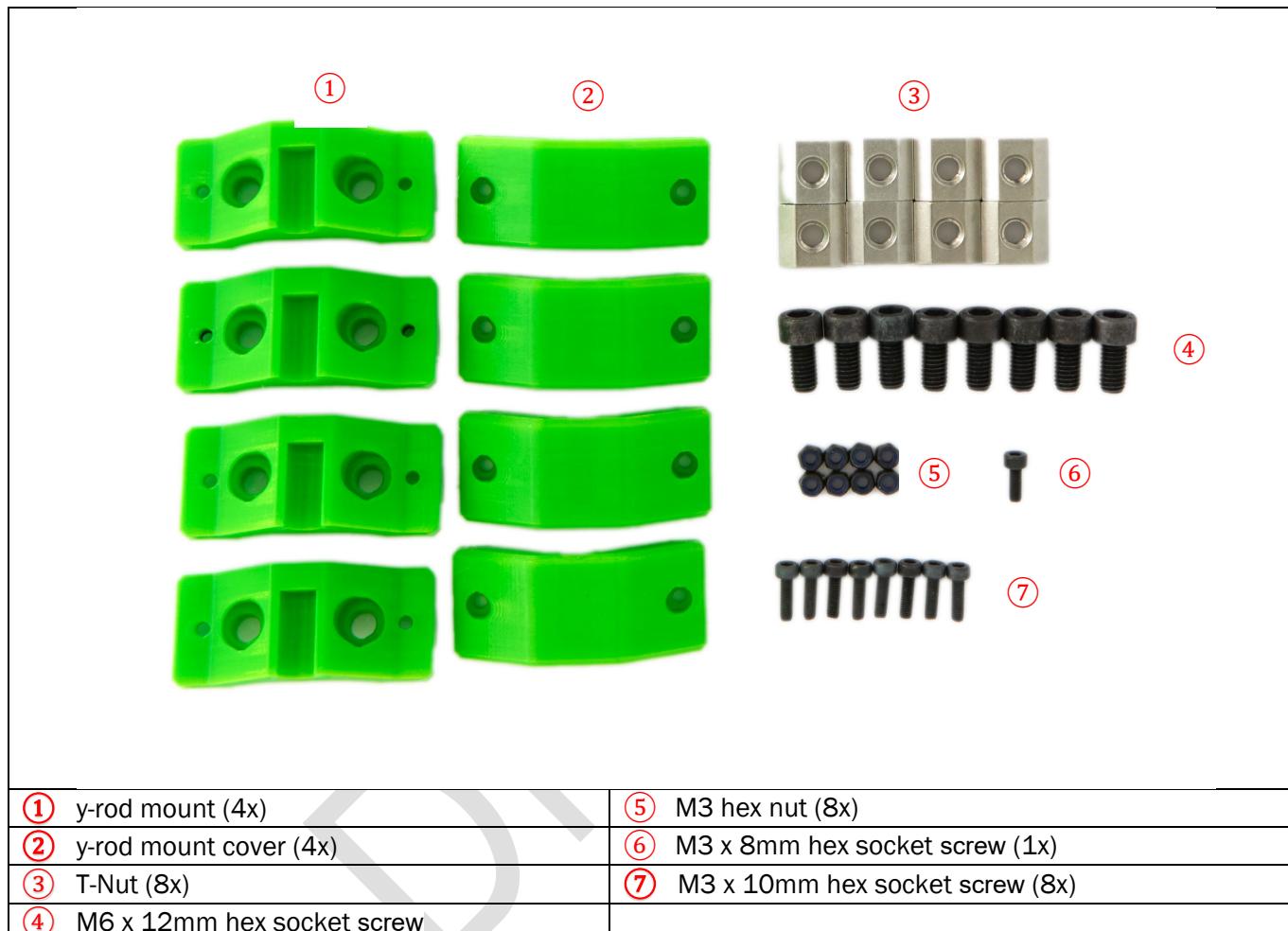
③ M6 x 20mm hex socket screw (4x)

④ Misumi rubber feet (4x)

	Flip the frame upside down.
	Insert two T-nuts into the (now) upper slots of each extrusion.
	For each corner, set a T-nut in the position as seen in the picture, and place an L-bracket over it.
	For each corner, place one of the rubber feet onto the bracket. Use a <b>M6x20mm</b> screw to secure it and the L-bracket into place.

## 5.2 Y-AXIS ASSEMBLY

### 5.2.1 Y-ROD INSTALLATION



① y-rod mount (4x)

② y-rod mount cover (4x)

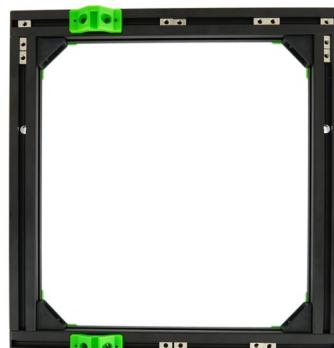
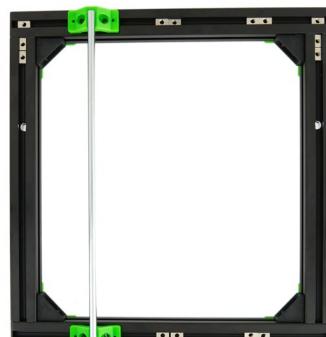
③ T-Nut (8x)

④ M6 x 12mm hex socket screw

⑤ M3 hex nut (8x)

⑥ M3 x 8mm hex socket screw (1x)

⑦ M3 x 10mm hex socket screw (8x)

		<p>Insert 2 self-securing hex nuts into each Y-rod mount bottom. You may use pliers to do so.</p>
		<p>Using an M3x8mm screw, pull the nuts into their slots.</p>
		<p>Set the frame to be in the following position. Position the T-nuts in the extrusion as shown in the picture.</p>
		<p>Place a rod mount onto the frame, with each of the holes dedicated to a T-nut. Repeat the same for the opposite side. Now clip in a 360mm rods as seen in the picture.</p>

	<p>Use the y-alignment tool to make the rod parallel to the Y-extrusions.</p> <p>Do this by firstly placing the tool at the top and then pushing the rod against it. Secondly slide the tool down the frame to the other side and push the rod against it again. Do this a few times just to be sure that the rod is straight.</p> <p>Secure the mounts in place using the marked holes, using two <b>M6x12mm</b> screws.</p>
	<p>Prepare the other rod for installation. We will adjust its position later when we fix it in place.</p>

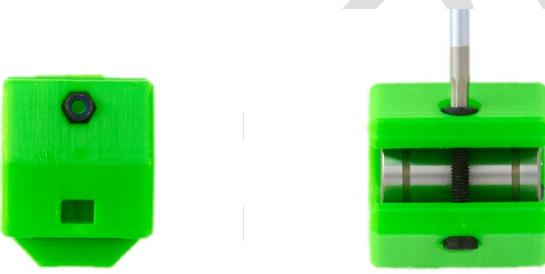
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## 5.2.2 INSTALLATION OF THE HEATBED CARRIAGE

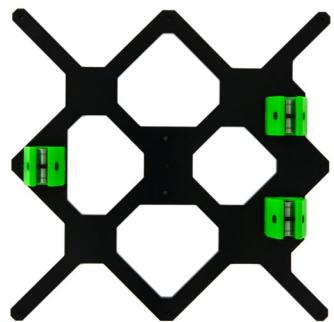
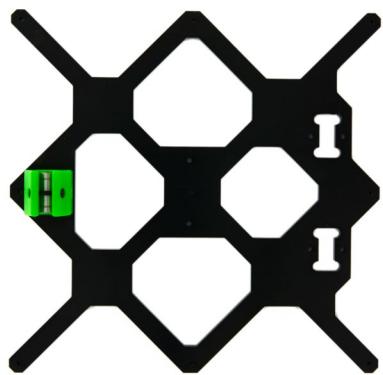


① Superlube	⑪ Bearings (3x)
② Y-carriage	⑫ Y-BearingHolder (3x)
③ grease injector and cap	⑬ GT3 pulley
④ M3 nyloc nuts	⑭ toothless pulley
⑤ M3 washer	⑮ Dowel Pin
⑥ M6 x 12mm (4x)	⑯ y-MotorHolder
⑦ M3 x 18mm (3x)	⑰ xy-BeltTensioner insert
⑧ Rubber feet (4x)	⑱ y-BeltTensioner
⑨ M3 x 12mm	⑲ y-Motor
⑩ y-BeltHolder	

Add M3 x 12mm  
M3 x 16mm  
M3 hex nuts

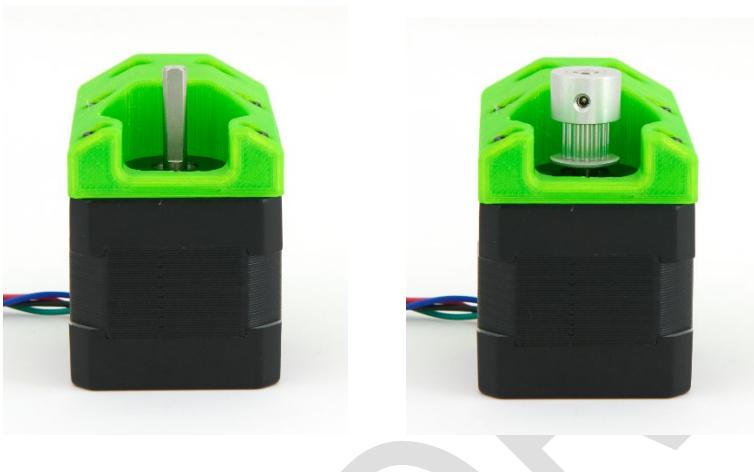
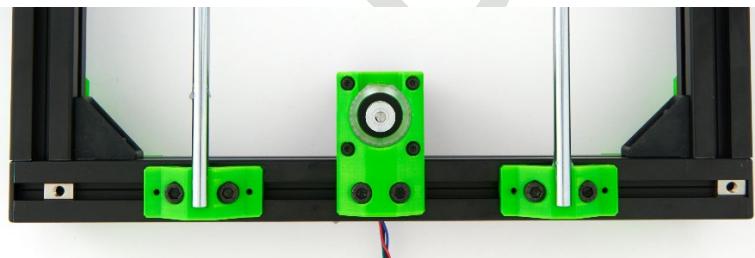
	<p>Open the super lube tube and screw on the provided injector.</p>
	<p>Place a bearing on the injector and align the channels of the bearing with the slots on the injector. Press the grease into the bearing. You are done when grease comes out the end.</p> <p>If you want to save time, do this for every bearing in the kit so that you won't have to do it again later.</p>
	<p>Insert the bearing into the bearing mount. Make sure that once inserted, the channels of the bearing form an "X". (a "+" with a 45° offset)</p>
	<p>Secure the bearing by pushing in a <b>M3 hex nut</b> on one side and screwing in a <b>M3 x 18mm screw</b>.</p> <p>Do not over tighten this screw, as you will risk breaking the bearing mount. It is only meant to stop the bearing from falling out.</p>
<h2>ORIENTATION OF THE BEARING!!</h2>	
	<p>Insert 2 <b>M3 self-sealing nuts</b> on each side of the bearing holder. Check for alignment with the hole in the top of the bearing mount.</p>

PICTURE FROM TOP





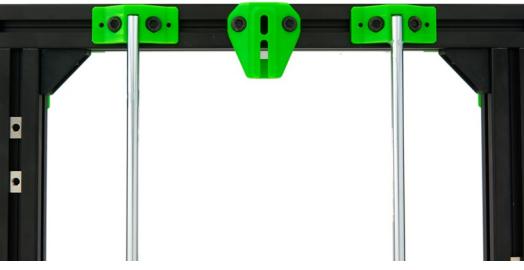
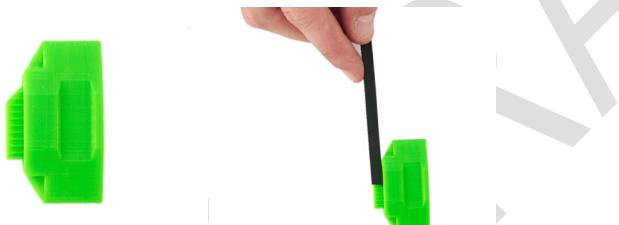
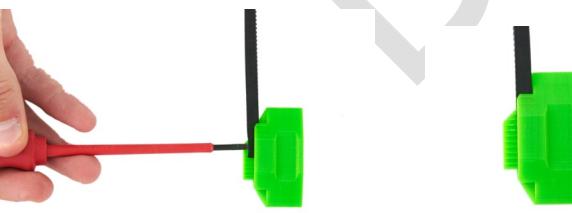
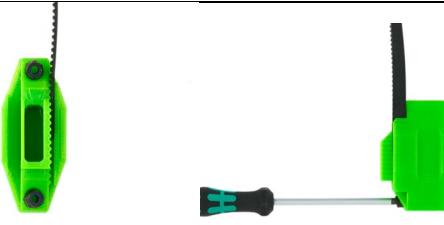
### 5.2.3 Y-MOTOR ASSEMBLY

	<p>Attach the motor mount onto the motor, with the cables exiting towards the M6 holes on the back (don't get confused by the picture). Use four M3 washers and M3x10mm screws to attach the motor to the mount.</p>
	<p>Slide the toothed GT3 pulley onto the motor shaft. The pulley has two fastening screws, make sure one of them is aligned with the flat surface of the shaft. The end of the shaft should sit flush with the flat side of the pulley.</p>
	<p>Now attach the motor assembly to the rear extrusion, with the motor on the inner side of the frame. Use two <b>M6x12mm</b> screws and the two T-nuts that we inserted into the extrusion in chapter 1. Leave these lightly loose as we will adjust the position of the motor along the extrusion later.</p>

## 5.2.4 XY-IDLER (TENSIONER) ASSEMBLY

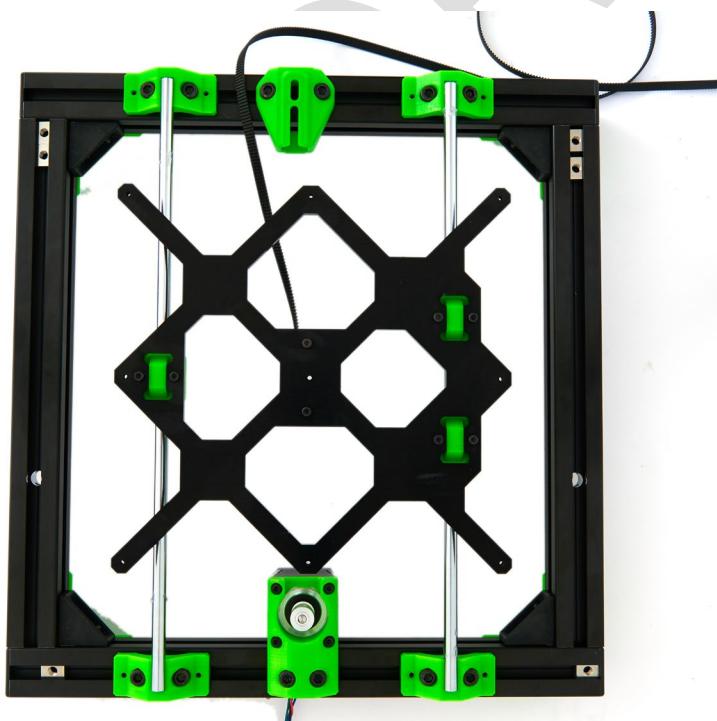
		<p>Take the belt tensioner and insert the dowel pin until you can see about half a millimeter of the pin inside the tensioner. If you feel that the hole is too small, you may use a 3mm drill bit (by hand!) to widen the hole slightly.</p>
		<p>Place a plastic washer on the dowel pin and insert the toothless pulley. Push the dowel further until it reaches the end of the pulley.</p> <p>Insert the second plastic washer and push the dowel pin all the way through the tensioner insert.</p>
		<p>Handle the part with care as brute force may cause it to break.</p>
		<p>Finally insert a self-locking nut into the slot of the tensioner.</p>

## 5.2.5 Y-IDLER AND Y BELT INSTALLATION

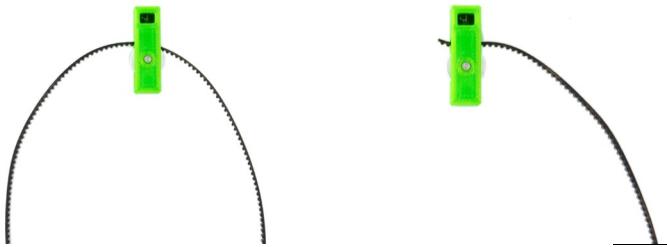
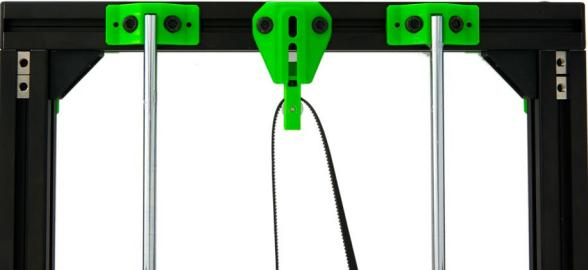
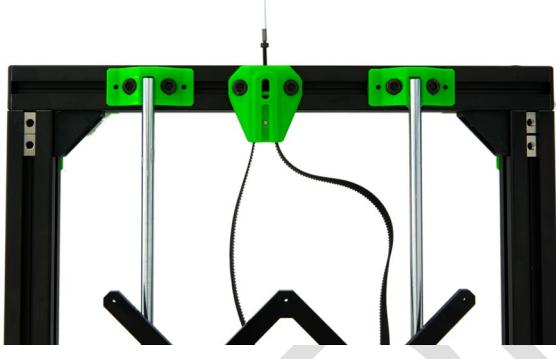
	<p>Attach the Y-belt tensioner mount to the front extrusion opposite to the motor in the orientation shown.</p>
	<p>Use two M6x12mm screws and the two T-nuts that we inserted into the extrusion in chapter 1.</p> <p>Leave these lightly loose as we will adjust the position of the y-belt tensioner mount along the extrusion later.</p>
	<p>Cut the provided GT3 belt in two pieces of about 1m. The two pieces are for the axes X and Z respectively.</p> <p>Using half of the available teeth, insert the belt into the slot.</p>
	<p>You may use a large slot screw driver to gently push the belt in.</p>
	<p>Insert two self-locking nuts into their designated holes.</p> <p>You may use a screw driver or a screw from the other side to push them in.</p>



Pay attention to the orientation of the belt holder. The side with the fastened belt should face the side of the carriage with ONE bearing.

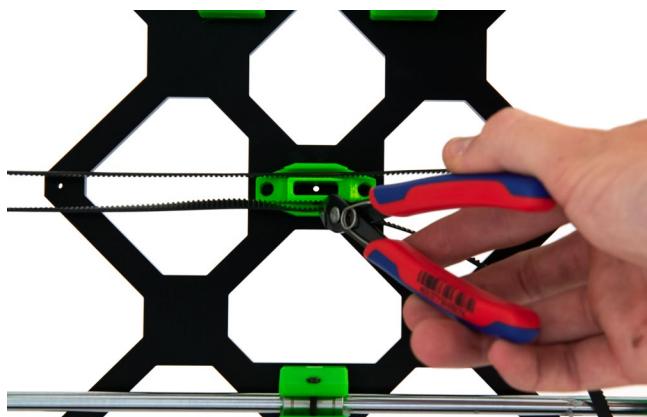


Take two M3 washers and two M3 x 16 mm screws to fasten the belt holder to the bottom of the carriage.

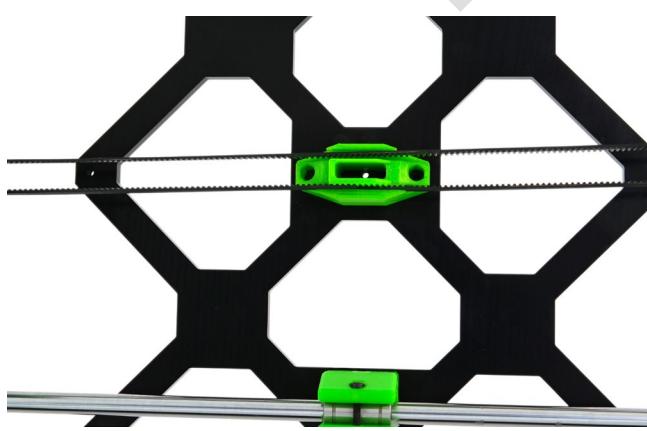
	Loop the belt around the tensioner pulley.
	Insert the tensioner into the housing with the nut facing upwards.
	Push an M3x18mm screw into the housing and screw it in till it reaches the tensioner.
	View from below



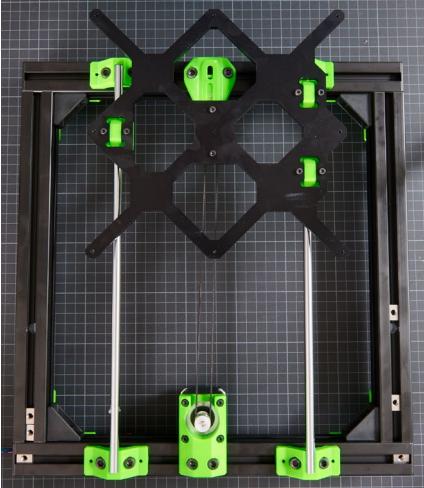
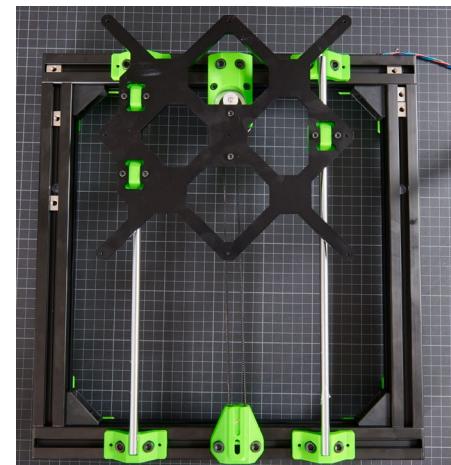
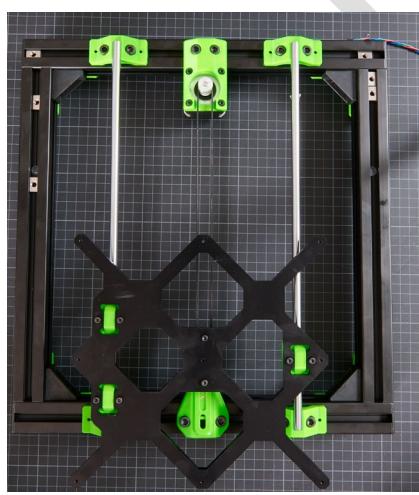
Now loop the belt around the motor.



Hold the belt against the belt mount to see how much of the belt you have to trim. Cut off the excess.



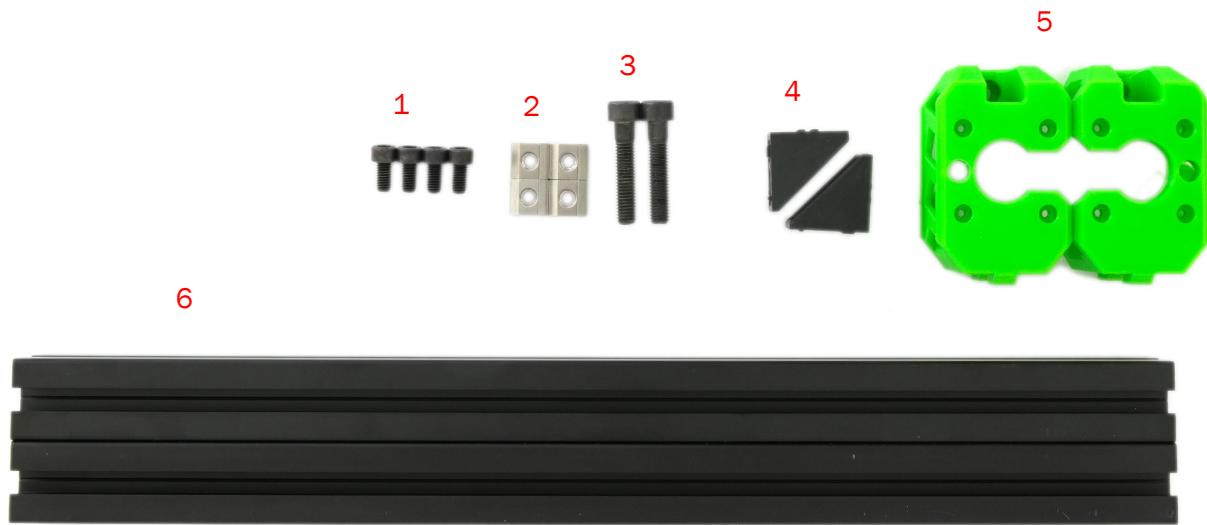
Insert the belt into the mount.

	<p>This is an example of a badly aligned belt.</p>
	<p>Using a working mat with a grid can be very helpful for you to determine whether the belt is aligned correctly.  Move the carriage to the back. Make sure that the screws that attach to the belt mount are in one line with the motor shaft.  Secure the motor to the frame by tightening the two M6x12mm screws.</p>
	<p>Move the carriage to the front and position the tensioner so that the dowel pin and the two screws line up. Then offset the tensioner to the left by 0.8mm.  This is to compensate for the lack of teeth on the tensioner pulley which results in a greater diameter (1.6mm larger).  Tighten the M6 screws.</p>

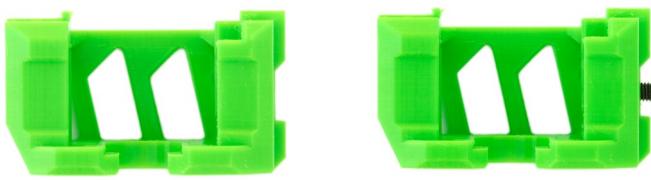
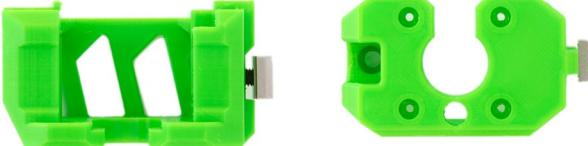
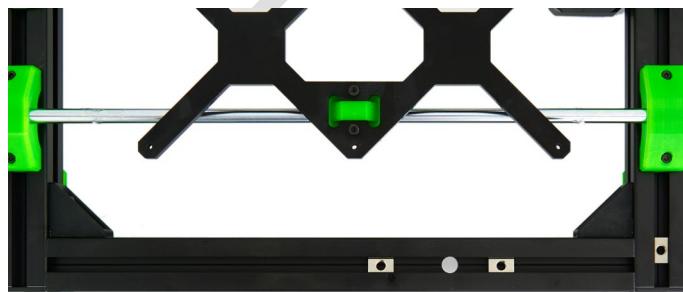
	Place the rod mount covers onto the rod mounts.
	Screw them down with two M3x10mm screws each. Do not push the screw in as you risk pushing the nut out the other end. Instead, screw the screw in.

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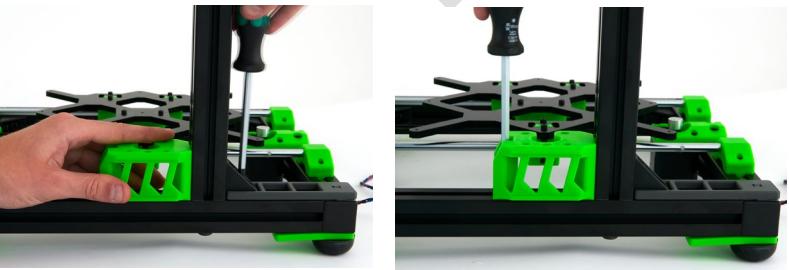
## 5.3 Z-AXIS ASSEMBLY

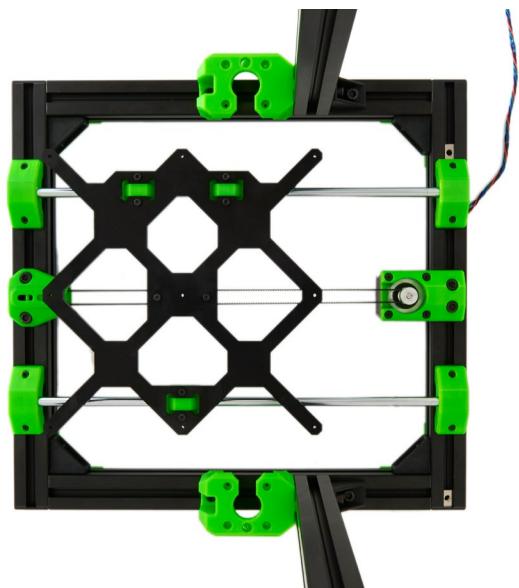


① M3 x 12mm (8x)	④ Corner bracket (2x)
② T-Nut (4x)	⑤ z-motor mount, left and right
③ M6 x 40mm (2x)	⑥ z-Extrusions (320mm for Zaribo 220, 420mm for Zaribo 320, 520mm for Zaribo 420)

	<p>NOTE: you have to prepare <b>both</b> z-motor mounts like this.</p> <p>Insert a M6 x 12mm screw into the back of the holder.</p>
	<p>Screw a T-nut on the M6 x 12mm screw.</p> <p>The right holder will look like this.</p> <p>Repeat the same preparation for the left z-motor holder.</p>
	<p>Prepare two corner brackets in the following way:</p> <p>Insert a M6 x 12mm screw to one of the holes of the bracket.</p>
	<p>Screw a T-nut on the M6 x 12mm screw.</p> <p>Top and side view of the bracket.</p>
	<p>Now continue with the xy-frame that was assembled so far.</p> <p>Make sure one of the T-nuts is in front side of the hole for the z-axis and one is on the back side!</p>

	<p>Place the z-Extrusions over the hole and fasten from below with a M8 x 40mm screw. Only tighten loosely!!</p>
	<p>Slide the right z-motor holder and a corner bracket into the extrusion slot (T-nut goes into the slot). Push both to the bottom of the extrusion so that they sit on the xy-frame.</p>
	<p>Make sure the corner bracket and the motor holder sit flush in the xy frame and fasten the M6 x 12mm screws that are attached to the T-nuts.</p>

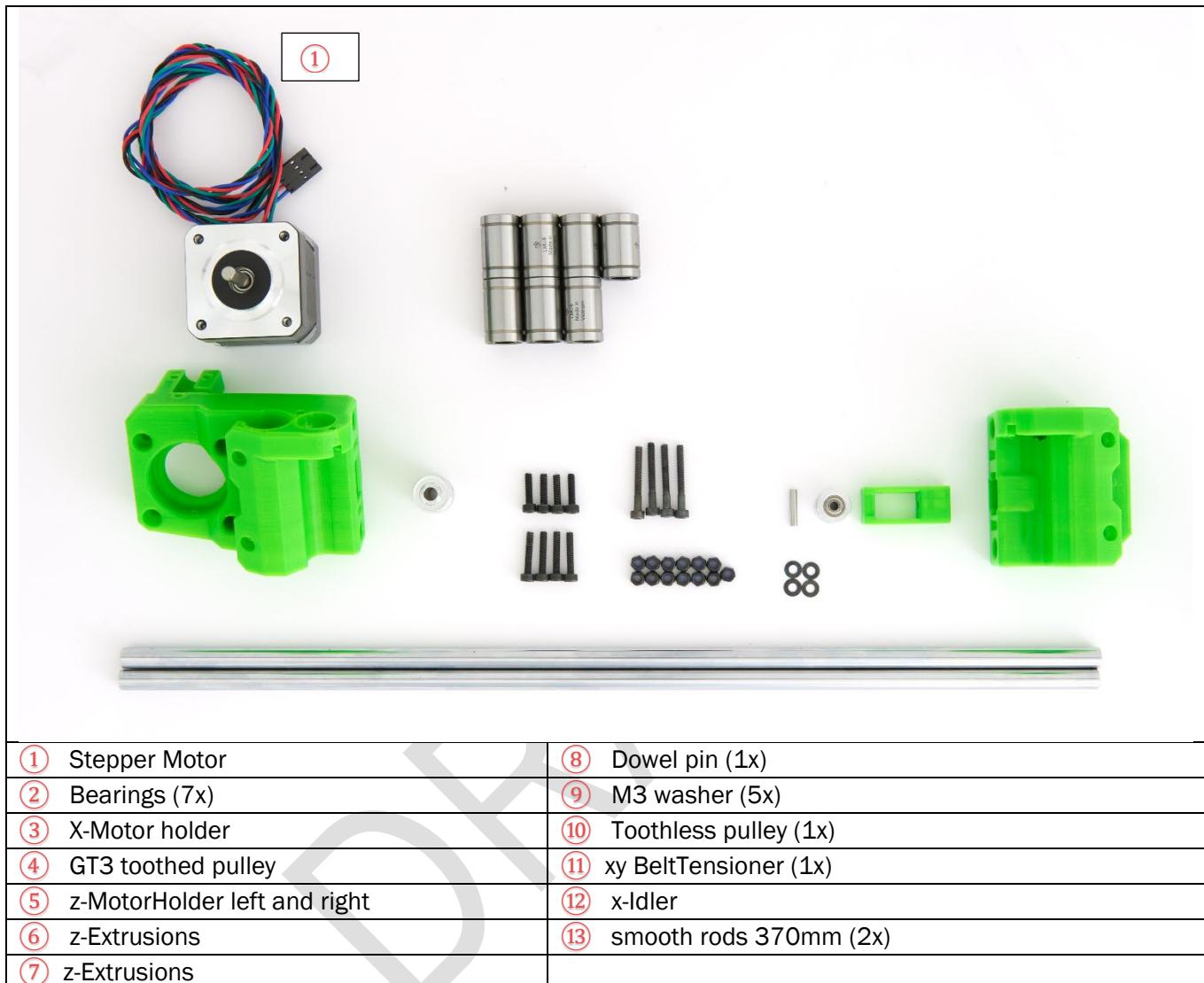
	<p>Make sure the T-nuts in the xy-frame sit under the hole of the motor holder and under the corner bracket.</p> <p>Take two M6 x 12mm screws and screw them into the motor holder and the T-nut below. Do the same for the corner bracket.</p> <p>Don't tighten the screws yet. You should still be able to move the y-extrusion back and forth by about 1mm.</p>
	<p>Now comes another important step in order to get a square frame. It need to be ensured that that both z-axis have the same distance to the back.</p> <p>Use the z-alignment tool and slide it into the x-extrusions on the back. Press the z-extrusion to the back so that it touches the alignment tool.</p>
	<p>Fasten the corner bracket with a M6 x 12mm screw.</p> <p>Fasten the front side of the motor with a M6 x 12mm screw.</p> <p>Make sure the z-extrusion side flush with y-extrusion on the side.</p> <p>Fasten the M8 x 40mm of the z-extrusion.</p> <p>Repeat the above steps for the other side of the frame.</p>



After completing the motor and z-axis assembly your frame should look like this.

In the last step the two z-motors are attached.

## 5.4 X-AXIS ASSEMBLY



Update photo: 2x POM nuts

5x washer

1x square nut

2x M3 hex nut

5x M3 x 16mm

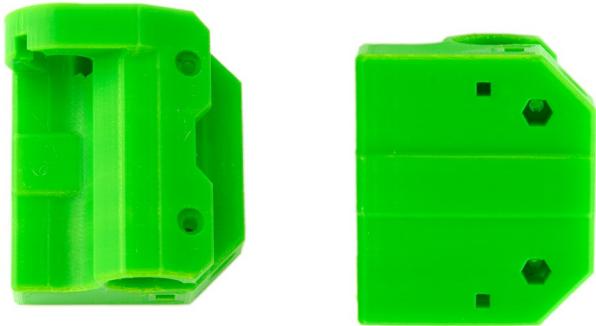
2x M3x 14mm

## 5.4.1 X-MOTORHOLDER ASSEMBLY

	<p>Insert <b>2 M3 self securing nuts</b> on the back of the x-MotorHolder.</p> <p>Insert two <b>M3 hex nuts</b> at the top for the motor holder cover.</p>
	<p>Use a screwdriver to push in the self-securing nuts.</p> <p>Use a plier to push in the hex nuts. As an alternative use a <b>M3 x 10mm head cap screw</b> to pull in the hex nuts in to the holder. LIEBER MIT 5HEX SCHRAUBER REINDRÜCKEN</p>
	<p>Place one stepper motor on the back of the holder and make sure that the cables runs through the cable holder</p> <p>Turn the motorholder around and insert <b>M3 washers</b> into the hole of the screws for the motor.</p>
	<p>Fasten the motor with <b>4 M3 x 12mm head cap screws</b>.</p> <p>Insert one bearing from the top and one from the bottom into the holder. Make sure to push them far enough so that they touch the stop in the middle in the holder.</p>

	<p>Insert <b>2 self securing nuts</b> into the slots close the hole for the POM nut.</p> <p>Insert the <b>POM nut</b>.</p>
	<p>Take <b>2 M3 washers</b> and <b>2 M3 x 14mm head cap screws</b> to fasten the POM. Don't tighten the screws yet. This will be done in a later step.</p> <p>Use <b>2 M3 x 25mm head cap screws</b> to fasten the bearings. Only tighten the screws until you feel that the screws grab on the self-securing nuts. Don't overtighten!</p>
	<p>Slide the toothed GT3 pulley onto the motor shaft. The pulley has two fastening screws, make sure one of them is aligned with the flat surface of the shaft.</p> <p>Leave a thin gap between the pulley and the motor face, as to avoid rubbing.</p> <p>The two pictures show the assembled motor holder.</p>

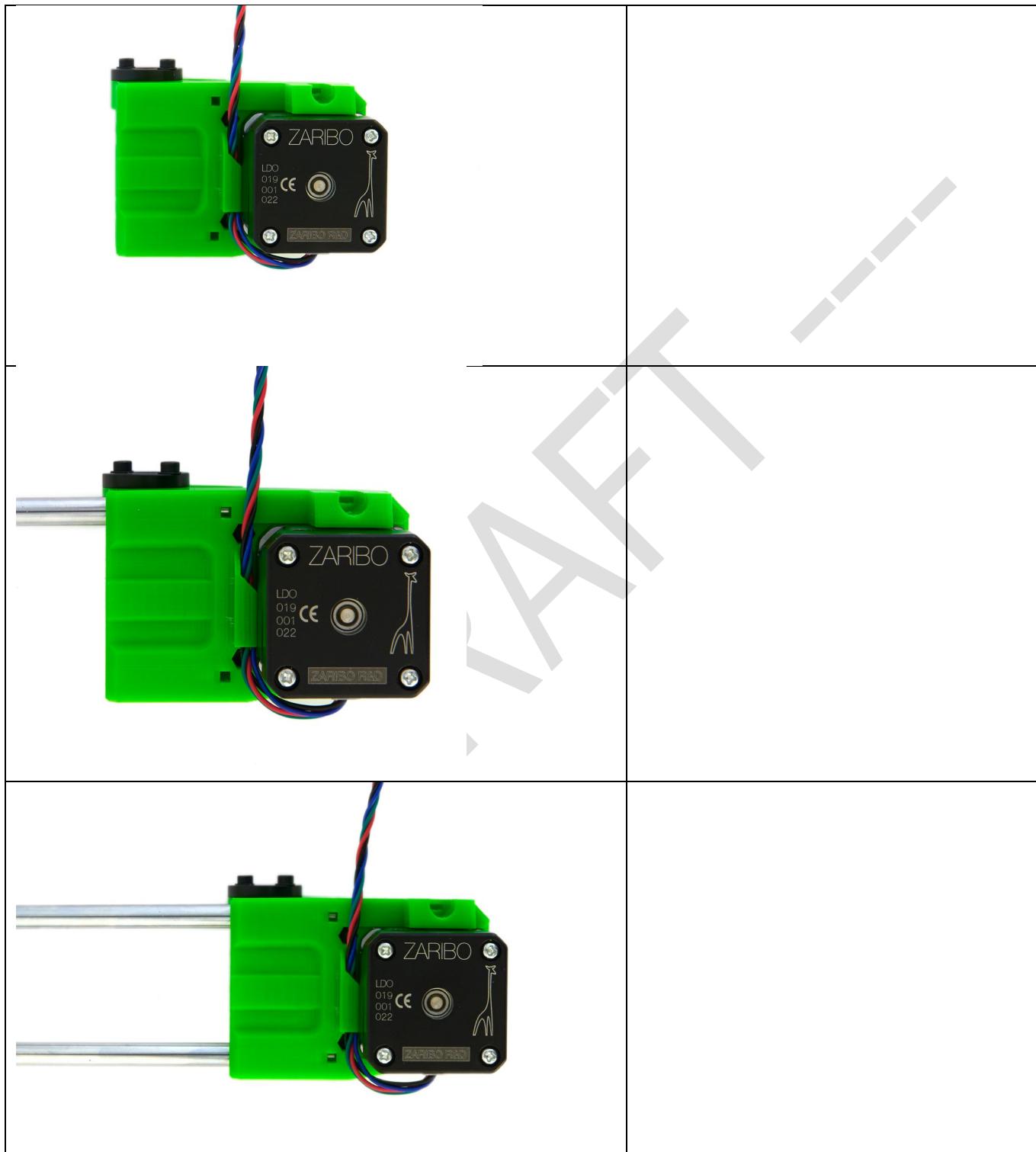
## 5.4.2 X-IDLER ASSEMBLY

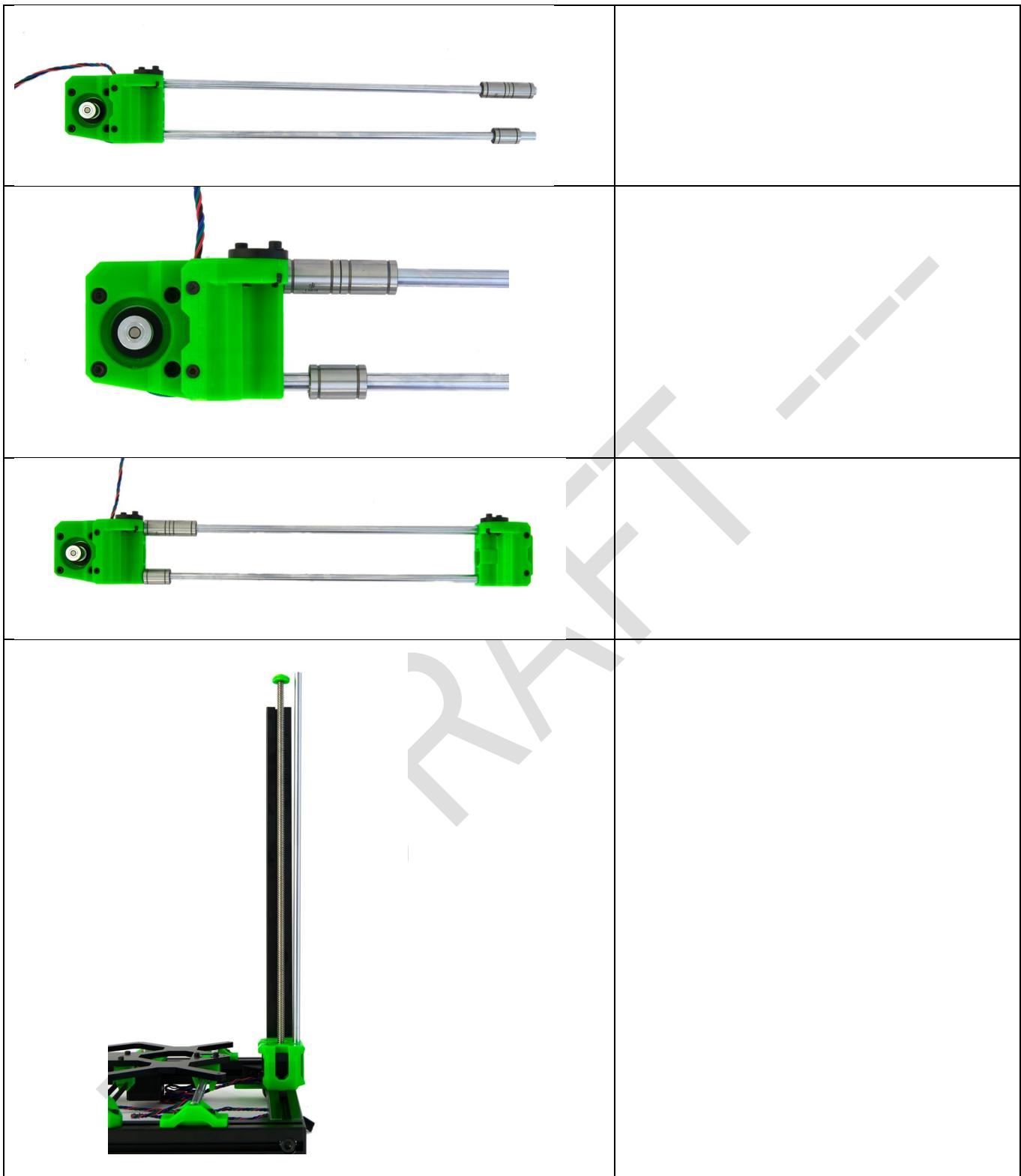
	<p>Follow the same steps for the x-idler as for the x-motor holder:</p> <ul style="list-style-type: none"> <li>- Insert <b>2 M3 self securing nuts</b> on the back of the x-MotorHolder</li> <li>- Insert <b>2 self securing nuts</b> into the slots close the hole for the POM nut</li> <li>- Insert the <b>POM nut</b></li> <li>- Take <b>2 M3 washers</b> and <b>2 M3 x 14mm head cap screws</b> to fasten the POM. Don't tighten the screws yet. This will be done in a later step</li> <li>- Use <b>2 M3 x 25mm head cap screws</b> to fasten the bearings. Only tighten the screws until you feel that the screws grab on the self-securing nuts. Don't overtighten!</li> </ul>
	<p>Insert one M3 self securing nut at the top and one at the bottom of the idler</p>
	<p>View from the bottom of the assembled x-idler.</p>

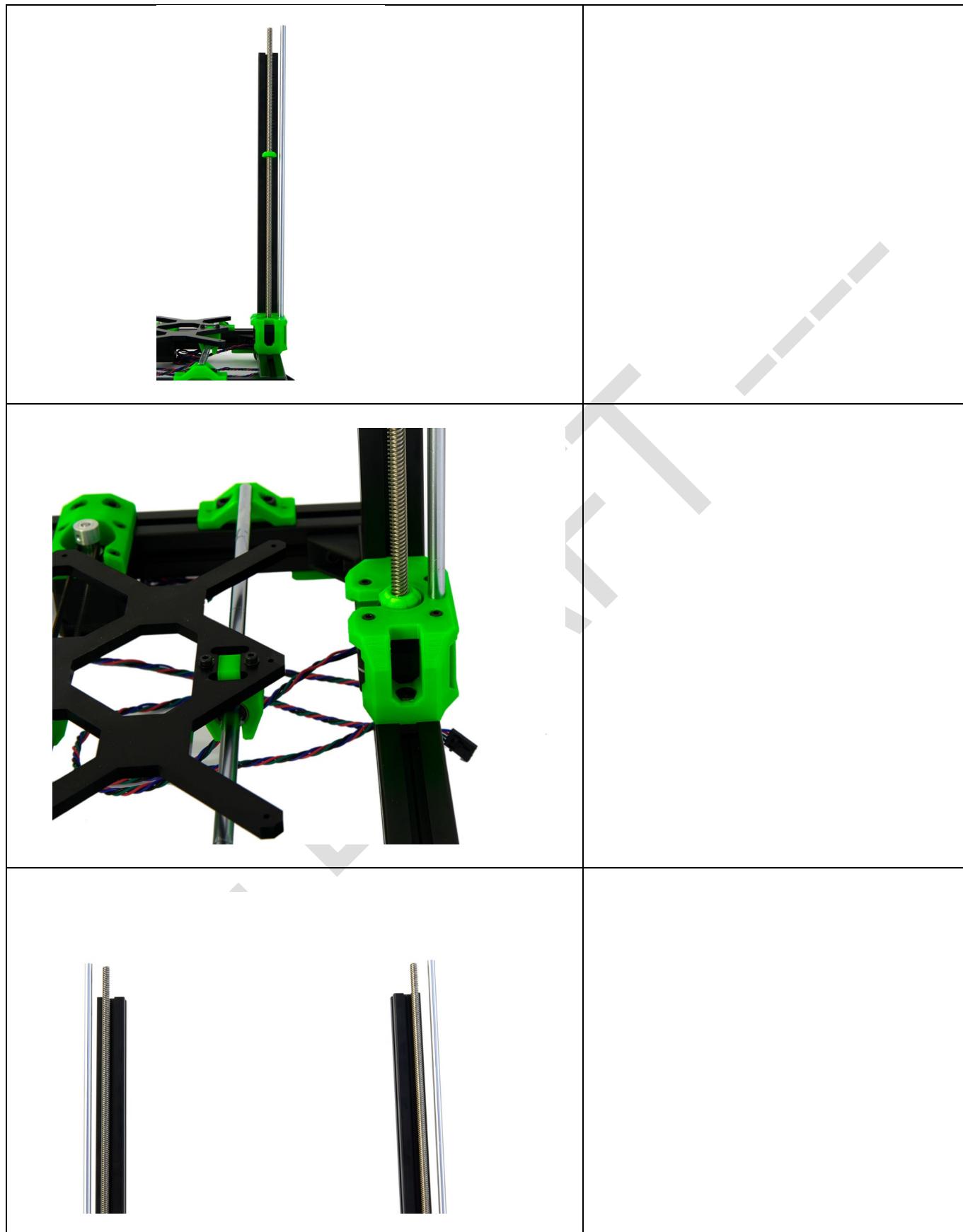
### 5.4.3 XY-IDLER (TENSIONER) ASSEMBLY

		<p>Take the xy-belt tensioner and insert the dowel pin until you can see about half a millimeter of the pin inside the tensioner. In case of difficulty use a sharp knife to increase the diameter of the hole a bit.</p>
		<p>Now put a plastic washer on the dowel pin and insert the toothless pulley. Push the dowel further until it reaches the end of the pulley.</p>
		<p>Insert a second plastic washer and push the dowel pin all the way through the tensioner insert.</p>
		<p><b>CAUTION:</b> Don't use too much force while pushing the dowel this may break the plastic part.</p>
		<p>Finally insert a Nyloc nut into the slot of the tensioner.</p>

#### 5.4.4 ASSEMBLING AND INSTALLING THE X-AXIS









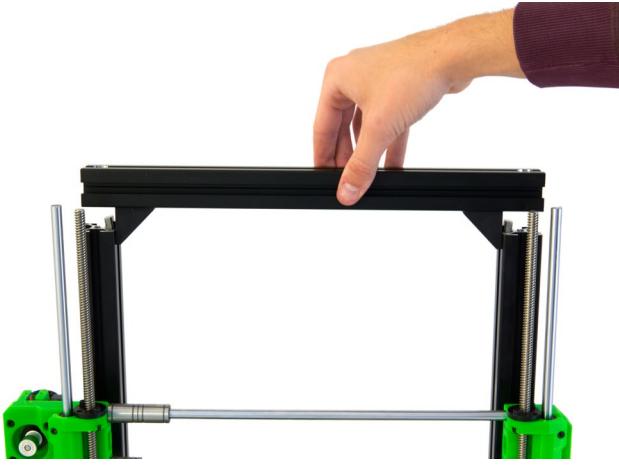
## 5.5 Z-TOP AXIS ASSEMBLY



① x-Extrusion	⑤ Extrusion Cover (2x)
② Corner brackets (2x)	⑥ z-TopHolder left
③ T-Nuts (10x)	⑦ z-TopHolderRight
④ M6 x 12mm (8x)	

### 5.5.1 MOUNTING X-TOP-EXTRUSION

		<p>Prepare two corner brackets in the following way: Insert a M6 x 12mm screw to one of the holes of the bracket.</p>
		<p>Screw a T-nut on the M6 x 12mm screw. Top and side view of the bracket.</p>
		<p>Put the two corner brackets onto the X-extrusion, in the slot with the two smaller screw holes.</p>
		<p>Prepare the left and right z-top holder by putting in 2 M6 x 12mm screws from the front and screwing in 2 T-nuts from the back.</p>

	<p>Put the X-extrusion onto the printer as seen in the picture, with the T-nuts of the corner brackets properly slotted into the inner slots of the z-extrusions.</p>
	<p>Screw in both M8x40mm screws into the top, and tighten them slightly.</p>
	<p>While pushing the corner brackets up against the x-extrusion, screw in the horizontal M6x12mm screws. Do this for both sides of the frame.</p>
	<p>Remove both M8x40mm screws in order to be able to slide the extrusion.</p>

	Slide the x-extrusion to the right.
	Insert 1 T-nut into the back slot of the left z-extrusion. (Needed to the Einsy box)
	Install the left top bracket, making sure the notch is properly inserted in the z-extrusion.
	You may use a hammer to VERY GENTLY top the top mount onto the rod.  Please pay attention to the next picture!

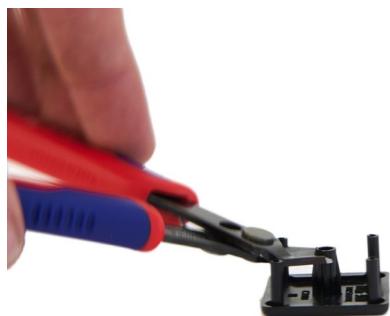


Gently adjust the height of height of the top bracket so that its upper notch is aligned with the extrusion slot of the X-extrusion.





Insert one t-nut into the right extrusion slot  
(for PSU top holder)



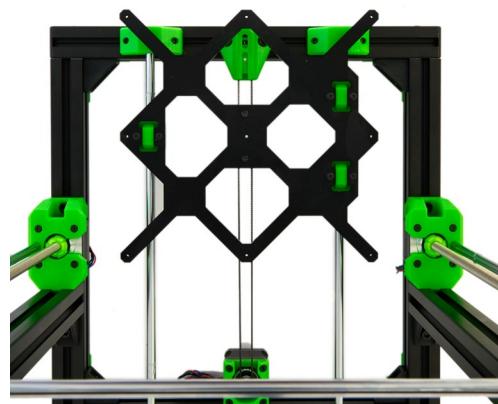




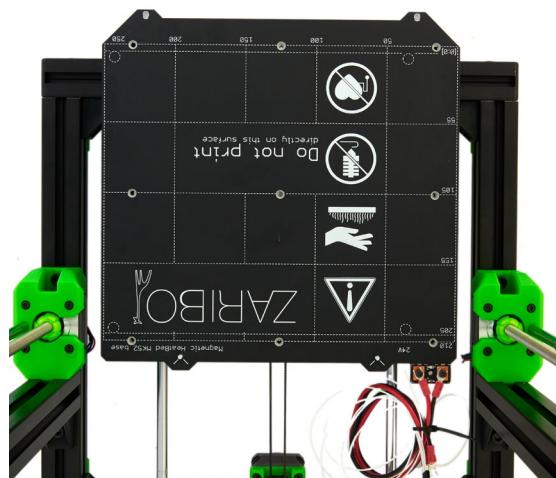
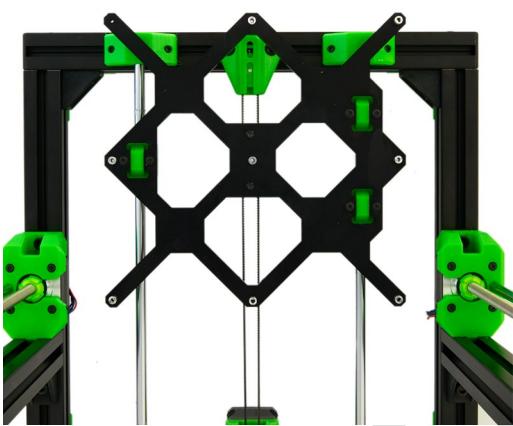
## 5.6 HEAT BED INSTALLATION

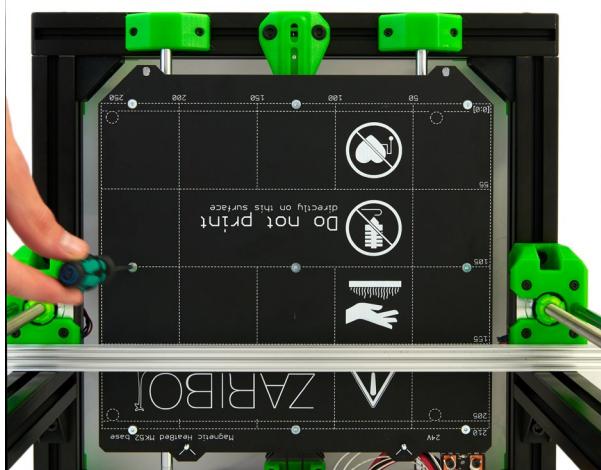
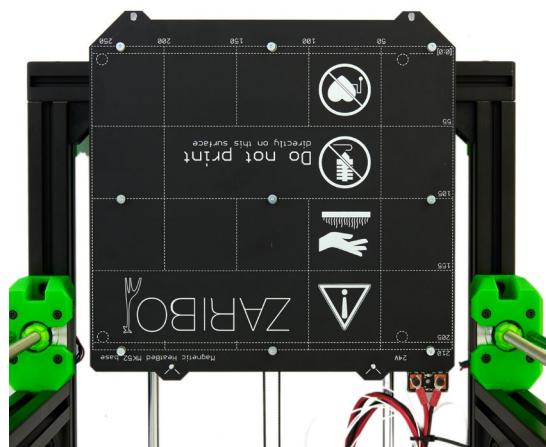


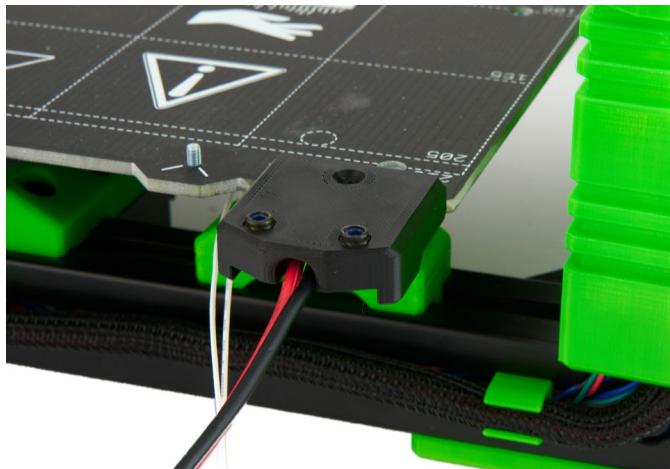
① Heat bed	⑤ M3 hex nut (2x)
② Distance holders 6mm (9x)	⑥ M3 x 12mm flat head
③ M3 x 12mm flat head	⑦ Heat bed cover top
④ M3 nyloc nut	⑧ Heat bed cover bottom



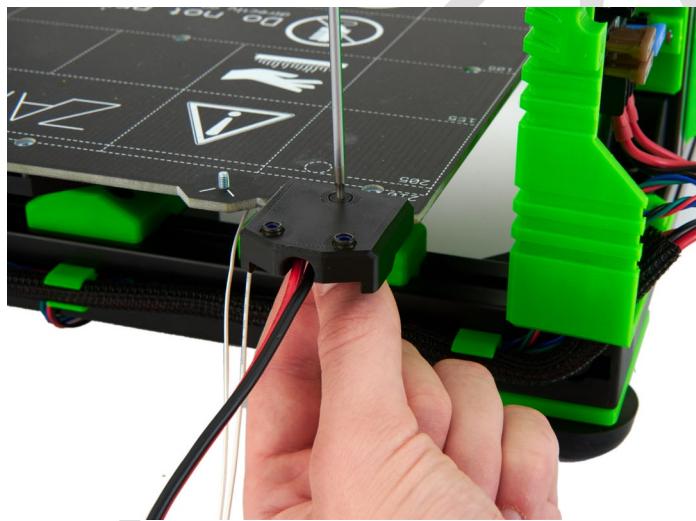
Using M6x12mm screws and T-nuts, prepare the four corner brackets as seen in the picture. Don't tighten them fully, the T-nut should have a generous amount of play (will be useful in the next step).

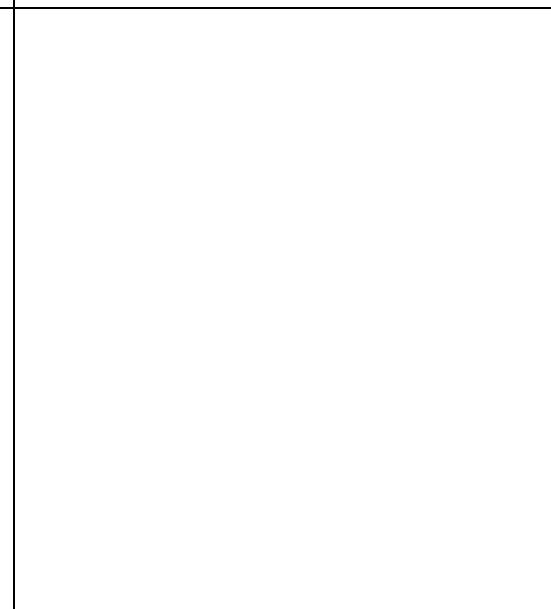
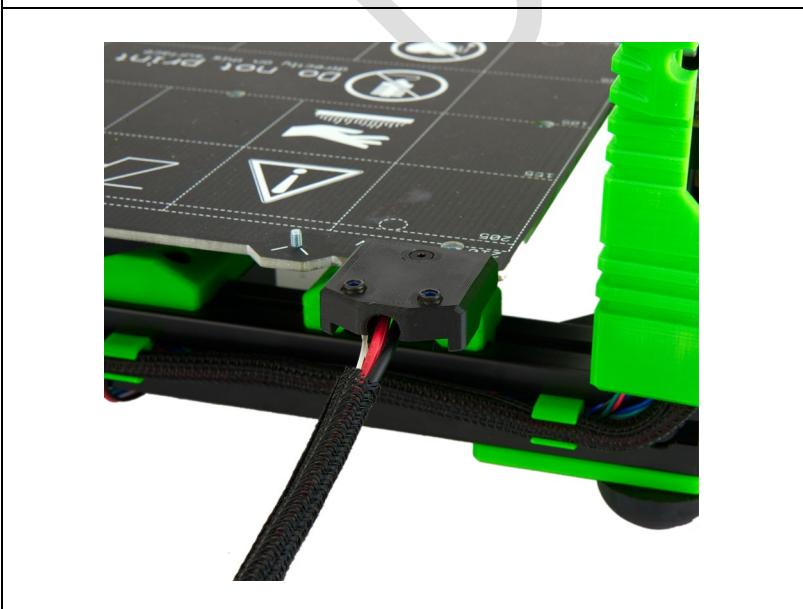
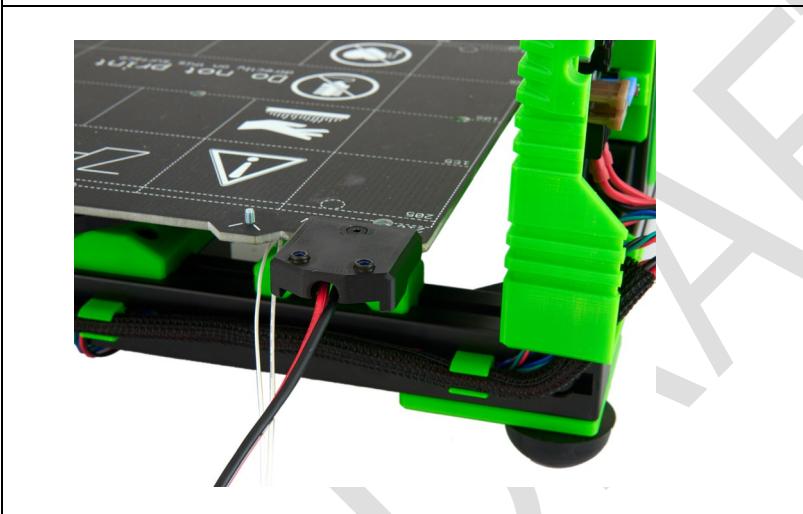
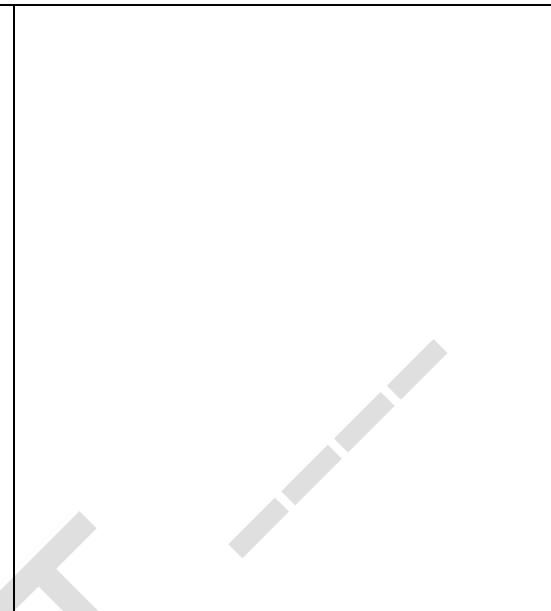
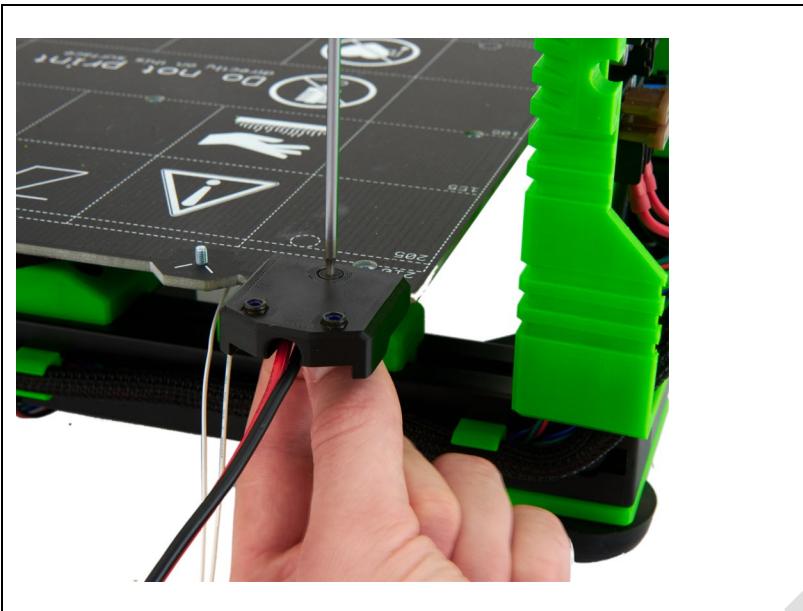






Ignore Einsy box in the picture  
!

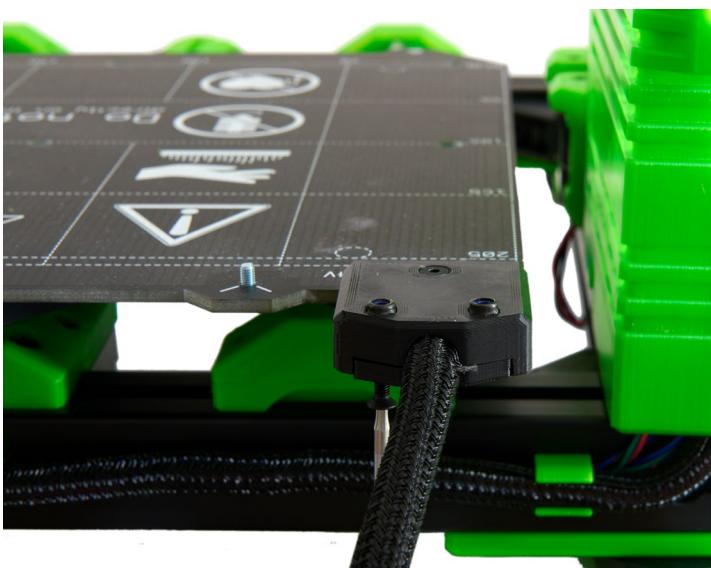
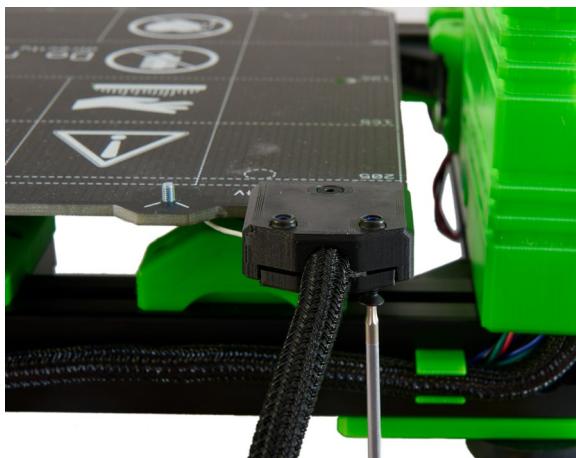






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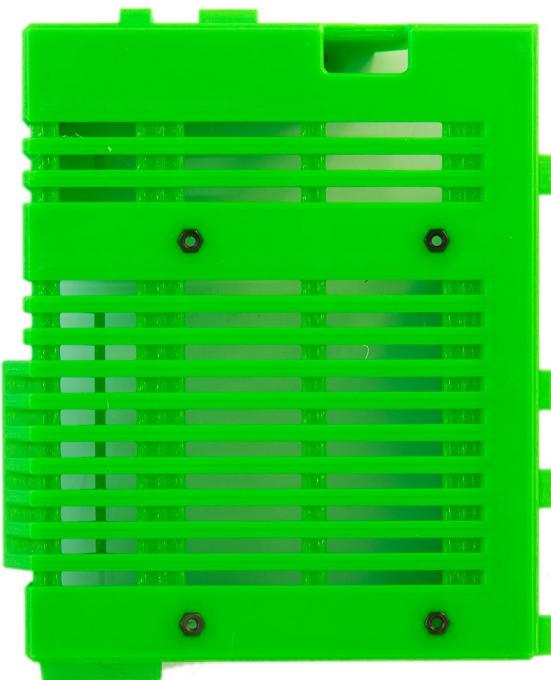




## 5.7 EINSY BOX ASSEMBLY

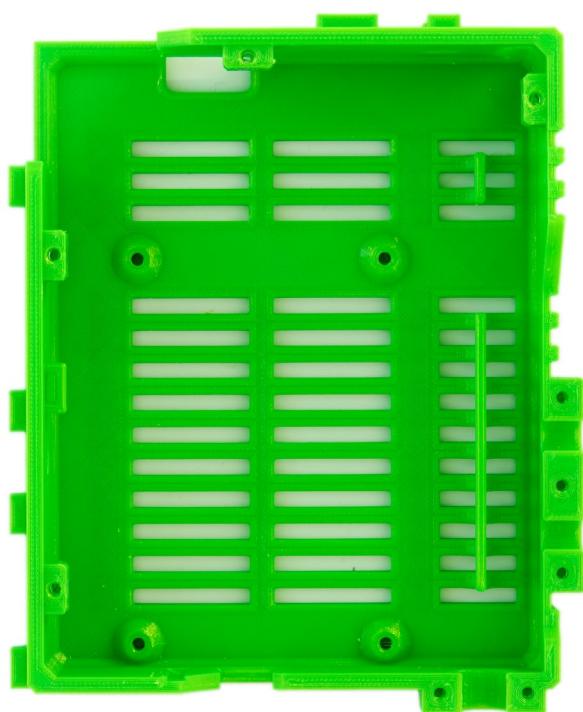


① Einsy Box	⑥ M3 x 22mm (5x)
② Einsy Box Cover	⑦ M3 hex nut (4x)
③ M3 Square Nut (9x)	⑧ M3 x 8mm (4x)
④ M3 x 14mm (4x)	⑨ Einsy board
⑤ M6 x 12mm (2x)	

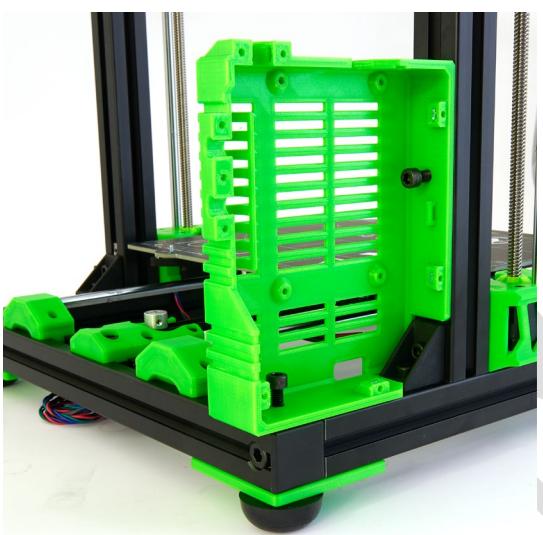


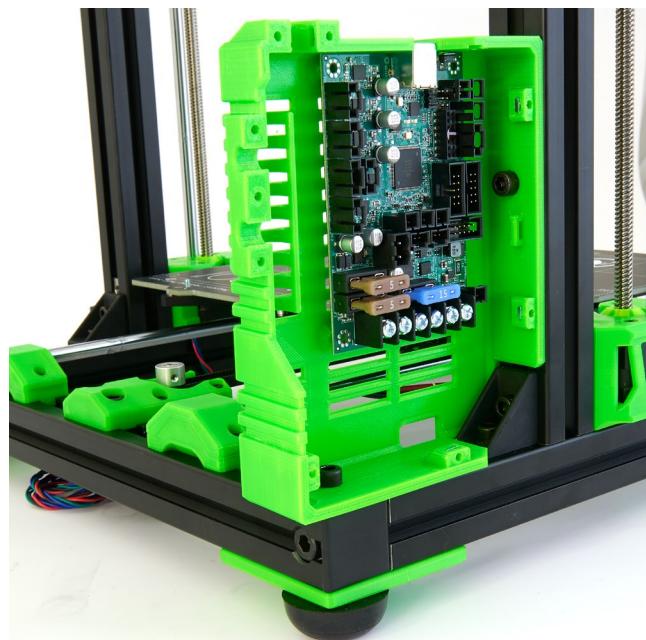
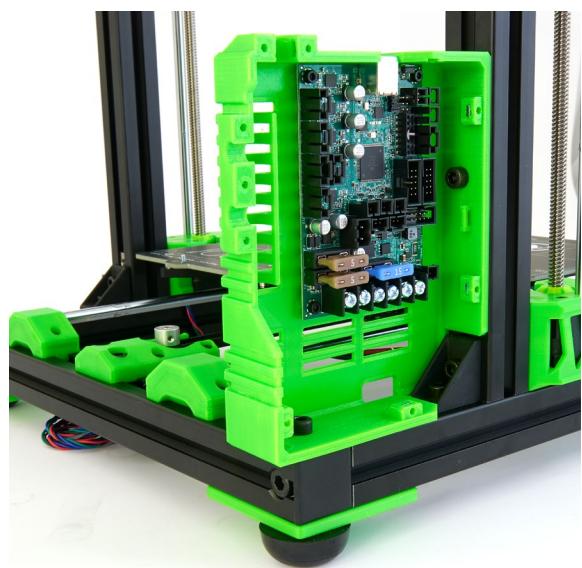
Preparation of the Einsy box:

Insert 4 M3 hex nut on the back of the  
Einsy box

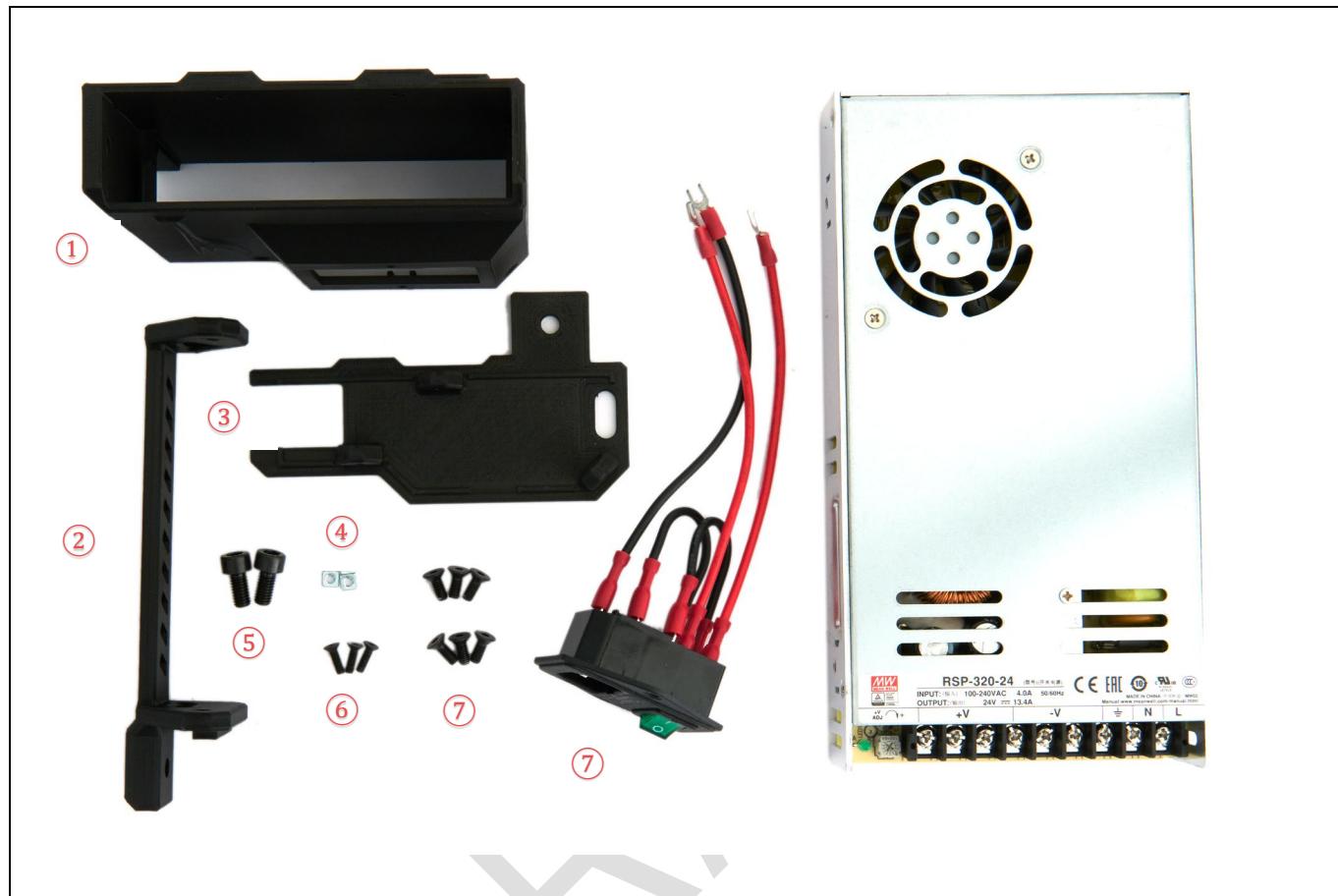


Insert 9 square in the slots on the inside  
of the box.



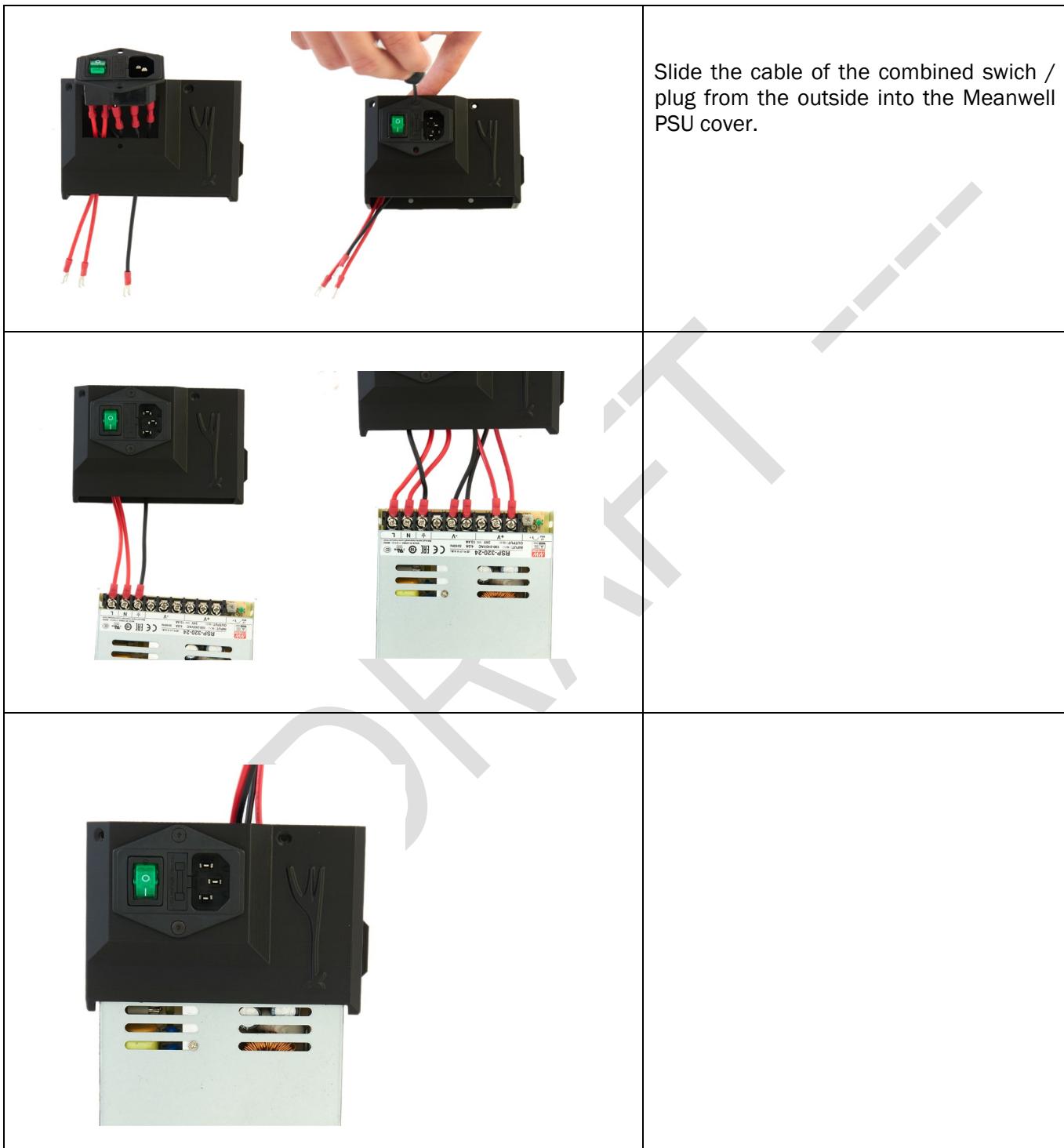


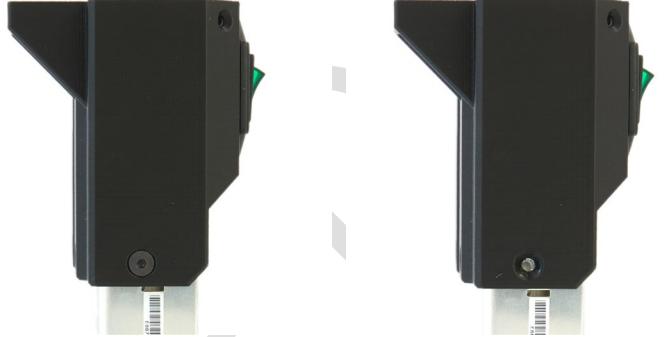
## 5.8 PSU ASSEMBLY

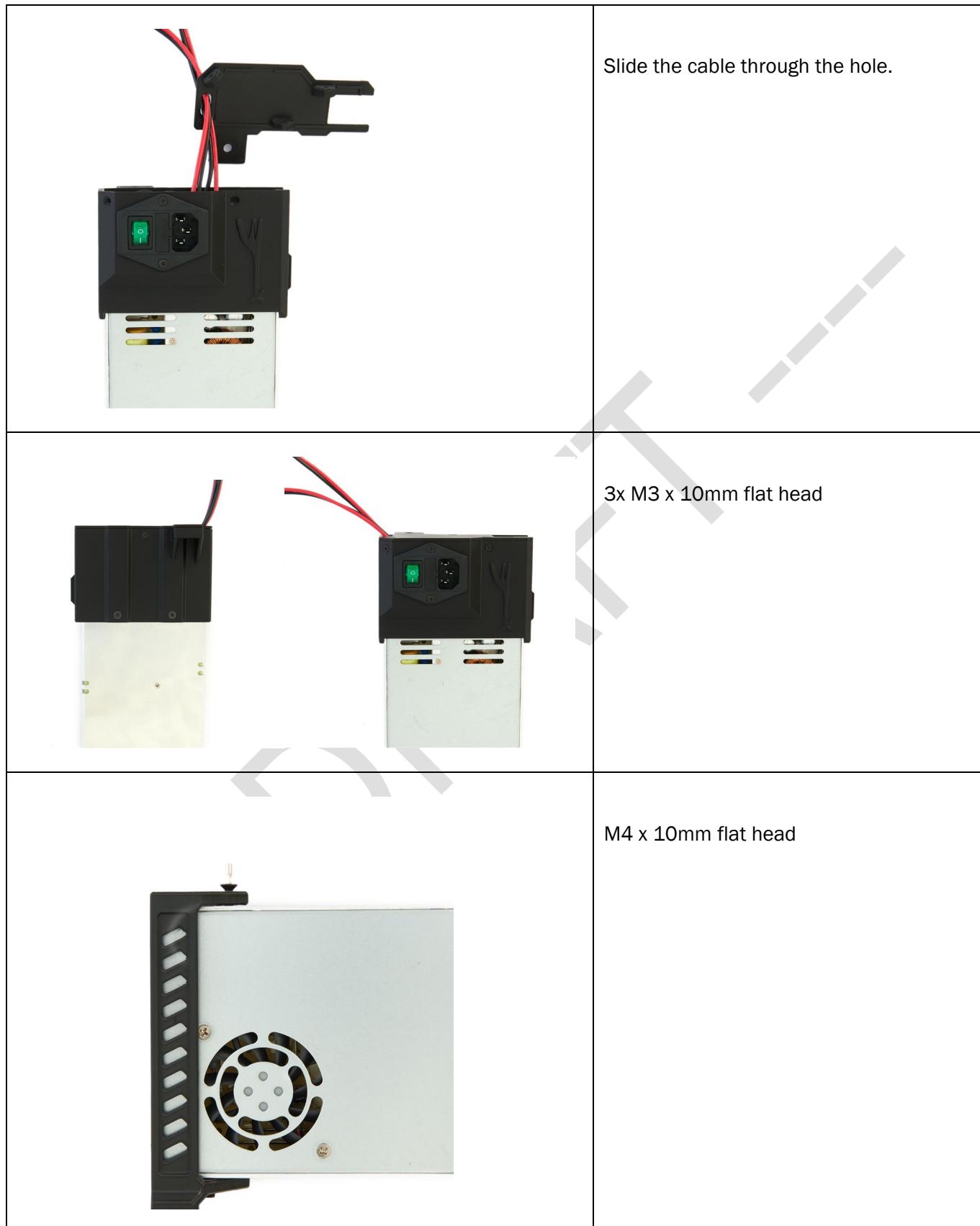


① Meanwell Cover	⑥ M3 x 10mm (3x)
② Meanwell Top Holder	⑦ M4 x 14mm (6x)
③ Meanwell Cover Bottom	⑧ Plug / Switch with cables
④ M3 Square Nuts (3x)	⑨ Meanwell PSU
⑤ M6 x 12mm (2x)	

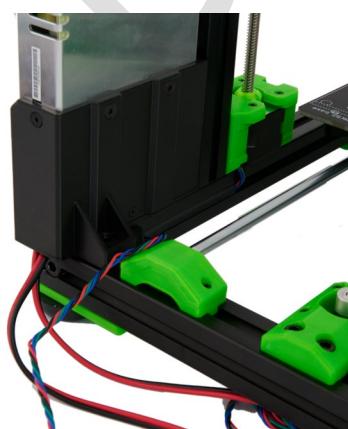
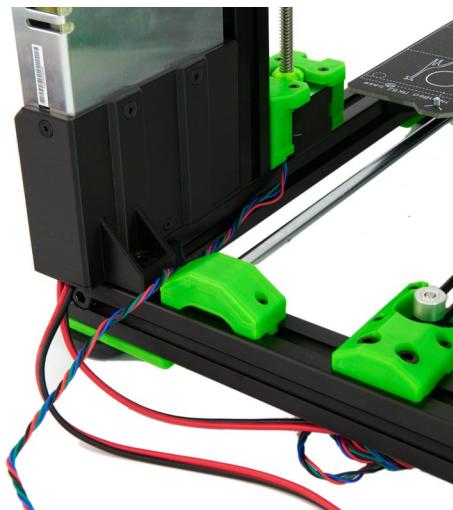
## 5.8.1 MEANWELL RSP-320

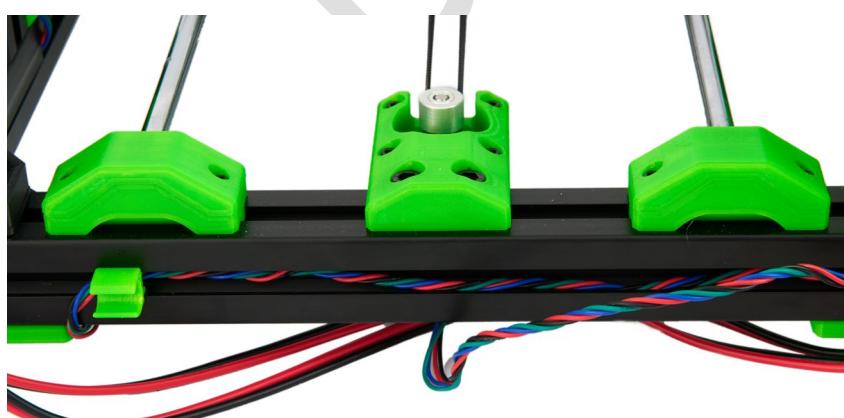
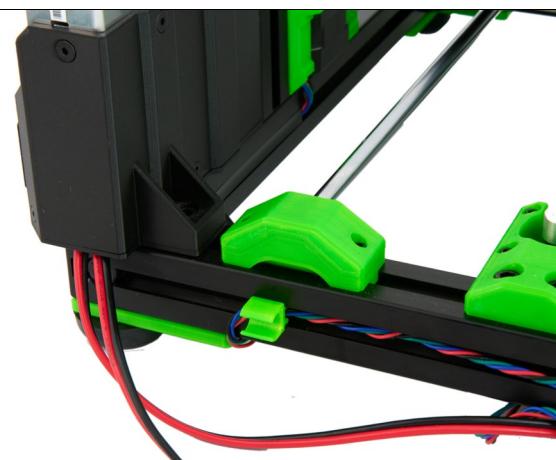
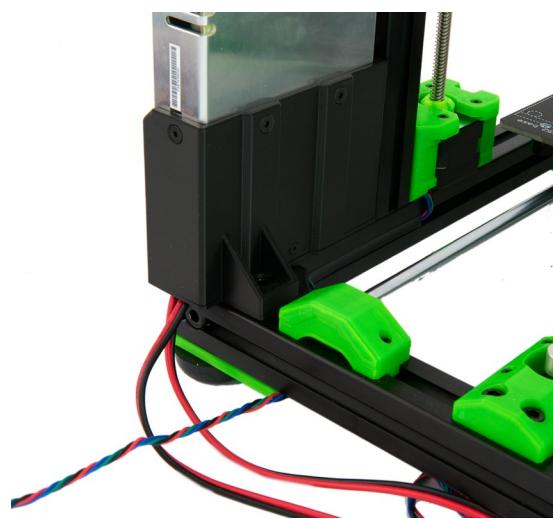


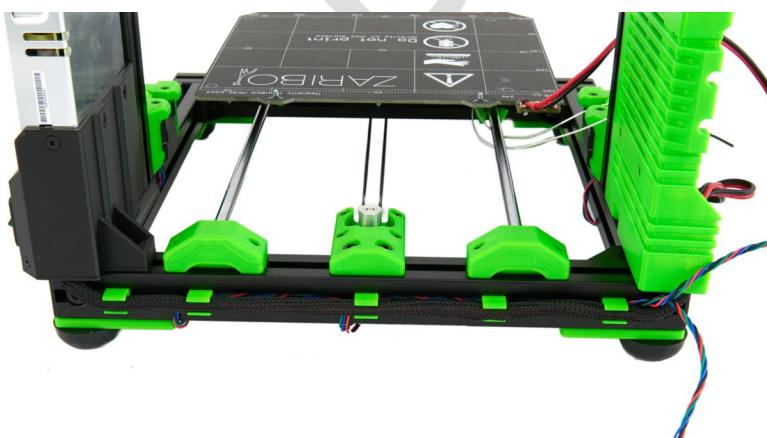
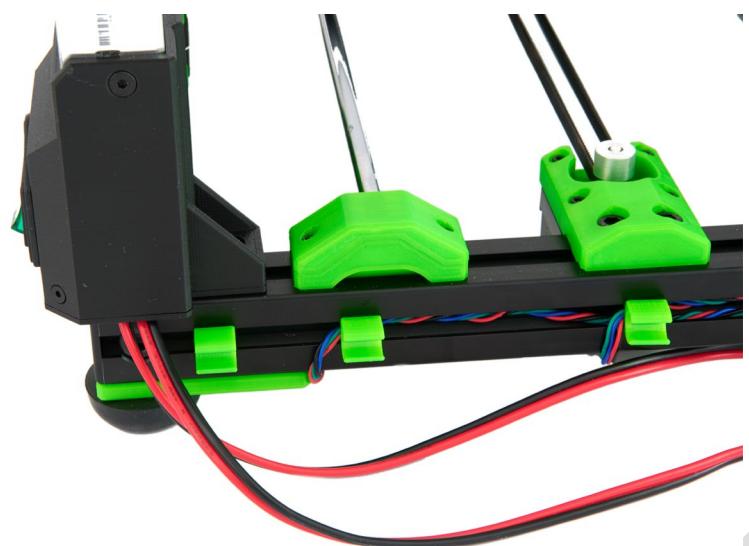
	
	2x M4 x 10mm
	2x M4 x 10mm
	Insert 3x square nuts into the bottom cover.



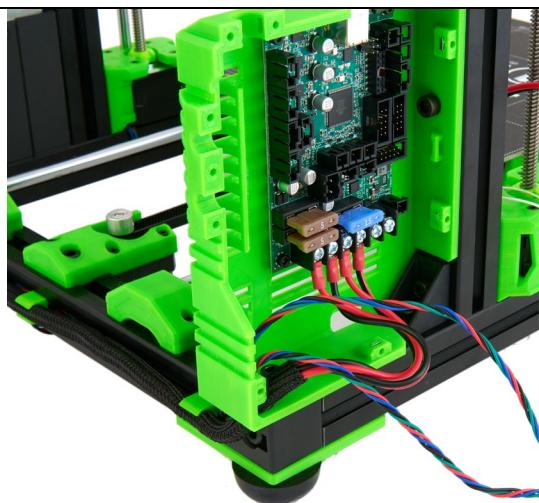
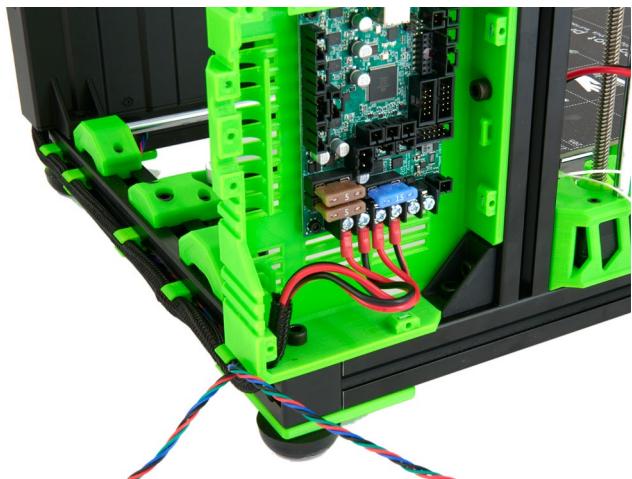
	M4 x 10mm flat head
	M6 x 12mm
	M6 x 12mm









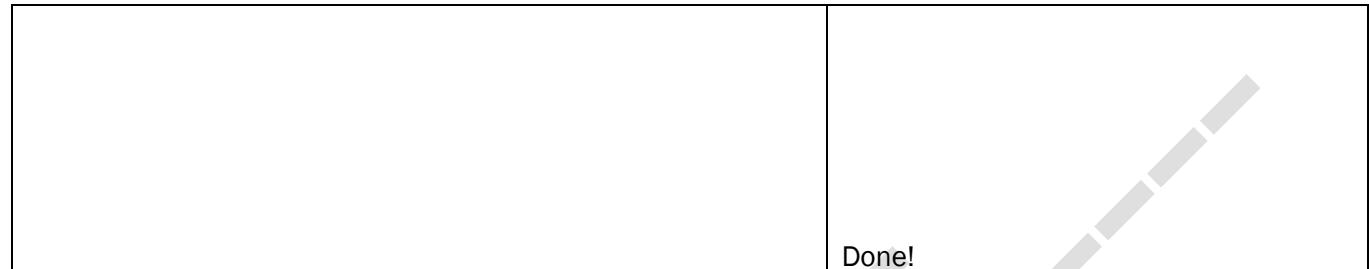






# 6 EXTRUDER ASSEMBLY

## 6.1.1 BONDTECH EXTRUDER



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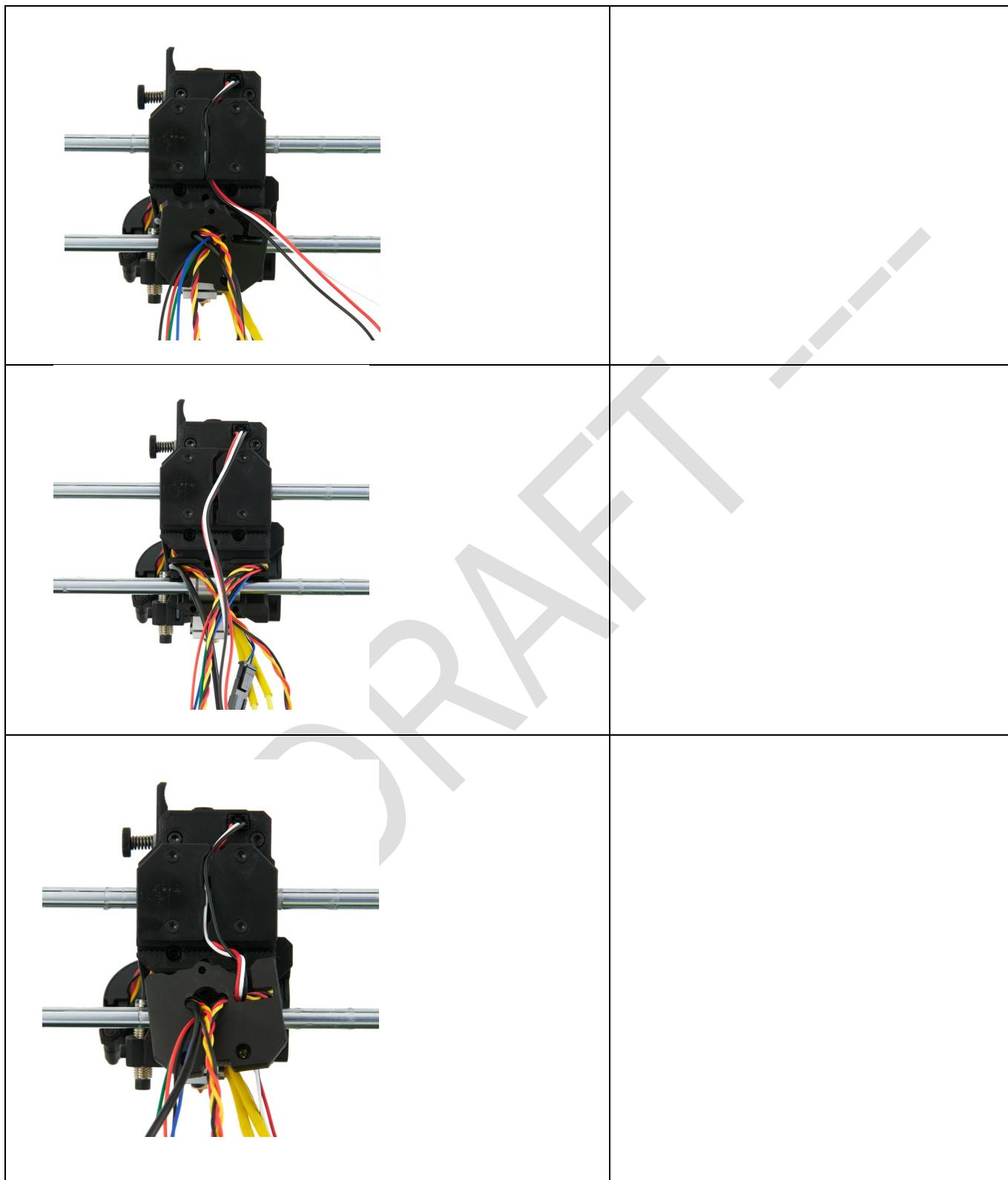

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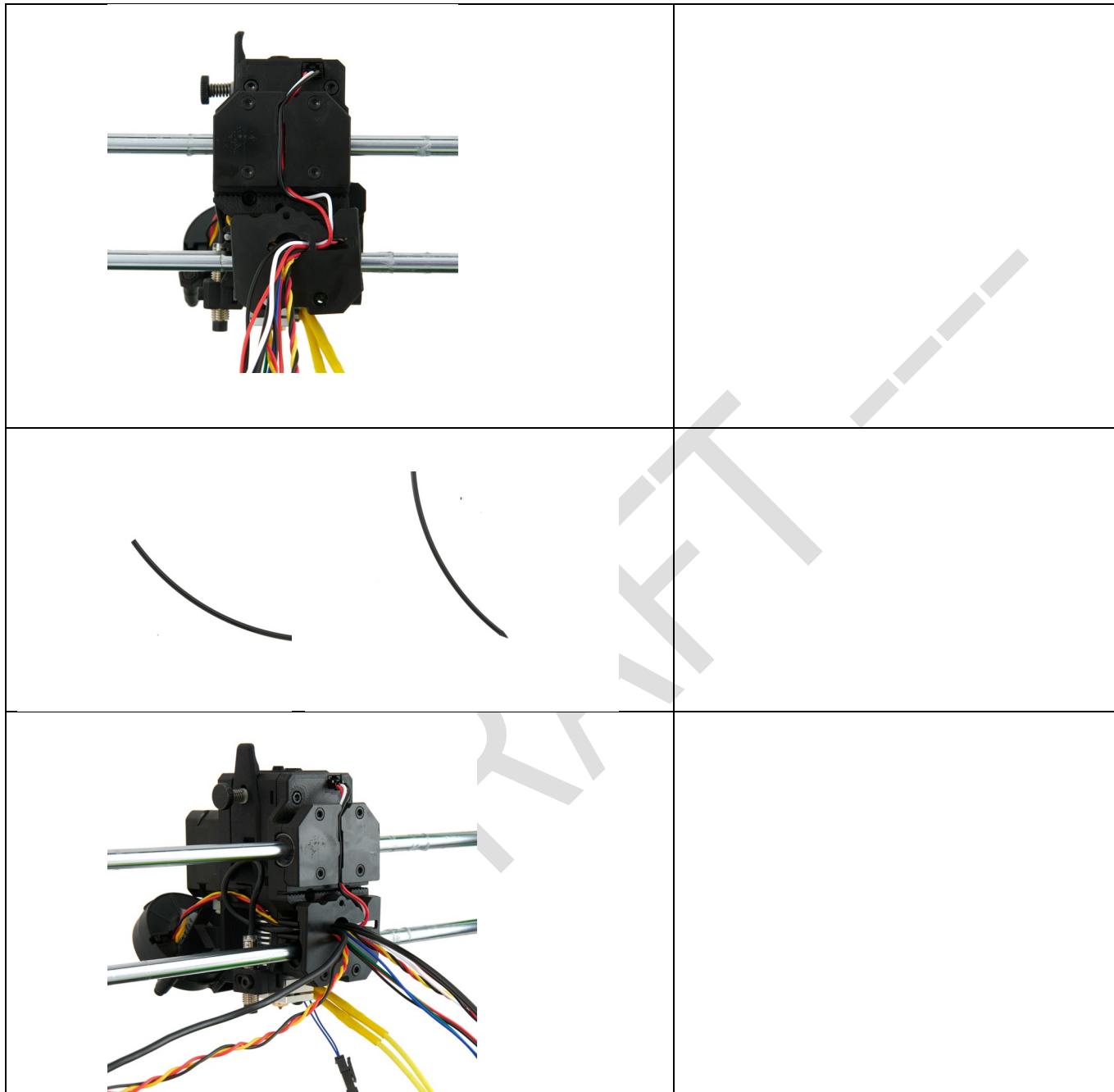

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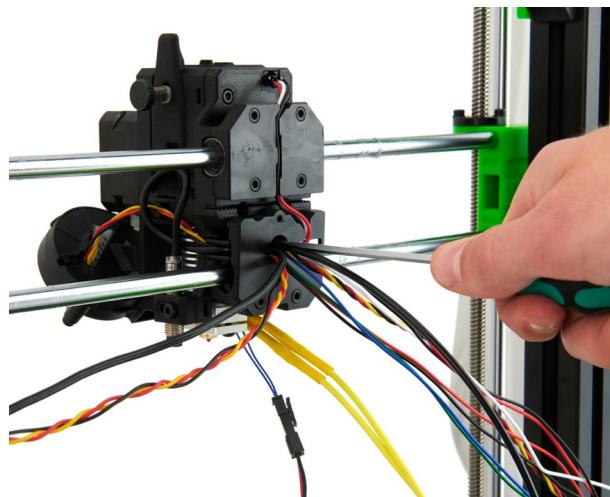

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## 6.2 EXTRUDER INSTALLATION

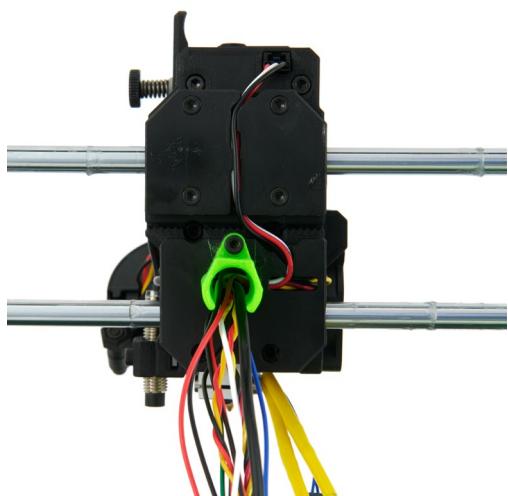
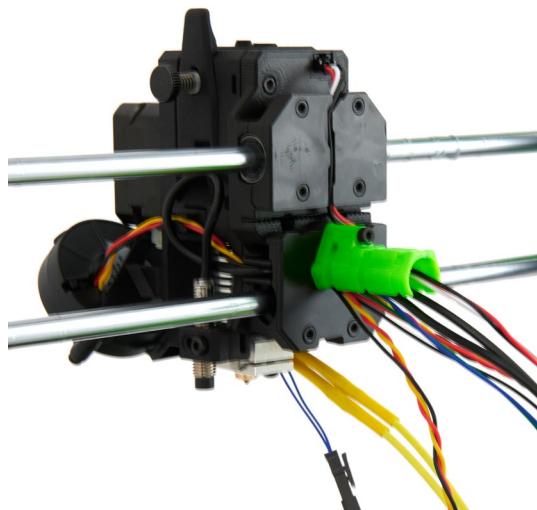


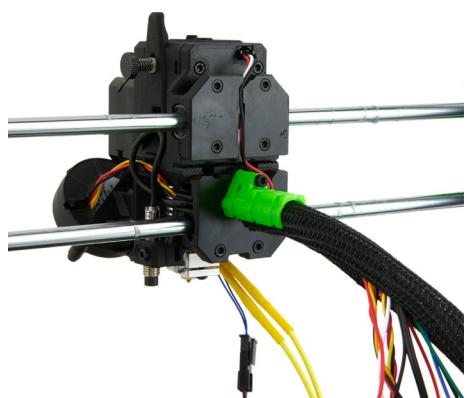




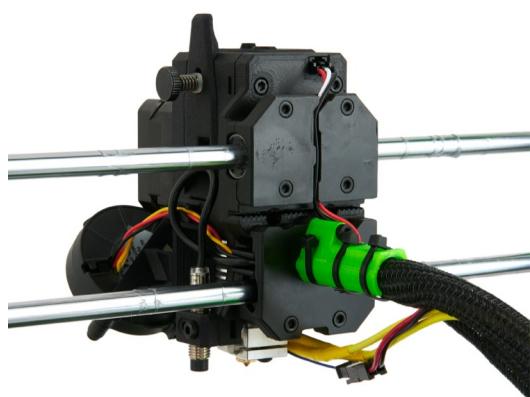
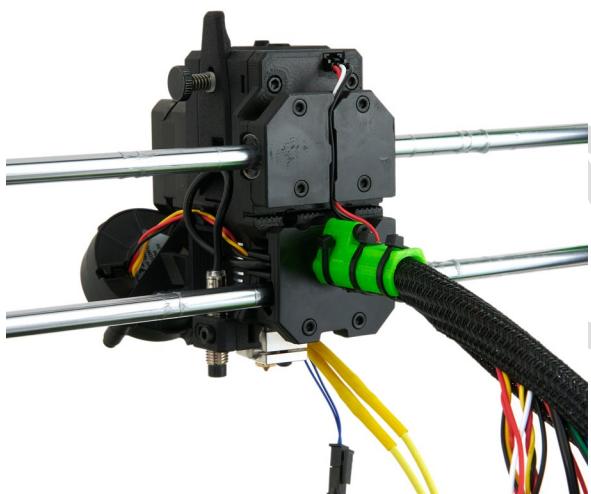


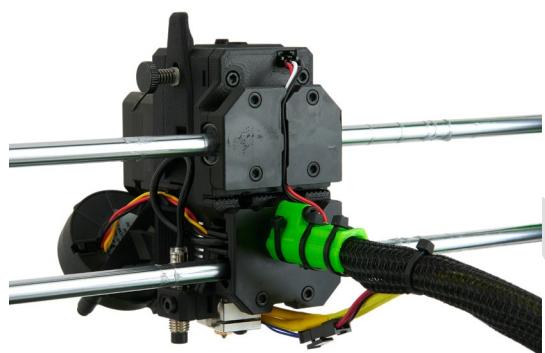
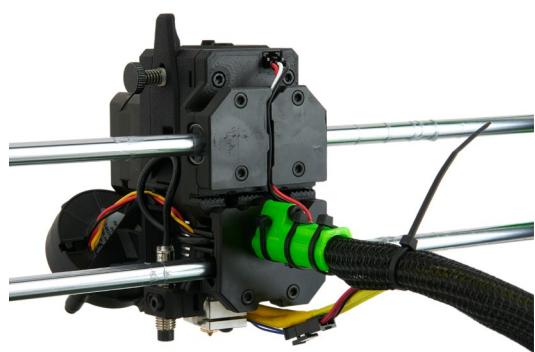
Done!





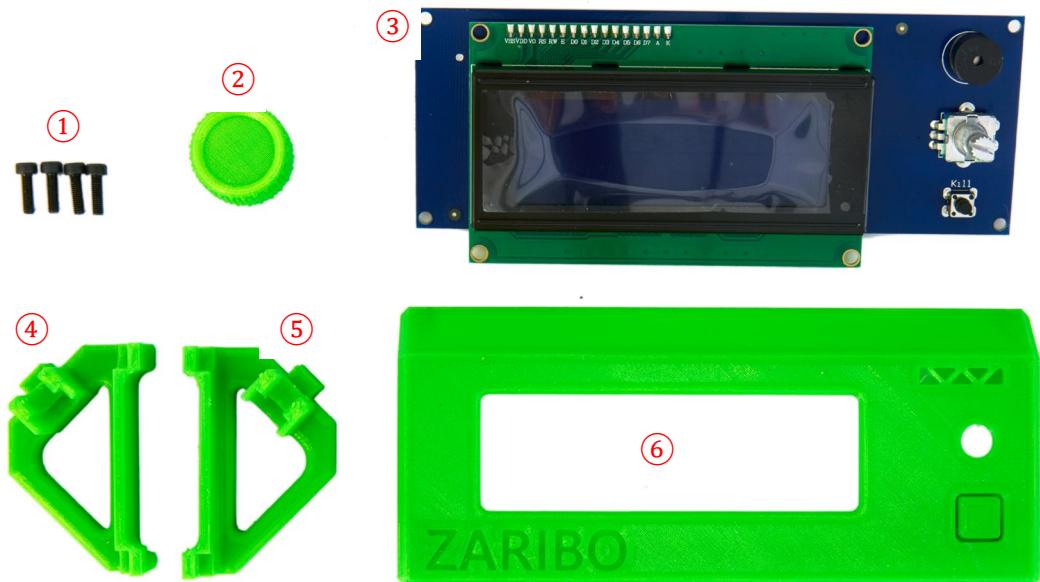
Done!







## 6.3 LCD ASSEMBLY



① M3 x 6mm (4x)	④ LCD-Mount left
② LCD-Knob	⑤ LCD-Mount right
③ LCD panel	⑥ LCD cover

	<p>Insert the LCD panel into the LCD cover</p>
	<p>Place the LCD mounts onto the LCD panel. You may have to push them into the cover gently. Pay attention to the orientation. Mounts for attaching the LCD to the frame must point to the outside.</p>
	<p>Place 4 M3 x 10m screws into the holes in the corner. Tighten the screws gently.</p>
	<p>Make sure that you hear a clicking sound when pressing the pin of the LCD and pressing the reset button.</p>

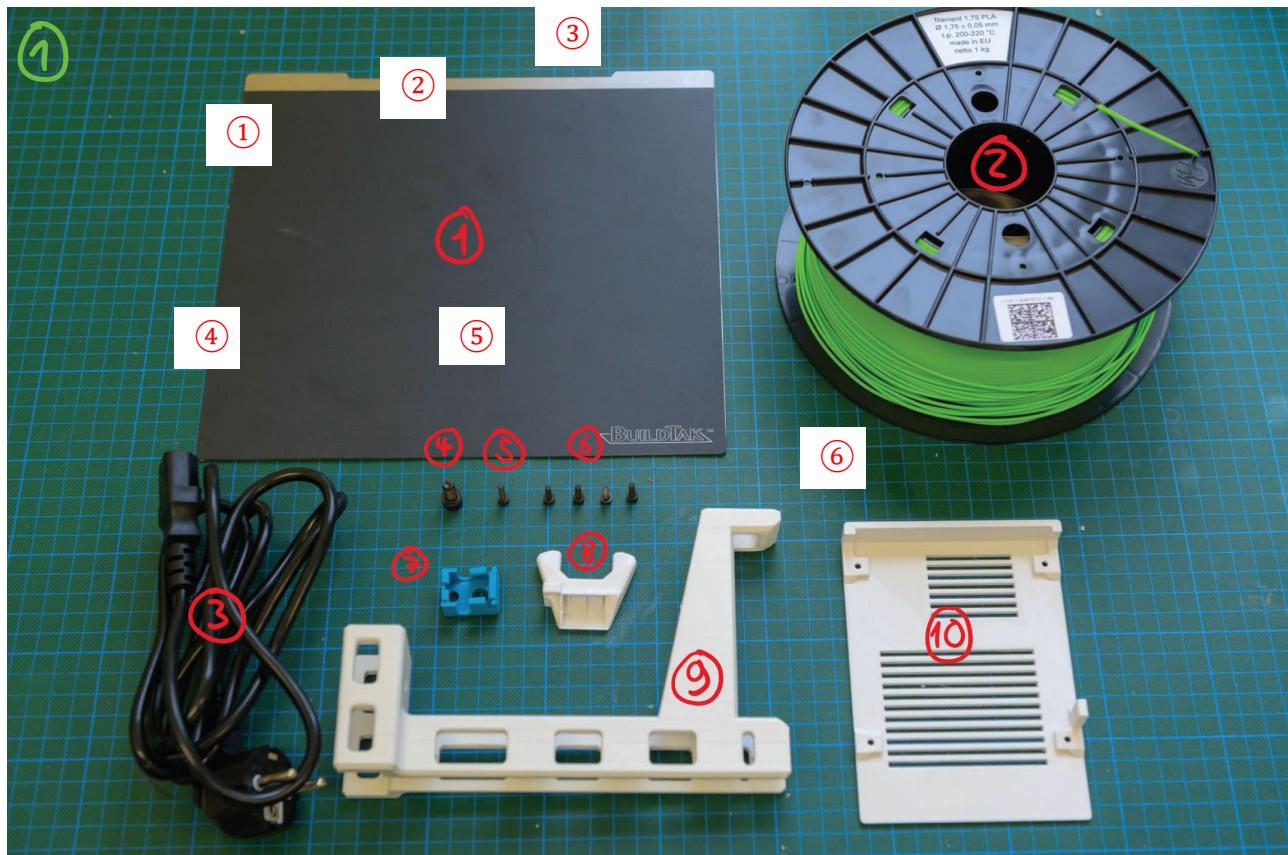
	Put on the control button. While pressing the button on the pin press against the panel from behind.
	Carefully remove the plastic foil in front of the display.

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## 7 CABLE ROUTING



# 8 SETUP AND CALIBRATION



(1) M3 x 6mm (4x)	(4) LCD-Mount left
(2) LCD-Knob	(5) LCD-Mount right
(3) LCD panel	(6) LCD cover

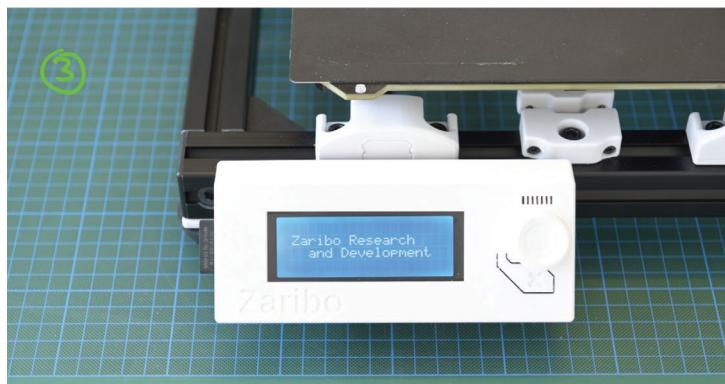
1x BuildTak steel sheet	1x BuildTak steel sheet
1x PLA filament 1.75mm	1x PLA filament 1.75mm
1x power cord	1x power cord
1x M6x12mm hex socket screw	1x M6x12mm hex socket screw
1x M3x12mm hex socket screw	1x M3x12mm hex socket screw

USB-Cable



Before you connect the printer to power make sure that power settings on the PSU are correct.

Plug in the power cord and turn on the printer.



You will see the boot loader. The fans should be running at full speed

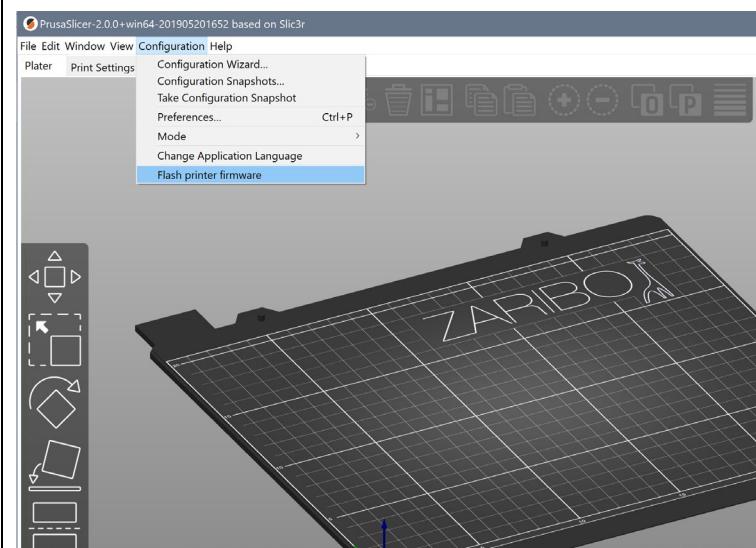


Plug the included USBcable into the 3D-printer and connect it to a PC.

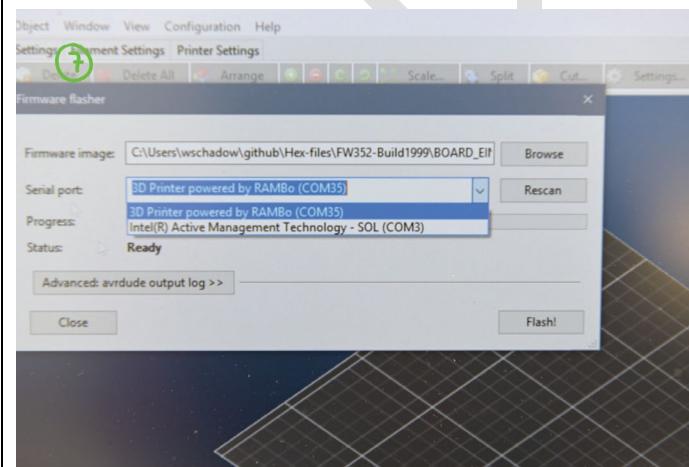


Download and install the program "PrusaSlicer" from  
<https://www.prusa3d.com/prusaslicer>

Start the program "Prusa Slicer" from your Desktop.



In the "Configuration" tab, select "Flash printer firmware".



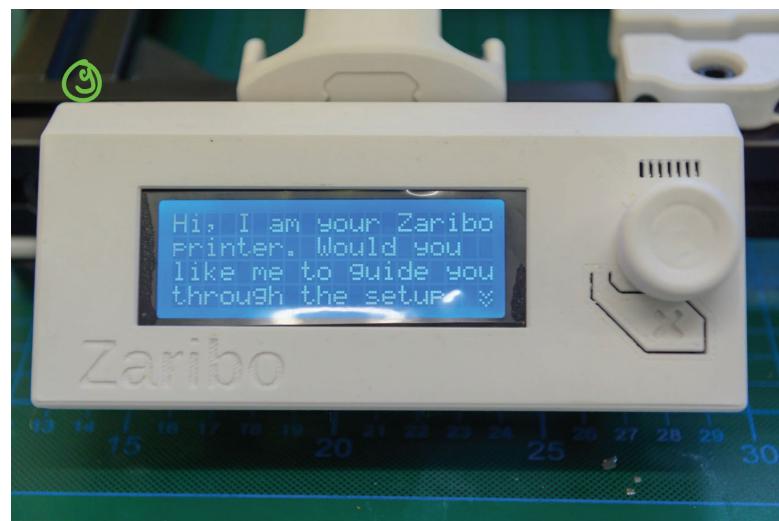
Choose the corresponding Firmware .hex file for height (220/320/420). and extruder

Then Choose the Port with "3D Printer powered by RAMBo"



Press "Flash"

You will see this screen on the printer.  
Wait for it to complete.



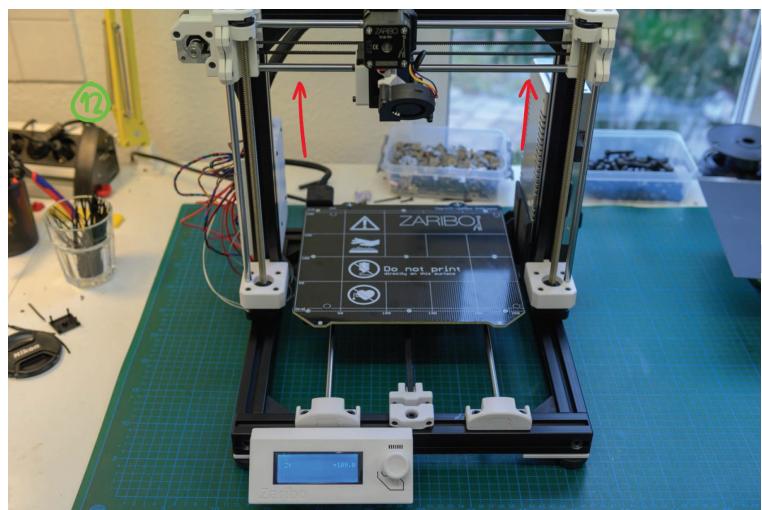
After writing and verifying the printer will boots up, this is what you should see.



Select "No".



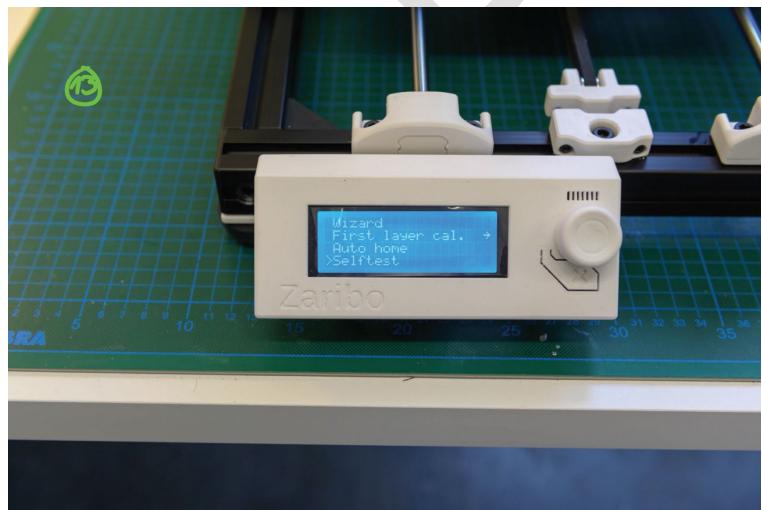
You will be taken to the info-screen.



Press and hold the control knob. It is a shortcut to the manual Z-axis control and can be accessed from any menu except when the printer is in operation.

Turn the knob clockwise to move the extruder up. Move it up until it hits the top two brackets, and it will make a relatively loud sound.

This is so that we know the X-axis is level.



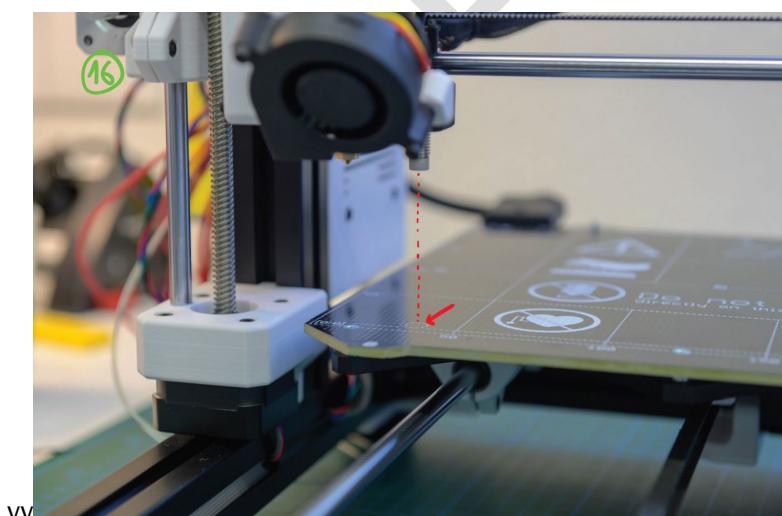
Click once to exit the Zaxis control, and again to enter the main menu. Scroll down and select "Calibration". From there start the "Selftest".



There is a chance that this message will pop up. Don't lie to the printer! The "left hot end fan" is the extruder fan.



The self-check tests all the basic functions of the printer to check if there are any malfunctions or wiring errors.



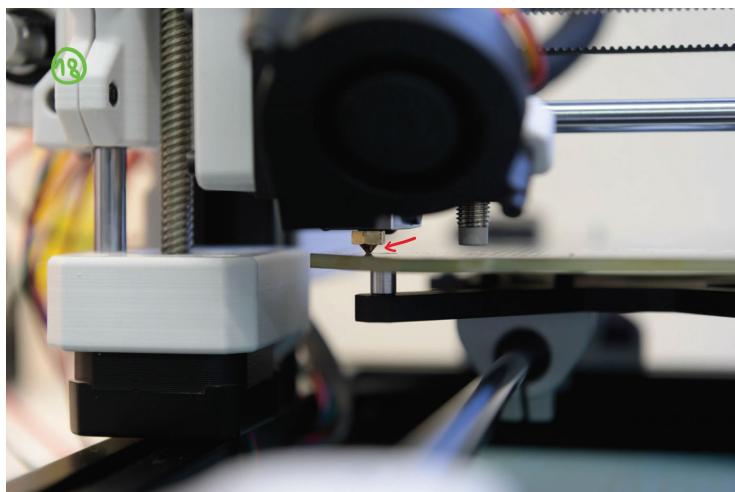
In the self-check process the printer will move the extruder down until the PINDA sensor triggers in presence of the heat bed. Make sure that the PINDA is above the dotted circle marked on the heat bed.

If it is severely misaligned, the sensor might not trigger causing the extruder to go into the heat bed, causing damage.

Should this be the case you will have to check all the parts involved to see if you have properly assembled them.

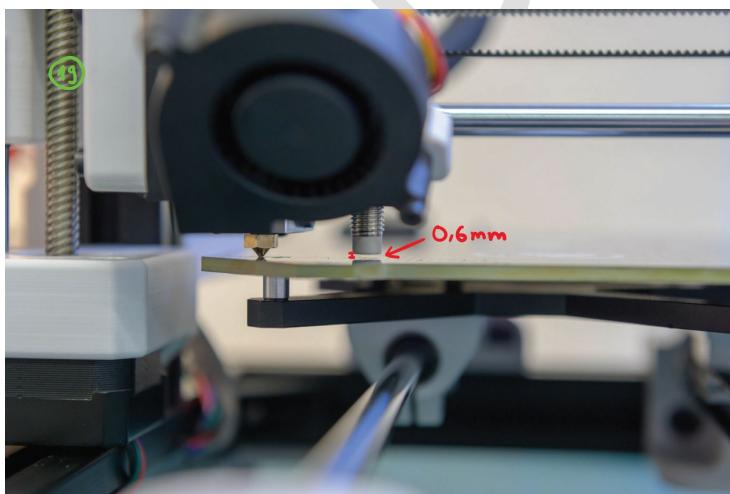


This is (hopefully) what you will see. If not, troubleshoot the described error.



Turn off the printer.

Loosen the PINDA clamp and push the PINDA sensor up by about 5mm. By hand, turn the Zmotor- screws counterclockwise at an even rate so that the nozzle nudges the heat bed.

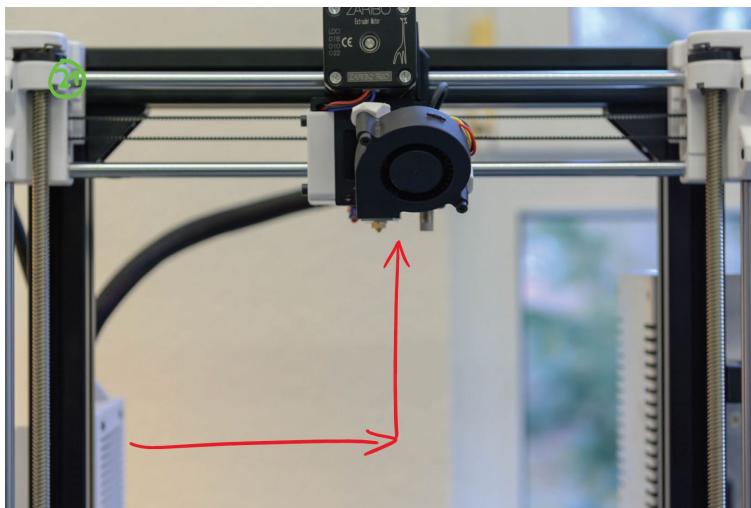


Set the distance between the PINDA and the heat bed to about 0.6mm.

(Although we recommend using a thickness gauge, you can also use the thinner pointy part of the zip ties we include in our kits, which is also 0.6mm thick.)



From the settings tab, use "Move X" and "Move Z" to move the extruder to the top middle.



This will give us more workspace.



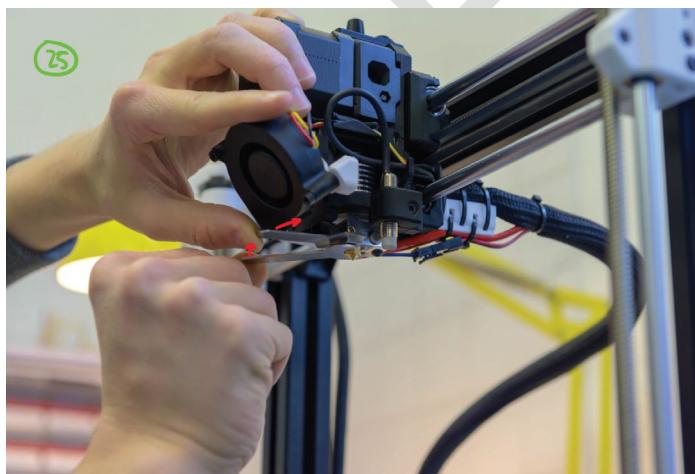
From the main menu, select "Preheat" and select "ABS - 255/100".



Wait till the printer reaches the target temperature.



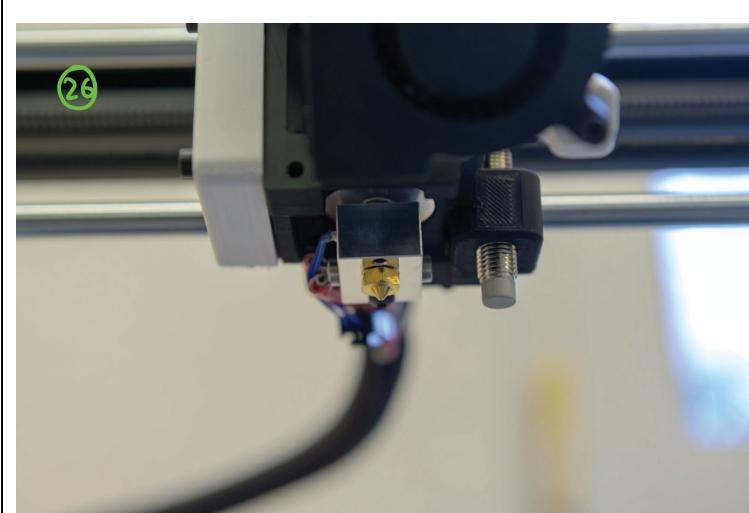
For the next step, you will need wrenches in the sizes 16mm and 7mm.



As the metal parts expand at high temperatures, we must retighten the nozzle and the nozzle block under similar conditions.

While doing this, also straighten the nozzle block, as we left it slightly angled in the extruder assembly. Be very careful to not turn it clockwise too far!

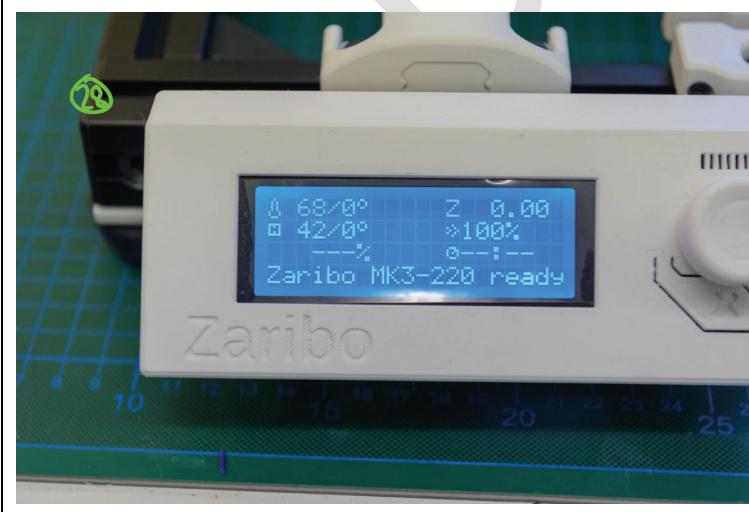
You will not be able to turn it back. Also be careful as the metal wrenches can get pretty hot.



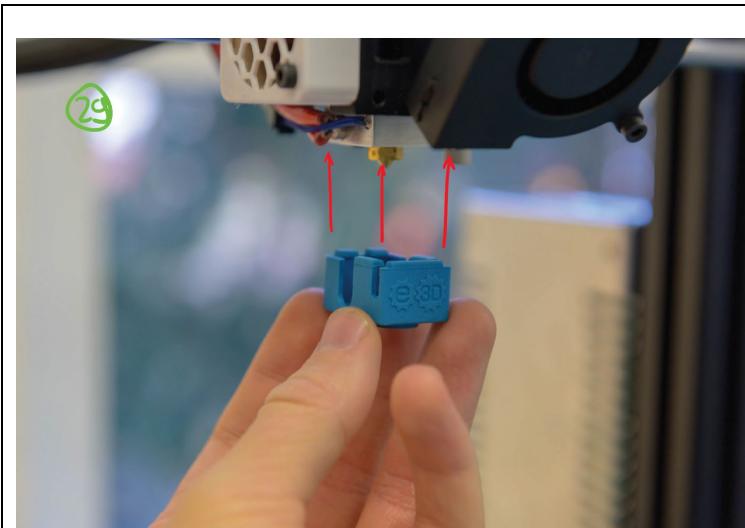
The nozzle and block should now look like this.



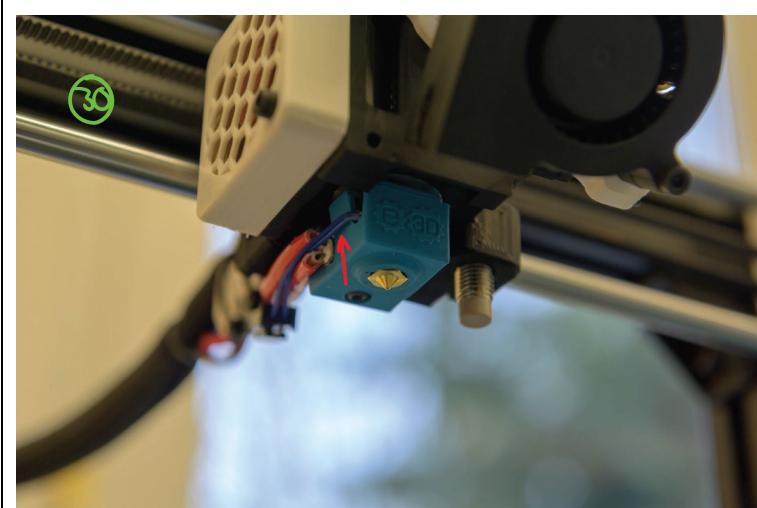
Under the same "Preheat" tab, select "Cooldown".



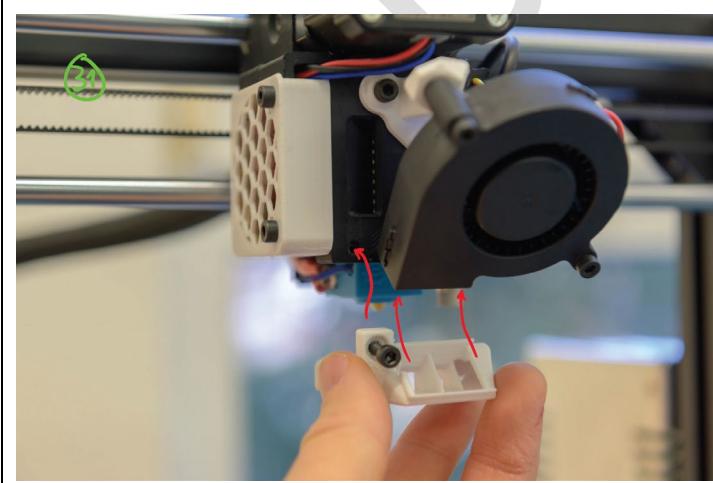
Wait until the temperatures are below 50 °C.



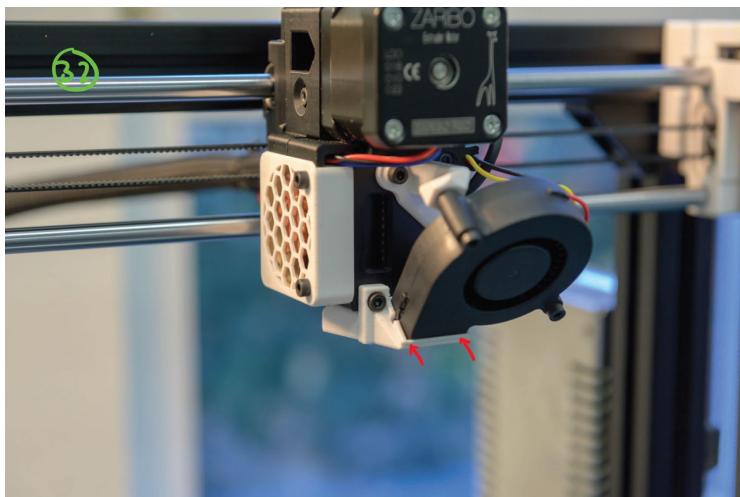
Install the silicone sock.



Make sure the sock is positioned not over the cables, but under them.



Using an M3x12mm screw, install the radial fan shroud.



Make sure that the radial fan exhaust is properly seated in the shroud.



Navigate to the "Calibration" tab and start the XYZ calibration.



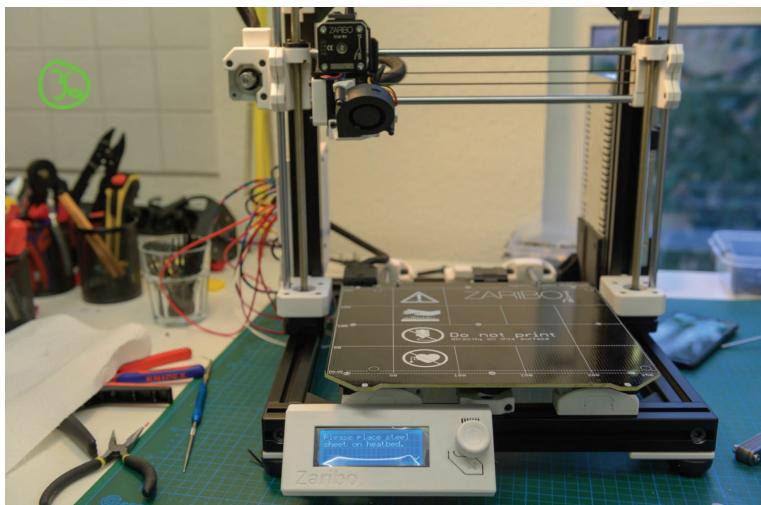
Make sure that the steel sheet is not on the heat bed and the heat bed is clean. Then select "No".

Lay a piece of paper on the heat bed to protect it from the nozzle, should it go too low.

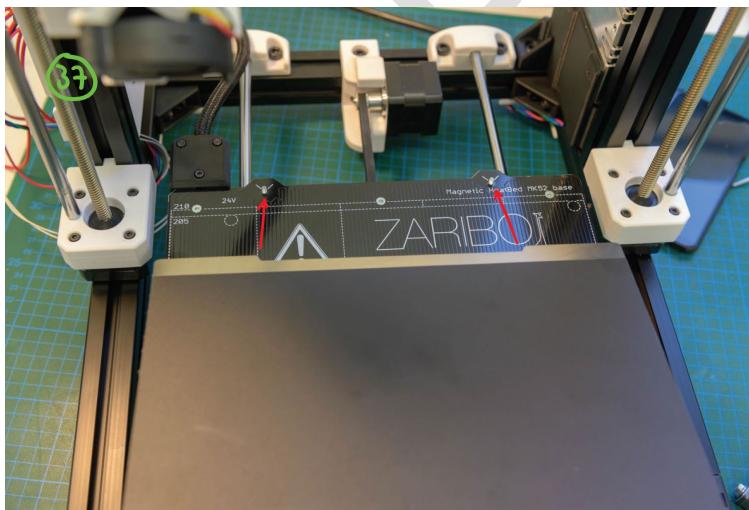


Wait until the printer has found all calibration points.

When it is done, remove the paper.



The extruder will rise towards the top, and the printer will prompt you to place the steel sheet on the heat bed.



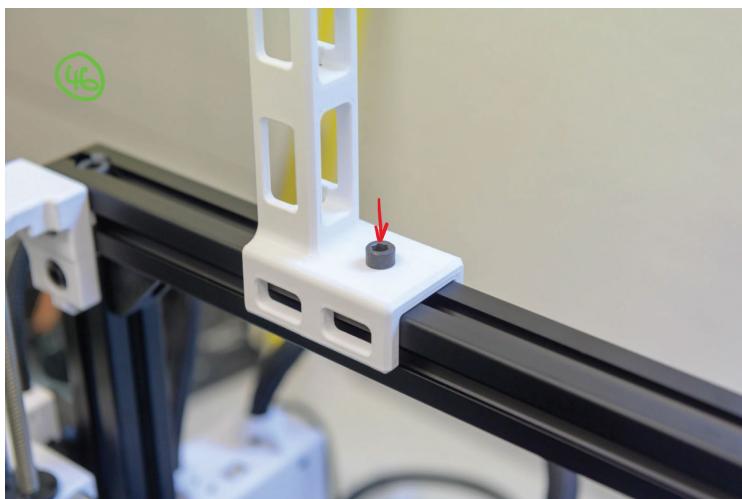
Do this in the orientation shown. Be careful not to scratch up the heat bed.



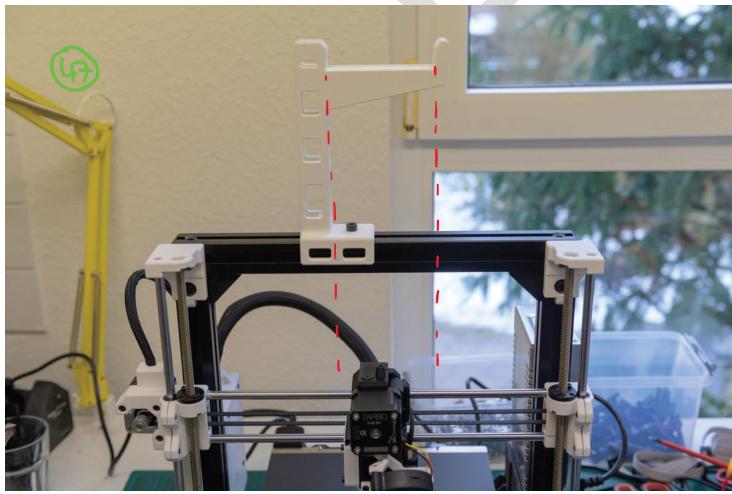
This is the message you will get if you built the printer well.

You may also receive "slightly skewed but still alright" as a result. In this case the printer can still print well, but might not be as good as a printer with the message on the left.

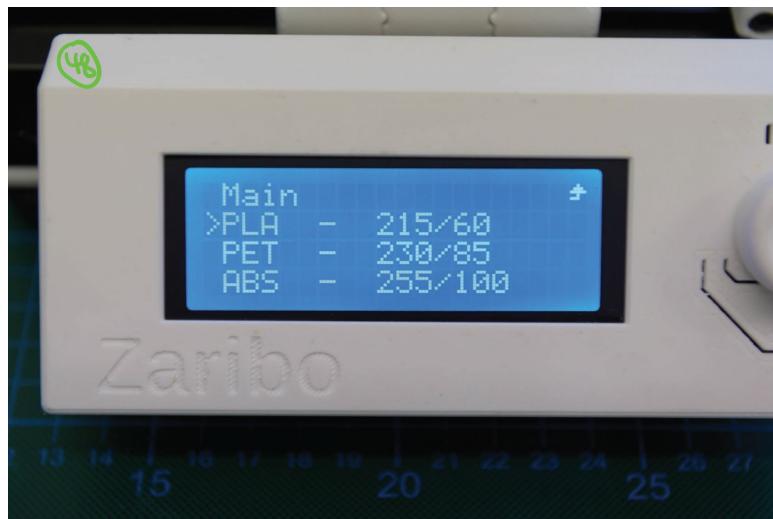
If the calibration fails, revise all steps to check if you have assembled the printer correctly.



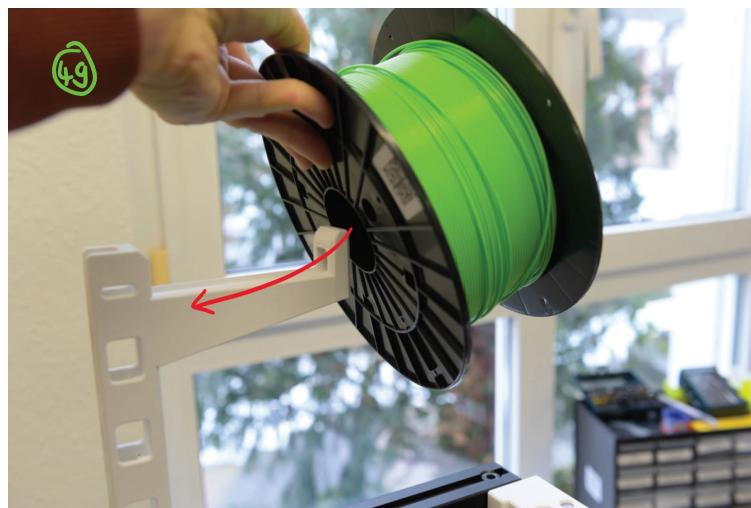
Using an M6x12mm screw, install the filament spool holder to the top of the frame.



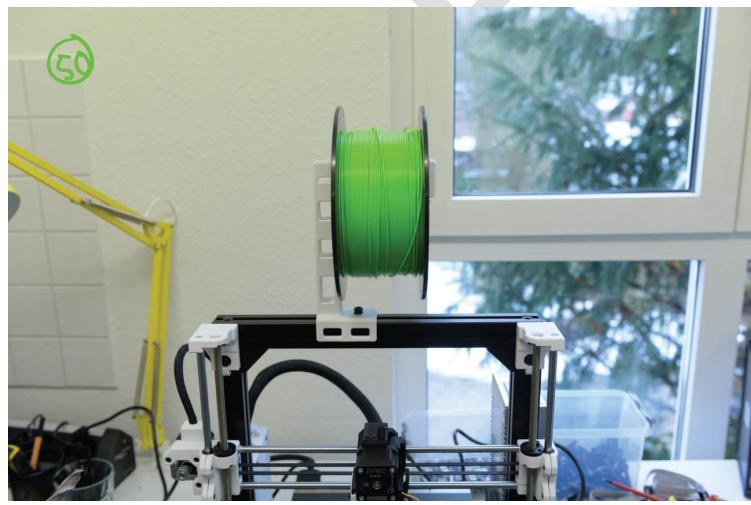
Position the holder with the roller part in the middle.



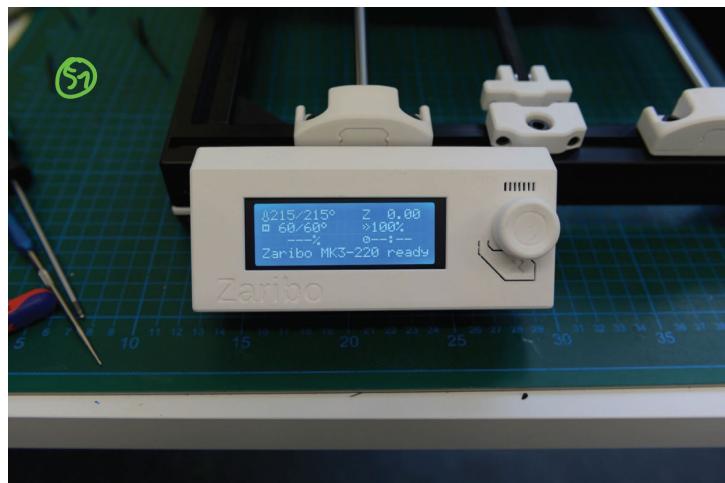
Preheat the printer to the PLA temperature preset.



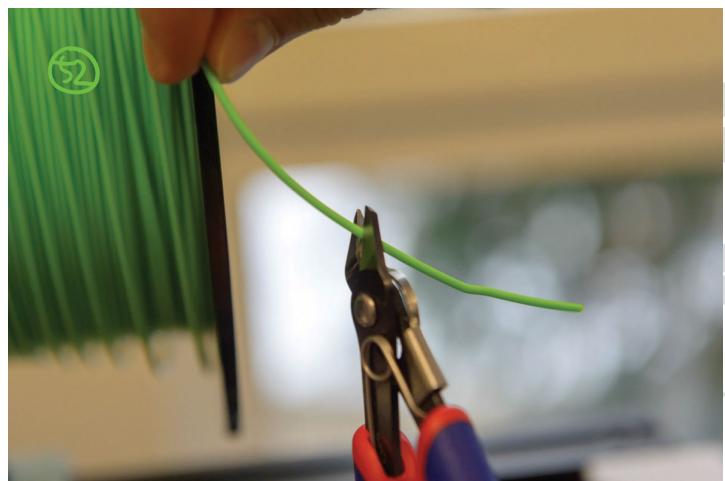
Place the spool of PLA filament onto the holder so that the filament exits the spool from the front (similar to the way that normal humans orient toilet paper).



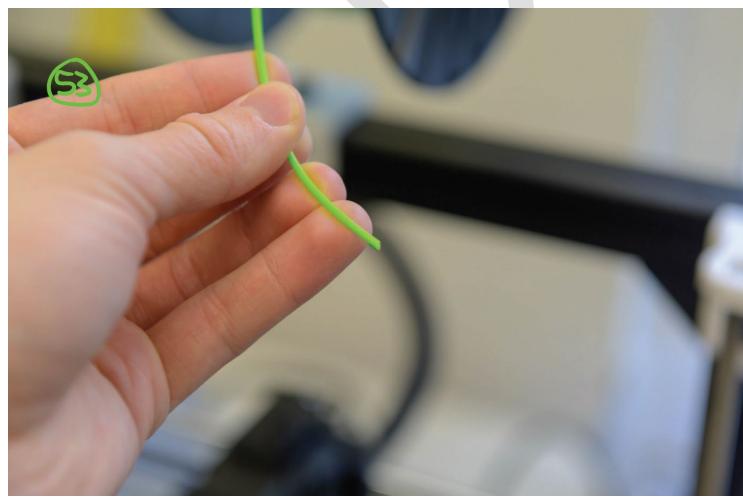
It should look like this.



Wait till the printer has reached its target temperature.



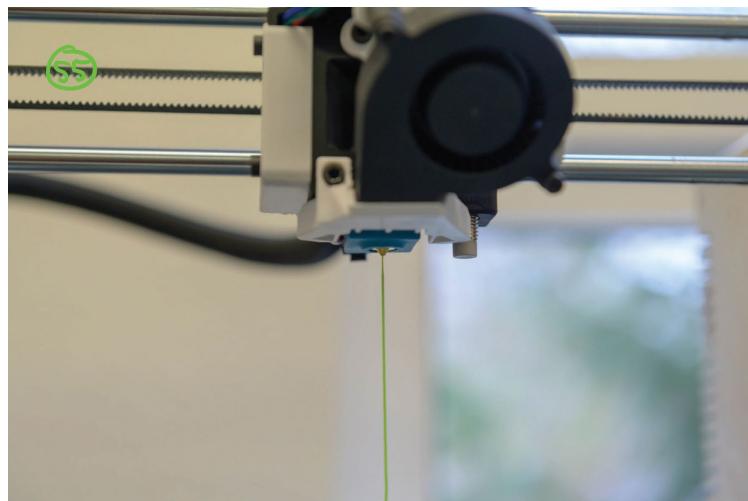
Cut the end of the filament at an angle to make it pointy.



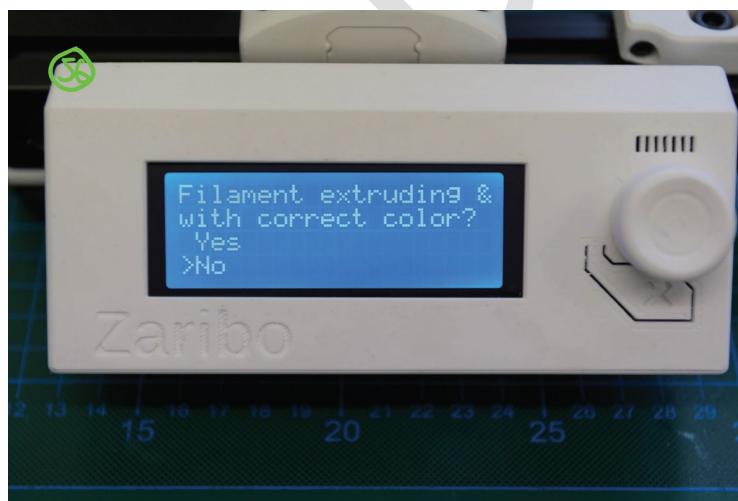
This is what it should look like.



Insert the filament into the top. It will be detected by the filament sensor and the loading of the filament will start automatically.

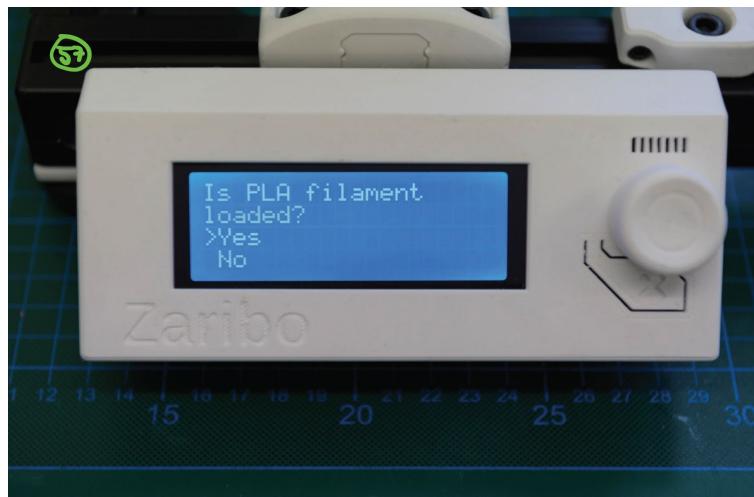


After a few seconds, the filament should come out of the bottom.

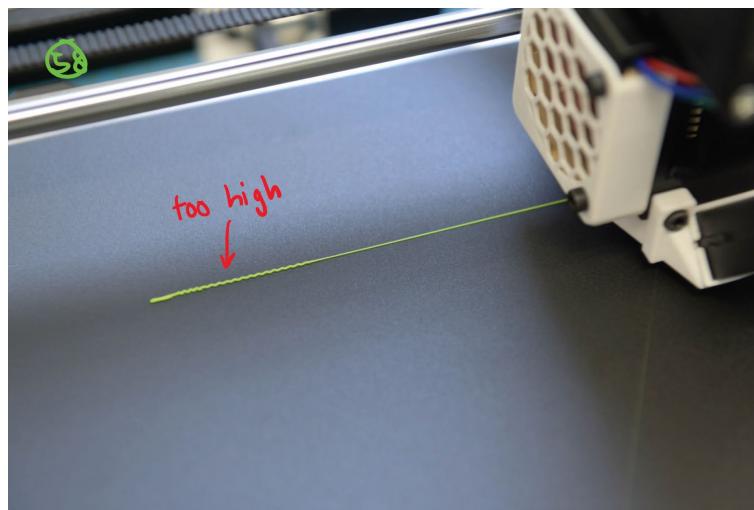


Although the filament is the right colour, select "No". This is so that we can clear out any fine debris in the nozzle.

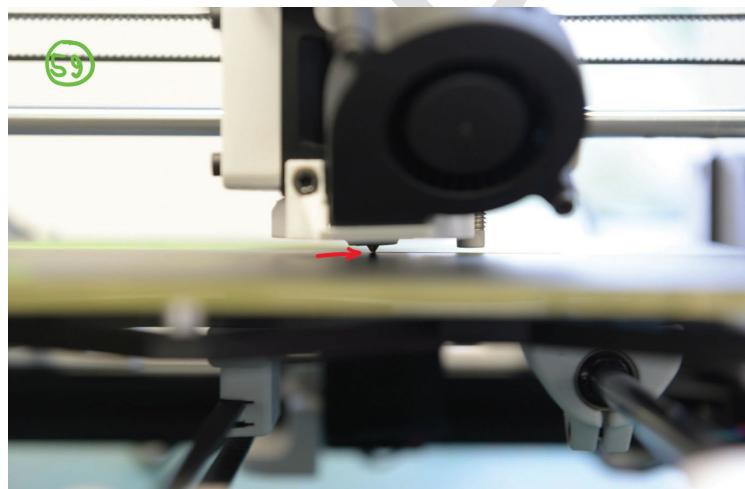
The next time select "Yes". Once complete, remove the extruded "spaghetti".



In the Calibration tab, select "First layer calibration". Select "Yes" to start the process.



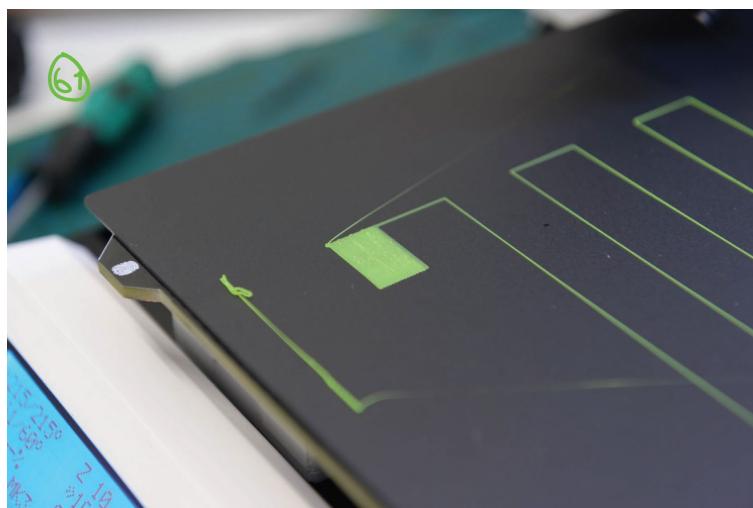
At first the nozzle will be way too high.



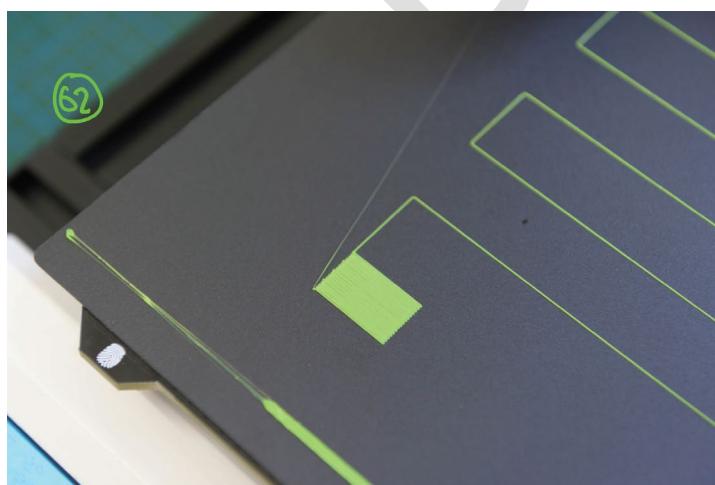
Move it down so that the nozzle doesn't print mid-air but also doesn't touch the heat bed.



With the way that we positioned the PINDA sensor, a negative adjustment of about 1mm is as expected.



This is an example of the nozzle being too low. Notice how the nozzle smears through already printed filament.



This is an example of the nozzle being too high. Notice the slight gaps between the lines of filament.



If you think that the height of the heat bed is higher on one side than the other, you may use "Bed level correct" to virtually adjust the sides of the heat bed.



"um" stands for microns.

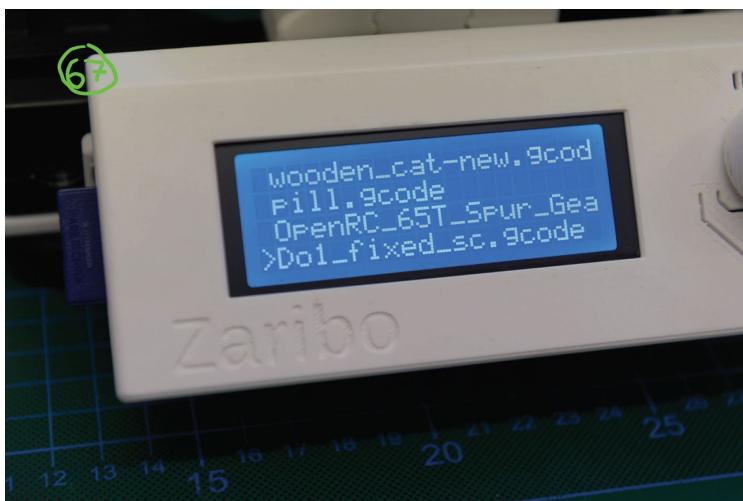
100 microns = 0.1mm



This is what it should look like.



Once you are satisfied with the Z-calibration, insert the included SD card.



Choose a .gcode file to print from.

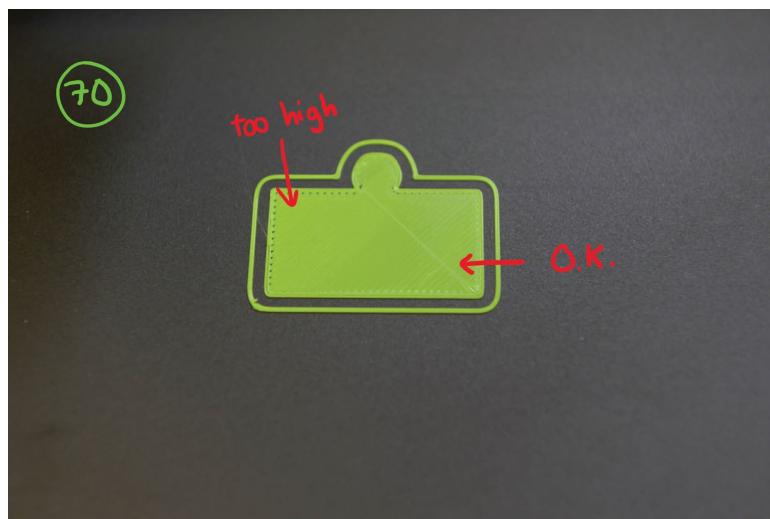
Note: Double check that the filament can't tangle up on the spool, and also clean the steel sheet with something like alcohol before printing.



When the print begins, the "Live adjust Z" option will appear. Here you can adjust the height of the first layer again. Any adjustments you make here will be saved for future prints.



As soon as the printer completes the first layer, stop the print.

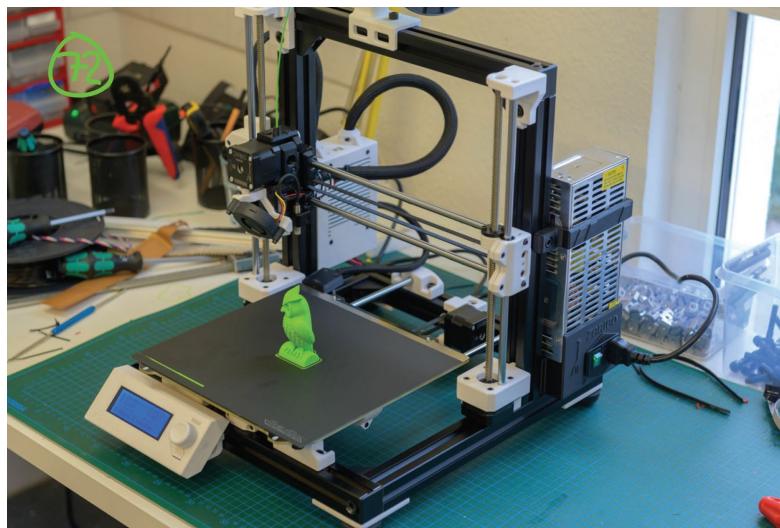


As you see, at the start of the print (left) the Z-height was too high. After adjustment it was good (right).

When the Z-height is done, restart the print (after removing all material from the heat bed of course) and let it print till the end.



We used this owl as a test print and it turned out pretty good.



Your printer is now complete. Before you continue with your printing adventure, please refer to our operating manual (coming soon).

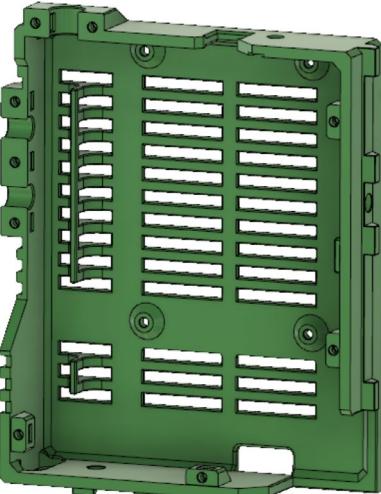
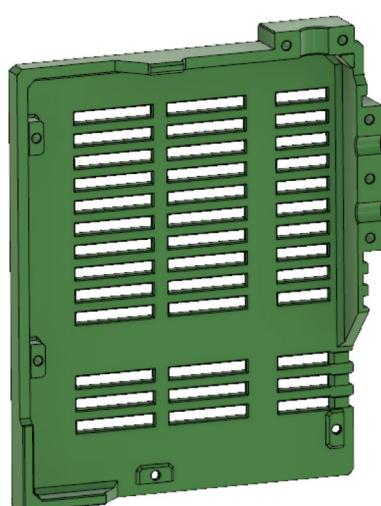
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# 9 OVERVIEW OF PLASTIC PARTS

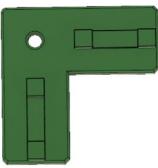
In this chapter we list all plastic parts of the release. On github <https://github.com/Zaribo/Zaribo-MK3> all STLs files (except Bondtech parts) are available in a corresponding directory structure

## 9.1 FRAME

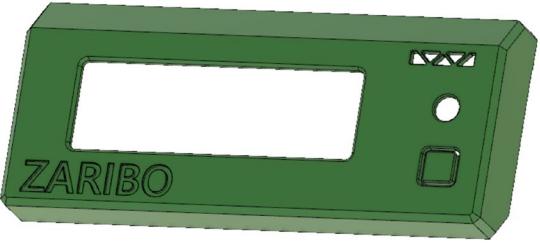
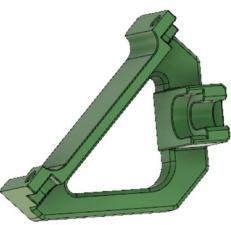
### 9.1.1 EINSY

	EinsyBox (1x)
	EinsyBoxCover (1x)

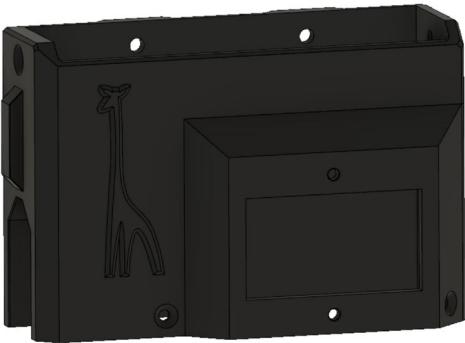
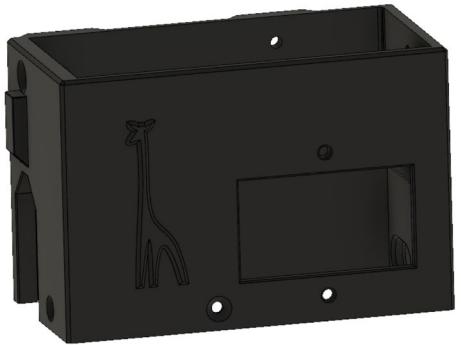
## 9.1.2 FRAME COMPONENTS

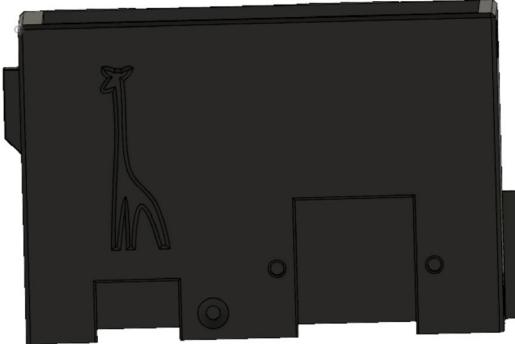
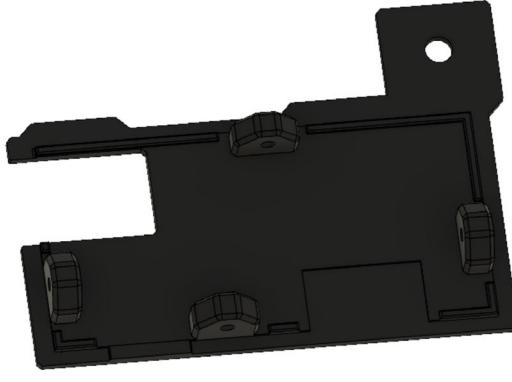
	L-Bracket (4x)
	ExtrusionCableClip (4x)
	LCD Cable Clip (3x)
	ExtrusionSlotCover (optional)

## 9.1.3 LCD

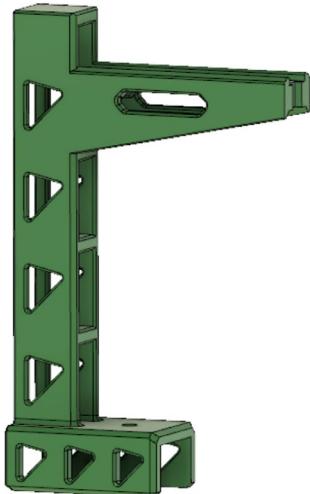
	LCD-Cover (1x)
 	LCD-Mount left (1x) LCD-Mount right (1x)
	LCD-Knob (1x)

### 9.1.4 PSU (MEANWELL, PRUSA)

	Meanwell PSU Cover
	Meanwell PSU Cover Bottom
	Meanwell PSU TopMount
	PSU-Cover (OneHole)
	PSU Cover Bottom (OneHole)
	PSU TopMount (for OneHole and TwoHole)

 A black rectangular plastic cover with two circular holes near the bottom edge. It has a small protrusion on the left side and a rectangular cutout on the right side.	PSU-Cover (TwoHole)
 A black plastic component with a central rectangular plate featuring four circular mounting holes. A small metal bracket is attached to the top edge of the plate. A white rectangular label is positioned on the left side of the plate.	PSU Cover Bottom (TwoHole)

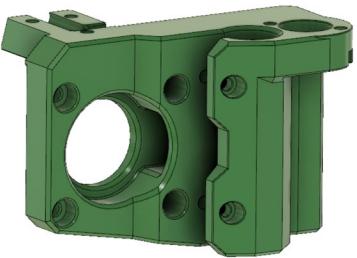
## 9.1.5 SPPOOLHOLDER

	SpoolholderBody (1x)
	SpoolholderEndCap (1x)

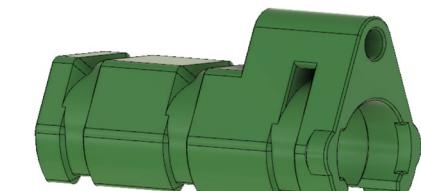
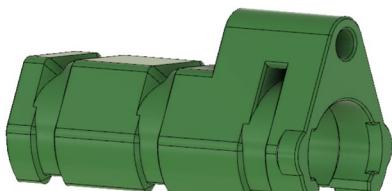
## 9.2 TOOLS

	y-AlignmentTool (1x)
	z-AlignmentTool (1x)
	LubelInjector-8mm (1x)
	LubelInjectorCap-8mm (1x)

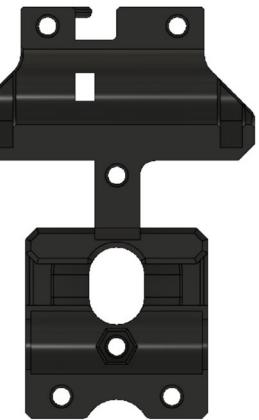
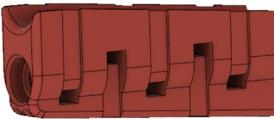
### 9.3 X-AXIS

	x-MotorHolder (1x)
	x-MotorHolderCover (1x)
	x-Idler (1x)
	xy-BeltTensionerInsert (1x)

### 9.3.1 BONDTECH SPECIFIC PARTS FOR X-AXIS

	X-Carriage (1x) (only for Bondtech extruders)
	X-CarriageCoverTop (1x) (only for Bondtech extruders)
	X-CarriageCoverBottom (1x) (only for Bondtech extruders)
	x-CableHolder (1x) (only for Bondtech extruders)

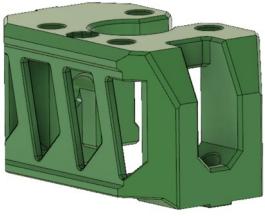
### 9.3.2 DEFAULT EXTRUDER SPECIFIC PARTS FOR X-AXIS

	X-Carriage (1x)
	X-CarriageBack (1x)
	x-CableHolder (1x)

## 9.4 Y-AXIS

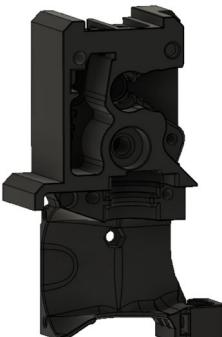
	y-RodHolderBottom (4x)
	y-RodHolderTop (4x)
	y-BearingHolder (1x)
	y-MotorHolder (1x)
	y-BeltHolder (1x)
	y-BeltTensioner (y-Idler) (1x)
	xy-BeltTensionerInsert (1x) (same part as on x-axis)

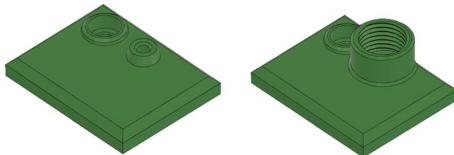
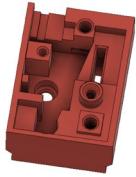
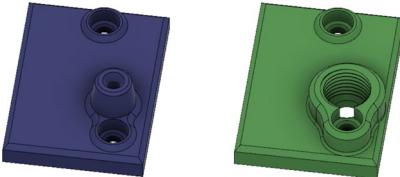
## 9.5 Z-AXIS

	z-MotorMount left
	z-MotorMount right
	z-TopMount left
	z-TopMount right

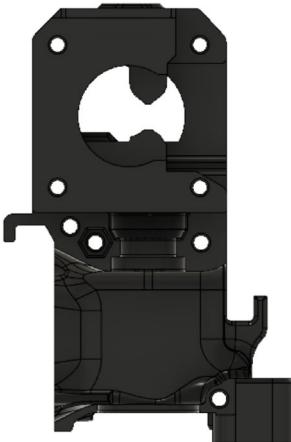
## 9.6 EXTRUDER

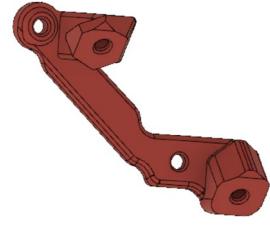
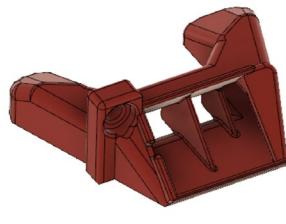
### 9.6.1 BONDTECH EXTRUDER

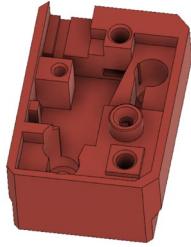
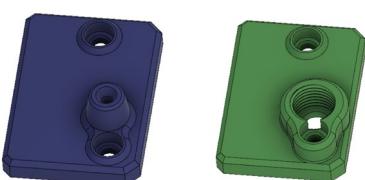
	Bondtech extruder body
	Bondtech extruder cove
	Bondtech radial fan holder
	Bondtech fan shroud

	Bondtech cover / Bowden adapter (MK3s version)
	Filament Sensor housing (MK2.5 / MK3 version)
	Lever
	Filament Sensor Covers (regular and Bowden)

## 9.6.2 DEFAULT EXTRUDER

	Extruder Body (1x)
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	Extruder Cover (1x)
	Extruder Idler (1x)
	Radial fan holder
	Fan Shroud
	Noctua cover
	Filament Sensor Cover

	Filament Sensor Housing
	Lever
	Filament Sensor Covers (regular and Bowden)

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