

# ASSEMBLY MANUAL

For VERTEX3D.org by Martin Lexa y Alberto López

English versión by Martin Lexa and Tereza Sedlackova

**Version 1.1.01**  
Latest update: 26. 02. 2022

<b>0. INTRODUCTION.....</b>	<b>5</b>
<b>0.1. SAFETY WARNING.....</b>	<b>6</b>
<b>0.2. MANIPULATION AND USE INSTRUCTIONS .....</b>	<b>9</b>
<b>0.3. TOOLS.....</b>	<b>12</b>
<b>1. FRAME MAP .....</b>	<b>13</b>
<b>1.1. XY FRAME PREPARATION I .....</b>	<b>14</b>
<b>1.2. XY STRUCTURE PREPARATION II.....</b>	<b>15</b>
<b>1.3. XY FRAME ASSEMBLY.....</b>	<b>16</b>
<b>1.4. XY FRAME CORNERS PREPARATION .....</b>	<b>17</b>
<b>1.5. XY FRAME CORNERS ASSEMBLY.....</b>	<b>18</b>
<b>1.6. ANTI-VIBRATION FEET ASSEMBLY.....</b>	<b>19</b>
<b>1.7. Y STRUCTURE PREPARATION.....</b>	<b>20</b>
<b>1.8. Z FRAME ASSEMBLY.....</b>	<b>21</b>
<b>1.9. Z FRAME CORNERS ASSEMBLY.....</b>	<b>22</b>
<b>1.10. Z FRAME ON XY FRAME ASSEMBLY.....</b>	<b>23</b>
<b>1.11. ZY ANGLE PREPARATION .....</b>	<b>24</b>
<b>1.12. ZY ANGLE ASSEMBLY.....</b>	<b>25</b>
<b>1.13. Z BOTTOM REINFORCEMENTS PREPARATION .....</b>	<b>26</b>
<b>1.14. Z BOTTOM REINFORCEMENTS ASSEMBLY.....</b>	<b>27</b>
<b>1.15. Z REINFORCEMENT THREADED RODS PREPARATION .....</b>	<b>28</b>
<b>1.16. Z TOP REINFORCEMENTS PREPARATION I .....</b>	<b>29</b>
<b>1.17. Z TOP REINFORCEMENTS ASSEMBLY I .....</b>	<b>30</b>
<b>1.18. Z TOP REINFORCEMENTS PREPARATION II .....</b>	<b>31</b>
<b>1.19. Z TOP REINFORCEMENT ASSEMBLY II .....</b>	<b>32</b>
<b>1.20. Z HORIZONTAL THREADED ROD ASSEMBLY .....</b>	<b>33</b>
<b>1.21. Z VERTICAL THREADED RODS ASSEMBLY .....</b>	<b>34</b>
<b>1.22. FINISHING FRAME ASSEMBLY .....</b>	<b>35</b>

<b>2. Y AXIS MAP .....</b>	36
<b>    2.1. Y MOTOR PREPARATION.....</b>	37
<b>    2.2. Y MOTOR HOLDER PREPARATION.....</b>	38
<b>    2.3. Y MOTOR HOLDER ASSEMBLY.....</b>	39
<b>    2.4. Y TENSIONER PREPARATION .....</b>	40
<b>    2.5. Y TENSIONER HOLDER ASSEMBLY .....</b>	41
<b>    2.6. Y LINEAR RAIL HOLDERS PREPARATION .....</b>	42
<b>    2.7. Y LINEAR RAIL HOLDERS PREPARATION .....</b>	43
<b>    2.8. Y LINEAR RAIL HOLDERS ASSEMBLY .....</b>	44
<b>    2.9. Y CARRIAGE PREPARATION .....</b>	45
<b>    2.10. Y BELT HOLDER PREPARATION.....</b>	46
<b>    2.11. Y CARRIAGE ASSEMBLY.....</b>	47
<b>    2.12. Y BELT ASSEMBLY I.....</b>	48
<b>    2.13. Y BELT ASSEMBLY II.....</b>	49
<b>    2.14. Y BELT ASSEMBLY III.....</b>	50
<b>    2.15. Y BELT ADJUSTMENT I.....</b>	51
<b>    2.16. Y BELT ADJUSTMENT II.....</b>	52
<b>    2.17. HEATBED ASSEMBLY .....</b>	53
 <b>3. X AXIS MAP .....</b>	54
<b>    3.1. X END MOTOR IDLER PREPARATION I.....</b>	55
<b>    3.2. X END MOTOR IDLER PREPARATION II.....</b>	56
<b>    3.3. X END MOTOR IDLER PREPARATION III.....</b>	57
<b>    3.4. X MOTOR PREPARATION.....</b>	58
<b>    3.5. X MOTOR ASSEMBLY.....</b>	59
<b>    3.6. X END IDLER PREPARATION I.....</b>	60
<b>    3.7. X END IDLER PREPARATION II.....</b>	61
<b>    3.8. X TENSIONER PREPARATION I .....</b>	62
<b>    3.9. X TENSIONER PREPARATION II .....</b>	63
<b>    3.10. X AXIS ASSEMBLY.....</b>	64
<b>    3.11. X CARRIAGE PREPARATION .....</b>	65
<b>    3.12. X CARRIAGE ASSEMBLY .....</b>	66

<b>4. Z AXIS MAP .....</b>	67
<b>    4.1. Z MOTOR HOLDERS PREPARATION .....</b>	68
<b>    4.2. Z MOTOR HOLDERS ASSEMBLY.....</b>	69
<b>    4.3. Z MOTORS ASSEMBLY.....</b>	70
<b>    4.4 X AXIS ON STRUCTURE ASSEMBLY.....</b>	71
<b>    4.5. Z SMOOTH RODS ASSEMBLY .....</b>	72
<b>    4.6. Z TOP PREPARATION .....</b>	73
<b>    4.7. Z TOP ASSEMBLY.....</b>	74
<b>5. EXTRUDER MAP .....</b>	75
<b>    5.1. EXTRUDER BODY PREPARATION I .....</b>	76
<b>    5.2. EXTRUDER BODY PREPARATION II.....</b>	77
<b>    5.3. EXTRUDER BODY PREPARATION III.....</b>	78
<b>    5.4. EXTRUDER MOTOR PREPARATION .....</b>	79
<b>    5.5. EXTRUDER COVER PREPARATION .....</b>	80
<b>    5.6. HOTEND ASSEMBLY .....</b>	81
<b>    5.7. EXTRUDER MOTOR ASSEMBLY.....</b>	82
<b>    5.8. EXTRUDER COVER ASSEMBLY.....</b>	83
<b>    5.9. X CARRIAGE FILAMENT SENSOR CABLE PREPARATION.....</b>	84
<b>    5.10. X MOTOR CABLE PREPARATION.....</b>	85
<b>    5.11. EXTRUDER ASSEMBLY ON X CARRIAGE .....</b>	86
<b>    5.12. FILAMENT SENSOR ASSEMBLY.....</b>	87
<b>    5.13. FS COVER ASSEMBLY.....</b>	88
<b>    5.14. EXTRUDER IDLER PREPARATION I .....</b>	89
<b>    5.15. EXTRUDER IDLER PREPARATION II.....</b>	90
<b>    5.16. CHECK EXTRUDER MOTOR GEAR ALIGNMENT .....</b>	91
<b>    5.17. EXTRUDER IDLER ASSEMBLY.....</b>	92
<b>    5.18. HOTEND NOCTUA FAN ASSEMBLY I .....</b>	93
<b>    5.19. HOTEND NOCTUA FAN ASSEMBLY II.....</b>	94
<b>    5.20. FAN SUPPORT ASSEMBLY .....</b>	95
<b>    5.21. FAN SHROUD ASSEMBLY.....</b>	96
<b>    5.22. PRINT FAN ASSEMBLY .....</b>	97

<b>5.23. INDUCTIVE SENSOR ASSEMBLY .....</b>	98
<b>5.24. EXTRUDER CABLES ORGANIZATION I .....</b>	99
<b>5.25. X BELT ASSEMBLY.....</b>	100
<b>5.26. X BELT TENSION ADJUSTMENT.....</b>	101
<b>5.27. X CARRIAGE BACK PREPARATION.....</b>	102
<b>5.28. EXTRUDER CABLES ORGANIZATION II .....</b>	103
<b>5.29. X CARRIAGE BACK ASSEMBLY.....</b>	104
<b>5.30. EXTRUDER CABLES ORGANIZATION III .....</b>	105
<b>6. ELECTRONICS MAP.....</b>	106
<b>6.1. MEANWELL PSU PREPARATION.....</b>	107
<b>6.2. MEANWELL PSU ASSEMBLY .....</b>	108
<b>6.3. PSU CABLES PREPARATION.....</b>	109
<b>6.4. MOSFET PREPARATION .....</b>	110
<b>6.5. LCD PREPARATION I .....</b>	111
<b>6.6. LCD PREPARATION II .....</b>	112
<b>6.7. LCD ASSEMBLY ON XY STRUCTURE .....</b>	113
<b>6.8. EINSY RAMBO BOX PREPARATION I .....</b>	114
<b>6.9. EINSY RAMBO BOX PREPARATION II .....</b>	115
<b>6.10. EINSY RAMBO BOX ASSEMBLY .....</b>	116
<b>6.11. EINSY RAMBO ASSEMBLY .....</b>	117
<b>6.12. WIRING PREPARATION .....</b>	118
<b>6.13. EINSY RAMBO WIRING.....</b>	119
<b>6.14. MOSFET ASSEMBLY.....</b>	120
<b>6.15. MOTOR X WIRING PREPARATION .....</b>	121
<b>6.16. EINSY RAMBO COVER ASSEMBLY .....</b>	122
<b>6.17. PRINTER FIRMWARE PREPARATION .....</b>	123
<b>6.18. PRINTER FIRMWARE BURNING .....</b>	124

## 0. Introduction

---



**Time to assemble:** 8 - 20 hours

**All tools included**

**No soldering required**

**Latest STL printed parts at:**  
[github.com/Vertex3dPrinters/VERTEX-XL](https://github.com/Vertex3dPrinters/VERTEX-XL)

**Instagram:**  
[instagram.com/vertex3dorg/](https://instagram.com/vertex3dorg/)

**Facebook forum:**  
[Facebook.com/groups/vertex3d](https://Facebook.com/groups/vertex3d)

## 0.1. Safety Warning

---

The Vertex XL 3D printer brings the power of additive manufacturing to your home/office/workshop. It is a robust and precise machine with moving parts and parts that heat up to high temperatures, please use it with caution. Make sure the printer is out of reach of children, pets, and untrained people.

**The content of this assembly guide is protected by the intellectual property rights belonging to VERTEX3D. Any use of its contents by third parties, whether for profit or not, can be prosecuted.**

Before assembling and using your VERTEX XL 3D printer, make sure you have read and understood all the instructions in this manual (mainly the pages highlighted in yellow). Failure to follow the warnings and instructions may result in injury, equipment damage, fire, or property damage for which VERTEX3D is not responsible.



Use the gloves provided in the KIT when mounting the linear guides for the X and Y axis. Keep the linear guides greased at all times.

Clean the smooth sheet base with isopropyl alcohol or soap and water. If you are going to print materials other than PLA, use separating agents before each print such as lacquer or glue stick to avoid breaking the PEI sheet. Let the surface cool down before removing the prints, do it slowly and without sudden movements so as not to break the PEI sheet.

Any software or electronic modification will automatically void its warranty.

### **Electrical safety**

- Before connecting the Vertex XL 3D printer to the electric power, make sure that the local voltage line corresponds to the voltage indicated on the PSU (power supply unit), you can change it on the back switch of the power supply to 110v or 220v. The yellow sticker on the PSU will show you where to find the switch.
- Make sure the Vertex XL 3D Printer is plugged into a properly grounded power point.
- Do not use the 3D printer if the plug, power cord, or any other part is damaged. Contact the supplier to replace the damaged part.
- Do not try to repair the power cable and do not use any adapter.
- Disconnect the 3D printer from current when performing maintenance.
- Disconnect the 3D printer from current if you are not going to use it for a long time.
- Disconnect the 3D printer during a severe electrical storm and whenever there is a risk of an unstable power grid or storm.
- Be sure to protect electronic components from electrostatic discharge (ESD), especially when assembling the printer or performing maintenance.
- Please use the original components provided by VERTEX3D.org you will find any replacement in the site.
- Do not make any unauthorized electronic modifications to the device. This will automatically invalidate the warranty.

### **Personal Safety**

- When using the VERTEX XL 3D printer, stay alert and watch what you're doing. Do not operate the 3D printer if you are tired, under the influence of alcohol or drugs.
- Make sure nothing interferes with the moving parts of the VERTEX XL 3D Printer. Keep your hair, clothing, and accessories away from the moving parts of the 3D printer.
- Do not touch the nozzle, heated bed, or printing plate when they are heated: just before printing starts, during printing, or after printing finishes. You can check the temperatures on the screen.

### **Safe manipulation**

- The Vertex XL 3D printer is designed for use at room temperature, with relative humidity levels of 30% to 60%.
- Do not use the Vertex XL 3D printer in humid or wet environments. Make sure the 3D printer is completely dry before plugging it into electricity and turning it on.
- Do not expose the Vertex XL 3D printer to intense heat (temperatures above 45°C/113°F) or strong/long-term UV light.
- Do not use the Vertex XL 3D printer in dusty environments.
- Use the Vertex XL 3D printer in a ventilated environment, but make sure that no air is directed directly at the printer (fan, air conditioning, open window...)
- Do not use the Vertex XL 3D Printer close to flammable liquids or gases.
- When using the Vertex XL 3D Printer, do not leave it unattended for too long.

## 0.2. Manipulation and use instructions

Throughout the guide you will find the following symbols:

-  To inform you or give you some advice or curiosity.
-  To warn you of something you need to pay attention to.

Keep your workplace tidy! Use only the pieces you need for the given chapter/step. Use small containers to sort bolts and nuts to make sure they don't get scattered

 **Each bag of screws corresponds to each chapter of this guide, we suggest you to open each bag according to the chapter number.**

If you find any small scratches on any of the components, please note that it is because each component is tested before shipping. It will not affect performance or print quality.



Keep the electronic components inside the protective bag until instructed that it is time to install them. Handle electronic components with care: hold them on their sides only. Avoid touching chips, capacitors, and other electronic parts.

Before manipulating any of the electronic components, touch a conductive material (any type of metallic material) to remove any static charge you may have. Please note that carpets or wool and certain synthetic fabrics can easily accumulate static electricity.

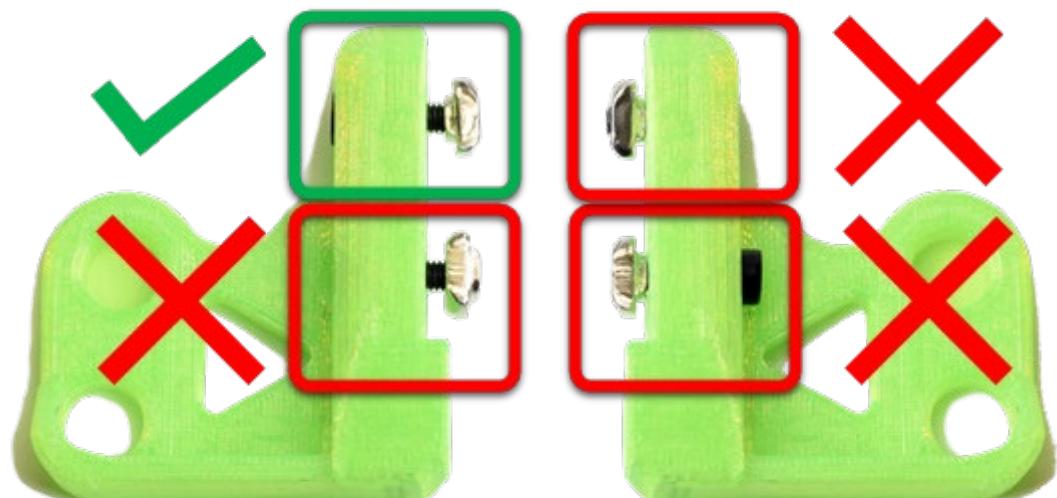
**⚠ Most of the screws used during the assembly of the 3D printer must be tightened carefully: not too much, not too little.**

For this reason, we strongly recommend that you do not use any electric screwdriver. The torque of the electric screwdriver may be too high and cause over-tighten the screws, causing the printer parts to misalign or even break the printed plastic parts.

Even though you can adjust the torque on the electric screwdriver (about 2Nm), the fast rotation of the screw may melt the plastic part due to friction making the part useless.

Throughout this guide, you will often be instructed to use **M4 T-Nuts**. There are two techniques you need to understand to complete the assembly successfully:

1. Insert the screw into the plastic part hole and **screw the M4 T-nut from the other side onto the screw tip (only 4 turns)**. Then **align the T-nut with the slot in the aluminium profile** to secure printed part.
2. Put the printed part on it's position, **slide the M4 T-nut into the aluminium profile slot** and push it using an Allen key under the printed part until it aligns with the screw hole, then screw to secure it.



If a nut keeps coming out of its slot, use a small piece of tape to seal the slot after inserting the nut inside. Remove the tape when you start to tighten the screw. **Do not use glue** to secure the nut as it can get into the threads and not allow you to tighten the bolt properly. Also, one day you may need to remove the nut and reuse it when you upgrade the printer.



#### Embed hexagonal nuts in printed parts

To embed an hex nut into its slot in a printed part, use a longer screw that is threaded the full length (M3x14, for example). Insert it from the other side and screw the nut manually using the Allen key, until reaching the screw head. Use the screw to embed the nut into the printed part, and then tighten the screw to insert it all the way. Remove the screw afterward.

Before beginning any assembly step, make sure you have read and understood all written instructions.

**⚠️ Not all the pictures shows the finalized result, so DO NOT skip over the text and DO NOT proceed sentence by sentence either.**

**i** If you have any questions, consult our technical support team through the live chat or email [info@vertex3d.org](mailto:info@vertex3d.org)

## 0.3. Tools

---



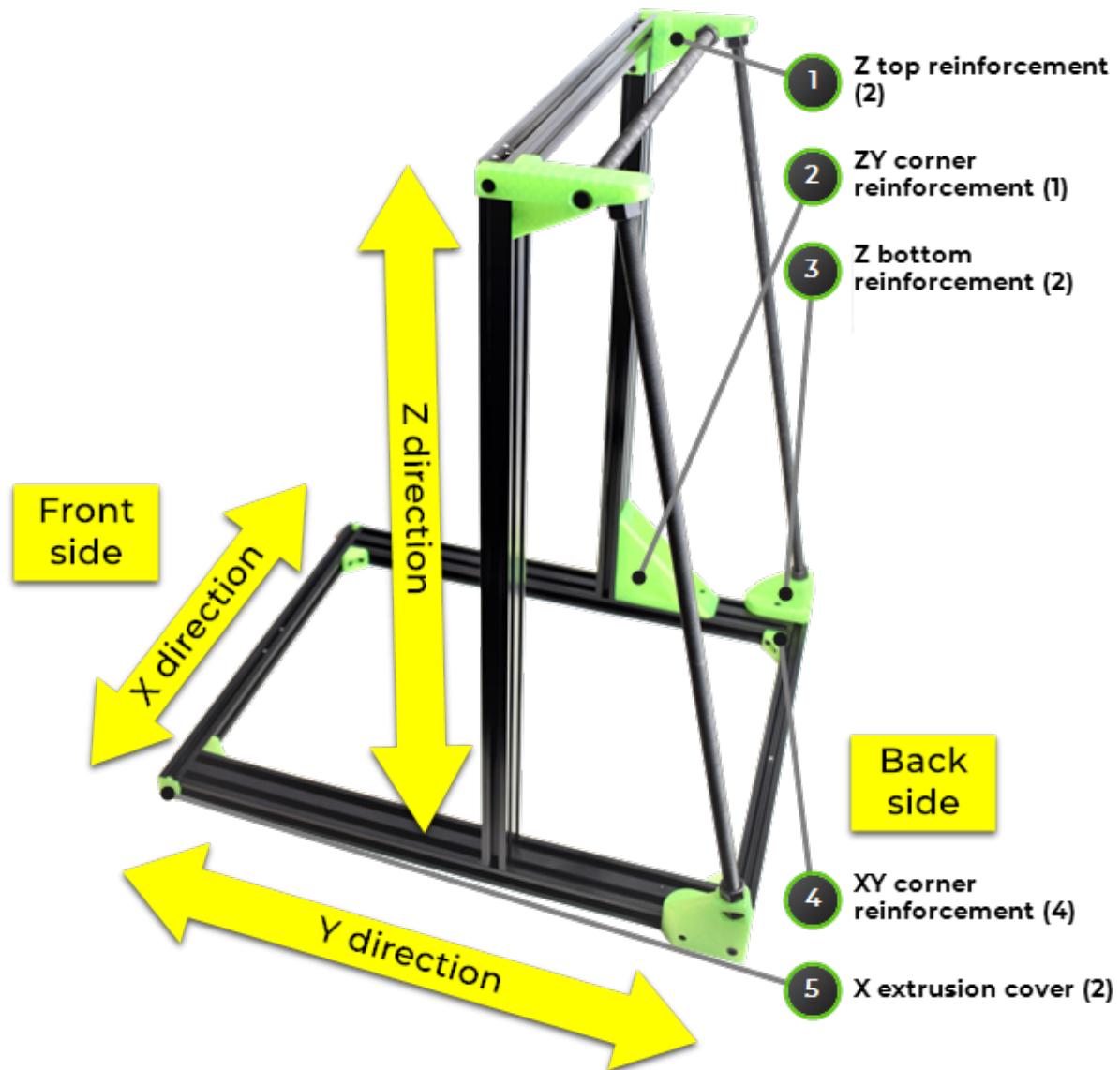
The KIT includes these tools:

- Allen keys of the following sizes:
  - 4 mm
  - 3 mm
  - 2,5 mm
  - 2 mm
  - 1,5 mm
- Needle nose pliers
- Philips screwdriver

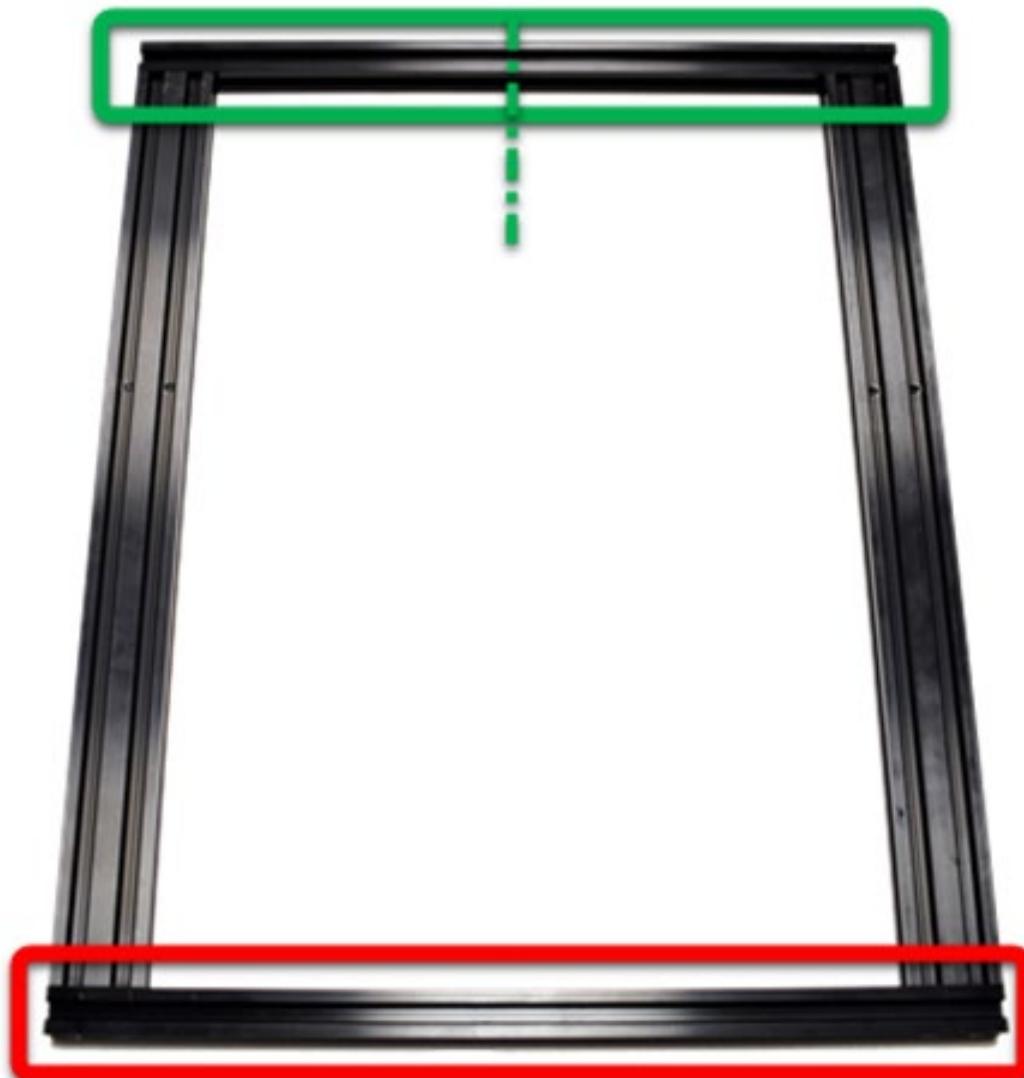
Other useful tools (not included):

- Meter or ruler over 20cm
- Framing square
- Marker

## 1. Frame map



## 1.1. XY Frame preparation I



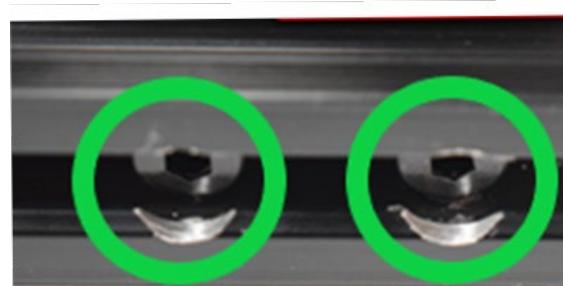
Place the XY base aluminium extrusions as shown in the picture:

- x2 2020 aluminium extrusions 40cm
- x2 2040 aluminium extrusions 56cm

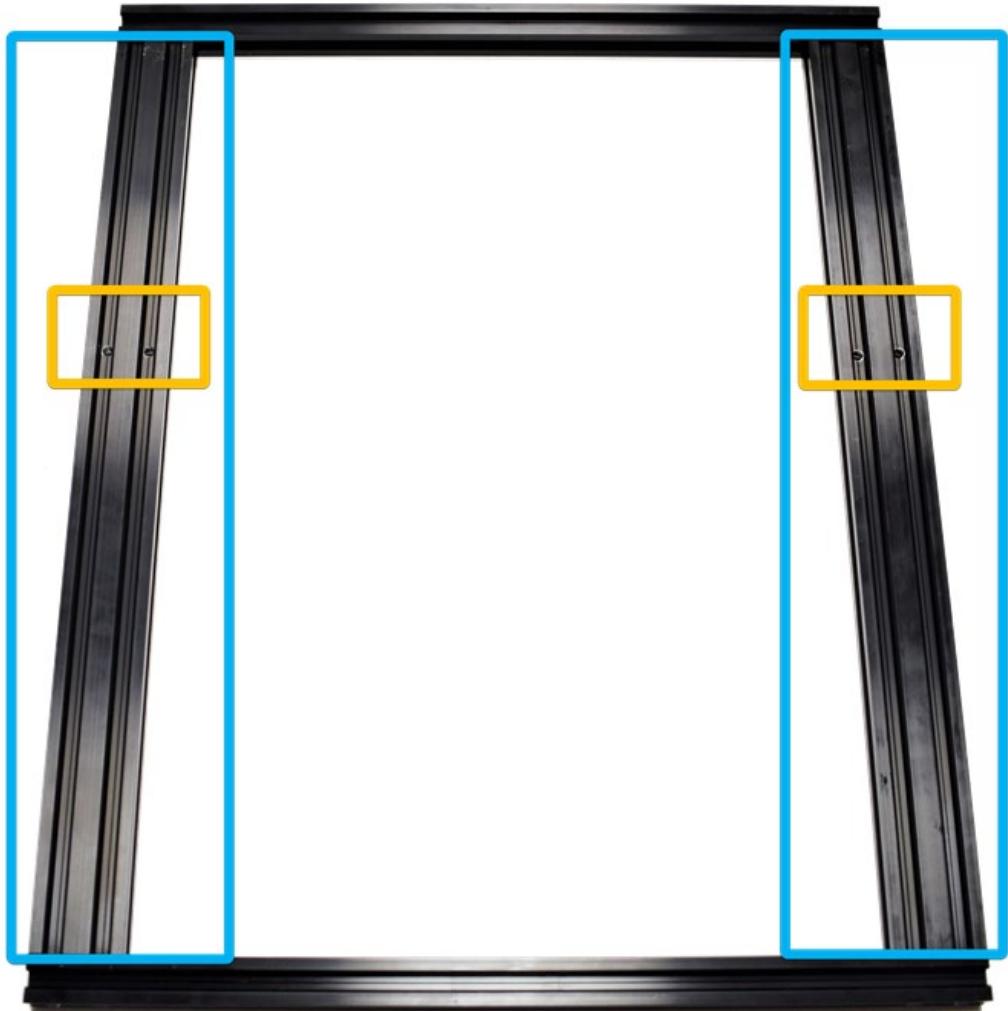
The shorter 2020 aluminium extrusions 40cm will be placed in the X direction (horizontal):

- **2020 profile front.**
- **2020 profile rear.**

In both 2020 profiles there are **4 holes** in each, make sure that the part with the larger holes faces out as there will be input screw heads.



## 1.2. XY Structure preparation II



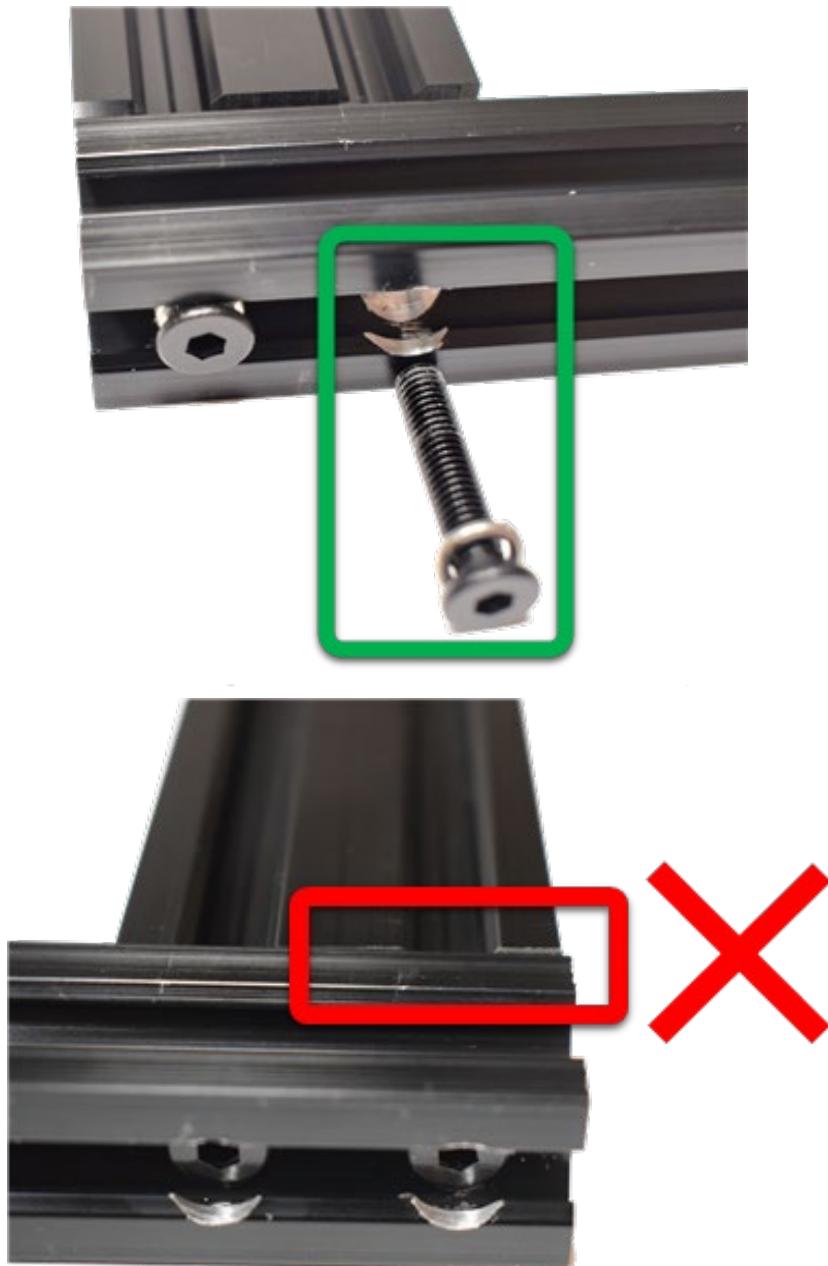
Between the 2020 aluminium extrusions placed in the previous step, place the **2040 46cm aluminium extrusions** vertically.

**i** Both **2040 aluminium extrusions** are the same no matter which side you put them on.

**!** There are **two holes** in these **2040 aluminium extrusions**, they are not exactly in the middle, they must be closer to the back than to the front as shown in the picture.

As in the 2020 aluminium extrusions installed in the previous step, there are **two holes** in **each 2040 profile** with the larger holes on. The big holes must face down and the small ones up as shown in the picture.

## 1.3. XY Frame assembly



Prepare **x8 M5x25 bolts** and **x8 M5gw grower washers**.

Before inserting the **M5x25 screws**, make sure to put the **M5gw grower washers** on them.

Start at the preferred corner of the frame. Insert the **screw** through the 2020 aluminium extrusion and tighten it against the corresponding 2040 aluminium extrusion.

Repeat this step in the remaining 3 corners with two screws per corner.

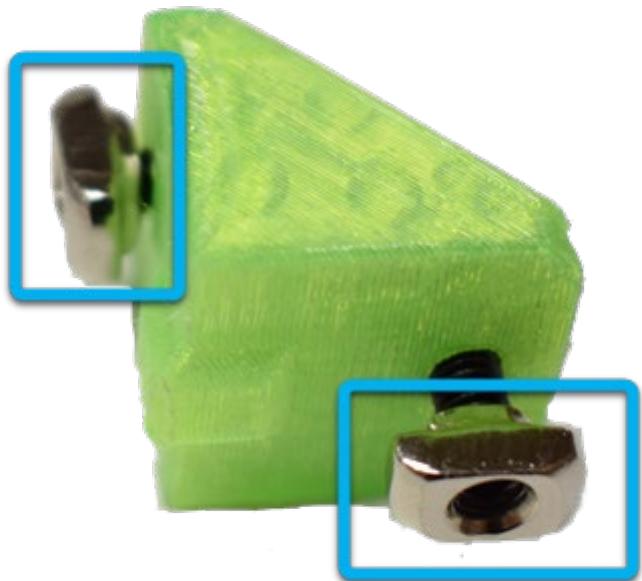
**!** Do not fully tighten the screws! When all of them are in place, make sure the frame is on a completely flat surface.

**!** Do not over-tighten the screws, the frame may bend slightly and may affect the rest of the assembly.

**!** Make sure that the aluminium extrusions are aligned with each other. Avoid what is shown in the **second image**. Once aligned, tighten the screws.

**i** If you have any framing square, you can use it to make the aluminium extrusions alignment easier.

## 1.4. XY Frame corners preparation



Take x6 frame corners (printed parts) as follows:



From now on, you will be using the following technique very often. Remember the next steps.

Insert **x2 M4x10** screws into the 2 holes on the printed part.

On the other side, screw on **x2 T-M4 nuts** onto the screws tip:

- Screw only 4 turns.
- Orient the nuts, so that they align with the aluminium extrusions groove.

Repeat this step another 5 times with the rest of the frame corners.

You should see something similar to what is shown in the image.

## 1.5. XY Frame corners assembly



Insert x1 frame corners prepared in the previous step into the aluminium extrusion corner, the **T-M4 nuts** have to be aligned with the groove.

Make sure the frame corner is aligned.

**i** When tightening the M4x10 screws, the **T-M4 nut** will turn 90° by itself, securing the printed part to the frame, if it does not turn, loosen and tighten again until you see it turn.

**i** If you have any framing square, you can use it to check the frame perpendicularity in this point.

Repeat this step on the other 3 corners.

## 1.6. Anti-vibration feet assembly

---

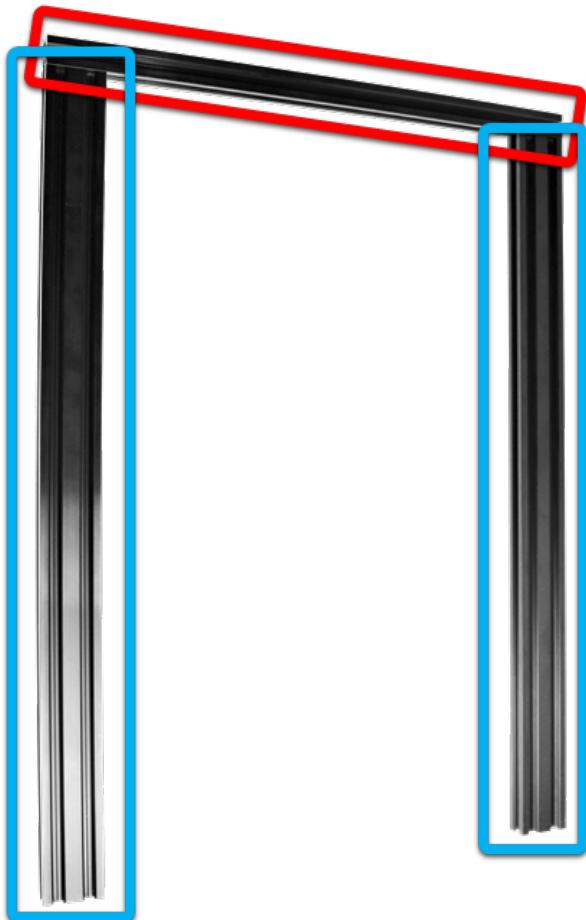
Before continuing, install the Anti-Vibration feet (printed part).

**Slide** x2 foot into the bottom of the front and x2 foot on the rear 2020 aluminium extrusions as shown in the picture.

Position them at each of the four corners of the XY frame.



## 1.7. Y Structure preparation



Place the rest of the aluminum extrusions on a flat surface as shown in the photo:

- X1 2020 aluminium extrusion 40cm.
- X2 2040 aluminium extrusions 56cm.

The **2020 aluminium extrusion 40cm** has to be placed horizontally.

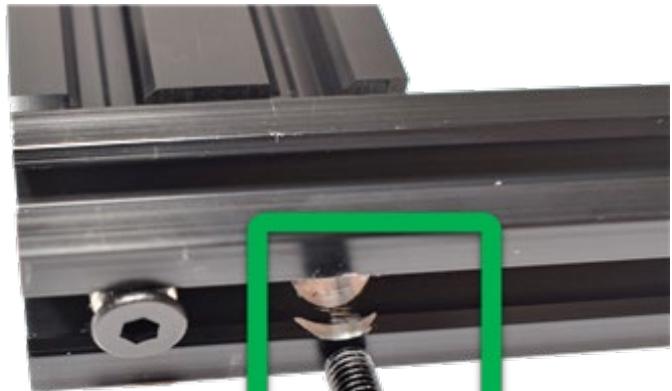
**⚠ Make sure that the bigger drilled holes face outside.**



The **2040 aluminium extrusions 56cm** have to be placed vertically.

**i** Both **2040 aluminium extrusions** are the same, no matter which side you choose.

## 1.8. Z Frame assembly



Prepare **x4 M5x25 bolts** and **x4 M5gw grower washers**.

Before inserting the **M5x25 screws**, make sure to put the **M5gw grower washers** on them.

Start at the preferred corner of the frame. **Insert** the screw through the 2020 aluminium extrusion and tighten it against the corresponding 2040 aluminium extrusion.

Repeat this step in the remaining 3 corners with two screws per corner.

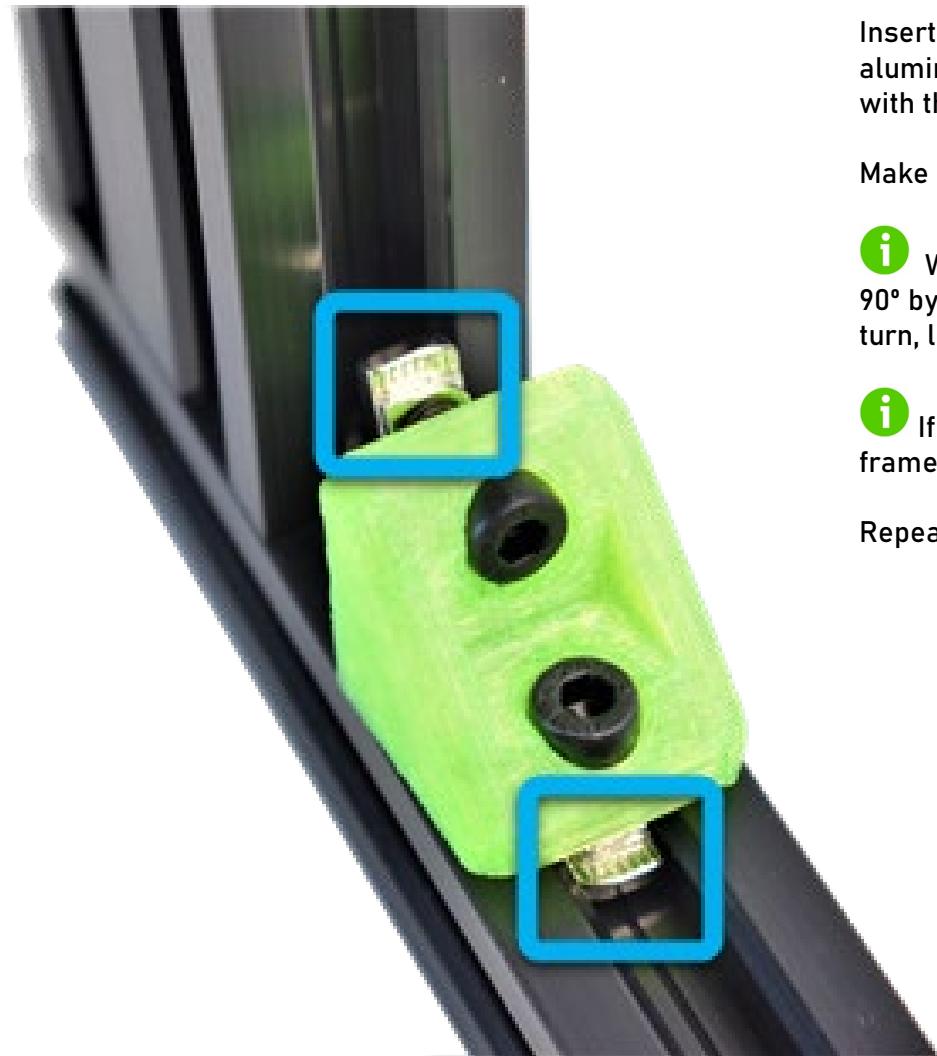
**!** Do not fully tighten the screws! When all of them are in place, make sure the frame is on a completely flat surface.

**!** Do not over-tighten the screws, the frame may bend slightly and may affect the rest of the assembly.

**!** Make sure that the aluminium extrusions are aligned with each other. Avoid what is shown in the **second image**. Once aligned, tighten the screws.

**i** If you have any framing square, you can use it to make the aluminium extrusions alignment easier.

## 1.9. Z Frame corners assembly



Insert x1 frame corner prepared in previous steps into the aluminium extrusion corner, the **T-M4 nuts** have to be aligned with the groove.

Make sure the frame corner is aligned.

**i** When tightening the M4x10 screws, the **T-M4 nut** will turn 90° by itself, securing the printed part to the frame, if it does not turn, loosen and tighten again until you see it turn.

**i** If you have any framing square, you can use it to check the frame perpendicularity in this point.

Repeat this action on the other corner.

## 1.10. Z Frame on XY frame assembly



Take the XY frame and place it on a flat surface.

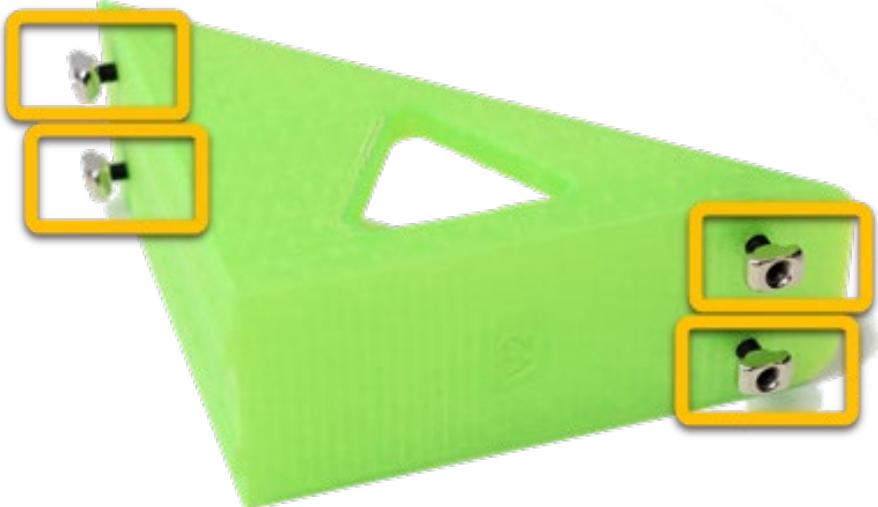
Insert **x2 M5x25 screws** and **x2 M5gw washers** in each 2040 aluminium extrusion from the bottom.

Put the Z frame on top and **tighten the screws** to secure both frames.

**i** If you have any framing square, you can use it to check the frame perpendicularity in this point.

**!** Do not over-tighten the screws, the frame may bend slightly and may affect the rest of the assembly.

## 1.11. ZY Angle preparation



Take the ZY reinforcement angle (printed part).

Insert **x4 M4x10 screws** into the printed part 4 holes.

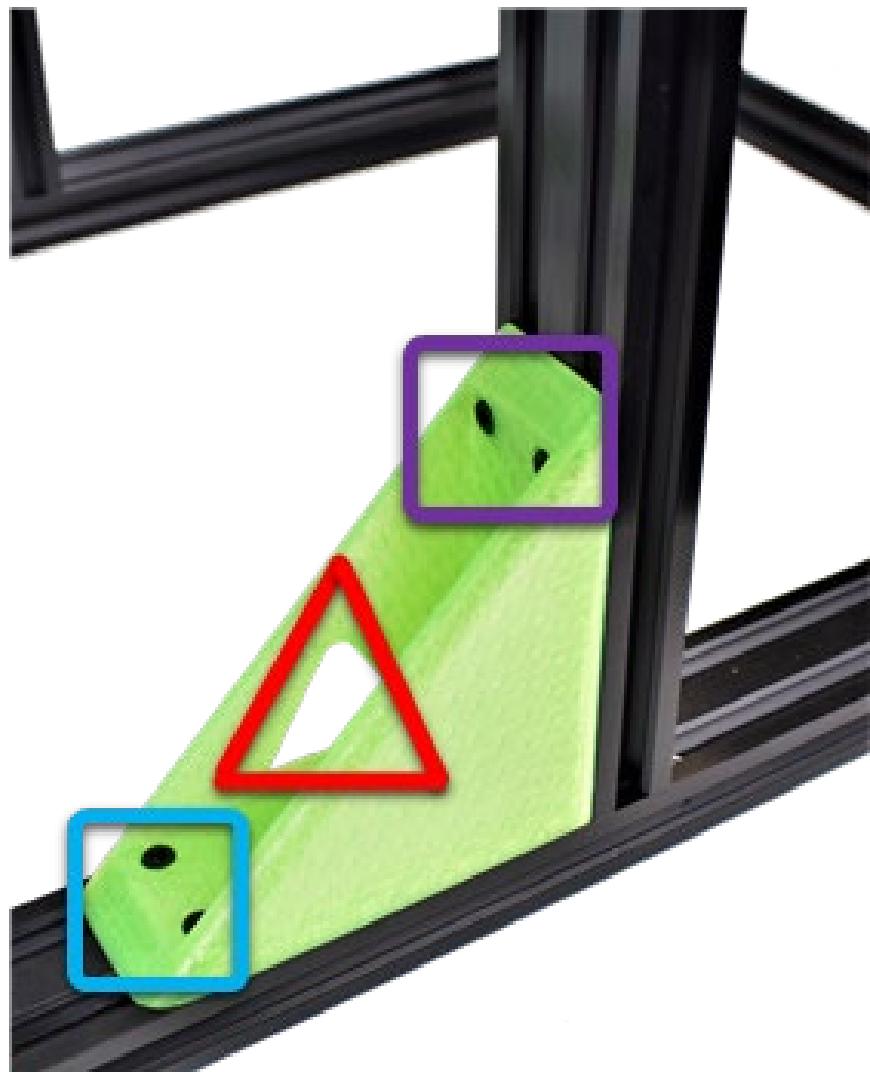
On the other side, screw on four **T-M4 nuts**.

You should see something similar to what is shown in the image.



If you have any questions, go to step 2 to see the position.

## 1.12. ZY Angle assembly



Take the frame and turn it until the back is facing you in the shortest part.

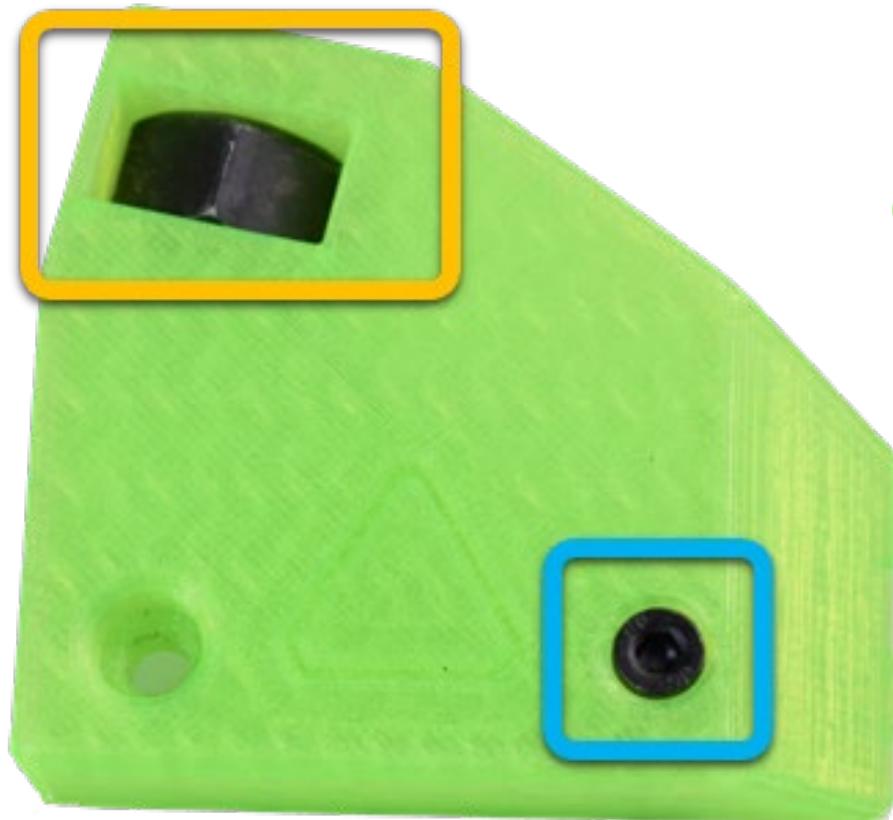
Place the ZY angle (printed part) over the right aluminium extrusion grooves. The **hole with the Vertex logo** must be towards the inside of the frame.

Lightly tighten the bottom with **x2 M4x10 screws**, do not fully tighten them, you have to be able to move the part.

**i** If you have any framing square, you can use it to check the frame perpendicularity in this point.

Push the ZY angle against the 2040vertical aluminium extrusion and tighten the **x2 upper M4x10 screws**. Then finish tightening the **x2 lower M4x10 screws**.

## 1.13. Z Bottom reinforcements preparation



Take the bottom Z reinforcements (printed parts) and insert **x1 M12n nut** into the slot.

Insert **x1 M4x12 screw**

Screw on **x1 T-M4 nut** from the other side.

**i** The other holes remain free for now.

Repeat this step in the opposite side.

## 1.14. Z Bottom reinforcements assembly



Place the Z bottom reinforcement on the back of the frame as shown in the photo.

**i** If you have any doubts, go to step 2 to see the position.

**!** Make sure you have mounted the Anti-vibration feet as you will not be able to put them on after installing this part.

Align the **M5 hole** in the printed part with the threaded hole in the 2020 aluminum extrusion, insert **x1 M5x12 screw** and tighten it.

Tighten **x1 M4x12 screw**.

From the top side groove of the 2040 aluminium extrusion, slide and push **x1 T-M4 nut** under the printed part then align it with the remaining hole.

Once aligned, insert **x1 M4x12 screw** and tighten it to fully secure the printed part.

Repeat this step in the opposite side.

## 1.15. Z reinforcement threaded rods preparation



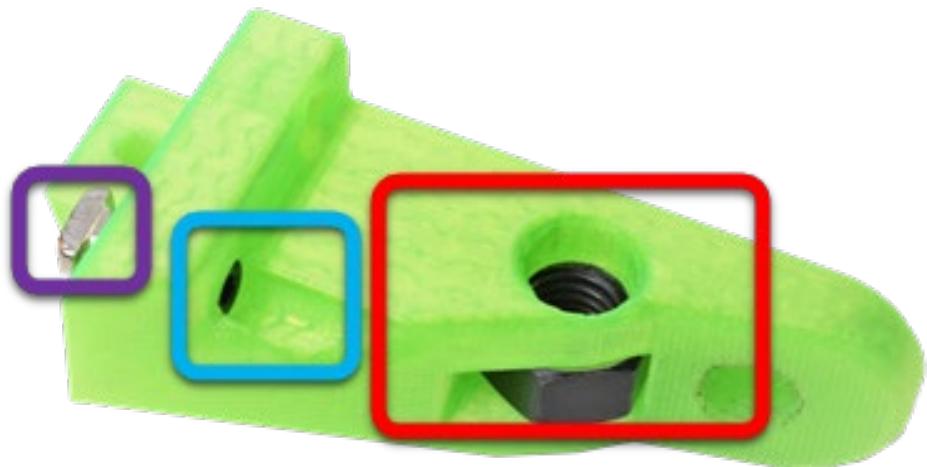
Take **x2 longer thread rods**.

Take **x4 M12 nuts** and screw them onto each side of each threaded rod about 5cm far from the ending.

Screw **x1 threaded rod** into the previously assembled Z bottom reinforcement until reaches the bottom.

Repeat the same step for the opposite side.

## 1.16. Z Top reinforcements preparation I



Take x2 Z top reinforcements (printed parts) and insert **x1 M12n nut** into the slot.

Insert **x1 M4x12 screw**.

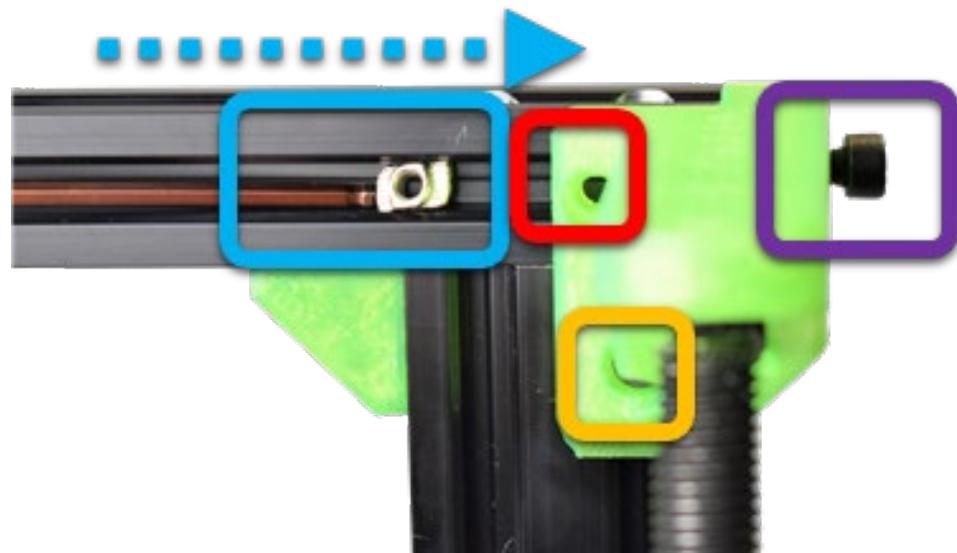
Screw on **x1 T-M4 nut**.



The other two holes remain free for now.

Repeat this step in the opposite side

## 1.17. Z top reinforcements assembly I



Place one of the Z top reinforcements on its respective top corner, in the case of the photo, it is shown on the right side from the back. The **T-M4** nut must be aligned with 2040 aluminium extrusion vertical groove.

Align the **M5 hole** in the printed part with the **M5 thread hole**.

Insert **x1 M5x12 screw** and tighten it.

Tighten **x1 M4x12 screw**.

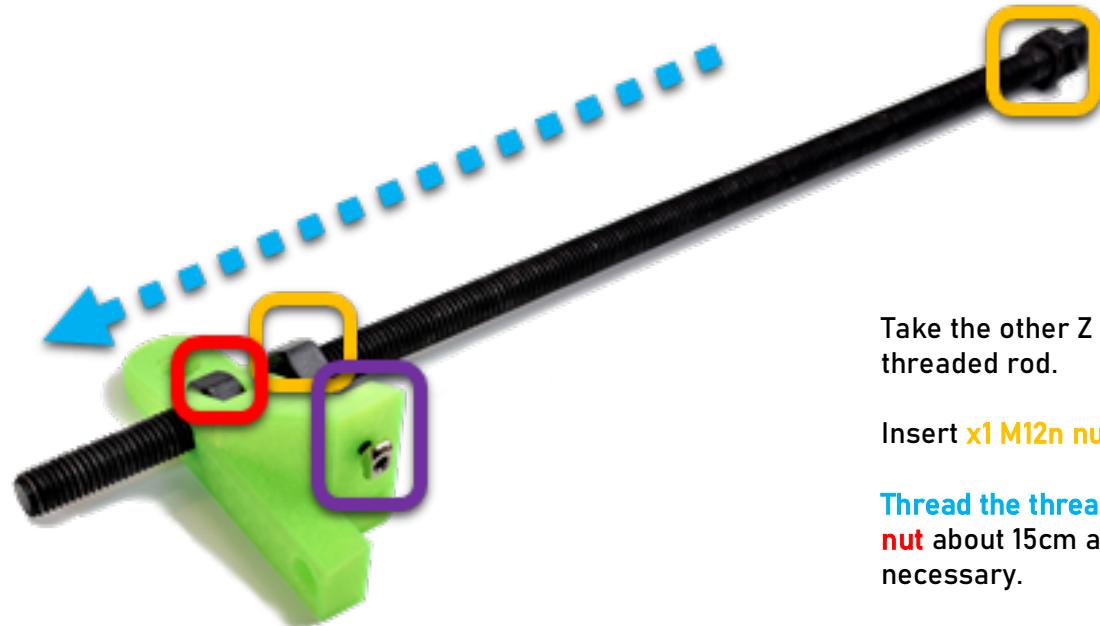
**Slide** and push **x1 T-M4** nut into the remaining hole, you can use the small Allen key for this.

After aligning the **T-M4 nut**, insert **x1 M4x12 screw** and tighten it.

**i** The vertical threaded rod should still not touch the printed part yet. In any case, it should be aligned with the hole in the printed part where it will be tightened on later.

**⚠ DO NOT install the other Z top yet.**

## 1.18. Z top reinforcements preparation II



Take the other Z top (printed part) and the remaining short threaded rod.

Insert **x1 M12n nut** into each end.

**Thread the threaded rod through the printed part and the **M12n nut** about 15cm as shown in the picture. Move the **M12N nuts** if necessary.**

## 1.19. Z top reinforcement assembly II

Repeat what you have done in step 1.17

**i** The vertical threaded rod should still not touch the printed part yet. In any case, it should be aligned with the hole in the printed part where it will be tightened on later.



## 1.20. Z Horizontal threaded rod assembly



Now that you have the two Z top reinforcements assembled, connect both parts with the horizontal threaded rod.

Screw the horizontal threaded rod through the other printed part and **M12n nut** until it lines up on both sides.

Tighten by hand to the sides the **x2 M12n nuts**, one fully left and the other one fully right using equal force against the printed parts.

**i** The distance between both nuts is more or less 36cm.

## 1.21. Z Vertical threaded rods assembly



**⚠** Make sure you have inserted **x1 M12n nut** on each side of each vertical threaded rod before continuing.

**Screw** the vertical threaded rod into it up over the printed part to the end.

**⚠** Do not use too much force, you are tightening over a plastic part!

Tighten by hand the **M12n nuts** fully up and down against the top and bottom printed parts.

**i** The distance between these nuts should be around 51cm.

## 1.22. Finishing frame assembly



Take the pre-cut textile sleeves to the exact length included in the KIT and **cover** the 3 threaded rods to protect them and give them a better looking.

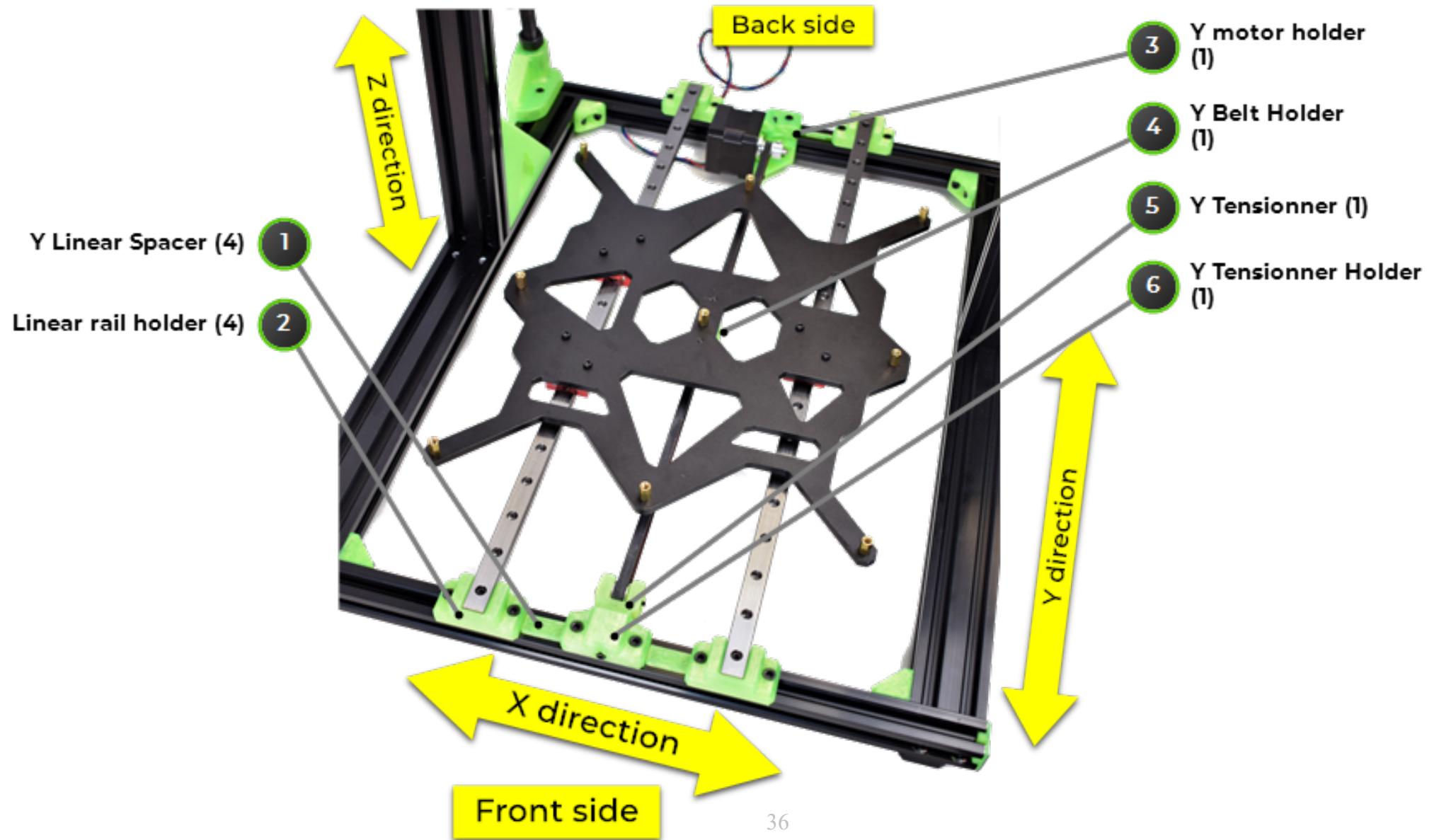


**Insert** x2 2020 aluminium extrusion covers (printed parts) into the front 2020 aluminium extrusion.

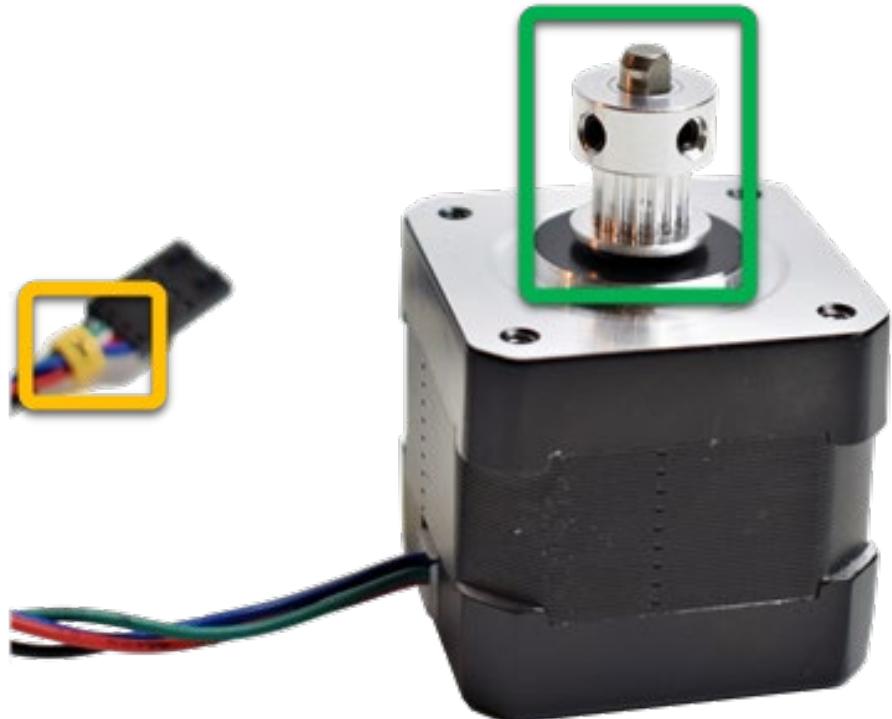
**!** The geometry of the frame should be as good as possible at this point. If you feel a big frame deviation, we recommend you to check the frame assembly chapter again. However, if you feel a small deviation, don't worry, the printer software is capable of making slight compensations.

**i** Take a step back and look at the size of your new VERTEX XL 3D printer. Impressive right?

## 2. Y Axis map



## 2.1. Y motor preparation



From the motors box, take the motor with the Y **yellow label** at the end of the cable. If the cable does not have a yellow label, the X and Y motors are exactly the same so it does not matter if you install it on the X or Y axis.

**⚠** Each motor has a different cable length, make sure you use the correct motor at all times.

Place **x1 Gt2- 16 toothed pulley** on the motor shaft and leave a small gap of about 1mm (you can put a zip tie between the pulley and the motor).

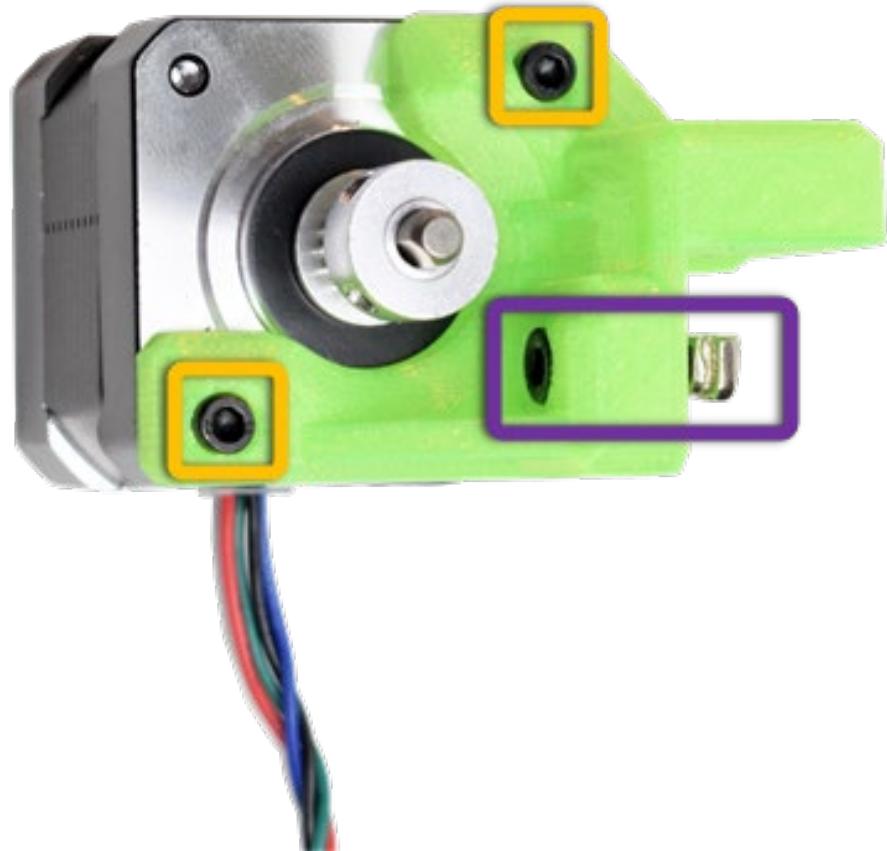
**⚠** Notice the orientation of the pulley in the photo.

**⚠** The motor shaft is not completely rounded, one of the grub screws must to be tightened on the flat side.

Tighten the two grub screws to secure the **Gt2-16 toothed pulley** to the motor.

## 2.2. Y motor holder preparation

---



Take the Y motor holder (printed part) and place the motor as you see it in the picture

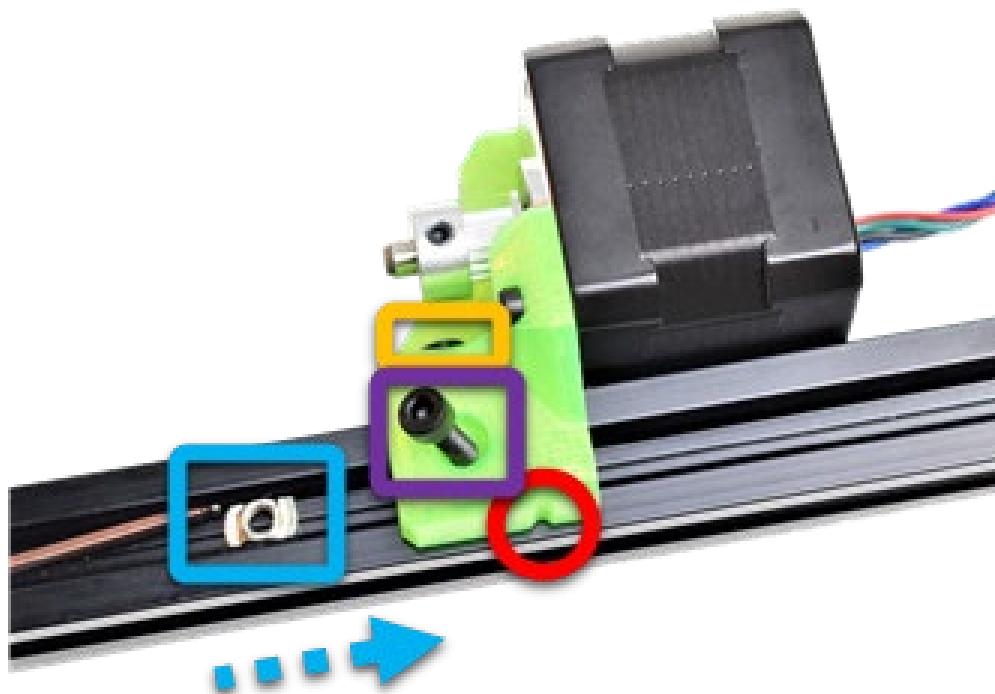
**⚠️ Notice the cable orientation.**

Secure the Y motor to the Y motor holder with **x2 M3x10 screws**.

Insert **x1 M4x12 screw**

Screw on **x1 T-M4 nut**.

## 2.3. Y motor holder assembly



Looking at the frame from the **back**.

**i** If you have doubts, visit step 3.

Take the previously prepared Y motor holder and lightly tighten the **M4x12 screw**. Don't fully tighten it, you should be able to move the printed part.

**i** The motor must be inside the frame.

There is a **small cut** in the printed part. This **cut** must be aligned exactly in the middle of the 2020 aluminium extrusion that is 20cm from the end (not counting the Z bottom reinforcements). For this, you will need a meter or a ruler at least 20cm long.

Once the part is aligned, tighten the **M4x12 screw**.

Slide and push **x1 T-M4** nut through the top 2020 aluminium extrusion groove.

Align it with the hole, insert and tighten **x1 M4x12 screw**.

## 2.4. Y tensioner preparation



Take the Z tensioner holder (printed part),

Insert **x2 M4x12 screws**

Screw on **x2 T-M4 nuts**.

Take the Y-tensioner arm (printed part) and insert **x1 623h smooth pulley**.

Insert **x1 M3x25 screw** through the **smooth pulley 623h**.

Embed **x1 M3nN hex nut** (Nyloc).

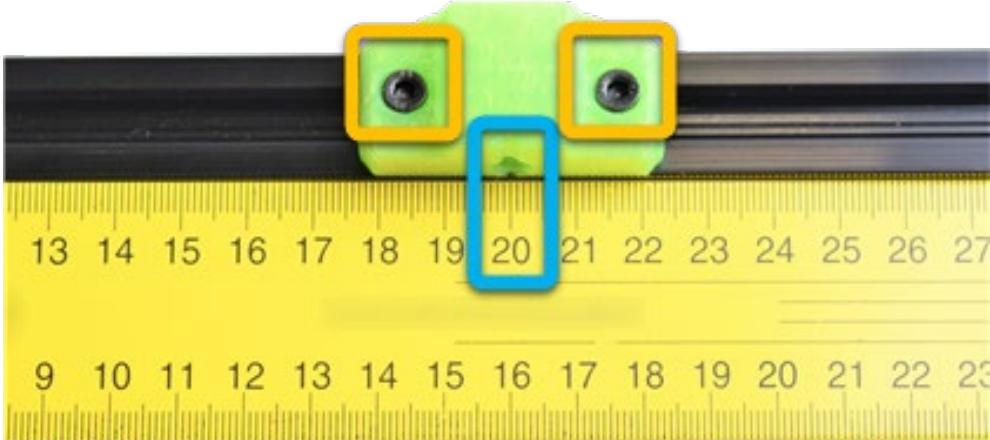
**i** To embed nuts, you can make use of the technique that we showed you on page 11.

**!** Do not over-tighten the screw. The pulley should rotate freely without resistance.

Embed **x1 M3nN hex nut** (Nyloc) into the slot on the Y-tensioner arm. This can be a bit tricky as it's very tight by design so it won't move in the future.

**i** For now, set aside the Y-tension arm, you'll install it later.

## 2.5. Y tensioner holder assembly



Take the Y tensioner holder that you have prepared in the previous step and place it over the front 2020 aluminium extrusion groove.



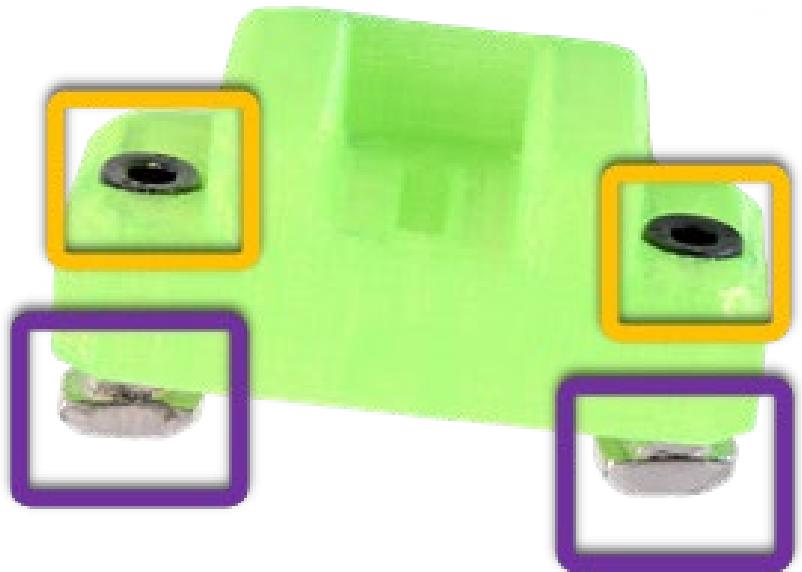
If you have any doubts, visit point 3.

As was with the Y motor holder, the Y tensioner body has a **small cut** that must be aligned exactly to the middle, 20cm from the end of the front 2020 aluminium extrusion as shown in the image (not counting the 2020 aluminium extrusion covers you installed in the step 1.22). For this, you will need a meter or a ruler at least 20cm long.

Once aligned, tighten the **x2 M4x12 screws** checking that it has not moved once tightened.

## 2.6. Y Linear rail holders preparation

---



Take x4 Y linear rail holders (printed parts).

Insert **x2 M4x12 screws**

Screw on **x2 T-M4 nuts**.

Repeat this step in other 3 printed parts.

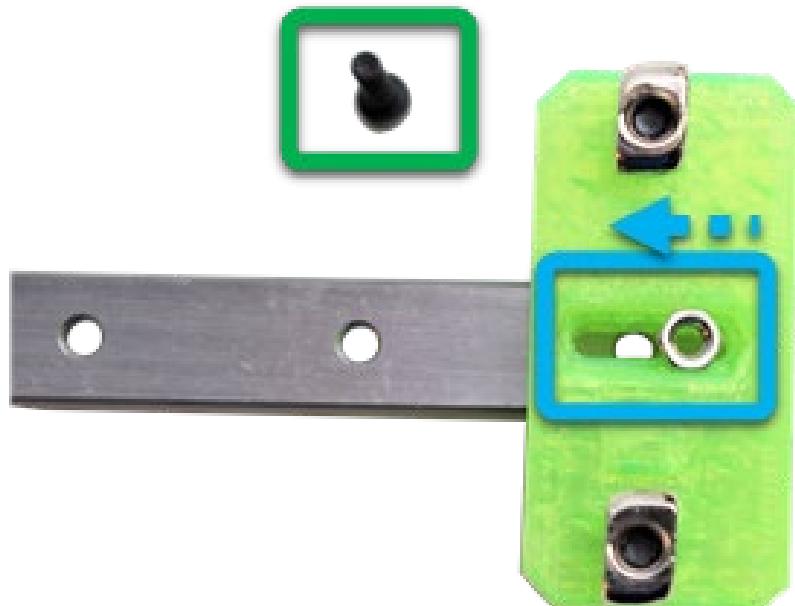
## 2.7. Y linear rail holders preparation



**!** Use the gloves provided in the KIT while manipulating the linear rails and keep them greased at all times. The linear rails are made out of steel and could rust.

**i** If any block has come off the linear rail, insert it as straight and slowly as you can, the small balls from the block could come out.

From the 3 linear rails, take **x2 long 50cm**.



Flip **x1** linear rail support Y at the bottom, you will find an **oblong hole**.

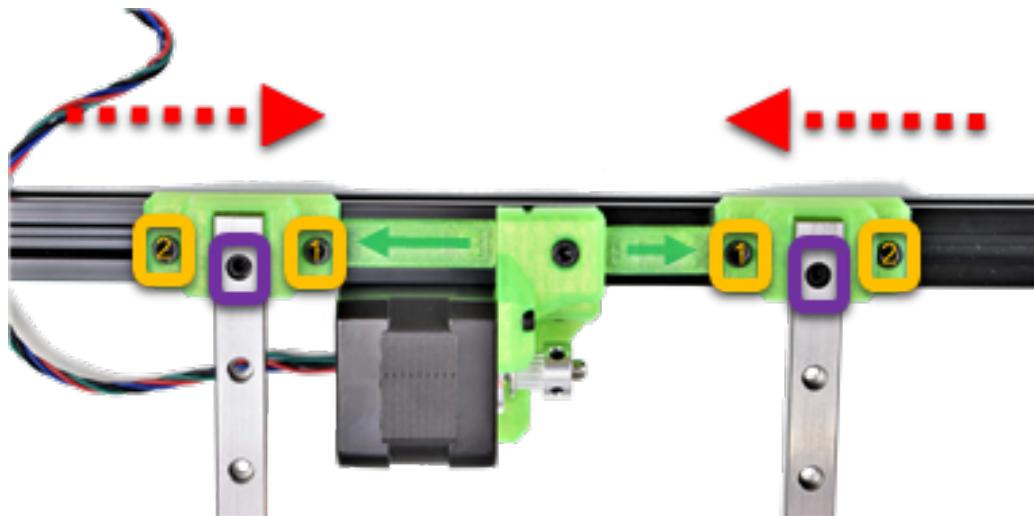
Install 1 of the linear rails over the printed part as shown in the picture.

In the upper part, insert **x1 M3X14 screw** in the first hole of the linear rail and in the bottom part, **x1 M3n hex nut**.

**!** DO NOT fully tighten the screw, you will tighten it later.

Repeat this step in the other 3 linear rail support Y parts.

## 2.8. Y linear rail holders assembly



Take the Y-axis linear rails that you have prepared in the previous step and lay them out over the front and back 2020 aluminium extrusion grooves (like a bridge).

**!** Looking at the printer from the front, the linear rail with 2 blocks goes to the left and the linear rail with 1 block goes to the right.

Now take the spacers (printed pieces) provided in the KIT in a small bag called **SPACERS** and place them as indicated in the picture. Notice the printed parts have letters and arrows:

- B = Back. (Rear)
- F = Front. (Frontal)

The **arrows** on the spacers indicates the direction in which they have to point, in this case towards the linear rails.

**Push** the Y linear rails supports onto the spacers, this will give you the exact distance they should be attached.

**!** Make sure you were precise in the steps 2.3 and 2.5.

Once adjusted, tighten **x8 M4x12 screws** to secure Y linear rails to the frame.

**!** DO NOT tighten the **x4 M3x14 screws** yet.

## 2.9. Y Carriage preparation



This is the final position that the carriage will have where the heated bed will be installed, but first, you have to prepare it.

**⚠** Make sure that the Y carriage is oriented at all times as shown in the picture. The **holes** marked in red must face the front in the frame.

Prepare **x9 M4x8b screws** and **x9 spacers**.

Flip the Y carriage and from the bottom, insert **x1 M4x8b screw** into each of the perimeter holes and in the middle.

Screw **x9 spacers** onto each screw as shown in the picture. Use the pliers and the corresponding allen key provided in the KIT for the final tightening.

**i** The orientation of the spacers does not matter.

**⚠** Make sure all spacers are tight and perpendicular to the Y-carriage.

## 2.10. Y belt holder preparation



Flip the carriage Y over the spacers.

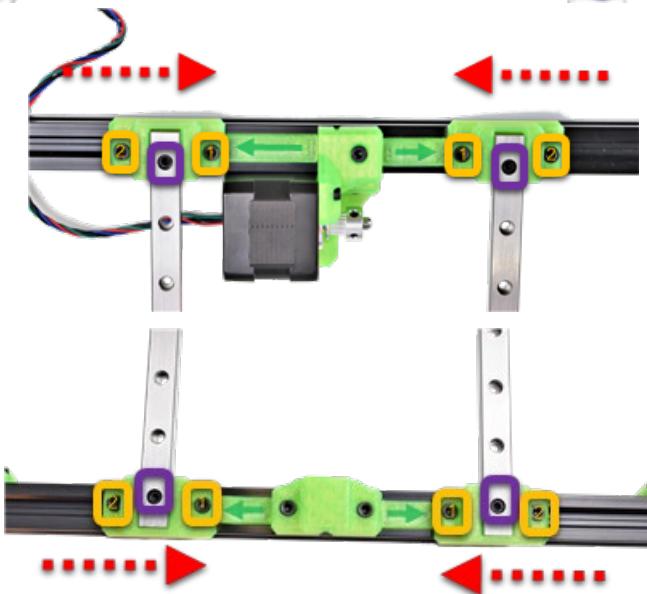
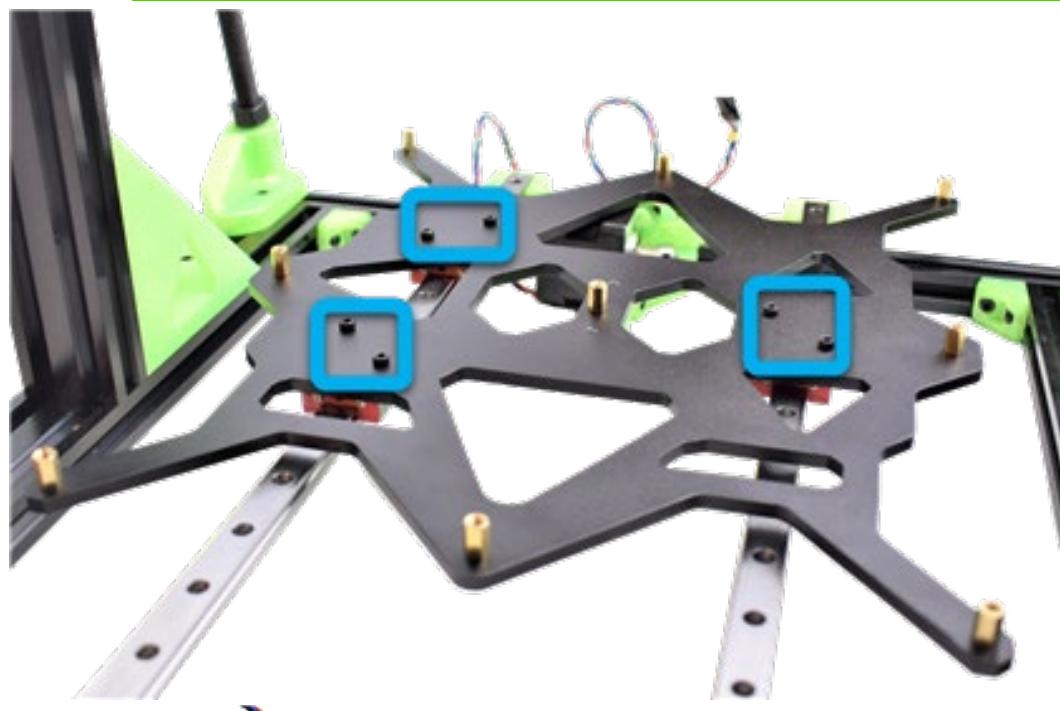
Take the part Y Belt Holder (printed part).

**i** The printed part is designed to be assembled only in one position:

- The middle hole of the printed part must match the head of the middle M4x8b screw of the Y-carriage.
- The printed part teeth lines must be facing to the left, in the direction of the **4 holes** where the linear rail blocks will be fastened.

Secure the Y Belt Holder to the Y carriage using **x2 M3x10 screws**.

## 2.11. Y Carriage assembly



Flip the Y carriage back over so that the spacers are facing up again.

Align the **x6 holes** with their respective Y linear rail blocks as shown in the picture.

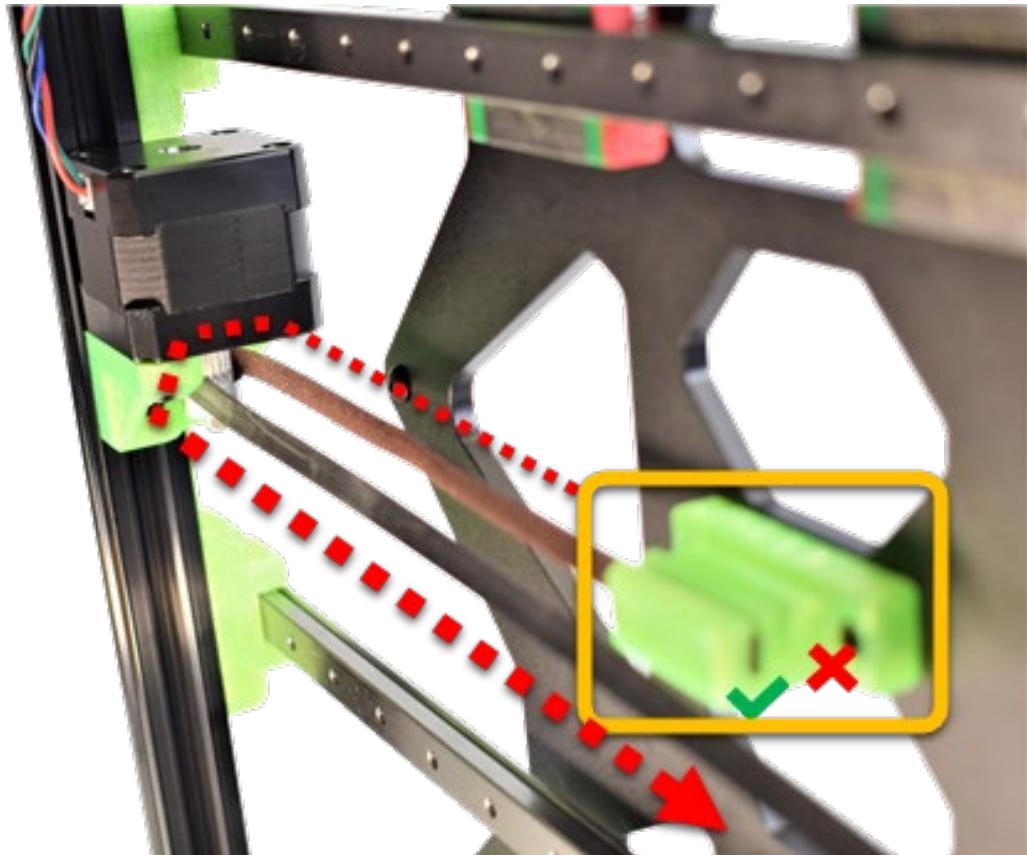
To secure each block, use **x2 M3 washers** and **x2 M3x10 screws**.

**⚠️ Once secured, move the Y-carriage back and forth by hand to check that it moves freely.**

If it moves freely, move the Y carriage forward and tighten the **x2 M3x14 screws** on the Y linear guide rails. Move the Y carriage backward and tighten the **x2 M3x14 screws**.

If it does not move freely, check the assembly again from point 2.8.

## 2.12. Y belt assembly I



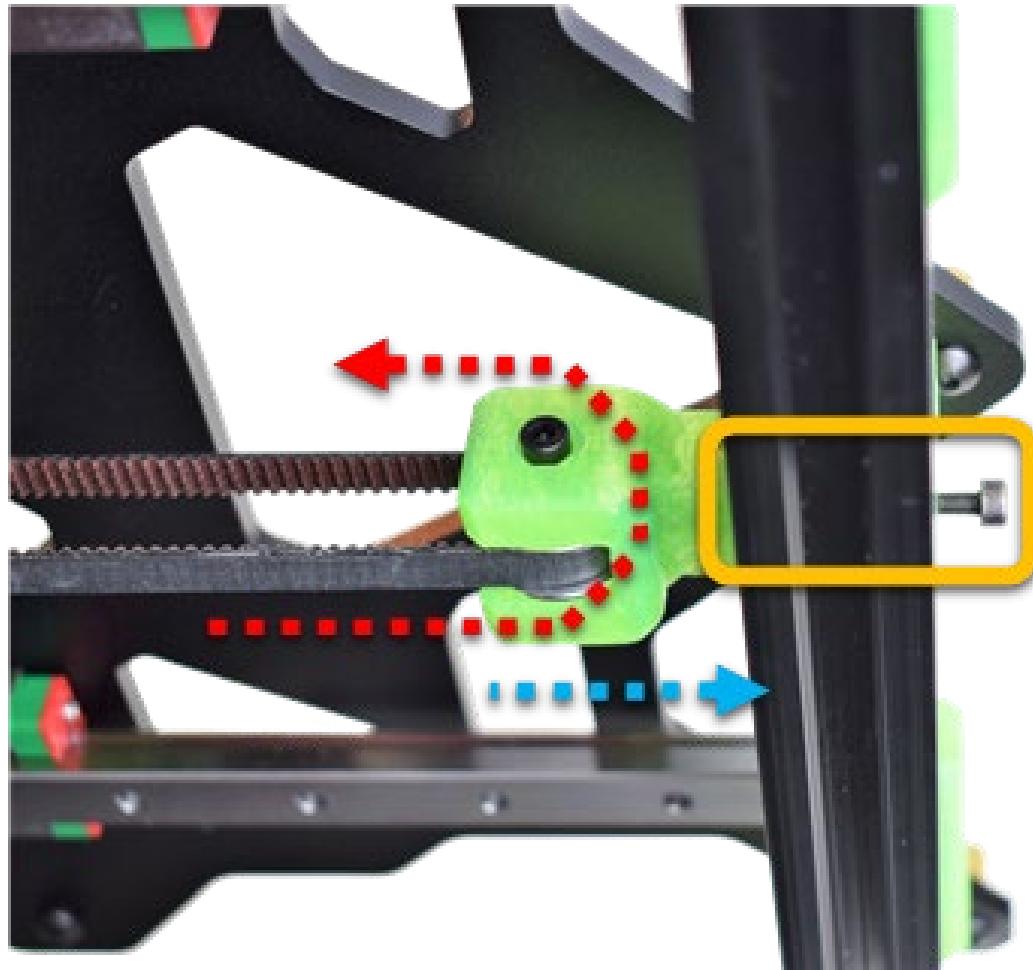
Lay the printer on its right side so that you have an easy access to the bottom.

Move the Y carriage approximately to the middle.

**⚠ It is important that the both Y belt ends not protrude from the ends of the **Y Belt Holder** where they are inserted (picture in step 2.14.).**

Take the Y-Axis belt included in the KIT (both are 90cm long) and insert the left end in the bottom toothed line marked with ✓ symbol of the printed **Y Belt Holder** as shown in the picture. The toothed belt should face down, **pass it over the Y-axis motor pulley**, and **continue under the printed part**.

## 2.13. Y belt assembly II



**Insert** the belt tensioner arm Y that you prepared in 2.4 step.

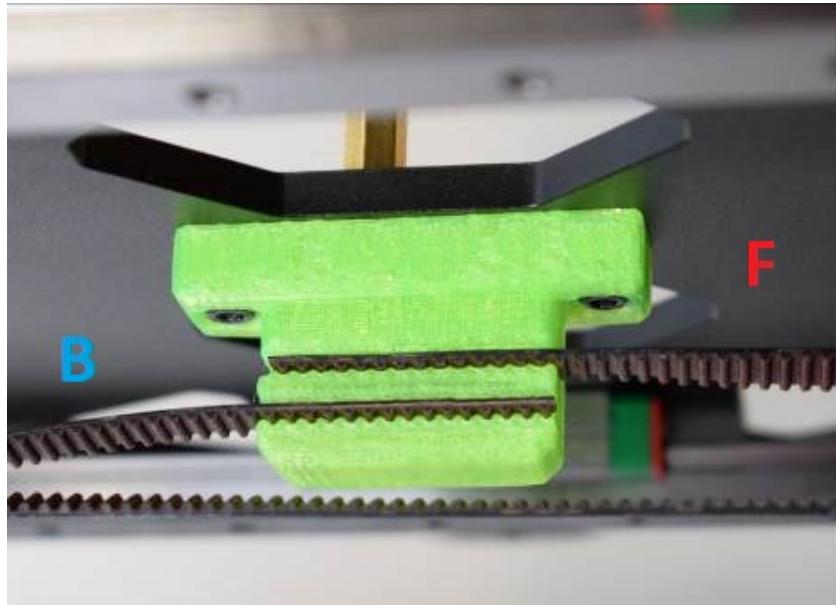
**i** The printed part is designed to be assembled only in one way.

Insert **x1 M3x20 screw** through the hole in the Y-axis Tensioner Body but do not tighten it yet.

**Guide** the belt that comes from below through the smooth pulley 623h so that it comes back to the middle printed part from the previous step.

**i** If the tensioner arm comes off, don't worry, in the next step, you will put the belt in the right place and finish the assembly.

## 2.14. Y belt assembly III



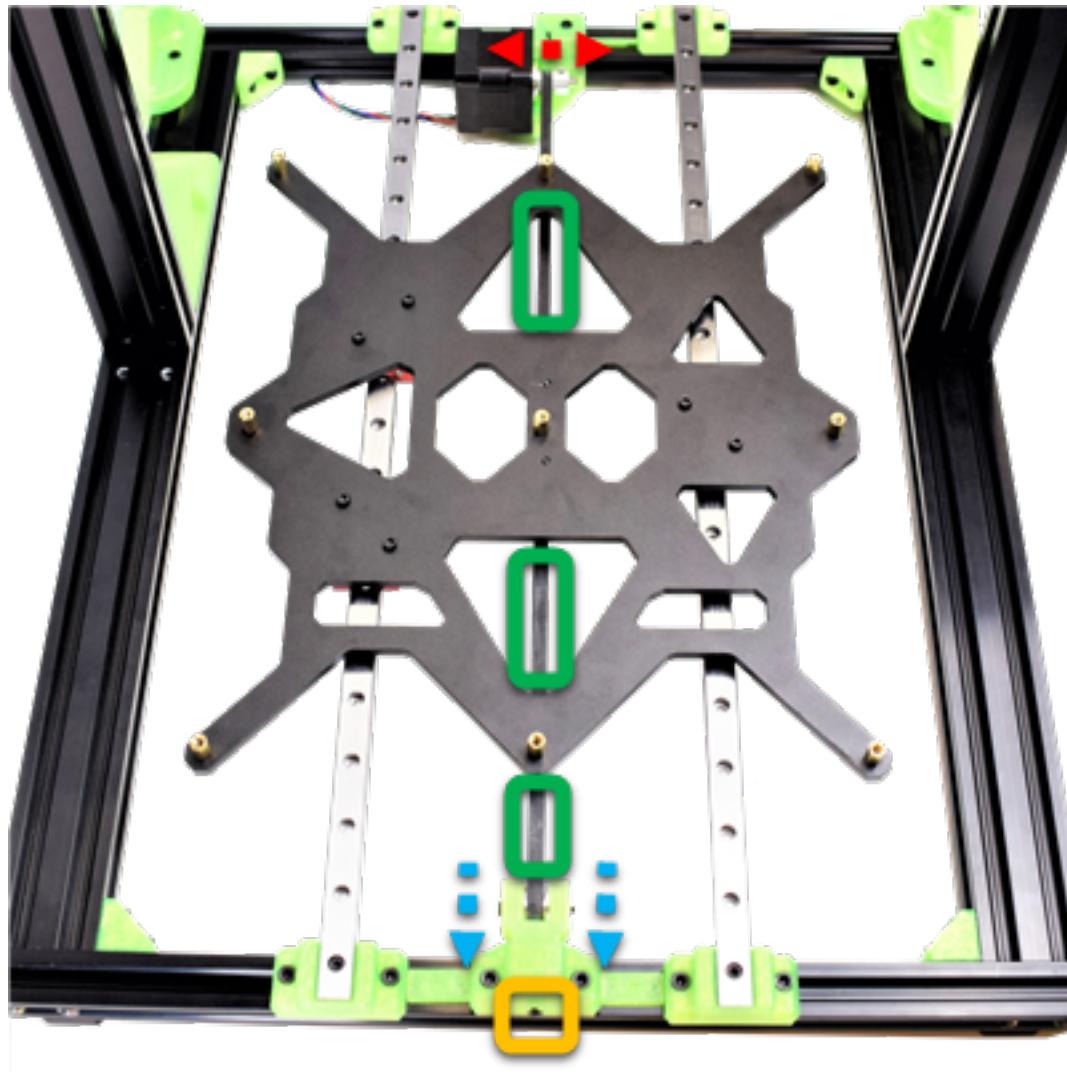
Insert the other Y belt end into the top toothed line in the printed part.

The **F** corresponds to the front of the printer, and the **B** corresponds to the back.

**i** Use the thinnest Allen key to push the belt in to prevent from coming off in the future.

**!** Before placing the printer in its natural position, make sure that both ends do not protrude from the printed part as shown in the image. They must be aligned.

## 2.15. Y belt adjustment I



Place the printer back on its feet.

You should be able to see the entire **Y belt** through the Y-carriage holes.

Now **lightly** tighten **x1 M3x20 screw** that goes through the tensioner body and the tensioner arm to give tension to the Y belt.

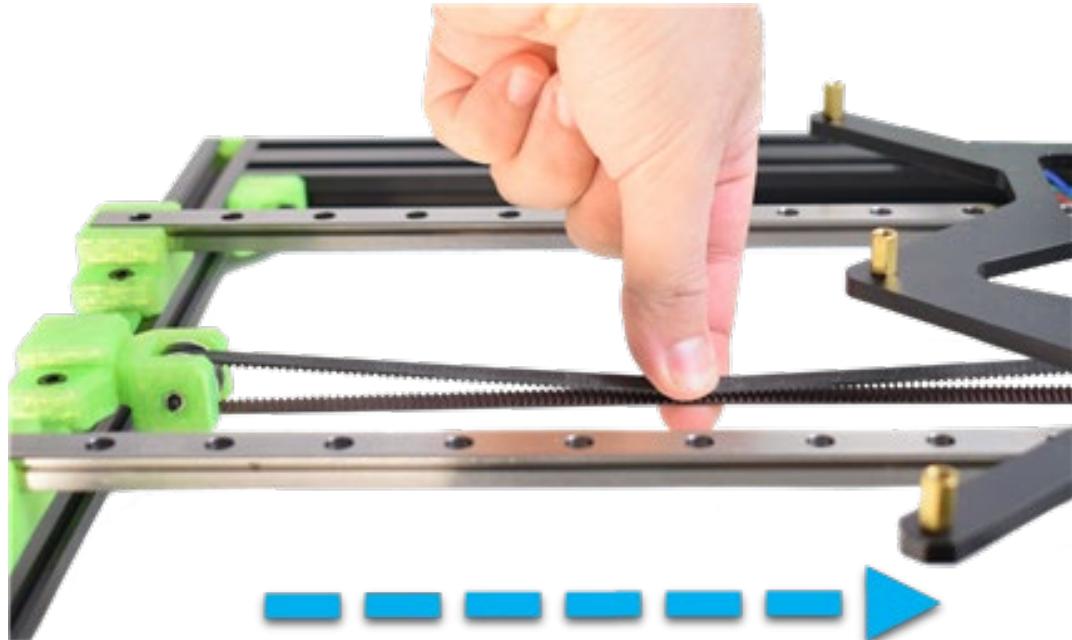
**⚠ DO NOT overtighten the M3x20 screw, you will adjust the tension in the next step.**

The belt must be straight and parallel to the linear rails. To adjust it, you can loosen up the grub screws on the Y-motor Gt2-16 toothed pulley, **and move it to the left or right** to achieve straightness. Once you are satisfied, tighten the toothed pulley.

The Y belt tension can be adjusted by loosening or tightening the **M3x20 screw** on the Y tensioner:

- By tightening the screw, the tensioner arm Y is **drawn towards** you, and therefore the belt will become tighter.
- Loosening up the screw produces the opposite effect.

## 2.16. Y belt adjustment II



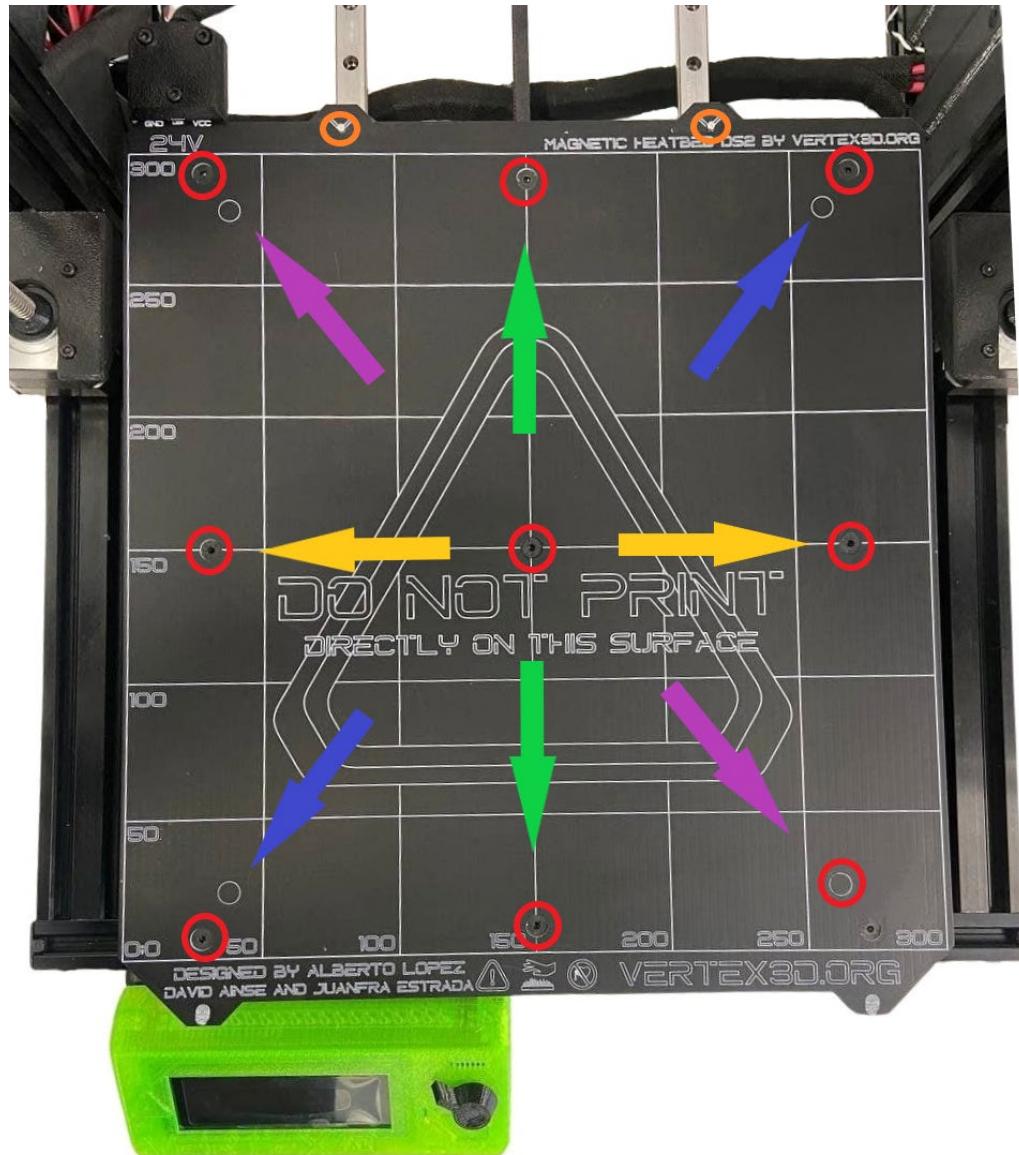
**Push** the Y carriage all the way back with your hand. Using your fingers, press the belt. You should be able to join the top with the bottom but feel some resistance.

**i** It is better for the Y-belt to be tighter than loose.

**!** If the belt tension is too low, by moving the Y-carriage with your hand, you will notice that the belt miss steps (hops). On the other hand, if the belt tension is very high, you will notice a high resistance to movement which is bad as well.

**i** When starting the printer for the first time, it will make an automatic selftest to check all the components and common assembly problems. This means it will tell you if the belt is too tight or not.

## 2.17. Heatbed assembly



Take the heatbed and remove the smooth sheet.

Align the **x9 holes** on the heatbed with the **x9 gold spacers** on the Y Carriage.

Insert and tighten **x9 M4x8c screws** starting from the middle.

**⚠️ For a correct surface leveling, screw them diagonally.**

Remove the protection plastics from the smooth sheet as shown in the augmented image.

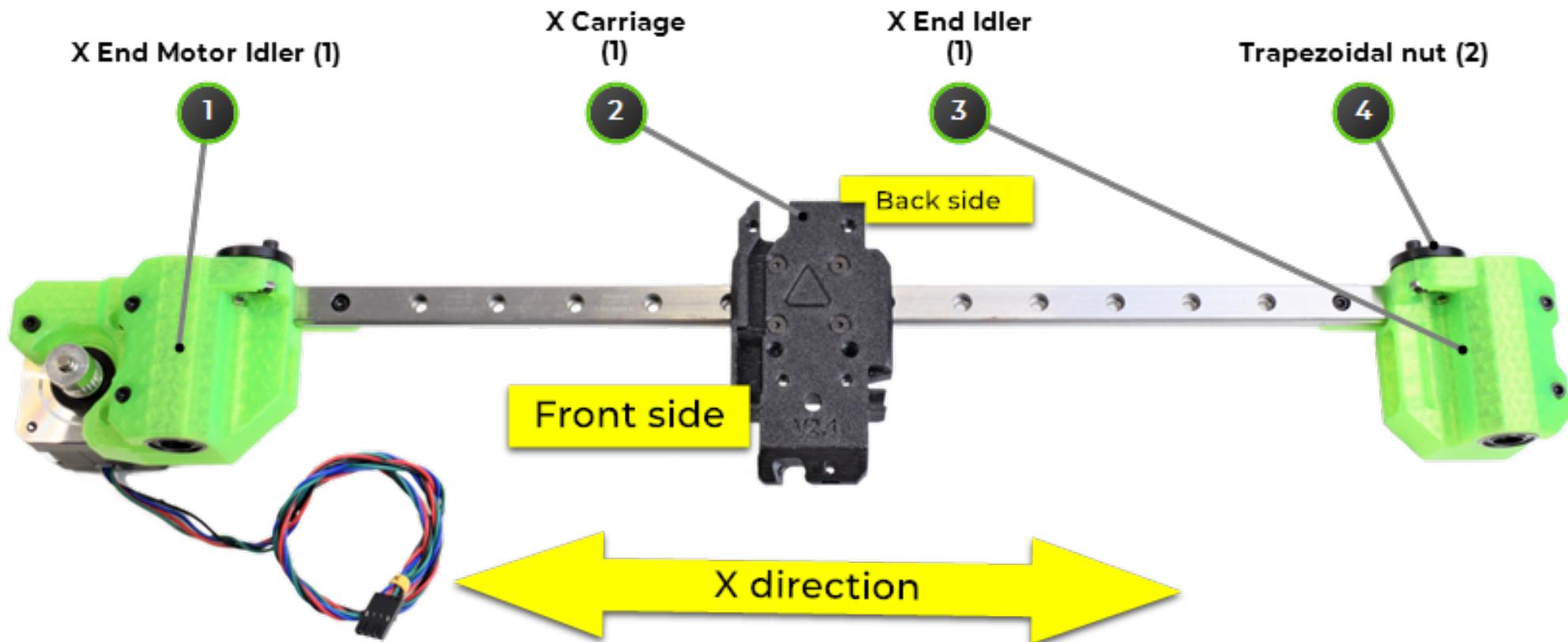
**⚠️ The protection plastics are a transparent foil that is removed effortlessly on each side. Do not attempt to remove the yellow PEI sticker as this is the surface you will be printing on.**

Place the smooth sheet on the heatbed using the **rear screws** of the heatbed to align it.

**i** If you damage one side of the smooth sheet, you can use the other to continue printing.

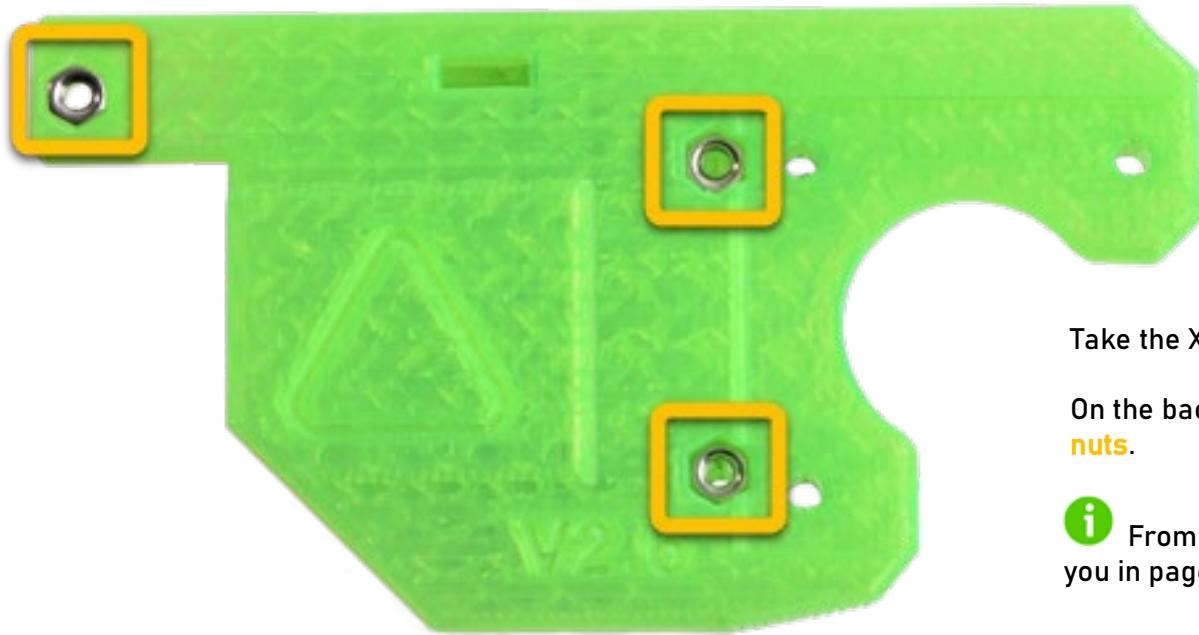


### 3. X Axis map



### 3.1. X End Motor Idler preparation I

---



Take the X End Motor Idler (printed part).

On the back (the part with the Vertex logo), embed **x3 M3n hex nuts**.

**i** From now on, you will be using the technique we showed you in page 11 very often. Remember the steps.

### 3.2. X End Motor Idler preparation II



**⚠️** Before inserting the bearings, make sure to insert them so that the **balls lines** of both are offset from each other.

Take x2 LM10UU bearings included in the KIT and insert them through the printed part into their housings. They must be perfectly aligned both at the top and at the bottom as shown in the second picture.



Secure the bearings in place using **x2 M3x30 screws** that you will tighten directly into the nuts installed in the previous step.

**⚠️** Do not over-tighten these screws, the printed part could break. It is enough that the printed part exerts a little pressure on the bearings.

### 3.3. X End Motor Idler preparation III



Take the printed part as it's comfortable for you and insert **x2 M3n hexagonal nuts**.

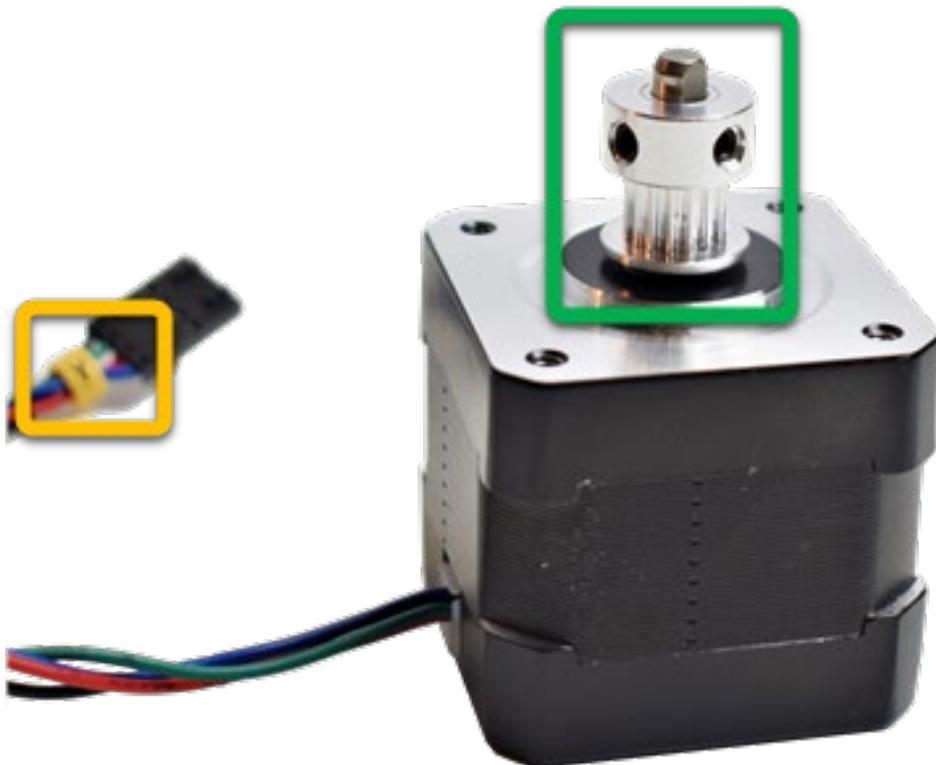
On the other side, insert **x1 trapezoidal nut** included in the KIT and secure it with **x2 M3x14 screws**.

**⚠** The protruding part of the **trapezoidal nut** must be inserted inside the printed part.

**i** **Trapezoidal nuts** are rounded pieces of black plastic with a threaded hole.

**i** 2 of the 4 **trapezoidal nut** holes remains without screws, this is normal.

## 3.4. X motor preparation



From the box with the motors, take the motor with the **yellow label** at the end of the X cable. If the cable does not have a yellow label, the X and Y motors are exactly the same so it does not matter if you install it on the X or Y axis.

**⚠️ Each motor has a different cable length except the X and Y motors, make sure you use the correct motor at all times.**

Insert **x1 toothed pulley Gt2-16** on the motor shaft and leave a small gap of about 1mm (you can put a zip tie between the pulley and the motor).

**⚠️ Notice the orientation of the pulley as shown in the picture.**

**⚠️ The motor shaft is not completely rounded, one of the grub screws must to be secured on the flat side.**

Tighten the two grub screws to secure the pulley to the motor.

### 3.5. X motor assembly



Take the X End Motor Idler (printed part) that you have prepared in previous steps.

Place the X motor as you see in the picture.

**⚠️** The **motor cable** must face down.

Secure the motor using **x3 M3x14 screws**.

### 3.6. X End Idler preparation I



Take the X End Idler (printed piece).

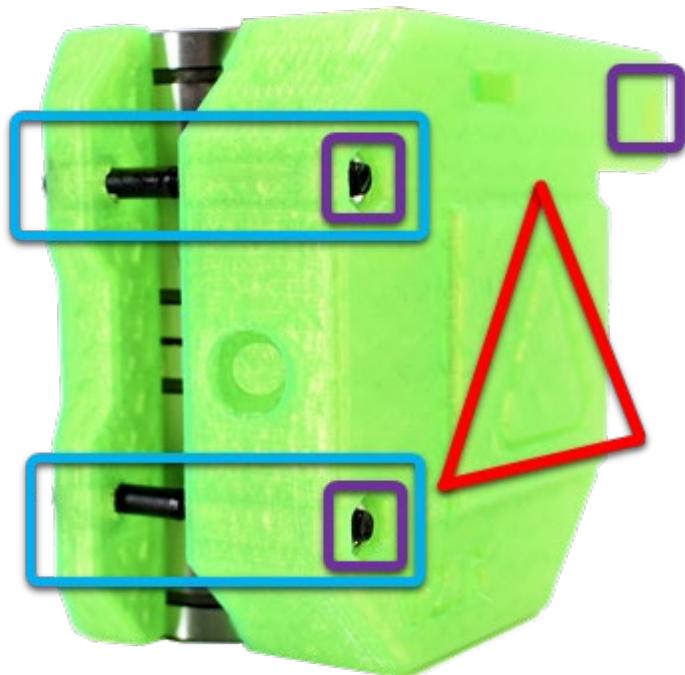
On the back part with the **Vertex logo**, mount **x3 M3n hex nuts**.

**⚠** Before inserting the bearings, make sure to insert them so that the **balls lines** of both are offset from each other.

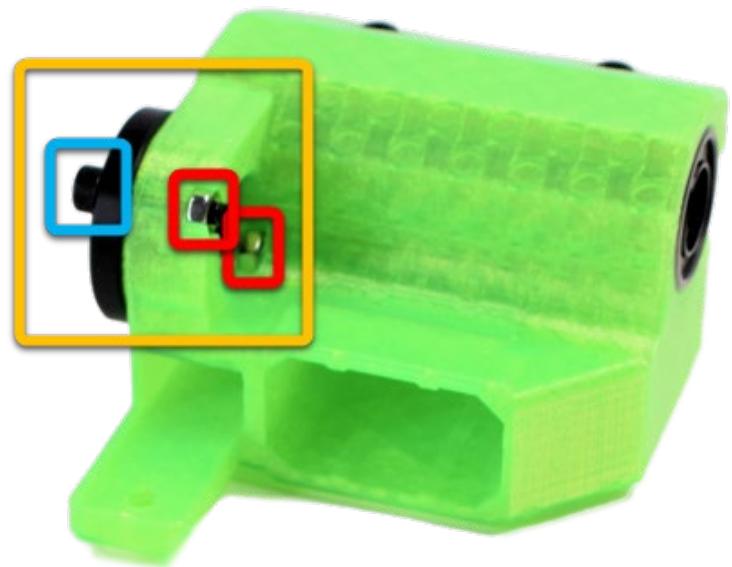
Take **x2 LM10UU** bearings included in the KIT and insert them through the printed part into their housings. They must be perfectly aligned both at the top and at the bottom as shown in the second picture.

Secure the bearings in place using **x2 M3x30 screws** that you will tighten directly into the nuts installed in the previous step.

**⚠** Do not over-tighten these screws, the printed part could break. It is enough that the printed part exerts a little pressure on the bearings.



### 3.7. X End Idler preparation II



Take the printed part as it's comfortable for you and insert **x2 M3n hexagonal nuts**.

On the other side, insert **x1 trapezoidal nut** included in the KIT and secure it with **x2 M3x14 screws**.



**⚠** The protruding part of the **trapezoidal nut** must be inserted inside the printed part.

**i** **Trapezoidal nuts** are rounded pieces of black plastic with a threaded hole.

**i** 2 of the 4 **trapezoidal nut** holes remains without screws, this is normal.

## 3.8. X tensioner preparation I



Take X tensioner (printed part).

On the inside, there is a hole for a Nyloc hex nut.

Embed x1 M3nN hex nut(Nylock) into the printed part.

Insert **x1 623h smooth pulley** into the printed part.

Align the hole in the X tensioner with the hole in the smooth pulley and insert **x1 M3x14 pin** through from side to side.

**⚠ Insert the pin fully, it should not stick out at either end.**

### 3.9. X tensioner preparation II



Take the X End Idler and X tensioner (printed parts)

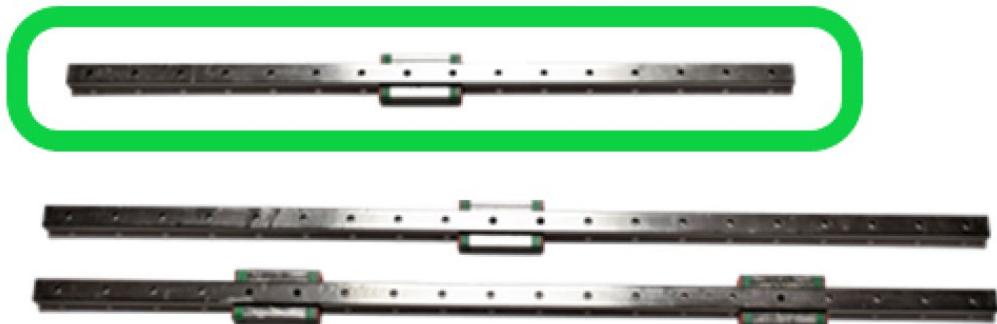
**Insert** the X tensioner into the X End Idler you prepared in the previous steps.



Tighten **x1 M3x25 screw**.

**⚠ DO NOT fully tighten yet, only the tip.**

## 3.10. X Axis assembly



**!** Use the gloves included in the KIT to manipulate the linear rails and keep them greased at all times.

**i** If any block has come off the linear rail, insert it as straight and slowly as you can, the small balls from the block could come out.

Take the remaining linear rail **x1 short 40cm**.

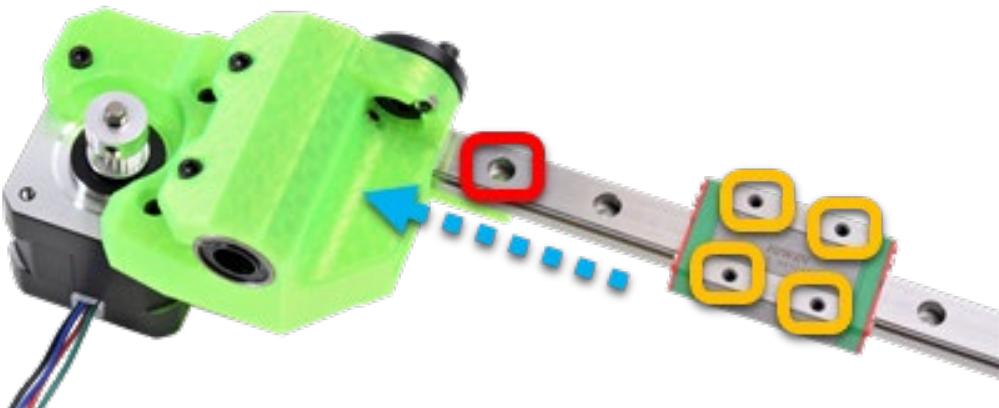
**!** Make sure the block **4 holes** are facing the front as shown in the picture.

**Insert** the linear rail left end into the X End Motor Idler and the right end into the X End Idler fully.

**i** If you have any doubt visit step 4.

On both sides, align the **second hole** in the linear rail with the hole in the printed parts.

Insert **x1 M3x8 screw** into each hole which will be tightened to the M3n hex nut on the other side.



**!** DO NOT tighten the **x2 M3x8 screws** yet. When you finish the assembly and pass all the tests (Selftest) you can tighten them.

## 3.11. X Carriage preparation

---



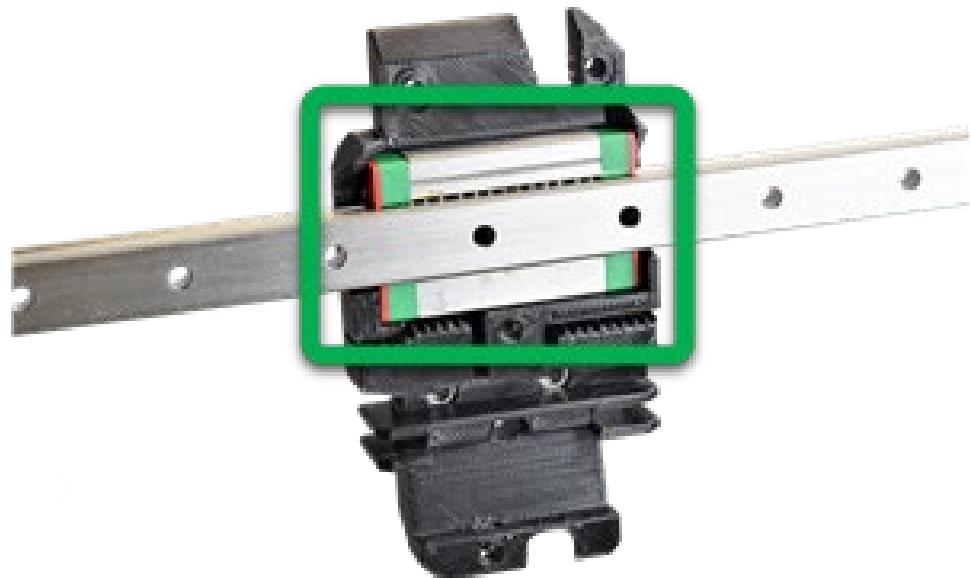
Take the X carriage (printed part).

Embed **x2 M3n hex nuts**.

Insert **x2 M3nS square nuts** into their housings.

**i** M3nS square nuts could come off while handling the printed parts. Do not use glue to fix them as it could affect the thread

## 3.12. X Carriage assembly



Take the X carriage and press it against the **X axis block**, it should fit perfectly. The X carriage holes should line up with the block.

Secure the X carriage with **x4 M3x6c screws**.



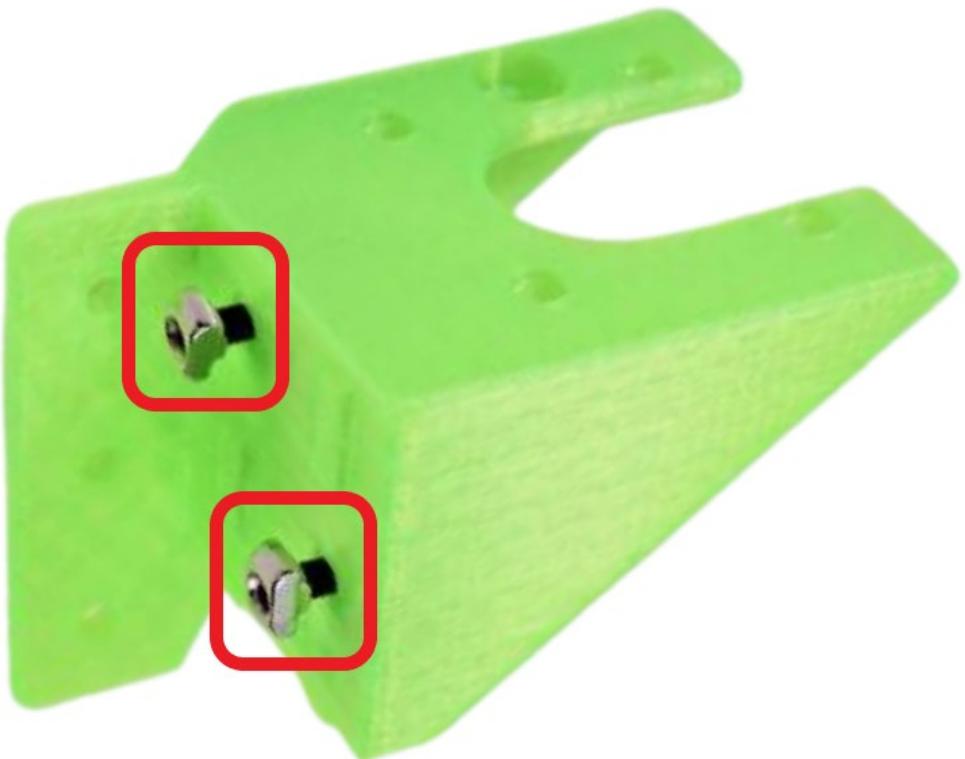
## 4. Z axis map

---



## 4.1. Z motor holders preparation

---



Take the left and right Z motor holders (printed parts).

Insert **x2 M4x12 screws**.

Screw on **x2 T-M4 nuts**.

## 4.2. Z motor holders assembly



Place the Z motor holders in the frame as shown in the picture.

Push the printed part down against the XY frame while tightening the x2 M4x12 screws prepared in the previous step.

**i** Lay the construction on the side you are going to work on as shown in the picture.

Take **x3 T-M4 nuts** and **slide** them inside 2040 aluminium extrusions grooves.

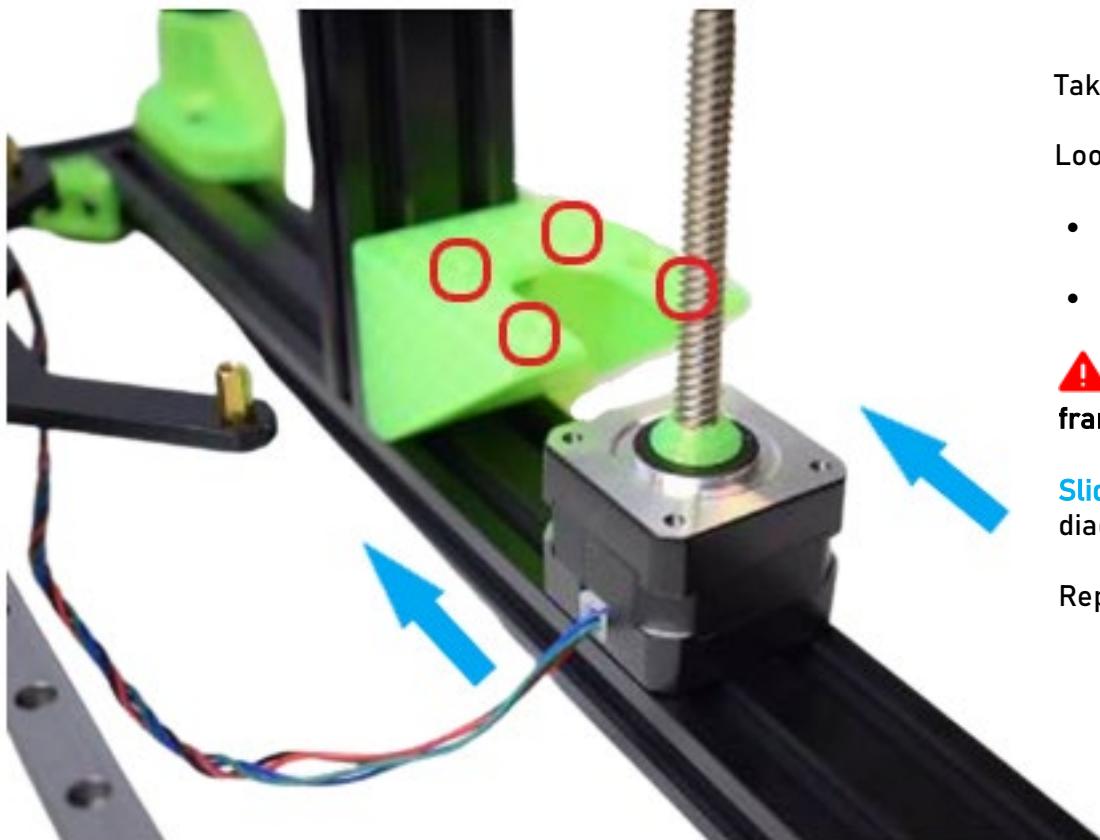
Align them with their respective holes in the printed part.

**i** You can use the small allen key to push the T-M4 nuts.

Insert and tighten **x3 M4x10 screws** to secure the printed part completely to the frame.

Repeat this step in the opposite side.

## 4.3. Z motors assembly



Take the Z-axis motors from the motor box.

Looking at the frame from the front:

- The motor with the **shortest** cable is the one on the left.
- The motor with the **longest** cable is the one on the right.

**⚠ Both cables must be oriented towards the inside of the frame as shown in the picture.**

**Slide** and secure the motors with **x4 M3x8 screws** per motor diagonally.

Repeat this step in the opposite side.

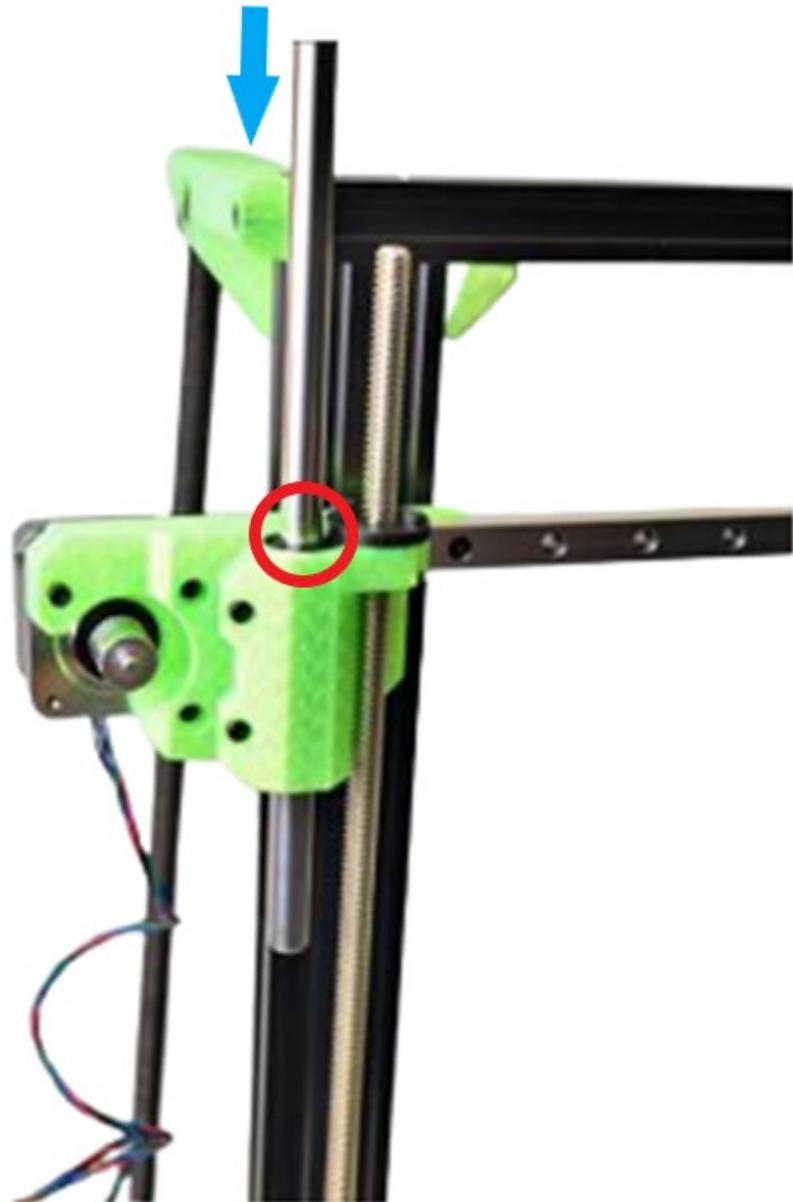
## 4.4 X axis on structure assembly



Take the X axis assembly that you have assembled in previous steps and carefully place it on the Z motors threaded rods.

**⚠** Do not thread the X axis in yet as this could damage the trapezoidal nuts.

## 4.5. Z Smooth rods assembly



From above, **slide** the smooth rods **down through the linear bearings**.

**i** Proceed with caution, it will be easier if you rotate the rod while sliding it down.

**⚠ DO NOT insert the smooth rods into the bearing at an angle.**

**⚠ DO NOT push, or force. Accompany the rod as it slides down.**

**⚠ Make sure the Z motor threaded rods not bends.**

Once the rod is fully inserted, push it into the Z motor holder rounded housing at the bottom.

When you have the two smooth rods assembled, proceed with your fingers to turn Z motor threaded rods at the same time in an anti-clockwise direction.

**⚠ When turning the threaded rods, if you feel a lot of resistance you may not be going in straight. Do not force the trapezoidal nuts as they could be damaged.**

## 4.6. Z top preparation



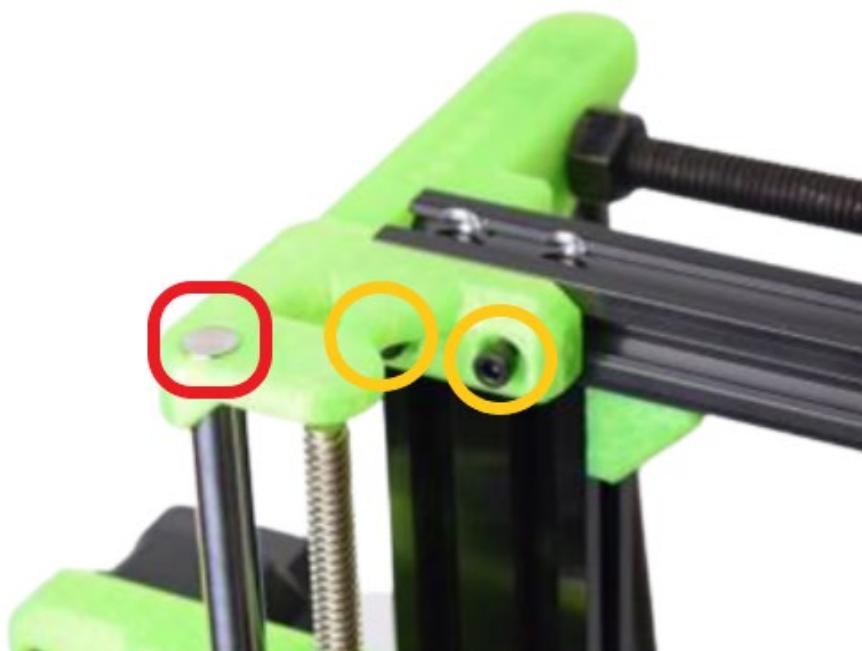
Take the Z top parts (printed parts).

Insert **x2 M3x12 screws**.

Screw **x2 T-M4 nuts**.

Repeat this step in the opposite side.

## 4.7. Z top assembly



Embed the Z top in the **smooth rod** and place the **T-M4 nuts** in upper 2020 aluminium extrusion groove as shown in the picture.

**i** The Z motors threaded rods never reaches the Z top printed part. Must be like that.

**⚠** It's very important! Double check that the Z Top printed part is completely aligned with the upper 2020 aluminum profile, when passing a finger over it should be flush.

Once aligned, secure the Z top printed part with **x2 M4x12 screws**.

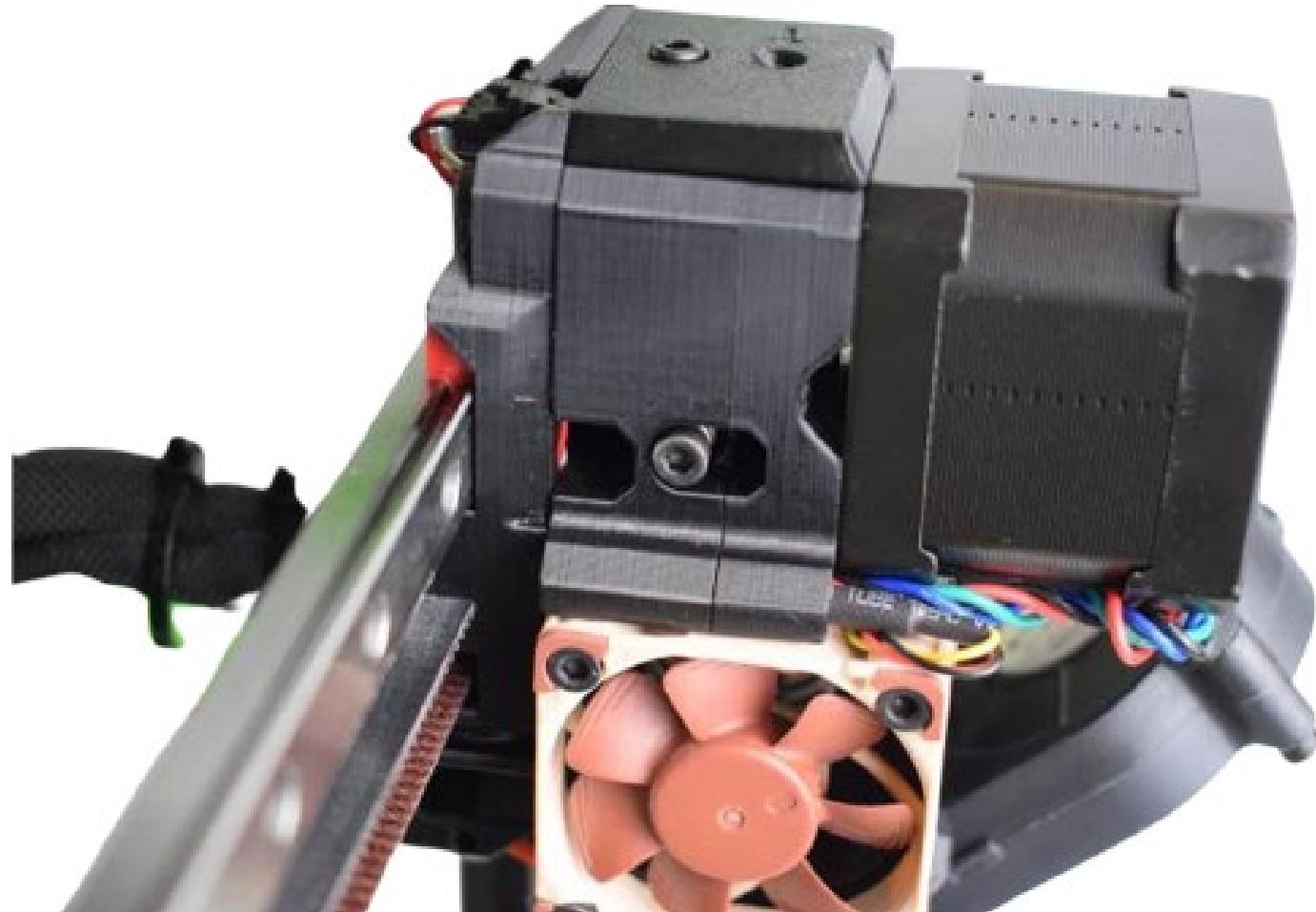
Make sure that before tightening it is perfectly aligned with the upper profile 2020. Then proceed to fix the piece by tightening the **x2 M4x12 screws**.

Check that the Z Top part is properly aligned with the 2020 pro top profile rod by running your finger, it should be aligned.

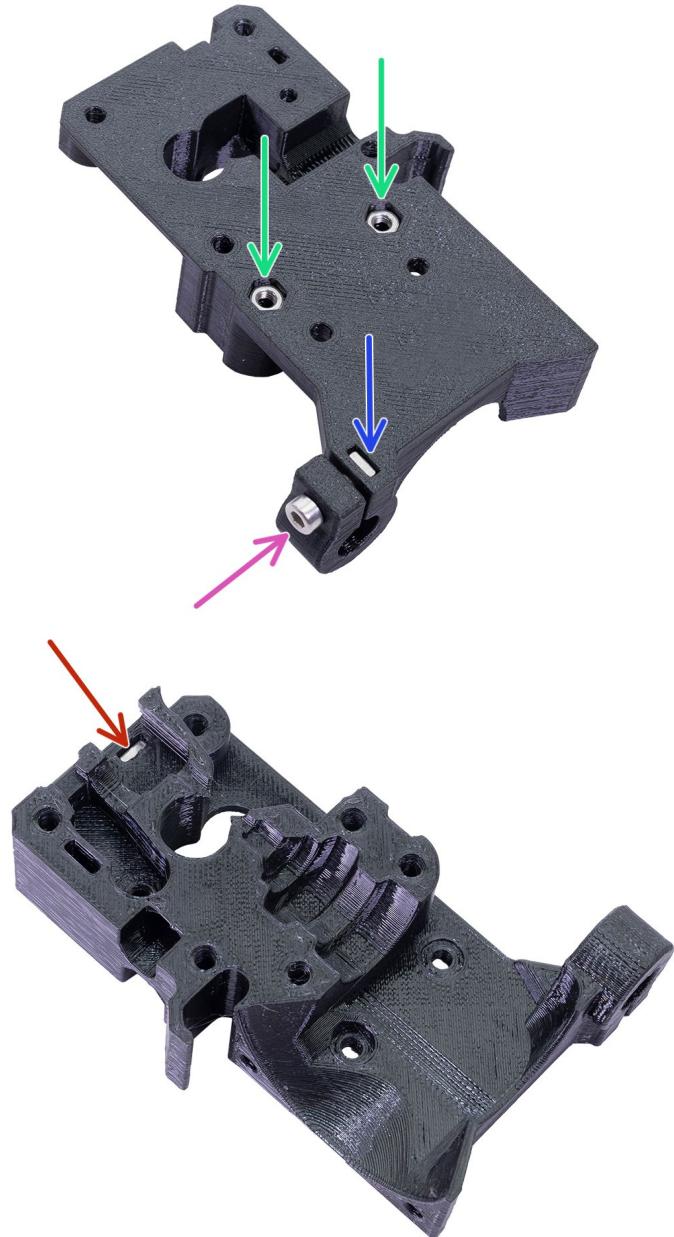
Repeat this step in the opposite side.

## 5. Extruder map

---



## 5.1. Extruder body preparation I



Take the Extruder Body (printed part).

Embed **x2 M3n hex nuts**.

Insert **x1 M3nS squarenut** into its housing.

Insert **x1 M3x10 screw**.

Flip the part over and insert **x1 M3nS square nut** into its socket.

## 5.2. Extruder Body preparation II



Prepare the following printed parts:

- Extruder Body
- Adapter printer
- FS lever

Insert the **small magnet (10x6x2)** into the FS lever piece.

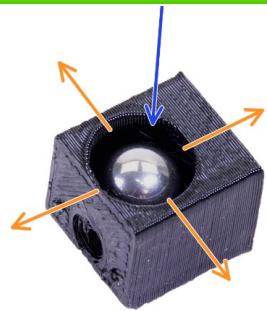
Insert the FS lever part on the Extruder Body part and secure it with **x1 M3x18 screw**.

**⚠ Do not fully tighten. The FS lever should move freely.**

Insert the **large magnet (20x6x2)** into the Extruder Body.

**⚠ The two magnets must repel each other!**

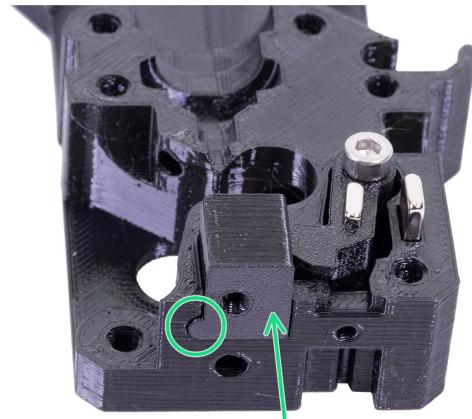
## 5.3. Extruder Body preparation III



Take the part Adapter printer (printed part)

Take the metal ball

**Insert** metal ball into the Adapter Printer part.



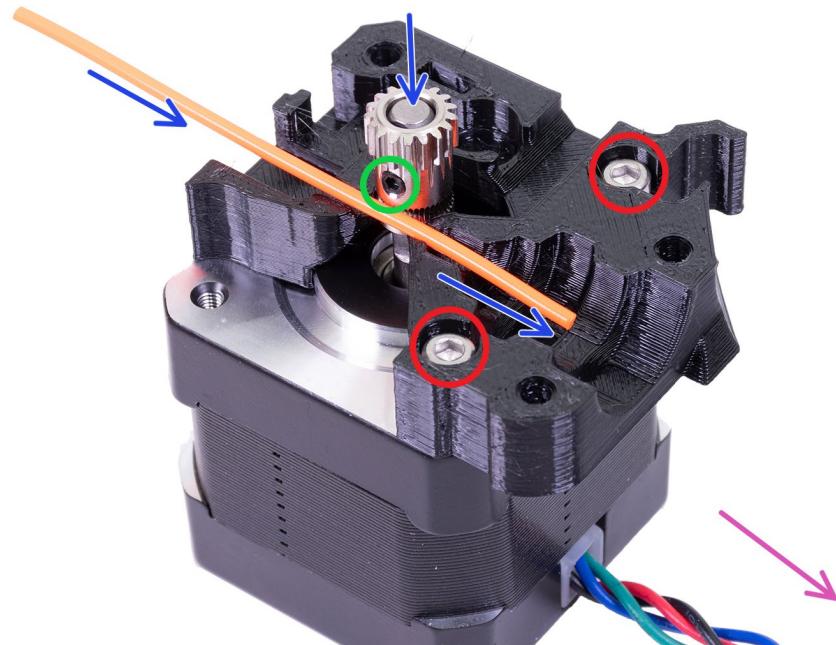
Take the Extruder Body part (printed part).

**Insert** the Adapter Printer part into its housing.



**Insert x2 M3x10 screws.**

## 5.4. Extruder motor preparation



From the motors box, take the remaining motor with the Vertex logo engraved, it has EXTRUDER inscribed on it.

Take the Motor Cover part (printed part) and place it on top of the motor, orienting it as shown in the picture.

**i** Look the **motor cable** as a reference.

Secure the printed part to the motor with **x2 M3x10 screws**.

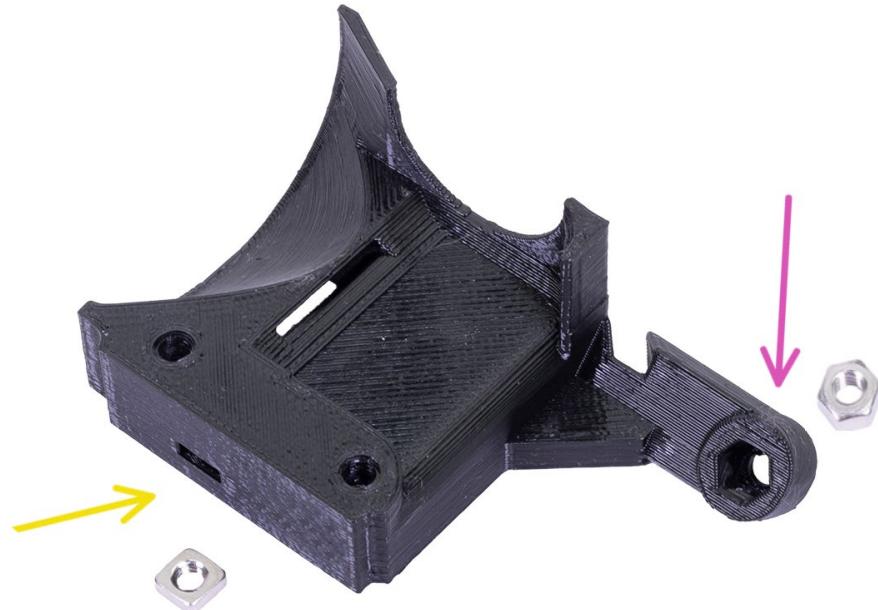
**Insert** the gear with the **grub screw** into the motor shaft so that the toothed part faces up as shown in the picture.

Place a **piece of filament** or the smallest Allen key over the printed part grooves and align it with the gear groove.

Once aligned, tighten the **grub screw** on the motor shaft at its flat side.

**⚠ Check again if the gear groove is aligned with the printed part grooves.**

## 5.5. Extruder cover preparation



Take the part Extruder Cover (printed part).

Insert **x1 M3nS square nut** into the printed part.

Insert **x1 M3n hex nut** into its slot on the "arm" of the Extruder Cover.

## 5.6. Hotend assembly



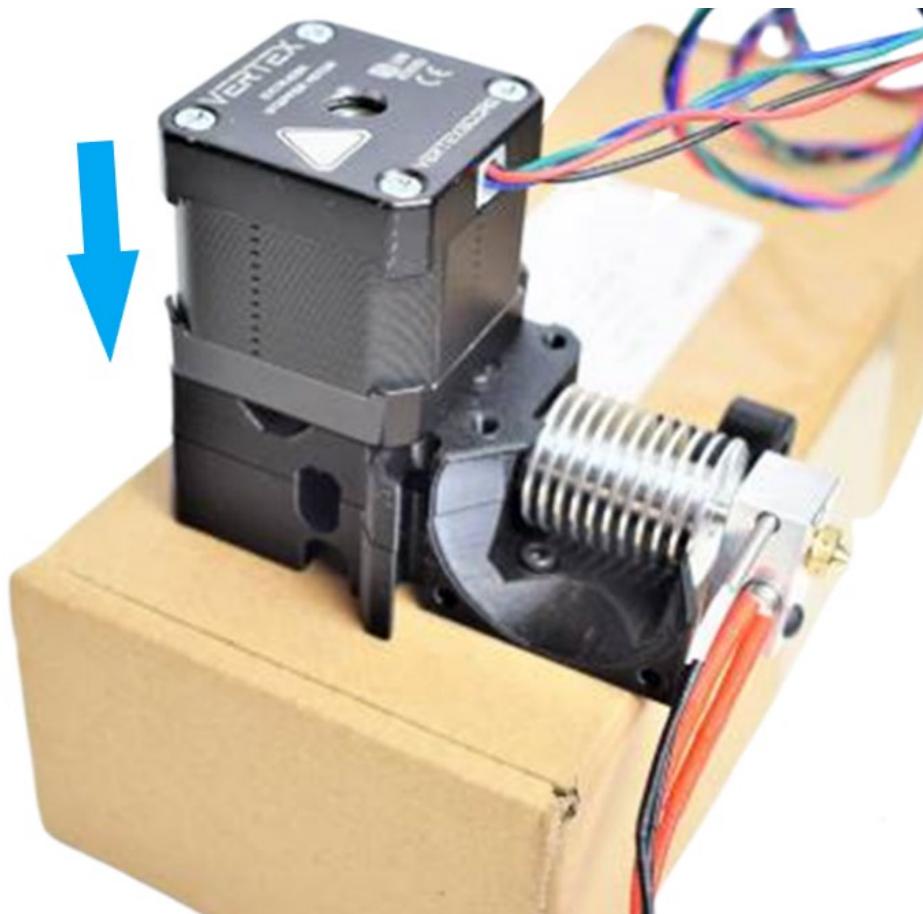
To make the assembly easier, place the prepared Extruder Body on a cardboard box, as shown in the picture.

**Insert** the pre-assembled hotend into the Extruder Body printed part.



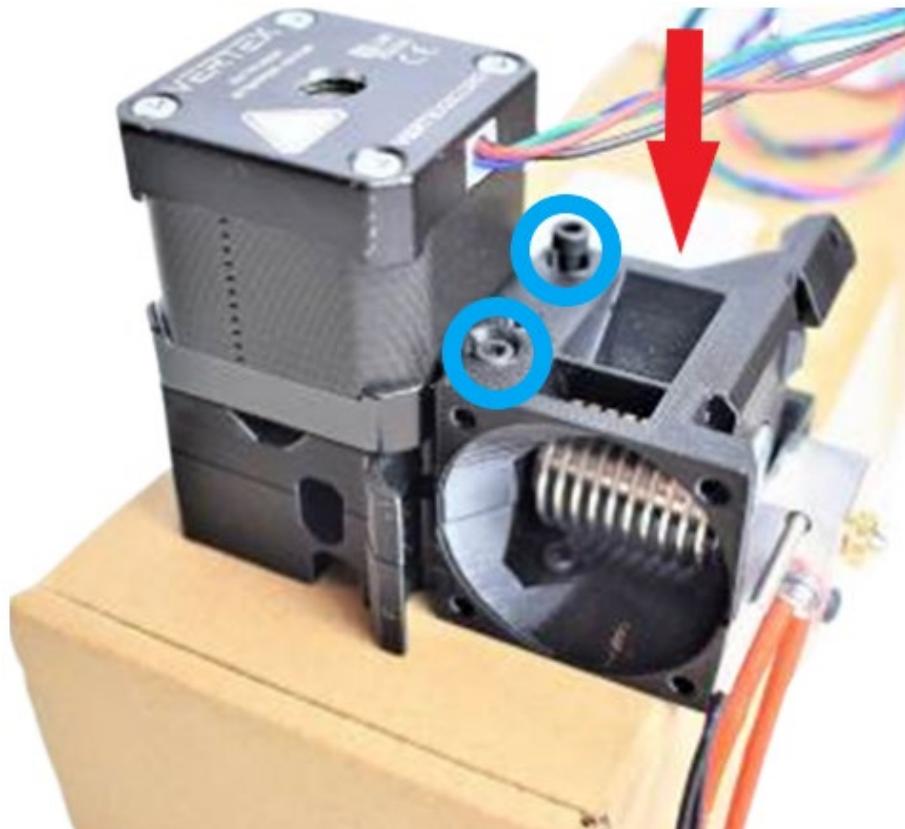
**The cables must be on the LEFT side.**

## 5.7. Extruder motor assembly



- i If any of the magnets come off you can use glue.
- ! Make sure they repel each other.
- ! Insert the extruder motor sub-assembly prepared in step 5.4 over the Extruder Body printout and Hotend.
- ! Make sure both parts are aligned as shown in the image.

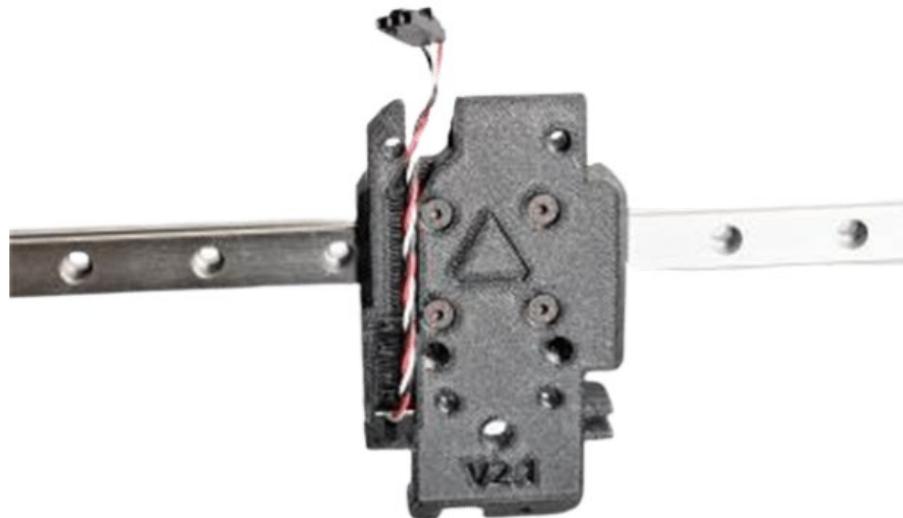
## 5.8. Extruder cover assembly



**Insert** the Extruder Cover that you prepared in step 5.5. on the hotend.

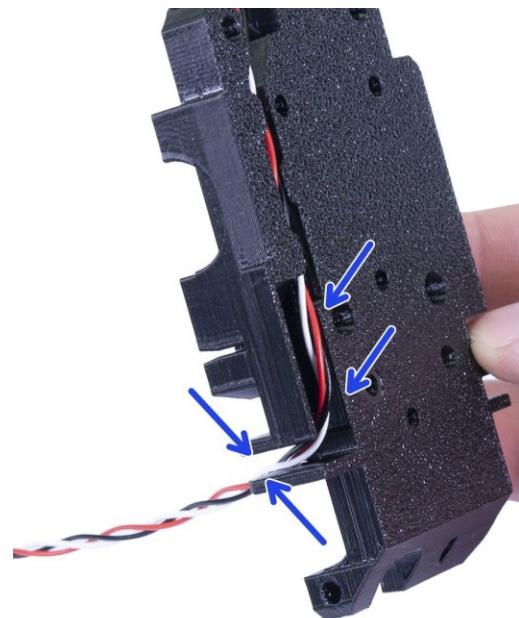
Insert and tighten the **x2 M3x40 screws**. These screws stick out a couple of millimeters on the other side, this is intentional. Let them sink into the cardboard.

## 5.9. X Carriage filament sensor cable preparation



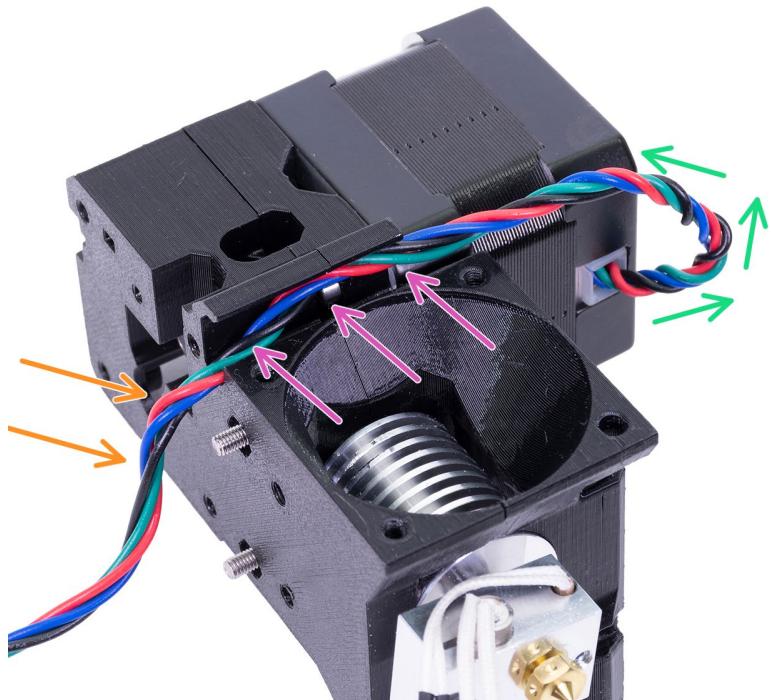
Take the **Red - White - Black** braided cable that corresponds to the filament sensor

Place it as shown in the image, trying to leave approximately the same length at the top.



Guide the filament sensor cable through X carriage **left groove**.

## 5.10. X motor cable preparation

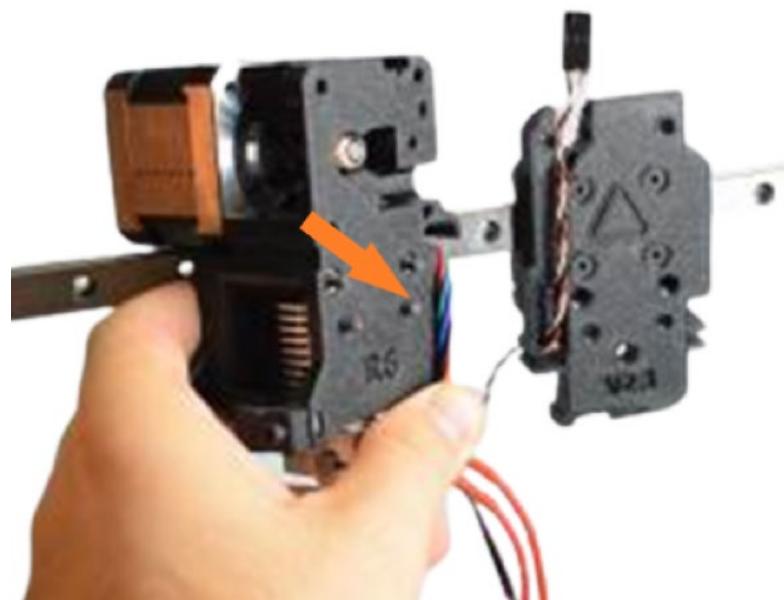


Make a small loop under the extruder motor leaving about 3cm of cable to facilitate future maintenance.

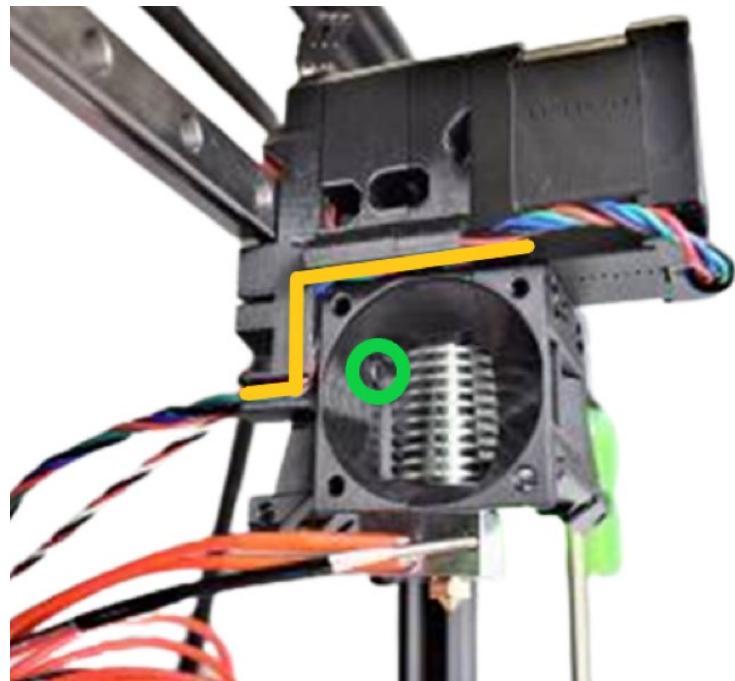
Guide the cable through the printed parts grooves to the back.

Bend the cable down to prepare it for securing to the X carriage.

**⚠ Proper installation is important for final assembly**



## 5.11. Extruder assembly on X carriage



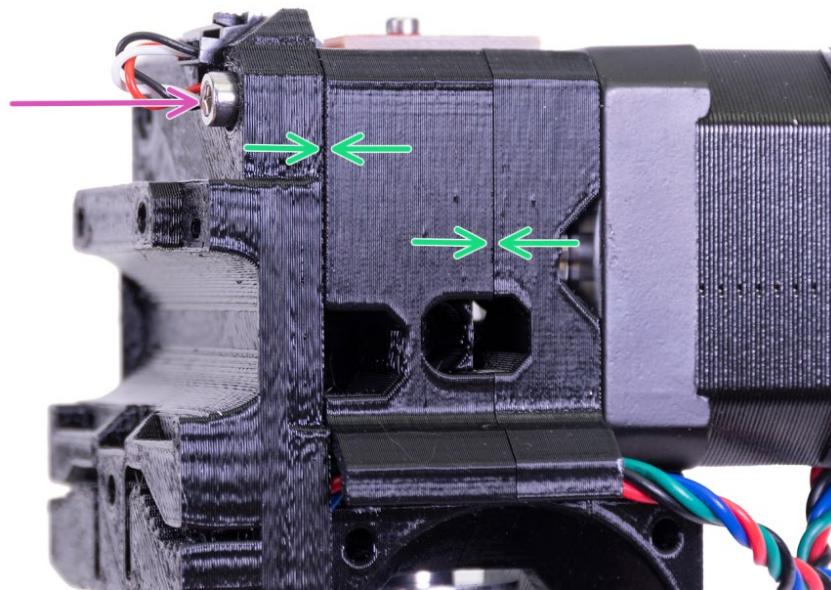
**Guide** the Extruder motor cable through the plastic parts groove.

**i** Remember to leave some slack so that the cable is not too tight.

Place the Extruder assembly over the X Carriage.

**⚠** Check, that the cable is not pinched by the printed parts.

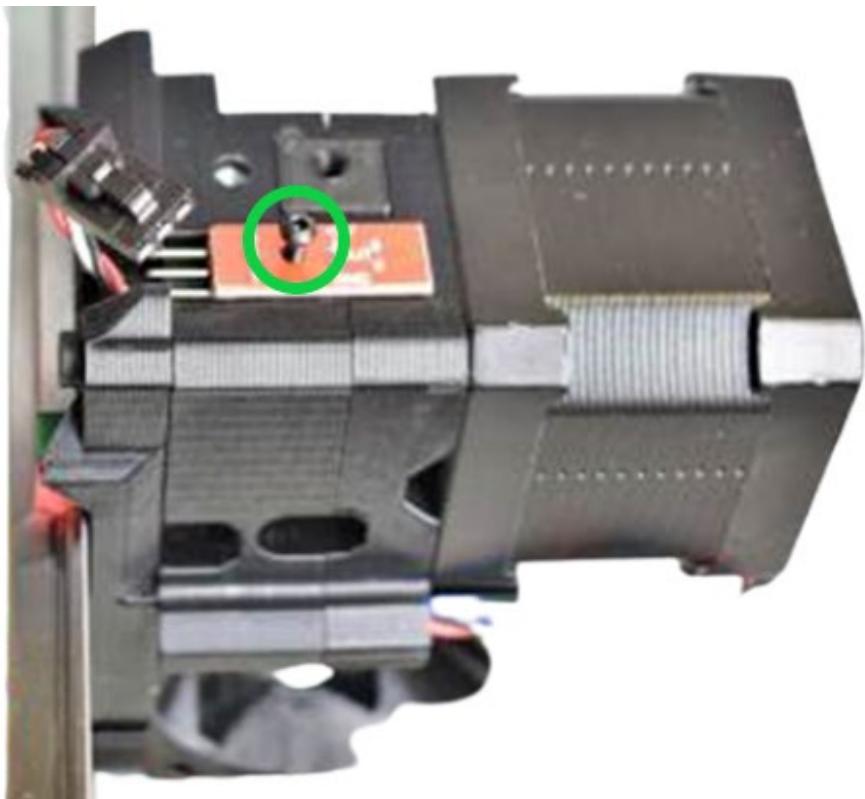
Insert and tighten **x2 M3x10 screws** one on each side near the hotend heatsink to secure the extruder to the X carriage.



Insert and tighten **x1 M3x40 screw** through the X carriage all the way through the extruder to secure into the Extruder motor.

**⚠** Check that the **gaps** between the pieces close well.

## 5.12. Filament sensor assembly



Place the filament sensor on top of the Extruder Body, the U-shape part of the sensor must be facing down.

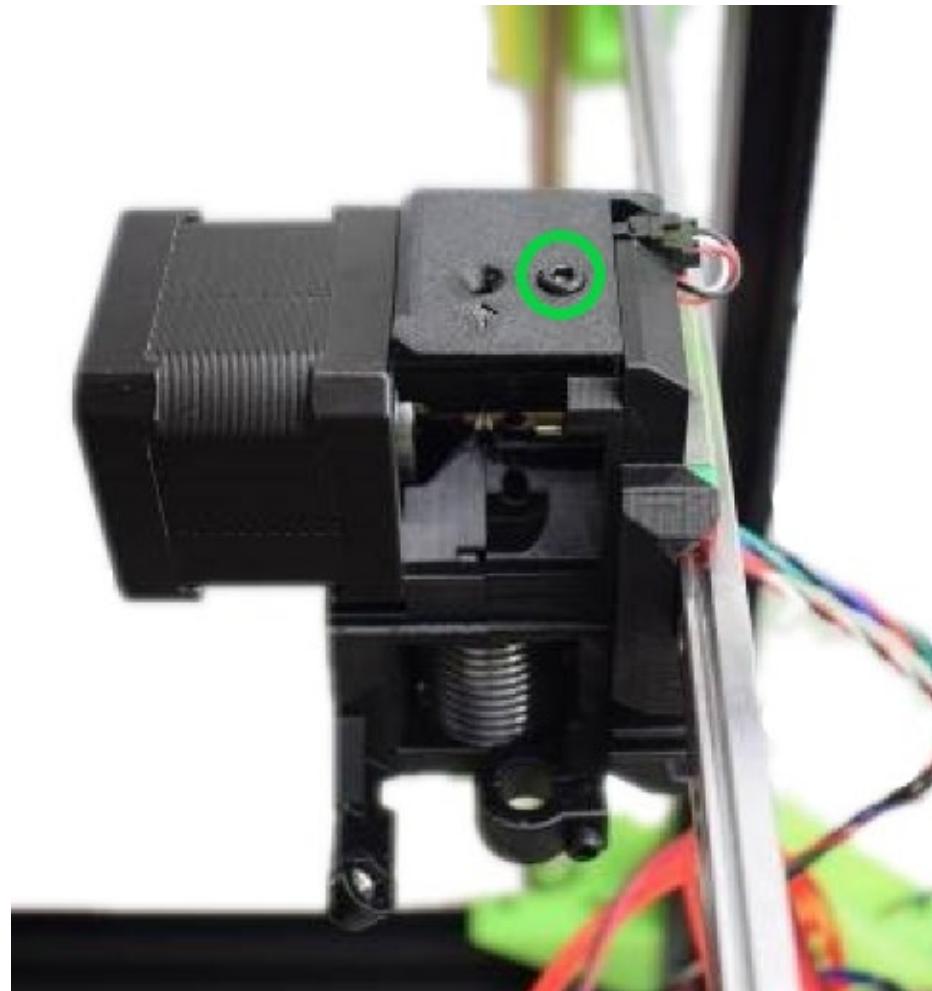
Secure the filament sensor in place with **x1 M2x8 screw**.

**!** Screws on directly into the printed part, don't use too much force. Do not over-tighten the **M2x8** screw.

Connect the filament sensor cable to the filament sensor pins. Looking at the extruder from the front, the cables from left to right are:

**BLACK GND-WHITE -RED 5V**

## 5.13. FS Cover assembly



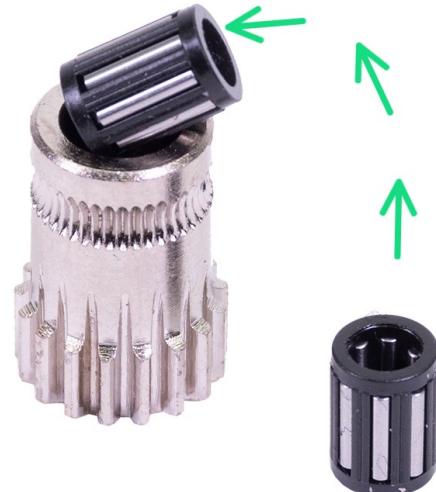
Take the part FS Cover (printed part).

Place the FS cover on the Extruder, over the filament sensor.

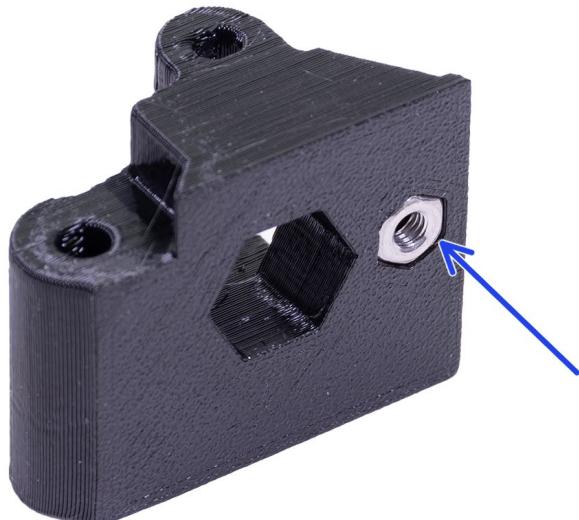
**i** The small arrow indicates the hole through which you will use to load and unload the filament.

Secure the FS cover to the extruder with **x1 M3x10 screw**.

## 5.14. Extruder Idler preparation I



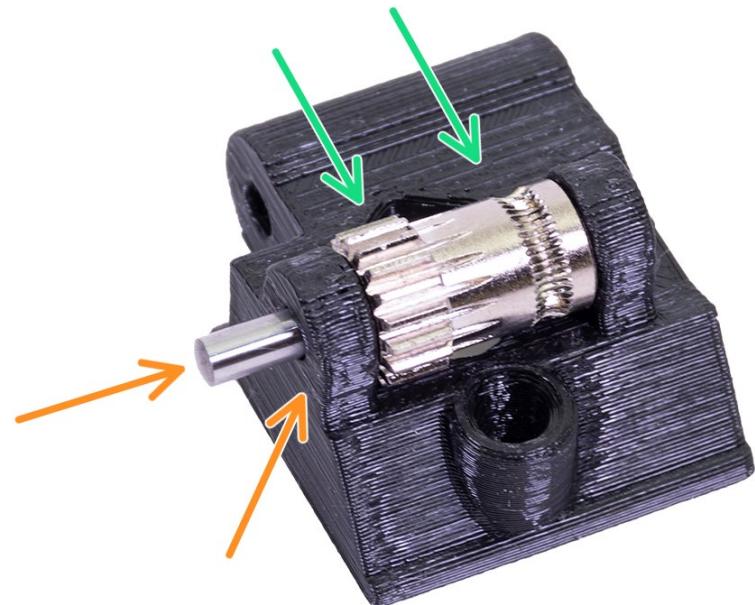
Insert the **x2 bearings** into the remaining gear.



Take the Extruder Idler (printed part).

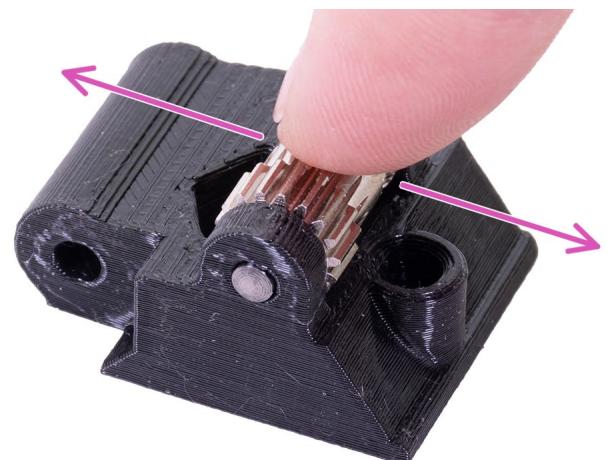
Embed **x1 M3n hex nut** on the Extruder Idler.

## 5.15. Extruder idler preparation II



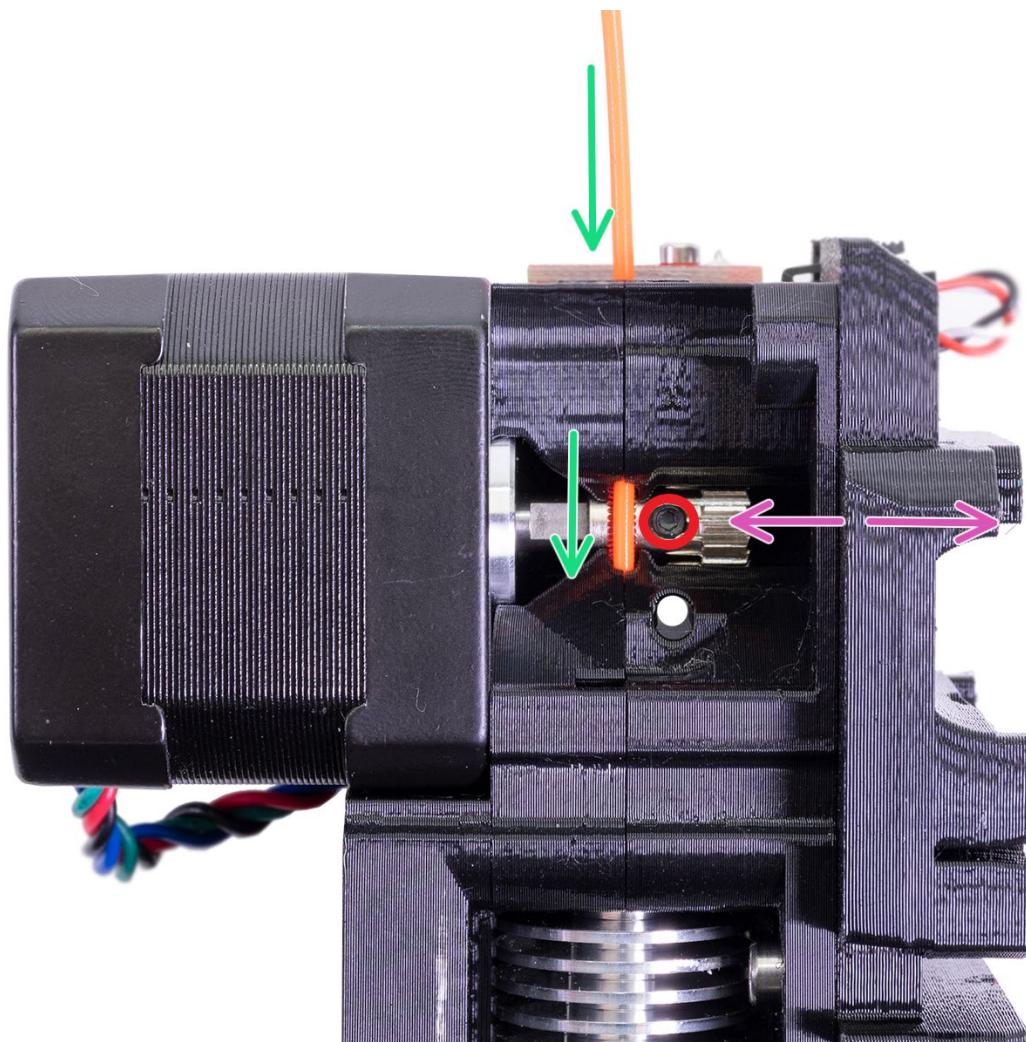
Insert the gear into the Extruder Idler as shown in the picture.

Insert the pin.



 Make sure the gear turns freely.

## 5.16. Check extruder motor gear alignment



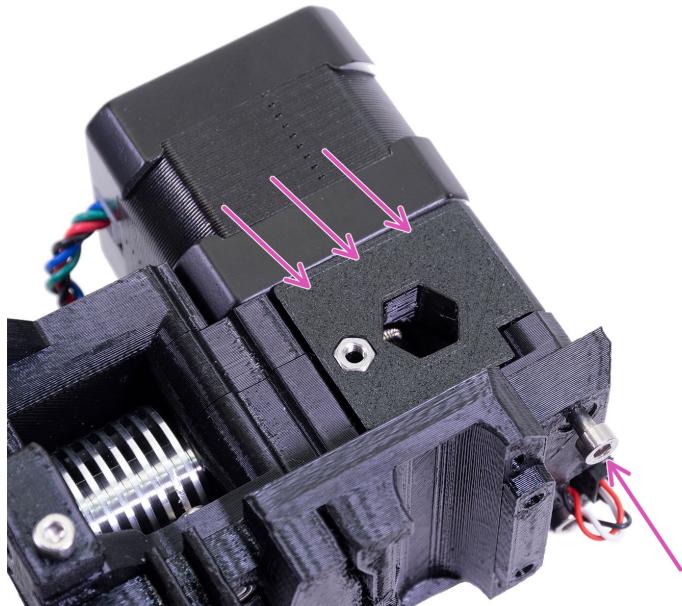
Before assembling the Extruder Idler, check that the Extruder motor gear groove is aligned.

Insert a piece of filament or the smallest Allen key through the hole as shown in the image. The gear groove should be perfectly aligned with the filament.

If not, you can loosen up the **grub screw** and move the gear **left or right**.

Retighten the **grub screw** once you are satisfied.

## 5.17. Extruder Idler assembly



Insert the Extruder Idler into the housing left in the extruder, so that the gear is inside the extruder.

Secure it with **x1 M3x40 screw**. This screw serves as the hinge pin for the Extruder Idler, so do not over-tighten it. The Extruder Idler must move freely.

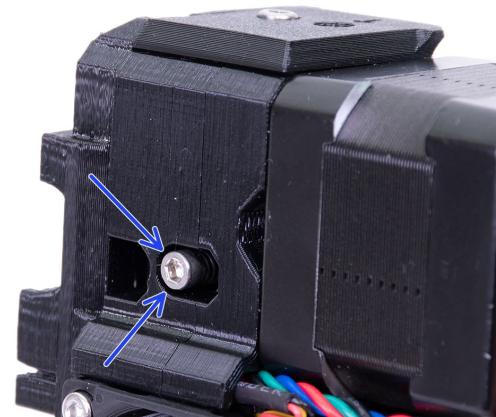
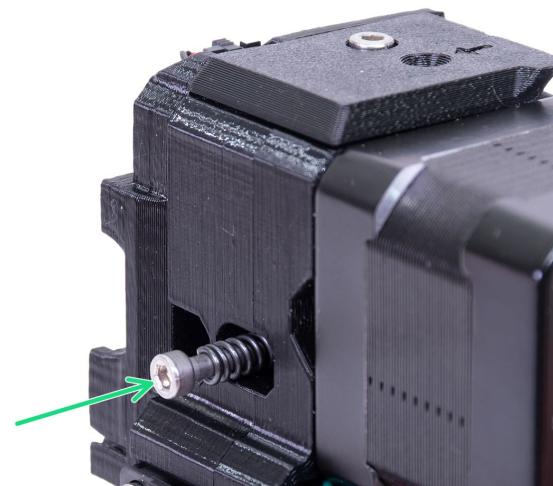
**⚠** Check that you can open and close the Extruder Idler. If not, loosen the **M3x40 screw** a bit.

Insert spring into **x1 M3x40 screw** and into the hole shown in the picture.

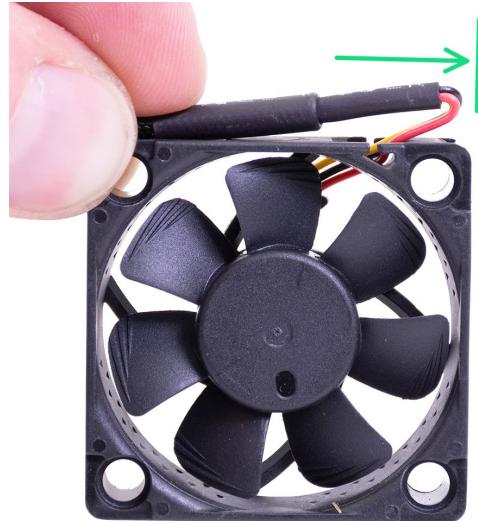
Tighten the **tensioner M3x40 screw**.

**i** Hold the Extruder Idler on the other side with your hand to be able to tighten.

Tighten the **M3x40 screw** until the head is almost flush with the plastic part.



## 5.18. Hotend Noctua fan assembly I

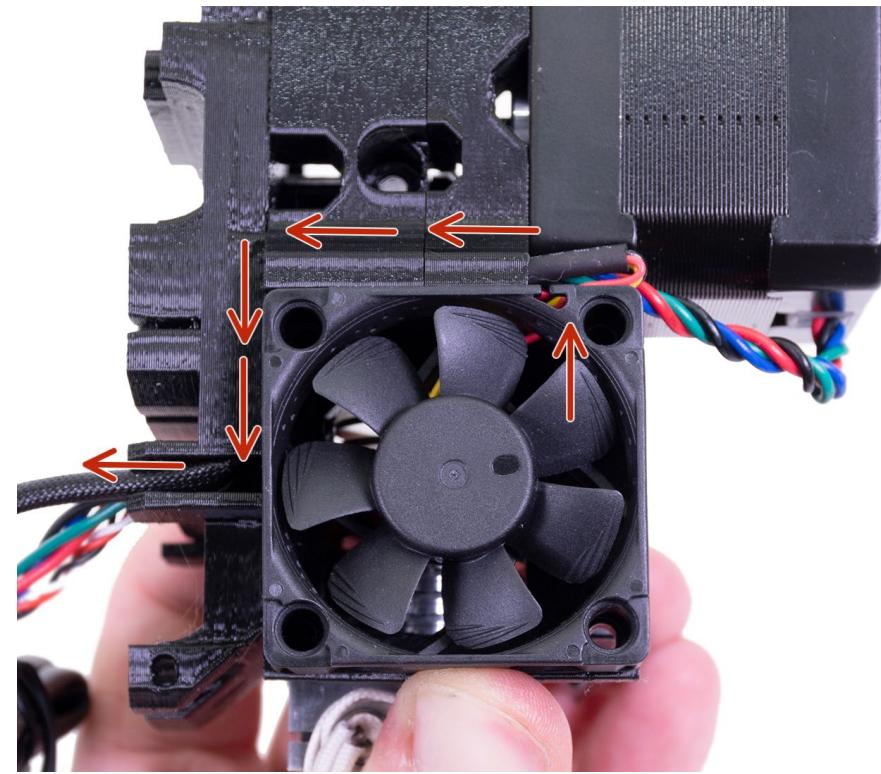
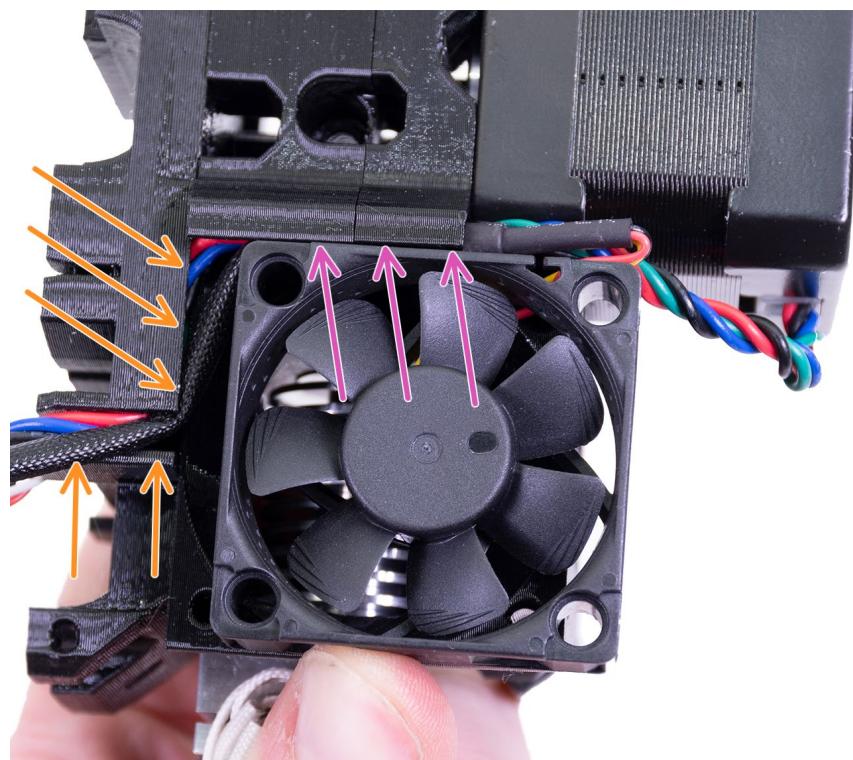


On the Noctua fan (yours is brown) cable, **make the loop** shown in the image.

**Guide** the cable through the same plastic parts groove you guided the Extruder motor cable.

**⚠ Make sure the **cable** stays inside the groove.**

**The path** followed by the cable is as follows.



## 5.19. Hotend Noctua fan assembly II

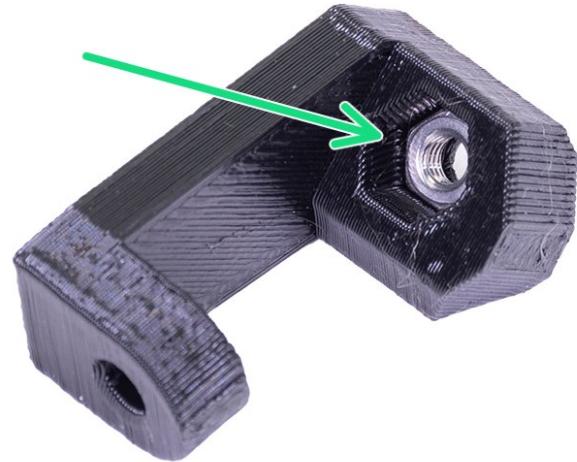


Insert and tighten **x1 M3x14 screw**.

**⚠** Screws on directly into the printed part, don't use too much force. Do not over-tighten the **M3x14 screw**.

**i** The other 3 holes remains free for now.

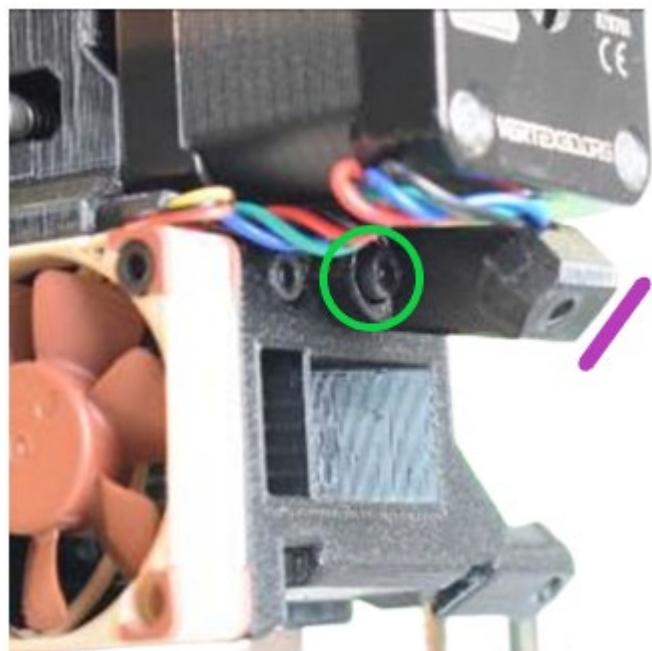
## 5.20. Fan Support assembly



Take the Print Fan Support (printed part).

Embed **x1 M3n hex nut** into it's housing on the Print Fan Support print part.

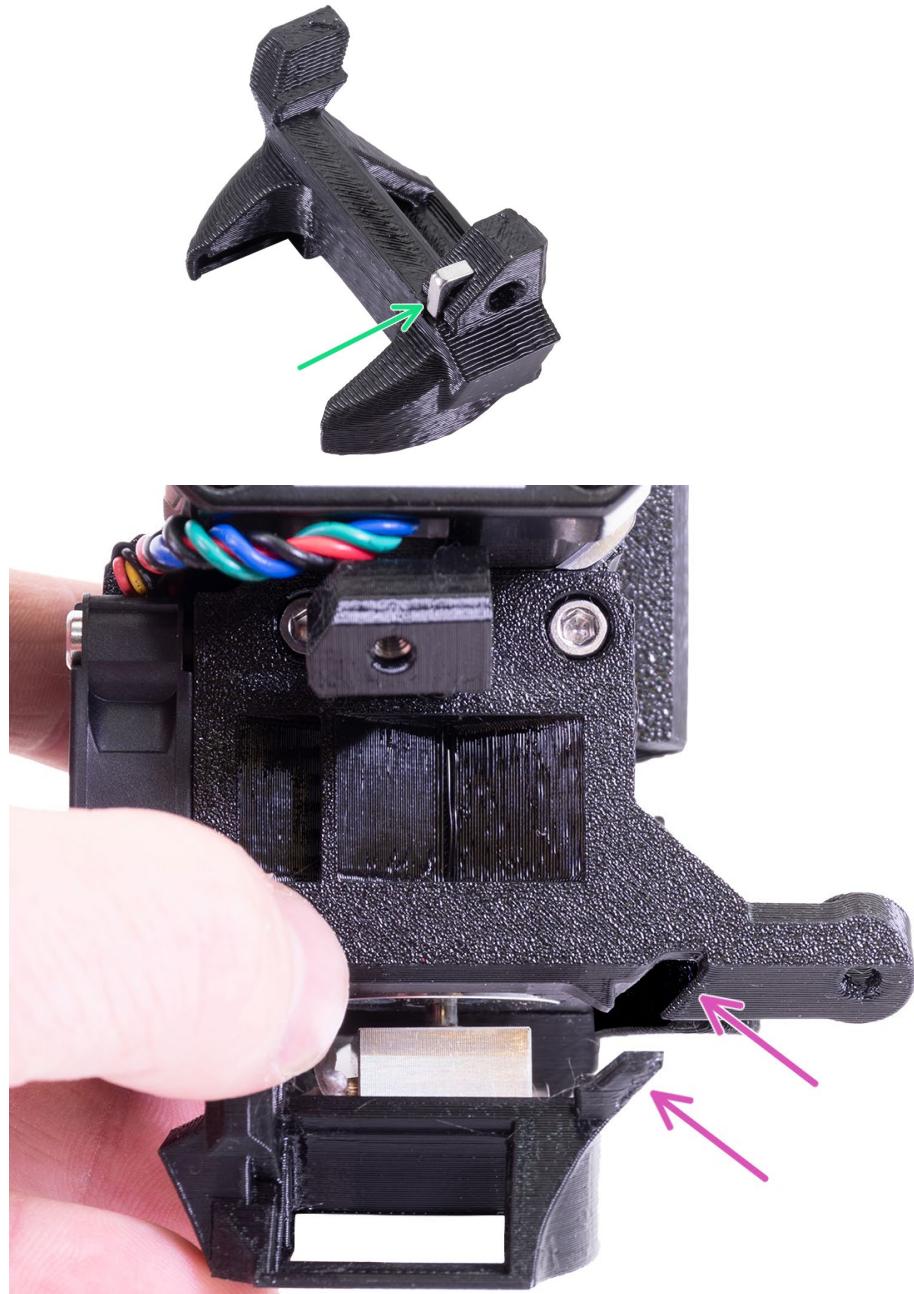
**⚠ It is important that you embed the nut to the end.**



Secure the Print Fan Support using **x1 M3x10 screw**.

**⚠ Make sure the part is tilted as shown in the picture.**

## 5.21. Fan Shroud assembly



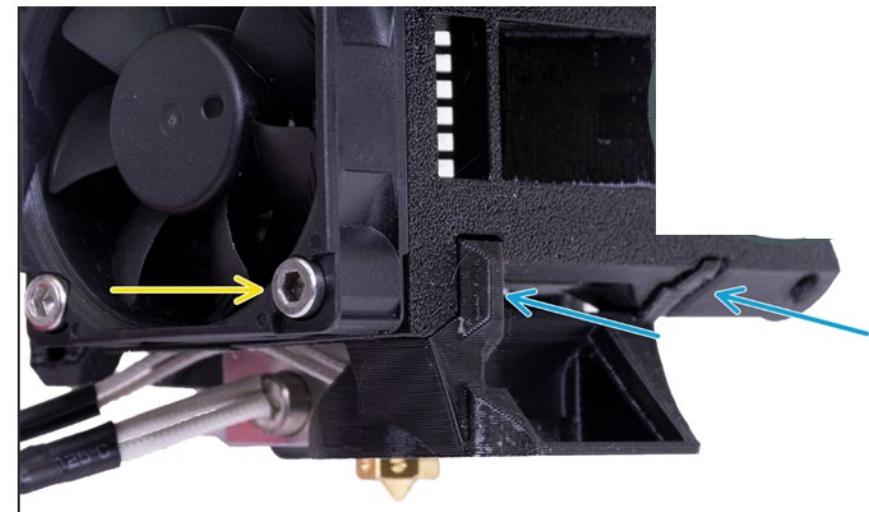
Take the Fan Shroud part (printed part)

Insert **x1 M3nS square nut** into the housing.

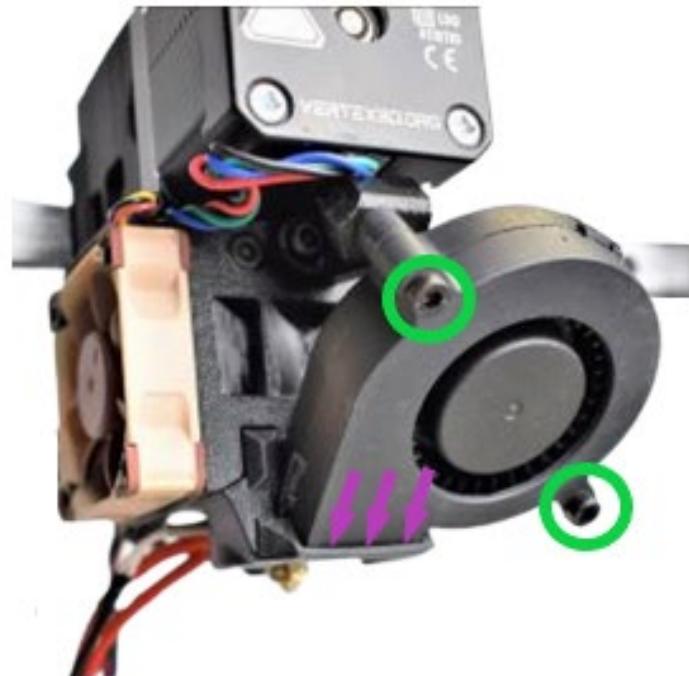
**i** As a curiosity, this part is the only one printed in another material. Specifically ASA to withstand the heat that comes from the Hotend.

Looking at the **groove** shown in the picture, **insert** the Fan Shroud into the extruder by pressing it.

Insert and tighten **x1 M3x20** screw going through the hole bottom right of the Noctua fan and the fan shroud.



## 5.22. Print Fan assembly

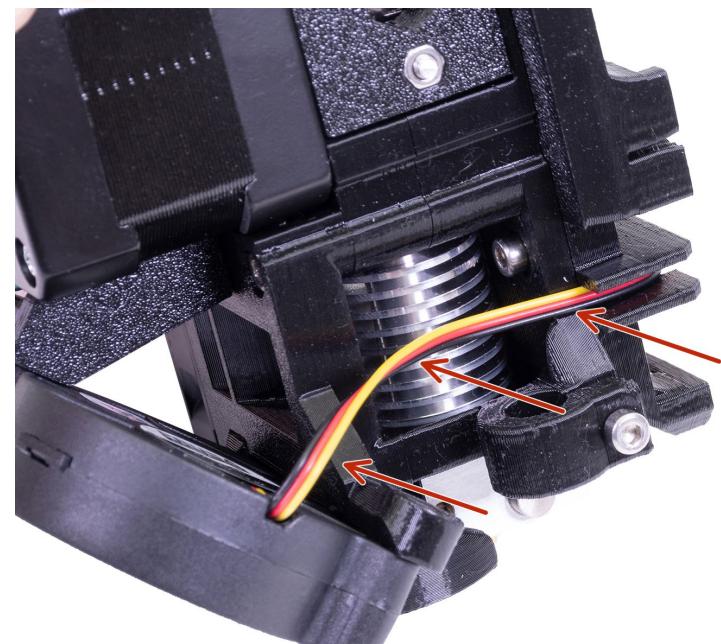


Take the print fan (printed part)

Insert the print fan into the Fan Shroud printed part housing.

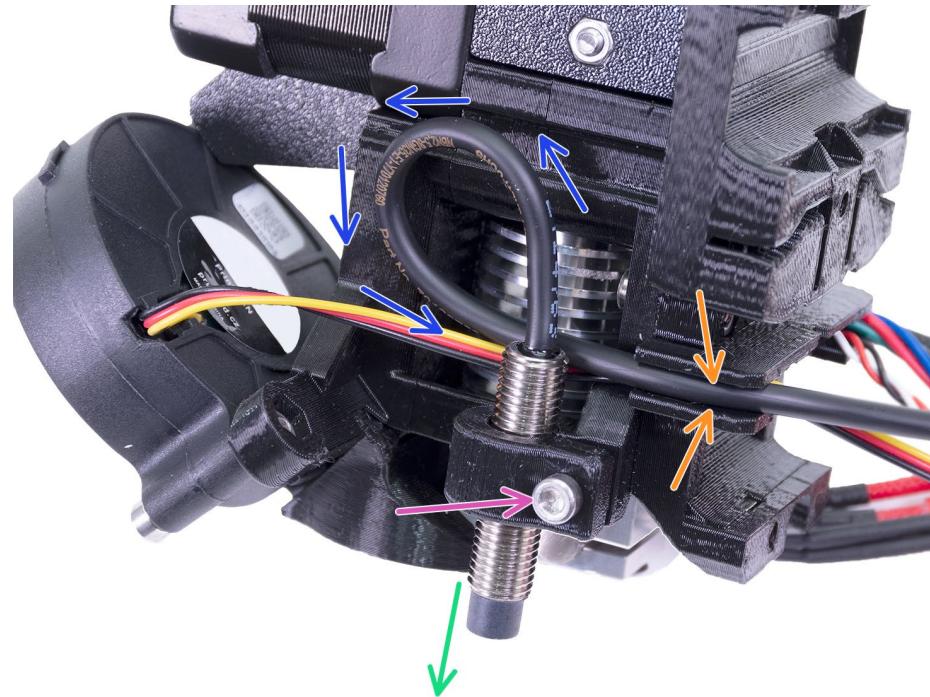
Insert and tighten **x2 M3x20 screws** into the print fan as shown in the picture.

 **Do not use too much force, it is a plastic part.**



Guide the print fan cable through the X carriage groove on the right side as shown in the picture.

## 5.23. Inductive Sensor assembly



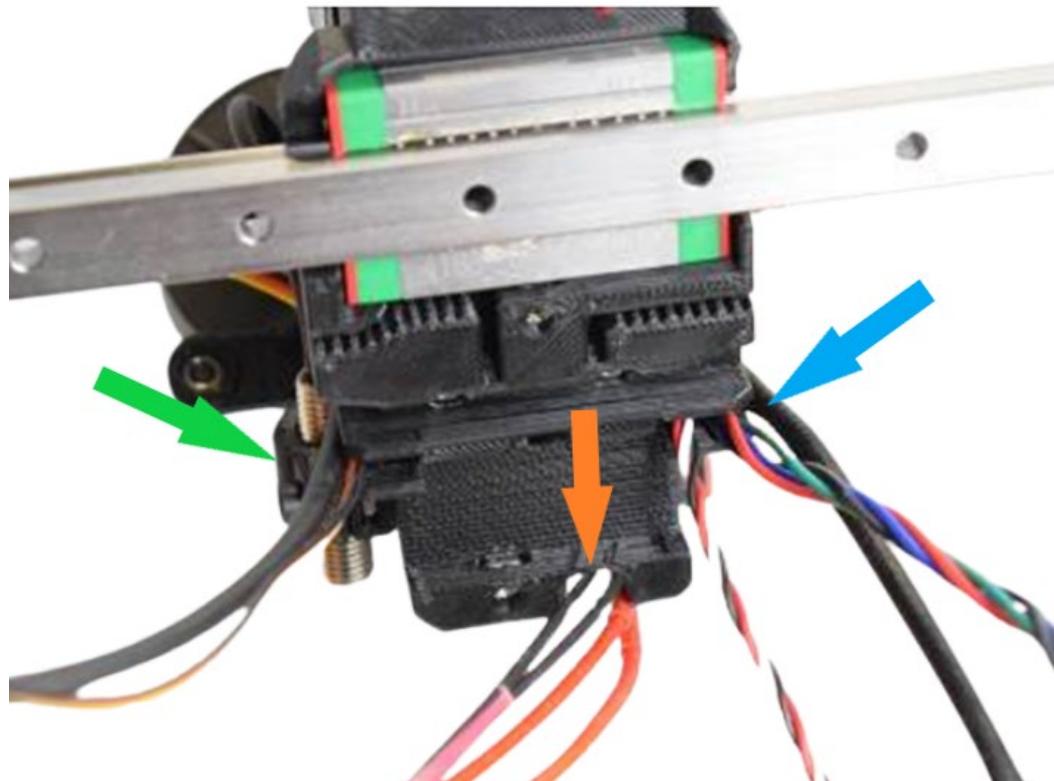
**Make a loop** with the inductive sensor cable and **insert** the sensor on the printed part housing.

Slightly tighten the **M3x10 screw**.

**i** The inductive sensor tip must be slightly above the hotend nozzle tip. You will adjust it later.

**Guide** the inductive sensor cable through the right X carriage groove.

## 5.24. Extruder cables organization I



Looking at the X carriage from back.

On the X carriage **left groove**:

- Print fan cable **Yellow-Black-Red**
- Inductive sensor cable. **Black**.

On the X carriage **right groove**:

- Filament sensor cable. **Red-Black-White**.
- Extruder motor cable. **Green-Red-Blue-Black**.
- Noctua hotend fan cable. **Black**.

In the X carriage **lower groove**:

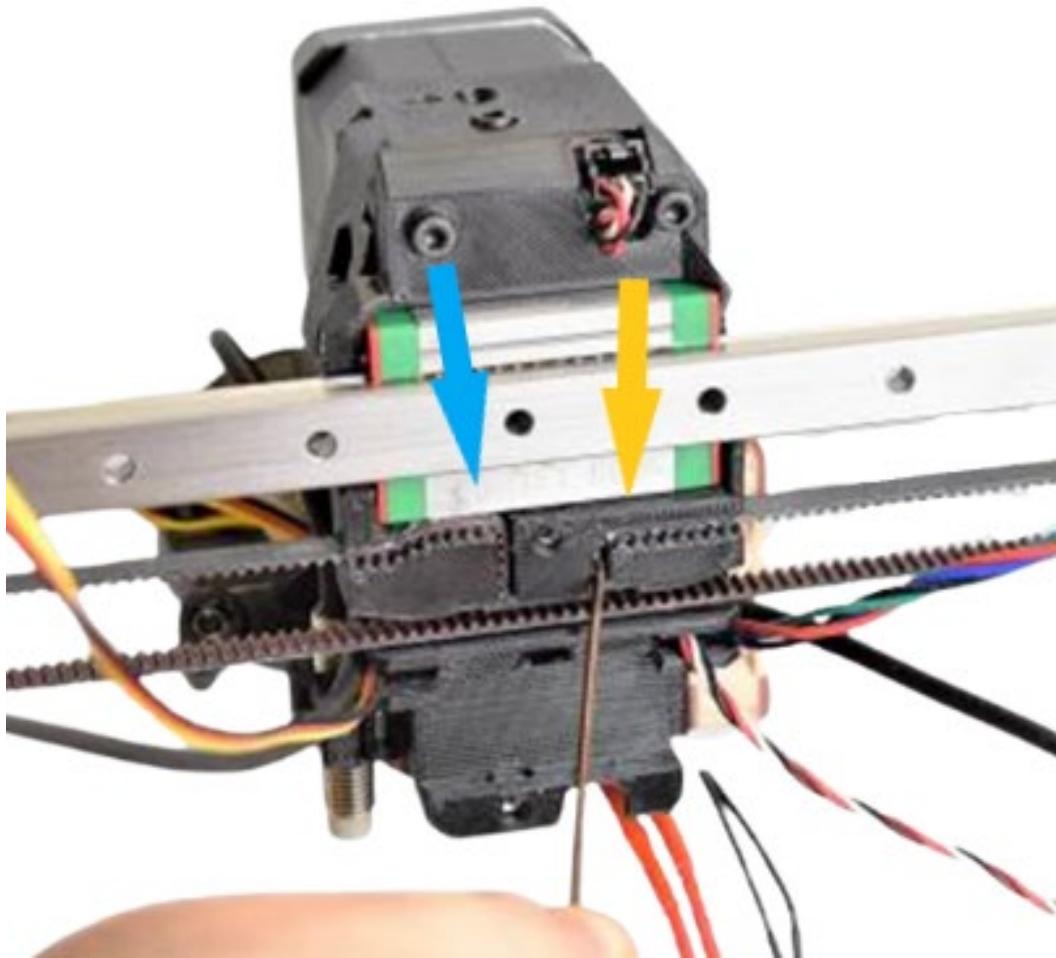
- Heater cartridge cable. **Red**.
- Thermistor cable. **Red-Black**.

For now, keep these 3 group of cables separate.



You can move the cables to keep them tidy.

## 5.25. X belt assembly



Take the X-axis belt (90cm).

Insert one X belt end into the X carriage **right toothed groove**.

Guide the X belt over the X motor pulley and return through the groove below as shown in the picture.

Continue guiding the belt through and over the X tensioner smooth pulley 623h, return the belt and insert the other end into the **left toothed groove** on the X Carriage.

**i** Use the thinnest Allen key to push the belt in to prevent from coming off in the future.

**!** Make sure the belt stays straight all the way.

## 5.26. X belt tension adjustment



Tightening the **M3x25 screw** will tense the belt while loosening this screw will cause the opposite effect.

As you did in point 2.16, push the Extruder all the way to the left with your hand. Using your fingers, press the belt. You should be able to join the top with the bottom but feel some resistance.

**i** It is better for the X belt to be tighter than loose.

**⚠** If the belt tension is too low, by moving the Extruder with your hand, you will notice that the belt miss steps (hops). On the other hand, if the belt tension is very high, you will notice a high resistance to movement which is bad as well.

**i** When starting the printer for the first time, it will make an automatic selftest to check all the components and common assembly problems. This means it will tell you if the belt is too tight or not.

## 5.27. X Carriage Back preparation



Take the X Carriage Back and Cable Holder (printed parts).

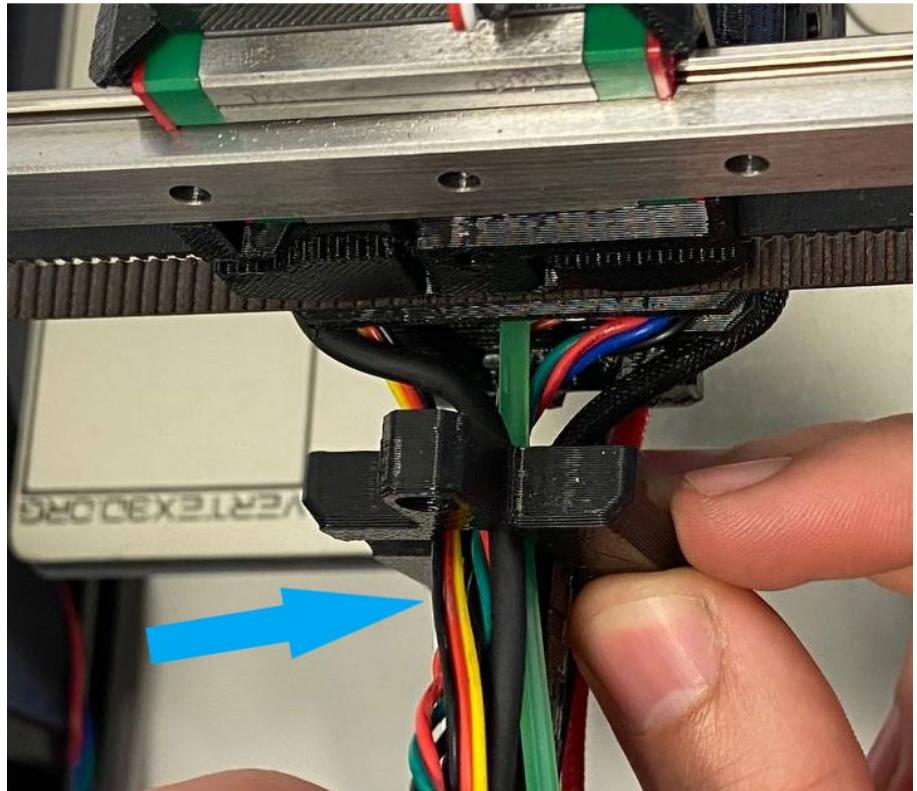
Embed **x1 M3n hex nut** into the X Carriage Back.

Insert **x1 M3x40 screw**.

Flip the X carriage Back and secure both parts with **x1 M3x40 screw**.

 **Align both pieces.**

## 5.28. Extruder cables organization II



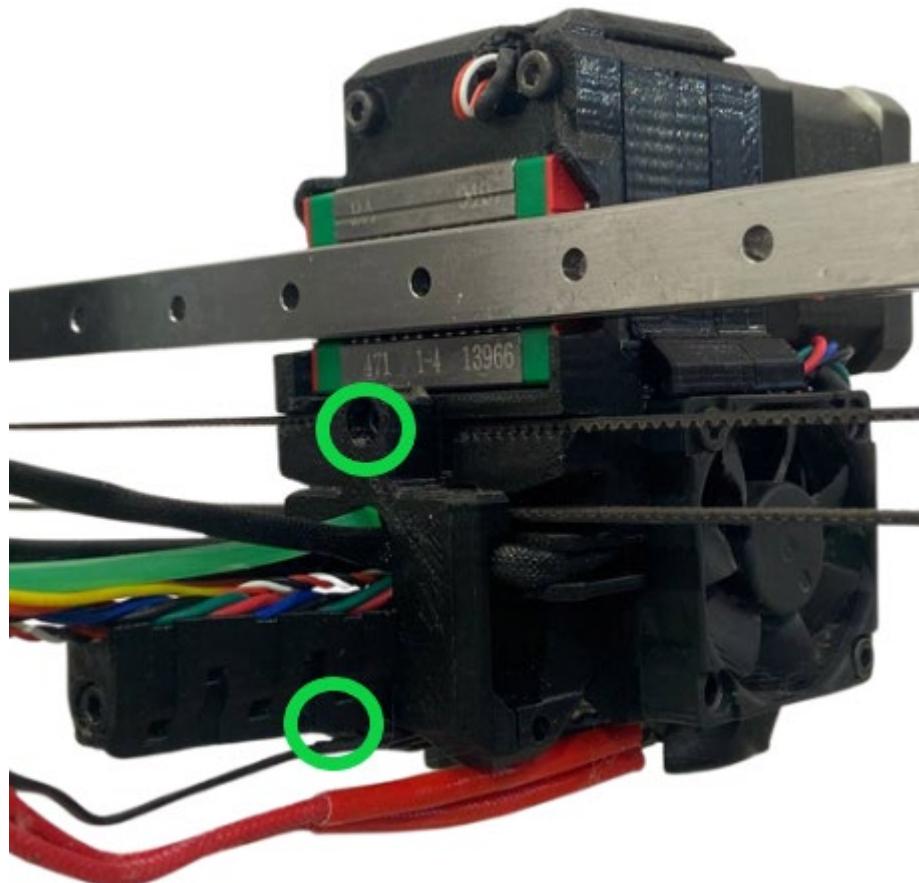
Take the 3mm black nylon (in this picture is green) included in the KIT and insert it into the X carriage hole. Just below the belt.

Take the X Carriage Back and insert the following wires through the hole as shown in the picture.

- Print fan cable **Yellow-Black-Red**
- Inductive sensor cable. **Black**.
- Filament sensor cable. **Red-Black-White**.
- Extruder motor cable. **Green-Red-Blue-Black**.
- Noctua hotend fan cable. **Black**.
- 3mm Nylon. **Black**

**⚠ Do not insert the cables that come out from below corresponding to the hotend heater cartridge and thermistor.**

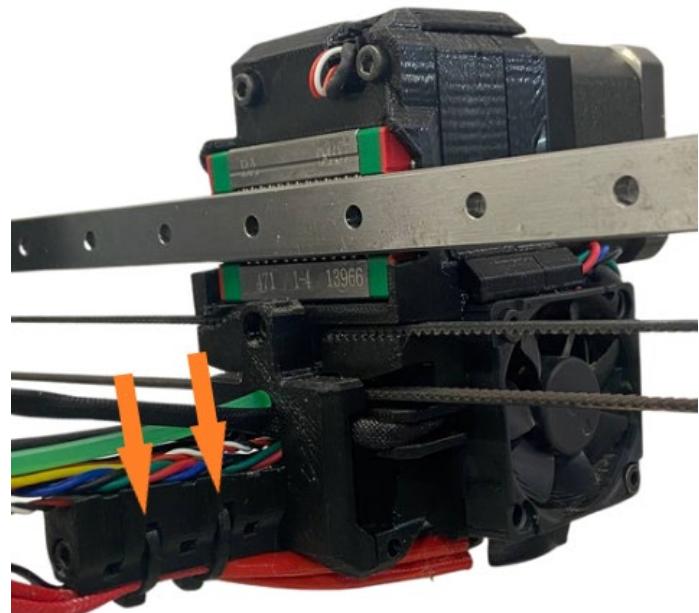
## 5.29. X Carriage Back assembly



Secure the X Carriage Back to the X Carriage with **x2 M3x10 screws**. One at the top and one at the bottom.

**⚠** Make sure that the 3mm black Nylon (in the picture is green) is still well inserted on its place.

## 5.30. Extruder cables organization III



Guide the **heater cartridge cable** and **thermistor** underneath as shown in the picture.

Secure the lower cables with **x2 zip ties**.

**⚠ Do not tighten the zip ties with excessive force. It could break the wires.**

**⚠ The zip ties head must face down.**

Take the longest textile sleeve, wrap it around the upper extruder cable group, except for the lower hotend cables.

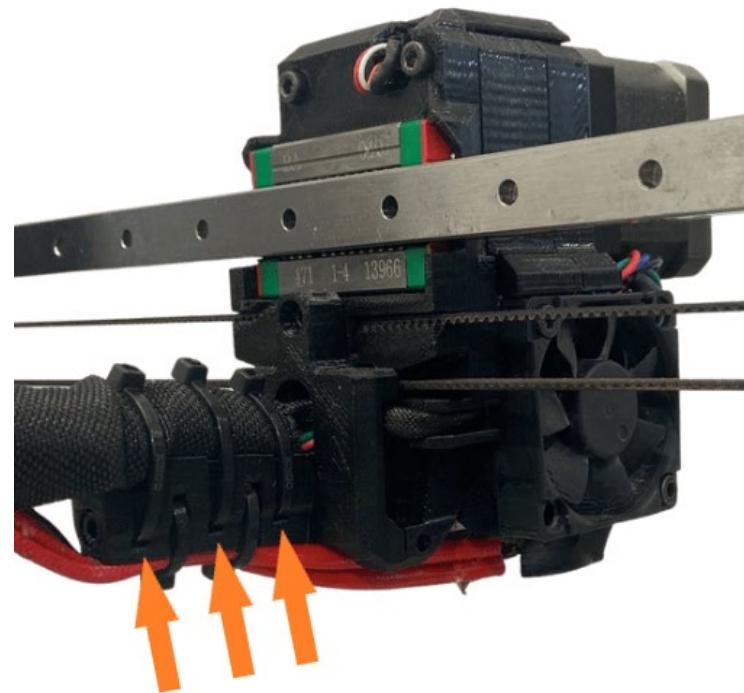
Gently twist the sleeve around **ONLY** the top wires so that you can slide it onto the extruder as shown in picture 2.

Secure the cables unit with **x3 zip ties**.

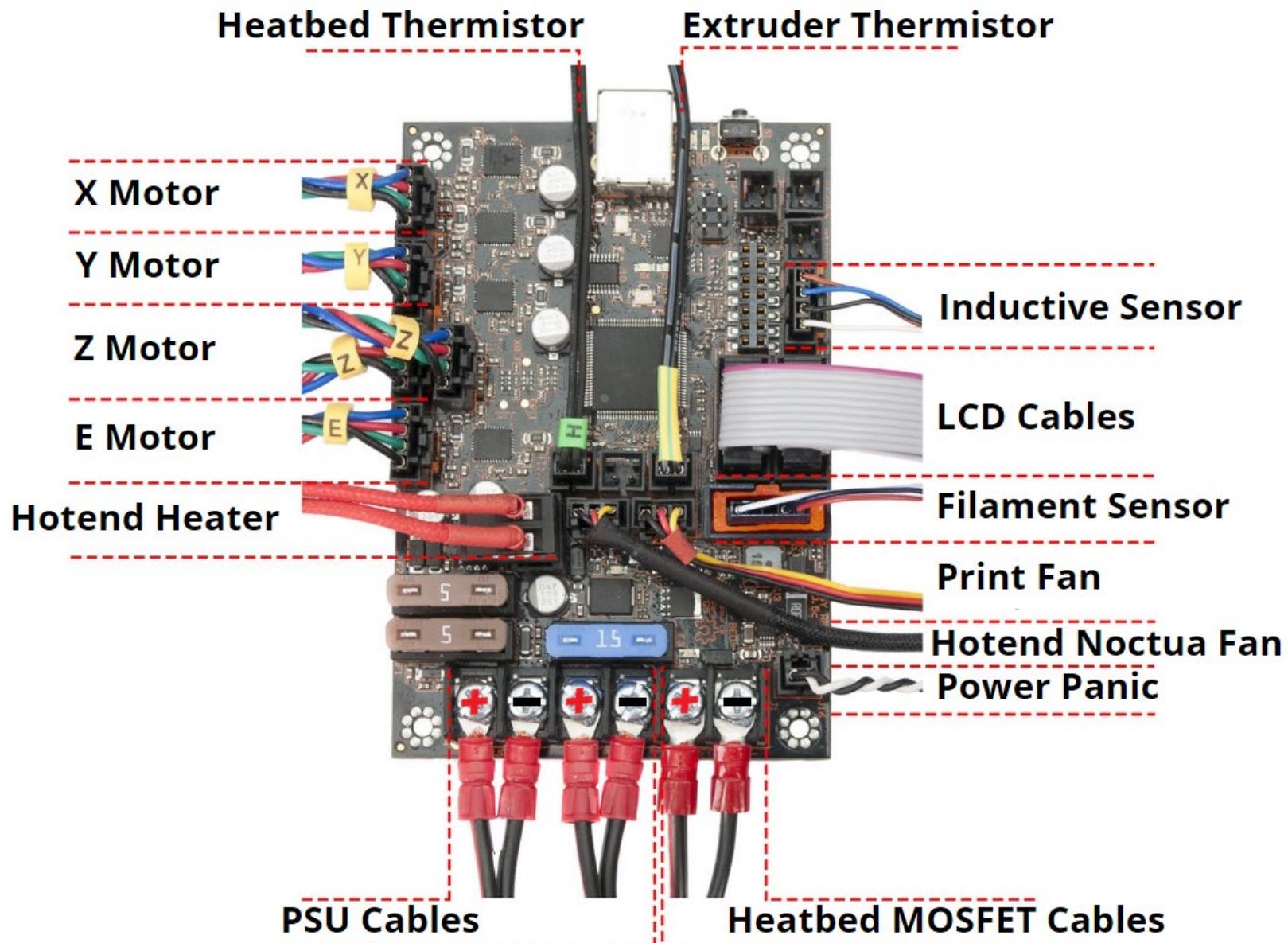
Insert the hotend lower cables into the textile sleeve as shown in the picture and twist the textile sleeve with your fingers clockwise in a spiral to give the cabling more strength.

**⚠ Do not tighten the zip ties with excessive force. It could break the wires.**

**⚠ The zip ties heads must face up.**



## 6. Electronics map



## 6.1. Meanwell PSU preparation



Take the pre-assembled Meanwell power supply.

Insert **x1 M4x10 screw** at the top

Screw on **x1 T-M4 nut**.

Insert **x1 M4x10 screw** at the bottom.

Screw on **x1 M4 T-nut**.

**i** The other 2 holes remain free for now.



## 6.2. Meanwell PSU assembly



Place the PSU to the frame as shown in the picture.

Push with the hand the PSU against the frame.

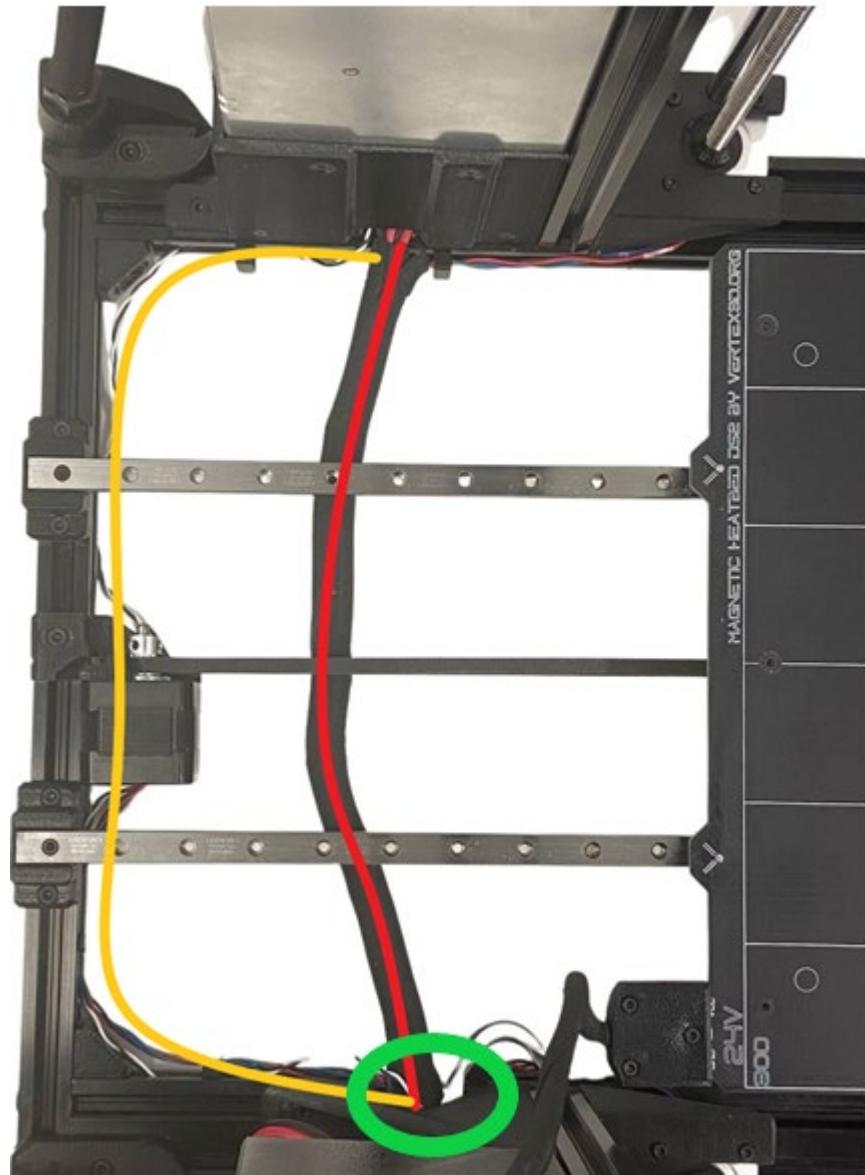
Tighten the **lower M4x10 screw** and repeat the same on the **upper M4x10 screw**.

Lay the printer down, slide and align with the PSU side holes x2 T-M4 nuts through the 2040 aluminium extrusion groove.

**⚠️ Avoid laying the printer on the X axis. Be careful with the X axis when laying the printer!**

Insert and tighten **x2 M4x10 screws** to fully secure the PSU to the frame.

## 6.3. PSU cables preparation



Cover the 4 power cables **Black-Red** with the remaining big textile sleeve.

Guide the **power cables** under the linear rails and Y belt.

Insert the **power cables** into the Z angle printed part **Vertex logo hole**.

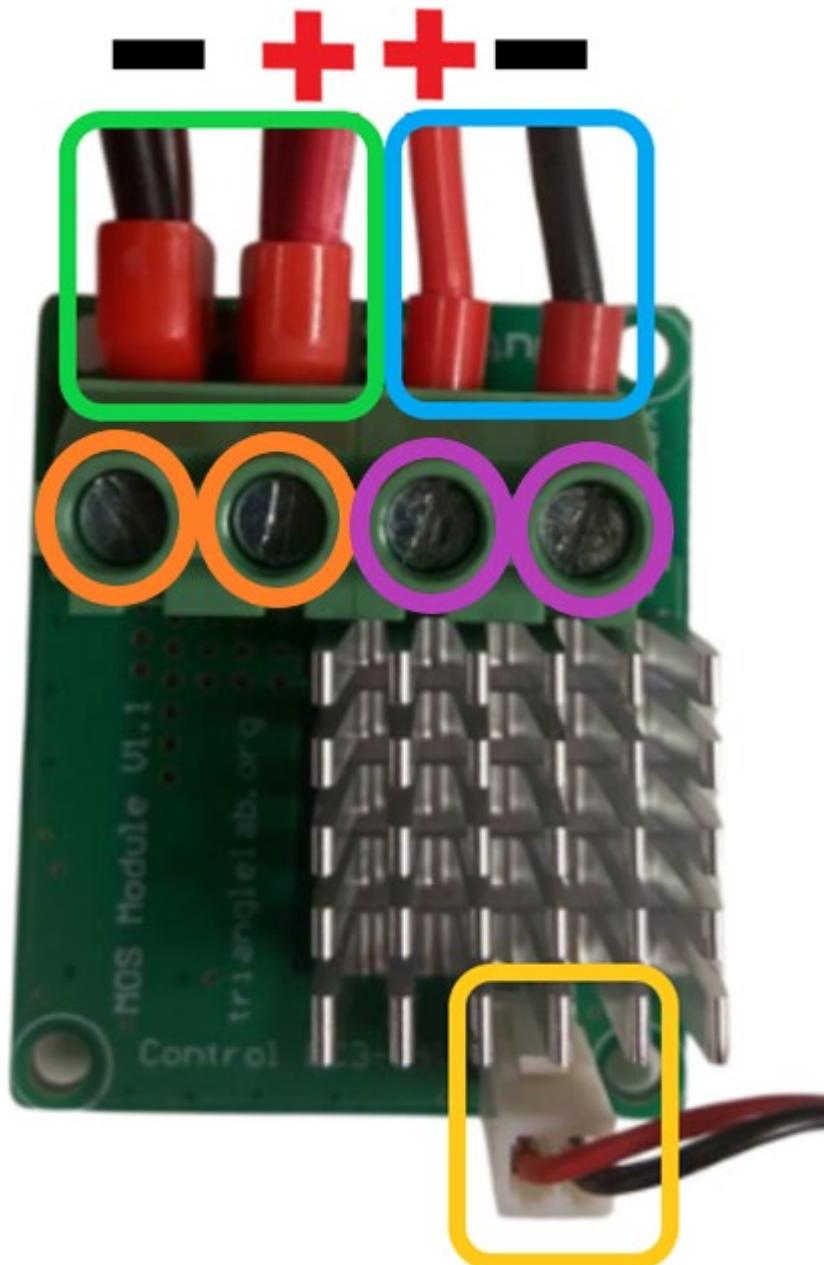
Guide the Power Panic cable **Black-White** under the linear rails and Y motor, when arriving to the Y motor, merge the cable with the power panic **making a U shape** around the back 2020 aluminium extrusion. Secure the cable with the 2020 cable clip (printed parts).

**⚠** Take special care when securing the Power Panic cable with the cable clips, you can pinch them.

Insert the Power Panic cable into the Z angle printed part **Vertex logo hole**.

**i** The Power Panic cable is separated from the rest, otherwise it would receive electrical noise from the PSU power cables which could damage the Einsy Rambo board.

## 6.4. MOSFET Preparation



Take the 2 **power cables supply**, the ones from which 2 other cables come out at the end and that you covered in step 6.1 and the **power cables** coming from the heatbed.

Loosen up the **screws** on the MOSFET left side.

Connect the **2 power supply cables** on the left side respecting the polarity.

**BLACK - / + RED**

Loosen up the **screws** on the MOSFET right side.

Connect the **Heatbed power cables** on the right side respecting the polarity.

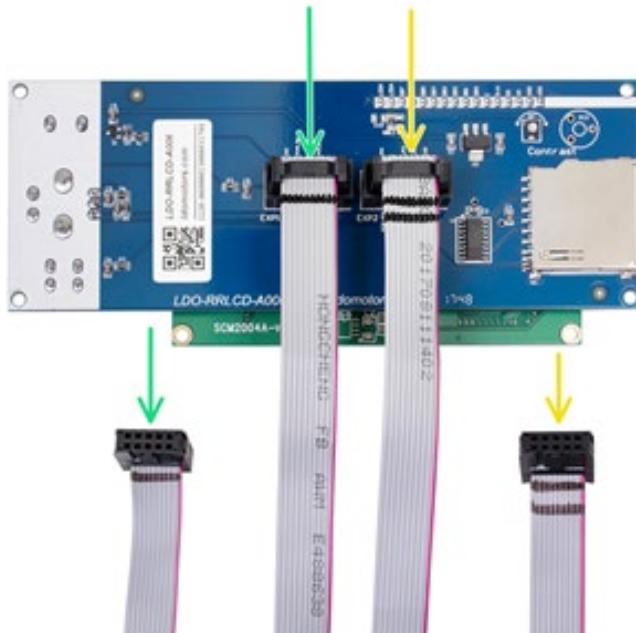
**RED + / - BLACK**

Connect the **signal cable**.

**⚠ Check again that the connections are correct.**

**i** The MOSFET is used to control power to the heatbed due to its large size. Otherwise, it would pass directly through the Einsky Rambo board and could damage it.

## 6.5. LCD preparation I



Take the LCD electronics and signal cables.

Connect the cables as shown in the picture.

**i** The painted black stripes on the wires indicate the position on both sides, the LCD and the Einsy Rambo board.

- **1 BLACK STRIPE**

- On the LCD **right** slot.
- On the Einsy Rambo **right** slot.

- **2 BLACK STRIPES**

- On the LCD **left** slot.
- On the Einsy Rambo **left** slot.

**⚠ Check again that the connection is correct.**



Take the LCD Support A and LCD Support B (printed parts).

Insert **x2 M3x10 screws**.

Screw on **x2 T-M4 nuts**.

**⚠ Notice that LCD Support A has one plate that Support B does not.**

## 6.6. LCD Preparation II



Take the LCD Support A and LCD Support B parts that you have prepared in the previous step and slide them onto the electronics board as shown in the picture.

**⚠** The LCD Support A with the **plate** goes to the right covering the SD card slot.

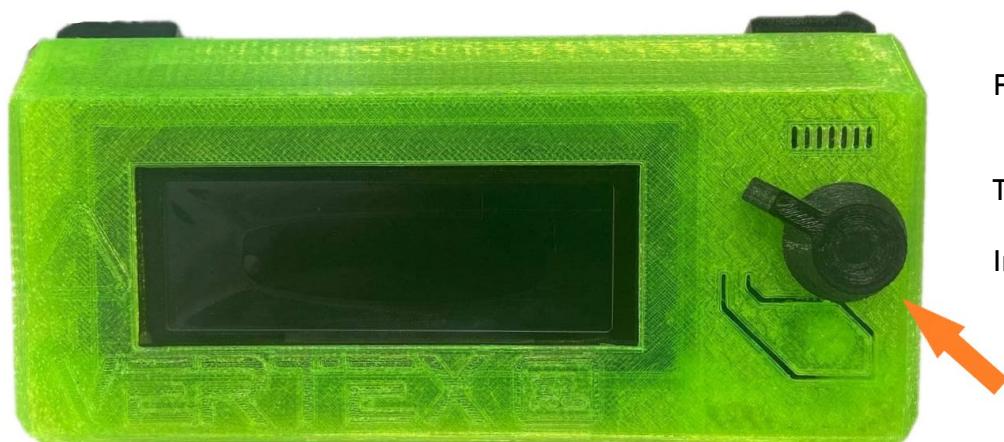
Take the LCD Cover part (printed part)

Make it fit over the LCD electronic board.

**⚠** In the central part of the LCD Cover piece there is a **small support** on which the electronic board must click.

**i** The LCD Cover piece has **2 indentations** that mark the position of the LCD supports.

Fix the LCD cover part and electronics with **x2 M3x10 screws**.



Take the **LCD Button** (printed part).

Insert the **LCD Button** into the protruding potentiometer.

## 6.7. LCD assembly on XY structure



Place the LCD assembly on the left side of the XY frame.

Secure the LCD assembly by tightening the **x2 M4x10 screws**.

Guide the LCD cables under the front 2020 aluminium extrusion.

Secure them with the **2020 cable clip printed parts** along the left 2040 aluminium extrusion.

Insert the LCD cables through the Vertex logo shaped hole in the Z Angle printed part.

**⚠ Take special care when securing the LCD cables with the cable clips you can pinch them.**

## 6.8. Einsy Rambo Box preparation I



Take the Einsy Rambo Body (printed part).

Embed **x8 M3n hex nuts**.

## 6.9. Einsy Rambo Box preparation II



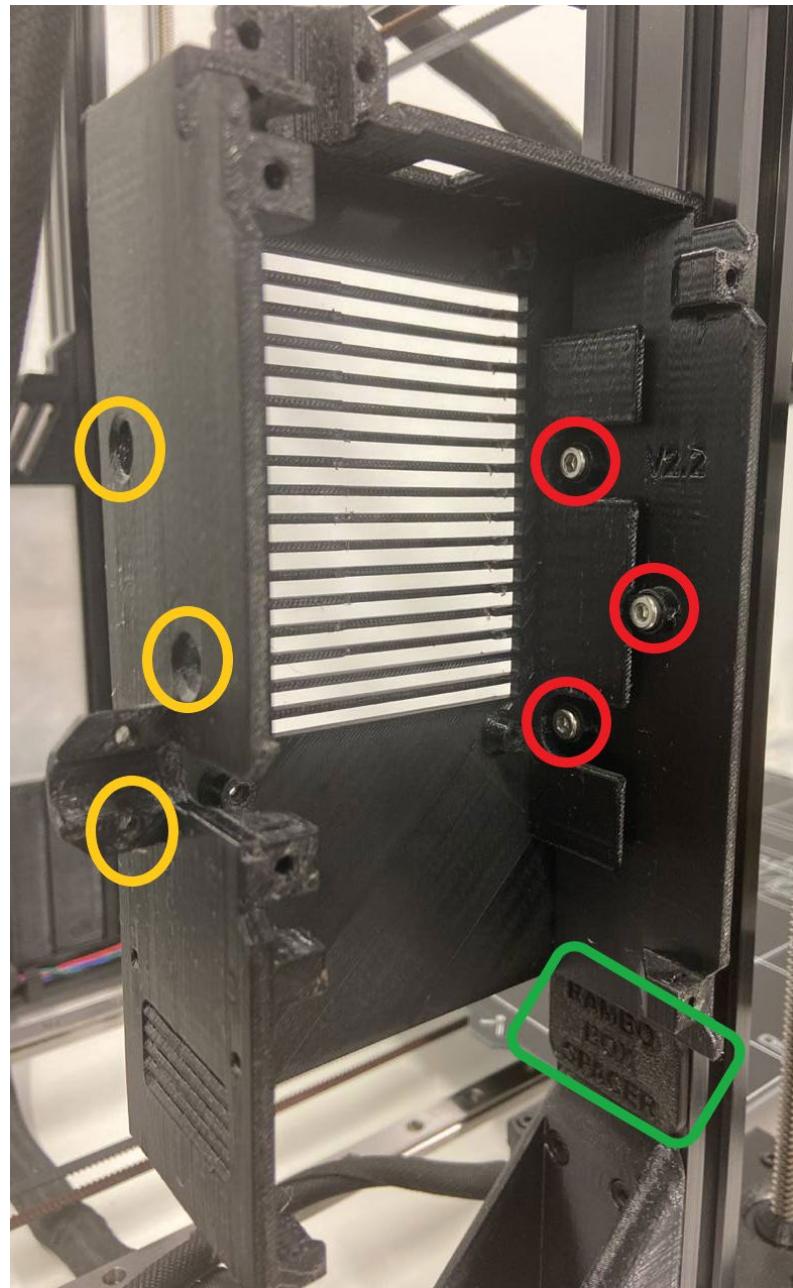
Insert **x4 M3nS square nuts** into their sockets.

**⚠ Check, that the holes of the nut and printed part are aligned.**

Insert **x3 M4x10 screws**

Screw on **x3 T-M4 nuts**.

## 6.10. Einsy Rambo Box assembly



From the bag labeled SPACERS, take the **RAMBO BOX SPACER** (printed part).

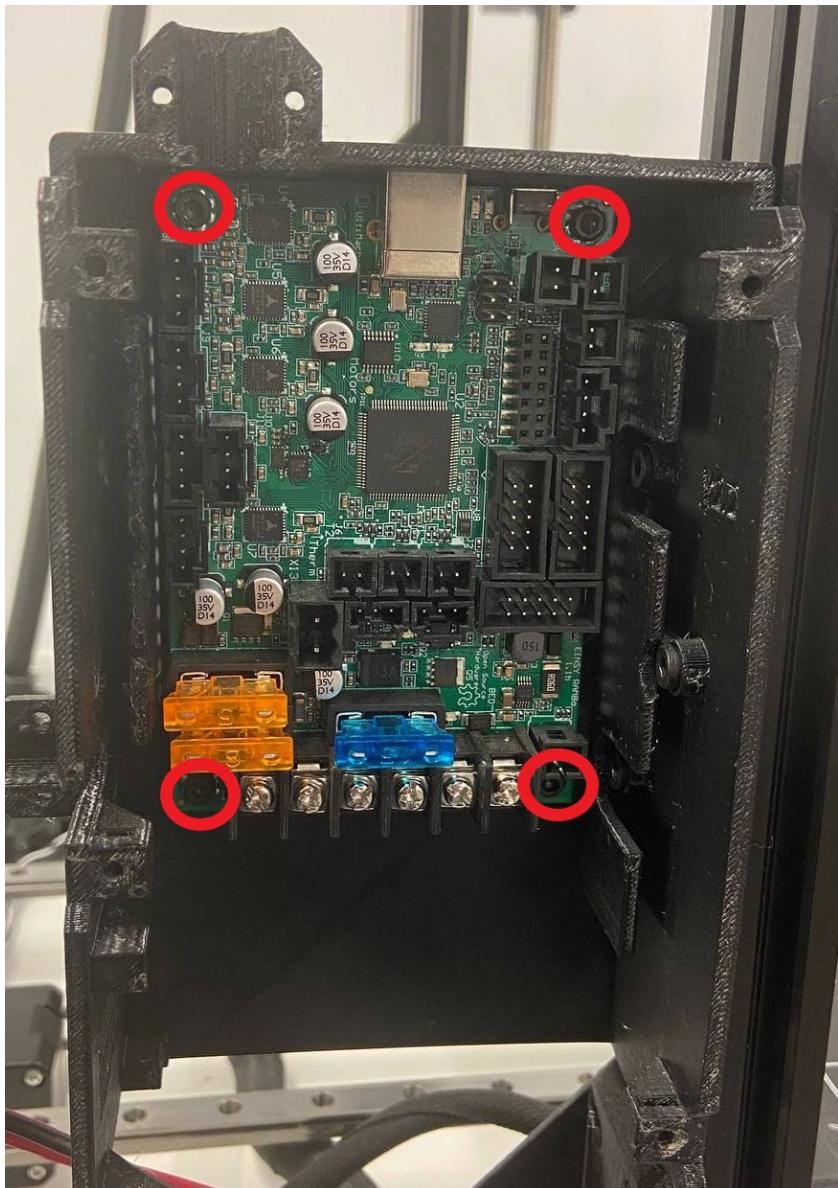
Place the **RAMBO BOX SPACER** over the Z Angle printed part and on top of it the Einsy Rambo Body.

**i** The **RAMBO BOX SPACER** indicates the exact position of the Einsy Rambo Body box.

Tighten the **x3 M3x10 screws**.

**i** You can pass through Allen key to tighten the **3 back holes**.

## 6.11. Einsy Rambo assembly



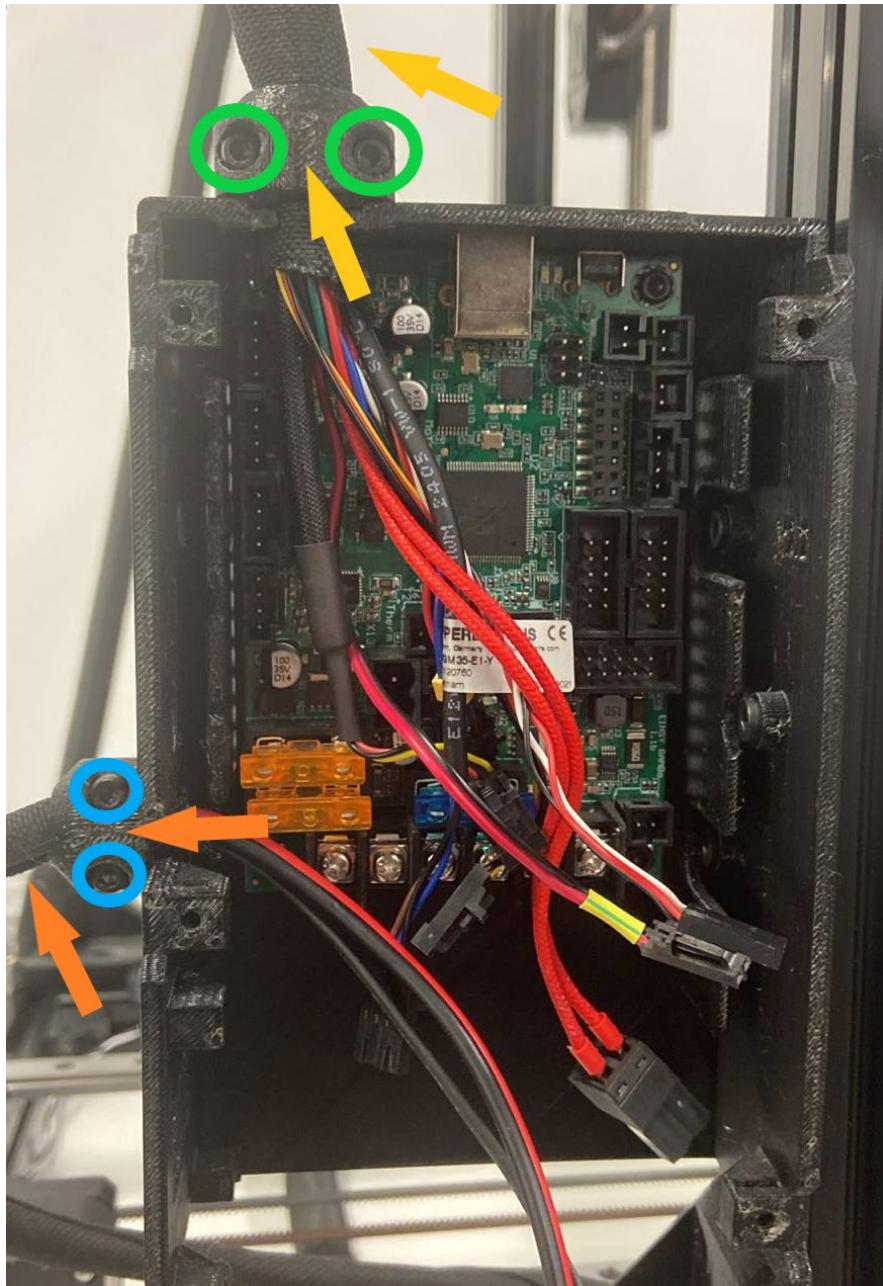
Take the Einsy Rambo Board and insert it into the Einsy Rambo Body Box that you have installed in the previous step.

Align the four holes in the board with the four holes in the box.

Insert and tighten **x4 M3x10 screws**.

**⚠ Be careful while securing the electronics. Do not use excessive force.**

## 6.12. Wiring preparation



Place the **cables** coming from the extruder into the hole in the top of the electronics box.

**⚠️ Notice that the textile sleeve goes through the box.**

Take the part **Extruder Cable Cover** (printed part).

Place the part **Extruder Cable Cover** over the extruder cables textile sleeve.

Insert and tighten **x2 M3x10 screws**.

Place the **cables** coming from the heatbed into the hole in the bottom of the electronics box.

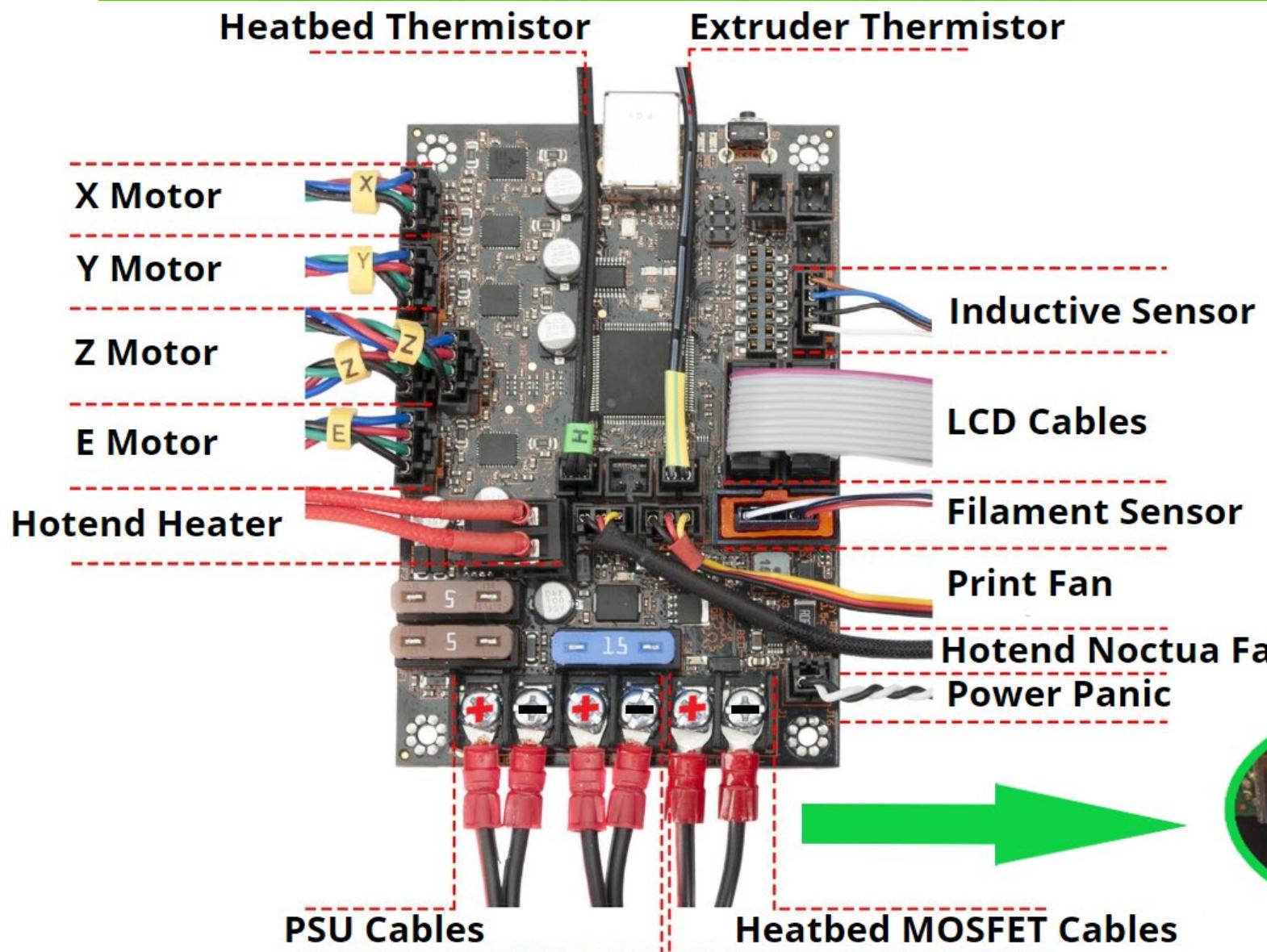
**⚠️ Notice that the textile sleeve goes through the box.**

Take the part **Heatbed Cable Cover** (printed part).

Place the part **Heatbed Cable Cover** over the heatbed cables textile sleeve.

Insert and tighten **x2 M3x10 screws**.

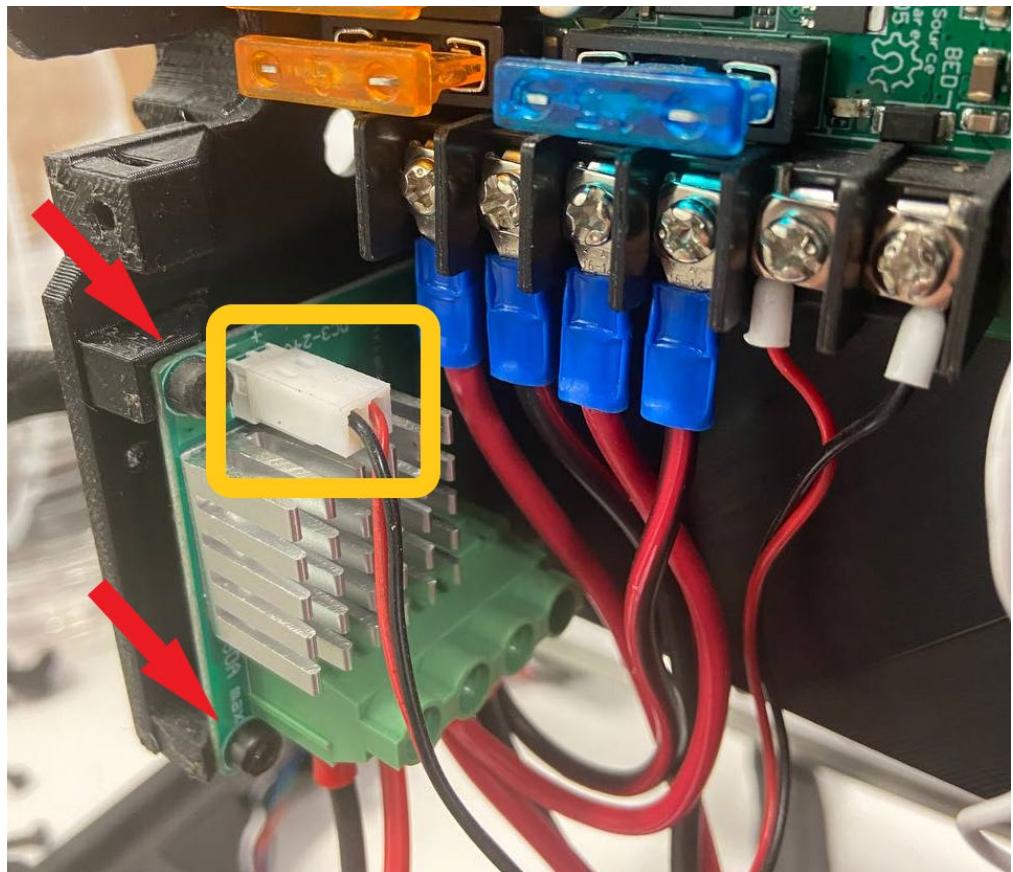
## 6.13. Einsy Rambo wiring



⚠ The augmented picture can help you understand where to connect the heatbed MOSFET signal cable.



## 6.14. MOSFET assembly



Place the MOSFET in its location inside the Einsky Rambo Body box.

⚠️ Notice the MOSFET orientation.

ℹ️ There is a housing for the MOSFET in the electronics box printed part.

Secure the MOSFET to the printed part with **x2 M3x10 screws**.

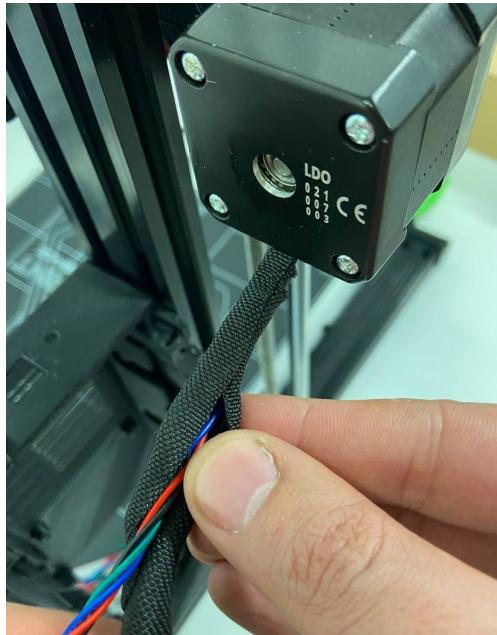
⚠️ Screws on directly into the printed part, don't use too much force. Do not over-tighten the **M3x10 screws**.

⚠️ Make sure the **signal cable** is connected in both ends.

ℹ️ The picture shows you a global position of the wiring for you to compare.

⚠️ Make a final check of all the electronics wiring.

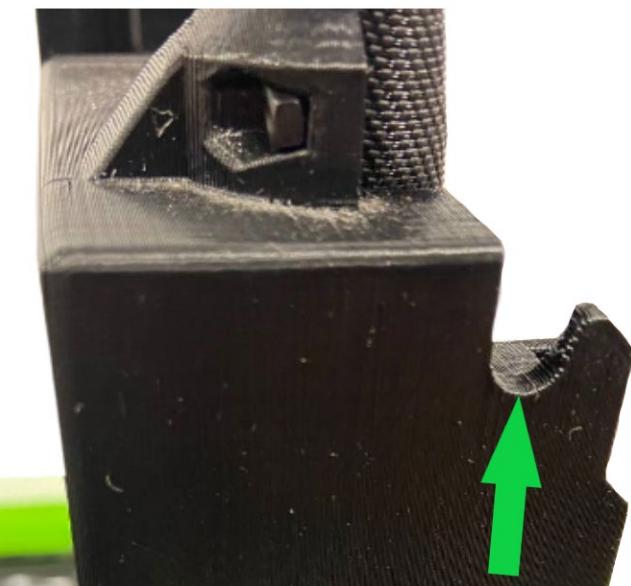
## 6.15. Motor X wiring preparation



Take the remaining small textile sleeve.

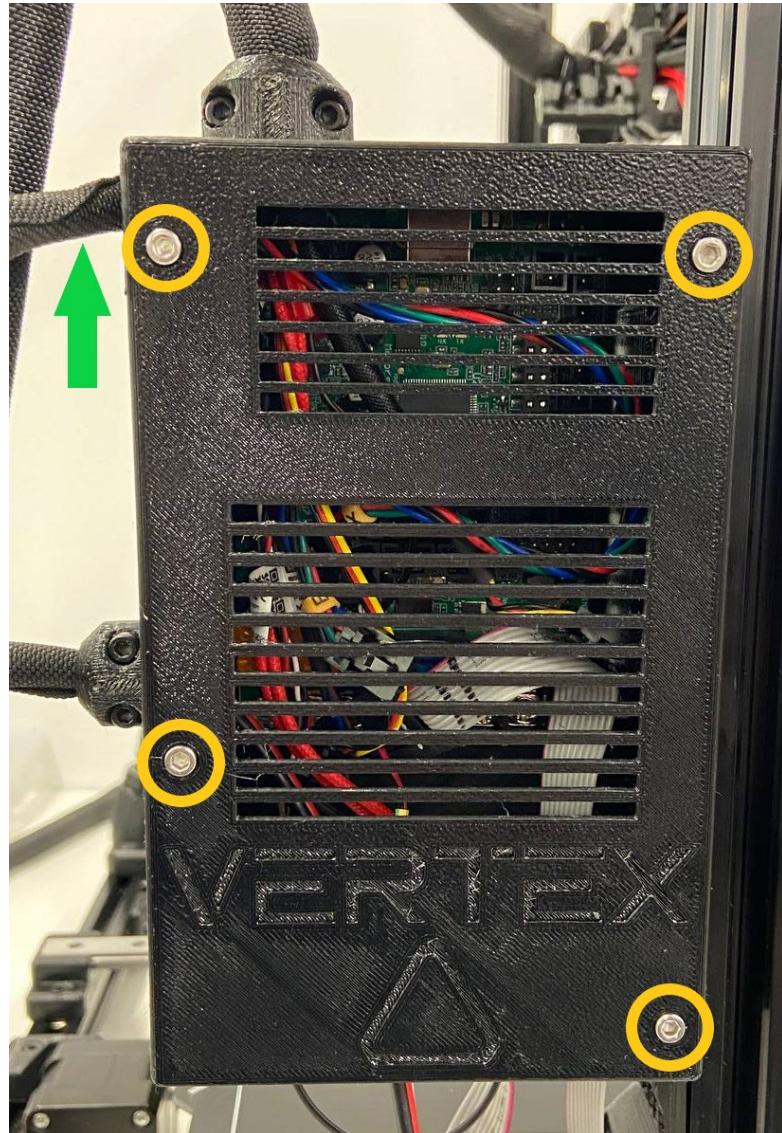
Cover the X motor cable with the remaining small textile sleeve.

**i** You may find it easier to cover the X motor cable if you disconnect it.



Pull the motor cable X through the **hole** in the electronics box.

## 6.16. Einsy Rambo Cover assembly



**⚠️ Notice where is the X motor cable.**

Take the Einsy Rambo Cover part (printed part).

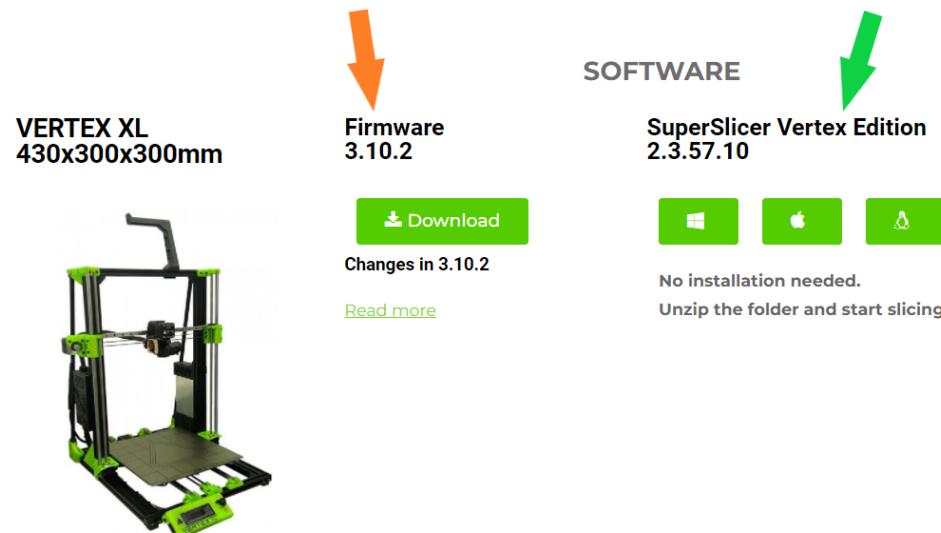
**i** Before closing the electronics box. Connect and turn on the printer, check that the screen turns on and that the electronics wiring is correct.

**⚠️ Try to have the cables organized so as not to pinch any when screwing on the cover.**

Place the Einsy Rambo Cover over the electronics to cover it and keep the wires inside.

Insert and tighten the **x4 M3x10 screws**.

## 6.17. Printer FIRMWARE preparation



Visit <https://vertex3d.org/en/72-software>

Download **Firmware**.

Download, unzip and open **Super Slicer Vertex Edition** for the platform you use.

The screenshot shows the "SuperSlicer Vertex Edition - Configuration Wizard" window. On the left, a sidebar lists options like Welcome, Vertex, Other Vendors, etc. The main area is titled "Vertex" and shows "XL Family" with "All standard", "All", and "None" buttons. It displays two printer models: "VERTEX XL" and "VERTEX XL MMU2S". Under "VERTEX XL", there's a list of nozzle sizes: 0.4 mm nozzle (unchecked), 0.25 mm nozzle (unchecked), 0.6 mm nozzle (checked), and 0.8 mm nozzle (unchecked). A green arrow points from the bottom right towards the checked "0.6 mm nozzle" option. At the bottom, there are buttons for "Select all standard printers in this page", "< Back", "Next >", "Finish", and "Cancel".

Select the **VERTEX XL 3D printer with 0.6mm nozzle**.

**i** If you change the nozzle in the future, you must change the diameter here.

Click in Filaments tab and select your preferred filaments.

Click finish button.

**i** You can open this menu any time in Settings > Configuration Wizard.

## 6.18. Printer FIRMWARE burning



Open the .zip file you downloaded from the **Firmware** and unzip the file **ending in .hex** to the desired path.

Connect the printer to the USB plug of the electronics box and into the computer with the blue USB cable included in the KIT.

Turn on the printer.

In the top **Super Slicer Vertex Edition** menu, go to **Settings > Flash printer firmware**.

The following window will open.

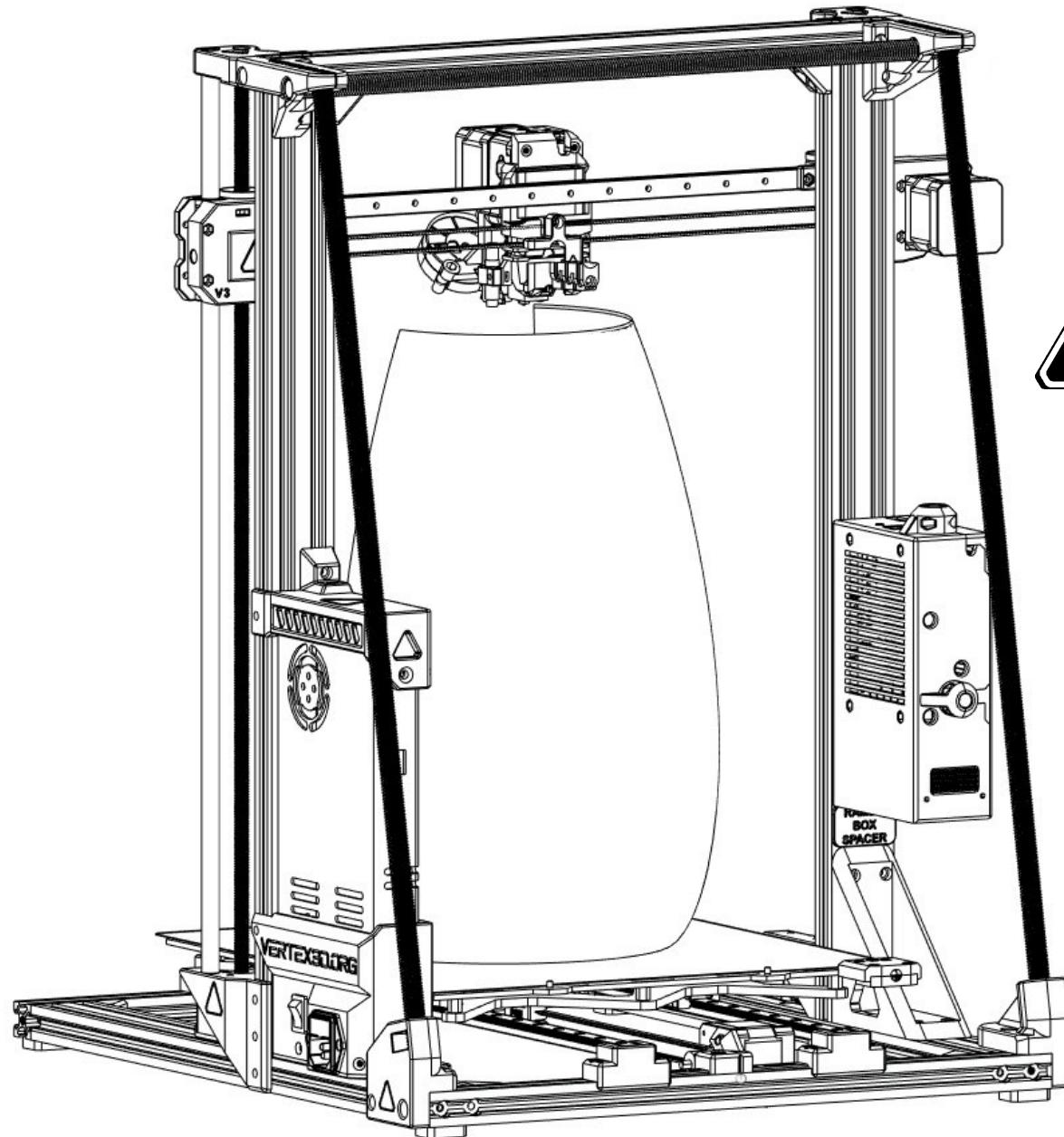
Click **Browse** and select the **unzip .hex file**.

In the **Serial port** section: The printer should appear along with the text COM.

Click on **Flash** and you will see the Progress bar start to fill up.

**⚠ Do not turn off your computer or printer while you are doing this process.**

**⚠ Do not disconnect the USB until finished. The % of progress will also appear on the printer screen.**



On behalf of the entire VERTEX3D team, we would like to personally thank you for placing your trust and support in us. We hope you enjoy your brand new VERTEX XL printer.

If you have any questions, consult the technical support team via live chat or email  
[info@vertex3d.org](mailto:info@vertex3d.org)

**Instagram:**  
instagram.com/vertex3dorg/

**Facebook forum:**  
facebook.com/groups/vertex3d