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# 5. E-axis assembly


help.prusa3d.com/g28536

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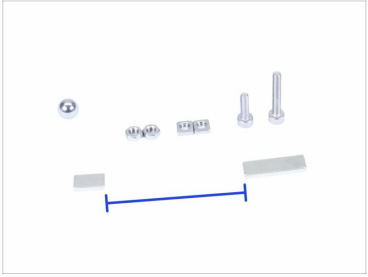
# STEP 1 Tools necessary for this chapter

- Needle-nose pliers for zip tie trimming.
- 2.5mm Allen key for M3 screws
- 2mm Allen key for nut alignment
- 1.5mm Allen key for tightening the pulley

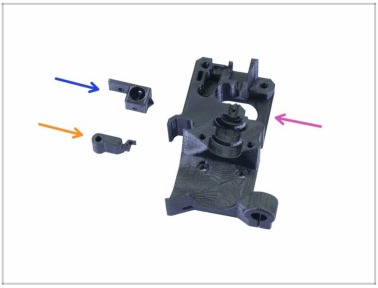
# STEP 2 Few tips before we start



⚠ **This is the most important and hardest chapter**, take your time, don't rush. Properly assembled extruder is essential.

- **The bag with fasteners includes M3x20 and M3x18 screws make sure you won't mix them!** Pay attention to the instructions, when to use the M3x20.
- **Keep the magnets apart in a sufficient distance.** They can break each other!
- **The hotend for MK3S needs a shorter PTFE tube compared to the MK3** (more info at help.prusa3d.com/PTFE-MK3S). *The PTFE tube is already installed, MK3S compatible hotend is marked with a yellow/orange dot on the heater block.*
- **Pay great attention to the cable management**, if you miss some important step you would need to disassemble the extruder.
- **This bag includes extra fasteners**. Don't worry if you finish with few unused screws and nuts.

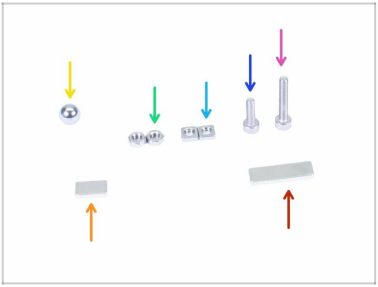
## STEP 3 Extruder-body parts preparation



- **For the following steps, please prepare:**
- Extruder-body (1x)
- Adapter-printer (1x)
- FS-lever (1x)

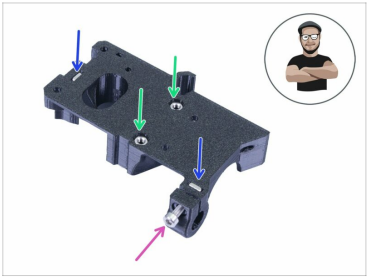
The list continues in the next step.

## STEP 4 Extruder-body parts preparation



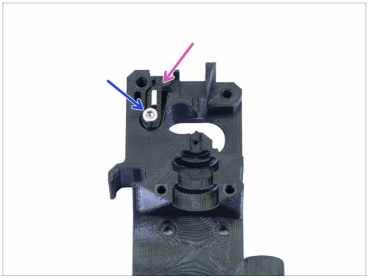
- **For the following steps, please prepare:**
- M3x18 screw (1x)
- M3x10 screw (1x)
- M3nS nut (2x)
- M3n nut (2x)
- Steel ball (1x)
- Magnet 10x6x2 (1x)
- Magnet 20x6x2 (1x)

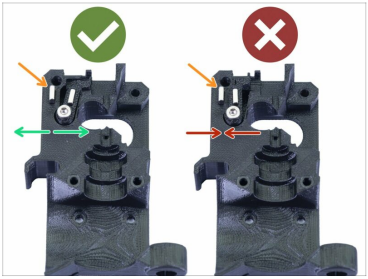
# STEP 5 Extruder-body assembly



- Take two M3nS nuts and insert them in the Extruder-body. **Make sure both are all the way in.** Push them in, the upper nut must "disappear" inside the printed part.
- Ensure correct alignment of the nuts using the Allen key.
- Secure the nut using an M3x10 screw. *Tighten the screw just slightly, later on we need to add the P.I.N.D.A. sensor.*
- Take two M3n nuts and insert them in.
- Use the screw pulling technique.
- Take the smaller magnet (10x6x2) and insert it carefully in the FS-lever. Majority of the magnet will be hidden inside the printed part.

# STEP 6 FS-lever assembly



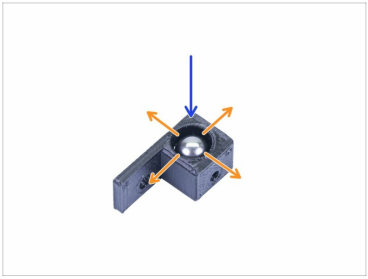


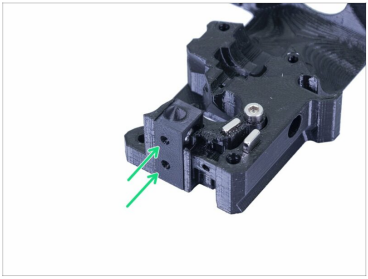
- Insert the FS-lever in the body.
- Secure the part with a M3x18. Tighten it, but ensure the lever can move freely.

⚠ **WARNING**: make sure the following procedure is done right, otherwise the **filament sensor won't work!!!**

- Insert the bigger magnet (20x6x2) in the Extruder-body, it will stick out:
  - **Correct setup:** magnets are repelling each other, thus the **lever is pushed to the right.**
  - **Incorrect setup:** magnets are attracting each other, thus the **lever is pulled to the left.**

# STEP 7 Steel ball assembly





- Take the printed part Adapter-printer and insert the steel ball in.
- Roll with the ball to all sides to ensure smooth movement.
- In case of any rough surface, remove the ball and clean the inside of the printed part.
- Place the printer part together with the steel ball in the Extruder-body. The surfaces of both parts should be almost aligned.
- **DON'T** use any screw to secure the Adapter-printer. It should hold inside the Extruder-body by itself.

# STEP 8 Extruder motor parts preparation

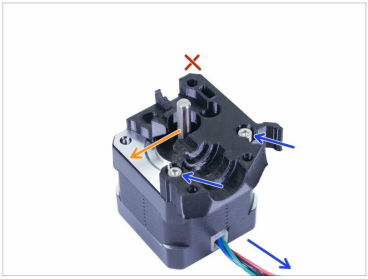
- **For the following steps, please prepare:**
- Extruder motor (1x)
- Extruder-motor-plate (1x)
- M3x10 screw (2x)

⚠ **ATTENTION:** there is a set of the Bondtech gears. Make sure you have all the parts and you are using correct ones.

- **Use now:** Bondtech gear with a set screw. If the screw is out, gently screw it in (leave space inside for the shaft).
- **Use later:** Bondtech without a set screw, bearings and a shaft. Keep the bearings somewhere safe, they tend to roll away ;)

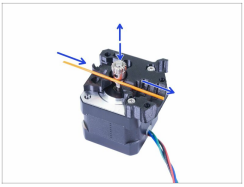
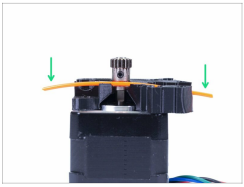
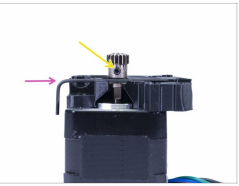
ⓘ In the upcoming steps, always check the pictures to **ensure the correct orientation of the Bondtech gears**. Always double-check your work.

# STEP 9 Bondtech gear assembly



- Take the Extruder-motor-plate and secure it using **two M3x10 screws**. Use the cable as a guide to properly orient the part.
- Resist the temptation to place a screw in the third hole! Leave it for later ;)
- Rotate the shaft as in the picture. Flat part must face in the direction of the arrow.
- Slide the gear on the shaft, the set screw must be facing against the flat part of the shaft. Tighten the screw slightly.
- There is a "channel" for the filament inside the printed part. Align approximately the teeth on the gear with it.
- Don't tighten the screw just yet. We will align it properly first. See the next step.

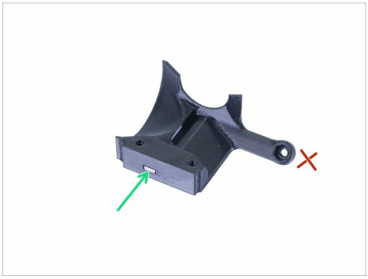
# STEP 10 Bondtech gear alignment

- Take a piece of the 1.75 filament. You can use the bundled one on a spool, don't use the black nylon, which is too thick. Straighten the filament as much as possible.
- Place the filament along the path and align the gear properly.
- The filament will be always slightly bent. Use it anyway for the initial alignment.
- For a final check replace the filament with an Allen key. Bear in mind, the key has slightly different size than the filament.
- Tighten the screw slightly to temporarily fix it, we will make the final check and tightening later on. **Be careful, you can strip the thread.**

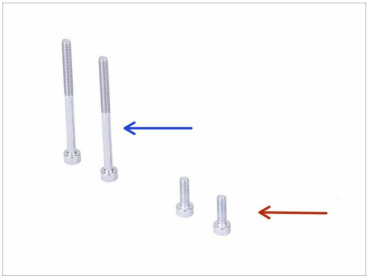
ⓘ Don't use any glue to fix the screw in place, you won't be able to release it, in such case you might have to replace the entire motor.

# STEP 11 Extruder-cover part preparation



- **For this step, please prepare:**
- Extruder-cover (1x)
- M3nS nut (1x)
- Slide the nut all the way in.
- Ensure correct alignment using the Allen key.
- Leave the hole on the "arm" empty for now. We will use it later, while assembling a print fan.

# STEP 12 Hotend parts preparation



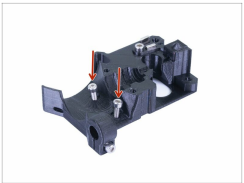
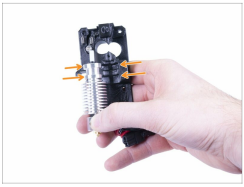
- **For the following steps, please prepare:**
- Hotend for MK3S (1x)
- M3x40 screw (2x)
- M3x10 screw (2x)

(i) "MK3S ready" hotend is marked with an orange/yellow dot on the heater block. If yours differs contact our support immediately!

(i) We will use one M3x40 later on, keep it around.

(i) Don't cut the main zip tie on the hotend cables, or remove the rubber band, it will make the assembly easier.

# STEP 13 Hotend assembly

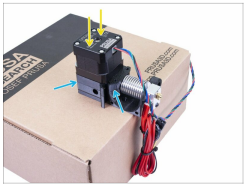
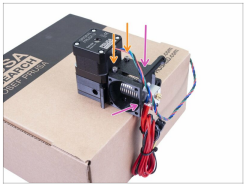




- Take two M3x10 screws and insert them in the holes. Doing this now makes the assembly slightly easier, but both holes are shallow and the screws might fall out. If this happens, you can continue without them and put them back later on (you will be notified later). *Also note, that in few upcoming pictures the screws might be missing.*

ⓘ Hotend assembly was completely reworked from MK3 to avoid bad placement. Also any future maintenance is much easier.

- Place the hotend next to the Extruder-body, see the grooves in the printed part, which are in the shape of the hotend.
- Correctly placed hotend. Cables should point in the direction behind the hand, we will align them in the next step.

# STEP 14 Extruder assembly

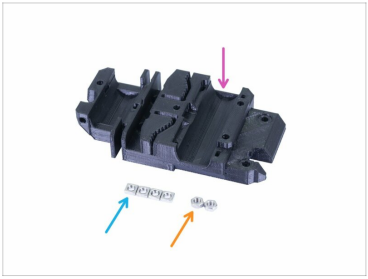




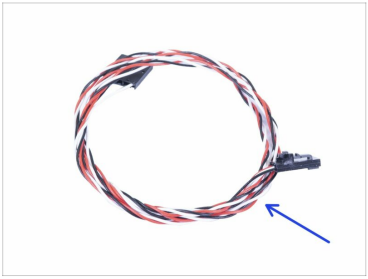
⚠ **In order to protect the hotend cables and ensure proper orientation**, it is highly recommended to use a box. Use the one provided in the kit.

- Place the Extruder-body with the hotend on the box and make sure the cables are pointing down.
- Place your finger temporarily on the longer magnet and place the extruder motor assembly on the Extruder-body. The Bondtech gear might pull the magnet out while assembling parts together.
- Make sure both parts are aligned.
- Place the Extruder-cover on the Extruder-body. Again, make sure that all three parts are properly aligned.
- Insert two M3x40 screws, you've prepared earlier. Tighten them, but be careful, they are slightly longer (2-3 mm), than the thickness of the entire assembly.

ⓘ Place the extruder aside for few steps, we need to prepare another part. Leave it on the box to prevent damaging the cables.

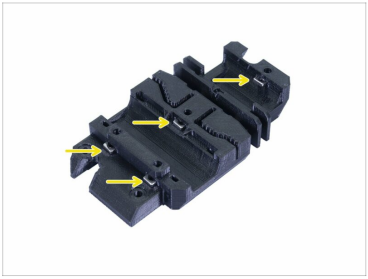
# STEP 15 X-carriage parts preparation





- **For the following steps, please prepare:**
- X-carriage (1x)
- M3n nut (2x)
- M3nS nut (4x)
- IR-sensor cable (1x)

# STEP 16 X-carriage assembly

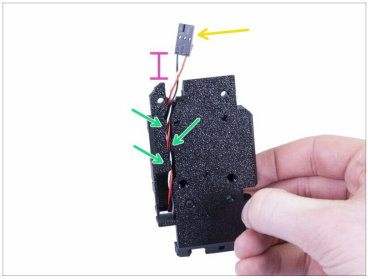


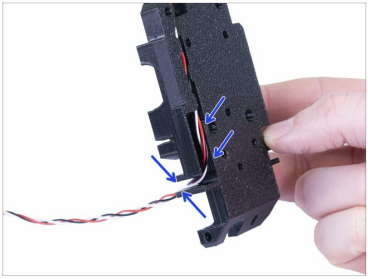
⚠ For the following nut insertion **USE A SCREW. THAT'S AN ORDER!!!** Seriously, use a screw to pull the nuts in, both have to be properly seated in the X-carriage.

- Take both M3n nuts and using pliers (or screw) push them in the X-carriage, then using a screw from the other side, pull them all the way in.
- Don't forget to remove the screw.
- Take all four M3nS nuts and insert them in. Ensure correct alignment using the Allen key.

ⓘ From now on, keep in mind the nuts are inside, avoid rotating the X-carriage "downwards", or the nuts might fall out.

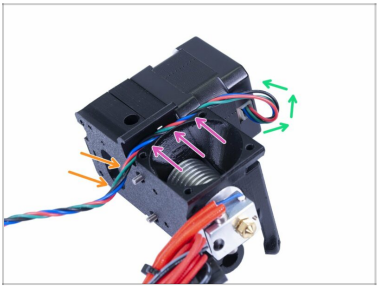
# STEP 17 Assembling the IR-sensor cable





- Take the IR-sensor cable and locate the end with the smaller connector.
- Place cable in the X-carriage, use the small printed overhangs to keep the cable inside.
- The distance between the connector and the X-carriage should be around 15 mm (0.6 inch). We will adjust it later.
- Guide the cable through the slot, **remember this path**, we will use it for other cables as well.

# STEP 18 Assembling the X-carriage

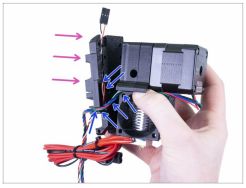
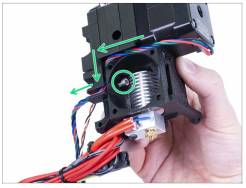
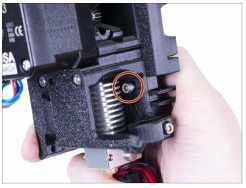


⚠ Following cable management is **CRUCIAL** for the extruder **TO WORK PROPERLY**! Read the instructions carefully.

- Start by making a small loop just below the extruder motor. Leave a slack about 2-3 cm (0.8 - 1.2 inch) *This is comes handy for easier disassembly in the future.*
- Then guide the cable in the "channel" all the way to the back.
- Slightly bend the cable down to form it around the edge.

ⓘ Also, prepare X-carriage, both M3x10 screws (if you haven't used them already) and the longest Allen key with the ball-end, you will need it.

# STEP 19 Assembling the X-carriage

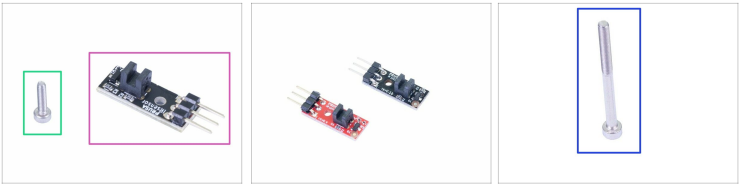
⚠ Following cable management is **CRUCIAL** for the extruder **TO WORK PROPERLY**! Read the instructions carefully.

⚠ Before you assemble the X-carriage, **check the nuts in the Extruder body are still in place**. The upper nut sometimes falls out.

- Grab the X-carriage and place it onto the back of the extruder assembly as shown in the picture.
- Make sure the motor cable follows the channel both in Extruder-body and X-carriage. In the X-carriage the motor cable will follow the path of the IR-sensor cable.
- **ENSURE NO WIRE IS PINCHED!** Then use the M3x10 screw and **Allen key with ball end** to connect both parts together. If you are inserting the screw at this moment, it will be slightly inclined in the beginning, but it will "straighten up" after few turns. Don't tighten the screw completely, we need to adjust the IR-sensor cable.
- Turn the extruder to the other side and if needed insert the second M3x10 screw. Don't tighten the screw, we need to adjust the IR-sensor cable.

ⓘ Good job! Grab one extra gummy bear ;)

# STEP 20 IR-sensor parts preparation

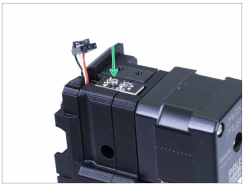
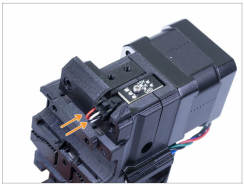
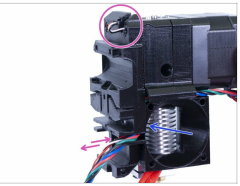


- **For the following steps, please prepare:**
- Prusa IR-sensor (1x)
- M2x8 screw (1x)
- M3x40 screw (1x)

⚠ **BE CAREFUL** with the filament sensor, do not touch the PCB nor the chips on it. Hold the PCB from sides.

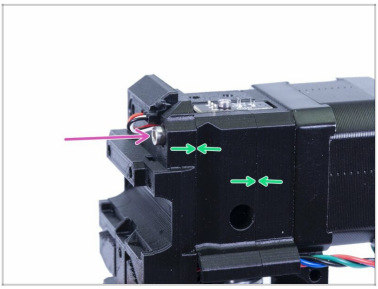
ⓘ Your package includes IR-sensor with black or red PCB. The red is a new version with some hardware optimisations. Filament detection is the same on both.

# STEP 21 IR-sensor assembly

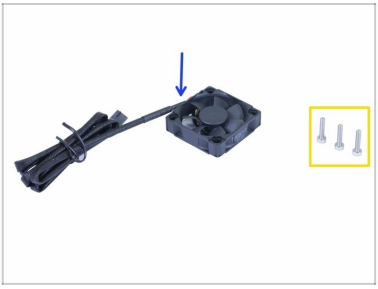
- Place the IR-sensor on the top of the Extruder-body and secure it with the M2x8. **Make sure the black plastic "u-shaped" part is facing down.**
- Tighten the M2x8 screw, the sensor shouldn't be able to move, but be careful the PCB isn't indestructible ;)
- Connect the cable, mind the correct orientation of the connector and wires.
- Leave a slack behind the sensor like in the picture. Don't create too big loop as it might interfere with the frame. If needed adjust the length by gently pulling/pushing the cable.
- Ready? Ok, check once more no cable is pinched and **tighten both M3x10 screws** installed previously.

## STEP 22 IR-sensor assembly



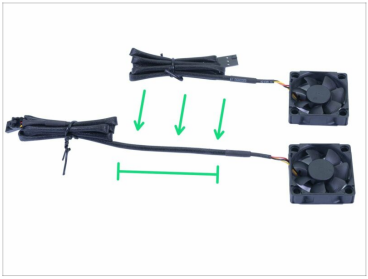
- Finish the sensor assembly by inserting an M3x40 screw.
- Make sure all the gaps are gone.

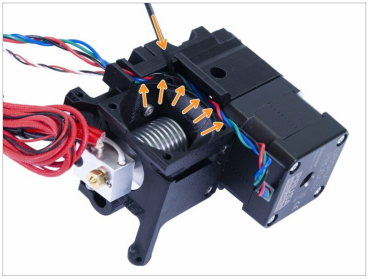
## STEP 23 Hotend fan parts preparation



- **For the following steps, please prepare:**
- Hotend fan Noctua (1x)
- M3x14 screw (3x)
- Make sure you are using the correct screws.
- Keep the cable in a bundle for now.

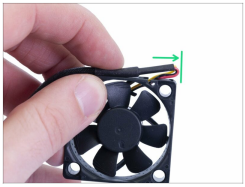
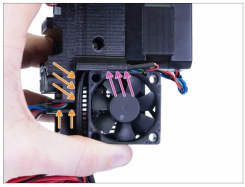
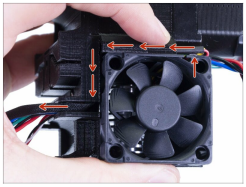
# STEP 24 Hotend fan cable adjustment





- For easier fan installation, remove temporarily the black twist tie from the cable bundle and release at least one loop. Then tie the bundle back, see the picture.
- Before you move to the next step, take an Allen key and **GENTLY PUSH** the motor cable to the channel to create space for the fan cable.

# STEP 25 Hotend fan assembly

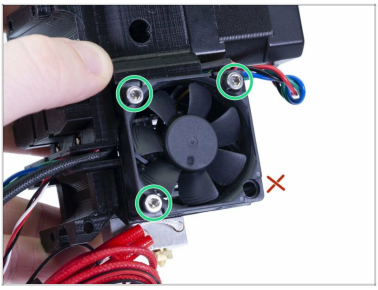




⚠ **The fan has two sides**, one has a Noctua sticker. Make sure, this side is facing inside the extruder.

- First, create a loop on the cable. Make sure the black protective wrap is close to the edge of the fan. See the picture.
- Place the fan on the extruder and proceed in the following way:
  - Start by placing the fan's cable in the upper channel
  - Slide the fan close to the X-carriage and **GENTLY PUSH** the cable in using an Allen key. Before you push the fan all the way to the left, place the cable in the X-carriage channel.

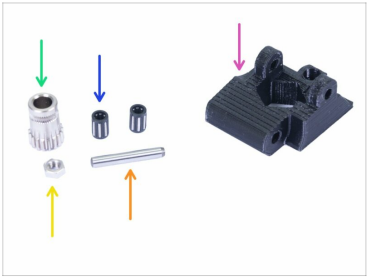
⚠ **FINAL CHECK!** The fan is oriented with the cable facing up, then the cable goes through the upper channel all the way to the X-carriage. In the X-carriage don't forget to use both channels. Make sure the **CABLE ISN'T PINCHED** along the way!

# STEP 26 Hotend fan assembly



- Use the three M3x14 screws to fix the fan in place. Don't over tighten them, you can break the fan's plastic casing. Also make sure the fan can rotate freely.
- Note that the screws are "self-tapping" in the printed parts. There are no nuts.
- Leave the last hole empty, for now.

# STEP 27 Extruder-idler parts preparation

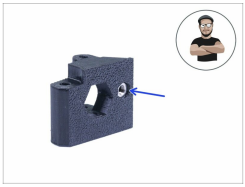


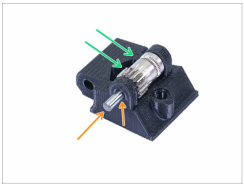
- **For the following steps, please prepare:**
- Extruder-idler (1x)
- Bondtech **WITHOUT** the hole for the set screw (1x)
- Bearing (2x) *might be stuck inside the gear*
- Shaft (1x)
- M3n nut (1x)
- M3x40 screw (2x)
- Idler spring (1x) *place the spring on the screw*

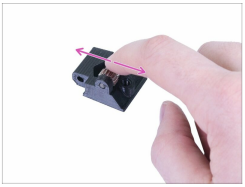
## STEP 28 Bearing assembly

- **Insert both bearings** in the pulley. Be aware that bearings can slip out during assembly.

## STEP 29 Extruder-idler assembly

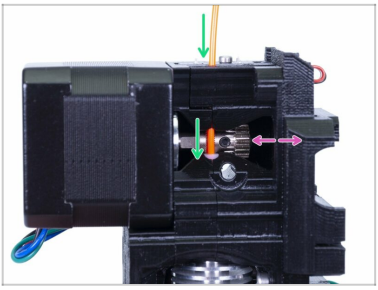






- Take M3n nut and place it in the Extruder-idler.
- Use the screw pulling technique.
- Insert the pulley in idler as shown in the picture.
- Slide the shaft through the idler and pulley. Use reasonable force or you will **BREAK** the printed part. The shaft should be flush with the surface of the printed part.
- Place your finger on the bearing and ensure it can rotate freely.

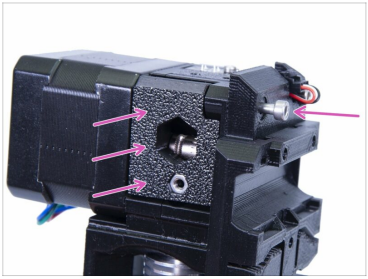
# STEP 30 Filament alignment check

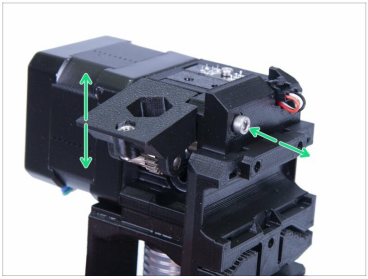


Let's use this opportunity to check once more the proper alignment of the filament and the Bondtech gear.

- Push the filament from the top, through the Bondtech into the PTFE tube.
- Check the alignment and if needed, adjust the position.
- **Tighten the screw, but be careful,** you can easily strip it.
- **REMOVE** the filament.

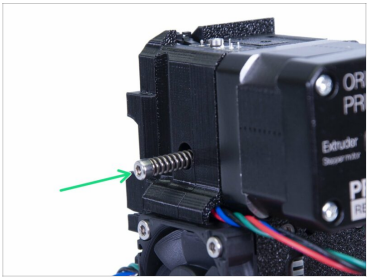
## STEP 31 Extruder-idler mounting

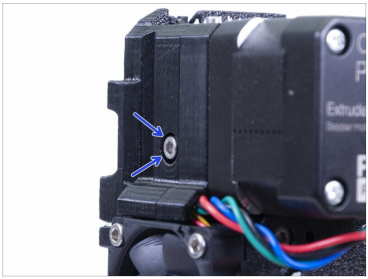




- Place the Extruder-idler in place and secure it using a M3x40 screw.
- Don't tighten the screw too firmly, it serves as a shaft for the idler. Check that the idler can rotate freely.

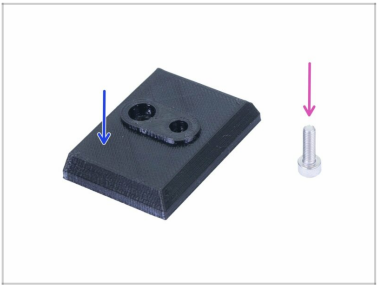
## STEP 32 Pretensioning the Extruder-idler





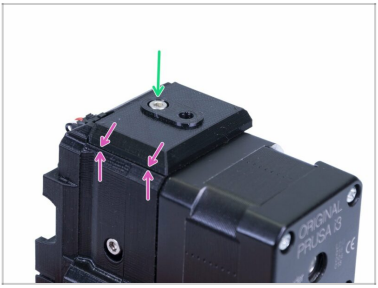
- Use the M3x40 screw with the spring to introduce tension to the Extruder-idler.
- Hold the Extruder-idler on the other side, until the screw reaches the nut.
- Since there is only one screw, you need to introduce a large force. The head of the screw, should be aligned or slightly below the surface.

## STEP 33 FS-cover parts preparation



- **For the following steps, please prepare:**
- FS-cover (1x)
- M3x10 screw (1x)

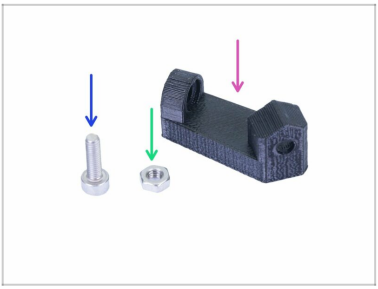
## STEP 34 FS-cover assembly



- Place the FS-cover on the extruder and align it according to the picture. *Tapered sides of the cover must be oriented towards you.*
- Insert the screw (mind the correct hole) and tighten it.

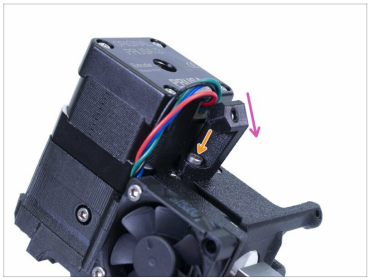
Tip: If you can't reach the nut, try to align it using an Allen key or pulling it up using a longer full-threaded screw from the spare bag.

## STEP 35 Print-fan-support parts preparation



- **For the following steps, please prepare:**
- Print-fan-support (1x)
- M3x10 screw (1x)
- M3n nut (1x)

## STEP 36 Print-fan-support assembly



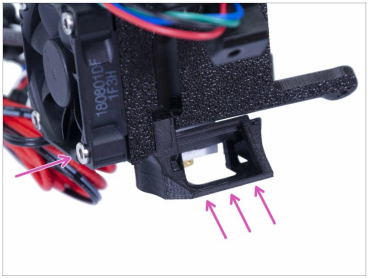
- Take the M3n nut and insert it all the way to the support. **It is crucial!**
- Use the screw pulling technique.
- Place the support on the extruder and ensure the inclined part is facing "down" (towards the nozzle).
- Secure the support using an M3x10 screw.

# STEP 37 Fan-shroud parts preparation

- **For the following steps, please prepare:**
- Fan-shroud (1x)
- M3x20 screw (1x) *(see info below)*
- M3nS nut (1x)

The fan-shroud was initially designed for M3x18 screw, but based on the feedback and to make the assembly more convenient, use M3x20. If your extruder bag includes only two M3x20 screws, please use another one from the spare bag.

# STEP 38 Fan-shroud assembly



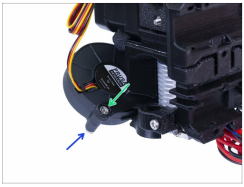
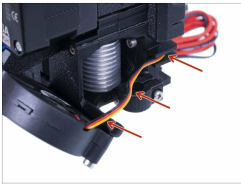
- Insert M3nS nut in the Fan-shroud, all the way in.
- Ensure correct alignment using the Allen key.
- Mount the Fan-shroud to the extruder, secure it using an M3x20 screw. Don't over tighten the screw, you can break the plastic casing. Also make sure the fan can rotate freely.

# STEP 39 Print fan parts preparation

- **For the following steps, please prepare:**
- Print fan (1x)
- M3x20 screw (2x)
- M3n nut (1x)

You need M3x20 screw due to its length. If you have used them accidentally somewhere else, head for the spare bag ;)

# STEP 40 Print fan assembly

- First, slide the fan in the Fan-shroud and make sure it is aligned properly.
- Second, fix the fan in place using one M3x20 screw. **Tighten carefully**, or you will damage the fan's casing.
- Turn the extruder around and insert the M3n nut. No need to pull it in, we will use the screw.
- Place the remaining M3x20 screw from the other side and tighten it, **but carefully**, or you will damage the fan's casing.
- Guide the cable according to the picture in the channel. Bend it slightly towards the extruder. **DON'T stretch the cable!**

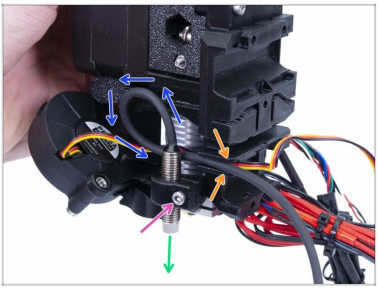
# STEP 41 P.I.N.D.A. sensor parts preparation

- **For the following steps, please prepare:**
- P.I.N.D.A. sensor (1x)

*The look of the sensor might slightly differ.*

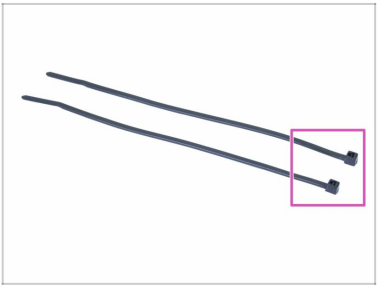
*Due to the multiple vendors, there can be 3 or 4 wires in the connector. Both versions will work correctly, the firmware was adjusted and flashed in the factory.*

## STEP 42 P.I.N.D.A. sensor assembly



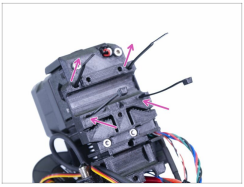
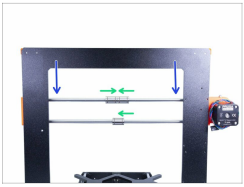
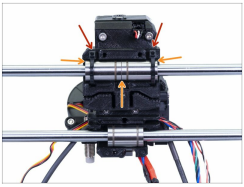
- Insert P.I.N.D.A. sensor in the holder. Exact position doesn't matter, we will adjust it later.
- Tighten the M3x10 screw, but just slightly.
- Create a loop on the cable from the sensor.
- Push the cable in the channel together with the fan cable.

## STEP 43 Extruder parts preparation



- **For the following steps, please prepare:**
- Zip tie (2x)

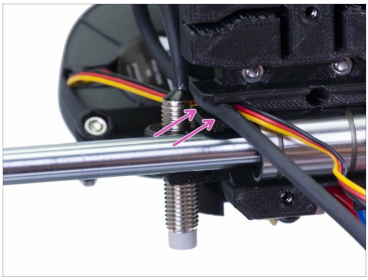
# STEP 44 Extruder preparation and mounting

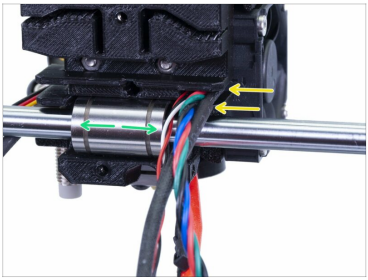




- Insert the zip ties in the X-carriage like in the picture.
- Lower the X-axis at about 1/3 from the top.
- Turn the printer like in the picture with X-axis motor and shorter extrusions facing towards you. Align the bearings similarly to the picture. The exact position of the lower bearing doesn't matter for now.
- Place the extruder on the bearings, the top couple must fit perfectly. Make sure the X-carriage is facing towards you (together with the shorter extrusions).
- We will adjust the lower bearing later on.
- Tighten and cut the zip ties.

⚠ Before you assemble the X-carriage, **check the nuts in the Extruder body are still in place**. The upper nut sometimes falls out.

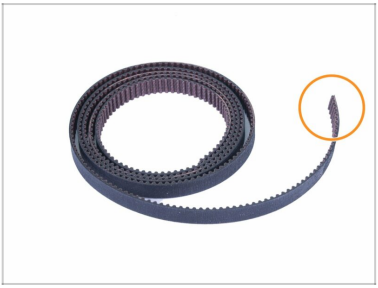
## STEP 45 Extruder channels cable management





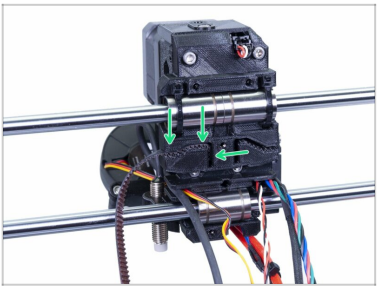
- Place the cables on the P.I.N.D.A. sensor side over the lower smooth rod and push them back in the channel.
- Place the cables on the hotend fan side over the lower smooth rod and push them back in the channel.
- Align the bearing, so it fits nicely in the X-carriage.

## STEP 46 X-axis belt parts preparation



- **For the following steps, please prepare:**
- X-axis belt (850 mm)

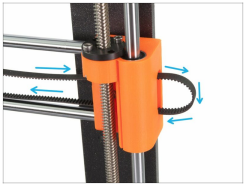
## STEP 47 X-axis belt assembly

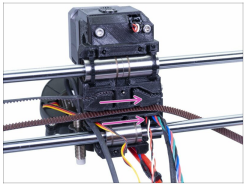


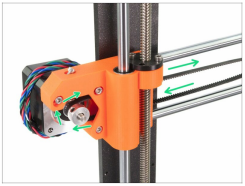
- Insert the flat part of the X-axis belt into the X-carriage as in the picture.

ⓘ Use a screwdriver or the smallest Allen key to push the belt in.

## STEP 48 X-axis belt assembly

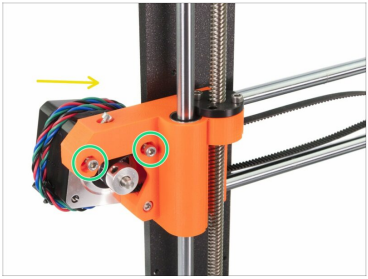


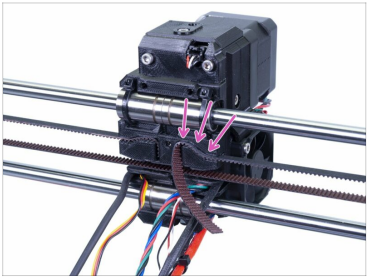




- Guide the X-axis belt through the X-end-idler, around the 623h bearing with the housing and back.
- Continue with the belt through the X-carriage.
- Guide the X-axis belt through the X-end-motor, around the GT2-16 pulley and back.

# STEP 49 X-axis belt assembly



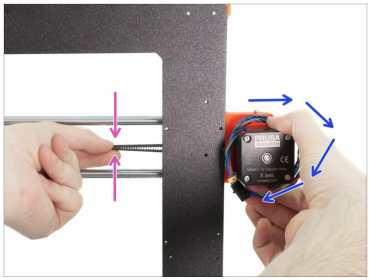


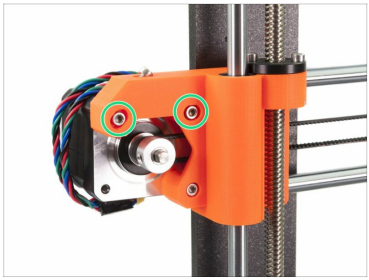
- Before you continue to guide the belt through the X-axis, please release two M3 screws on the X-end.
- Rotate the X-axis motor as indicated towards the frame.
- Insert the flat part of the X-GT2 belt into the X-carriage as in the second picture.

ⓘ Use a screwdriver or the smallest Allen key to push the belt in.

⚠ There will be belt overhang on this side, **DON'T TRIM IT** yet.

# STEP 50 Tensioning the X-axis belt



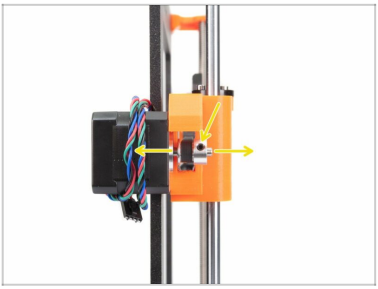


- Using right hand rotate the motor to its original position and hold it (tension is applied to the belt).
- Using two fingers on your left hand push the belt together. Very small force should be needed for bending the belt, BUT the belt shouldn't be bent by its own weight before being pressed with your fingers, it must be straight.

ⓘ If you are struggling to rotate the motor back into position, the belt tension is too high.

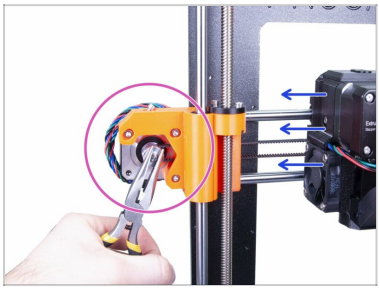
- Depending on the belt being under or overstretched, adjust the amount of the belt in the X-carriage.
- When done, rotate the motor to its original position and tighten the M3 screws again.

# STEP 51 Aligning the X-axis belt



- Both top and bottom part of the belt should be parallel (above each other).
- To adjust the belt position, release the screws on the pulley and move it slightly until you reach the best position.
- Tighten both screws on the pulley.

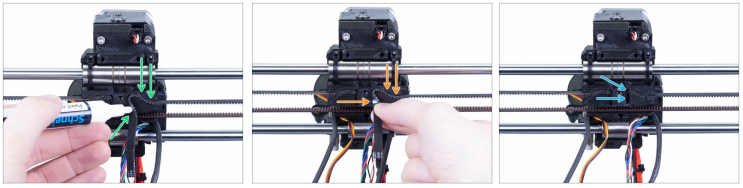
# STEP 52 Testing the X-axis belt



- Use the technique described below to test if the belt is properly stretched.
- Use pliers to hold the X-axis motor shaft.
- Move the extruder towards the X-axis motor. Don't use excessive force.
- If the belt is stretched properly, you should feel a resistance and the extruder won't move at all. If the belt is too loose, it will deform (create a "wave") and jump over the teeth on the pulley.

ⓘ Belt too loose? Return to step 49 and repeat all steps until now. You have to rotate the motor and retighten the belt in the X-carriage. Shortening the belt length by moving one or two teeth outside X-carriage should be enough.

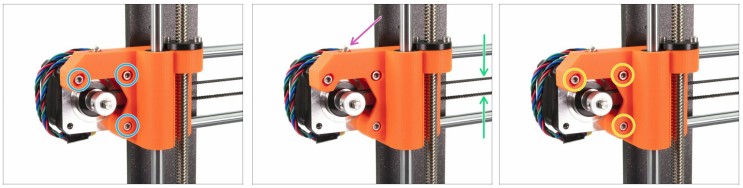
## STEP 53 Trimming the X-axis belt



For the following step we recommend getting a white marker, but you can also trim the belt without it.

- Measure the part, which must be trimmed and gently take the end of the belt away, from the X-carriage, but make sure at least 3-4 teeth are still in the X-carriage, as you don't want to lose the tension. If possible make a mark, where to cut the belt.
- Ensure again your mark is in the correct position and the belt is still stretched.
- Using pliers cut the belt and push it inside X-carriage. Use screwdriver or Allen key, if needed.

## STEP 54 Fine tuning the x-axis belt



In this step, we will finish tensioning the belt. Please read the instructions first, your belt might have proper tension already, then there is no need for additional screw adjustment.

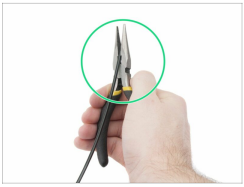
- First, slightly release all the screws holding the motor, otherwise, the upper "tensioner" won't work (the motor must be able to move).

**ATTENTION !!! BE EXTREMELY CAREFUL WHILE TIGHTENING, YOU CAN CRACK THE PART IF YOU OVER TIGHT THE SCREW.**

- Using Allen key start tightening the M3x18 screw inside the X-end-motor, but after each turn or two check the tension in the belt.
- For the optimal performance, the belt must be a bit harder to press with your fingers. Move the extruder all the way to the X-end-idler and try the belt tension in the middle of the X-axis.
- When you achieve optimal tension, please tighten the screws again.

In case you experience X-axis failure during calibration or skipped layers in the X direction, you can adjust this screw accordingly. Tightening the screw stretches the belt. Releasing the screw has opposite effect. Each time don't forget to release the screws on the motor first.

# STEP 55 Nylon guide parts preparation

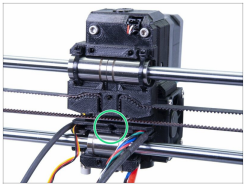
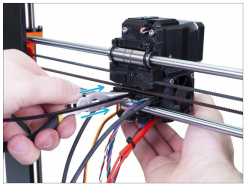
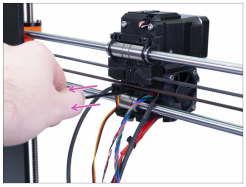

It is recommended to wear **safety glasses** while cutting the nylon filament.

- **For the following steps, please prepare:**
- Black nylon filament 50 cm / 19.7 inch (1x)

The black nylon filament is included in the MK3S Fasteners & ELE package.

- Using the pliers cut one end of the filament to create a tip.
- Check the tip is similar to the third picture.

# STEP 56 Nylon guide assembly

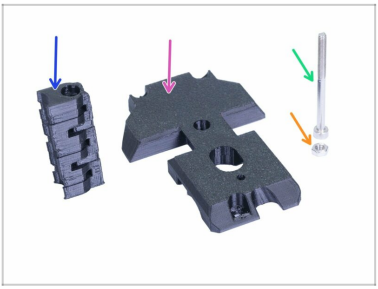




- Locate the hole for the NYLON filament. Using the smallest Allen key ensure there are no obstacles inside.
- Using the pliers **insert and twist the NYLON filament in the slot**. Hold the extruder with your other hand.

⚠ **BE EXTREMELY CAREFUL** as the pliers tend to slide and you can easily damage the wires!!!

- To check if the filament is seated properly, gently pull it with your hand. The X-axis should bend a little, but the filament must remain in the slot.
- If you have issues, try to adjust the tip on the filament.

## STEP 57 X-carriage-back parts preparation



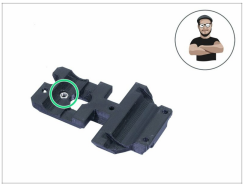
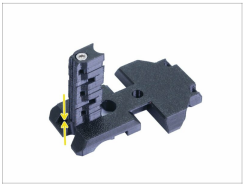
- **For the following steps, please prepare:**
- X-carriage-back (1x)
- Cable-holder (1x)
- M3x40 screw (1x)
- M3n nut (1x)

## STEP 58 Cable-holder assembly

- Prepare the M3x40 screw and cable-holder from the previous step.
- Drive the screw all the way through the printed part.

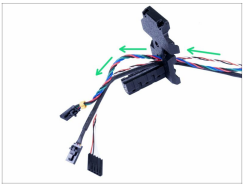
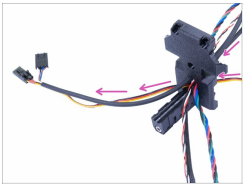
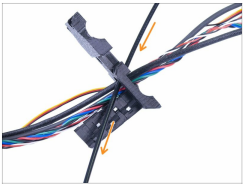
⚠ Note there is a recess (slot) for the screw's head on one side of the printed part.

## STEP 59 X-carriage-back assembly

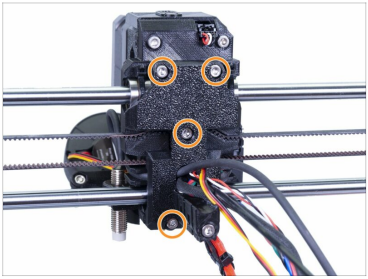

- Take the M3n nut and place it in the printed part (all the way in).
- Use the screw pulling technique.
- Rotate the X-carriage-back and tighten it together with the cable-holder.
- Check the "u-shaped" slot is aligned properly on both parts.

## STEP 60 Mounting the X-carriage-back

- Push the cables from the Extruder **THROUGH** the X-carriage-back. Start with IR-sensor cable, then the extruder motor and hotend fan.
- Next, add the print fan and P.I.N.D.A. sensor cables.
- Cables from hotend are **NOT GOING** through the X-carriage-back!
- Carefully insert the nylon filament and then slide the X-carriage-back towards the X-axis.

# STEP 61 X-carriage-back assembly



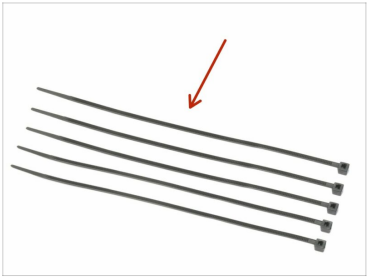
- **For this step, please prepare:**
- M3x10 screw (4x)

⚠ Before you tighten the X-carriage-back, arrange all cables, make sure none is pinched.

- Use all four screws and tighten the X-carriage-back.

ⓘ Tighten the screws with a reasonable force, make sure you won't deform/squeeze the bearings between the printed parts.

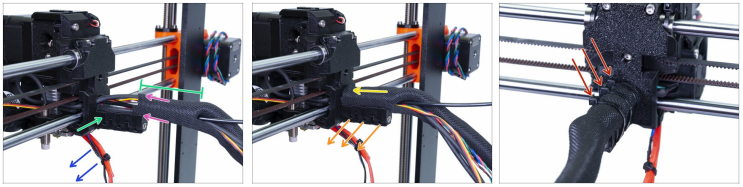
# STEP 62 Textile sleeve parts preparation



- **For the following steps, please prepare:**
- Zip tie (5x)
- Textile sleeve 13 x 490 mm (1x)

There are three textile sleeves in the package, use the largest one (both diameter and length).

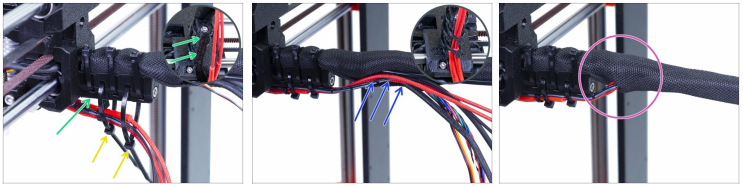
# STEP 63 Tightening the textile sleeve



- Open one end of the textile sleeve and slide it on the cable bundle leading from the extruder. **Don't forget to include the black nylon filament inserted earlier!**
- Leave the cables from the hotend out for now.
- Length of the first wrap should be slightly longer than the cable-holder part, about 5 cm is enough.
- Gently twist the sleeve to make it smaller and tighter around the cables, orient the sleeve's seam downwards, then slide the sleeve towards the extruder.
- **Take 3 zip ties** and insert them into the **lower row** of holes on the cable-holder.
- Twist the sleeve again (without twisting the cables inside) and tighten the zip ties.

⚠ **IMPORTANT:** Cut the remaining part of each zip tie using pliers as closest to its head as possible. Note the correct position of each zip ties's head (slightly off-centre to the left).

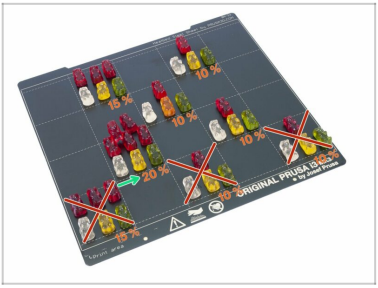
# STEP 64 Tightening the textile sleeve



- Use two zip ties and push them through the upper slots on the cable-holder.
- **ATTENTION!** Before tightening the zip ties add the cables from the hotend. Use the channel in the printed part to arrange them properly.
- Once the hotend cables are included, tighten the zip ties and cut remaining parts.
- Open the textile sleeve and insert the cables from the hotend.
- Compare the look of the cable management with the last picture.

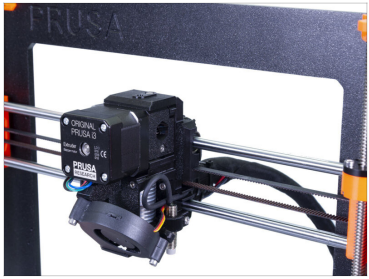
⚠ The zip tie arrangement was tested with the injection molded double spool holder (provided in the kit and assembled later on). If you intend to use any other frame mounted type holder, make sure the zip ties won't crash into it, which might result in a print failure.

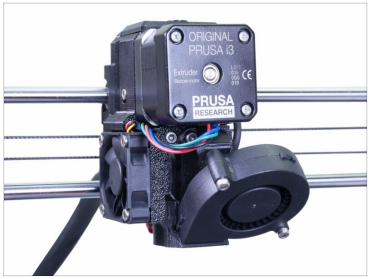
## STEP 65 Haribo time!




- **Hats off! This was the toughest chapter in the history of Original Prusa i3 printers.** Have 20 % of bears and rest for a while ;)

## STEP 66 E-axis is finished!




- **Are we there yet? Almost!**
- Check the final look, compare it to the picture.
- Checked everything? Let's move to: 6. LCD assembly

**Notes:**

**Notes:**

**Notes:**

**Notes:**