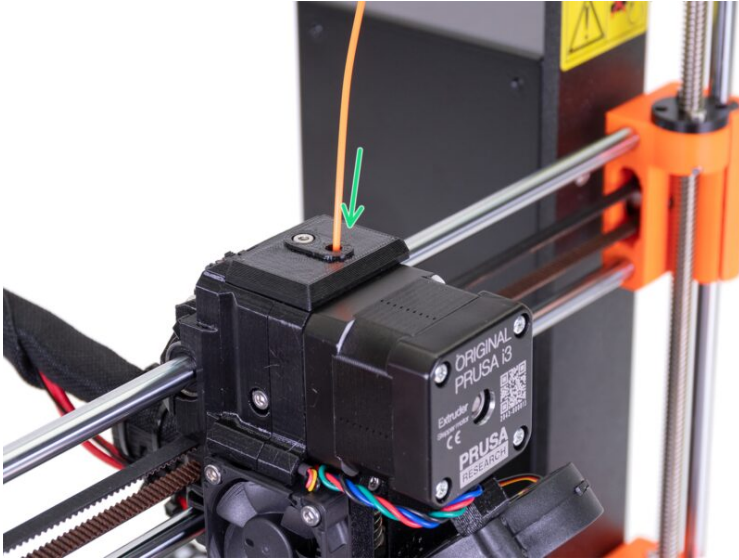


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How to replace an IR-sensor (MK3S/MK3S+)

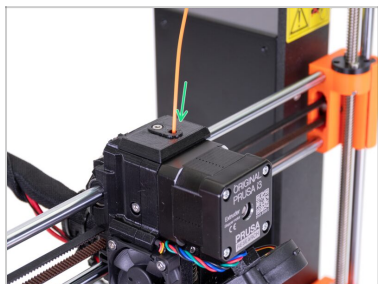


help.prusa3d.com/g162262

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display the latest
version of this
chapter.



STEP 1 Introduction



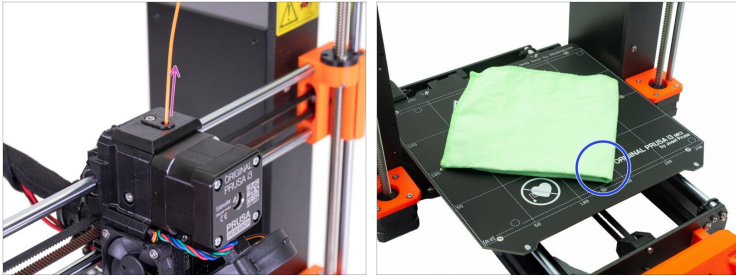
- ◆ This guide will take you through the replacement of the **IR-sensor** on the **Original Prusa i3 MK3S** and **MK3S+**.
- ⓘ Some parts might slightly differ. However, it does not affect the procedure.
- ⓘ All necessary parts are available in our eshop shop.prusa3d.com
- ◆ If the printer does not detect the inserted filament, start by **replacing the IR-sensor**. Follow these steps: Tools necessary for the IR-sensor replacement
- ◆ If replacing the IR-sensor does not help and the printer still does not detect the filament, continue **replacing the IR-sensor cable**. Follow these steps: Tools necessary for the IR-sensor cable replacement

STEP 2 Tools necessary for the IR-sensor replacement



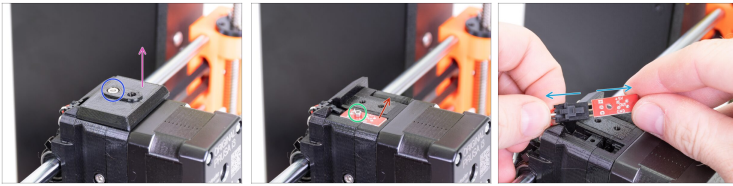
- **For the following steps, please prepare:**
- 1.5mm Allen key
 - 2.5mm Allen key
 - Cloth or piece of fabric 15x15 cm

STEP 3 Preparing the printer



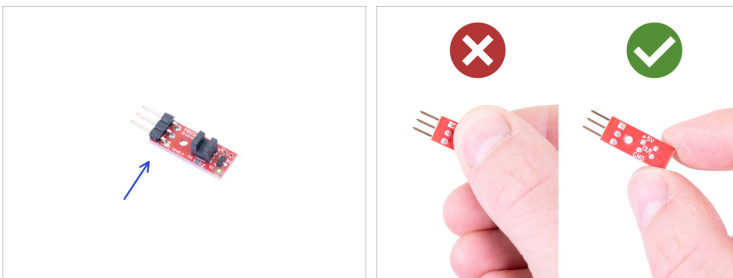
- ◆ Unload the filament from the printer.
- ⚠ **Make sure the printer is cooled down at room temperature.**
- ⚠ **Turn the printer off and unplug it!**
- ⓘ **Before you proceed, it is recommended to protect the heatbed.**
- ◆ Take off the flexible steel sheet.
- ◆ Use any cloth or piece of fabric, which is thick enough and cover the heatbed. This will ensure you won't damage (scratch) the surface during the disassembly.

STEP 4 Removing the IR-sensor



- ◆ Release the screw in the fs-cover.
- ◆ Remove the fs-cover from the extruder.
- ◆ Release the screw on the IR-sensor.
- ◆ Remove the IR-sensor from the groove.
- ◆ Disconnect the IR-sensor from the filament sensor cable and remove it from the printer.

STEP 5 New IR-sensor - parts preparation







- ◆ **For the following steps, please prepare:**
- ◆ New IR-sensor (1x)
- ⚠ **Keep the electronics inside the ESD bag right until you are asked to install them.**
- ⚠ **Always touch the sides of the board while manipulating with it. Avoid touching the chips, capacitors and other parts of the electronics.**

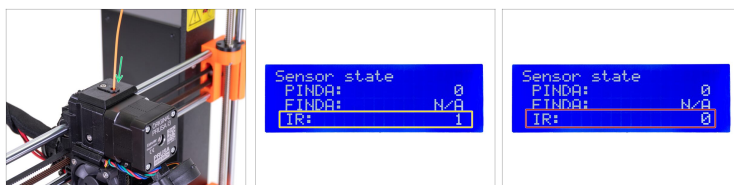
STEP 6 Installing the new IR-sensor



Always touch the sides of the board while manipulating with it. Avoid touching the chips, capacitors and other parts of the electronics.

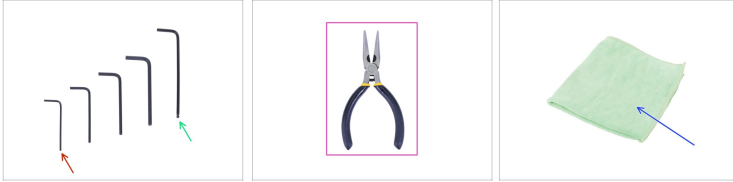
-  Connect the new IR-sensor to the filament sensor cable.
-  Use the notch on the connector for proper orientation and connect it to the filament sensor board, see the picture.
-  Place the IR-sensor on the top of the Extruder-body and secure it with the M2x8 screw. **Make sure the black plastic "u-shaped" part is facing down.**
-  Place the fs-cover on the extruder and secure it with the M3x10 screw. **Do not insert the screw into the filament hole!**

STEP 7 Checking the connector



- ◆ **Check the proper function of the filament sensor:**
 - ◆ Turn the printer ON and at the screen navigate to **Menu** -> **Support** -> scroll down and select **Sensor info**.
 - ◆ Insert a piece of filament into the filament hole in the extruder.
 - ◆ Look at the **Sensor state** on the printer's screen. The printer must indicate **IR: 1** (the filament is detected). Now, please skip to: It's done!
 - ◆ If the printer indicates **IR: 0** (the filament is not detected), continue with the **replacing of the IR-sensor cable**: Tools necessary for the IR-sensor cable replacement

STEP 8 Tools necessary for the IR-sensor cable replacement



● **For this guide, please prepare:**

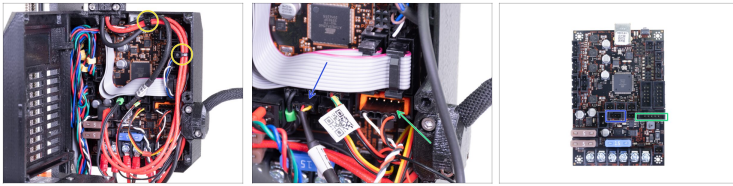
- 1.5mm Allen key
- 2.5mm Allen key (ball-end is recommended)
- Needle-nose pliers
- Cloth or piece of fabric 15x15 cm

STEP 9 Preparing the printer



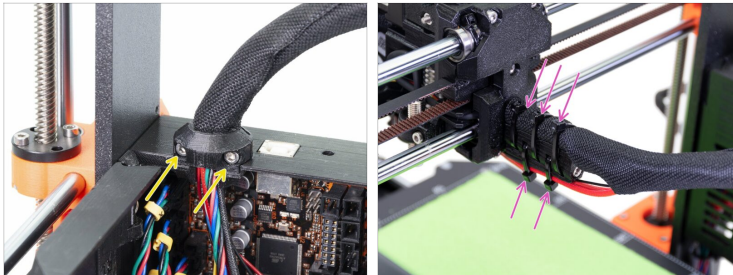
- ◆ Unload the filament from the printer.
- ◆ Move the Z-axis to 1/3 of the axis height.
- ① Hold down the LCD knob for one second until you see the Z-axis movement function on the display. Then turn the knob to move the Z-axis.
- ⚠ **Make sure the printer is cooled down at room temperature.**
- ⚠ **Turn the printer off and unplug it!**
- ① **Before you proceed, it is recommended to protect the heatbed.**
- ◆ Take off the flexible steel sheet.
- ◆ Use any cloth or piece of fabric, which is thick enough and cover the heatbed. This will ensure you won't damage (scratch) the surface during the disassembly.

STEP 10 Disconnecting the IR-sensor cable



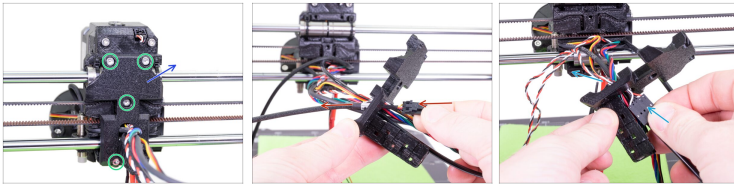
- ✦ Open the electronics box and cut two zip ties on the cable bundle. **Avoid cutting the cables!**
- ✦ Disconnect the IR-sensor cable from the Einsy board.
- ✦ Disconnect the hotend fan from the Einsy board.

STEP 11 Removing the textile sleeve



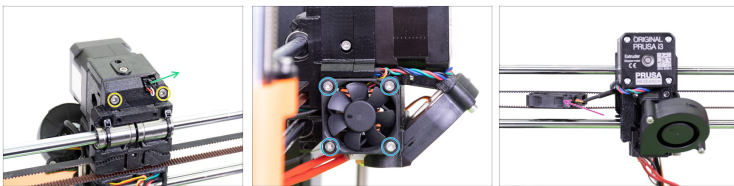
- ✦ Release two screws on the cable clip and remove the clip.
- ✦ Cut five zip ties on the cable holder. **Avoid cutting the cables!**
- ✦ Remove the textile sleeve from the cable bundle.

STEP 12 Removing the x-carriage-back



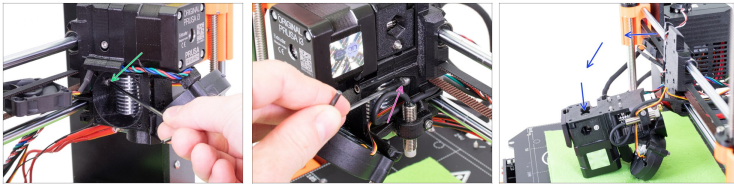
- ◆ Release four screws on the x-carriage-back part.
- ◆ Remove the x-carriage-back from the extruder.
- ◆ Push the hotend fan cable through the opening in the x-carriage-back. Removing the hotend fan cable will give you better access to pushing the IR-sensor cable through the opening.
- ◆ Push the IR-sensor cable through the opening in the x-carriage-back.

STEP 13 Extruder surgery



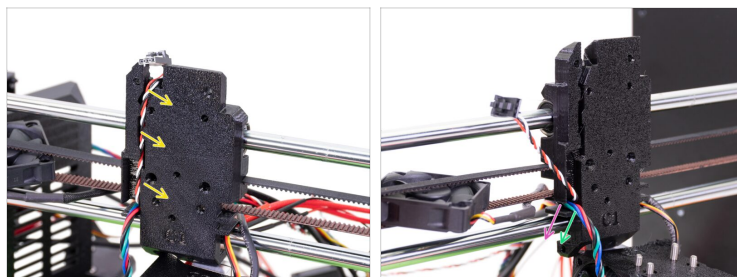
- ◆ Release two screws from the extruder.
- ◆ Disconnect the IR-sensor cable from the IR-sensor.
- ◆ Release four screws from the hotend fan.
- ◆ Remove the hotend fan and place it between the X-belt.

STEP 14 Extruder surgery



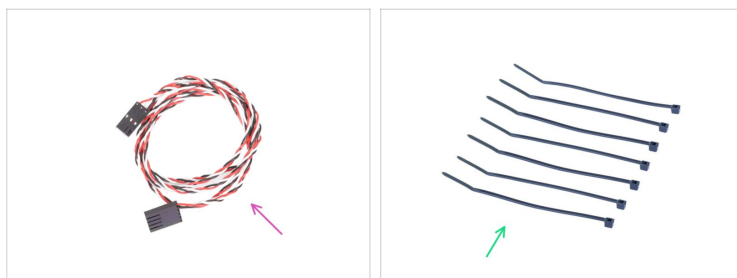
- ◆ Use the ball-end Allen key to loosen the screw in the extruder. No need to remove the screw.
- ◆ Use the ball-end Allen key to loosen the screw in the extruder from the opposite side. No need to remove screw.
- ◆ Carefully put the extruder on the protected heatbed.
- ⓘ If the extruder does not reach the heatbed, move the Z-axis manually down by evenly turning the threaded rods.

STEP 15 Removing the IR-sensor cable



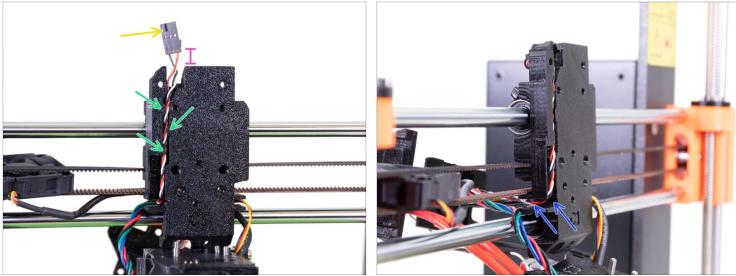
- ✦ Remove the IR-sensor cable from the groove in the x-carriage.
- ✦ Remove the extruder motor cable from the channel in the x-carriage.
- ✦ Remove the IR-sensor cable from the channel in the x-carriage. And remove it from the printer.

STEP 16 New IR-sensor - parts preparation



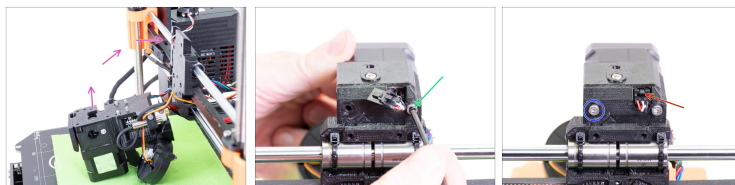
- ✦ **For the following steps, please prepare:**
- ✦ New IR-sensor cable (1x)
- ✦ Zip tie (7x)

STEP 17 Guiding the new IR-sensor cable



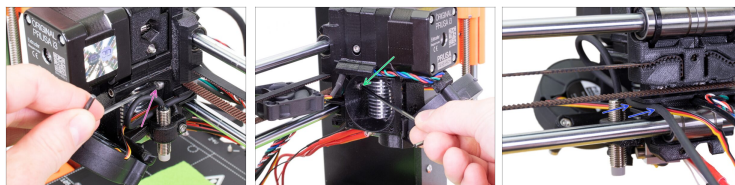
- Take the new IR-sensor cable and locate the end with the smaller connector.
- Place the cable in the X-carriage, use the small printed overhangs to keep the cable inside.
- The distance between the connector and the X-carriage should be around 15 mm (0.6 inch).
- Guide the IR-sensor cable through the channel in the x-carriage.

STEP 18 Reassembly of the extruder



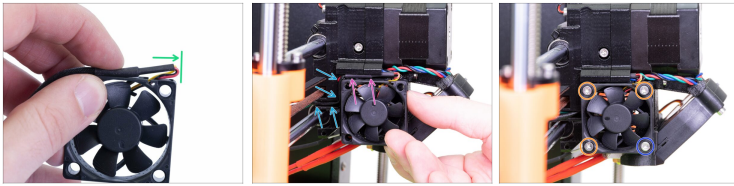
- ◆ Place the extruder back on the x-carriage.
- ◆ Hold the extruder by hand and secure it with one M3x40 screw in the right hole on the back side of the x-carriage.
- ◆ Insert and tighten the M3x40 screw in the left screw hole.
- ◆ Connect the IR-sensor cable to the IR-sensor. Make sure the red cable is on the left.

STEP 19 Reassembly of the extruder



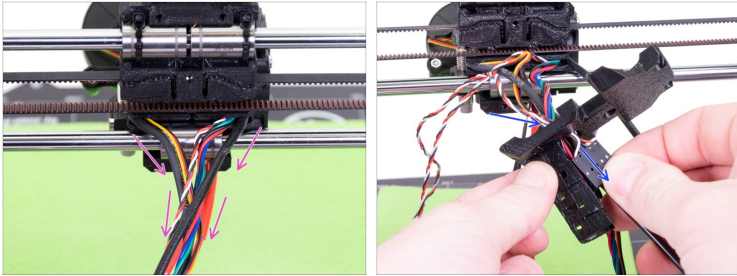
- ◆ Use the ball-end Allen key and tighten the M3x10 screw in the extruder.
- ◆ Tighten the M3x10 screw in the extruder from the opposite side.
- ◆ Push the P.I.N.D.A. sensor cable and the print fan cable in the channel.

STEP 20 Mounting the hotend fan



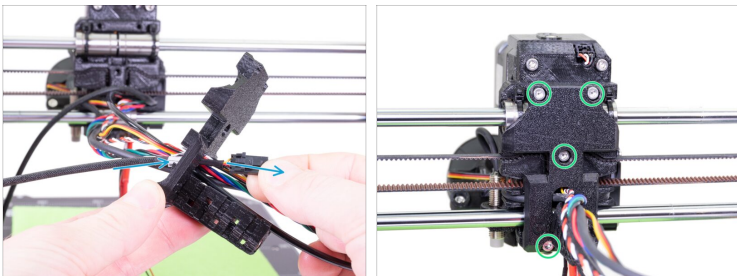
- ⚠ The fan has two sides, one has a Noctua sticker. Make sure, this side is facing inside the extruder.**
- First, create a loop on the cable. Make sure the black protective wrap is close to the edge of the fan. See the picture.
 - ⬛ Place the fan on the extruder and proceed in the following way:
 - 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.
- ⚠ Make sure no cable is pinched.**
- 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.
 - Insert and tighten the M3x20 (M3x18) screw to the fourth hole in the hotend fan.

STEP 21 Mounting the x-carriage-back



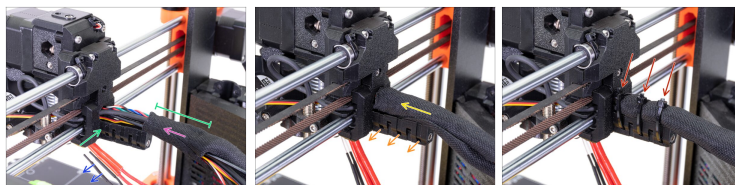
- ◆ Merge all cables from the extruder.
- ◆ Push the IR-sensor cable through the opening in the x-carriage-back part.

STEP 22 Mounting the x-carriage-back



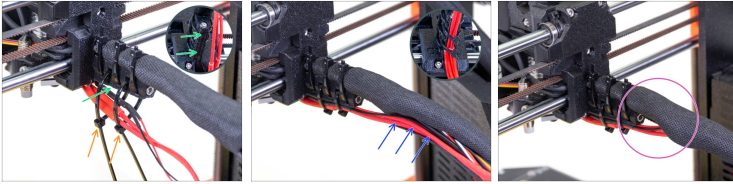
- ◆ Push the hotend fan cable through the opening in the x-carriage-back part.
 - ◆ Place the x-carriage-back to the x-carriage and secure it with four M3x10 screws.
- ⚠ Make sure no wire is pinched between the printed parts!**

STEP 23 Tightening the textile sleeve



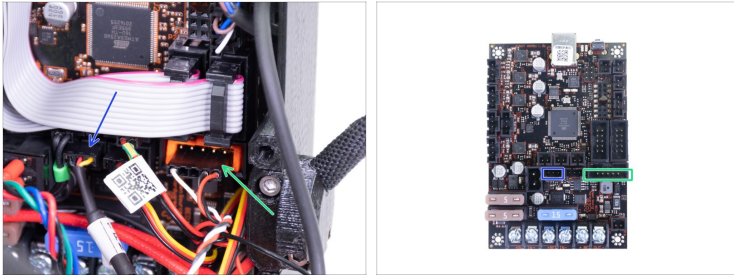
- ◆ Open one end of the textile sleeve and slide it on the cable bundle leading from the extruder. **Don't forget to include the black nylon filament inserted earlier!**
 - ◆ Leave the cables from the hotend out for now.
 - ◆ Length of the first wrap should be slightly longer than the cable-holder part, 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 close to its head as possible. Note the correct position of each zip ties's head (slightly off-centre to the left).

STEP 24 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 25 Connecting the IR-sensor cable



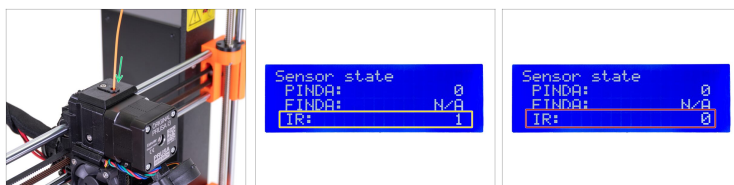
- ◆ Connect the IR-sensor cable to the Einsky board. !!!
USE THE BOTTOM ROW in the slot, leave the upper row free!!!
- ⚠ **Make sure the red cable in the connector is on the right side like in the first picture.**
- ⚠ **NOTE:** Some units may be without a plug aligner (the orange plastic part in the slot). In this case, make sure that all the pins in the bottom row are inserted in the IR-sensor cable connector.
- ◆ Connect the hotend fan cable to the Einsky board.

STEP 26 Guiding the textile sleeve



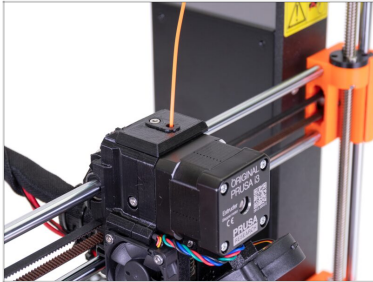
- ◆ Slide the sleeve in the holder at least 3/4 of the holder's height.
- ⚠ Ensure the nylon filament isn't pushing the motor cables and if needed slightly unwrap the sleeve and push the filament up.
- ◆ Use the Extruder-cable-clip and two M3x10 screws to fix the cable bundle in place.
- ◆ Manage all cables in the Einsy base like in the picture.
- ◆ Guide the hotend fan cable like in the picture.
- ◆ There are two perforations in the right corner of the Einsy base. We will use them for securing the cable bundle.
 - ◆ Push the zip tie through the lower perforation and tie the cable bundle. Make sure the hotend fan cable is not included in the cable bundle. **Do not overtighten the zip tie!**
 - ◆ Push the zip tie through the upper perforation and tie the cable bundle. **Do not overtighten the zip tie!**

STEP 27 Final check



- ◆ **Check the proper function of the filament sensor:**
 - ◆ On the printer's screen navigate to **Menu** -> **Support** -> scroll down and select **Sensor info**.
 - ◆ Insert a piece of filament into the filament hole in the extruder.
 - ◆ Look at the **Sensor state** on the printer's screen. The printer must indicate **IR: 1** (the filament is detected).
 - ⚠ **If the printer indicates IR: 0 (the filament is not detected), go through the procedure again. Check the connectors are plugged correctly.**

STEP 28 It's done!



⚠ **NOTE:** If you moved the Z-axis manually during the surgery (by manually rotating the threaded rods), you must calibrate the Z-axis.

- ◆ On the printer's screen navigate to the **Menu** -> **Calibration** -> **Calibrate Z** and follow the instructions on the screen.
- ◆ **Good job!** The filament sensor works well ;)
