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How to replace Nextruder heatsink (XL Multi-tool)

help.prusa3d.com/g559633

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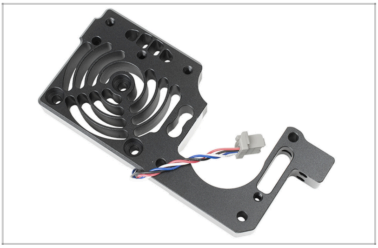
STEP 1 Introduction



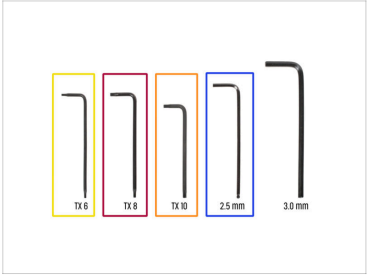
- This guide will take you through the replacement of the **heatsink** on the **Original Prusa XL (Multi-tool)**.

The **following instructions are intended for XL multi-tool only**, although most steps are common. A single-tool version will be offered at a later time.

Some parts might slightly differ. However, it does not affect the procedure.

The following instructions require extreme attention. The procedure involves direct intervention in the planetary gearbox.

STEP 2 Tools necessary for this guide



- **For this guide, please prepare:**
- Torx TX10 key
- Torx TX6 key
- Torx TX8 key
- 2.5 mm Allen key
- Universal wrench
- Nose pliers
- Side cutters *recommended for cutting zip ties*

STEP 3 Additional parts

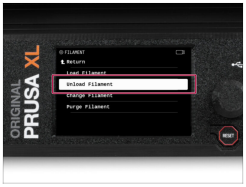
- **For this guide, please prepare:**
- Prusa lubricant (1x) *supplied with your printer*
- PG-assembly-adapter (1x)

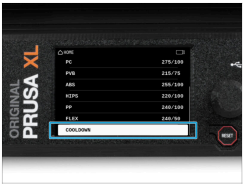
  ⚠ **The PG-assembly-adapter is not included in the box** and needs to be printed. You can download the STL file from printables.com.

  ⓘ The STL file is located in **Parts for maintenance** section. Before proceeding, please ensure to **review the recommended print settings** provided in the caption.

⚠ **DO NOT continue without the PG-assembly-adapter. It is necessary for the assembly!**

STEP 4 Unloading filament



The following step is only necessary if you have a filament loaded in the current toolhead.

- Unload the filament from the hotend. On the screen, navigate to *Filament -> Unload Filament* and select the tool, you want to working on.
- Remove the filament from the hotend. It is not necessary to completely remove it from the printer. Just a few centimeters (inches) above the extruder.
- Cool down the printer to room temperature. On the screen, navigate to *Preheat -> Cooldown*.

CAUTION: Wait for the printer to fully cool down to room temperature before proceeding further.

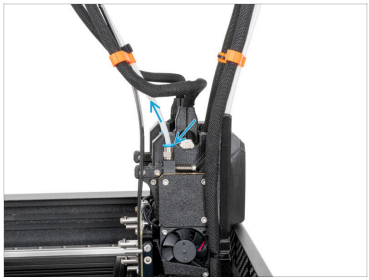
STEP 5 Preparing the printer

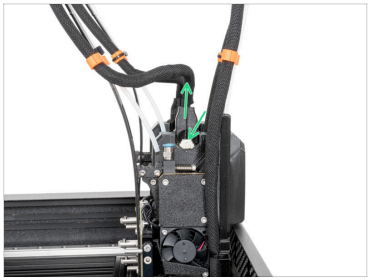
- On the printer screen, navigate to *Control -> Pick/Park Tool -> Park Current Tool*.
- Turn the power switch OFF (symbol "O").
- From the rear side of the printer, unplug the PSU cable.

STEP 6 Protecting the heatbed

- **Before you proceed, it is recommended to protect the heatbed.**
- Make sure the heatbed is cooled down to ambient temperature. Place the empty cardboard box approximately to the front center part of the heatbed.

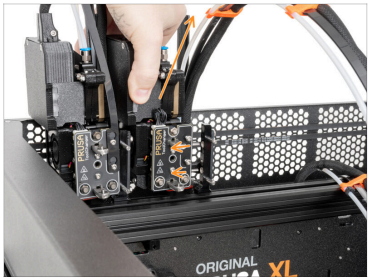
STEP 7 Nextruder cable bunde unpluging





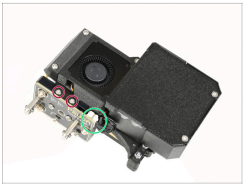
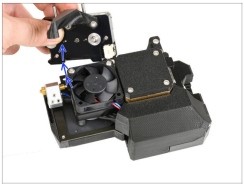
- On the selected toolhead you want to work on:
  - Locate the FESTO (QSM-M5) fitting, press the blue collet and unplug the PTFE tube from the second Nextruder. Leave the PTFE hanging freely.
  - Locate the Nextruder cable, press the secure pin and unplug the cable from the second Nextruder. Leave the cable hanging.

STEP 8 Nextruder unlocking



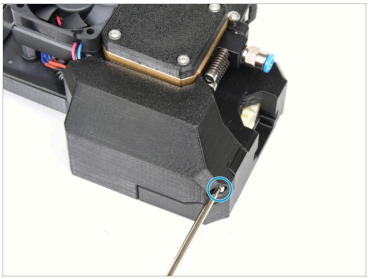
- On the selected toolhead you want to work on:
  - From the front side of the Nextruder, using a T10 screwdriver, loosen (a few turns are enough) two M3x8r screws and take off the cable support.
  - Gently undock the Nextruder and put it aside.

STEP 9 Removing the toolchanger board

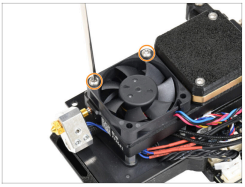
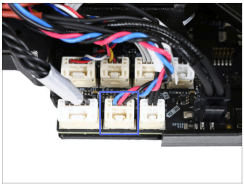
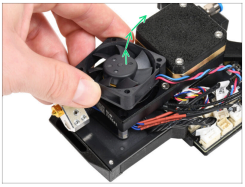
- Using a T10 screwdriver, remove the M3x30 screw holding the fan-shield.
- Turn the nextruder with the print fan facing up.
- Remove the M3x8rt screws from the tool-changer using a T10 screwdriver..
- Unplug the toolchanger cable. Press the safety latch while disconnecting the connector.
- Remove the toolchanger from the Nextruder.

STEP 10 Accessing the Dwarf board




- Loosen the M3x16 screw, just a few turns are enough to release the dwarf-cover-door. **No need to removing the screw completely.**
- Open the dwarf-cover-door widely.

STEP 11 Removing the heatsink fan

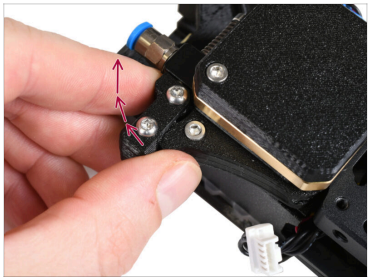
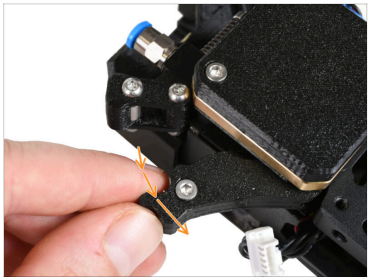




- Remove two M3x20rT screws from the heatsink fan using a T10 screwdriver.

⚠ Each connector has a safety latch. **It is necessary to press the latch before disconnecting.** Otherwise, the connector may get damaged.

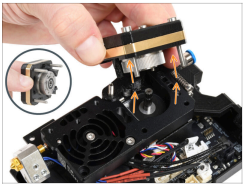
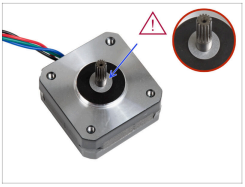
- Unplug the heatsink fan cable from the Dwarf board.
- Remove the heatsink fan and put it aside.

STEP 12 Opening the extruder idler

- Push the idler-swivel upward.
- Pull the idler-lever downward in order to release tension on the gearbox.

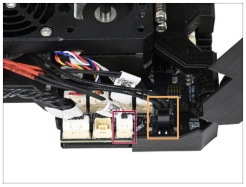
STEP 13 Removing the gearbox & motor assembly

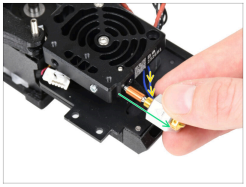




- Fully loosen three M3x25 screws from the printed gearbox cover. **Keep the screws in the assembly, don't remove them completely.**
- Carefully slide the gearbox assembly off. **It is necessary to remove the entire assembly in one piece.** This means PG-cover (top plastic cover), PG-ring (brass ring), PG-assembly (metal gears), and main-plate (bottom plastic plate), all joined by M3x25 screws.
- Set the gearbox assembly and the extruder motor aside.

  ⚠ **Pay attention to not lose the spacer from the motor shaft.**

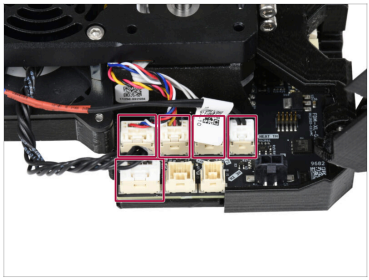
STEP 14 Removing the hotend

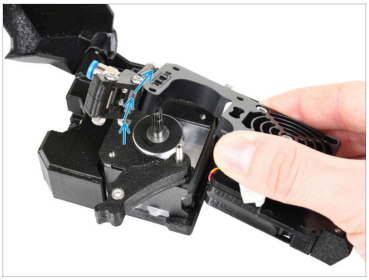




- Unplug the hotend thermistor cable from the Dwarf board. **Press the safety latch while disconnecting the connector.**
- Unplug the hotend heater cable from the Dwarf board. **Press the safety latch while disconnecting the connector.**
- With a Torx TX 8 key loosen the grub screw in the extruder. **Do not remove the screw completely.** A few turns are enough to release the hotend assembly in the heatsink.
- Carefully pull the hotend assembly out of the heatsink.
- At the same time pull the disconnected hotend cables from below the heatsink.

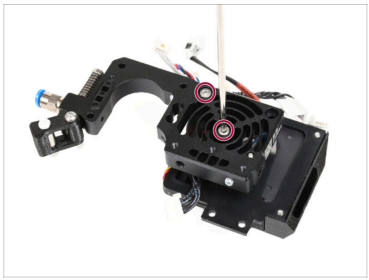
STEP 15 Removing the heatsink assembly

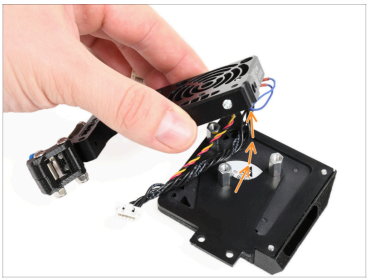




- Unplug all remaining cables from the Dwarf board. Press the safety latch while disconnecting each connector.
- Remove the heatsink assembly and set it aside.

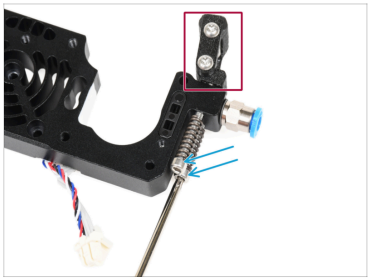
STEP 16 Removing the print fan

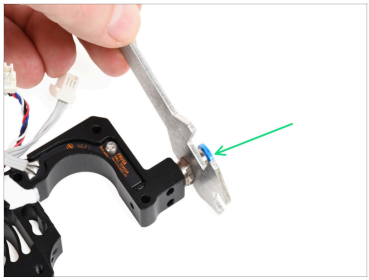




- Remove the two M3x10 screws from the heatsink with a 2.5 mm Allen key.
- Separate the heatsink and the print fan.
- Set the print fan aside. We will need it later again.

STEP 17 Removing the idler-swivel

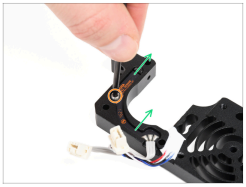


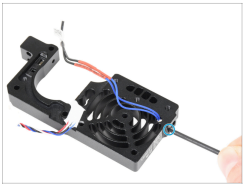


- Remove the two M3x30 screws to remove the idler-swivel from the heatsink.
- Remove the idler-swivel from the heatsink.
- Remove the festo with a universal wrench.

⚠ **Be careful to not lose the springs.**

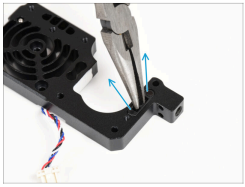
STEP 18 Removing the NTC thermistor & Hall sensor





- Unscrew the M2.5x6rT screw to remove the Hall filament sensor.
- Carefully remove the Hall filament sensor.
- Release the set screw from the bottom of the heatsink to remove the NTC thermistor.
- Pull the NTC thermistor out from the heatsink.

STEP 19 Removing the filament sensor



⚠ **BE EXTRA CAREFUL when removing the filament sensor.** The filament sensor contains a tiny parts (spring, magnet, steel ball) that tend to fall out when the sensor is removed.

- Very carefully pull the filament sensor out from the heatsink using the needle-nose pliers.

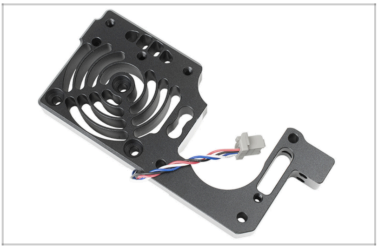
  ⚠ **CAUTION: Avoid gripping the part firmly, as this may cause irreparable damage.**

  ⚠ **Don't lose the small parts!** You will need them again later. **Keep them aside in a safe place.**

- Remove the grub screw from the heatsink.

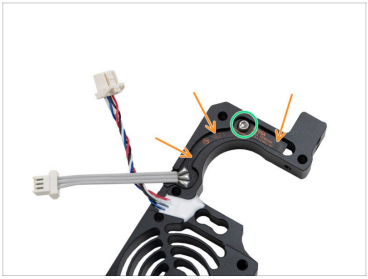
  ⓘ Tip: store small parts in a box or bowl.

STEP 20 New heatsink: parts preparation



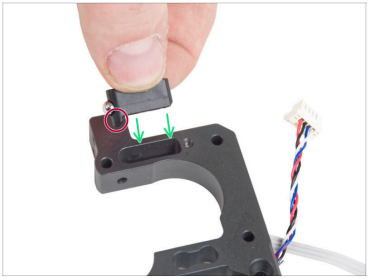
- **For the following steps, please prepare:**
- New heatsink (1x)

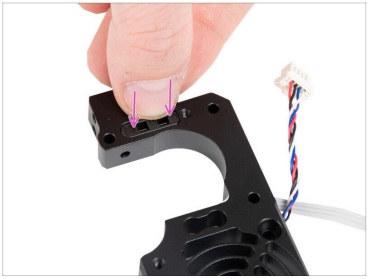
STEP 21 Installing the Hall sensor



- Place the Hall filament sensor into the similarly shaped pocket in the heatsink.
- Fix it with M2.5x6rT screw. Tighten it very carefully, you can crack the electronics board.
- Insert the grub screw into the slot closer to the bottom of the heatsink. See the picture.

STEP 22 Installing the filament sensor



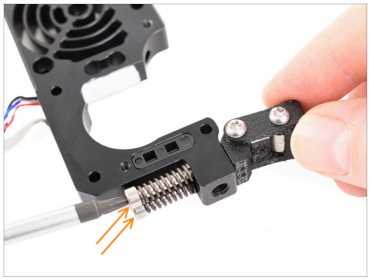


- Insert the Prusa ball holder assembly into the heatsink. Make sure the steel ball part is closer to the side of the heatsink.

⚠ Note the correct orientation of the Prusa ball holder assembly. There is a protrusion on the part. The protrusion must be facing down.

- Push the assembly into the heatsink.

STEP 23 Mounting the idler-swivel

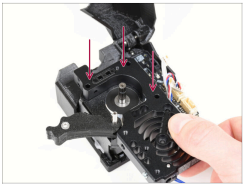
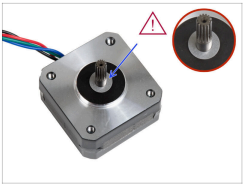


- Tighten the idler-swivel with two M3x30 screws.

  ⓘ Note the correct orientation of the part. The screw heads on the idler-swivel must be facing up (like in the picture).

- The tip of each screw should be flush with the plastic part on the other side.

STEP 24 Inserting the NTC thermistor

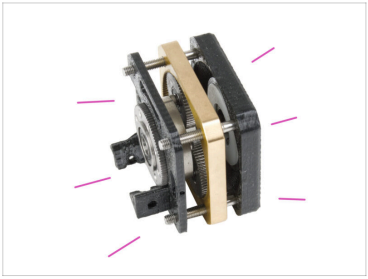
- On the extruder motor side, insert the NTC thermistor into the hole in the heatsink.
- Secure it with the M3x4T grub screw. Screw it all the way in. Tighten gently, but firmly using two fingers and the short side of the T6 Torx key. Applying more force may cause permanent damage to the thread.
- Align the heatsink with the motor assembly.

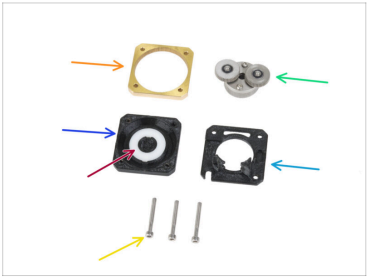
⚠ Double-check that the spacer is still in place on the motor shaft!

STEP 25 Gearbox assembly: parts preparation


- **For the following steps, please prepare:**
- Gearbox assembly (1x) *you took from Nextruder*
- PG-assembly-adapter (1x)

STEP 26 Preparing the gearbox parts





- Dismantle the gearbox assembly into its component parts:
  - PG-ring (1x)
  - PG-assembly (1x)
  - PG-front-case (1x)
    - ⚠ Make sure there is a plastic spacer inside the case. It can be black or white. **Do not remove the plastic spacer** from the case.
  - Main-plate (1x)
  - M3x25 screw (3x)
- Using a paper towel clean all the parts from grease.

STEP 27 Assembling the gearbox

- In the following steps, we will reassemble the entire gearbox assembly to ensure proper installation.

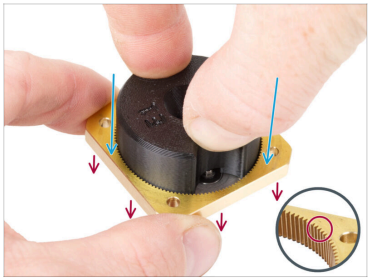
⚠ **The following instructions need to be done correctly and carefully.** Achieve better understanding and successful assembly by watching the video alongside the guide: prusa.io/PG-assembly

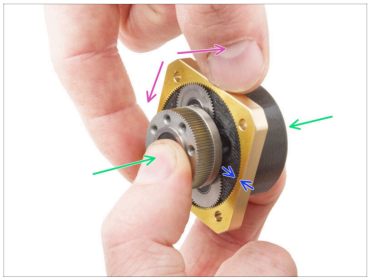
ⓘ The video is for MK4, but the procedure is identical.

- After watching the video, follow the steps in this guide.

- Attach the PG-assembly-adapter on the PG-assembly. Note the pockets for the gears in the adapter.

STEP 28 Assembling the PG-ring

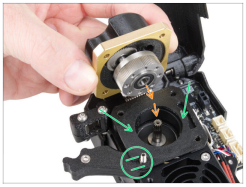
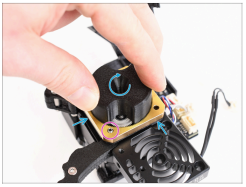
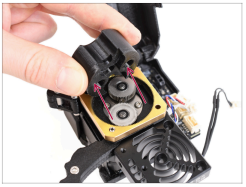




⚠ **Do not assemble the gearbox without the PG-assembly-adapter.** This tool is intended to ensure that the gears are correctly fit together.

- Slide the PG-ring onto the adapter.
  - Note there is a chamfer on one side of the PG-ring teeth. This side must be facing down (to the PG-assembly).
- Grasp the entire assembly in one hand so that it can be rotated with the PG-ring.
- With the other hand, slide the PG-ring onto the PG assembly in a wobbling motion (move the PG-ring left and right repeatedly) - a quarter turn is enough.
- Stop when the surfaces of the gears are approximately flush with the surface of the PG ring.

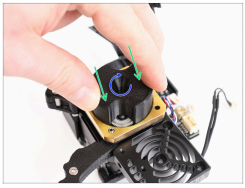
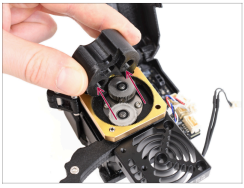
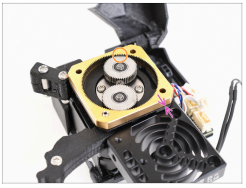
STEP 29 Mounting the gearbox

Proceed very carefully in this step.

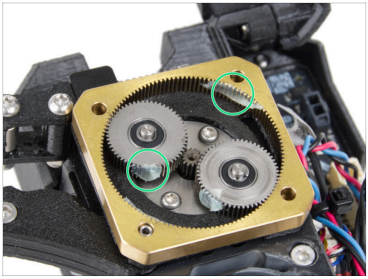
- Attach the main-plate on the heatsink. Note the orientation of the part. Use the cutout for the socket screw as a guide (lower left corner).
- Maintain the position of the PG-assembly and attach it on to extruder motor shaft.
- Make sure the PG-ring perfectly fits on the socket set screw.
- Very gently and freely rotate with the whole PG assembly (PG-assembly-adapter, PG-assembly and PG-ring) until it drops down so that there is minimal gap between the assembly and the main-plate. Do not push on the assembly.
- Remove the PG-assembly-adapter.

STEP 30 Checking the PG assembly

- Attach the PG-assembly-adapter back on the PG-assembly again to verify that all parts are properly seated.
- Rotate with the PG-assembly-adapter. The PG assembly must be easy to rotate without having to exert much force.
- Remove the PG-adapter. You will no longer need it during assembly. We recommend keeping it for maintenance.
- Ensure that the PG-assembly is not sticking out above the PG-ring. It should be positioned lower than the level of the PG-ring's surface or at the same level as the ring.
- There must be no gap between PG-ring and the Main-plate. If you see a gap, remove the planetary gear assembly and repositon it again.

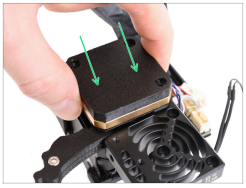
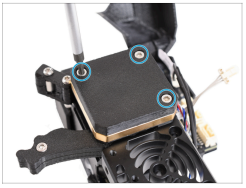
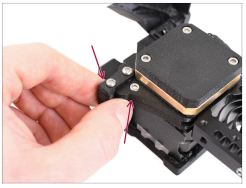
STEP 31 Lubricating the gears



- Open the Prusa Lubricant. Using the opposite side of the cap, puncture the hole in the opening of the tube.
- Apply a small amount of Prusa Lubricant all around the PG-ring and PG-assembly teeth.

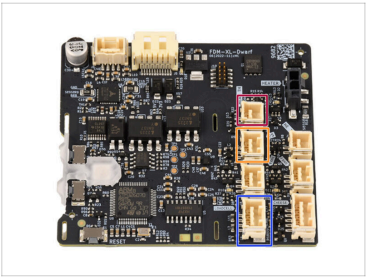
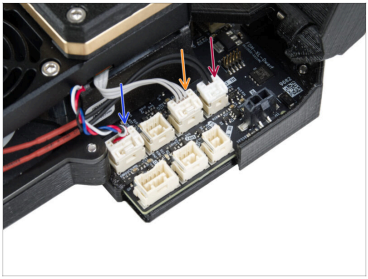
  ⓘ Tip: apply a small amount of lubricant to the tip of the zip tie and then spread the lubricant over the gears.
- Using a paper towel, wipe off any excess lubricant on the front surfaces.

STEP 32 Covering the gearbox

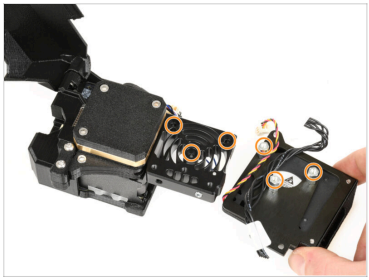
- Place the PG-case on the gearbox.
- Insert three M3x25 screws into the PG-case, but do not tighten them completely. They will be tightened later.
- Close the idler-lever and lock it in position with the idler-swivel.

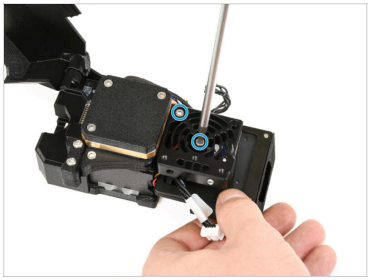
STEP 33 Connecting the Nextruder cables

- Plug the load cell sensor cable into the Dwarf board.
- Plug the filament sensor cable into the Dwarf board.
- Plug the heatsink thermistor cable into the Dwarf board.

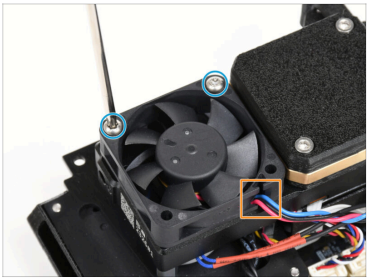
STEP 34 Attaching the Tool Changer board & print fan assembly

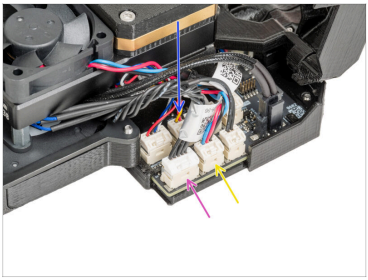




- Prepare the Tool changer board & print fan assembly.
- Align the three metal spacers with the holes in the heatsink, make sure the board and fan cables are guided below the top spacer before you attach the heatsink, so that they are not pinched.
- Use the M3x10 screws to secure the heatsink & gearbox assembly to the spacers on the print fan cover. Start with the centre screw, taking care not to pinch any cables.

STEP 35 Mounting the hotend fan



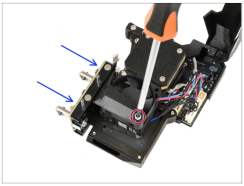
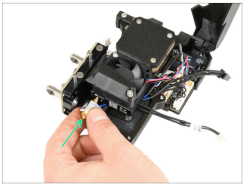


- Attach the hotend fan to the heatsink with its cable positioned as can be seen in the picture.

⚠ Mind the orientation of the fan.

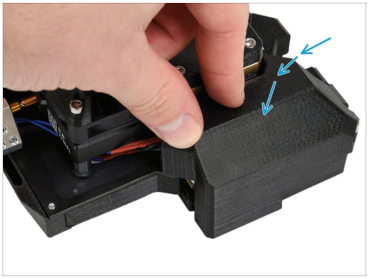
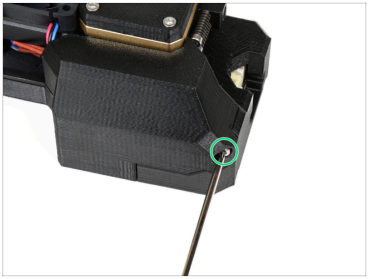
- Secure the heatsink fan with two M3x18rT screws.
- Plug the print fan cable into the Dwarf board.
- Plug the toolchanger cable into the Dwarf board.
- Plug the hotend fan cable into the Dwarf board.

STEP 36 Reattaching the toolchanger board and the hotend

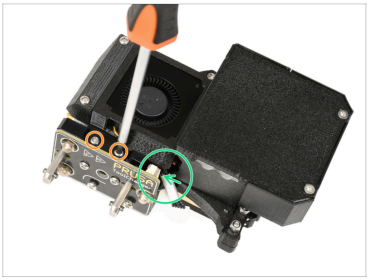

- Attach the toolchanger board with the heat shield to the Nextruder.
- Secure the fan shield with a M3x30 screw.
- Insert the hotend into the heatsink.
- ⚠ Lead the hotend cables between the heatsink spacers as shown in the picture and make sure that they are not pinched.
- Plug in the hotend thermistor cable.
- Plug in the hotend heater cable.

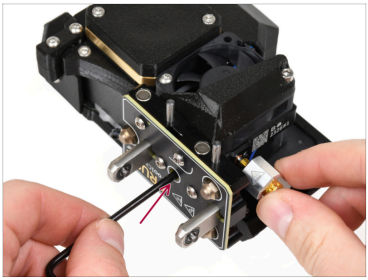
STEP 37 Covering the Dwarf board

- Close the printed Dwarf board cover on the Nextruder.
- Tighten the M3x12 screw.

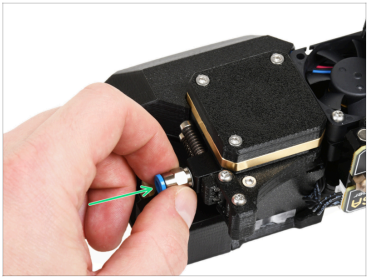
STEP 38 Securing the toolchanger and the hotend

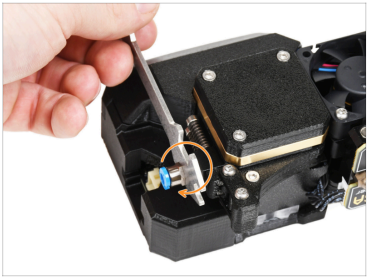




- Secure the toolchanger with two M3x8rt screws.
- Connect the toolchanger cable.
- While pushing the hotend into the heatsink, tighten the grub screw with a Torx TX 8 key.

STEP 39 Mounting the festo

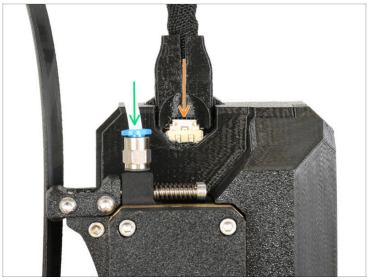


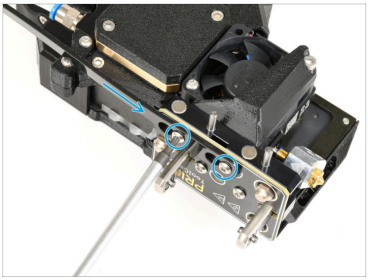


ⓘ Starting from September 2024, you may receive a new black Fitting M5-4. The assembly and functionality remain identical to the blue one.

- Mount the festo on the top of the heatsink.
- Gently tighten the festo with a uni-wrench.

STEP 40 Connecting the nextruder

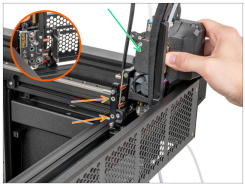
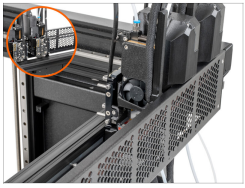
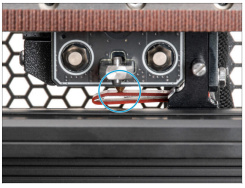




- Insert the PTFE tube into the festo connector as far as possible. Slighty tug on the PTFE tube to make sure it's firmly secured.
- Plug the Dwarf extruder cable to the Dwarf board.
- Slide the black nylon plate onto the screws in the Cheese board, and tighten them with a Torx T10 key.

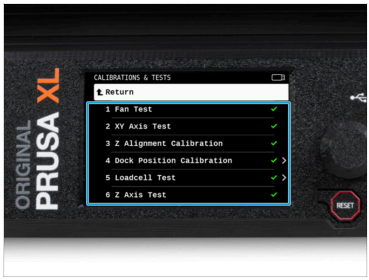
⚠ Make sure the nylon plate is not twisted.

STEP 41 Docking the tool

- Carefully turn the printer so that the front side is facing towards you.
- Take the Nextruder and place it carefully next to the dock.
- Place the two metal inserts through the white holes in the dock. The magnets will help you dock the Nextruder.
- Check that the Nozzle seal lightly touches the nozzle.

STEP 42 Wizard



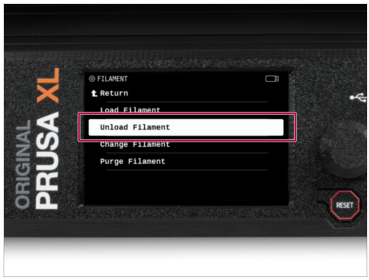
- From the rear side of the printer, plug in the PSU cable.
- Turn the power switch ON (symbol "I").
- Run the tests from the *Control - Calibration & Tests* menu.

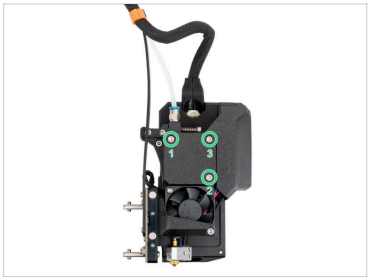
The wizard will test all important components of the printer. The whole process takes a few minutes. Some parts of the wizard require direct user interaction. Follow the instruction on the screen.

NOTE: While testing the axes, make sure that there is nothing in the printer that is obstructing the movement of the axes.

WARNING: Do not touch the printer during the wizard unless prompted! Some parts of the printer may be HOT and moving at high speed.

STEP 43 Calibrating the Nextruder gears





- Plug in the printer and turn it ON.
- Now we need to simulate the movement of the gearbox. On the LCD screen, navigate to Filament - *Unload filament.*
- As soon as the extruder's movement finishes, tighten the three M3x25 screws on the PG-case in the correct order (shown on the picture).
- Then loosen the screws slightly and repeat the process, tightening the screws in the correct order. This ensures that the gearbox is seated correctly.

STEP 44 Well done!

- **Congratulation**s, you have just successfully replaced the heatsink on your Original Prusa XL!

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