

Nozzle Change

Filament Maker TWO

Introduction

The nozzle of the Filament Maker TWO can be removed. This can be done for the purpose of cleaning, changing to a different size, or to conduct a maintenance check. This document provides a step by step guide with pictures, safety warnings, and detailed instructions. The tools and consumables required for the procedures are listed below:

Common tools

These tools are not provided by 3devo, but are required to perform maintenance tasks and part replacements. They can easily be sourced locally.

- Pliers, to remove plastic debris
- Tweezers, to remove plastic debris
- Heat resistant gloves

Maintenance kit tools

These are tools provided by 3devo.

- Wrench 21mm, for the nozzle, and nozzle adapter
- 2.5mm Allen key for panel screws
- 5mm Allen key for H4 bolts

Consumables:

These consumables are provided by 3devo and machine specific.

- Nozzle adapter, connects die head to nozzle
- Nozzle gasket x2, installed on both ends of the nozzle adapter
- Nozzle (sizes 4mm, 3mm, and 2mm)
- Nozzle cover, installed between outside of nozzle and nozzle plate

Nozzle Change

Safety

1. Carry out procedure with two persons!
2. Hazards of burns! Use necessary tools and protective equipment.

Preparation

The nozzle is easier to remove when the material is still hot and partially melted. For ease and reduced risk of damage, we recommend using 3devo supplied PLA or HDPE. Once the machine is switched off after extrusion, the heaters will slowly lose heat. This is approximately within 30 minutes of switching off the Filament Maker TWO. It's important to move at a steady but safe pace.

Prepare the machine

1. Stop extrusion by setting all Heaters to 0 degrees and hit 'Confirm'.
2. Stop screw rotation by pressing 'Stop' on screw speed.
3. Switch OFF the machine with the power switch at the back, and unplug.
4. Hoover out hopper, in case it is filled above the black base.



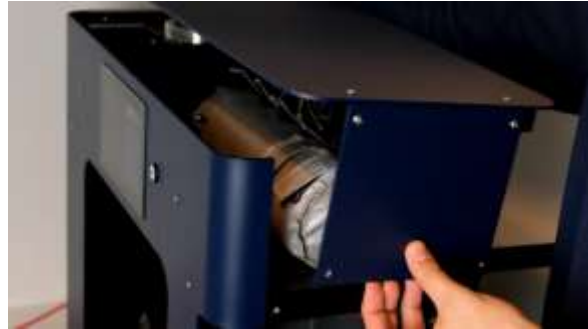
Heat resistant gloves: Ensure to always wear heat resistant gloves when accessing the extrusion area while the machine is turned on.

5. Open the door to access the extrusion area.
6. Rotate the fans to direct away from the nozzle.
7. Insert the bib to prevent any material from falling into the extrusion area or sensor.

Remove panels

8. Unscrew the hopper from the top of the machine by turning it anticlockwise.
9. Remove 6 of the 8 screws from the top panel. Leave the two front screws attached. Place the removed screws in a tray to prevent misplacement.
10. Remove the 2 bottom screws from the front panel, so that the top and front panel remain attached to each other.
11. Remove the panel assembly and place it in a safe area.





Disassembly

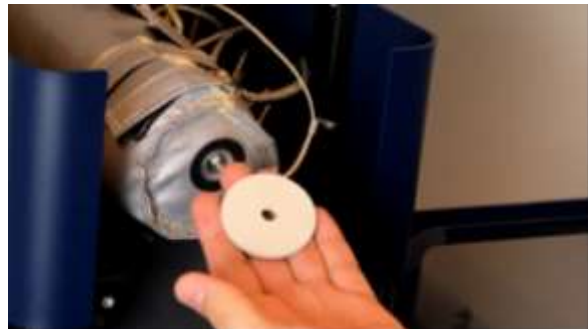


Warning: The extrusion barrel is exposed in various areas and is hot, do not touch the part without wearing heat resistant gloves.



Warning: The heaters near the back panel of the machine carry 230v or 110v of current, do not touch the part when the machine is turned on.

12. Remove the nozzle panel by sliding it out in a forward direction. Check quality of the nozzle cover. If necessary, discard and place a new one (step 28 of this guide).



13. Open the two velcro straps of the barrel above the nozzle. Slide the insulation sleeve forward and slightly down so that it is free of the nozzle. This is not easy.



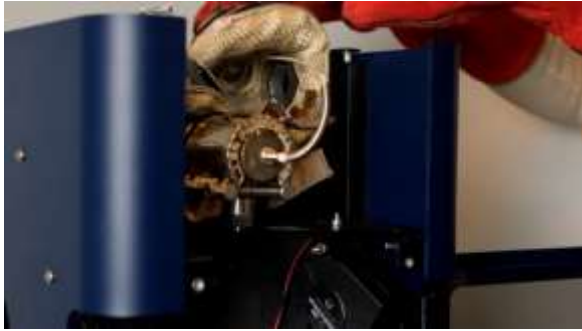
Warning: The thermocouple is connected to the front of the barrel through the insulation sleeve and must be treated with care.

14. The heater and thermocouple cable remain attached, place the sleeve carefully on top of the back side of the barrel, while preventing stress on the cables.



Note: Avoid placing the insulation sleeve close to the touchscreen display to prevent possible damages.





Remove Heater 4

15. Using the 5mm Allen Key, unscrew and remove the two bolts under Heater 4.
16. With heatproof gloves gently spread apart and lift Heater 4 off the diehead.
17. Be mindful of the heater cable and place Heater 4 on top of the insulation sleeve.



Remove the nozzle

The nozzle assembly consists of two parts: the nozzle adapter at the top and the nozzle at the bottom. For this procedure we will keep the adapter in place and attached to the diehead, while unscrewing the nozzle.



18. Hold the nozzle adapter with one 21mm wrench and loosen the nozzle with the other wrench. This means turning the lower wrench to the left, or clockwise (when viewed from top).



Picture: Top wrench in right hand holds adapter in place, while bottom wrench in left hand loosens nozzle by turning it left.

Note: Hold the nozzle adapter tightly to prevent it from being loosened out of the barrel and prevent lateral forces on the entire assembly.

19. When the nozzle is loosened, continue untightening until you can remove the nozzle by hand wearing the heat protective gloves.



Cleaning

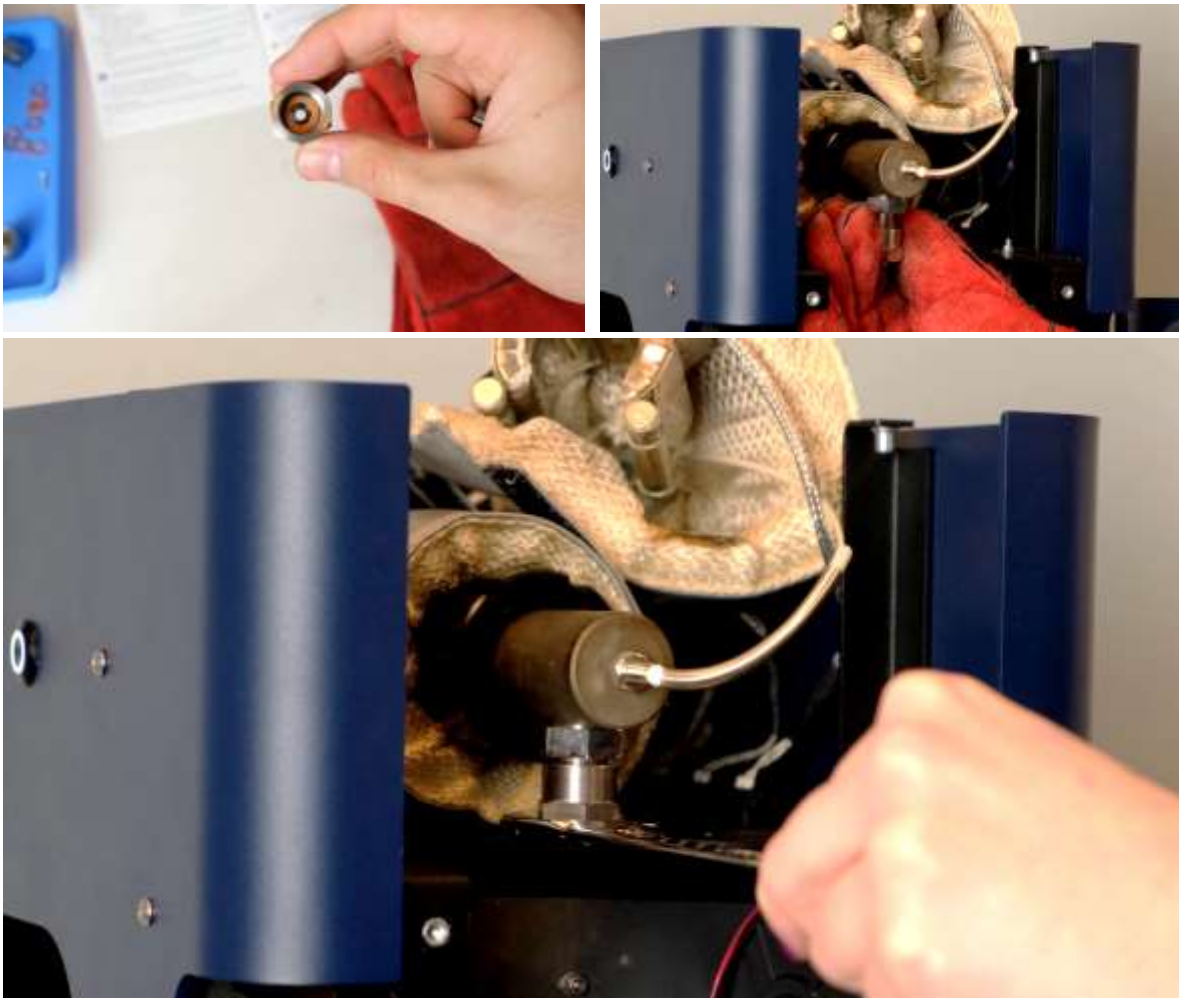
The cleaning of the nozzle is done at a work station with a vise, blow torch, and an optional oven. If the parts cool down fast, it might be necessary to heat them up with an oven or blow torch before removing any plastic residue. **Wear eye protection and heat resistant gloves.**



Insert new nozzle

20. Remove any residue from the nozzle adapter opening to prevent leaking. The machine is now ready for the new nozzle to be installed.
21. Insert the copper gasket into the new nozzle. Ensure it is aligned properly and sits tightly on the inside of the nozzle.
22. Screw it in first by hand (wearing heat resistant gloves), followed by tightening it with the 21mm wrench, with 25Nm strength.

i Note: It is not required to hold the nozzle adapter when tightening the nozzle, as there is no risk of loosening the nozzle adapter.



Picture: A single 21mm wrench is used to tighten the nozzle turning it to the right, or anticlockwise (when viewed from the top).

Re-assembly


With the new nozzle in, it's time to re-attach Heater 4, the insulation sleeve, and nozzle cover and plate. Please be mindful that most parts can still be hot!

23. Attach Heater 4 by gently spreading it apart just enough to fit it around the diehead. It is flexible but also fragile.

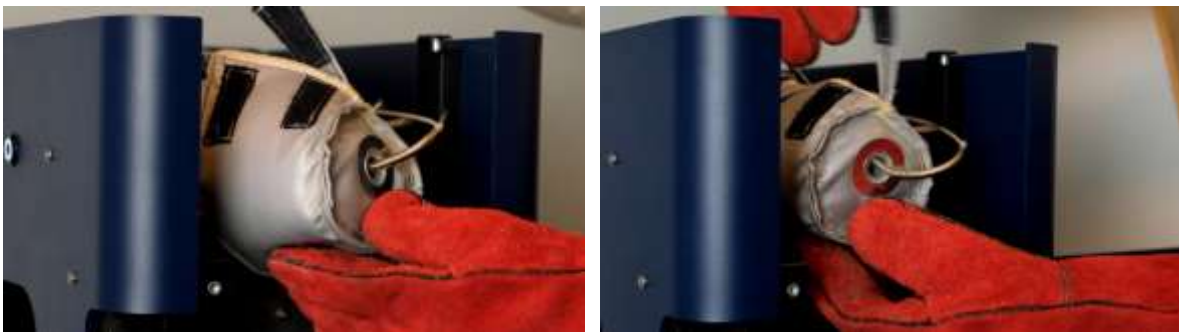
24. Insert the back bolt first, then the front bolt.
25. Gently tighten both bolts. If the bolts are tightened too much, it may damage the heaters. It's enough for Heater 4 to have a solid contact with the diehead and not move.

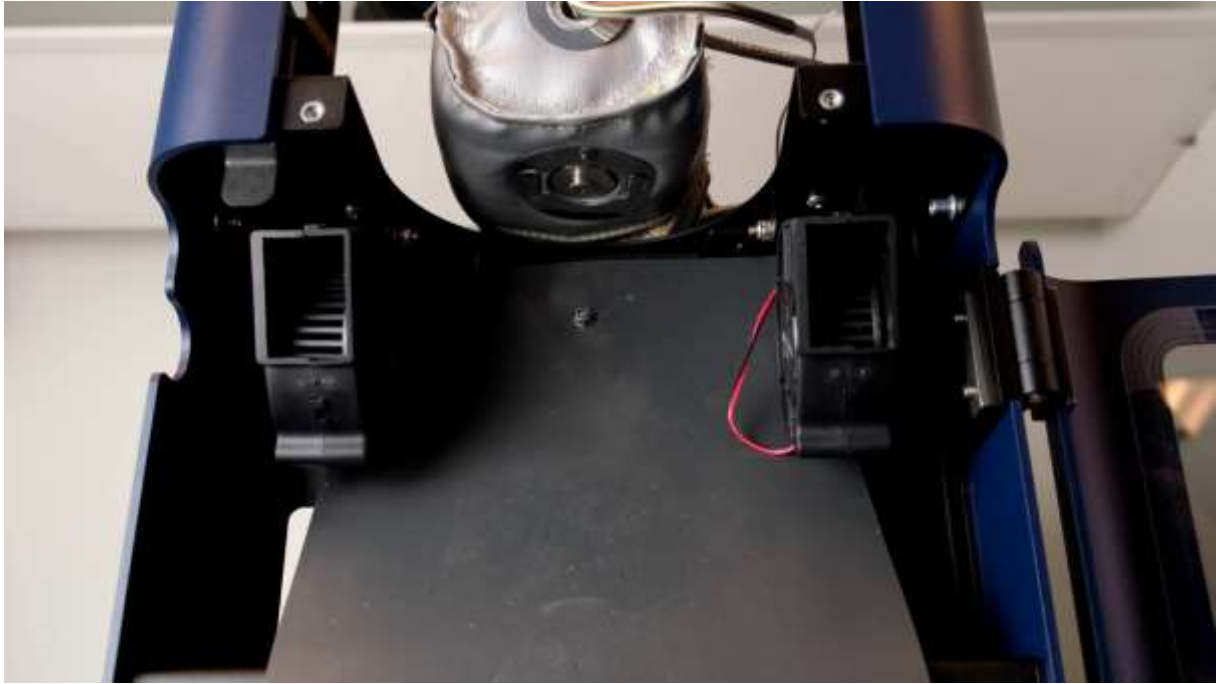


26. Place back the insulation sleeve by aligning the nozzle hole on the bottom of the sleeve with the nozzle.

 **Warning:** Align the front metal ring over the thermocouple, being careful not to put any stress on the thermocouple cable.

27. Reattach the two velcro straps while tightening the insulation sleeve.



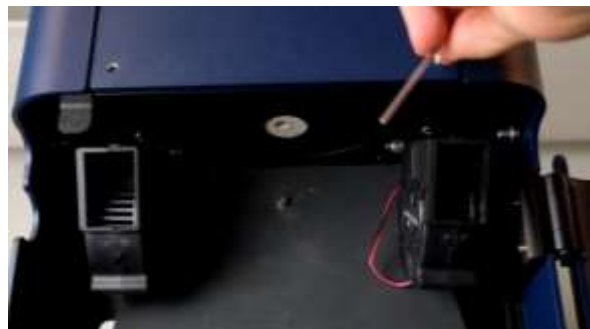


28. Press the nozzle cover against the bottom side of the nozzle.
29. Slide the nozzle plate in place. Ensure the nozzle cover is properly aligned and does not block the nozzle output.



Re-attach panels, and hopper

30. Place the front and top plate assembly and insert all 8 screws holding it in place.



31. Re-attach the hopper to the top of the machine.
32. Remove the bib and close the door.