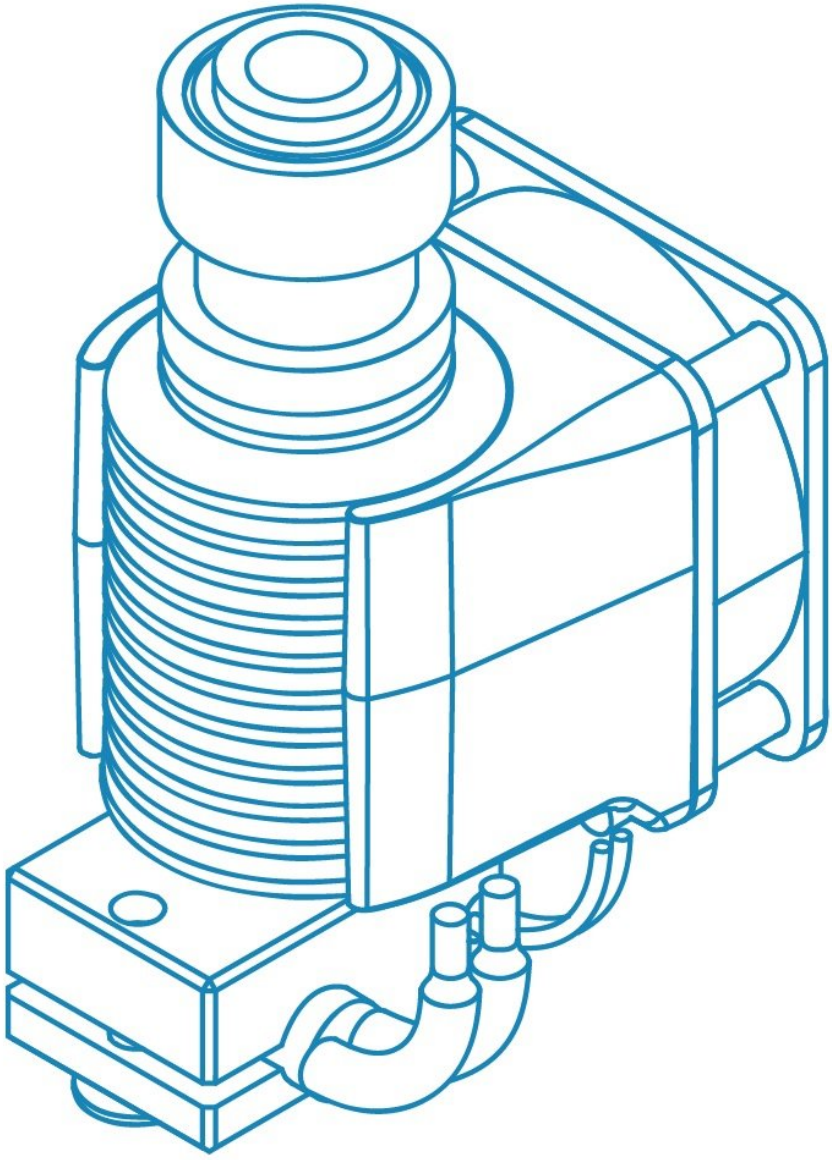
V6 Assembly

Here you'll learn to assemble your V6!

Written By: Gabe S.



INTRODUCTION

V6 Assembly is easy, and we provide most of the tools you'll need. Please note, though, that you should be very careful of the following safety cautions:

- Be aware of your electronics. Don't work on your printer while it is plugged in or turned on.
- Be aware when you heat up your new hotend not to burn yourself on the heater block nozzle or heater cartridge.
- The standard V6 is capable of printing up to 285°C, do not exceed these temperatures unless you have replaced the Thermistor cartridge with a PT100, the Aluminium heater block with a Plated copper heater block, and the Brass nozzle for a Plated copper, Hardened steel or Nozzle X.
- Firmware modification is not optional it is a mandatory step,
- Make sure you have ordered and received the correct voltage heater and fan to match the power supply of your printer. All of our current heater cartridges should have the voltage and wattage laser engraved on the cartridge. Taking an ohm reading is the most reliable method of testing what voltage/ wattage you have received.
- Connecting 12v parts to a 24v power supply can result in overheating, component damage, or fire. If you are unsure double check the rating on your power supply.
- Your HotEnd and your printer are your responsibility. We cannot be held responsible for damages caused by the use, misuse or abuse of our products.

TOOLS:

- Multimeter (1)
- Hex Wrench (1)

2.5mm
Included in Kit

- Screwdriver (1)

Pozidrive Head

- Nozzle Spanner (1)

Or any 7mm Spanner

- x1 Adjustable wrench (1)

PARTS:

- V6 Heatsink (1)
- V6 Heat Break (1)
- V6 Heater Block (1)
- V6 Nozzles (1)

Brass 0.40mm

- Thermistor Cartridge (1)
- Heater Cartridge (1)

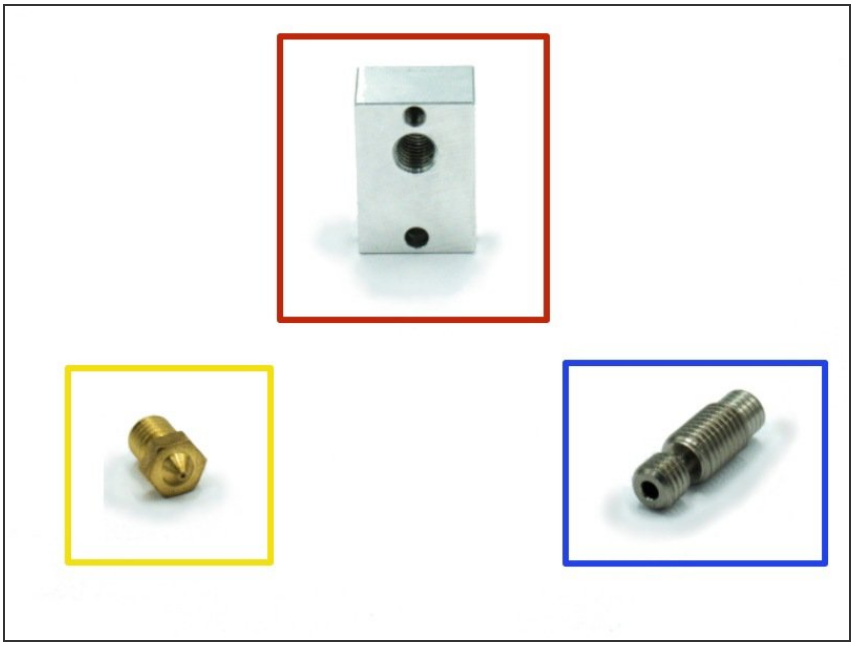
12v or 24v Depending on your printer

- 30mm Fan (1)

12v or 24v Depending on your printer

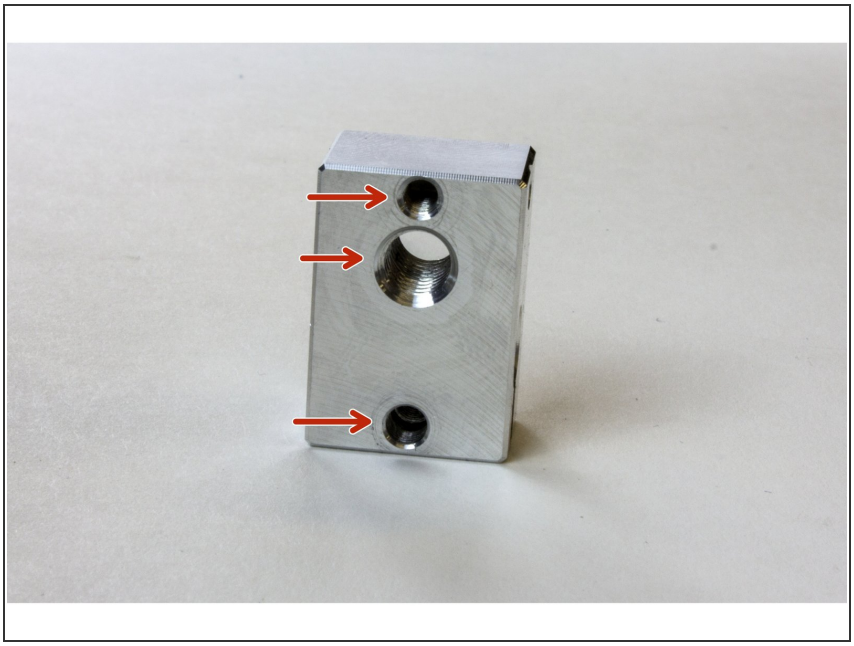
- Plastic Screws (4)
- M3 Grub Screw (1)
- Fan Duct (1)
- M3x10 Socket Dome Screw (1)
- V6 Silicone Sock (1)
- Collet (1)
- Collet Clip (1)
- Silicone sock (1)
- PTFE Tubing (1)

Step 1 — Gather Parts.



- You'll need the following parts:
  - Heater Block
  - Nozzle
  - Heat Break

Step 2 — Orient your Heater Block

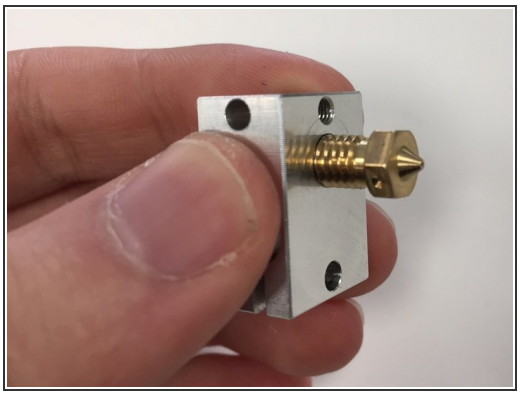
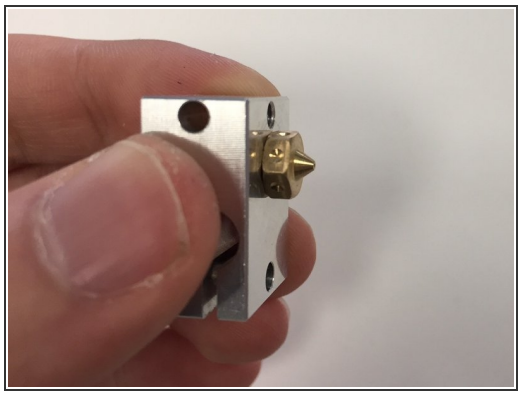
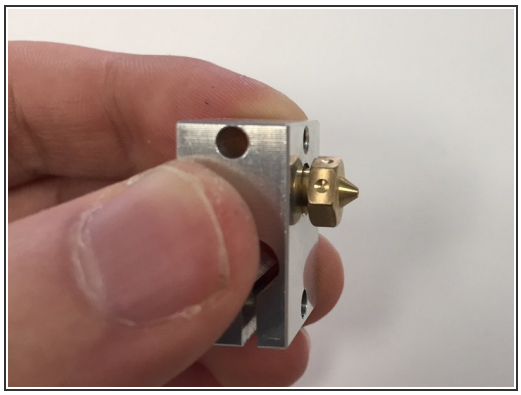


Before starting work on your heater block, make sure that you're going to screw your nozzle into the correct side.

- You should be looking at the side of the heater block with three holes in it

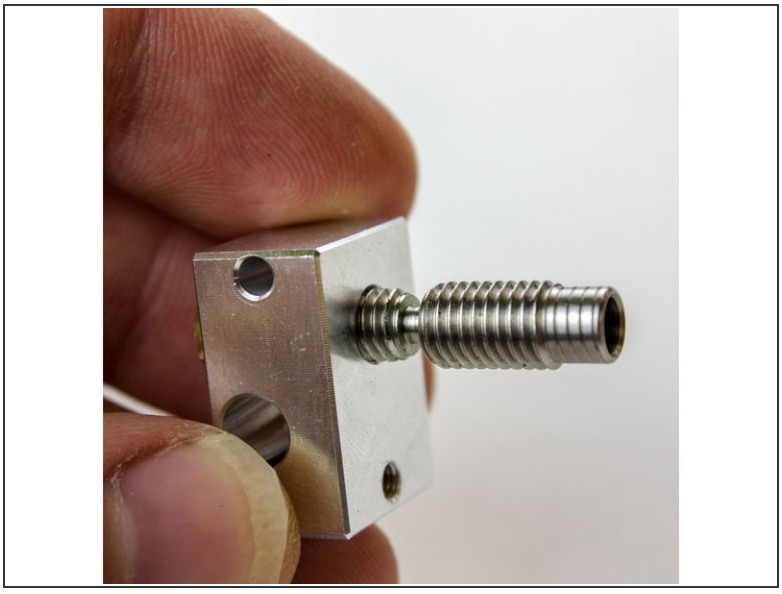
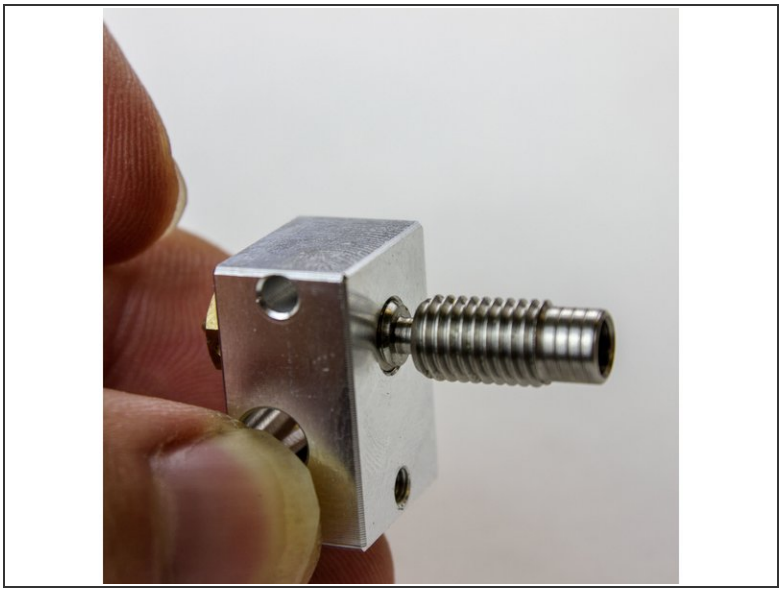
Be aware that if you do install the nozzle the wrong way you won't be able to clamp the heater cartridge.

Step 3 — Screw in Nozzle

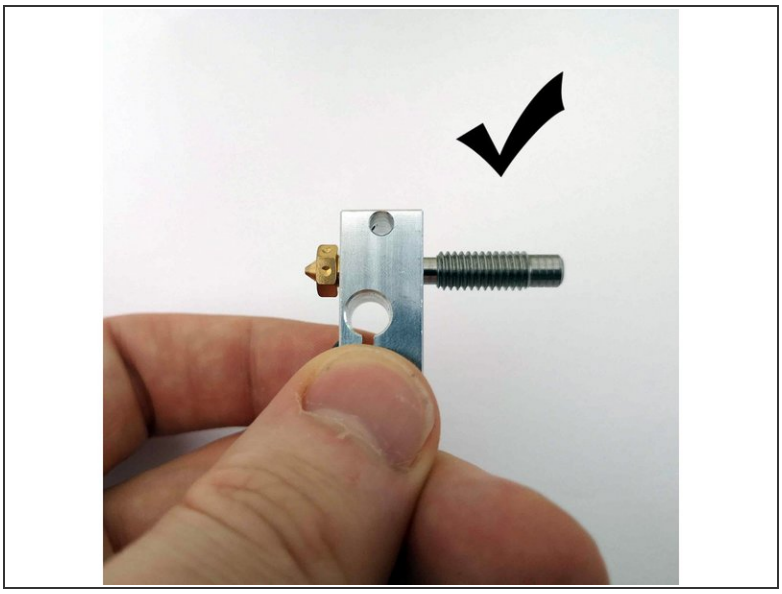
- Screw in the nozzle all the way into the heater block. Don't worry about tightness yet.
- Then, unscrew the nozzle a full turn. This will leave a little space to tighten after screwing in the heat break.

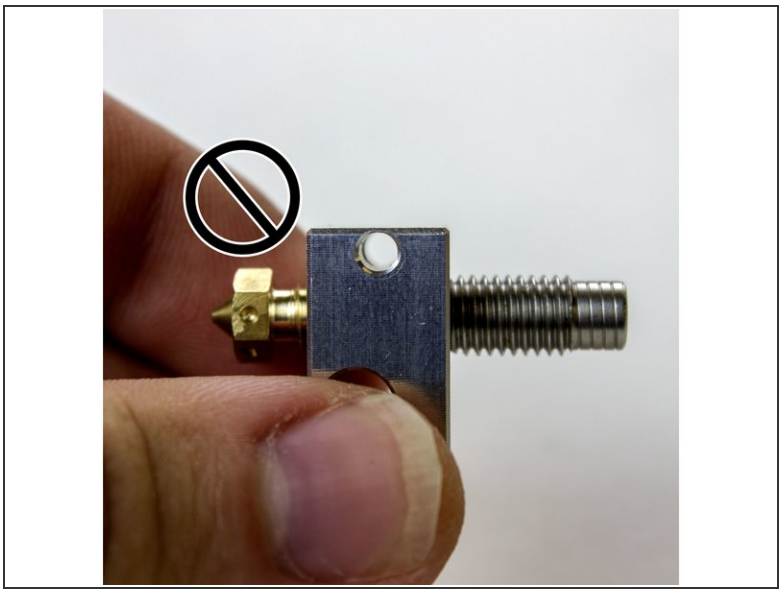
Step 4 — Screw in Heat Break

- Screw in the heat break until it touches the nozzle.
- Tighten the nozzle against the heat break. No need to over tighten, we'll be hot-tightening later.

Step 5 — Heat Break Check

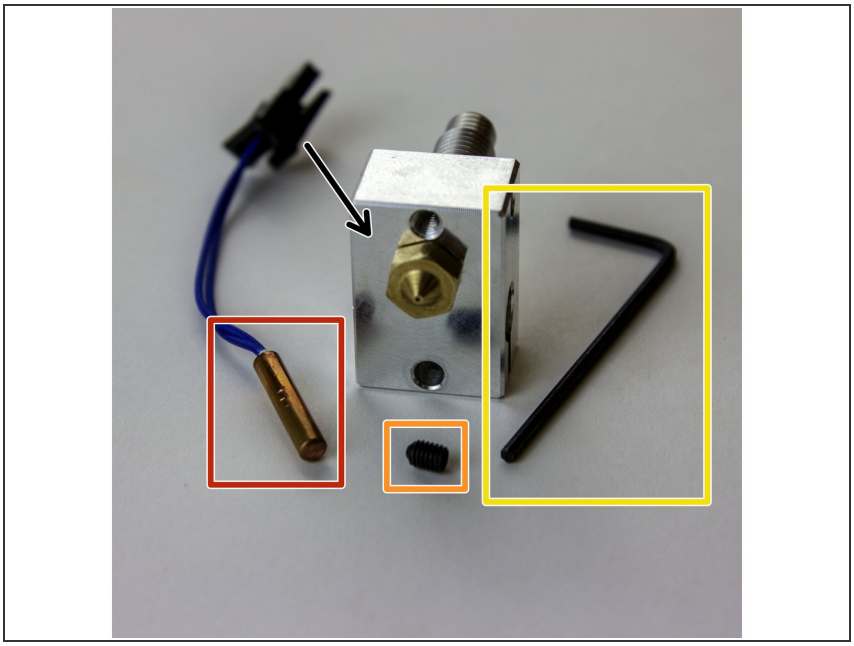




⚠ Double check that your nozzle is still almost flush with your heater block.

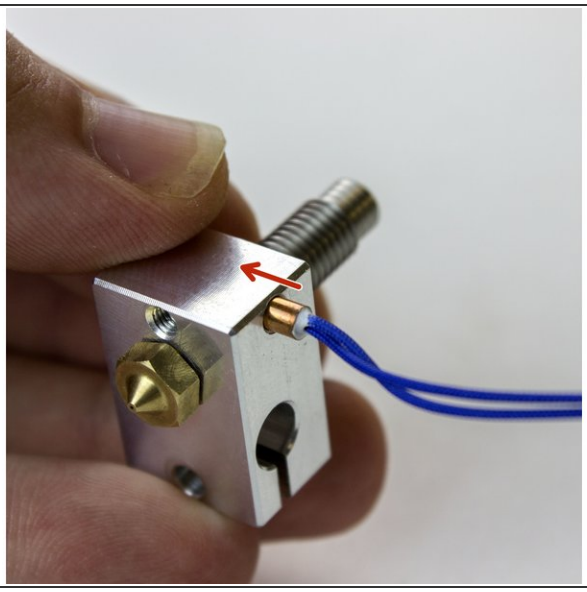
- If there is significant space between the nozzle top and the heater block you should re-adjust your nozzle and heat break to eliminate that space.

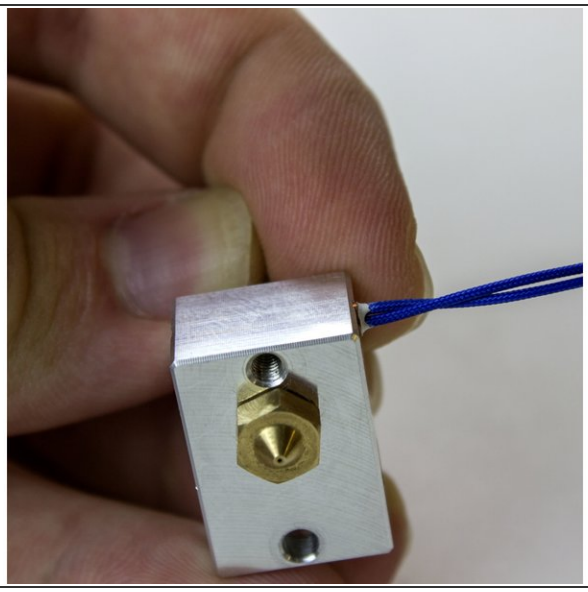
Step 6 — Gather Thermistor Parts



- Gather the parts you'll need to install the thermistor:
  - Thermistor Cartridge
  - M3 Grub Screw
  - The Smaller, 1.5mm Hex Wrench
  - Heater Block

Step 7 — Slide in Thermistor

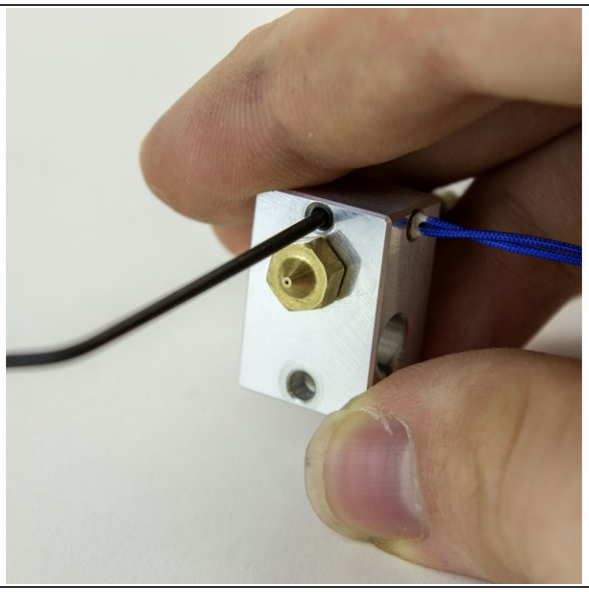


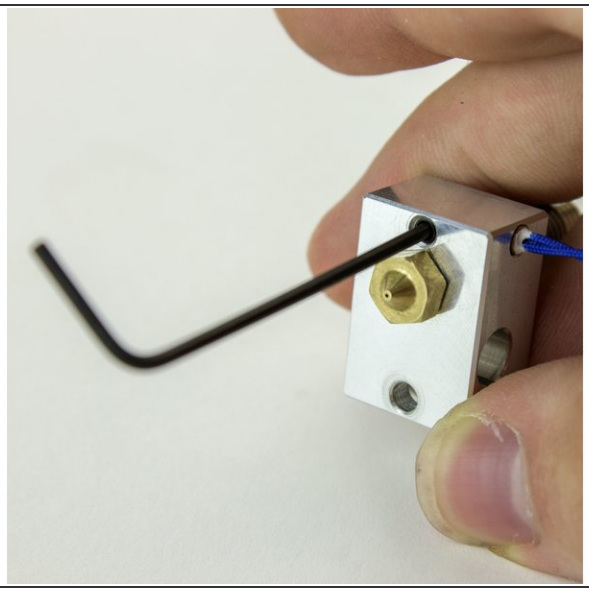


- Slide in the thermistor cartridge.

You can slide the cartridge in either direction so that the wires extend from one side or the other of your heater block. Think about how you'll be organising your wiring to decide which makes sense for your printer.

Step 8 — Screw in Grub Screw





- Screw in grub screw until it just touches the thermistor.
- Tighten M3 grub screw by an 1/8 of a turn.

⚠ Do not over tighten the screw. The stainless steel thermistor cartridge is relatively soft, and you might deform it if you over-tighten the screw.

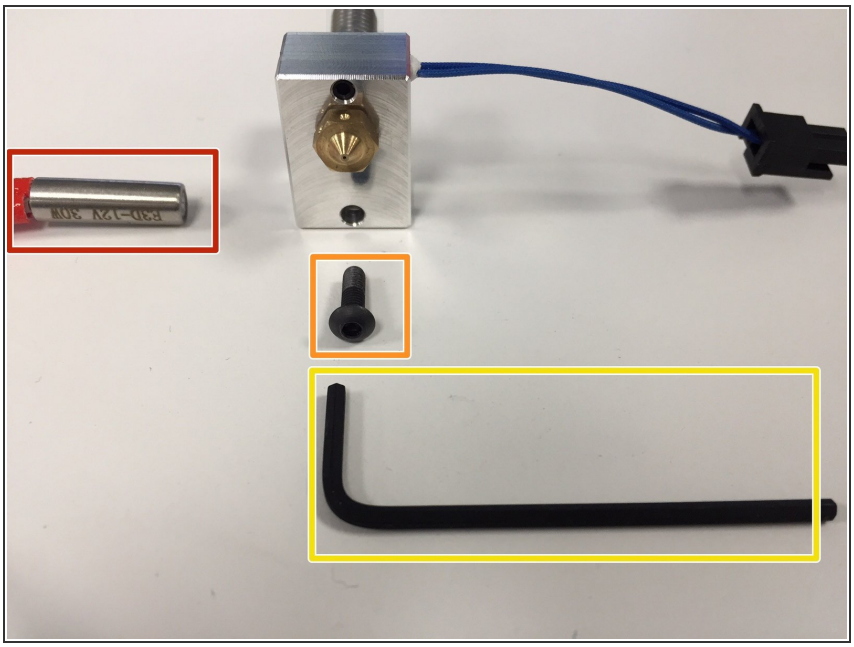
ⓘ Deformation of the cartridge can make it difficult to remove at a later date.

ⓘ Cracking of the potting ceramic resulting in poorer thermal response or in extreme circumstances, short circuit.

Step 9 — Test Heater Cartridge

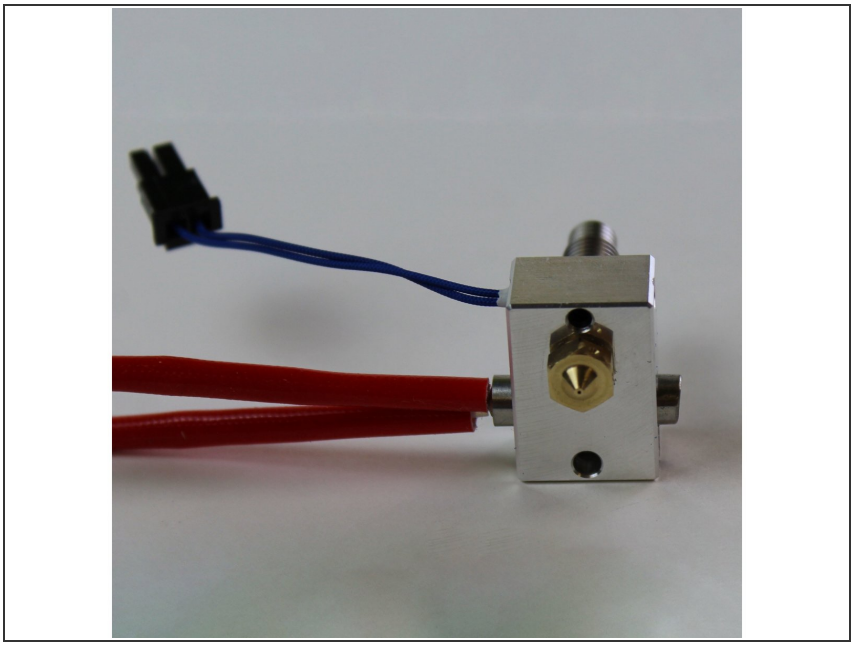
- Before you install your heater cartridge, you should double check that you both purchased and received the correct voltage cartridge. Cartridges are laser etched with their voltage, but all it is worth double-checking anyway. *This process is less annoying than putting out a house fire.*
- If you have a 12v30w heater cartridge, your multimeter should read 4.8Ω
- If you have a 24v30w heater cartridge, your multimeter should read 19.2Ω
- Your cartridges resistance may deviate slightly from these numbers, which is fine. We're mostly interested in verifying which cartridge type you have.
- If you have a 12v 40w heater cartridge your multimeter should read 3.6Ω
- If you have a 24v 40w heater cartridge your multimeter should read 14.4Ω

Step 10 — Gather Heater cartridge Parts



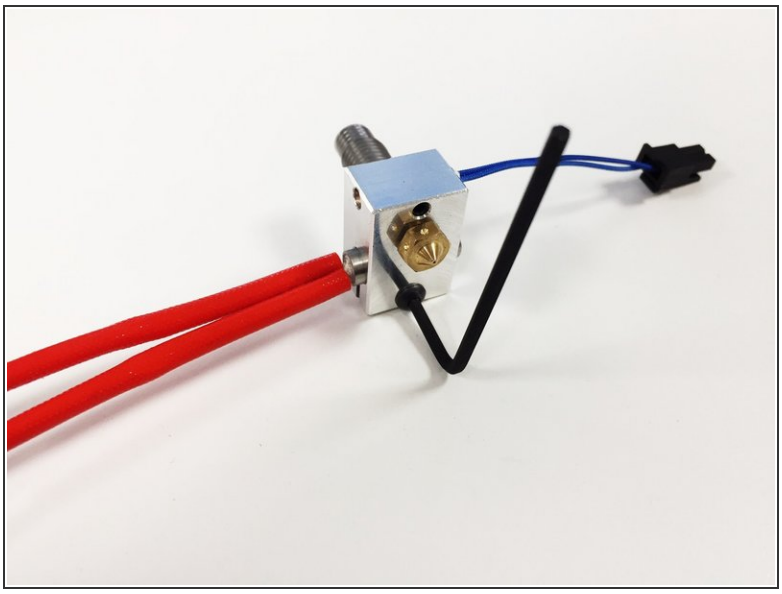
- Gather the parts you'll need to install your heater cartridge:
  - Heater Block
  - Heater Cartridge
  - The Larger, 2mm Hex Wrench
  - One of the longer, M3x10 Screws.

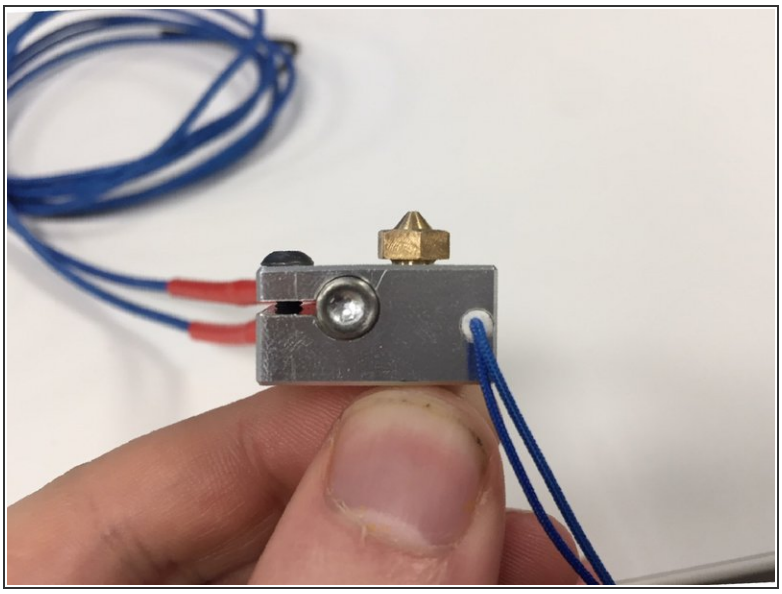
Step 11 — Slide in Heater Cartridge



- Slide in the heater cartridge. Typically you'd want the wires to come out the same side as your thermistor wires.
- It's fine if the cartridge protrudes a bit from both sides of the heater block.

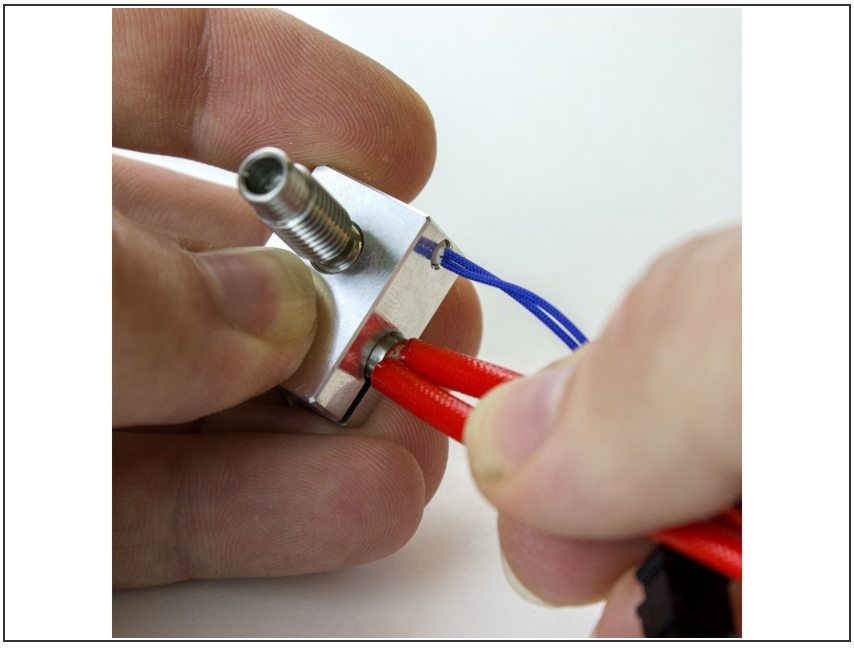
Step 12 — Screw in M3 x 10 Screw





- Tighten the M3 x 10 socket dome screw with 2mm hex key until the clamp deforms slightly (as shown in the second picture).

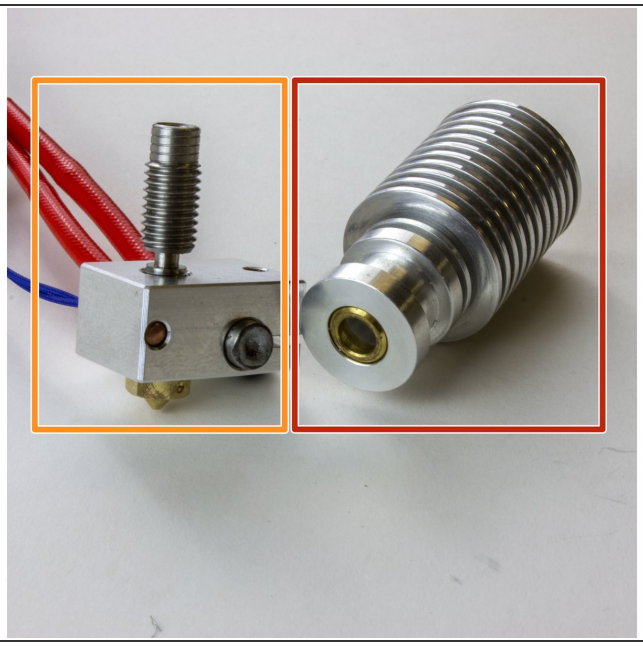
Step 13 — Tug Test



- Before moving on, gently tug on your thermistor and heater cartridge wires. We don't want them slipping out during a print!

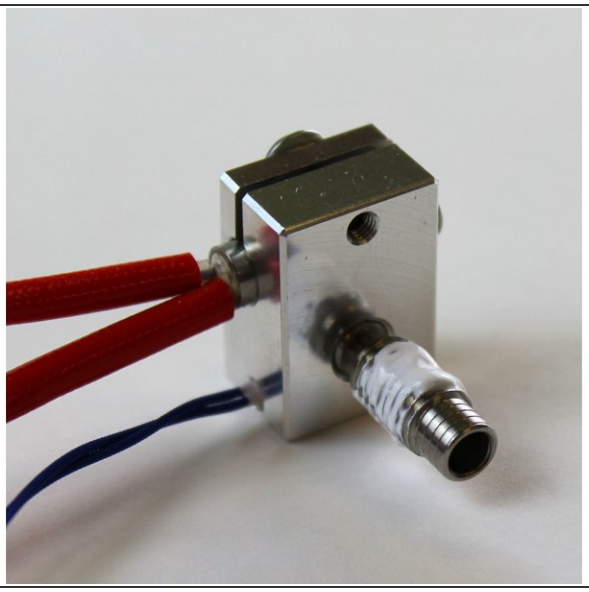
⚠ Be careful the thermistor wires are very fragile if you tug too hard it will cause damage to the thermistor.

Step 14 — Gather Parts for the Heatsink



- Gather the following parts:
  - Heater Block
  - Heatsink
  - Thermal Paste Sachet (not pictured)

Step 15 — Apply Thermal Compound

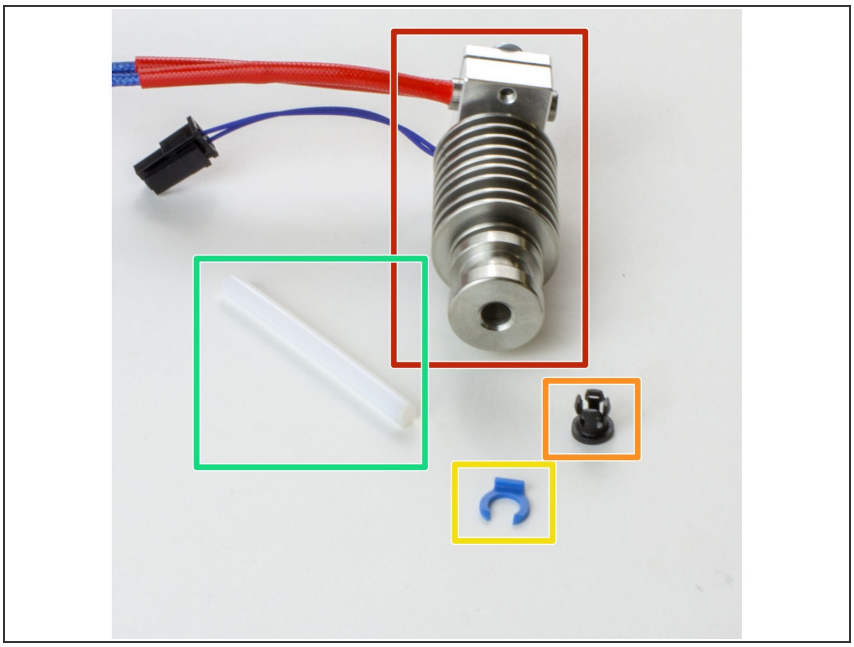


- Apply thermal compound to the thread of the heat break. You don't need to use the whole sachet.
- After you're done, screw in the heatsink. It only needs to be hand-tight.

Don't use any thermal paste elsewhere on your hotend

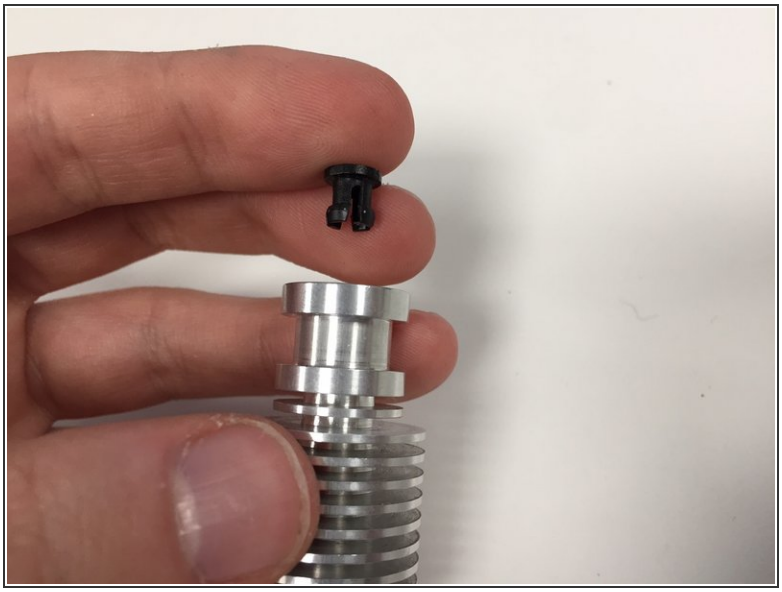
Wash your hands once you're done working with the paste

Step 16 — PTFE Tubing



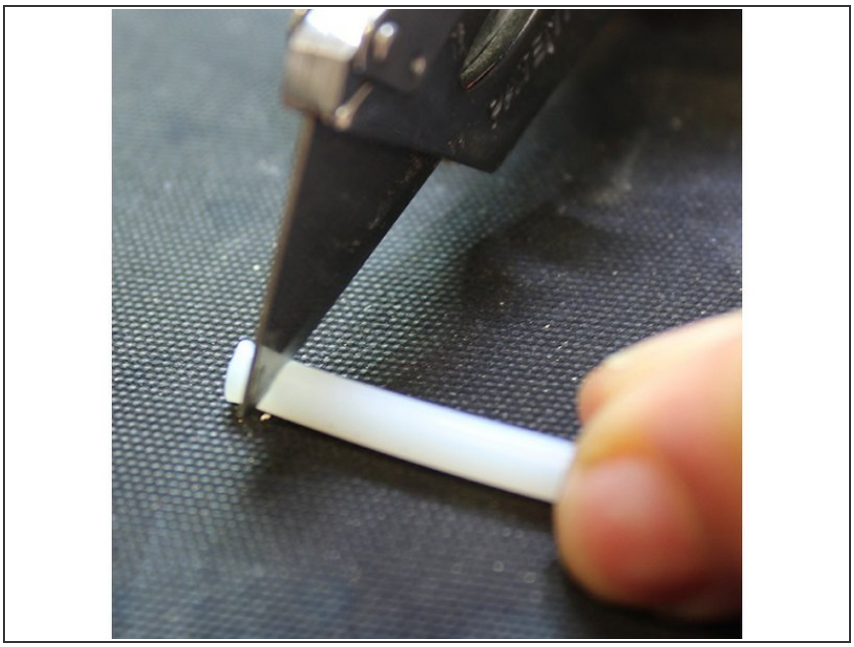
- Gather the following parts:
  - Assembled Hotend
  - Collet
  - Collet Clip
  - PTFE Tubing (at least 70mm long)

Step 17 — Insert Collet



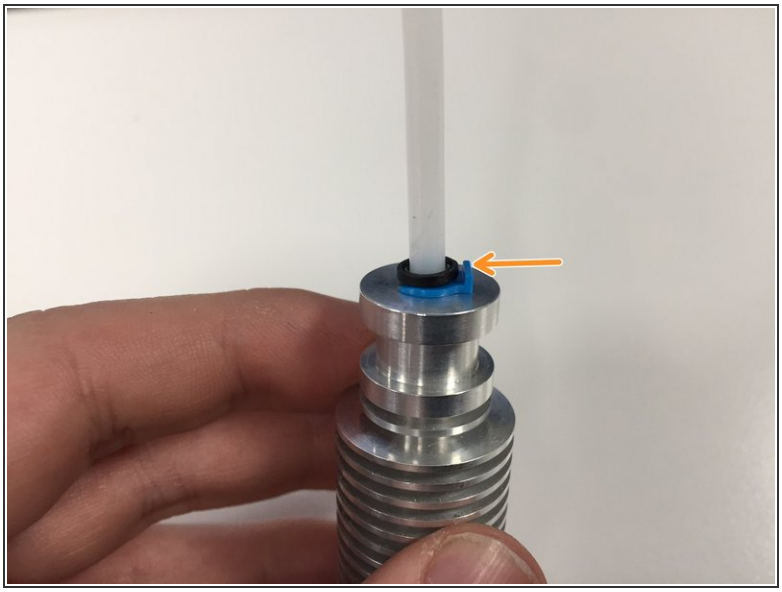
- Insert the small black collet into the top of the Heatsink, the side with the four small legs should push into the brass ring in the top of the heatsink with gentle finger pressure.

Step 18 — Prep PTFE Tubing



- To make sure that the end of the PTFE tubing that will sit inside your hotend is square and flat, cut a slice off with a very sharp knife (a craft knife with razor sharp blade is recommended for this).
- You might also find it handy to put some filament in the tubing while you trim it. This can help keep it round.

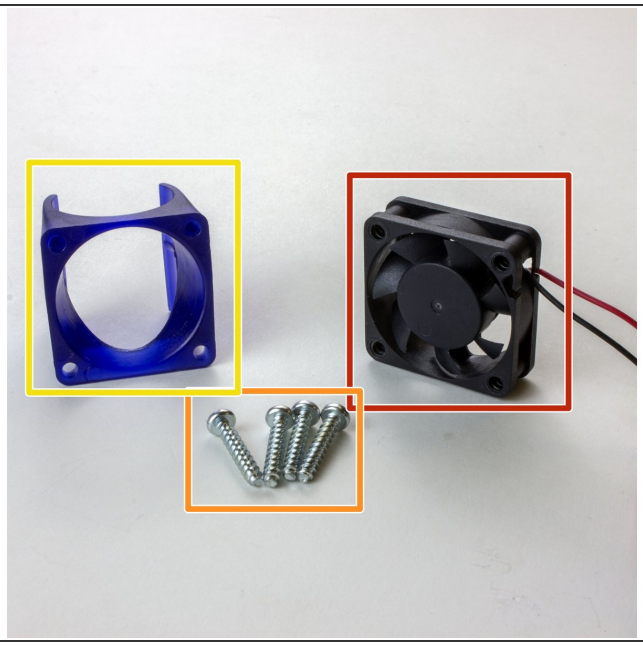
Step 19 — Insert PTFE and Lock in Place



- Insert the PTFE tubing all the way down until it reaches the top of the Heat Break.
- Slide the collet clip in between the collet lip and the aluminium to lock the PTFE tube in place.

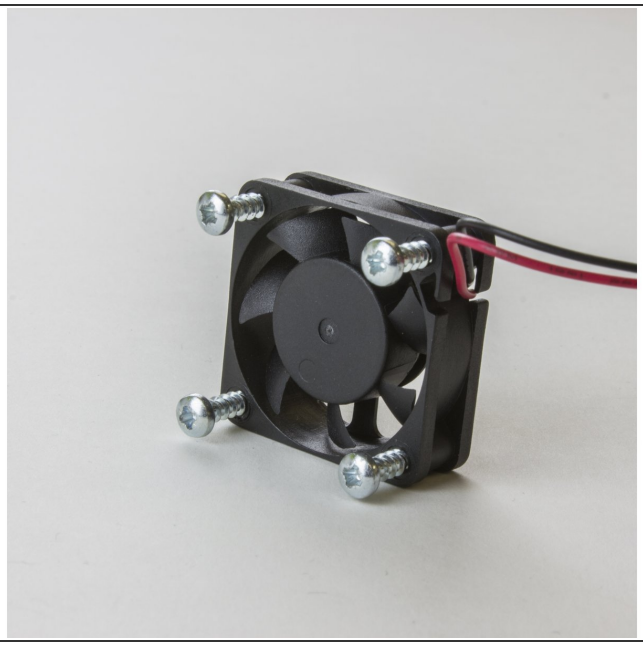
ⓘ To release the PTFE tubing, remove the collet clip, press down on the collet whilst pulling out the PTFE tube.

Step 20 — Fan and Duct Parts



- Gather the Following
  - Hotend
  - 30mm Fan
  - 4 Plast-fast Pozidriv -head Self-tapping Screws
  - Fan Duct

Step 21 — Screw Plastfast Screws into Fan

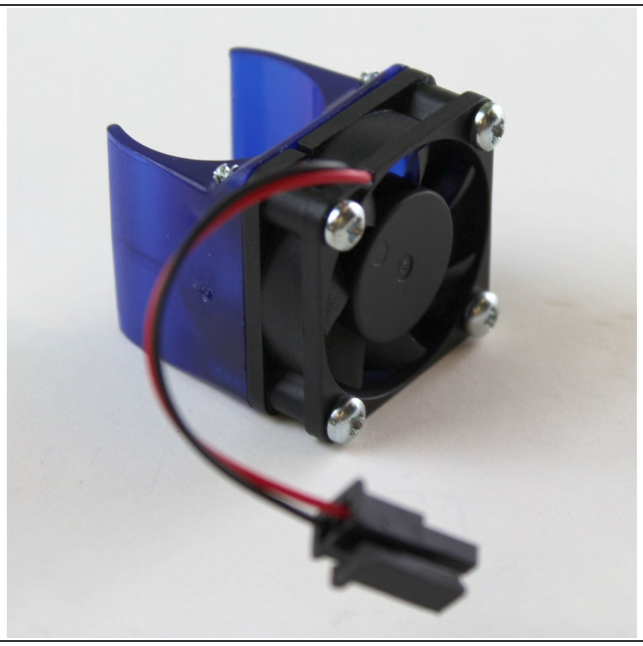


⚠ Make sure the screw heads are on the non-sticker side on the fan.

- Screw the Plastfast screws partially into the fan.

ⓘ The screws should not be sticking out of the opposite side yet.

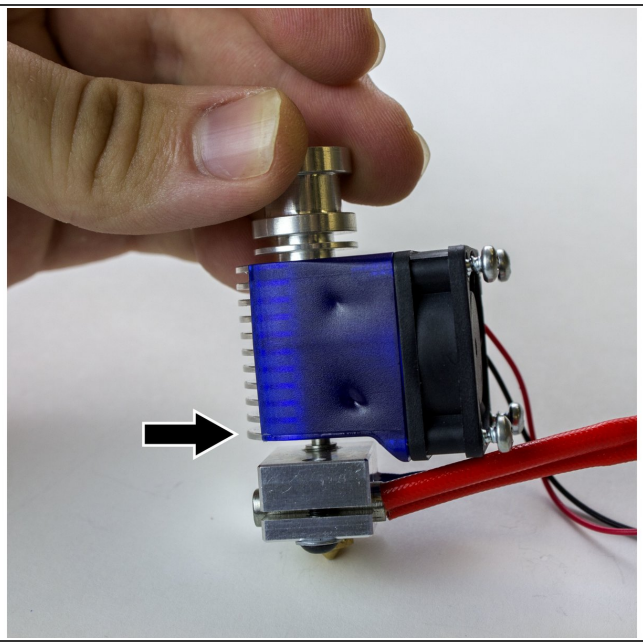
Step 22 — Screw Fan into Fan Duct



Think about where you want your fan's wires to come out before screwing it on. (You can mount the fan duct facing either way on your HotEnd)

- Screw the fan onto the fan duct. You may require a lot of torque and will therefore need a well-fitting screwdriver.
- Don't worry about getting the screws 100% tightened, you just need to secure the fan.

Step 23 — Clip Fan Duct onto Heatsink

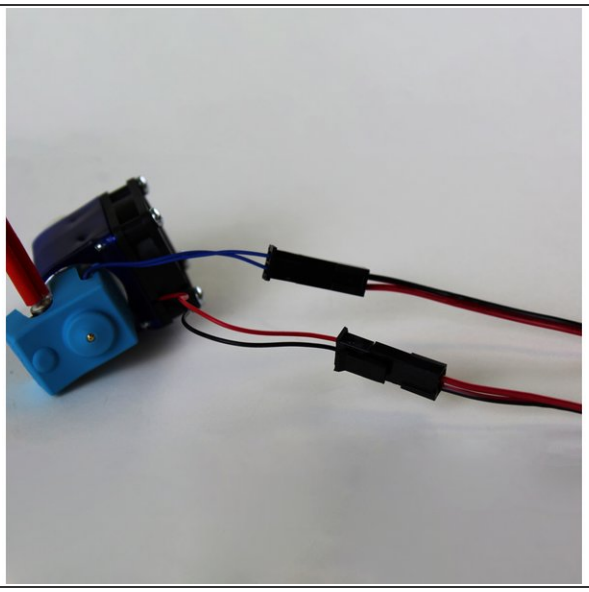


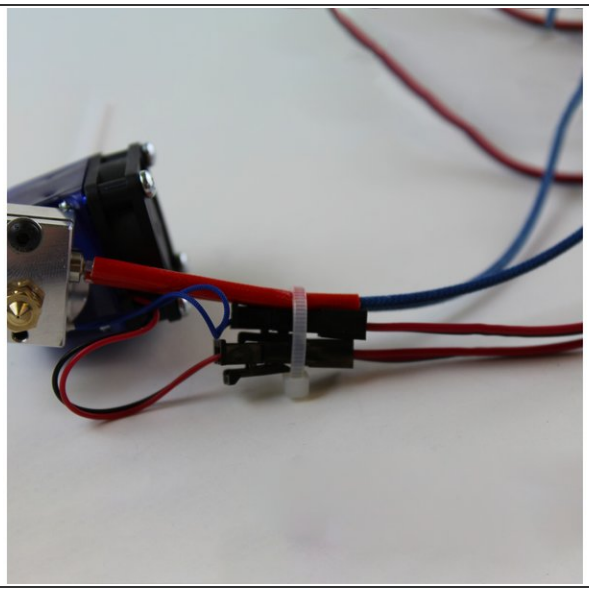
- Clip the duct onto heatsink

Make sure the duct covers the fin closest to the heater block.

- The little over-hang can face up, down, depending on your setup.

Step 24 — Connect Extension Wires





- Plug the extension wires into your thermistor and fan. The other ends will go into your printer's electronics board.

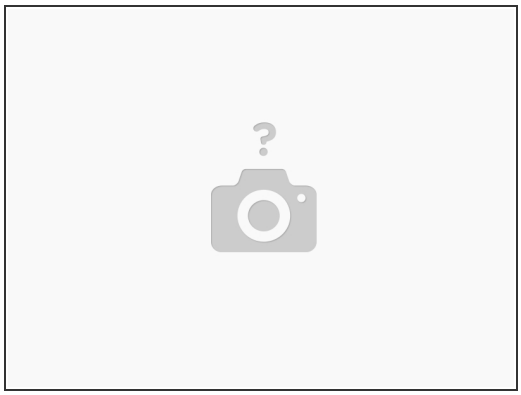
ⓘ If you're replacing an old HotEnd, note where its wires were plugged in and mirror those for your new V6.

ⓘ If you're building a new printer, you may need to consult the documentation for your electronics board to see where to plug in everything.

- Use the included cable tie to link the connections together for strain relief.

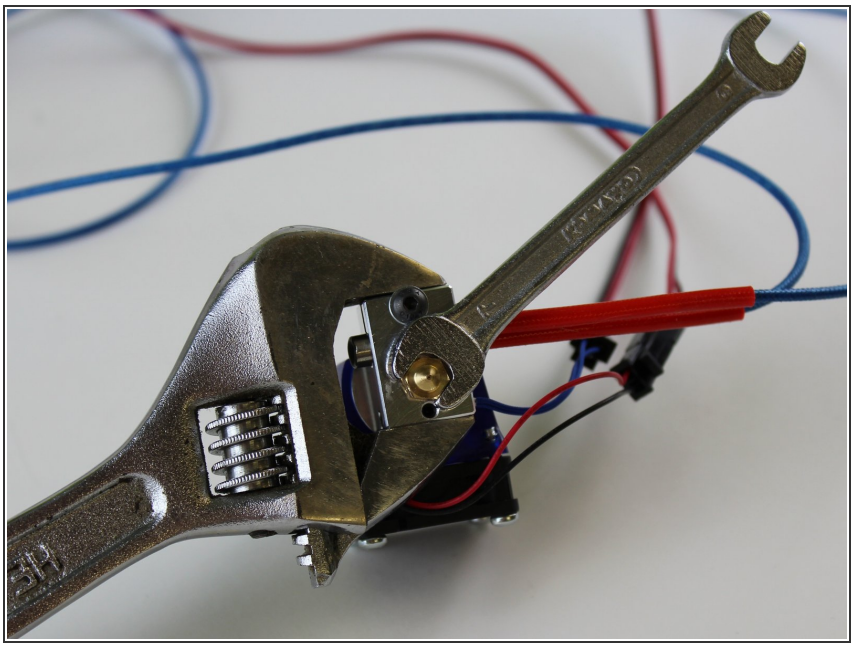
ⓘ Take a little while to properly organise your wiring so that it doesn't get snagged on any corner of your printer.

Step 25 — Firmware



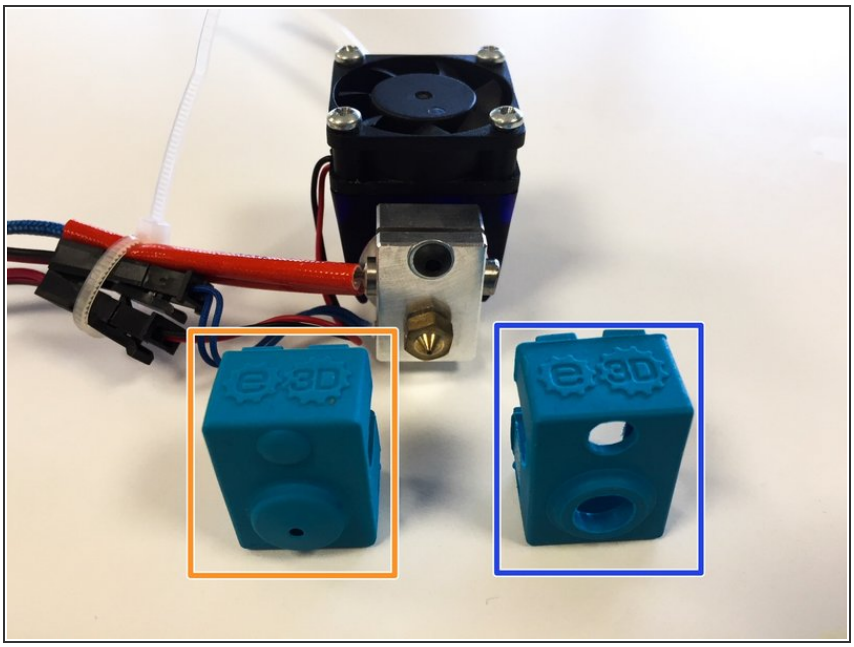
- Configuring your firmware is different depending on the type your printer uses. Follow one of the links below for guides on how to update each of the most popular firmware. When you're done, continue in this guide.
  - Marlin
  - Repetier
  - Smoothieware
  - RepRap Firmware

Step 26 — Hot-Tightening



- Hot-tightening is the last mechanical step before your V6 is ready to go! Hot-tightening is essential to sealing the nozzle and heatbreak together to ensure that molten plastic cannot leak out of the hotend in use.
- Using your printer's control software (or LCD screen), set the hotend temperature to 285°C. Allow the hotend to reach 285°C and wait one minute to allow all components to equalise in temperature.
- Gently tighten the nozzle whilst holding the heater block still with a spanner and using a smaller 7mm spanner to tighten the nozzle. This will tighten the nozzle against the Heatbreak and ensure that your hotend does not leak.
- You want to aim for 3Nm of torque on the hot nozzle—this is about as much pressure as you can apply with one finger on a small spanner.

Step 27 — Gather Sock Parts



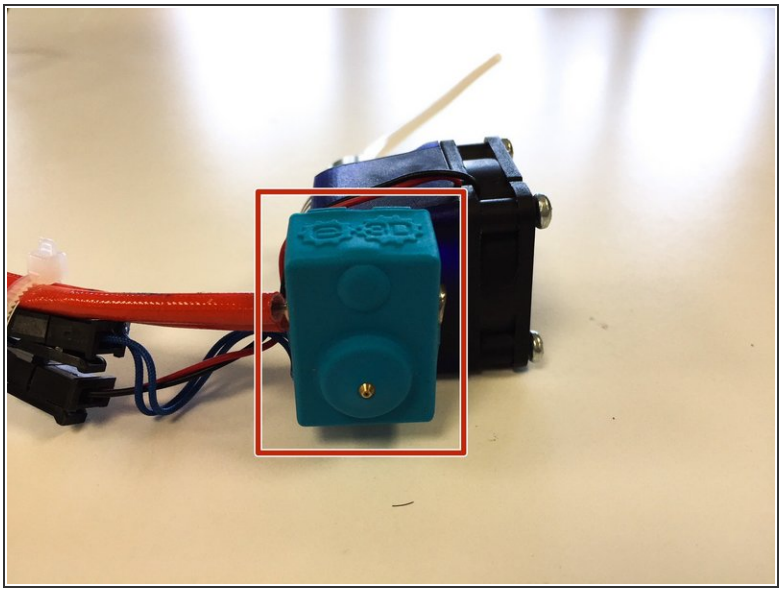
- Gather the following:
  - Silicone Sock, one of either:
    - Pro Sock
    - Or Normal Sock
  - Your HotEnd

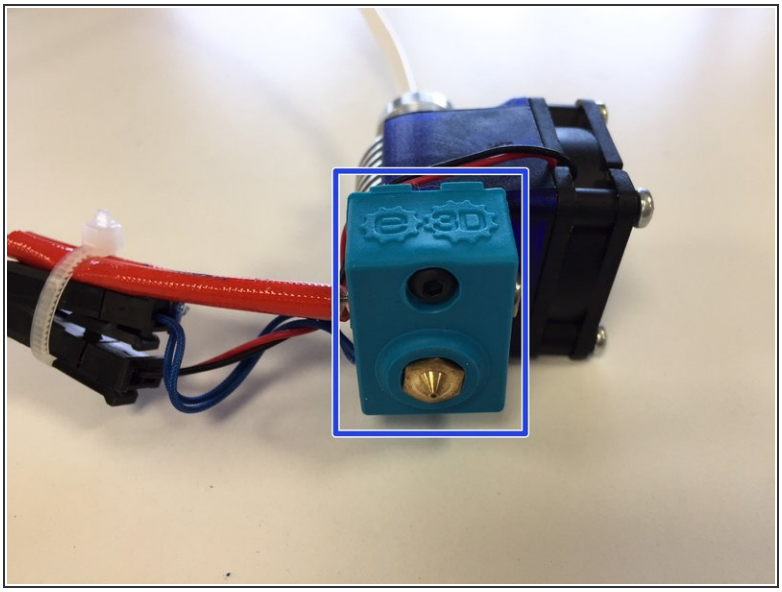
Step 28 — Attaching Sock

- First, let your hotend cool down.
- Slip your silicone sock over the hotend. Try to get each of the little clips on the top of the heat block so the sock will stay on better.

ⓘ It may look like your sock doesn't quite fit. Don't worry, when you heat up your HotEnd, the sock will expand, and the clips will fit just fine.

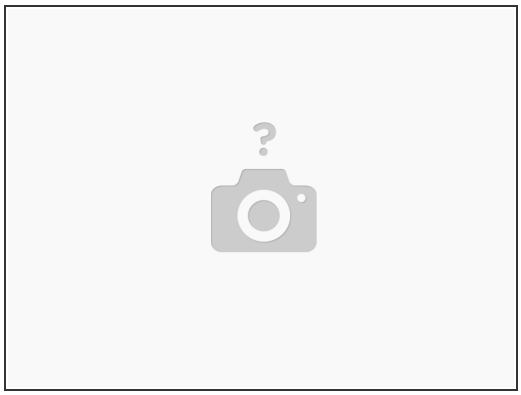
Step 29 — Final adjustments





- If you're using the pro sock make sure that the tip of the nozzle protrudes from the sock.
- If you're using a normal sock, it should look like the second picture when you're finished.

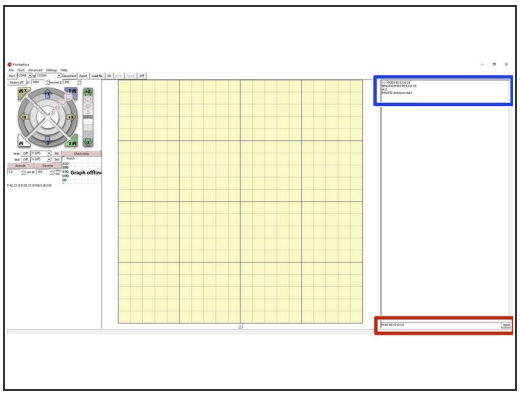
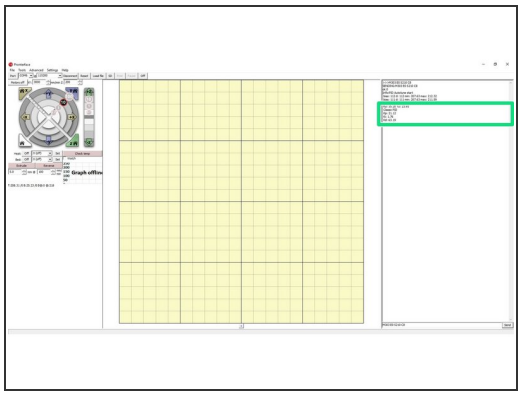
Step 30 — PID Tuning



Whenever you install a new hotend, it's important to run a PID tune. This will allow your printer to adjust some internal parameters so that it can learn how your hotend heats up. This way, your printer can anticipate how much power it needs to give your hotend to get it up to temperature, but not over.

- Use a computer to connect to your printer. If you have a typical RepRap printer, you can use PrintRun, Repetier Host, Simplify3D, or MatterControl.
- Other, closed-source, printers may be better suited to their manufacturer's recommended printer control software.

Step 31 — PID Tuning.


⚠ Make sure you have your hotend in a place where it can get hot without damaging anything or setting any fires! Mounted on your printer or held with a spanner will work fine. Take care not to touch your hotend when it heats up.

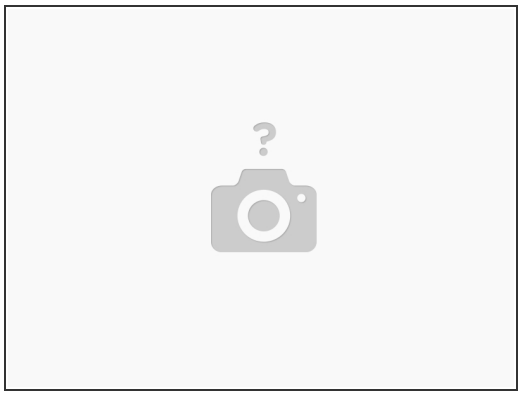
- Send the command M303 to autotune your PID. For more detailed instructions, check out Thomas Sanladerer's video guide for more information.

ⓘ Not all firmware supports PID autotuning, and you may need to tune manually.

- We recommend running two PID tunes for the V6, one now and one later at at normal printing temperatures, with filament in the hotend, sock attached, and with an active cooling fan on if you're planning on using one. This way your printer can finely tune its settings to match your real printing environment.
- Typically you will use M303 E0 S210 C8. It will take a few minutes to run through the 8 cycles (C8) - it should then show a Kp Ki and Kd value. Write these down/ remember them for the next step.
- Follow this with M301 P17.28 I0.63 D118.87 (These values will be different for you)
- Then you can type M500 to store these value to your EEPROM, Optionally you can enter these values into your firmware manually.

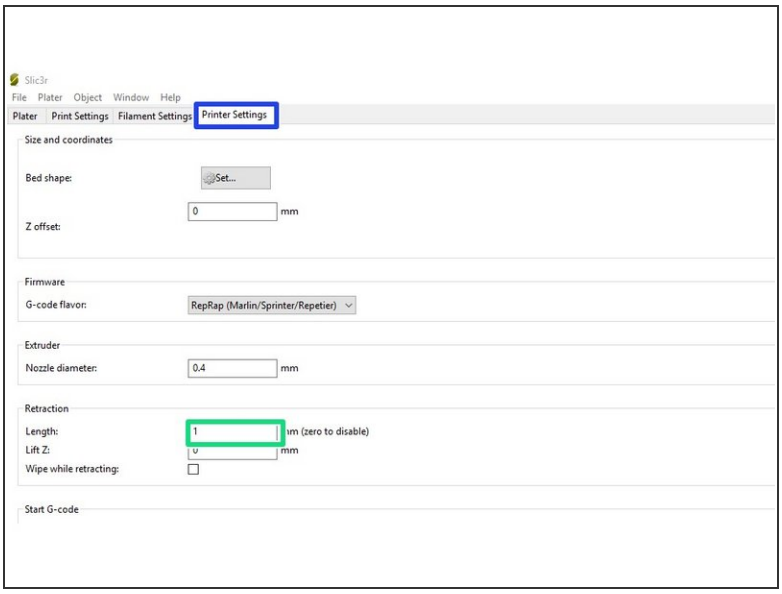
ⓘ For this example we have used Proterface on a printer running Repetier firmware.

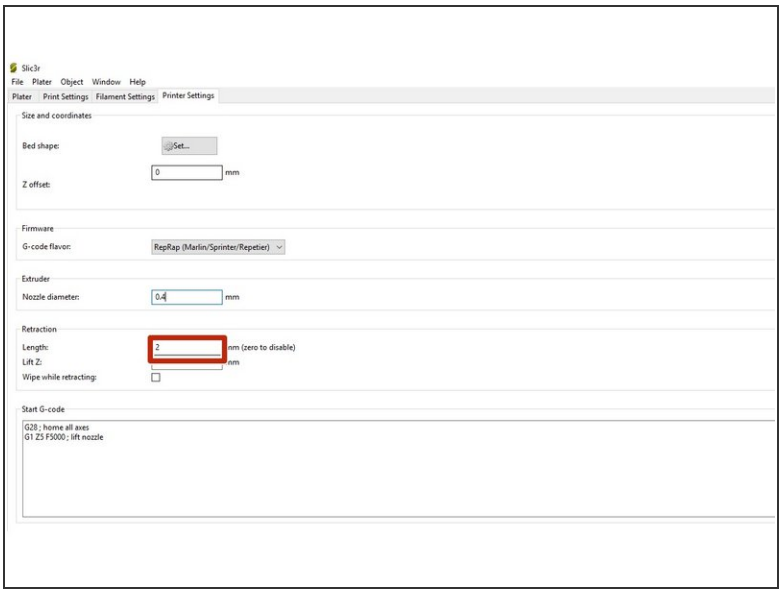
Step 32 — PID Duet wifi/ethernet



- For the Duet Wifi/ Ethernet running RepRap firmware the PID setup is slightly different:
- M303 H1 P0.5 S240
- M307 H1 - display the result.
- This should give you something that looks like this:
- M307 H1 A352.6 C122.2 D8.0 S1 B0 - put these value into config.g
- For more information please visit : https://betrue3d.dk/duet-wifi-configurat...

Step 33

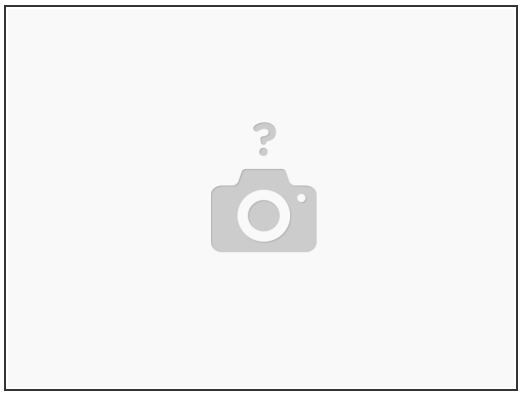




- In your slicer of preference find the retraction settings. In Slic3r this is in printer settings.
- Start with a retraction length of 1mm
- If you experience blobs or stringing on the surface of the print increase the retraction length to 2mm.

⚠ Do not increase the retraction length more than 2mm as this can lead to molten plastic being pulled into the heat break, increasing the likelihood of jams.

Step 34 — CONGRATULATIONS



- You're now ready to go! Remember you'll have to update your slicer settings a little:
- Check your nozzle diameter in your slicer. All V6 kits ship with a 0.40mm brass nozzle.
- Having very long retraction settings will cause problems.
  - For direct extrusion systems you should use anywhere from 0.5mm–2mm of retraction.
  - For bowden systems you need to use the same as with direct + the compression strain, which will depend on the length of your Bowden tube.
- Print PLAs at 205–215°C, and ABS at ~240°C. For other materials check with their manufacturer

