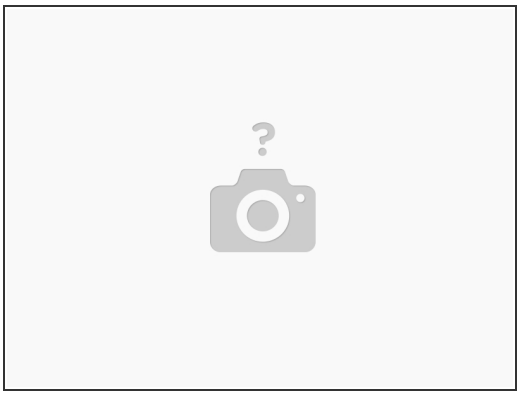
Titan Aero Marlin Configuration

Set up your Marlin Firmware to support your new Titan Aero.

Written By: Gabe S.

Step 1 — Download Marlin



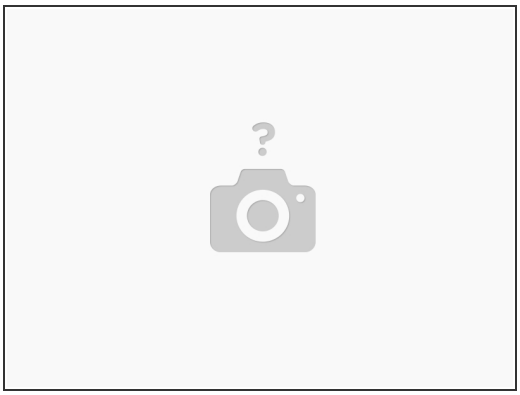
- First things first: you're going to need a copy of Marlin.
- If you are upgrading an existing 3D printer to use a Titan, you should try to get a copy of your current firmware from your printer's manufacturer.
- If you're building a new printer, or simply want to upgrade to the latest version of Marlin, download it at http://marlinfw.org/meta/download/

⚠ If you download a fresh version of Marlin you'll have to configure more settings than the ones mentioned in this guide so that it will work well with your printer.

Step 2 — Download Arduino

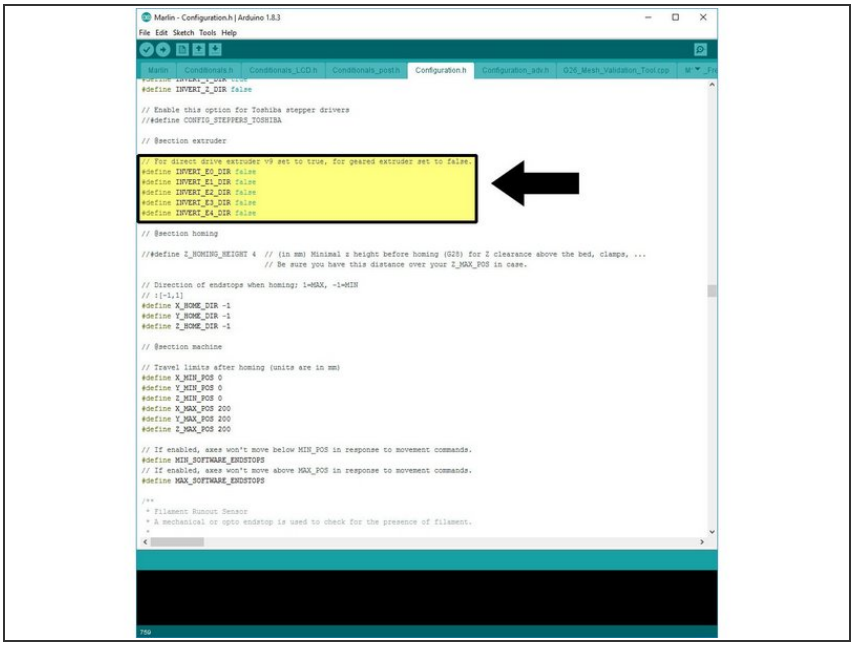
- Almost all printers use Arduino IDE to upload fresh firmware, so download it at https://www.arduino.cc/en/Main/Software

Step 3 — Open Marlin in Arduino



- Unzip Marlin from the zip file you downloaded and put the resulting folder anywhere on your computer for safe keeping.
- Inside this folder, navigate to the Marlin sub-folder, and open the Marlin.ino file. This should open every file in Marlin.
- Find the Configuration.h file

Step 4 — Extruder Direction



- If your old extruder was ungeared, you'll notice that your new Titan extrudes backwards!
- Flip the folowing line in the Configuration.h file from true to false, or vice versa: INVERT_E0_DIR

Step 5 — Extruder Steps-per-mm 1

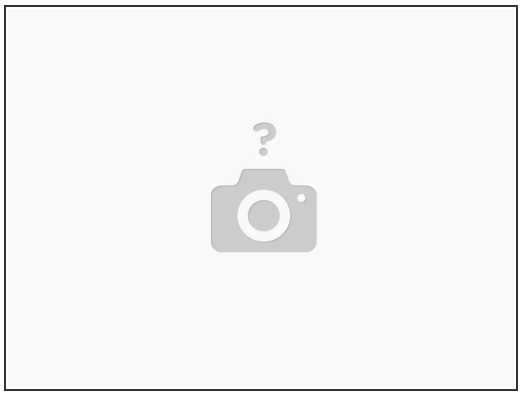
$$\textbf{E-Steps-per-MM} = \frac{\text{Motor Steps} * \text{Micro-stepping} * \text{Gear Ratio}}{(\text{Hobb Diameter} * \pi)}$$

- Standard motor steps / rev = 400
- Standard micro-stepping = 16x
- Gear Ratio = 3
- Hobb Diameter (Effective) = 7.3

400 * 16 * 3 / (7.3 * 3.142) = **837 E-steps-per-mm**
(For the motor sold with the Titan)

- The next thing we'll have to update is your printer's E-steps-per-mm.
- Your slicer will generate G-Code for your printer, which will tell it to extrude a certain length (in millimeters) of filament. Your printer takes those lengths of filament and calculates how much it should rotate your Titan's stepper motor to push out the expected amount filament. This number is used to make that conversion
- First, we'll start with a ball-park estimate of your E-steps-per-mm, and then we'll fine-tune it.
- If you're using the standard Titan motor, start with 837 Steps-per-mm

Step 6

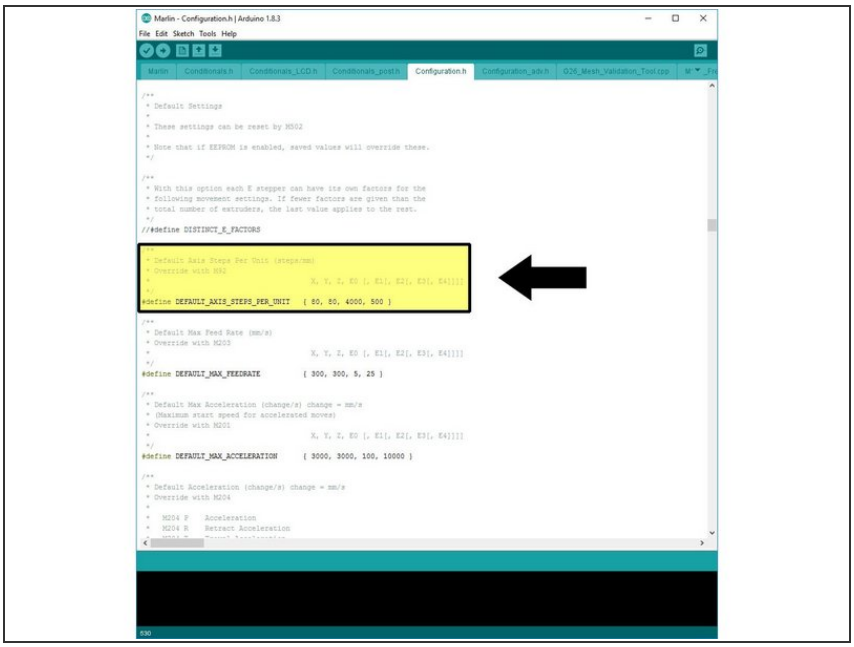


To set your new E-steps-per-mm you need to edit your firmware and EEPROM

EEPROM are special settings that can be changed without re-uploading new firmware to your printer. Steps-per-mm settings for each axis are included in the EEPROM. If you update your firmware, your EEPROM will overwrite any changes your firmware might have tried to make.

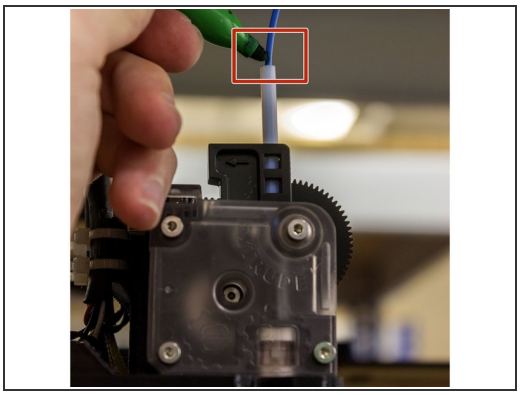
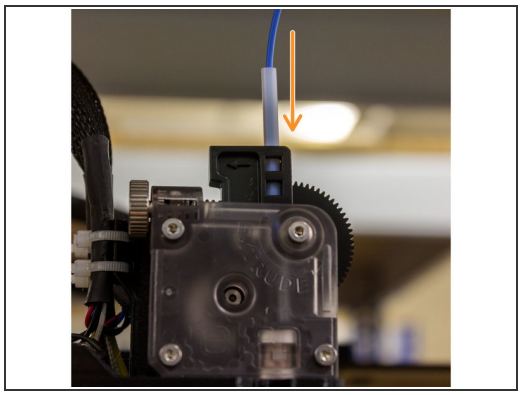
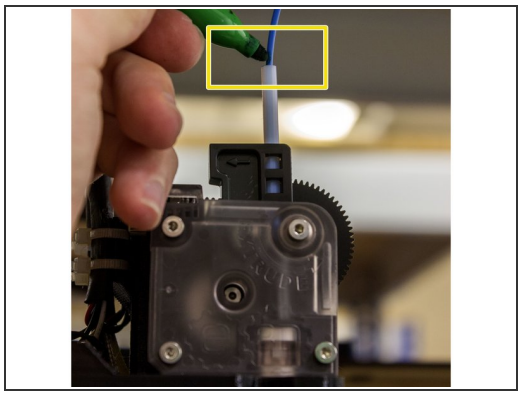
Not all printers have EEPROM settings, so if you can't update them, just update your firmware instead.

Step 7 — Update E-Steps



- If you have an LCD Screen:
  - Navigate to Control → Motion → Steps/mm → Esteps/m and enter your new E-steps-per-mm value.
  - Select Store Settings in the Control menu to save your settings.
- Over USB Connection
  - Use a printer control software to connect to your printer. Send the command M92 E<your number here>to your printer.
  - Then, send M500 to store your settings
- If you don't have EEPROM, or want your firmware to be consistant with your EEPROM:
  - Update the following line with your new value in the E-steps spot: #define DEFAULT_AXIS_STEPS_PER_UNIT {<X-axis> <Y-steps> <Z-steps> <E-steps>}. Upload your firmware as normal.

Step 8 — Extruder Steps-per-mm Tune

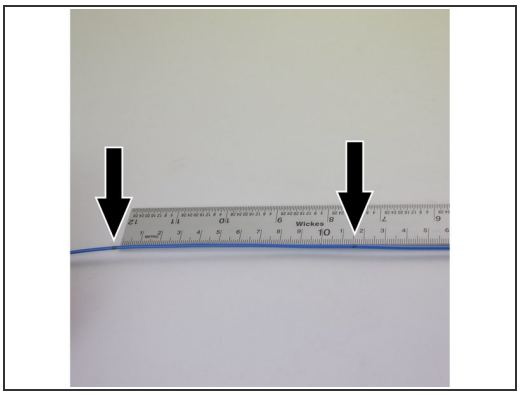
To get a more exact value for your E-steps-per-mm, measure the exact amount of filament that is pushed out of your extruder.

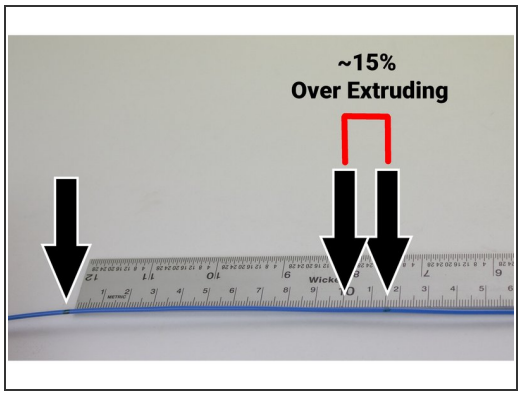
- Load filament into your extruder, just until it is gripped by the drive shaft (you can't pull it out without moving the large gear turning)
- Mark your filament at the top of the idler arm or PTFE tubing with a pen or permanent marker .
- Tell your printer to extrude 100mm of filament. Use your printer's LCD screen, or send it: `G92 E0`, then `G1 E100` via your printer control software.

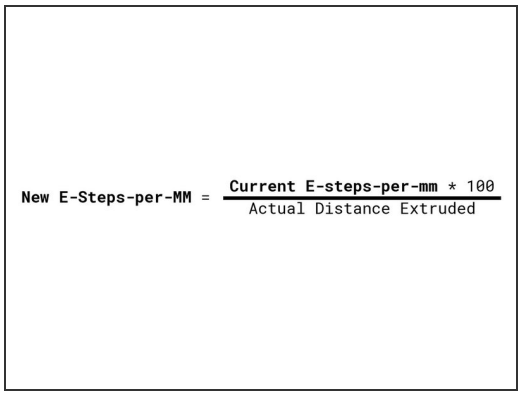
You may need to heat your HotEnd before your printer allows you to extrude filament. You can use M302 command to get around that.

- Mark your filament again at the top of your idler arm or PTFE tubing
- Eject your filament.

Step 9 — Extruder Steps-per-mm Tune 2

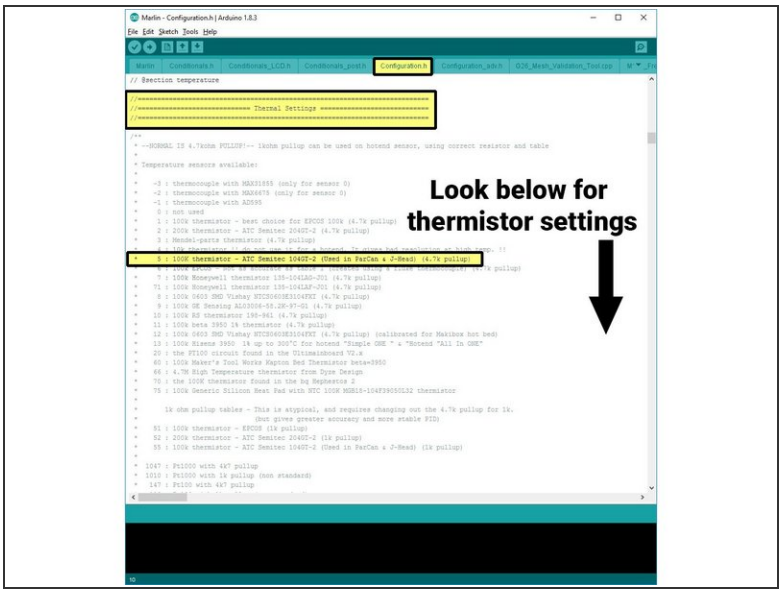


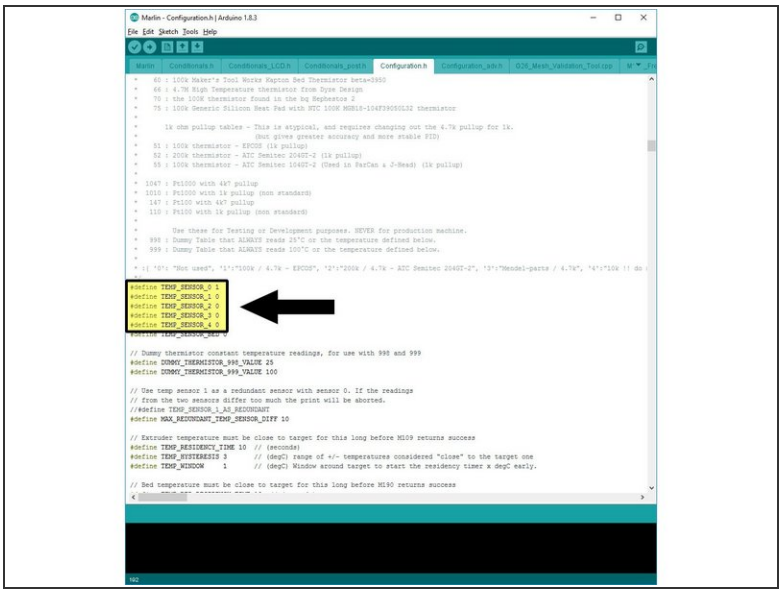




- With a ruler or calipers, measure the distance between the two marks on your filament.
- If the distance wasn't exactly 100mm, use a proportion to calculate a more precise E-steps-per-mm value.
- Enter that new value into your firmware or EEPROM as you did before.

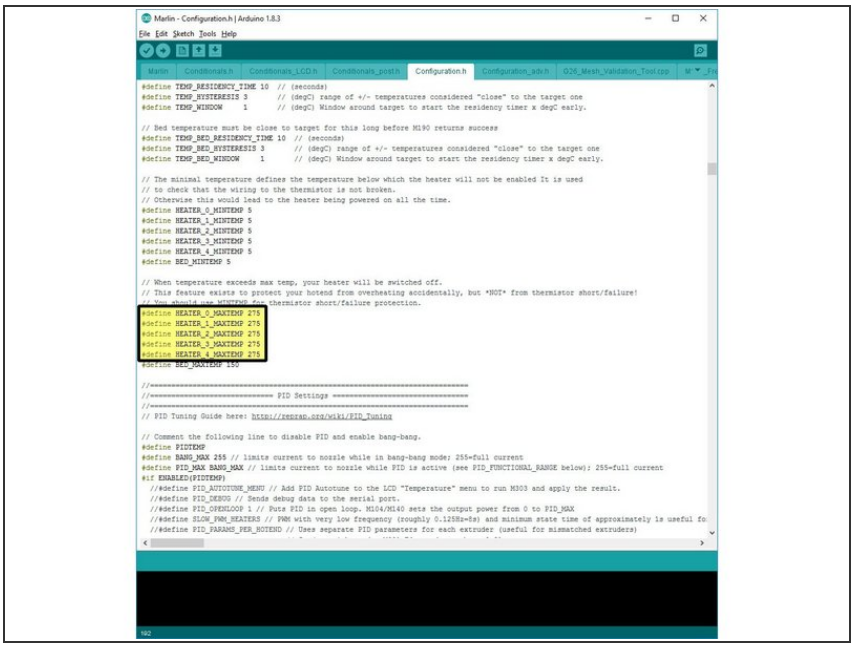
Step 10 — Thermistor Settings





- In the configuration.h file, find the Thermal Settings section. Below the comments you'll find the settings for the types of thermistors your printer uses. (Typically there will be one per hotend and one more if you have a heated bed.)
- If you're installing your V6 as your only hotend, change the first highlighted line to: #define TEMP_SENSOR_0 5
- If you're replacing an existing hotend or have multiple hotends, adjust whichever line corresponds to the tool number that you're changing (they start counting from 0)

Step 11 — Set Maximum Temperature



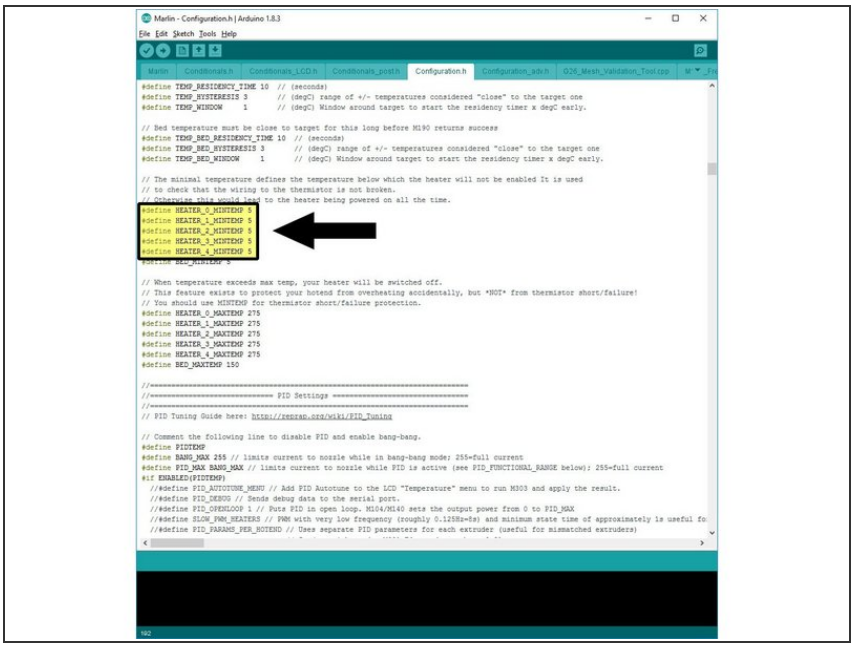
While the metal of your new V6 hotend can withstand very high temperatures, your thermistor can only go up to around 285°C for extended periods.

- Set that as your maximum temperature by changing the first highlighted line to: #define HEATER_0_MAXTEMP 285 (or adjust the line corresponding to the hotend you're changing.)

The Max settable temperature on the LCD is 15 less than the max temperature, you will need to set the max temperature to 300°C in the firmware in order to hot tighten at 285°C.

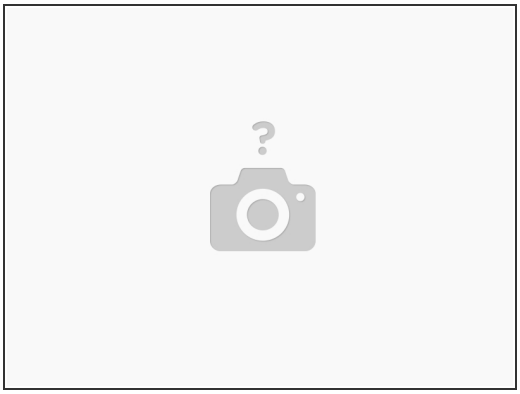
Remember to change the max temperature back to 285°C after you have hot tightened.

Step 12 — Set Minimum Temperature



- For safety it is strongly recommended to make sure that your printer detects if the thermistor stops sending correct temperatures for any reason.
- Set the first highlighted line to: **#define HEATER_0_MINTEMP 5** (or adjust the line corresponding to the hotend you're changing.)
- In newer versions of Marlin there are other features such as Thermal Runaway Protection that might be useful as well, though they are typically on by default.

Step 13 — Upload Firmware



- Upload the new firmware to your electronics as you normally would. Typically this means plugging in your printer to your computer, selecting the correct COM port and board type, and pressing the upload button.
- If you're unsure of how to update your printer's firmware, check with its manufacturer.

You're all done. Enjoy your new Titan!

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