

JLTXplore

5. Software Changes

Written By: JLTX

Octo Prusa i3 MK3 custom (mod)

General

Custom G-code

Machine limits

Extruder 1

Notes

Dependencies

Size

Nozzle diameter:

0.4

mm

Layer height limits

Min:

0.070

mm

Max:

0.25

mm

Position (for multi-extruder printers)

Extruder offset:

x : 0

y : 0

mm

Retraction

Length:

0.65

mm (zero to disable)

Lift Z:

0.4

mm

Only lift Z:

Above Z:

0

mm

Below Z:

209

mm

Retraction Speed:

35

mm/s

Deretraction Speed:

0

mm/s

Extra length on restart:

0

mm

Minimum travel after retraction:

1

mm

Retract on layer change:

☒

Wipe while retracting:

☒

Retract amount before wipe:

0

%

Retraction when tool is disabled (advanced settings for multi-extruder setups)

Length:

4

mm (zero to disable)

Extra length on restart:

0

mm

INTRODUCTION

Technically, you **only** need to do step 1. It is that simple. However, there are optional steps to make things better and enable more capabilities. Note that you should not need to run a full XYZ calibration unless you made other printer modifications that require it. Just a Z calibration and first layer is all you need.

NOTE: if you are using indirect laser filament sensor mod (not hybrid), you *must* make one firmware change. See [step 4](#).

Step 1 — Changing E steps - GCode



- Because you now have a geared extruder, you need to tell the firmware to move the extruder more steps for the same distance.
- This is easily accomplished using M92 and M350 commands. Default steps are 280, multiplied by 3.5 (gear ratio) is 980. This works ok but better to keep it a bit lower so Einsy can drive high speeds. So cutting microsteps in half 32->16 gives us 490 steps!
 - M350 E16 ; change extruder microsteps to 16 (M350 available starting in firmware 3.7.2)
 - M92 E490 ; change extruder steps to 490 per mm
- ⓘ If you are using a different gear ratio, apply that here instead. See table in [Print Guide](#)
- ⓘ This all assumes a standard 1.8° stepper. If you are using a 0.9°, you either need to double the E steps again, or halve the microsteps.
- You can add these lines to your start Gcode in slic3r, or send it using a terminal followed by M500 to save it permanently.
- ⓘ It's always a good idea to run an extrusion test to dial in your esteps as there is some variability in the drive gear effective diameter. The factory setting of 280 is just a median value that works for most people.

Step 2 — Z calibration



- With Skelestruder you gain print volume because the extruder is shorter so you can print taller.
 - ① If you are using volcano hot end, the print volume does not increase, but you don't lose height like you would with the stock extruder.
- Be aware that when you run Z calibration, which homes the X gantry at the top of the frame, it tries to check results with a mesh bed level. However, the firmware closely monitors the descent to make sure it sees the bed where it expects. It will error out early.
- To work around, just hit reset half way down and run mesh level yourself. You can adjust this expected value in the firmware if you want to avoid it in the future.

Step 3 — Motor current



- With the gearing, the motor has an easier time pushing filament so current can be lowered. But if your pancake stepper is low torque, you may need to increase current some to compensate.
- Add to your start Gcode, just before the purge line code `G1 X60.0 E9.0 F1000.0`
 - `M907 E400` ; set motor current mA
- ⓘ Best to start low, like 100, then work your way up until you have good prints. Too low will produce audible clicking which is harmless. If you have to go much over 500, check for mechanical issues or nozzle blockage.
- ⓘ Since firmware version 3.5.0, the M91x gcodes below are no longer enabled on stock firmware. Only M907 is supported, which allows current to be set but not reported, and there's no equivalent of M910. Uncomment the line `#define TMC2130_SERVICE_CODES_M910_M918` in `Configuration_prusa.h` to re-enable.

Step 4 — Firmware changes



- You can also change the E steps permanently in the Firmware. This also allows for more fine tuning
 - The unload needs adjustment because the distance from the gears to nozzle is shorter. So need to move it less and slower to allow tip to cool.
 - You can use a [Patch file](#) from the supplemental information page. Apply directly or read it as guide of things to change
 - ① That patch also adds optional changes: nozzle preheat menu item, lowers E motor current, turns off forcing self-test, increases acceleration and feed limits.
 - ① Helpful user also maintaining patches on [GitHub](#). May be more current than mine at times, so check there too.
- ⚠ If you are using indirect filament sensor (not hybrid), you need to flip a sign in the firmware to correct the direction. See patch file link above, at end of file.

Step 5 — Changing E steps - Firmware



- You can also change the setting in firmware (as you can see in patch file)
- After flashing new firmware you need to issue an M502 (recalls firmware settings) followed by an M500 (saves to non-volatile memory).
- ① Merely flashing the firmware does not change the non-volatile memory and you would pick up the old values.
- It is recommended to keep the E steps well below 1000 due to limitations of the Einsy processor. If you have a 0.9 stepper then best to halve or quarter the microsteps. This does not impact print quality due to the gearing.

Step 6 — Slic3r tuning



- With the shorter filament path, you should change some settings
 - Reduce the retraction length and keep the same quality. This is under the Printer section / extruder.
 - ① Should be tuned for each filament, but is under Printer section. I typically use 0.6mm
 - Reduce spring constant for linear advance, under Filament/custom G-code
 - ① 20 for PLA, 30 for PETG
- With the lighter weight you can increase printing speed as well.
 - This is under Print settings / speed.