

# Voron Design

## Extruder Calibration (ESTEPS)

Written By: insurgus



## INTRODUCTION

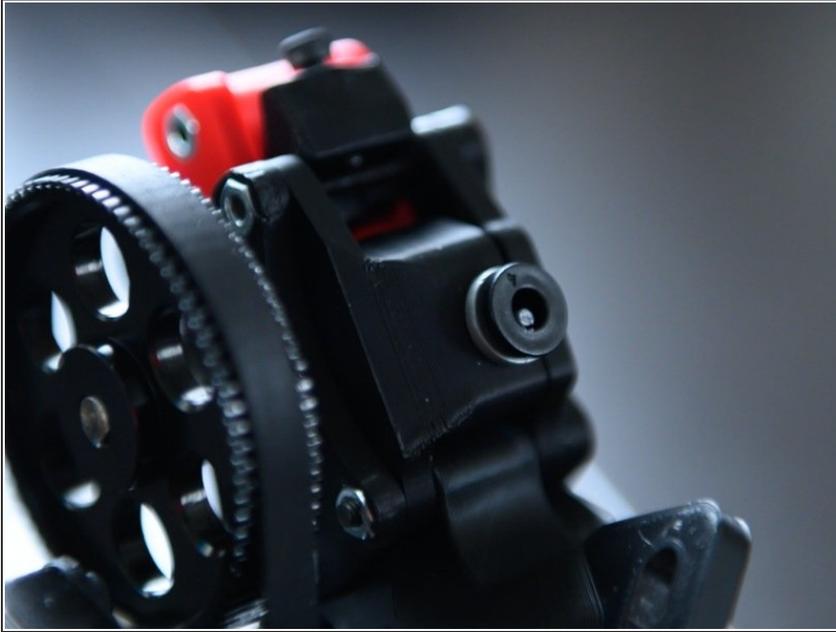
Extruder calibration is critical to quality print results. In order to complete calibration, you will be extruding a known length of filament from the extruder and measuring it as accurately as possible. Calipers make the job easy, but a ruler with mm divisions will work fine. Just note if you are using calipers, 1/10th mm is probably more than accurate for this purpose.

## Step 1 — Loading printer.cfg

```
step_distance: 0.00180180
```

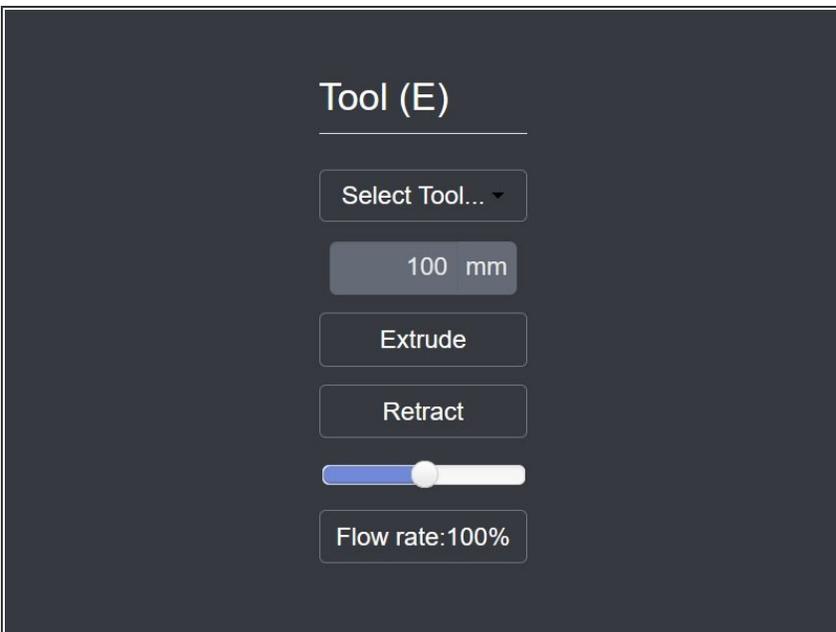
- Open your printer.cfg file in your preferred method. SSH and Nano work very well for this, but WinSCP is a viable method as well.
- Locate the [extruder] section.
- Take note of the step\_distance value. You are going to need this in later steps.

## Step 2 — Setting up for calibration



- Remove the output bowden tube from the extruder (the one feeding the hot end). If there is filament loaded, please unload enough that you can remove the tube from the collet.
- If you have no filament sticking out of the extruder, extrude a few mm until a short amount is sticking out of the collet.
- Cut this clean with the collet with side cutters. I like to depress the collet with the side cutters, but whatever method you choose, ensure you measure the same way.

## Step 3 — Extrude 100mm of filament



- Warm up your hot end to 235C.
- Once at temp, extrude 100mm using the Octoprint web interface.

## Step 4 — Measurement



- Measure the extruded filament from the extruder. It helps to flush cut this again and measure with the filament straightened out on a flat surface. If you wish to measure from the extruder, just ensure it is straight as possible during measurement.
- Note this number. We are going to use it in the next step.

## Step 5 — Quick Maths

1. Extruded Filament Length
2. Divide by 100
3. Multiply by original `step_distance`

- Take your measured filament length. In this example we are using **105mm**.
- Divide this number by **100**. The result is **1.05**
- Multiply this number by the **step\_distance** number we recorded previously. For this example, we will be using **0.00180180**. The result is **0.00189189**
- This is your new **step\_distance** value that we will update our config with in the next step. Remember, do not use these values. They are for example only.
- For reference, larger `step_distance` values mean that *less* filament will be extruded.

## Step 6 — Update printer.cfg

```
#step_distance: 0.00180180  
step_distance: 0.00189189
```

- If you have closed your **printer.cfg** file, please re-open it.
- Locate the **step\_distance** line in the **[extruder]** section.
- Comment out the existing **step\_distance** configuration by adding a **#** to the start of the line.
- Copy and paste the new value into the config under the previous entry.
- Save your config
- Restart klipper by issuing a **"FIRMWARE\_RESTART"** command in the OctoPrint terminal window.

## Step 7 — Repeat until calibrated



- Repeat Steps 3 - 6 until your extruded filament is within 99-101mm. It may take a few tries to get right!