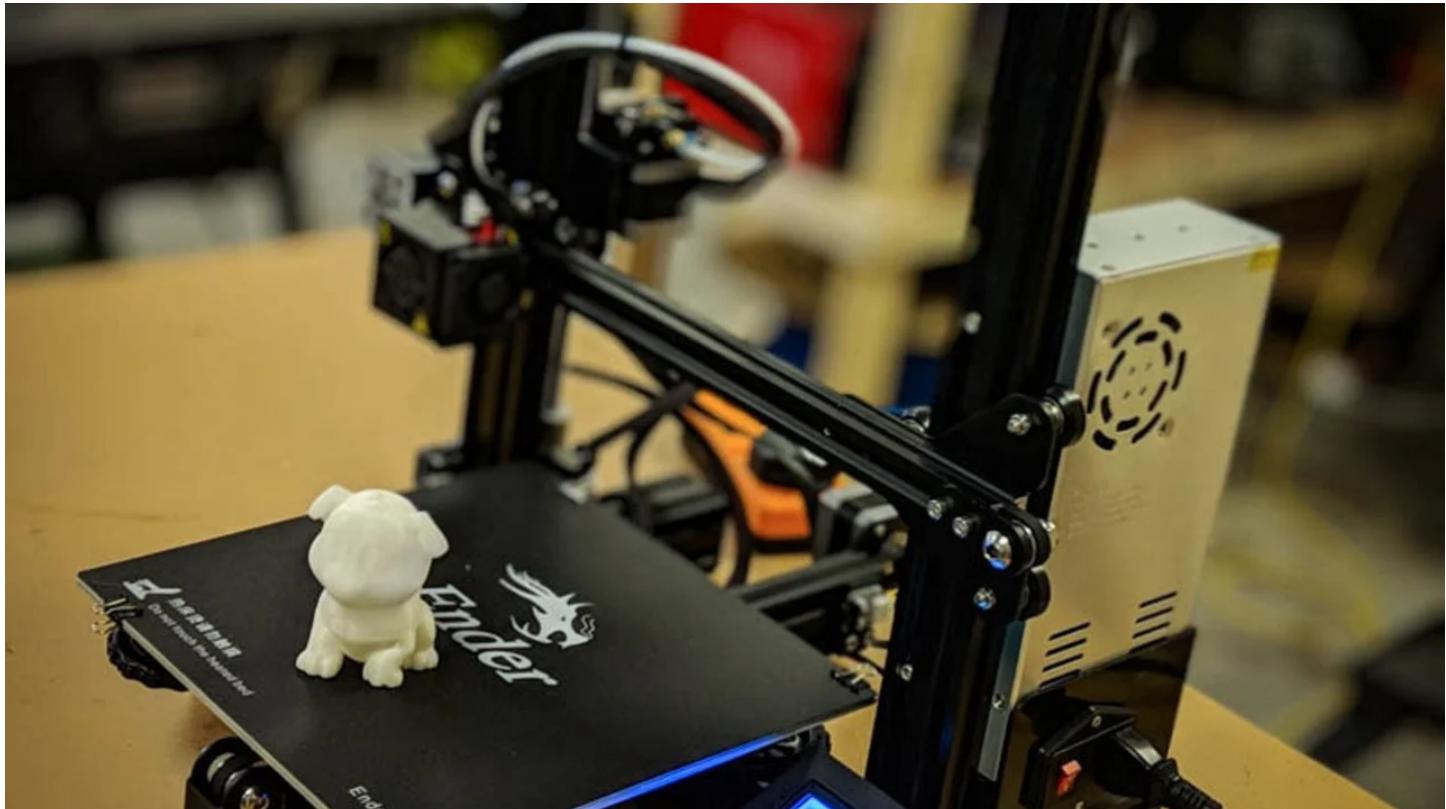


PRO



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End Your Ender 3 Issues

Ender 3 (Pro/V2) Calibration: Optimize Your Setup



by Alexander Issal

3 weeks ago

CONTENTS

[Perfecting Perfection](#)

[Screw Tightening](#)

[Bed Leveling](#)

[Extruder Calibration](#)

[Belt Tensioning](#)

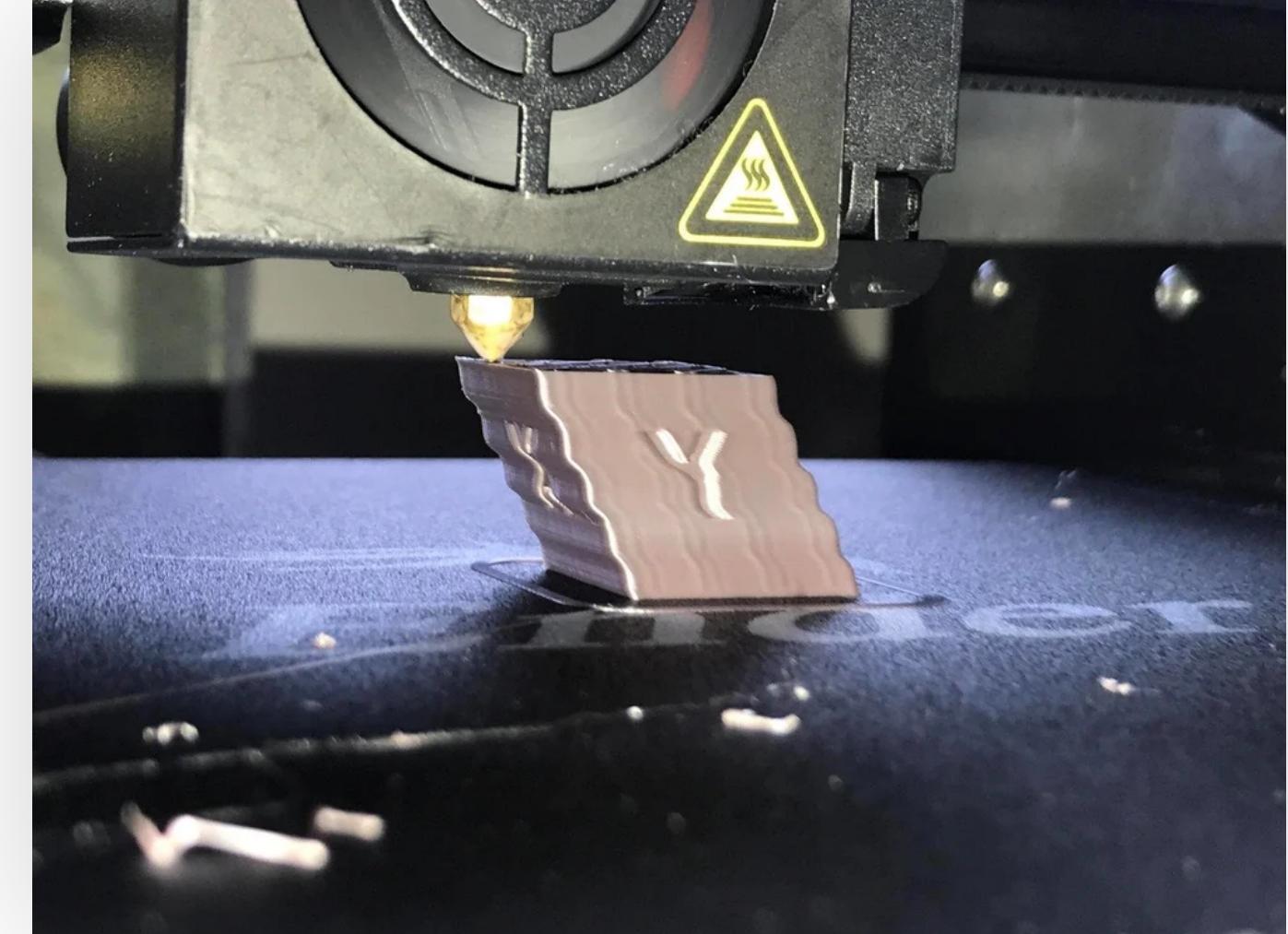
[Eccentric Nut Adjustment](#)

Keep Improving

Even the Ender 3 is only great if calibrated correctly. Check out this Ender 3 calibration guide to get the most out of your beloved printer.

ENDER 3 (PRO/V2) CALIBRATION: HOW TO
CALIBRATE IT

Perfecting Perfection



It's truly amazing that this severely layer-shifted cube continued to print (Source: [R-U-My-Daddy via Reddit](#))

Creality's Ender 3 family of printers is much beloved. The [Ender 3](#), [Ender 3 Pro](#), and the latest, the [Ender 3 V2](#), have together made a lasting impression on the 3D printing community with their amazing value for money. In fact, because of its unusually high performance at this price point, many call them the [best beginner 3D printers](#).

Some calibration, however, is normal for 3D printers. After all, these machines are tasked with printing accurately for hours on end, so fine-tuning of their mechanical components is expected. Let's explore some of the calibration steps that each model of Ender 3 can benefit from in this guide.



For All Our Articles On
Creality Ender 3

[BACK TO CONTENTS ▲](#)

ENDER 3 (PRO/V2) CALIBRATION: HOW TO CALIBRATE IT

Screw Tightening



Tightening the attachment screws of a stepper motor (Source: [Let's Print 3D](#))

Creality 3D printers are known to offer good value, but quality control is something that they can lack. As a result, many Creality printers may not have fully tightened screws.

It's up to the user to make sure that all the screws are tight, which may seem like a silly idea, but the difference it could make is surprising. It will not only remove issues like [ghosting](#), but also reduce the number of possible failures, making troubleshooting later on much easier.

[BACK TO CONTENTS](#) 

ENDER 3 (PRO/V2) CALIBRATION: HOW TO
CALIBRATE IT

Bed Leveling





Yep, we've still got to deal with knobs (Source: [cytrontech via YouTube](#))

Another very easy yet important step is to [correctly level your Ender 3's bed](#). It's one of the most crucial adjustments but also one of the easiest to miss. Adjusting the bed on the Ender 3 is a very simple and quick task that instantly improves the surface quality (if it's not already adjusted).

Regardless of what Ender 3 model you have, the steps are the same. Here's how it's done:

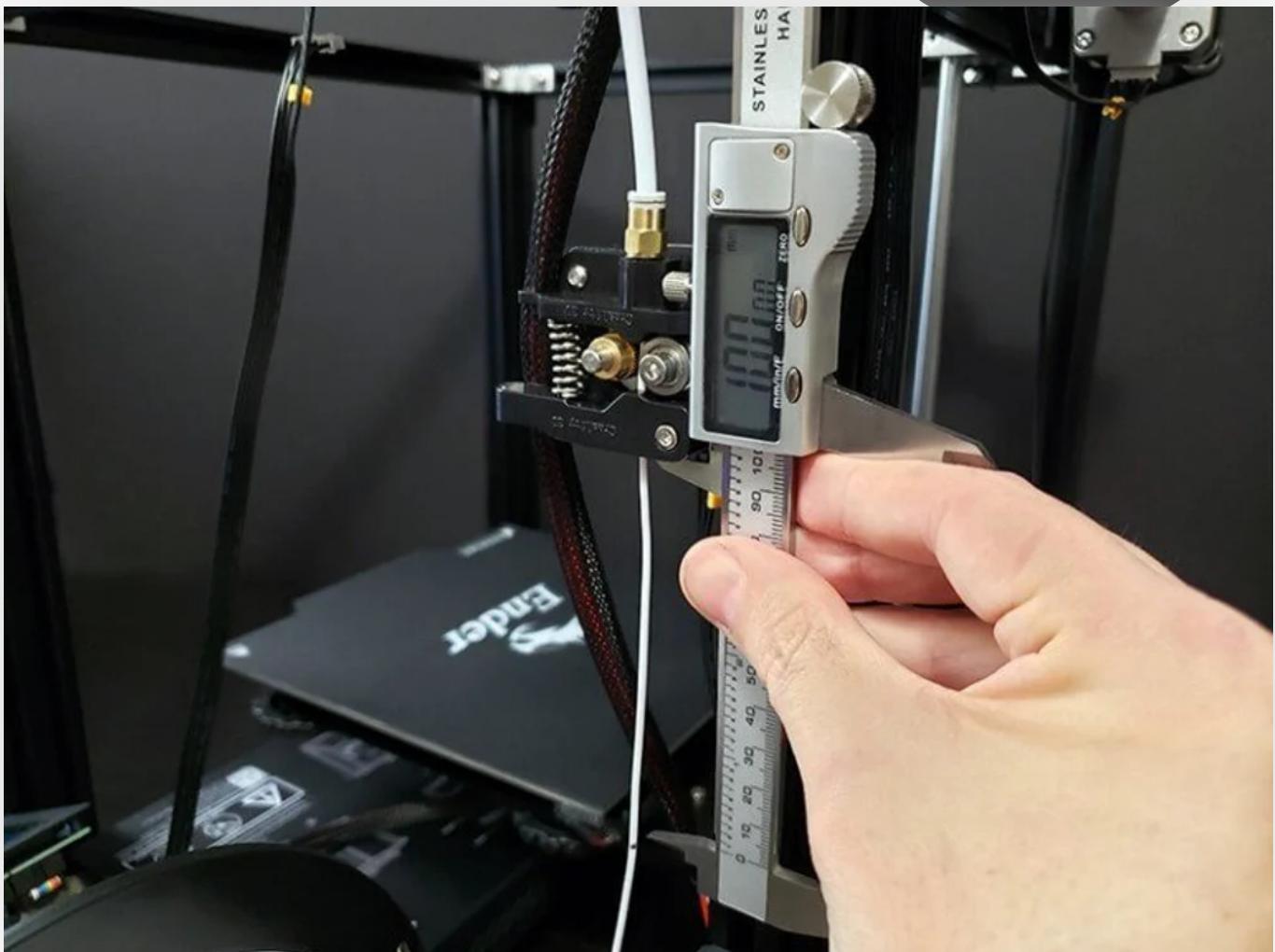
1. Home all axes by clicking "Home".
2. Click "Disable Steppers" and move the print head to one corner, making sure that there is adequate distance between the nozzle and the build platform. (The nozzle doesn't scratch the build platform while moving it.)
3. Unscrew the knob underneath one corner of your Ender 3 while moving a paper back and forth until you can feel slight friction.
4. Repeat the previous step with all four corners to ensure the whole bed is leveled.

[BACK TO CONTENTS](#)

3

ENDER 3 (PRO/V2) CALIBRATION: HOW TO
CALIBRATE IT

Extruder Calibration



Measuring filament to check E-step calibration (Source: [Let's Print 3D](#))

If you're having problems with [under-](#) or [over-extrusion](#), there's a possibility that your extruder's [E-steps](#) aren't calibrated. In order to find the right E-steps, you'll have to do a

little bit of math. Using a simple formula, you can calculate the new E-step with only three inputs.

Before starting, make sure that you're able to navigate to "Control" > "Motion" on whichever Ender 3 you have. [Some users](#) have noted that this option is missing, perhaps due to the status or version of their [firmware](#).

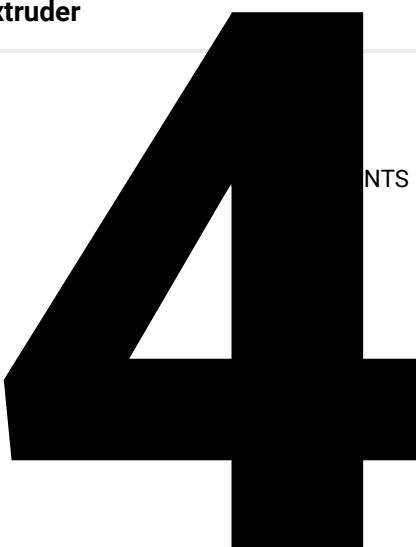
1. Measure 100 mm from a set point on your extruder and mark it. Mark an extra 10 mm above and under this 100-mm marking to make measuring easier later on.
2. Heat up your hot end and extrude 100 mm. (The temperature may need to go above 180 °C before the extruder will operate.) You can do this by clicking "Prepare" > "Move axis" > "Move 1 mm" and then slowly rotating the knob until you arrive at 100 mm.
3. Wait until the printer has finished extruding and measure how far from the 100-mm mark the filament stopped. If the mark has passed the extruder, then your extruder is over-extruding, and if it hasn't reached the mark, then it's under-extruding.
4. Use the marks above and under the 100-mm mark in order to estimate the amount of filament extruded.
5. Now calculate the correct E-steps by multiplying 100 with the current E-steps, then divide this by how much your extruder extruded. The resulting value will be your new, correct E-step value.
6. Click "Control" > "Motion", then scroll down to "E-steps/mm" and change it to your new E-step value.



Don't Miss

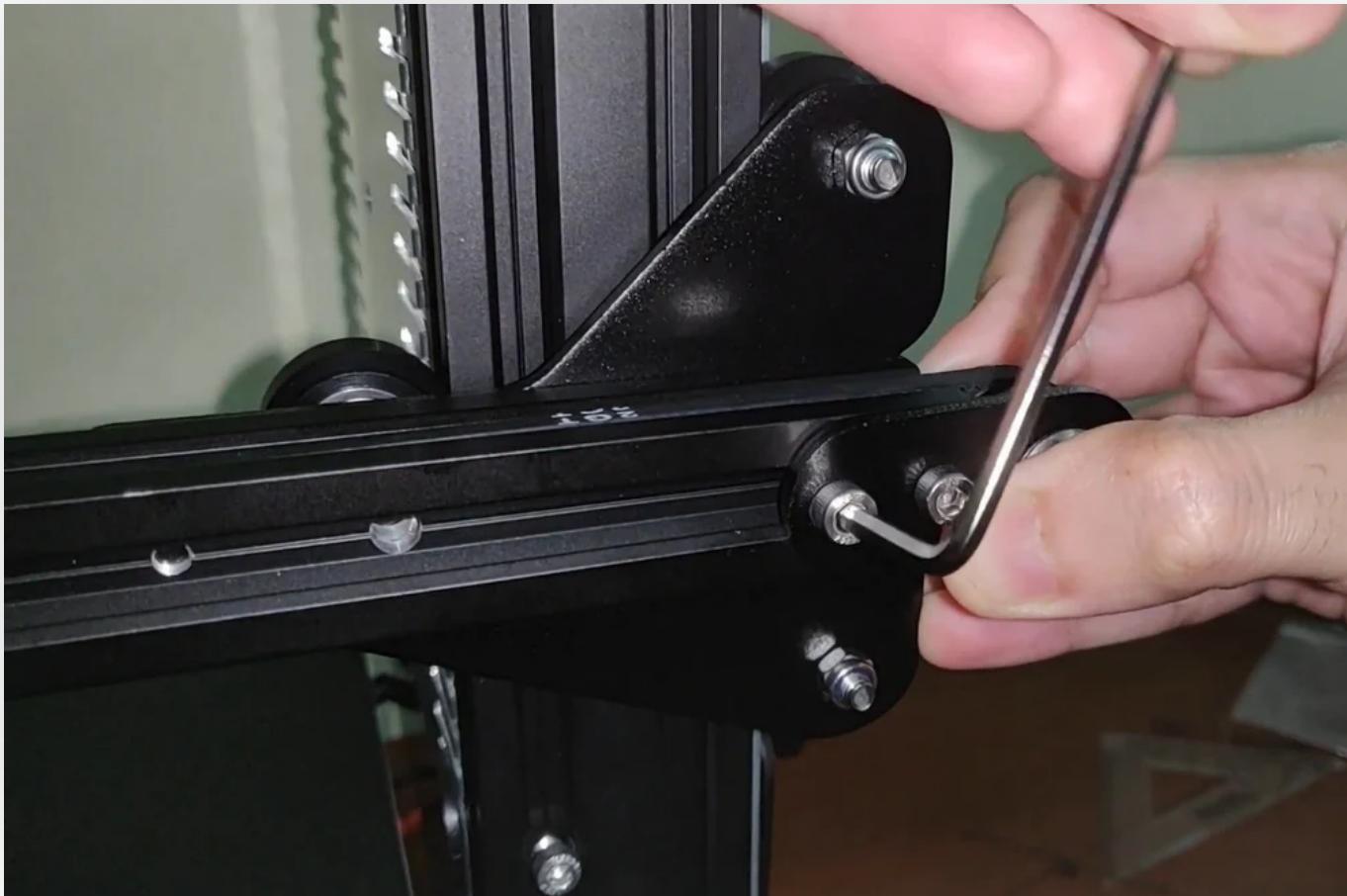
Extruder Calibration: 6 Easy Steps to Calibrate Your Extruder

NTS ▾



ENDER 3 (PRO/V2) CALIBRATION: HOW TO CALIBRATE IT

Belt Tensioning



Adjusting belt tension on the Ender 3 (Source: [GeekWareSoft via YouTube](#))

The belt tension on the Ender 3s also has a big impact on how your 3D prints turn out. Looser belts can cause severe ghosting, [layer shifting](#), and [dimensional accuracy](#) issues.

On the Ender 3 and Pro, you can tighten the belts by unscrewing the brackets that hold the bearings and moving them so that there's sufficient tension between the stepper motor and bearing. The V2, on the other hand, has screws built into the end of the X-and Y-axes, which allow you to adjust the tension for those belts on the fly. Either way, the belts shouldn't be super tight or super loose, just somewhere in between.

[BACK TO CONTENTS ▲](#)

5

ENDER 3 (PRO/V2) CALIBRATION: HOW TO
CALIBRATE IT

Eccentric Nut Adjustment



Using a wrench to tighten eccentric nuts (Source: [Kiwi3D](#))

Another very important thing to adjust on the Ender 3s is the eccentric nuts. These nuts

are located under the bed and on the X-carriage. They can be tightened by rotating them with the wrench that comes with the printer.

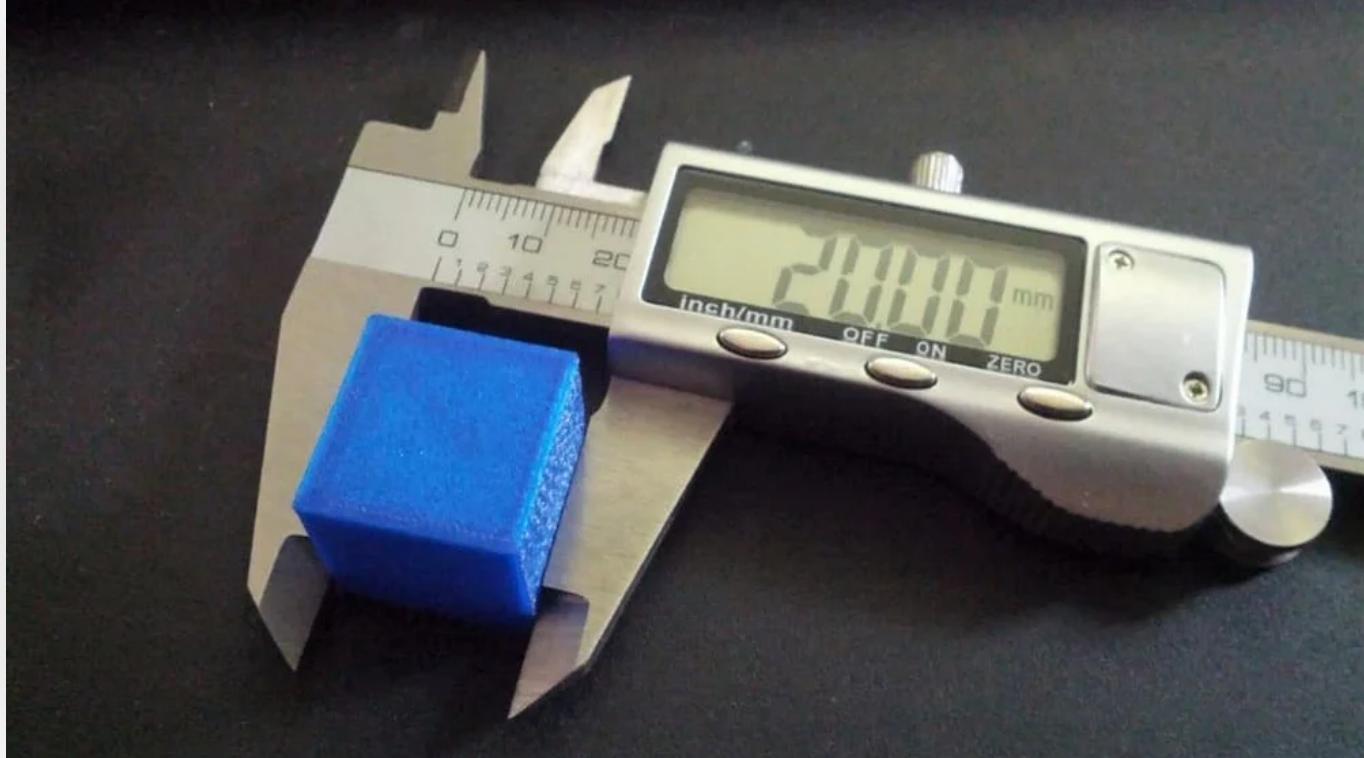
The eccentric nuts should be tight enough so that you can't rotate or tilt the bed but not so tight that it inhibits motion. The easiest way to do this is by loosening all the nuts and then tightening them again until the bed is firm.

The X-carriage should also be adjusted this way. What you're looking for is a horizontal carriage that doesn't have too much resistance when moving up and down.

[BACK TO CONTENTS](#) 

ENDER 3 (PRO/V2) CALIBRATION: HOW TO CALIBRATE IT

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Accuracy is everything! (Source: [Kiwi3D](#))

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If you're hungry for more general information on optimizing your Ender 3, here are a few [TERMS OF USE](#) more articles you might be interested in:

IMPRINT

- [Best upgrades and modifications for Ender 3 \(Pro/V2\)](#)

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- [General Ender 3 \(Pro/v2\) calibration](#)

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