

3DC Sintratec Kit Calibration Guide

REVISION	DATE	DESCRIPTION	AUTHOR
A01	10/30/18	More detailed instructions for calibrating Sintratec Kit	JT

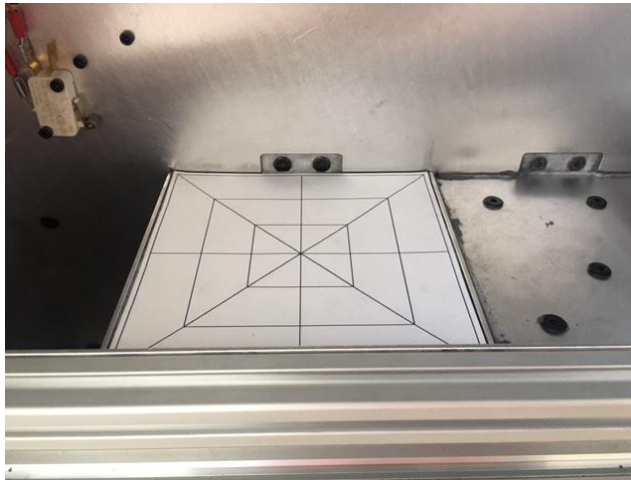
> INTRODUCTION

We've noticed that some customers have difficulty calibrating their Sintratec Kit with the instructions provided by Sintratec. This guide serves as a secondary resource with more detailed instructions based on our experience with the Sintratec Kit. The guide will walk you through a step-by-step process of calibrating your printer with an initial rough calibration, then a second fine calibration that can be repeated as necessary.

> INITIAL COARSE CALIBRATION

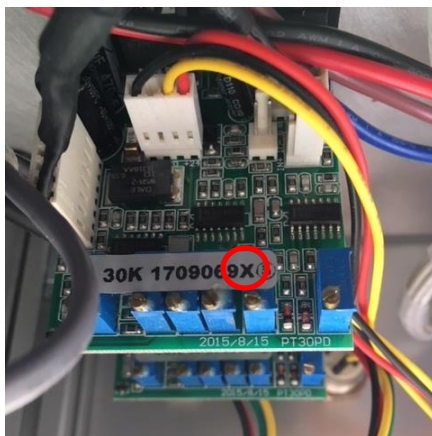
This stage of calibration is done manually and will only get your printer to an approximate level of accuracy. The additional information in this guide is meant to ensure that you will only have to do the manual calibration once.

1. Read the laser calibration section of the Initial Commissioning Guide provided by Sintratec. This will give you an understanding of the general process.
2. Download and print the 103% scaled version of the Sintratec Calibration pattern. This can be found on our website at <https://shop3dchimera.com/pages/sintratec-kit-support> under Technical Support Documents. Print at full size on 8.5 x 11 cardstock or similar heavy paper. Cut the pattern out carefully on the dotted lines.
3. Prepare your printer for calibrating by bringing the (empty) print bed all the way to the top of the print chamber until it hits the limit switch and retracts. Then, raise it an additional 4 mm so it is at its absolute highest position.
4. Place the calibration pattern on the print bed, making sure that it is centered and as flat as possible.



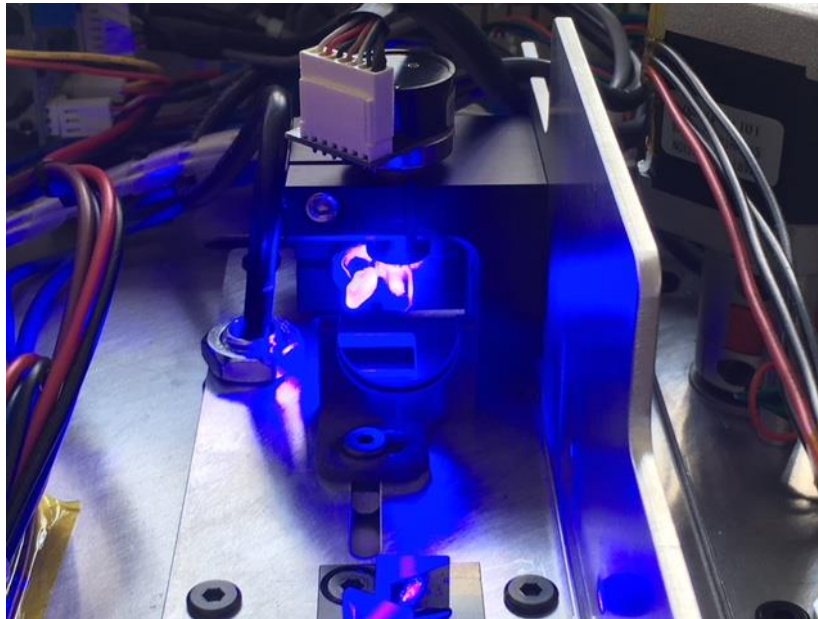
Correct placement of the calibration pattern – well-centered and close to the printing surface.

5. Turn your printer off, then remove the top cover of the printer and the laser cover. Be careful not to dislodge any wires while removing the laser cover. It is recommended to unplug the fans from the board and set both covers aside.
6. Remove the lens from the lens holder and place it on a clean, soft surface.
7. Make sure the galvanometer mounts are tightened correctly. You should be able to turn the galvos and move them back and forth inside their mounts, but they should not wiggle or slide freely. If the tightness needs adjusting, do this before starting the calibration. You will need to remove the entire laser/galvo assembly to access the screw for the y-galvo mount.
8. Make sure that the each galvo is plugged into its correct driver board, and that each driver board is plugged into the correct port on the board. Each of these should be labeled and easy to differentiate.



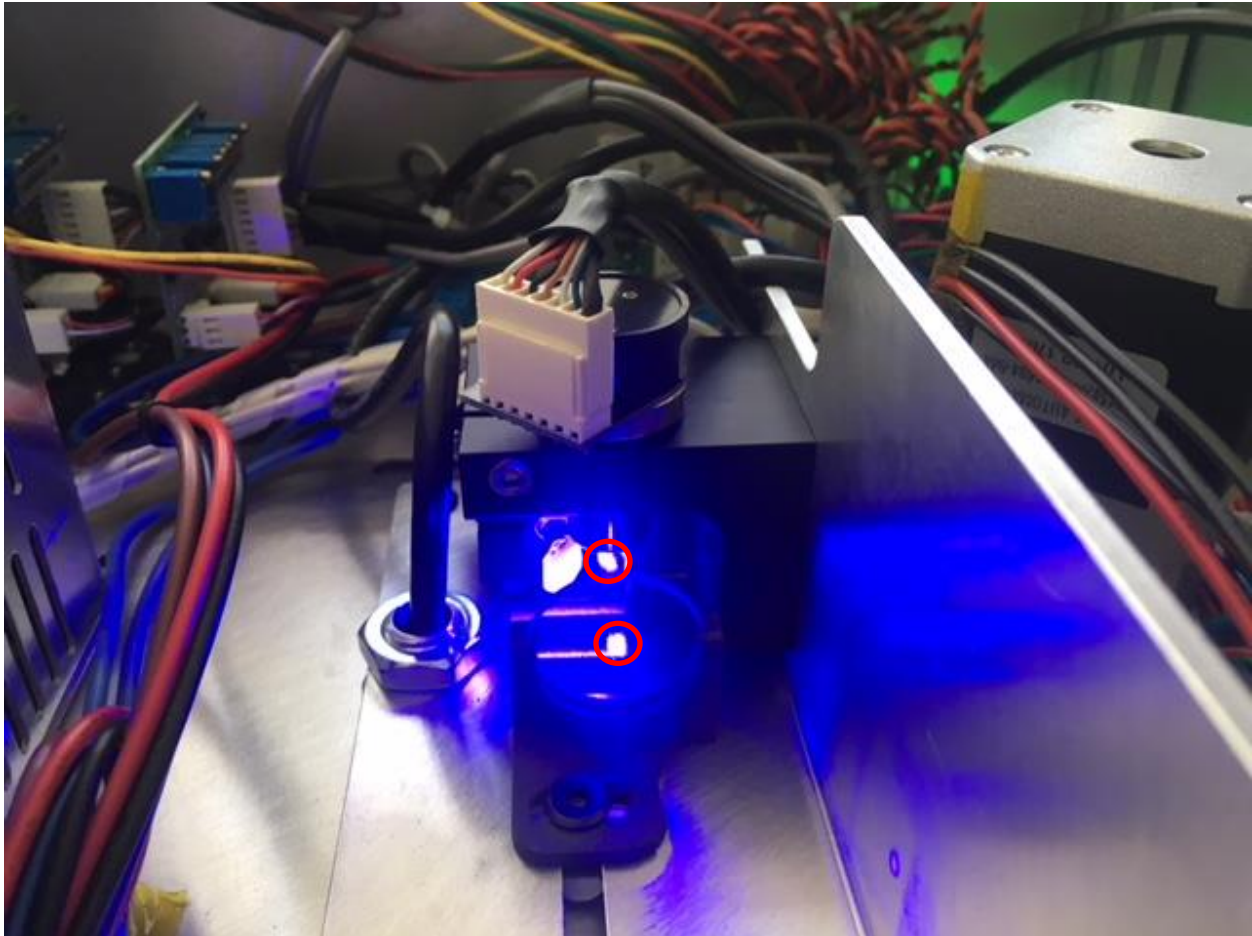
CONFIDENTIAL & PROPRIETARY
 DO NOT DISTRIBUTE
 PAGE 2 OF 7

9. Do an initial adjustment of the galvos as shown in IC08 of the Initial Commissioning Guide. The mirrors should cross each other at the center.
- 10. PUT ON THE LASER VIEWING GLASSES!**
11. It is helpful to have the printer door open for better visibility of the laser. Tape down the laser door switch so that the laser will fire with the door open
12. Turn the printer on, connect it to your computer and open Sintratec Central. Access the calibration window by clicking 'Calibrate' in the '4. Print' tab.
13. Under 'Calibration Pattern' click 'Show on Kit' then turn the laser key. You should see the laser firing.
14. Loosen the screws holding the laser and move it so that the laser hits the center of the x-galvo mirror. The laser should be parallel to the back of the plate it's mounted on. If you cannot get the laser parallel, do not force it. Try loosening the screws more. Once you have the laser in place, carefully tighten the screws and make sure the laser is still aimed at the correct place.

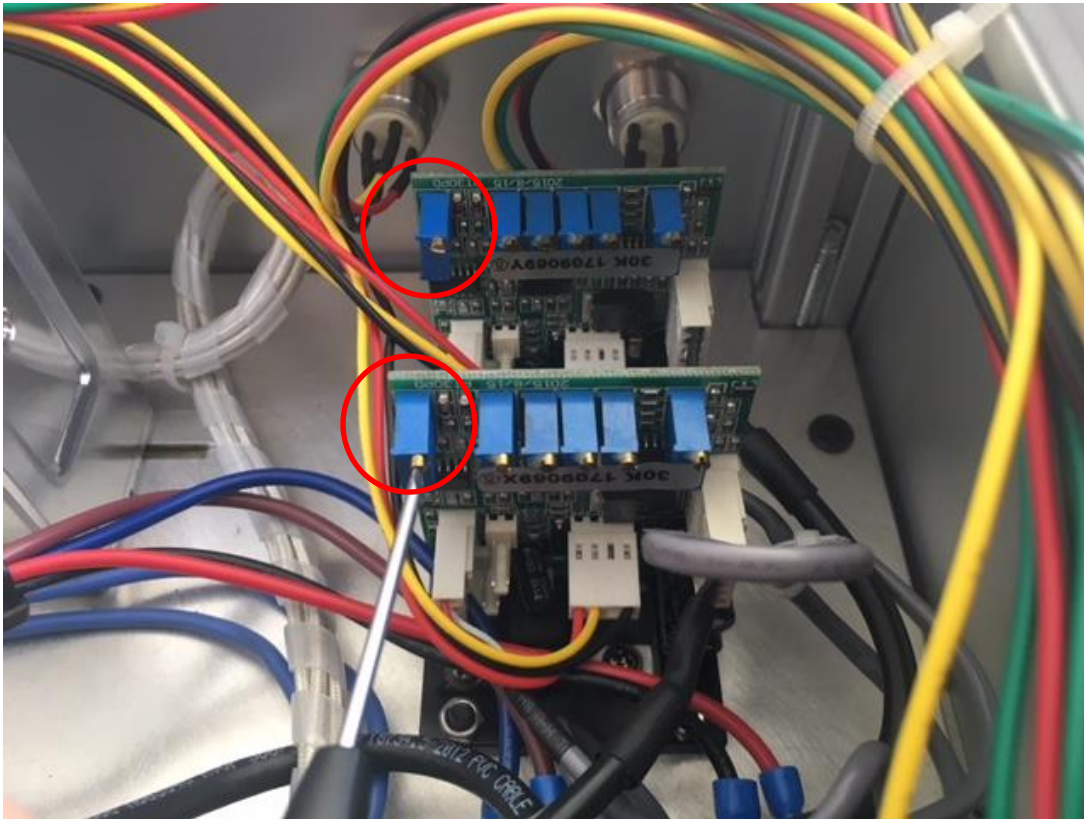


15. Look at the platform to see if the laser is projecting onto the surface. It will look faint and out of focus until you insert the lens.

16. Carefully insert the lens into the lens holder with the convex side facing the mirrors. Move the holder so that the laser hits the lens in the center. Double check that the laser is still hitting the center of the x-galvo mirror.



17. The calibration pattern should now be in focus. Now, rotate the x and y-galvos so that the center of the pattern lines up with the printout on the platform.
18. Now you must manually adjust the scaling on the x and y-galvos by turning the left-most screw on each galvo driver board. If this is your first calibration, there will be some glue that needs to be broken to turn the screws. **DO NOT TURN ANY OTHER SCREWS ON THE GALVO DRIVER BOARD!** Turn the screws clockwise to stretch the pattern and counterclockwise to shrink it.



ONLY TURN THIS SCREW ON EACH DRIVER BOARD

Once the laser path lines up with the calibration pattern, you are done with the initial coarse calibration. Below are a few common problems with this stage and possible solutions.

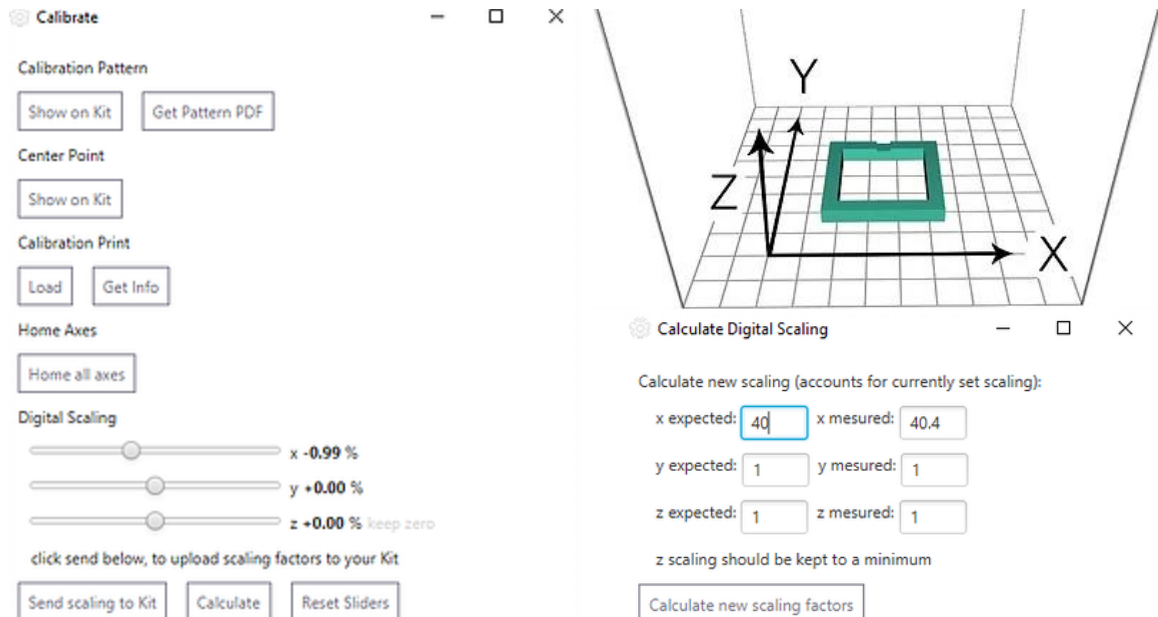
Problem	Solution
The laser pattern is rotated and not parallel with the edges of the build platform.	Loosen the four screws holding the entire laser/galvo assembly and rotate it slightly.
An edge of the laser pattern is missing or has dark spots.	Check the laser path for insulation. Check the laser glass for residue. Check the tabs holding the laser glass. Move the laser/galvo assembly in the opposite direction.
The corners of the laser pattern look bent.	Check the printed pattern for wrinkles or bends. Also check that the galvos do not wiggle in the mount.

After initial coarse calibration, you can reassemble the printer and proceed with fine-tuning your machine. The next step is to print a calibration part with known dimensions.

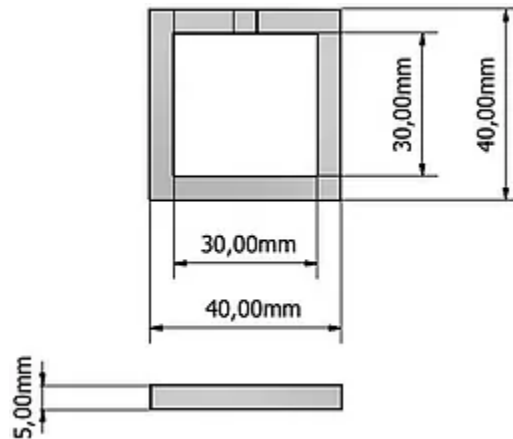
>FINE CALIBRATION

Fine calibration is done digitally and can be applied within $\pm 5\%$ of your coarse calibration. If you print a calibration part and the dimensions are off by more than 5%, you will need to adjust the galvos manually before proceeding with the fine calibration.

1. Load the powder reservoir with around 3 cm of powder and level the build surface. Let the machine preheat fully.
2. In the Calibrate window, click 'Load' under 'Calibration Print' to place the calibration print in the build chamber. Leave it centered in the default orientation.



3. Start the print. Once it is finished printing, let it cool completely before removing the part. If you remove the part while still hot it will warp and will no longer be useful for calibrating.
4. Remove the part and clean it thoroughly with a plastic bristled brush. This should remove all the loose powder without removing any sintered material.
5. Measure the dimensions of the part with calipers. Refer to the orientation of the part to determine which directions are x and y.
6. Open the digital scaling calculator by clicking 'Calculate' under 'Digital Scaling'.



7. Enter the expected and measured dimensions of the calibration part.
8. Click 'Calculate New Scaling Factors'. The scaling factors will automatically apply to the sliders.
9. Make sure to click 'Send Scaling to Kit'.
10. Reprint the calibration part to check the new scaling factors. Repeat the digital scaling as necessary.