Sunlu S8 Bed Leveling

Version: 001
My repository of information on the Sunlu S8 is available in GitHub at:

https://github.com/ctkjose/robobo3dr1plus/master/sunlus8.md

Send feedback and suggestions to jose.cuevas@gmail.com

To familiarize yourself with the process I suggest you watch these three videos:

https://www.youtube.com/watch?v=Gkg7lh7yTUQ&t=1475s

https://www.youtube.com/watch?v=PghwKamVnlQ

https://www.youtube.com/watch?v=ail-0E_LtV0 (using old firmware, menus are different)

Also the steps to level the bed in the S8 are the same for the Ender 3, CR10 printers and other printers with similar kinematics.

Before you start!

The experience and results that you might get when leveling the bed of your Sunlu S8 may vary due to the following factors.

How level is the surface where you place your printer.

Issues with the Z-Axis end-stop switch (tells the printer where the bottom should be) caused by assembly errors, it may be too low or too high.

Issues with the bed frame or metal plate (warps/bends) which alter the level in areas of the bed but mainly in corners. You can see this more clearly when you place the glass on top and look at the edges you will see the gaps.

If you inspect the metal bed or the metal frame and see significant bending or warping you should contact Sunlu for a replacement.

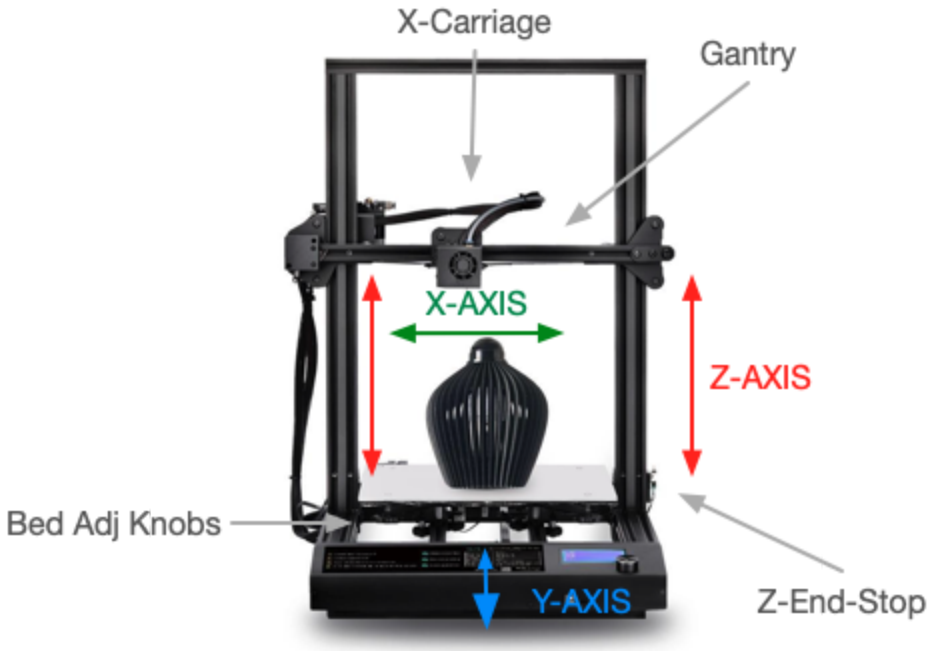
Some people have reported a warped glass. I suggest you check your glass against a flat surface and request a replacement if it is warped. All other issues we can work around assuming that our glass is level.

The springs holding the bed do not have enough tension, they may get stock and not extend when you make adjustments. In that case you may need to use your hand to stretch the gap between the bed and the bed frame so the spring bounces open to the correct position. It will also mean that your printer will tend to lose its level over time.

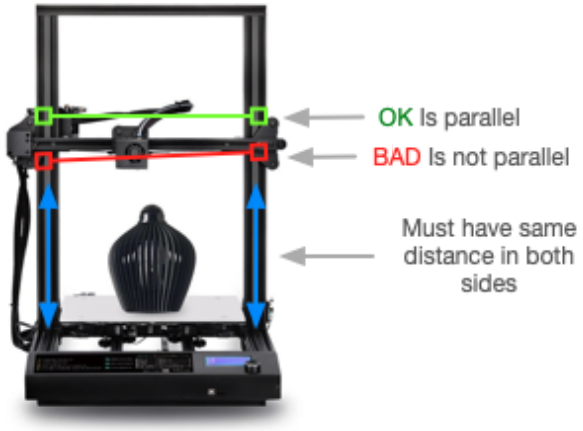
In my experience and others in the forums is best if you order new springs right of way and replace the stock springs.

Before attempting to level the bed or use your printer you need to check the clearance of your extruder/z-axis.

The Z-axis uses two motors that move and hold the gantry (the bases for our X-Axis). The up and down movement of that gantry is our Z-Axis while the carriage for the extruder nozzle is our X-Asis.



CHECK 1 You need to ensure that the gantry is parallel to the frame, that is the distance from the gantry to the frame at the bottom must be the same on both sides.



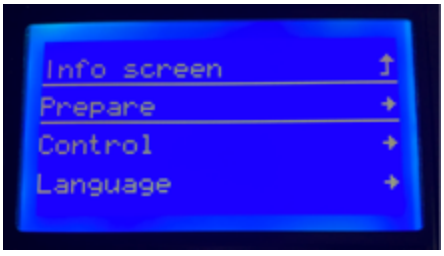
You can use the glue-stick that came with your printer or any other object that is rigid enough and fits under.

Place the glue-stick under on one side and lower the gantry by rotating the motor screw on that side until it touches the top of the glue-stick.

Repeat on the other side.

You can not rotate one screw too far down (or up) because it will lock the gantry, so you may want to rotate both screws at the same time or rotate the other after just enough so it is kind of level with the other side.

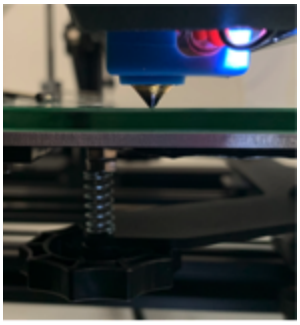
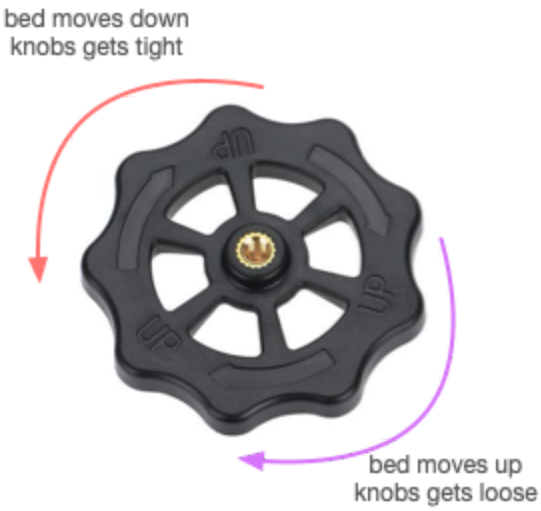
CHECK 2 Nozzle clearance and Z end-stop switch location. With a parallel gantry the next step is to ensure that the tip of the nozzle is above the top of the glass. The objective here is that the clearance should let you slide a piece of paper under without any resistance and have enough travel with the knobs under the bed to make adjustments. For example if your knobs are all the way loose or tight you will not be able to make adjustments when we level the bed.

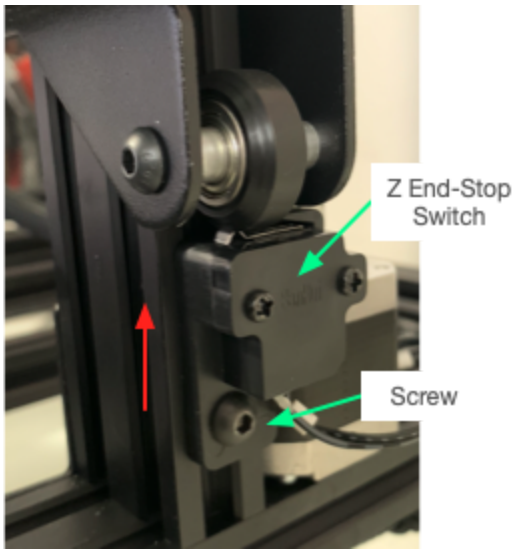


Turn the printer ON.

On the printer push once on the screen knob and select the **Prepare** menu by pushing the knob.

Select **Auto Home** and push on the knob to start the Auto Home process.

	The printer will move all three axis and find the home position using the end-stop switches.
	The nozzle tip should be above the glass top with enough clearance to fit a paper sheet. It can be close but not touching the glass. We need to judge if the distance of the nozzle to the glass can be cleared using the knobs under or if we need to adjust the position of our z end-stop switch. If it is below the glass you can check if the distance is small enough that by moving the knob under in a counter clockwise direction you can clear a gap to have the nozzle tip above the glass.
	If the clearance needed is small enough try using the knob under to clear the glass. Remember the nozzle tip must be close to the glass but not touch it. If this works on this side (left side), go ahead and turn off the printer and start adjusting the knob on the right side while sliding the x-carriage towards the right side of the bed. By doing this we are making sure that our nozzle can clear the bed across by adjusting the knob on the right.

	Succes: If you were successful on adjusting the clearance using the knobs you are ready to start the bed leveling process. **You are DONE with this check**! No way: if the nozzle is too far under and you went all the way in with the knob, then we need to adjust the Z-end stop. **Sorry you have more things to do!**
	You are here, that means we don't have enough clearance so we need to move the end-stop switch. Here we need to move the switch up so when the printer does its auto home routine it stops above the glass. Go ahead and turn On your printer and run the **Auto-Home** again. You will see the roller on the right side pushing down on the switch. We need to move the gantry up and figure out how far up we need to go to clear the bed. To give us more travel to calibrate the bed you can lose the four knobs under the bed and then tight them a couple of turns in (cc) but not all the way, try to be even with the number of turns (30!) on all sides. On the **Prepare** menu you will find the option **Move axis**, select this option. In this menu you will find the **Move Z** menu, once selected inside you will select the **Move 1mm** option.

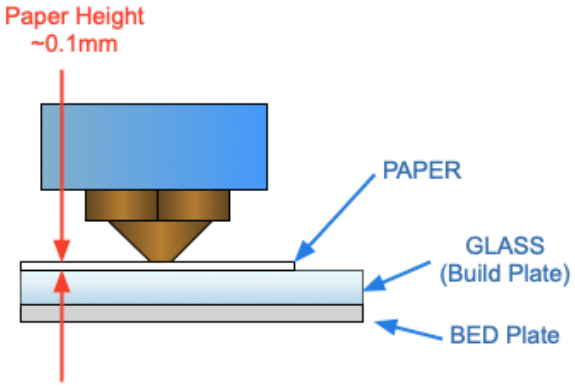
	Rotate the knob clockwise and the gantry will move up. You will notice the distance (in mm) that is moving away from the end-stop switch. Move the gantry up until you clear the bed. Back in the **Move Z** menu there is a **Move 0.1mm** option that you can use to move the gantry with more precision. As a reference for the gap I use a sheet of copy paper folded twice (4 layers). In the **Prepare** menu you have the **Disable steppers** option. Use that option to turn off the motors on the printer. Now using your hand slide the X carriage across the bed and check the clearance, may want to try also checking with the bed in the back and forward. Use the **Move Z** options to go back and make adjustments if necessary. When you're happy with the clearance it is time to move our switch. The printer came with a set of Allen wrench (hex key). Find the one that fits the 3mm screw holding the switch in place. Unscrew the switch just enough so that it can be slided up.

	Slide the switch up until you hear the "click" of paddle closing the switch, tight the screw back. Make sure that it is tight, you do not want the switch to move over time. Once done do another **Auto Home** from the **Prepare** menu and check the clearance. You may have to repeat some of these steps again if your clearance is too close to the bed or touching the bed.

Leveling the Bed

Bed leveling does a couple of things.

The first is to tell the firmware the distance between the nozzle and the bed. The ideal distance is 0 but in reality we are trying to get that nozzle as close as we can with the constraint that it must be the "*same*" distance across the build plate. So our second goal is in other words to get the nozzle parallel across the whole build plate.



The first goal is to get that nozzle as close as possible and parallel to the bed.

A piece of regular copy paper is about 0.1mm height and thus it is used commonly as a gauge to level the bed.

Other people use a feeler gauge like the ones used for spark plugs.

Some people are adventurous enough and use a flashlight from behind the nozzle to get the nozzle on top of the bed.

In this document we will use a regular piece of paper, you can cut a strip of about one inch in width to make it easier to handle.

The paper is our gauge to check that the nozzle is at the same distance from the bed at different points of the bed.

The process will check four corners of the bed and we will use the paper to measure the distance of the nozzle and use the knobs under the bed to adjust the distance as required.

The distance between the bed and the nozzle is set when you can slide the paper under the nozzle with ease and yet feel the friction of the nozzle touching the paper.

To double check we can slide the paper in from the front and it should slide under without bending.

Understand that when we use the piece of paper we are lying to the printer because in reality the nozzle is 0.1mm away from the bed. When we print a model with a Layer-Height setting of 0.2mm our first layer will be around 0.3mm.

To correct this we will have to set the Z-Offset setting accordingly after we level our bed. Assuming everything is perfect configuring a Z-Offset of -0.1mm will set the nozzle at 0, but in reality we may have to play with that value.

When printing the first layer the filament that you use needs a different "squish" (layer height). For example PETG needs a ticker layer so you ideally just adjust your first layer height or first layer width or adjust your Z-Offset.

If we do our bed leveling properly and set our Z-Offset accordingly you should NOT have to change the Z-Offset when using different materials, just adjust the first layer height.

Running a bed leveling routine	
STEP 1: The first step is to make sure that our nozzle and bed are warm. We do this to ensure that all metals have expanded and our leveling process accounts for this expansion.	Turn your printer On. Select the **Prepare** menu and then **Preheat PLA**. From this menu select **Preheat PLA** again. This will start heating up the bed and the hotend. Wait a couple of minutes until the heating reaches its temperature and is stable.
STEP 2: Run the bed leveling routine from the menu. The printer will move the nozzle to four corners and will wait for you to adjust the bed and then move to the next point.	Make sure you have your strip of paper ready. Under the **Prepare** menu select **Bed Leveling**.

The printer will display "Homing XYZ" and will run an **auto home** routine. The nozzle should be at the left corner and the front of the bed near the nozzle when the process finishes.

The printer will display "Click to begin". Push on the knob to start the process.

The printer will move the nozzle to the first position. Place the paper under the nozzle.

If the paper does not slide under, adjust the knob under that corner until it slides.

Adjust the knob until the paper slides without effort and you feel the friction of the nozzle touching the paper. Double check by sliding the paper from the front, it should not bend.

When satisfied press the knob to repeat the process with the next corner.

When you finish the last point it will display "Leveling done". The printer will then go to its home position.

STEP 3: You want to repeat this process at least two more times. You should have to do little to no adjustments on the consecutive steps.

Notice that due to the stock springs when you lose a knob (counter clockwise) on the bed it may not spring back up as it should. Using your hand you can spread the bed lightly from the frame to push up the bed and make the spring snap into the proper place.

STEP 4: Print a first layer calibration model. While calibrating your first layer has to do with more things besides the bed leveling, working on calibrating your first layer will tell you right of way if your bed level needs adjustments.

In this link you will find a good tutorial and a tool to generate a gcode model to print and test your first layer.

https://teachingtechyt.github.io/calibration.html#firstlayer

I also like this video:

The main thing here is to get an even layer.

Gaps between lines means the nozzle is too far up.

If the surface of the first layer feels like it has ridges, it is too far down. The same if the layer is very translucent (layer is too thin).

https://www.youtube.com/watch?v=AaF28dnDgKA

The first layer height will affect adhesion and the overall physical height of the part vs the actual height in the model/design.

Things to look out for

If your nozzle is oozing or has a blob it must be clean before leveling the bed. You can also reduce the temperature a bit by using the **Temperature** menu available under the **Control** menu.

When sliding the paper do not make pressure on the bed.

When cleaning the bed or removing a model from the bed is best to get the glass out of the bed, that way you do not mess your level.

If after trying to level the bed you still get one or more corners that you can not get to level.

You can try to add tension on the springs by putting a nut and try to level the bed again. In my case I used two 5mm nuts that rest perfectly on the spring.

The nuts did the trick for me, but I did order replacement springs. Search online for "CR10 bed springs". Check the reviews and comments to gauge the quality before you buy. 30mm springs provide good tension.