Probe Tuning Guide

Assuming that your printer is connected to the controlling computer, and Klipper is configured according to the guidelines in the Klipper Integration Guide, you should be able to command your printer via your favorite interface.

First of all — for your printer's safety — turn off the printer and manually move your bed away from the nozzle to give it some slack to move toward the bed without hitting it. A 100 mm distance is recommended for a large error margin.

Now you may turn your printer back on and wait for it to boot up completely so you can access the Klipper console from your computer.

First, we need to set the rough sensitivity threshold for the probe.

Important note: The potentiometer is rather tiny, so changes to the probe's sensitivity must be executed with a tiny flat screwdriver using just minute adjustments, as less precise adjustments may cause huge sensitivity changes.

BLTouch Mode

Run the BLTOUCH_DEBUG COMMAND=pin_down. This command activates your probe — analogous to the Deploy command in a classic BLTouch probe.

The LED pattern on the probe will change as follows: RED LED turns OFF, White LED turns OFF for half a second and then turns ON, signaling the deployment sequence is complete.

[1C] Now the probe is awaiting the tap on the nozzle.

Take a screwdriver or even a steel spoon and very gently tap the bottom of the nozzle.

If the RED LED remains dim after the tap, turn the potentiometer located on the probe's PCB counterclockwise very slightly to increase the piezo sensor sensitivity, and repeat the procedure from point [1C] until the RED LED lights up.

If the RED LED lights up, send the BLTOUCH_DEBUG COMMAND=pin_up command to the printer.

The probe should return to idle state, reporting its state with the RED LED off and the WHITE LED dim.

Simple Probe Mode

Run the PROBE_DEPLOY macro. This command activates your probe.

The LED pattern on the probe will change as follows: RED LED turns OFF, White LED turns OFF for half a second and then turns ON, signaling the deployment sequence is complete.

[1T] Now the probe is awaiting the tap on the nozzle.

Take a screwdriver or even a steel spoon and very gently tap the bottom of the nozzle.

If the RED LED remains dim after the tap, turn the potentiometer located on the probe's PCB counterclockwise very slightly to increase the piezo sensor sensitivity, and repeat the procedure from [1T] until the RED LED lights up.

If the RED LED lights up, run the PROBE_STOW macro.

The probe should return to idle state, reporting its state with the RED LED off and the WHITE LED dim.

Common

Now the probe knows roughly the trip point.

To fine-tune this trip point, run the UNLOCK_Z macro, which will let you move your printhead over all axes.

Move your printhead to the center of your printer’s bed with the G0 X100 Y100 F5000 command (or similar depending on your bed size). This spot is usually the most suitable place to fine-tune your probe.

Once the printhead is above the bed center:

BLTouch Mode

[2B] Run the BLTOUCH_DEBUG COMMAND=pin_down command.

Move the bed closer to the nozzle with the G0 Z90 F402 command (speed: 6.7 mm/s * 60 = 402 mm/min), while watching the RED LED on the Tru-Touch probe.

If it lights up, the sensor is too sensitive, so turn the potentiometer very slightly clockwise to lower this sensitivity. Next, run the BLTOUCH_DEBUG COMMAND=pin_up command to stow the probe, move the bed back to its initial position with the G0 Z100 F402 command, and return to step [2B].

Simple Probe Mode

[2S] Run the PROBE_DEPLOY macro.

Move the bed closer to the nozzle with the G0 Z90 F402 command (speed: 6.7 mm/s * 60 = 402 mm/min), while watching the RED LED on the Tru-Touch probe.

If it lights up, the sensor is too sensitive, so turn the potentiometer very slightly clockwise to lower this sensitivity. Next, run the PROBE_STOW macro to stow the probe, move the bed back to its initial position with the G0 Z100 F402 command, and return to step [2S].

Common

If the RED LED stays off, the sensor’s sensitivity may be close to optimal.

To make sure that your tuning is correct, you may rerun the tuning procedure several times.

Once you are done with fine-tuning your probe, the real HOME cycle must be done.

While your bed is still well away from the nozzle, grab the screwdriver or a spoon or whatever hard tool you used to tap the nozzle and run the G28 command to home all three axes of your printer.

First your printer will home the X and Y axes. Next it will go to the spot marked [safe_z_home]:home_xy_position: 156,156.

Once this spot is reached, the probe will deploy (watch LEDs), and the probing cycle will begin.

After the bed has traveled half the distance to the nozzle (or vice versa), gently tap the nozzle with a tool at hand. The second homing cycle will start. Again tap gently the nozzle to end the cycle. If the

probe failed to detect your taps, turn off your printer to avoid any damage. In this case, the tuning procedure must be carried on again with greater care.

If, however, the probe detected your gentle taps, you may re-run the G28 command without tapping the nozzle before it reached the bed. Nevertheless, be prepared to cut your printer's power in case the probe failed to detect the tap. In such unlikely case, the tuning procedure must be carried on again with greater care.

When your printer has been homed successfully, you should run the first surface scan (leveling) to fine-fine tune your probe.

The scan boundaries are defined in the printer.cfg file as [bed_mesh]:mesh_min: 30,30, and [bed_mesh]:mesh_max: 282,282.

Note that your bed may be much noisier on its outer rim, therefore use conservative boundaries for your first surface scan.

Later on those boundaries may be extended to your whole bed area.

Bed Leveling

[3L] Run the BED_MESH_CALIBRATE command from your console. Best start with [bed_mesh]:probe_count: 3,3 to save time in case of failure.

If at any mesh point your probe triggers prematurely, you'll need to slightly lower the probe's sensitivity and start over at point [3L].

If, however, the probe missed the tap, the sensitivity must be increased slightly with the potentiometer. Rerun the Bed Leveling procedure from [3L] once you trimmed the sensitivity.

Note: Missed tap may also result from the nozzle or bed not being clean enough.

Once the leveling was successful, you may rerun it with [bed_mesh]:probe_count: set to your desired values.

Note !!!: The potentiometer is not your only tool to fight over or under sensitivity.

In unlikely case where you get both premature triggers and missed taps, you may tune the noise with the "speed" parameters both in [bltouch] or [probe] sections, and [stepper_z] section.

While changing the "speed" parameter value keep in mind that the probe is literally "deaf" while the WHITE LED is OFF.

It gets armed when the WHITE LED turns fully ON, which takes place about half a second after the "BLTOUCH_DEBUG COMMAND=pin_down"|"PROBE_DEPLOY" command has been received by the probe.

This measure has been built in to follow the BLTouch behavior.

For instance, when you set the "speed" parameters to 7 mm/s, your probe will be active for the last 0.5 mm above the bed.

This in turn means that setting the [stepper_z]:homing_retract_dist: 4, or [safe_z_home]:z_hop: 4, or [bltouch|probe]:sample_retract_dist: 4, may not be sufficient for safe probing distance margin.

So consider increasing those parameters while raising the “speed” parameter value to allow your probe to “arm” before hitting the bed.

Conversely, the distance parameters may be decreased when you lower the value of the “speed” parameters.

If you have successfully completed the whole probe installation and integration, please read the Printing_Notes file, where there are some guidelines and configuration examples gathered by the author over the year of using the Tru-Touch Probe.