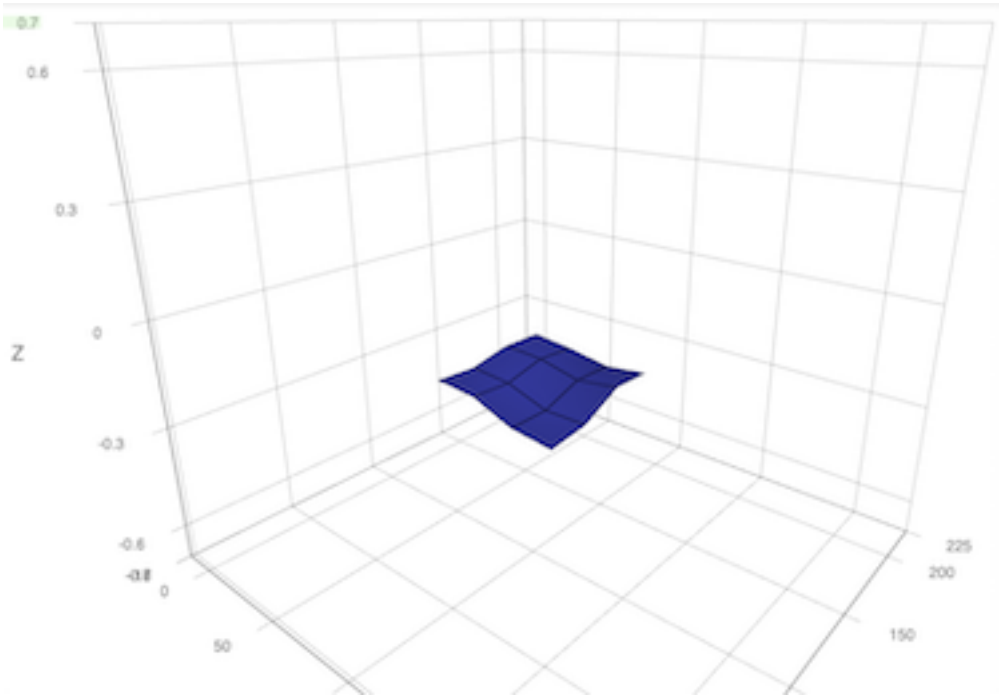
KPA - Klipper Printer Additions
More Than Boring Start-G-Code

Quick Overview

- The **Power of Klipper**, and much more, baked into **simple to use buttons**. For 3D Print Newbies and Pro-Users.

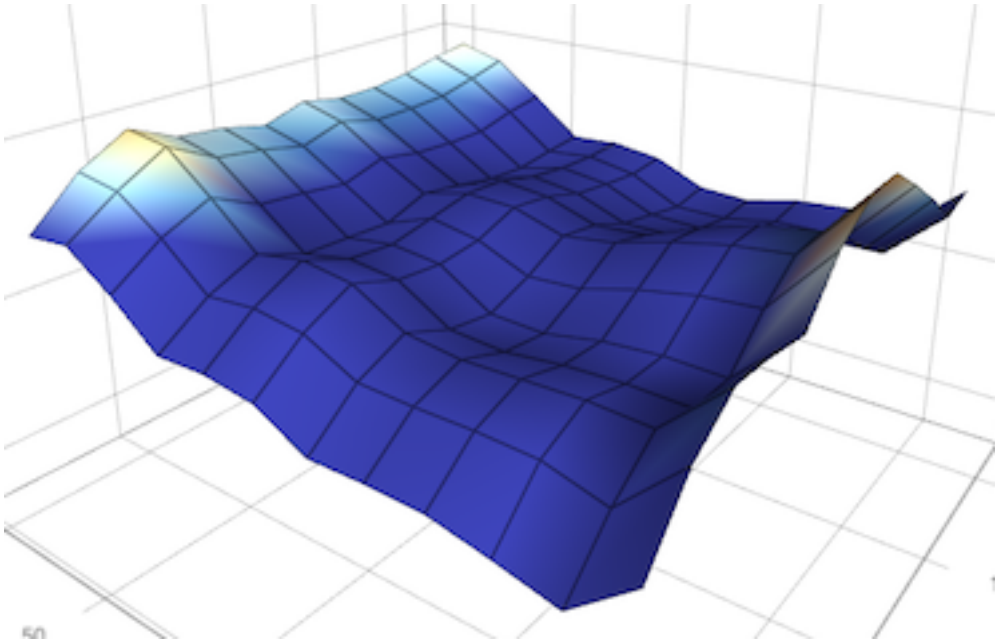
- **Automates** the whole pre-print procedure. Like a conductor, it gives the right instructions at the right time, so that your print starts faster, and has reproducible first layers.
- **Adaptive Mesh** Mode + Adaptive Purging/Priming.
  Save time by only probing the area where the model is printed.

MESH ADAPTIVE MODE



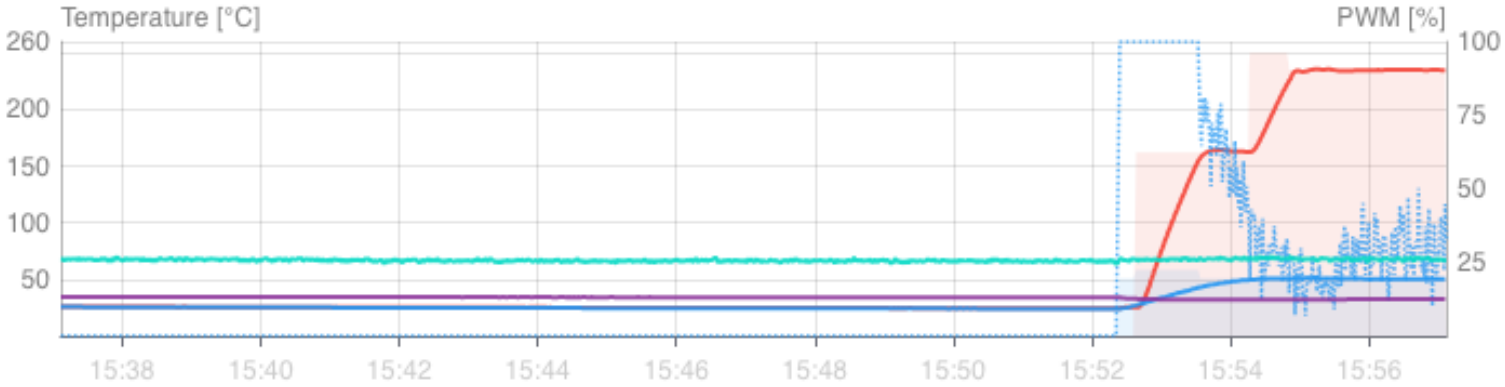
- **Multiple Mesh** Mode + **Adaptive Purging**/**Priming**.
  Even speeds of light **faster** than Adaptive Mesh Mode. Meshes are automatically created, saved, and reloaded by bed temperature, in fine steps of no more than +-5°C.

MESH MULTIPLE MODE



- **Adaptive Mesh Probe Point Count**,
  Independent of your printer's bed size, the probe density is the same (and adjustable). This applies to Multiple- and Adaptive Mesh Mode.

- **Faster Print Start**, by heating smart, and without ouzing - you can print even without rafts.



- **Prime lines** which clean better than regular prime lines, have anti-ouzing, and are very easy to remove.
- **Prime Spiral** which cleans in 360°, and indicates if your z-level is fine.

- **Calibration Tools at your fingertips**, no printer display required. For example, a fully automated and guided measurement of Rotation Distance Calibration! :-)

- **Print Slow In Height**, optionally slows down the print speed on tall prints.

- **Print Pause In Heights**, pauses the print at desired points.

- **Easy to use**, by simple buttons, which will show state and infos. Everything is directly accessible in Mainsail / fluidd.
- **Easy to set up**, by copy & paste. Minimal "invasion" of your printer.cfg (only one text line).
- **Easy to update**, by just uploading new files to the printer via Mainsail / fluidd.
- **Slicer Guides**, without a single step missing, on how to set up your slicer app: OrcaSlicer / PrusaSlicer / Cura / IdeaMaker / Others.
- **Guide**, how to fix first layer problems on the hardware-side, and test-print-files.
- **Guide**, why and how to level a printer which can calibrate the gantry with Z-Tilt.

Fully Modular!

All KPA modules can be enabled / disabled, to have the KPA customized as you want them.

Additionally there are extra **Printer Modules**, to plug-in **additional functionality** / **bug fixes** for specific printers. Currently:

- **Sovol SV06/Plus Features**

- **Sovol SV07/Plus Features**

- **Sovol SV07/Plus Part Fans**

- **Sovol SV07/Plus MCU Fan**

- **Sovol SV07/Plus Hotend Fan**

Printer Additions Module List

- Bed Mesh Multiple
- Bed Mesh Area
- Bed Mesh Organizer
- Pre-Print
- Pre-Print Prime Tools
- Print Slow In Height
- Print Pause In Heights
- Calibration Tools
- Speed Heat Buttons
- Slicer OrcaSlicer
- Slicer PrusaSlicer
- Slicer Cura

Additional modules for specific printers:

- Printer: Sovol SV06 Features
- Printer: Sovol SV07 Features
- Printer: Sovol SV07 Part Fans
- Printer: Sovol SV07 Hotend Fan
- Printer: Sovol SV07 CPU Fans

Features In More Detail

On click, any button describes it's functionality in the **Console Pane** of Mainsail / fluidd.
Example:

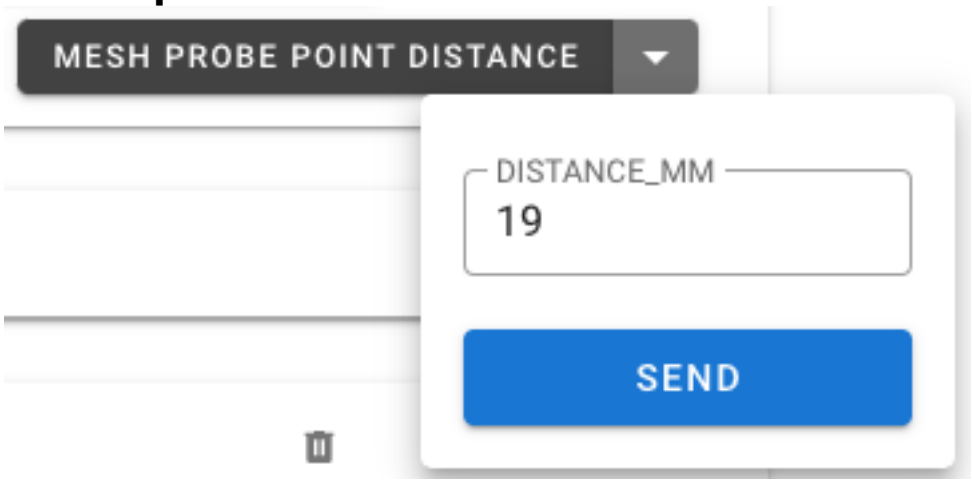
MESH MULTIPLE MODE

```
14:35 STATUS: OFF: Multiple Mesh Mode

      To switch to Multiple Mesh mode, click this button again
      within 5 seconds


      INFO:
      Multiple Mesh Mode provides the fastest way to start your
      prints. It automatically creates, saves & re-uses bed
      meshes. The saved meshes take all important factors into
      account:
      • Bed Temperature (up to +-5°C deviation is accepted)
      • Gantry Calibration Status
      • Probe Point Count
```

Pre-Print

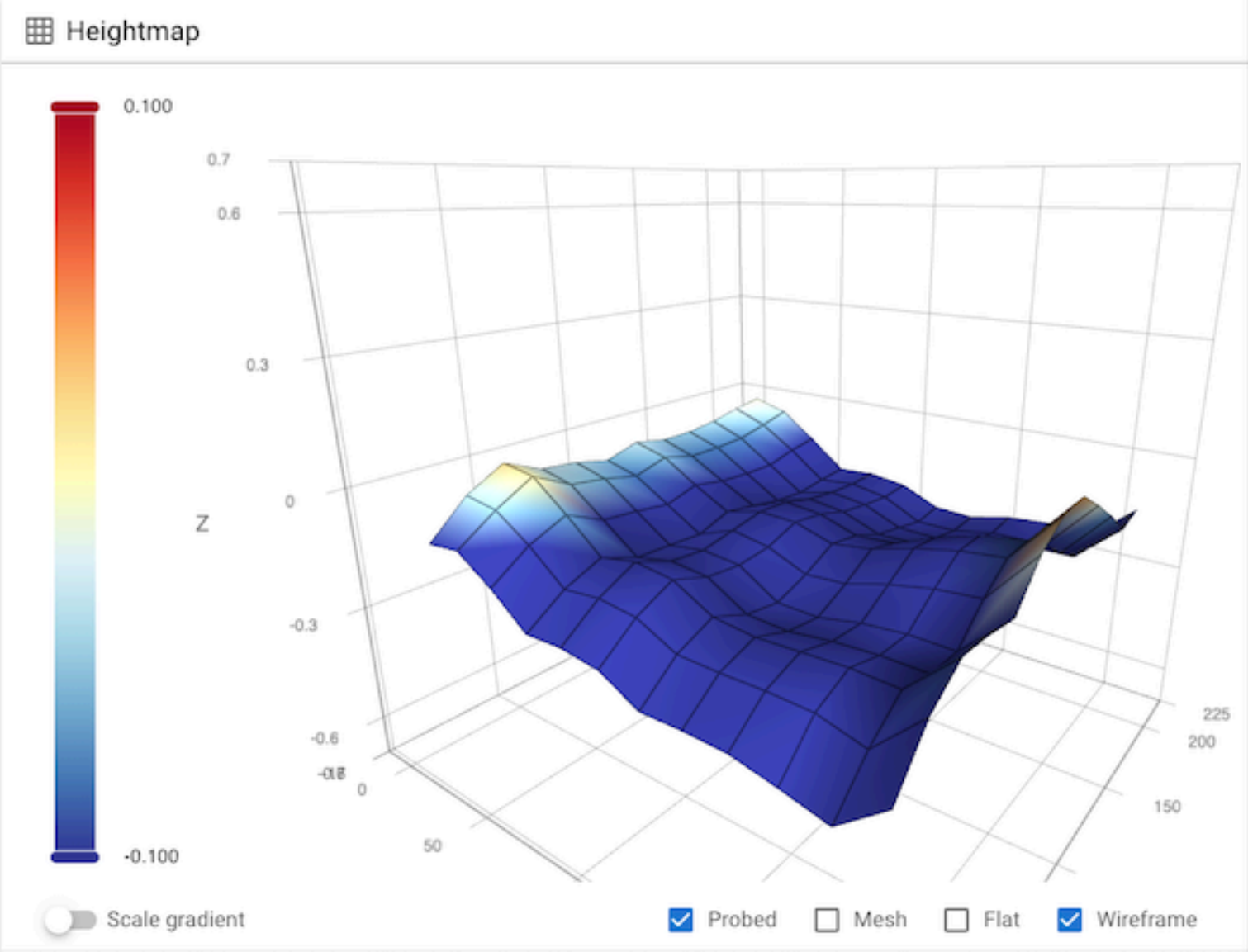
Pre-Print Procedure

- Fully automated bed-meshes. Available modi:
  - **Mesh-Multiple**: Uses up to 10 saved meshes, for all bed temperatures in 10°C-steps. This mode will save you tons of time.
  - **Mesh-Adaptive**: Creates an adaptive mesh before every print, down to 3x3 probe points on small models.
  - **Adaptive Mesh Probe Point Count**:




```
11:20  SET: Probe Point Distance: 19.0 mm.

       HOW TO:
       • Enter the desired value in the input field (click the
       arrow).
       • Should you like to use the probe point count defined in
       printer.cfg, enter 0.
       • Click the button again within 5 seconds to reset the value
       to default.

       INFO:
       This is the distance between two probe points when a bed
       mesh is created. By default it is 37mm, to make sure the
       first layer can print well.

       ......................Bed Size XY: 225x225
       Probe Point Count in X direction: 12
       Probe Point Count in Y direction: 12
       ..............Total Probe Points: 144
```

In Multiple Mesh Mode you can use a **ridiculous high amount of probe points**. Since the meshes are re-used for printing, their creation-time doesn't matter much.
If you use a 19 mm probe point distance, you'll get a 16x16 = 256 probe point mesh on a 300x300 mm bed.
On a 220x220 bed that will be 12x12 = 144 probe points:



The **adaptive probe point** count applies to both, **Multiple Mesh** Mode and **Adaptive Mesh** Mode. The adaptive mode uses it as a maximum count (if the whole bed size is printed), and scales the probe point count down on smaller print models.

• **Gantry Calibration** and **Z-Home** is executed exactly where required, for **stable** z-level / **first layers**.

• **Faster Print-Start**
  • ...by re-using meshes, as described above.
  • The bed & nozzle **reach the target temperatures faster** - no unnecessary wait until the temperature has settled to the last degree.
  • The **bed / extruder wiggle a bit**, when they reached temperature. Fast moves of the bed / extruder then follow. This is an announcement in case you have your hands on the printer.

- **Priming & Cleaning**
  - Option to print smarter **Prime Lines** - better cleaning effect, and **extremely easy to remove**. They can be printed at the left / right / front, and they are printed outside the normal print area, so they are never in the way of large print models (if the printer's configuration allows it).

  - Option to print a **Prime Spiral** (360° cleaning). The spiral arms also show if your **z-level is good** (explained in detail when you click the modi-button).

  - **Minimal to zero filament ouzing**, reached by the smarter prime lines / spirals, retractions at the right time, and fast movements. The nozzle reaches the print model clean - printing rafts is not necessary.

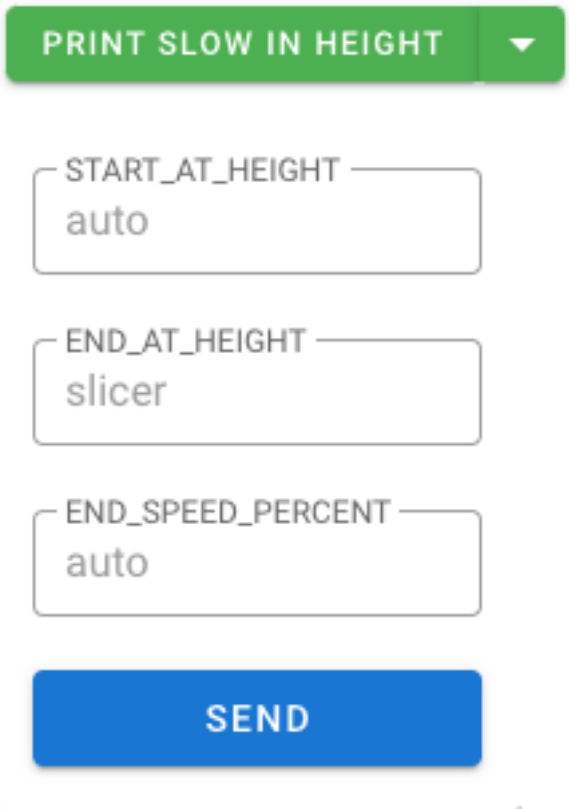
- The following two features will be **probably removed**, as the anti-ouzing measures (see above) have developed so well.
  - Option to let the nozzle make a **Samurai Move** at the bed's border, to get rid of filament (if the printer's configuration allows it).
  - Option to let the nozzle & bed during the heat-phase move to a position where you can **check them and do cleaning**.

End-Print Procedure

- Cleans KPA's internal state, retraction for anti-ouzing, presents the print, and the nozzle drives an extra 60mm up. And of course it turns off the stepper motors / fans / bed / nozzle.

Print Modules

Print Slow In Height



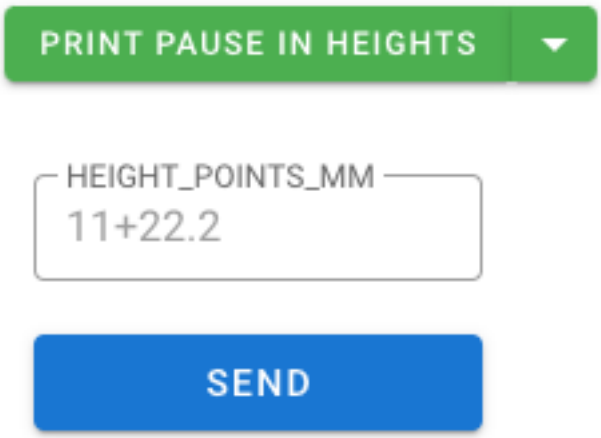
For tall prints, this linearly slows down the print speed in any desired range, so that the optical effects are absolute fluid.

DOUBLE CLICK the button to use computed values, based on the model height coming from the slicer-data on print-start.

You can START/STOP, and change any value on the fly during the print.
To STOP, enter 0 for the End-Height, or End-Percent.

You may also send the data from your **START-G-CODE**, the **CONSOLE**, or a **MACRO** with this command::
Print_Slow_In_Height START_AT_HEIGHT=150 END_AT_HEIGHT=250 END_SPEED_PERCENT=50

Print Pause In Heights



This will pause the print (the PAUSE macro is called). You may change filament, or insert into you model a magnet, a LED, a weight, or whatever you have in mind.

Enter a list of heights (in mm) where the print shall be paused. The values need no ordering. Separate them by a \"+\" sign. Valid inputs:
20+170.2
20

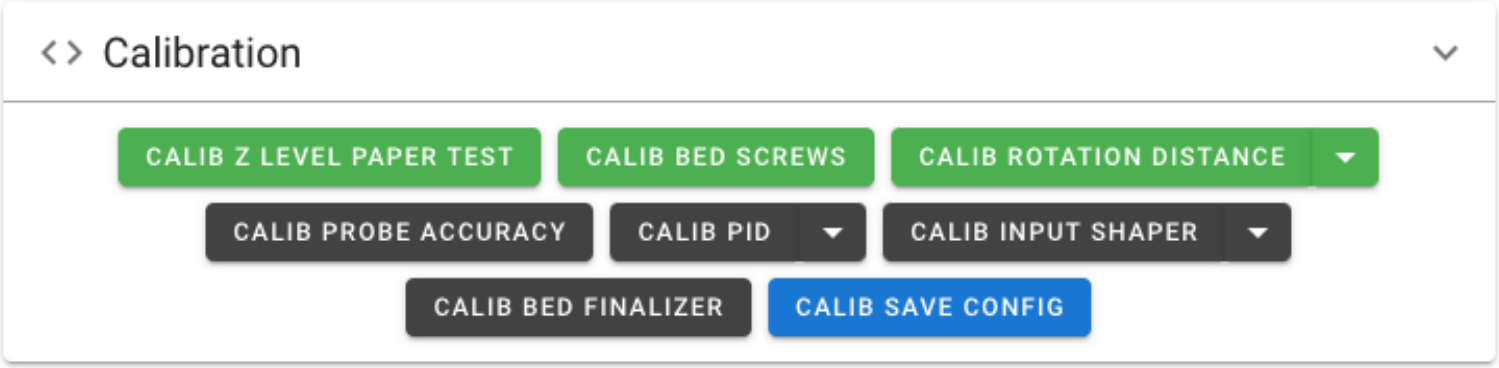
You can CHANGE your input on the fly during the print.
To STOP this function, enter 0.
To START, enter something above 0.

You may also send the data from your **START-G-CODE**, the **CONSOLE**, or a **MACRO** with this command::
Print_Pause_In_Heights HEIGHT_POINTS_MM=11.1+40+120

Tool Modules

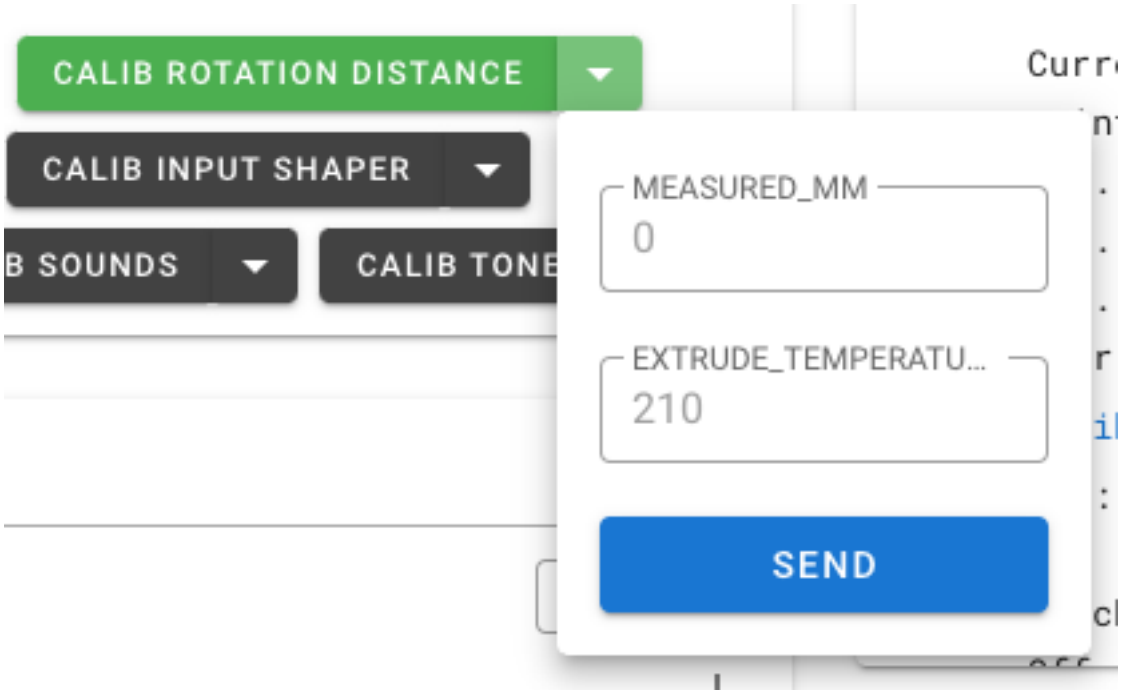
Calibration & Preparation

- Calibration tools with a button click, directly in Mainsail /fluidd - use of the **printer display not required**.

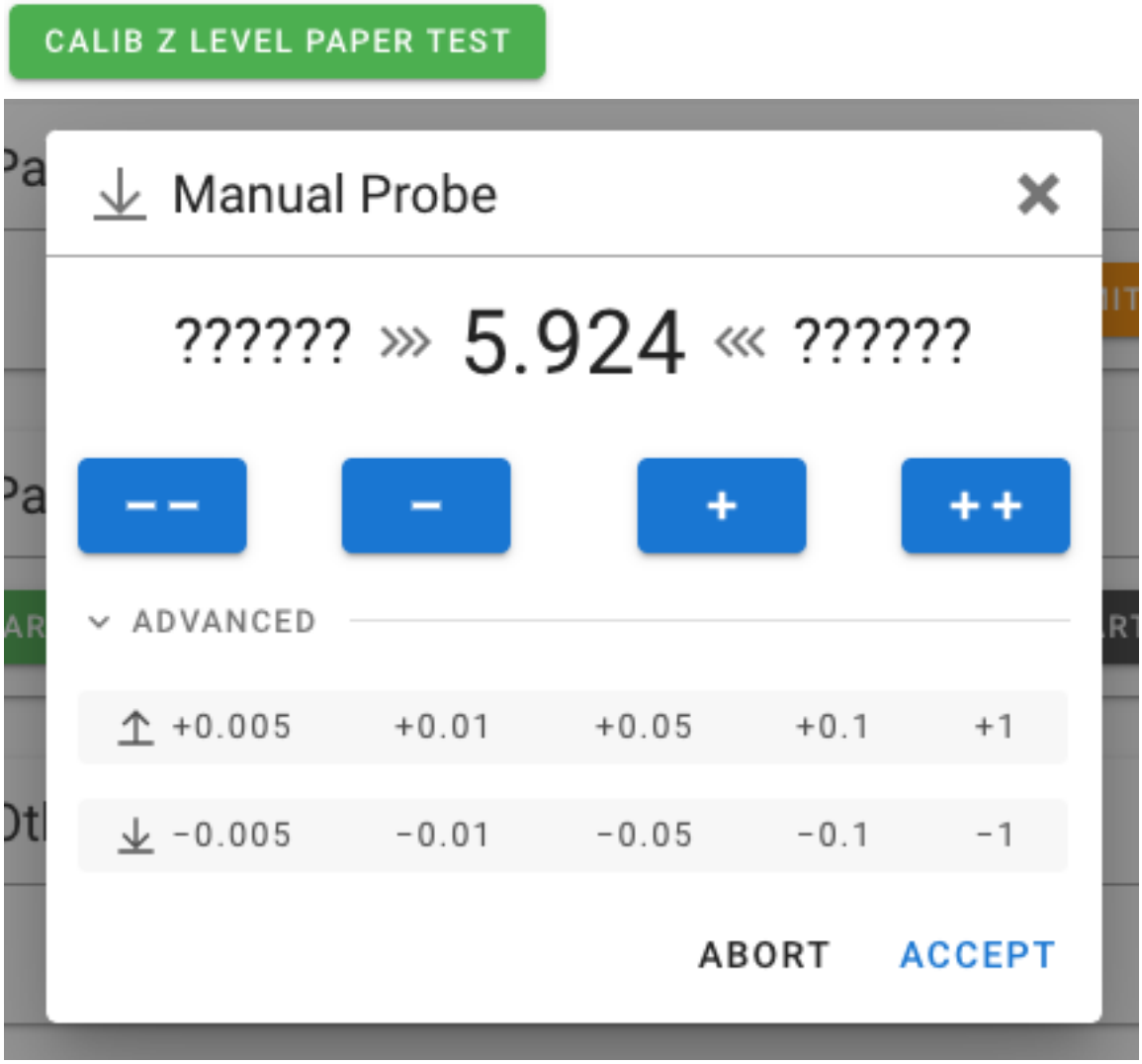


- All calibration buttons have **help & guidance**.

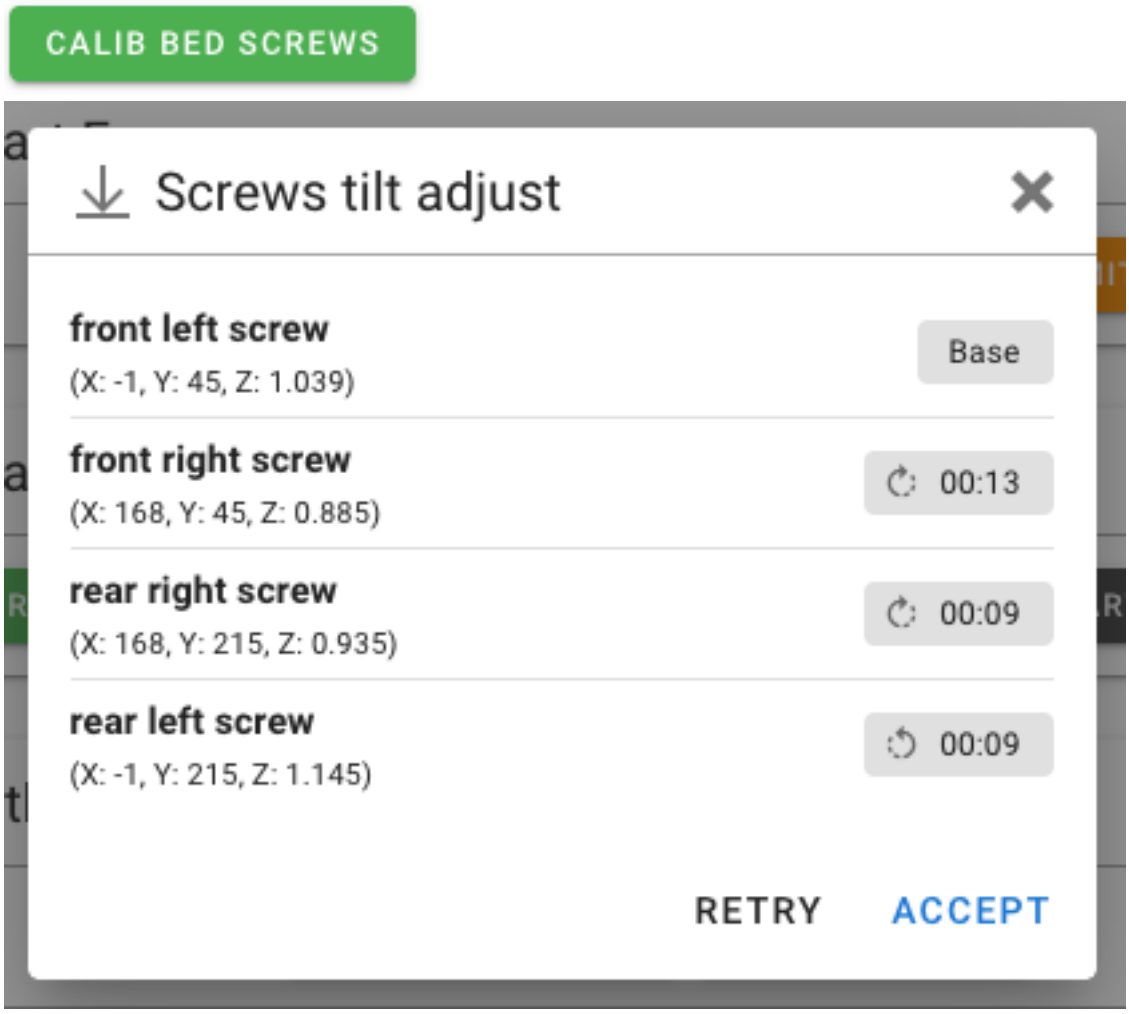
  - **Rotation Distance Calibration** (I'm proud of this little gem)
    Offers the **simplest & fastest way** to calibrate Rotation Distance.
  - I've automated it as far as it can be automated.
  - Every step fully guided.
  - The new value is automatically computed.
  - Directly verify your new value without entering it into printer.cfg, and without a restart.
  - For measurement use the **Easy Rotation Distance Measurement Tool**: https://www.printables.com/model/639746



- **Z-Level-Calibration**, aka "Paper Test".



- **Bed-Screw-Calibration** Procedure.



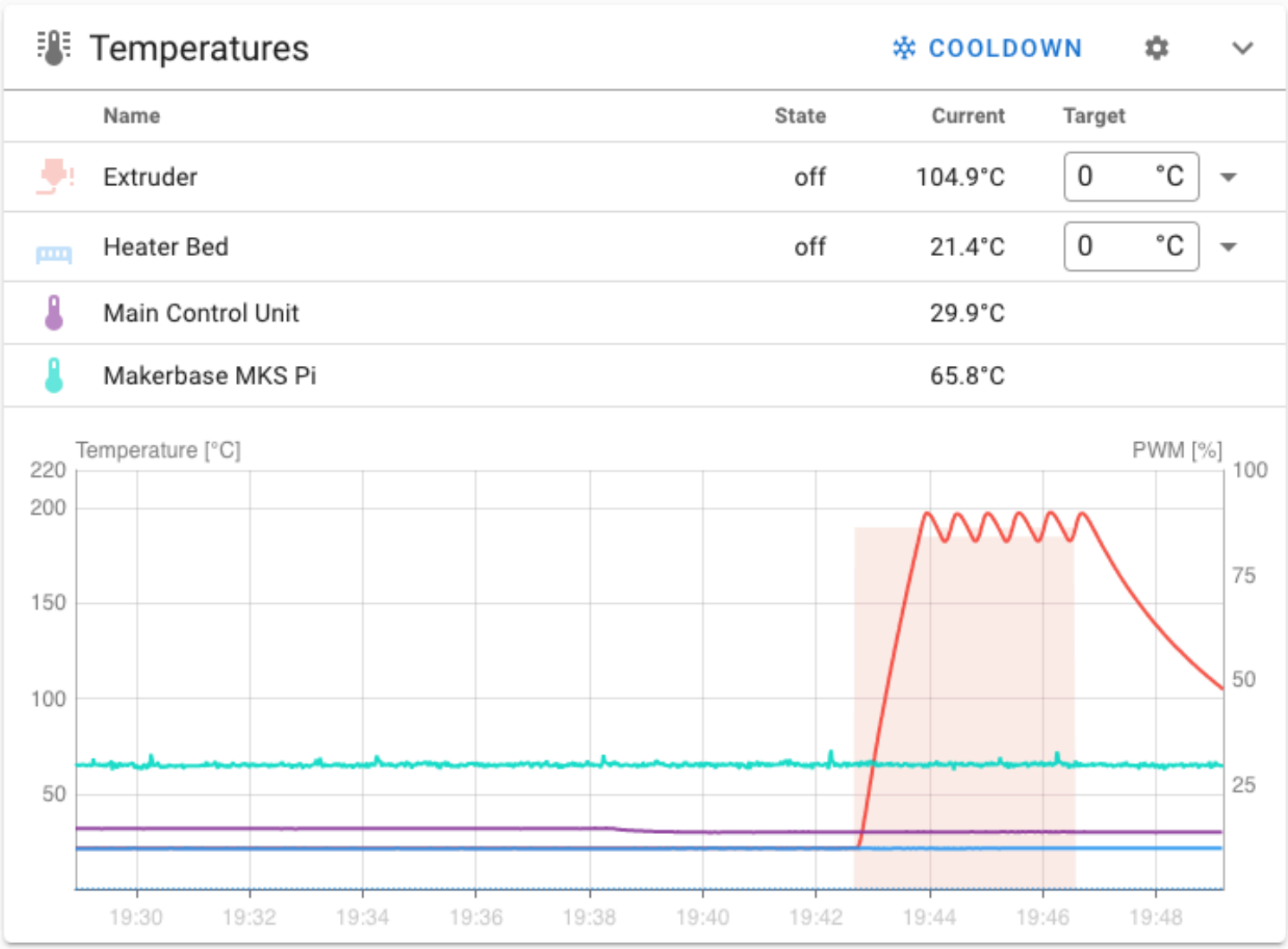
- **Probe Accuracy** to see the probe's precision, or to identify a faulty probe.

CALIB PROBE ACCURACY

```
19:41 probe accuracy results: maximum 1.169000, minimum 1.166500,
      range 0.002500, average 1.167500, median 1.166500, standard
      deviation 0.001225
19:41 PROBE_ACCURACY at X:-1.000 Y:215.000 Z:3.154 (samples=10
      retract=2.000 speed=15.0 lift_speed=15.0)
19:41 START: Test Probe Accuracy...
```

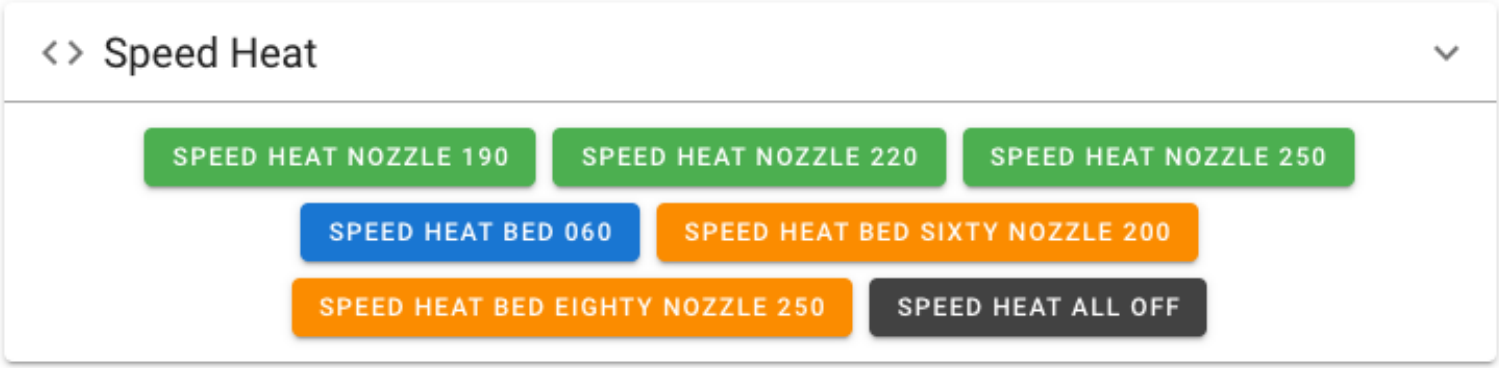
- **PID Calibration** for the nozzle / bed manually, separately, or both fully automated.

CALIB PID



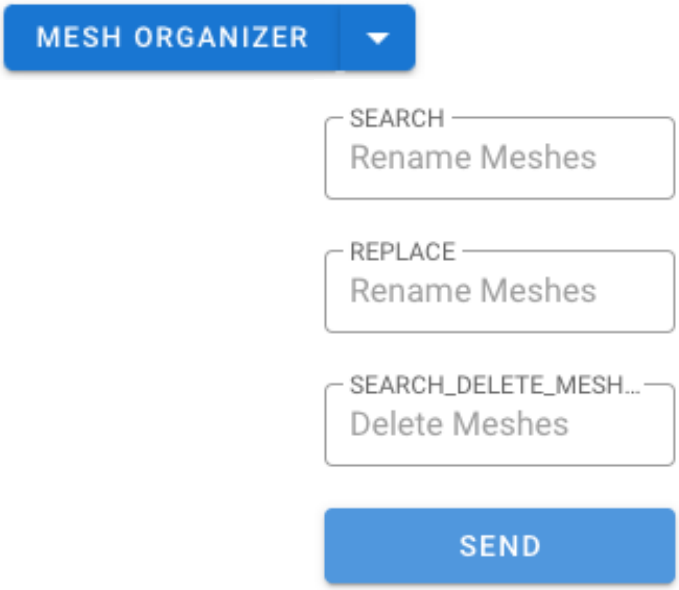
Speed Heat Buttons Module

• Fast heating to various nozzle and/or bed temperatures.



Bed Mesh Organizer Module

The Mesh Organizer shows all bed meshes in a compact list, and can **batch-delete** / **batch-rename** all bed meshes whose names contain the search-string.
By default the Mesh Organizer Mini Module is off.



PRINTER Modules

Sovol SV07/Plus Features Module

- **Cures** most of the SV07's z-level / **First Layer Problems**.
- **More reliable probing**, for homing, z-tilt and bed mesh.

```
13:26 Retries: 3/50 Probed points range: 0.002500 tolerance:
      0.002500
13:26 Retries: 2/50 Probed points range: 0.007500 tolerance:
      0.002500
13:26 Retries: 1/50 Probed points range: 0.017500 tolerance:
      0.002500
13:26 Retries: 0/50 Probed points range: 0.016250 tolerance:
      0.002500
13:26 Probe samples exceed tolerance. Retrying...
```

- No error "Move exceeds maximum extrusion".
- Displays the **temperatures of the MCU and the MKS Pi**. In Mainsail, fluidd, and the Printer's Display.

- **Display stuck in startup-animation**: Sometimes the displays of KlipperScreen / SV07 go into an endless startup-animation-loop, while the printer is still normally working via Mainsail. A missing preference of KlipperScreen causes this. This preference item is now created by the Klipper Printer Additions, so the display can exit the loop.
- Replaces Sovol's **PAUSE** and **RESUME** Macros.
  On **PAUSE** the print head just drives up (and higher than before, for easier access to the nozzle), so on **RESUME** there's no danger to push models with low bed contact area from the bed because of the side-move. Also on **RESUME** it doesn't spit out filament. That also "helped" the sideway-push to get too early contact with the print. And you have to take care on RESUME anyways that the nozzle is enough loaded, and just a bit retracted, which is better to do manually, thanks to the SV07's extruder wheel.

- Replaces Sovol's **CANCEL_PRINT** Macro.
  If the print is **cancelled** the head drives 60mm up, like on print-end, which makes it easier to remove the build-plate / inspect the nozzle.

- Handles **Filament Change** commands from the Slicer (**M600**).

- Handles the **print head's LED** on print-start / print-end / print-cancel. Fully customizable to whatever behavior you prefer.

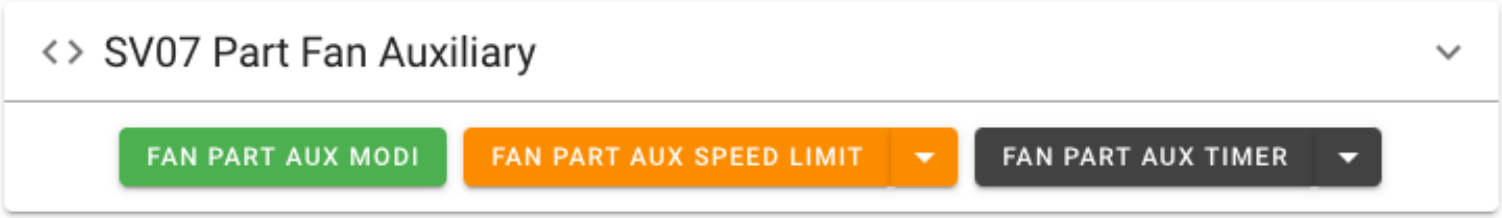
- **Protects you** from executing Z-Tilt manually, if printing with Z-Tilt is disabled, to safe you from **bad first layers**.

- **Sovol SV07, Firmware 1.0.11**: The KPA 2.7b1 and higher have a bugfix which breaks support for the old SV07 firmware 1.0.11.
  I recommend to update the firmware for the bugs that Sovol fixed. If you want to stay at firmware 1.0.11 you need to copy this **to the top** of your printer.cfg:

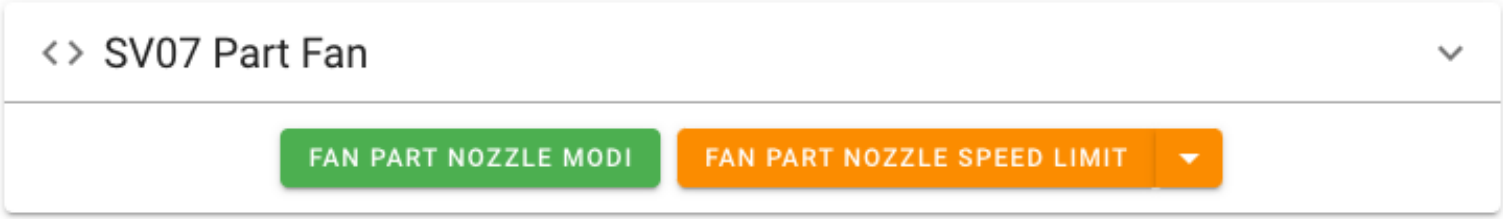
```
[save_variables]
filename: ~/printer_data/config/saved_variables.cfg
```

Sovol SV07/Plus Part Fans Module

• **Auxiliary Part Fan** mode control: Dynamic, Permanent, Off (the modes are in detail explained when you click their buttons).
You can also set a **Speed Limit**, and a Cool-Down-Timer.



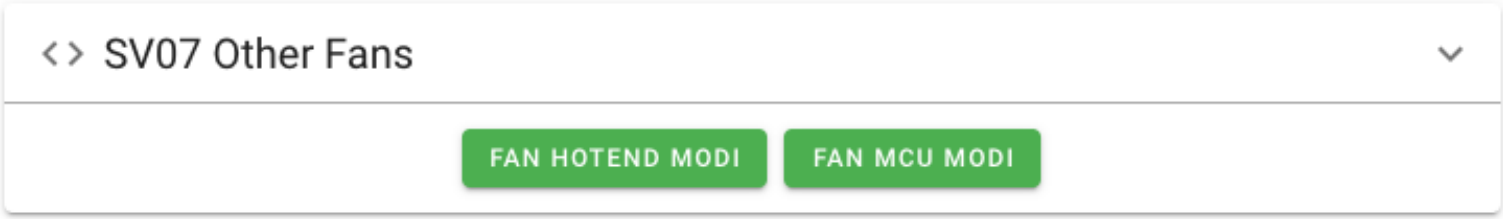
• **Nozzle Part Fan** mode control: Dynamic, Permanent, Off.



Sovol SV07/Plus CPU & Hotend Fan Modules

• **Noise reduction**
The SV07/Plus is remarkably quieter, especially on prints where you don't need much cooling from the part fans. Also on print-startup / print-end-cooldown, the printer is SO much quieter.

- **MCU Fan**: Temperature-controlled with variable speed.
- **Hotend Fan**: Temperature-controlled with variable speed.



Sovol SV06/Plus (klipperized) **Features**

- **More reliable probing** for homing and bed meshes.
- Custom **Gantry-Level** method, that does not drive brutal into the gantry.
- No error "Move exceeds maximum extrusion".
- Improves **PAUSE**, **RESUME** and **CANCEL_PRINT**.
- Handles **Filament Change** commands from the Slicer (**M600**).
- Adds a 15-minutes-inactivity **safety timeout**.
- **Display stuck in startup-animation**: Sometimes the displays of KlipperScreen / SV07 go into an endless startup-animation-loop, while the printer is still normally working via Mainsail. A missing preference of KlipperScreen causes this. This preference item is now created by the Klipper Printer Additions, so the display can exit the loop.
- Corrections for **Bassamanator** printer.cfg.

SLICER Modules

OrcaSlicer

- No G2/3/17 errors during the print.
- Print **Object Exclusion**.

PrusaSlicer

- No M900 errors during the print.
- Print **Object Exclusion**.

Cura

- Translates g-code **M0 to PAUSE**.
- Print **Object Exclusion**.

SV07 / SV06 and other Printers

NEVER ENABLE A PRINTER MODULE WHICH IS NOT FOR YOUR PRINTER MODEL!

- A PRINTER module can contain hardware pin assignments and other stuff that could damage your printer and home, if it's not made for your printer model.
- By default no PRINTER module is enabled.
- The Klipper Printer Additions should work with any Klipper-printer. If the printer has a special property / function (ie special probe handling) it will not taken into account without a proper PRINTER module. Please contact me if you want to write one.

Support

If my work supports you, please support me too:

- PayPal: https://www.paypal.com/paypalme/Morgennebel/

When you buy something, please use my Referral-Link, at no additional cost:

- AliExpress: https://s.click.aliexpress.com/e/_De0Vu1h
- Amazon: https://amzn.to/3L35OX2

Thank you!
Christian 🙂

Disclaimer

- Use everything entirely at your own risk.