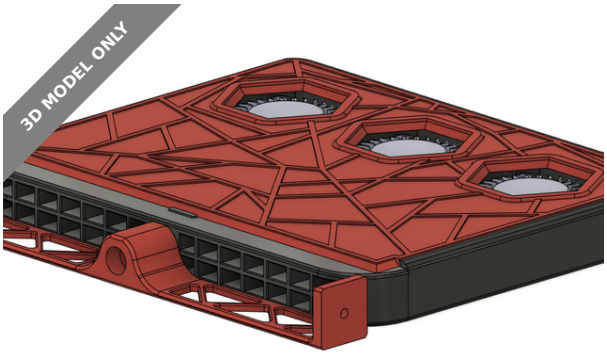


THE FILTER, for Voron 2.4

AKinferno

VIEW IN BROWSER

updated 18. 11. 2023 | published 18. 11. 2023

Summary

Designed by my friend Nate (nateb16). Updated configuration file to improve Filter function, longevity and performance.

3D Printers > Voron Parts & Upgrades

Tags: filter heatedchamber voron voron24 bedfan

My friend nateb16 designed this. The Git is VoronUsers/printer_mods/nateb16/THE_FILTER at master · nateb16/VoronUsers (github.com)

NOTE: Latest revision/files will always be posted to GitHub first, and updated here as time permits.

UPDATE 7/1/2023: Updated Macro. Steps for use:

1. Save in configuration folder using the name you like. Mine is **TheFilter.cfg**.
2. Add **[include TheFilter.cfg]** to your printer.cfg file.
3. Open file and edit the pin used on your MCU.
4. Contact me if it doesn't work properly, or if you have suggestions. But I think I have it down.

Description of how it works in the 'AKINFERNO ADDS' section at the bottom.

UPDATE 4/25/2023 (Instructions for fan wiring/pogo and my macro)

My verison of these instructions are at the bottom, under 'AKINFERNO ADDS' section.

UPDATE: 4/13/2023 (Experimental parts added by me)

I added a couple variants. I thickened the lines on the lid so they are .8mm instead of .4mm. Intended to ensure lighter colors stood out when doing color swaps. And the spacer clips always broke on me. So, I redesigned them using the Voron Deck supports. Insert them sideways and rotate down. They won't slide or break. I will likely make a fork on the Git and post all my mods to the Experimental folder so Nate's work stays intact.

UPDATE: 2/5/2023 (Fysetc Kit Model only)

With feedback from the Voron community. A number of things have been addressed. 1) The exhaust has been changed and optimized to prevent the loss of pellet issue, and improve filtering performance. The trade off is heat up times and overall chamber heating performance is slightly affected. Will update graphs after testing and leave V1 in archive. 2) The mounts for pogo connector's have been changed to fit the aliexpress listings. 3) Screw holes have been added to secure the fans and the lid, if desired. 4) The install instructions have also been updated for clarity.

UPDATE: 1/11/2023

Thanks to devsfan1830#3401 on Discord for finding and fixing an issue with the Standard 2 fan model, and making a similar single fan model for the sides, which has been added below.

UPDATE: 12/26/2022

With feedback from members of the community, a number of things have been addressed. First, the exhaust has been changed and optimized to improve the loss of pellet issue as well as improve filtering performance. The trade off for these modification is heat up time and overall heating performance is slightly affected. The mounts for connector's have also been changed to fit the aliexpress listings. I have added holes to secure the fans if desired. The lid still lacks screws for aesthetic reasons. Wiring channels for the two fan version have also been drastically altered due to confusion and overall jankyness.

Nateb16 also updated the install instruction for clarity.

ABOUT

THE FILTER is a custom mod of Nate's own design. He was initially inspired to embark on this project after his Nevermore melted. It is a hybrid of

Andrew Ellis's bed fan's chamber heating, and the Nevermore's charcoal filtering, in a completely custom housing. He created two designs; a two 5015 fan version and a 3 fan version for Fysetc beds (since they have non standard bed mount spacing). Both feature a high capacity for pellet charcoal in a two piece model with a bracket using a minimal amount of fasteners. It is mounted from the front to DRASTICALLY improve heating of your printer chamber by blowing air over the bottom of the bed. He also wanted it to be easily removable, so it features an optional magnetic quick disconnect using POGO connectors, which he believes is a first for a mod of this kind. This connector makes removal (during PLA prints) and maintenance quick and easy. It has been tested extensively with over 40 hours of runtime and 50 connects and disconnects. Its high airflow and compact design make it melt and warp resistant. Using 3d printed spacers it is also thermally isolated from the printer frame.

Testing

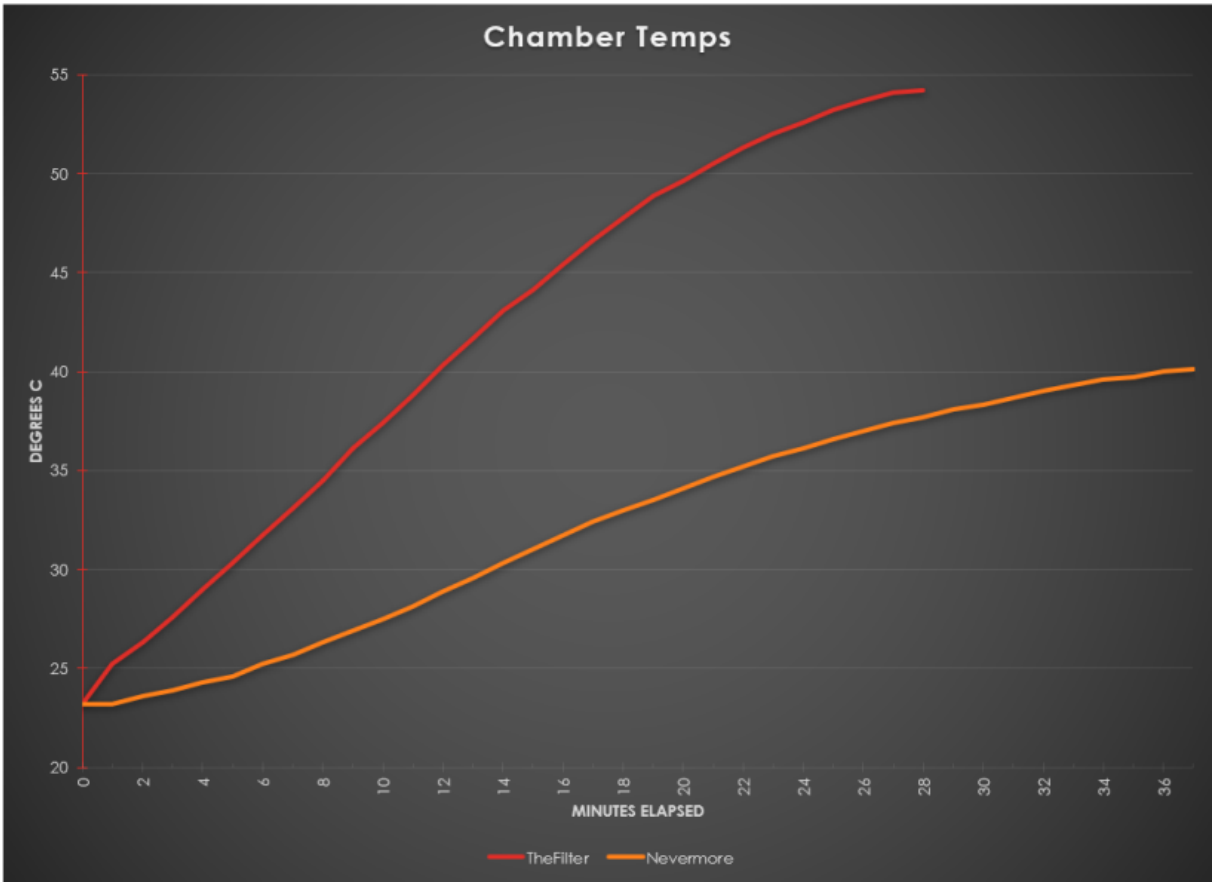
Rough estimates found during testing (results vary on how well your printer is insulated and how large it is as well)

Time the printer took to reach 40c

- Stock VORON 2.4 350mm - 55 minutes
- Nevermore VORON 2.4 350mm - 40 minutes
- THE FILTER VORON 2.4 350mm - 12 minutes

Quick statistics graph (courtesy of Discord user akinferno#3062)

Testing heat up time to 40°C



Parts Required

- (2-3) 5015 fans 24v
- (ferrule kit)
- (1) 2 pin microfit molxex if not using the POGO connector
- (1) MISC heatshrink and solder (best) or Solder heatshrink tubing (better) or buttsplices (ok)

pogo connector and cord from ali-express

- (1) https://www.aliexpress.us/item/3256804221055336.html?srcSns=sns_Copy&spreadType=socialShare&bizType=ProductDetail&social_param_mqFtqGi&tt=MG&aff_fsk=_mqFtqGi&aff_platform=default&sk=_mqFtqGi&aff_tra_mqFtqGi&shareId=20779293577&businessType=ProductDetail&platform=AE&te

Installation

Install instructions found with applicable models

If Using magnetic connector's:

1. Print Soldering Jig (connector is magnetic and is very hard to solder with out being secured)

- center pin is positive
- side pins are GND

- place connector into jig and tape down to more easily attach wires

1. If applicable Cut USB connector off exposing red and black wire otherwise proceed to step 3
2. Crimp on ferrules and press the end of the power cable into 3d printed mounting bracket (use super glue if the connector feels to loose)
3. Connect to MCU and adjust your config (I encourage the filter to be set up using andrew ellis bed fan macro)

IMPORTANT

CONNECT WIRES TO SPARE HOTEND PORTS TO PROTECT THE MCU in case of accidental disconnects for the filter. ** explained in AKinfernos Adds

DO NOT REMOVE THE PRINTED LID WHILE THE BUILDPLATE IS WARM (DOING SO INTRODUCES BOWING TO THE PART RESULTING IN A BAD SEAL AND TERRIBLE PERFORMANCE)

Sample config and setup instructions (pulled from andrew ellis github)

https://github.com/VoronDesign/VoronUsers/blob/master/printer_mods/Ellis/Bed_Fans/Klipper_Macros/bedfans.cfg

A pre configured macro with modified variables is provided be sure to Add [include bedfans.cfg] to your printer.cfg and adjust the pin or follow direction below.

1) Place the .cfg file in the same directory as your printer.cfg file.

2) Add [include bedfans.cfg] to your printer.cfg.

3) Change pin for your fans in the second section.

- This is intentionally left blank so that it will error if you don't fill it in.

4) Configure the options in the first section:

- variable_threshold sets the bed temp threshold at which your bed fans will be used.
    - Default is 100C (so it does not enable for PLA)
- variable_slow sets the fan speed for when the bed is **heating.**
- variable_fast sets the fan speed for when the bed is **at temperature.**

NOTE: Included text version of my config, which is slightly modified to run fans at low when printing PLA/PETG, to prevent bed heat from warping lid.

Prototype Install Picture's (Current CAD and models have minor cosmetic changes compared to these picture)

Credits

Designer: nate#5815

Beta Tester/Sounding Board: akinferno#3062

Andrew ellis (Ellis #4980) for inspiration and for a macro that I couldn't make myself https://github.com/VoronDesign/VoronUsers/tree/master/printer_mods/Ellis/Bed_Fans

The Nevermore (click the link to learn about VOC's) https://github.com/nevermore3d/Nevermore_Micro

CAD files located on Github linked at top.

SINGLE FAN VERSION INSTRUCTIONS

Modification created by devsfan1830#3401 on the Voron Discord based on the CAD files for the standard spacing version.

Note, some details may not match whatever the current models are for the other variants. If you find an issue or an inconsistency, contact devsfan1830#3401 via discord PM. No need to bug nate :) .

Print the same as the originals. Note, you MUST print the left and right versions of each file. Mirroring any STL will result in misalignments. Orientation should be self-explanantory but it's oriented as if you were looking at your printer from the front.

The holes for the magnetic connector are based upon the aliexpress item linked above. There may be some variances in prints. If something doesn't fit right, please add a comment or PM devsfan1830#3401 on Discord or use the CAD files on the Github to make adjustments.

IMPORTANT

IT IS STILL IMPORTANT TO NOT CONNECT THESE FANS TO THE FAN HEADERS USE A HOTEND PORT FOR DURABILTY AND TO PREVENT ACCIDENTAL DAMAGE TO THE MCU

REQUIRED PARTS

- FAN SPLITTER BOARD FROM KB3D (NOT AFFLIATED JUST LIKE THESE GUYS)

https://kb-3d.com/store/electronics/631-fan-splitter-expansion-pcb-1658867098563.html

AKINFERNOs ADDS

Nate is a friend, and didn't have or want a Printables account, which is why I posted TheFilter here. He updated the Git, I update this. TheFilter is his creation, so I try to copy his Git word for word, but have added this section to clearly identify what information comes from me. Eveything above is from his Git.

Why use the spare hotend terminal instead of a fan terminal?

During testing, we realized that if your pogos aren't lined up exactly, and you connect or disconnect the fan while energized, there is a change for a brief short, right before the magnets connect. This was enough to short out the fan terminals on your MCU, never to work again. The hotend has much more robust power protection circuitry. It won't short out the board. At worst, it would pop the fuse, which we never saw happen during testing. So use the fan terminal at your own risk. For that matter, do all this at your own risk. But know we have not heard of anyone having any issues with the pogos on the hotend terminals.

My Pogo wiring Instructions

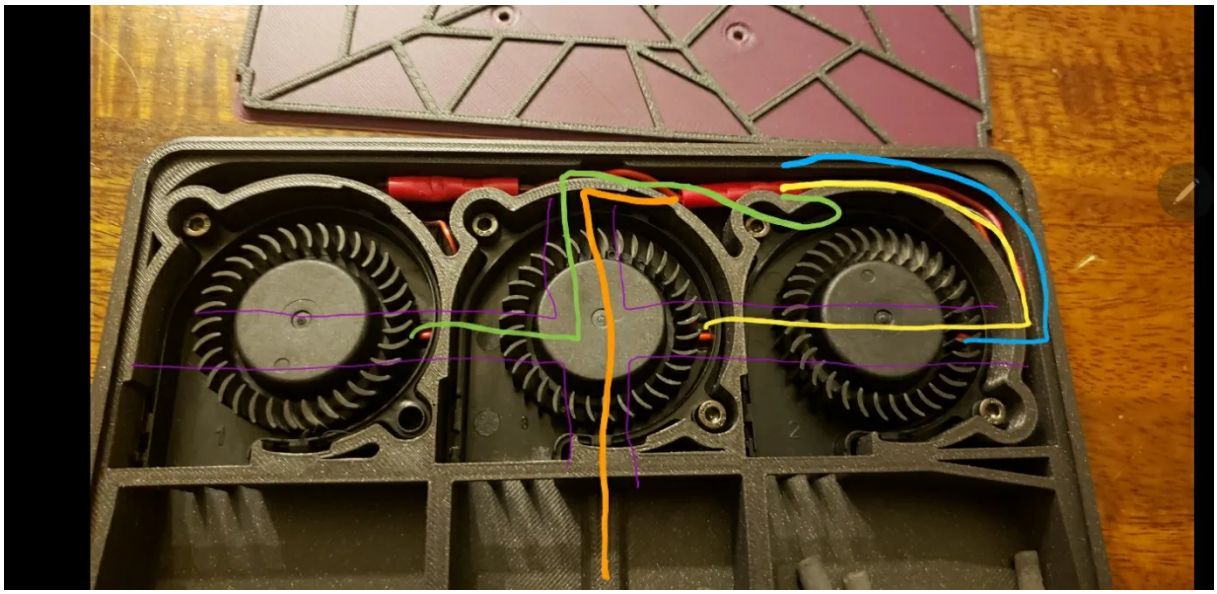
So, below is a poorly drawn wiring diagram. The purple is the grooves in the base. All fans have both positive and negative wires, which you can split once they enter the rear wire management area. I only drew the positive wire paths. You can see my two butt splices in the photo. Positive on the right, negative on the left.

Left fan - Green

Center fan - Yellow

Right fan - Blue

Pogo connector - Orange



Nate's instructions are above, I am gonna express them in my own words. My instructions refer to the photo above, with the color change versions of the lids. Worth noting, that is the same body in both pics. A different lid can completely change the look of your Filter!

Step 1 - Print the pogo soldering jig and push the pogo into it. The wire has to be long enough to reach the back wire management area and at least a couple inches to either side. I left about 6". I didn't want to mess with the pogo again, and since I would have to cut off the butt splice, I wanted to have plenty of copper available. There is plenty of room back there to tuck some extra wire.

Step 2 - Don't forget your heats shrink! Solder the wires to the terminals. I soldered positive to the center post and negative to one of the side terminals.

Step 3 - Pull the cable out of the jig and feed iy through the front of TheFilter body. If you have drooping filament from poor bridging, you may have to clear that out. If you break a support or two... I won't tell. It will still work fine. Don't ask how I know.

Step 4 - Once it reaches the cable management area, split the positive and negative to the side they belong, and attach them to your fan terminals. Nate recommends soldering. I prefer the lazy butt splices. I have enough excess from step 1 not to worry about it :p

Step 5 - Install the mounting bracket. My pogo had a thick grommet around it, so it didn't fit flush with the bracket. It did however taper down, so I pushed it in anyway. Once secured, I mounted it in place and it works great. The pogo sits about an inch in front of the mounting bracket, but is perfectly aligned, so not ordering another one. If you got the 90degree

plug, the 1.1 bracket in the ‘Stock Filter’ folder appears to support that cable.

Step 6 - Install a config file. Mine is located in my akinferno/VoronConfig: Files for my new Voron (github.com) TheFilter.cfg is my file for this mod. Some people are happy with the Nevermore macro, others use Ellis' BedFan macro. I think mine works perfect now. It is a slightly modified version of Ellis'. You have to add that as an [include TheFilter.cfg] in your printer.cfg. Adjust the pins and thresholds in the top section of your printer. BE AWARE: I am not afraid to play around with these files. I usually only update the Git when I get it working properly, so it should be safe, but use my files at your own risk. I don't know enough to make big changes without testing, but do know enough about Jinja to break things. I also lack sufficient fear to keep me from tweaking things :p

How my macro works right now: When bed temp is set to 60C or higher, the fan kicks on to 30%. Once the target temperature is reached... if target is 100C or greater, it jumps up to 100%. Those thresholds can be changed right at the top of the file. With Ellis', if you set it to 60, it kicks on to 100% when that temp is reached too. My macro just keeps the fan at 30% for temps between the low and high thresholds. I didn't want the extra chamber heat when printing PLA. Just enough airflow so the lid won't warp.

UPDATE: In Ellis' macros, when the Target is 0C, the fans turn off. With my macro, there is now an offthreshold. The fans drop to the slow speed until the bed temperature falls below that temperature. This will ensure the fans keep running to 1) filter the air while the chamber is warm, 2) ensure airflow through TheFilter while the bed is hot enough to warp the lid. This status is checked every 5min. So, they may stay on slightly below the threshold. That is easily adjusted too.

I set it to 45 by default. Just be sure the temperature is above the ambient temperature of your bed or it will stay on forever.

----------OLD UPDATES----------

The Filter Stock Body V1.2 UPDATE: 12/21/2022

- Edited lids to shave a bit from edge. This should ensure a good fit, even with a slightly squished first layer.
- Added screw holes for fans. These aren't required, but have been requested. Ensure you remove the tops of the 5015 fans or the lid will not fit properly. Non-screw version is in Archive folder.

Model files

Fysetc Edition (Wider bed supports than Voron manual)

5 files

the-filter_fysetc_body_2_0.stl

the-filter_fysetc_lid_2_0.stl

the-filter_fysetc_bracket_2_0.stl

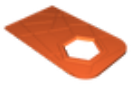
the-filter_spacer-25mm.stl

the-filter_pogo_soldering-jig.stl

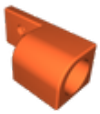
Single Fan (Side Fan) Model

6 files

the_filter_single_left-side-body.stl



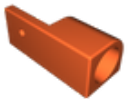
the_filter_single_left-side-lid.stl



the_filter_single_left-side-mag-mount.stl

the_filter_single_right-side-body.stl

the_filter_single_right-side-lid.stl



the_filter_single_right-side-mag-mount.stl

Standard Voron Spacing

3 files

the-filter_stock_body_1_4.stl

V1.4 - Thanks to Reddit user devsfan1830 for finding and fixing gap in previous stl.

the-filter_stock_lid_1_1.stl

V1.1 - Made lid easier to print. Shaved small amount from edges. Updated 12/21/2022

the-filter_stock_bracket_1_1.stl

V1.1 - modified to fit listed connector.

CAD Files

3 files

the_filter_standard_spacing-v61.step

3 Jan 2023

the_filter_fysetc_edition-v10.step

29 Jan 2023

single-fan-fixed-mount.step

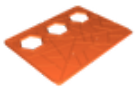
23 Jan 2023

Experimental

2 files

updated_25mm-spacer.stl

This is AKinferno's mod, uses the clip from the Voron deck supports.



the-filter_fysetc_lid_2_0_x1.stl

This is AKinferno's mod with a .8mm high fractal pattern (instead of .4mm)

Archive_Obsolete

11 files

the-filter_stock_mounting-bracket_v1.stl

V1.0 Original

the-filter_stock_body_1_3.stl

V1.3-Improved cable routing and reduced mesh size, and magnet holder. Updated 12/27/2022

the-filter_fysetc_body_v10.stl

V1.0 - Original

the-filter_fysetc_lid_v10.stl

V1.0 - Original lid

the-filter_stock_body_v10.stl

V1.0

the-filter_stock_lid_v10.stl

V1.0

the-filter_stock_body_1_1.stl

Version 1.1 update: 12/10/2022

the-filter_stock_body_1_2.stl

V1.2 - Added fan screw holes, ridge so charcoal won't roll out. 12/21/2022

the-filter_fysetc_mounting-bracket.stl

the-filter_fysetc_body_1_1.stl

V1.1 Added screw holes for fans. Updated 12/21/2022

the-filter_fysetc_lid_1_1.stl

V1.1 - Easier to print. Shaved small amount from edges. Updated 12/21/2022

Other files

thefiltercfg.txt

Klipper config I came up with, based on Ellis' BedFan config. Rename it TheFilter.cfg

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