



We build space shuttles with gardening tools so anyone can
have a space shuttle of their own.

SIBOOR 2023-04-20

INTRODUCTION

How to get help

How to find our SIBOOR community, where you can meet many SIBOOR 0.2 users like you
if anyone have any issues do not hesitate to reach out , we welcome suggestions or feedback
and we are happy to face and overcome our challanges to improve our products.



<https://discord.gg/hpF4bBbrht>



Here you can view our database on GITHUB

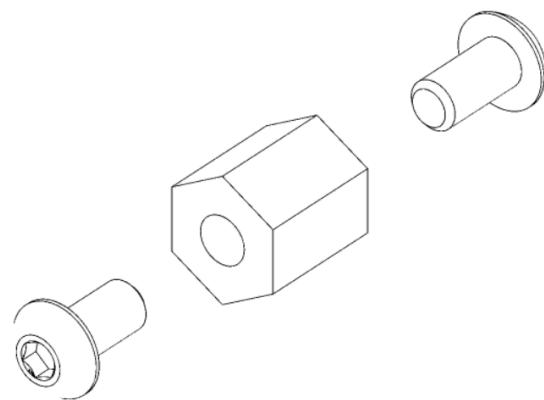
<https://github.com/Lzhikai/siboor-voron>

Voron design : <https://www.vorondesign.com/>

mellow Fly : <https://mellow.klipper.cn/#/>

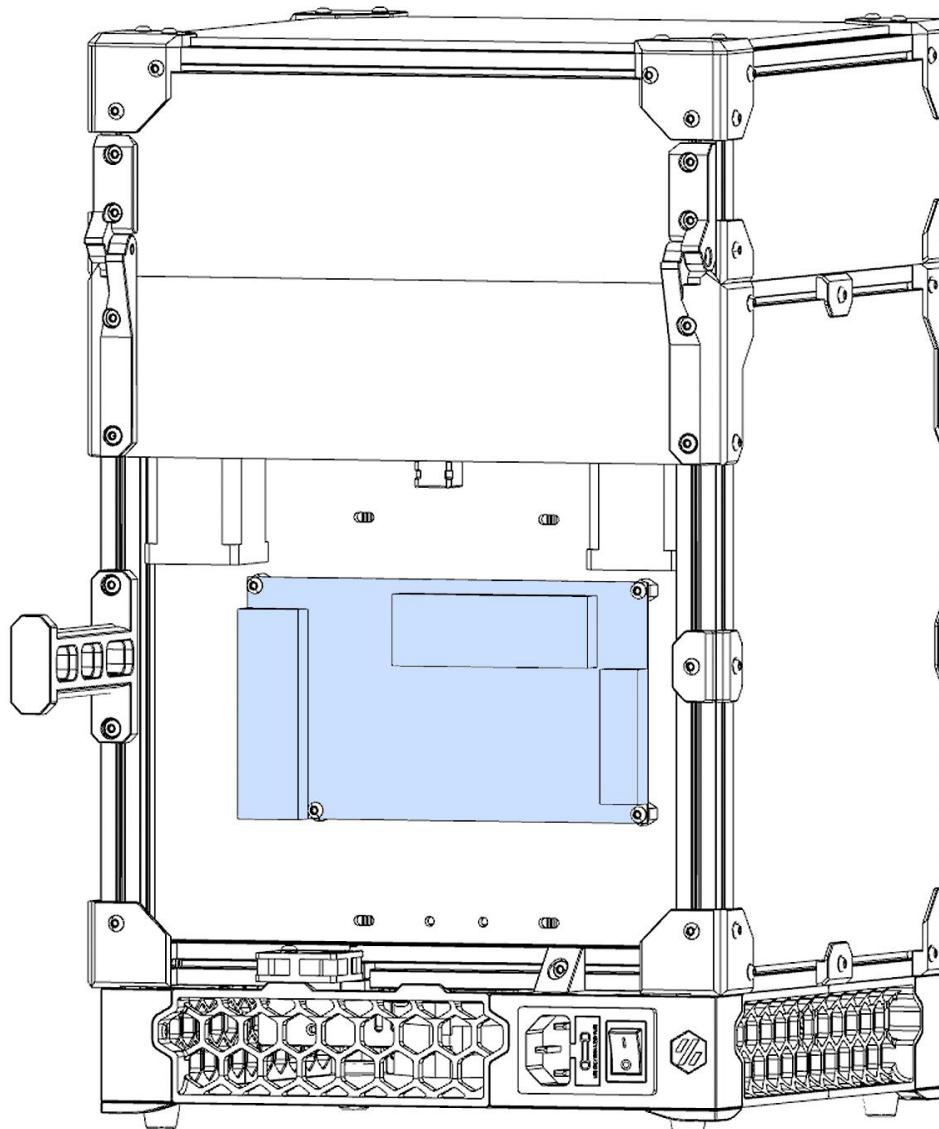
klipper : <https://www.klipper3d.org/zh/>

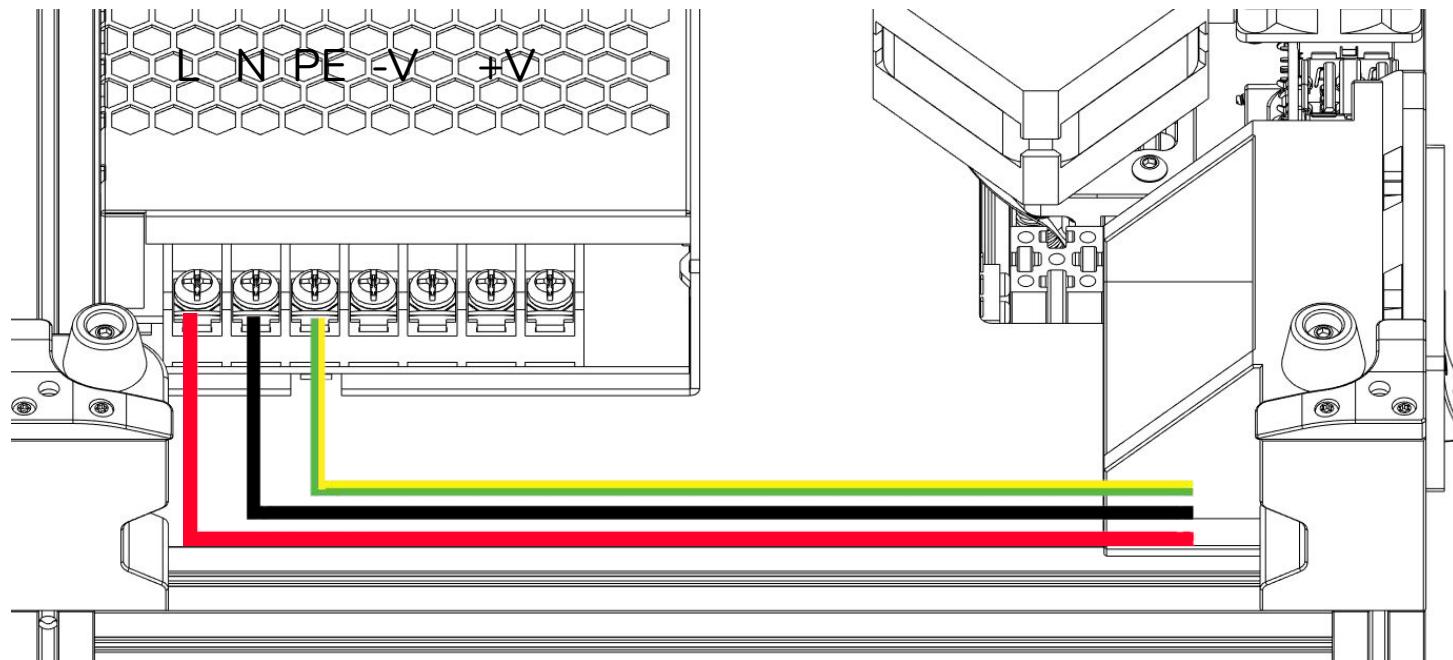
Motherboard installation



Motherboard installation

The above is our suggested location. Use four m3 White Nylon columns as gaskets, and fix the nylon columns with screws on the front first. Then place the motherboard on the back and fix it with screws.

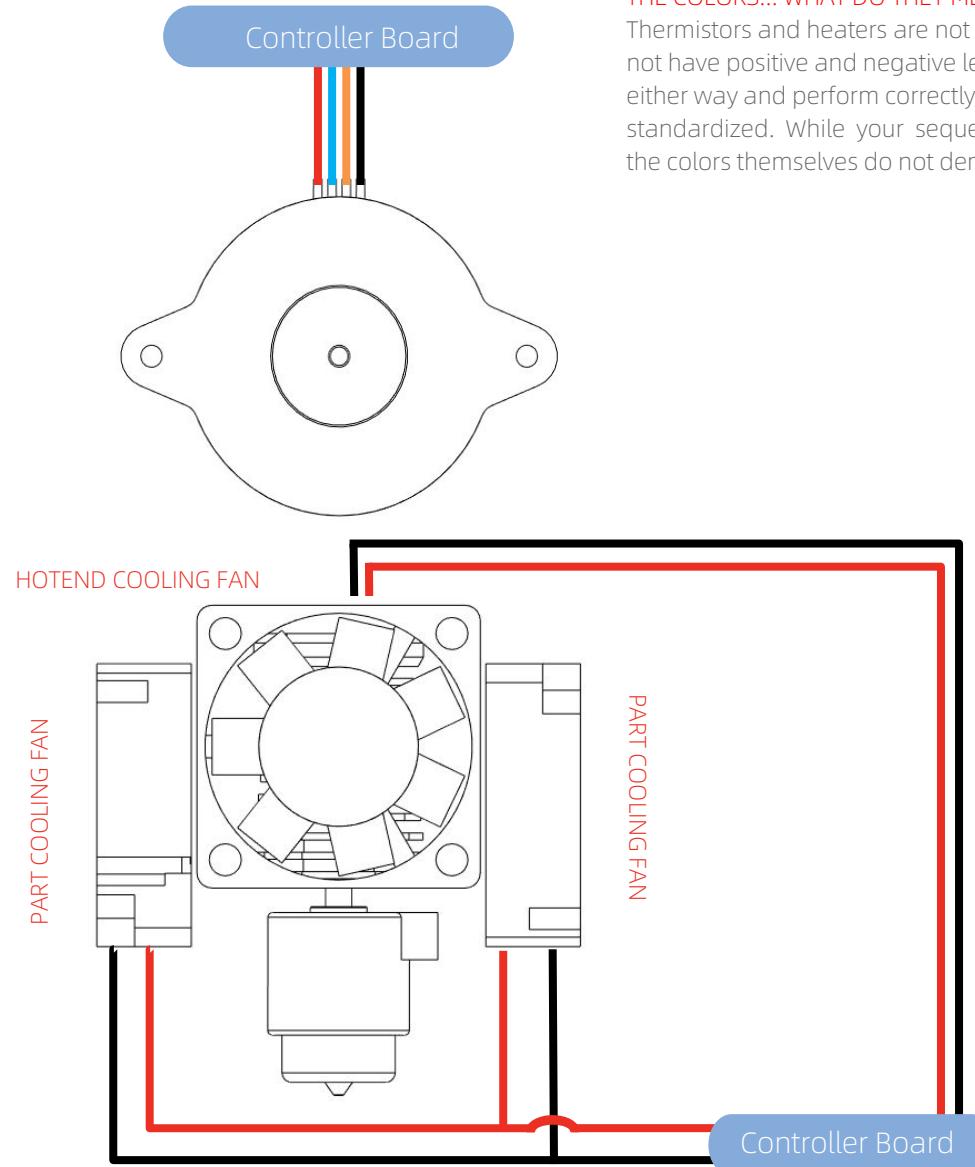




MAINS WIRING

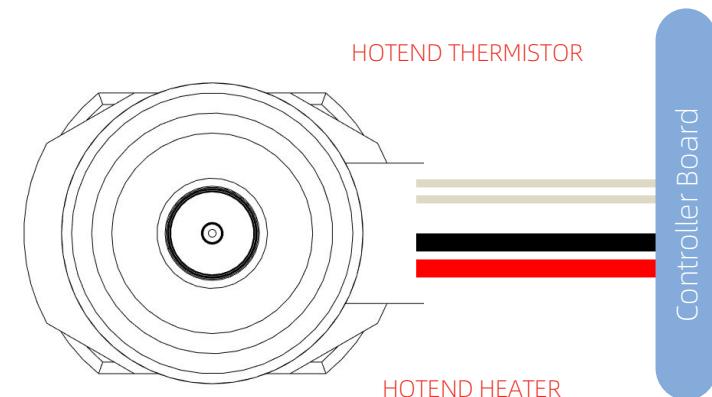
This completes the mains wiring on a V0.2. A guard cover will be installed in a later step. Secure the wires with cable clips / cable tie anchors.

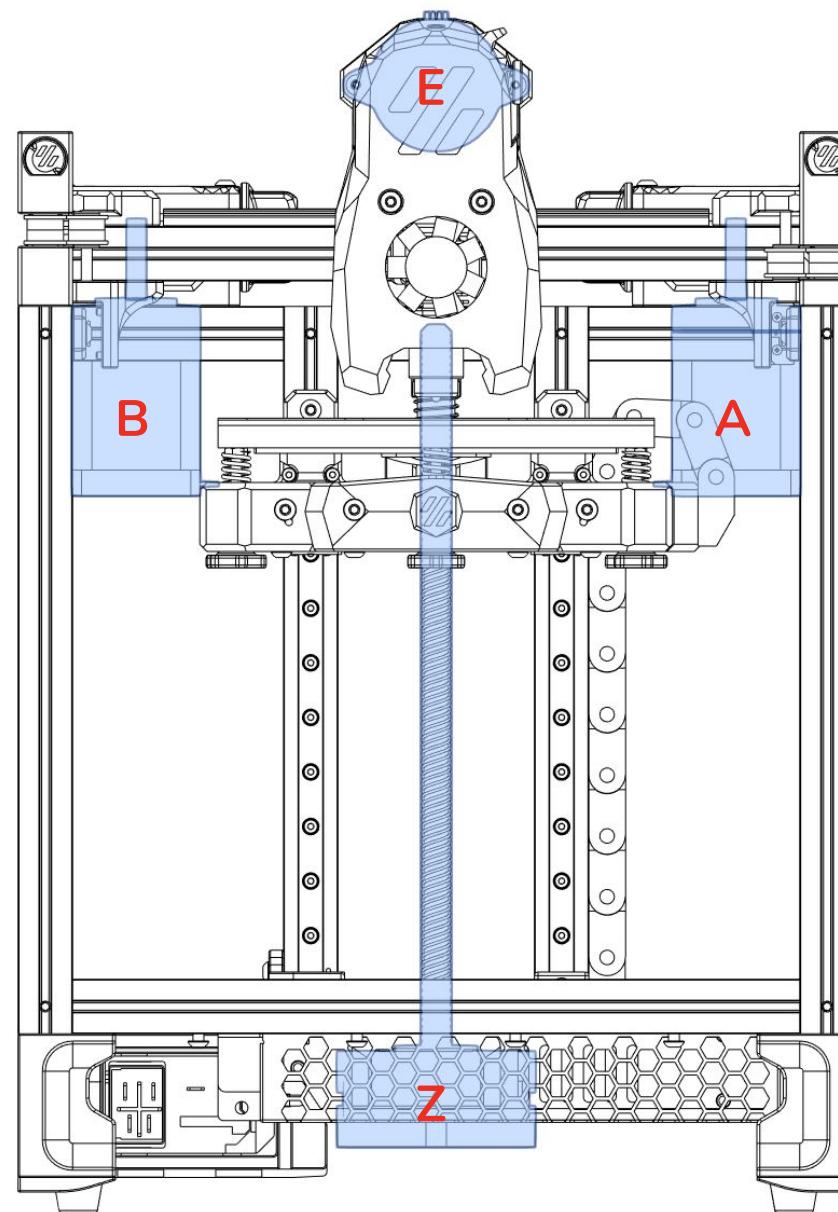
The bed heater is powered by DC voltage, grounding the print bed should not be required. Observe your local regulations in regards to grounding the frame/other components.



THE COLORS... WHAT DO THEY MEAN?

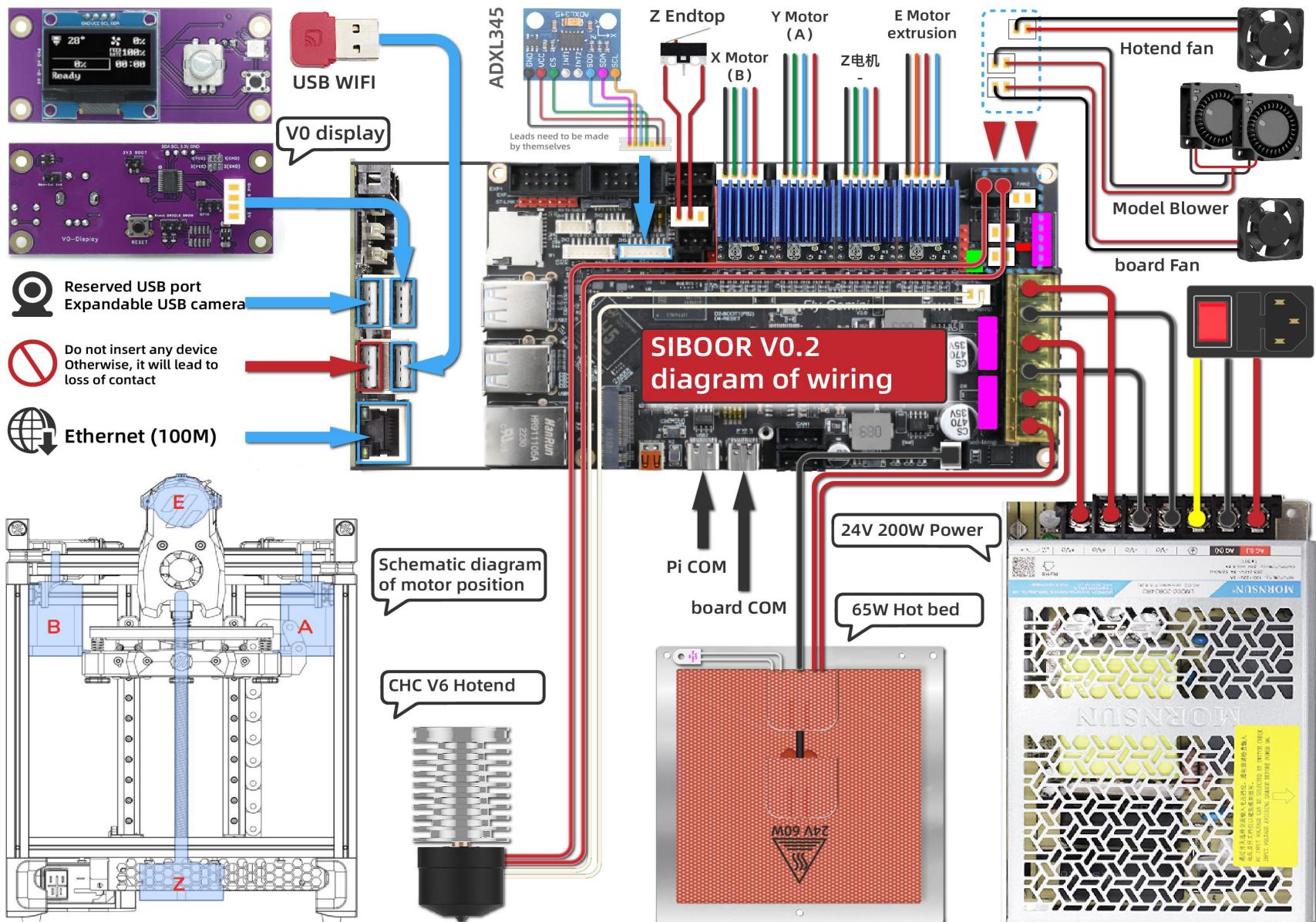
Thermistors and heaters are not polarity dependent so they do not have positive and negative leads. They can be hooked up either way and perform correctly. Motor wiring colors are not standardized. While your sequence may match the images, the colors themselves do not denote anything in particular.



**BA BA BLACK SHEEP**

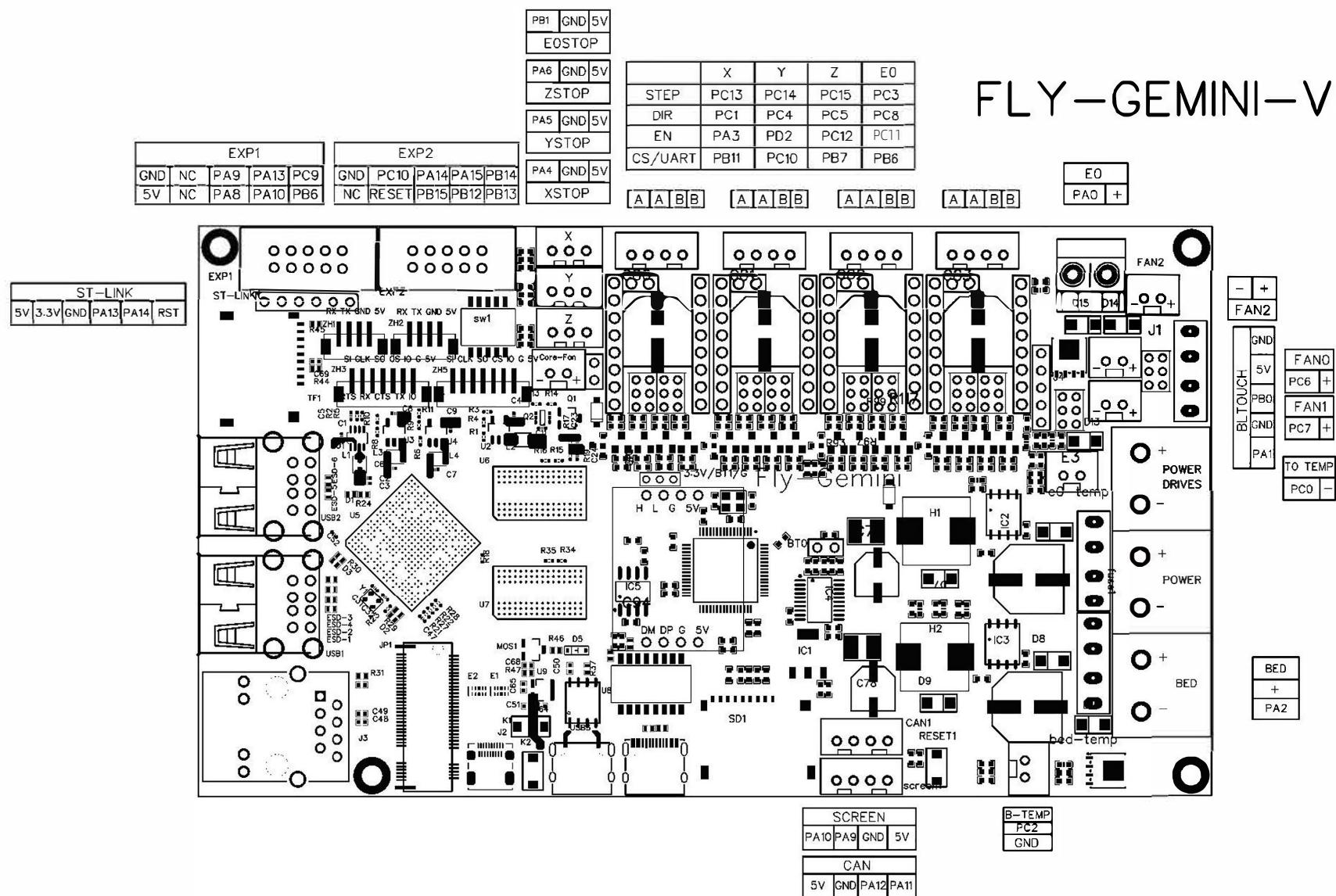
Take note of the locations of the B (X) Stepper Motor and the A (Y) Stepper Motor as they relate to the wiring instructions.

Mainboard wiring



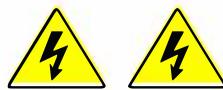
Main board pin diagram - Gemini V3

FLY-GEMINI-V3



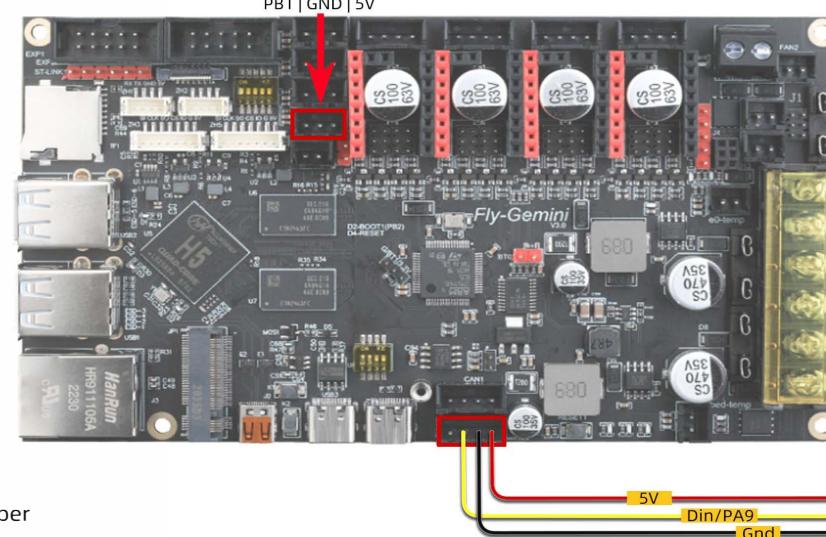
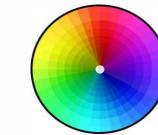
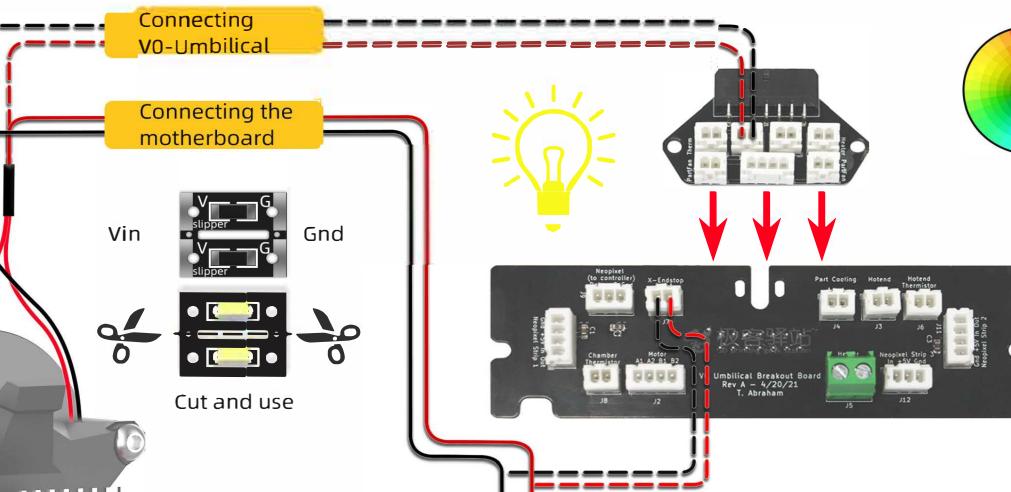
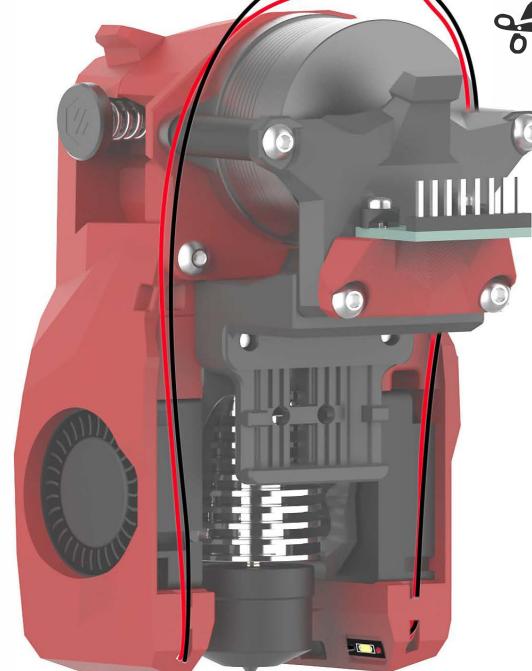
LED wiring

Schematic diagram of installing nozzle LED and RGB lights for SIBOOR V0.2 kit



Attention: Positive and negative poles must be strictly distinguished. Otherwise, it may cause short circuit damage!!!
In this figure, red represents the positive pole, while black represents the negative pole or signal!!!

Weld two sets of light wires together



Configure download link:

<https://github.com/Lzhikai/SIBOOR-Voron-0.2/tree/slipper>

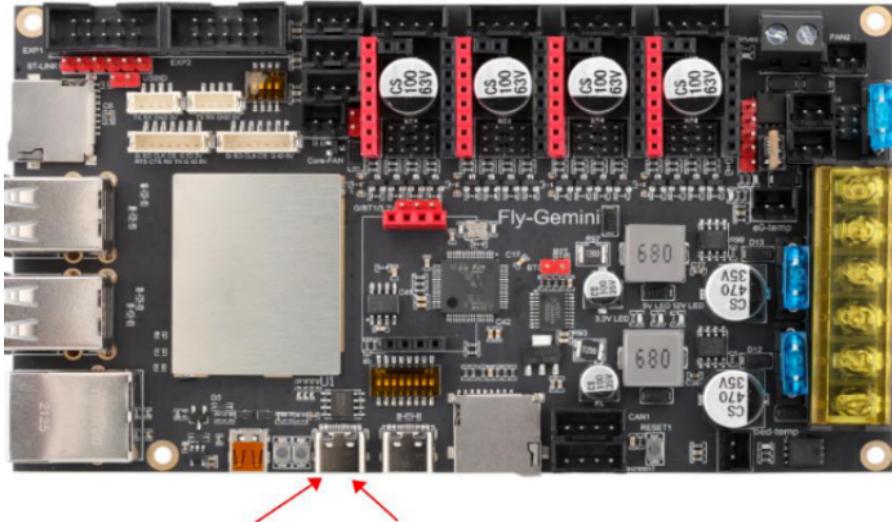
Please note that. This page only shows the wiring method.

LED lighting is only included in shipments after April 19th.

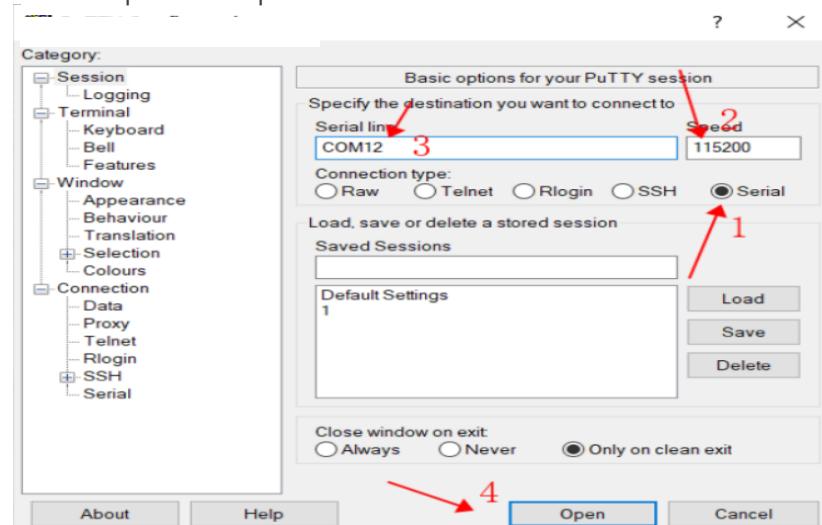
RGB light strips need to be purchased by oneself and are not included in the kit,

Link WiFi with SSH software

After the mainboard is wired, we need to use some methods to connect the mainboard and configure WiFi information for it. Before doing this step. We need to download the [putty software] online disk in advance or download it directly from Baidu.



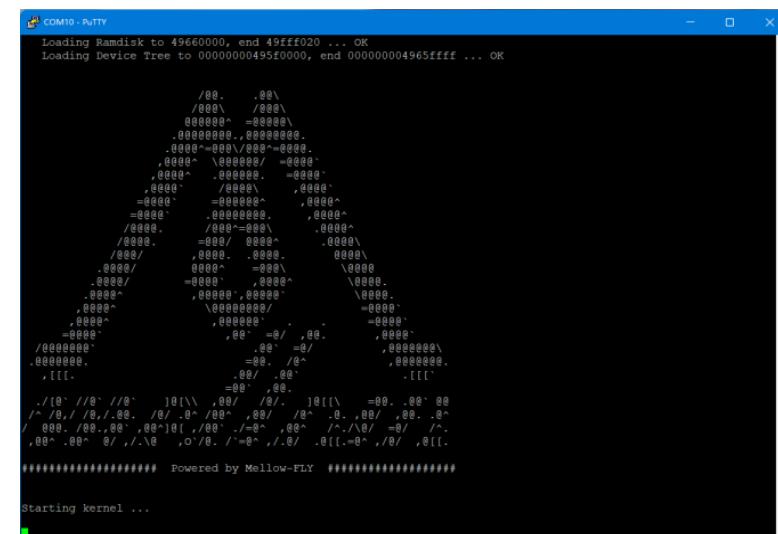
Use the USB type-C data cable provided in the kit to connect the Gemini motherboard (upper computer communication port) with the computer USB port.



Open putty software, select [serial], enter [115200], and enter the port [com12] displayed behind ch340. Note that everyone's may be different, and input according to the actual situation.



Open the device manager on the computer and find the port of CH340.



Wait for a moment, and the screen will start. (if the display is blank, you can press the space or enter key. If not, plug and unplug the connection again)

```

flygemini login: root (automatic login)

Welcome to Armbian 21.11.0-trunk Bullseye with Linux 5.10.85-sunxi64

No end-user support: built from trunk

System load: 40% Up time: 0 min
Memory usage: 18% of 984M IP:
CPU temp: 34°C Usage of /: 13% of 30G

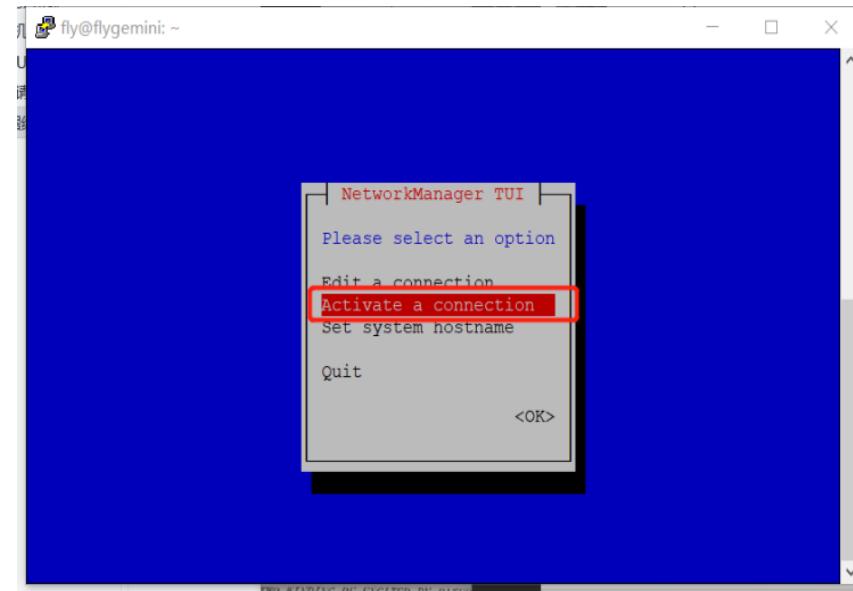
[ 0 security updates available, 4 updates total: apt upgrade ]
Last check: 2022-10-05 09:56

[ General system configuration (beta): armbian-config ]

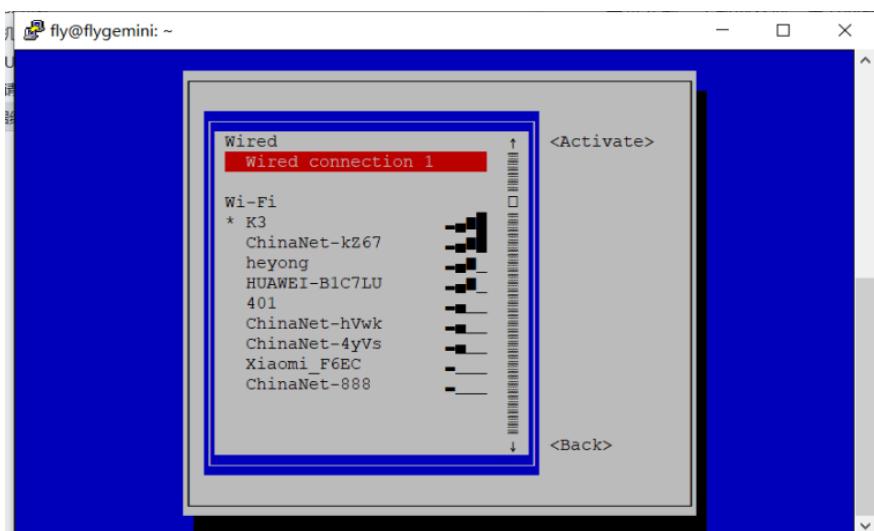
Last login: Mon May 23 11:02:17 UTC 2022 on ttym1
root@flygemini:~#

```

5 After waiting for a few moments, it will look like the picture above . This is when the login is successful.



6 enter 【nmtui】 and press enter to enter the above page. Select the second line and press enter through the direction key on the keyboard.



```

fly@flygemini:~$ ip a|grep inet
    inet 127.0.0.1/8 scope host lo
        inet6 ::1/128 scope host
            inet 192.168.50.226/24 brd 192.168.50.255 scope global dynamic noprefixroute
wlan0
    inet6 fe80::7c67:41d9:18d4:a0b5/64 scope link noprefixroute
fly@flygemini:~$ 

```

Enter the command [ip a|grep inet] and enter. Then a message will be returned. The network IP of the motherboard is in the red box. Record this IP. In the future, whether we use mobile phones or computers, we need this IP to log in to the console.

7. Also select WiFi through the direction key, and then enter the password. Enter to exit. Then WiFi will be connected. (a * key in front of the WiFi name means that it is connected) press ESC to exit. If WiFi information does not appear, check if the WiFi module is not inserted or inserted in the wrong location.

Login console

Enter the IP address obtained in the previous step in the computer or mobile browser.

You can enter the web console of fluidd

(the premise is that the computer and mobile phone are connected to the same network as your printer) it is recommended to use microsoft edge/ Google Browser / Firefox, etc. there will be many problems using QQ or 360 browser!

The screenshot shows the VORON o.1 web console interface. The left side features a navigation sidebar with icons for Home, Print, Tools, and Settings. The main area is divided into several sections:

- IDLE** (highlighted with a red box): Shows a table with columns for Name, Status, and Print duration. It displays "No data available".
- RE-PRINT**: A button to start reprinting.
- Tool** (highlighted with a red box): Includes a homing section with buttons for X, Y, and ALL, and a coordinate entry section for X[60.00] 60.00, Y[120.00] 120.00, and Z[98.00] 98.00. It also has settings for Extrude Length (10 mm), Extrude Speed (5 mm/s), and a retract/retract speed section.
- MOTORS OFF**: A button to turn off all motors.
- Thermals** (highlighted with a red box): Shows a table for thermal components: Extruder (off, 28.2°C), Heater Bed (off, 28.3°C), FLY Gemini (50.2°C), and FLY MCU (48.3°C). Below is a temperature graph from 14:58 to 15:16 showing temperatures around 50°C.
- Console** (highlighted with a red box): Displays a log of Klipper commands. The log includes:

```
15:38:17 // Klipper state: Ready
15:38:46 $ SDCARD_PRINT_FILE FILENAME="V0_Baby_Dragon_Hatching.gcode"
15:38:46 File opened:V0_Baby_Dragon_Hatching.gcode Size:35189638
15:38:46 File selected
15:38:46 // Unknown command:"T0"
15:40:14 // Unknown command:"SKEW_PROFILE"
15:52:57 $ M220 S151
16:28:09 $ M220 S200
16:28:28 $ M220 S149
21:35:10 // Unknown command:"SET_SKEW"
21:35:10 Done printing file
15:15:55 $ SDCARD_RESET_FILE
```
- Macros** (highlighted with a red box): A section for managing macros, currently uncategorized.
- CANCEL_PRINT**, **PAUSE**, **PRINT_END**, **PRINT_START**, **RESUME**: Control buttons at the bottom.
- SEND**: A button at the bottom right.

Common error reporting problems

TMC UART error: this happens when the communication between the TMC driver and the motherboard fails. The above fault may be caused by the failure to provide 24V power to the mainboard (TMC driver is not started), or the TMC stepping driver module is not inserted in the correct position, or the jumper of the driver is set incorrectly.

Please recheck the above problem points.



Unable to read tmc uart 'stepper_z' register IFCNT

Once the underlying issue is corrected, use the "FIRMWARE_RESTART" command to reset the firmware, reload the config, and restart the host software.

Printer is shutdown

ADC error: ADC is the abbreviation of "analog-to-digital converter", which is used to convert the reading of thermistor into the temperature of extrusion head and hot bed. As a safety precaution, once klipper detects that the temperature exceeds the maximum or minimum threshold (thermistor may be open or short circuited), the system will enter the off protection mode. Please check carefully to ensure that the thermistor is inserted into the correct socket.



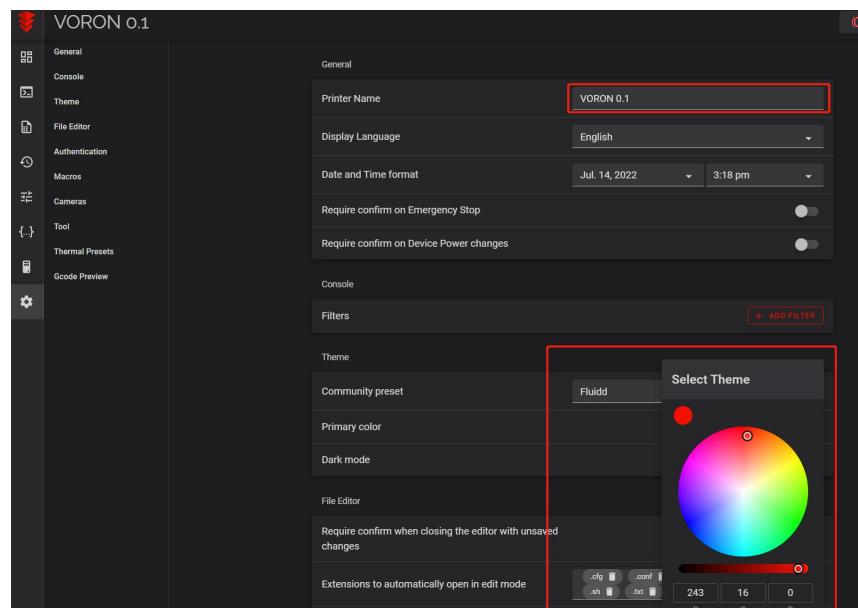
MCU 'mcu' shutdown: ADC out of range

This generally occurs when a heater temperature exceeds its configured min_temp or max_temp.

Once the underlying issue is corrected, use the "FIRMWARE_RESTART" command to reset the firmware, reload the config, and restart the host software.

Printer is shutdown

Modify CFG configuration

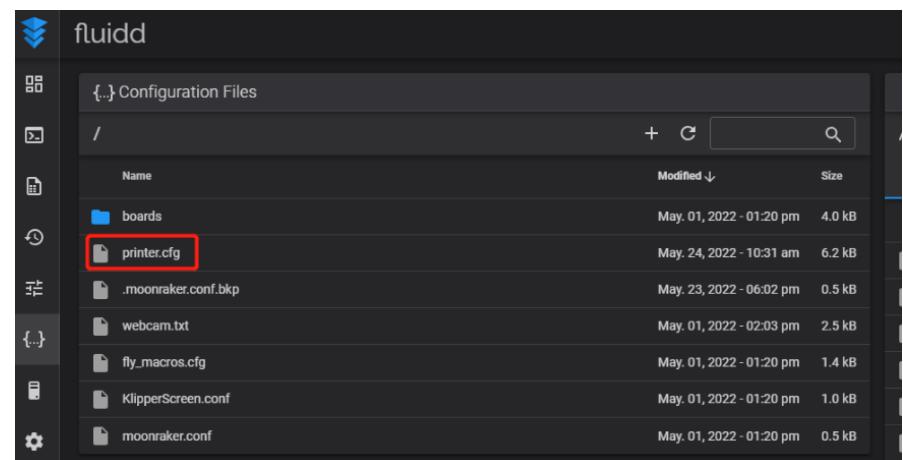


1、 Before we start, we can first enter the settings, select the language we are familiar with, and then give the device a favorite name.

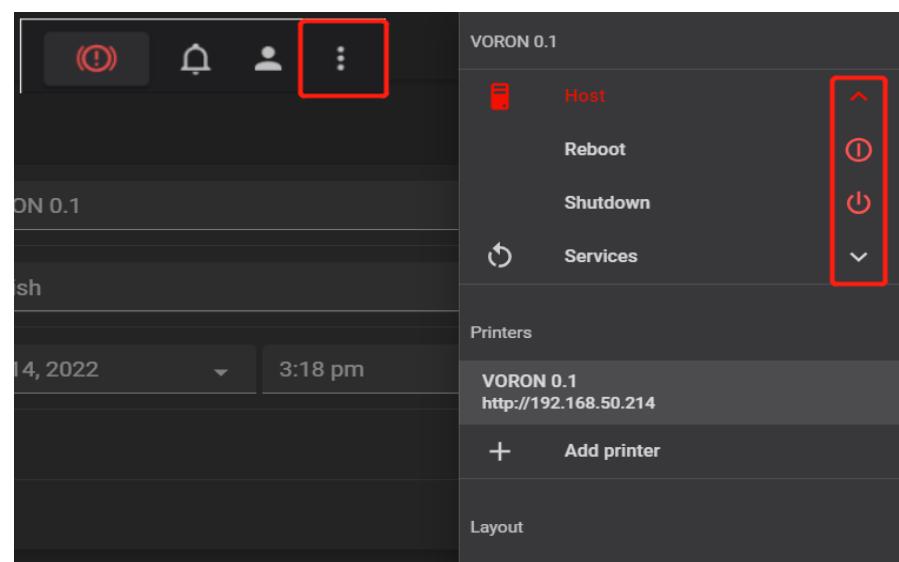
You can also adjust the theme and color of the interface according to your preferences.

```
x printer.cfg
1 [include fly_macros.cfg]
2
3 #####
4 # Motherboard model
5 # Please modify it based on your motherboard model
6 # 请根据您的主板型号修改
7 #####
8 #[include boards/FLY_GEMINI_V1.cfg]
9 #[include boards/FLY_GEMTNT_V1_1.cfg]
10 [include boards/FLY_GEMINI_V2.cfg]
11
```

3、 Set the motherboard model to V2 as shown in the above figure



2、 Find printer cfg。 Double click to enter. printer. CFG is an important configuration file of klipper. All parameters about the printer need to be configured in this file.



Note: if the situation permits, do not directly power off the printer, because the upper computer on the motherboard is also similar to a microcomputer. If the power is cut off and shut down frequently, the system may be damaged. The main machine should be turned off at the upper right corner of the motor first. Power off again. Remember!!

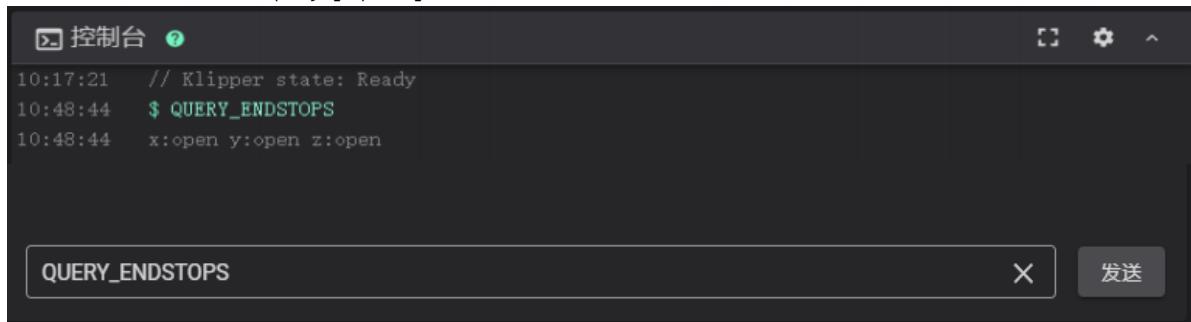
Check the limit switch

Make sure that the limit switches of X, y and Z axes are not pressed, and then send the command through the terminal console:

QUERY_ENDSTOPS

The terminal window should have the following return values.

All axes should display [open] status.



```
10:17:21 // Klipper state: Ready
10:48:44 $ QUERY_ENDSTOPS
10:48:44 x:open y:open z:open
```

QUERY_ENDSTOPS 发送

If the return status of an axis is: triggered

Open print cfg。Find the limit switch setting of the corresponding axis. At ENDSTOP _In pin,Add or delete the exclamation mark to reverse the limit signal. For example:

step_pin: PD8

endstop_pin: PB12 #Before

endstop_pin: !PB12 #After

.....

Next, press and hold the x-axis limit switch manually, and send the

[query_endstops] command again. The following return values should be displayed.

And continue to test the limit switches of Y-axis and Z-axis in the same way.

Send: QUERY_ENDSTOPS

Recv: x:triggered y:open z:open

Remember to save and close in the upper right corner after modification.

"Triggered" will be displayed until the three limit positions are pressed, and "open" will be displayed if not on time.)

The pin positions of XYZ limit in CFG configuration are shown in the figure below for reference. Adding or deleting an exclamation mark can reverse the signal (exclamation mark of

[stepper_x] method)

```
step_pin: X_STEP
dir_pin: X_DIR
enable_pin: !X_EN
microsteps: 16
rotation_distance: 40
endstop_pin: X_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

[stepper_y]

```
step_pin: Y_STEP
dir_pin: !Y_DIR
enable_pin: !Y_EN
microsteps: 16
rotation_distance: 40
endstop_pin: Y_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

[stepper_z]

```
step_pin: Z_STEP
dir_pin: !Z_DIR
enable_pin: !Z_EN
microsteps: 16
rotation_distance: 8
endstop_pin: Z_STOP
position_endstop: 0.5
position_max: 120
```

Machine debugging - homing direction

Please note that VORON0.2 XY adopts infinite position homing mode. Sensorless homing allows an axis to be homed without the need for physical limit switches. After the pulley on the shaft touches the mechanical limit, the stepper motor loses steps. The drive senses the number of steps lost and the microcontroller assumes that homing is complete.

After XY homing and checking that the motors are working properly, you can start testing the X and Y homing!

During testing, it may be necessary to use the emergency stop function in order to prevent collisions caused by wrong direction of the motor. The following methods can make the printer stop suddenly.

1. Press the red emergency stop button on the upper right corner of the Klipper to stop the printer.
2. Put your laptop close to the printer, and when you find that the homing direction is reversed, quickly press the limit switch on the machine twice manually. When you start to test the printer homing function, if it goes in the wrong direction, use the appropriate method above to immediately stop the current action of the printer.

Send the homing command of X in the terminal console window: G28 X

Facing the printer squarely, the print head should move to the right of the printer until it hits the right side of the frame Send the homing command of Y in the terminal console window: G28 Y

Looking straight at the printer, the print head should move toward the back of the printer until it hits the rear of the frame

Ways to Reverse Motor Steering

Also in Printer.cfg, find the setting of the corresponding axis,

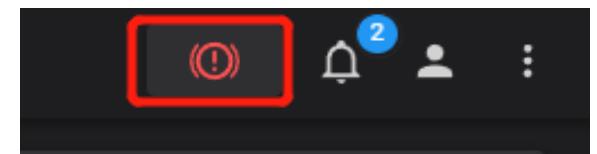
Add or delete "!" before the setting value of dir_pin: to achieve the reverse purpose.

For example:

```
[stepper_y]
step_pin: PD8
```

dir_pin: !PB12 #before fixing

dir_pin: PB12 #After modification... the position of the motor is as shown in the figure:



```
[stepper_x]
step_pin: X_STEP
dir_pin: X_DIR
enable_pin: !X_EN
microsteps: 16
rotation_distance: 40
endstop_pin: X_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

```
[stepper_y]
step_pin: Y_STEP
dir_pin: !Y_DIR
enable_pin: !Y_EN
microsteps: 16
rotation_distance: 40
endstop_pin: Y_STOP
position_endstop: 120
position_max: 120
homing_speed: 40
```

```
[stepper_z]
step_pin: Z_STEP
dir_pin: !Z_DIR
enable_pin: !Z_EN
microsteps: 16
rotation_distance: 8
endstop_pin: Z_STOP
position_endstop: 0.5
position_max: 120
```

Machine debugging - XY infinite position homing

Carrying on from the previous article, the principle of infinite position homing is roughly that when the print head moves and collides with the machine frame, the driver on the main board detects that the motor has lost steps, and it is judged that the homing has been successful. But there is a key sensitive value parameter, that is, how much resistance the motor encounters before it can be regarded as unable to rotate. Although the printer.cfg of VORON 0.2 already contains all the configurations of infinite bit homing, and the threshold is preset. But in some cases, we may need to adjust this value.

The sensitivity value is suitable: the print head can reach the maximum stroke smoothly in both the X and Y directions, and there will be no obvious noise. Then you can skip this page directly.

The sensitivity value is too small: the print head has reached the maximum stroke, and it will still not stop when it hits the frame, and will make a severe "da da da" noise.

The sensitivity value is too large: the print head has just moved a short distance, because of the vibration of the machine itself or the vibration of the fan, it directly stops homing.

```
X printer.cfg
140 #####
141 [fan]
142 pin: FAN0
143 #cycle_time: 0.50
144 #####
145 # TMC2208 configuration./2209/2225
146 #####
147 [tmc2209 stepper_x]
148 uart_pin: X_CS
149 interpolate: False
150 run_current: 1.2
151 sense_resistor: 0.110
152 stealthchop_threshold: 200
153 diag_pin: PA4
154 driver_SGTHRS: 60
155 #####
156 [tmc2209 stepper_y]
157 uart_pin: Y_CS
158 interpolate: False
159 run_current: 1.2
160 sense_resistor: 0.110
161 stealthchop_threshold: 200
162 diag_pin: PA5
163 driver_SGTHRS: 60
164 #####
165 [tmc2209 stepper_z]
166 uart_pin: Z_CS
167 interpolate: False
168 run_current: 1.2
169 sense_resistor: 0.110
170 stealthchop_threshold: 200
171 diag_pin: PA6
172 driver_SGTHRS: 60
173 #####
```

According to the above description, we need to judge whether the threshold is appropriate, and then find a suitable sensitivity setting that can be successfully homing

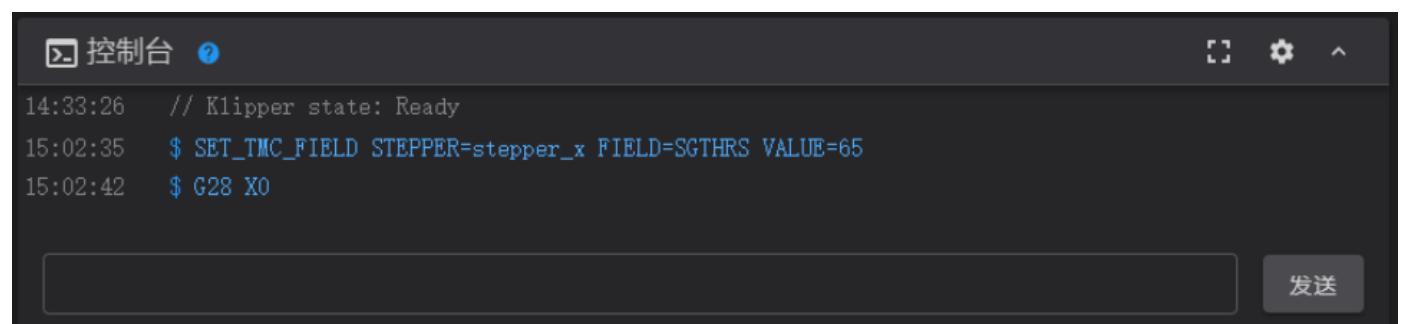
Position the printhead near the center of the track. Send the following command on the console to set the sensitive value of the X-axis homing

SET_TMC_FIELD STEPPER=stepper_x FIELD=SGTHRS VALUE=65

The minimum sensitive value is 0 and the maximum is 255. You can refer to the preset sensitivity value in the printer (for example, the sensitivity value shown on the left is 60), and you can test at -5 or +5 each time. After setting the sensitive value, send the homing command G28 X0. Then observe the homing situation. If it is still not suitable, send the M84 command to turn off the motor, continue to move the print head to the center of the platform, and then change the sensitivity value to experiment. Once you find a suitable sensitivity value, enter it into the white box on the left.

The test method for the Y axis is the same. Only the command to set the sensitive value is different.

SET_TMC_FIELD STEPPER=stepper_y FIELD=SGTHRS VALUE=65



Machine commissioning - Test Motor

To verify whether each stepping motor operates correctly, please send the following commands separately and observe whether the corresponding motor rotates forward and backward with a small amplitude.

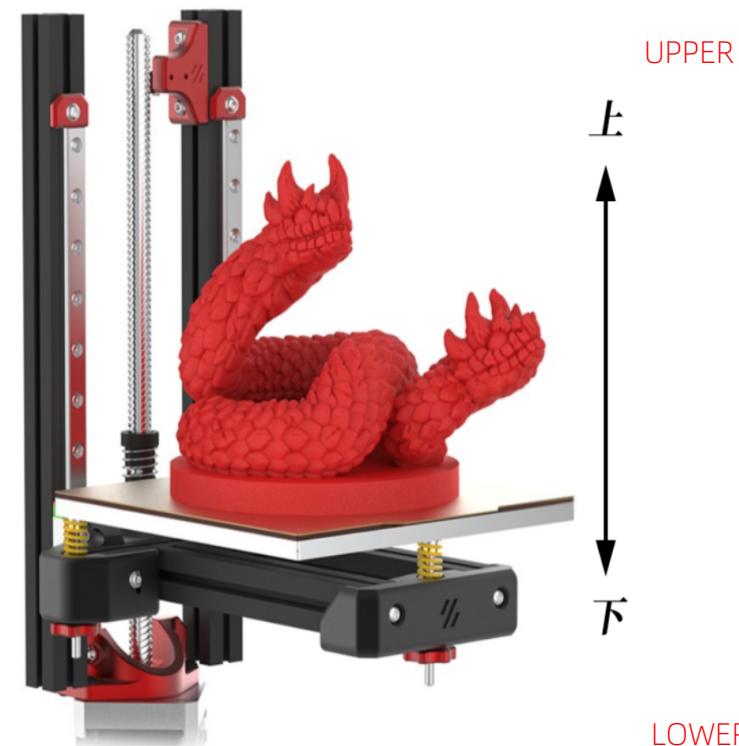
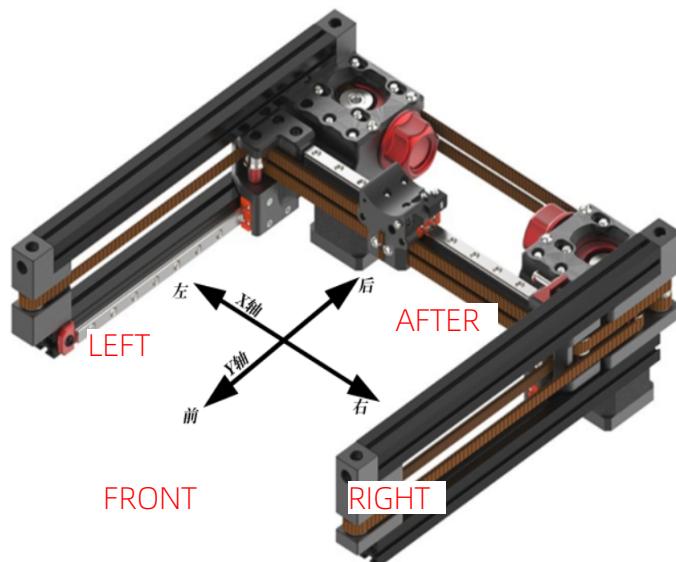
STEPPER_BUZZ STEPPER=stepper_X # test the x-axis motor, The print head should move back and forth in small increments

STEPPER_BUZZ STEPPER=stepper_Y # test the y-axis motor, The print head should move back and forth in small increments

STEPPER_BUZZ STEPPER=stepper_Z 35; test the z-axis motor, and the gantry of this axis should be lowered first and then raised for reciprocating motion

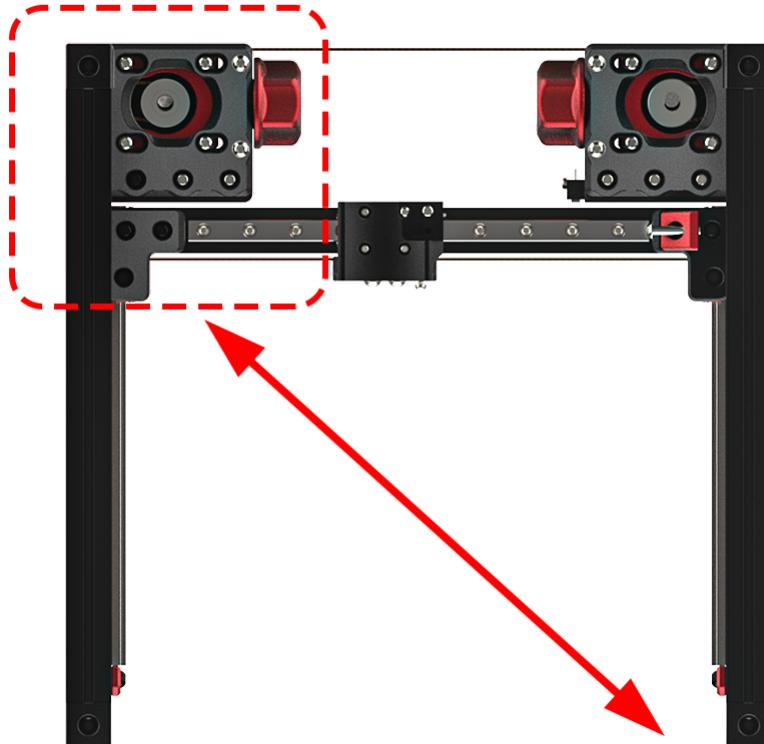
During the test, there is no requirement for the direction of the X-Y axis motor. When testing the z-axis, the hot bed should be lowered first and then raised, otherwise, please modify the motor direction parameters. If the stepping motor does not rotate, please check whether the wiring is wrong or loose. If it is necessary to change the running direction of the motor, find the configuration of the corresponding shaft in the CFG, and click dir_ Add or remove "!" before the setting value of pin; To achieve the reverse purpose.

Because of the motor line batch, if the Z-axis screw motor jitter occurs, replace the middle two leads of the Z-axis motor line.



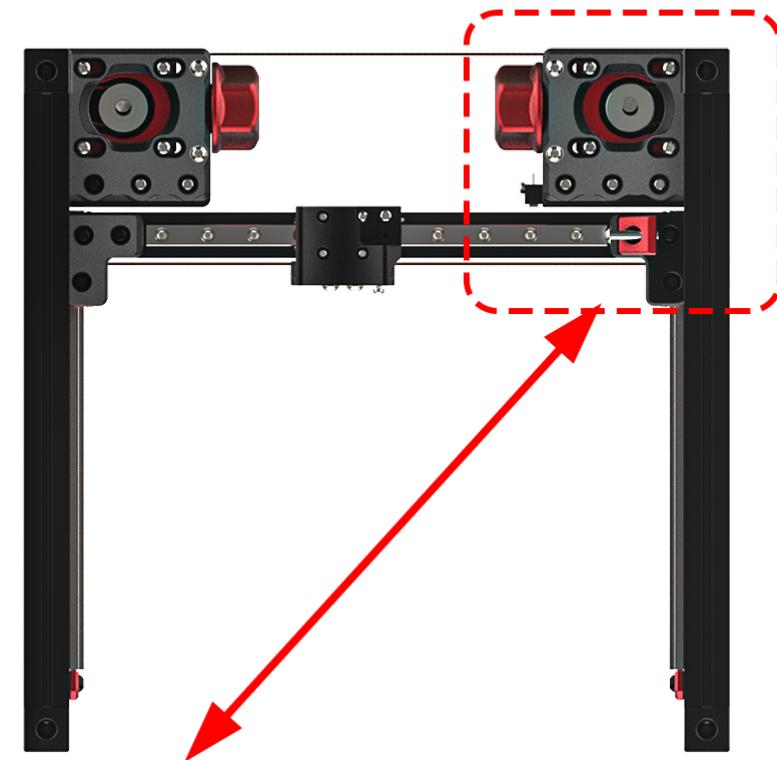
Machine commissioning - Test Motor

As mentioned earlier, since V0.1 is the design of corexy structure, AB Motors should move together no matter in X or y-axis operation. If only one motor is rotating, the machine can only move sideways.



When the left motor does not rotate, the machine can only move obliquely from the rear left to the front right. At this time, check whether the left B motor (x) rotates normally. The following are common problems:

- ① The synchronous wheel on the motor is not locked, causing the motor to rotate, but the synchronous wheel does not rotate.
- ② CFG configuration is not set to V2 version, resulting in pin mismatch.
- ③ There is no jumper cap or driver installed on the drive port.
- ④ The motor pressure line is not pressed well or the drive or drive port is damaged.

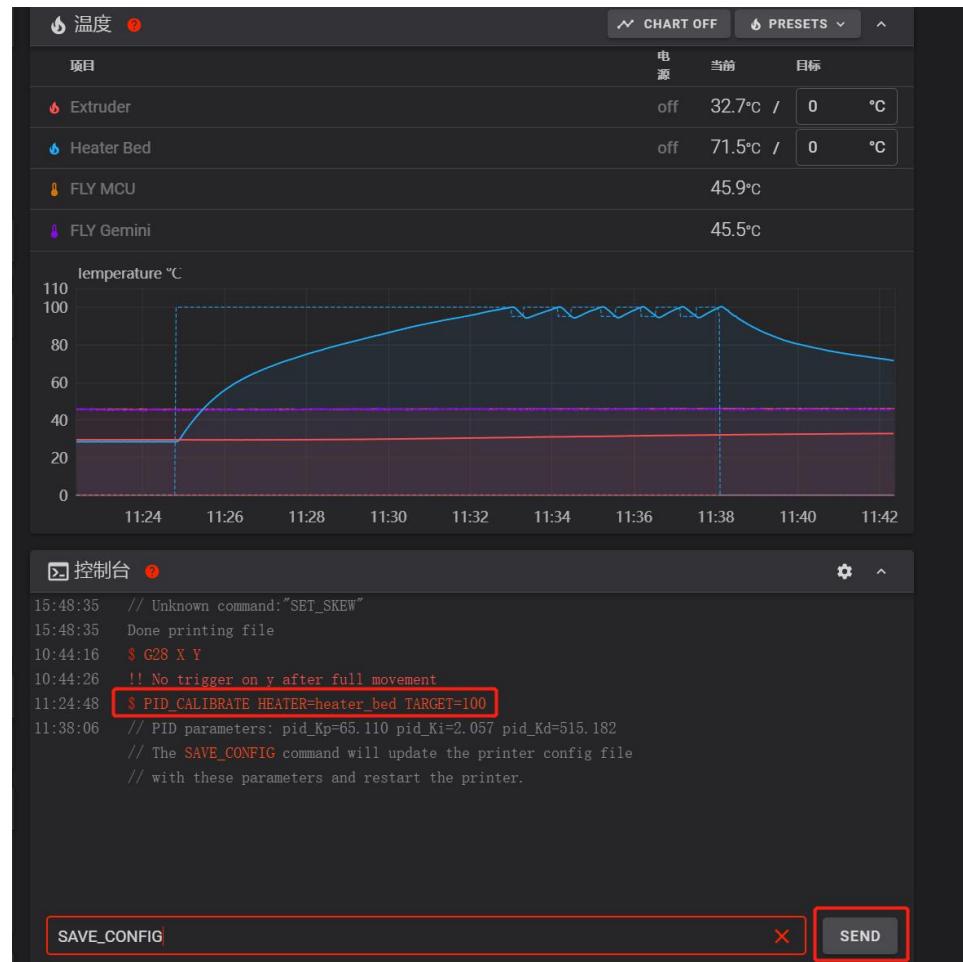


When the motor on the right does not rotate, the machine can only move diagonally from the rear right to the front left. At this time, check whether the motor a (y) on the left rotates normally. The following are common problems:

- ① The synchronous wheel on the motor is not locked, causing the motor to rotate, but the synchronous wheel does not rotate.
- ② CFG configuration is not set to V2 version, resulting in pin mismatch.
- ③ There is no jumper cap or driver installed on the drive port.
- ④ The motor pressure line is not pressed well or the drive or drive port is damaged.

Machine commissioning - nozzle / hot bed heating test

PID regulation is to calibrate the stability of temperature fluctuation at the hot end of the hot bed. It can make the temperature measured by the system closer to the actual temperature and reduce the temperature fluctuation.



PID correction of hot bed

After G28 returns, move the nozzle to the center of the hot bed, about 5-10mm higher than the bed surface, and then send the command

PID_CALIBRATE HEATER=heater_bed TARGET=85

It will perform a PID calibration procedure that will last approximately

10 minutes. Send Save command after completion

SAVE_CONFIG

Parameters will be automatically saved to the configuration file.



PID correction of extrusion head

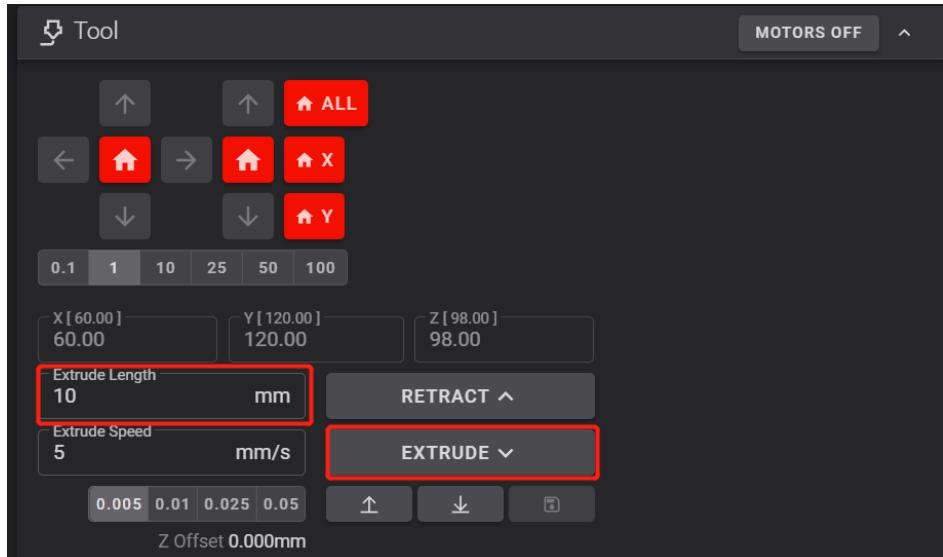
First set the model cooling fan to 25% speed (M106 S64), and then send the command

PID_CALIBRATE HEATER=extruder TARGET=210

It will perform a PID calibration procedure that will last approximately 5 minutes. Once completed, send the Save command save_CONFIG

Extruder calibration

Before the first printing, it is necessary to ensure that the extruder extrudes the correct length of material. According to the temperature required by the printing material, heat the extrusion head, measure the 120mm feed wire from the Teflon nozzle of the extruder feed port, and make a mark at 120mm with a art knife. In fluid, manually extrude 50mm² times, a total of 100mm (the single extrusion amount of klipper shall not exceed 50mm).



After the extruder stops, measure the length x from the extruder feed port to the mark. If the extrusion amount is correct, X should be 20mm (120mm - 100mm =20mm). But there will be deviation in practice. Find the existing extrusion value in the configuration file and update it with the following method.

[extruder]

...

rotation_distance: 25.12 #The higher the value, the less material #extruded...

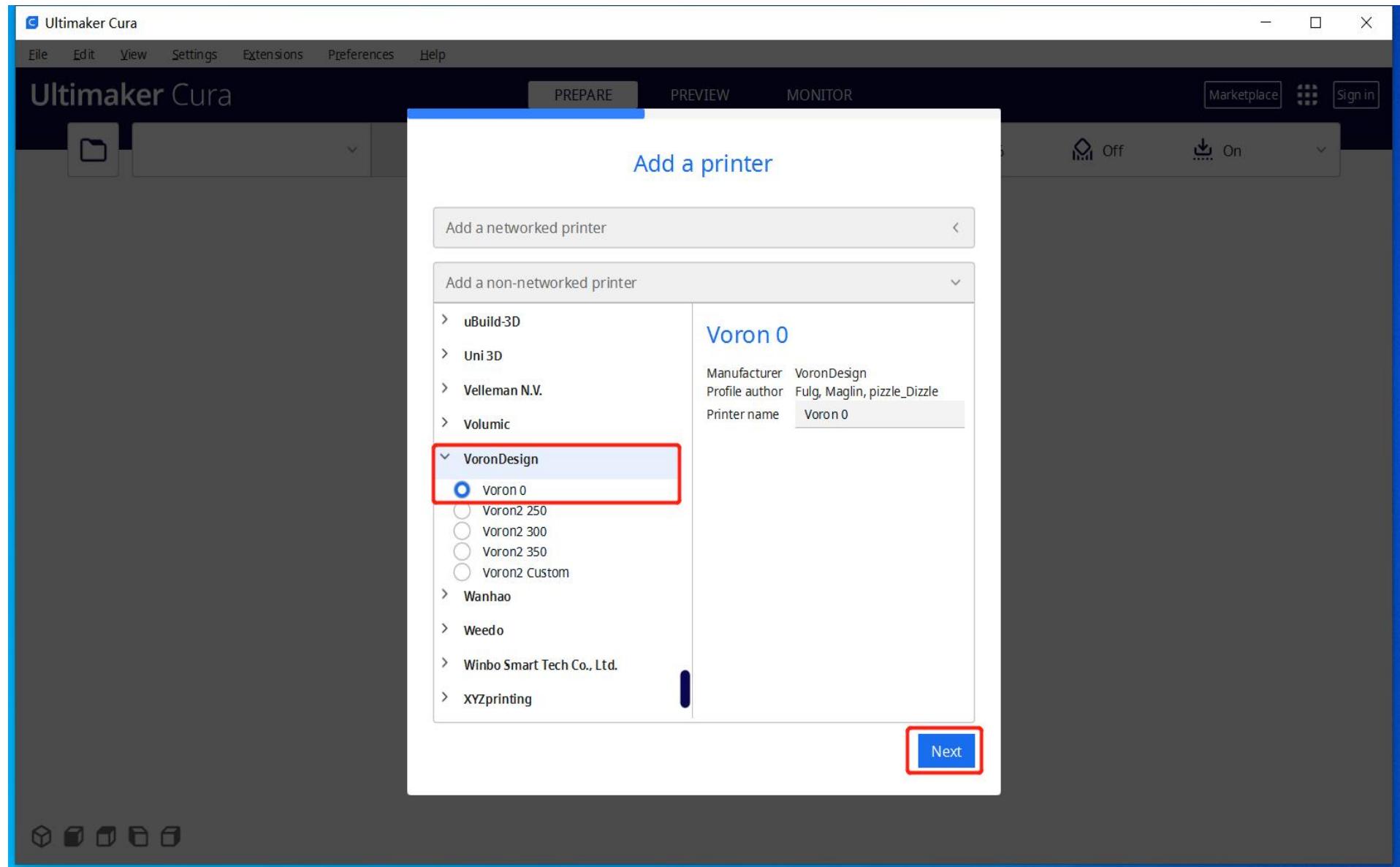
```
[extruder]
step_pin: E_STEP
dir_pin: !E_DIR
enable_pin: !E_EN
microsteps: 16
rotation_distance: 23
gear_ratio: 50:10
nozzle_diameter: 0.400
filament_diameter: 1.750
heater_pin: HEAT
sensor_pin: HEAT_TEMP
```

New shrinkage value = old shrinkage value * (actual extrusion volume / target extrusion volume) Replace the new value in the configuration file, save and restart klipper. Then verify again according to the above method. If the extrusion amount is within ± 0.5% of the target value (that is, the target value is 99.5-100.5mm, and the target extrusion length is 100mm), the extruder is calibrated.

Slice print model

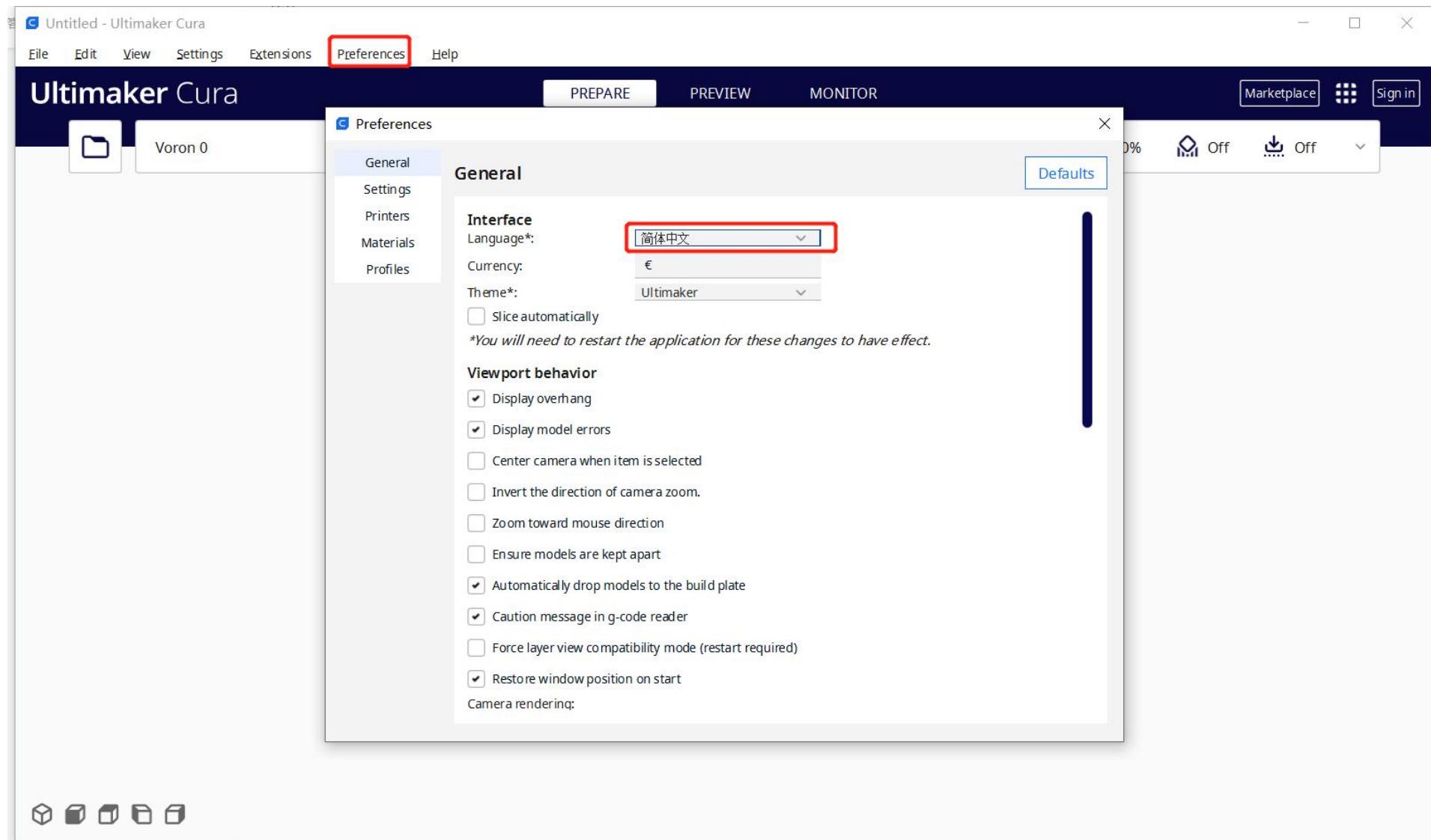
Download and install Cura software

Link: <https://ultimaker.com/software/ultimaker-cura> Add a printer, select Voron 0, and then click next.



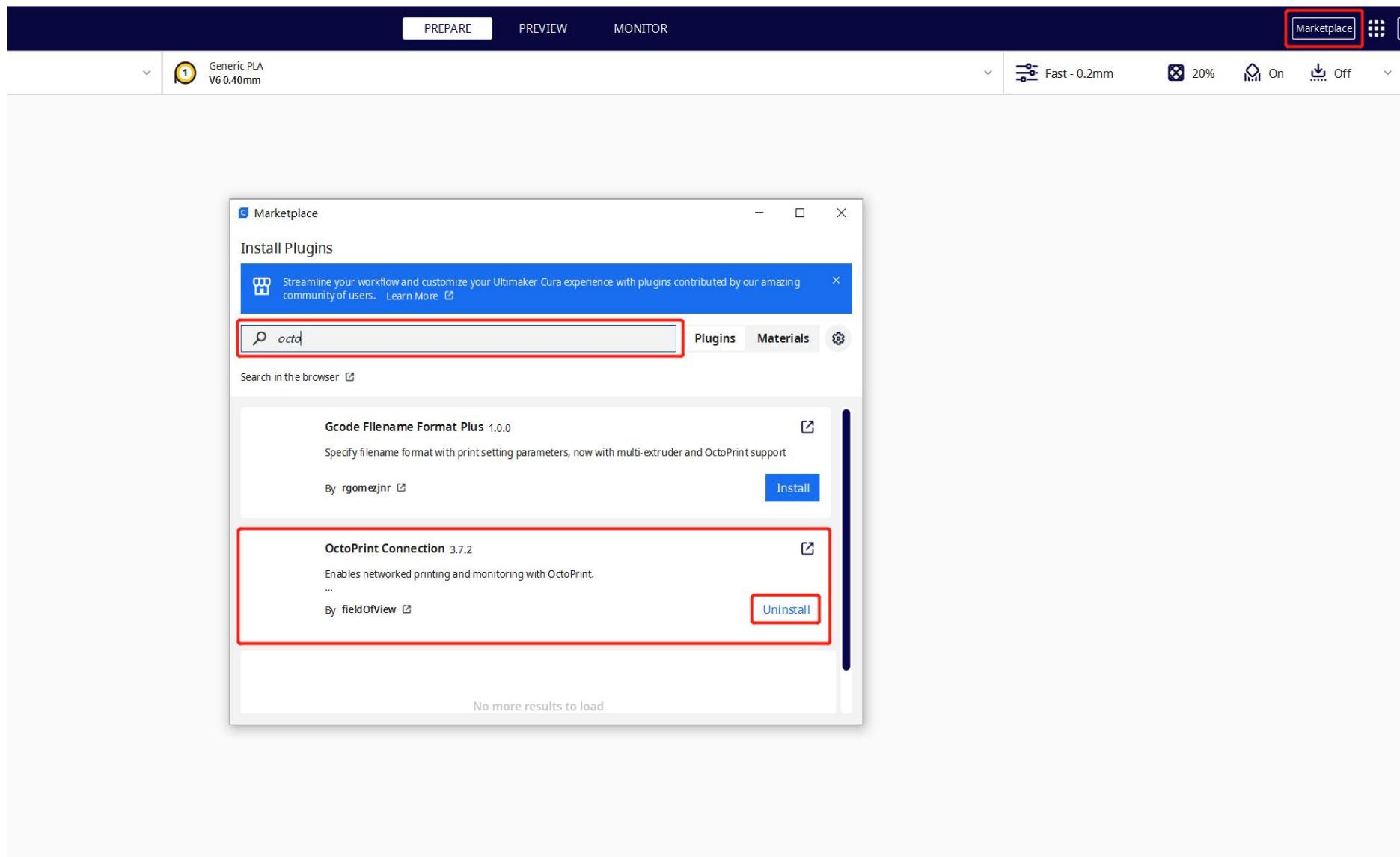
Set language

Follow the instructions in the figure below. It can be set to the language version required by the whole machine



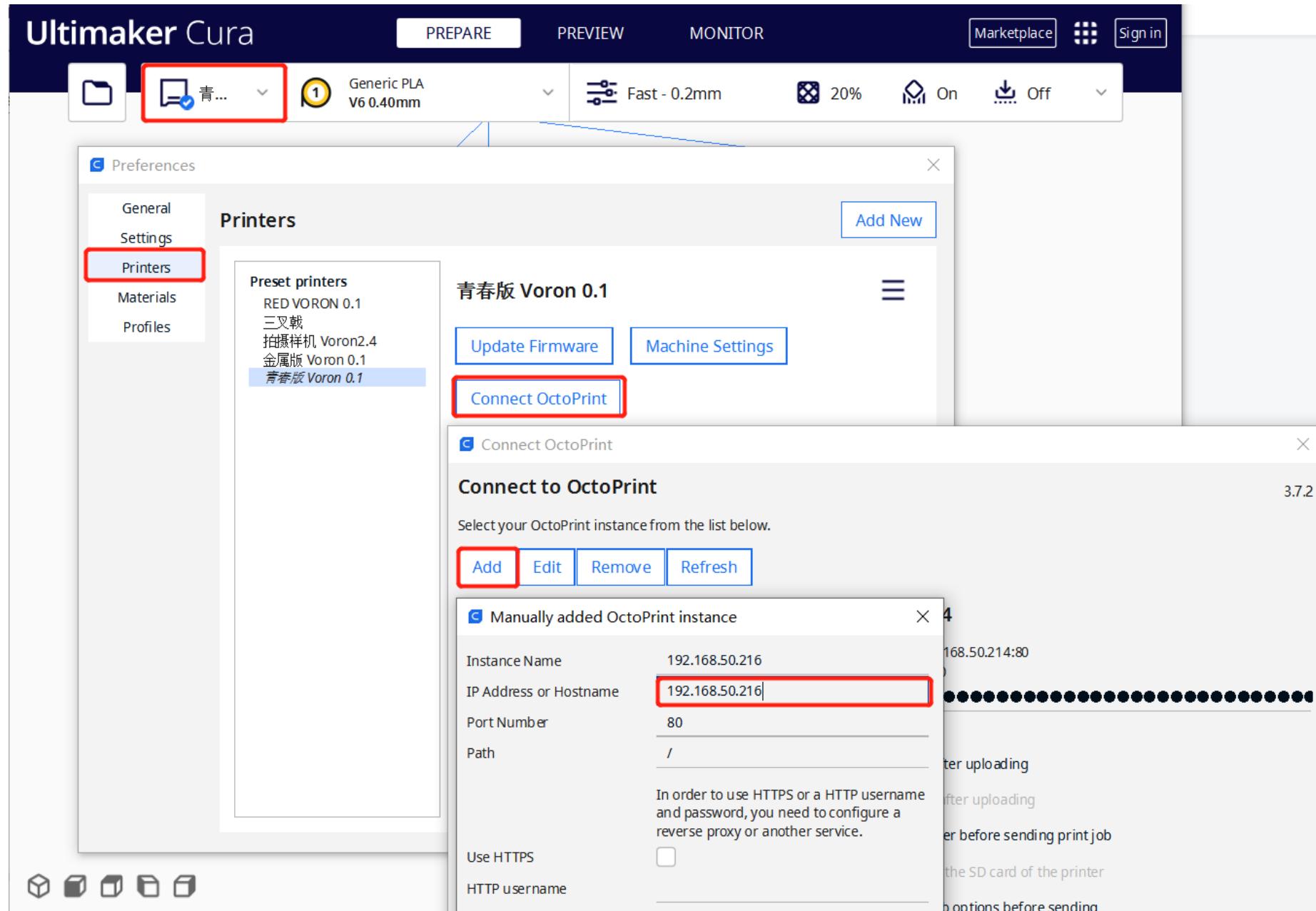
Install remote plug-in

Follow the instructions in the figure below. Search and install the 'octoprint' plug-in in the market. It can upload files directly to the printer after slicing in the slicing software.



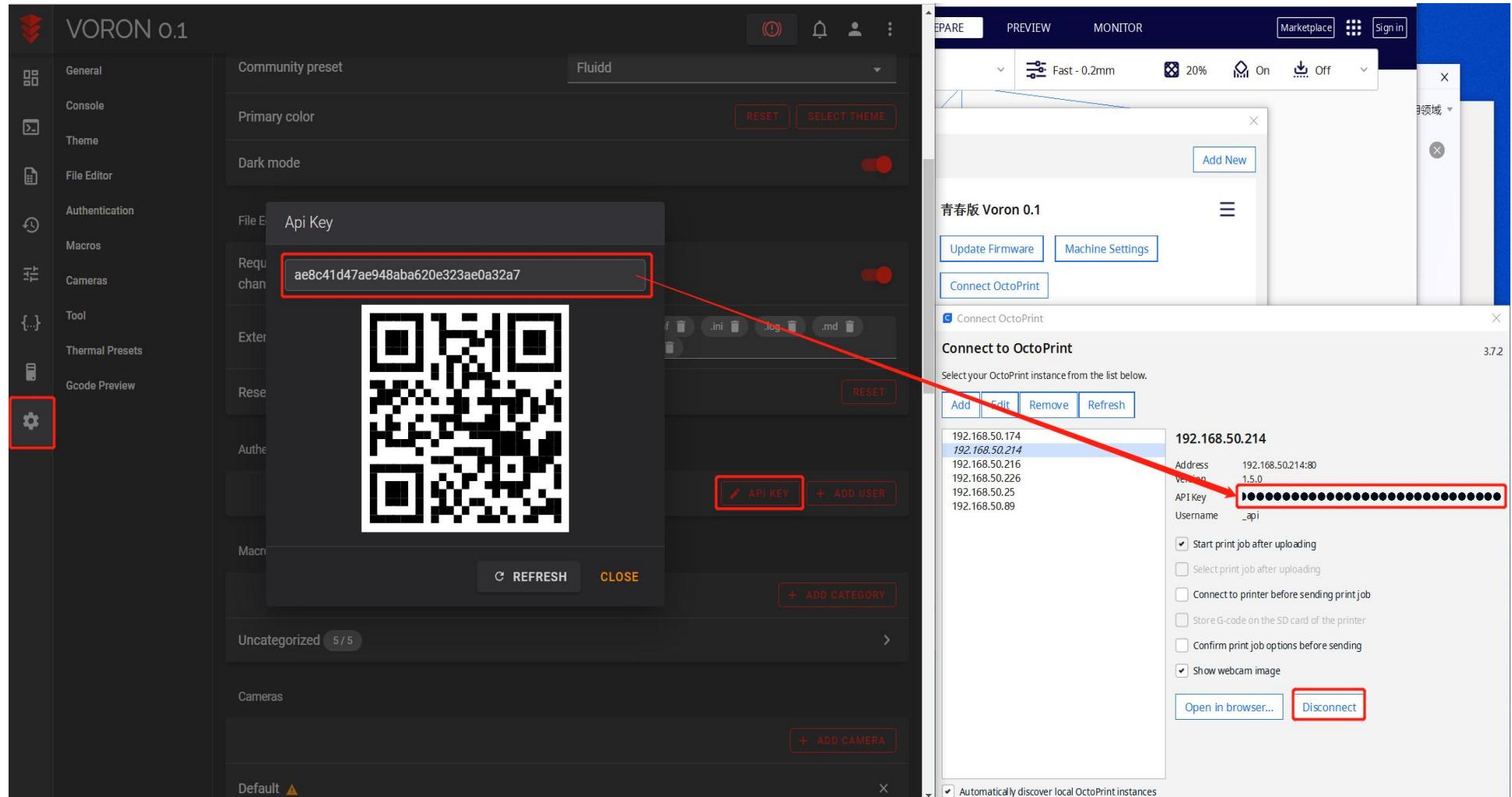
Set IP

In the model setting, add the IP address of the printer.



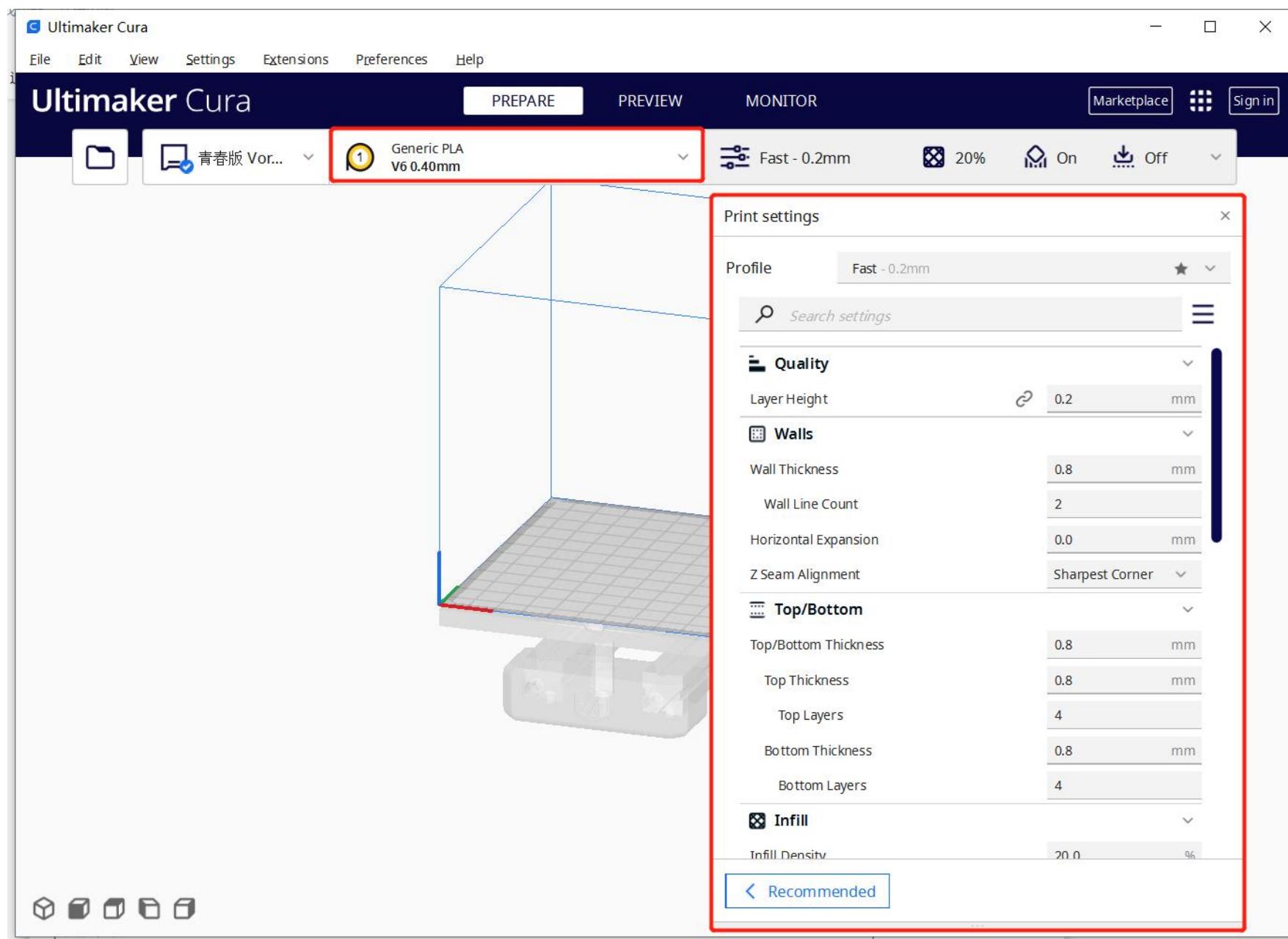
Set IP

In the setting of the web console, find the API of the machine, copy it, fill in the API in Cura software, and finally save the motor connect.



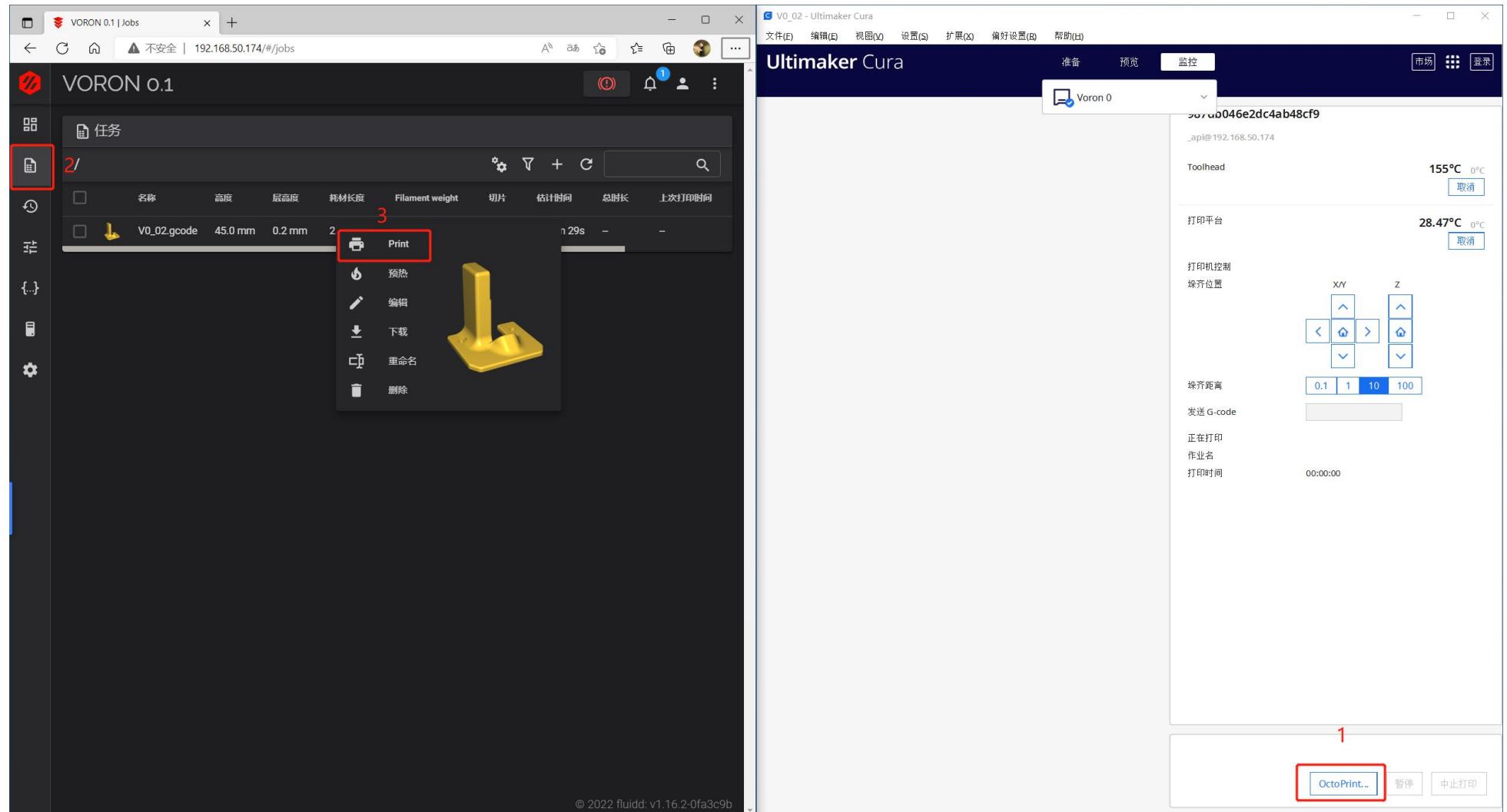
Slice settings

Select the consumables to be used in the drop-down list, such as pla/abs, which must be set, because different consumables vary from day to day. The printing temperature is also different. In addition, you can also set the layer height, filling density, etc. in the print settings on the right. After setting, click [print with octoprint]

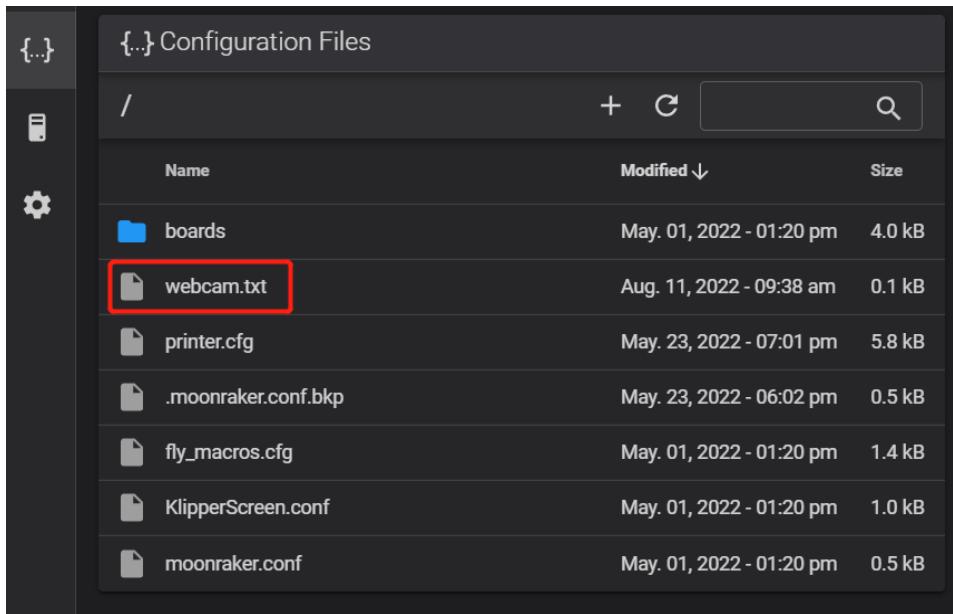


Start printing

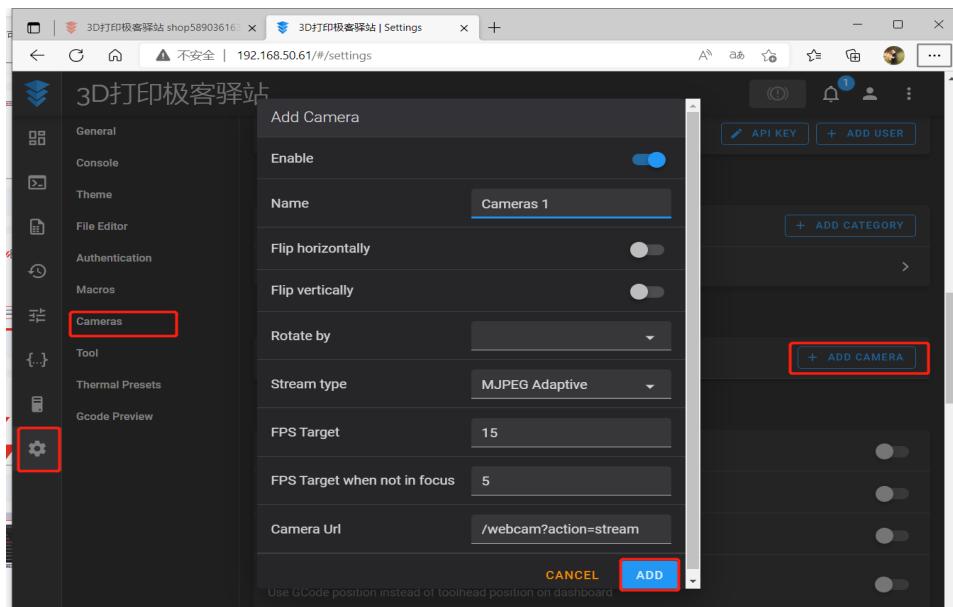
Click [octoprint] and it will automatically jump to the web console interface. In the task list, find the code just uploaded automatically by Cura, right-click [print] and start printing.



Appendix 1: add USB camera



① Plug the USB camera into the port of the motherboard Find [webcam.TXT] in the configuration file and open it.



③ Add a camera to the settings. Set a name
For the rest, keep the default configuration and click
[add]

```
camera="usb"
camera_usb_options="-r 640x480 -f 10 -d /dev/video0"
camera_http_options="-n -p 8080"
```

② Delete all the contents first.
Then add the contents in the red box above,
Save and restart in the upper right corner

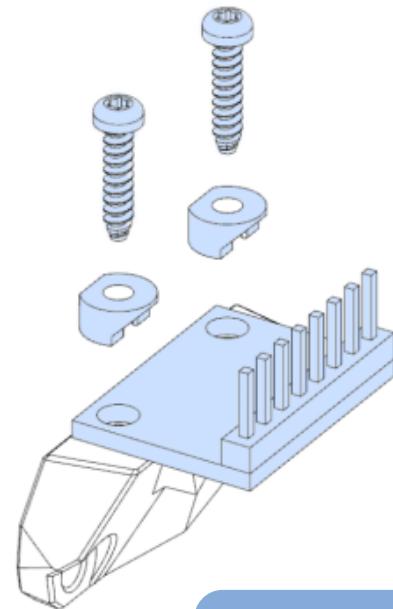
```
camera="usb"
camera_usb_options="-r 640x480 -f 10 -d /dev/video0"
camera_http_options="-n -p 8080"
```

Note: if
the fourth step is completed and the screen
is not displayed, please try to change the digital part of
[video0] in the above code to 1 / 2 / 3.

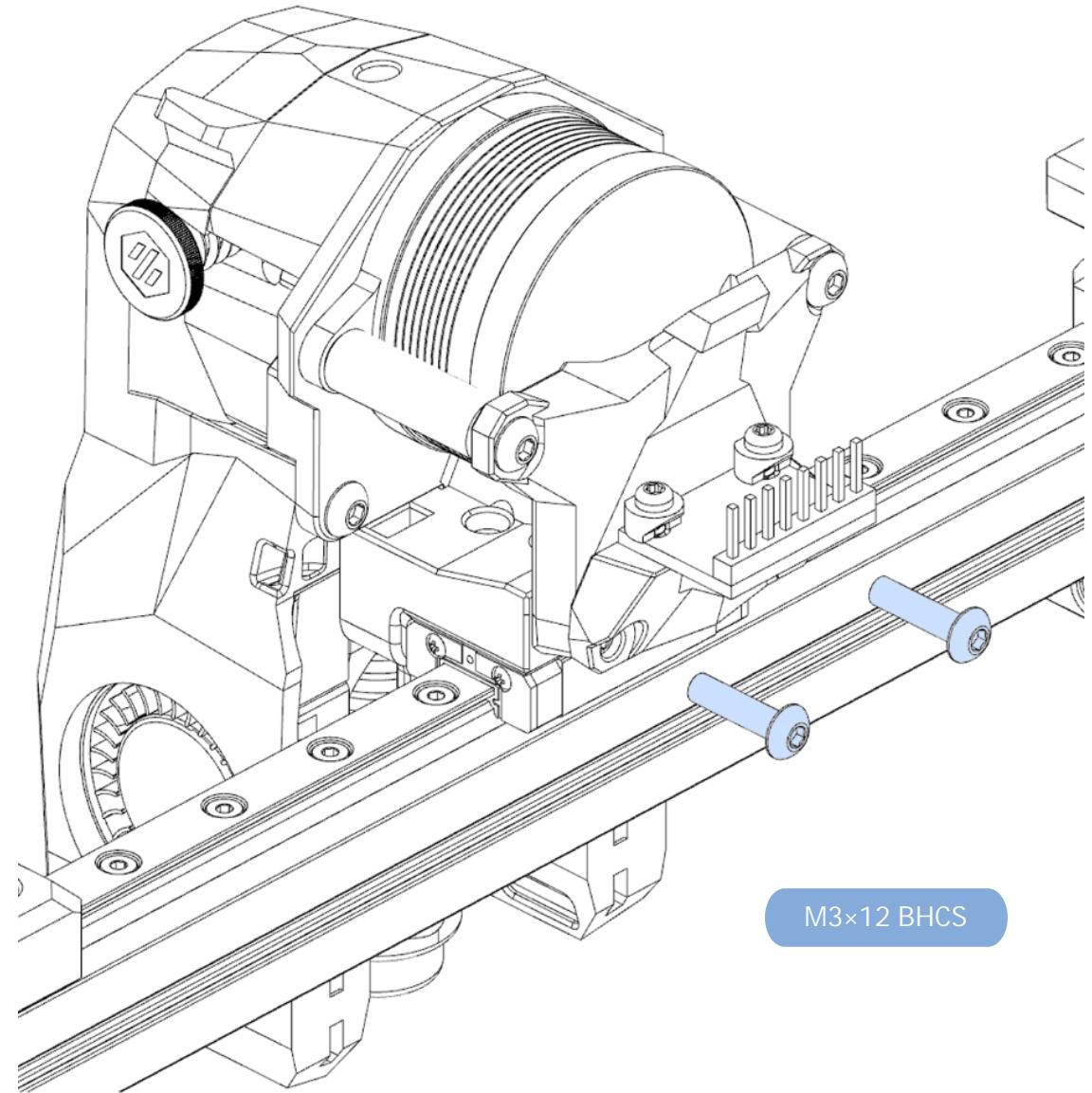
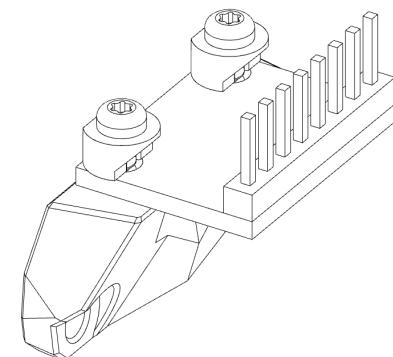


④ When you return to the console, the monitoring
screen of the camera will be displayed.

ADXL345 Install



M2x10 Self Tapping



M3x12 BHCS

Please refer to the previous wiring diagram for wiring
Use the tutorial in this URL:<https://mellow.klipper.cn/#/>