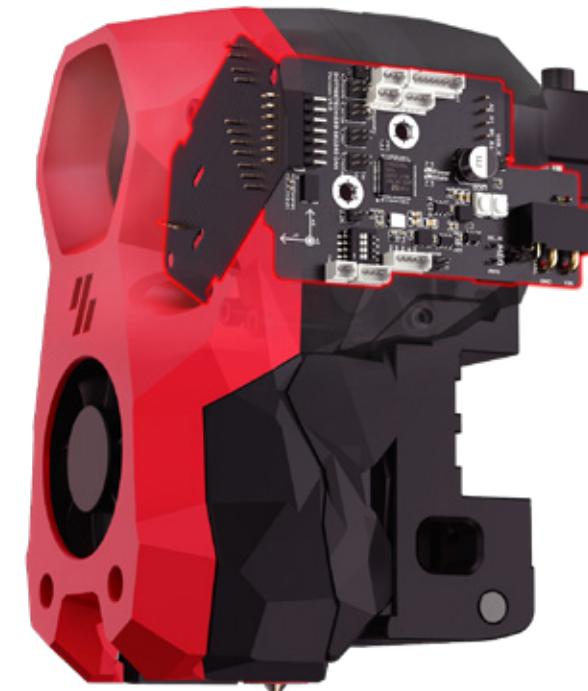


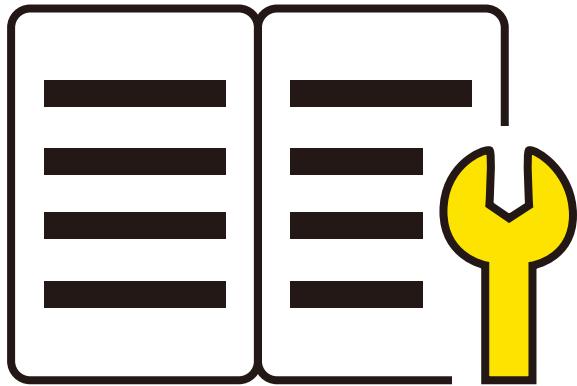
BIGTREETECH



EBB SB2240\2209 CAN V1.0 BUILD GUIDE

VERSION 2024-02-19

Version	Date	Revisions
v1.0	2023.5	Original
v1.2	2024.02	<ul style="list-style-type: none">• Added: Detailed instructions for the correct application of heat sink.• Added: Specifications for the optimal diameter and length of steel wire to securely fix the CAN bus cable.• Updated: Renamed all instances of 'CanBoot' to 'Katapult' throughout the manual.



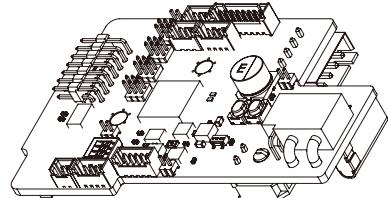
Thanks to **CHAOTICLAB** for providing guidance on Voron's official style build guide, and designing the printed part model for EBB SB2240\2209 CAN.

- Highlighted in blue are included in this EBB SB2240\2209 CAN v1.0.
- Highlighted in red are other accessories of the Voron StealthBurner, which are not included in this EBB SB2240\2209 CAN v1.0 and will need to be purchased by yourself.

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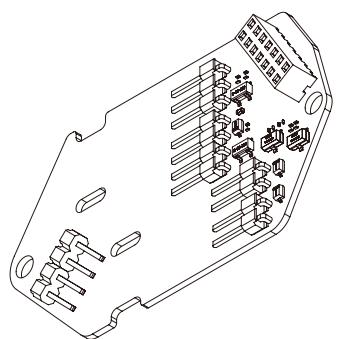
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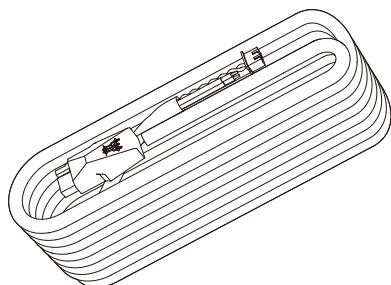
BIGTREETECH EBB SB2240/2209 CAN V1.0

1pc



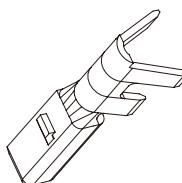
BIGTREETECH EBB SB0000 CAN V1.0

1pc



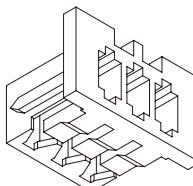
CAN bus Cable

1pc



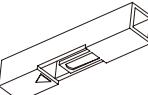
Crimp Pin

1.25 mm pitch	40pcs
3.0 mm pitch	5pcs
2.54 mm pitch	20pcs



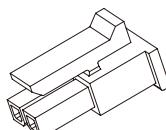
1.25 mm Pitch Pin Connector Housing

2Way	1pc
3Way	2pcs
4Way	2pcs
5Way	1pc
8Way	1pc



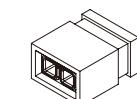
2.54mm Pitch Pin Connector Housing

1Way	15pcs
------	-------



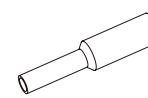
3.0 mm Pitch Pin Connector Housing

2Way	1pc
------	-----



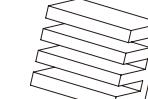
Jumper Cap

	15pcs
--	-------



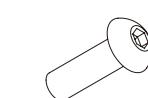
Insulated Wire Ferrule

	2pcs
--	------



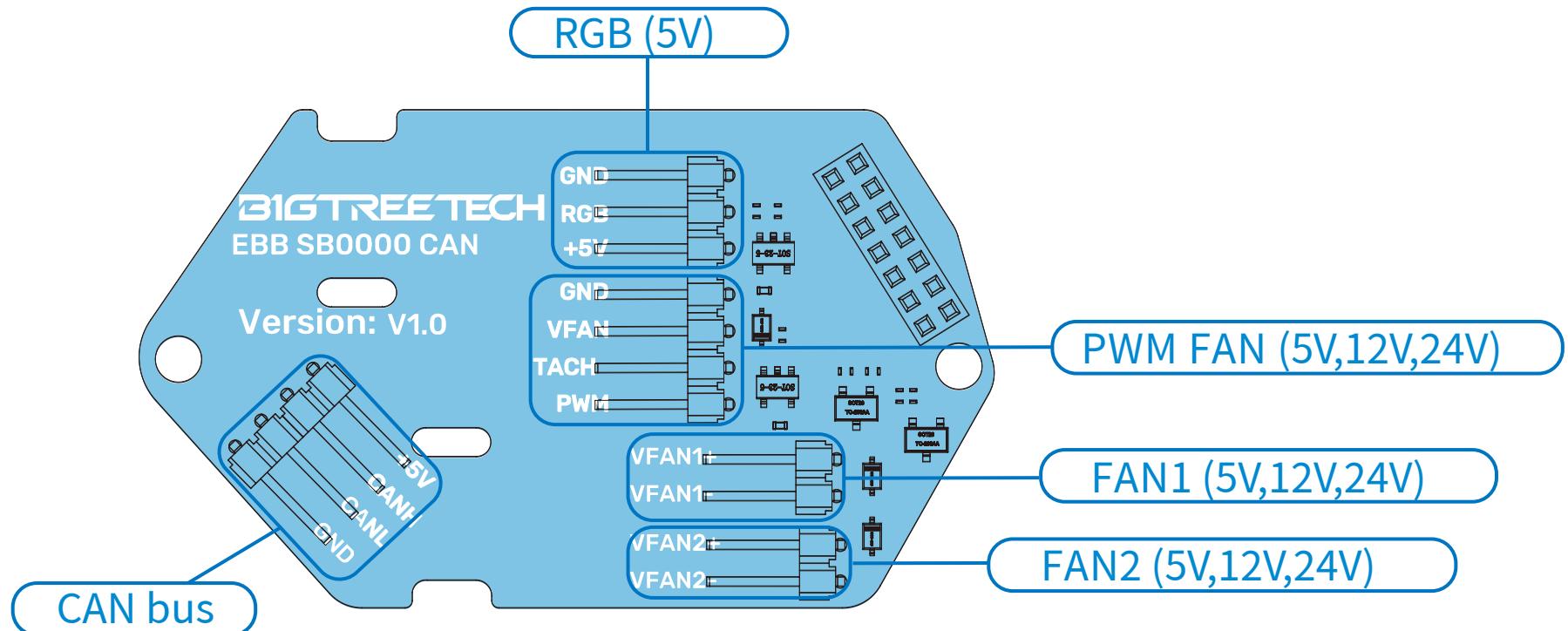
Heat Sink

	1pc
--	-----



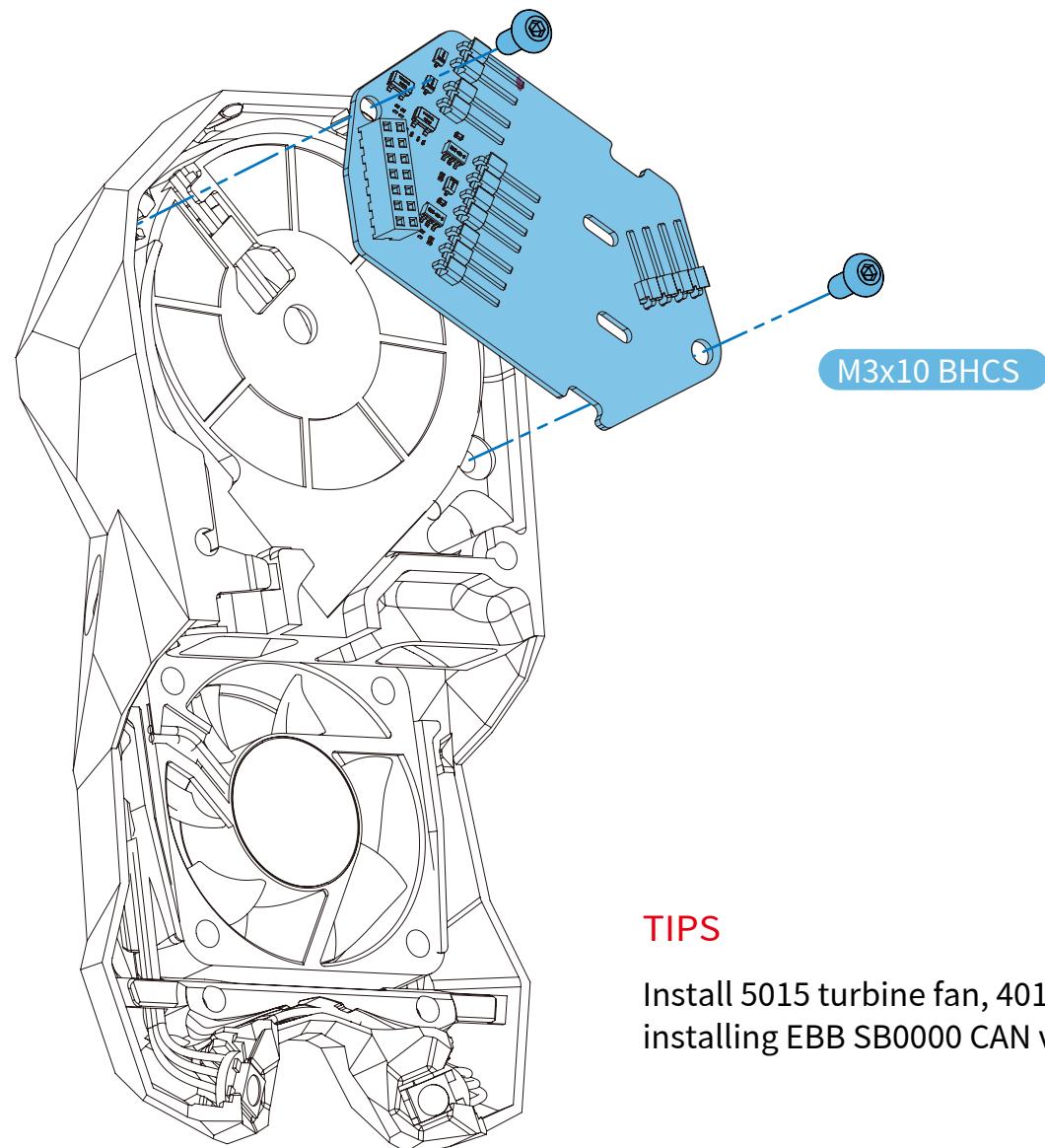
M3 x 10 Button Head Cap Screw (BHCS)

	4pcs
--	------



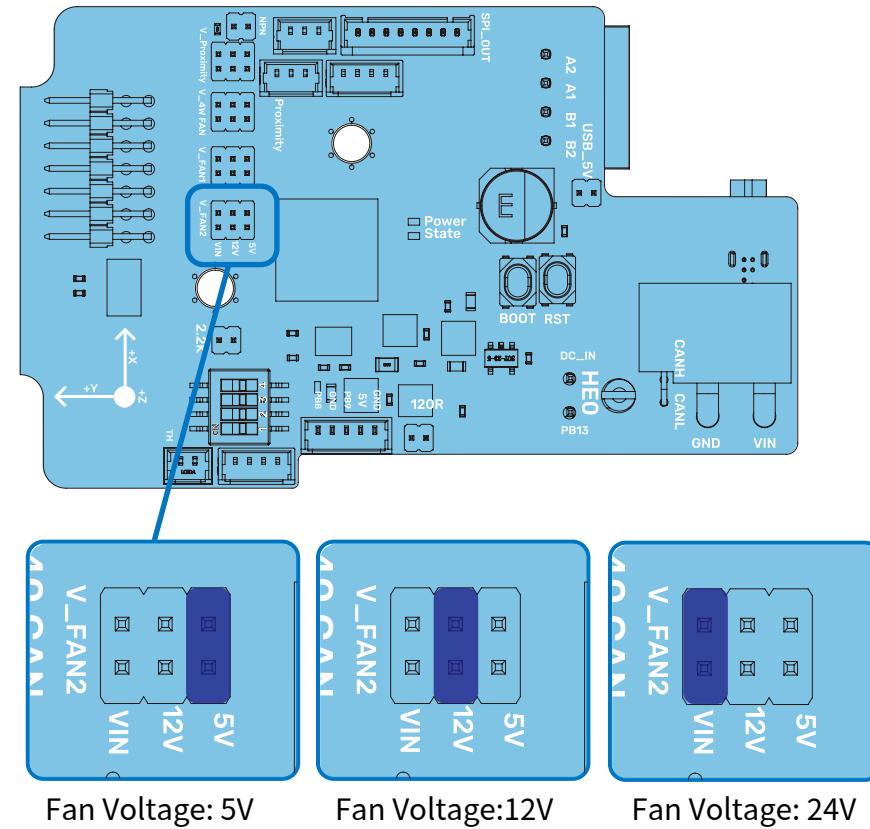
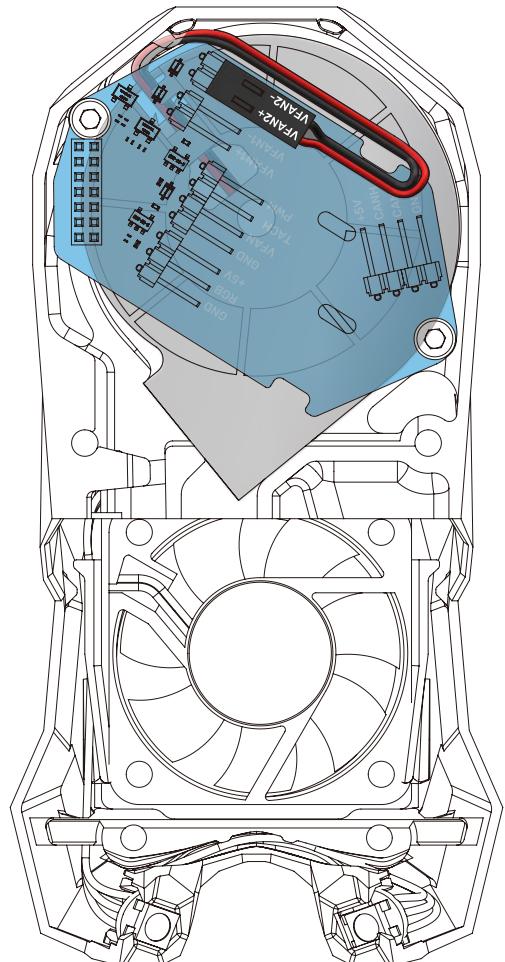
WIRE TERMINAL

EBB SB0000 CAN v1.0 use 2.54 pitch DuPont connector.
Therefore, all fans and LED lights on StealthBurner Body
should be 2.54 pitch DuPont connector.



TIPS

Install 5015 turbine fan, 4010 axial fan, and LED lamp before installing EBB SB0000 CAN v1.0.



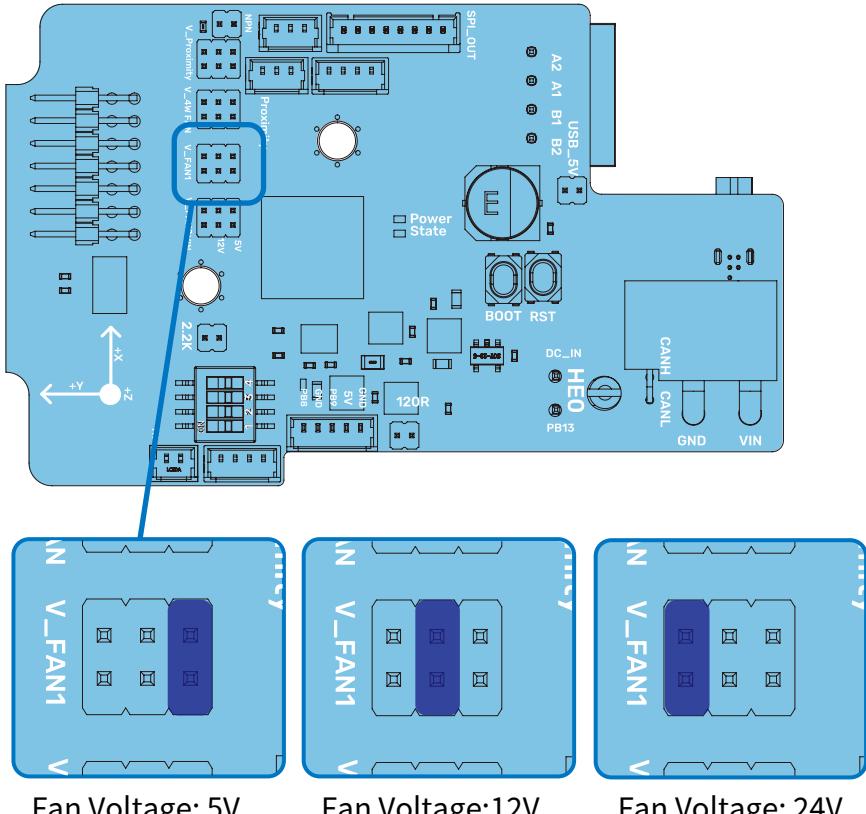
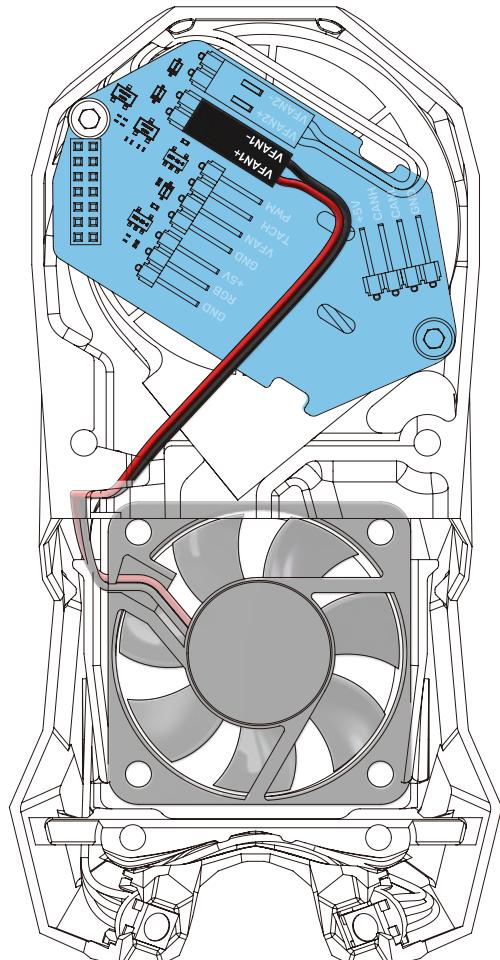
Fan Voltage: 5V

Fan Voltage: 12V

Fan Voltage: 24V

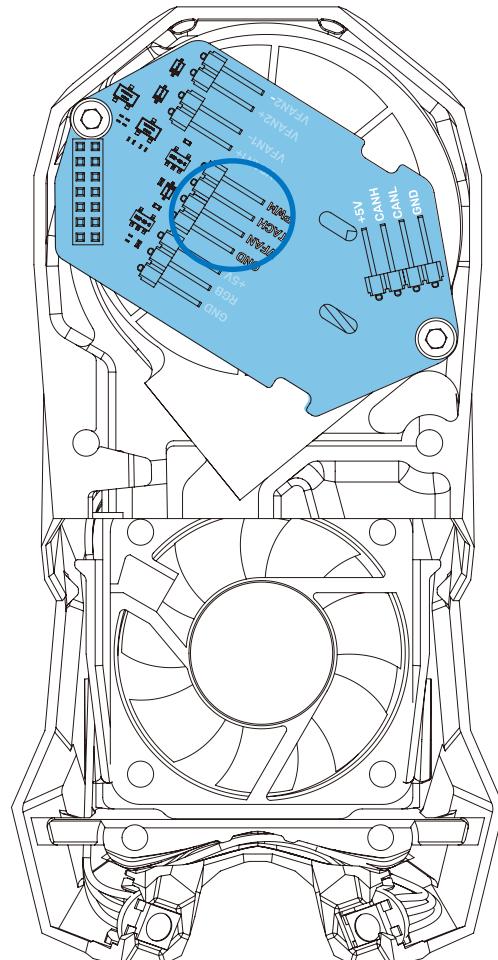
FANVOLTAGE

All fans on the EBB SB0000 CAN v1.0 support multi voltage selection, as shown in the figure, and jumper caps are inserted or removed according to the actual voltage used.



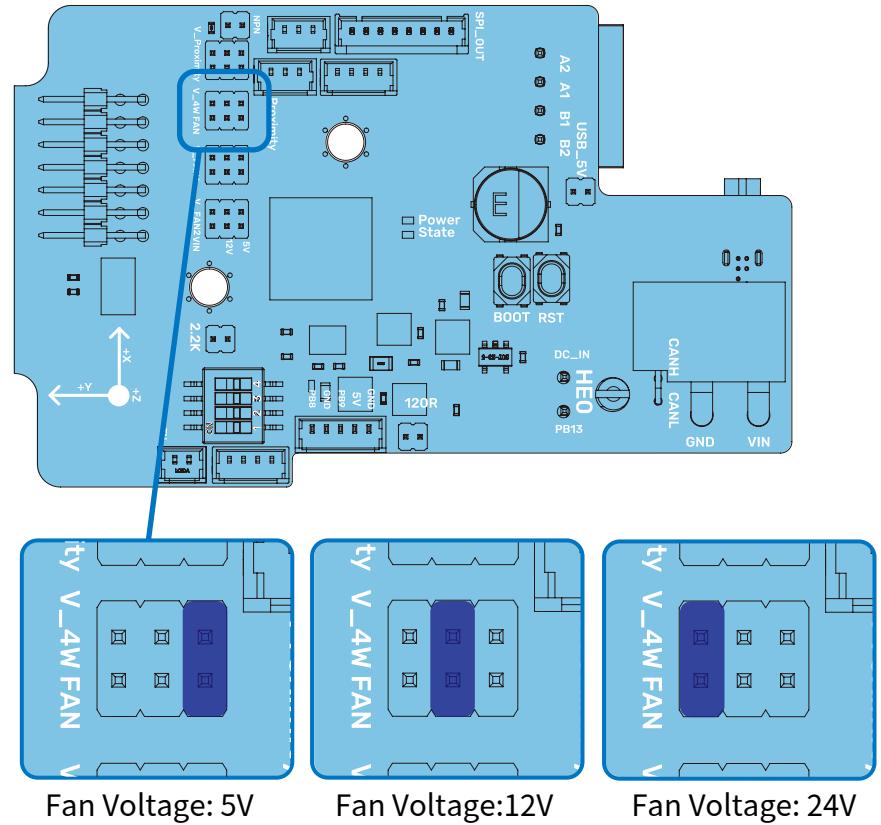
FANVOLTAGE

All fans on the EBB SB0000 CAN v1.0 support multi voltage selection, as shown in the figure, and jumper caps are inserted or removed according to the actual voltage used.



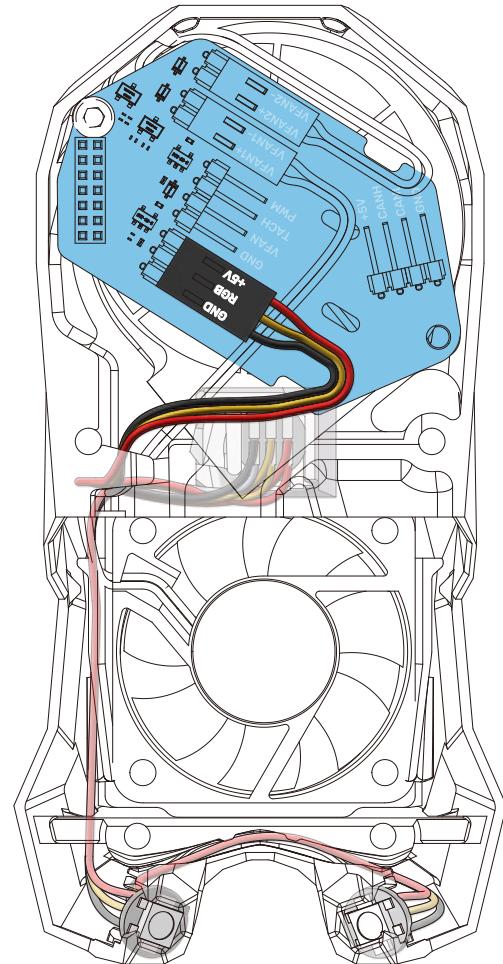
PWM FAN

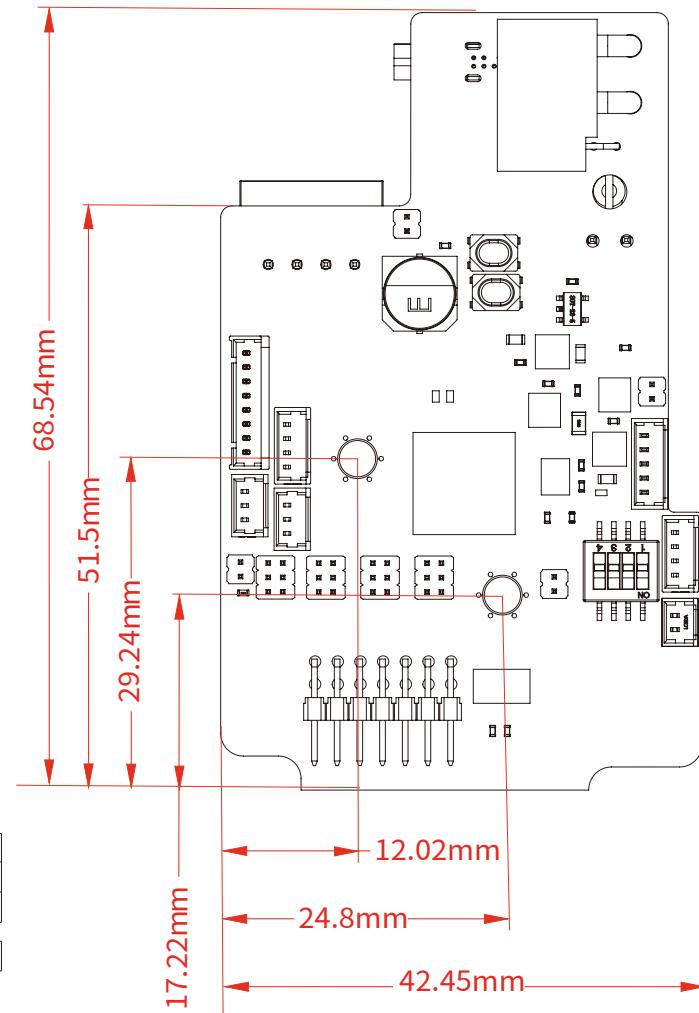
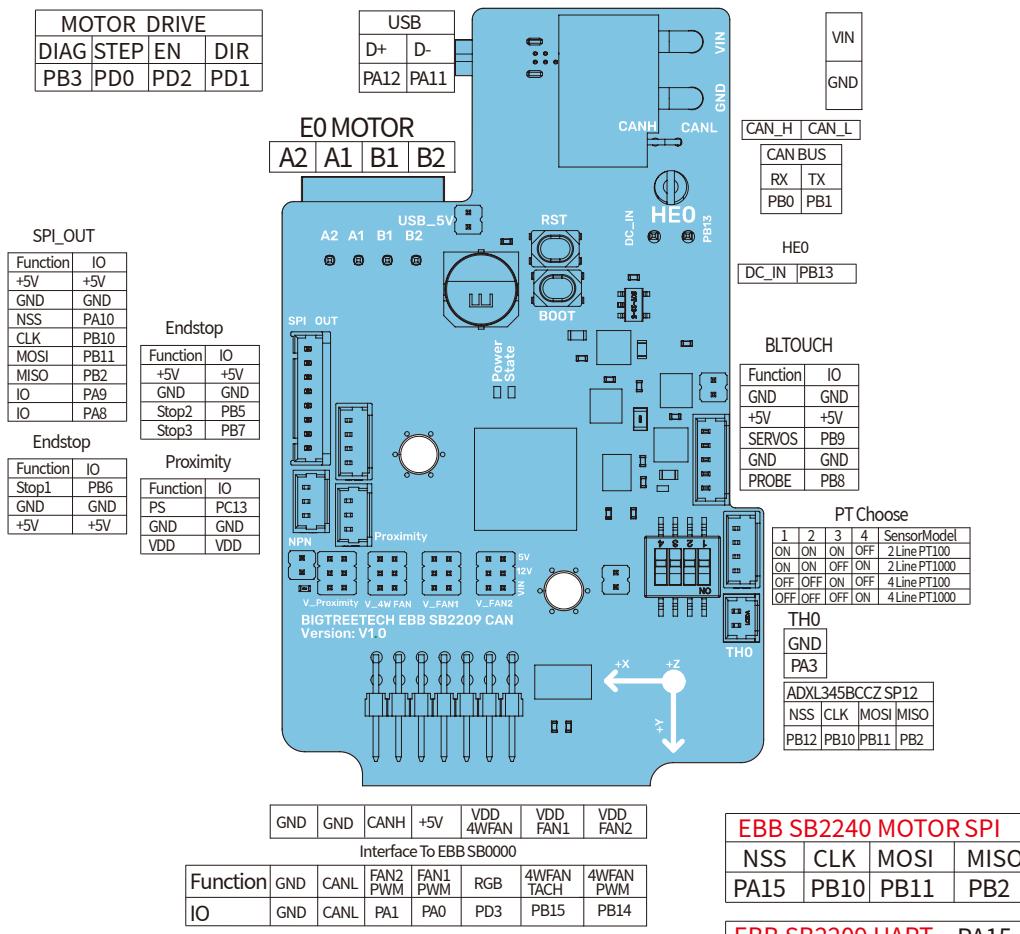
You can also use PWM fan on EBB SB0000 CAN v1.0. As shown in the figure, it contains a 4 pins PWM fan header (2.54 pitch and 4 pins DuPont connector).



FAN VOLTAGE

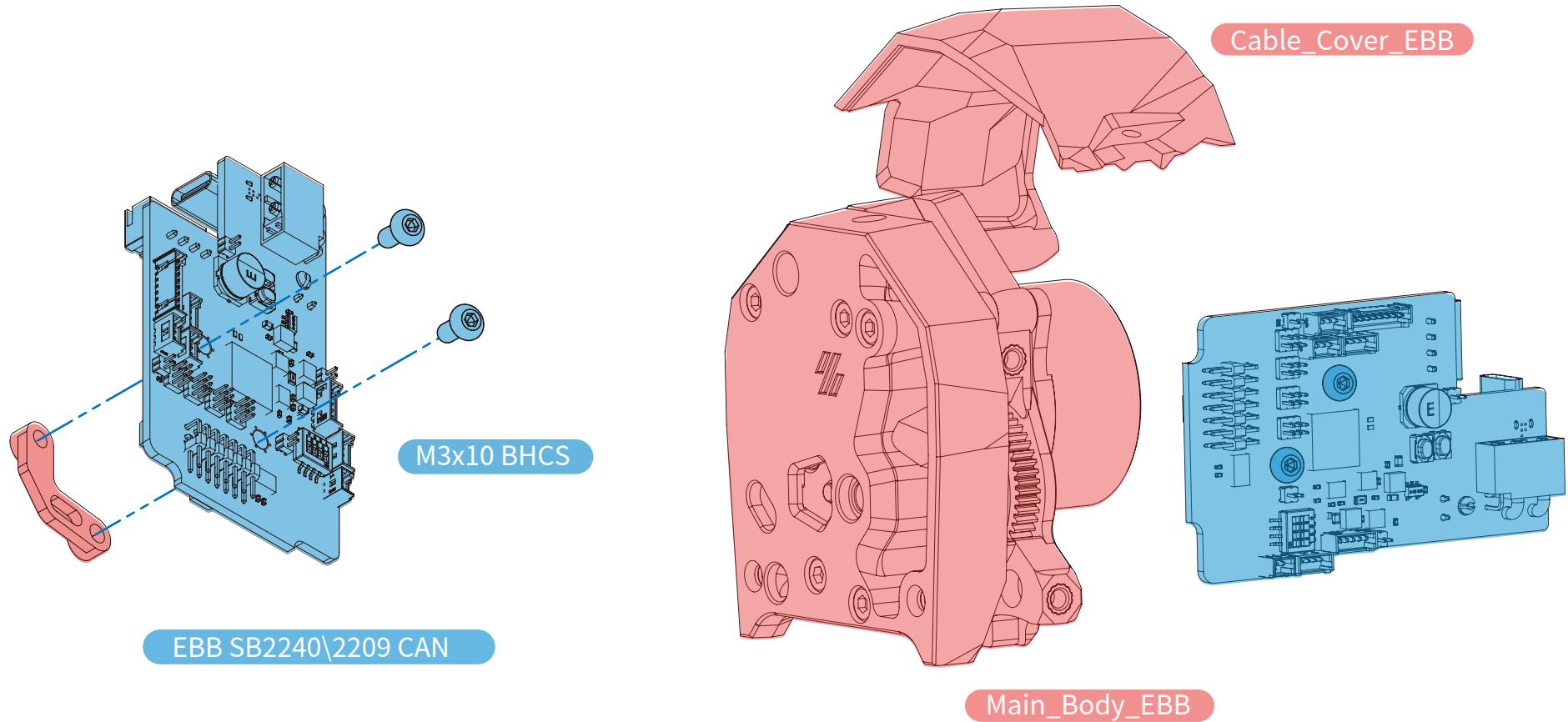
All fans on the EBB SB0000 CAN v1.0 support multi voltage selection, as shown in the figure, and jumper caps are inserted or removed according to the actual voltage used.





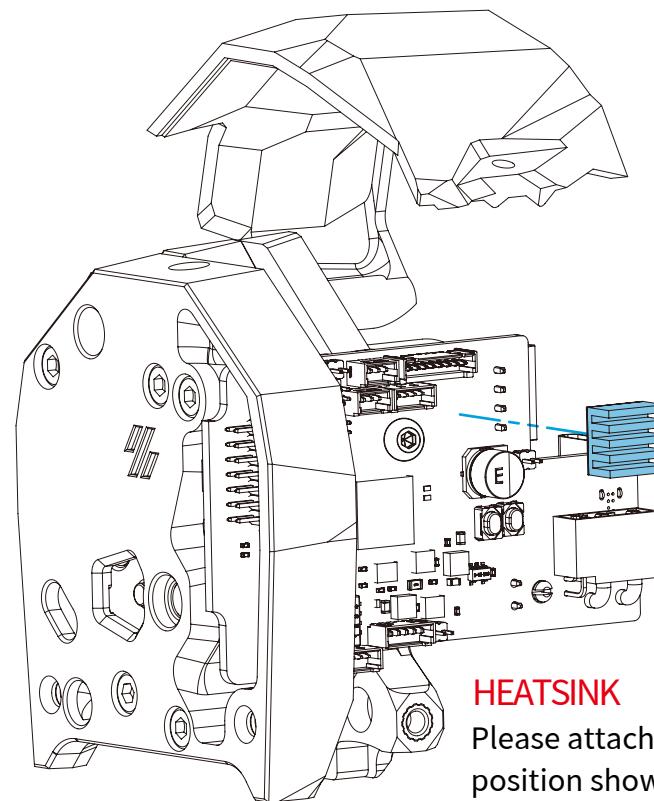
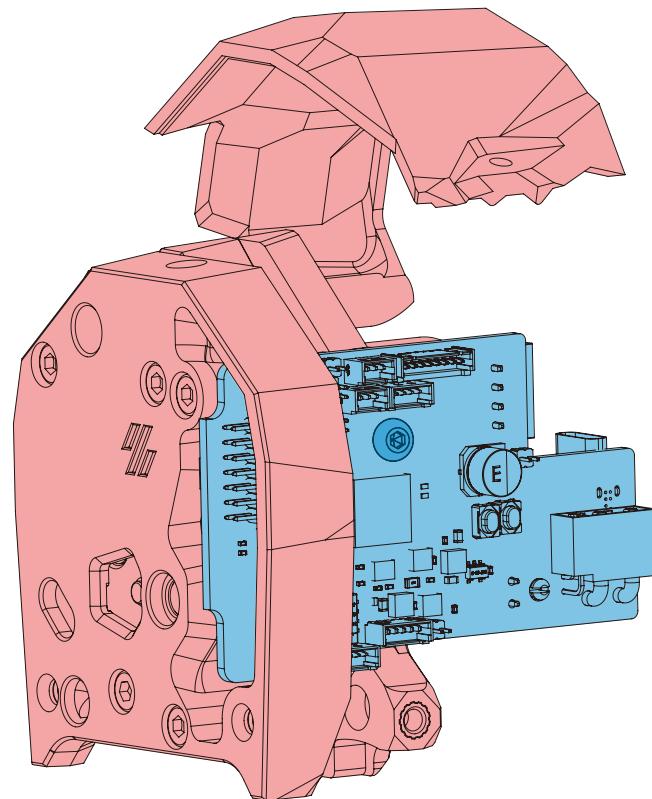
MOTOR DRIVE

The EBB SB2240 CAN uses SPI mode, whereas the EBB SB2209 CAN uses UART.



TIPS

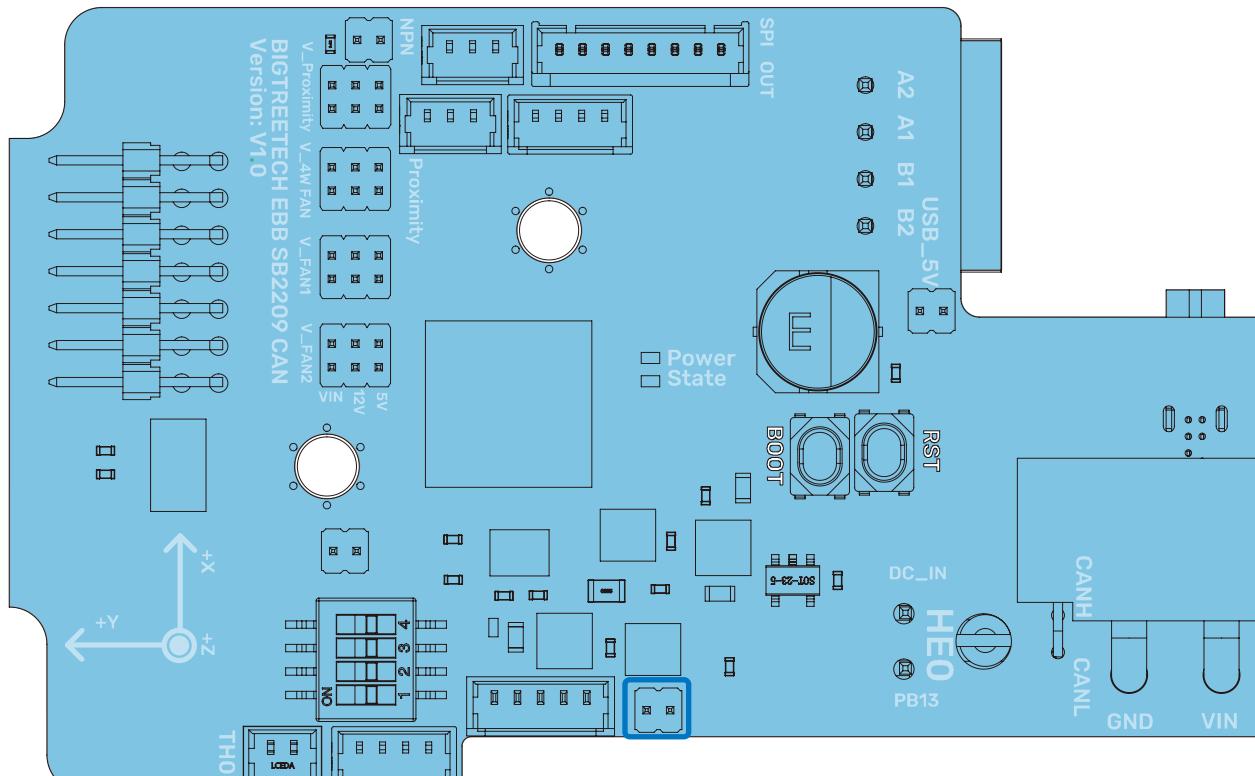
The Cable_Cover_EBB and Main_Body_EBB are modified from official VORON prints to be compatible, but have slight differences to facilitate easier wiring.



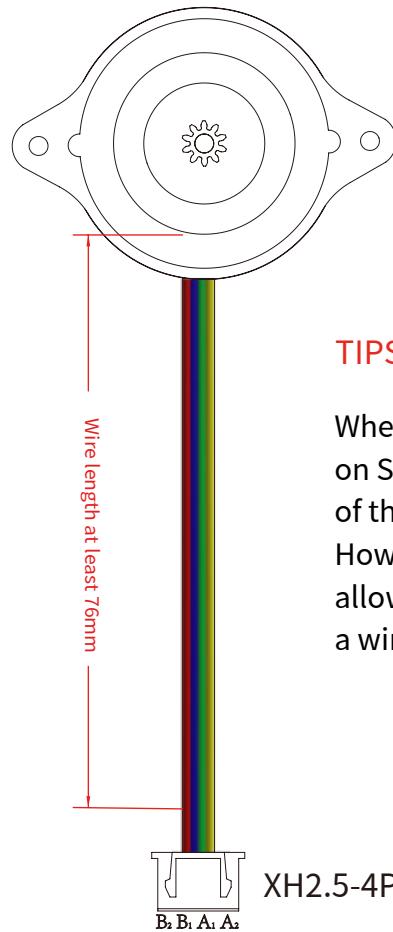
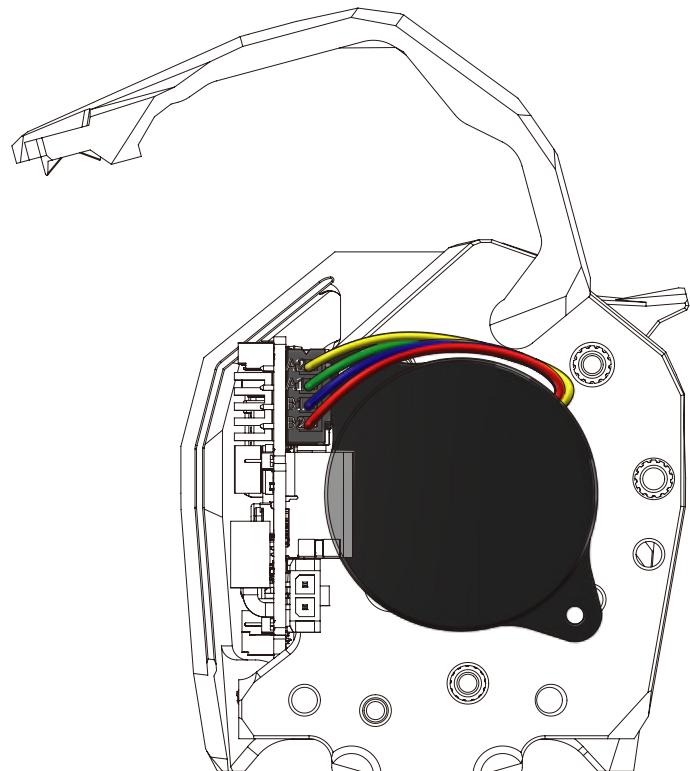
HEATSINK

Please attach the heatsink to the position shown in the diagram, which is on the back of the driver chip. It is crucial to avoid contacting the connector pins of the motor when installing the heatsink.

When the EBB SB2240/2209 CAN device uses CAN bus communication, if it is the final device in the CAN bus chain, you must plug a jumper at the 120R position.

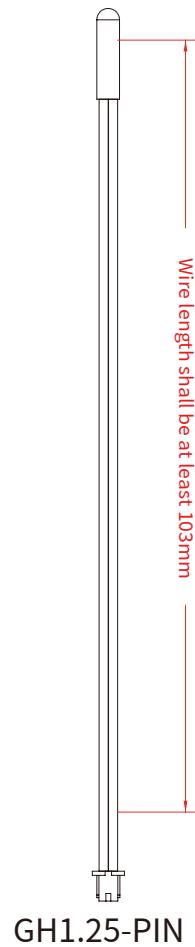
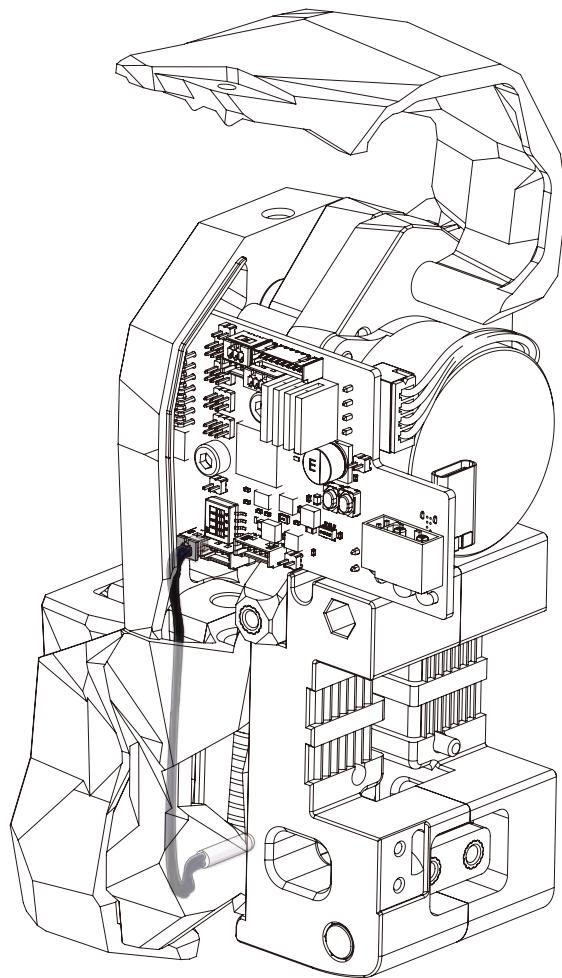


120R Termination Resistor



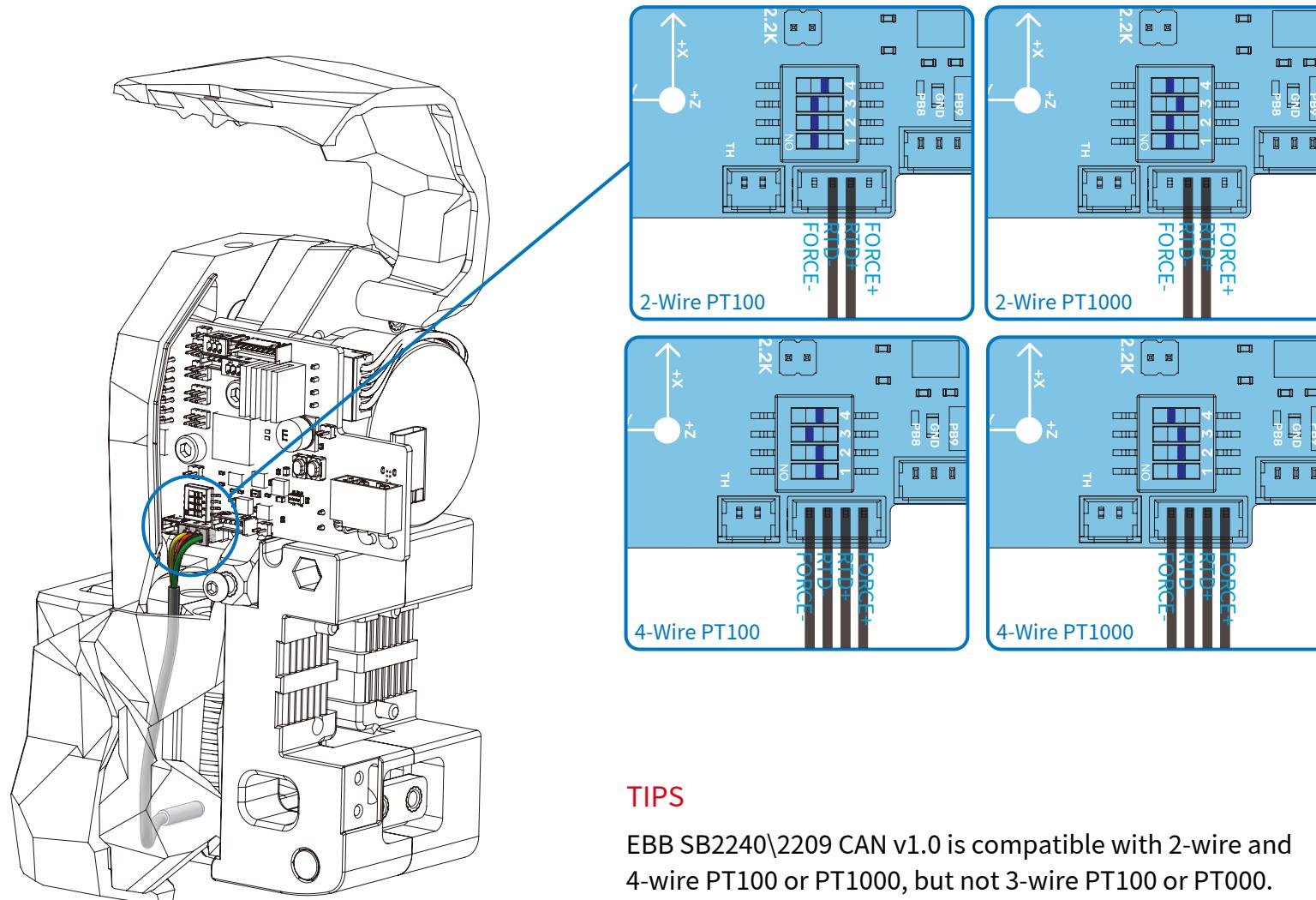
TIPS

When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the motor is 76mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 100mm or 110mm.



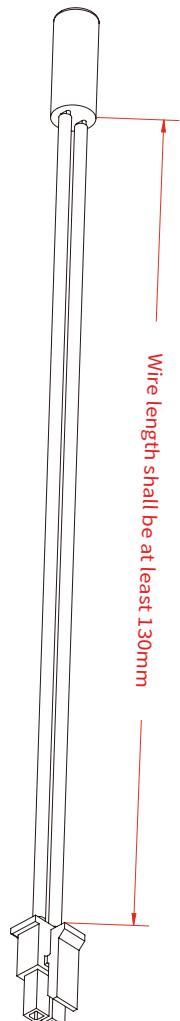
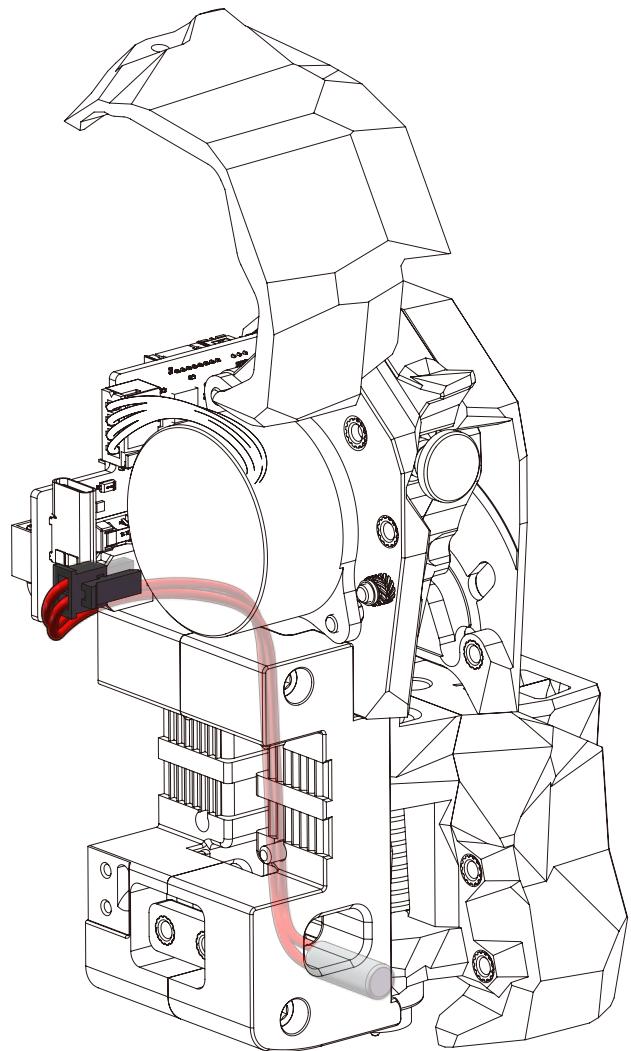
TIPS

When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the thermistor is 103mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 120mm or 130mm.



TIPS

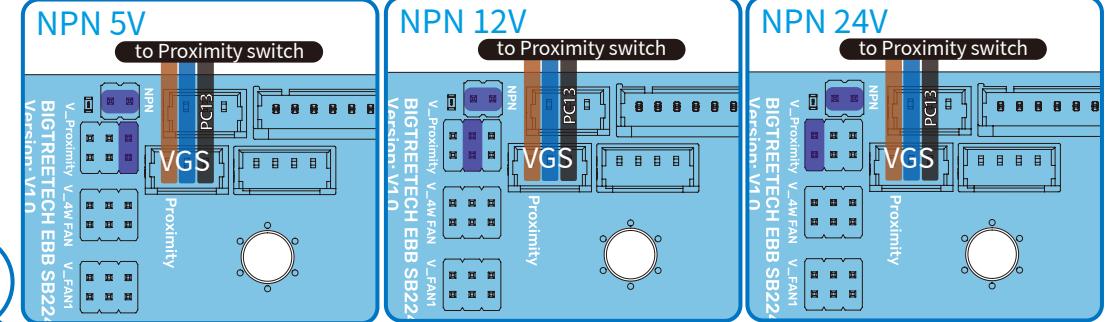
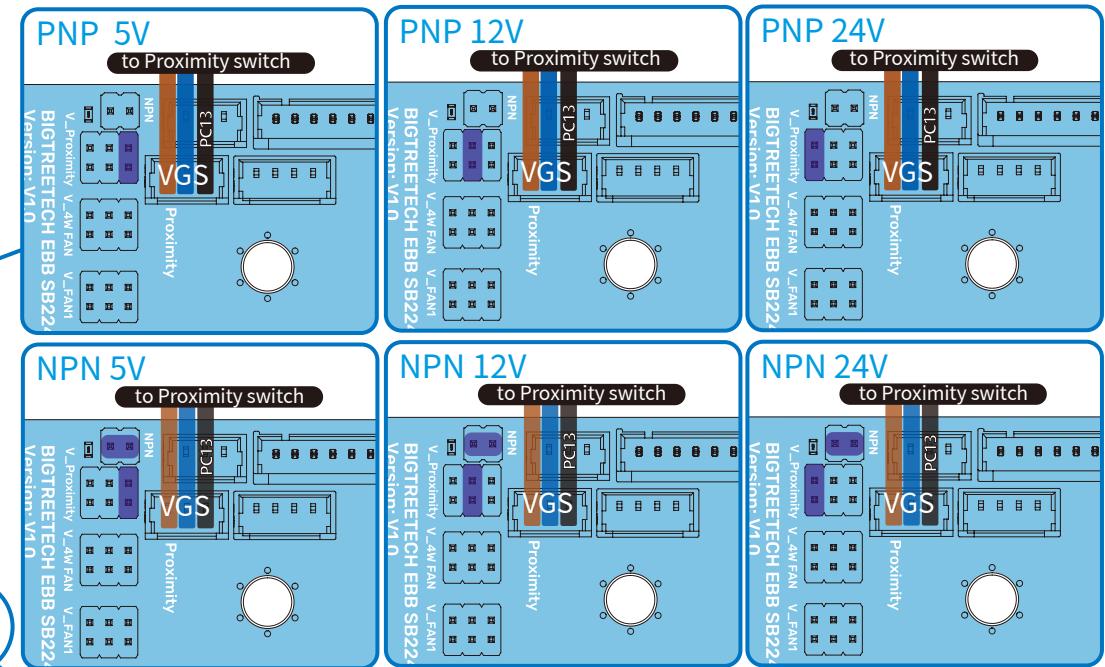
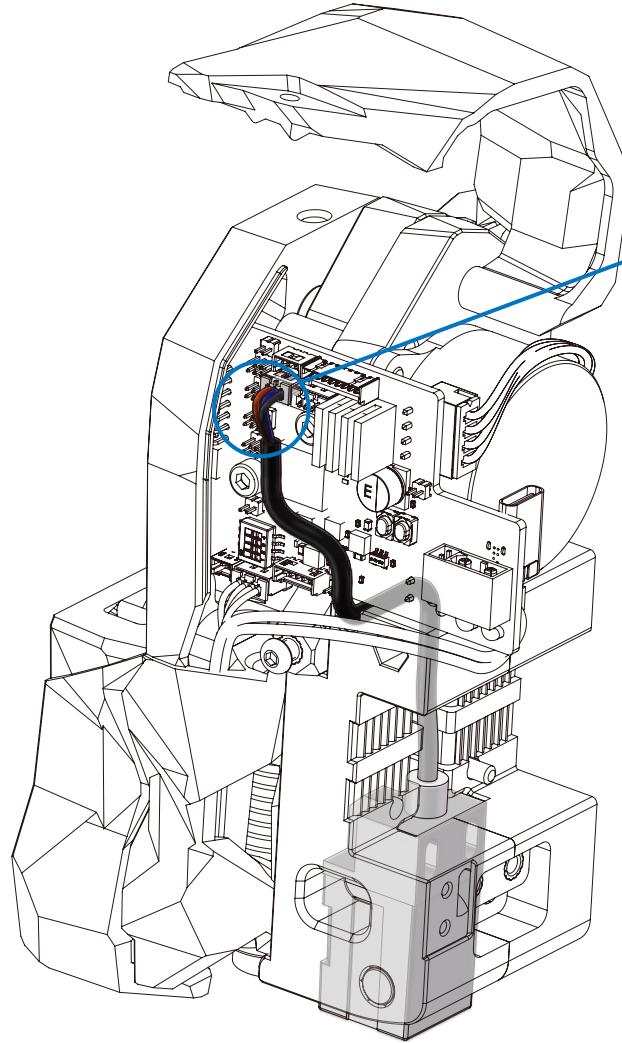
EBB SB2240\2209 CAN v1.0 is compatible with 2-wire and 4-wire PT100 or PT1000, but not 3-wire PT100 or PT000. As shown in the figure, wire and adjust the dial switch according to the actual model. And the terminals are GH1.25.



MX3.0-2PIN

TIPS

When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the heater cartridge is 130mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 150mm or 160mm.

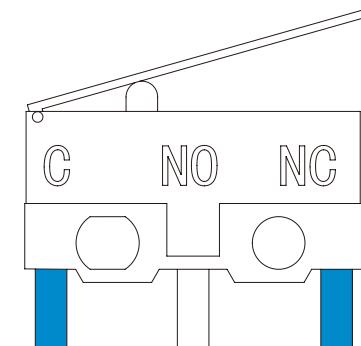
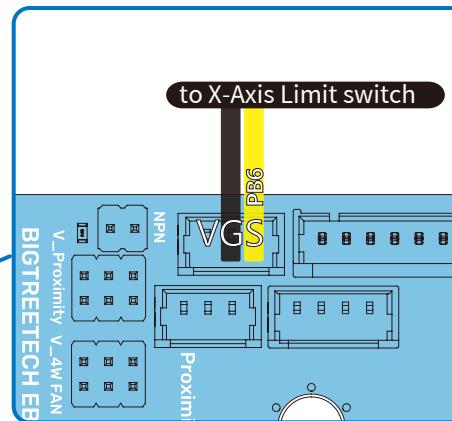
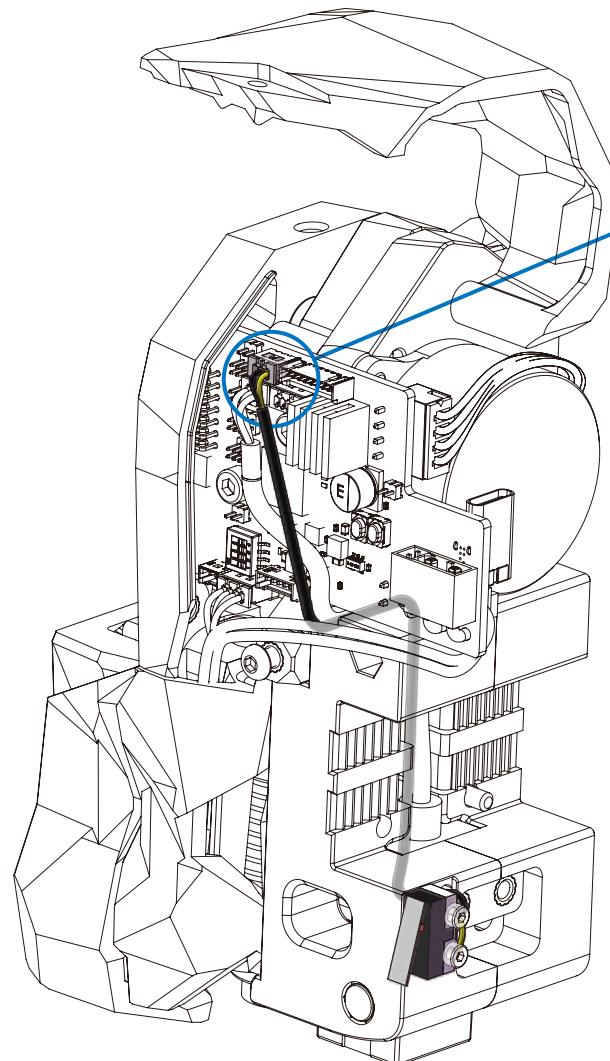


PROXIMITY SWITCH

The proximity switch is divided into PNP and NPN and has various voltages. As shown in the figure, the jumper cap is inserted or removed at the corresponding position according to the actual model.

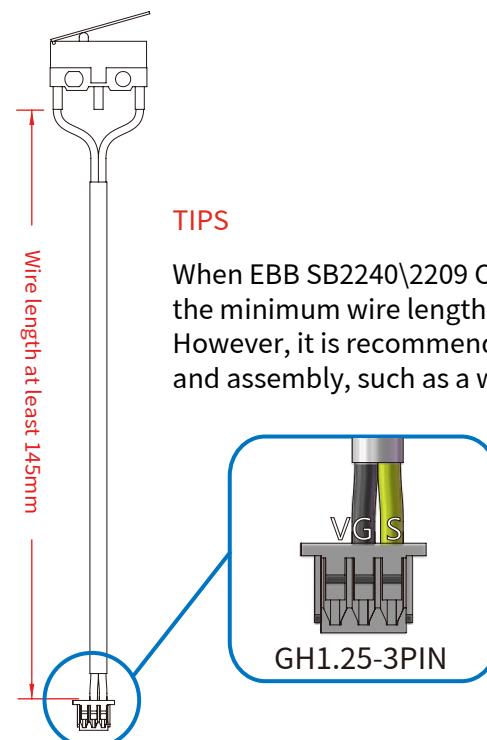
TIPS

When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the PL-08N is 100mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 130mm or 140mm.



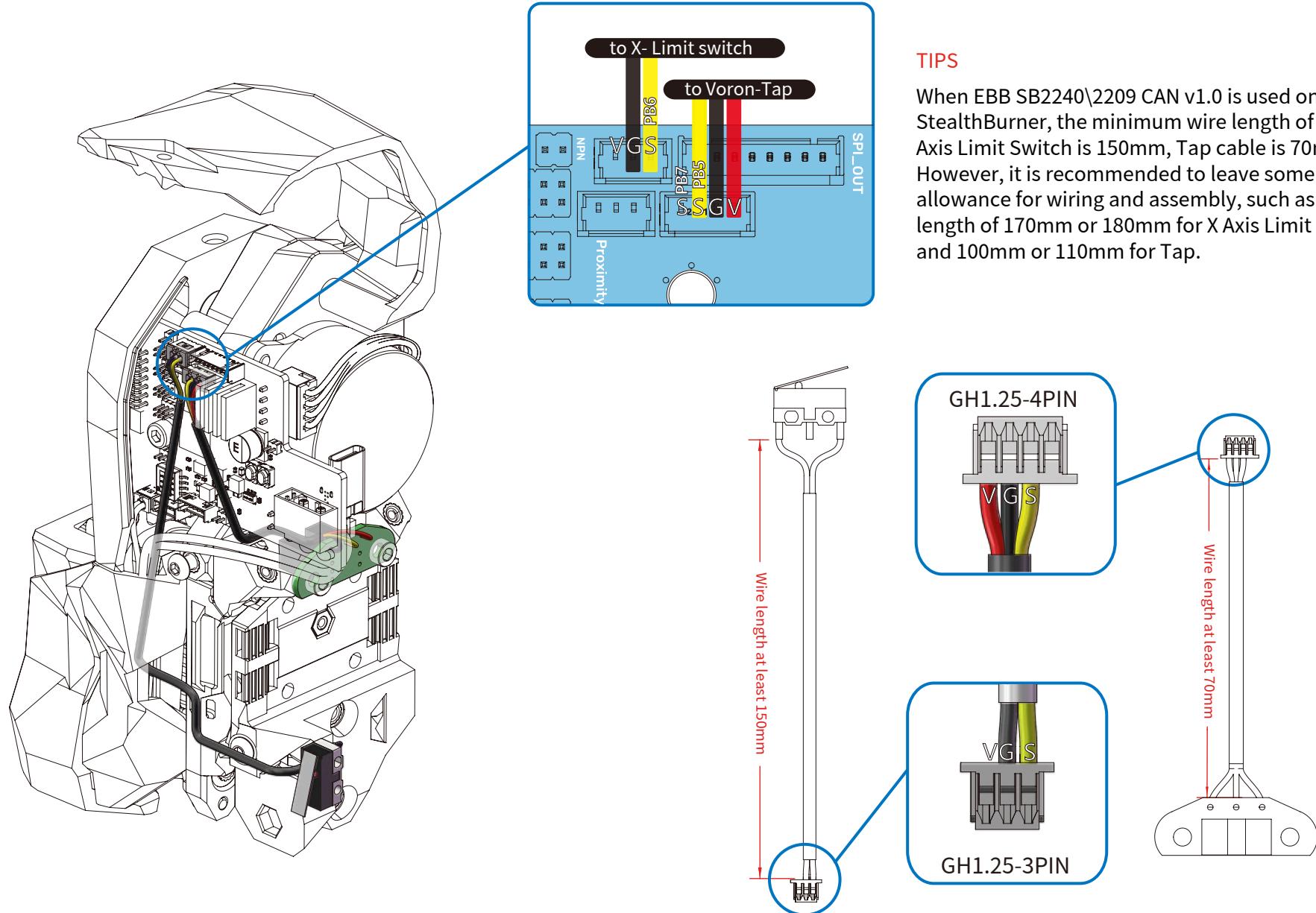
END-STOP SWITCHES FOR X

End-stops are wired in a "Normally Closed" configuration. On microswitches those are the 2 outer terminals indicated by C and NC.



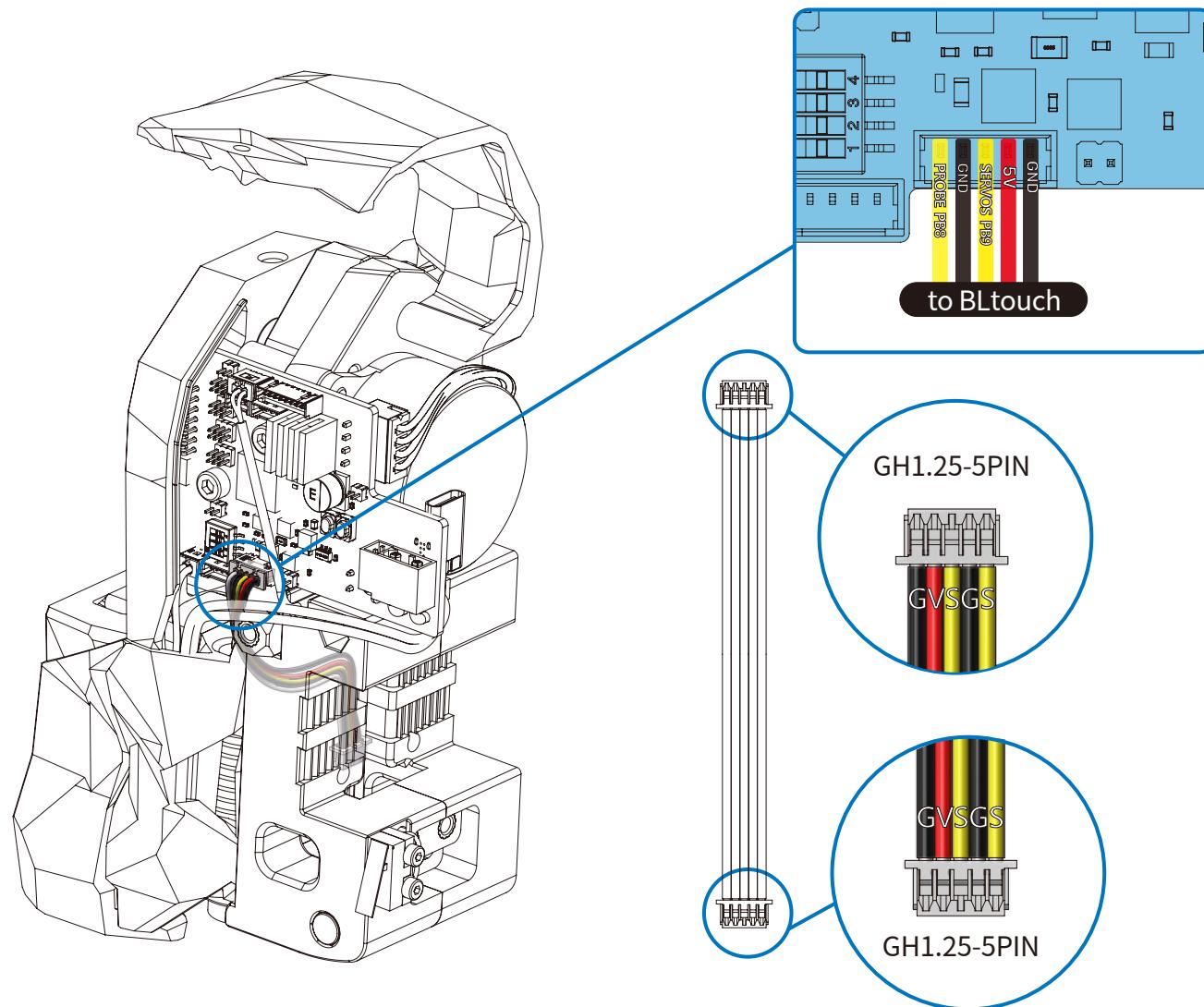
TIPS

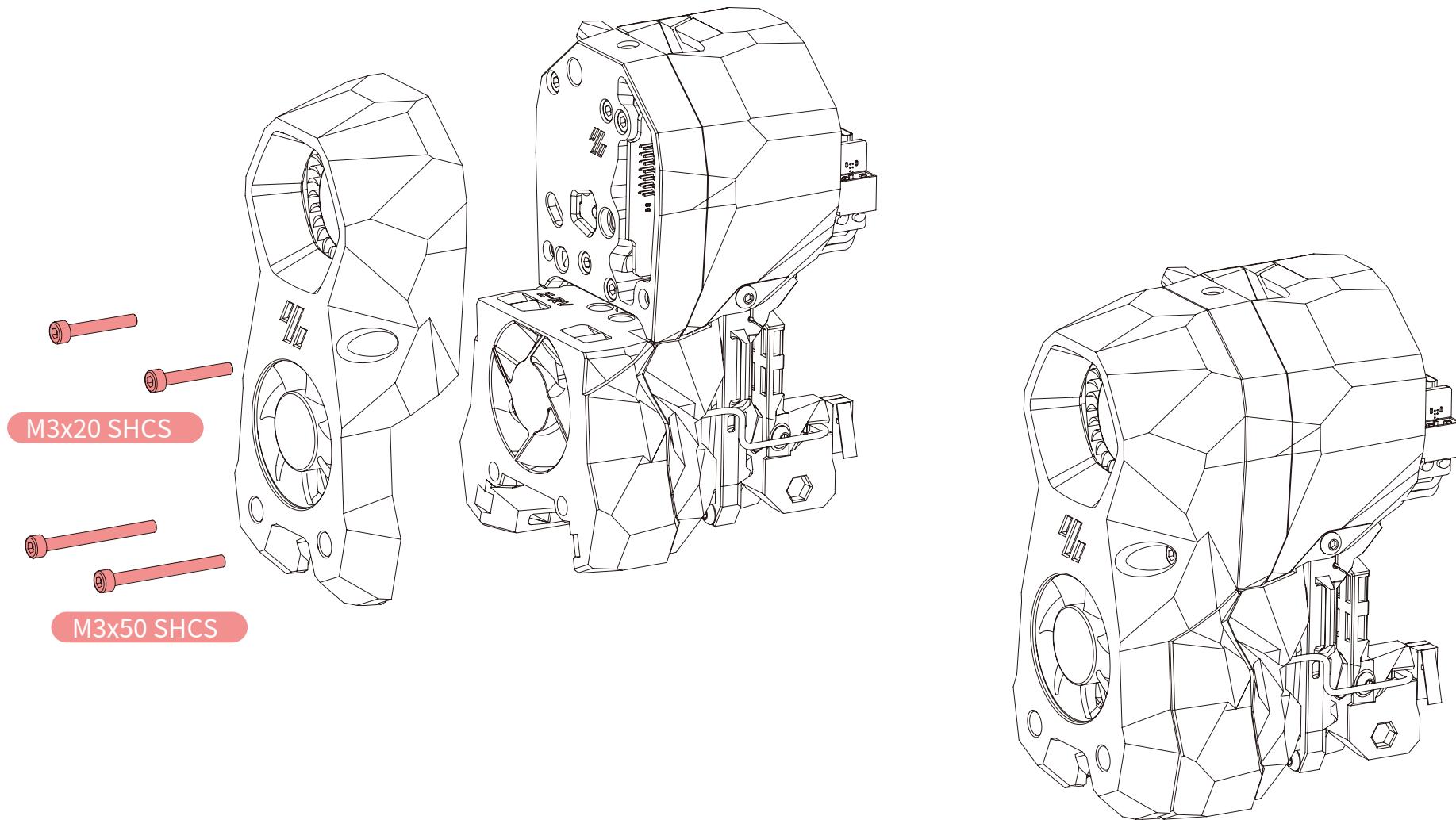
When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the X Axis Limit Switch is 145mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 165mm or 175mm.

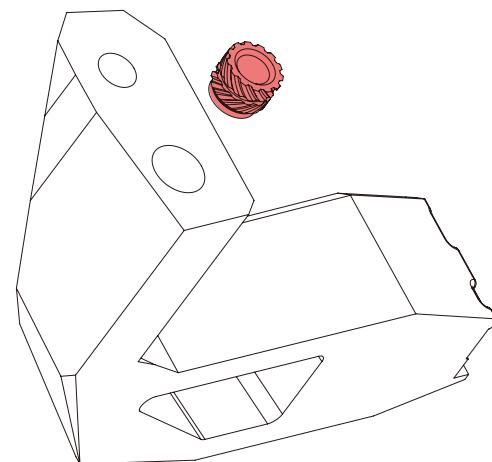
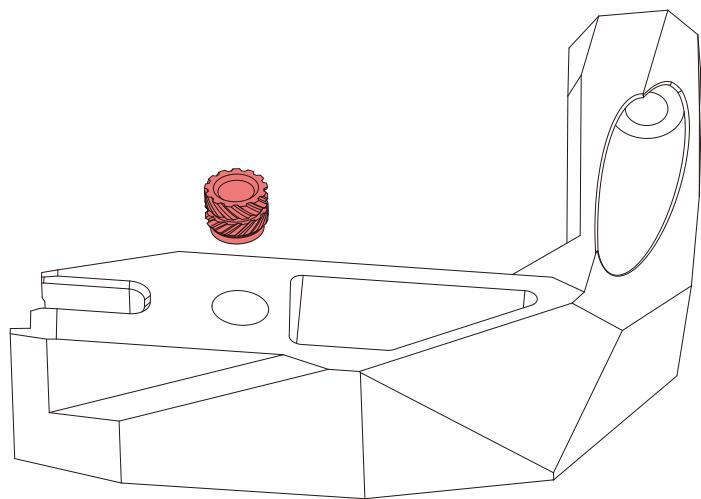


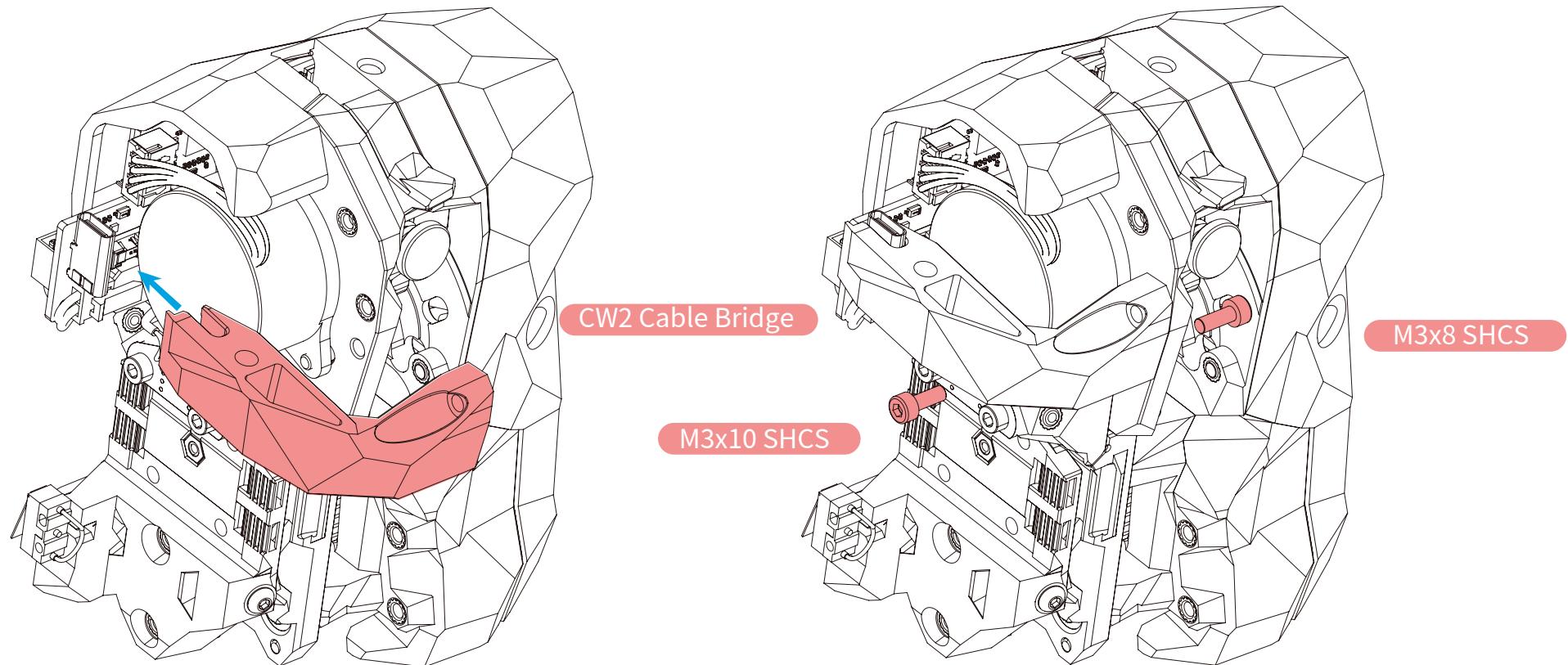
TIPS

When EBB SB2240\2209 CAN v1.0 is used on StealthBurner, the minimum wire length of the X Axis Limit Switch is 150mm, Tap cable is 70mm. However, it is recommended to leave some allowance for wiring and assembly, such as a wire length of 170mm or 180mm for X Axis Limit Switch and 100mm or 110mm for Tap.



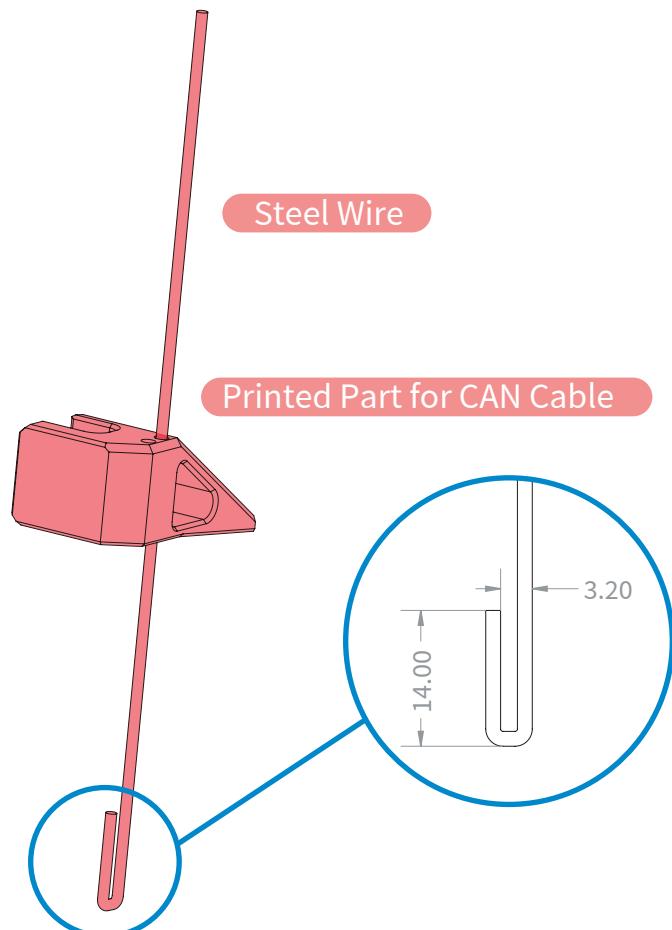






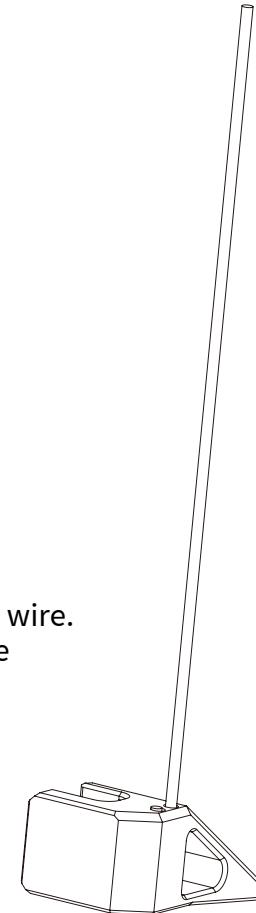
TIPS

The CW2 Cable Bridge differs slightly from the original CW version and is available for download on BIGTREETECH's GitHub in the EBB\EBB SB2240_2209 CAN\CAD or STL folders.



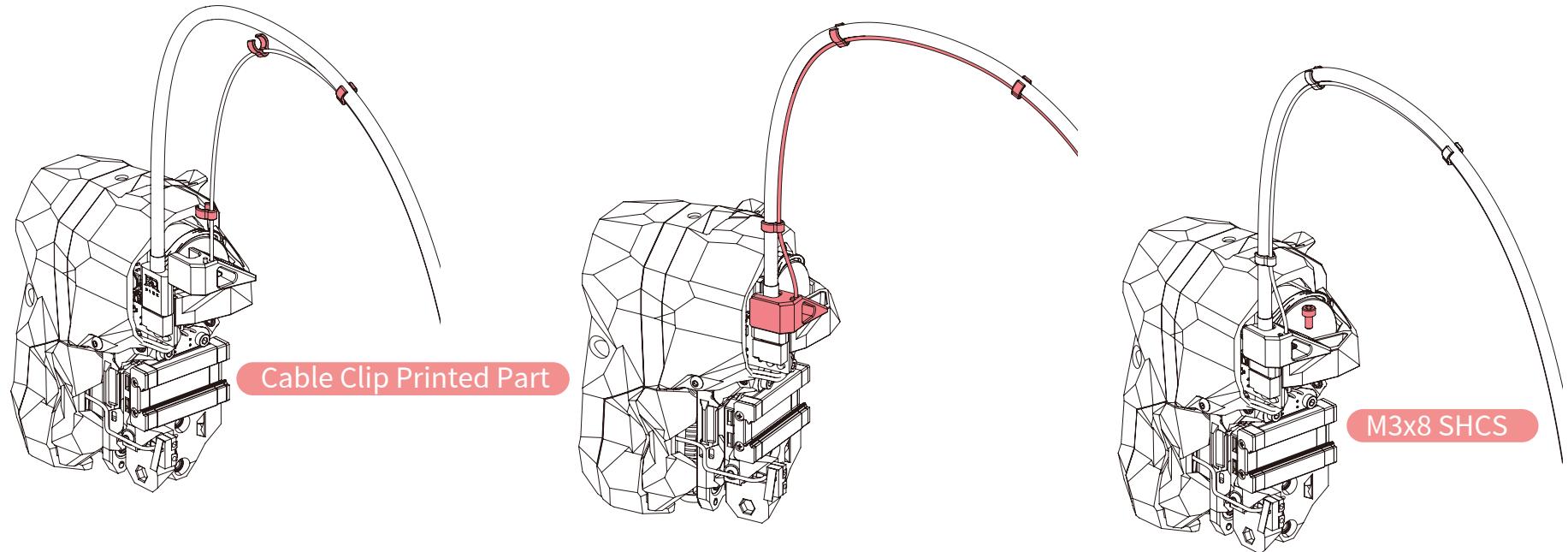
STEEL WIRE

Use 1mm diameter steel wire.
Length should match the
machine, generally 1m.



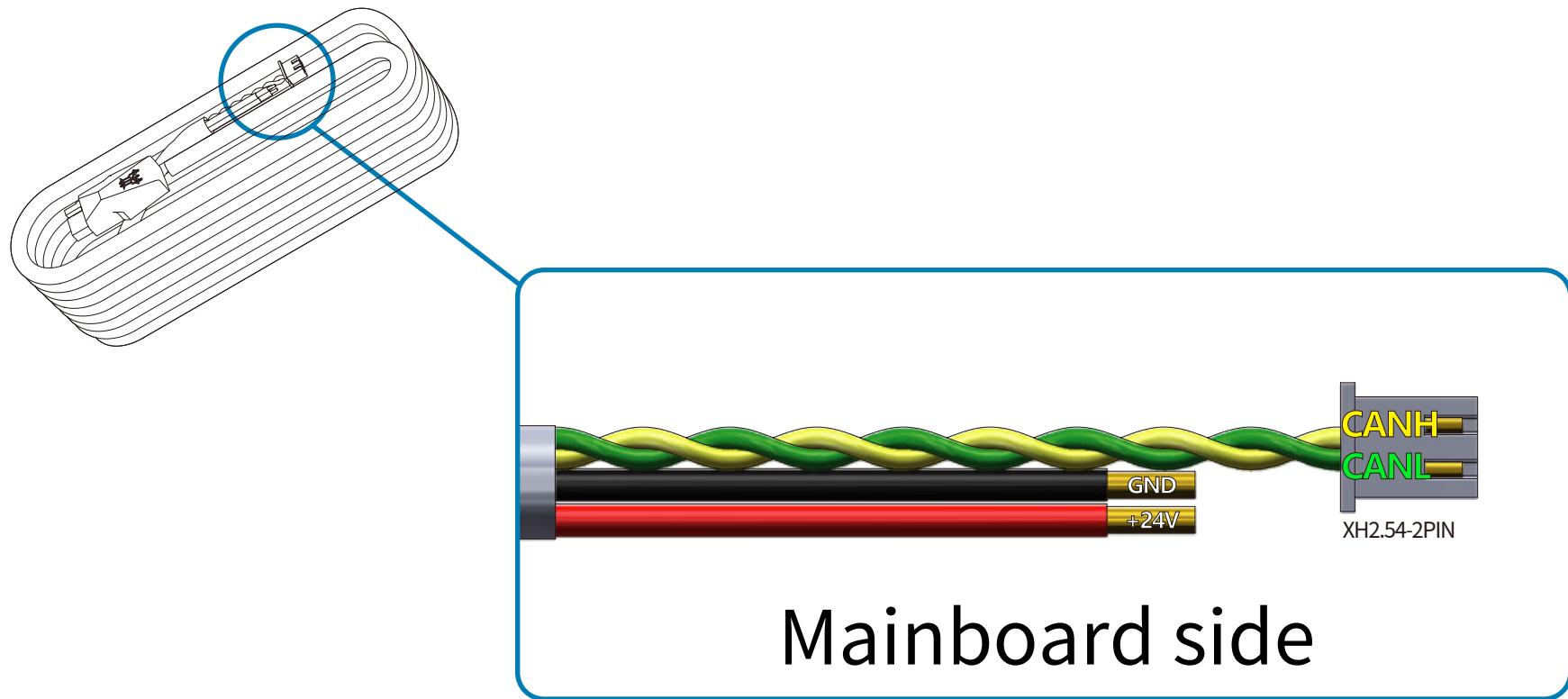
TIPS

The Printed Part for CAN Cable and Printed Part for USB-C Cable are custom-printed parts, available for download on BIGTREETECH's GitHub in the EBB\EBB SB2240_2209 CAN\CAD or STL folders.



CABLE CLIP

The Cable Clip Printed Part is a custom-printed part, available for download on BIGTREETECH's GitHub in the EBB\EBB SB2240_2209 CAN\CAD or STL folders. Alternatively, zip ties can also be used to secure the cables.



Note: "Katapult" is the New Name for "CanBoot"

Please note that Katapult is designed for the purpose of directly updating the MCU firmware via the CAN bus interface. If you prefer the DFU update method, you may skip this step.

“Flashing Katapult on a CB1/Raspberry Pi”

Refer to the instructions here to download the Katapult project

<https://github.com/Arksine/Katapult>

1.Run:

```
cd ~
```

to enter the home directory, then run:

```
git clone https://github.com/Arksine/Katapult
```

to download Katapult project.

run:

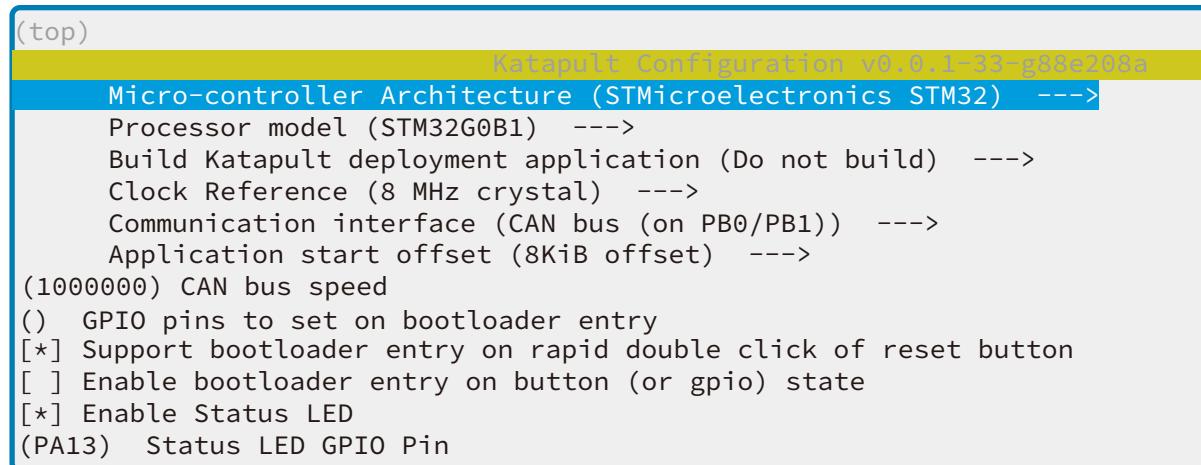
```
cd Katapult
```

to enter the Katapult directory.

2.Run:

```
make menuconfig
```

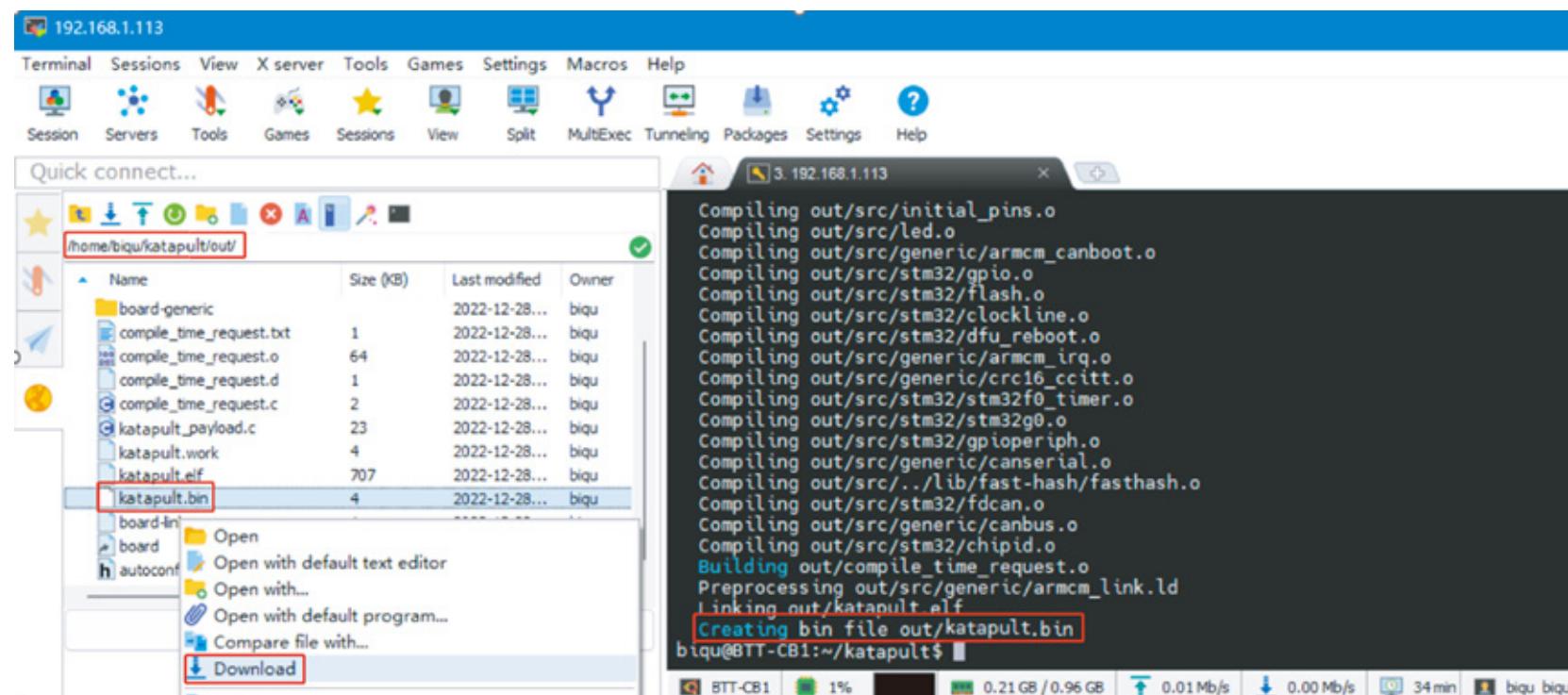
and configure according to the following figure



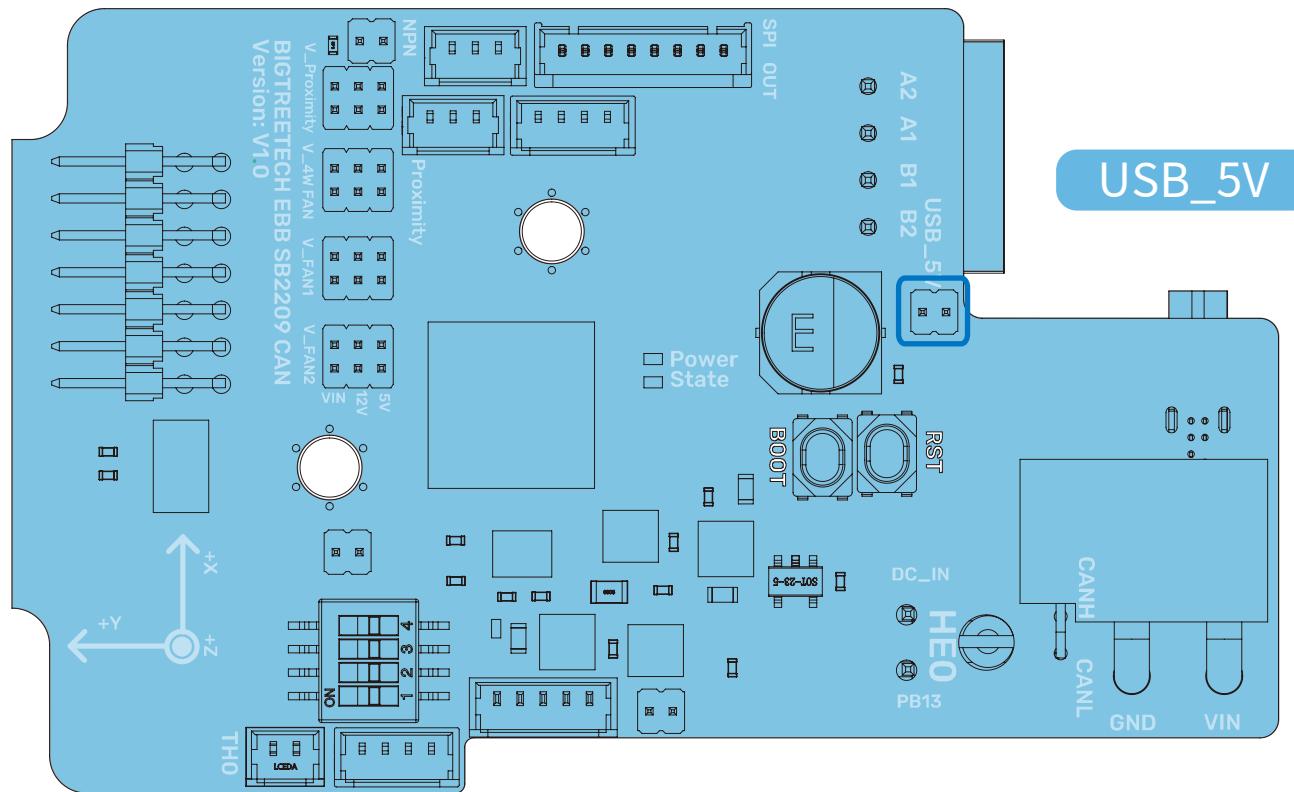
3.Run

make

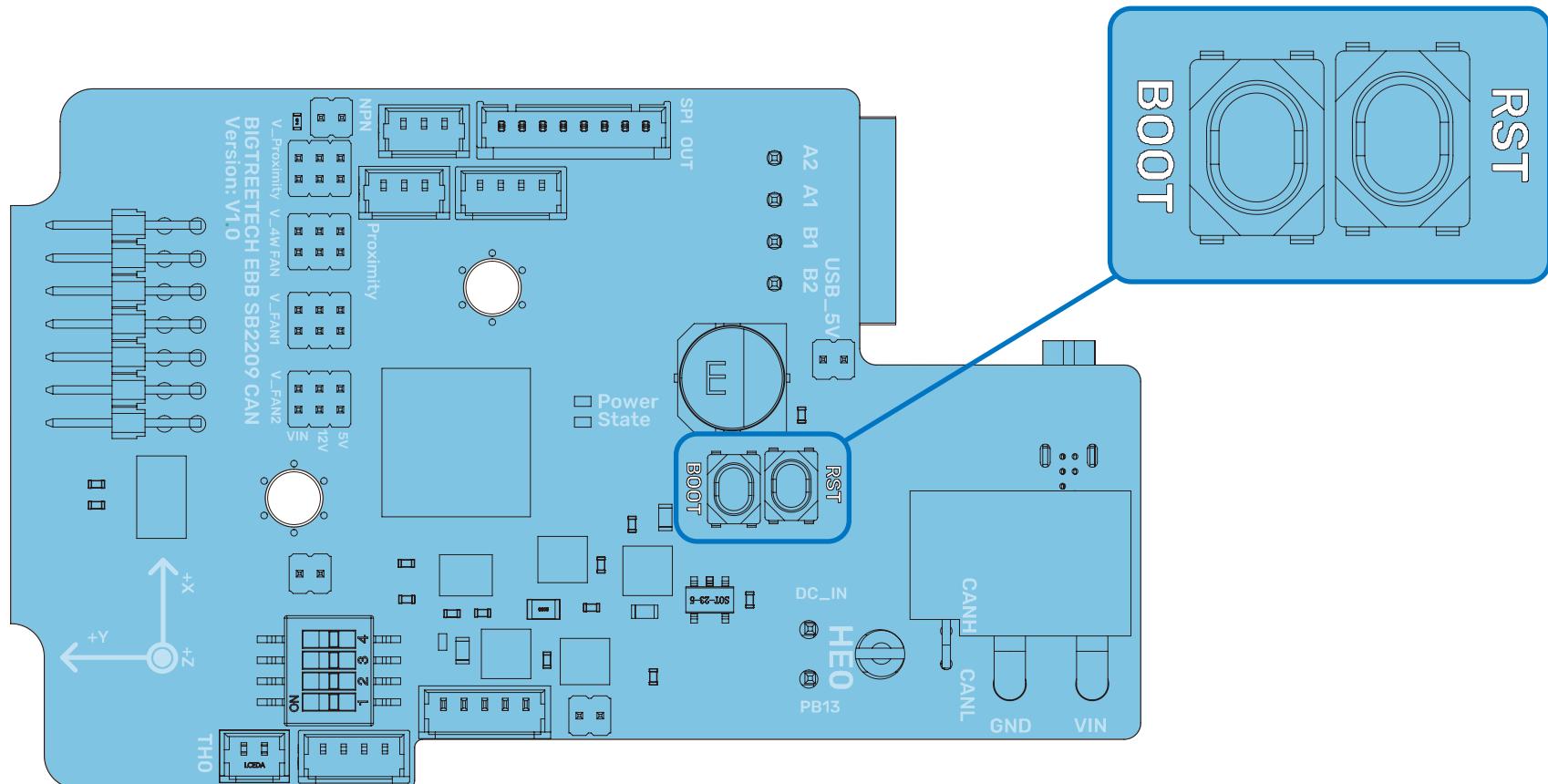
to compile firmware, 'katapult.bin' file will be generated in `home/biqu/Katapult/out` folder when `make` is finished, download it onto your computer using the SSH application.



4.1 Please use a Type-C cable to connect the EBB SB2240/2209 CAN to the Raspberry Pi/CB1, and ensure that the USB_5V jumper is connected, in order to supply power to the EBB SB2240/2209 CAN via Type-C.



4.2. Press and hold the Boot button, and then click the Reset button to enter the DFU mode.



4.3. Enter in the SSH terminal command line

```
lsusb
```

Query DFU device ID

```
pi@fluiddpi:~ $ lsusb
Bus 001 Device 005: ID 0483:df11 STMicroelectronics STM Device in DFU Mode
Bus 001 Device 004: ID 1d50:6061 OpenMoko, Inc. Geschwister Schneider CAN adapter
Bus 001 Device 003: ID 0424:0c00 Microchip Technology, Inc. (formerly SMSC) SMC9512/9514 Fast Ethernet Adapter

Bus 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC) SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
pi@fluiddpi:~ $
```

4.4. Please enter the following command to flash Katapult:

```
sudo dfu-util -a 0 -d 0483:df11 -s 0x08000000:mass-erase:force -D ~/Katapult/out/katapult.bin
```

where "0483:df11" should be replaced with the actual device ID obtained in step 4.3.

4.5. After flashing is complete, remove the USB_5V jumper and the Type-C cable.

1.) After SSH is successfully connected to Raspberry Pi, run

```
cd ~/klipper/
make menuconfig
```

Compile the firmware with the following configuration (if the options below are not available, please update your Klipper source code to the newest version).

[*] Enable extra low-level configuration options

Micro-controller Architecture (STMicroelectronics STM32) -->

Processor model (STM32G0B1) -->

If you do not use Katapult

Bootloader offset (No bootloader) -->

If Katapult is used

Bootloader offset (8KiB bootloader) -->

Clock Reference (8 MHz crystal) -->

If USB communication on Type-C is used

Communication interface (USB (on PA11/PA12)) -->

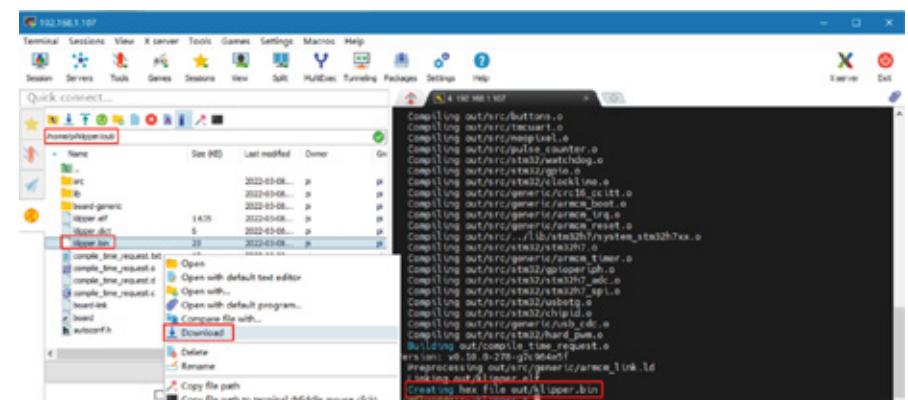
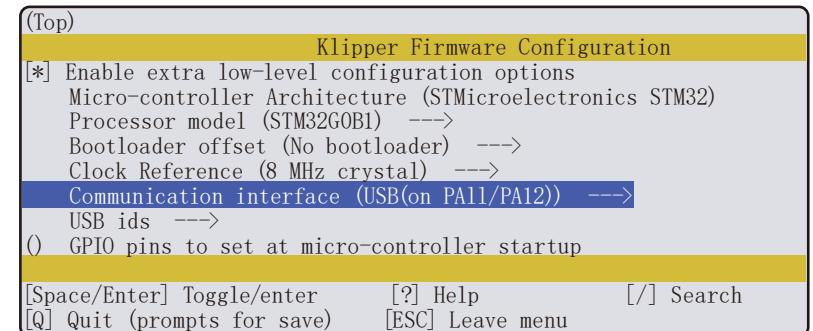
If CAN-Bus communication is used

Communication interface (CAN bus (on PB0/PB1)) -->

(1000000) CAN bus speed

2.) Press 'q' to exit, and "Yes" when asked to save the configuration.

3.) Run **make** to compile firmware, "klipper. bin" file will be generated in **home/pi/klipper/out** folder when **make** is finished, download it onto your computer using the SSH application.



1.To use the CAN bus, you need to connect the CAN bus cable and insert a jumper at the position of the 120R termination resistor.

2. Run:

```
cd ~/Katapult/scripts
```

then run:

```
python3 flash_can.py -i can0 -q
```

to query the canbus ID (connect the CAN cable and power it on in advance), as shown in the figure below, the UUID of the device has been found

```
biqu@BTT-CB1:~/Katapult/scripts$ python3 flash_can.py -i can0 -q
Resetting all bootloader node IDs...
Checking for katapult nodes
Detected UUID: be69315a613c, Application: Katapult
Query Complete
biqu@BTT-CB1:~/Katapult/scripts$
```

3. Run:

```
python3 flash_can.py -i can0 -f ~/klipper/out/klipper.bin -u be69315a613c
```

The be69315a613c is replaced with the actual UUID. Note: klipper.bin needs to be made in advance, and the application start offset of Katapult is 8KiB offset, so Klipper's menuconfig Bootloader offset should also be 8KiB bootloader, as shown in the following figure.

```
biqu@BTT-CB1:~/Katapult/scripts$ python3 flash_can.py -i can0 -f ~/klipper/out/klipper.bin -u be69315a61c
Sending bootloader jump command...
Resetting all bootloader node IDs...
Checking for katapult nodes...
Detected UUID: be69315a613c, Application:Katapult
Attempting to connect to bootloader
Katapult Connected
Protocol Version: 1.0.0
Block Size: 64 bytes
Application Start: 0x8002000
MCU type: stm32gb1xx
Verifying canbus connection
Flashing '/home/biqu/klipper/out/klipper.bin'...
[#####
]
Write complete: 13 pages
Verifying (block count = 414)...
[#####
]
Verification Complete: SHA = C3B1F96A8FCE706587BF4A9119D95D80465875A3
CAN Flash Success
```

4. Run:

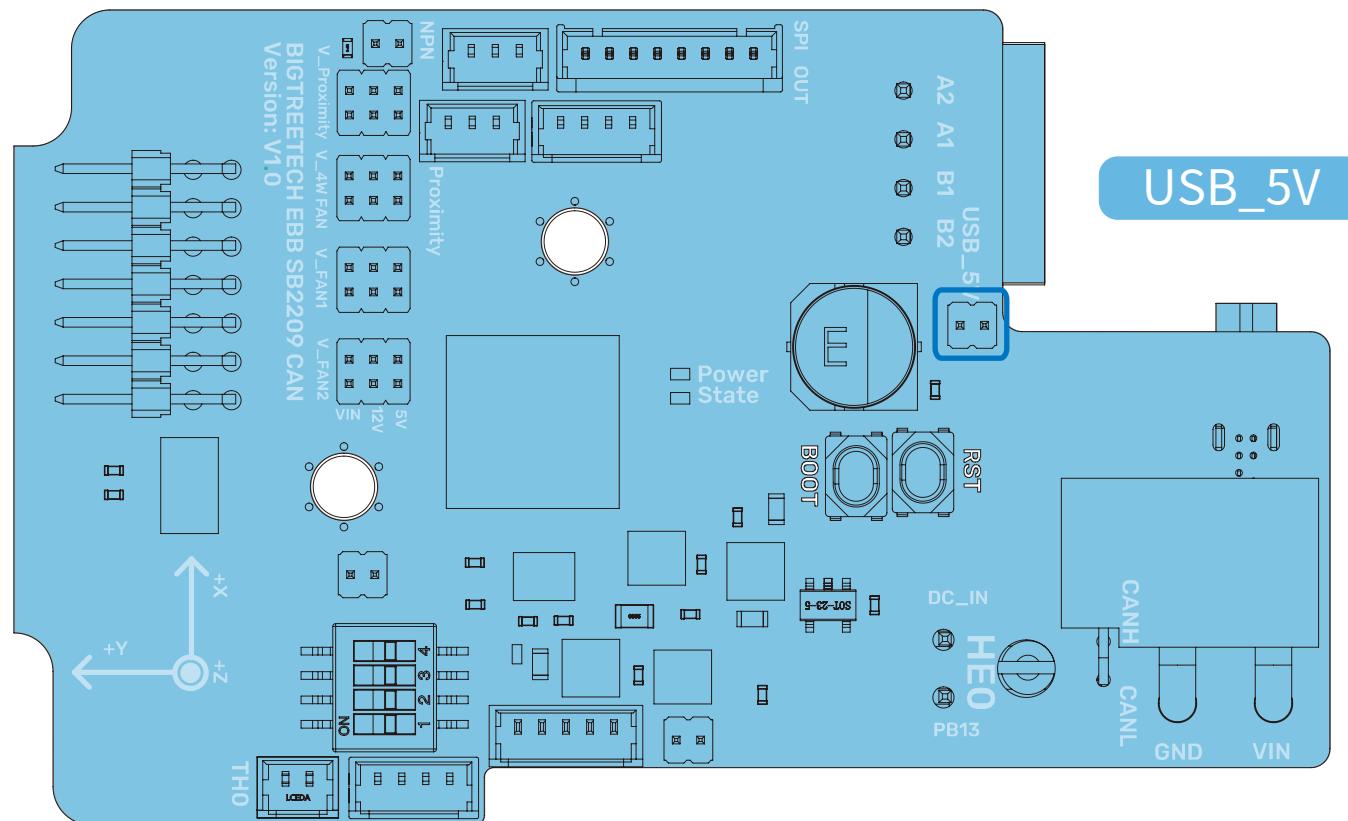
```
python3 flash_can.py -i can0 -q
```

to query. At this time, the Application changes from Katapult to Klipper, indicating that Klipper has been running normally

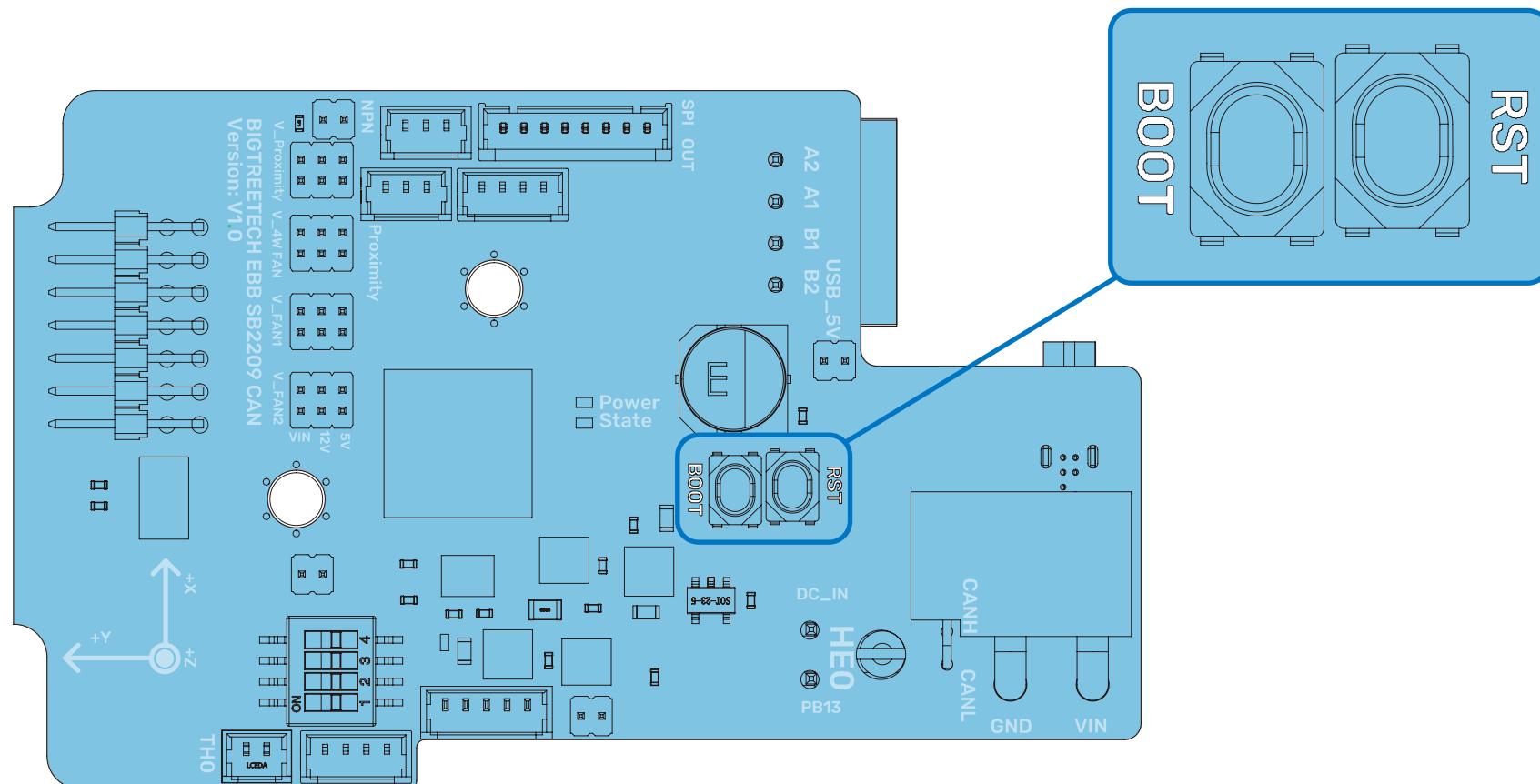
```
biqu@BTT-CB1:~/Katapult/scripts$ python3 flash_can.py -i can0 -q
Resetting all bootloader node IDs...
Checking for katapult nodes...
Detected UUID: be69315a613c, Application: Klipper
Query Complete
biqu@BTT-CB1:~/Katapult/scripts$
```

Raspberry Pi or CB1 update via DFU.

1. Please use a Type-C cable to connect the EBB SB2240/2209 CAN to the Raspberry Pi/CB1, and ensure that the USB_5V jumper is connected, in order to supply power to the EBB SB2240/2209 CAN via Type-C.



2. Press and hold the Boot button, and then click the Reset button to enter the DFU mode.



3.Enter in the SSH terminal command line

```
lsusb
```

Query DFU device ID

```
pi@fluidpi:~$ lsusb
Bus 001 Device 005: ID 0483:df11 STMicroelectronics STM Device in DFU Mode
Bus 001 Device 004: ID 1d50:6061 OpenMoko, Inc. Geschwister Schneider CAN adapter
Bus 001 Device 003: ID 0424:0c00 Microchip Technology, Inc. (formerly SMSC) SMC9512/9514 Fast Ethernet Adapter

Bus 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC) SMC9514 Hub
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
pi@fluidpi:~$
```

4.Run:

```
cd klipper
```

to enter to the klipper directory, then run the following command to write the firmware:

```
make flash FLASH_DEVICE=0483:df11
```

Note: Replace 0483: df11 with the actual device ID found in the previous step.

5.The prompt `File downloaded successfully` indicates that the writing is completed.

After the writing is completed, there will be an error message: dfu-util: Error during download get_status, just ignore it.

6. After the firmware is written, run

```
ls /dev/serial/by-id/
```

to query the serial ID of the device (this ID can only be found in the USB communication mode, and this step is ignored in CANBus mode).

7. If USB communication is used, after the first writing, it is not necessary to manually press the Boot and Reset buttons to enter the DFU mode when updating again.

You can directly enter

```
make flash FLASH_DEVICE=/dev/serial/by-id/usb-Klipper_stm32g0b1xx_0F0033000C504B4633373520-if00
```

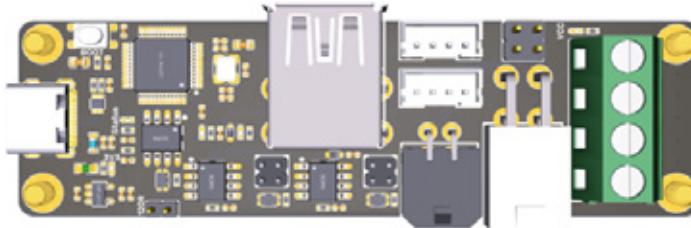
to write the firmware (Note: replace/dev/serial/by id/xxx with the actual ID found in the previous step).

8. The prompt File downloaded successfully indicates that the writing is completed.

After the writing is completed, there will be an error message: dfu-util: Error during download get_status, just ignore it.

After flashing is complete, remove the USB_5V jumper and the Type-C cable.

Used with BIGTREETECH U2C module.



1. Enter the command

```
sudo nano /etc/network/interfaces.d/can0
```

in the SSH terminal and execute

```
allow-hotplug can0
iface can0 can static
    bitrate 1000000
up ifconfig $IFACE txqueuelen 1024
```

Set the CAN-BUS speed to 1M (it must be consistent with the speed set in the firmware (1000000) CAN bus speed), save (Ctrl+S) and exit (Ctrl+X) after modification, and enter

```
sudo reboot
```

to restart Raspberry Pi.

2. Each device on CAN bus will generate a canbus_uuid according to the UID of MCU, to find each microcontroller device ID, make sure the hardware is powered on and wired correctly, and then run:

```
~/klippy-env/bin/python ~/klipper/scripts/canbus_query.py can0
```

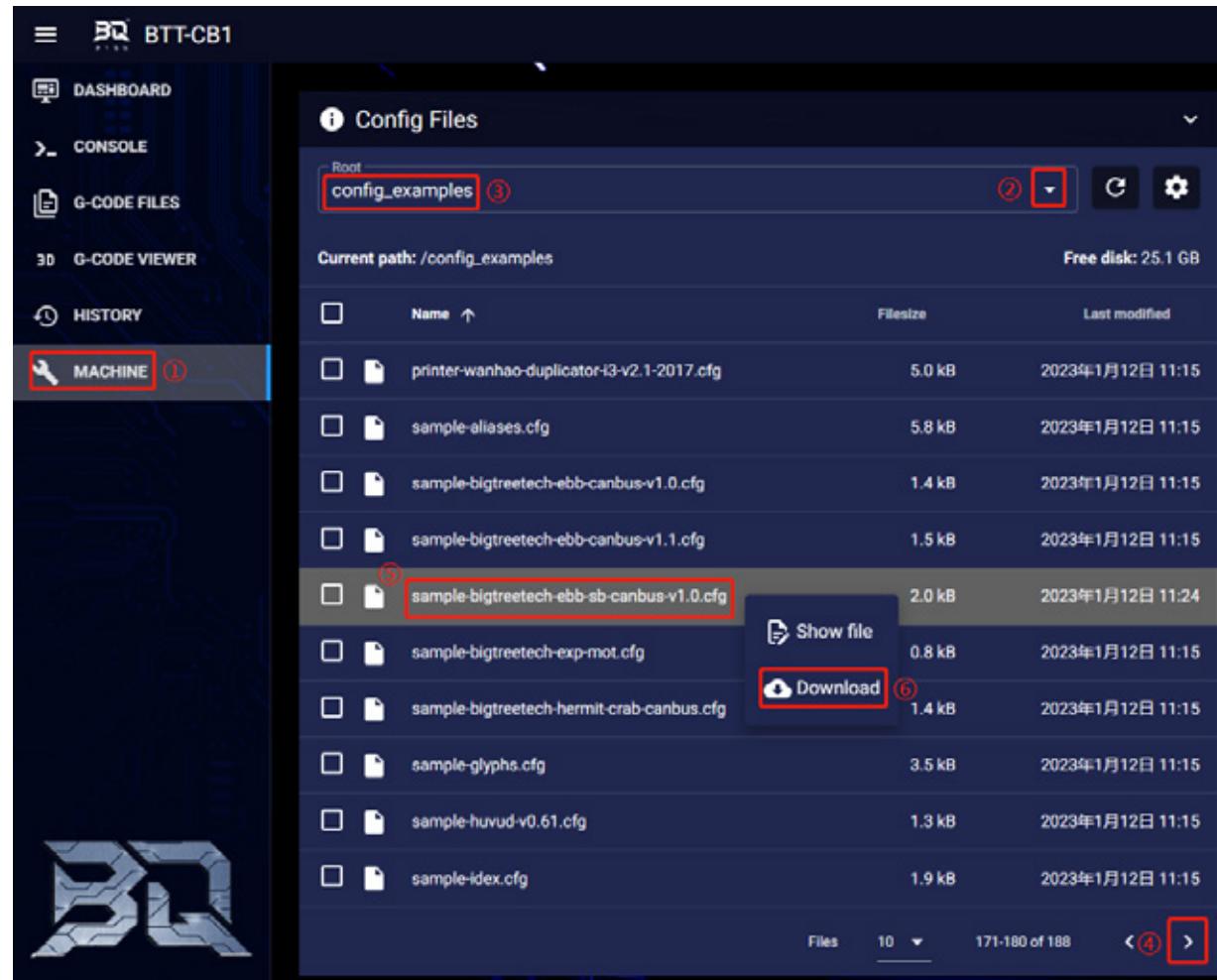
3. If an uninitialized CAN device is detected, the above command will report the device's canbus_uuid.

```
Found canbus_uuid=0e0d81e4210c
```

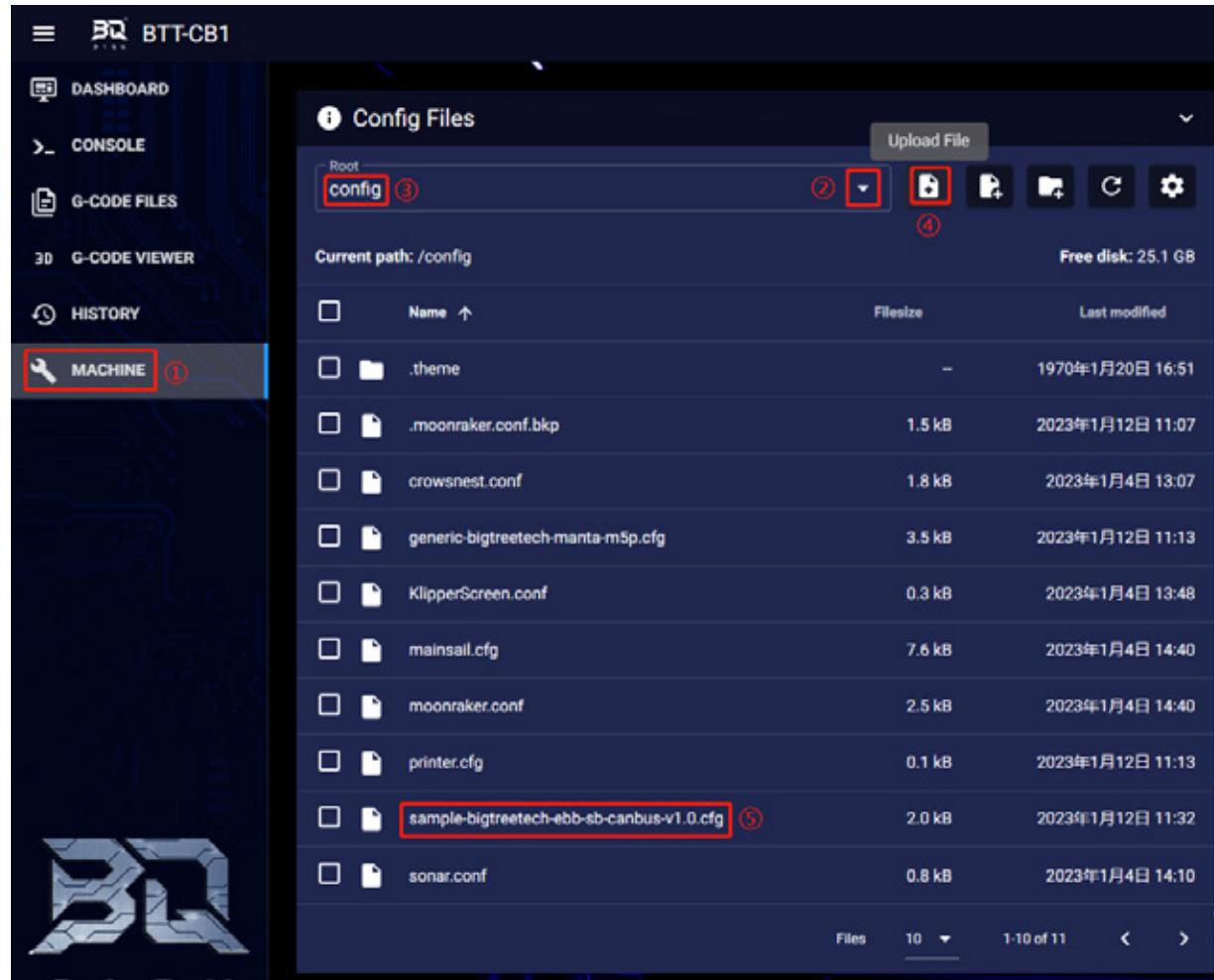
4. If Klipper has been running normally and connected to this device, then canbus_uuid will not be reported, which is normal.

1. Enter Raspberry Pi IP address into your browser, and find the reference config for the motherboard in the directory shown below, if there is no such config available, update your Klipper source code to the newest version or download it from GitHub:

<https://github.com/bigtreetech/EBB>



2. Upload the configuration file of the motherboard to Configuration Files.



3. Add the configuration of this motherboard in the "printer.cfg" file:

```
[include sample-bigtreetech-ebb-sb-canbus-v1.0.cfg]
```

```
X     printer.cfg
11
12   [include sample-bigtreetech-ebb-canbus-v1.0.cfg]
13
```

4. Enter the correct ID (USB serial or canbus).

```
X     sample-bigtreetech-ebb-sb-canbus-v1.0.cfg
8       [mcu EBBCan]
9       serial: /dev/serial/by-id/usb-Klipper_firmware_12345-if00
10      #canbus_uuid: 0e0d81e4210c
```

5. Configure the module's specific functions according to

```
https://www.klipper3d.org/Overview.html
```



Website

www.bigtree-tech.com

GitHub

www.github.com/bigtree-tech

Discord

www.discord.gg/5jdwbYYZuv
