



Lineux Toolchanger



LINEUX

- lee-knee-yurks
(noun)

toolchanger that print things you never know
you need in a way you never imagine

- see also wizardry, mesmerizing

BTC Klipper Initial Setup Guide

2025-02-11



<https://discord.gg/Xwqbjj4VjH>



<https://github.com/Bikin-Creative/Lineux-Toolchanger>

**A big thank you to everyone who
made this project possible.**



CAUTION



- Please take careful precautions with safety in mind when attempting to build Lineux.
- Only attempt the build if you are knowledgeable with 3d printer mechanics and electronics.
- Failure to follow safety precautions may result in things going against you, or even harm you.
- Magnets are extremely strong and may cause injuries. Please handle them with extra care.
- If things start to get confusing or you're stuck at some point during the build, do ask questions on our discord.
- We try to keep things as simple and as clear as possible for a fun and enjoyable build for everyone.
- We are humans and are prone to mistakes. If you encounter any issues/faults with the build guide, please raise them on our Discord.

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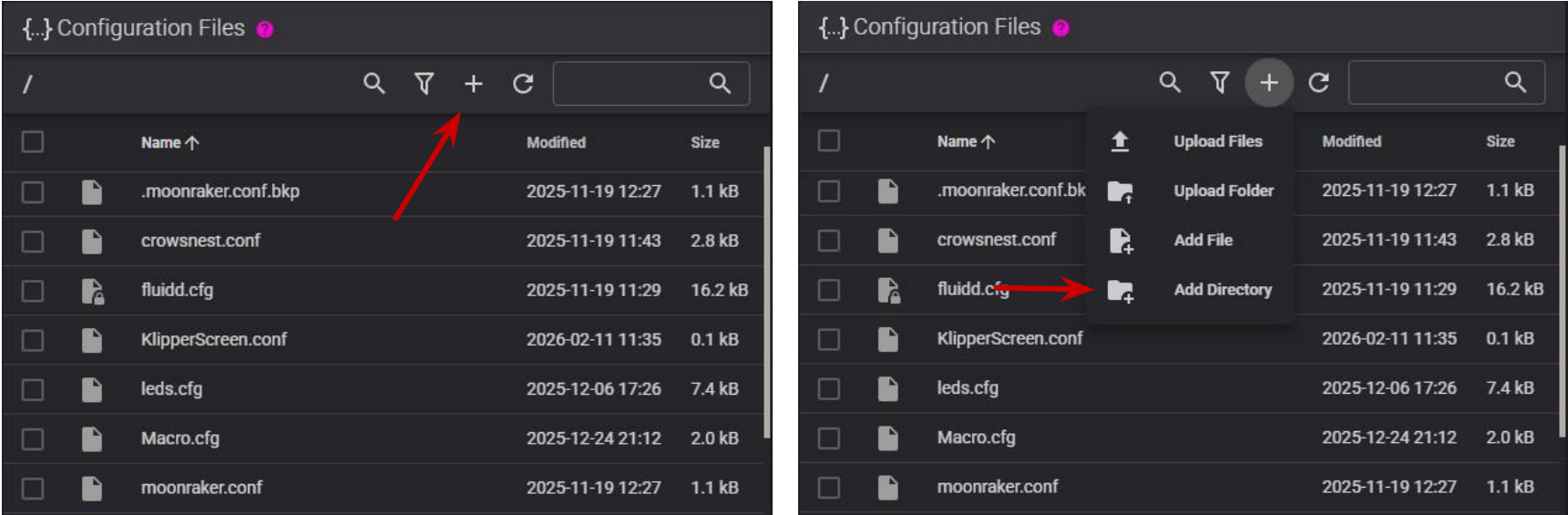
Bikin Tool Changer (BTC) Klipper is a collection of Klipper macros created by @JackBeam that enables toolchanger functionality on any Klipper-based machine. It operates entirely through macros and does not require external plugins, making the system easier to understand, customize, and maintain.

Because BTC relies solely on native Klipper functionality, it is generally more resilient to Klipper updates and less likely to break. However, this approach also comes with some limitations in features and functionality, as it is constrained by what Klipper macros can support within the ecosystem.

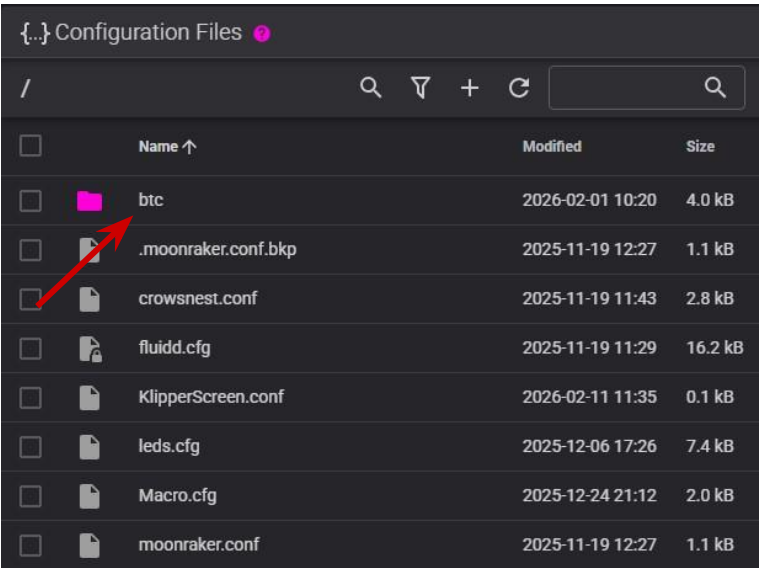
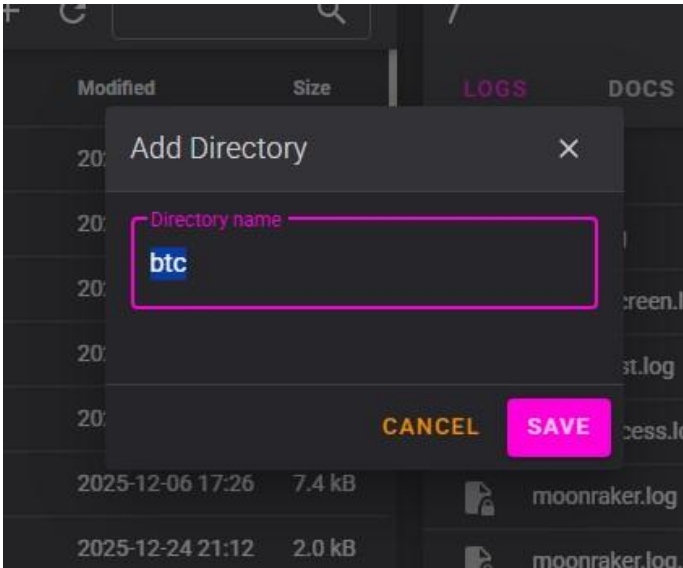
This guide may be updated over time, so please check the Discord community if you have any questions or need the latest information.

*** The following guide is showing Fluidd UI for Klipper. Other UI may differ in names.**

1. Add a new directory in yr klipper configuration files.



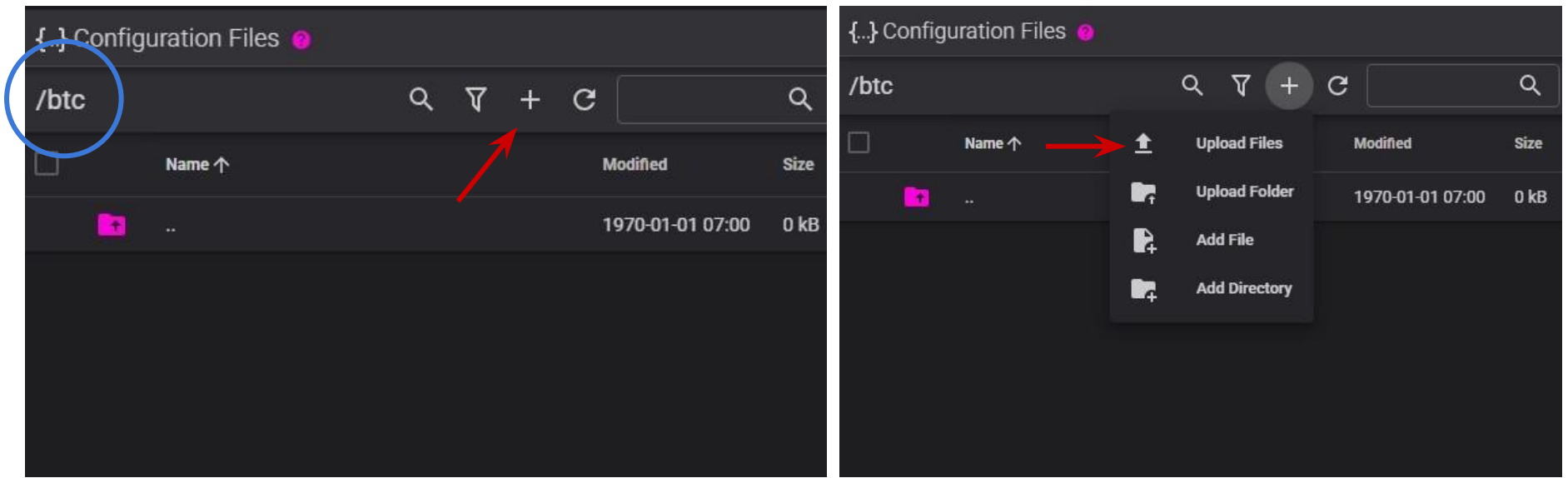
2. Name the directory “btc” and open the new btc folder you have just created.



3. Download all the config files from our github to your pc
- <https://github.com/Bikin-Creative/Lineux-Toolchanger/tree/main/Klipper>

Name	Last commit message	Last commit date
..		
README.md	Update README.md	last week
bashed_macros.cfg	Moved Klipper out of Dev	2 weeks ago
btc.cfg	Moved Klipper out of Dev	2 weeks ago
btc_extras.cfg	Moved Klipper out of Dev	2 weeks ago
btc_nudge.cfg	Moved Klipper out of Dev	2 weeks ago
btc_spoolman.cfg	Moved Klipper out of Dev	2 weeks ago
btc_tubby_z.cfg	Moved Klipper out of Dev	2 weeks ago
btc_variables.cfg	Moved Klipper out of Dev	2 weeks ago
dockslide.cfg	Moved Klipper out of Dev	2 weeks ago
tool_0.cfg	Moved Klipper out of Dev	2 weeks ago
tool_1.cfg	Moved Klipper out of Dev	2 weeks ago

4. Upload the downloaded files to the btc folder in Klipper.



5. All toolhead-related sections are not required in your `printer.cfg`, as they are defined in each individual tool configuration. The following sections in `printer.cfg` should be commented out.

mcu toolhead

```

11 View 'virtual_sdcard' documentation
12 [virtual_sdcard]
13 path: /home/hive24/printer_data/gcodes
14 on_error_gcode: CANCEL_PRINT
15
16 View 'force_move' documentation
17 [force_move]
18 enable_force_move: true
19
20 View 'mcu' documentation
21 [mcu]
22 canbus_uuid: f512339e3481
23
24 # [mcu ebb36]
25 # canbus_uuid: 724082d99d1b
26
27 View 'printer' documentation
28 [printer]
29 kinematics: corexy

```

extruder

```

#####
# Extruder
#####
## In E0-MOT Position
# [extruder]
# step_pin: toolboard0: PD0
# dir_pin: !toolboard0: PD1
# enable_pin: !toolboard0: PD2
# rotation_distance: 22.6789511 #Bondtech 5mm Drive Gear
# ## Update Gear Ratio depending on your Extruder ?
# ## Use 50:17 for Afterburner/Clockwork (BMG Gear)
# ## Use 80:20 for M4, M3.1
# gear_ratio: 50:10 #BMG Gear Ratio
# microsteps: 16
# full_steps_per_rotation: 200 #200 for 1.8 degree
# nozzle_diameter: 0.400
# filament_diameter: 1.75
# max_extrude_only_distance: 1400.0
# max_extrude_only_velocity: 75.0
# max_extrude_only_accel: 8700
# max_extrude_cross_section: 500

```

tmc extruder

```

# pressure_advance_smooth_time: 0.040
1
2 # ## Make sure to update below for your relevant
3 # [tmc2209 extruder]
4 # uart_pin: toolboard0: PA15
5 # interpolate: false
6 # run_current: 0.8
7 # hold_current: 0.2
8 # sense_resistor: 0.110
9 # stealthchop_threshold: 0
10
11 #####
12 # Bed Heater
13 #####
14 View 'heater_bed' documentation
15 [heater_bed]
16 ## SSR Pin - In BED OUT position

```

If you are using a **Klicky probe**, you may comment out the probe section in `printer.cfg`, as it will be defined in the toolhead configuration. If you are using a different probe, you can leave its probe configuration unchanged.

probe

```
#####
# Probe
#####

# [probe]
# pin: ^toolboard0: PB9
# x_offset: 0
# y_offset: 0
# z_offset: -1.0
# speed: 17.0
# samples: 3
# samples_result: median
# sample_retract_dist: 3.0
# samples_tolerance: 0.006
# samples_tolerance_retries: 3
# activate_gcode:
#     {% set PROBE_TEMP = 150 %}
#     {% set MAX_TEMP = PROBE_TEMP + 5 %}
#     {% set ACTUAL_TEMP = printer.extruder.temperature %}
#     {% set TARGET_TEMP = printer.extruder.target %}
#
#     {% if TARGET_TEMP > PROBE_TEMP %}
```

temp sensor toolboard

```
274
View 'temperature_sensor' documentation
275 [temperature_sensor pi4b]
276 sensor_type: temperature_host
277 min_temp: 0
278 max_temp: 100
279
280 # [temperature_sensor EBBCan0]
281 # sensor_type: temperature_mcu
282 # sensor_mcu: toolboard0
283 # min_temp: 0
284 # max_temp: 100
285
View 'temperature_sensor' documentation
286 [temperature_sensor mcu_temp]
287 sensor_type: temperature_mcu
288 min_temp: 0
289 max_temp: 100
290
291 #####
292 # Fan Control
```

hotend and part fan

```
#####
# Fan Control
#####

# [heater_fan hotend_fan]
# ## Hotend Fan - FAN0 Connector
# pin: toolboard0: PA1
# max_power: 1.0
# kick_start_time: 0.5
# heater: extruder
# heater_temp: 50.0
# ## If you are experiencing back flow, you can reduce
# #fan_speed: 1.0

# [fan]
# ## Print Cooling Fan - FAN1 Connector
# pin: toolboard0: PA0
# max_power: 1.0 # change to 0.4 if you're having problems
# kick_start_time: 0.5
# ## Depending on your fan, you may need to increase th
# ## if your fan will not start. Can change cycle_time
# ## if your fan is not able to slow down effectively
# off_below: 0.10
```

If you are using a **Klicky probe**, you may also comment out the **safe_z_home** section, as Klicky provides its own safe Z home configuration. If you are using a different probe, you can leave the existing probe and safe Z home settings unchanged.

safe_z_home

```
#####
# Homing and Gantry Adjustment Routines
#####

View 'idle_timeout' documentation
[idle_timeout]
timeout: 7200

# [safe_z_home]
# home_xy_position:167,176
# speed:700
# z_hop:10

View 'quad_gantry_level' documentation
[quad_gantry_level]
## Use QUAD_GANTRY_LEVEL to level a gantry.
## Min & Max gantry corners - measure from nozzle at
## MAX (250, 250), (300,300), or (350,350) depending
## to respective belt positions
```

adxl and input shaper

```
3
4 # [adxl345 toolboard0]
5 # cs_pin: toolboard0: PB12
6 # spi_software_sclk_pin: toolboard0: PB10
7 # spi_software_mosi_pin: toolboard0: PB11
8 # spi_software_miso_pin: toolboard0: PB2
9 # axes_map: x,y,z
10
11 # [resonance_tester]
12 # accel_chip: adxl345 toolboard0
13 # probe_points:
14 #     170,160,20 # an example for a 350mm pr
15
16 # [input_shaper]
17 # shaper_freq_x: 49.6
18 # shaper_freq_y: 39.2
19 # shaper_type_x: zv
20 # shaper_type_y: zv
21
```

extruder pid and probe offset in save_config

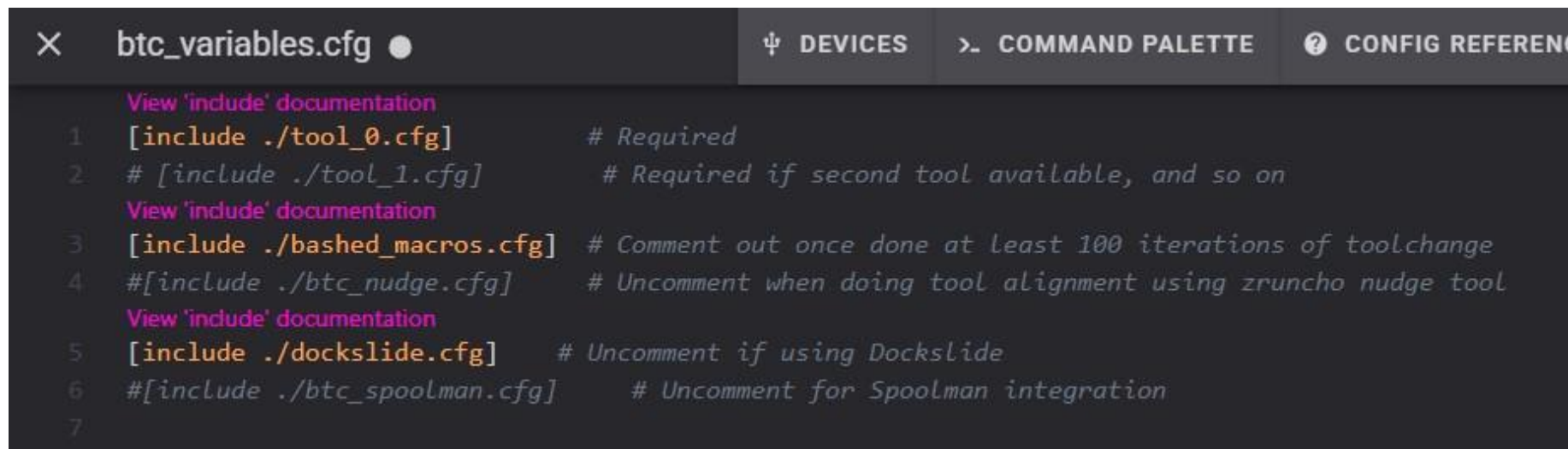
```
*** <----- SAVE_CONFIG ----->
*** DO NOT EDIT THIS BLOCK OR BELOW. The contents are auto-generated
***
***
*** [heater_bed]
*** control = pid
*** pid_kp = 39.619
*** pid_ki = 1.611
*** pid_kd = 243.656
***
*** [bed_mesh default]
*** version = 1
*** points =
***     0.037776, 0.027776, 0.015276, -0.007224, 0.000276, 0.027776
***     0.042776, 0.082776, -0.009724, 0.037776, -0.012224, -0.042776
***     0.051776, 0.012776, 0.011776, 0.001776, 0.011776, 0.011776
```

Include **btc.cfg** in your **printer.cfg**. Take note of the file path, as it is located in the **btc** folder.



```
× printer.cfg  ψ DEVICES
1  [include leds.cfg]
2  [include Macro.cfg]
3  [include Speed.cfg]
4  [include Start_Stop.cfg]
5  #[include pauseresume.cfg]
6  [include btc/btc.cfg]
7  [exclude_object]
8  [pause_resume]
9  [gcode_arcs]
10
11 [virtual_sdcard]
12 path: /home/hive24/printer_data/gcodes
```

Open **btc_variables.cfg**. By default, these three files are not commented out. You can leave them as they are for the initial setup.



```
1  View 'include' documentation
2  [include ./tool_0.cfg]           # Required
3  # [include ./tool_1.cfg]         # Required if second tool available, and so on
4  View 'include' documentation
5  [include ./bashed_macros.cfg]   # Comment out once done at least 100 iterations of toolchange
6  #[include ./btc_nudge.cfg]      # Uncomment when doing tool alignment using zruncho nudge tool
7  View 'include' documentation
8  [include ./dockslide.cfg]       # Uncomment if using Dockslide
9  #[include ./btc_spoolman.cfg]   # Uncomment for Spoolman integration
10
```

Under the global variables section, you may adjust the settings to suit your needs. For initial setup, a slower speed of **100** is recommended.

X
btc_variables.cfg
ψ DEVICES
> COMMAND PALETTE
? CONFIG

```

12 #####
13 # Global Variables
14 View 'gcode_macro' documentation
15 [gcode_macro _btc_Variables]
16 variable_btc_travel_speed: 300 # speed from print to approach position
17 variable_btc_toolchange_speed: 200 # speed from approach position to actual
18 variable_btc_wipe_speed: 200 # wipe speed
19 variable_btc_z_hop: 0 # set this to 0 to disable z hop
20 variable_btc_temp_allow: 1.0 # Temperature allowance. This is range o
21 variable_btc_inc_leds: True # Using neopixel
22 variable_btc_enable_spoolman_integration: False # Enable updating Spoolman upon toolchan
23
24 variable_tool_approachlocation_z: 0 # NOTE: Currently only used if using sling
25 # MUST BE 0 unless using sling!!!
26
27 variable_carriage_sense_switch: True # Set to True if using microswitch for carriage sens
28
29 variable_sling_mode: False
30 #####
31 # Options ends here!!!
32 #####

```

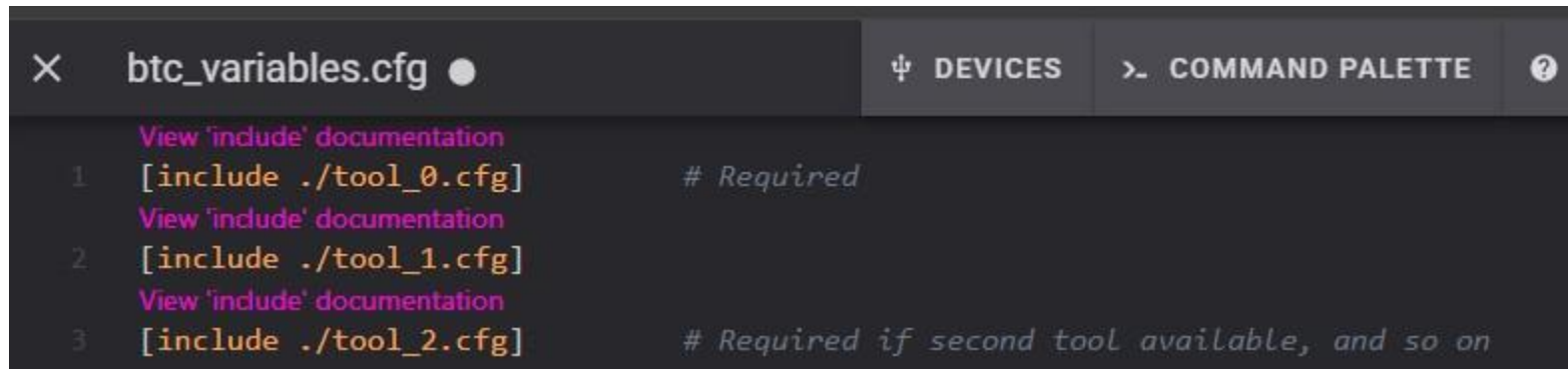
- a. `variable_btc_travel_speed`
Speed from print to approach location and from approach location back to print after tool pickup.
- b. `variable_toolchange_speed`
Speed of toolchange sequence moves from approach location and back to approach location after a toolchange.
- c. `variable_btc_wipe_speed`
Speed of tool wipe sequence.
- d. `variable_btc_z_hop`
Z hop height during a toolchange. This is a separate z hop from the slicers z hop.
- e. `variable_btc_temp_allow`
Hotend temperature allowance range. You may use a higher value if you find difficulty to get a stable set temperature after pid tuning.
- f. `variable_btc_inc_led`
This is usually set to True unless you are not using leds on your tools.

- g. **variable_btc_enable_spoolman_integration**
Set to True if you are using Spoolman. This will enable updating Spoolman upon toolchanges. Some users have reported error when using this feature as its still a work in progress.
- h. **variable_tool_approachlocation_z**
This must be set to 0 unless you are running BTC on Lineux Sling together with a dockslide.
- i. **variable_carriage_sense_switch**
Currently this must be set to True since we are using a microswitch as the carriage sense. “carriage mounted probe as carriage sense” feature is still a work in progress.
- j. **variable_sling_mode**
Set this to True only if you are running BTC on Lineux Sling. Else, it must be set to False.

Each toolhead has its own configuration. Tool numbering starts from **0** instead of 1.

For example:

- First tool = `tool_0.cfg`
- Second tool = `tool_1.cfg`
- Third tool = `tool_2.cfg`
- and so on.



```
1  [include ./tool_0.cfg]           # Required
2  [include ./tool_1.cfg]
3  [include ./tool_2.cfg]           # Required if second tool available, and so on
```

In **tool_0.cfg**, if you are using **Klicky**, set the **carriagesense** pin to use a pull-up (^). For **Fysetc Tap**, it can remain as a pull-down (~).

```
#####  
# These 2 senses pins provides actual  
View 'gcode_button' documentation  
[gcode_button carriagesense_t0]  
pin: ^toolboard0:PB8  
press_gcode:  
    #_tool_off_carriage TOOLNUMBER=0  
release_gcode:  
    #_tool_on_carriage TOOLNUMBER=0  
  
View 'gcode_button' documentation  
[gcode_button docksense_t0]  
pin: ^!toolboard0:PB6  
press_gcode:  
release_gcode:  
    #_tool_atdock TOOLNUMBER=0  
#####
```

```
#####  
# These 2 senses pins provides actual  
View 'gcode_button' documentation  
[gcode_button carriagesense_t0]  
pin: ~toolboard0:PB8  
press_gcode:  
    #_tool_off_carriage TOOLNUMBER=0  
release_gcode:  
    #_tool_on_carriage TOOLNUMBER=0  
  
View 'gcode_button' documentation  
[gcode_button docksense_t0]  
pin: ^!toolboard0:PB6  
press_gcode:  
release_gcode:  
    #_tool_atdock TOOLNUMBER=0  
#####
```

While some sections are already included and can remain at their default values, you will need to configure the following sections to match your specific setup.

1. `[mcu toolboard0]` (Set yr canbus uuid)
2. `[extruder]` (Set yr extruder settings)
3. `[tmc2209 extruder]` (Set yr tmc driver settings)
4. `[probe]` (Only for T0 using klicky which will be set as the master tool)
5. `[resonance_tester]` (Set yr probe points)

If you are using more than one tool, you must include each tool's respective configuration in **btc_variables.cfg**. Ensure that section names and identifiers match the correct tool or toolboard numbers—for example: **t1**, **t2**, **toolboard1**, **toolboard2**, **toolnumber=1**, **toolnumber=2**, and so on.

```
#####  
# Tool1 Variables  
View 'gcode_macro' documentation  
[gcode_macro _Variables_t1]  
# Absolute pickup moves in XYZ  
# Accept any number of moves
```

```
View 'gcode_button' documentation  
[gcode_button _carriagesense_t1]  
pin: ^toolboard1:B8  
press_gcode:  
    #_tool_off_carriage TOOLNUMBER=1  
release_gcode:  
    #_tool_on_carriage TOOLNUMBER=1  
  
View 'gcode_button' documentation  
[gcode_button _docksense_t1]  
pin: ^!toolboard1:B6  
press_gcode:  
release_gcode:  
    #_tool_atdock TOOLNUMBER=1  
#####
```

```
#Specify which serial device this is
View 'mcu' documentation
[mcu toolboard1]
canbus_uuid: 04c145172fb8
```

```
#extruder setup connected to EBB36
View 'extruder1' documentation
[extruder1]
step_pin: toolboard1: PD0
dir_pin: !toolboard1: PD1
enable_pin: !toolboard1: PD2
microsteps: 16
rotation_distance: 22.68
gear_ratio: 50:10
full_steps_per_rotation: 200
nozzle_diameter: 0.400
filament_diameter: 1.750
max_extrude_only_distance: 1400.0
max_extrude_only_velocity: 75.0
max_extrude_only_accel: 8700
max_extrude_cross_section: 500
heater_pin: toolboard1: PB13
sensor_type: Generic 3950
sensor_pin: toolboard1: PA3
#pullup_resistor: 2200
min_temp: 10
max_temp: 270
max_power: 1.0
min_extrude_temp: 170
control = pid
pid_Kp: 22.075
pid_Ki: 1.001
pid_Kd: 121.694
```

```
View 'tmc2209' documentation
[tmc2209 extruder1]
uart_pin: toolboard1: PA15
run_current: 0.8
interpolate: False
stealthchop_threshold: 0
```

```
View 'neopixel' documentation
[neopixel status_led1]
pin: toolboard1: PD3
chain_count: 3
```

```
View 'gcode_macro' documentation
[gcode_macro status_active_tool1]
gcode:
  SET_LED LED=status_led1 INDEX=1 RED=0 GREEN=1

View 'gcode_macro' documentation
[gcode_macro status_standby_tool1]
gcode:
  SET_LED LED=status_led1 INDEX=1 RED=1 GREEN=0

View 'gcode_macro' documentation
[gcode_macro status_unused_tool1]
gcode:
  SET_LED LED=status_led1 INDEX=1 RED=0 GREEN=1

View 'gcode_macro' documentation
[gcode_macro Nozzle_Led1]
gcode:
  SET_LED LED=status_led1 INDEX=2 RED=1 GREEN=0
  SET_LED LED=status_led1 INDEX=3 RED=1 GREEN=0

View 'gcode_macro' documentation
[gcode_macro Nozzle_Led_Off1]
gcode:
  SET_LED LED=status_led1 INDEX=2 RED=0 GREEN=0
  SET_LED LED=status_led1 INDEX=3 RED=0 GREEN=0
```

View 'heater_fan' documentation

[heater_fan hotend_fan1]

pin: toolboard1: PA1

max_power: 1.0

kick_start_time: 0.5

heater: extruder1

heater_temp: 60.0

View 'fan_generic' documentation

[fan_generic partfan1]

pin: toolboard1: PA0

max_power: 1.0

#shutdown_speed:

#cycle_time:

#hardware_pwm:

kick_start_time: 0.5

off_below: 0.1

#tachometer_pin:

#tachometer_ppr:

#tachometer_poll_interval:

#enable_pin:

View 'temperature_sensor' documentation

[temperature_sensor Toolboard1]

sensor_type: temperature_mcu

sensor_mcu: toolboard1

View 'adxl345' documentation

[adxl345]

cs_pin: toolboard1: PB12

spi_software_sclk_pin: toolboard1: PB10

spi_software_mosi_pin: toolboard1: PB11

spi_software_miso_pin: toolboard1: PB2

axes_map: x,y,z

View 'resonance_tester' documentation

[resonance_tester]

accel_chip: adxl345

probe_points:

170,160,20

Somehow SET_GCODE_VARIABLE is case sen

View 'gcode_macro' documentation

[gcode_macro t1]

variable_spool_id: None

variable_active: False

gcode:

Tool_Pickup TOOLNUMBER=1

BTC Extras contains sample macros that you can use to add or replace macros in your Klipper configuration. Sample macros include:

1. Print_Start
2. Print_End
3. Klicky homing_override
4. BED_MESH_CALIBRATE
5. QUAD_GANTRY_LEVEL
6. Z_TILT_ADJUST
7. Z_CALIBRATION_SET_OFFSET_MACRO

Since the probe is configured on **Tool 0 (the master tool)**, sample macros are provided to ensure Tool 0 is automatically picked up whenever probing is required.

Dockslide requires two stepper motors, each connected to its own stepper driver on the MCU. Two endstop switches must also be connected to two endstop or signal ports on the MCU.

Lineux Sling, however, runs the Dockslide horizontally, allowing both motors to be driven from a single stepper driver port. When using this setup, ensure the stepper motor wiring is configured so that both motors move in the same direction when operating in parallel.

If you are using a **stepper motor brake module** with your Dockslide, you must connect the module to a **5V supply, a signal output, and ground**.

```
View 'multi_pin' documentation
[multi_pin ds_brake]
pins: !PC5, PA1

View 'tmc2209' documentation
[tmc2209 manual_stepper motor_right]
uart_pin: PD11
run_current: 1.0
hold_current: 0.5
interpolate: False
stealthchop_threshold: 0

View 'manual_stepper' documentation
[manual_stepper motor_right]
step_pin: PE1
dir_pin: PE0
enable_pin: multi_pin:ds_brake
full_steps_per_rotation: 200
rotation_distance: 40
microsteps: 16

View 'gcode_button' documentation
[gcode_button dockslide_endstop_right]
pin: ^PC0
press_gcode:
release_gcode:
```

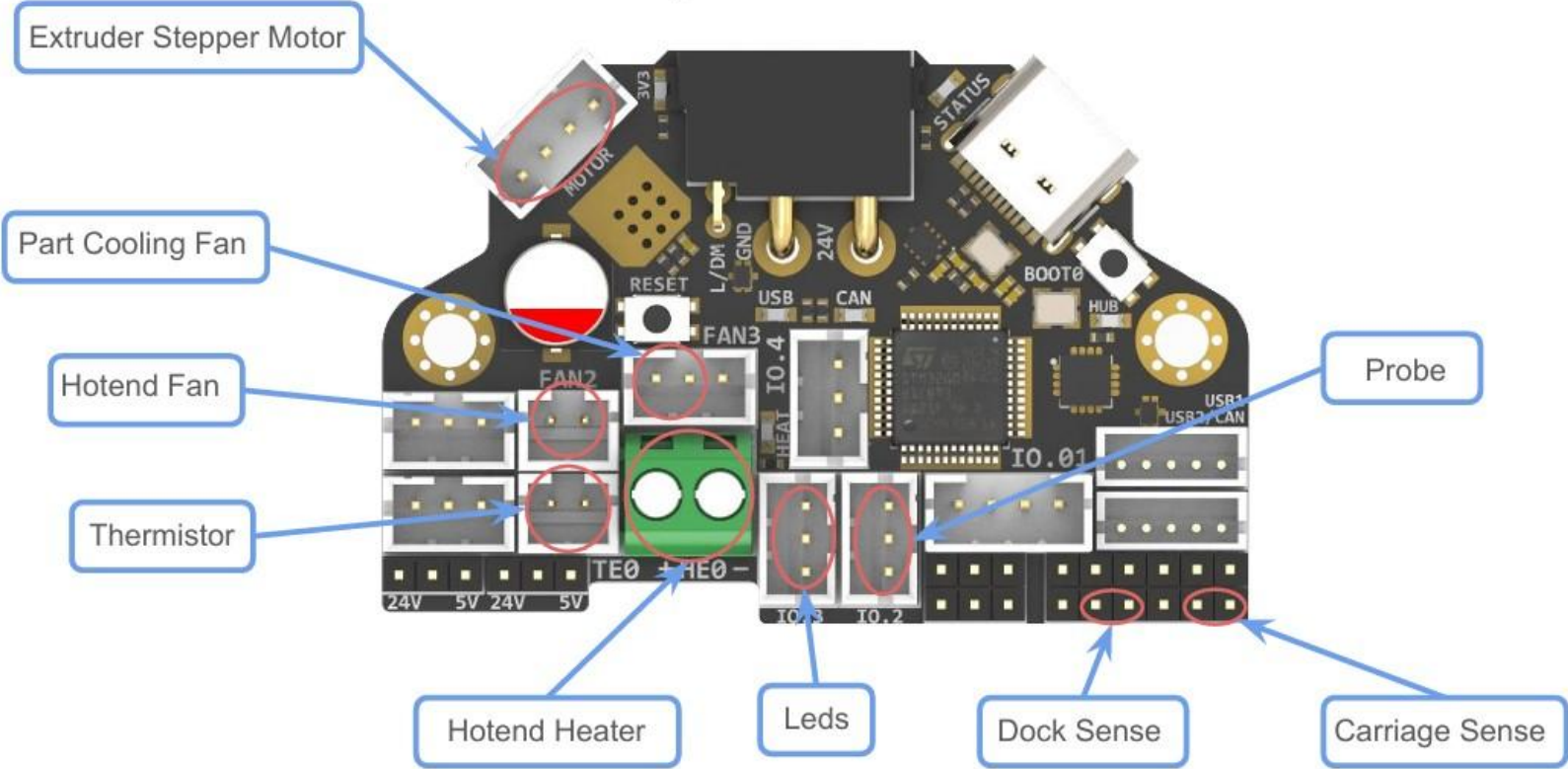
The **stepper brake module signal pin** and the **stepper_motor_right enable pin** should be combined in the `[multi_pin ds_brake]` section. If you are not using a brake module, you can just rename the second pin to any unassigned pin on yr mcu.

The remaining stepper settings can be configured according to your stepper motor specifications.

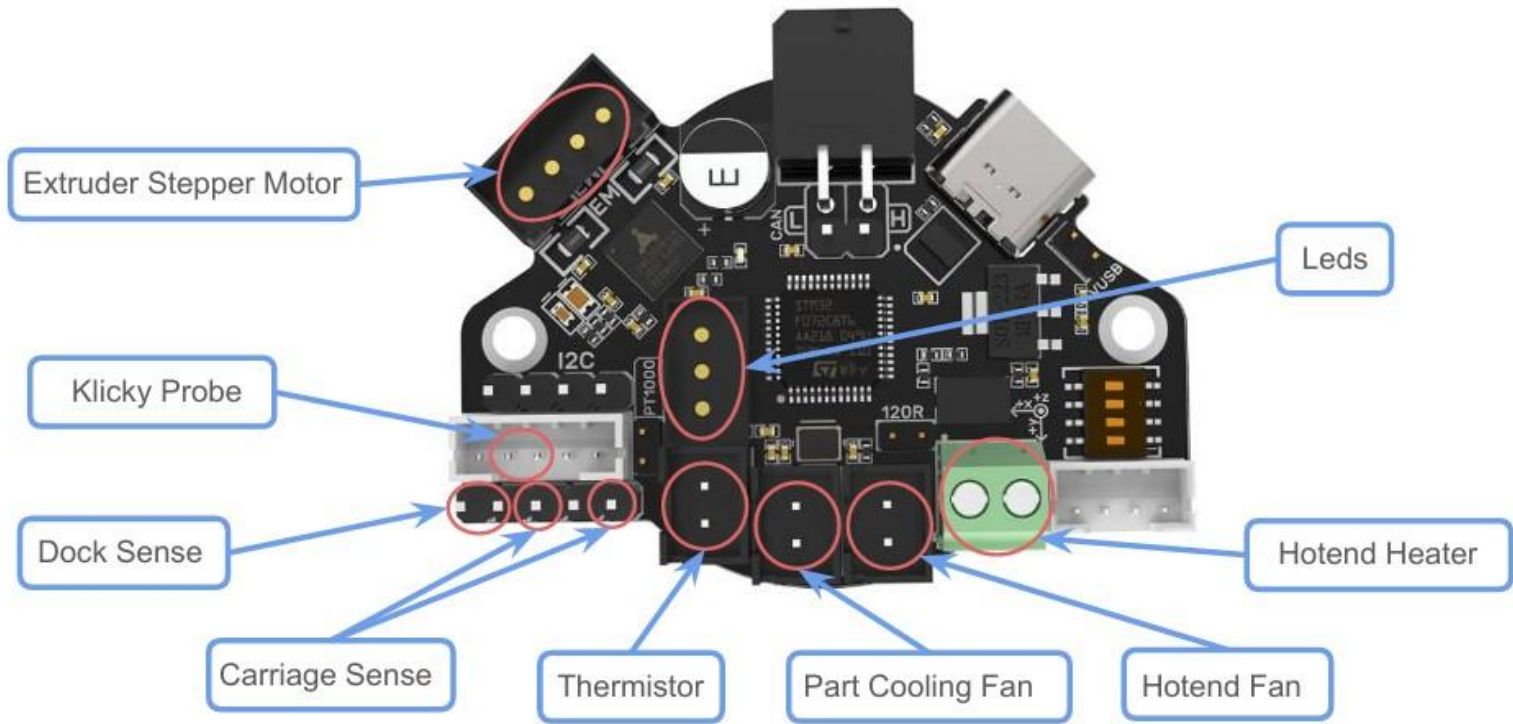
Apply the same configuration approach to the **left stepper motor** as well.

Be sure to set the **endstop pins** for both motors.

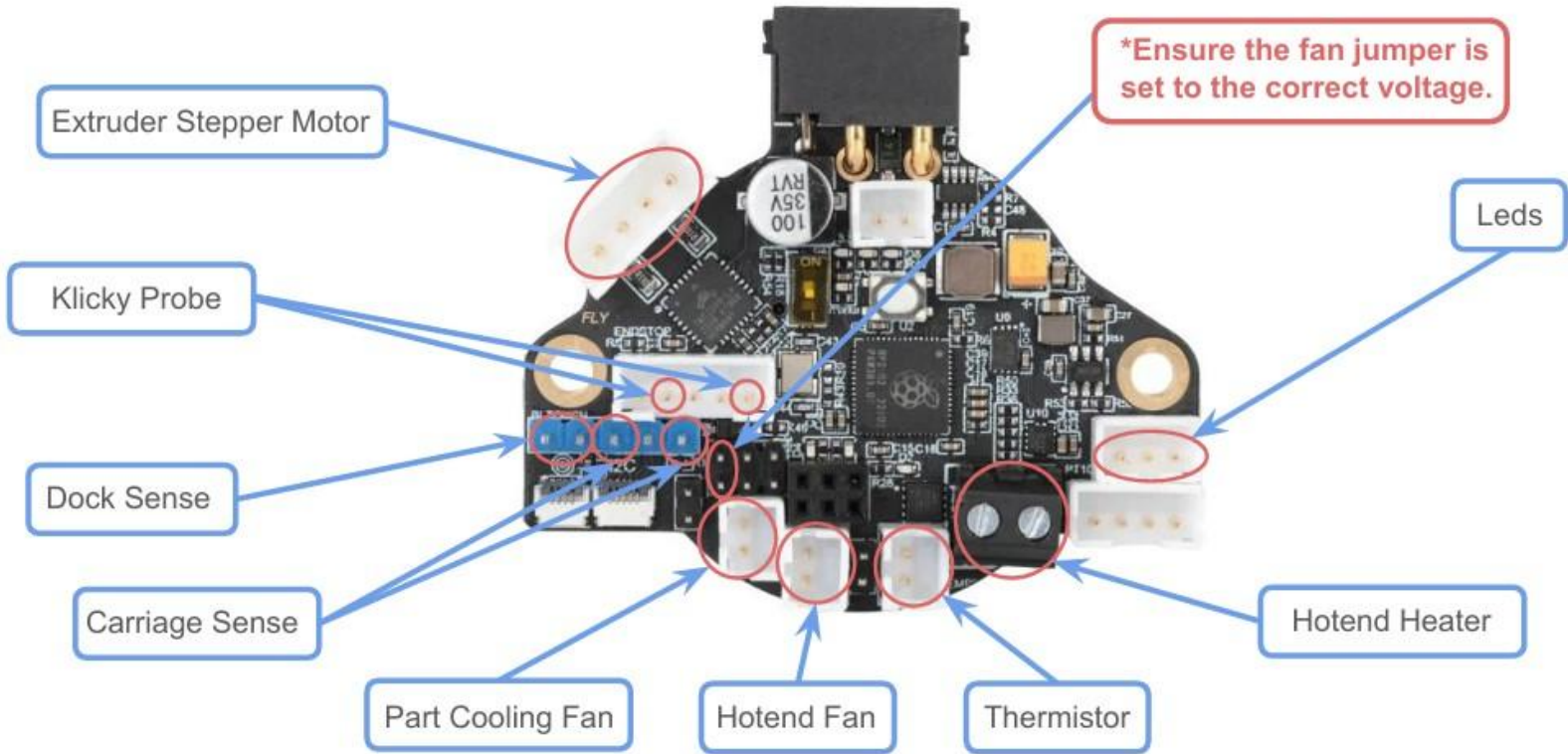
Fysect H36 v1.3



Bigtreetech EBB36 v2.1



Mellow SHT36 v3



Your BTC initial setup is complete. Your next step will be to setup the toolchange configurations and calibrations. Do join us on Discord if you need help or have any questions.



<https://discord.gg/Xwqbjj4VjH>



<https://github.com/Bikin-Creative/Lineux-Toolchanger>



We are humans and are prone to mistakes. If you encounter any issues/faults with the build guide, please raise them on our Discord with the relevant page number or a screenshot of the issues/fault.

This guide may be subjected to changes regularly based on feedbacks from the community.