MicroProbe V2

User Manual

Revision Log

Version	Date	Revisions
v1.00	23rd August 2023	Initial Version
v1.10	19th September 2023	Wiring diagrams and Klipper configuration instructions have been added for the following boards: SKR MINI E3 V3.0 MANTA E3EZ/M5P/M8P V1.1/V2.0 Octopus (446/407) MAX EZ

CONTENTS

Product Parameters

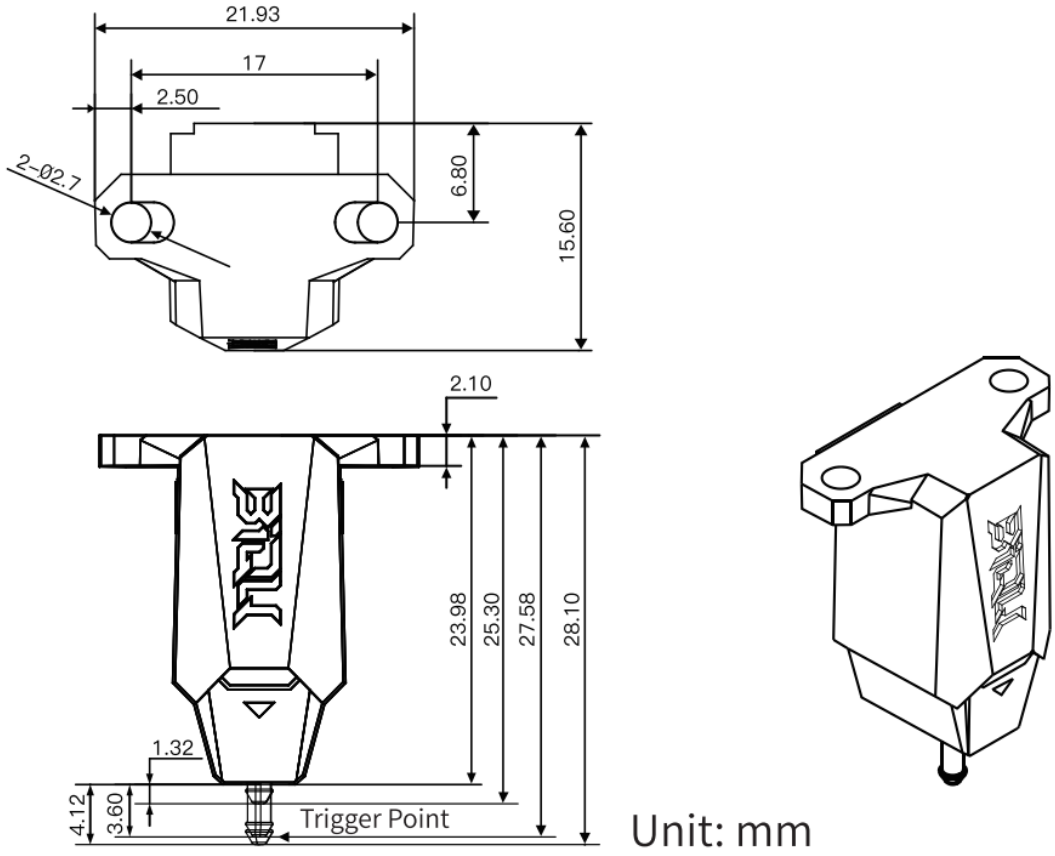
Product Name	MicroProbe
Total Weight	6g
Voltage	5V
Standby Current	3mA
Maximum Current	2A
Cable Length	1.5 m
Wiring	5-pin, 1.25 mm Pitch
Working Chamber Temperature	≤60℃ Ambient
Accuracy	0.001mm Standard Deviation @24 ℃ Ambient, 60℃ Bed 0.003mm Standard Deviation @60 ℃ Ambient, 100℃ Bed
Lifespan	10,000,000+
Compatibility	All FDM 3D Printers

Main Features

- Ultra small, fits into more places;
- Lightweight design;
- Easy installation;
- Compatible with a wide range of FDM printers;
- High precision and reliability;
- Removable and replaceable probing pin.

Product Dimensions

21.9 x 15.6 x 28.1 mm (Probe Extended)



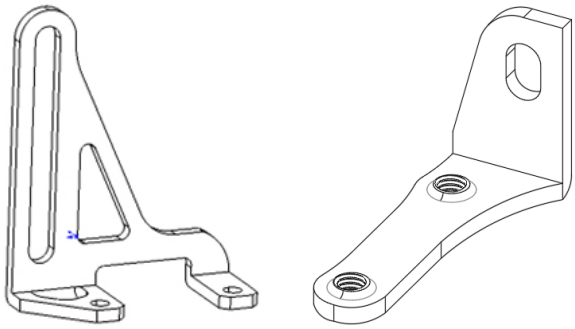
Size Diagram

Note: When designing brackets, please place the bottom surface of the probe approx. 1-2 mm below the nozzle in the fully extended position.

Mounting Bracket Instruction and Installation Guide

Mounting Bracket Instruction

Optional mounting brackets are available for purchase for drop-in installation, for B1/H2 series extruder, Ender series printheads, and Voron Afterburner/ StealthBurner. Alternatively, 3D models of brackets for other printheads are available for download and print yourself. The source CAD model of the MicroProbe mockup is also available to provide references for users to design mounting brackets for other machine. You are welcome to send your bracket design to us via any channel including email(info@biqu3d.com)/ facebook/discord, etc., and we will share it on GitHub for our community.



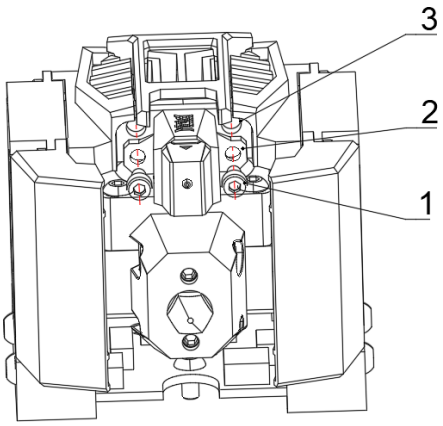
Installation Guide

Hurakan Printhead-No mounting bracket needed

1: M2.5x5 Screws (2pcs)

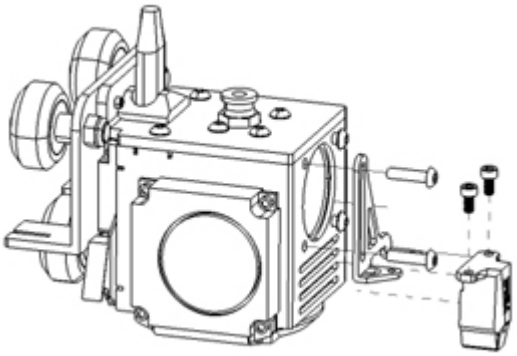
2: MicroProbe

3: Hurakan Printhead

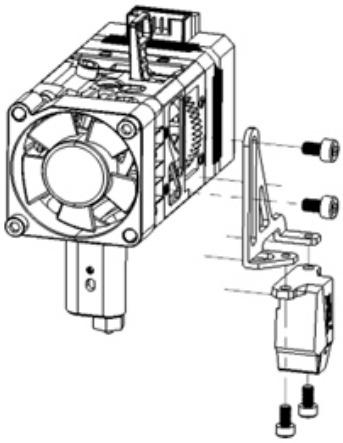


As shown in the picture: Use the two M2.5x5 screws to directly fix the MicroProbe to the Hurakan printhead.

B1 Printhead / H2 V2S Extruder-B1/H2 V2S Bracket needed



B1 Printhead



H2 Series Extruder

Fix the B1/H2 V2S Bracket to the B1 Printhead/H2 Series Extruder, then fix the MicroProbe to the B1/H2 V2S Bracket with the two M2.5x5 screws.

Ender Series Printhead-Ender Bracket needed

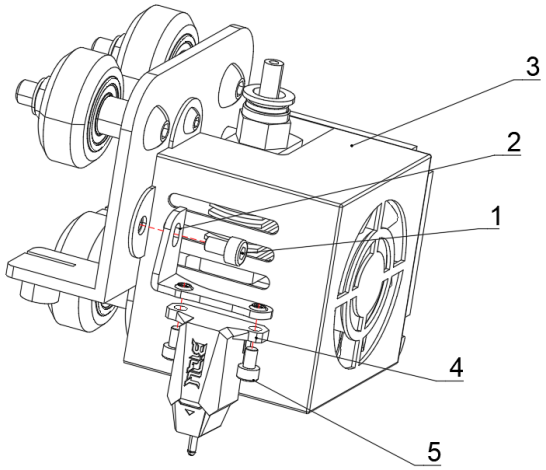
1: M3x5 Screw

2: Ender Bracket

3: Ender Series Printhead

4: MicroProbe

5: M2.5x5 Screw

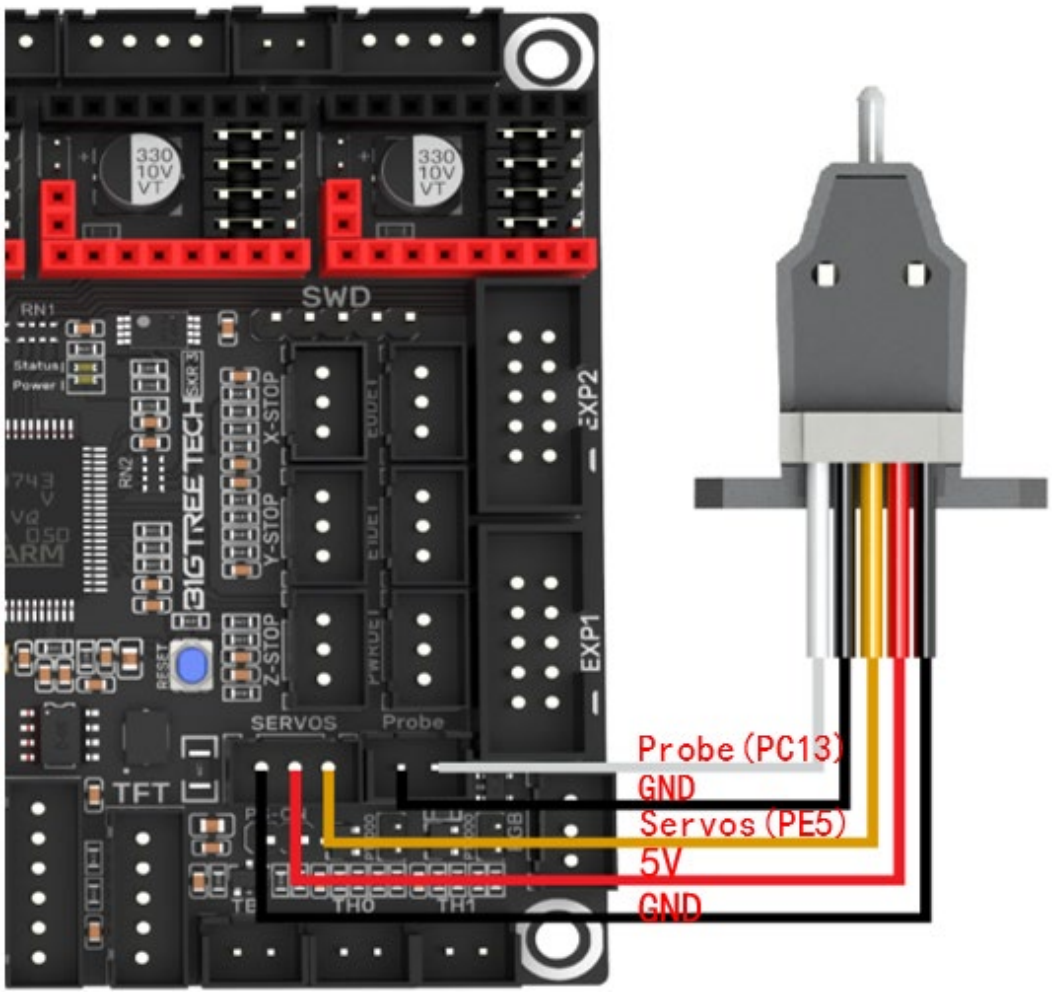


Fix the Ender bracket to the Ender-3 printhead with the M3x5 screw; then fix the MicroProbe to the Ender Bracket with the two M2.5x5 screws.

Wiring

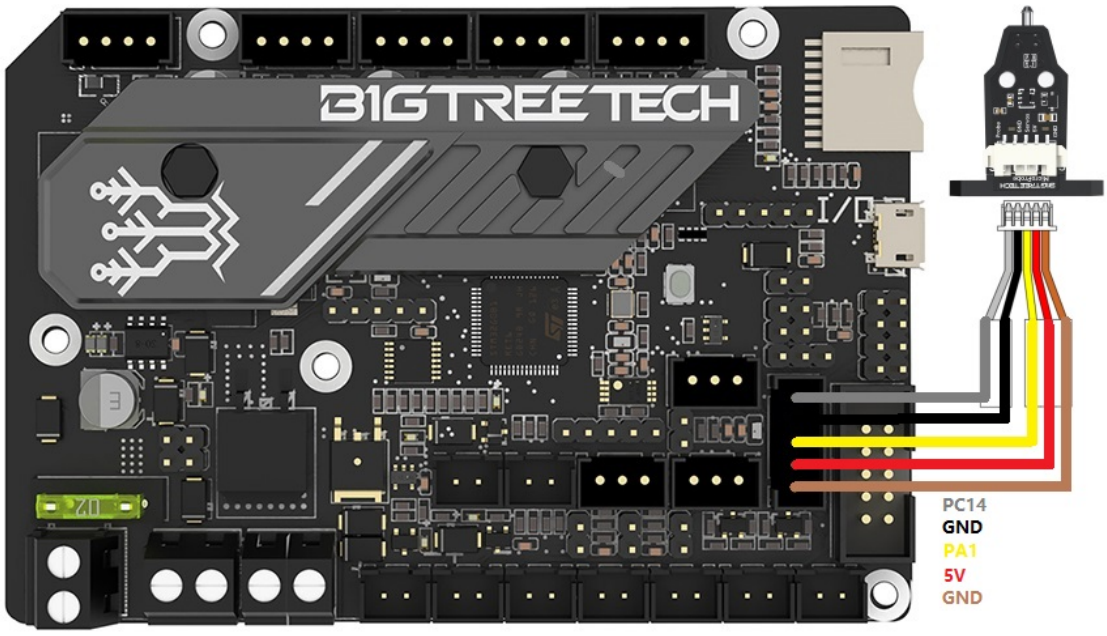
The MicroProbe has the same wiring sequence as the BLTouch. It uses a 5V power supply, and its control signal line is compatible with both 3.3V and 5V. The detection signal line is an open-drain output, which requires a 10K pull-up resistor on the mainboard's signal line or setting the IO as a pull-up input in the firmware. (For the V2 version, the detection signal line requires a strong pull-up, as some chips have weak internal pull-up capabilities. Therefore, it is recommended to connect it to a port with an external pull-up resistor.)

MicroProbe + SKR3



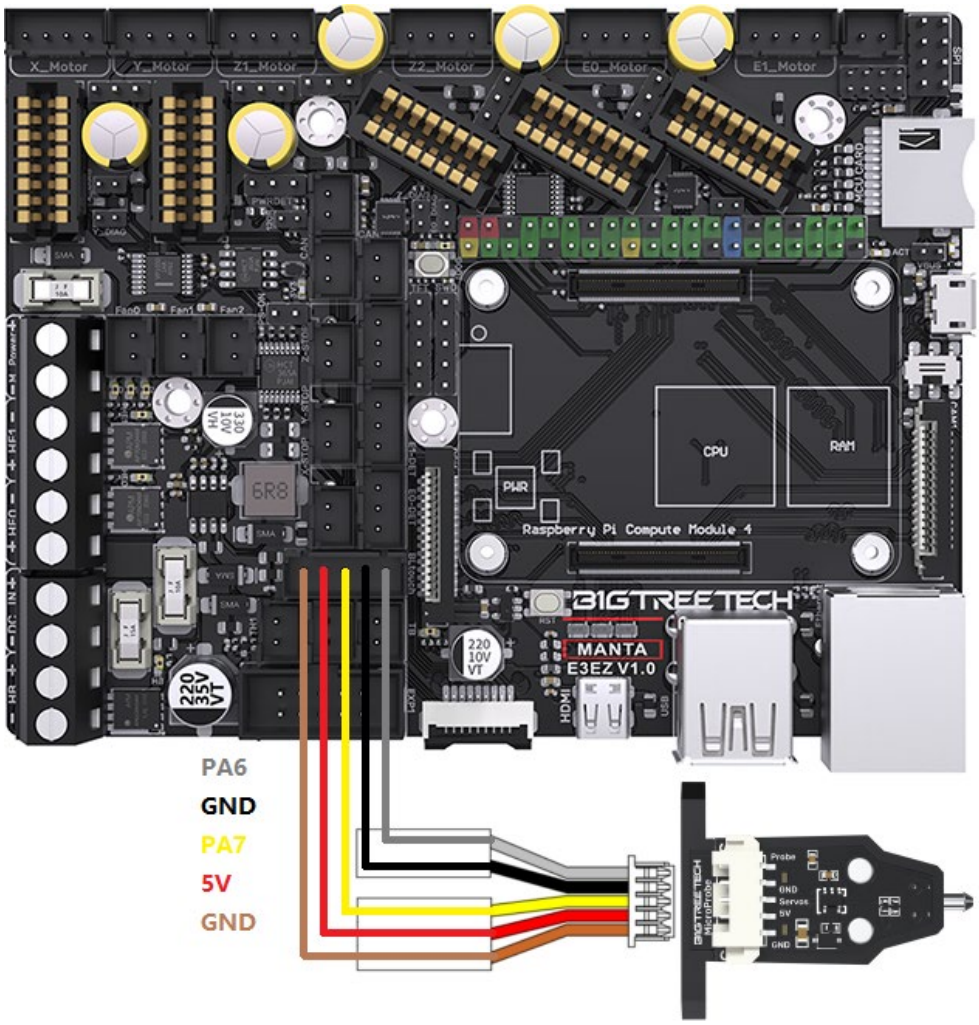
```
[output_pin probe_enable]
pin: PE5
value: 0

[gcode_macro Probe_Deploy]
gcode:
    SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
    SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PC13 # For V1 version, set to ^PC13 for high-level trigger; for V2 version, set to ^!PC13 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
    Probe_Deploy
    G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
    Probe_Stow
```

MicroProbe + SKR MINI E3 V3.0




```
[output_pin probe_enable]
pin: PA1
value: 0

[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PC14 ## For V1 version, set to ^PC14 for high-level trigger; for
V2 version, set to ^!PC14 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

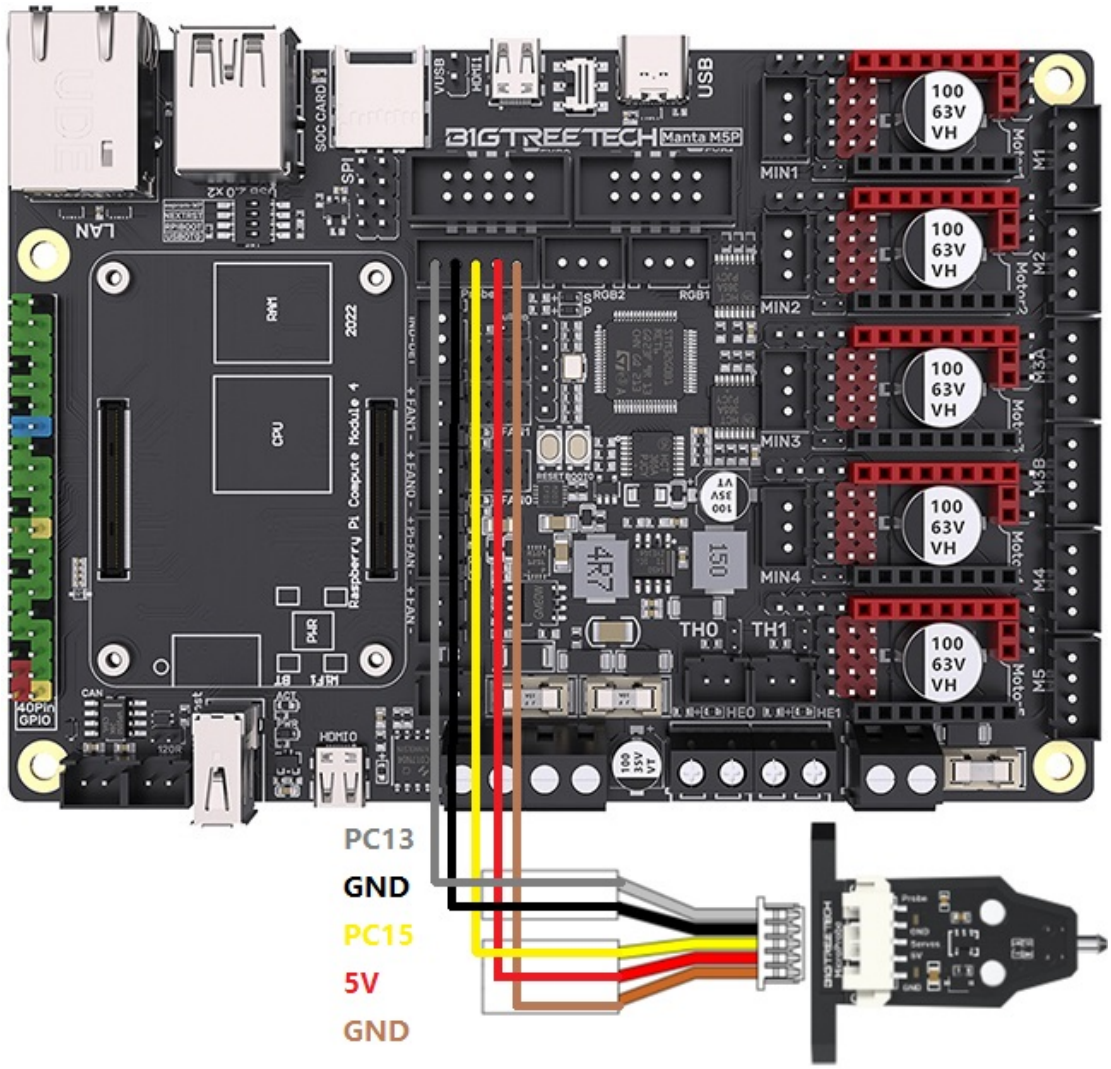
MicroProbe + MANTA E3EZ




```
[output_pin probe_enable]
pin: PA7
value: 0

[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PA6 # For V1 version, set to ^PA6 for high-level trigger; for V2 version, set to ^!PA6 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
```

```
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 #Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

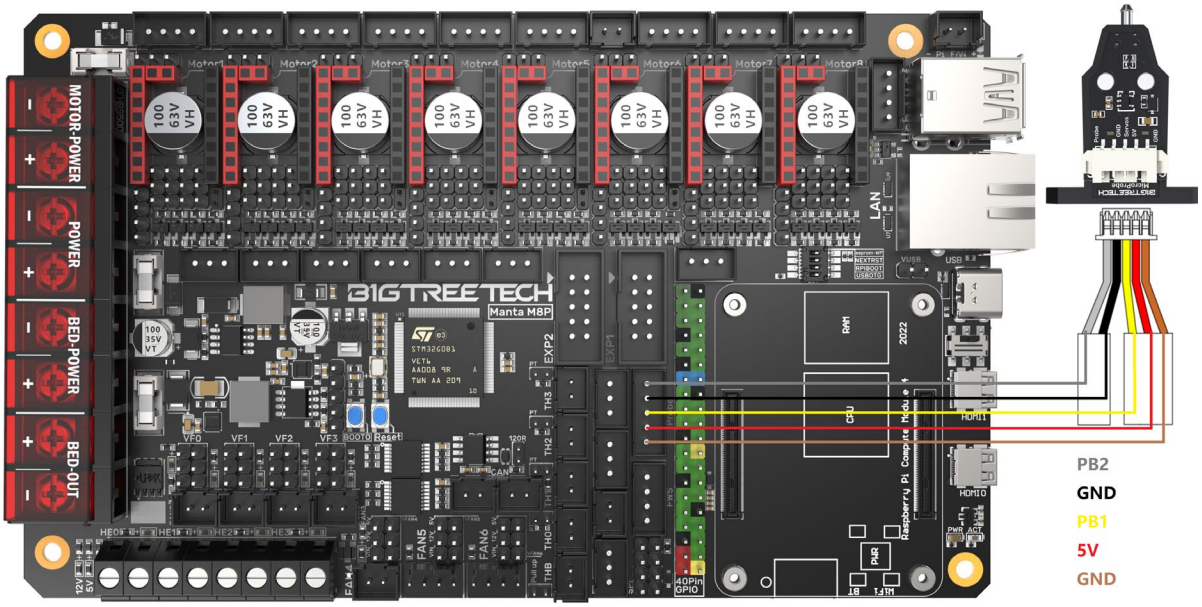
MicroProbe + MANTA M5P




```
[output_pin probe_enable]
pin: PC15
value: 0
```

```
[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PC13 # For V1 version, set to ^PC13 for high-level trigger; for
V2 version, set to ^!PC13 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation

speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

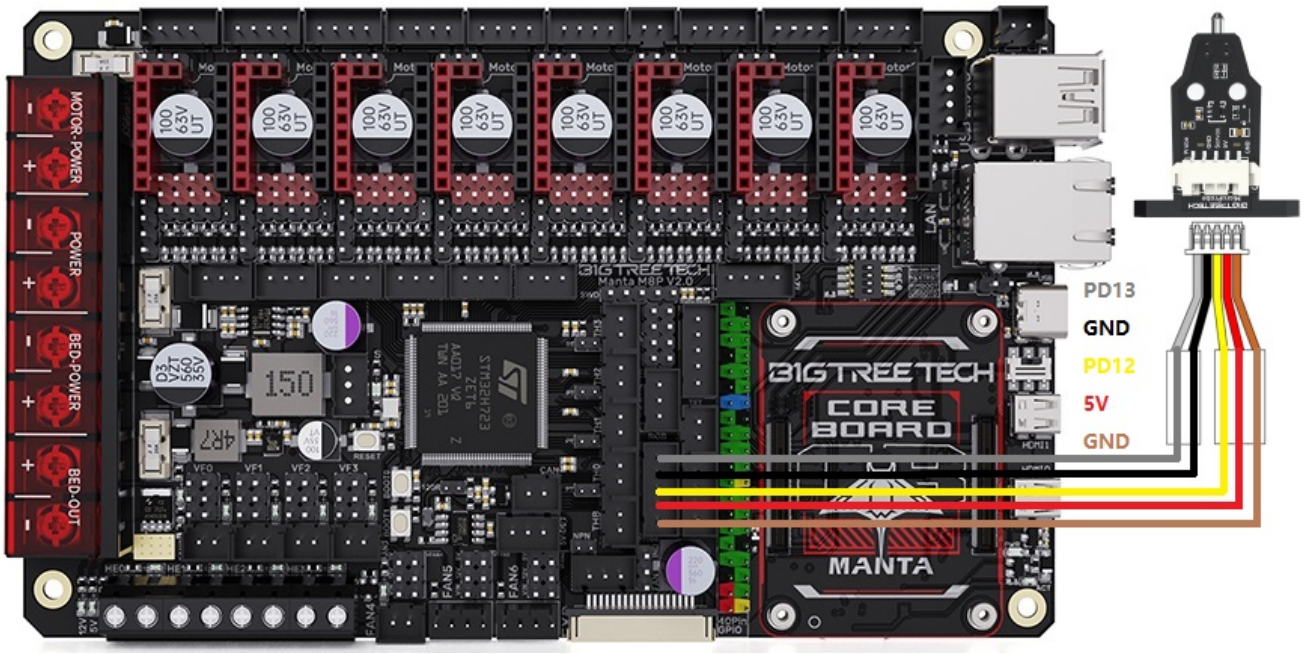
MicroProbe + MANTA M8P V1.1




```
[output_pin probe_enable]
pin: PB1
value: 0
```

```
[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PB2 # For V1 version, set to ^PB2 for high-level trigger; for V2
version, set to ^!PB2 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

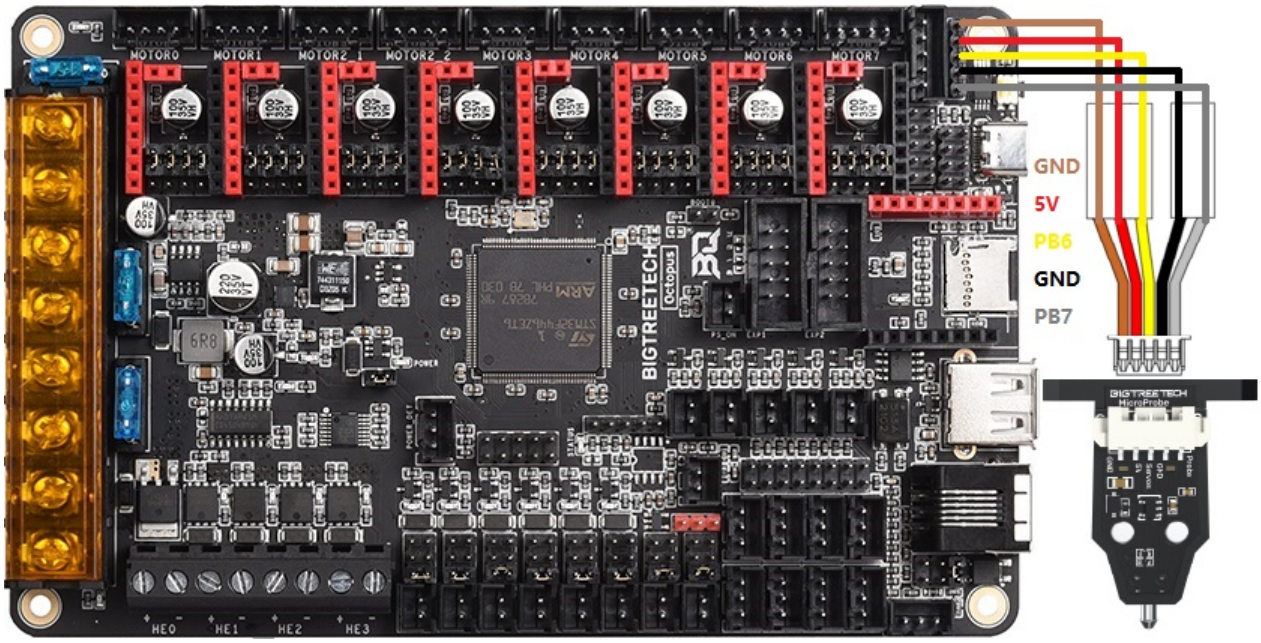
MicroProbe + MANTA M8P V2.0




```
[output_pin probe_enable]
pin: PD12
value: 0
```

```
[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PD13 #For V1 version, set to ^PD13 for high-level trigger; for V2
version, set to ^!PD13 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

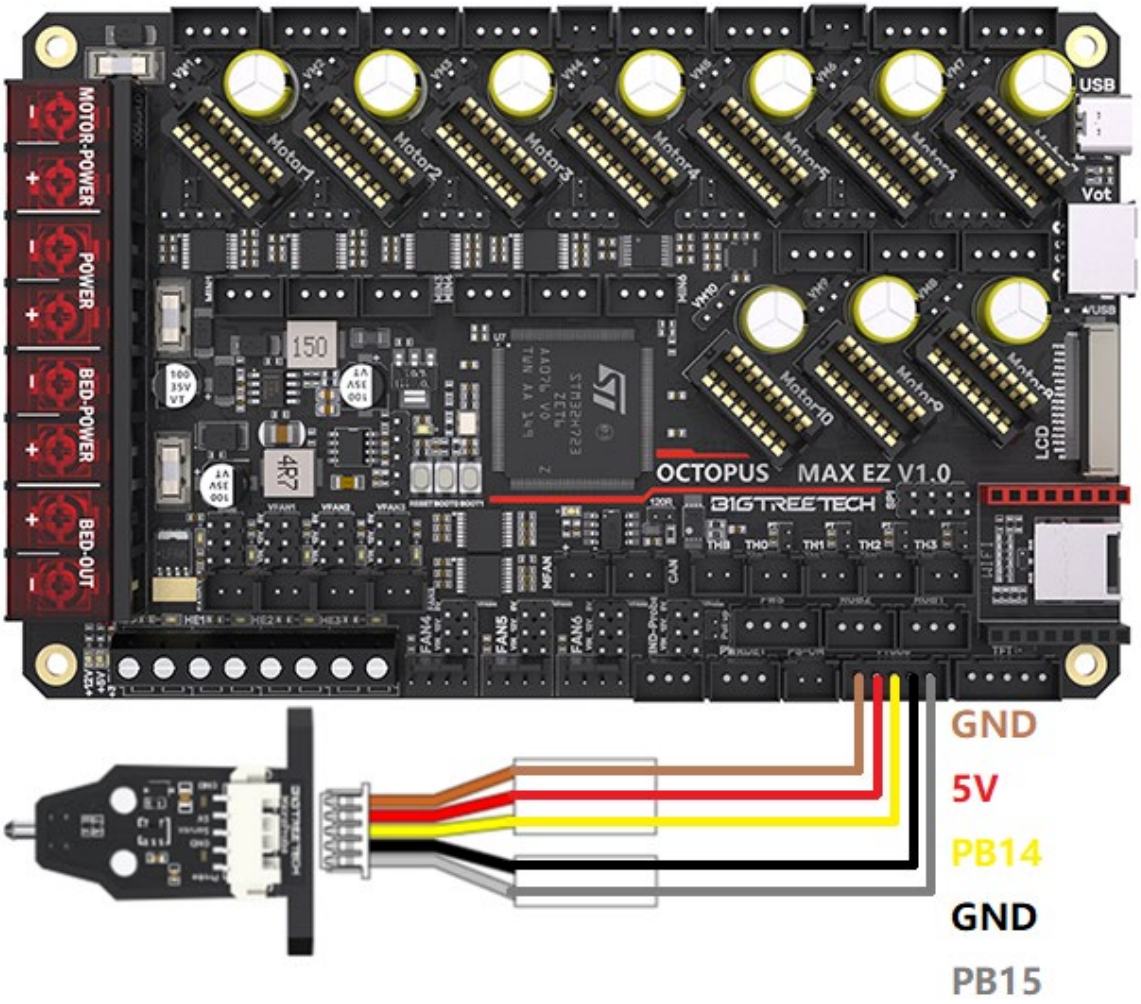
MicroProbe + Octopus（446/407）




```
[output_pin probe_enable]
pin: PB6
value: 0
```

```
[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PB7 # For V1 version, set to ^PB7 for high-level trigger; for V2
version, set to ^!PB7 for low-level trigger.

deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation

y_offset: 0.0 # Actual offset of the MicroProbe installation
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

MicroProbe + Octopus MAX EZ




```
[output_pin probe_enable]
pin: PB14
value: 0

[gcode_macro Probe_Deploy]
gcode:
      SET_PIN PIN=probe_enable VALUE=1

[gcode_macro Probe_Stow]
gcode:
      SET_PIN PIN=probe_enable VALUE=0

[probe]
pin: ^!PB15 # For V1 version, set to ^PB15 for high-level trigger; for
V2 version, set to ^!PB15 for low-level trigger.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual offset of the MicroProbe installation
y_offset: 0.0 # Actual offset of the MicroProbe installation
```

```
z_offset: 0.0 # Actual offset of the MicroProbe installation
speed: 5.0
activate_gcode:
      Probe_Deploy
      G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
      Probe_Stow
```

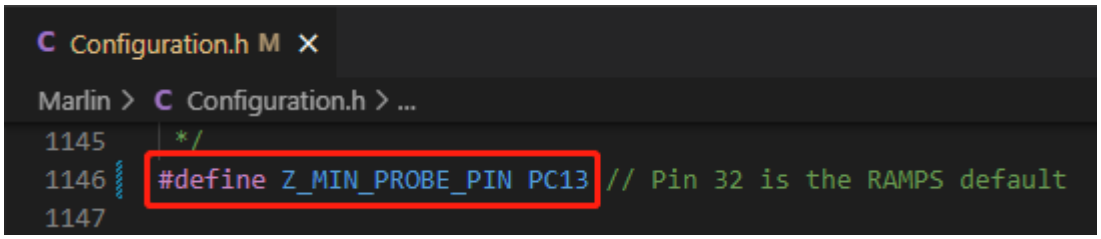
Firmware

Important

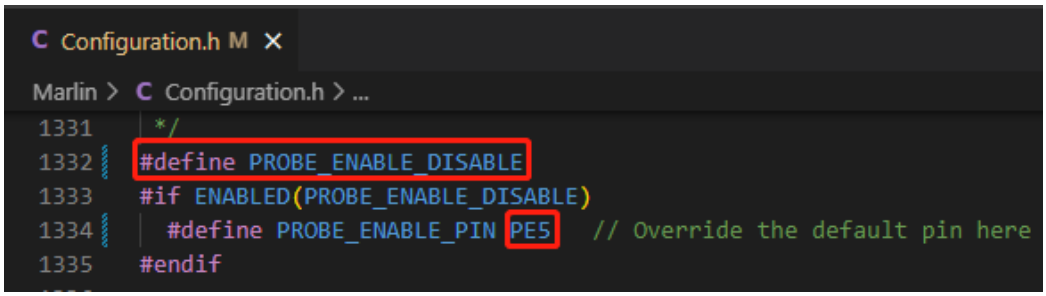
- The MicroProbe works differently than the BLTouch, so the firmware must be reconfigured for the MicroProbe otherwise unrecoverable hardware damage may occur.
- As an example for the SKR 3 board, for other boards just change the "Control (PE5), Detection (PC13)" signals to the actual IOs used.
- MicroProbe V1 and V2 versions have different trigger levels for the detection signal line. V1 triggers on high, V2 triggers on low. Configure the firmware according to the actual hardware version. For the V2 version, the detection signal line requires a strong pull-up, as some chips have weak internal pull-up capabilities. Therefore, it is recommended to connect it to a port with an external pull-up resistor.

Marlin

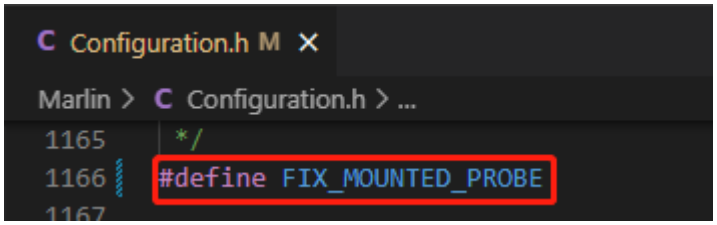
Comment out #define Z_MIN_PROBE_USES_Z_MIN_ENDSTOP_PIN, otherwise, the IO of the detection signal line will be automatically set to the IO of the Z_MIN_ENDSTOP port.



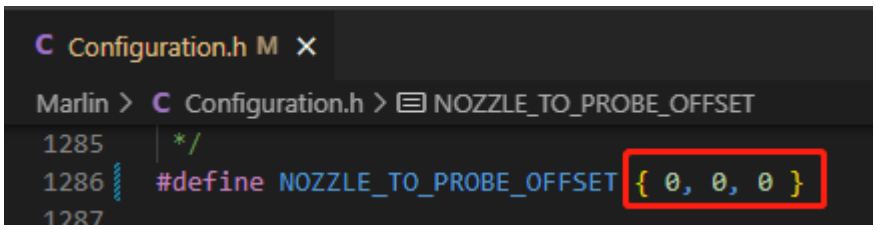
#define Z_MIN_PROBE_PIN PC13 // The detection IO on the SKR 3 is PC13



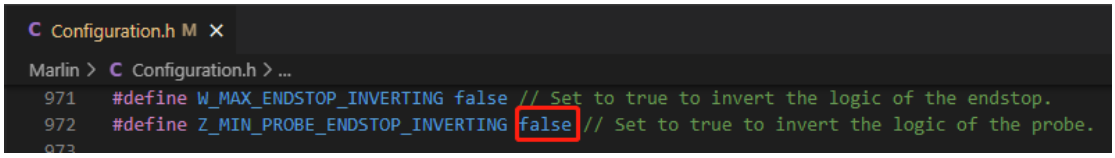
#define PROBE_ENABLE_DISABLE // Probe Enable / Disable
#define PROBE_ENABLE_PIN PE5 // The control IO on the SKR 3 is PE5



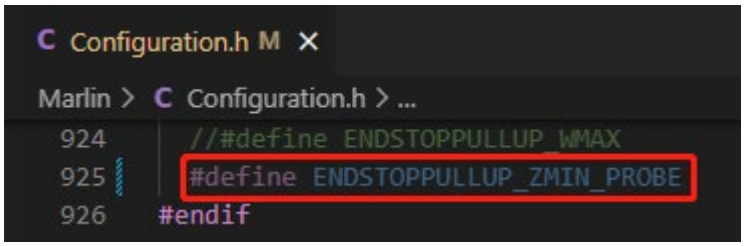
#define FIX_MOUNTED_PROBE // Set the type of leveling sensor



#define NOZZLE_TO_PROBE_OFFSET { 0, 0, 0 } // Actual installed offset of MicroProbe



#define Z_MIN_PROBE_ENDSTOP_INVERTING false // Detection signal line, V1 should be false means high-level triggered, V2 should be true means low -level triggered.



#define ENDSTOPPULLUP_ZMIN_PROBE // The detection signal is open-drain output, and a pull-up resistor needs to be set.

Klipper

[output_pin probe_enable]

pin: PE5 # The control IO on the SKR 3 is PE5

value: 0 # Probe default retracted

Probe deploy command

[gcode_macro Probe_Deploy]

gcode:

SET_PIN PIN=probe_enable VALUE=1

Probe stow command

[gcode_macro Probe_Stow]

gcode:

SET_PIN PIN=probe_enable VALUE=0

[probe]

```
pin: ^PC13 # The detection IO on the SKR 3 is PC13, V1 should be ^PC13 means high-level triggered, V2 should be ^!PC13 means low -level triggered.
deactivate_on_each_sample: False
x_offset: 0.0 # Actual installed offset of MicroProbe
y_offset: 0.0 # Actual installed offset of MicroProbe
z_offset: 0.0 # Actual installed offset of MicroProbe
speed: 5.0
activate_gcode:
    Probe_Deploy
    G4 P500 # Allow 500 milliseconds for the probe to deploy
deactivate_gcode:
    Probe_Stow
```

Refer to https://www.klipper3d.org/Probe_Calibrate.html
And https://www.klipper3d.org/Bed_Level.html#the-paper-test

Z offset

The Z offset calibration process is a bit complex, so let's go through it step-by-step.

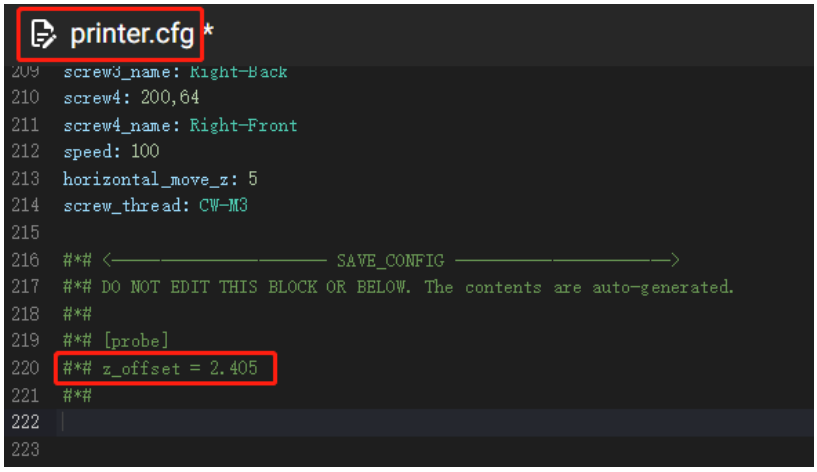
First, home the machine and start the calibration procedure by running "G28" then "PROBE_CALIBRATE" in the console.

Next, place a piece of A4 paper between the nozzle and bed. Run "TESTZ Z=-0.1" in the console to move the nozzle down 0.1mm. Use negative values to move down and positive values to move up. Adjust the value based on the actual nozzle height.

Move the nozzle down until it just presses against the paper with some friction but does not damage the paper. At this point the height is perfect.

Run "ACCEPT" then "SAVE_CONFIG" in the console to accept and save the z offset value to the printer.cfg file.

After restarting klipper, check the end of printer.cfg to see the actual z offset height from calibration.



bed_mesh

speed: 50

The speed (in mm/s) of non-probing moves during the calibration

horizontal_move_z: 5

The height (in mm) that the head should be commanded to move to

just prior to starting a probe operation.

mesh_min: 10, 10

Defines the minimum X, Y coordinate of the mesh for rectangular
beds. This coordinate is relative to the probe's location. This
will be the first point probed, nearest to the origin. This
parameter must be provided for rectangular beds.

mesh_max: 220, 220

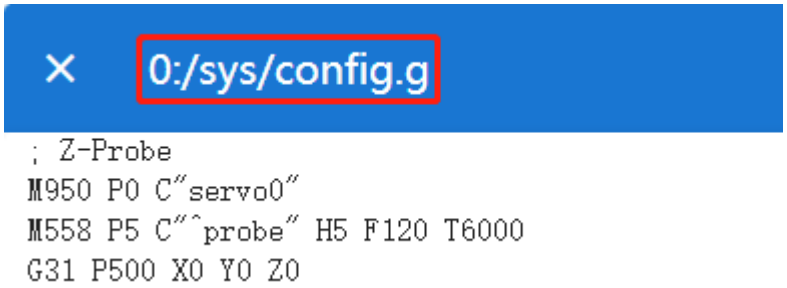
Defines the maximum X, Y coordinate of the mesh for rectangular
beds. Adheres to the same principle as mesh_min, however this will
be the furthest point probed from the bed's origin. This parameter
must be provided for rectangular beds.

probe_count: 5, 5

For rectangular beds, this is a comma separate pair of integer
values X, Y defining the number of points to probe along each
axis. A single value is also valid, in which case that value will
be applied to both axes.

Refer to https://www.klipper3d.org/Config_Reference.html#bed_mesh

RRF

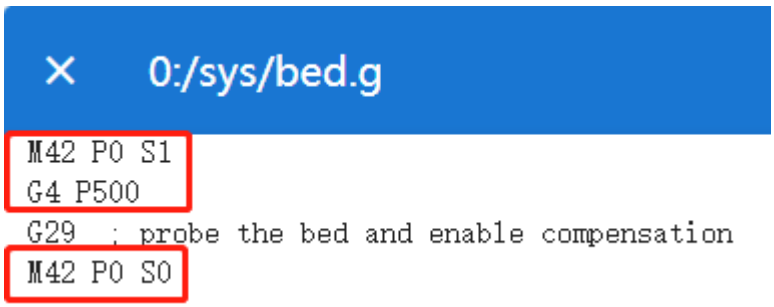


The name of SKR 3 control IO in RRF firmware is "servo0"

M950 P0 C"servo0"
The name of SKR 3 detection IO in RRF firmware is "probe", set as pull-up input

M558 P5 C"^probe" H5 F120 T6000
V1 should be **"^probe"** means high-level triggered, V2 should be **"^!probe"** means low-level triggered

G31 P500 X0 Y0 Z0; Actual installed offset of MicroProbe



M42 P0 S1; Probe deploy command

G4 P500; Allow 500 milliseconds for the probe to deploy

G29; probe the bed and enable compensation

M42 P0 S0; Probe stow command