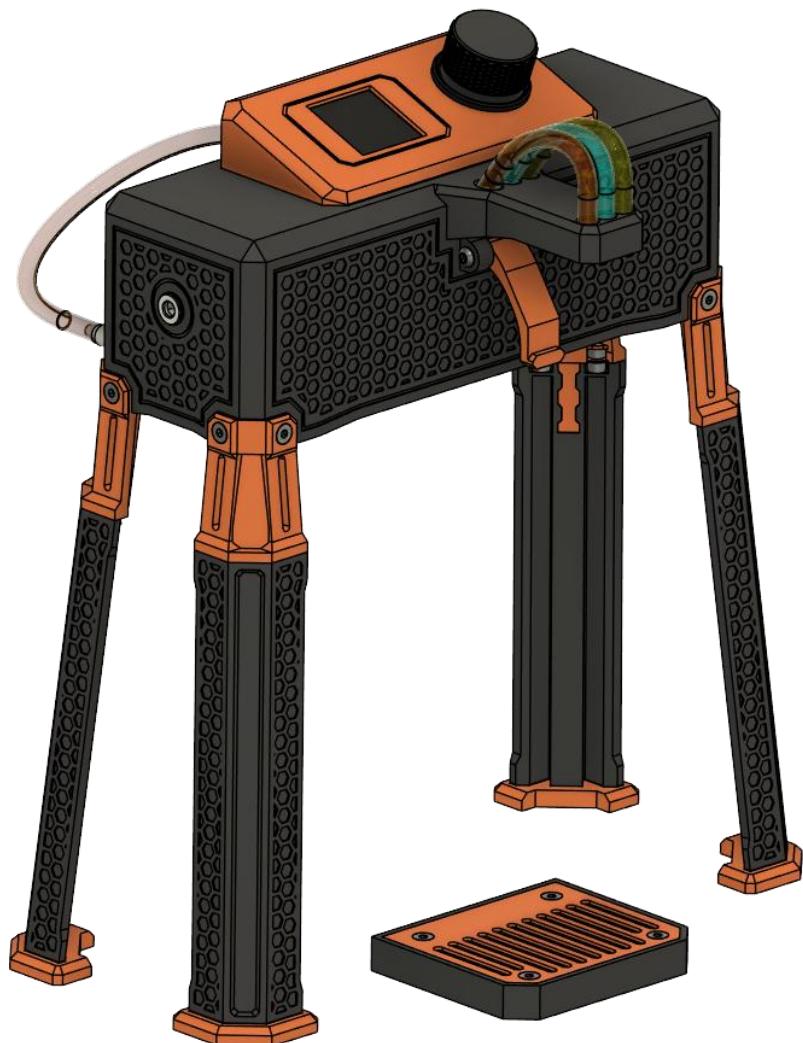


# COCKTAILCUBE

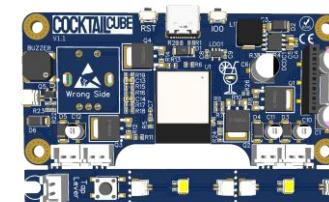


## COCKTAIL CUBE BUILD GUIDE

Version 13.02.2025

### INTRODUCTION:

This manual is intended for you if you have purchased the special **CocktailCube circuit board** (CocktailCube PCB).



# PROLOG



Before you begin on your journey, a word of caution.

In the comfort of your own home, you are about to assemble a robot. This machine can burn or electrocute you if you are not careful. Please do not become the first **CocktailCube** fatality. There is no special Reddit flair for that.

Please, read the entire manual before you start assembly.

Most of all, good luck!

THE COCKTAILCUBE TEAM

Finally, thank you to Christoph, Kai and Jakob who always support my work.

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# INTRODUCTION

## PART PRINTING GUIDELINES

We recommend you follow these Guidelines.

### 3D PRINTING PROCESS:

Fused Deposition Modeling (FDM)

### MATERIAL:

PLA / ABS

### LAYER HEIGHT:

Recommended: 0.2mm

### EXTRUSION WIDTH:

Recommended: Forced 0.4mm

### INFILL TYPE:

Gyroid

### INFILL PERCENTAGE:

Recommended: 40%

### WALL COUNT:

Recommended: 4

### SOLID TOP/BOTTOM LAYERS:

Recommended: 5

## FILE NAMING

By this time, you should have already downloaded our STL/3MF files. You might have noticed that we have used a unique naming convention for the files. This is how to use them.

### PRIMARY COLOR:

Example: ControlPanelRing.3mf

These files will have nothing at the start of the filename.

### ACCENT COLOR:

Example: [a]\_Controlpanel\_PCB.3mf

We have added “[a]” to the front of any STL file that is intended to be printed with accent color.

### QUANTITY REQUIRED:

Example: [a]\_Foot\_x4.3mf

If any file ends with “\_x#”, that is telling you the quantity of that part required to build the machine.

### SUPPORT AND MULTIMATERIAL:

Example: [MM]\_Housing.3mf

All files will print **without support**, if your 3D printer is well calibrated!

Except for the file of the housing. The "support structure above print bed" must be activated there!

In addition, you will notice the [MM]. The housing can be printed as a multi-material. No color changer is necessary for this. See the chapter "Print housing multimaterial" for more information.

# OVERVIEW OF TOOLS

## TOOLS YOU WILL NEED

You will need the following tools. You should also be familiar with them and know how to use them.

SOLDERING IRON



SCREWDRIVER



SOLDERING TIN



SCALPEL



STRING CUTTER



SUPER-GLUE



# PARTS LIST

You can source your parts from Amazon, AliExpress, eBay or from your local parts store.



Part	Properties	Quantity	Description
M3x25 BHCS	Lens head, M3, 25mm	1	Mounting the lever handle (1x)
M3x6 BHCS	Lens head, M3, 6mm	15	Mounting the control panel (4x) / main PCB (4x) / tap lever PCB (1x) / pumps (6x)
M3x8 FHCS	Countersunk head, M3, 8mm	24	Mounting the lid (8x) / feet (8x) / feet extender bottom (4x) / drip tray (4x)
M8 hex nut	M8, height 6.5mm	4	Weight of the drip tray (4x)
Magnets	M3, OD ø5mm, height 3mm	16	Magnets for feet (8x) / feet extender (8x)
M3x4x4mm heat set insert	M3, OD ø4mm, length 4mm	40	Screw holes: control panel (4x) / main PCB (4x) / tap lever PCB (1x) / lever handle (1x) / lid (8x) / pumps (6x) / feet (8x) / feet extender (4x) / drip tray (4x)
Tube	OD ø5mm, ID ø3mm	3m	Tubing between bottles and CocktailCube
Stainless steel straws	OD ø5-6mm, length ~240mm, straight	3	Extension of the tubing
DC jack	OD ø7mm, input interface 5.5x2.5mm	1	Connector for power supply
24V 6A Power supply	24V 6A, EU/US/CN Plug, output interface 5.5x2.5mm	1	Power supply
GMT130-V1.0 display	IPS 240x240, 1.3" variant	1	Display
12V Pumps	12V, OD ø5mm tube, ID ø3mm tube, 150-160 ml/min	3	Peristaltic pumps
<b>CocktailCube PCB</b>	Custom PCB	1	Main PCB for CocktailCube
Wire Main PCB – LEDs	JST SH Wire	2	See cable specification, chapter "Electronics"
Wire Main PCB – Tap Lever	JST XH Wire	1	See cable specification, chapter "Electronics"
Wire Main PCB – Pumps	JST XH Wire	3	See cable specification, chapter "Electronics"
Wire Main PCB – DC Power Jack	JST XH Wire	1	See cable specification, chapter "Electronics"

# PARTS LIST

## WHAT PUMP TO BUY:

With 3mm ID and 5mm OD tube



Volt: DC 12V  
Tube size: 3\*5mm  
Flow rate: 150 ml/min (max)  
Turning speed: 0.1-60 rpm  
Driver size (Φx H): Dia. 32mm x Height 23mm  
Install hole: 48.5mm

# CHOOSE YOUR DESIGN

## CHOOSE YOUR DESIGN

You have different designs to choose from for your CocktailCube 3D print.

Variant: Clean



Variant: WineBar



Variant: CocktailCube



Variant: WildBerry



Variant: AperolSpritz



Variant: HugoSpritz



Variant: Aperolic



Variant: Aperoliker



Select your variant for 3D printing.

# PRINT HOUSING MULTIMATERIAL

## PRINT HOUSING

It is possible to print the housing with two colors without a multi material unit or color changer like the Prusa MMU or Bambu Lab AMS. The .3mf files are designed to print them as is, in two separate consecutive printing operations.

### Step 1:

Slice two different files. The first one only containing the characters and the second with the remaining enclosure.

### Step 2:

Print the first file with the accent color you are using.

### Step 3:

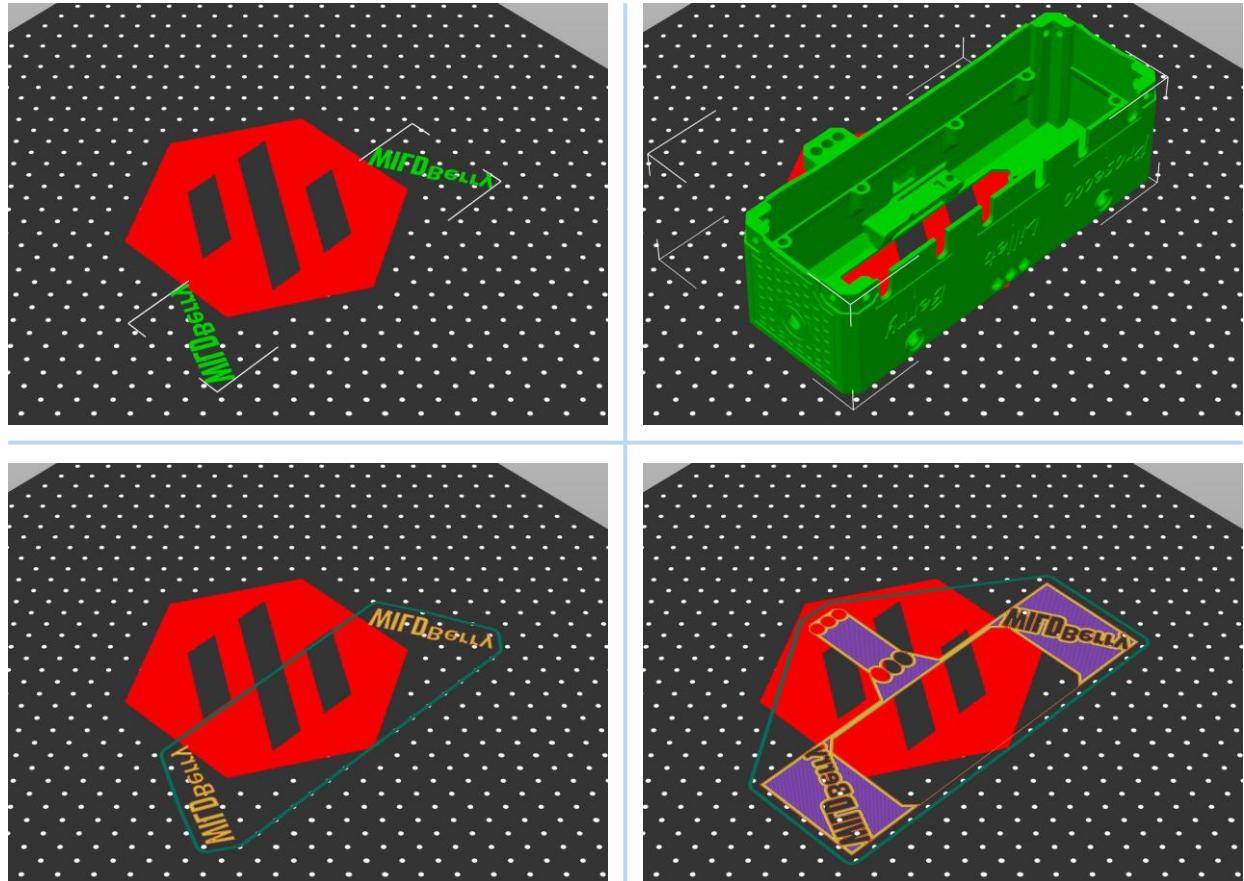
Directly after the end of printing, go to the printer settings and set the bed temperature back to 55°C (PLA). This will prevent the printed characters from cooling down and from detaching from the print bed.

### Step 4:

Remove the skirt from the printer bed and change filament manually to your primary color.

### Step 5:

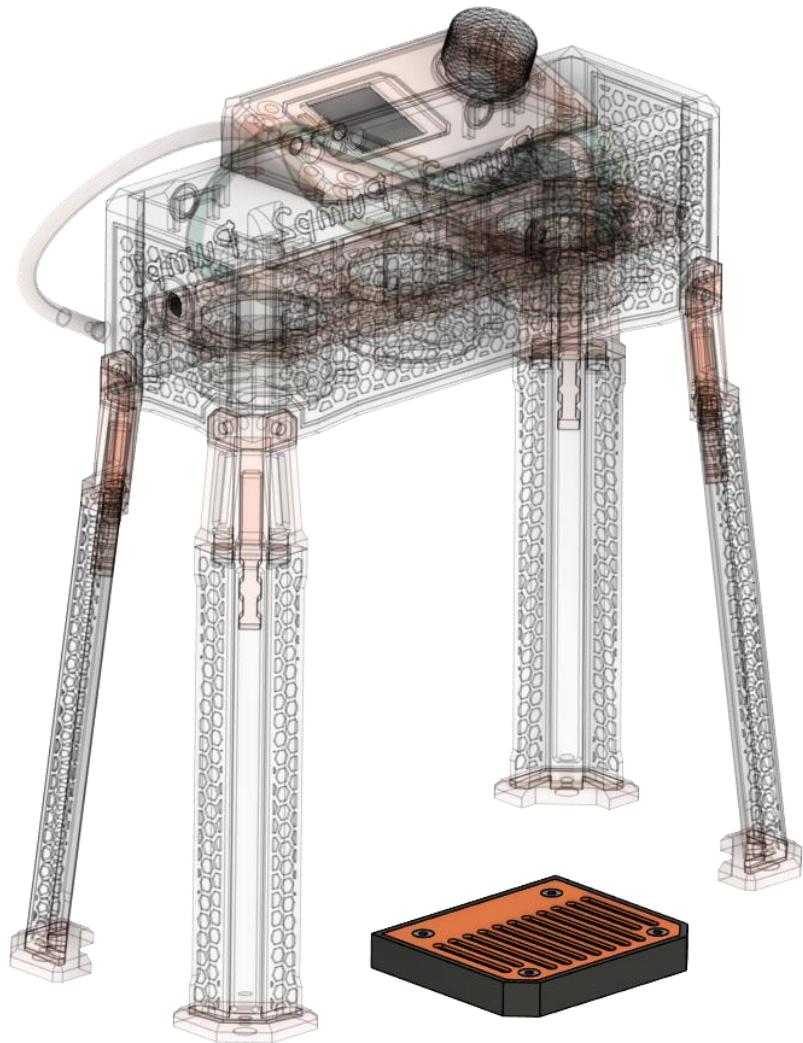
Print second file. The printer will wrap the letters and fuse them into a single first layer.



## PRACTICE MAKES PERFECT

It's a bit challenging and you have to exercise patience and also start one or two more attempts. But it works and the result is stunning!

## DRIP TRAY



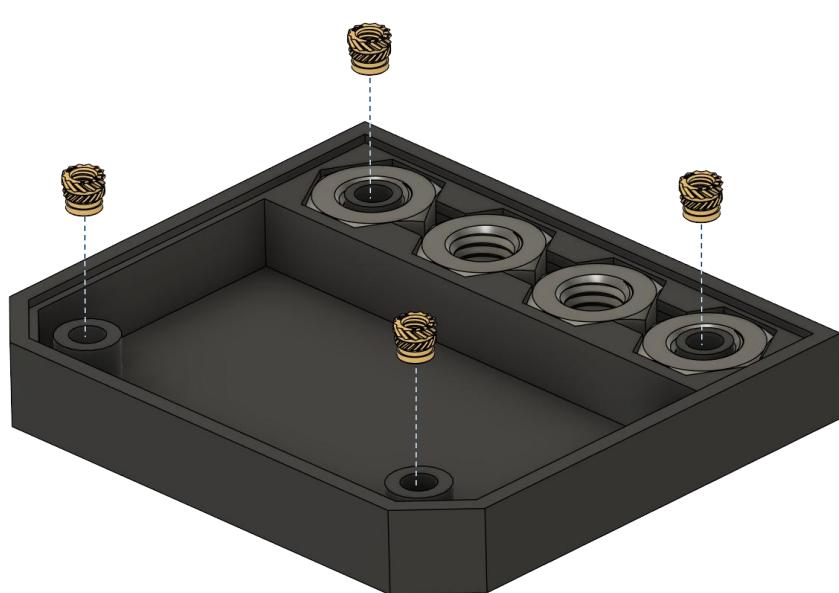
## DRIP TRAY ASSEMBLY

---

## DRIP TRAY



## DRIP TRAY



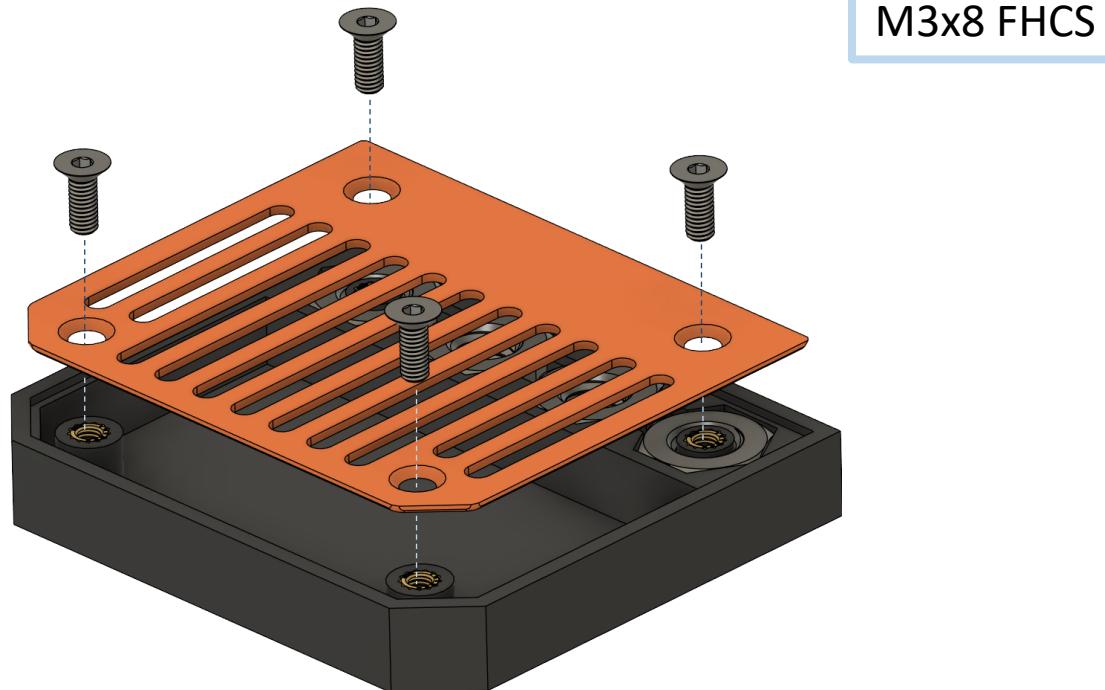
M3x4mm Heat Set Inserts

### HEAT SET INSERTS

This design relies heavily on heat set inserts. Make sure you have the proper inserts (check the hardware reference for a close-up picture and the BOM for dimensions).

If you've never worked with heat set inserts before we recommend you watch a video guide before.

## DRIP TRAY



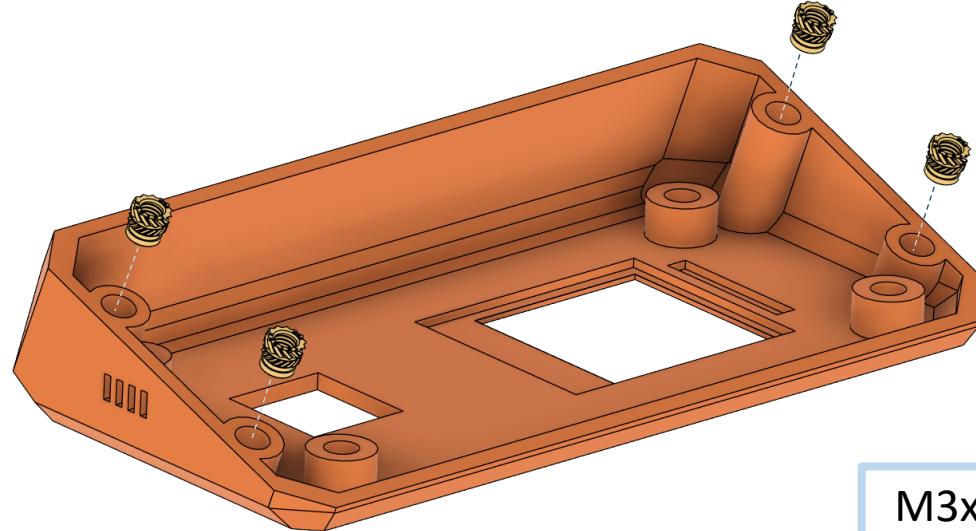
## CONTROL PANEL



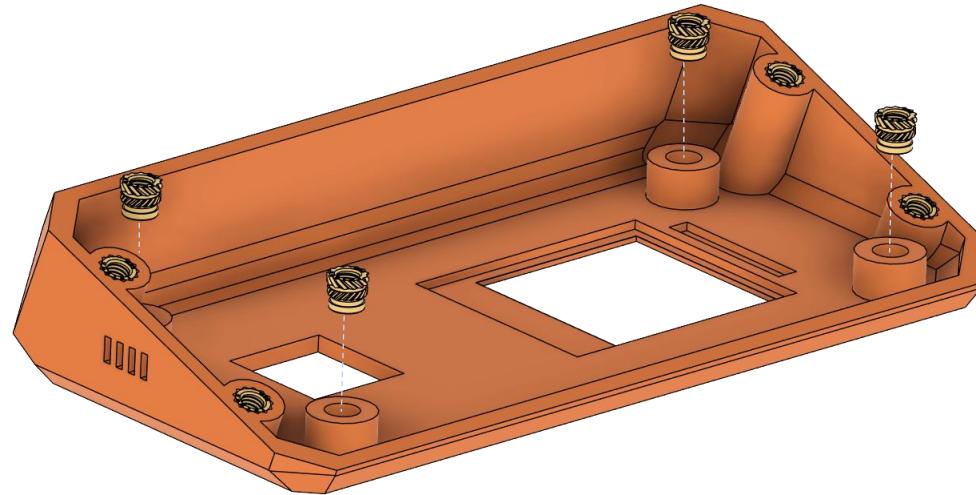
## CONTROL PANEL ASSEMBLY

---

## CONTROL PANEL

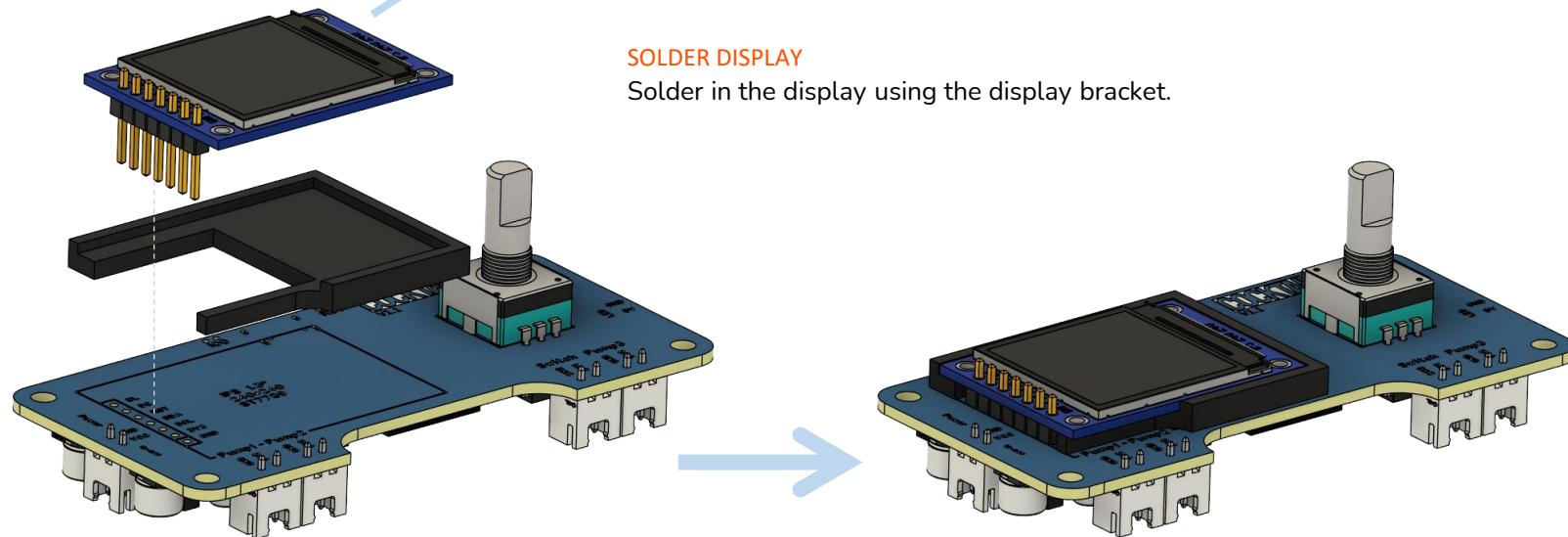


M3x4mm Heat Set Inserts



## CONTROL PANEL

Display 1.3" IPS 240x240



### SOLDER DISPLAY

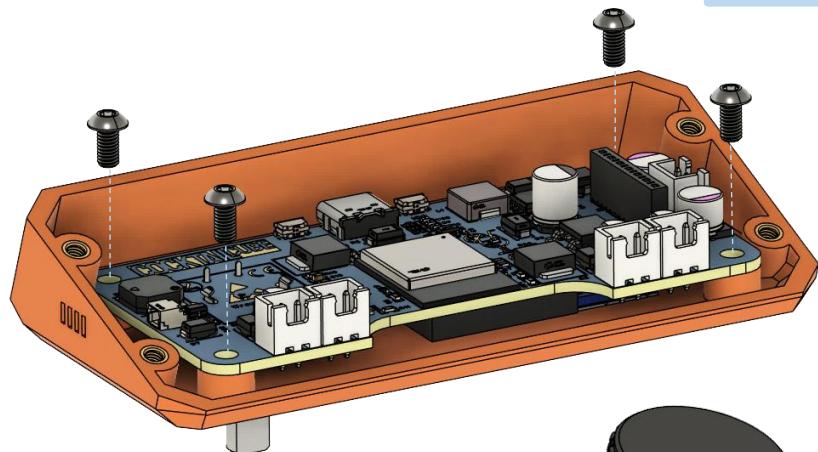
Solder in the display using the display bracket.

### GLUE INTO PLACE

Use a **very small drop** of a fast-acting glue, like super-glue, to secure the display bracket in place.

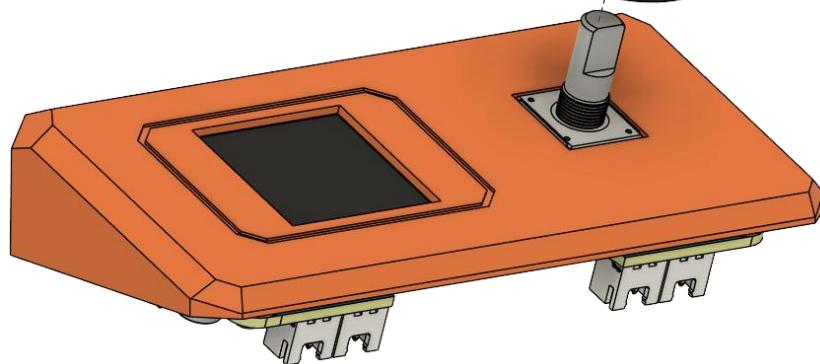
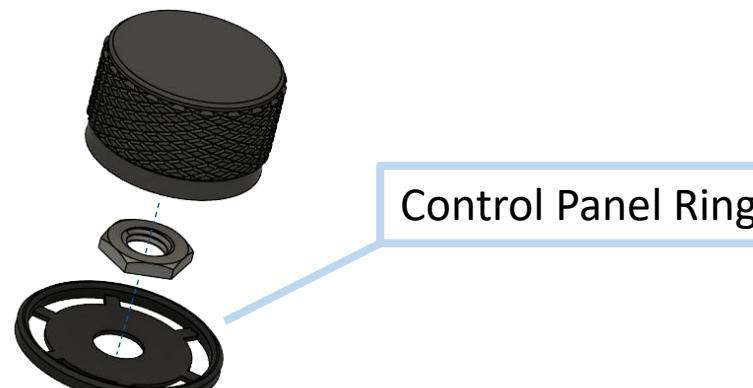
## CONTROL PANEL

M3x6 BHCS



### TIP:

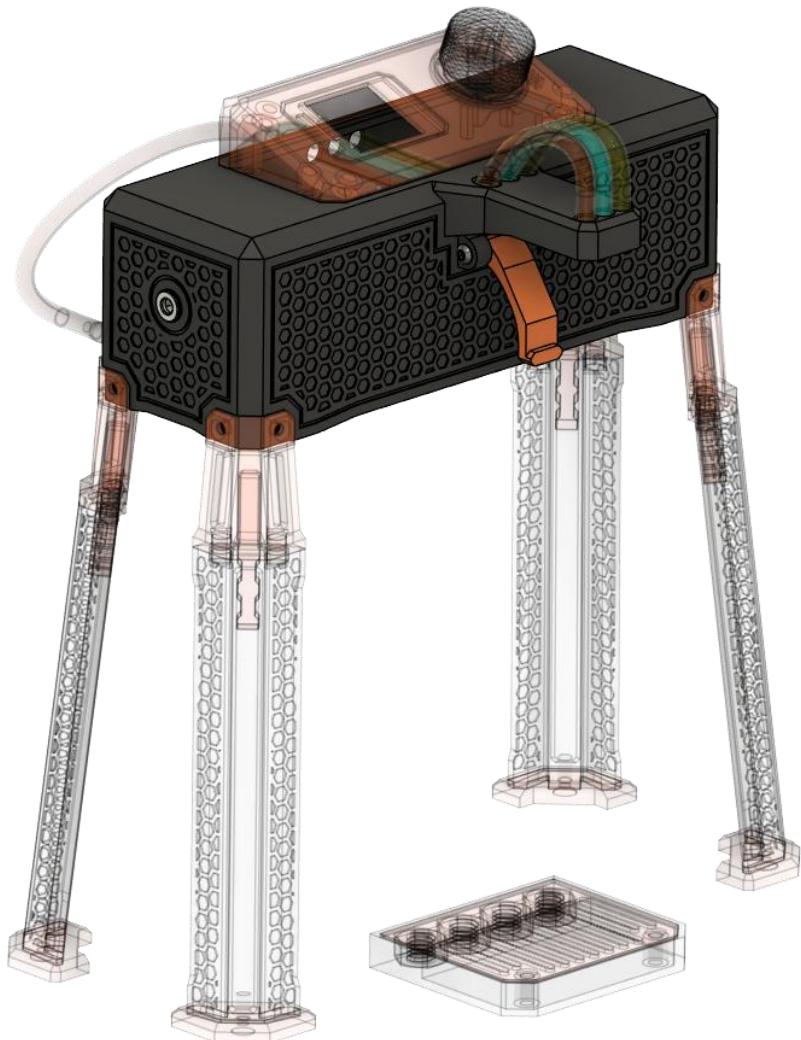
If you are not using the “Debug” ControlPanel variant, make sure that **you have flashed the firmware** before installing the circuit board. See chapter “Firmware”.



### PRESS FIT

The rotary knob should hold by friction. The nut is included with the rotary encoder.

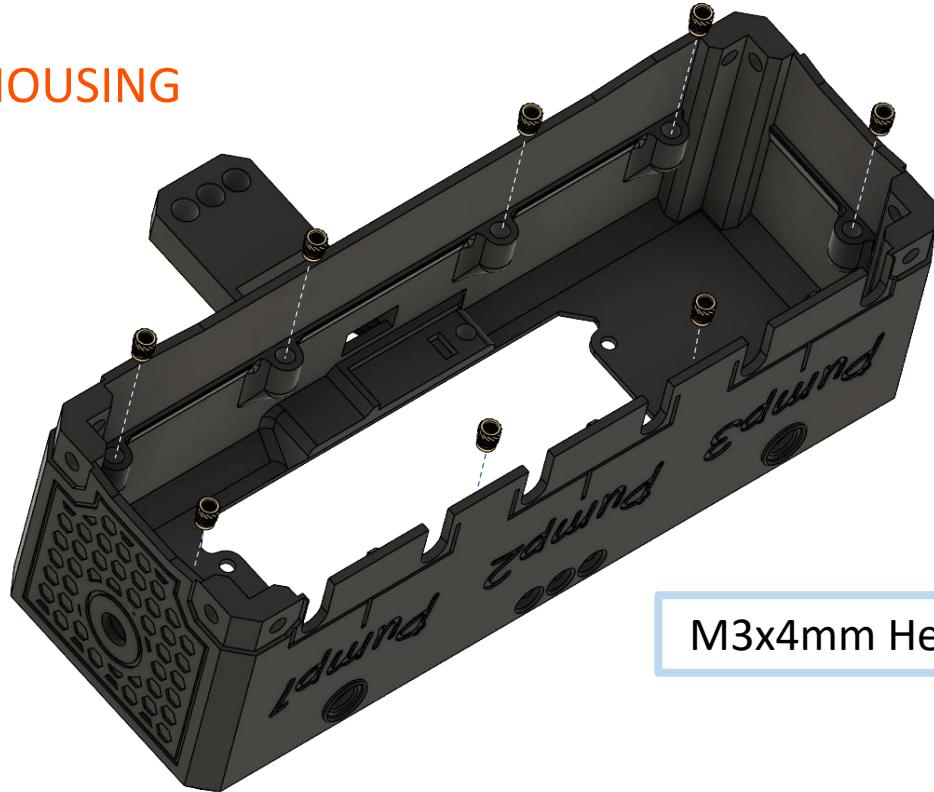
HOUSING



HOUSING ASSEMBLY

---

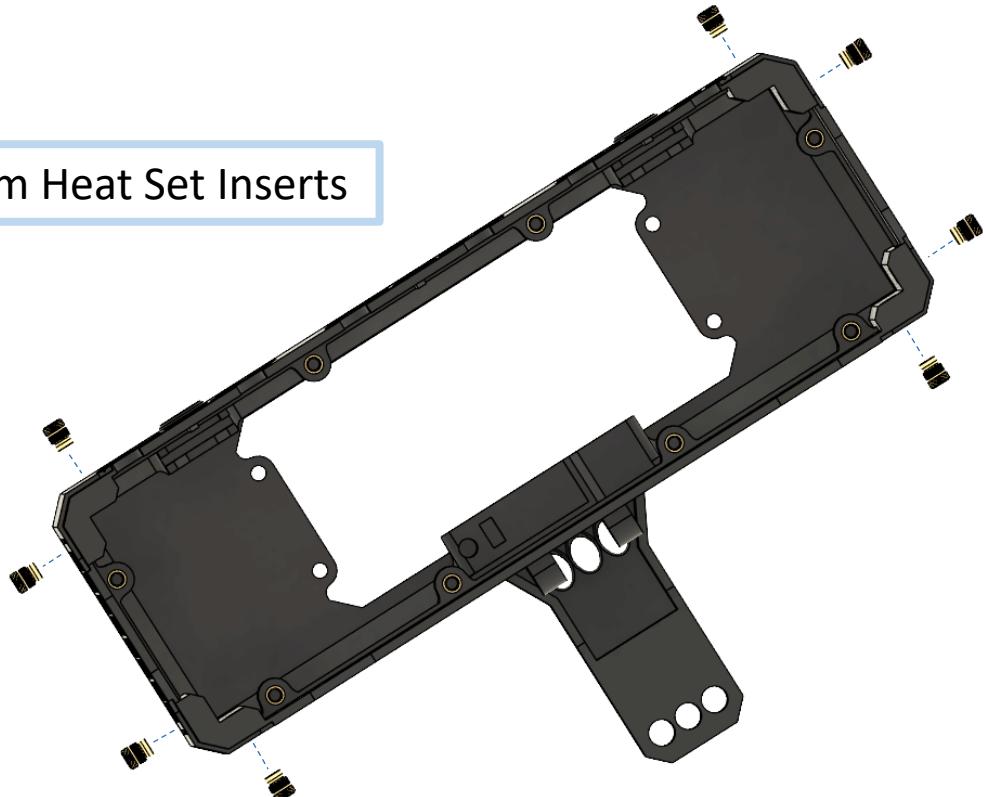
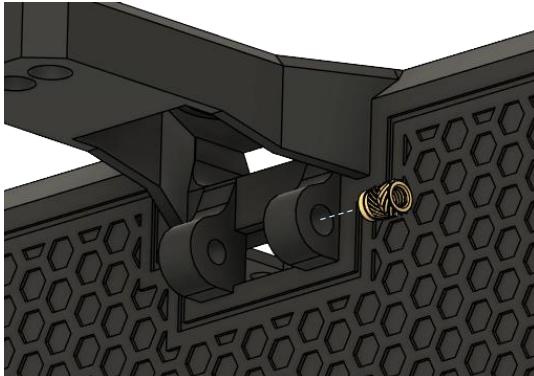
## HOUSING



TIP:

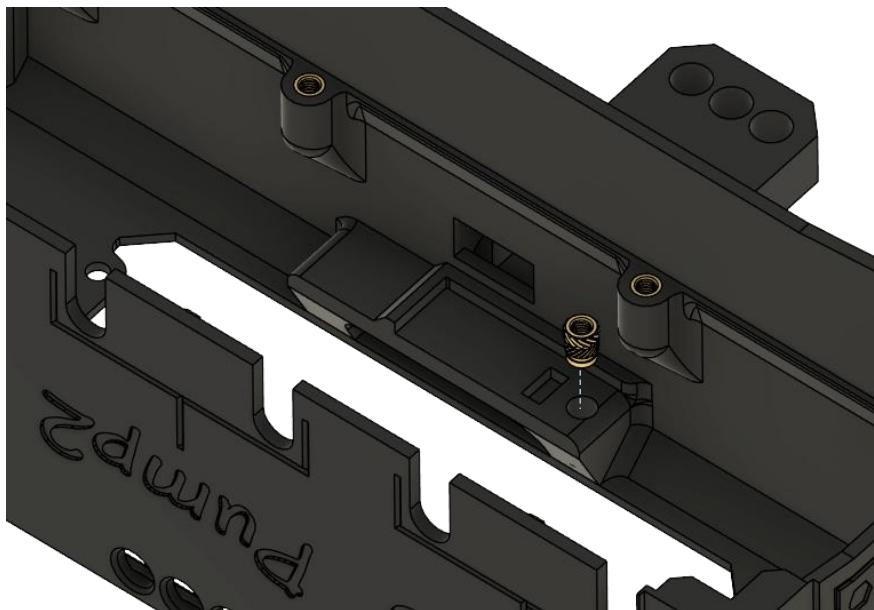
If you printed with PLA, do not apply  
to much heat.

M3x4mm Heat Set Inserts

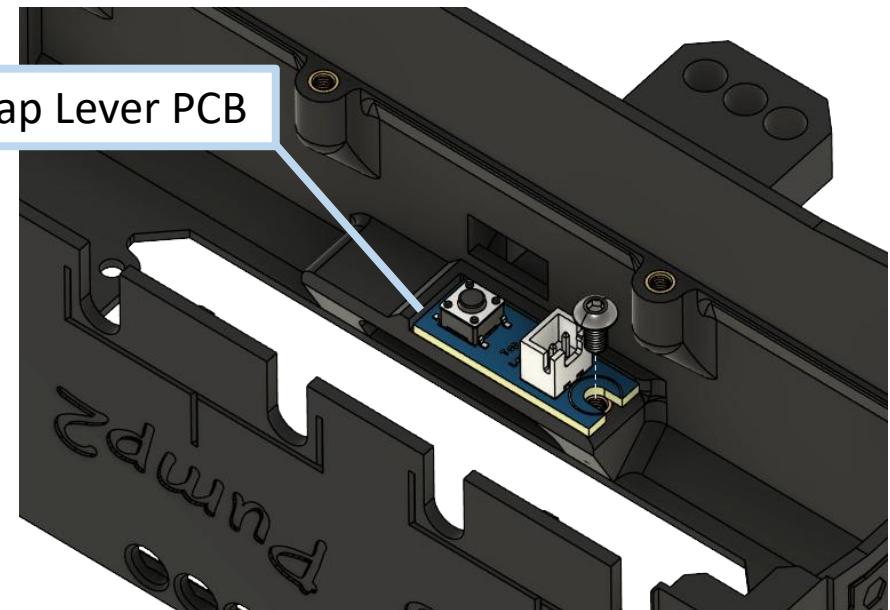


## HOUSING

M3x4mm Heat Set Insert



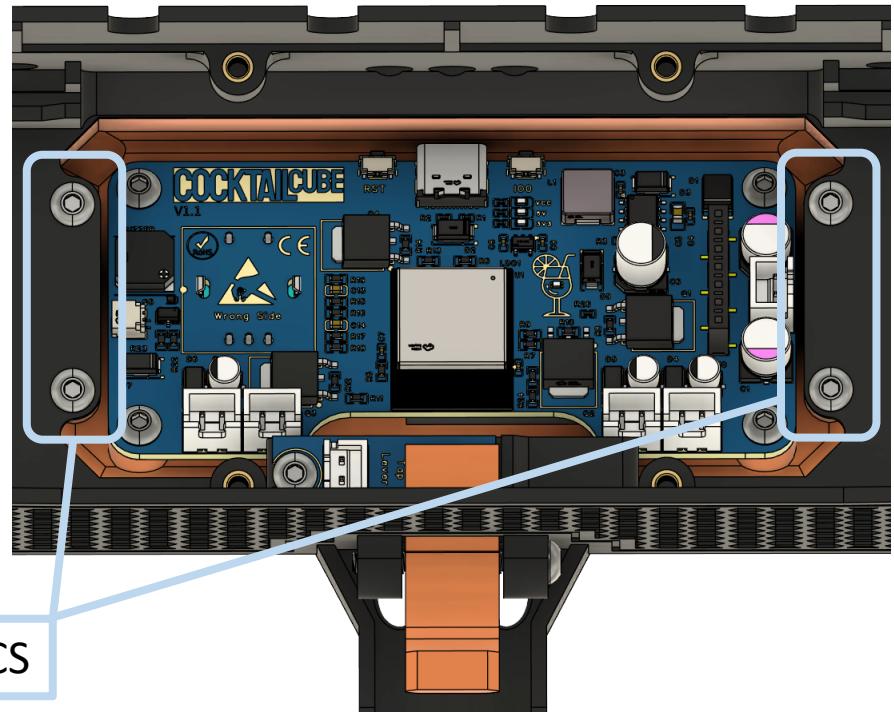
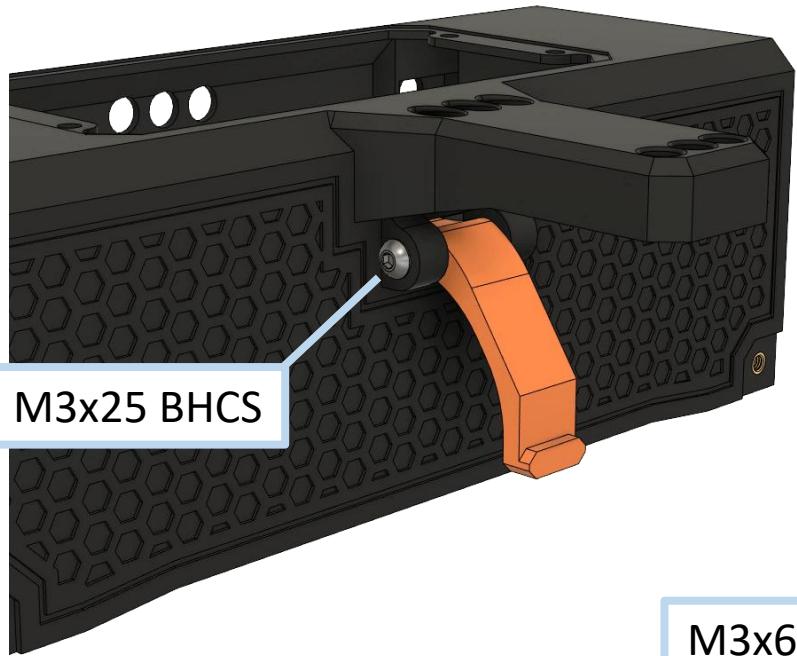
M3x6 BHCS



### SCREW INTO PLACE

Tighten the tap lever PCB with the screw.

## HOUSING

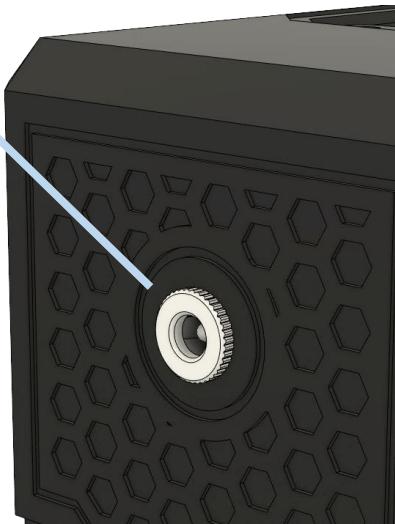


TIP:

Make sure you have connected the cable to the power LED output. See chapter 'Electronics'.

## HOUSING

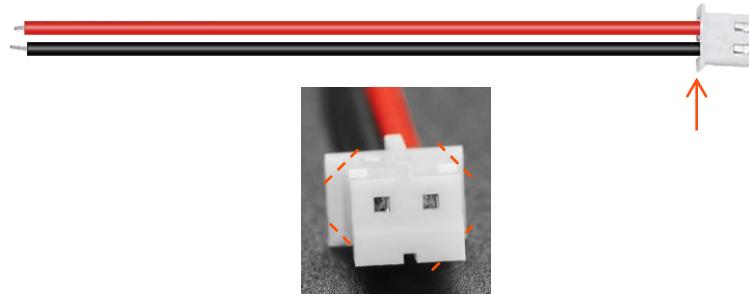
DC Connector Jack



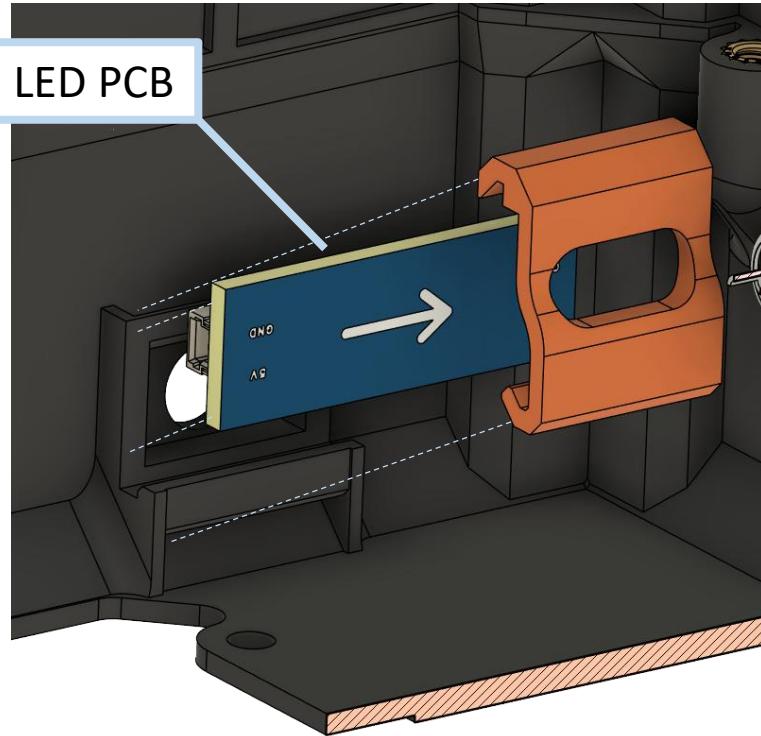
TIP:

Make sure that you have soldered the cables before installing the DC socket. See chapter 'Electronics'.

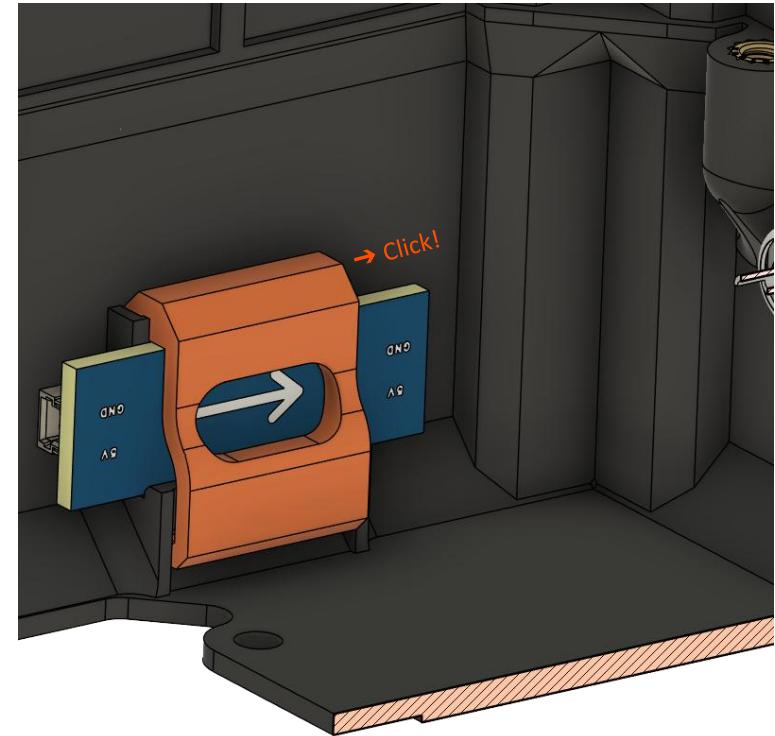
If the cable is already soldered to the DC socket and the connector does not fit through the hole in the housing, simply clip off the top corners of the JST XH connector housing.



## HOUSING



REPEAT 2X



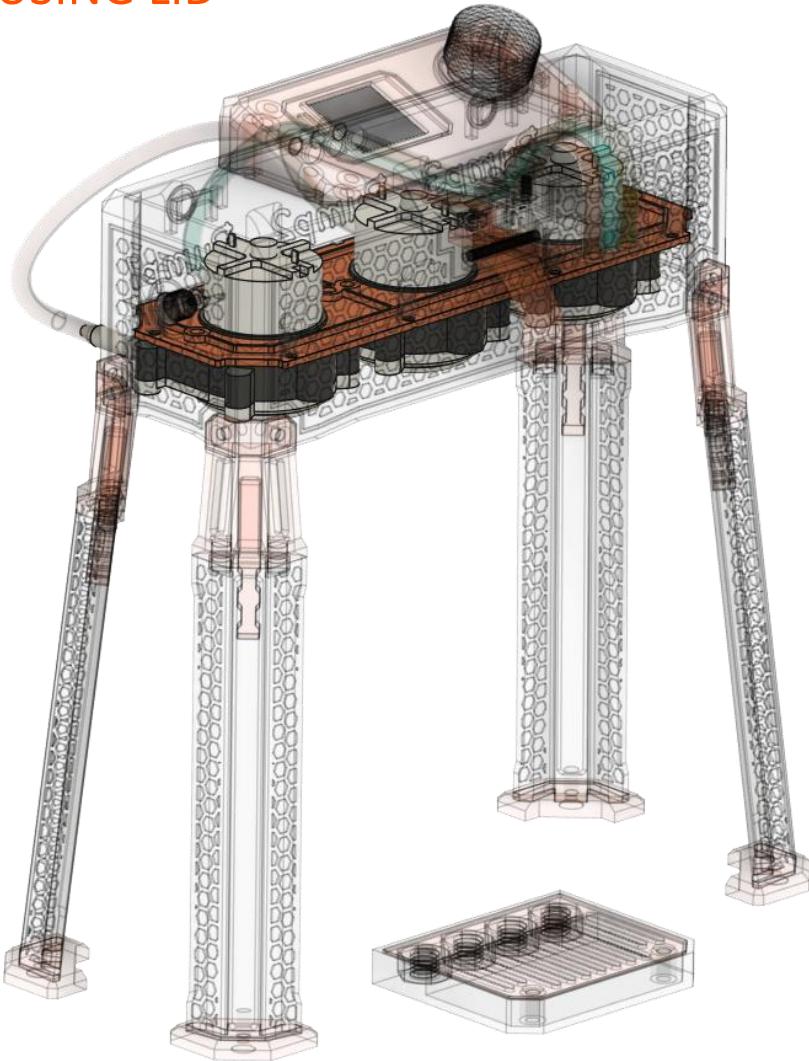
### TIP:

Make sure that you have connected the cables to the power LEDs. See chapter 'Electronics'.

### CLIPS INTO POSITION

The clip holds without glue.

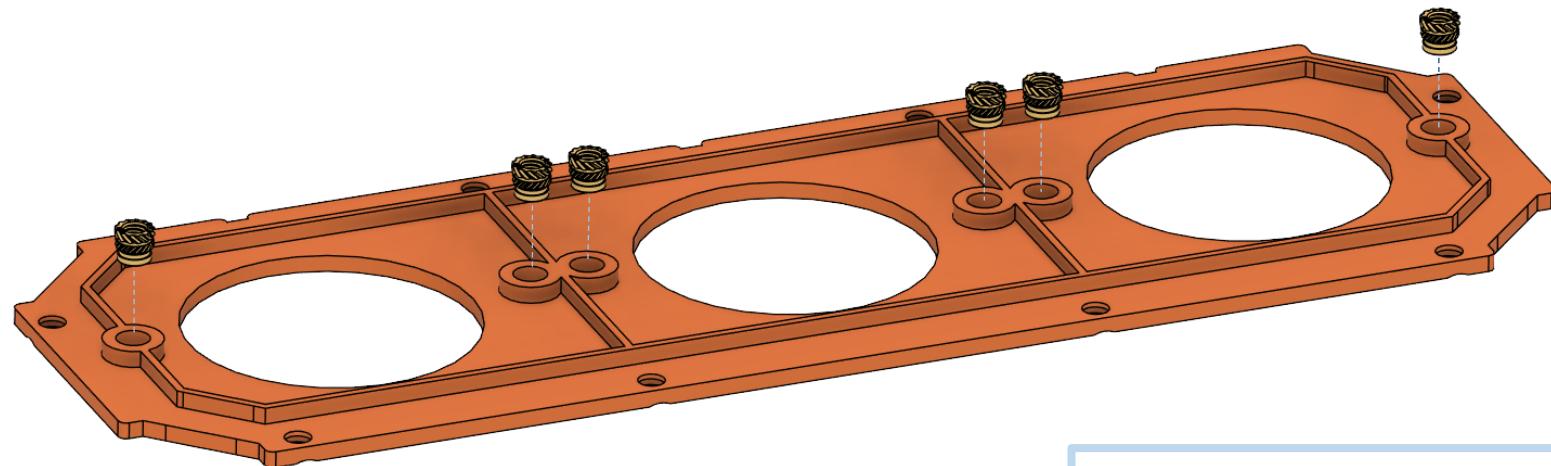
## HOUSING LID



## HOUSING LID ASSEMBLY

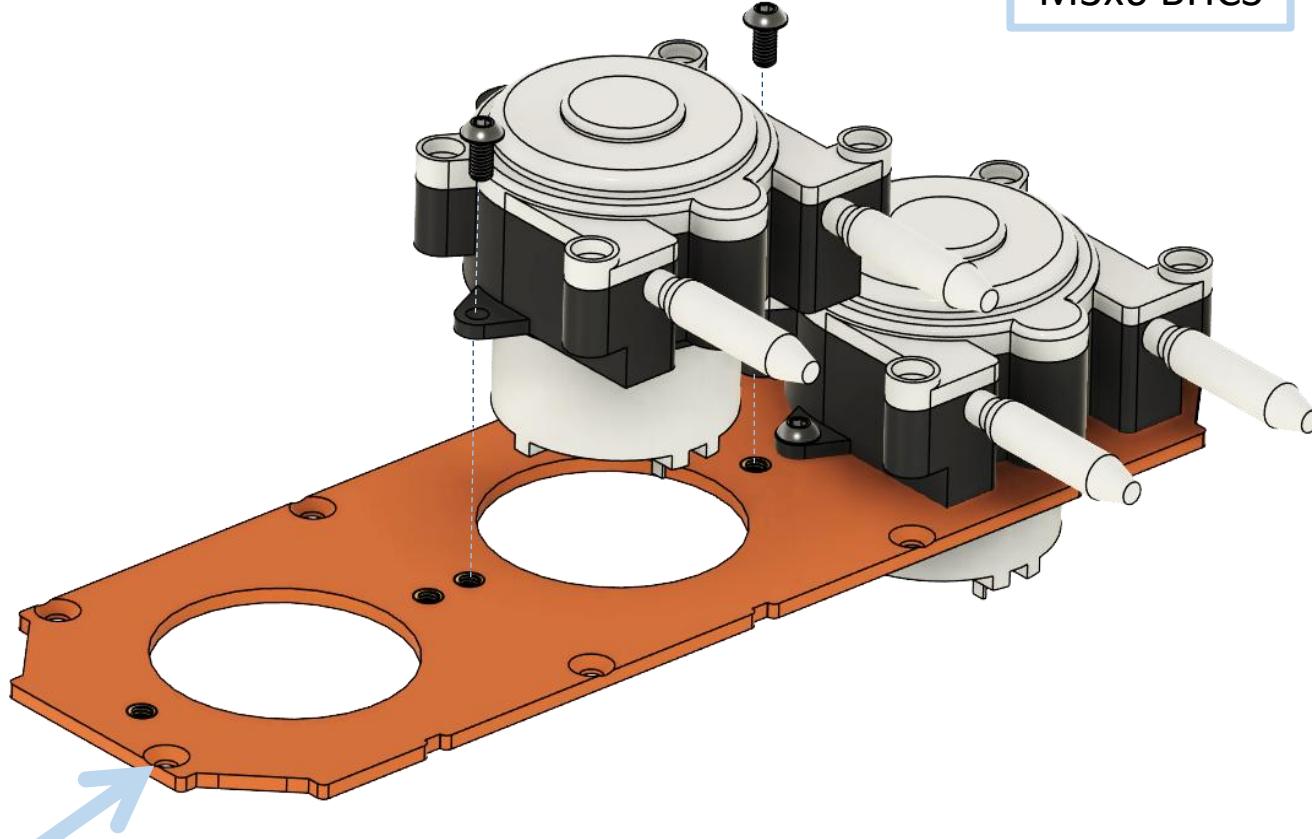
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## HOUSING LID



M3x4mm Heat Set Inserts

## HOUSING LID

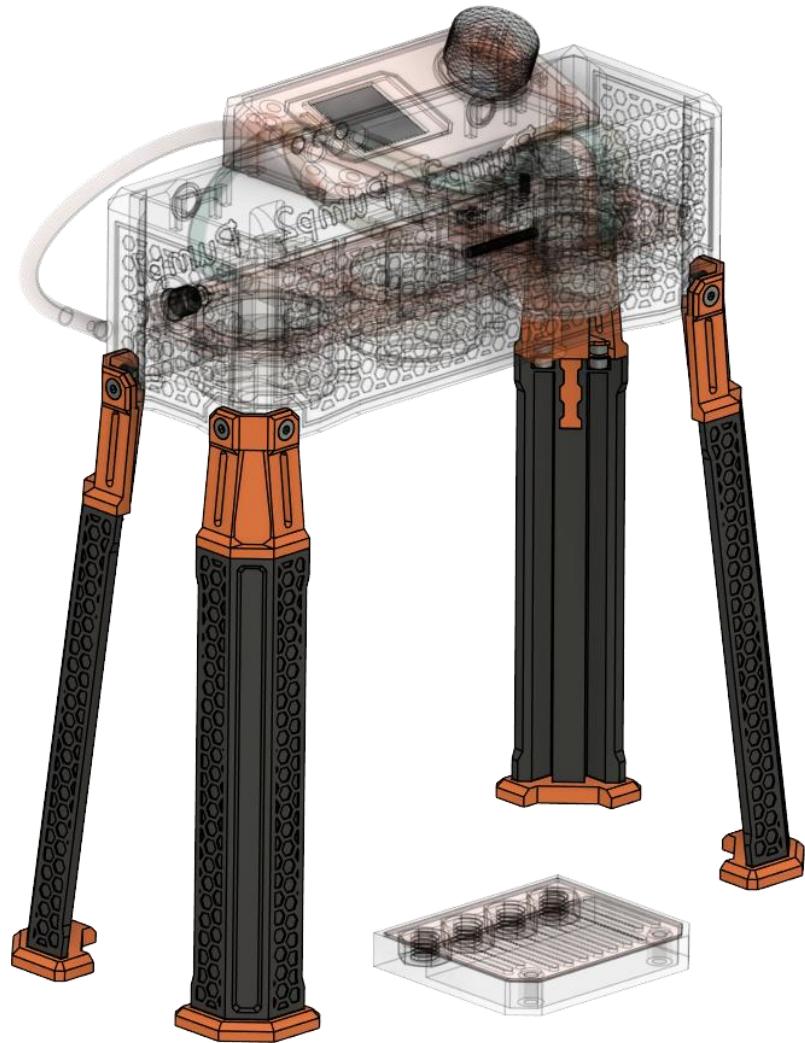


M3x6 BHCS



**TIP:**  
Note mounting direction!

EXTENDED FEET



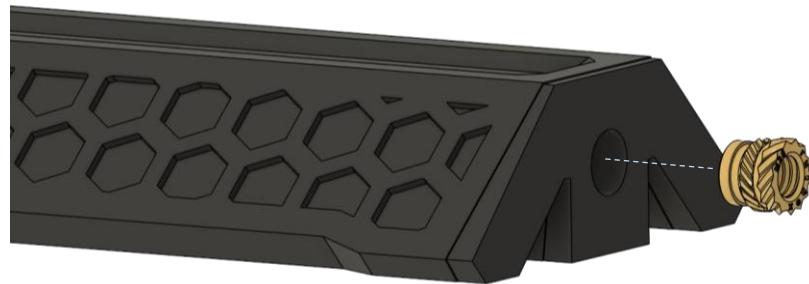
EXTENDED FEET ASSEMBLY

---

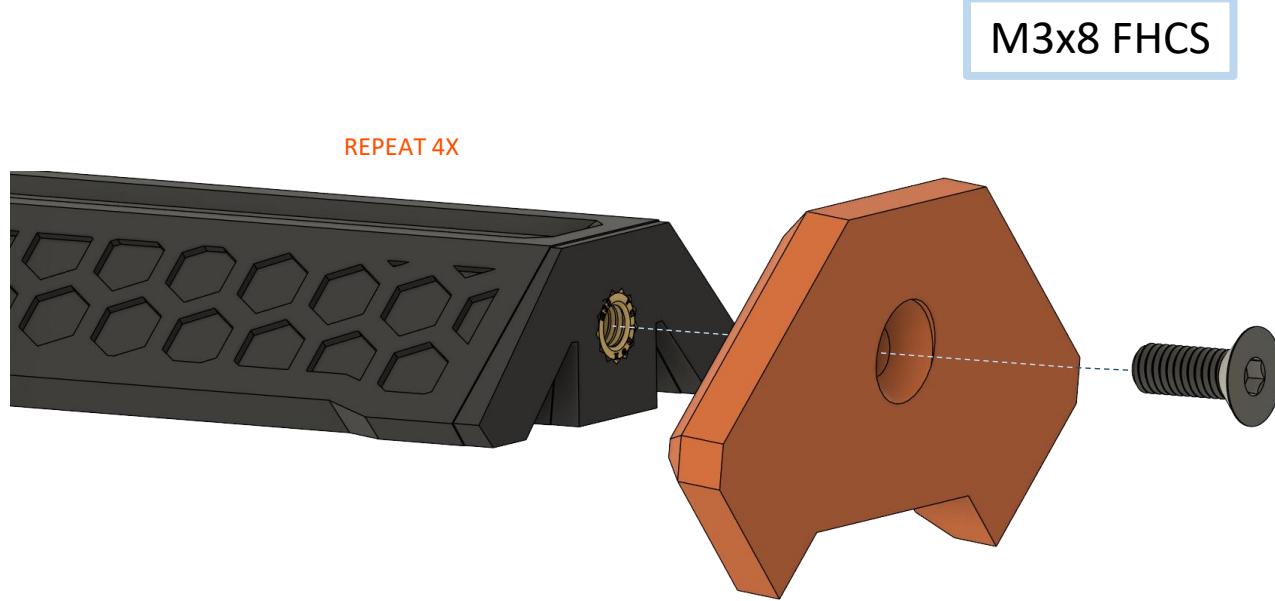
## EXTENDED FEET

M3x4mm Heat Set Insert

REPEAT 4X



## EXTENDED FEET

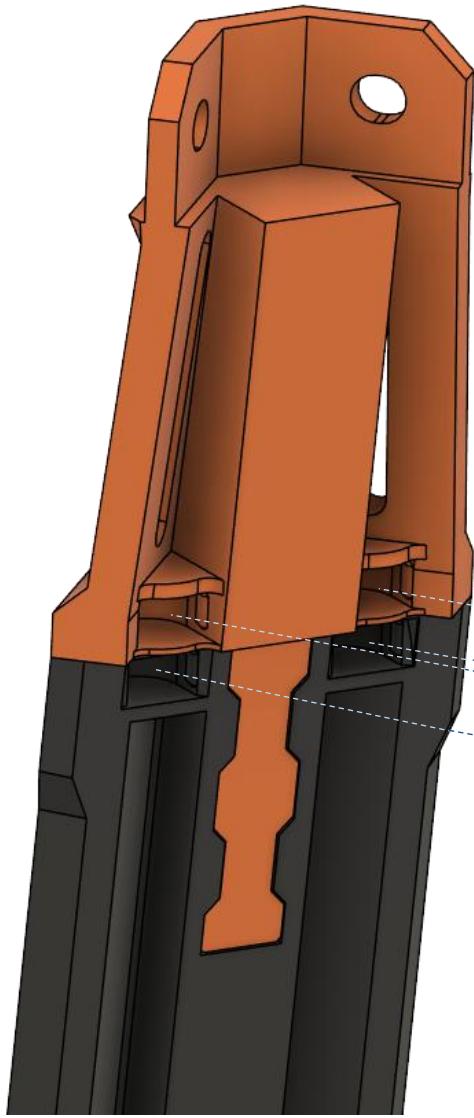


M3x8 FHCS

## EXTENDED FEET



## EXTENDED FEET

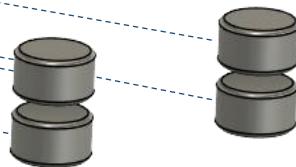


### OPTIONAL: GLUE INTO PLACE

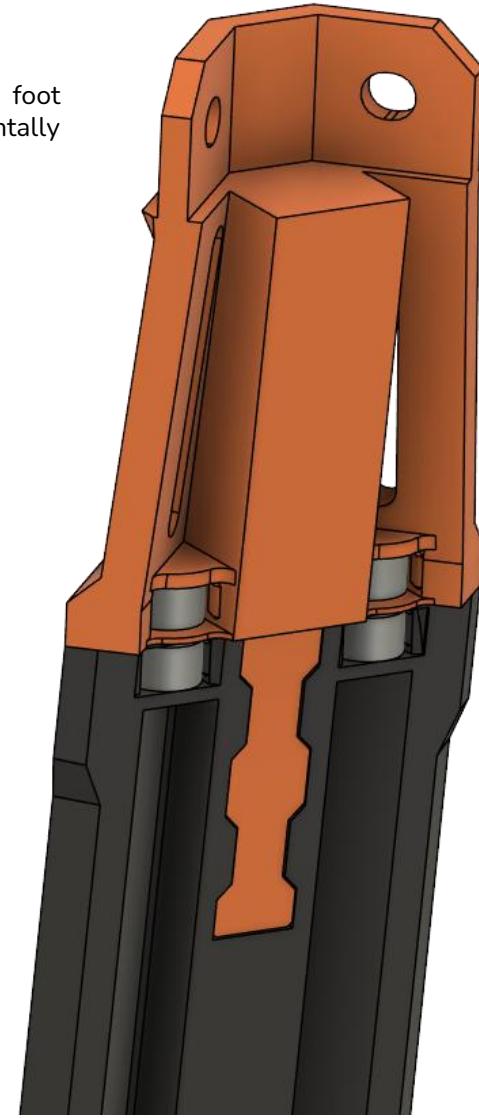
Use a fast-acting glue, like super-glue to glue the magnets in place.

### TIP:

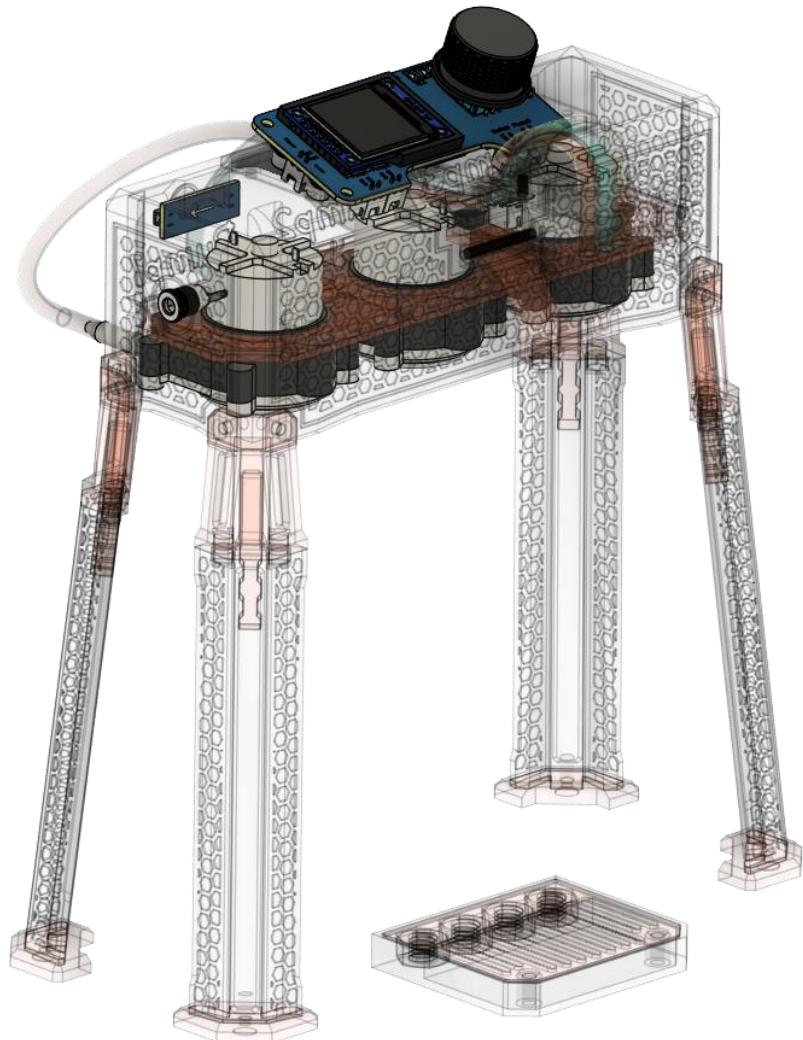
Glue the magnets in place while the foot extension is **not inserted** to avoid accidentally connecting the two plug-in foot sections.



Magnets 5x3mm



## ELECTRONICS



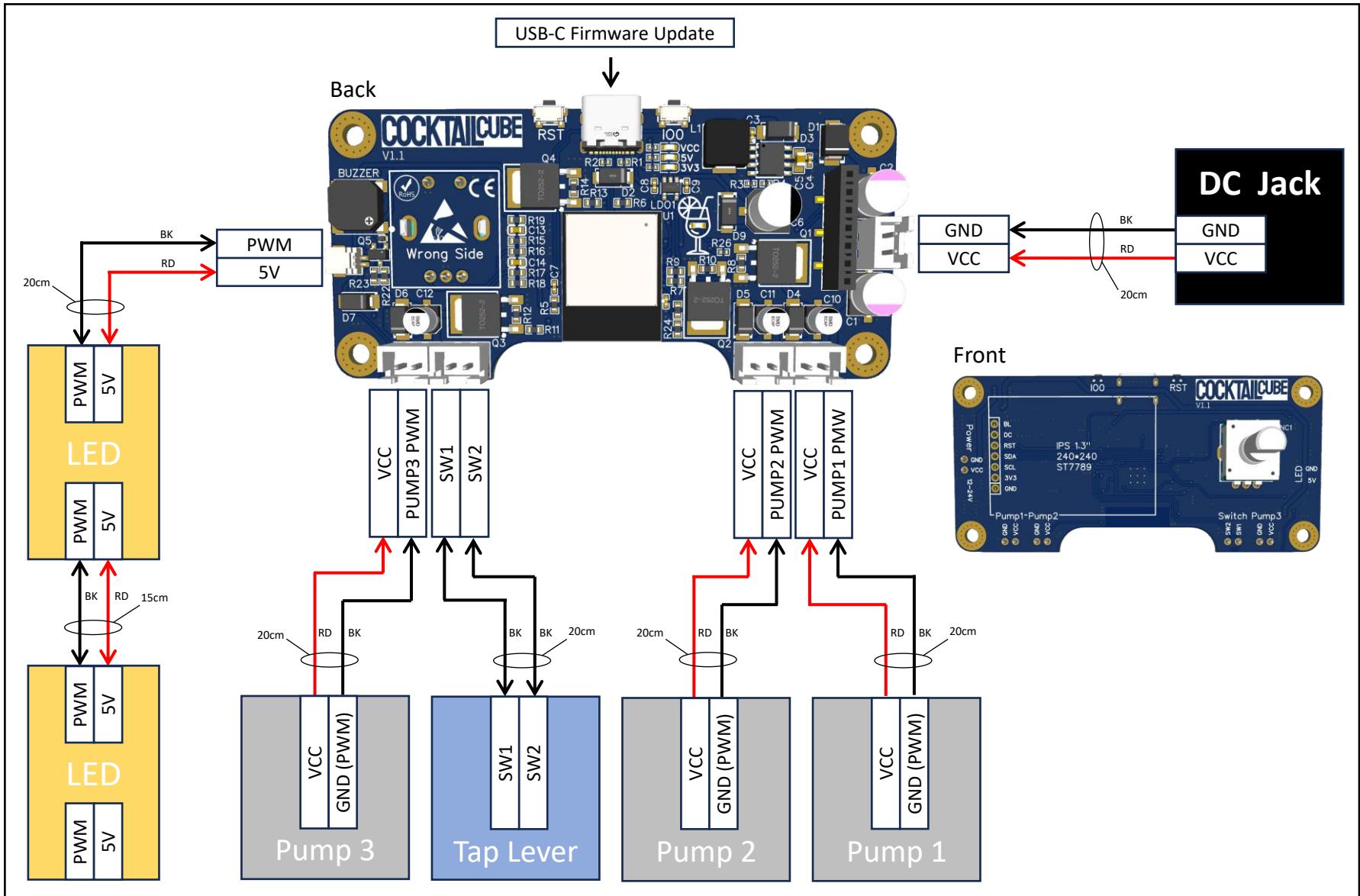
ELECTRONICS

---

# ELECTRONICS

## WIRING:

Use this electrical wiring diagram to connect all your parts together.



# ELECTRONICS

## CABLE SPECIFICATION:

Use this cable specification to identify the correct cable to connect your parts together.

### CONNECTION MAINBOARD - LEDS



Cable A  
15cm



Cable B  
20cm



JST SH CONNECTOR



**2x**



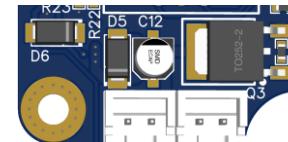
PAY ATTENTION

Pay attention to polarity.

### CONNECTION MAINBOARD – TAP LEVER



Cable A  
20cm



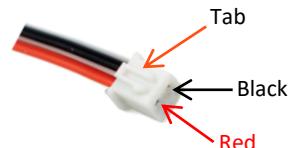
JST XH CONNECTOR



JST XH CONNECTOR

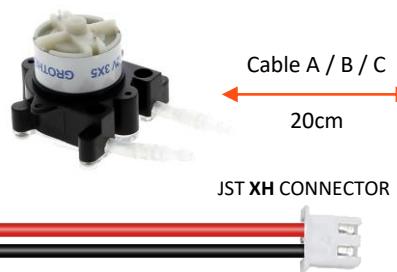
# ELECTRONICS

CONNECTION MAINBOARD – PUMPS



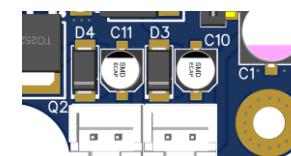
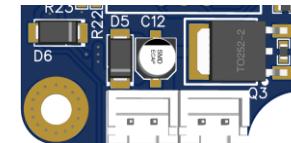
Solder End

**3x**



Cable A / B / C  
20cm

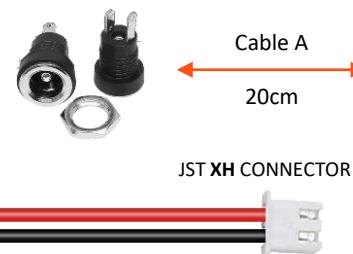
JST XH CONNECTOR



CONNECTION MAINBOARD – DC POWER JACK

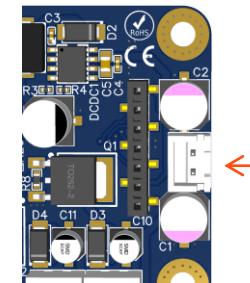


Solder End



Cable A  
20cm

JST XH CONNECTOR



FINAL ASSEMBLY



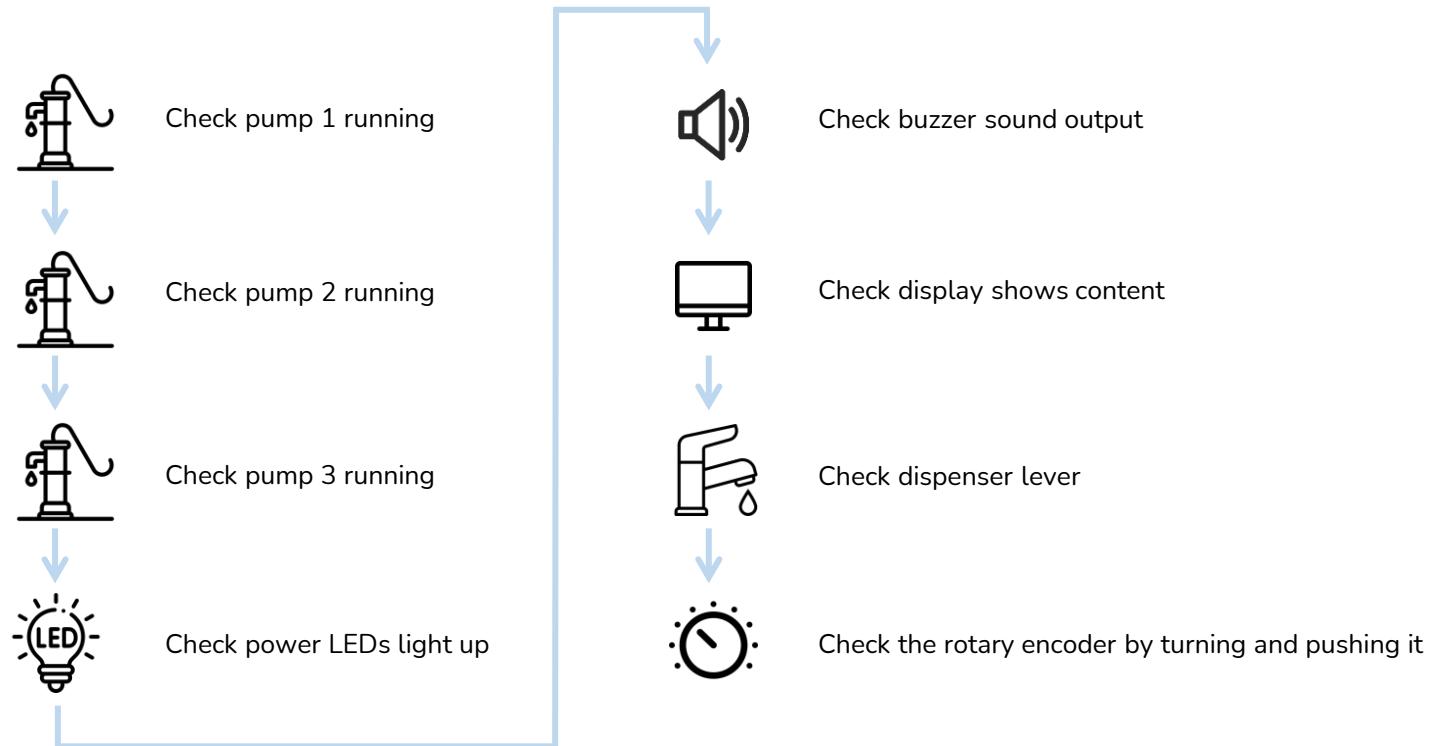
FINAL ASSEMBLY

---

# FINAL ASSEMBLY

## FINAL CHECK

After connecting all cables, check all hardware components **before** closing the housing cover.



### CHECK PUMP POLARITY

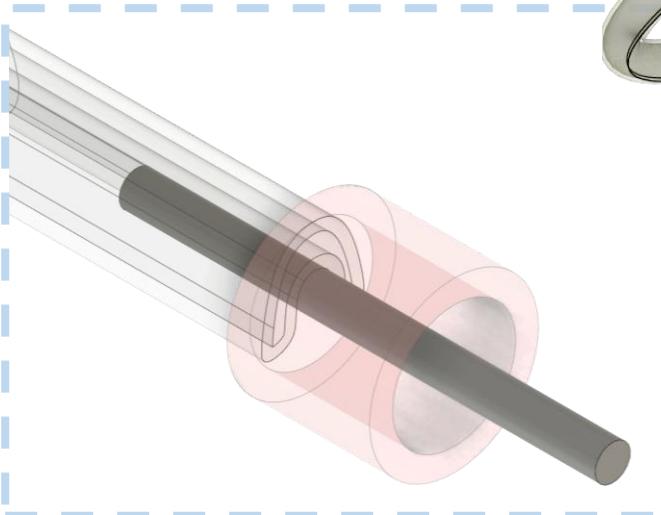
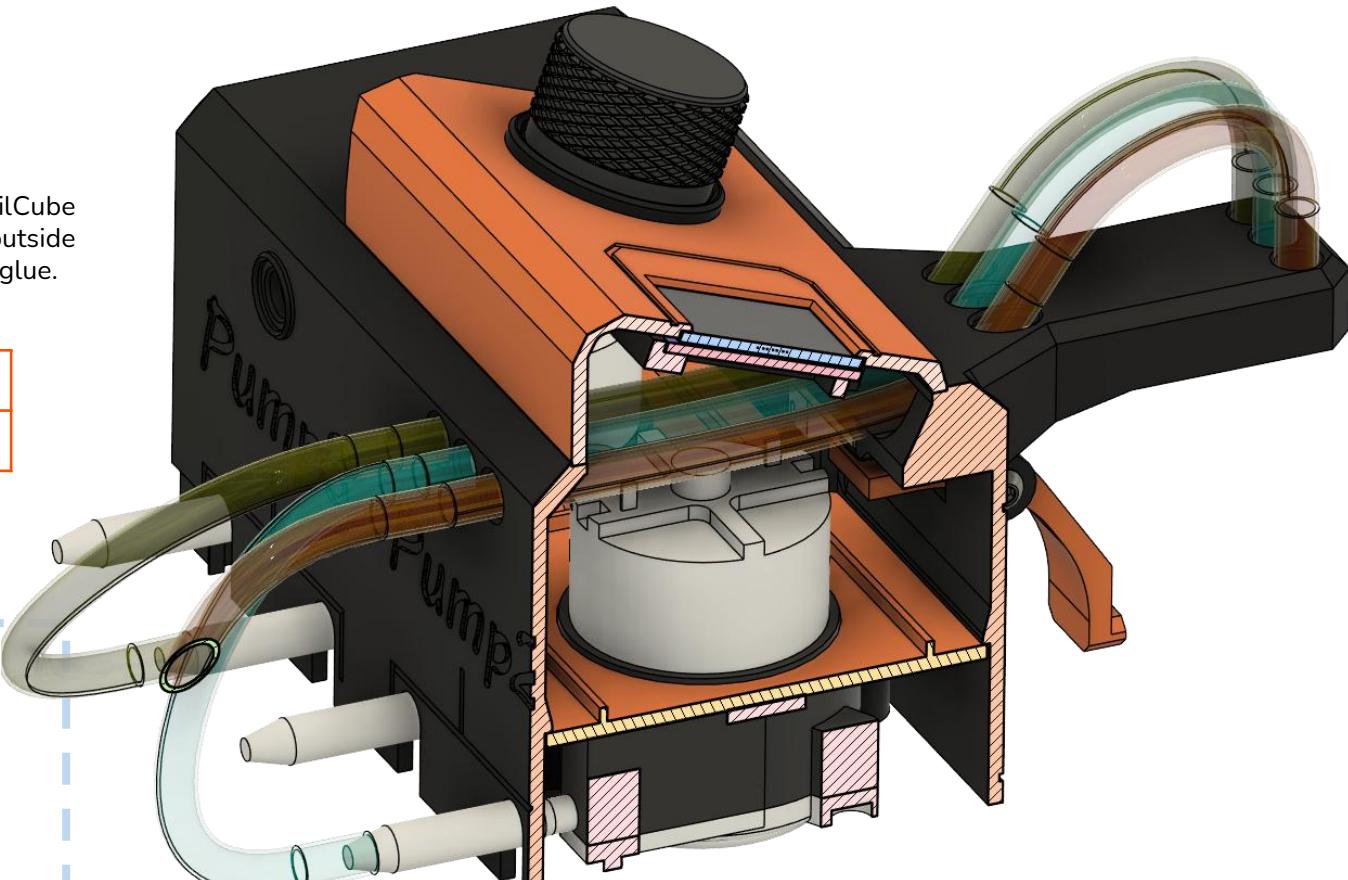
Be sure to check the polarity of the pump. It can happen that the pump is incorrectly labeled and then turns the wrong way round later.

# FINAL ASSEMBLY

## MOUNT TUBING

Insert the cut to length tubing into the CocktailCube like shown. If it is a tube with the appropriate outside diameter it will hold inside the holes without any glue.

Outer tubing	3x	50cm	Straw to pump
Inner tubing	3x	30cm	Pump to outlet



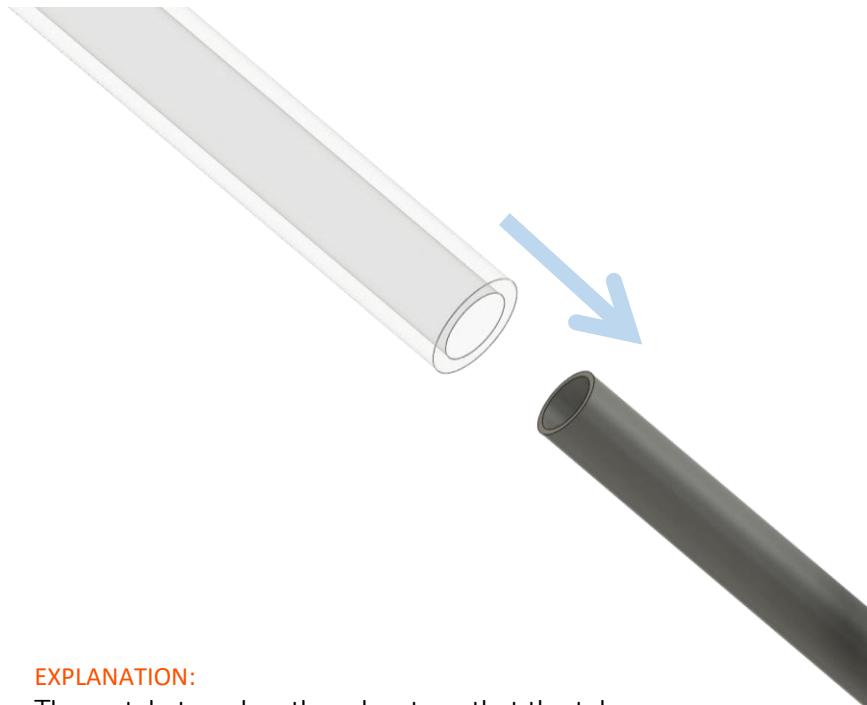
## TIP:

Use the back of a 1.5mm drill to fold in the tube as shown. This makes it very easy to push it into the hole. Let it unfold in the correct position.

## FINAL ASSEMBLY

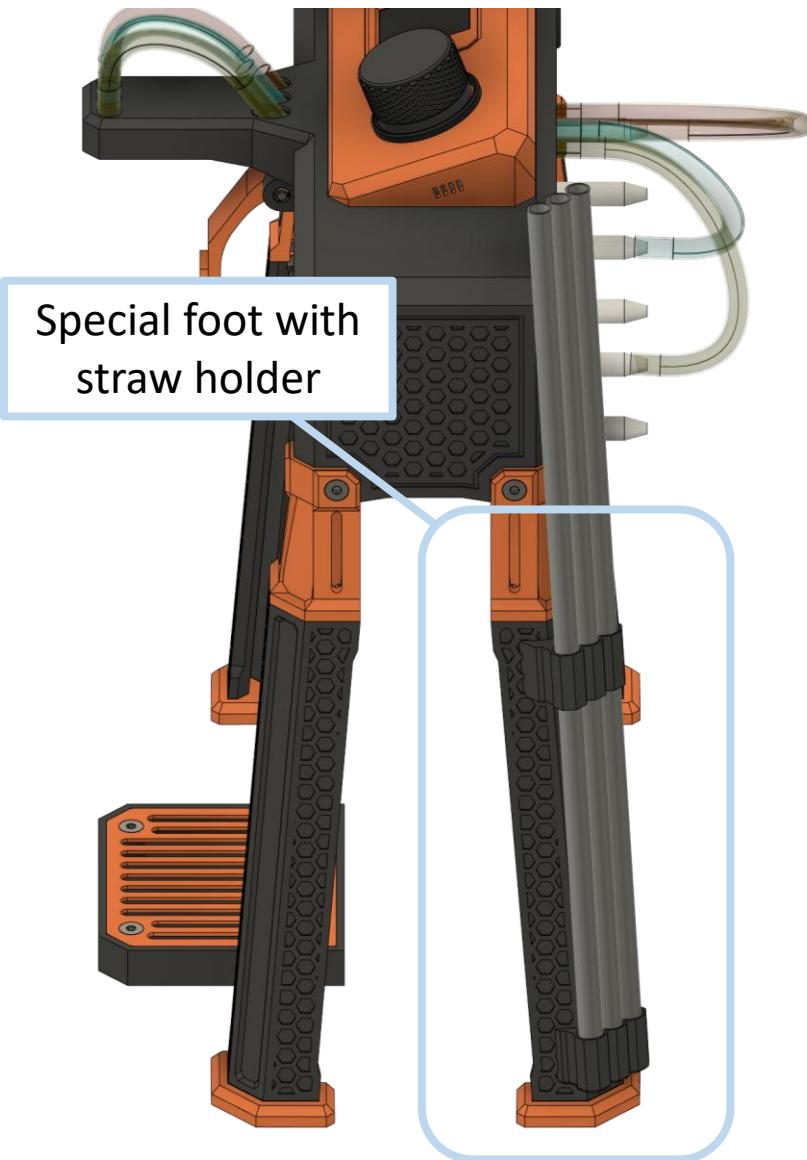
### MOUNT TUBING

Push the other end of the outer tube firmly over one straw at a time.

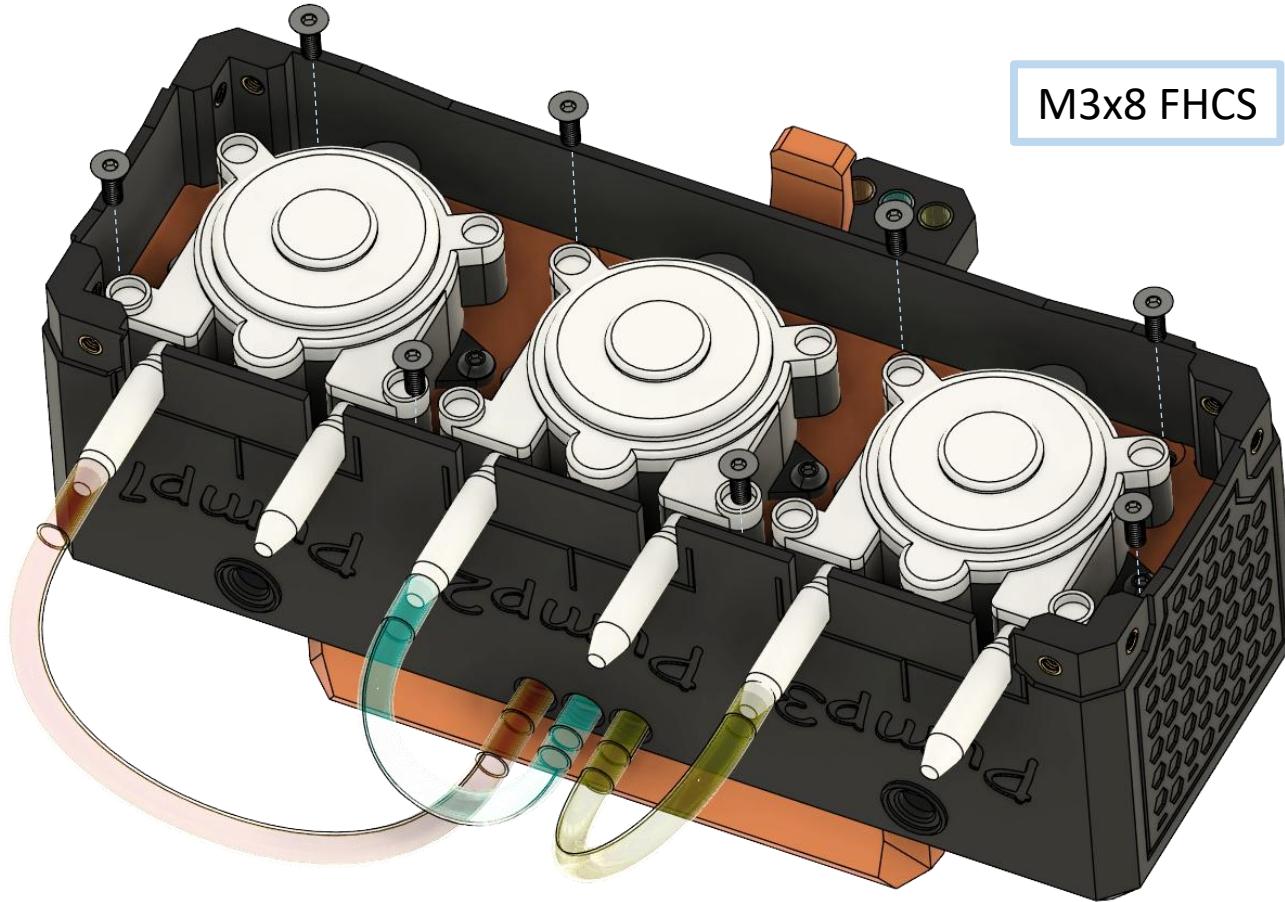


### EXPLANATION:

The metal straw has the advantage that the tube is weighted down at the end in the bottle and does not slip out on its own. The straw also ensures that the liquid can be sucked in, and the tube does not get stuck inside the bottle.



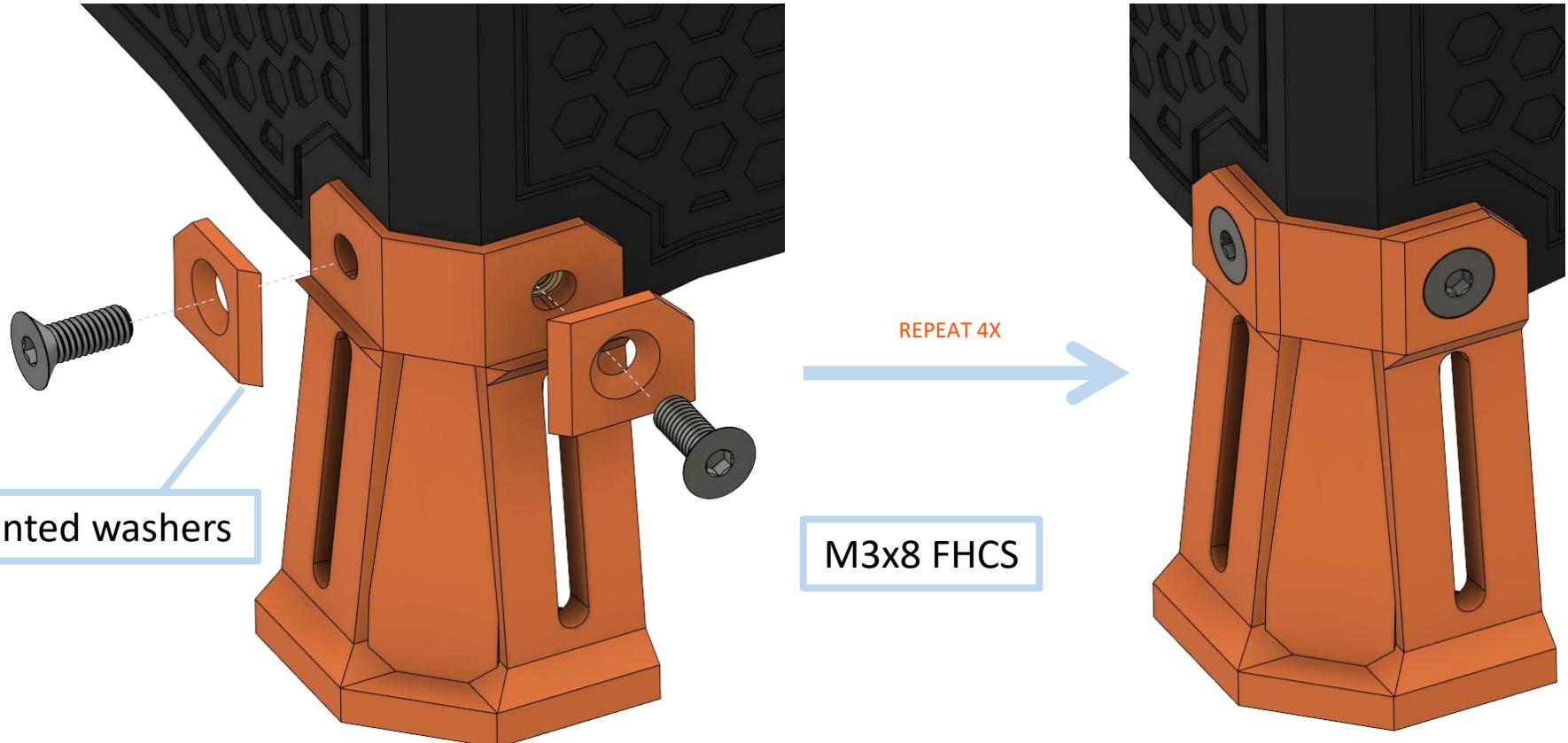
## FINAL ASSEMBLY



**TIP:**

Close the lid **carefully** without damaging any wires. Always double check – the screw is always stronger than any wire.

## FINAL ASSEMBLY



### OPTIONAL: GLUE INTO PLACE

Use a fast-acting glue, like super-glue to glue the washers in place for **maximum stability**.

## FINAL ASSEMBLY

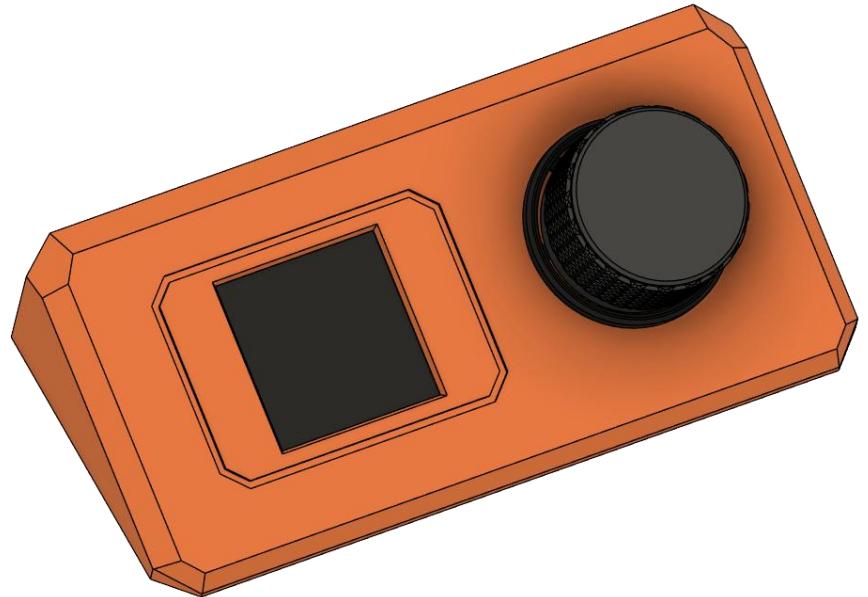


### INSERT FOOT

Insert the foot extension into the foot.

Caution: **Do not glue** the extension foot to the standard foot, so you can remove it for transport.

FIRMWARE



FIRMWARE UPDATE

---

# FIRMWARE

ASSEMBLY COMPLETED! ... NEXT STEP: UPDATE FIRMWARE

This manual is designed to be a reference manual for the build process. Next step is to upload the firmware to PCB and start testing each pump for its function.

You can find the firmware here:



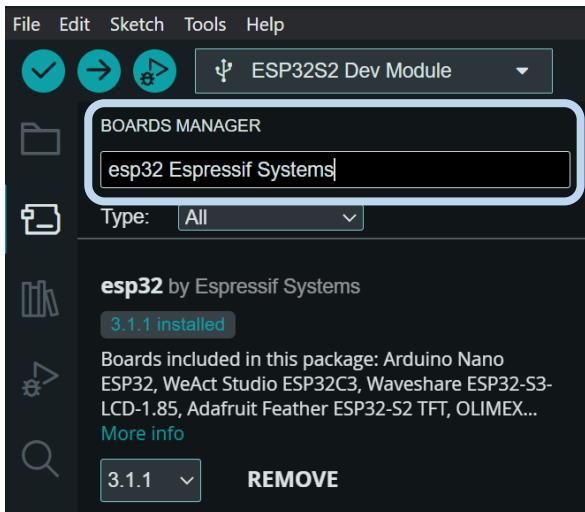
<https://github.com/flo199213/CocktailCube>

# FIRMWARE

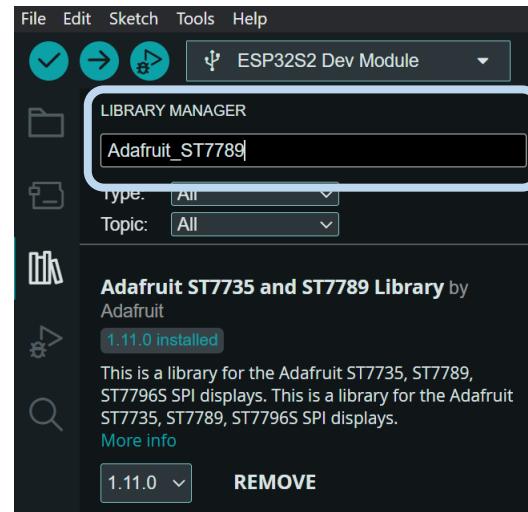
## USING ARDUINO IDE

If you are new to using the Arduino IDE, here are a few **quick start steps** to build and flash the firmware.

1. First, the board package for the ESP32 controller from Espressif Systems must be installed.



2. All necessary libraries must then be installed.



### Install the following libraries:

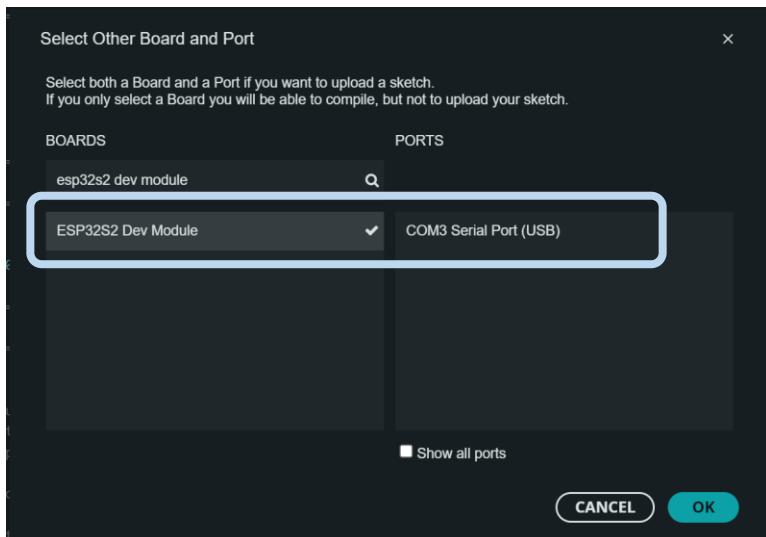
- ArduinoJson (by Benoit Blanchon)
- Adafruit\_ST7735 and ST7789 (by Adafruit)
- Adafruit\_GFX (by Adafruit)
- The libraries may have additional dependencies that are installed automatically (click Yes when prompted)

# FIRMWARE

## SETTING UP DEVICE

Follow the instructions to connect your CocktailCube circuit board.

3. Search for your device and select **ESP32S2 Dev Module** as target and the destination COM port with your device.



### IMPORTANT NOTICE:

The "USB CDC On Boot" flag must be always set. This flag causes the ESP32-S2 to report as a COM interface immediately after booting via USB. This means that the microcontroller can be programmed via the Arduino Ide WITHOUT having to press the "BOOT" and "RESET" buttons again. (This allows the housing to remain closed).



4. Use the following **device settings** for your target.

### Configuration ESP32-S2:

- **Board: "ESP32S2 Dev Module"**
- **CPU Frequency: "240MHz (WiFi)"**
- **USB CDC On Boot: "Enabled" <----- Important!**
- **Upload Mode: "Internal USB" <----- Important!**
- **Core Debug Level: "Verbose" <----- Only for Debugging**
- **USB DFU On Boot: "Disabled"**
- **USB Firmware MSC On Boot: "Disabled"**
- **Flash Size: "4Mb (32Mb)"**
- **Partition Scheme: "No OTA (2MB APP/2MB SPIFFS)"**
- **Upload Speed: "921600"**

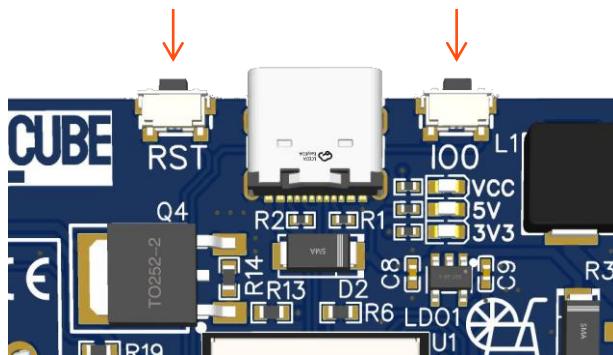
-> Leave everything else on default!

# FIRMWARE

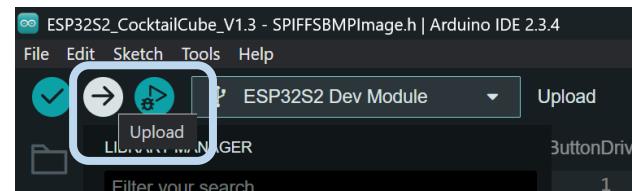
## UPLOADING FIRMWARE

Follow the instructions to upload the firmware.

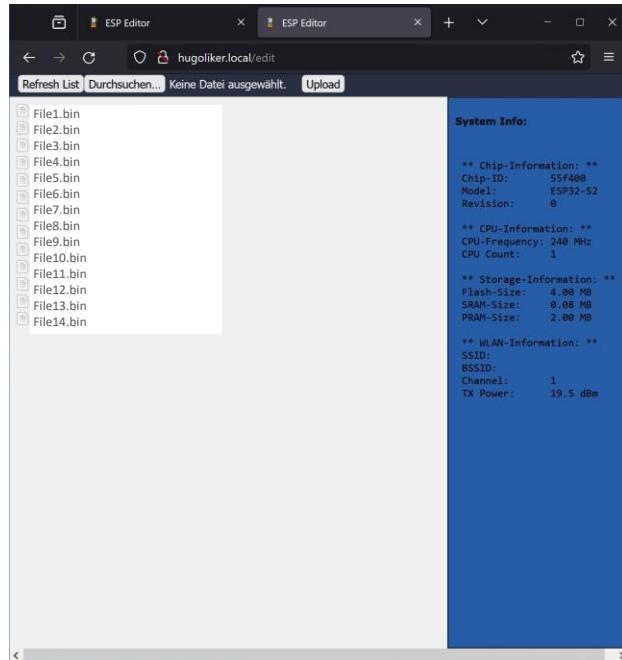
5. Press and hold the **IO0** button and short press the **RST** (reset) button to set the ESP32-S2 into DFU Mode. This is only necessary the first time.



6. Press **Upload**



# FILE UPLOAD



# FILE UPLOAD

---

# FILE UPLOAD

## SPIFFS UPLOADER:

After installing the firmware for the first time, **the design images and configuration for your selected cocktail theme are missing** in the SPIFFS file system. To upload the data directory files to the ESP32 microcontroller, a tool called "ESP32 Filesystem Uploader" must normally be used. This tool is not (yet) supported in the Arduino IDE 2.0. To simplify the data upload, there is a native SPIFFS uploader via WiFi as of CocktailCube V1.3.

## WIFI-CONNECTION

First power up CocktailCube and connect to access point with identical SSID. Use password "**mixer1234**" to connect.



### TIP:

If the WiFi of the mixer is not yet switched on, use the rotary encoder to go to the settings and switch on the access point.



### TIP:

The first time you connect to this WiFi, your smartphone or PC will reset the connection as it recognizes that there is no Internet access. You can prevent this by saying "Keep WiFi" when the corresponding message appears.

## Mandatory File Content (Example):

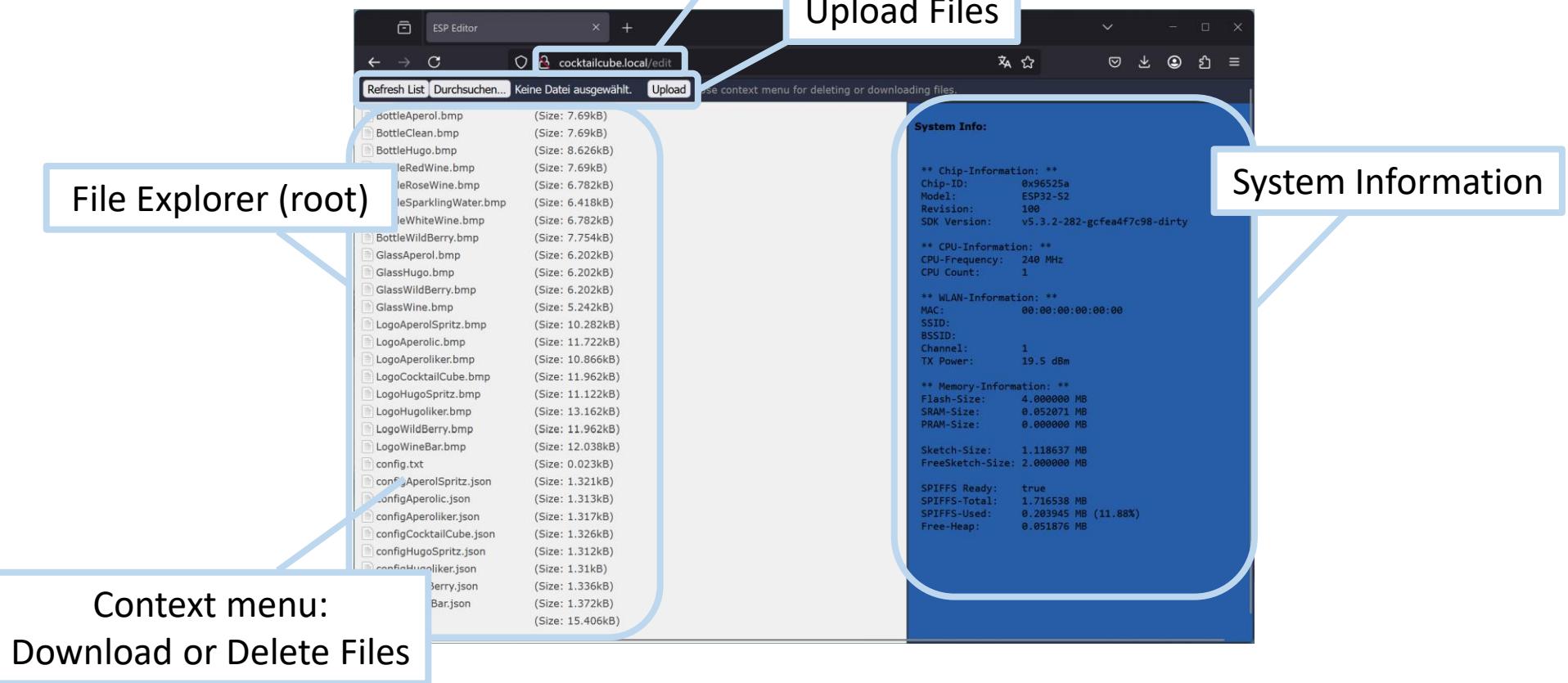
- config.txt
  - Content: "configCocktailCube.json"
- configCocktailCube.json
  - Content:

```
configCocktailCube.json x
1  {
2    "IS_MIXER": true,
3    "MIXER_NAME": "CocktailCube",
4    "MIXER_PASSWORD": "mixer1234",
5    "LIQUID1_NAME": "Liquid 1",
6    "LIQUID2_NAME": "Liquid 2",
7    "LIQUID3_NAME": "Liquid 3",
8    "LIQUIDIANGLE_DEGREES": 0,
9    "LIQUID2ANGLE_DEGREES": 120,
10   "LIQUID3ANGLE_DEGREES": 240,
11   "TFT_COLOR_STARTPAGE": "0xFC00",
12   "TFT_COLOR_STARTPAGE_FOREGROUND": "0xD9E",
13   "TFT_COLOR_STARTPAGE_BACKGROUND": "0xA6DC",
14   "TFT_COLOR_TEXT_HEADER": "0xFC00",
15   "TFT_COLOR_TEXT_BODY": "0xFFFF",
16   "TFT_COLOR_INFOBOX_BORDER": "0xF000",
17   "TFT_COLOR_INFOBOX_FOREGROUND": "0xFc00",
18   "TFT_COLOR_INFOBOX_BACKGROUND": "0xFFFF",
19   "TFT_COLOR_MENU_SELECTOR": "0xFC00",
20   "TFT_COLOR_LIQUID_1": "0xEC00",
21   "TFT_COLOR_LIQUID_2": "0x0F1F",
22   "TFT_COLOR_LIQUID_3": "0x0390",
23   "TFT_COLOR_FOREGROUND": "0xFFFF",
24   "TFT_COLOR_BACKGROUND": "0x0000",
25   "WIFI_COLOR_LIQUID_1": "0xFFE500",
26   "WIFI_COLOR_LIQUID_2": "0x01FFFF",
27   "WIFI_COLOR_LIQUID_3": "0x00E784",
28   "IMAGE_LOGO": "/LogoCocktailCube.bmp",
29   "IMAGE_GLASS": "/GlassAperol.bmp",
30   "IMAGE_BOTTLE1": "/BottleClean.bmp",
31   "IMAGE_BOTTLE2": "",
32   "IMAGE_BOTTLE3": "",
33   "IMAGE_BOTTLE4": "",
34   "TFT_LOGO_POS_X": 0,
35   "TFT_LOGO_POS_Y": 25,
36   "TFT_GLASS_POS_X": 140,
37   "TFT_GLASS_POS_Y": 85,
38   "TFT_BOTTLE_POS_X": 40,
39   "TFT_BOTTLE_POS_Y": 5
40 }
```

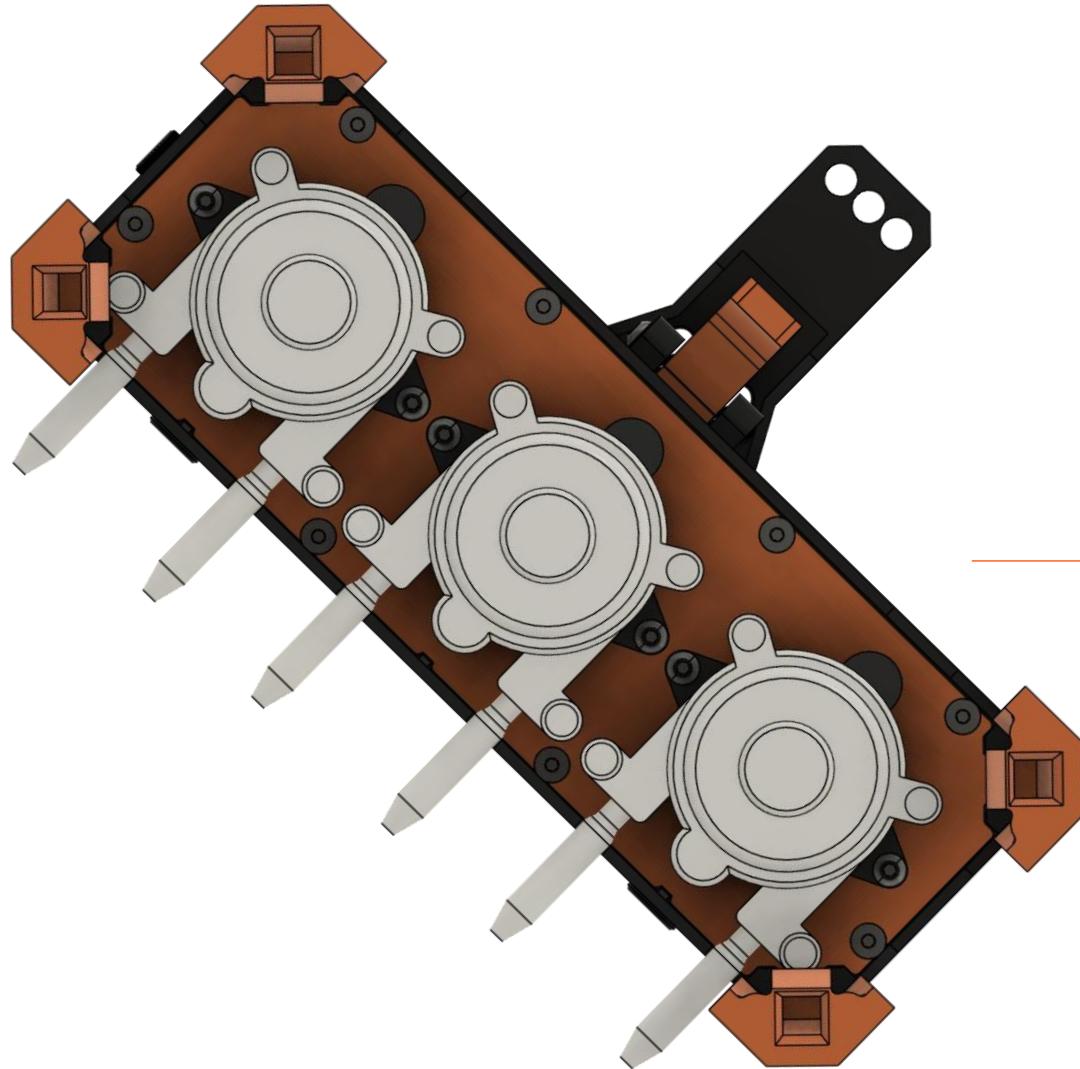
- LogoCocktailCube.bmp
- GlassAperol.bmp
- BottleClean.bmp
- ...all images named in json-Configuration file!

## FILE UPLOAD

Domain:  
[mixername].local/edit or 192.168.1.1/edit



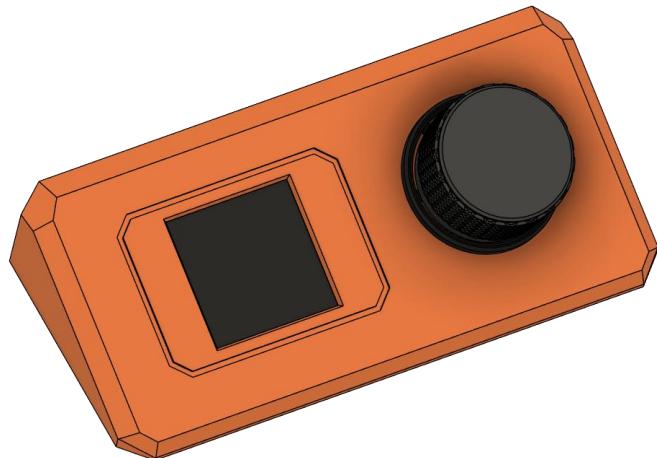
SERVICE



SERVICE PROCEDURE

---

# SERVICE



## TIP:

Clean the CocktailCube immediately after each use to prevent mildew.

### NORMAL MODE

The firmware is largely self-explanatory. But there is a hidden settings menu to perform cleaning after successful use → see **CLEANING MODE**.

Without special inputs the CocktailCube starts with a start screen and then automatically switches to an instruction page. You can exit this screen by simply pressing the rotary encoder. The CocktailCube then switches to normal mode and dispensing is enabled.

### CLEANING MODE

If the rotary encoder button is pressed down until the menu is displayed, you can select CLEANING MODE.

CLEANING MODE means that all selected pumps run at full power when dispensing. This makes it possible to pump a cleaning fluid by placing a bucket underneath until the CocktailCube and its pumps are completely cleaned.

## CUSTOM DESIGN



CUSTOM DESIGN

# CUSTOM DESIGN

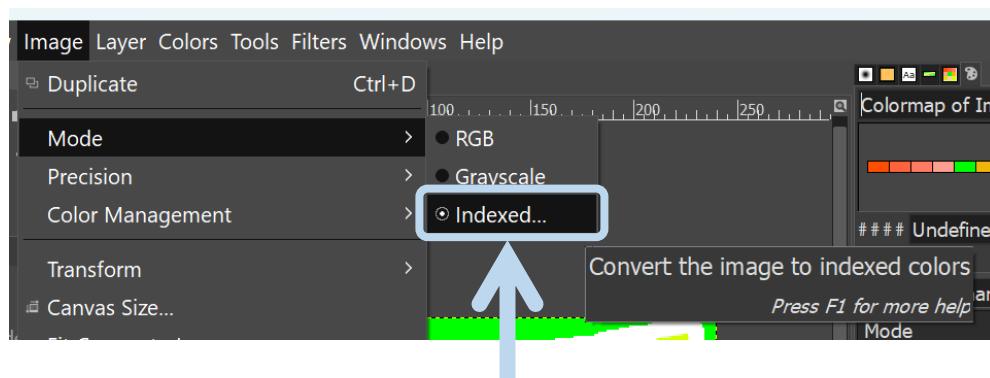
## CREATING A CUSTOM DESIGN

To create a custom design, special bitmap files must be created. The bitmap files used by the CocktailCube are indexed bitmap files with a **bit depth of 4 bits per pixel** and a **color palette of 16 colors**.

The bitmaps can be created with Gimp, for example.

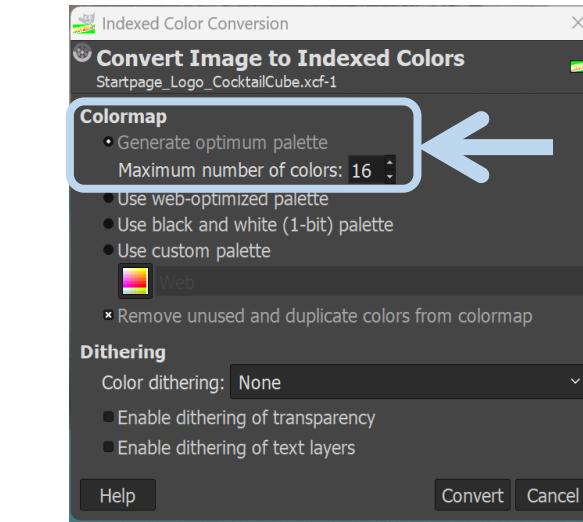
1. Start with an image that is the right size. Note that the display only has a maximum resolution of 240x240 pixels.

The **transparency** key for displaying the bitmaps is a full green with the color code **#00FF00**.

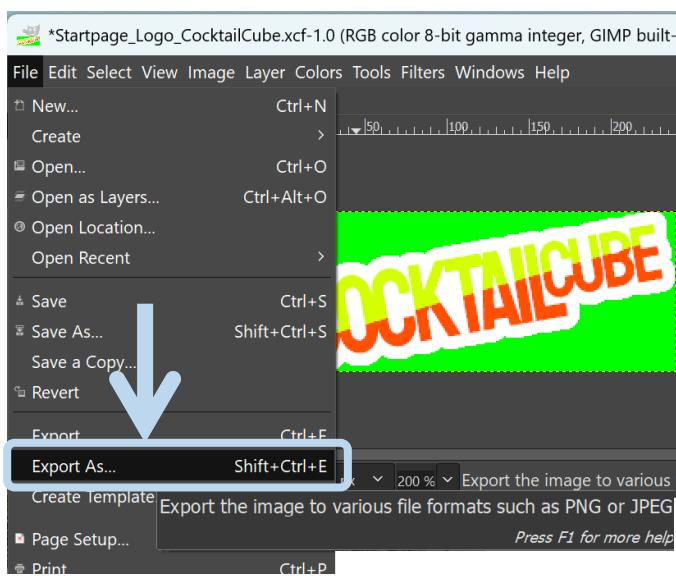


2. Then go to **Image → Mode → Indexed...** to switch the image to an indexed view with a maximum of 16 colors.

# CUSTOM DESIGN



3. Select 16 colors as the maximum number of colors.



4. Then go to **File → Export As...** and save as .bmp file.

5. Finally, a configuration must be created and the **file names** and the new display positions entered.

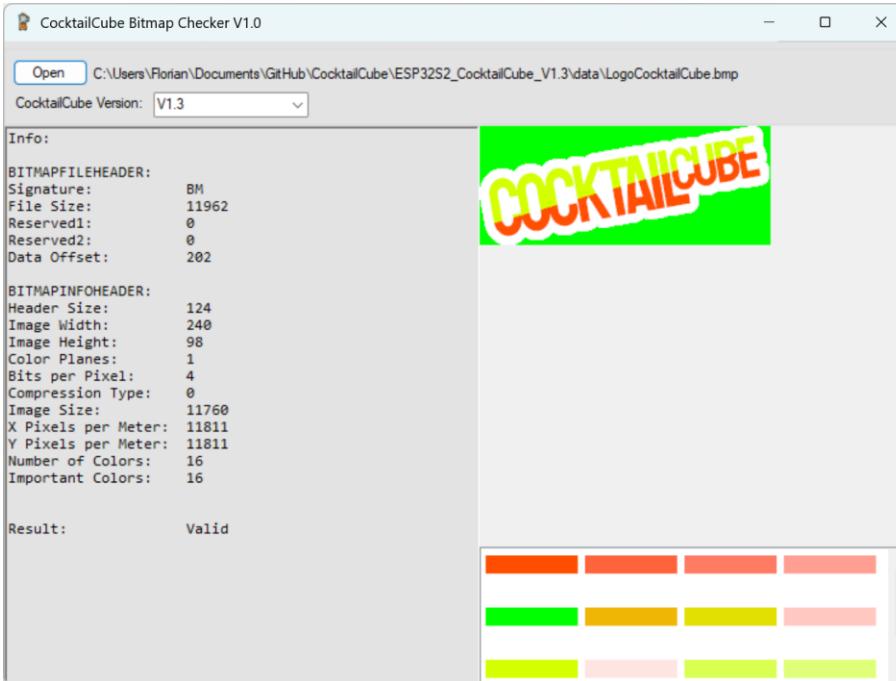
```
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 {  
    "IS_MIXER": true,  
    "MIXER_NAME": "CocktailCube",  
    "MIXER_PASSWORD": "mixer1234",  
    "LIQUID1_NAME": "Liquid 1",  
    "LIQUID2_NAME": "Liquid 2",  
    "LIQUID3_NAME": "Liquid 3",  
    "LIQUID1ANGLE_DEGREES": 0,  
    "LIQUID2ANGLE_DEGREES": 120,  
    "LIQUID3ANGLE_DEGREES": 240,  
    "TFT_COLOR_STARTPAGE" : "0xFC00",  
    "TFT_COLOR_STARTPAGE_FOREGROUND" : "0xDF9E",  
    "TFT_COLOR_STARTPAGE_BACKGROUND" : "0xA6DC",  
    "TFT_COLOR_TEXT_HEADER" : "0xFC00",  
    "TFT_COLOR_TEXT_BODY" : "0xFFFF",  
    "TFT_COLOR_INFOBOX_BORDER" : "0xFC00",  
    "TFT_COLOR_INFOBOX_FOREGROUND" : "0xFC00",  
    "TFT_COLOR_INFOBOX_BACKGROUND" : "0xFFFF",  
    "TFT_COLOR_MENU_SELECTOR" : "0xFC00",  
    "TFT_COLOR_LIQUID_1" : "0xFC00",  
    "TFT_COLOR_LIQUID_2" : "0x0F1F",  
    "TFT_COLOR_LIQUID_3" : "0x0390",  
    "TFT_COLOR_FOREGROUND" : "0xFFFF",  
    "TFT_COLOR_BACKGROUND" : "0x0000",  
    "WIFI_COLOR_LIQUID_1" : "0xFE5000",  
    "WIFI_COLOR_LIQUID_2" : "0x01FFFF",  
    "WIFI_COLOR_LIQUID_3" : "0x00E701",  
    "IMAGE_LOGO" : "/LogoCocktailCube.bmp",  
    "IMAGE_GLASS" : "/GlassAperol.bmp",  
    "IMAGE_BOTTLE1" : "/BottleClean.bmp",  
    "IMAGE_BOTTLE2" : "",  
    "IMAGE_BOTTLE3" : "",  
    "IMAGE_BOTTLE4" : "",  
    "TFT_LOGO_POS_X" : 0,  
    "TFT_LOGO_POS_Y" : 25,  
    "TFT_GLASS_POS_X" : 140,  
    "TFT_GLASS_POS_Y" : 85,  
    "TFT_BOTTLE_POS_X" : 40,  
    "TFT_BOTTLE_POS_Y" : 5  
}
```

# CUSTOM DESIGN

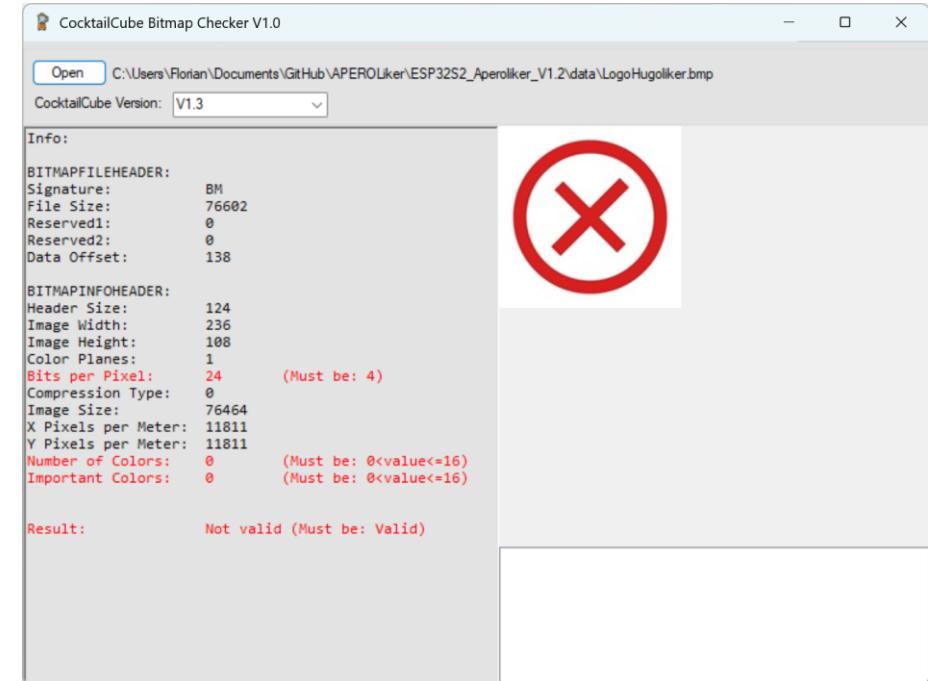
## CHECK CUSTOM BITMAPS

If you have problems with the bitmaps, there is help in the form of the “**CocktailCube Bitmap Checker**” software in the GitHub repo, with which you can check whether the generated bitmaps are valid for the desired software version.

You can even see the exported color palette.



Valid bitmap for firmware V1.3



Invalid bitmap for firmware V1.3



Enjoy your CocktailCube.

And please send the pictures of your build to: [info.cocktailcube@gmail.com](mailto:info.cocktailcube@gmail.com) ☺

