

# **OLIVER**

*Open-source MSLA printer*

*User's manual*



*Published under CC BY-NC 4.0 license*

*Version 1.0.4 from March 6th 2020*

*Manual version: 1.0.4*

*Printer version: 1.0*

# Terms and conditions

## Terms

**Oliver team** refers to all people actively involved in the development of the Oliver 3D printer. At the time of writing this EULA, the Oliver team consists of: *Adam Schuppler*. Contact information can be found in the “Contact information” chapter.

**Website** refers to <https://www.oliver3d.com>.

## General

This End-User License Agreement (“EULA”) is a legal agreement between you (“Licensee”) and Adam Schuppler (“Licensor”), the author of Oliver 3D printer, including all accompanying files, documentation (including this manual) and the official website.

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## Intellectual Property

The list below contains a list of licensed software used in the development together with their special conditions

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### OPEN SOURCE SOFTWARE

The list below contains a list of open source components

Name	License	Copyright	Link to terms and conditions
NanoDLP	MIT	2016 nanoDLP	<a href="https://github.com/nanodlp/ui/blob/master/LICENSE.md">https://github.com/nanodlp/ui/blob/master/LICENSE.md</a>
Tibus	MIT	2017 Julien Delnatte	<a href="https://github.com/Tibus/TouchScreen-For-NanoDLP/blob/master/LICENSE">https://github.com/Tibus/TouchScreen-For-NanoDLP/blob/master/LICENSE</a>

## Support

Licensors has no obligation to provide support services for the 3D printer.

## Duration

This EULA is perpetual or until:

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- B. Terminated or suspended by Licensor, with or without case

# Jurisdiction

This EULA was made in the Czech Republic and hence shall be construed pursuant to the laws of the Czech Republic.

# Limitation of liability

While the Oliver team strives to make the information in this manual as timely and accurate as possible, the team makes no claims, promises, or guarantees about the accuracy, completeness, or adequacy of the contents of this manual, and **expressly disclaims liability for errors and omissions in the contents of this manual.**

Given the fact that the Oliver development team have no influence on which parts users will choose to build their printer from and cannot assume the correct and accurate implementation of this manual the Oliver development team takes no responsibility for injury caused by improper assembly, disassembly or operation of the device and accepts no liability for any incorrect function of the device.

## WARNING

By using this manual, you are accepting the disclaimer.

# Acknowledgment

This project wouldn't be possible without help of many other makers and open hardware enthusiasts. We would like to offer special thanks to:

- developers of the NanoDLP firmware used in the Oliver 3D printer<sup>1</sup>
- developer(s) of the Tibus touchscreen interface<sup>2</sup>
- Raspberry Pi Foundation<sup>3</sup>

We would also like to thank people externally involved in this project. Namely:

- Ing. Jelínek Libor, Ph.D., Department of Cybernetics, West Bohemian University (*for technical mentorship*)
- Dave Singleton (*for proofreading the manual*)
- Ivo Kornatovský (*for offering photographic equipment*)

We would also like to extend our thanks to all other people who offered their technical expertise during the development.

This manual (version 1.0.3) was written by:

- Adam Schuppler

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<sup>1</sup> <https://www.nanodlp.com/>

<sup>2</sup> <https://github.com/Tibus/TouchScreen-For-NanoDLP>

<sup>3</sup> <https://www.raspberrypi.org/>

# Introduction

Stereolithography is a 3D printing process for creating parts from liquid resin (photopolymers). The printer shines UV light on the photopolymer, which causes a chemical reaction that transforms the resin to a solid substance.

Such process has several advantages over traditional FFF (fused filament fabrication) printing. Oliver has 47µm resolution in the XY plane and 25µm resolution in the Z axis. This is partly achieved by a custom-made LED array that shines the UV light at a better angle and thus offers a significant qualitative jump in the overall precision of 3D printed objects compared to FFF printing.

Despite the overall increase in resolution, Oliver achieves a very solid speed of 20 seconds per layer. With further firmware optimization we expect this number to go even lower.

We have spent over 1.5 years developing the printer and always had reliability in mind. Metal construction, solid electronics and easy disassembly makes it a reliable workhorse in an amateur environment.

**Thank you for choosing the Oliver 3D printer.**

**NOTE**  
Please read the manual carefully, as it contains important information.

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## Contact information

You can contact us by the following means:

- Website forum: [www.oliver3d.com](http://www.oliver3d.com)
- RepRap forum: *coming soon*
- Slack channel: *coming soon*
- Facebook group: *coming soon*
- Twitter: *coming soon*
- Reddit: *coming soon*
- Contact to individual team members:
  - Adam Schuppler: [adam.schuppler@oliver3d.com](mailto:adam.schuppler@oliver3d.com)

### NOTE

We develop the Oliver printer in our free time. Because of that, we cannot answer all your questions (and take no responsibility for the correctness of answers provided).

Thank you for understanding.

# Safety information

## Safe operation of the printer

The Oliver 3D printer is a professional tool and like all tools, it needs to be operated with respect and care. If you follow these instructions, nothing will stop you from achieving beautiful prints and seamless operation.

### GENERAL SAFETY

- The device is intended for indoor use only.
- Operate the device within 15°C to 40°C.
- Operate the device within 20% to 80% humidity.
- We encourage children to learn as much about technology and 3D printing as possible. However, because of dangers associated with resin handling, children should be under constant supervision when using the printer.
- Do not leave the printer unattended, when it is operating.
- Place the printer in well-ventilated area.
- The machine is designed to emit as little UV light as possible, but user modifications may expose sources of UV light. Excessive UV light exposure arising from these modifications may cause eye irritation and other health problems.

### ELECTRICAL SAFETY

- Always unplug the printer before doing any maintenance or modifications.
- Never disassemble the power supply unit. It contains no parts which could be replaced by an unskilled worker.
- The printer is designed to be powered by 230V 60Hz AC supply. Users can install a different power supply, though. This may change recommended voltage and frequency.
- Always check the condition of the power cord before operation. If damage occurs to the power cord stop using the printer immediately and replace the cord.
- Place the power cord so you cannot accidentally stumble over it or step on it, or otherwise expose it to any potential damage.
- When you disconnect the power cord from the socket, pull the plug rather than the cord to reduce the risk of damage to the plug or to the AC outlet.

### MECHANICAL SAFETY

- The Oliver 3D printer contains a moving Z axis. However, the stepper motor does not have enough power to cause any serious injuries. Still, it is advised to reach in the machine only when it is turned off.

## Resin handling

Photopolymers used in this device (“resin”) may pose substantial health hazards. Always consult the manufacturer’s documentation of any particular resin you are using.

You can read about proper disposal in the *routine operation* chapter. Here are some general directives:

### GENERAL PRINCIPLES

- Cured resin is much safer than uncured. Always try to cure it prior to disposal.
- Resin is absorbed by human skin and gets accumulated in fat tissues (liver, brain, etc.). Protect yourself!

### PROTECTIVE EQUIPMENT NEEDED

- nitrile gloves; Unless specified otherwise in the manufacturing documentation *DO NOT USE LATEX GLOVES*.
- plastic or aluminum foil
- protective glasses
- a dust mask when sanding or post-finishing parts

### LONG-TERM STORAGE OF RESINS

- Keep UV resin in tightly sealed lightproof containers. Avoid placing the containers under direct sunlight.
- Keep the temperature within 20° to 50°C.
- Keep the humidity within 20% to 80%.
- Store in well-ventilated area.
- The floor of the storage room must be impermeable to prevent the escape of liquids.

### WORKPLACE SETUP

- Set up the printer in well-ventilated place.
- Place protective plastic or aluminum foil underneath the device during operation. This will help contain any accidental spills of resin. Plastic foil is preferable, as in case of electrical accident, aluminum foil can pose a significant risk.
- Firstly, put on protective glasses, THEN put on nitrile gloves.

### POST-PROCESSING OF PARTS

- Immediately after print removal rinse the print in isopropanol alcohol (at least 99%) bath.
- Then post-cure the printed object under UV light as recommended by the resin manufacturer.
- It is crucial to ensure that all printed objects are fully cured. Remember, cured resin is much safer than uncured.

### FIRE-FIGHTING MEASURES

- Fire extinguishing:
  - Use carbon dioxide, dry chemical or water and foam fire extinguisher
  - Do not extinguish the fire with stream of water, as the fire may spread further.
- Fumes:
  - Dangerous fumes created during fire: CO<sub>2</sub>, CO, NO<sub>x</sub>, thick black smoke

- Other fumes may be created as a result of imperfect combustion
- Advice for fire-fighters:
  - Wear self-contained breathing apparatus.
  - Wear protective clothing to prevent contact with skin and eyes.

## FIRST AID

- Skin contact:
  - **First aid measures:** Remove all contaminated clothes and footwear immediately unless stuck to skin. Wash immediately with plenty of soap and water.
  - **Symptoms:** There may be irritation and redness at the site of contact.
- Eye contact:
  - **First aid measures:** Bathe the eye with running water for 15 minutes. Consult a doctor.
  - **Symptoms:** There may be irritation and redness. The eyes may water profusely.
  - Eye bathing equipment should be available on the premises.
- Ingestion:
  - **First aid measures:** Wash out mouth with water. Consult a doctor.
  - **Symptoms:** There may be soreness and redness of the mouth and throat.
- Inhalation:
  - **First aid measures:** Remove casualty from exposure ensuring one's own safety whilst doing so. Consult a doctor.
  - **Symptoms:** There may be irritation of the throat with a feeling of tightness in the chest. Exposure may cause coughing or wheezing.

## Isopropanol alcohol

Carefully follow instructions from the manufacturer of your purchased isopropyl alcohol (IPA). This substance is highly flammable, even explosive, and should be kept away from any sources of heat, fire or sparks. Consult the manufacturer's documentation for more in-depth information.

# Routine operation

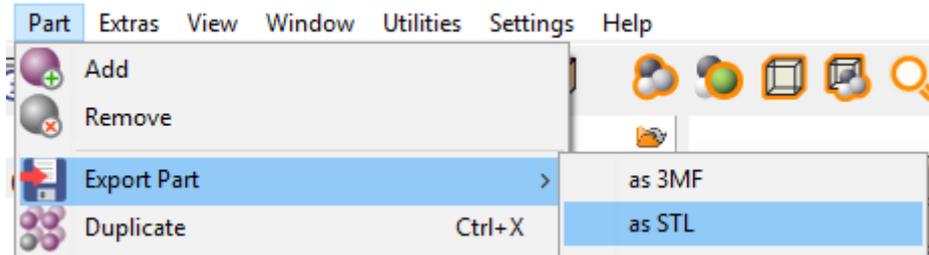
## First print

This section shows a detailed walkthrough of the printing process.

### SLICING THE OBJECT

After you have downloaded or created the desired object, it is a good idea to repair the STL model using the Autodesk Netfabb built-in repair function. Open the Autodesk Netfabb and then click on "Open  File" icon and import your 3D model.

Next click on "Repair"  icon. A new menu on the left will appear. Click on "Automatic Repair" button. Select "Default Repair" and click on "Execute". Then click on "Apply Repair" and select "Remove old Part" from the menu. Finally, to export the part, click on "Part" - "Export Part" - "as STL".



## WORKPLACE SETUP

Firstly, place the printer on an appropriate plastic or aluminum foil (plastic one is preferred, as it reduces the hazard of electrocuting yourself during an unlikely event of grounding failure). This way you avoid contaminating your table with uncured resin.

Then connect the power and ethernet cables. Do not turn the printer on yet. Be sure to have all appropriate safety equipment, such as appropriate gloves and safety glasses on hand.

## CALIBRATION

Turn on the power. Before starting the actual calibration process, it is a good idea to add some sewing machine oil to the threaded rod.

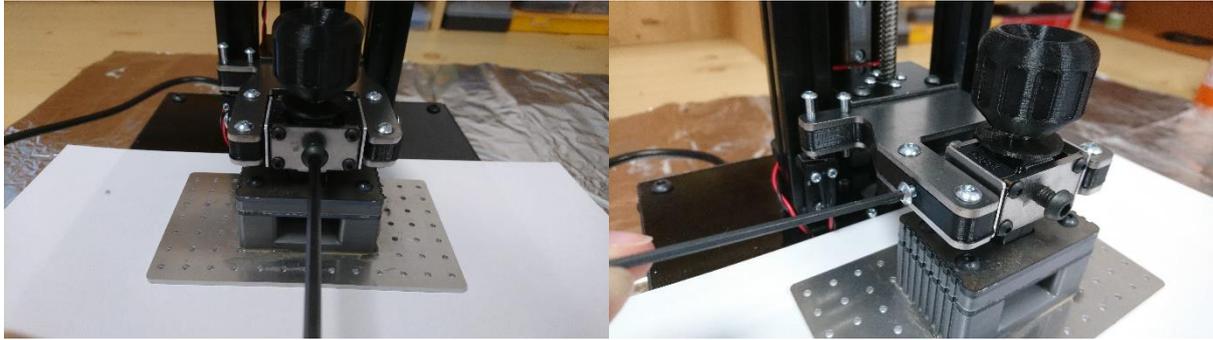
Check whether the FEP film is in good condition. Always clean it with isopropyl alcohol before printing. Clean the protective glass with isopropyl alcohol too.



Unscrew the front and TWO side screws:



Place a sheet of paper on the protective glass. Then lower the platform all the way down and tighten the calibration screws while holding the platform tightly on the protective glass.



## PRINTING

Go to <https://www.nanodlp.com/dashboard> and select your printer from the list:

Available printers in your local network

Printer Interface	Last Seen	Progress
Oliver 3D	Recently	Setup "Online Access Key" to monitor progress

Then click on "Plates":



Select "3D Editor":



Insert the model, prepare it and slice it using the 3D editor. Then pour the resin into the FlexVAT and use the front screen to start the print. Be sure to monitor the print!

## RINSING PARTS IN IPA AND WATER

Always remove the platform first. If you remove the FlexVAT first, uncured resin will start dripping on the protective glass. Remove the printed object(s) and then clean all parts contaminated with uncured resin in IPA. After IPA bath, wash printed object(s) in water.

## POST-CURING THE OBJECT

Since the printer cures the resin only partially, it is necessary to post-cure it under an UV lamp. If you do not have one, you can put the object under sunlight.

## Waste disposal

General material flow:

**inputs:** photopolymer resin, isopropyl alcohol, water

**outputs:** unused resin, isopropyl alcohol with resin solution, water with resin solution, contaminated equipment

**risks:**

- spills - clean with a cloth
- contaminated equipment - use cloth to get rid of the resin.

- dried resin - carefully file the resin (preferably wearing dust mask while doing so); dried resin does not pose significant health hazard, although it is not recyclable using current technology

**typical waste:**

- used nitrile gloves - dispose in municipal waste
- contaminated cloth - cure the resin under appropriate UV source (ideally under properly secured UV lamp), then use crumbling motion to get rid of cured resin - dispose it in municipal waste
- contaminated funnel - use cloth to get rid of the resin.
- isopropyl alcohol and photopolymer resin solution - mark it as hazardous waste and dispose of it according to local laws

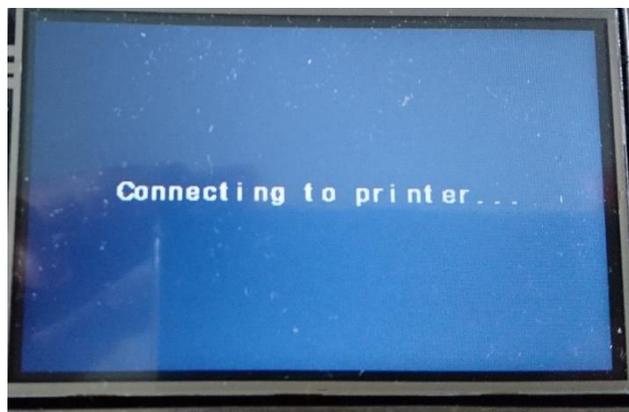
## LCD operation

The Oliver printer has 3.2” display for easy operation. Some basic instructions for using the display were given in the “First print” section. Here is a full list of commands:

### **Connecting to printer**

*Description:* This text will appear, when the printer is powered on.

*Possible issues:* If this image persists for more than two minutes, it means that the display can’t establish connection to Raspberry Pi. Further troubleshooting is needed.



## Main screen

*Description:* Home screen for the printer, when it's not printing.

*Possible issues:* IP address is not shown = no LAN connection.



## IP address QR code

*Description:* IP address with QR code. You can type in the address shown directly into web browser.

*Possible issues:* none known



## Settings

*Description:* This screen shows CPU and RAM utilization. There is also CPU temperature. Two buttons in the lower half of the screen are used for further operations.

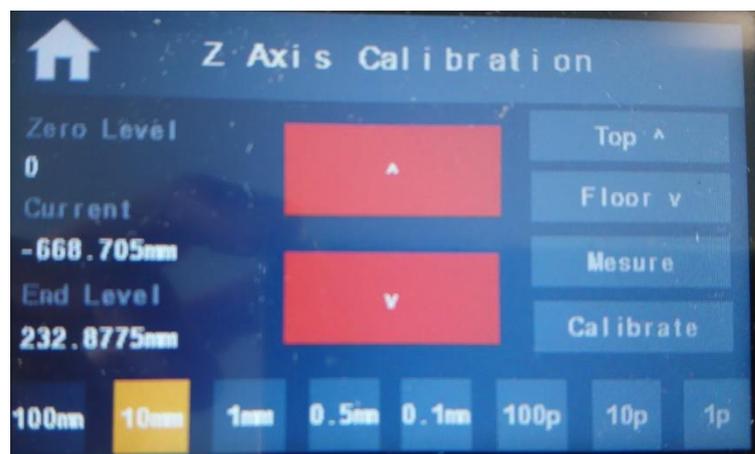
*Possible issues:* none known



## Z axis

*Description:* Z axis screen is used for manual operation of the Z axis.

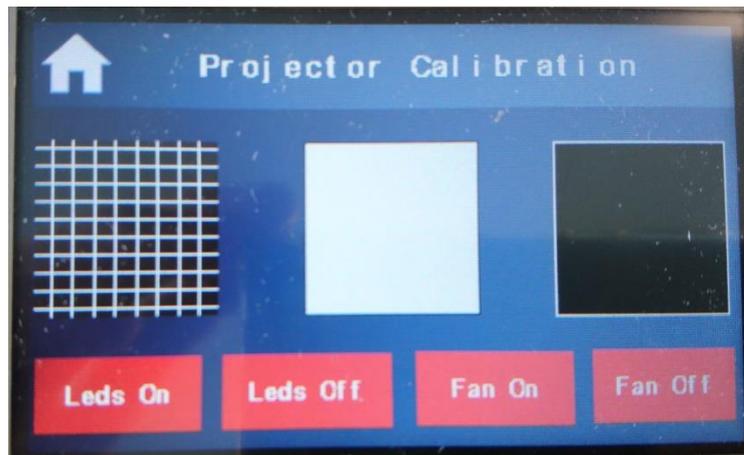
*Possible issues:* none known



## Projector Calibration

*Description:* You can click on one of three pictures to make sure, that the light assembly works correctly. Please note that manual operation of the fan is not implemented in this printer.

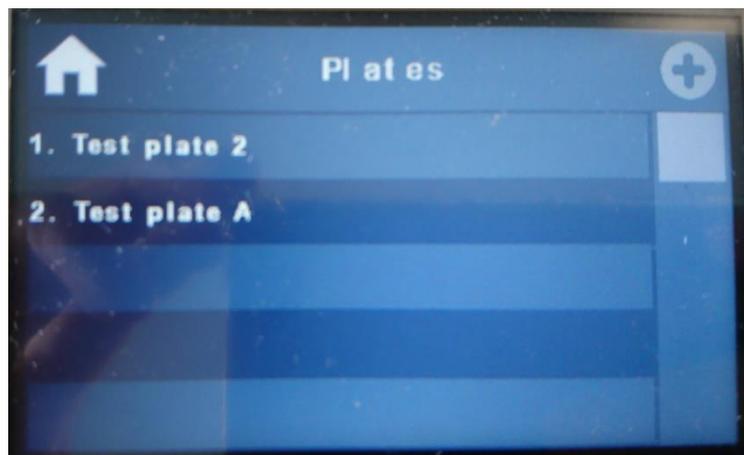
*Possible issues:* none known



## Plates

*Description:* List of sliced plates ready for printing. By clicking on the plus sign, you can add a new one.

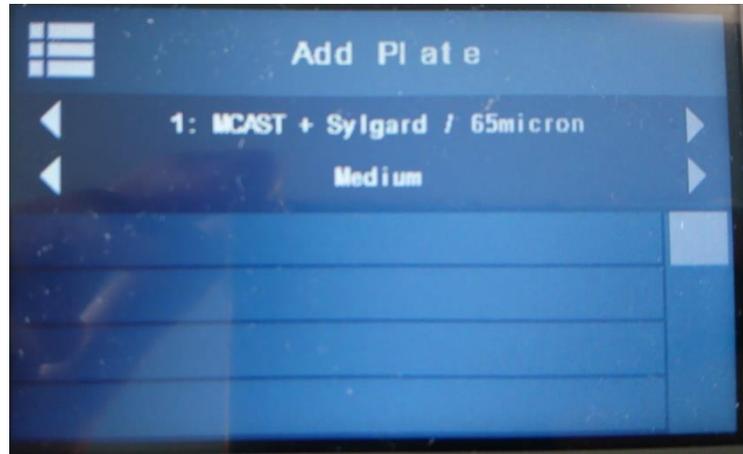
*Possible issues:* none known



## Add plate

*Description:* You can select an object in the list and slice it using the settings above.

*Possible issues:* none known



## Plate

*Description:* Shows a preview of the prepared plate. By sliding the slider, you can preview individual layers. Click on the garbage icon to delete plate. Click on the printer icon to start printing.

*Possible issues:* none known



## Print screen

*Description:* Default home screen when the printer is printing. Shows current layer, remaining time and the current action which the printer is performing.

*Possible issues:* none known



## Print settings

*Description:* You can overwrite the cure time. "Debug print" button will pause the print and move the platform 5 centimetres up. "Pause print" will just pause the print. "Stop print" will terminate the print.

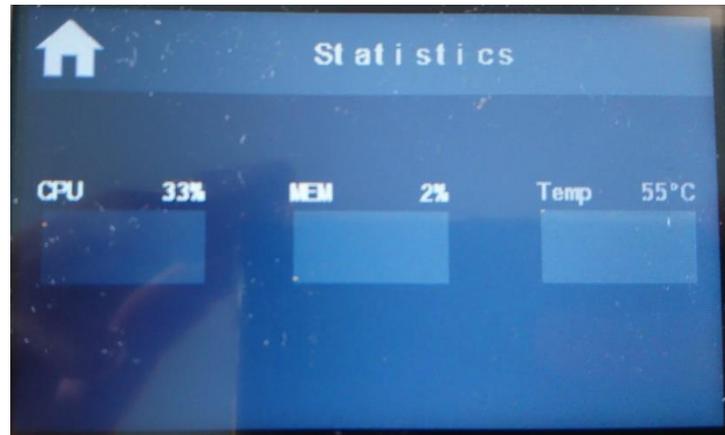
*Possible issues:* none known



## Statistics

*Description:* Similar to statistics shown in the settings window. Shows CPU and RAM utilization and CPU temperature.

*Possible issues:* none known



## NanoDLP on computer

Despite the included touchscreen, it is recommended to control the printer via a powerful NanoDLP web interface. Basic operations were shown in the “First print” chapter. Here is the full list of commands.

**WARNING**

Coming soon.

## NanoSupport

**WARNING**

Coming soon.

# Maintenance

## Before each print

You should check that the Z axis moves correctly. Also, check, if the optical assembly (UV lighting and mask) works correctly. You can easily accomplish both of these operations from the control touchscreen or via browser interface.

## Every 100 hours of operation

You should lubricate the linear guideway. Use sewing machine oil. Also check whether the FEP foil is cloudy. If it is, or has any other damage to it, replace it.

## Every 1000 hours of operation

The mask may come to end of its lifetime due to UV exposure. You may have to replace it.

**NOTE**

The exact procedure for changing the screen is omitted in this version of manual.

# Assembly

## Safety instructions

As with any assembly of an intricate electromechanical machine you should follow carefully all instructions given. This especially applies to AC wiring, where a mistake could have fatal consequences. This assembly manual is written for intermediate makers, who already possesses some basic safety knowledge.

# Tools needed

The printer was designed in such a way, that assembly does not require any highly specialized machinery. Despite that, you still need some basic tools and consumables. These include:



*Figure 1*  
**Soldering iron**  
Preferably with sharp tip.



*Figure 2*  
**Tin**



*Figure 3*  
**Cutters**



*Figure 4*  
**Isopropyl alcohol (recommended)**  
At least 99% concentration



*Figure 5*  
**Helping hands (recommended)**  
Makes soldering so much easier.



*Figure 6*  
**Screwdrivers**  
Flat-head: 0.4x2mm  
Phillips: M2.5, M2, M1.6



*Figure 7*  
**Alan keys**  
M6, M4, M3



*Figure 8*  
**Pliers**



*Figure 11*  
**Knife**



*Figure 9*  
**Crimping tool for insulated terminals**



*Figure 10*  
**General hand crimp tool**



*Figure 12*  
**Hand tap**  
M2, M2.5, M3, M4, M5,  
M6, M8



*Figure 13*  
**Metal drill**  
M2.5, M3, M3.5 (M3),  
M4, M4.5 (M4), M9



*Figure 14*  
**Drill press (recommended)**  
At least 140 mm between  
spindle nose and table.



*Figure 15*  
**Spanner**



*Figure 16*  
**Metal saw**



*Figure 17*  
**Miter box**



*Figure 18*  
**Body filler spreader**



*Figure 19*  
**Masking tape**

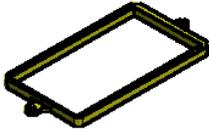
## Bill of materials

Full BOM with links is included in the accompanying files.

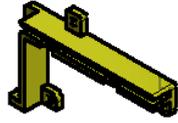
### ADDITIONAL INFORMATION ABOUT CUSTOM-MADE PARTS

- 3D printed parts: use PETG filament with 0.15mm layer height and 15% infill (you will need about 600g of material)
- Steel laser-cut parts: use generic 2.5mm steel
- Aluminum laser-cut parts: use 5754 AW (or similar) aluminum alloy. For parts HP01, HP02, HP03, HP04, HP05, HP07 and HP08 use 1mm thick metal and for part HP06 2.5mm thick metal.

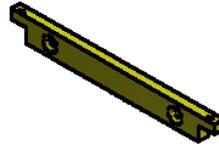
# Printed parts (1/2)



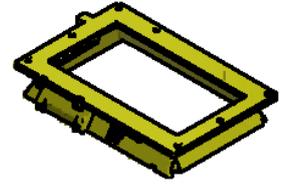
1x A002  
3D01



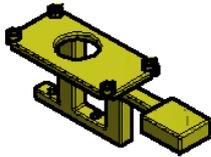
1x B004  
3D02



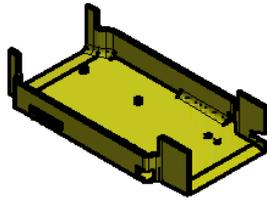
2x B005  
3D03



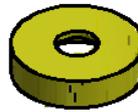
1x B006  
3D04



1x F013  
3D05



1x F014  
3D06



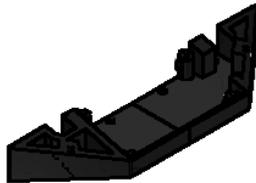
4x H002  
3D07



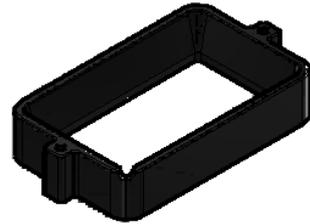
6x H003  
3D08



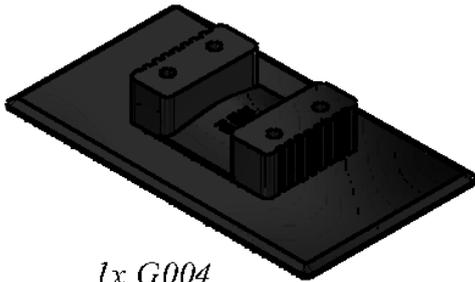
2x H004  
3D09



1x I002  
3D10



1x C001  
3D11



1x G004  
3D12



1x G005  
3D13



1x G007  
3D15



1x G008  
3D16



2x K003  
3D17



1x G028  
3D18



2x G029  
3D19



1x G033  
3D20

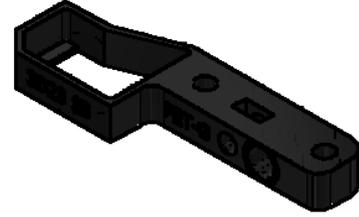
## Printed parts (2/2)



*2x G038*  
**3D21**



*1x G042*  
**3D22**



*1x G043*  
**3D23**

## Aluminium laser-cut parts



*1x H007*  
**HP01**



*1x H008*  
**HP02**



*1x H009*  
**HP03**



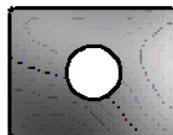
*1x H010*  
**HP04**



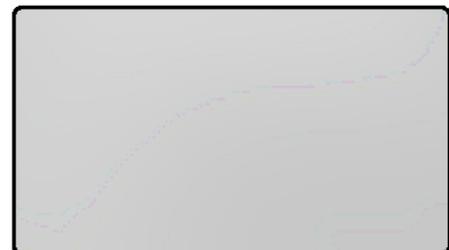
*1x I003*  
**HP05**



*1x G035*  
**HP07**

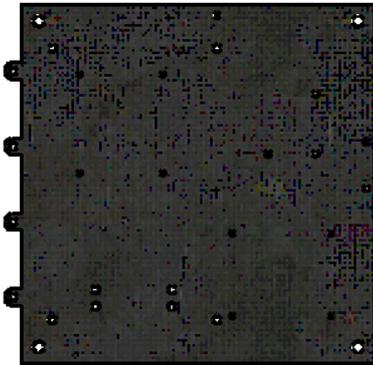


*2x G039*  
**HP08**

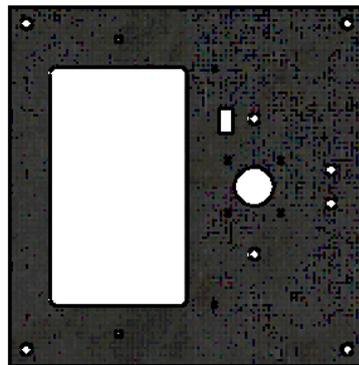


*1x G012*  
**HP06**

# Steel laser-cut parts



*1x H005*  
**OP01**



*1x H006*  
**OP02**



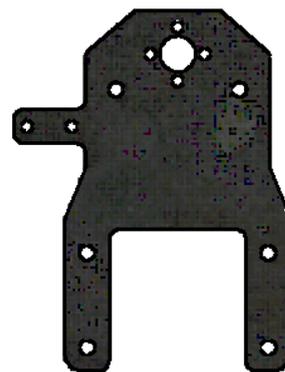
*1x B007*  
**OP03**



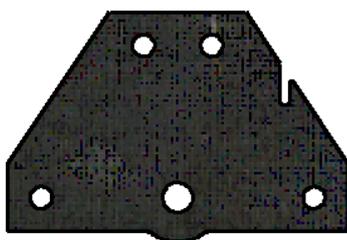
*1x B008*  
**OP04**



*1x C002*  
**OP05**



*2x G010*  
**OP06**



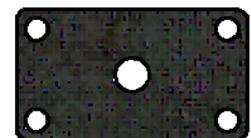
*1x G009*  
**OP07**



*1x G011*  
**OP08**



*1x G034*  
**OP10**



*1x G036*  
**OP11**



*1x G037*  
**OP12**

## Painting the metal parts

Coating the bare metal parts is a recommended protection against corrosion. The Oliver printer has an official color scheme, but feel free to use different colors. For maximum quality, you should follow this painting scheme:

- 1-2x base coat
- 2x color coat
- 1-2x protective coat

Consult the datasheet of paint products of your choice for more information. The official color scheme for the Oliver printer is as follows:

- OP01...OP012 + HP01...HP05 = RAL 4005 (Jet black)
- Oliver logo on HP02 = RAL 9001 (Cream)

You can find the painting mask for the Oliver logo in the included files.

## Assembly of the PCB

This part of manual deals with the preparation, assembly and testing of two custom made printed circuit boards, namely the Oliver Shield 1.3.2 and Light shield 1.0.

### NOTE

Custom printed circuit boards should be manufactured according to following specifications:

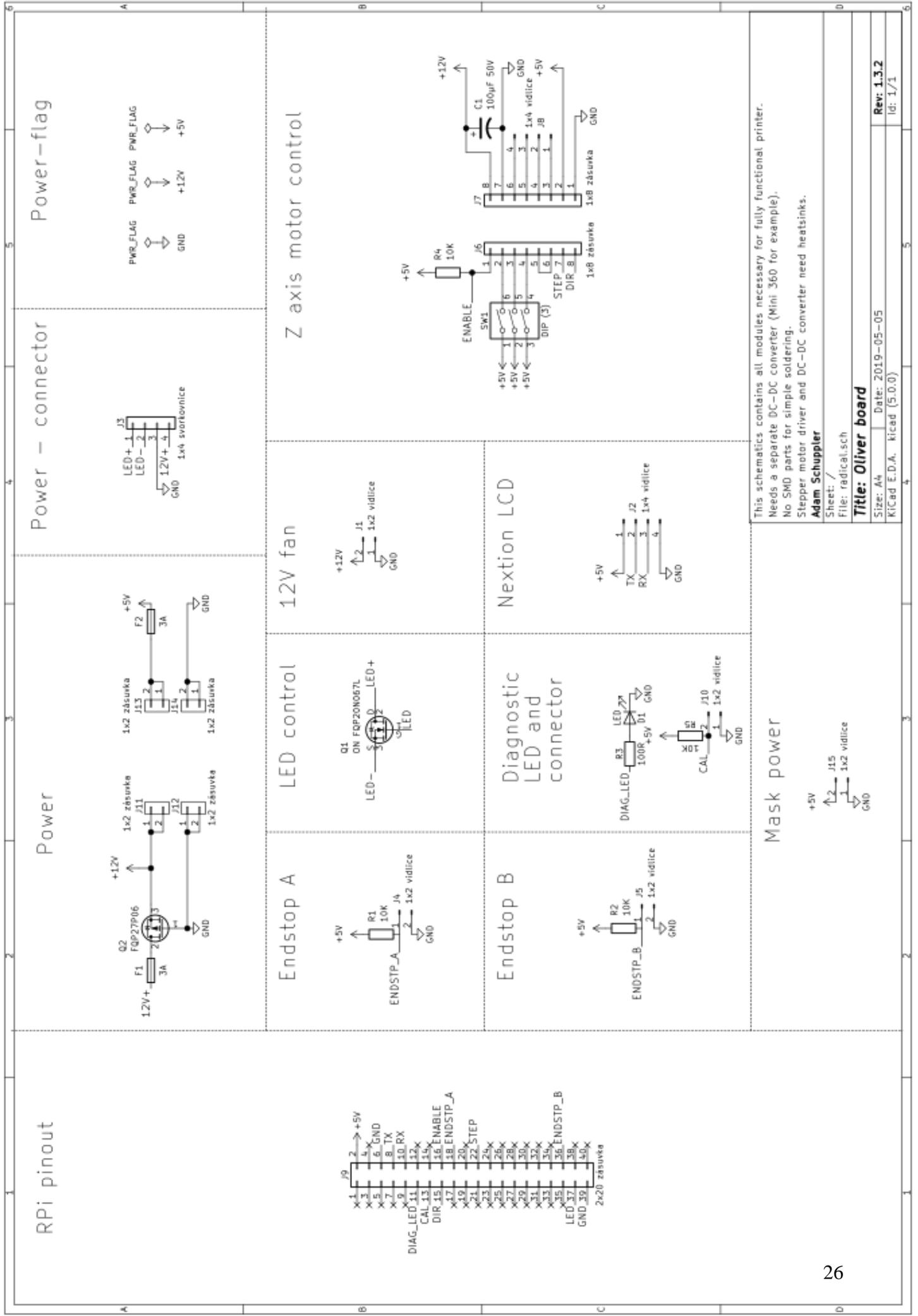
- 2 layers
- 18  $\mu\text{m}$  copper thickness
- 0.2 mm min. clearance
- 0.25 mm minimal track width
- 0.6 mm minimal via diameter
- 0.6 mm minimal via drill

### OLIVER SHIELD 1.3.2

Oliver shield is the main board, that serves as interface between Raspberry Pi and other electronics in the printer. It has many functions, namely:

- DC-DC conversion from 12 volts to 5 volts
- reverse polarity protection for 5 volts rail
- overcurrent protection for the whole printer (using 5 amps and 3 amps fuses respectively)
- power for fans, motor, touchscreen and Raspberry Pi
- stepper motor control, backlight control and interface for end-stops
- diagnostic connector and LED

Gerber files for manufacturing are included in the .zip file.



This schematics contains all modules necessary for fully functional printer.  
 Needs a separate DC-DC converter (Mini 360 for example).  
 No SMD parts for simple soldering.  
 Stepper motor driver and DC-DC converter need heatsinks.

**Adam Schuppler**  
 Sheet: /  
 File: radical.sch  
**Title: Oliver board**  
 Size: A4 Date: 2019-05-05  
 KiCad E.D.A. kicad (5.0.0)

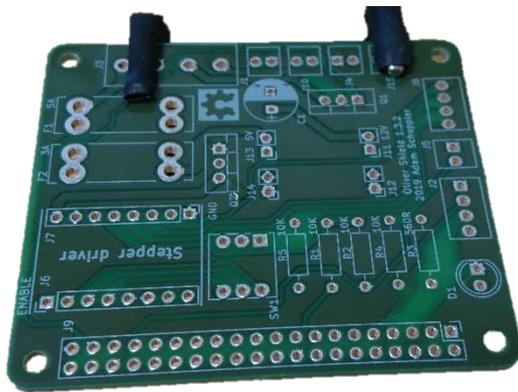
Rev: 1.3.2  
 Id: 1/1

Prepare all necessary parts as mentioned in the bill of materials prior to assembly. Then follow the steps.

### WARNING

This version of the manual does not include the steps for setting up the DC-DC converter (D025) and the stepper motor driver (D026). Users are therefore responsible for the appropriate preparation, assembly and testing of these parts prior to following the actual Oliver shield assembly.

#### Step 1

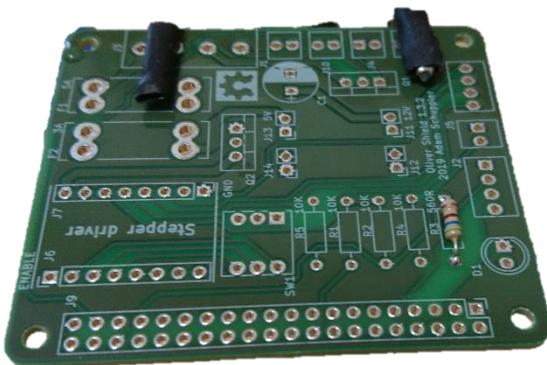


Parts:

1x D023 – PCB

Steps:

#### Step 2



Parts:

1x D005 – R3 - 560R

Steps:

Solder the R3 resistor.  
Orientation does not matter.

### Step 3



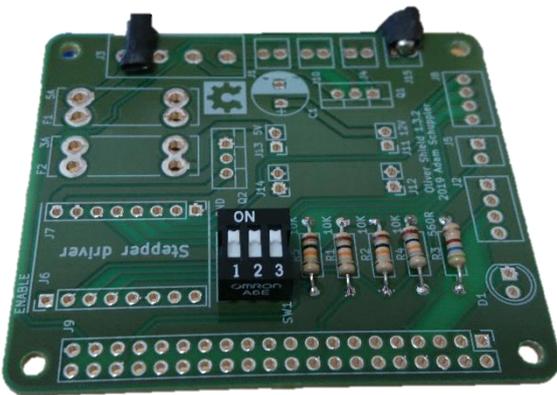
#### Parts:

4x D004 – R1, R2, R4, R5 - 10K

#### Steps:

Solder R1, R2, R4 and R5 resistors. Orientation does not matter.

### Step 4



#### Parts:

1x D008 – SW1 - 3-DIP switch

#### Steps:

Solder the SW1 3-DIP switch. Mind the proper orientation.

### Step 5



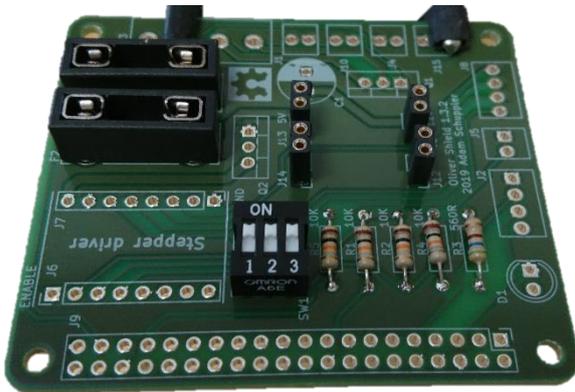
#### Parts:

2x D007 – F1, F2 - fuse holders

#### Steps:

Solder F1 and F2 fuse holders. Orientation does not matter.

### Step 6



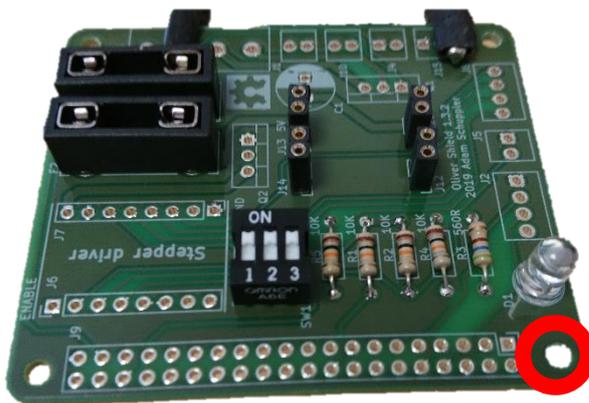
Parts:

4x D014 – J11, J12, J13, J14 - sockets

Steps:

Solder J11, J12, J13 and J14 sockets. Orientation does not matter.

### Step 7



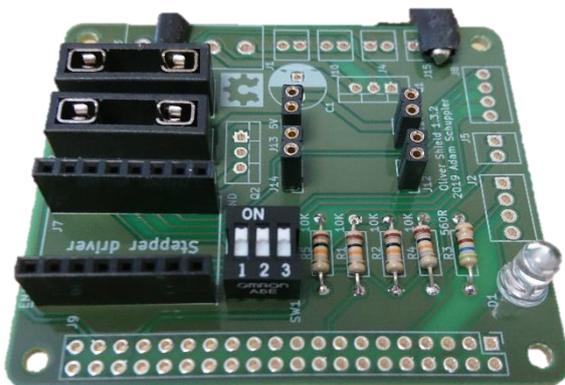
Parts:

1x D006 – D1 - 5 mm LED

Steps:

Solder D1. Mind the orientation. Longer (positive) leg must be closest to the mounting hole (marked in red).

### Step 8



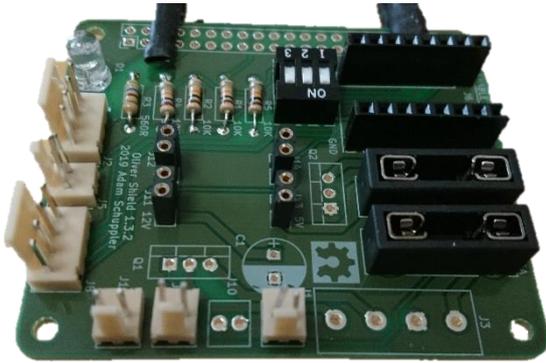
Parts:

2x D012 – J6, J7 - sockets

Steps:

Solder J6 and J7 sockets. Orientation does not matter.

### Step 9



#### Parts:

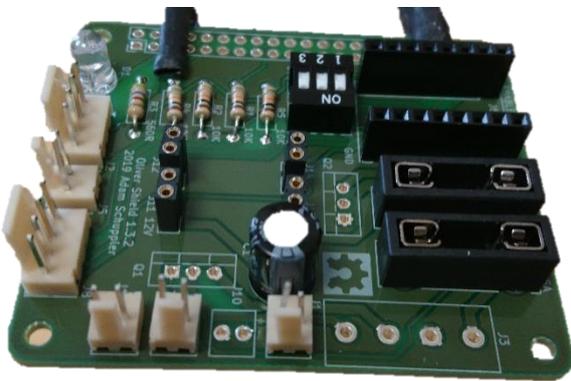
4x (5x) D009 – J1, J4, J5, J15,  
(J10) - sockets

2x D010 – J2, J8

#### Steps:

Solder J1, J2, J4, J5 and J15 sockets. Mind the orientation. You do not have to solder the J10, as it does not have any functionality by default and is there just as an expansion port.

### Step 10



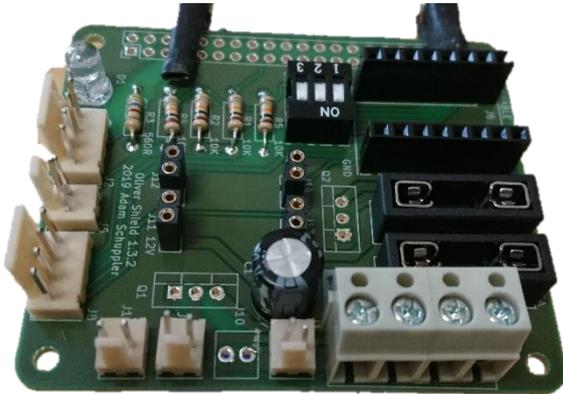
#### Parts:

1x D003 – C1 - capacitor

#### Steps:

Solder C1 capacitor. Mind the orientation.

### Step 11



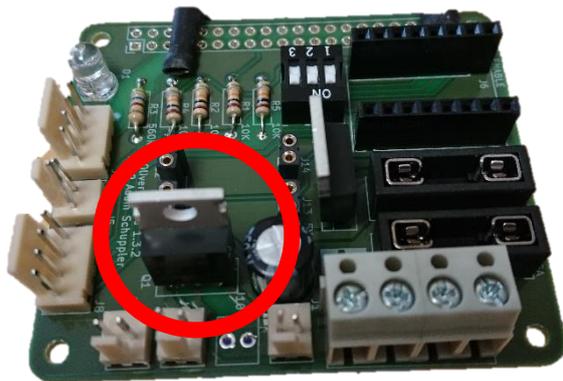
#### Parts:

1x D011 – J3 - socket

#### Steps:

Solder J3 socket. Mind the orientation.

### Step 12



#### Parts:

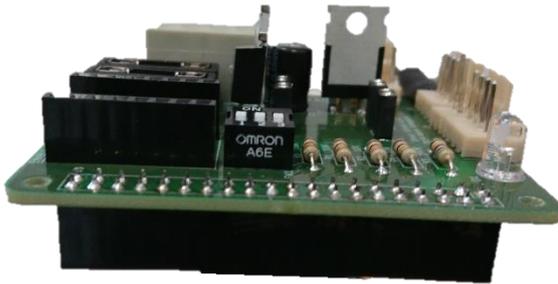
1x D001 – Q1 - N-MOSFET

1x D002 – Q2 - P-MOSFET

#### Steps:

Solder Q1 transistor (in red circle). Solder Q2 transistor. Mind the proper orientation and be careful with static electricity when soldering.

### Step 13



#### Parts:

1x D013 – J9 - socket

#### Steps:

Solder J9 socket. Orientation does not matter.

### Step 14



#### Parts:

1x D021 – 5A fuse

1x D022 – 3A fuse

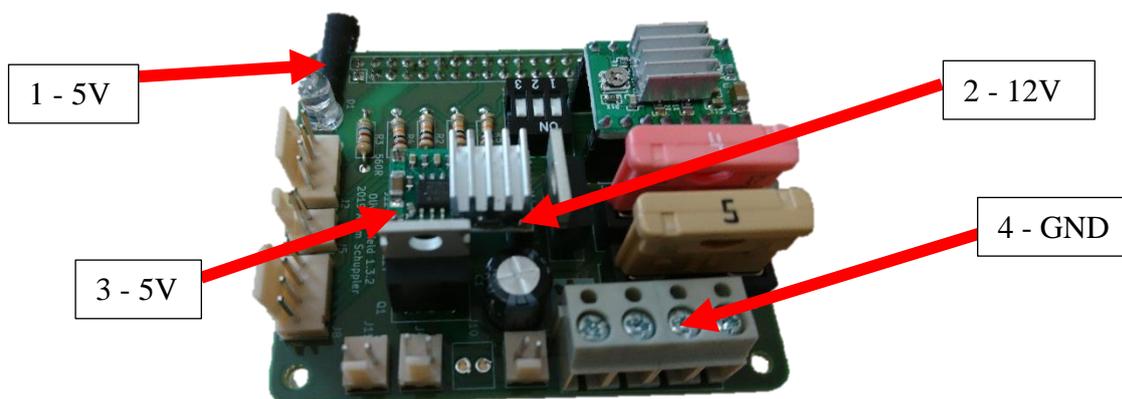
1x D025 – DC-DC converter

1x D026 – stepper driver

#### Steps:

Insert all components. Mind the proper orientation of DC-DC converter and stepper driver!

You should check the proper function of the board before mounting it to Raspberry Pi. In the picture below are important test points.





## LIGHT SHIELD 1.0



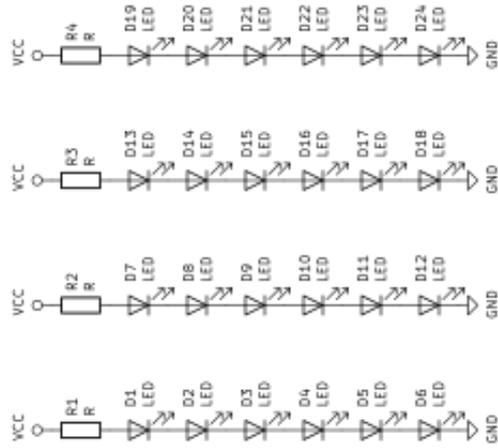
Light shield 1.0 serves as high-power (24 watts) backlight for the mask. It emits in the 410nm spectrum. 24 LEDs are placed in a triangular pattern to provide uniform lighting.

Gerber files for manufacturing are included in the .zip package.

# Power-flag



# LED array



Adam Schuppler

Sheet: /

File: radical\_led\_driver.sch

Title: Light shield 1.0

Size: A4

Date: 2018-08-13

Rev: 1.0

Id: 1/1

KiCad E.D.A. Kicad (5.0.0)

Prepare all necessary parts as mentioned in the bill of materials prior to assembly. You should test all the LEDs prior to assembly, as some suppliers have poor quality control. Use 3.3 V power supply with current limit set to 0.4 A. To determine correct polarity, look for a plus sign on one of the leads. This indicates positive polarity. Then follow the steps below.

**WARNING**  
Step by step photo instructions are omitted in this version of the manual. Only simplified written instructions are provided.

**Step 1**

<p>Parts:</p> <p>1x E001 – printed circuit board 4x E002 – R1, R2, R3, R4</p>	<p>Steps:</p> <p>Solder R1, R2, R3 and R4 resistors.</p>
---	--

**Step 2**

<p>Parts:</p> <p>24x E004 – LED</p>	<p>Steps:</p> <p>Solder LEDs and mind the proper orientation. There is a small plus sign on one of the leads coming from the LED package. This sign must be at the same side as the plus sign printed on the PCB.</p>
-------------------------------------	---

**Step 3**

<p>Parts:</p> <p>1x E003 – J1</p>	<p>Steps:</p> <p>Solder J1 connector. Orientation does not matter.</p>
-----------------------------------	--

#### Step 4

##### Parts:

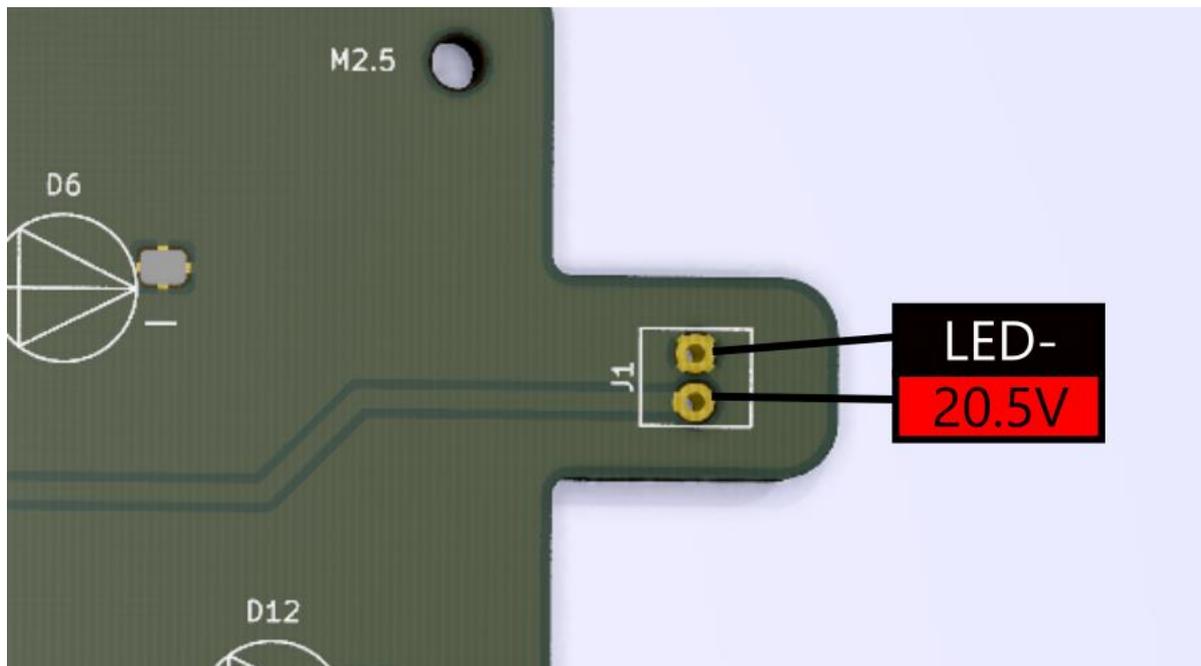
24x E005 – collimator

##### Steps:

Place the collimator on each of the LEDs.

You can connect the board to 20.5 V power supply (do not forget to set current limit to 1.5 A) to test whether the LED array works correctly.

#### PINOUT



## Preparation

To prepare the SD card, you will need following:

- Raspberry Pi 3 Model B
- 8 GB (or more) SD card
- power supply for Raspberry Pi 3 Model B (should supply at least 2.5A at 5V)
- HDMI cable (it is found on Raspberry Pi) and monitor
- Ethernet cable (with RJ45 connector found on Raspberry Pi)
- keyboard and mouse with USB A connectors (they are found on Raspberry Pi)
- internet connection

You also need to download following:

- SD card flashing software (we recommend balenaEtcher):  
<https://www.balena.io/etcher/>

Follow the installation procedure:

1. Install the balenaEtcher software
2. Insert the SD card into your computer
3. Flash the disk image included in the .zip package

Everything should be prepared by now, however we strongly advise to check, whether the RPi is actually working correctly. For that, connect monitor, keyboard, mouse, ethernet and finally power supply to Raspberry Pi. Then check, whether Raspberry Pi will boot up without any problems.

Finally, go to <https://www.nanodlp.com/dashboard>. You should see your Raspberry Pi there. When you click on the link, you should see NanoDLP interface. That means everything is working correctly.

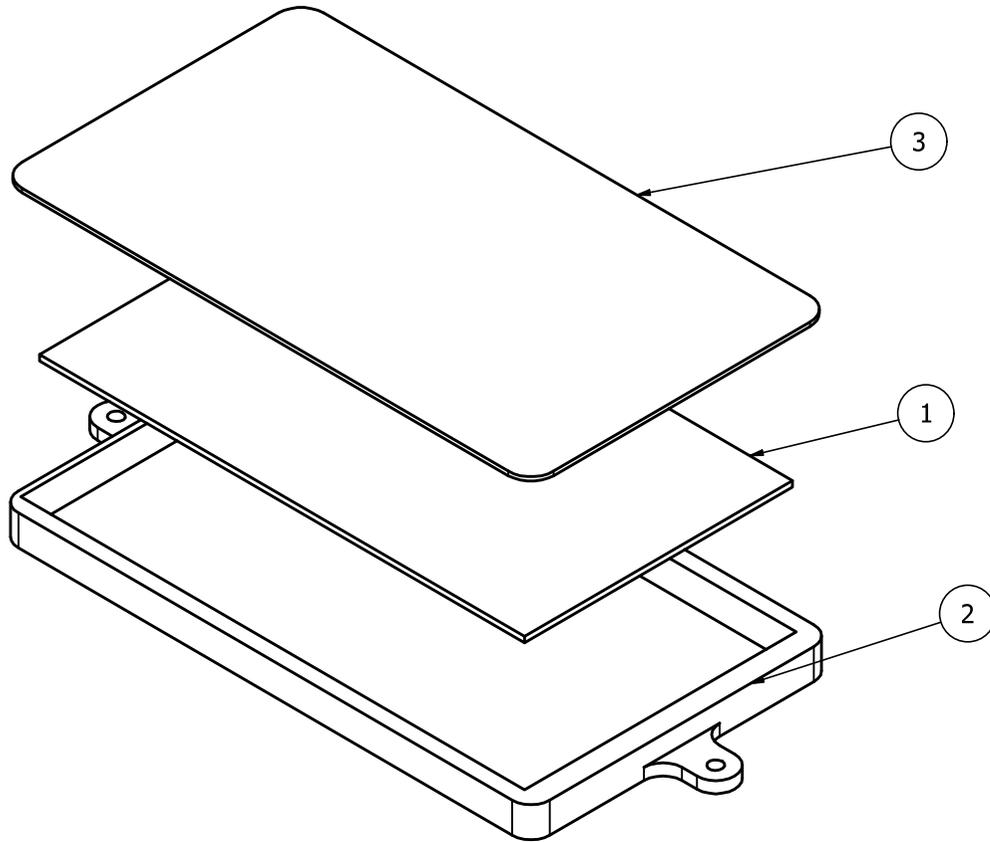
If you encounter any problems, repeat the flashing procedure. If that does not help either, you can contact us.

## Assembly instructions

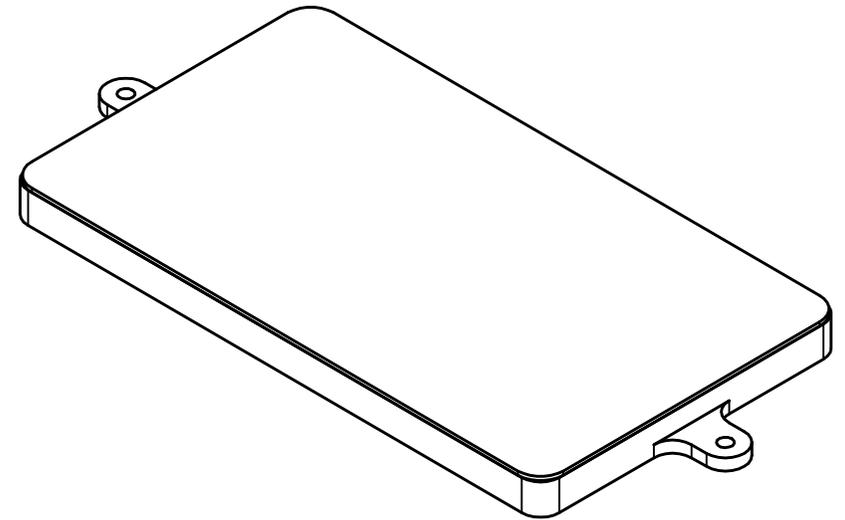
If you have successfully assembled both of the circuit boards and prepared the SD card, you can proceed to the actual assembly of the printer.

# Assembly instructions

Step 1



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	A001	Sharp LS055R1SX03
2	1	A002	3D01
3	1	A003	Protective glass for the mask panel
4	1	A007	Super glue



Glue the mask (1) and protective glass (3) together with the protective glass (3) adhesive.  
Glue the mask (1) and plastic part (2) with cyanoacrylate glue (4).

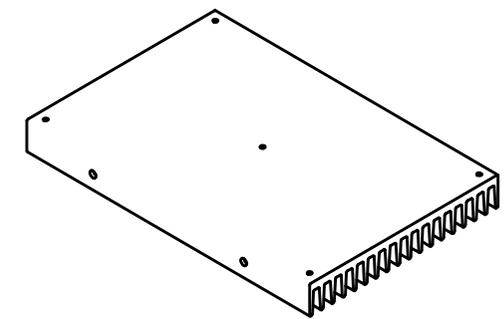
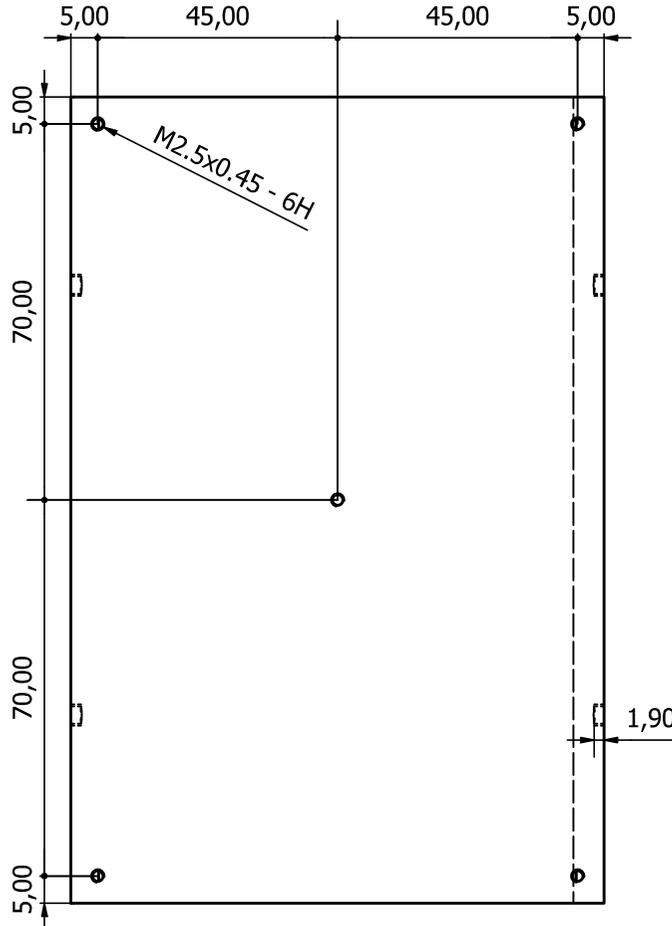
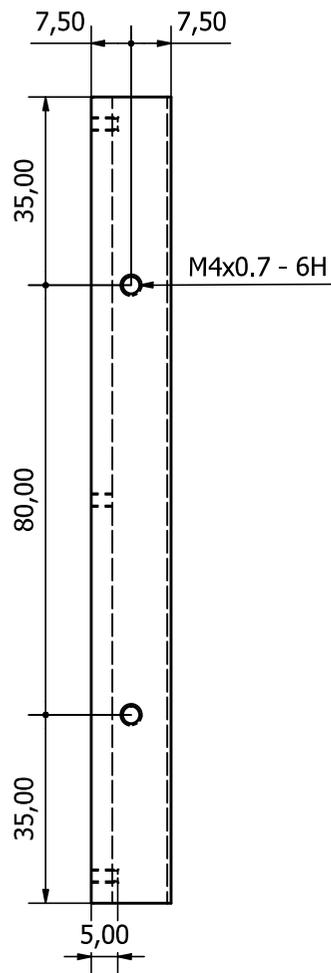
# OLIVER

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BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B001	Heatsink for the LED backlight PCB

# Assembly instructions

Step 2



After drilling, tap the holes with M4 and M2.5 tap respectively.

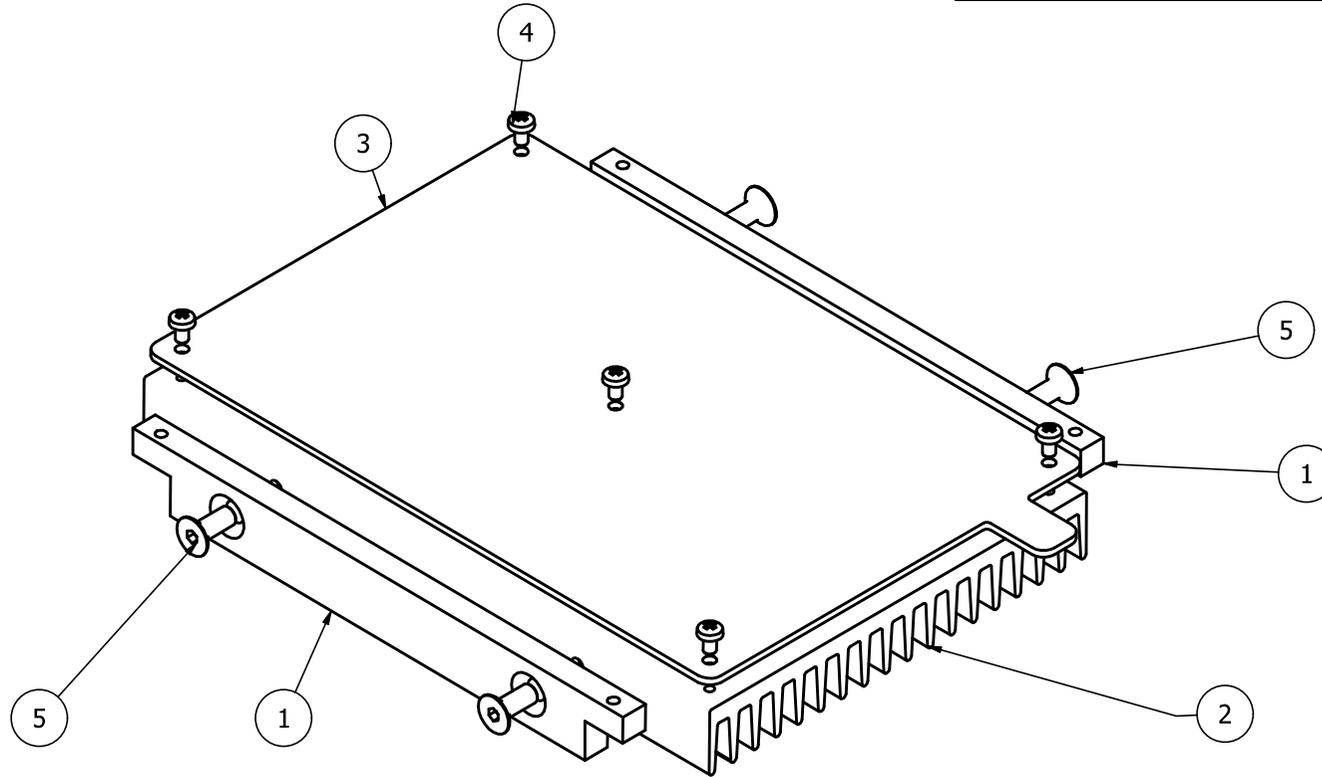


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# Assembly instructions

Step 3

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	2	B005	3D03
2	1	B001	Heatsink for the LED backlight PCB
3	1	E001	Light shield PCB
4	5	E007	DIN 7985 (H) - M2.5x4-H
5	4	B011	DIN 7991 - M4x10
6	1	E006	Thermal paste



Clean the bottom side of the PCB (3). Cover the heatsink (2) uniformly with thermal paste (6) and screw the two parts together

# OLIVER

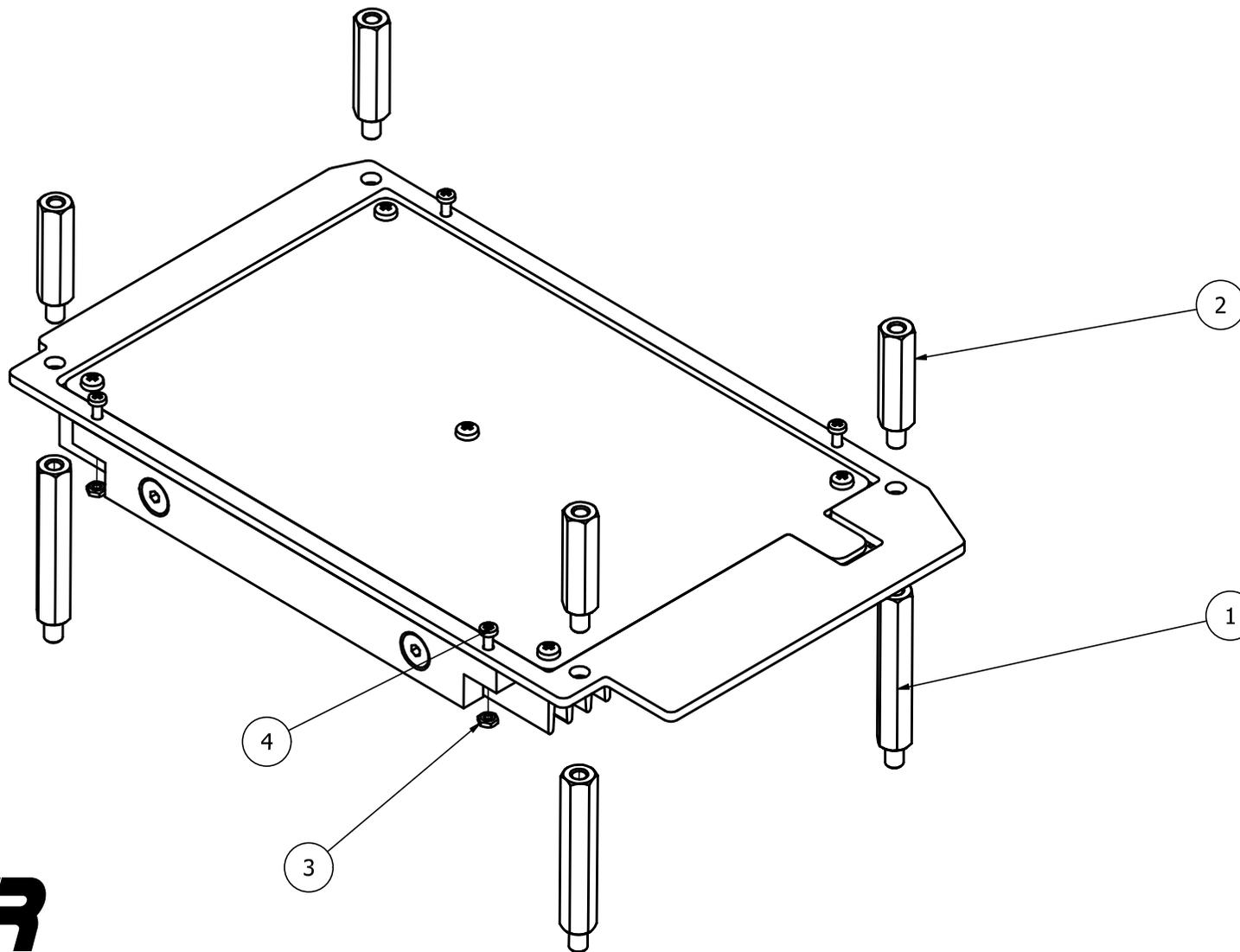
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# Assembly instructions

Step 4

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	B009	BN 3318 M4x40
2	4	B010	BN 3318 M4x25
3	4	B018	DIN 934 - M2
4	4	B015	DIN 7985 (H) - M2x10-H



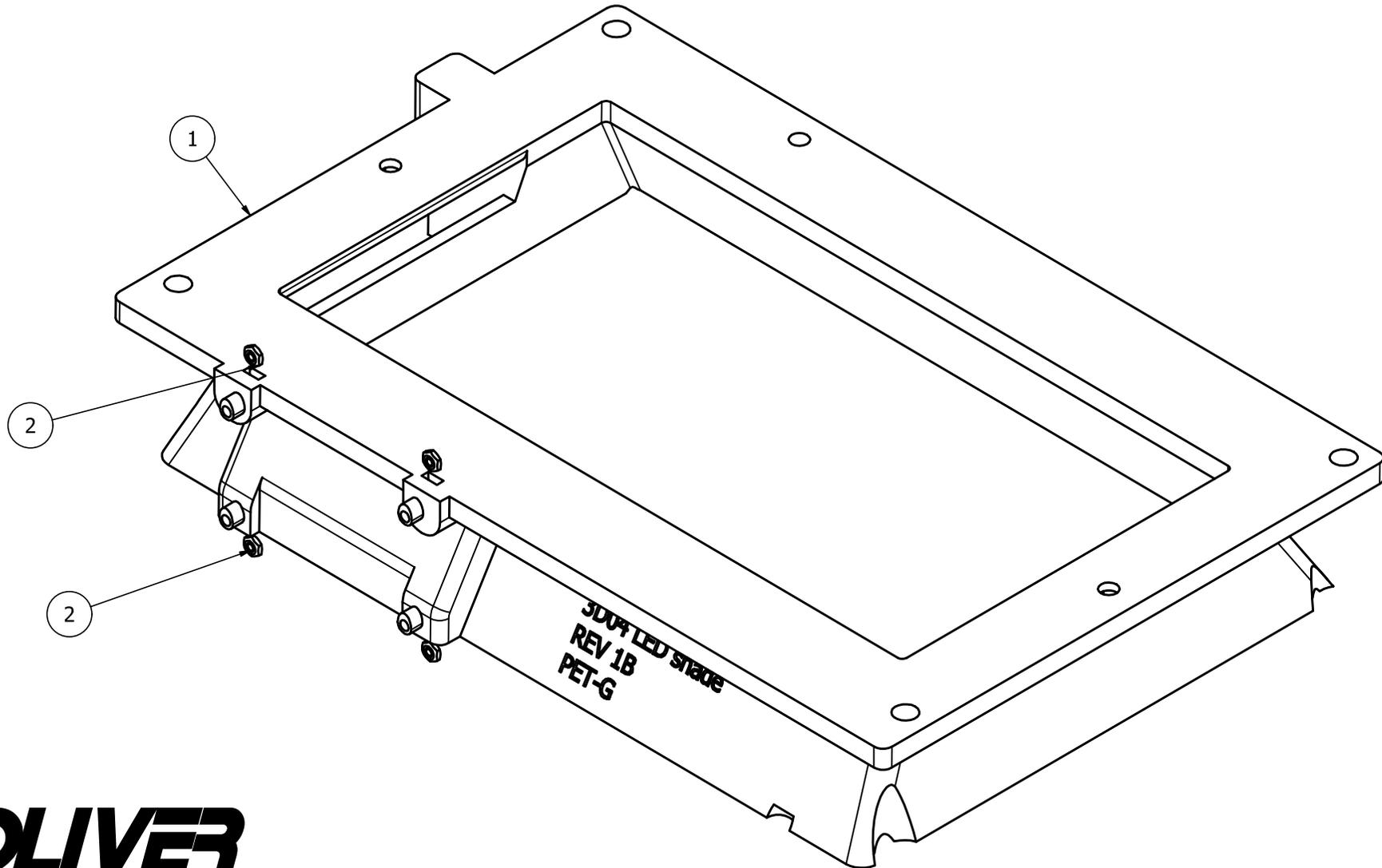
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BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B006	3D04
2	4	F028	DIN 934 - M1.6

# Assembly instructions

Step 5



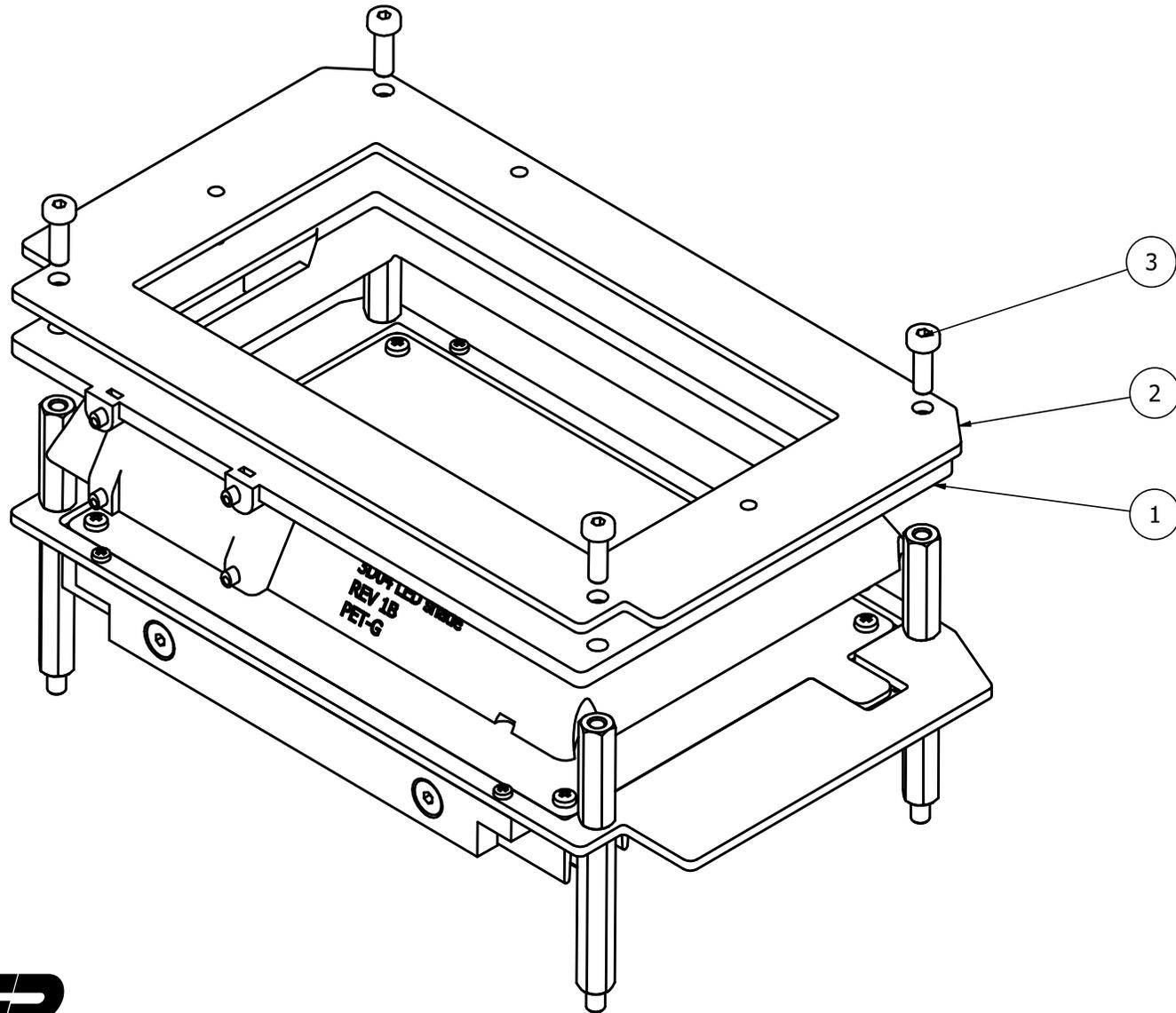
# OLIVER

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# Assembly instructions

Step 6

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B006	3D04
2	1	B008	OP04
3	4	B012	DIN 7984 - M4 x 12



# OLIVER

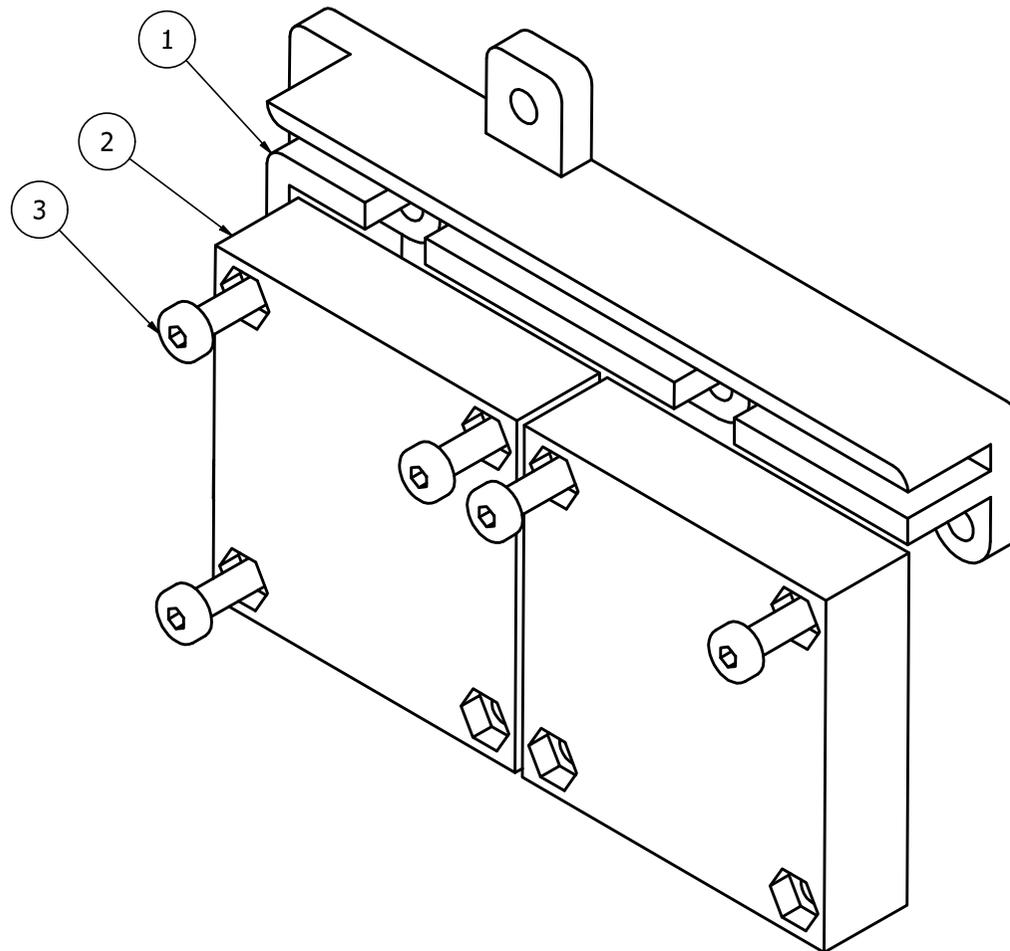
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# Assembly instructions

Step 7

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B004	3D02
2	2	B003	40x40mm fan
3	5	B013	DIN 7984 - M3 x 16



The fan wires must go into the prepared groove!

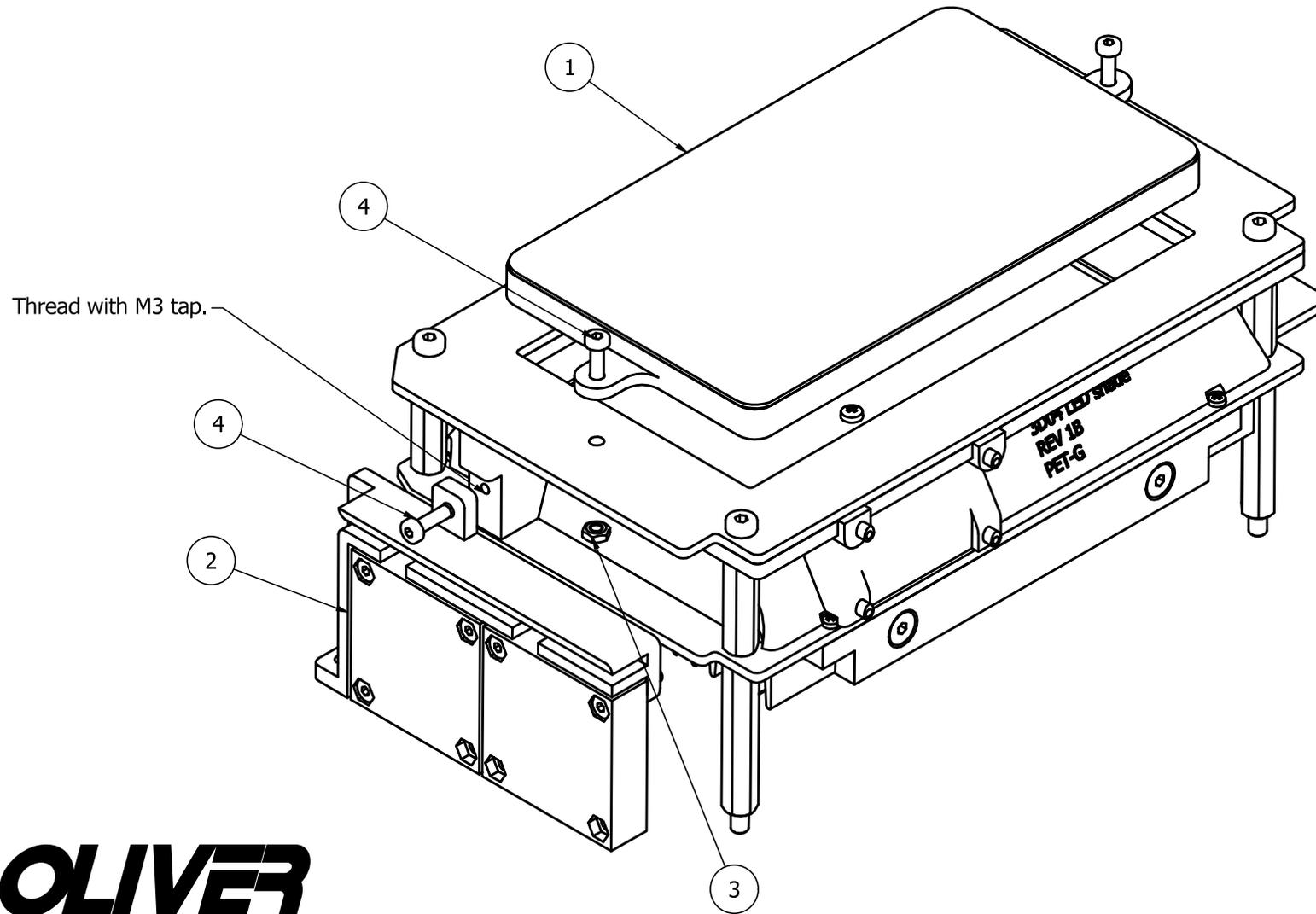
# OLIVER

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# Assembly instructions

Step 8

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	subassembly_a	Subassembly A
2	1	subassembly_b	Subassembly B
3	2	B017	DIN 934 - M3
4	3	B014	DIN 7984 - M3 x 10



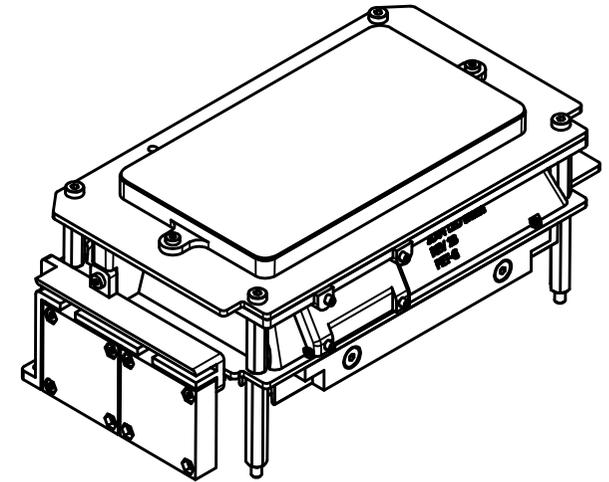
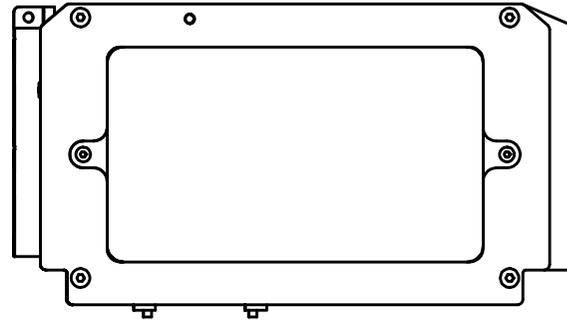
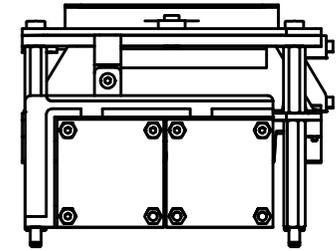
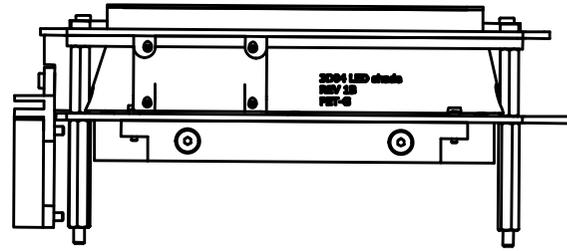
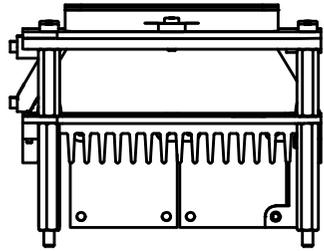
# OLIVER

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Carefully fit the LCD ribbon cable through the prepared opening. The ribbon cable should hang freely above the fan assembly. Be careful, ribbon cables break easily!

# Assembly instructions

Step 9

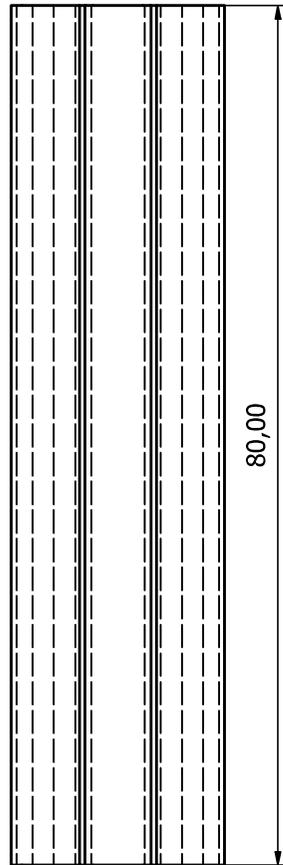
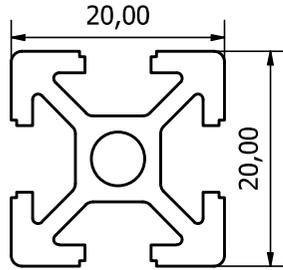
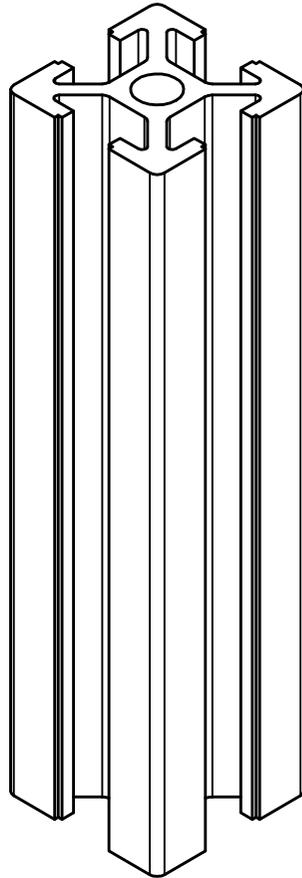


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# Assembly instructions

Step 10



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	320.000 mm	H001	HT01 ... HT04

4 pieces  
in total!

Tap at least 15 mm screw thread (M6) on both sides.

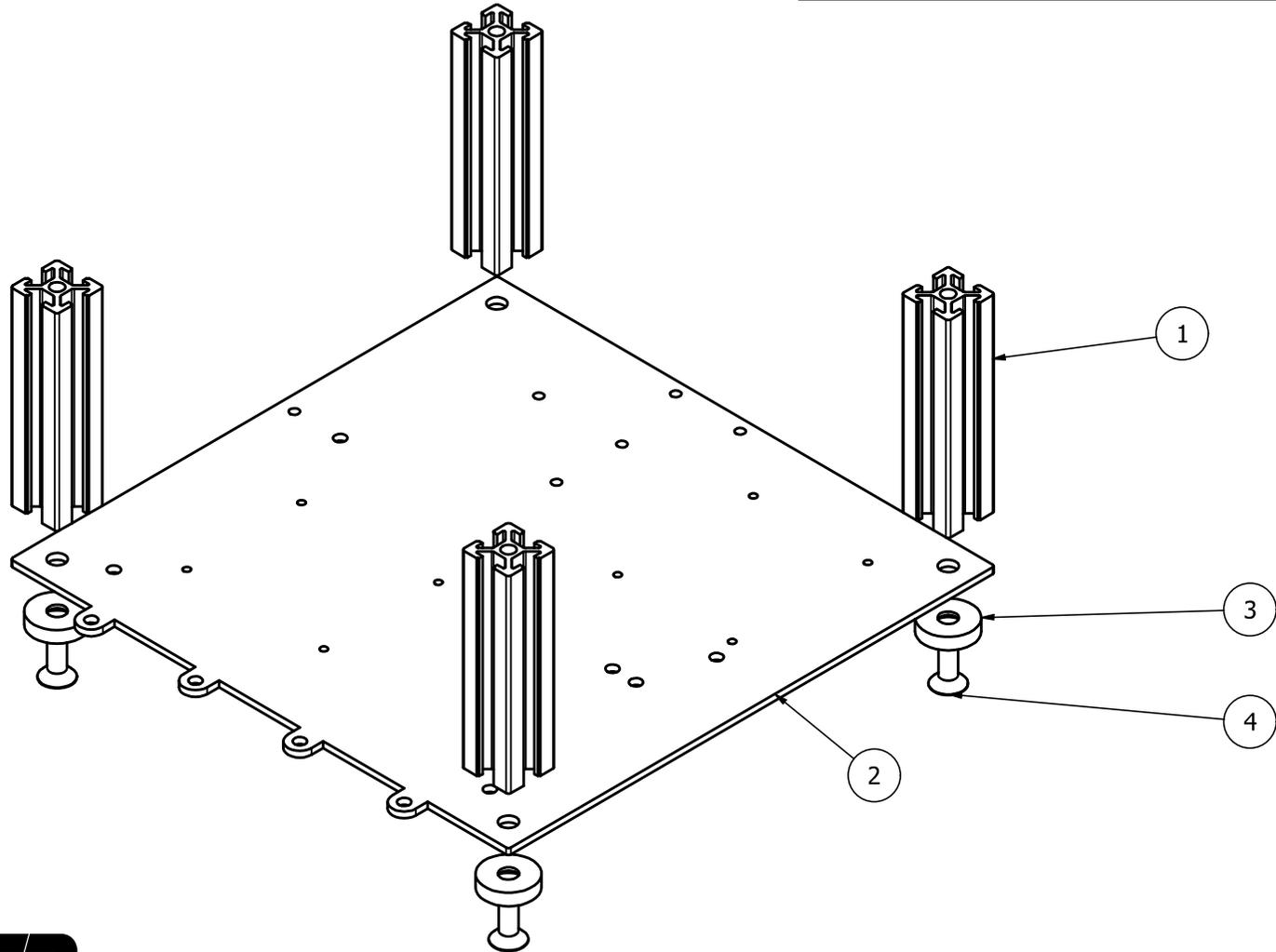
# OLIVER

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# Assembly instructions

Step 11

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	320.000 mm	H001	Extruded aluminium profile
2	1	H005	OP01
3	4	H002	3D07
4	4	H011	DIN 7991 - M6x16



# OLIVER

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Align sides of the aluminium extrusions with the sides of the steel plate as precisely as possible.

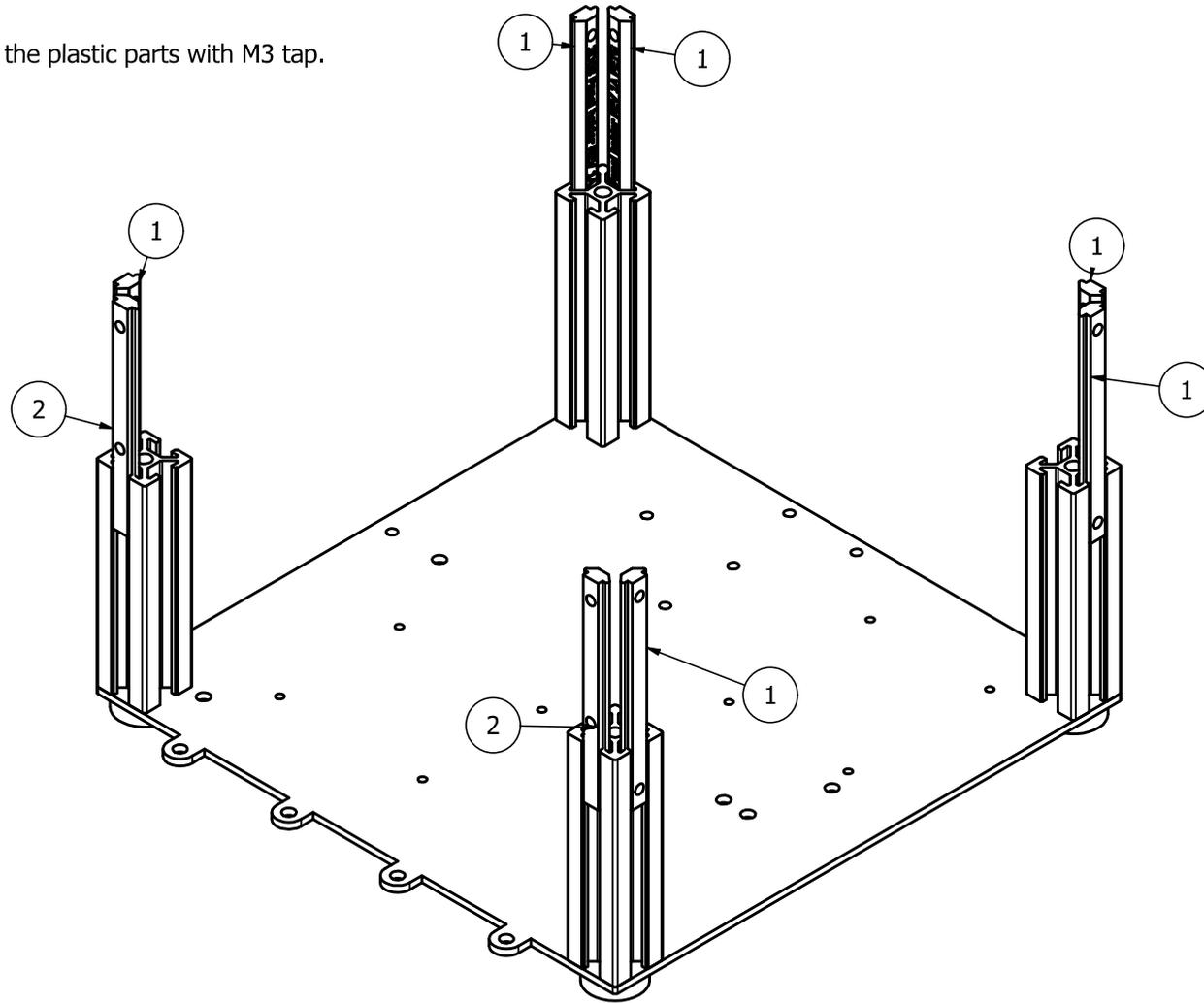
# Assembly instructions

Step 12

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	6	H003	3D08
2	2	H004	3D09



Thread the plastic parts with M3 tap.



# OLIVER

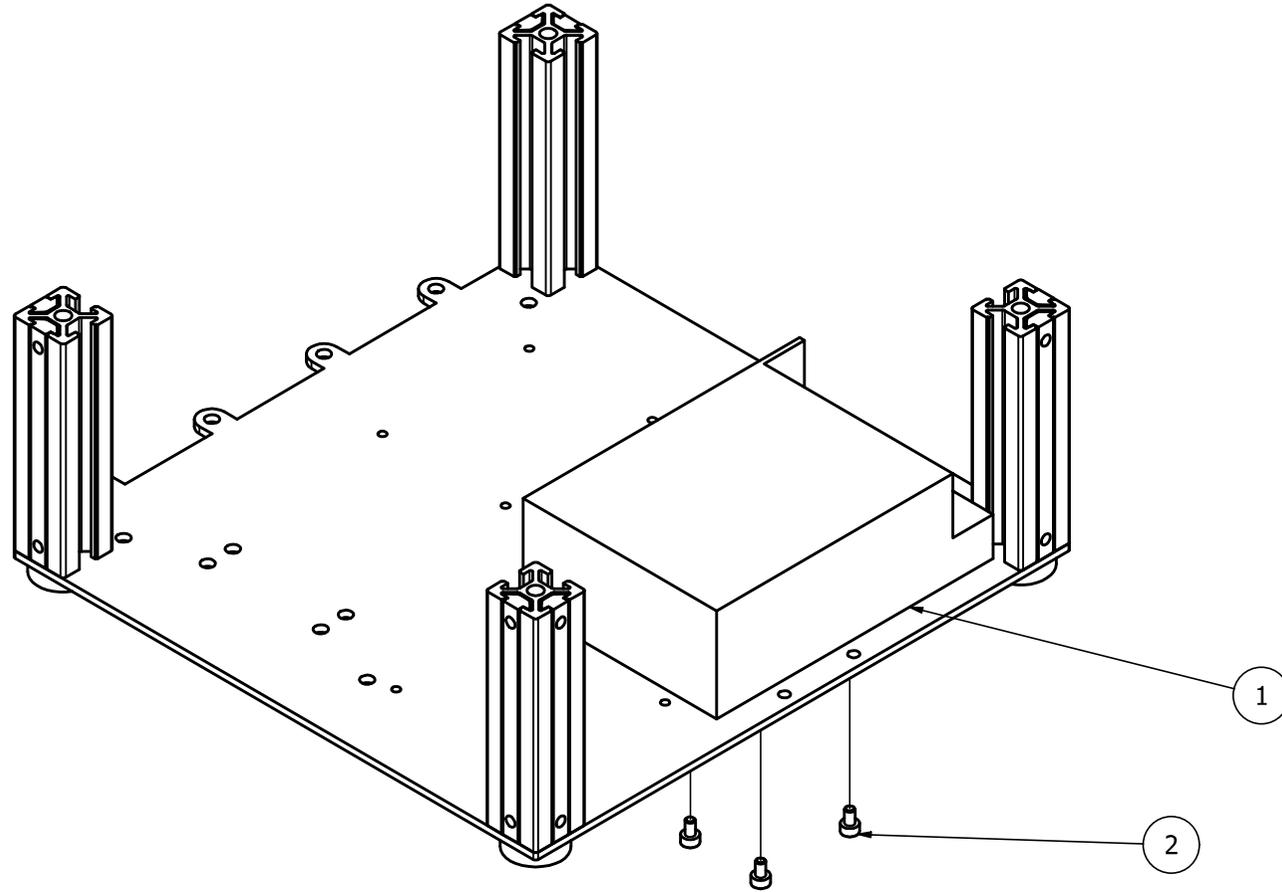
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# Assembly instructions

Step 13

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	F002	AC to DC (230V to 12V 5A) PSU
2	3	F021	DIN 912 - M3 x 5



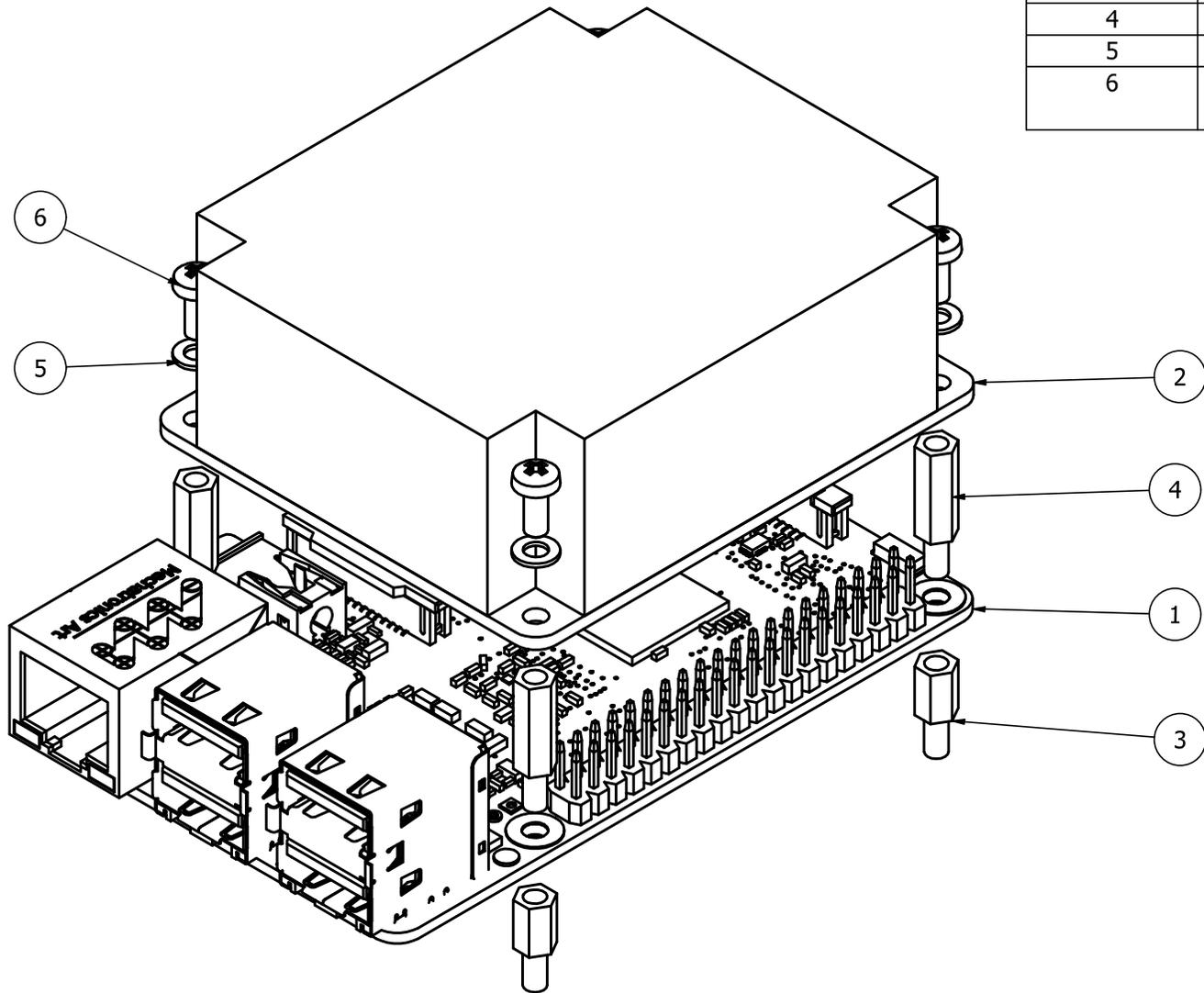
# OLIVER

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# Assembly instructions

Step 14

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	F011	Raspberry Pi 3 Model B
2	1	D023	Oliver shield 1.3.2
3	4	F009	Stand-off M2.5x6mm
4	4	F010	Stand-off M2.5x11mm
5	4	F031	DIN 433 - 2.7
6	4	F020	DIN 7985 (H) - M2.5x6-H



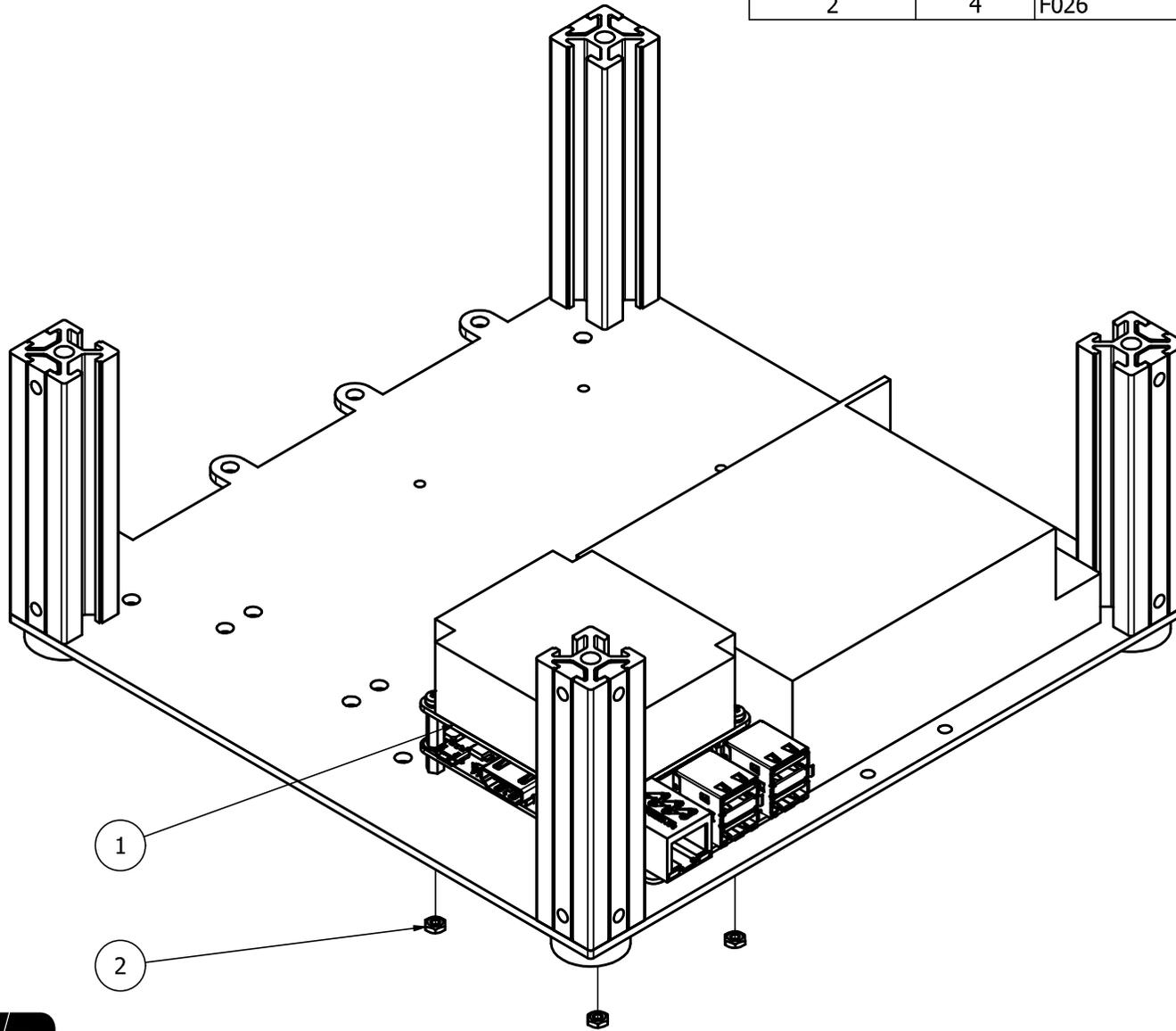
# OLIVER

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# Assembly instructions

Step 15

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	Raspberry Pi assembly	
2	4	F026	DIN 934 - M2.5



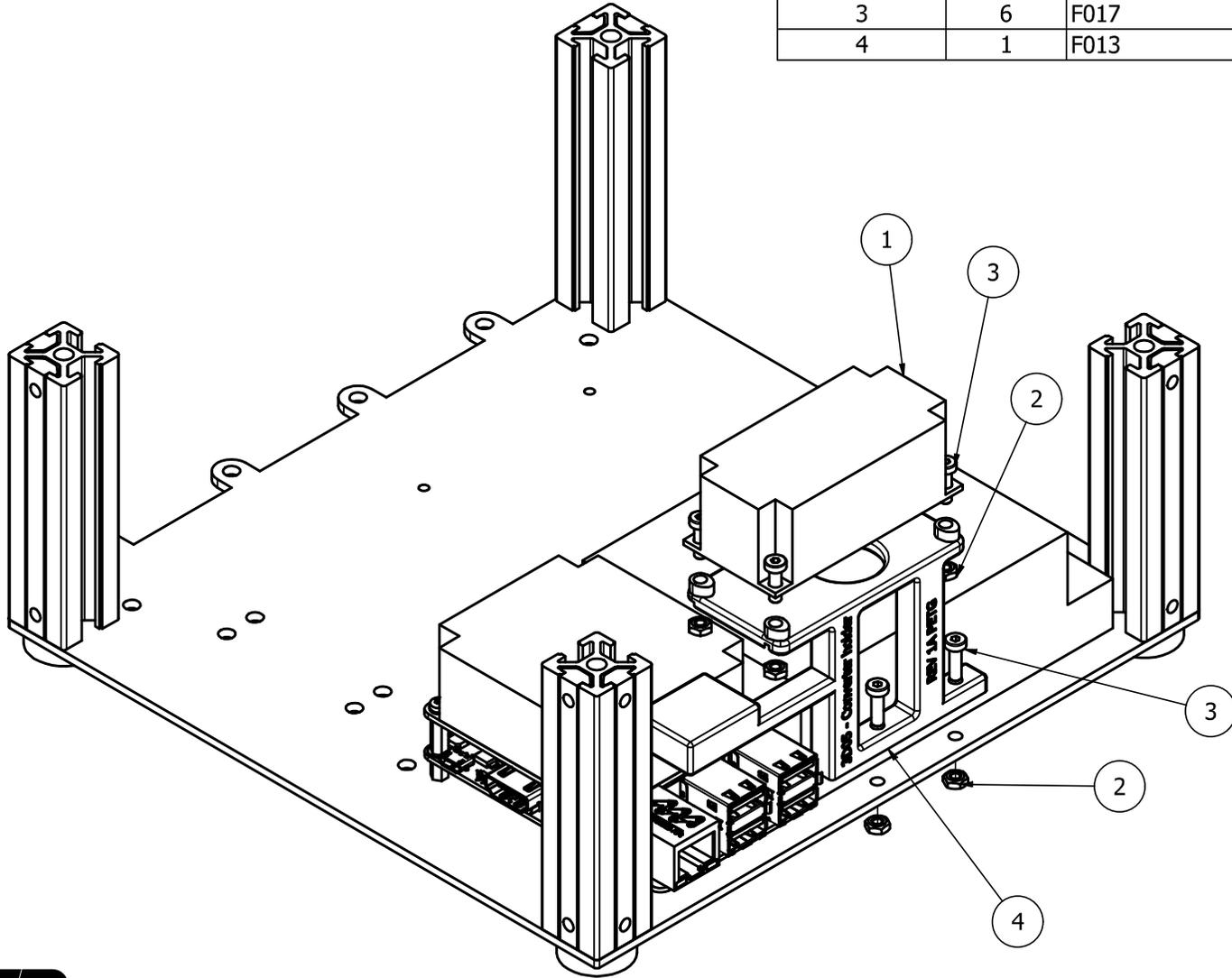
# OLIVER

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# Assembly instructions

Step 16

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B002	DC-DC Step up converter
2	6	F025	DIN 934 - M3
3	6	F017	DIN 7984 - M3 x 10
4	1	F013	3D05



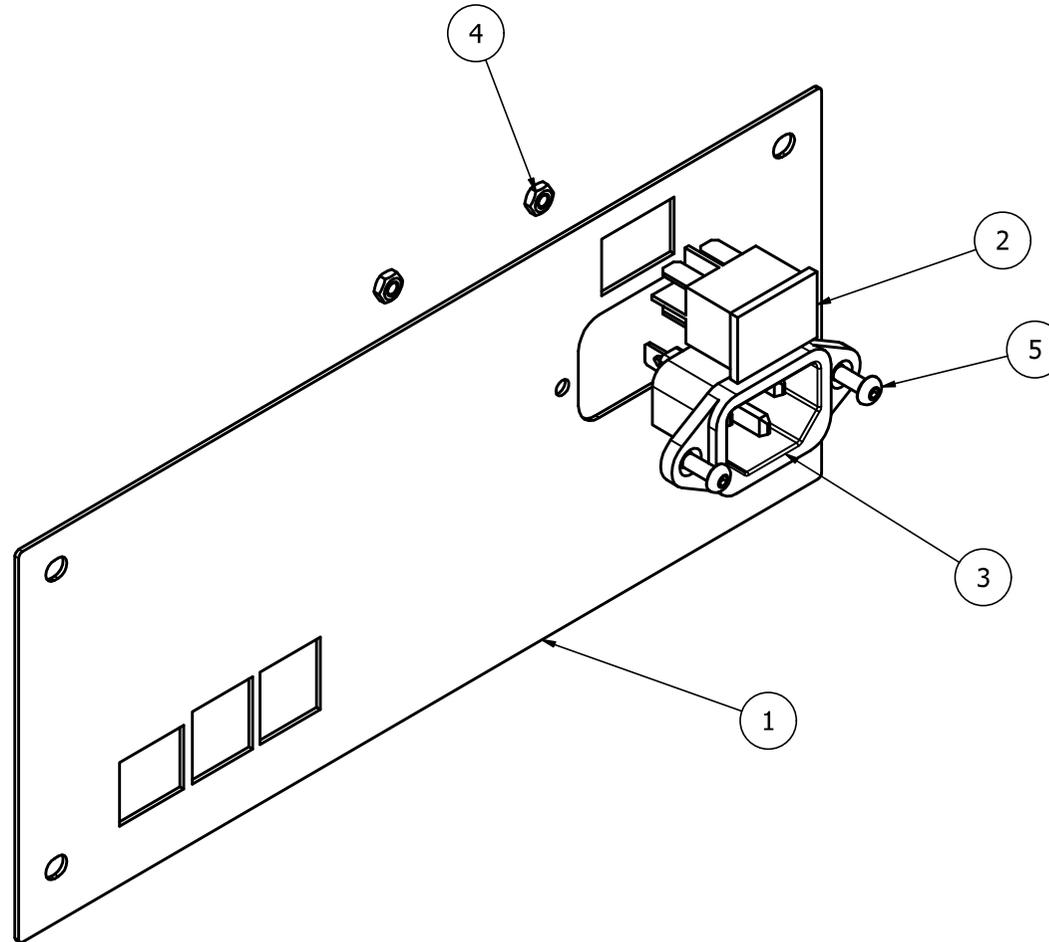
# OLIVER

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BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	H007	HP01I
2	1	F001	Marquadt 1858.1103
3	1	F003	IEC-A-1
4	2	F025	DIN 934 - M3
5	2	F018	ISO 7380-1 - M3 x 8

# Assembly instructions

Step 17



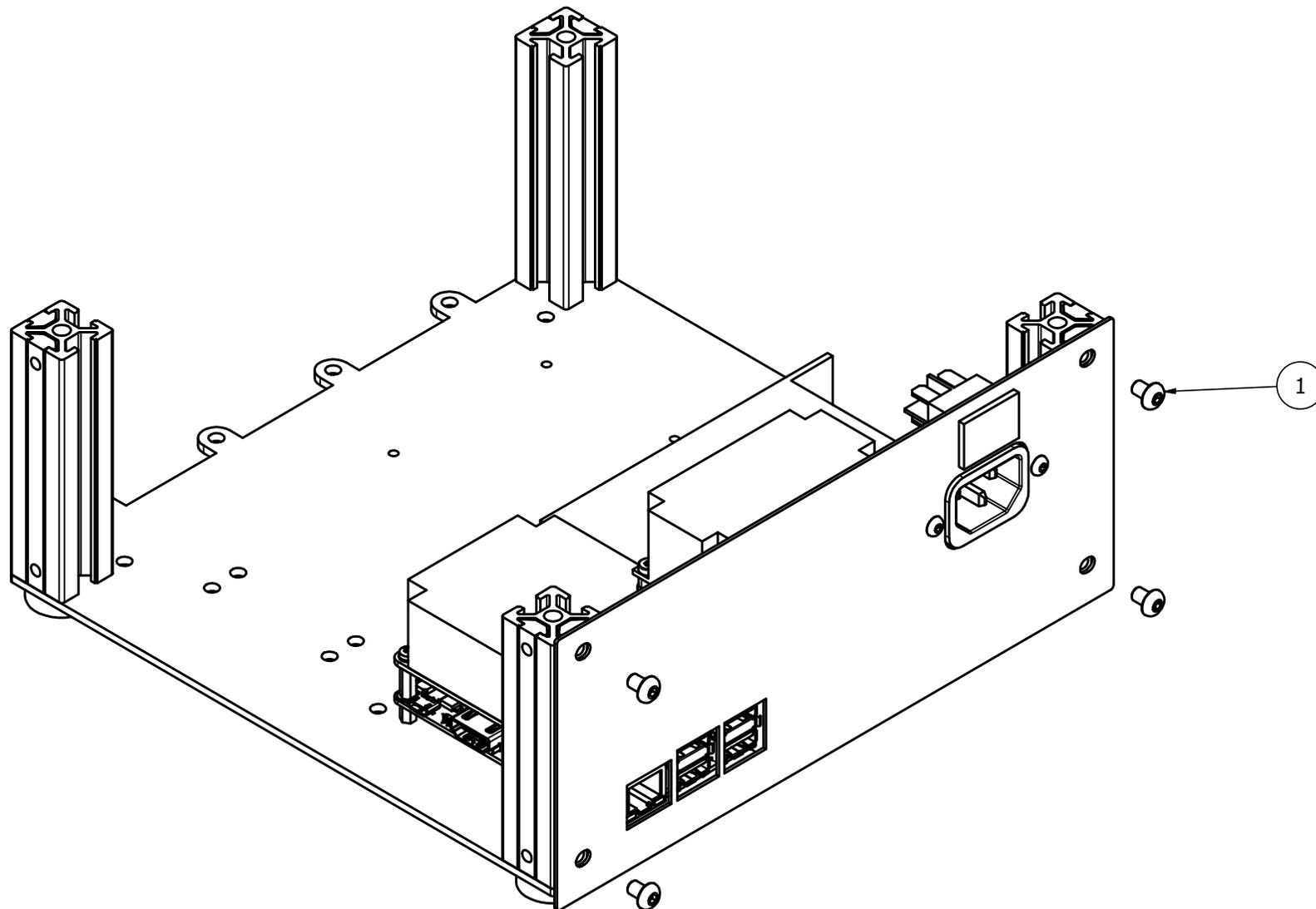
**OLIVER**

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# Assembly instructions

Step 18

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	H013	ISO 7380-1 - M4 x 6



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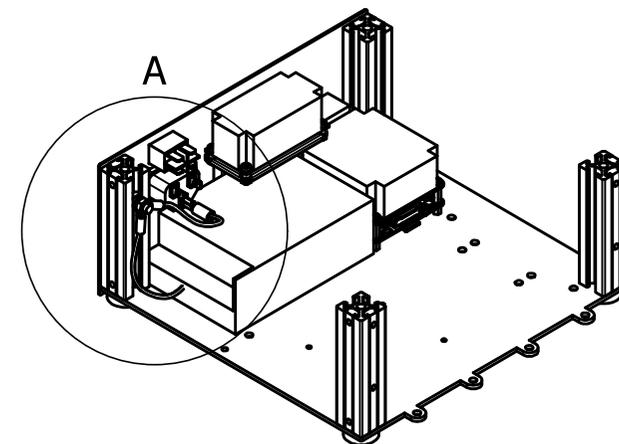
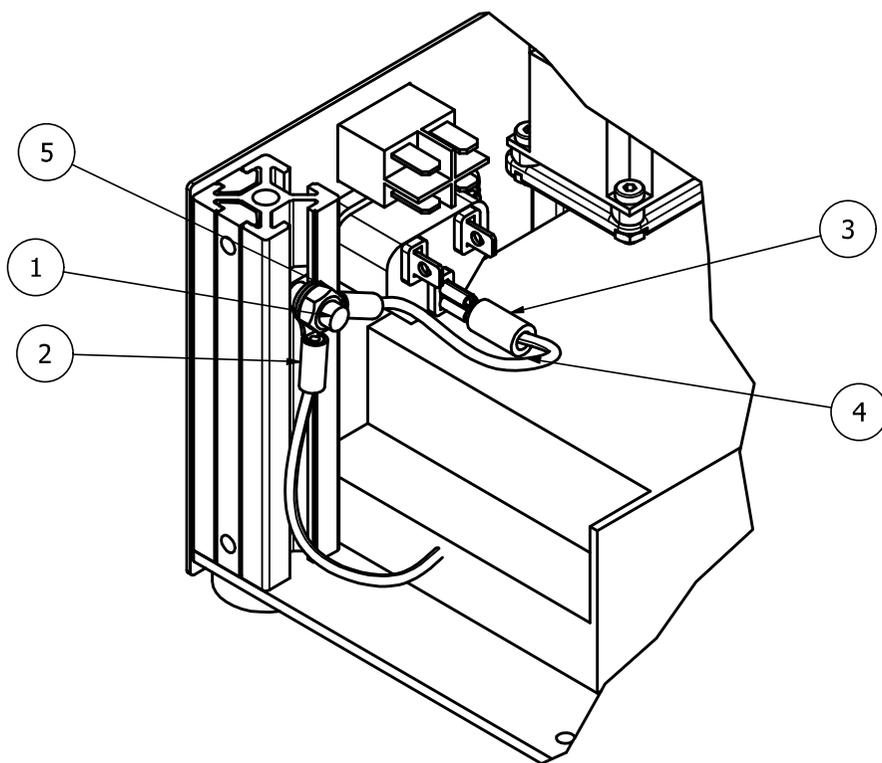
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# Assembly instructions

Step 19

Connect the wire to the grounding connector on PSU. Double-check your wiring.

A (1 : 1)



## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	F015	M5x10 T screw for grounding
2	2	F007	TE Connectivity C-130005 Ring terminal
3	1	F008	BM GROUP BM 00192 faston
4	1	F004	1mm2 yellow-green wire
5	1	F024	DIN 934 - M5

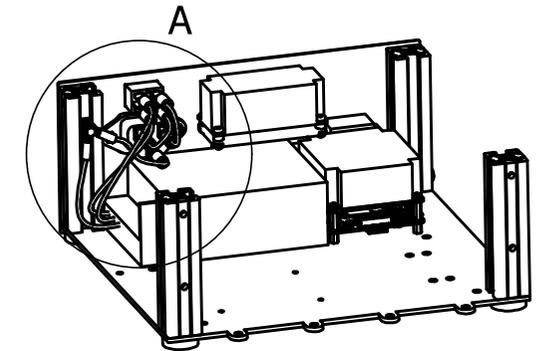
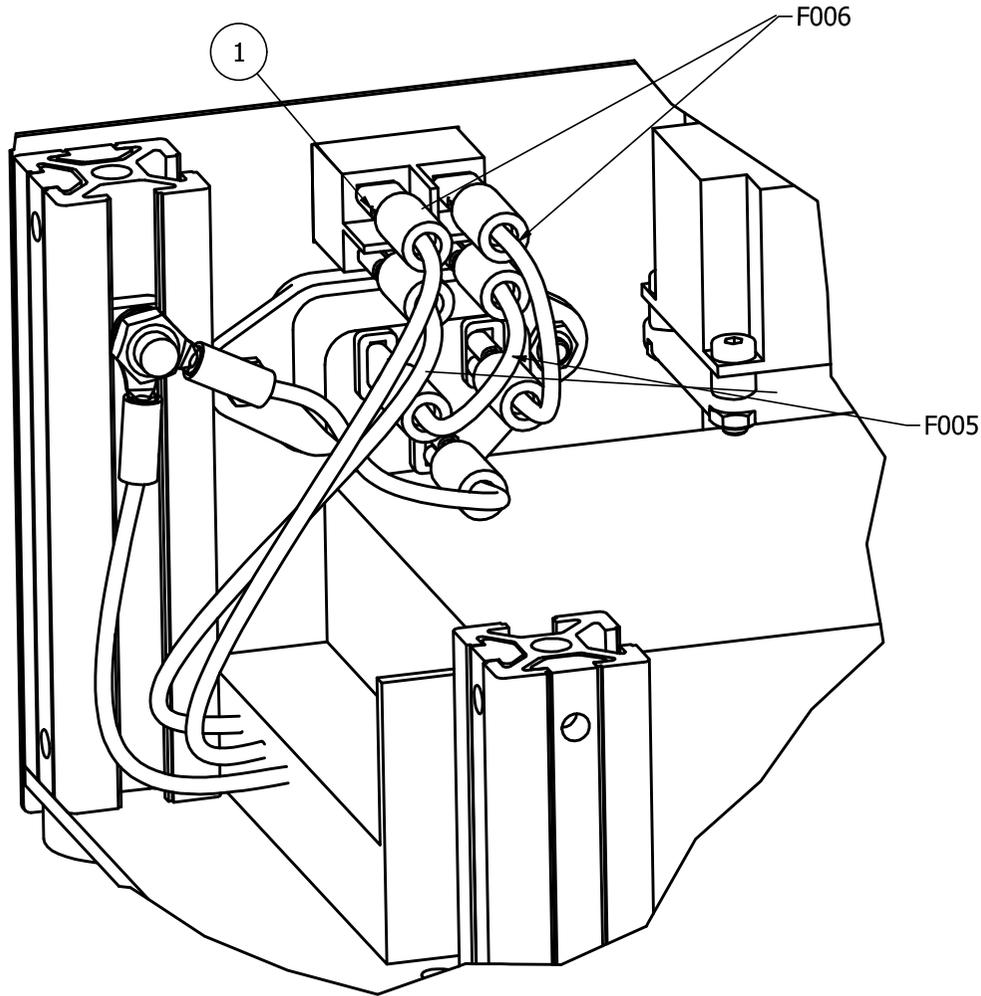
# OLIVER

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# Assembly instructions

Step 20

A ( 1.5 : 1 )



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	6	F008	BM GROUP BM 00192 faston

# OLIVER

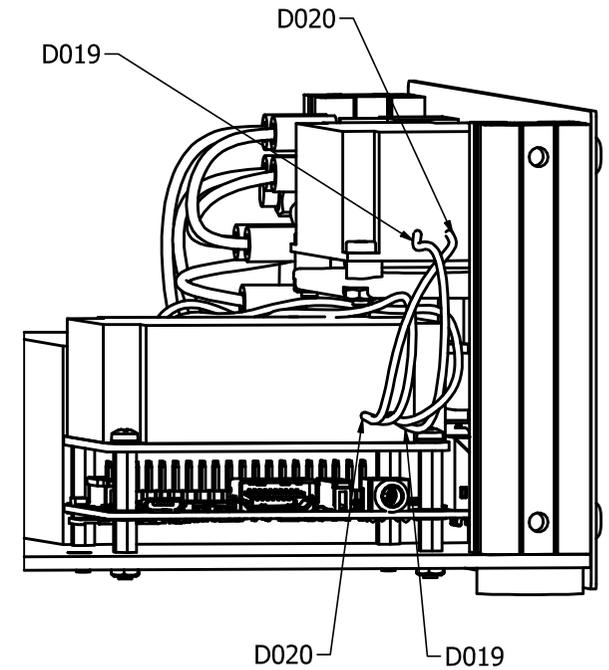
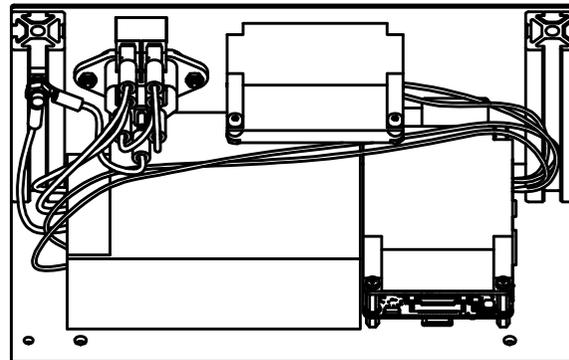
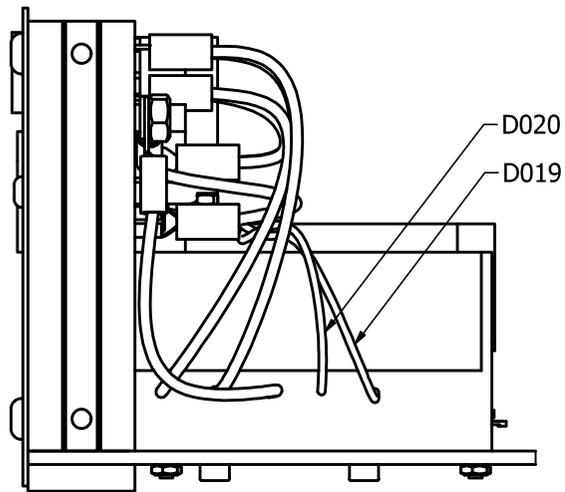
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Connect the F005 wire to neutral connector on PSU.  
Connect the F006 wire to live connector on PSU.  
Double-check your wiring. You're working with mains voltage.  
Any mistake can be lethal!

# Assembly instructions

Step 21

Connect the Raspberry Pi to PSU. For further information, refer to Oliver board schematics.



# OLIVER

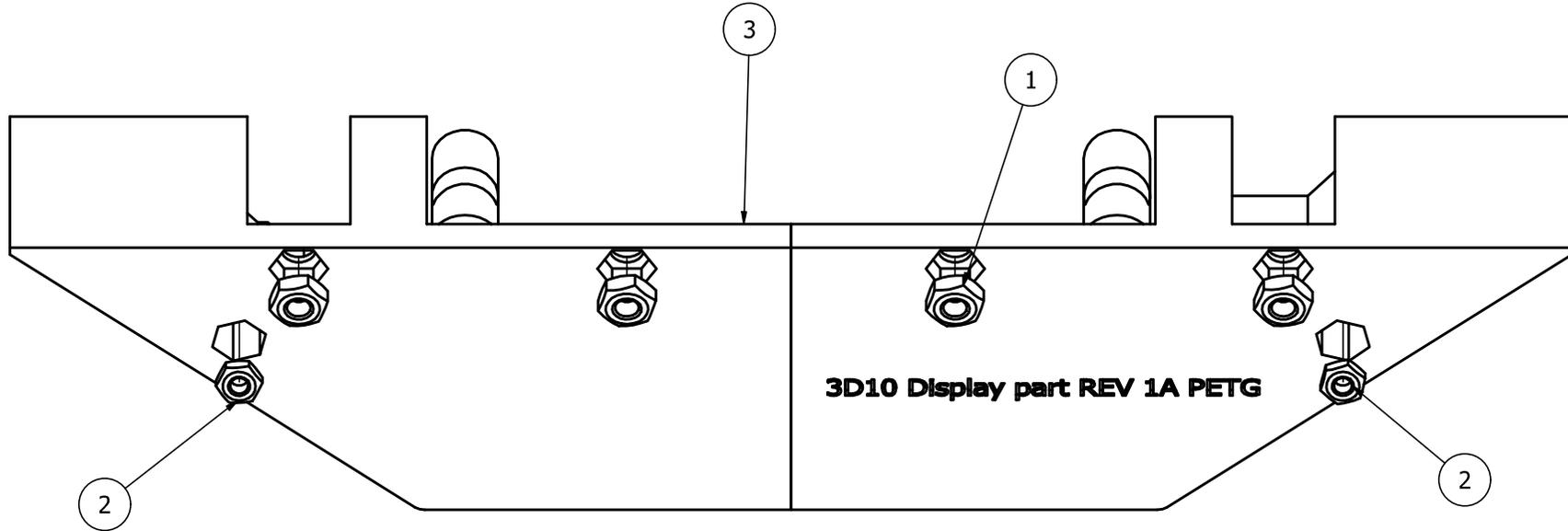
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# Assembly instructions

Step 22

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	I007	DIN 934 - M4
2	2	I008	DIN 934 - M3
3	1	I002	The front interface display holder



**3D10 Display part REV 1A PETG**

# OLIVER

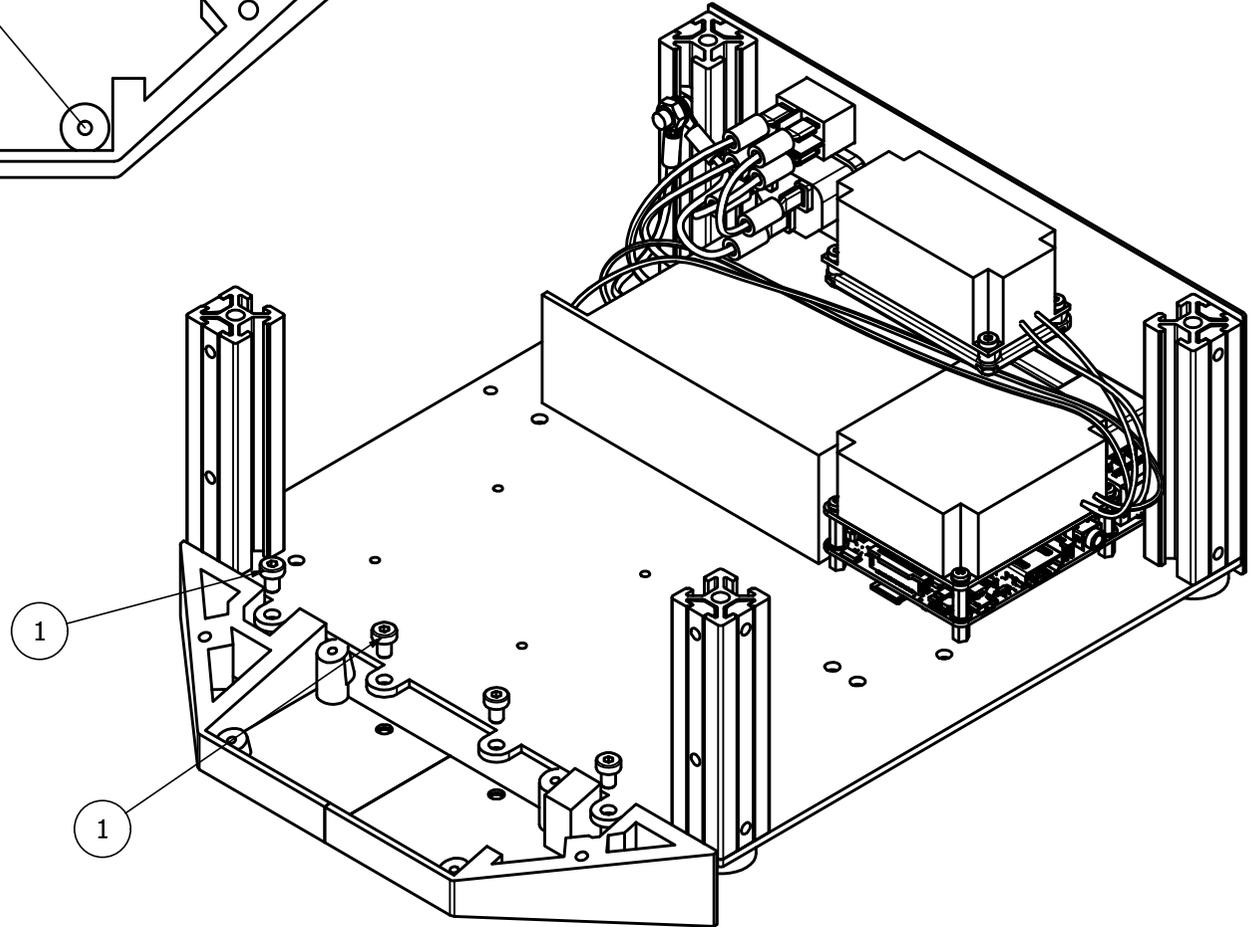
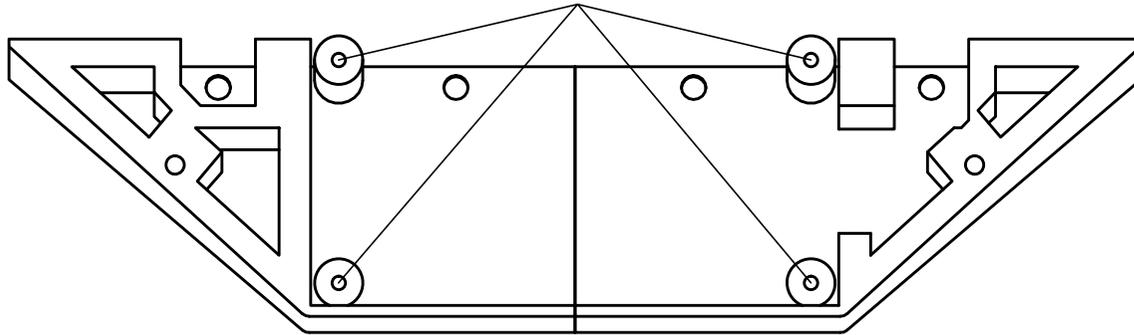
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# Assembly instructions

Step 23

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	I004	DIN 7984 - M4 x 6

Thread those holes with M3 tap.



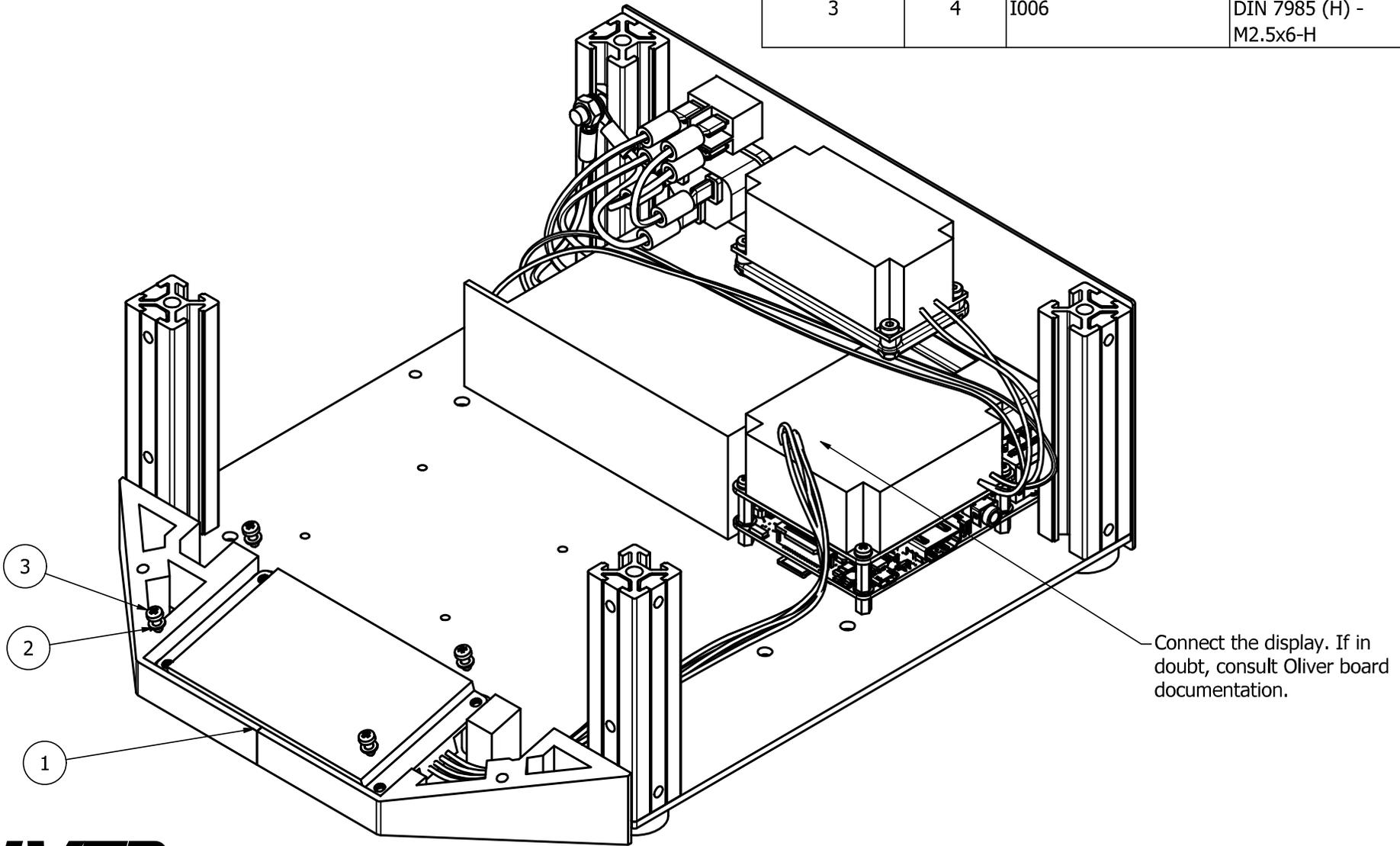
# OLIVER

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# Assembly instructions

Step 24

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	I001	Front touchscreen
2	4	I009	DIN 433 - 2.7
3	4	I006	DIN 7985 (H) - M2.5x6-H



# OLIVER

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# Assembly instructions

## Step 25

You are now about to set up the control display. Note, that this process applies only if you have installed isolated faston connectors. If any part of the AC wiring system is exposed, set-up the display using a separate 5V power supply.

Upload the 3\_2.tft file to a SD card. Put the SD card to Nextion display. Connect the printer to AC power. Wait, until the Nextion copies all files to its internal memory. Next, disconnect the display from Oliver board. Then remove the SD card and reconnect the LCD. It should now be showing a menu. Finally, remove the AC power.

**OLIVER**

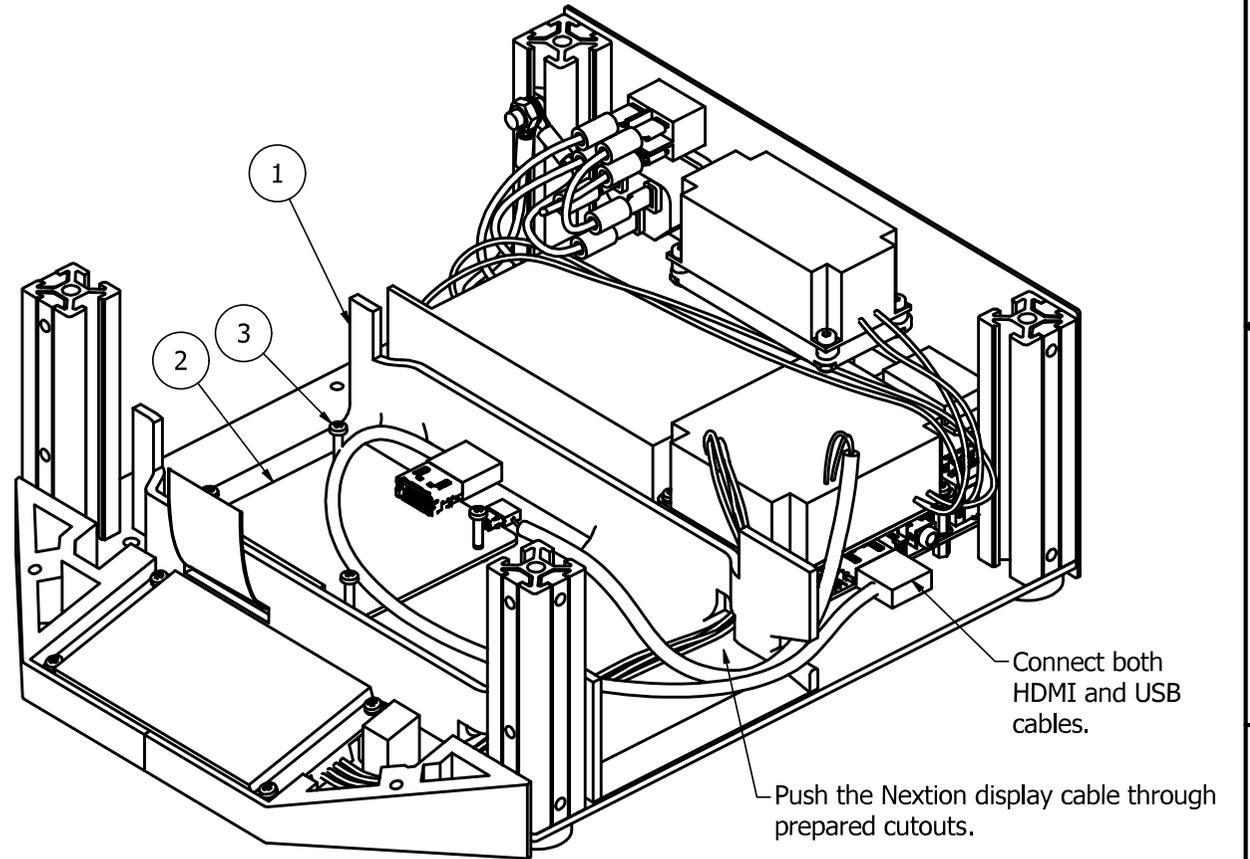
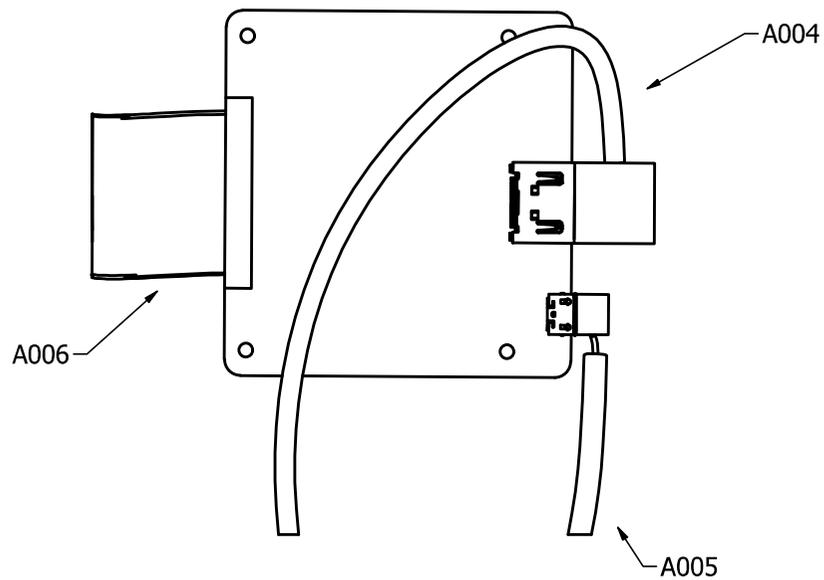
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# Assembly instructions

Step 26

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	F014	Aerodynamical tunnel for the flowing air from the two fans
2	1	A001	LCD controller board (supplied with display)
3	4	F019	DIN 7985 (H) - M2.5x10-H

Connect all cables before inserting the board into assembly



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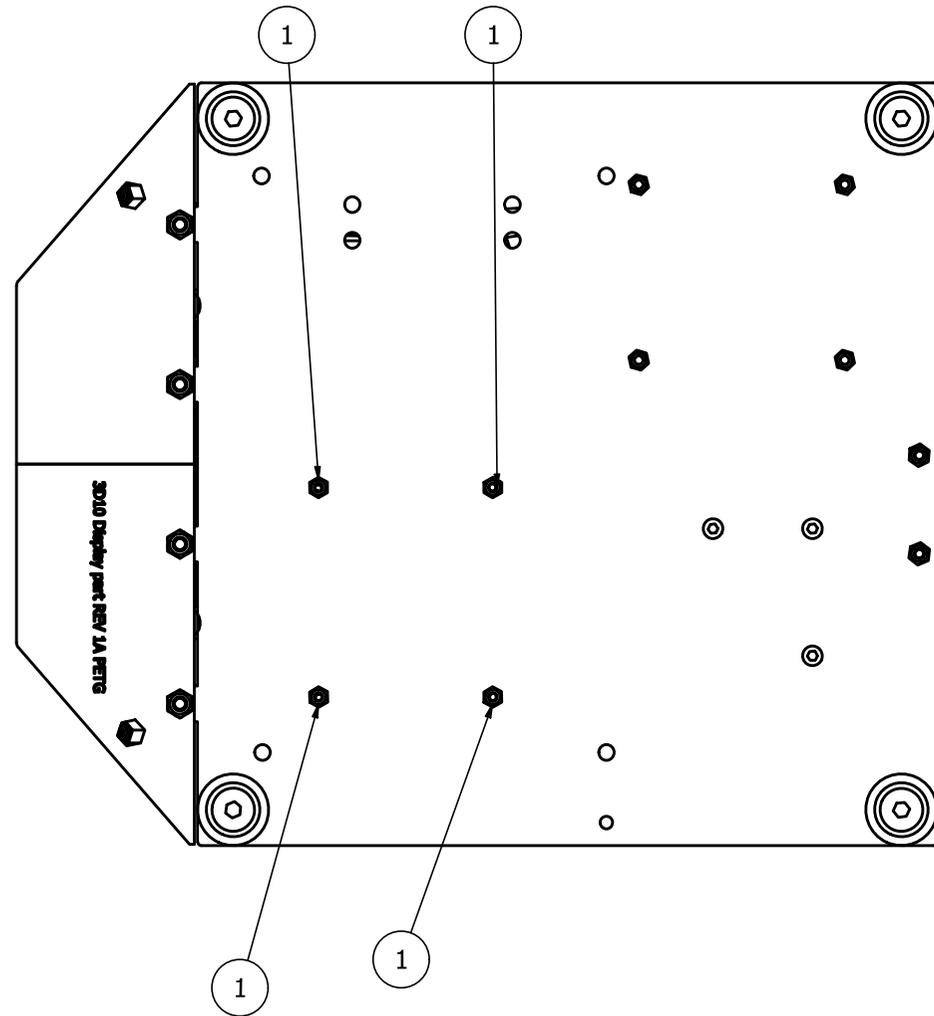
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# Assembly instructions

Step 27

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	F026	DIN 934 - M2.5



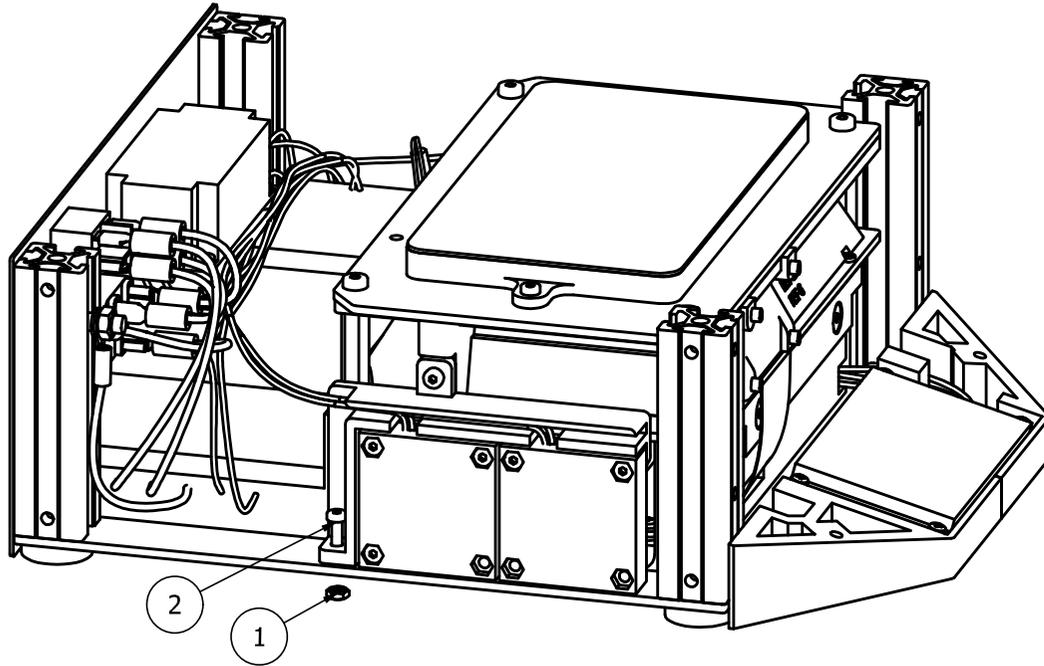
# OLIVER

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# Assembly instructions

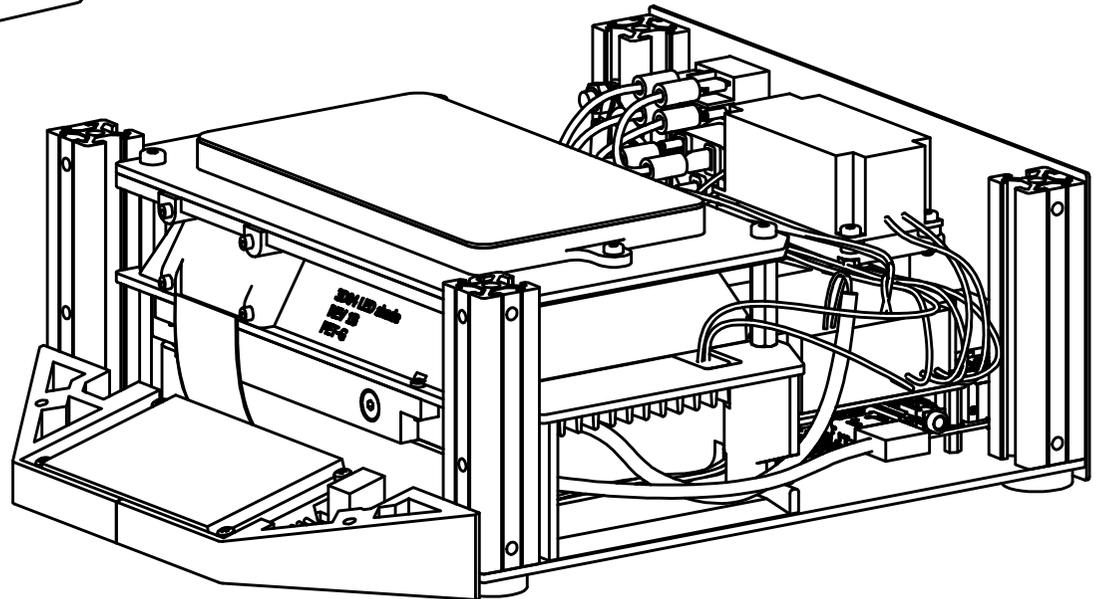
Step 28

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	B017	DIN 934 - M3
2	1	B014	DIN 7984 - M3 x 10



Insert the optical assembly into prepared holes.  
Connect fans and the backlight as specified in  
Oliver board documentation.

Notice that ribbon cable from the mask should  
hang over the fans. It's not shown there due  
to missing CAD file.



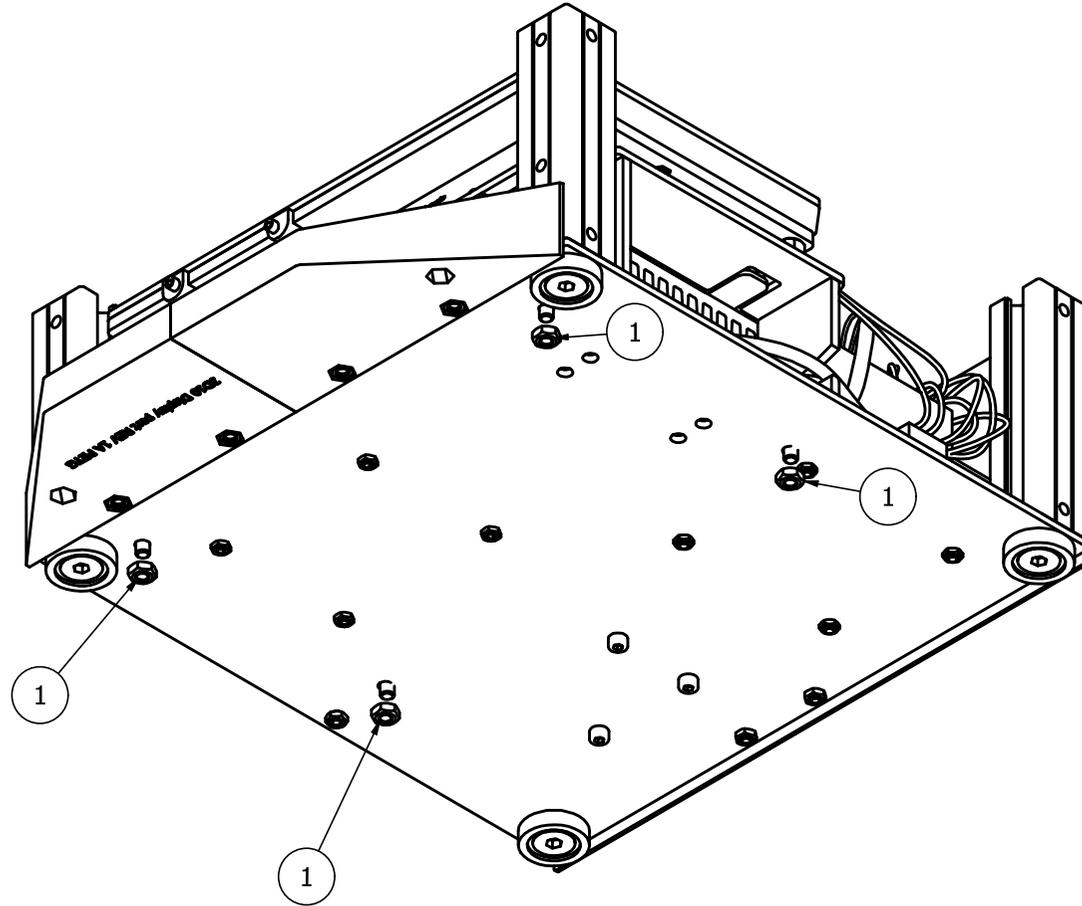
# OLIVER

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# Assembly instructions

Step 29

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	B016	DIN 934 - M4

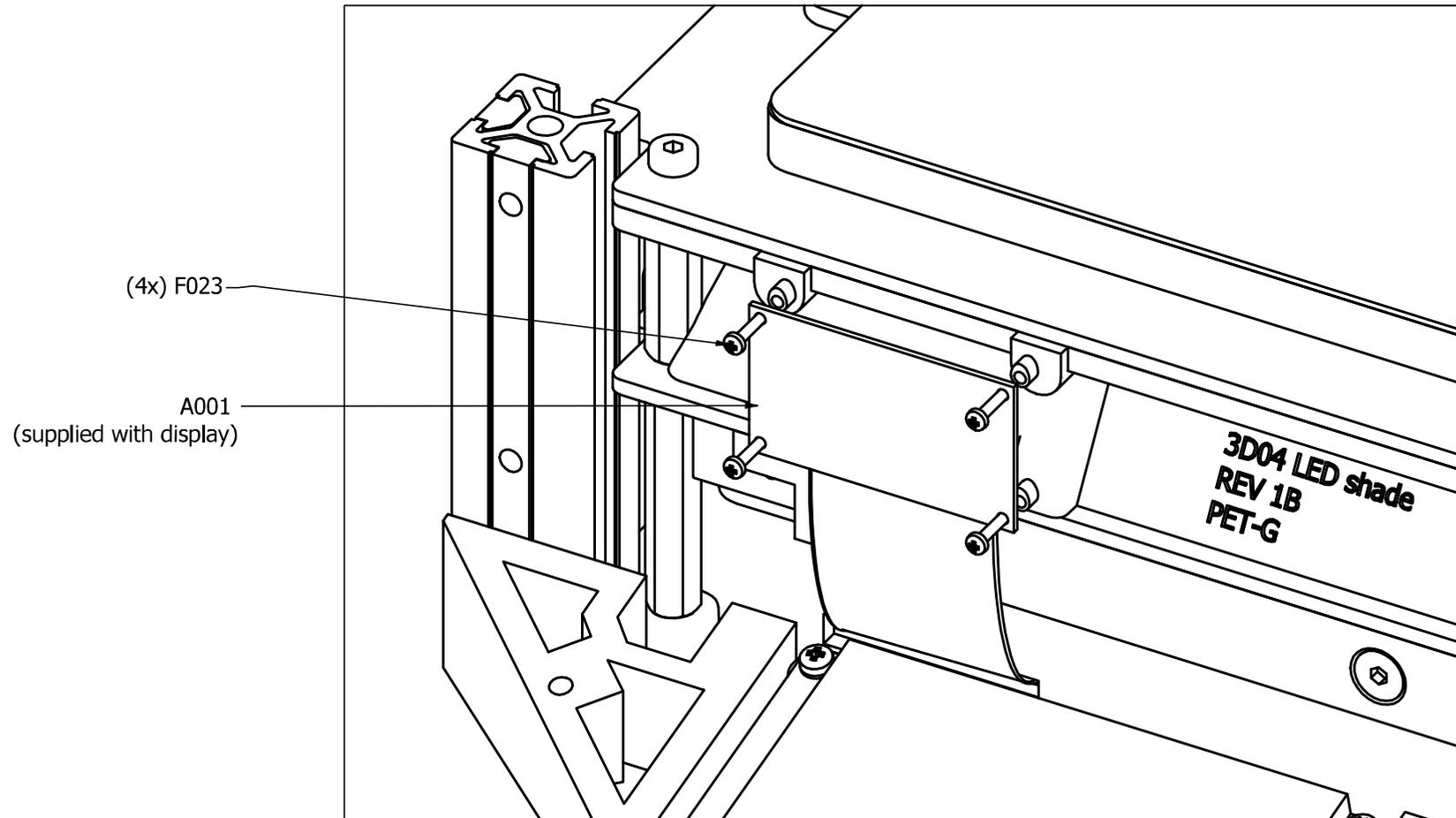


# OLIVER

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# Assembly instructions

Step 30



Firstly, connect the mask ribbon cable (not shown there due to missing CAD file), then connect the large ribbon cable (which IS shown in the picture above). Finally, screw the circuit board to the plastic part as shown.

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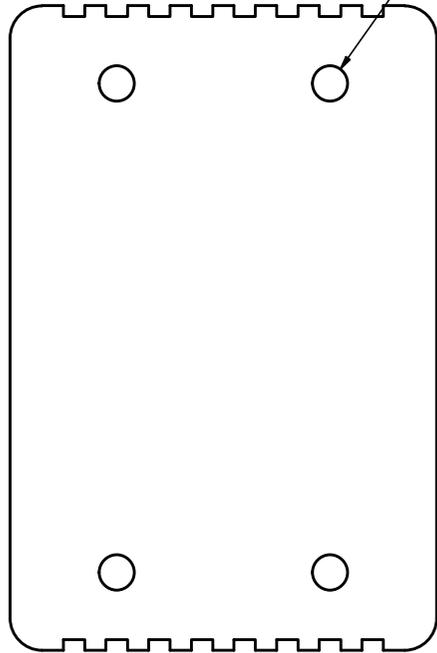
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# Assembly instructions

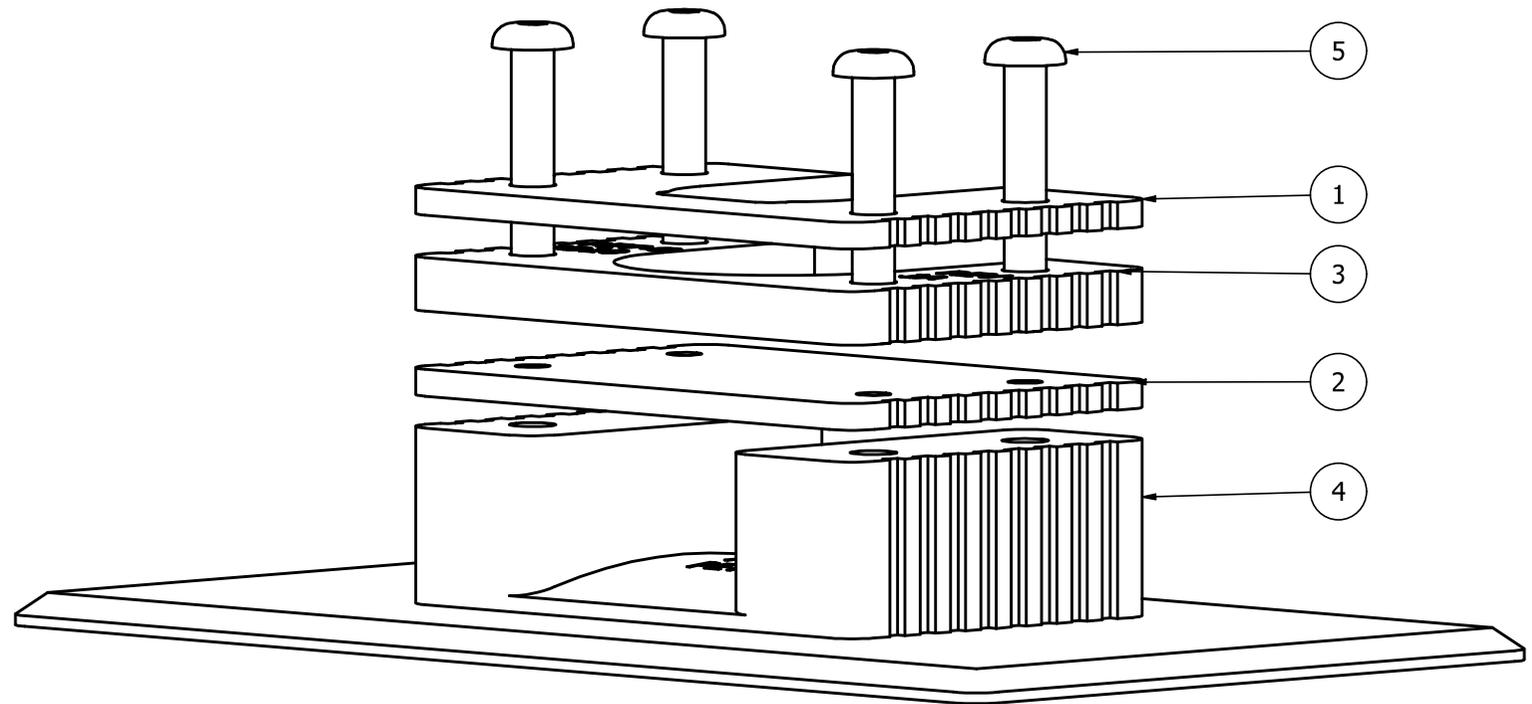
Step 31

G034

Thread all four holes with M4 tap.



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G011	OP08
2	1	G034	OP10
3	1	G033	3D20
4	1	G004	3D12
5	4	G018	ISO 7380-1 - M4 x 25
6	4	G026	DIN 934 - M4



# OLIVER

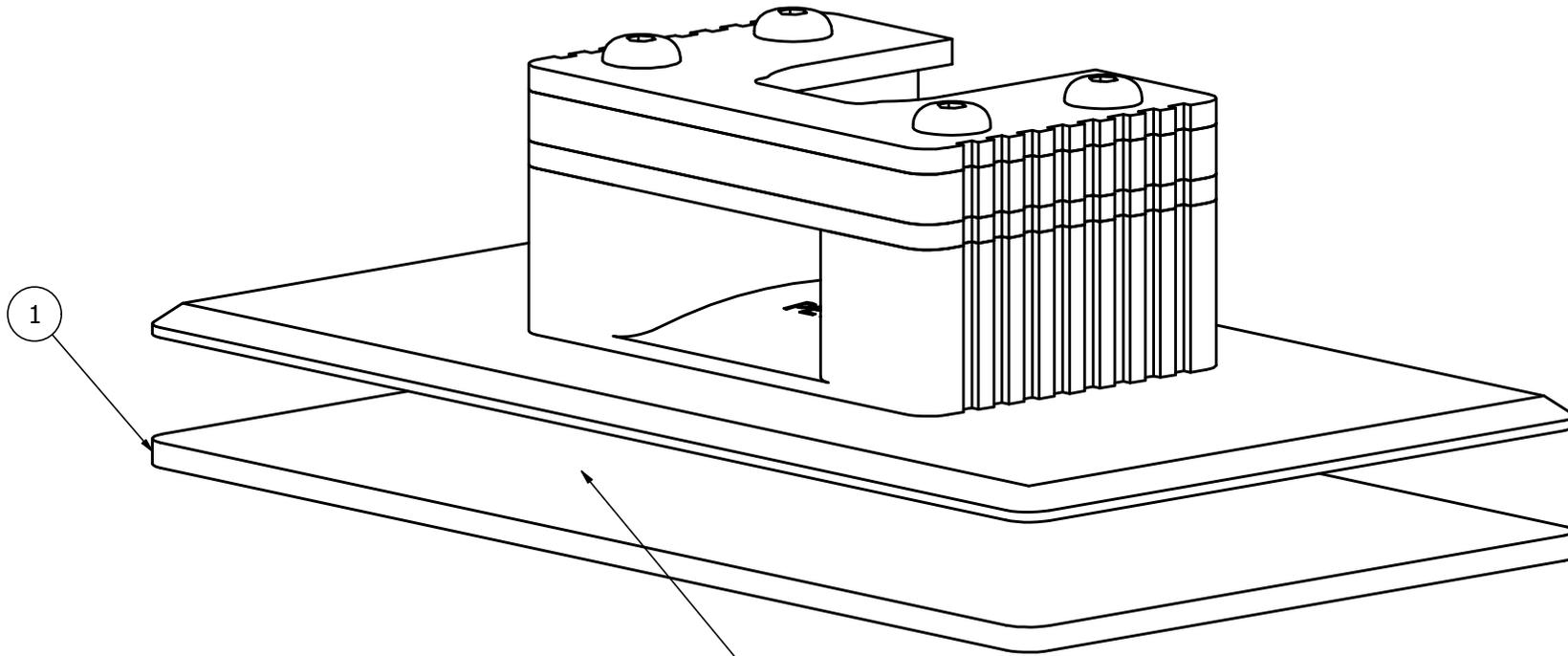
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# Assembly instructions

Step 32

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G012	HP06 - Aluminium bed
2	1	G032	Epoxy glue



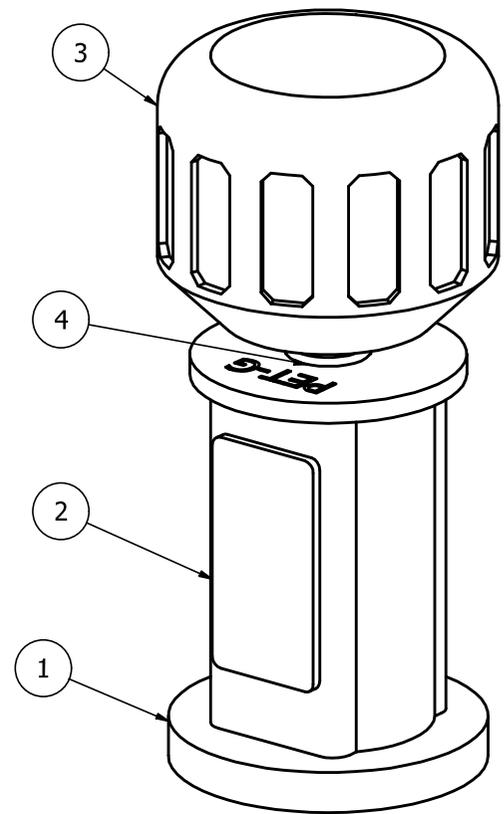
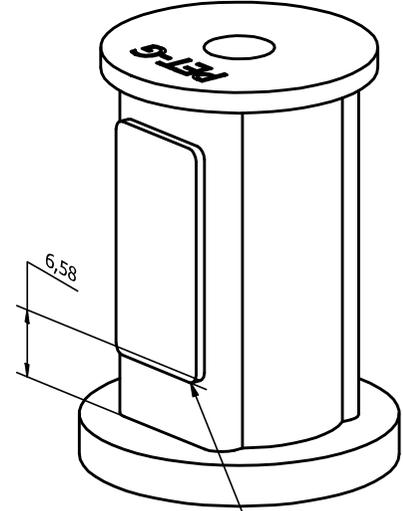
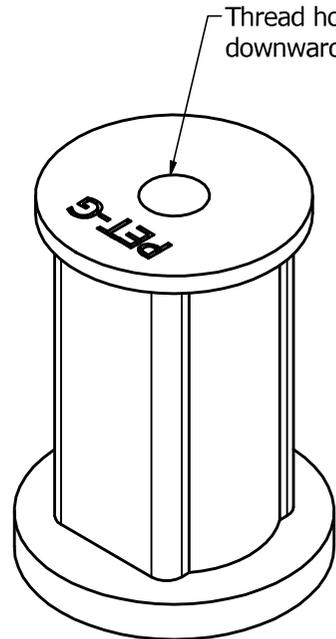
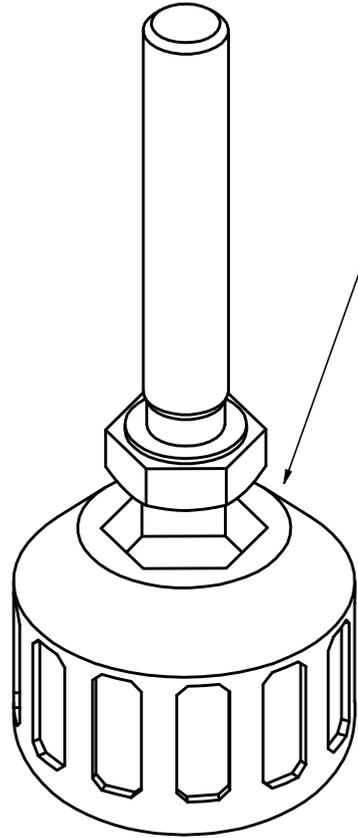
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# Assembly instructions

Step 33

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G028	3D18
2	1	G035	HP07
3	1	G005	3D13
4	1	G016	DIN 933 - M8 x 45
5	1	G032	Epoxy glue



**OLIVER**

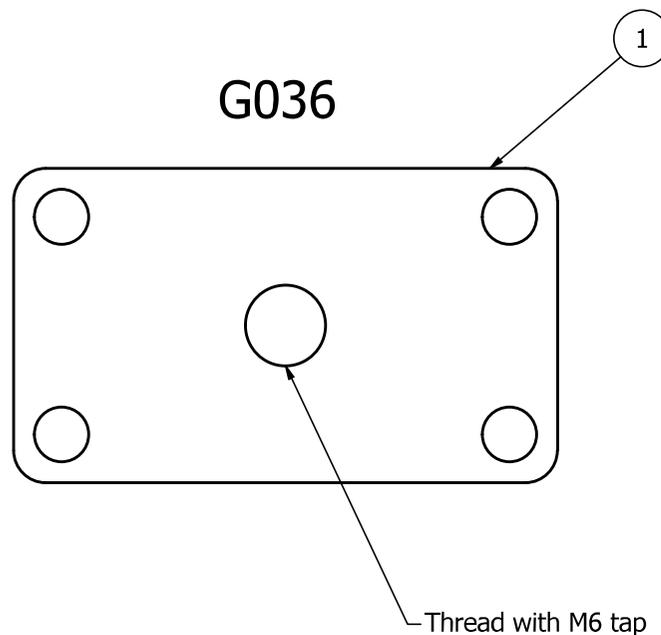
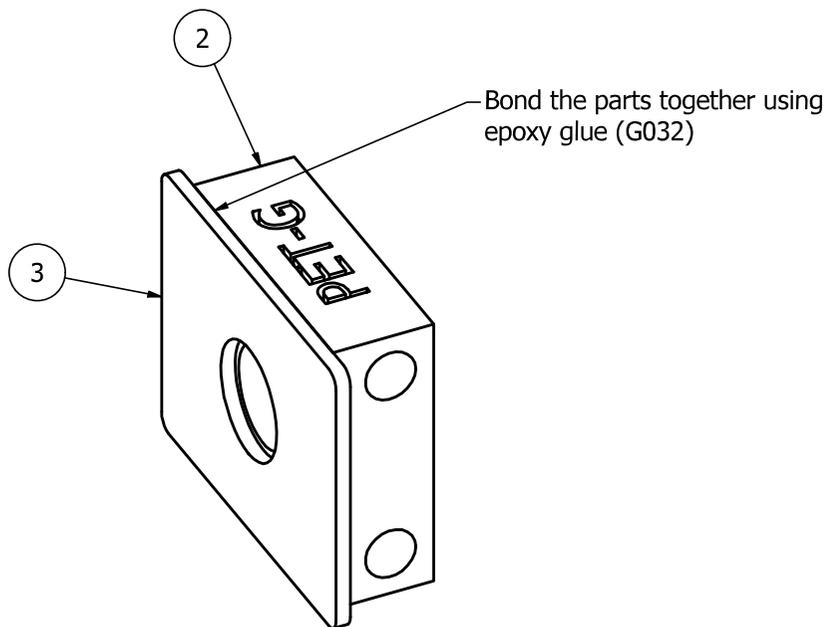
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# Assembly instructions

Step 34

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G036	OP11
2	2	G038	3D21
3	2	G039	HP08
4	1	G032	Epoxy glue

2X



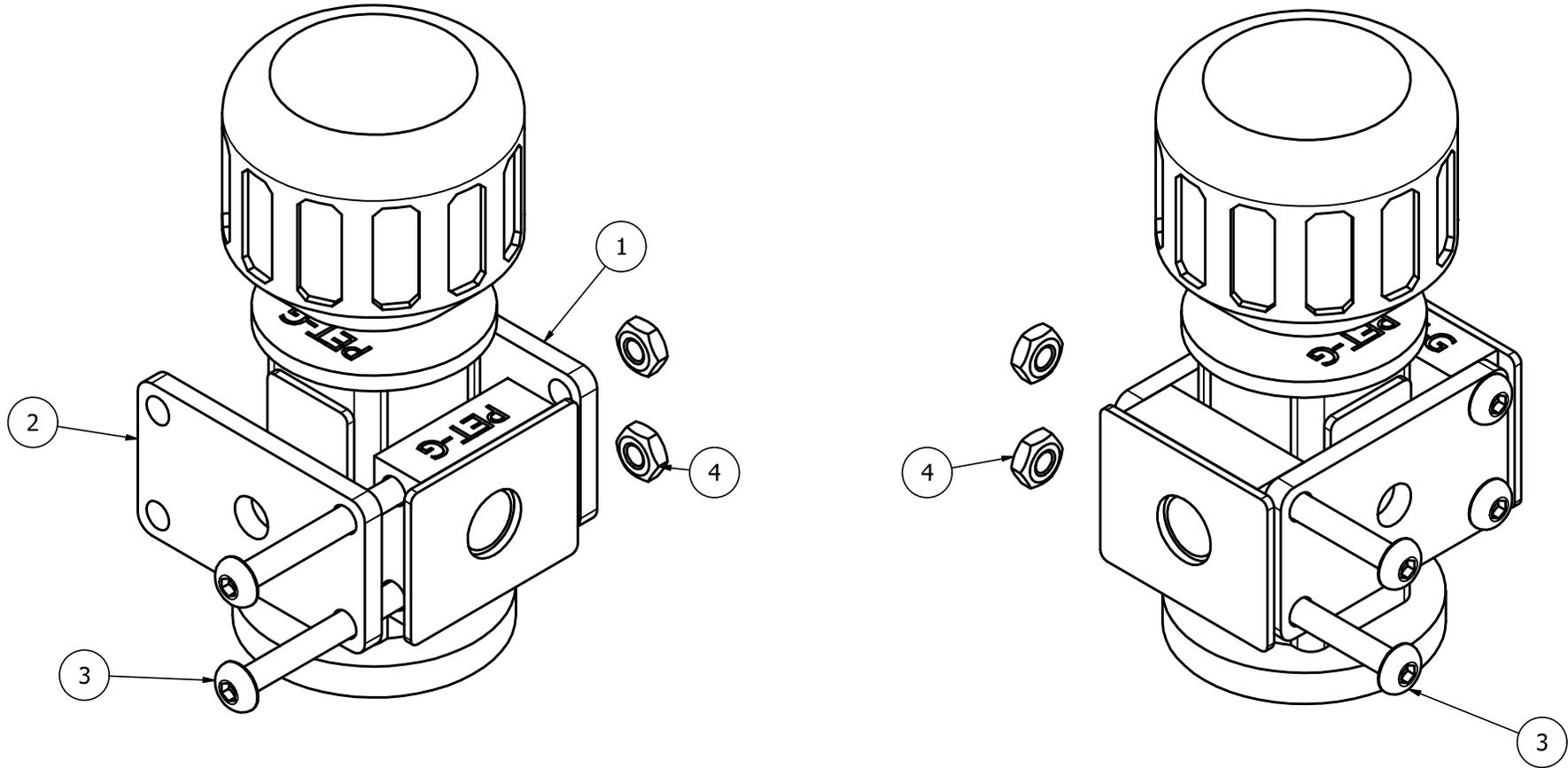
**OLIVER**

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# Assembly instructions

Step 35

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G037	OP12
2	1	G036	OP11
3	4	G040	ISO 7380-1 - M3 x 30
4	4	G027	DIN 934 - M3



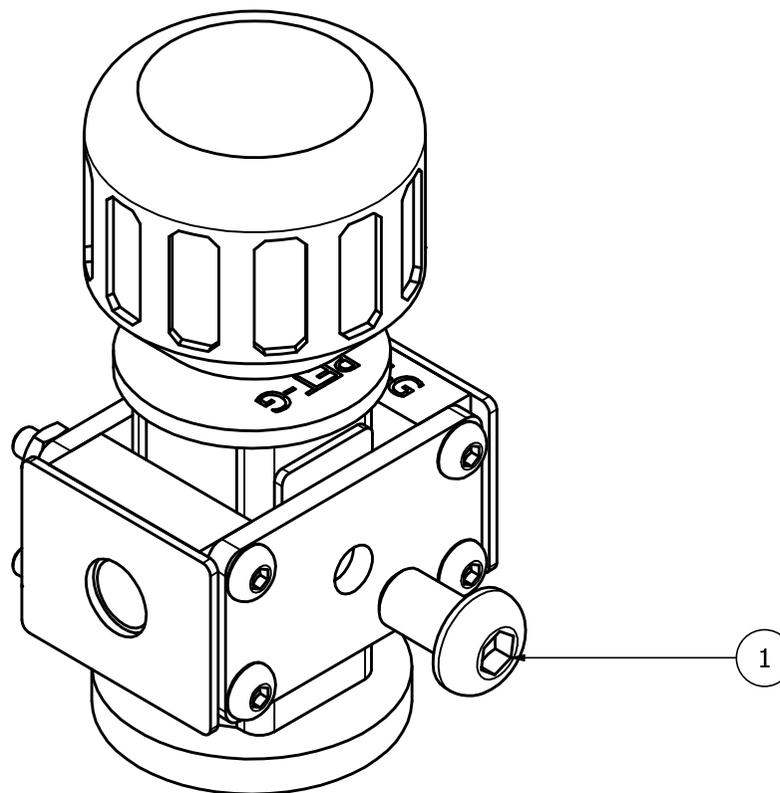
# OLIVER

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# Assembly instructions

Step 36

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G041	ISO 7380-1 - M6 x 10



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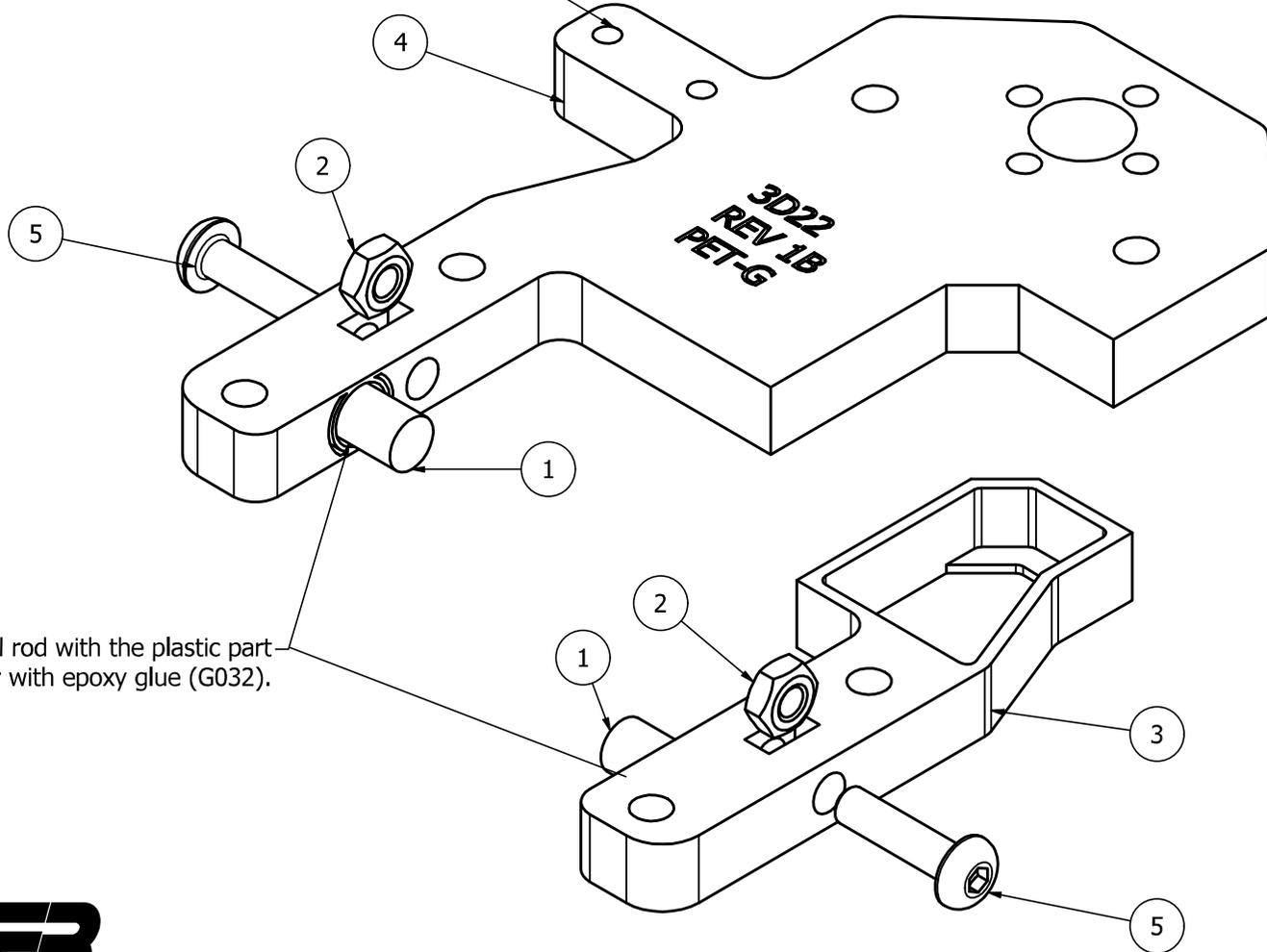
# Assembly instructions

Step 37

Thread with M3 tap from this side downwards.

Glue the metal rod with the plastic part together with epoxy glue (G032).

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	2	G044	OT01
2	2	G026	DIN 934 - M4
3	1	G043	3D23
4	1	G042	3D22
5	2	G019	ISO 7380-1 - M4 x 16
6	1	G032	Epoxy glue



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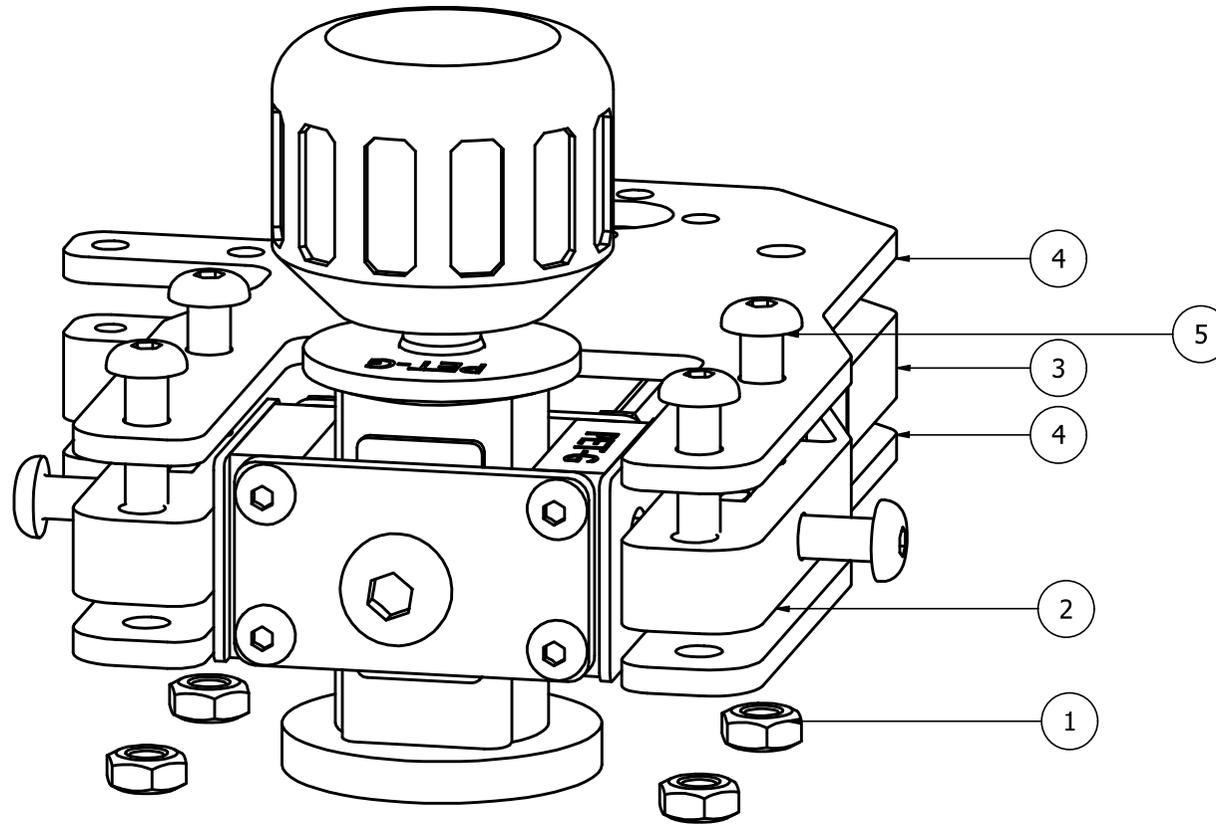
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# Assembly instructions

Step 38

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	G026	DIN 934 - M4
2	1	G043	3D23
3	1	G042	3D22
4	2	G010	OP06
5	4	G019	ISO 7380-1 - M4 x 16



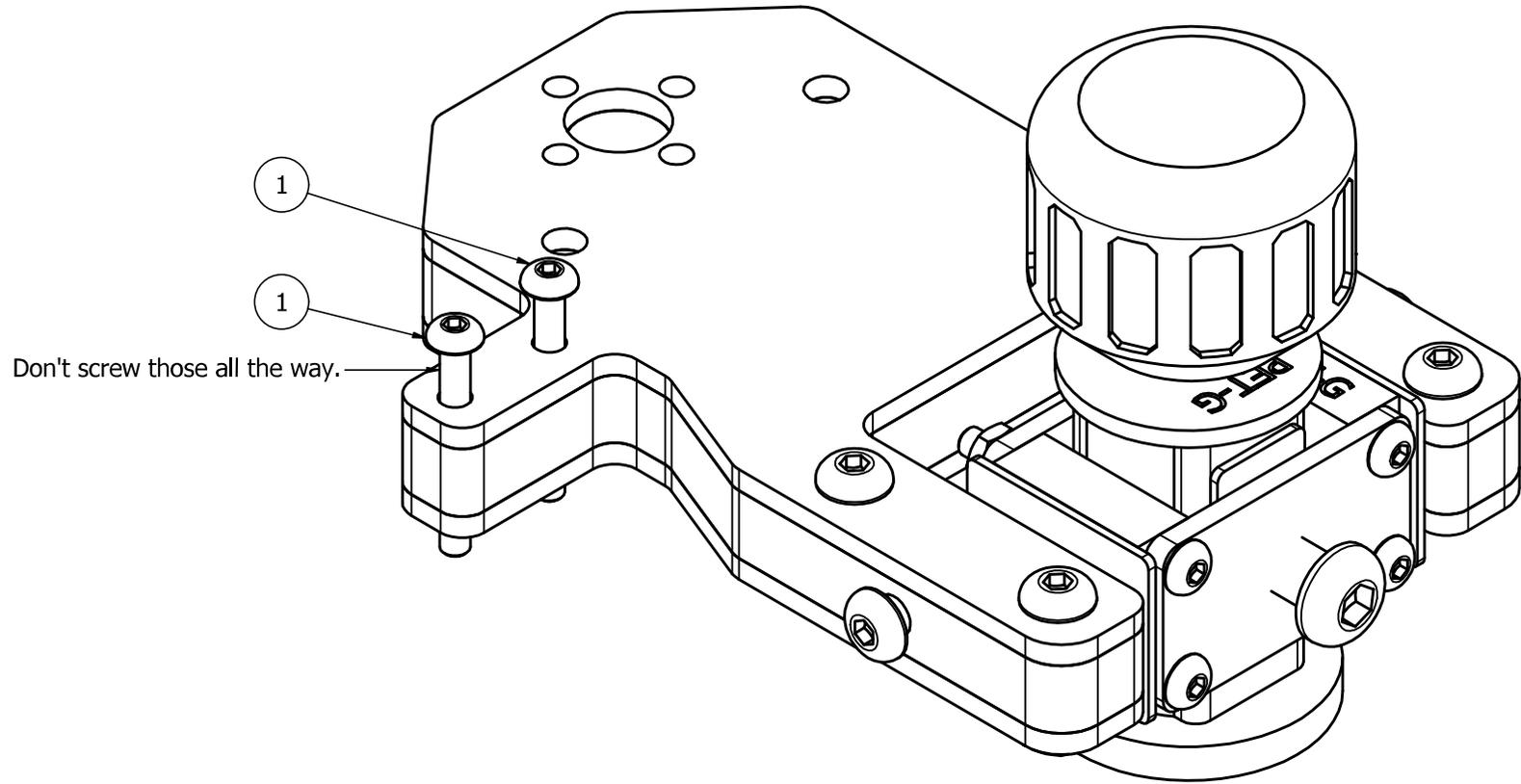
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# Assembly instructions

Step 39

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	2	G021	ISO 7380-1 - M3 x 25

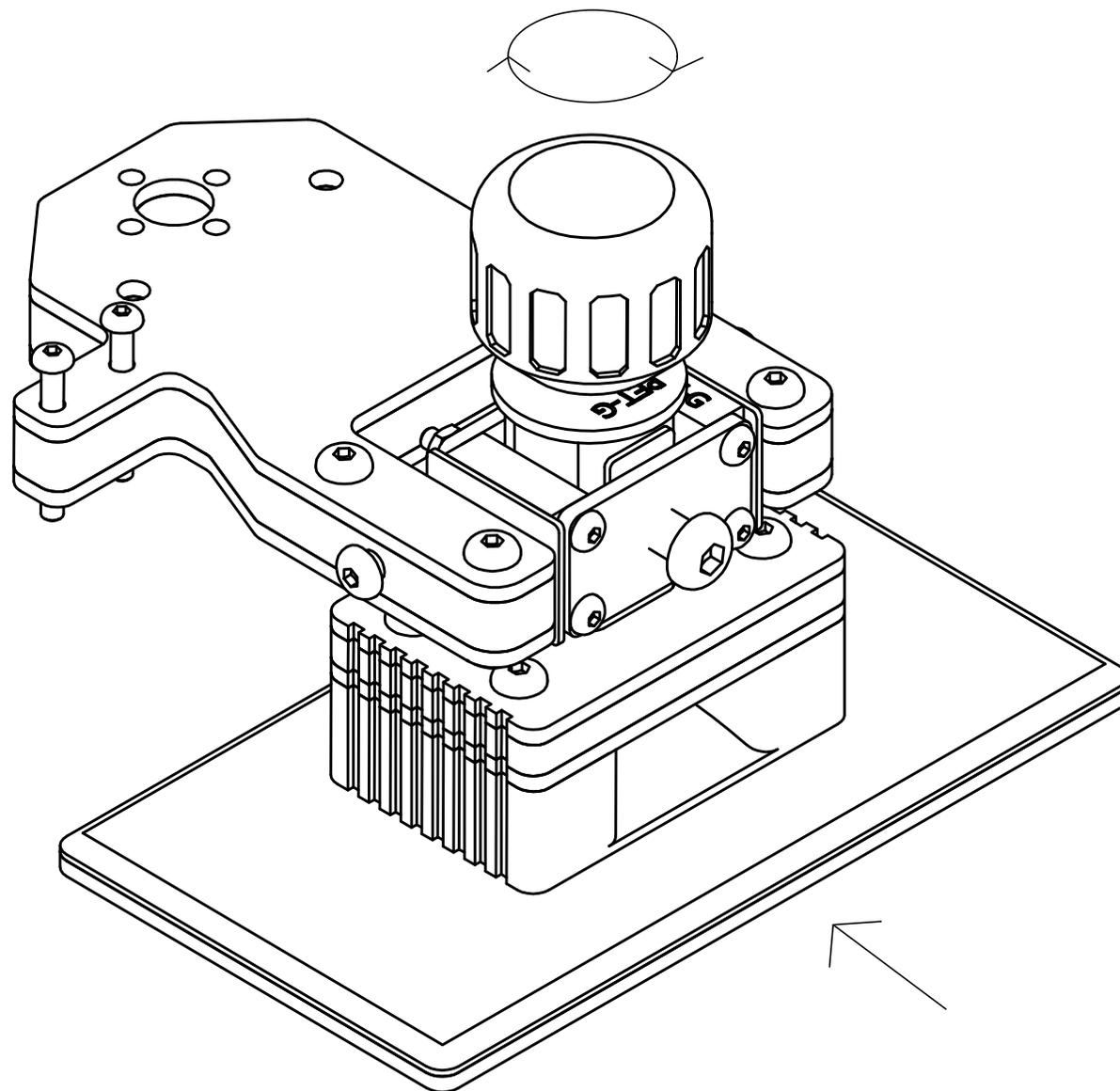


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# Assembly instructions

Step 40



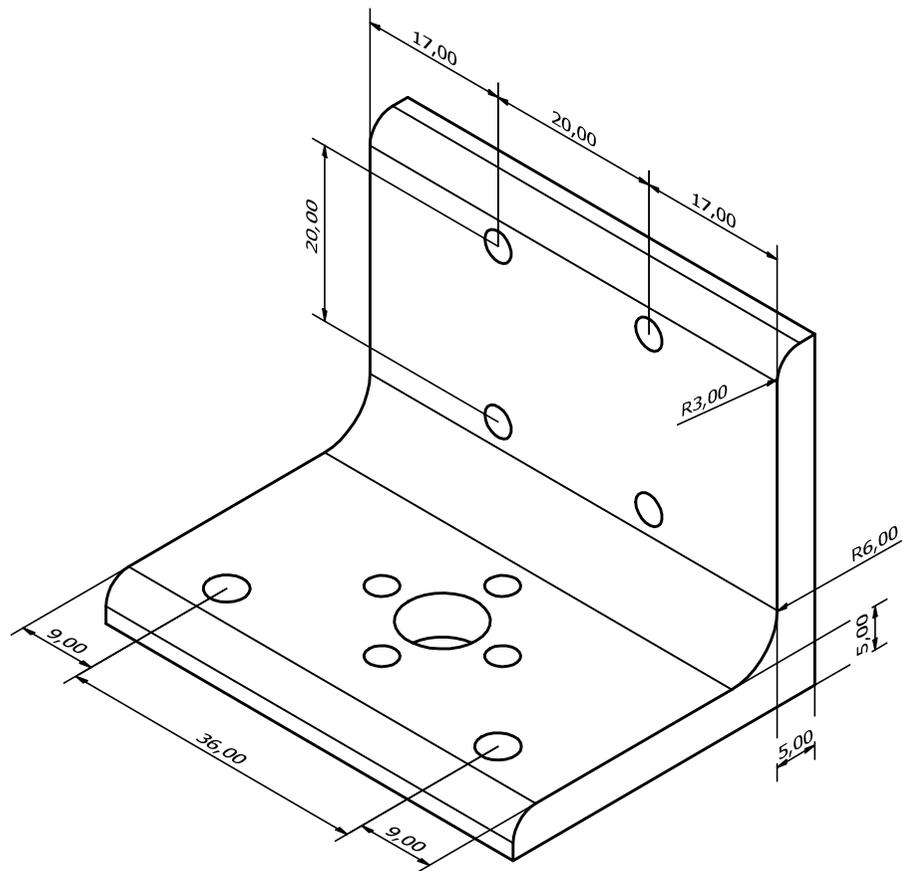
# OLIVER

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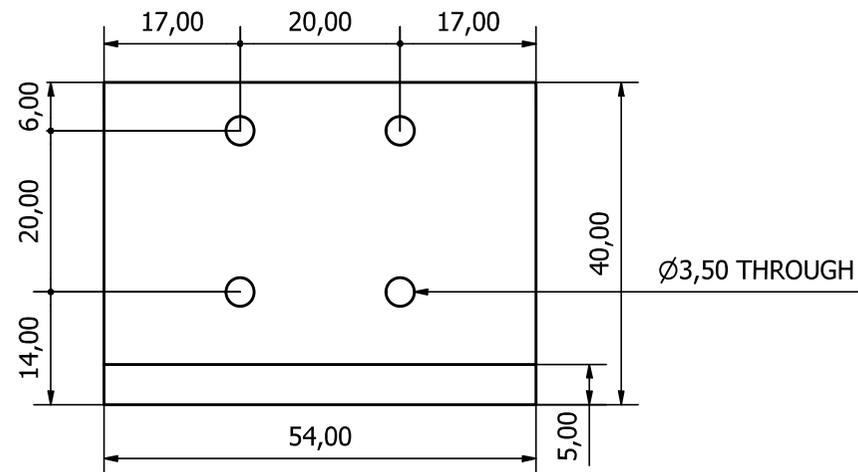
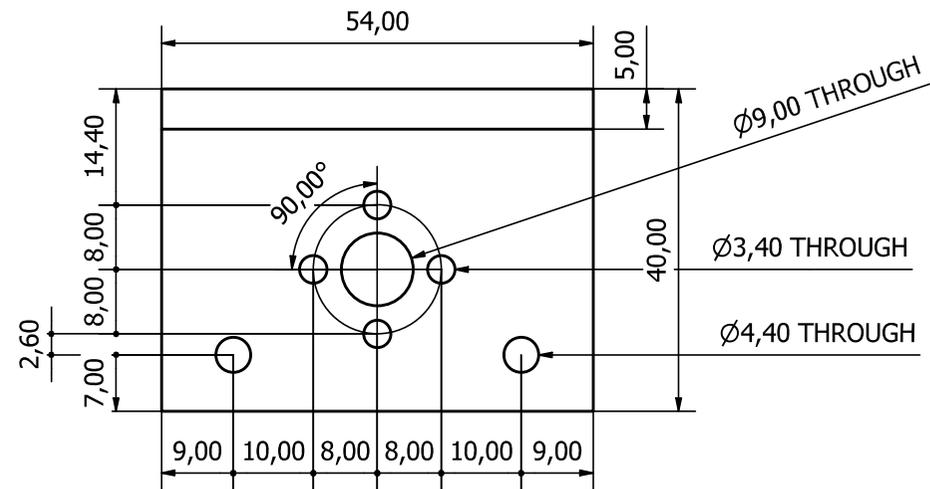
Make sure everything moves and fits properly and only then remove the platform.

# Assembly instructions

Step 41



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G015	L-shaped aluminium profile



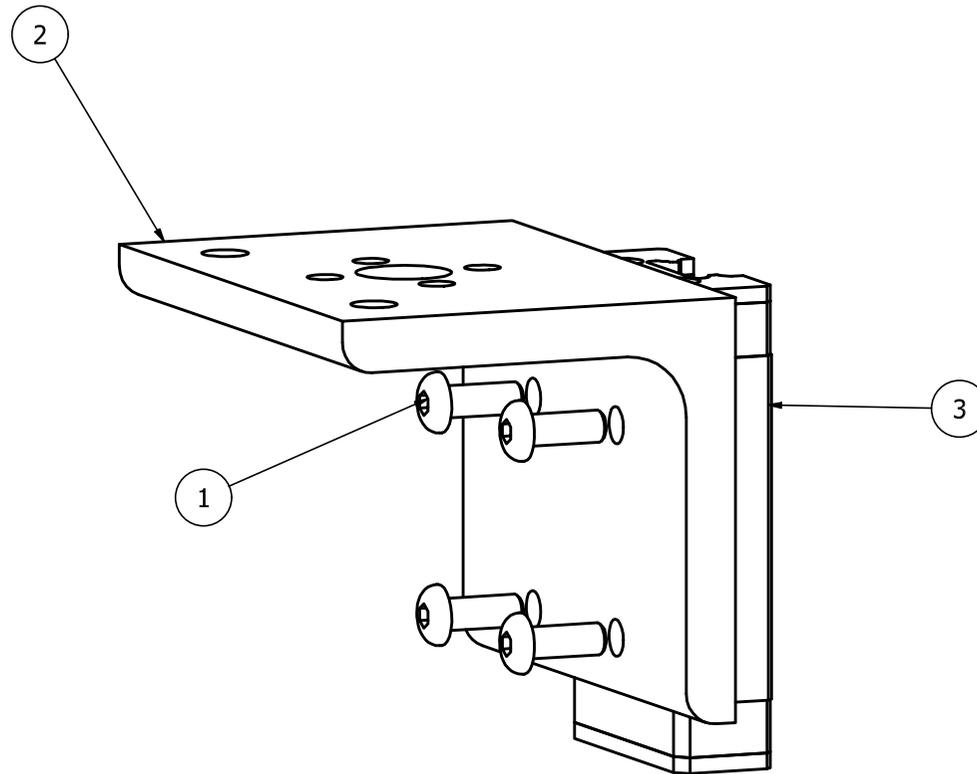
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# Assembly instructions

Step 42

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	G023	ISO 7380-1 - M3 x 8
2	1	G015	L-shaped aluminium profile
3	1	G013-1	linear guideway block



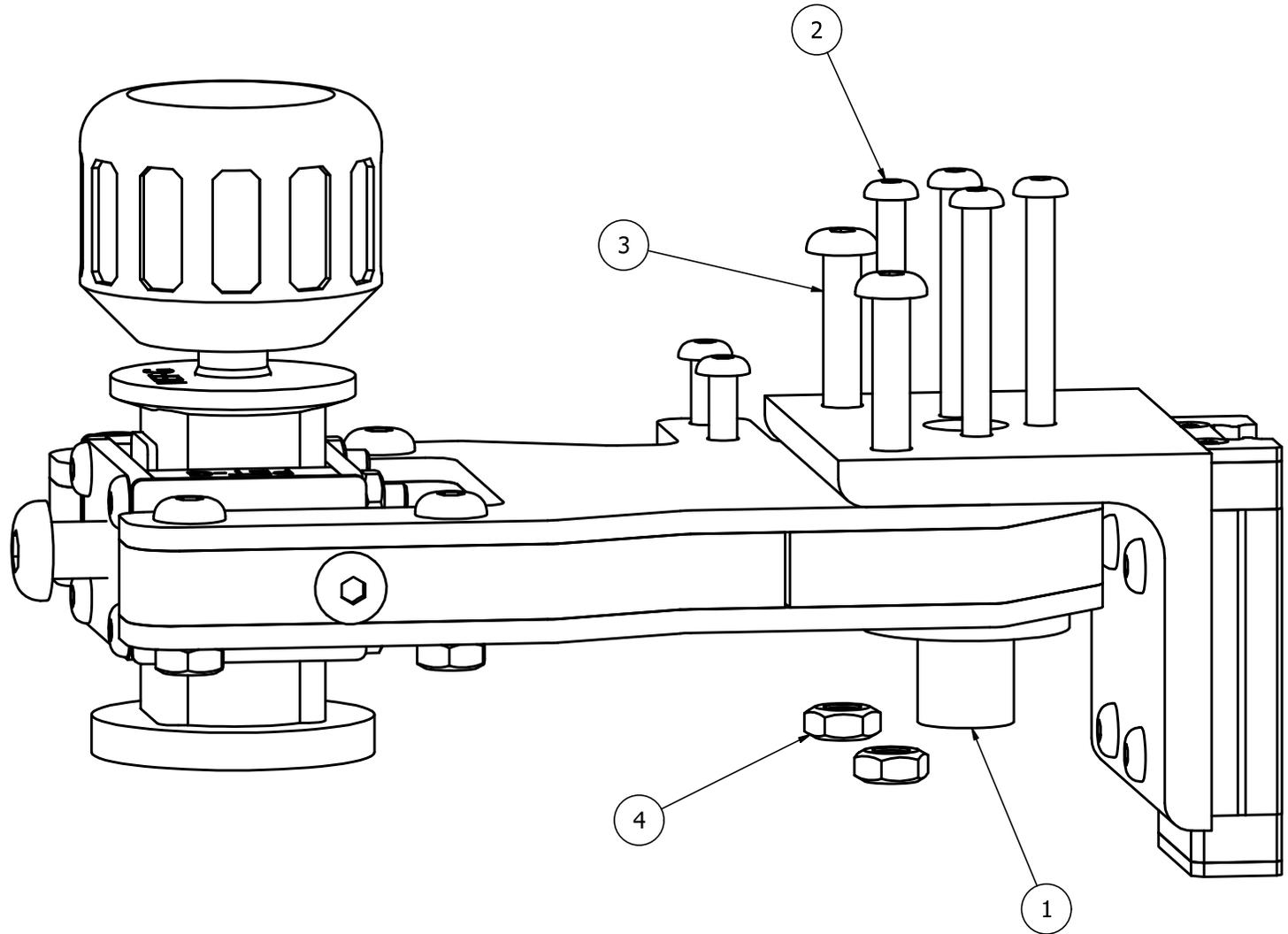
# OLIVER

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# Assembly instructions

Step 43

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G001-1	T8 trapezoidal screw
2	4	G021	ISO 7380-1 - M3 x 25
3	2	G018	ISO 7380-1 - M4 x 25
4	2	G026	DIN 934 - M4



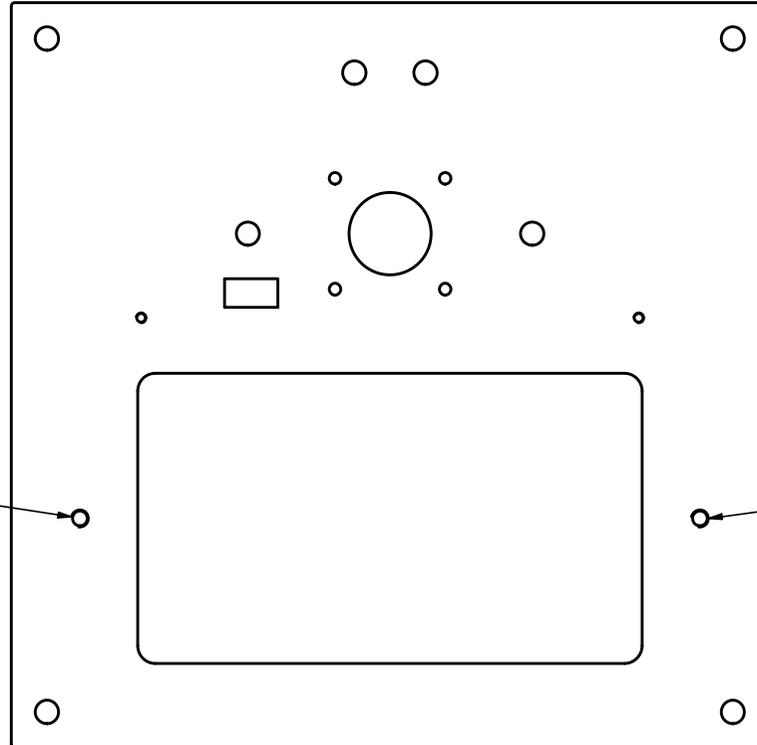
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BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	H006	OP02 - Top steel plate

# Assembly instructions

Step 44



Thread with M5 tap from this side downwards.

Thread with M5 tap from this side downwards.

**OLIVER**

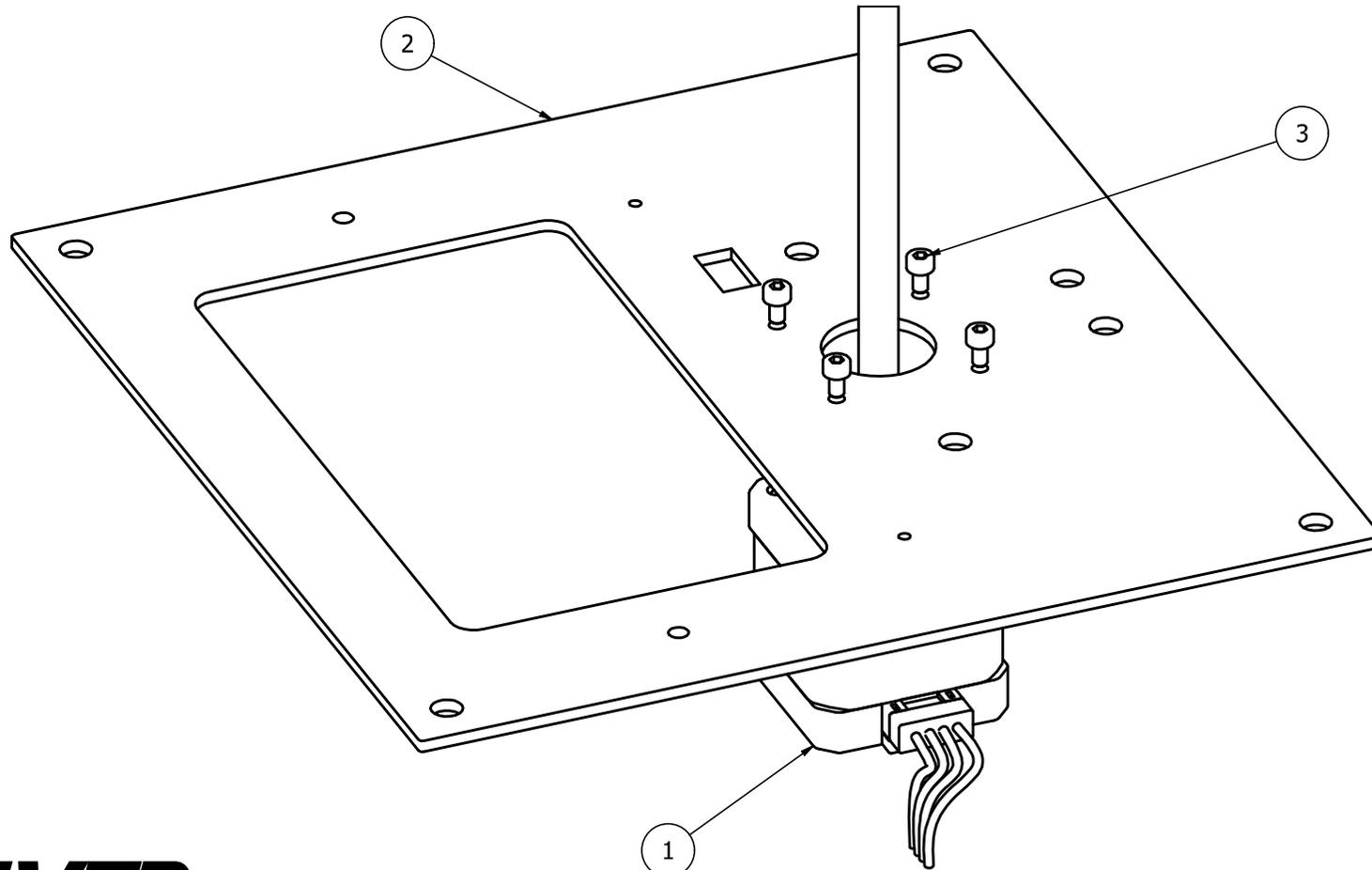
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# Assembly instructions

Step 45

## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G001	Nema 17 stepper motor
2	1	H006	OP02 - Top steel plate
3	4	G024	DIN 912 - M3 x 5

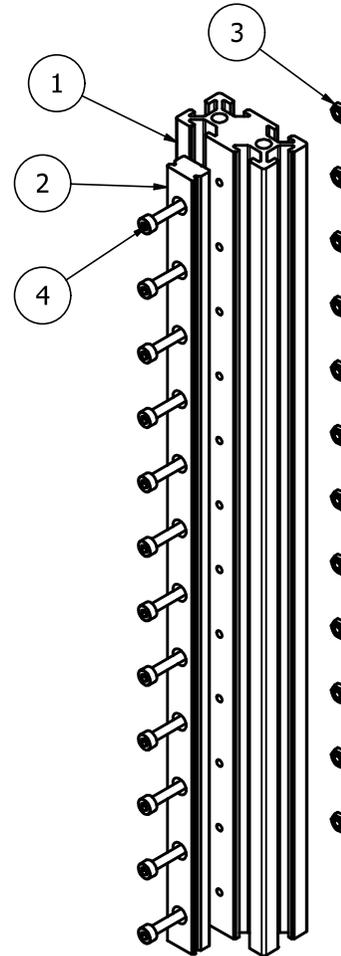
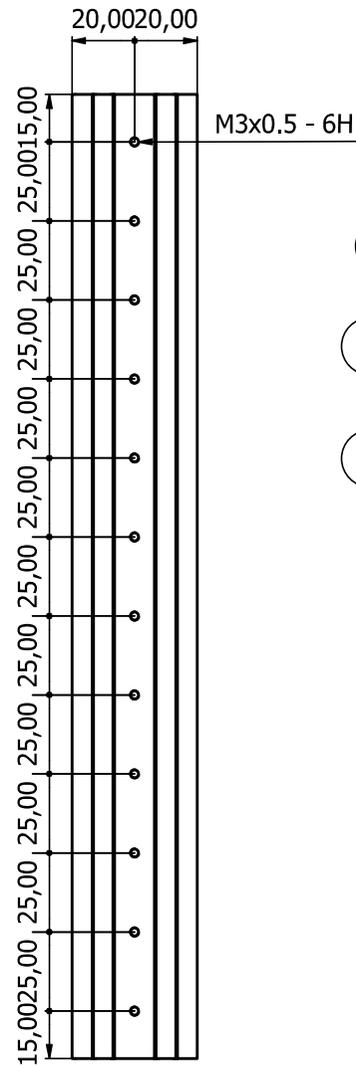
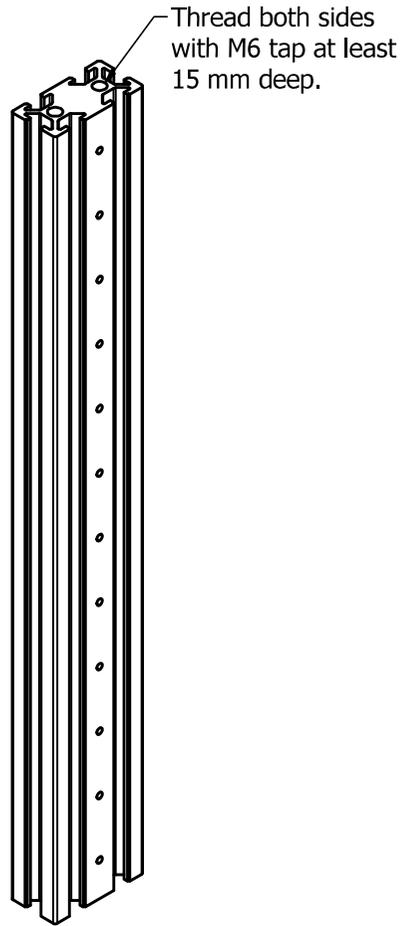


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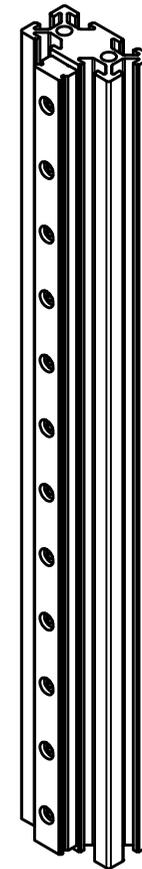
# Assembly instructions

Step 46



## BILL OF MATERIALS

ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	305.000 mm	G003	HT07
2	1	G013	Z axis linear rail
3	12	G027	DIN 934 - M3
4	12	G020	DIN 912 - M3 x 25

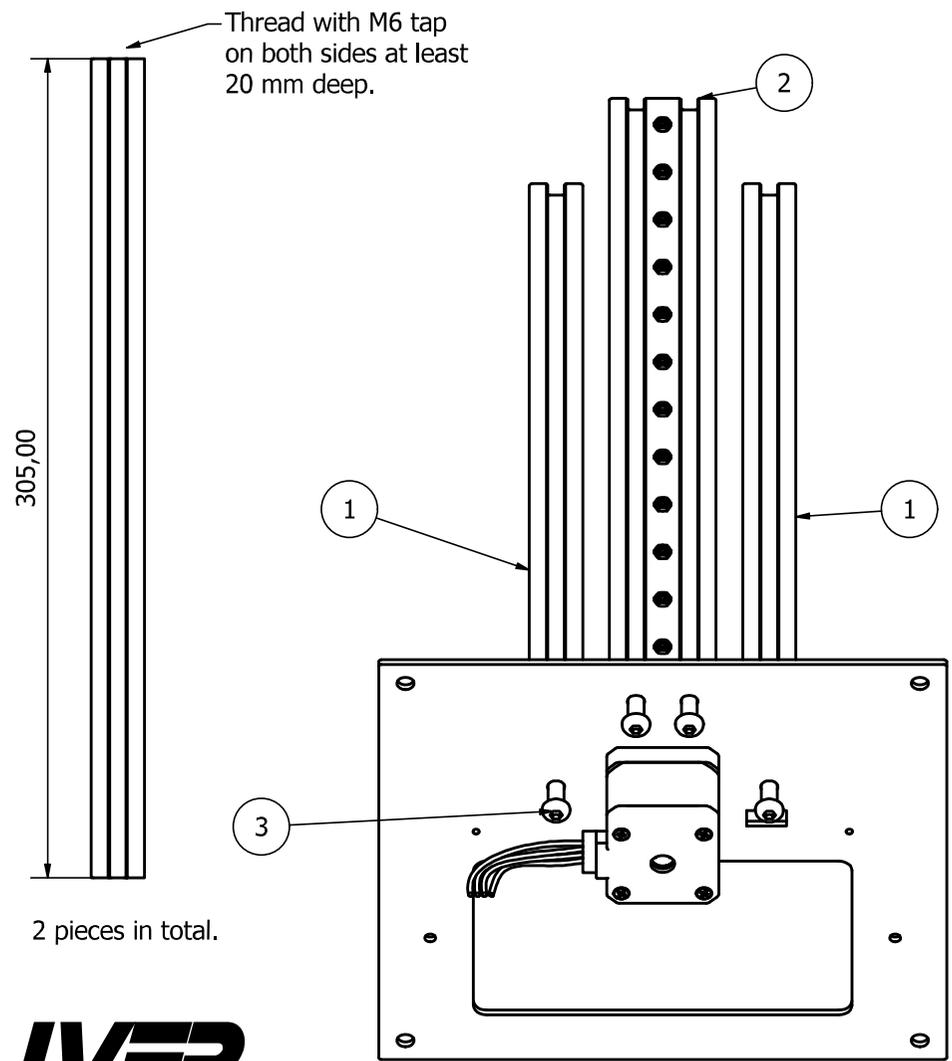


# OLIVER

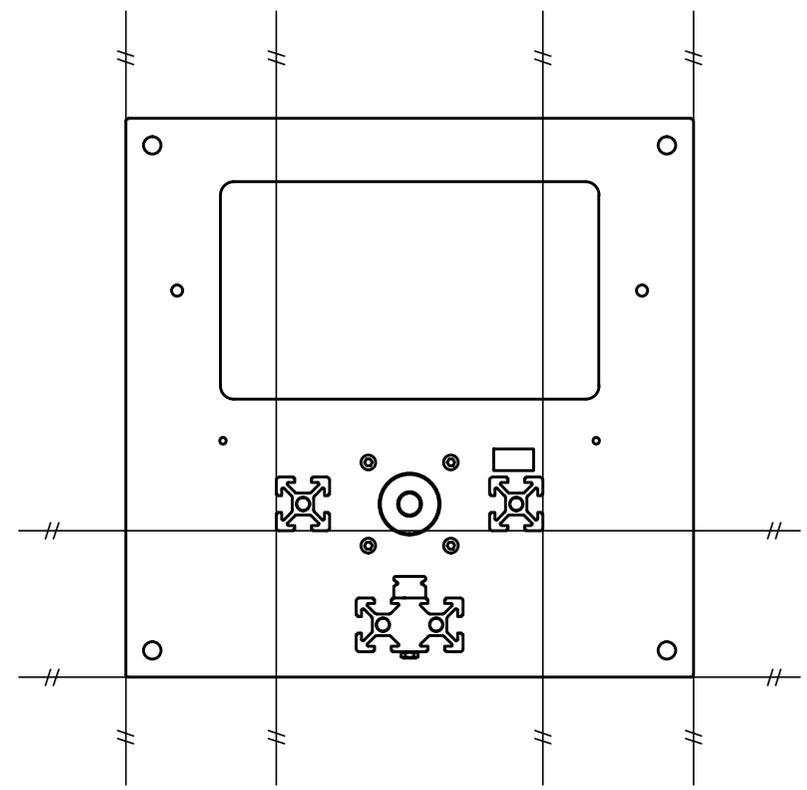
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# Assembly instructions

Step 47



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	610.000 mm	G002	HT05, HT06 - each 305mm long
2	305.000 mm	G003	HT07
3	8	G017	ISO 7380-1 - M6 x 20



Keep aluminium profiles perpendicular to edges of the metal part.

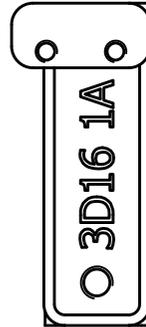


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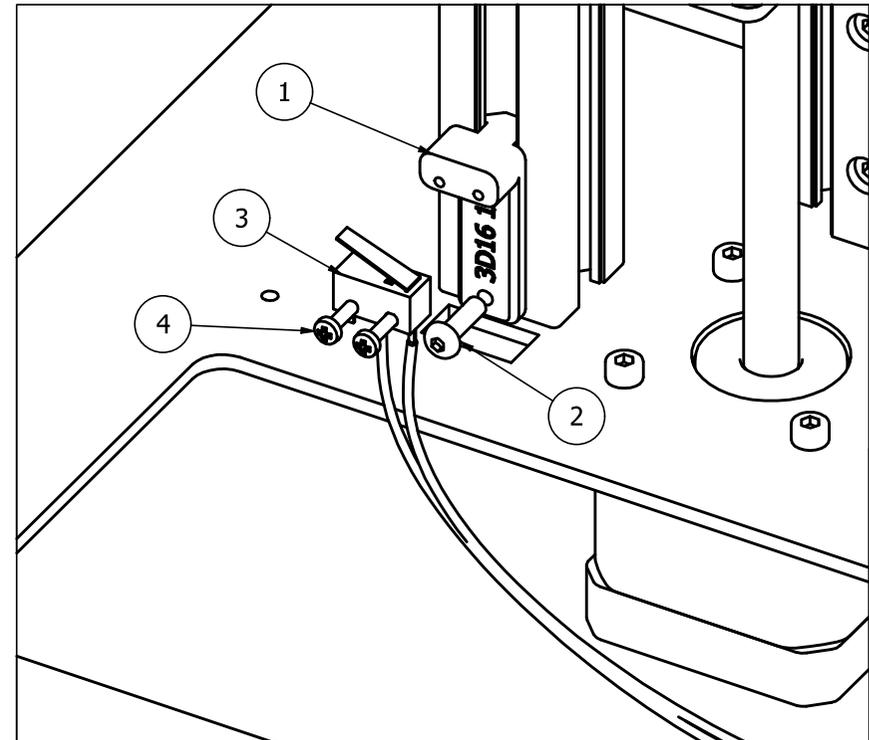
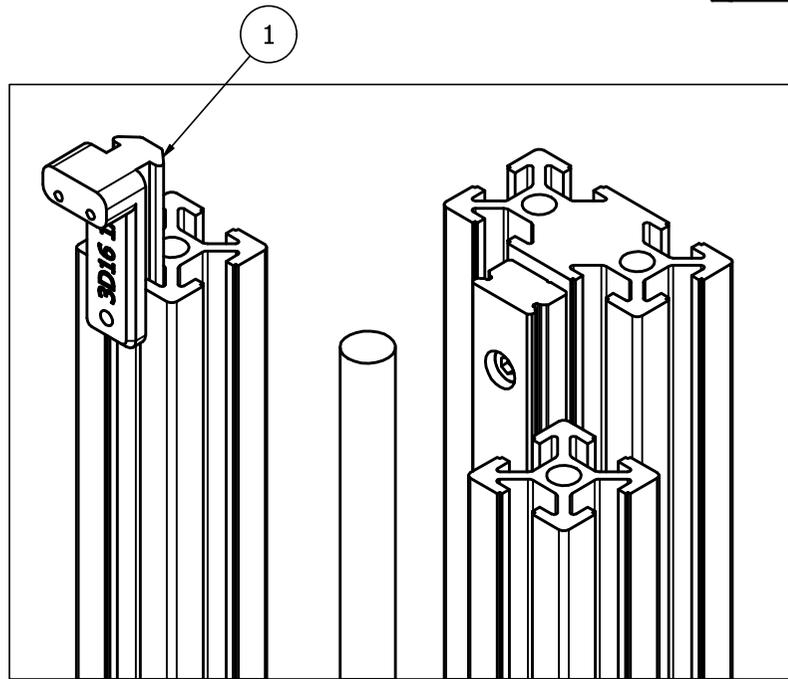
# Assembly instructions

Step 48

Depending on your 3D printer you may need to thread holes with M3 and M2 tap respectively. If you decide so, proceed slowly and carefully. Any excessive heat generated during threading process will destroy the thread and the part won't function.



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G008	bottom endstop holder
2	1	G022	ISO 7380-1 - M3 x 10
3	1	F012	endstop
4	2	G025	DIN 7985 (H) - M2x8-H

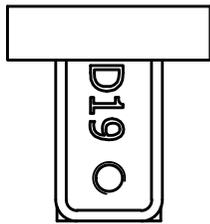


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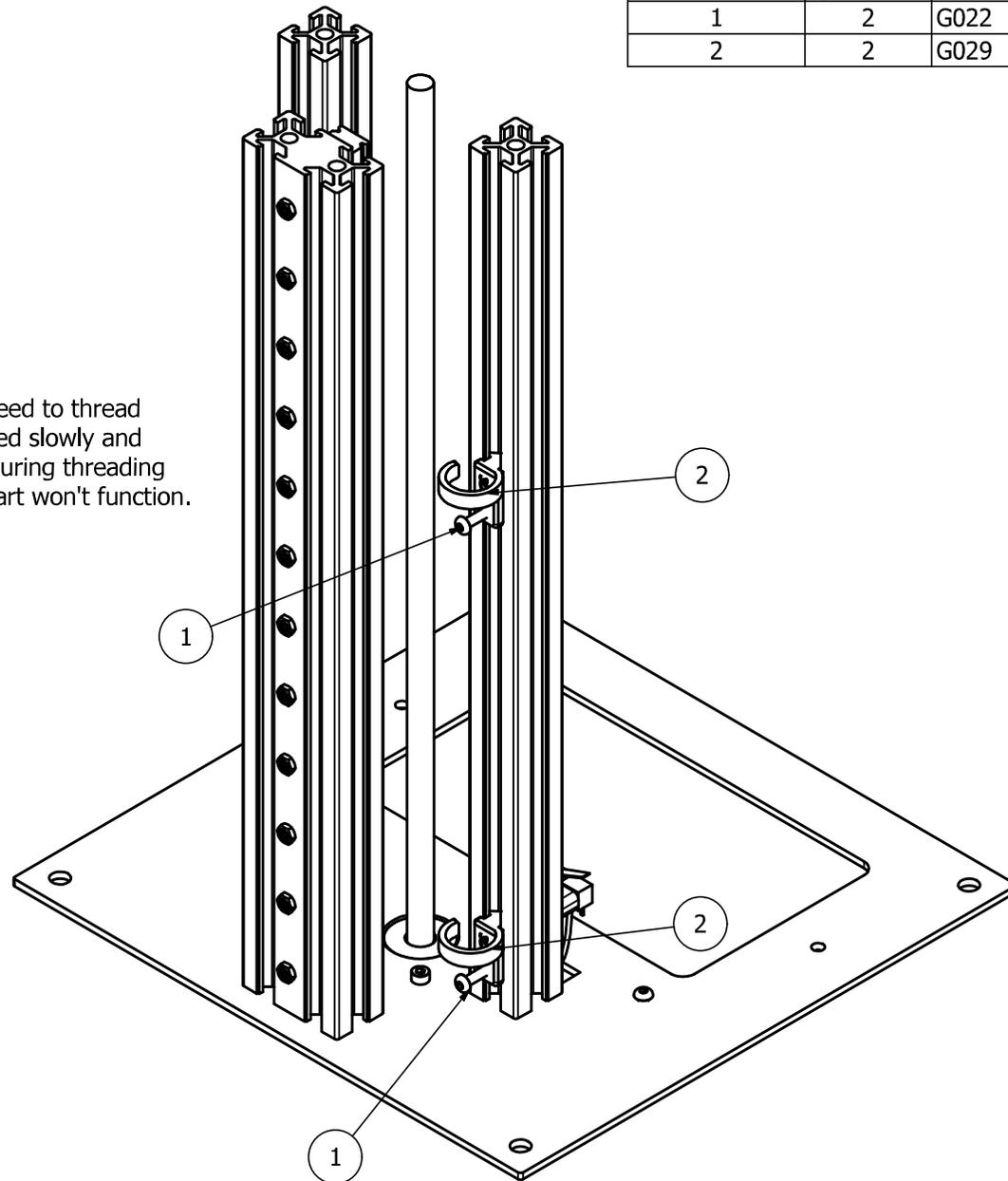
# Assembly instructions

Step 49



Depending on your 3D printer you may need to thread hole with M3 tap. If you decide so, proceed slowly and carefully. Any excessive heat generated during threading process will destroy the thread and the part won't function.

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	2	G022	ISO 7380-1 - M3 x 10
2	2	G029	3D19



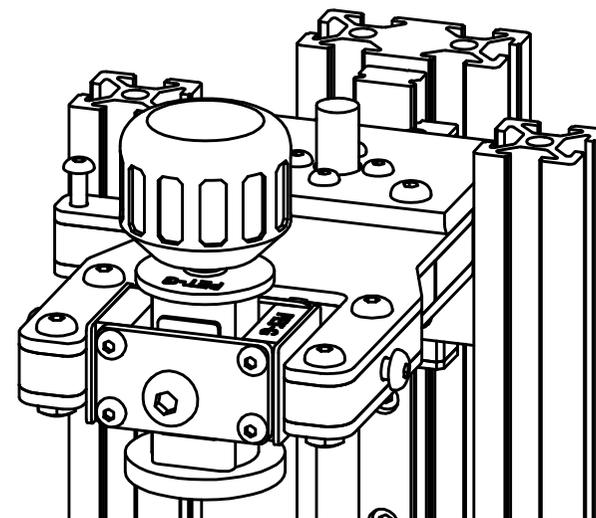
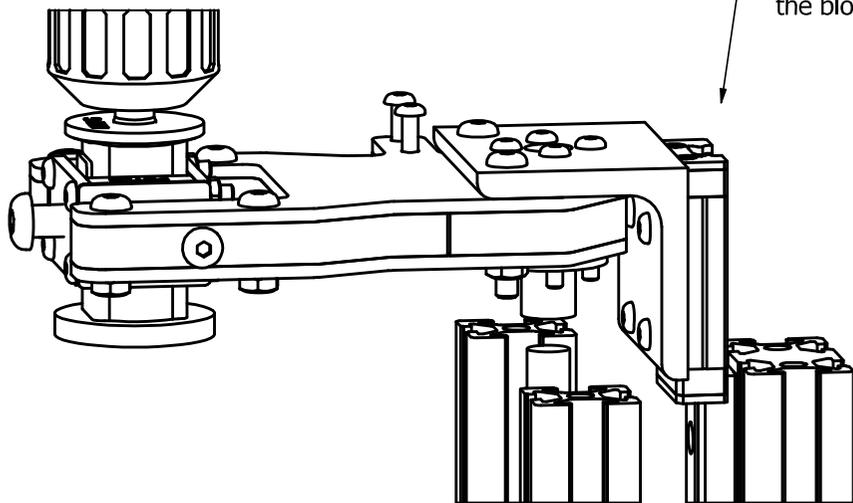
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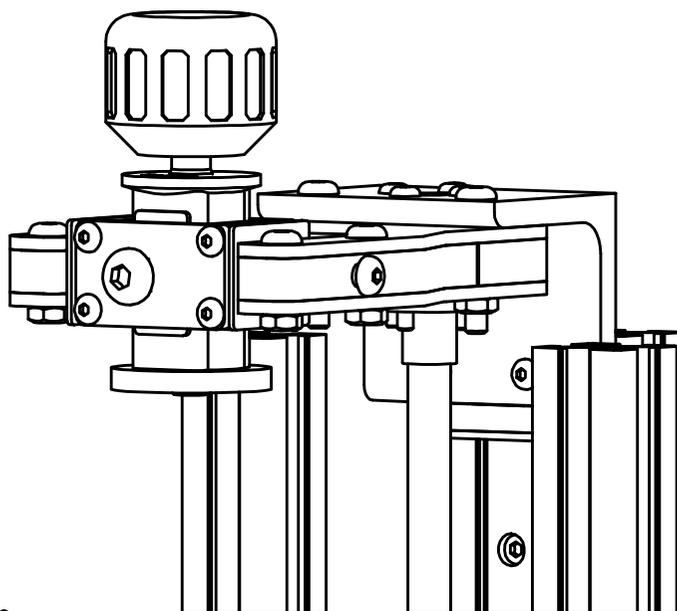
# Assembly instructions

Step 50

Firstly, start sliding the linear guideway block. Slide it perpendicular to the guideway/rail. Don't use force - the balls can easily fall off the block. If this happens, collect them and insert them in. With more than 2 balls missing, the block won't function properly.



By rotating the trapezoidal screw, move the platform to this position.



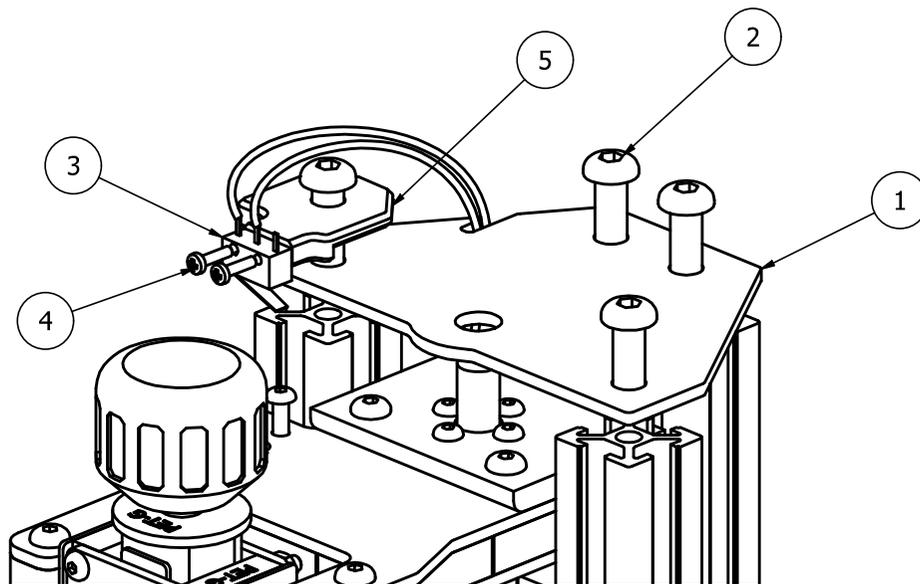
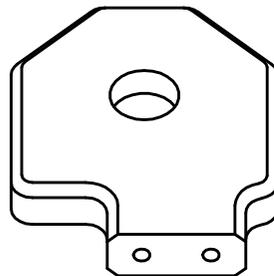
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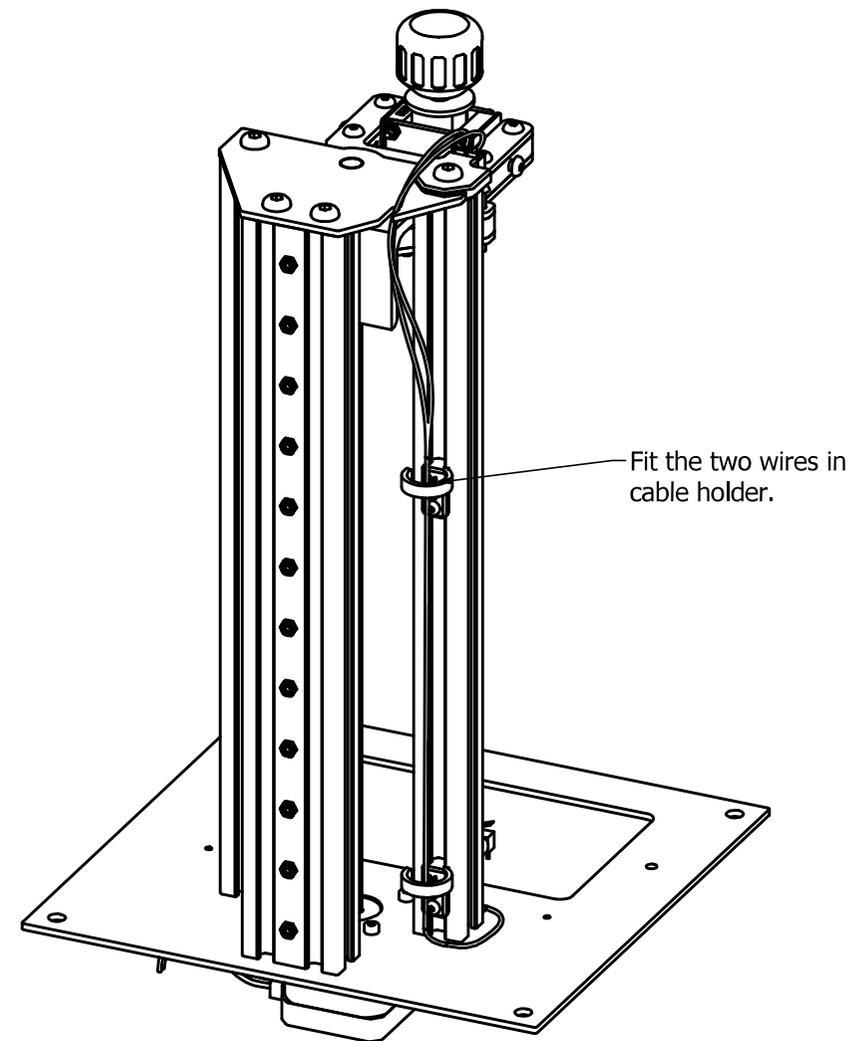
# Assembly instructions

## Step 51

Depending on your 3D printer you may need to thread holes with M2 tap. If you decide so, proceed slowly and carefully. Any excessive heat generated during threading process will destroy the thread and the part won't function properly.



BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	G009	OP07
2	4	G017	ISO 7380-1 - M6 x 20
3	1	F012	endstop
4	2	G025	DIN 7985 (H) - M2x8-H
5	1	G007	top endstop holder



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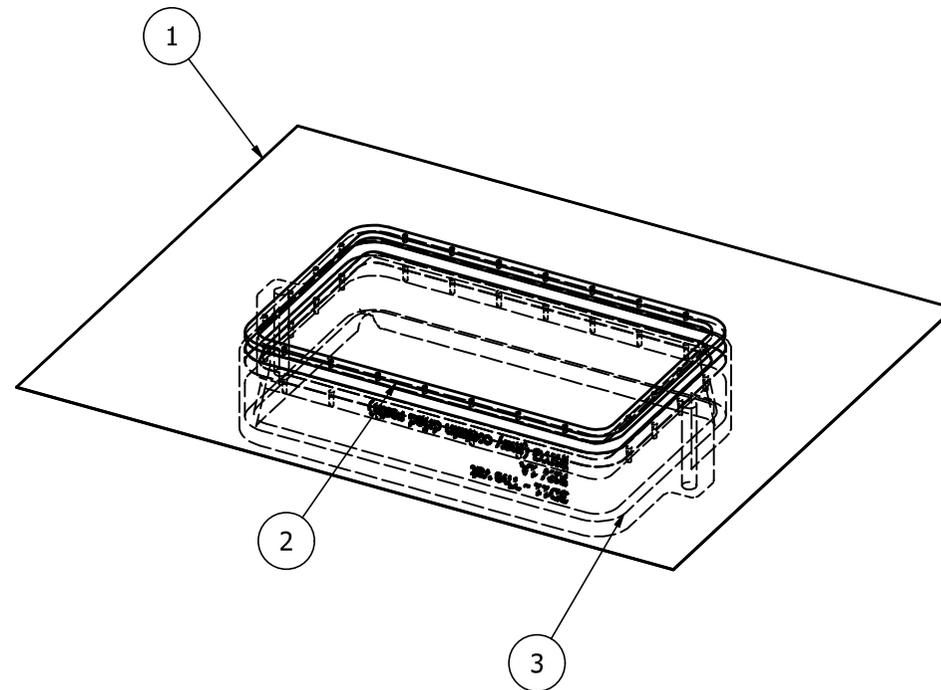
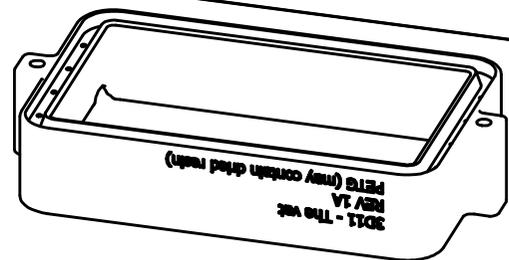
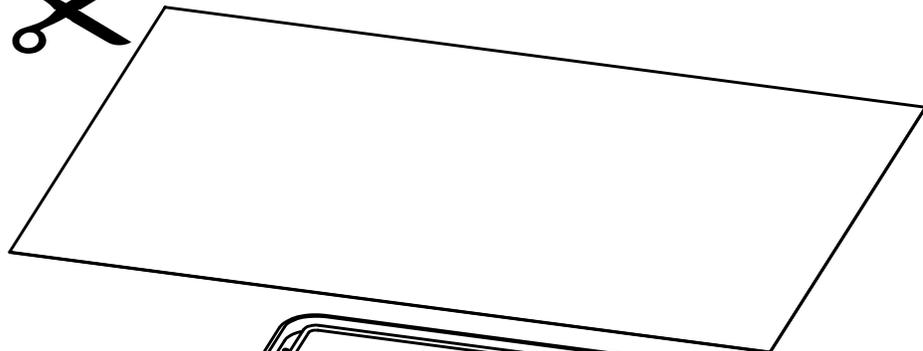
# Assembly instructions

Step 52

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	C003	127 micron FEP foil
2	1	C002	OP05
3	1	C001	Vat for the resin



Prepare the foil. You'll need about 20 cm by 15 cm foil.



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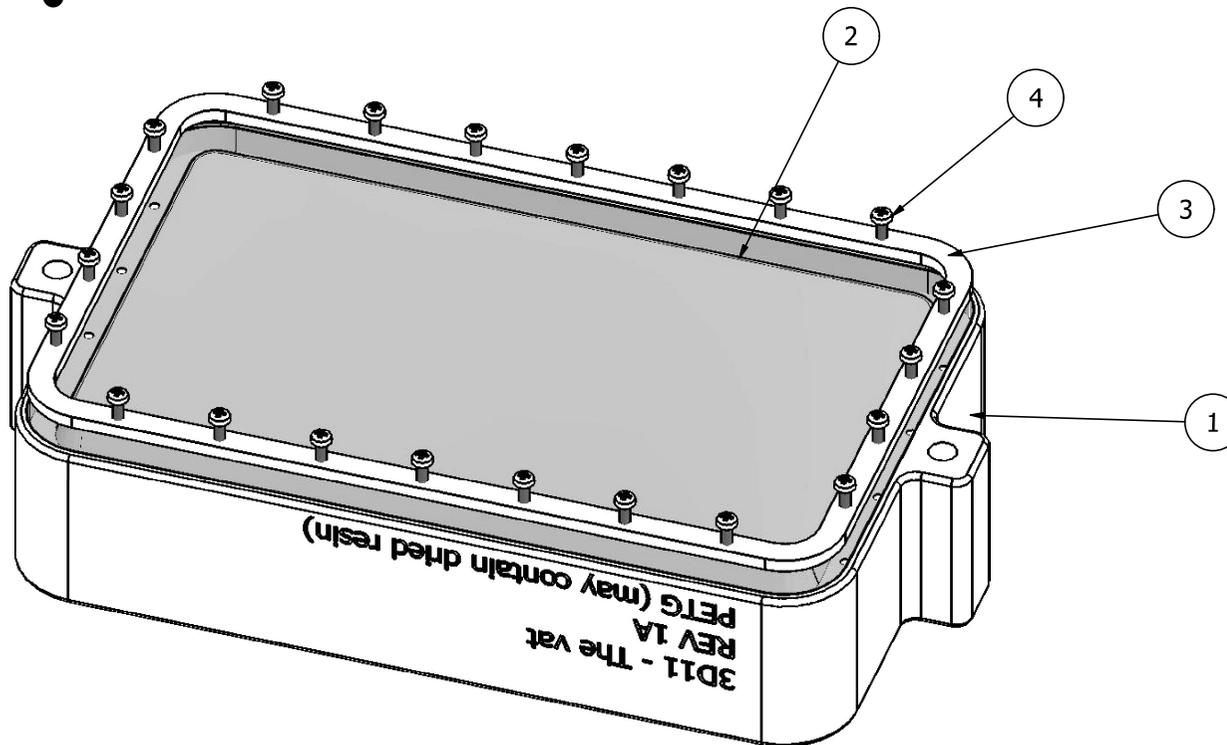
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# Assembly instructions

Step 53

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	C001	Vat for the resin
2	1	C003	127 micron FEP foil
3	1	C002	OP05
4	22	C004	DIN 7985 (H) - M2x8-H

**!** Make sure the foil is fully tightened. Then start turning the screws. They'll penetrate the foil, so you have only one try!



Cut all excess foil around the vat.

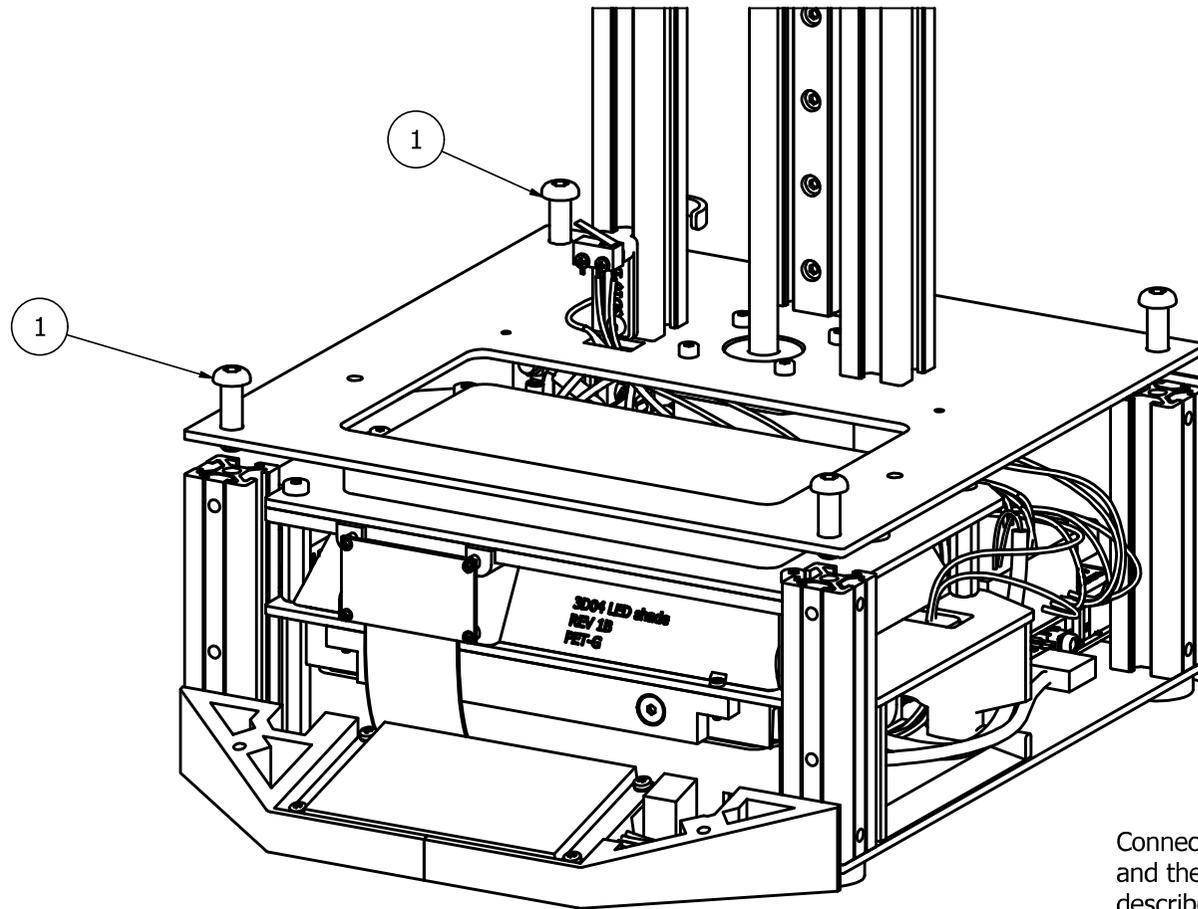
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# Assembly instructions

Step 54

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	4	H012	ISO 7380-1 - M6 x 20



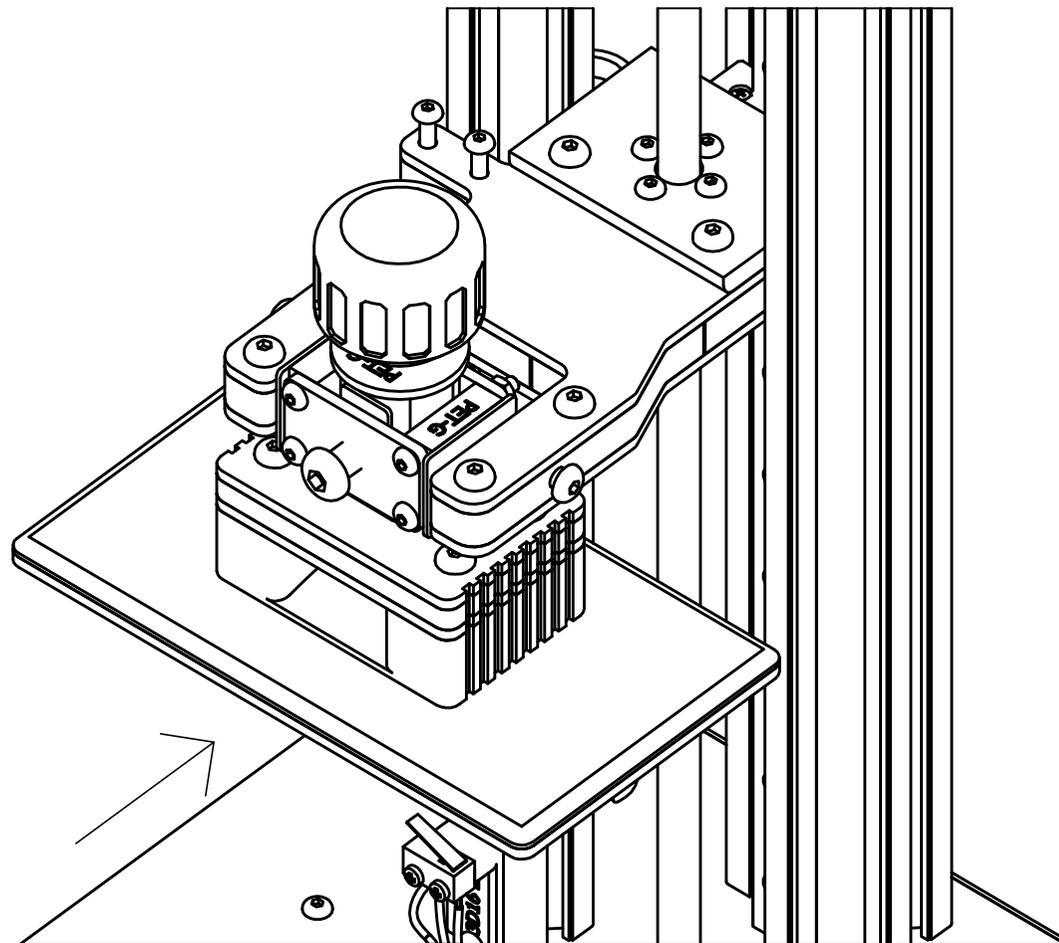
Connect top and bottom endstops and the motor to Oliver board as described in Oliver board documentation (page 35).

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# Assembly instructions

Step 55



Insert the platform and tighten the screw.

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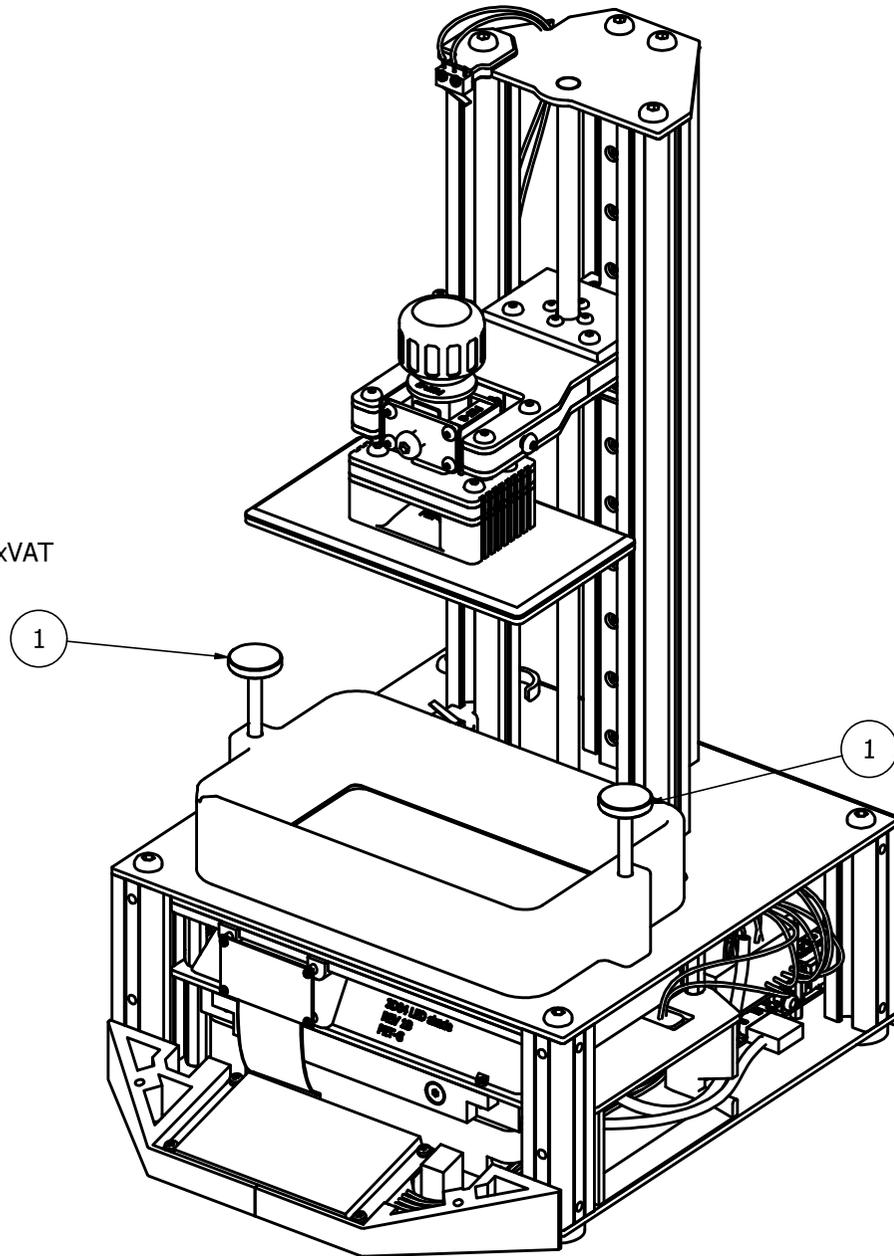
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BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	2	C005	DIN 653 - M5 x 30

# Assembly instructions

Step 56

Attach the FlexVAT



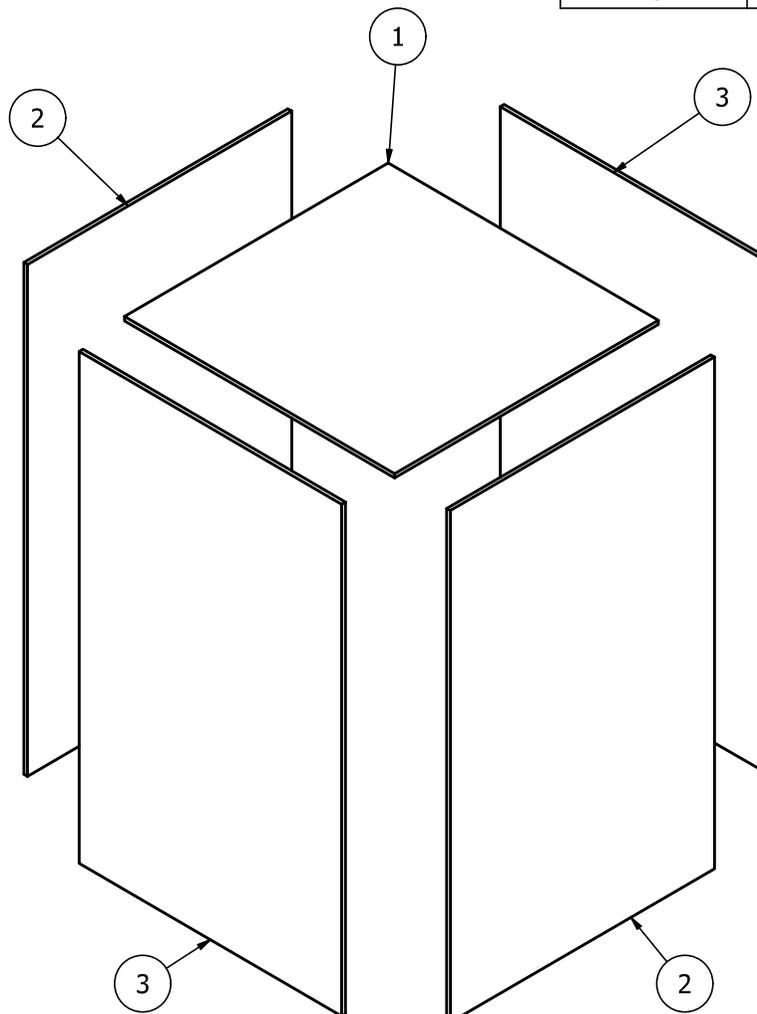
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# Assembly instructions

Step 57

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	K001	P0
2	2	K002	P1
3	3	K006	*Různé*
4	1	K005	glue for acrylic glass



Glue together with appropriate glue (K005).

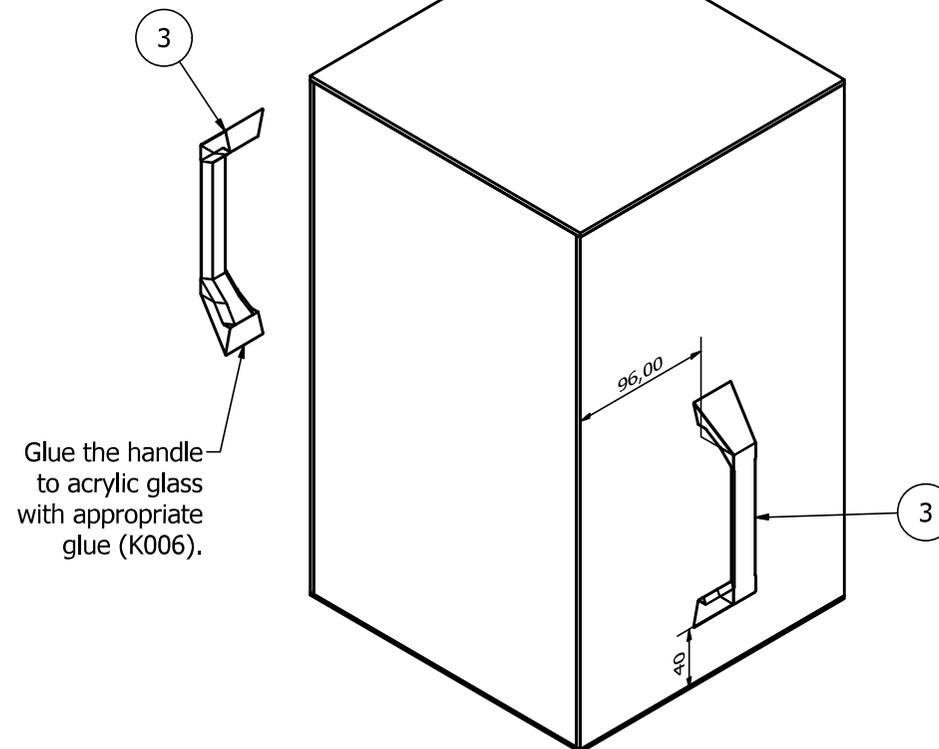
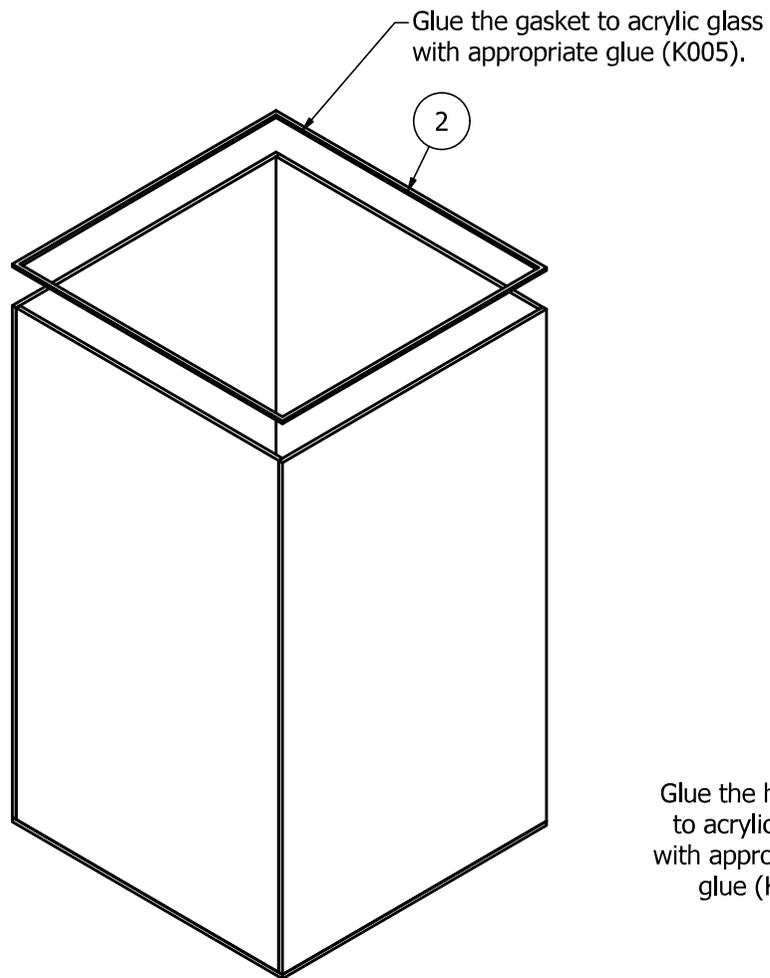
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# Assembly instructions

Step 58

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	K006	universal glue
2	1	K004	rubber gasket
3	2	K003	handle for the acrylic cover
4	1	K005	glue for acrylic glass



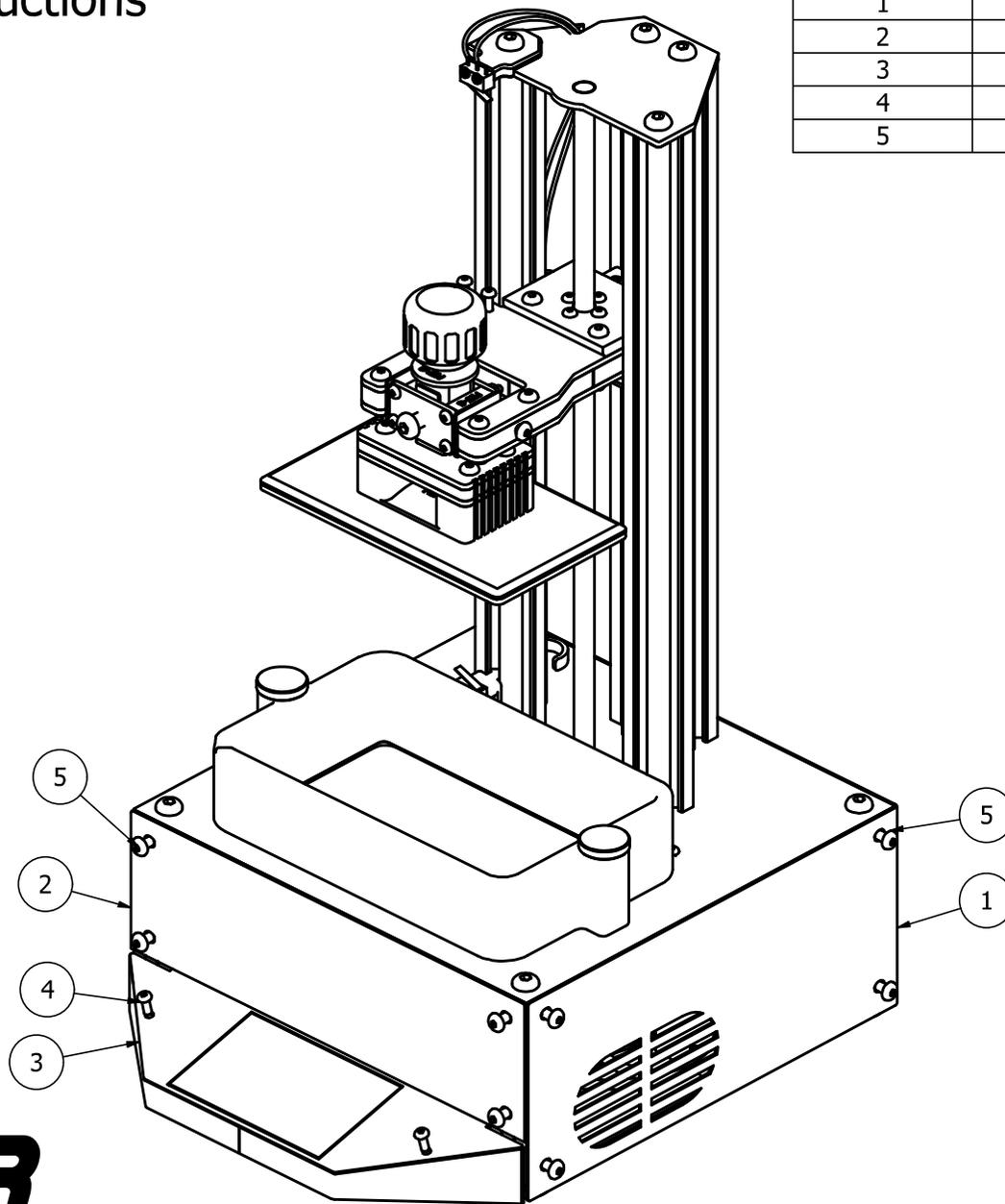
# OLIVER

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# Assembly instructions

Step 59

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	H010	HP04
2	1	H008	HP02
3	1	I003	HP05
4	2	I005	ISO 7380-1 - M3 x 8
5	8	H013	ISO 7380-1 - M4 x 6



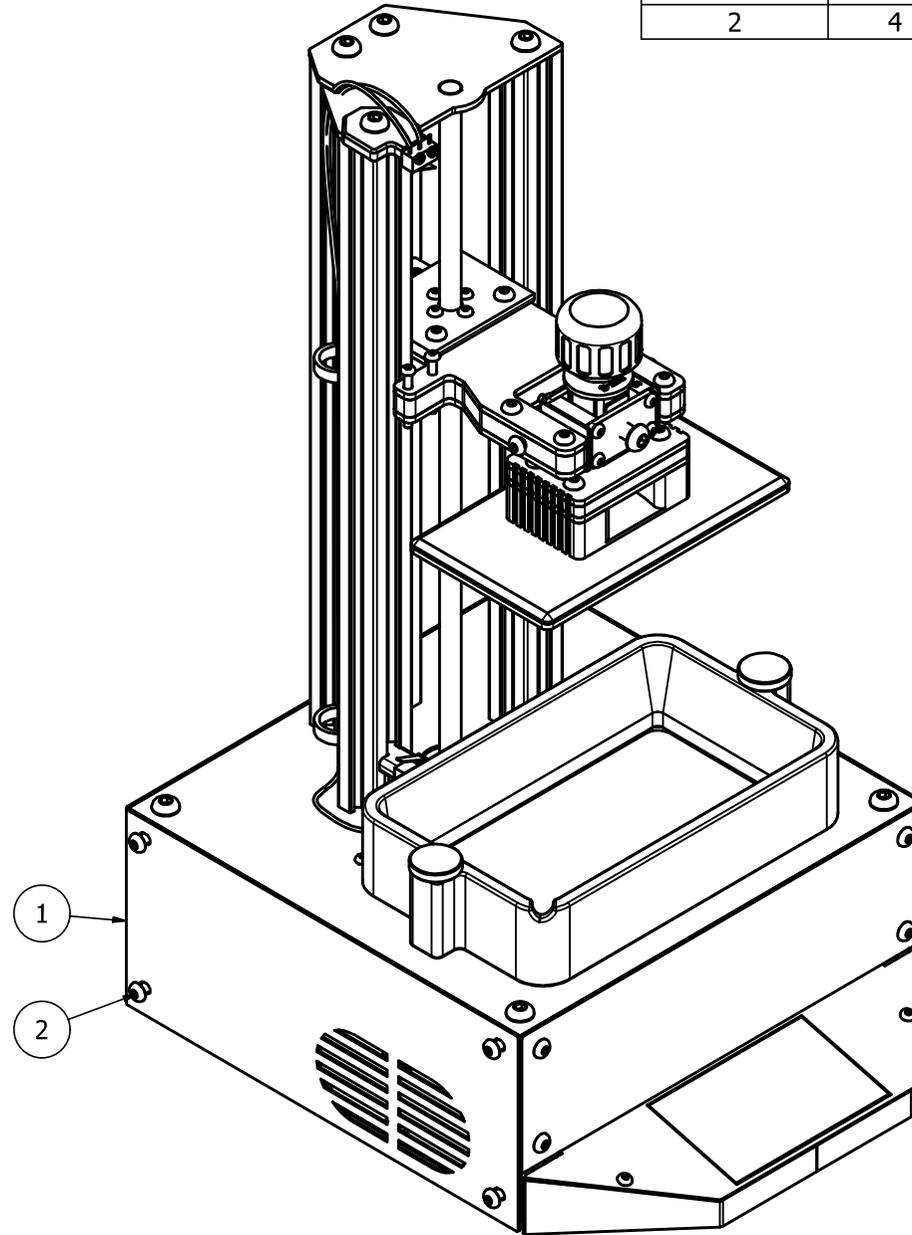
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# Assembly instructions

Step 60

BILL OF MATERIALS			
ITEM	QUANTITY	PART NUMBER	DESCRIPTION
1	1	H009	HP03
2	4	H013	ISO 7380-1 - M4 x 6

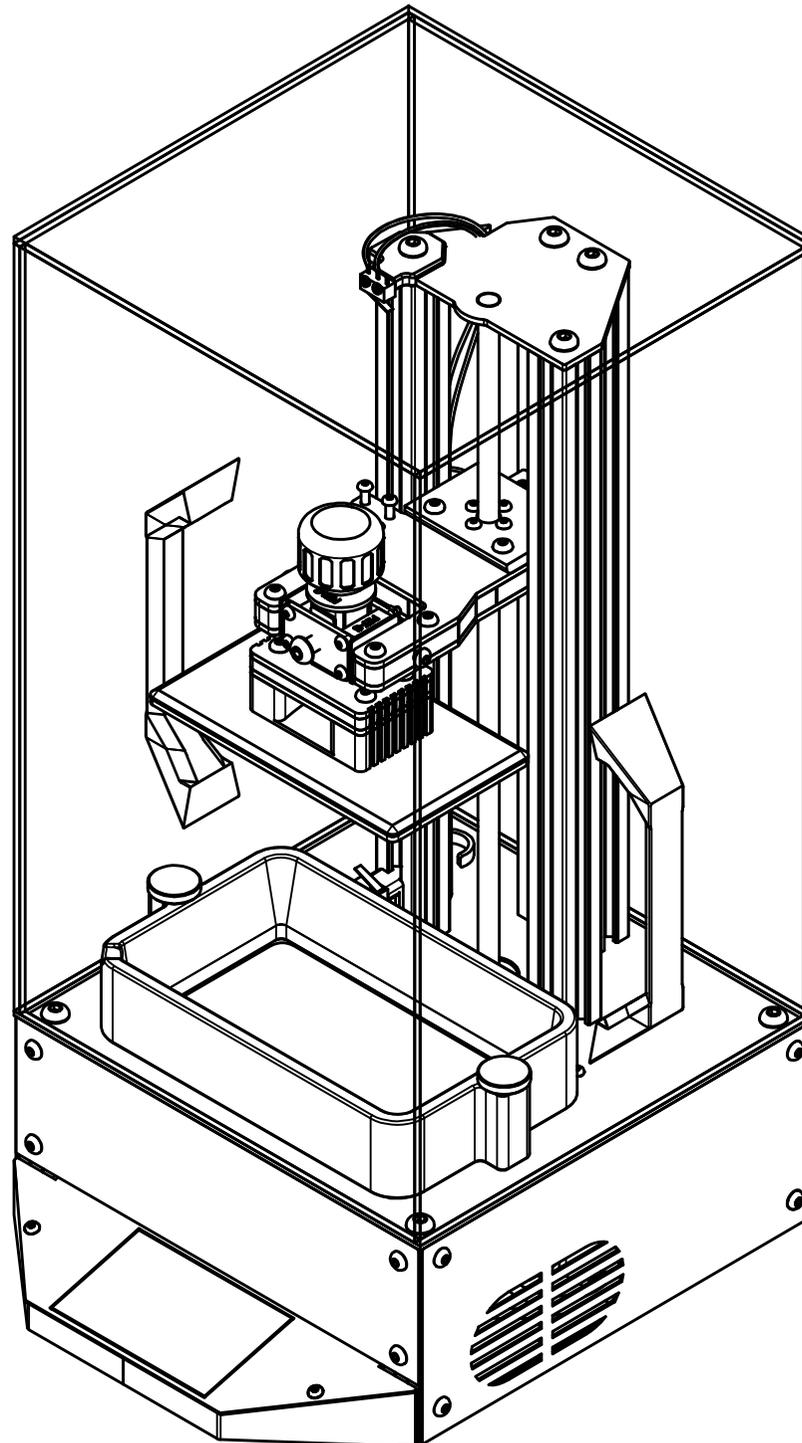


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# Assembly instructions

Step 61



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# Firmware and software installation

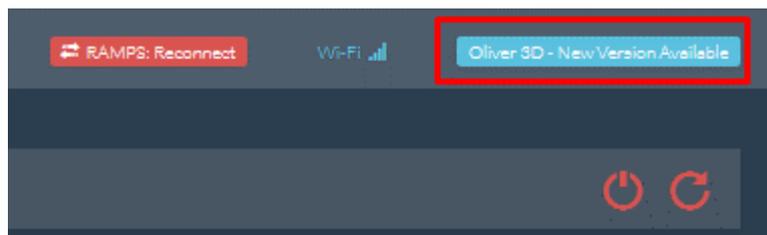
Connect the printer to AC power and establish an ethernet connection. Then connect to the printer via a web browser. You have two options to do that:

1. Type in the IP address shown on the front display
2. Go to <https://www.nanodlp.com/dashboard> and click on your printer there

After you have established the connection, you will be greeted by a NanoDLP cloud-interface. There will be a question, which printer settings do you want to use. Select a generic printer. Then follow the steps below.

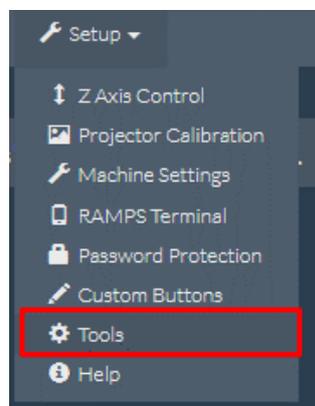
## Step 1

Firstly, make sure your printer firmware is updated to the latest version. If there's a blue icon at the right corner saying „New version available“, then update the firmware by clicking on this button.



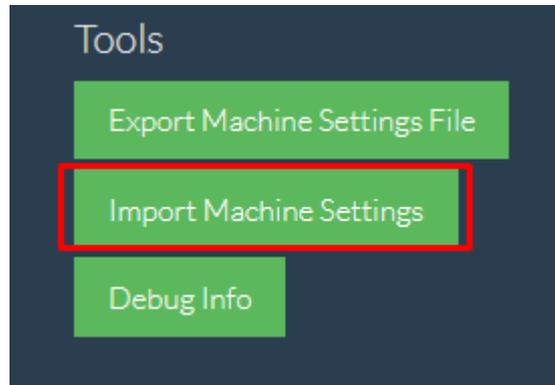
## Step 2

On the upper panel click on “Setup” button. A menu will appear. Select “Tools” option.



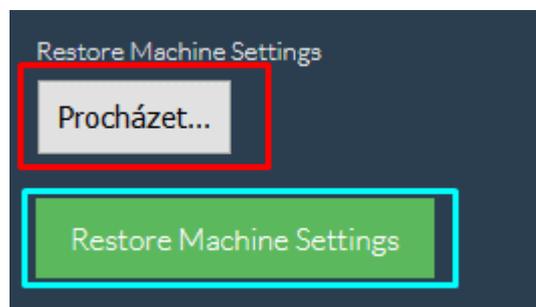
### Step 3

Select “Import Machine Settings”.



### Step 4

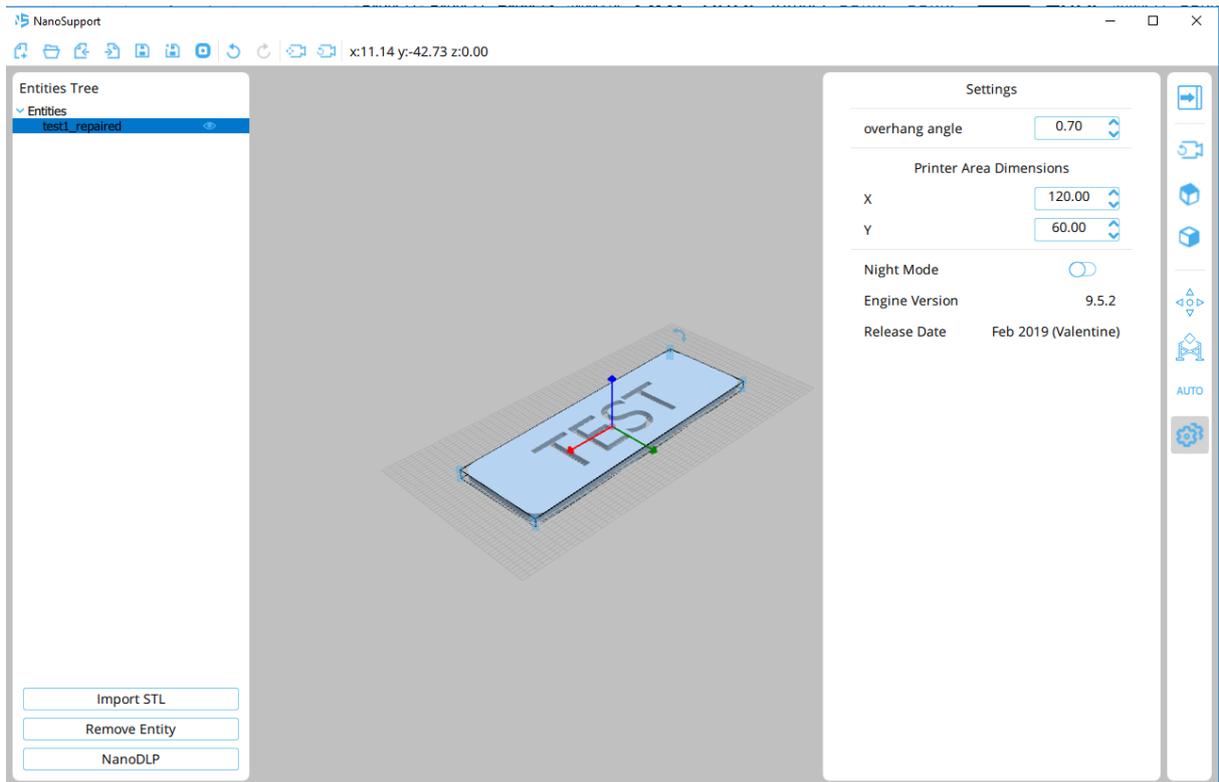
Click on the **button** below Restore Machine Settings. The text may differ depending on your default system language. After the file is uploaded, click on “Restore Machine Settings” **button**.



After completing these steps, you have successfully set up your printer. Now you can download desktop slicing software NanoSupport, although this step is optional. The web interface includes a fully functional slicer. Before starting your first print, be sure to go through a checklist below!

### NANOSUPPORT (OPTIONAL)

NanoSupport is a new and powerful desktop (for Windows, Mac and Linux) slicing software. Since the software is running on your desktop, as opposed on the printer itself, it is faster and more reliable.



You can download the software from this link:  
<https://www.nanodlp.com/download/#nanosupport>

### **WARNING**

Manual for operation is coming soon.

## Pre-flight check

Power up the printer and test the following functionality using either the front display or web interface.

- Fans are working
- The Z-axis is moving
- End-stops are working
- The mask is displaying images correctly

Then proceed to the “First print” chapter.

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## Sources

### Images

Figure of the scissors in the assembly: Scissors Clipart transparent PNG - StickPNG [online]. [Accessed 10 June 2019], Available from: <http://www.stickpng.com/img/tools-and-parts/scissors/scissors-clipart>

Figure of the exclamation mark in the assembly: Question Mark Background png download - 1200\*1200 - Free Transparent Exclamation Mark png Download [online]. [Accessed 10 June 2019], Available from: <https://www.kisspng.com/png-exclamation-mark-question-mark-computer-icons-symb-999307/>

Figure 1: ZD 99 [online]. [Accessed 10 May 2019]. Available from: <https://images.ges.cz/images/pictures/z/zd-99.jpg>

Figure 2: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/000588447PI00/Cínová pájka PBF, Sn99Cu1, Ø 1 mm, 500 g, Stannol HS10 2510.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/000588447PI00/Cínová_pájka_PBF_Sn99Cu1,_Ø_1_mm,_500_g,_Stannol_HS10_2510.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 3: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/816742\\_BB\\_00\\_FB/Stranové štípací kleště ESD Toolcraft 81 67 42, 128 mm.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/816742_BB_00_FB/Stranové_štípací_kleště_ESD_Toolcraft_81_67_42,_128_mm.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 4: Isopropyl alcohol [online]. [Accessed 10 May 2019]. Available from: [https://cdn.shopify.com/s/files/1/0275/8531/products/ipa-99.9\\_-isopropyl-alcohol-99.9.jpg?v=1488492781](https://cdn.shopify.com/s/files/1/0275/8531/products/ipa-99.9_-isopropyl-alcohol-99.9.jpg?v=1488492781)

Figure 5: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/588124\\_LB\\_00\\_FB/T%C5%99et%C3%AD+ruka+2d%C3%ADln%C3%A1+TOOLCRAFT+ZD-10F.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/588124_LB_00_FB/T%C5%99et%C3%AD+ruka+2d%C3%ADln%C3%A1+TOOLCRAFT+ZD-10F.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 6: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/826677\\_RB\\_02\\_FB/Sada+ploch%C3%BDch+a+k%C5%99%C3%AD%C5%BEov%C3%BDch+%C5%A1roubov%C3%A1k%C5%AF+Wiha+00503.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/826677_RB_02_FB/Sada+ploch%C3%BDch+a+k%C5%99%C3%AD%C5%BEov%C3%BDch+%C5%A1roubov%C3%A1k%C5%AF+Wiha+00503.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 7: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/806102\\_BB\\_00\\_FB/Inbus+sada+kl%C3%AD%C4%8D%C5%AF+806102%2C+16d%C3%ADln%C3%A1.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/806102_BB_00_FB/Inbus+sada+kl%C3%AD%C4%8D%C5%AF+806102%2C+16d%C3%ADln%C3%A1.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 8: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/822963\\_BB\\_00\\_FB/Ploch%C3%A9+kle%C5%A1t%C4%9B+pro+elektroniku+a+jemnou+mechaniku+rovn%C3%A9+120+mm+Br%C3%BCder+Mannesmann+10806.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/822963_BB_00_FB/Ploch%C3%A9+kle%C5%A1t%C4%9B+pro+elektroniku+a+jemnou+mechaniku+rovn%C3%A9+120+mm+Br%C3%BCder+Mannesmann+10806.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 9: Bex tools BC2 [online]. [Accessed 10 May 2019]. Available from: [http://www.bextools.com/img/p/3/2/8/328-thickbox\\_default.jpg](http://www.bextools.com/img/p/3/2/8/328-thickbox_default.jpg)

Figure 10: Molex 638111000 [online]. [Accessed 10 May 2019]. Available from: [https://www.molex.com/pdm\\_docs/iso/638111000\\_ISO.gif](https://www.molex.com/pdm_docs/iso/638111000_ISO.gif)

Figure 11: Conrad electronic [online]. [Accessed 10 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/824435\\_RB\\_01\\_FB/N%C5%AF%C5%BE+TOOLCRAFT%2C+18+mm%2C+hlin%C3%ADk.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/824435_RB_01_FB/N%C5%AF%C5%BE+TOOLCRAFT%2C+18+mm%2C+hlin%C3%ADk.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 12: Narex Žďánice [online]. [Accessed 24 May 2019]. Available from: [https://www.narexzd.cz/runtime/cache/images/productDetail/0200\\_1.png](https://www.narexzd.cz/runtime/cache/images/productDetail/0200_1.png)

Figure 13: Briol [online]. [Accessed 24 May 2019]. Available from: <https://www.briol.cz/data/imgauto/8/0/HSS-G.jpg>

Figure 14: Conrad electronic [online]. [Accessed 24 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/812777\\_LB\\_00\\_FB/Stoln%C3%AD+vrta%C4%8Dka+PBD+40+Bosch+0603B07000.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/812777_LB_00_FB/Stoln%C3%AD+vrta%C4%8Dka+PBD+40+Bosch+0603B07000.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 15: Conrad electronic [online]. [Accessed 24 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/825257\\_RB\\_00\\_FB/Staviteln%C3%A9+vratidlo+na+z%C3%A1vitn%C3%ADky+Exact%2C+04971%2C+DIN+1814%2C+M1+-+M8.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/825257_RB_00_FB/Staviteln%C3%A9+vratidlo+na+z%C3%A1vitn%C3%ADky+Exact%2C+04971%2C+DIN+1814%2C+M1+-+M8.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 16: Conrad electronic [online]. [Accessed 24 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/481541\\_BB\\_00\\_FB/Obloukov%C3%A1+pila+Br%C3%BCder+Mannesmann%2C+300+mm%2C+v%C4%8D.+3+ks+pilov%C3%BDch+list%C5%AF.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/481541_BB_00_FB/Obloukov%C3%A1+pila+Br%C3%BCder+Mannesmann%2C+300+mm%2C+v%C4%8D.+3+ks+pilov%C3%BDch+list%C5%AF.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 17: Conrad electronic [online]. [Accessed 24 May 2019]. Available from: [https://asset.conrad.com/media10/isa/160267/c1/-/cs/813437\\_AB\\_00\\_FB/Plastov%C3%A1+pokosov%C3%A1+%C5%A1ablona+Basetech%2C+300+mm.jpg?align=center&x=250&ex=250&y=250&ey=250](https://asset.conrad.com/media10/isa/160267/c1/-/cs/813437_AB_00_FB/Plastov%C3%A1+pokosov%C3%A1+%C5%A1ablona+Basetech%2C+300+mm.jpg?align=center&x=250&ex=250&y=250&ey=250)

Figure 18: Amazon [online]. [Accessed 24 May 2019]. Available from: <https://images-na.ssl-images-amazon.com/images/I/81rcggY3NwL.SL1500.jpg>

Figure 19: Amazon [online]. [Accessed 24 May 2019]. Available from: <https://images-na.ssl-images-amazon.com/images/I/91GBchGYuFL.SL1500.jpg>

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*Happy Printing :)*

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[www.oliver3d.com](http://www.oliver3d.com)