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# 1. Introduction

## 1.1. Safety instructions

The printer has a number of safety circuits, but never leave it unattended.

Do not lift the printer while the power plug is plugged in. There is a risk of electric shock.

Keep the pressure chamber clear. Handling within the installation space can cause injuries.

Never touch the heating components while the printer is switched on, as this may cause burns.

Use suitable fire extinguishers in case of fire to avoid the danger of an electric shock.

Have maintenance work on the electronics and mechanics carried out by a service technician to prevent damage.

The current-carrying components should be connected by a trained electrician (VDE)! The company raise-UAV assumes no liability for damages and injuries resulting from faulty installations.

## 2. Build the Printer

### 2.1. Manufacturing of the frame

Beech plywood with a thickness of  $\leq 12\text{mm}$  was used for the frame. The panels have a maximum dimension of 400mm in all directions. A little reserve when milling is to be considered. Milling was done with a 3mm universal 2-flute or 3mm diamond cut.

Milling parameters for beech plywood (MPCNC):  
400 mm/min at 3mm immersion depth conventional (clockwise)  
800W spindle at 30000 revolutions

Panel blanks with 450 x 450mm were used, which enables individual turning of the panels so that during assembly the curvature lies outside and can be pulled against the milling edge. When drilling the holes (CNC), a helical movement of at least 0.5mm (at 3mm milling cutter) must be observed to ensure chip removal.

The holes should not exceed 3.5mm as these threads are drilled with a 4mm tap. All 3mm holes in the drawing are therefore provided with an M4 thread which is necessary for the connection with the printed angles.

### 2.2 Post processing the plates

Grinding was done with a triangular grinder (depending on availability) to get the surface as smooth as possible for impregnation.

Polyboy wood oil has proved its worth since it cannot ignite itself and offers sufficient protection of the wood without toxic components. It can also be used indoors without the risk of solvents in the room air. Alternatively, the panels can of course also be painted. The oil is ideally applied after the frame has been mounted to relieve a bit of the tension.

### 2.3 Printing the parts

All parts can be printed in PLA with a minimum infill of 30%. The Nema14/17X holder should be made of temperature-resistant materials. In this case Greentec was used which withstands temperatures up to 60°C without any problems. With the larger Nema17 mount, the temperature is expected to be lower, so PLA or better PETG is completely adequate at this point. The extrudermount for the Titan Aero or MK8 extruder can also be printed from more thermostable materials.

## 2.4. Frame assembly

The frame is held together by two types of angles. They compensate and dampen possible distortion in the plywood panels and are easy to produce.

The angles are fixed with M4 x 16 mm screws in the previously cut threads in the plywood panels M4. [Explosionsanimation](#)

Start with the two side panels, the base plate, the front and back plates. It is recommended that the installation is carried out on a level ground. When tightening the screws make sure that nothing is distorted. The frame is largely self-aligning. Finally, the portal with any existing curvature is inserted in the direction of the logo and pulled backwards with the portal angles against the side panels.

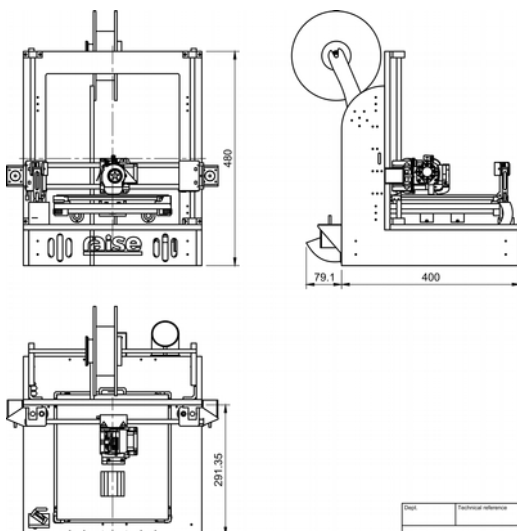


Abbildung 1: Übersicht

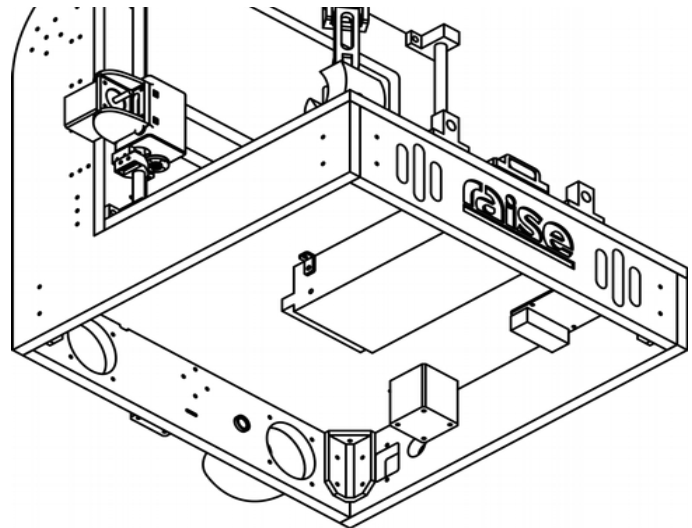
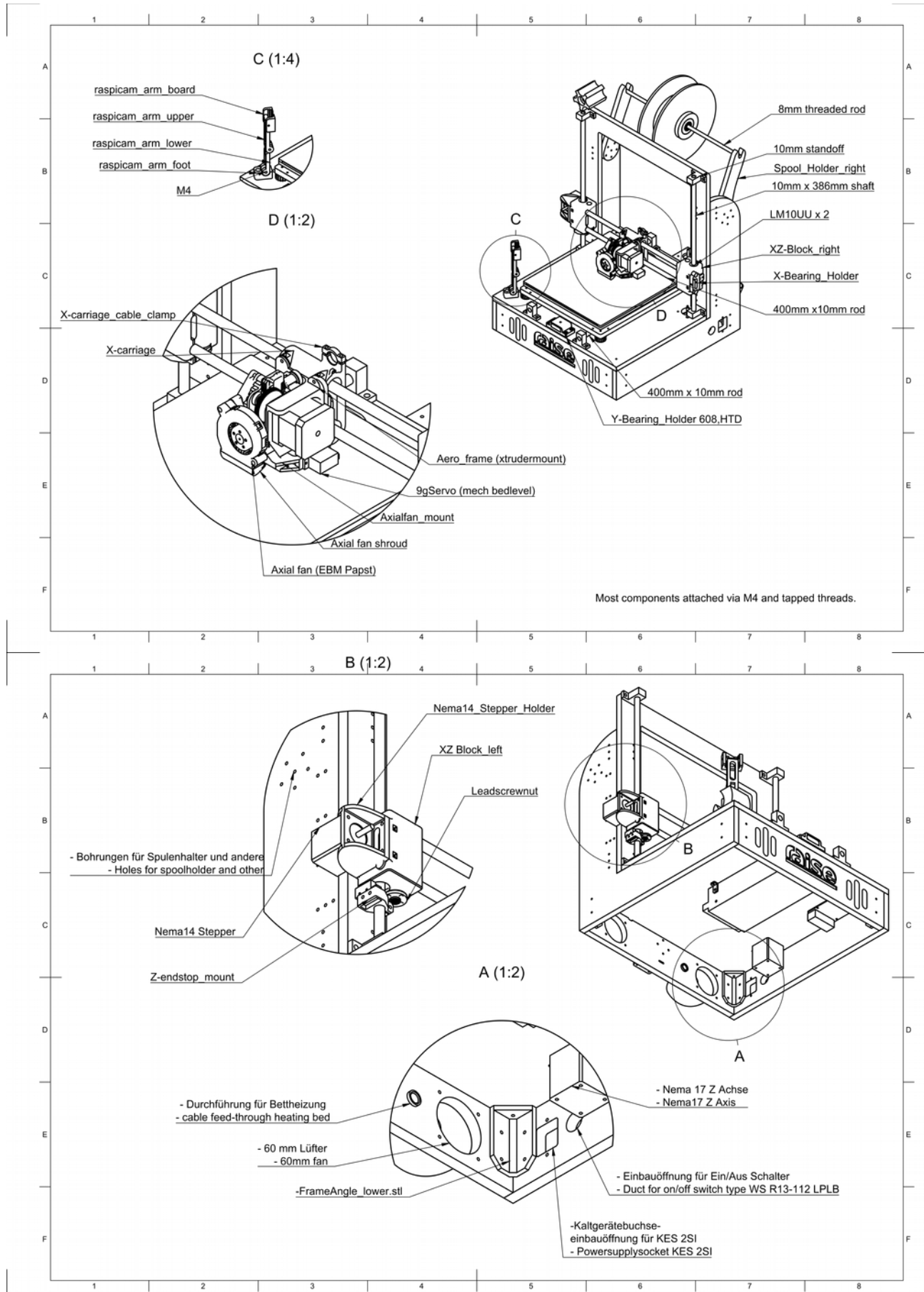


Abbildung 2: Position Winkel

## 2.5 Component placement



## 2.6. Axis installation

### 2.6.1 Y-Axis

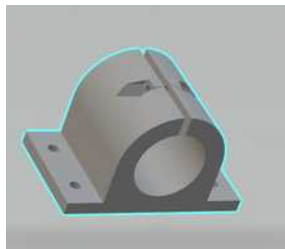


Abbildung 3

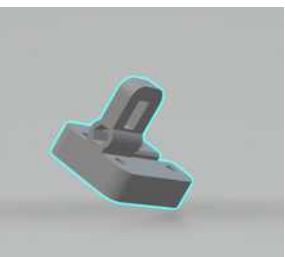


Abbildung 4



Abbildung 5

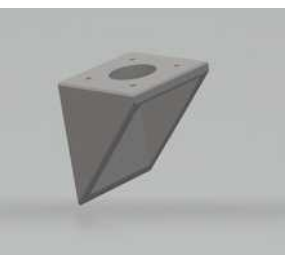


Abbildung 6

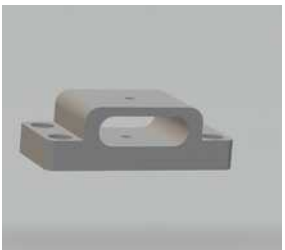


Abbildung 7

Push the LM10UU bearings into the "Y-Bed\_Bearing\_holder" and loosely screw them with M4x16 onto the underside of the bed. The bearings are fixed with M3 x 20 in the holders. Take one of the 10 x400mm precision shafts and slide it into the bearings to align them. While the shaft is in it, tighten the brackets crosswise. The shaft should move easily. Repeat this procedure for the second page.

Screw the belt holder "Y-Beltbed\_adjustment\_Stat" with four M4 x 16 screws to the underside of the bed. Insert an M3 locknut into the hexagon nut on the fixed side (Fig. 4) and an M3x30 into the movable side (Fig. 5). The movable side is now inserted into the T\_slot of the fixed side and tightened slightly with the M3 screw. These two parts later ensure that the Y-belt is tensioned.

Fasten the "Nema17-Y-Stepper\_Holder" (Fig. 6) to the rear of the frame with four M4x16 screws and a Nema 17 with approx. 40N/cm with M3 x16 loose in it. Attach the HTD Pulley to the axis of the stepper.

Screw the "Y-Bearing\_Holder" (Fig. 7) with countersunk head M4 x 16 onto the base plate and fix a 608 ball bearing with washers in it. There is an adapter for the M8 to M4 in the printed parts directory.

Guide the strap through all components around the pulley and secure it as tightly as possible on both sides of the tensioning mechanism with cable ties. It is recommended to fix one side of the Y-mechanism on the base plate with M4 x16 and to tilt the bed slightly when tightening. Continue tightening the belt by tightening the stepper motor and after securing the second linear guide, adjust the tension to the desired tension using the M3 screw on the belt attachment.

The aluminium bed is made of a finely milled cast aluminium piece of 250x280x6mm. The holes correspond to those in the bed and are screwed with M4 countersunk head screws and springs into the M4 threads of the bed.

An insight into the alignment of an older version of the printer is given below [hier](#)

## 2.6.2 X-Axis

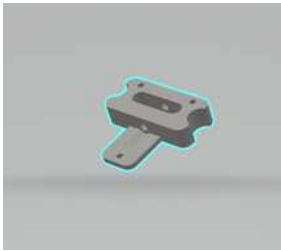


Abbildung 8

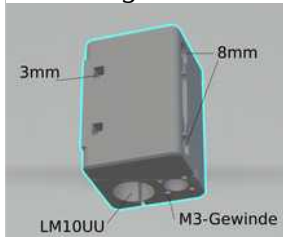


Abbildung 10

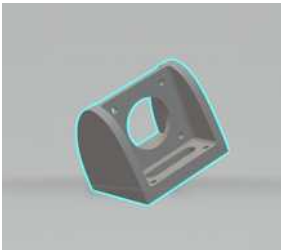


Abbildung 9

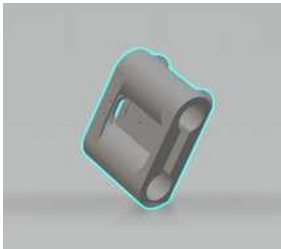


Abbildung 11

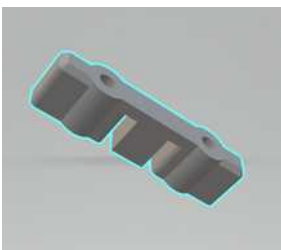


Abbildung 12

Drill the holes in part "XZ-Block\_left" and "XZ-Block\_right" as shown in Figure 9, attach the "Nema14\_Stepper\_Holder" to the left X-Z block with M3 x 16 and corresponding lock nuts.

Insert the 10 x 400 mm precision shaft into the 10 mm openings up to the stop of the stepper holder in the left X-Z\_Block, where more force may be required.

Drill all holes to 3mm. Take four LM10UUU bearings and slide them into the "X-carriage" (Fig. 11). Then push it onto the rods. If the bearings are too loose, they can be locked with a layer of tesa.

Slide the "XZ-Block\_right" onto the two shafts and attach the "X-Bearing\_Holder" to the "XZ-Block\_right". The shafts should be flush with the surface of the bearing support + 2mm, for example, the exact alignment is done when merging with the Z-axis.

Drill the "X-BeltClamp" (Fig. 12) to 3mm and fasten it in the pocket of the "X-carriage" with long enough M3 and nuts on the opposite side.

Connect the stepper motor and the moving part to the GT2 belt through the bearing on the opposite side. Leave the stepper loose so that you can retighten it later.

### 2.6.3 Z-Axis

Install the Nema17 Stepper with M3 screws in the base plate. Now screw the lower shaft holders into the holes of the portal. Then they take the 390mm precision shafts and insert them into the holders as far as they will go. Screw the guide spindles into the spindle axis nuts of the X-axis and guide the entire assembly on both sides onto the Z-axis shafts. Couple the leadscrews with the stepper motors in the base plate to the printed TPU coupler (or other). Alternatively: Integrated leadscrews. Now install the upper shaft holders.

Check the distance of the X-Z-blocks to each other and make sure that they do not cause any tension between the Z-shafts. Correct these if necessary.

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## 1. Einfuehrung

1.1. Sicherheitshinweise

1.2. Lieferumfang

1.3. Technische Details

## 2. Montage des Druckers

2.1. Aufbau des Rahmens

2.2. Installation der Linearmechanik

2.3. Installation der elektronischen Komponenten

2.4. Verkabelung

2.5. Ausrichten des Druckbetts

## 3. Software

3.1. Cura installation

3.2. WLAN Einrichtung

3.3. Koppeln des Druckers mit Cura

## 4. Allgemeiner Workflow

## 5. Support

## 6. Rechtliches