



# PRotos V3 3D-printer manual

German RepRap GmbH  
<https://www.germanreprap.com>

English versions are available at <https://wiki.germanreprap.com/en/>



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# PRotos V3 3D-printer manual



PRotos V3 3D-printer with special equipment

**PRotos V3 is a solid, stable and precise 3D-printer for self set-up. It's a favorable but high quality choice for everyone who wants to acquire more profound knowledge in 3D-printing. It is also a chance to personalize and extend your 3D-printer.**

This manual is subdivided in several paragraphs. From set-up of construction set, software installation and firmware to bringing into service and problem solving.

# Technical terms

- **printing range** ca. 205mm x 210mm x 140mm (X/Y/Z)
- **weight** ca. 10,5kg
- **footprint** ca. 550mm x 4250mm
- **layer thickness** 0,1 mm (finely) bzw. 0,2 mm (fast)
- **working voltage** 220/115V Wechselspannung
- **material** <sup>1)</sup> [ABS \(Acrylnitril-Butadien-Styrol\)](#) / PLA / PS/ PVA/ Laywood / Laybrick/ PP / Bendlay / Soft-PLA / SmartABS

## Feature

- solid steel frame with self-leveling base, buckling resistant
- CNC-milled aluminium parts for high precision and stability
- height adjustable z-endstop
- stabilization of y-axis
- simple belt tightener on x- and y-axis
- printing bed inclination adjustable by knurled screw - 3-point-intake
- lubricant free bearing on z-axis
- preset stepper driver
- pre-configured cable harness and power supply pack
- cost-efficient operation
- multifunctional

# Important notes

## Return / Original wrapping

Please retain this documentation and the original package of this printer in case you need to ship it for repairs or to a new address. 3D printers are inherently sensitive to bumping or knocking and are best protected in their original box. Returns that are not properly packaged cannot be repaired under warranty.

## Operation

Do not cut the power while the printer is active. This can lead to the loss of data as well as damage some electronic components.

## Other matters

All information in this guide is current at the time of printing. We reserve the right to amend the hardware, software or the documentation without prior notice. The latest information will always be available at <http://www.germanreprap.com>.

## Toxic fumes

Depending on the plastic being used there is a danger of toxic fumes developing if the printer is running too hot for that filament. Always make sure to set the correct temperature for the plastic used. The maximum temperature is generally printed on the filament spool and can also be looked up on our website. (<http://www.germanreprap.com>).

## Safety cut-off

The device has a thermal protection mechanism built-in. If the temperature exceeds the safe working limit the printer turn itself off after issuing a warning message.

## Maintenance

Every 12 months the printer has to be serviced by trained personnel. This includes checking the safety devices as well as all mechanical components. German RepRap offers this as a service. Please contact us via [info@germanreprap.com](mailto:info@germanreprap.com) for more details.

Work on a mains power supply should only be carried out by trained specialists. It is essential to note the safety regulations. Property or personal damage may be caused by improper installation, which the installer bears liability for.

Proper handling of the chemicals necessary for maintenance and care is obligatory, as well as complying with the regulations and operation notes regarding the chemicals. Directions of the manufacturer must be followed at all times and appropriate protective clothing has to be worn. Property or personal damage may be caused by improper use of the chemicals, which the operator alone bears liability for.

# Safety notes

## Power supply

Always ensure that the power lead has not been damaged. Disconnect the device immediately if the power lead shows any sign of damage. Have the power supply inspected by an authorised electrician. Only use the power supply that came with the printer. An electric shock from a faulty power lead can be fatal!

Only use the power supply if your mains voltage is 100-110V or 220-240V AC. Only use the correct power lead for your mains socket.

## Cleaning

Pull the power plug before cleaning the device. Use a dry cloth and only clean the surface.

Handling the chemicals necessary for maintenance and servicing has to take place properly and under adherence to valid regulations and application notes to the chemicals. To the specifications of the manufacturers absolutely for this is to be responded, it is appropriate protective clothing to be carried, and the dosage regulations are to be kept exactly. Special and personal injury can be caused by inappropriate handling chemicals, for which alone the operator is responsible.

## Playing children

Touching the internal parts of the power supply can cause an electric shock!

## Mains voltage

Only operate the device with the indicated supply voltage (visible on the backside of the device or on the external power supply) The device must not be connected to the mains until all connections were double checked.

There is a fire hazard if the mains voltage is too high!

## Humidity, solar radiation, heat, open fire

Protect the device from extreme humidity, dripping and splash water (do not place any liquid-filled containers such as beverages on it). Do not place the device near a heater, do not expose it to extended direct sunlight and do not operate it in damp rooms. Only use the device in a moderate, not a tropical climate. Do not put any open flames such as candles on the device!

## Ventilation

The heat arising in the device is sufficiently discharged. Nevertheless do not install the device in a closet or in a shelf with insufficient ventilation. Never cover the ventilation slots of the device, if there are any.

Do not place any object on the device. To allow heat to dissipate, please allow at least 30cm above, 20cm to each side and 30cm behind the device unobstructed.

The device only complies the declaration of conformity if the transparent case is assembled and the door closed while operating.

## Long absence, thunderstorms, accessibility of the power plug

To completely disconnect the device from mains power just pull the power plug out of the mains socket. Make sure this socket is accessible. In case of longer absence and possible thunderstorms, switch off the device with the power switch and then disconnect it from the mains. This also applies for USB appliances connected to the device.

## Installation site

Every electronic device develops heat. The heating of the device is within the permitted range though. Sensitive surfaces may discolor over time due to heat exposure. Moreover, the rubber feet of the device may cause color changes on furniture surfaces. If applicable, please place the device on a solid, appropriate and plane base!

Please mind the practicability when choosing the installation site (sufficient working height).

## Disposal

Electronic equipment may not be disposed in the domestic waste - in accordance with Directive 2002/96/EG of the European Parliament and the Council of 27th of January 2003 about electric and electronic equipment it has to be professionally disposed. At the end of its use please dispose this device at one of the public collection point intended for this.

# Assembly

The assembly instruction refers to the PRotos V3 3D-Printer of German RepRap GmbH. Necessary components are part of the kit. Both versions, Base-KIT and Full-KIT will be described in detail.

The printed parts are made of polyamide, which has a high surface hardness and impact strength ensuring a long service life. For high precision and stability the printing bed and holder of x-axis are made out of CNC-milled aluminium parts. The strong steel frame and re-designed printing bed greatly simplify the assembly as well as ensure better printing results.

## Tool kit

To build-up the PRotos V3 3D-printer you need a tool kit and some expendables.



Tool kit (example)

### Allen keys

- 4 mm
- 3 mm
- 2,5 mm
- 1,5 mm

### Spanners

- 13 mm SW
- 8 mm SW
- 7 mm SW
- 5,5 mm SW

### Measuring tools

- folding meter

- caliper gauge
- air level

## Other tools

- lighter/ hot air gun
- combination pliers
- soldering iron
- screwdriver (several sizes)
- pilot punch

## Optional tools

Optional tools might be helpful, but are not necessary for the assembly.

- wire stripper
- hot air gun
- sharp knife
- screw locking
- borer (for PP-plastic)
- soldering aid with clamps

## Expendable

- solder

## Components list

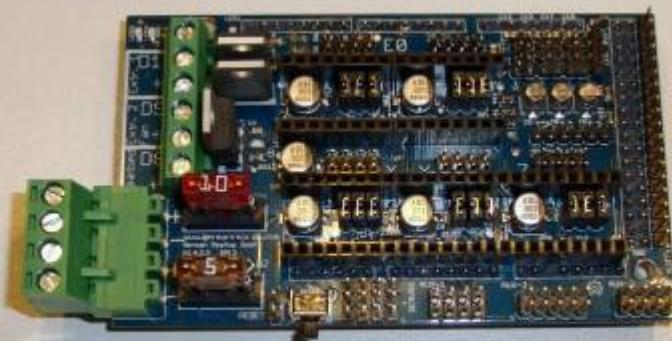
Following pages will give you a summary of different moulded parts, which are helpful during the different work steps.



stepper motor (100401)



©Arduino MEGA 2560 (100164)



©RAMPS (100279)



©adjustable base (600524)



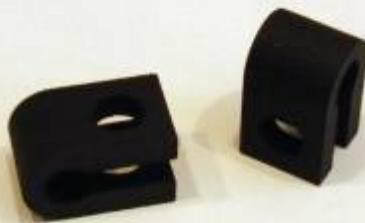
toothed belt (600799)



opto endstop (600918)



kit-hardware (601294)



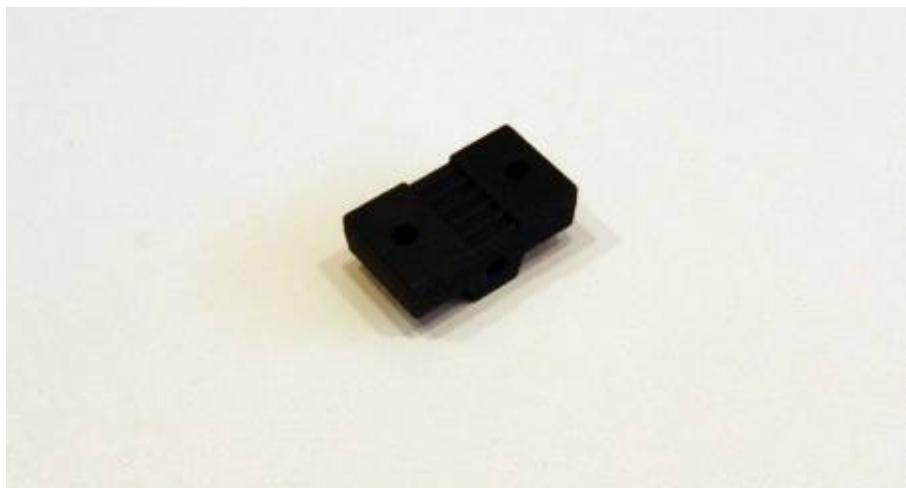
clamp (601302)



fixing y-endstop (601303)



clamping block (601304)



mounting block (601305)



z-endstop holder "2" (601306)



z-endstop holder "1" (601307)



DD2-hingh (601308)



three-point-intake (601310)



y-endstop-flag (601312)



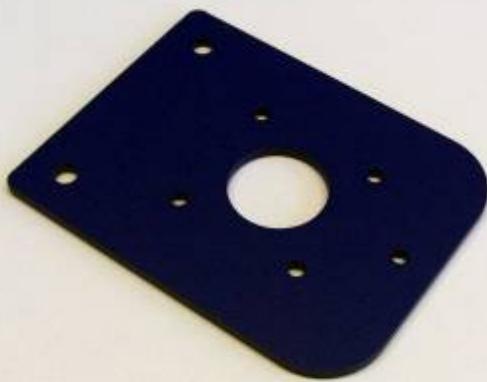
counter bearing (601313)



bracket-endstop (601314)



z-endstop-flag (601315)



motor-mounting (601316)



endstop x-axis (601317)



heat protection sheet (601318)



ventilating plate (601319)



electronic bracket (601321)



mounting block (601322)



motor disc IGUS counter plate (601323)



motor disc IGUS standard (601324)



mounting block thermal barrier(601325)



x-carriage (601348)



filament guidance (601353)



bar



ATX-power supply

## Basic information

Before starting the assembly, we will address some basic points.

- **Alignment:** This chapter addresses the alignment of the printer. Make sure to stick to the indicated measurements.
- **Drilling:** The holes inside some PP-plastic parts might be too small. If the screw or rod is not smooth-running through the hole, we recommend to enlarge the hole to a matching size.
- **Optional extras:** This manual covers the main unit as well as all optional components.
- **Screws and nuts:** While installing screws and nuts please make sure not to over-tighten them. Otherwise components might be damaged or increased friction might result, particularly on the bearings.
- **Washers:** Washers are used to spread the forces of a screw head, a screw or the nuts on a larger space.

Hence it is recommended to always use washers unless indicated otherwise, e.g. when using countersunk head screws or sunk cylinder head screws.

- **Cabling:** It is important to follow the circuit diagrams included in this manual lest property or personal damage may result.

In case of doubt, please seek professional help before commissioning!

Work on the 230 V mains power supply should only be carried out by trained and certified electricians. Property or personal damage or death may be caused by an improper installation, which the installer bears the liability for.

Proper handling of the chemicals necessary for maintenance and care is obligatory, as well as complying with the applicable regulations and operation notes regarding the chemicals. Directions of the manufacturer have to be followed at all times and appropriate protective clothing has to be worn.

Property or personal damage may be caused by improper use of the chemicals, which the operator alone bears liability for.

## Frame

### engine base



material overview engine base

#### material list engine base

amount	description	item number
1	steel frame	601283
4	engine base with each two M6 nuts	600524

The two nuts need to be fully turned in direction of the rubber pieces. After that, the engine base are screwed tightly at provided places with a proper screwdriver.



mounted engine base

## Electronic holder

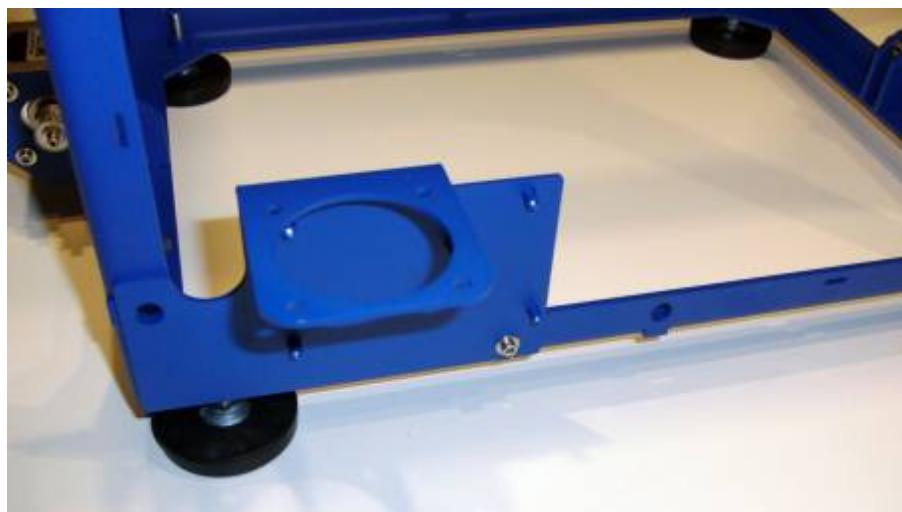


material overview electronic holder

**bill of material electronic holder**

amount	description	item number
1	electronic holder	601321
1	screw DIN912 M3x10	600642
1	washer DIN9021 D3,2	600451

In the left corner of the frame (with the stepper motor) a screw with washer is tightened through the electronic holder at the frame.



electronic holder

## Y-axis

### Y-stepper motor



material overview y-stepper motor

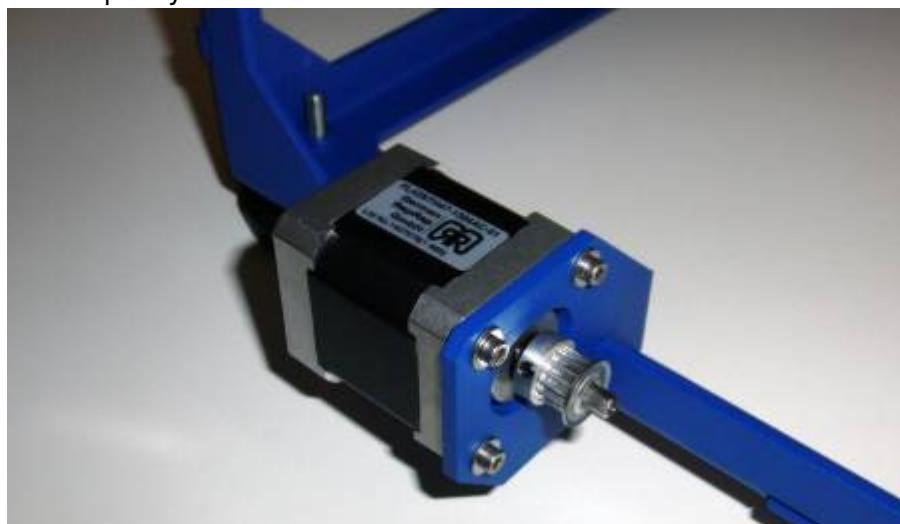
#### bill of material y-stepper motor

amount	description	item number
1	stepper motor	100401
1	thoothed washer/ pulley Al, T2.5	100213
4	screw DIN912 M3x8	600896
4	washer DIN9021 D3,2	600451

Attach the pulley to the motor shaft and secure it using the grub screw. The shaft should stick out of the pulley by about 2mm to align the pulley with belt clamps. The stepper motor has to be mounted that way the engine block points to the left (see picture above). Therefore each of four M3x8 screws are connected with three M3 washers and turned through the bore of frame into the motor.



details pulley



finished y-stepper motor

## Toothed belt guidance



material overview toothed belt guidance

#### bill of material toothed belt guidance

amount	description	item number
2	flange ball-bearing MF104-ZZ	601309
1	screw DIN912 M4x25	600654
2	washer DIN125 D4,3	600632
2	adjusting washer DIN988 4,0x8x0,5	601300
1	nut DIN985 M4	600672

The ball-bearing are implemented in the frame like shown on the picture below. Order: nut, washer, steel frame, adjusting washer, flange ball-bearing, flange ball-bearing, adjusting washer, steel frame, washer, screw. Make sure that the ball-bearing rotate freely after assemblage.



toothed belt guidance

#### Holder y-axis stepper motor

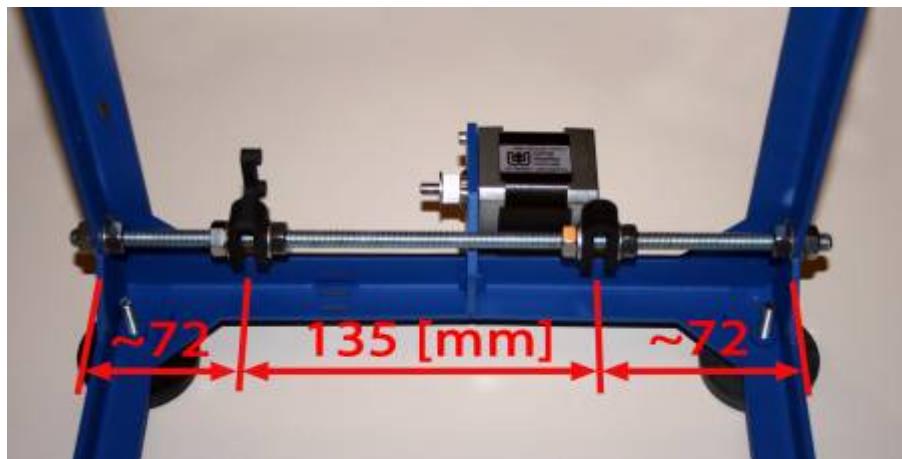


material overview holder y-axis stepper motor

#### bill of material holder y-axis stepper motor

amount	description	item number
1	thread bar, 310 mm	600746
1	clamp	601302
1	fixing y-endstop	601303
8	nut DIN934 M8	600669
8	washer DIN125 D8,4	600635

On the side of the frame with the stepper motor a thread bar with 310mm and 8xM8 nuts, 8xM8 washers with a clamp each and a fixing y-endstop, are mounted like shown on the picture above. The fixing y-endstop will be on the side of the pulley. The four nuts which are directly connected to the frame get tightened. The nuts connected to the clamps need to be organized as the wholes of the clamps have a distance of 135mm to each other and each a distance to the frame of ca. 72mm. The four (inner) nuts get tightened later.



holder y-axis stepper motor

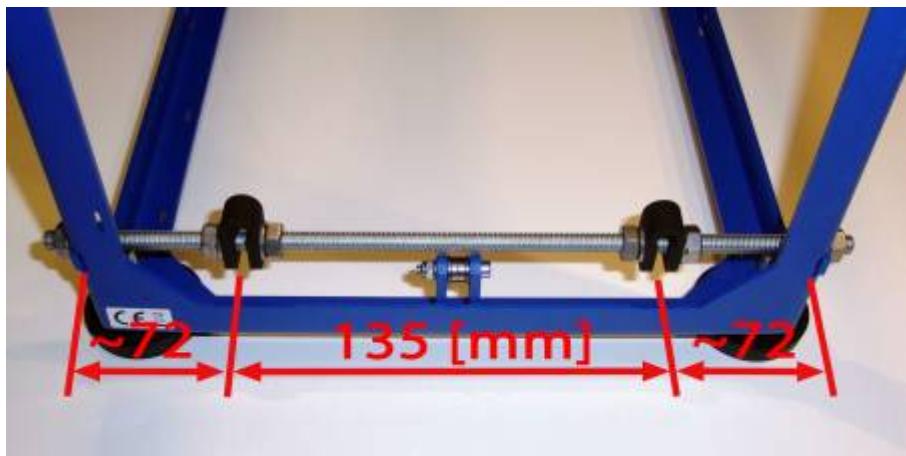
## Holder y-axis toothed belt guidance



material overview y-axis holder toothed belt guidance

<b>bill of material y-axis holder toothed belt guidance</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	thread bar, 310 mm	600746
2	clamp	601302
8	nut DIN934 M8	600669
8	washer DIN125 D8,4	600635

The y-axis holder on the side of the toothed belt guidance is mounted equally like the other holder of the y-axis but with two clamps.



holder y-axis toothed belt guidance

## Y-endstop

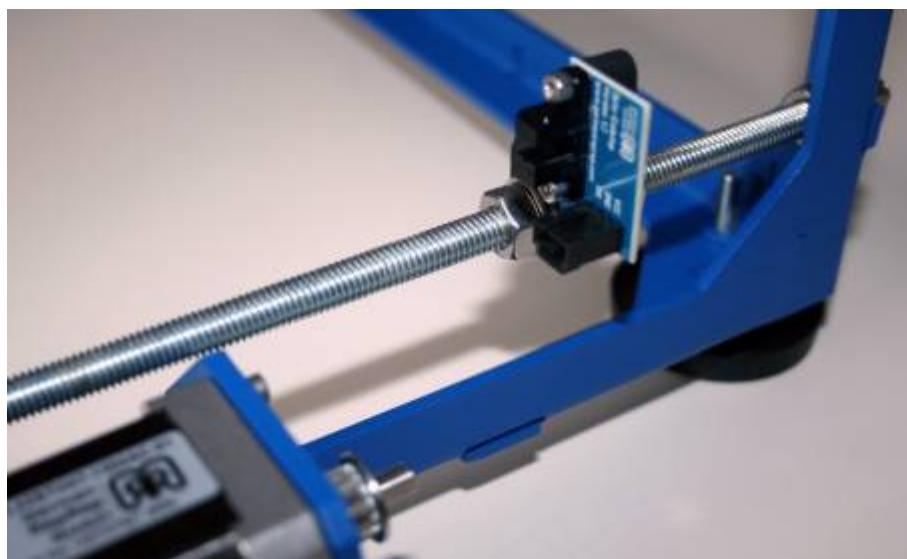


material overview y-endstop

### bill of material y-endstop

amount	description	item number
1	opto endstop	600818
2	screw DIN912 M3x8	600896

The y-endstop is tightened with the two screws into the fixing y-endstop. There is no need for washers or nuts. The connector of the y-endstop needs to be at the bottom side.



y-endstop

## Printing bed guidance



material overview printing bed guidance

<b>bill of material printing bed guidance</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
2	VA-shaft, 430 mm	600744
3	linear bearing SC8UU	601327

The VA-shafts get implemented with two or rather one linear bearing, like shown on the picture and moved between the clamps or rather the fixing y-endstop. The two linear bearing are needed on the side of the fixing y-endstop.



printing bed guidance in position

## Printing bed holder



material overview printing bed holder

<b>bill of material printing bed holder</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	board 3-point intake	601310
1	y-endstop flag	601312
12	screw DIN912 M4x10	600686
12	washer DIN125 D4,3	600632

Per linear bearing four screws with each a washer are needed to fix the printing bed holder. Next to "3" on the picture the y-endstop flag will be mounted.

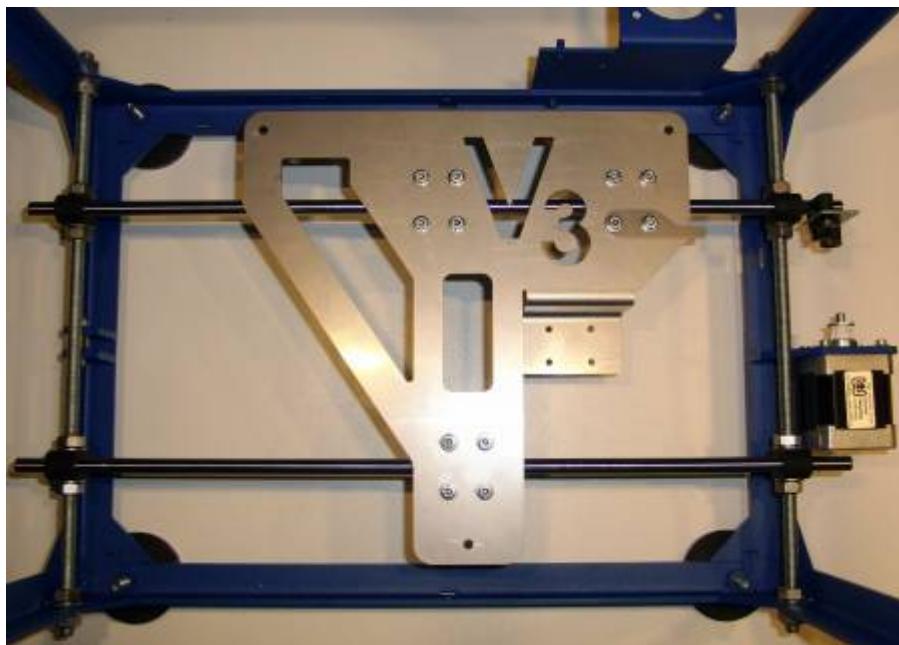


details y-endstop flag

If the bore aren't similar above the linear bearing, the distances between clamps or rather fixing y-endstop need to be adjusted. The distance between them needs to be 135mm to guarantee the easy moving of the y-slide. The steel bars need to have a distance of 72mm to the upper frame. After that the M8 nuts on the clamps can be tightened. Make sure the distance doesn't change.

The printing bed holder needs to be moved easily and with a soft push, slide from one side to the other. If that isn't possible or the ball bearing are making strange sounds the assembly isn't ideal. In this case it might be helpful to trim back all M4x10 screws of the printing bed holder and to tighten them crosswise again. The same could happen during tightening the M8 nuts.

Take enough time during this step of assembly! The easier the printing bed holder can be moved the better will be the printing results later.



printing bed holder mounted

## Y-toothed belt

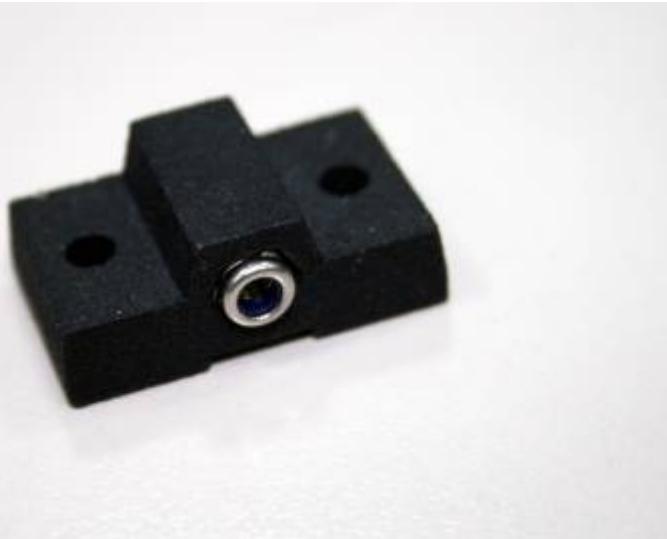


material overview y-toothed belt

### bill of material y-toothed belt

amount	description	item number
1	toothed belt, 910 mm	600799
1	clamping block T25 strap	601304
1	mounting block T25 strap	601305
1	screw DIN912 M3x55	601299
4	screw DIN912 M3x12	600823
4	washer DIN9021 D3,2	600451
1	nut DIN985 M3	600671

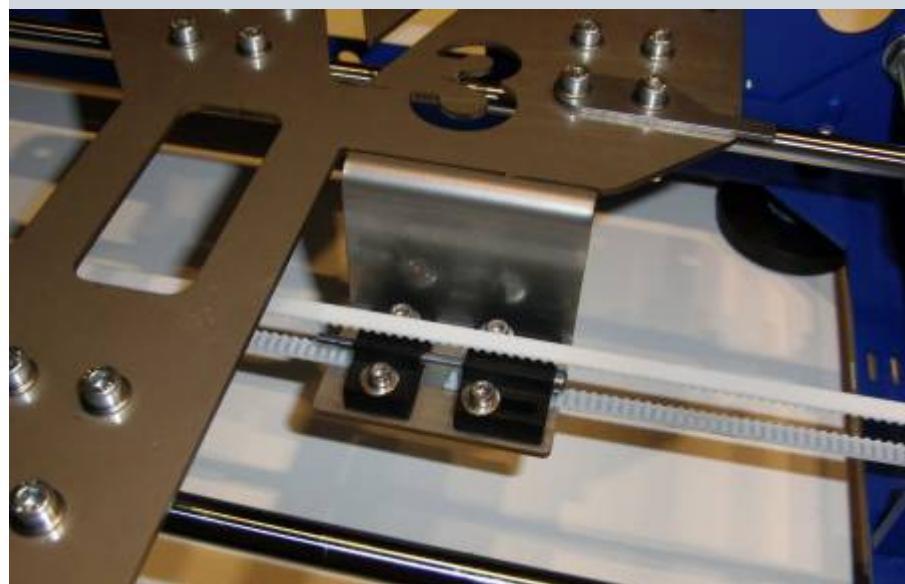
For preparation discharge the nut into the mounting block. The long screw provides the tension of the toothed belt.



#### preparation mounting block

Cut 910mm of the toothed belt and place it across the stepper motor and the diffuser, so both ends reach the printing bed intake. Below "3" of the intake tighten the toothed belt with the clamping and mounting block (nut outwards). The toothed belt should be tightened as much as possible and the distance between the two blocks should be as big as possible - The M3x55 screws push the blocks against each other, which tightens the toothed belt - (Before that step untighten the screws a little at the clamping block).

Overlaying toothed belt can be cut.



#### details y-toothed belt



y-toothed belt mounted

## Z-axis

### z-axis holder base, left

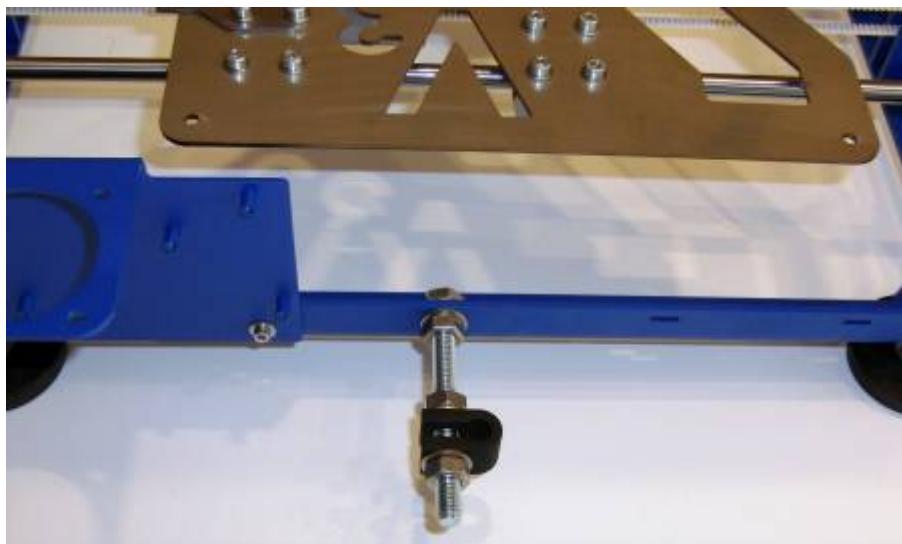


material overview z-axis holder base, left

#### bill of material z-axis holder base, left

amount	description	item number
1	clamp	601302
1	screw DIN933 M8x80	601341
4	washer DIN125 D8,4	600635
3	nut DIN934 M8	600669

Above the "V" of the printing bed holder a screw is mounted on the frame in order: screw – washer – frame – washer – nut – nut – washer – clamp – washer – nut.



details z-axis holder

### Stepper-motor holder z-axis, left

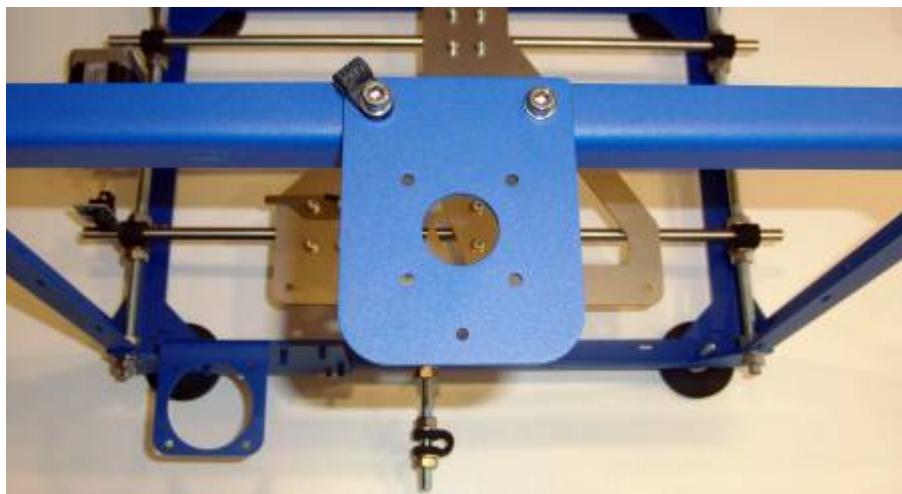


material overview engine holder z-axis, left

#### bill of material stepper-motor holder z-axis, left

amount	description	item number
1	stepper-motor holder z-axis	601316
1	filament guidance	601353
2	screw DIN912 M5x16	601339
2	washer DIN125 D5,3	601633

Above the straight mounted z-axis holder, the stepper-motor holder of the z-axis is screwed top side of the frame. On the left side -shown on the picture-, the filament guidance is also fixed from the screw.



stepper-motor holder z-axis, left

## Peperation engine board, left



material overview engine board, left

### bill of material engine board, left

amount	description	item number
1	engine board IGUS standard	601324
1	linear bearing LMH8LUU	601332
2	screw DIN912 M3x6	600973

The linear bearing is screwed into the engine board. Make sure that screws and flange of the linear guidance are enwrapped into the engine board.



engine board IGUS standard

## Preparation endstop holder 1



material overview preparation endstop holder  
1

<b>bill of material preparation endstop holder 1</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	z-endstop holder 1	601306
1	flange ball-bearing F698-ZZ	601333

The flange ball-bearing gets inserted into the z-endstop holder 1, therefore the flange needs to be on the flat side of the endstop holder.



endstop holder 1

## Z-axis guide bar, left



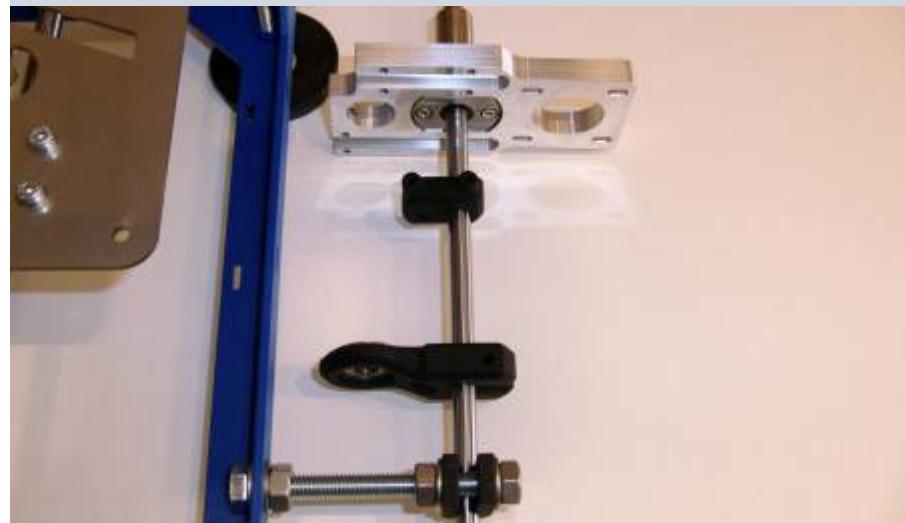
material overview z-axis guide bar, left

### bill of material z-axis guide bar, left

amount	description	item number
1	engine board IGUS standard, prepared	
1	z-endstop holder 1, prepared	
1	z-endstop holder 2	601307
1	VA-shaft, 340mm	601347
1	screw DIN912 M3x10	600642
1	washer DIN9021 D3,2	600451

Guide the VA-shaft as well as both z-endstop holders through the engine board. All together will be mounted (shown on the picture) into the base.

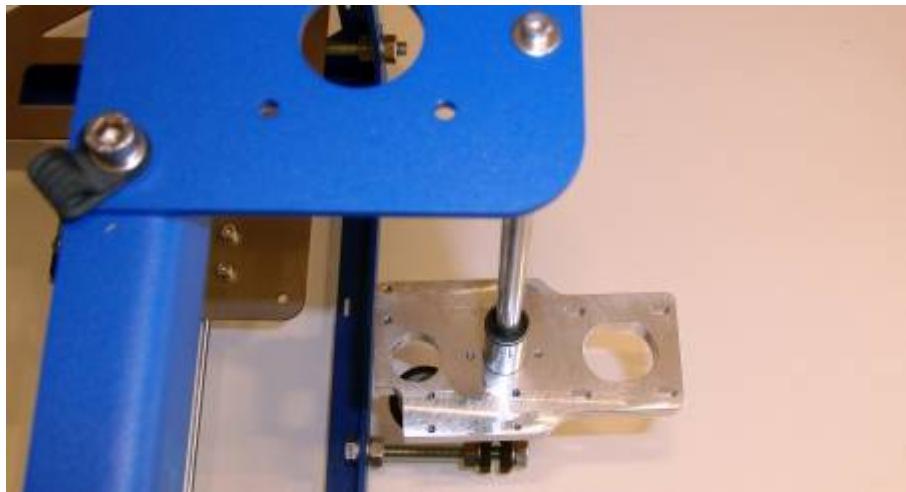
The bore for fixation needs to be top side the VA-shaft!



z-axis guide bar order

The VA-shaft will be mounted at the engine holder of z-axis, with the M3x10 screws and washers.

Screws can be fixed at the lower z-axis holder, but make sure the distance between VA-shaft and frame is the same at the bottom and the top!



VA-shaft fixation

## Z-endstop holder adjuster



material overview z-endstop holder adjuster

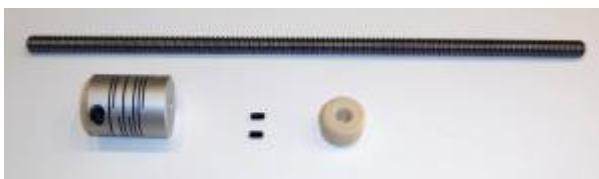
<b>bill of material z-endstop holder adjuster</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	pressure spring D-197A	601047
1	knurled screw M4	601320
1	screw DIN931 M4x40	601340

For an easy arrangement of the z-endstop holder, a pressure spring is placed between both endstop holder and mounted.



z-endstop holder adjuster

## Z-axis, trapezoidal thread spindle, left

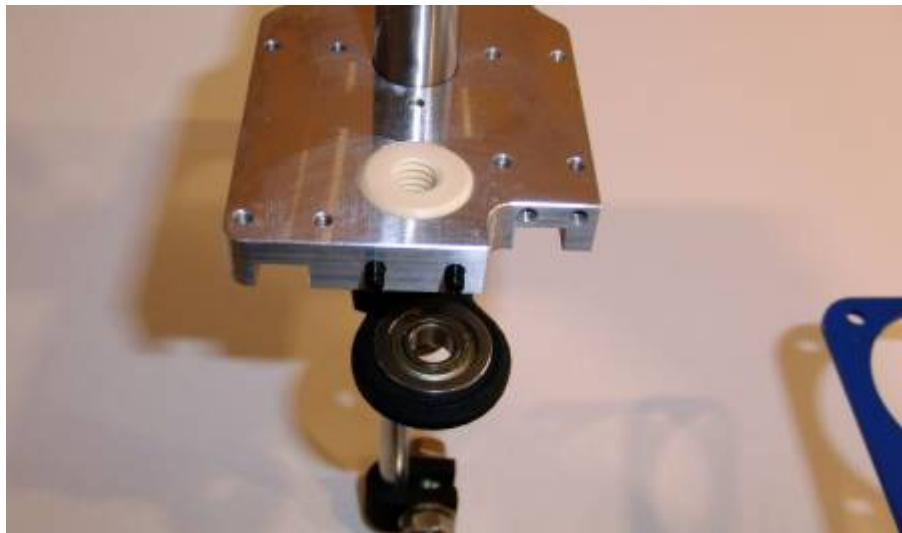


material overview z-axis, trapezoidal thread spindle, left

### bill of material z-axis trapezoidal thread spindle, left

amount	description	item number
1	engine coupling 8/5	100210
1	trapezoidal thread spindle	601342
2	grub screw DIN4026 M3x5	600624
1	nut JSRM-1812TR8x1,5	601331

The nut is placed from the top into the engine board standard and fixed with two nuts. Place the JSRM-nut into the engine board and secure it with the grub screws.



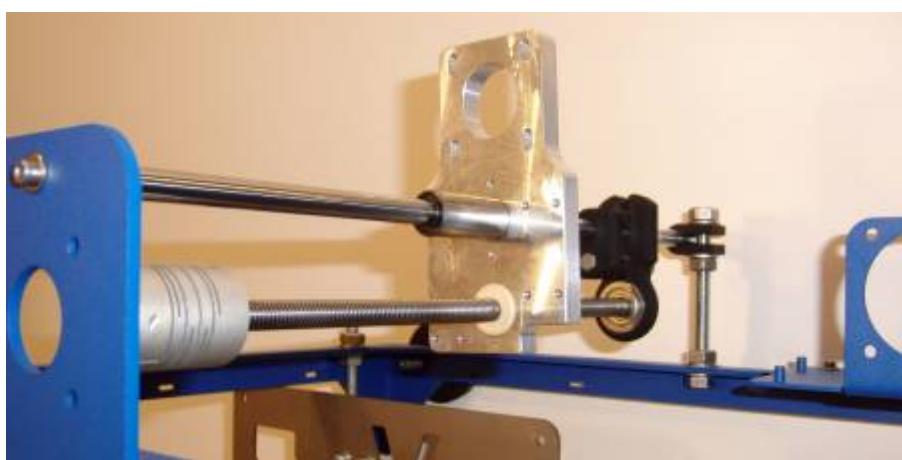
grub screw slide part

So that the trapezoidal thread spindle can be fixed at the stepper motor, the engine coupling is connected with one end of the trapezoidal thread spindle and fixed with the screw.



engine coupling

The trapezoidal thread spindle is guided from above through the nut and the flange-ball-bearing.



finish

## Z-endstop



material overview z-endstop

### bill of material z-endstop

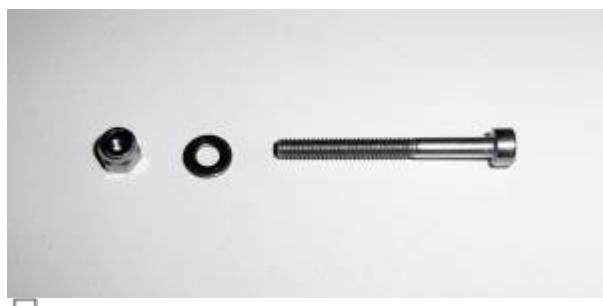
amount	description	item number
1	opto-endstop	600818
2	screw DIN912 M3x8	600896

Mount the z-endstop, like shown on the picture, onto the endstop-holder (no washers required).



z-endstop

## z-endstop fixing



material overview z-endstop fixing

### bill of material z-endstop fixing

amount	description	item number
1	screw DIN912 M3x30	600647

1	washer DIN125 D3,2	600631
1	nut DIN985 M3	600671

The screw is moved into the lower z-endstop holder, so the cheese head disappears. After that fix it with the screw and nut. Like that the z-endstop is held in right position. Vernier adjustment takes place with the knurled screw.



z-endstop fixing

## Stepper motor, left



material overview stepper motor, left

amount	description	item number
1	stepper motor	100401
4	screw DIN912 M3x8	600896
4	washer DIN9021 D3,2	600451

The stepper motor is placed with the plug inside on top of the engine holder and is screwed from below. The engine coupling is screwed on the side of stepper aswell.



finish

## Z-axis holder base, right

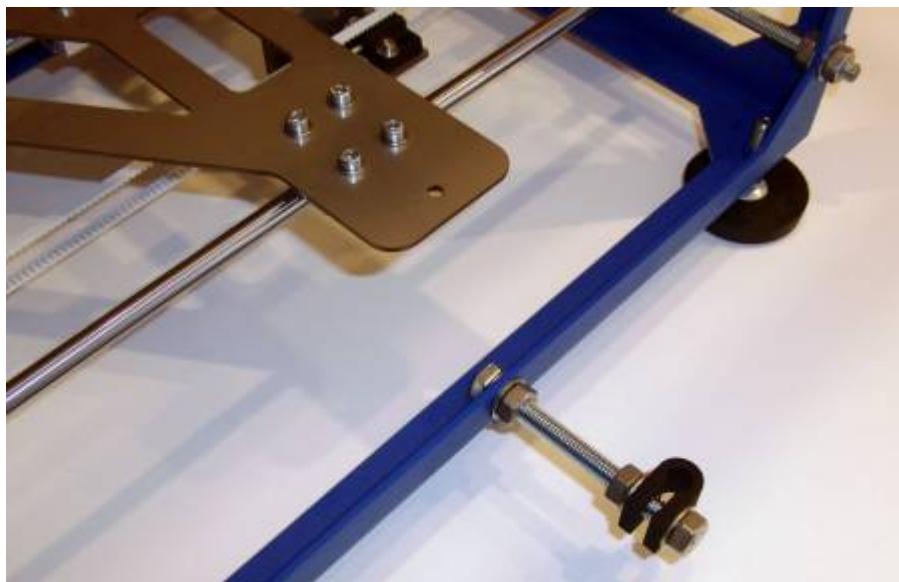
The z-axis on the right side is assembled nearly the same as on the left side, but without the endstop holder.



material overview z-axis holder base, right

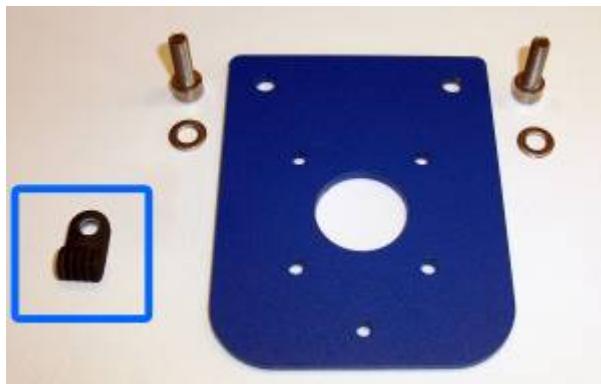
<b>bill of material z-axis holder base, right</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	clamp	601302
1	screw DIN933 M8x80	601341
4	washer DIN125 D8,4	600635
3	nut DIN934 M8	600669

The holder is mounted on the right side. Order: screw - washer - frame - washer - nut - nut - washer - clamp - washer - nut.



z-axis holder base, right

## Engine holder z-axis, right



material overview engine holder z-axis, right

### bill of material engine holder z-axis, right

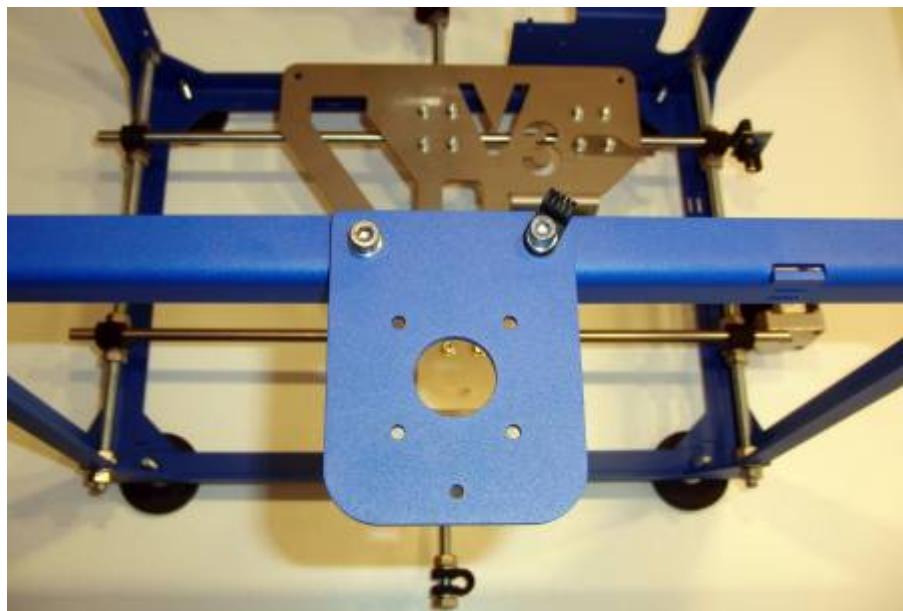
amount	description	item number
1	engine holder z-axis	601316
2	screw DIN912 M5x16	601339
2	washer DIN125 D5,3	601633

### additional parts for the dual-extruder

amount	description	item number
1	filament guidance	601353

The additional parts for the dual-extruder are marked with a blue rectangle.

Above the just mounted z-axis holder, the engine holder of z-axis is mounted top side of the frame. The filament guidance is only necessary for the dual-extruder.



engine holder z-axis, right

## Preparation engine board, right



material overview preparation engine board, right

### bill of material preparation engine board, right

amount	description	item number
1	engine board IGUS counterplate	601323
1	linear bearing LMH8LUU	601332
2	screw DIN912 M3x6	600973

The linear bearing LMH8LUU is mounted on the right side with two M3x6 screws into the engine board counterplate.



engine board IGUS counterplate

## Z-axis bar guidance, right



material overview z-axis bar guidance, right

### bill of material z-axis bar guidance, right

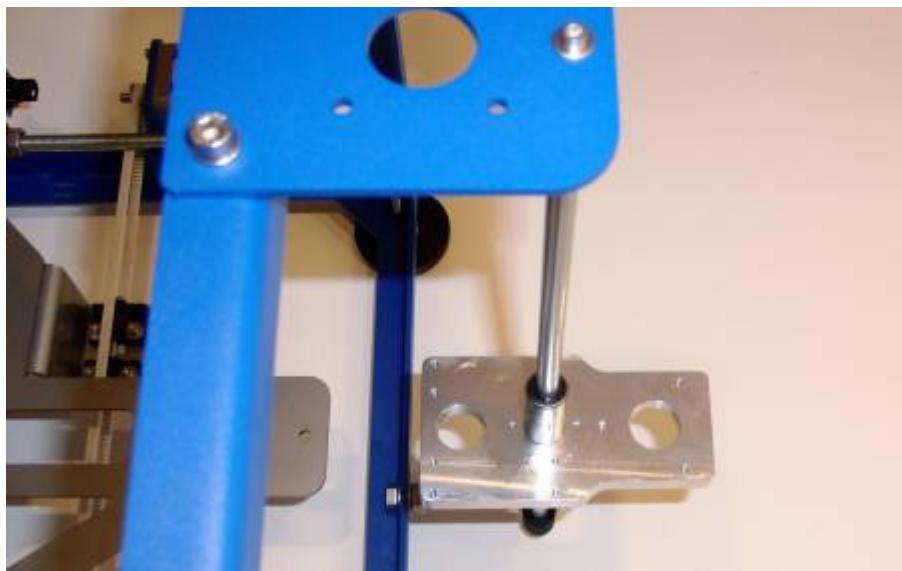
amount	description	item number
1	VA-shaft, 340mm	601347
1	engine board IGUS counterplate, prepared	
1	screw DIN912 M3x10	600642
1	washer DIN9021 D3,2	600451

The VA-shaft is guided through the engine board counterplate and the clamp at lower z-axis holder and fixed.

The bore of fixing needs to be top side the VA-shaft!

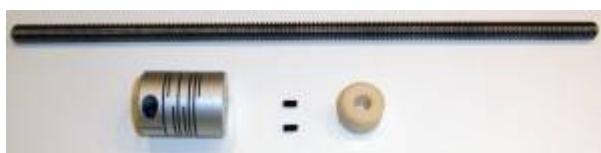
Tighten the screws at down side of z-axis holder. Make sure the distance between VA-shaft and frame is even on top and at the bottom!

The VA-shaft is fixed at the engine holder of z-axis, with M3x10 screws and washers.



VA-shaft finish

## Z-axis trapezoidal thread spindle, left



material overview z-axis trapezoidal thread spindle, left

### bill of material z-axis trapezoidal thread spindle, left

amount	description	item number
1	engine coupling 8/5	100210
1	trapezoidal thread spindle	601342
2	grub screw DIN4026 M3x5	600624
1	threaded nut JSRM-1812TR8x1,5	601331

The JSRM-nut is guided into the engine board counterplate from above and fixed.





grub screw and threaded nut

So that the trapezoidal thread spindle can be fixed at the stepper motor, the engine coupling is placed on one end of the trapezoidal thread spindle and fixed.



engine coupling

The trapezoidal thread spindle is screwed from above through the threaded nut and the flange ball-bearing.



finish

## Stepper motor, right



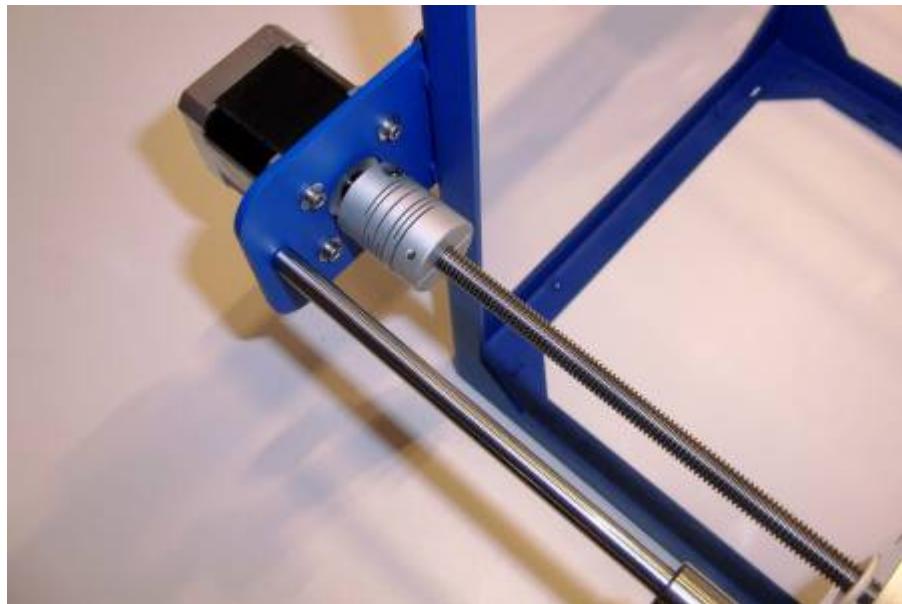


material overview stepper motor right

### bill of material stepper motor, right

amount	description	item number
1	stepper motor	100401
4	screw DIN912 M3x8	600896
4	washer DIN9021 D3,2	600451

The stepper motor is placed with plug inside at the engine holder and screwed from below. The engine coupling needs to be screwed aswell at the side of the stepper motor.



finish

## X-axis

### X-axis slide preparation 1



material overview x-axis slide preparation 1

### bill of material x-axis slide preparation 1

amount	description	item number
2	x-slide side	601348
1	mounting block thermal barrier	601325
4	screw DIN912 M3x10	600642

Both x-slide side elements and the mounting block thermal barrier are fixed, like shown on the picture, with the M3x10 screws without washers.



☞ x-axis slide preparation 1

## X-axis preparation slide 2



☞ material overview x-axis preparation slide 2

### bill of material x-axis preparation slide 2

amount	description	item number
1	x-slide, prepared	
1	endstop plate x-axis	601317
4	screw DIN912 M3x8	600896
4	washer DIN125 D3,2	600631

On the other side, the endstop plate x-axis is tightened with the M3x8 screws. The bigger projection needs to be on the right side, like shown on the pictures.



☞ x-axis preparation slide 2

## X-axis slide



☞ material overview x-axis slide

### bill of material x-axis slide

amount	description	item number
1	x-axis slide, prepared	
1	heat protection sheet	601318
2	distance bolt M3x20mm	601329
2	screw DIN912 M3x8	600896
2	washer DIN9021 D3,2	600451

The distance bolt are tightened in the first step between the bearing of the prepared slide.



distance bolt

The heat protection plate is mounted with screws and washers onto the distance bolt. The big slot needs to be on the side of the endstop plate, like shown on the picture.



x-axis slide

## X-axis guidance



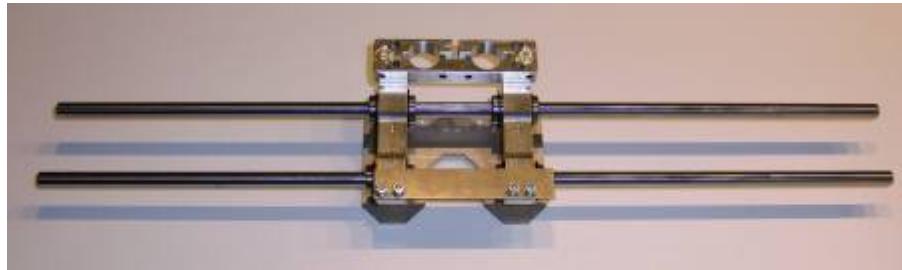
material overview x-axis guidance

### bill of material x-axis guidance

amount	description	item number
1	x-axis slide, mounted	
2	VA-shaft, 430mm	600744

1	z-endstop flag	601315
8	mounting block	601322
16	screw DIN912 M3x16	600644
16	washer DIN9021 D3,2	600451

For fixing the x-axis slide, the VA-shaft need to be pushed through the x-axis slide first.



VA-shaft

Seven mounting blocks need to be mounted with each two screws and two washers, but don't tighten them yet. The eighth is mounted with the z-endstop flag between the washer and mounting block, like shown on the picture, also without tightening.

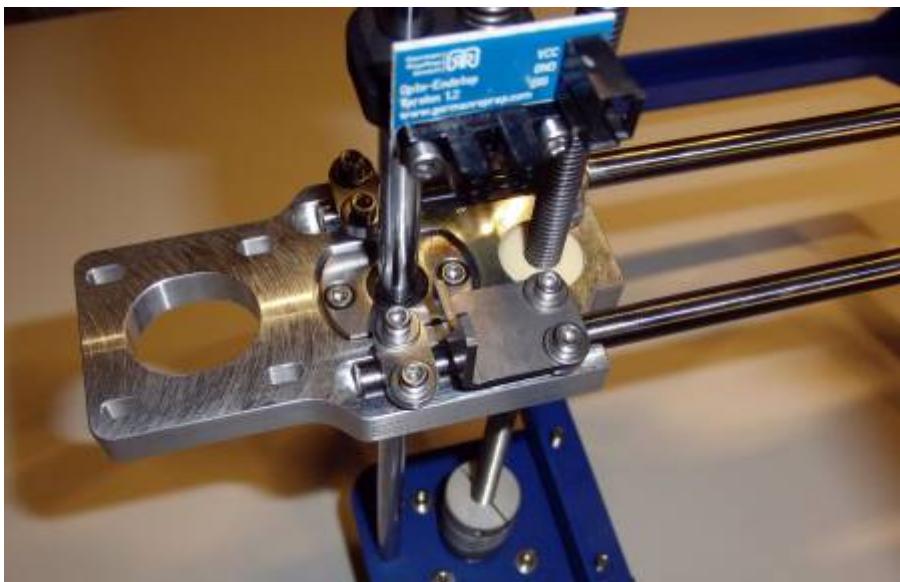
For this step it's recommended to turn the printer upside down, for an easier mounting.



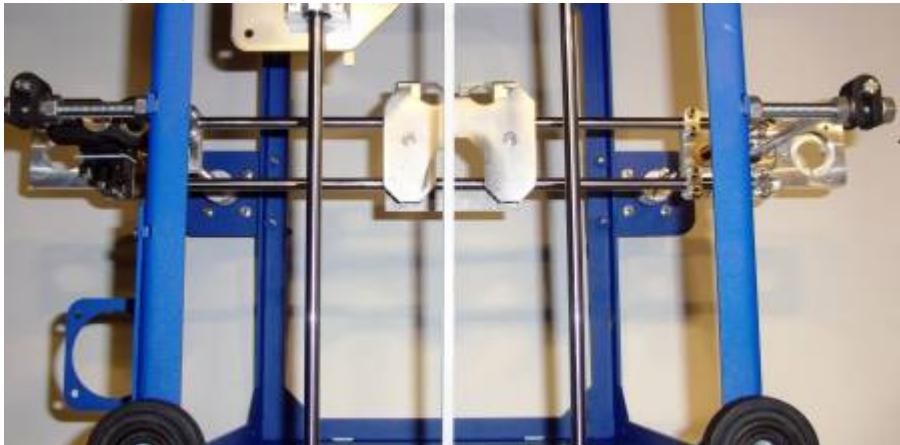
mounting blocks with and without z-endstop flag

The x-axis slide is set with the VA-shafts into the engine boards. The heat protection plate of the slide needs to be on the bottom side and the x-axis endstop plate needs to be on the side of the stepper motor of y-axis.

Four mounting blocks are tightened below every engine board of z-axis guidance. The mounting block of the left slide part is fixed, so that the flag can move into the light barrier of the endstop holder.

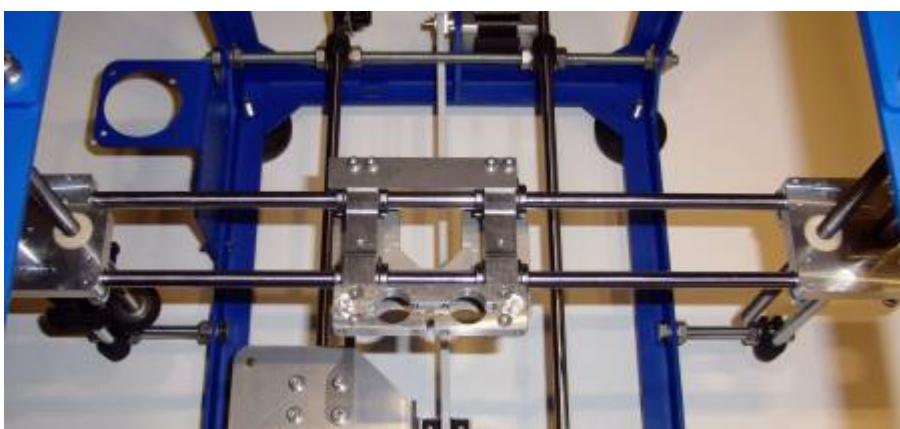


z-endstop flag



summary

Finally all screws of the mounting blocks get tightened into the slide parts, so that the VA-shaft is fixed.



x-axis slide mounted

## X-axis diffuser



material overview x-axis diffuser

### bill of material x-axis diffuser

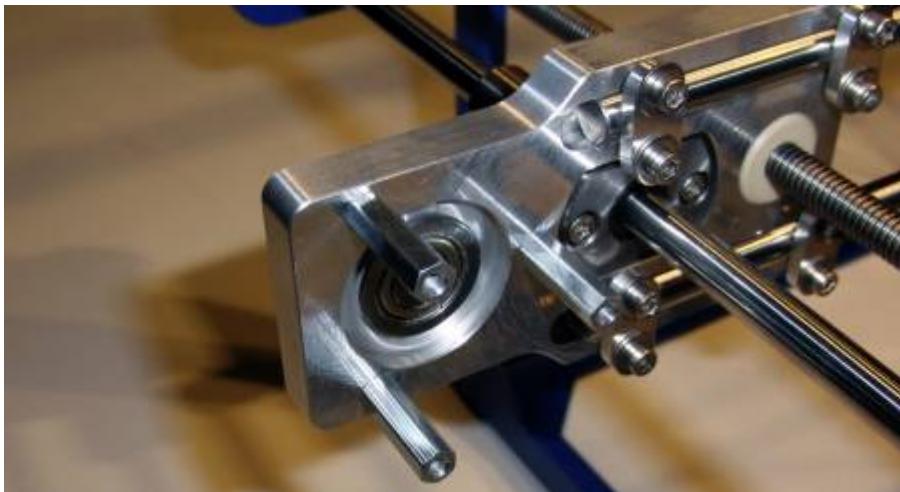
amount	description	item number
2	flange ball bearing F635-ZZ	601330
1	counter bearing plate	601313
3	distance bolt M3x20mm	601329
1	toothed washer / pulley Al, T2.5	100213
1	bearing pin D5x32mm	601338
3	screw DIN912 M3x8	600896
3	washer DIN125 D3,2	600631

One of the flange ball bearings is suited into the counter bearing plate.



counter bearing plate

Place the other ball bearing into the engine plate counterplate from below and screw the three distance bolts next to it, like shown on the picture.



engine plate with flange ball bearing and distance bolt

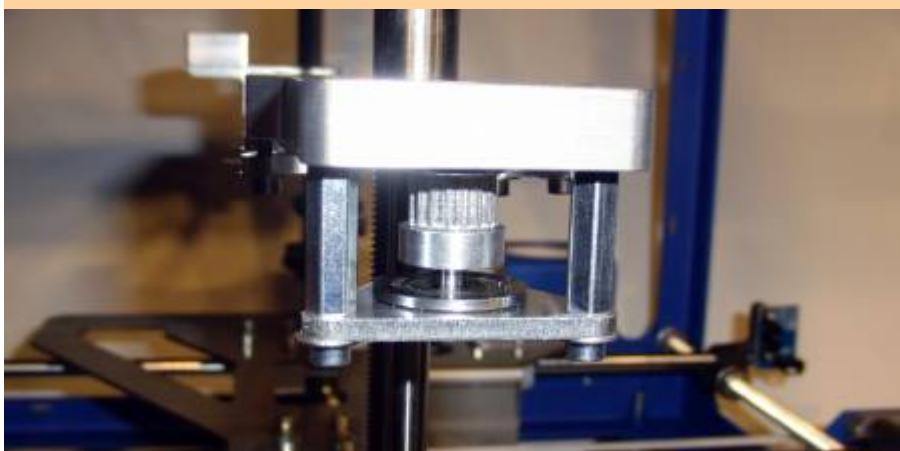
After that, the straight pin is placed through the pulley, so that the pulley is about centric onto the straight pin.



pulley with straight pin

The straight pin is placed from below into the slide part. Make sure the tooth are upside. Fix the prepared counter bearing plates with the rest of screws and washers.

The counter bearing plate needs to be mounted, so that the flange ball bearing can't fall out (flange pointing upwards).



finish

## X-endstop



material overview x-endstop

### bill of material x-endstop

amount	description	item number
1	opto endstop	600818
1	bracket endstop	601314
2	distance sleeve plastic L: 5mm	600494
2	screw DIN912 M3x12	600823
2	screw DIN912 M3x8	600896
2	washer DIN125 D3,2	600631

The endstop is tightened with two distance sleeves and M3x12 screws at the bracket. The bracket is placed, so that the other bores lay free.

Mount the prepared x-endstop onto the engine plate standard using the M3 screws and washers.



x-endstop, prepared



☒  
x-endstop

## X-axis stepper motor



☒  
material overview x-axis stepper motor

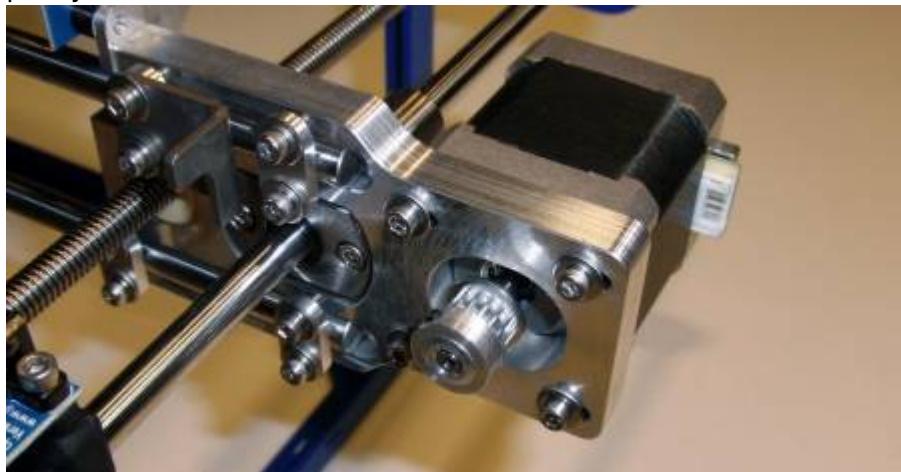
### bill of material x-axis stepper motor

amount	description	item number
1	stepper motor	100401
1	tooth washer / Pully Al, T2.5	100213
4	screw DIN912 M3x16	600644
4	washer DIN9021 D3,2	600451

Tighten the pulley onto the stepper motor, so that the pulley rounds with the motorshaft and the grub screw lays at the end of shaft. The prepared stepper motor is also mounted top side of the left slide part. Don't tighten the screws yet!



☞ pulley



☞ x-axis stepper motor

## Tooth belt x-axis

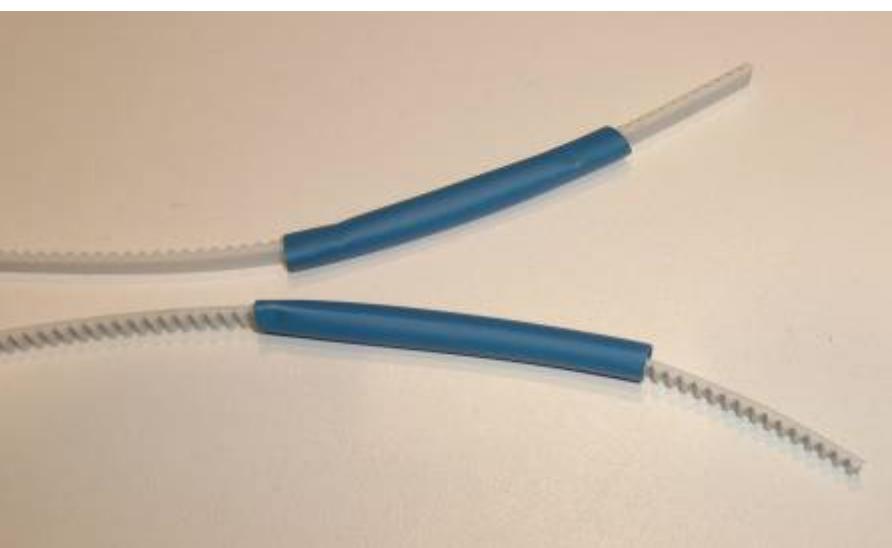


☞ material overview tooth belt x-axis

### bill of material tooth belt x-axis

amount	description	item number
1	tooth belt, 1160mm	600799
0,1m	shrink sleeving ø6,4mm	600703

The tooth belt is fitted at the length of 160mm. The shrink sleeving is halved and both parts are mounted on the tooth belt.



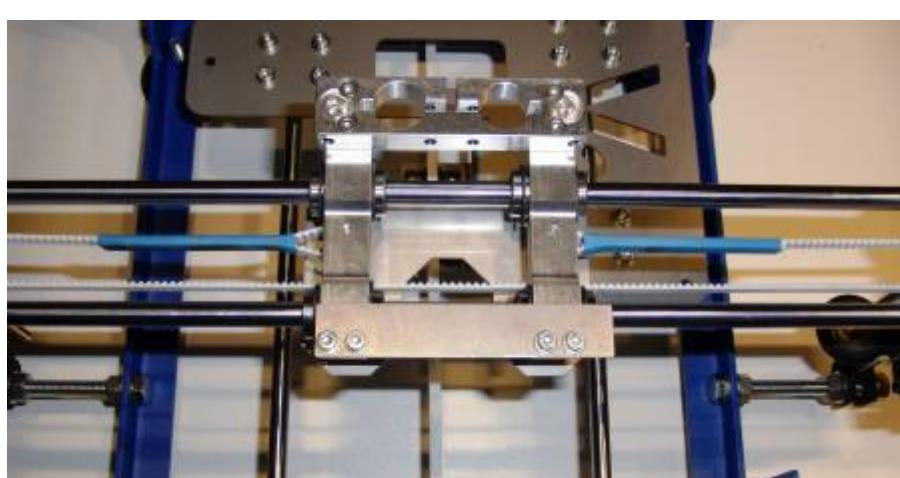
☞ tooth belt with shrink sleeving

One end of the tooth belt is placed around the distance bolt of x-axis slide and guided around the stepper motor and diffuser of x-axis. After that tooth belt is folded and held together with the shrink sleeving.



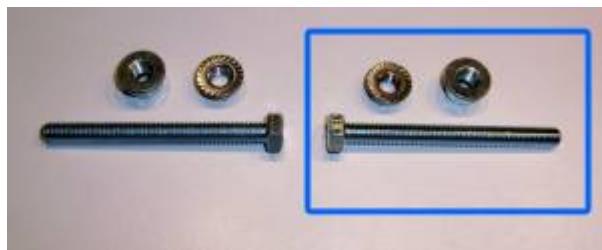
☞ tooth belt both sides

If the screws at x-stepper motor aren't tightened yet, the second end of the tooth belt can be fixed at the other distance bolt. By the position of stepper motor the tooth belt can be retightened. In tight position the x-axis slide should still move freely.



☞ finish

## Coil bracket



material overview coil bracket

### bill of material coil bracket

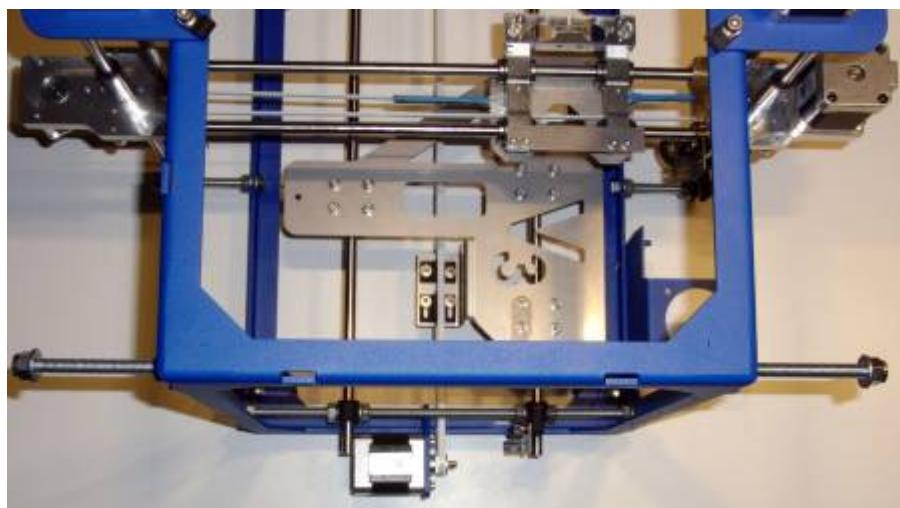
amount	description	item number
1	screw DIN933 M8x80	601341
1	nut DIN6923 M8	601352
1	nut DIN6926 M8	601354

### additional parts for the dual-extruder

amount	description	item number
1	screw DIN933 M8x80	601341
1	nut DIN6923 M8	601352
1	nut DIN6926 M8	601354

The additional parts for the dual-extruder are marked with a blue rectangle.

The screw is fixed at the upper rear corner of the frame with a nut. The self-locking nut is fixed at the end of the screw and prevents the slip off of the filament coil.



coil bracket

## The extruder

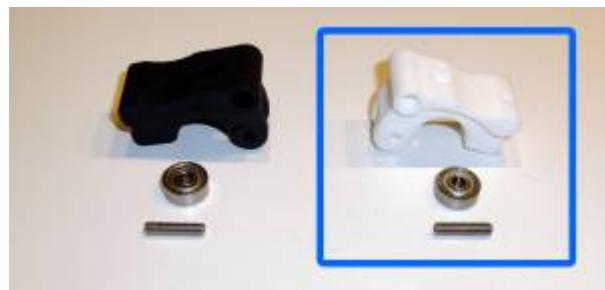
The PRotos 3D printer, in the basic configuration, is equipped with a direct-drive-extruder single (DD2 single).

This instruction shows how to assemble two different versions:

- [DD2-extruder single](#)
- [DD2-extruder dual](#)

## DD2-Extruder

### Extruder hinge



material overview: extruder hinge

#### bill of material: extruder hinge

amount	description	item number
1	extruder hinge DD2	601308
1	624-ZZ Ball bearing	600350
1	M4x16 M4x16 cylinder head bolt or grub screw	600910

#### additional parts for the dual-extruder

amount	description	item number
1	extruder hinge DD2	601308
1	624-ZZ Ball bearing	600350
1	M4x16 M4x16 cylinder head bolt or grub screw	600910

The additional parts for the Dual-Extruder are marked with a blue rectangle.

The ball bearing is attached with a M4x16 bolt inside the hinge.



finished extruder hinge

## Mounting extruder hinge



material overview mounting extruder hinge

### bill of material mounting extruder hinge

amount	description	item number
1	extruder hinge, preassembled	
1	stepper motor, NEMA 17	100401
2	sleeve, brass, 10mm	600817
1	screw DIN912 M3x25	600646
1	washer DIN9021 D3,2	600451

### additional parts for the dual-extruder

amount	description	item number
1	extruder hinge, preassembled	
1	stepper motor, NEMA 17	100401
2	sleeve, brass, 10mm	600817
1	screw DIN912 M3x25	600646
1	washer DIN9021 D3,2	600451

The additional parts for the dual-extruder are marked with a blue rectangle.

Two 10mm sleeves are placed in the upper hole of the hinge and fixed with a M3x25 bolt and M3 washers on the stepper motor.

The electrical connector should face up to simplify the installation of the cable loom



detail sleeve



finished extruder hinge

## Filament screw



material overview filament screw

### bill of material: Filament screw

amount	description	item Number
1	stepper motor, preassembled	
1	filament screw DD2-Extr. D: 10mm (incl. threaded pin)	100286

### Additional parts for the dual-extruder

amount	description	item number
1	stepper motor, preassembled	
1	filament screw DD2-Extr. D: 10mm (incl. threaded pin)	100286

The additional parts for the dual-extruder are marked with a blue rectangle.

The electrical connector should face up to simplify the installation of the cable loom

The threaded pin is screwed-in the filament screw on the shaft of the stepper motor. Position the filament screw on the motor shaft so that the toothed area of the screw is in line with the bearing (see figure filament screw 1)



filament screw 1

## Mounting extruder onto the X-axis



material overview mounting extruder onto the x-axis

<b>bill of material mounting extruder onto the x-axis</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	stepper motor, preassembled	
1	hot-end	100459
1	fan mounting plate	601319
1	extruder-fan, 40mm	600352
1	spacer sleeve, plastic L: 5mm	600494
1	screw DIN912 M3x40	600571
1	screw DIN912 M3x25	600646
2	washer DIN9021 D3,2	600451

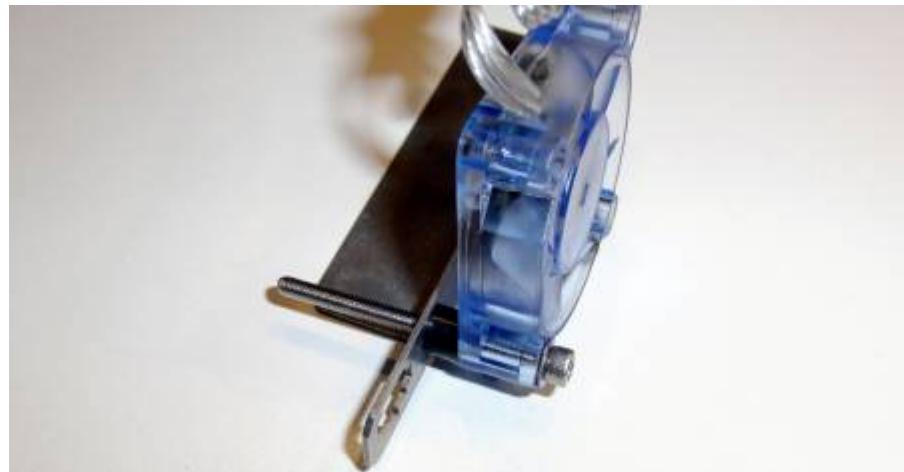
### Additional parts for the dual-extruder

<b>amount</b>	<b>description</b>	<b>item number</b>
1	stepper motor, preassembled	
1	hot-End	100459
1	extruder-fan, 40mm	600352
1	spacer sleeve, plastic L: 5mm	600494
1	screw DIN912 M3x40	600571
1	screw DIN912 M3x25	600646
2	washer DIN9021 D3,2	600451

The additional parts for the Dual-Extruder are marked with a blue rectangle.

If the PRotos V3 is assembled as a -SINGLE EXTRUDER- the extruder has to be mounted on the left side of the x-carriage (also the left side of the fan-mounting-plate)

Before mounting the extruder onto the x-axis, we need to prepare the extruder-fan. Use the M3x40 screw, a washer, the fan and the space sleeve to preassemble the extruder-fan. The folded part of the plate needs to be underneath the fan NOT like shown on the picture. (figure preparing extruder-fan)



preparing extruder-fan

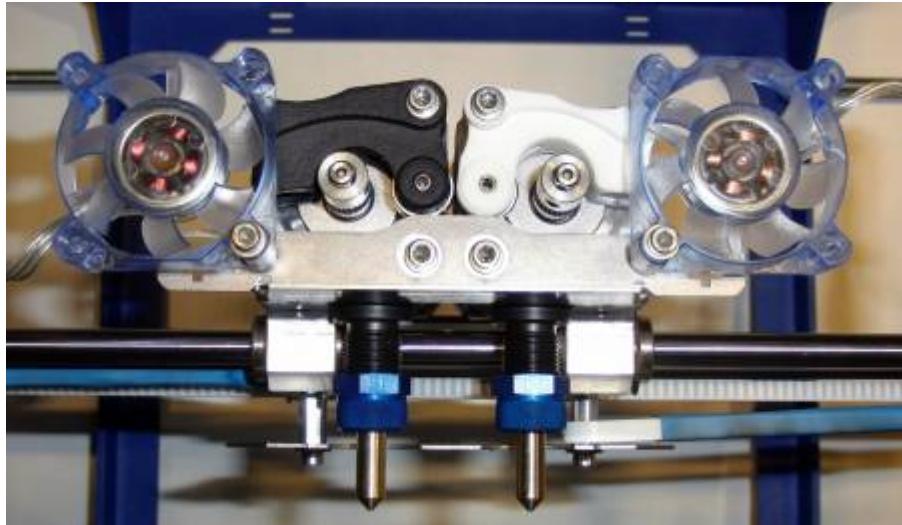
To attach the preassembled extruder-fan onto the x-axis, conduct the M3x40 screw through the mounting block and screw it to the stepper motor.

The electrical connector should face up to simplify the installation of the cable loom



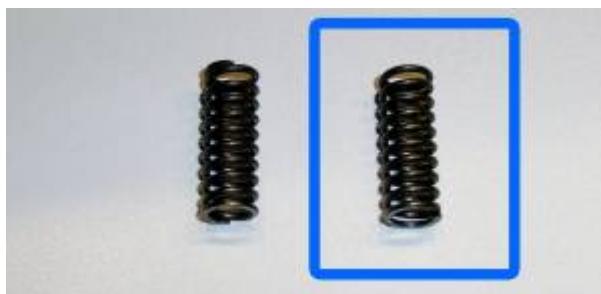
mounting extruder

Before fixing the stepper motor with the second M3 screw, put the hot-end into the thermal-barrier mounting block. After that, secure both M3 screws so that the hot-end is narrowly clamped.



mounting hotend

## Mounting spring



material overview mounting spring

### bill of material mounting spring

amount	description	item number
1	spring D-197A	601047

### Additional parts for the dual-extruder

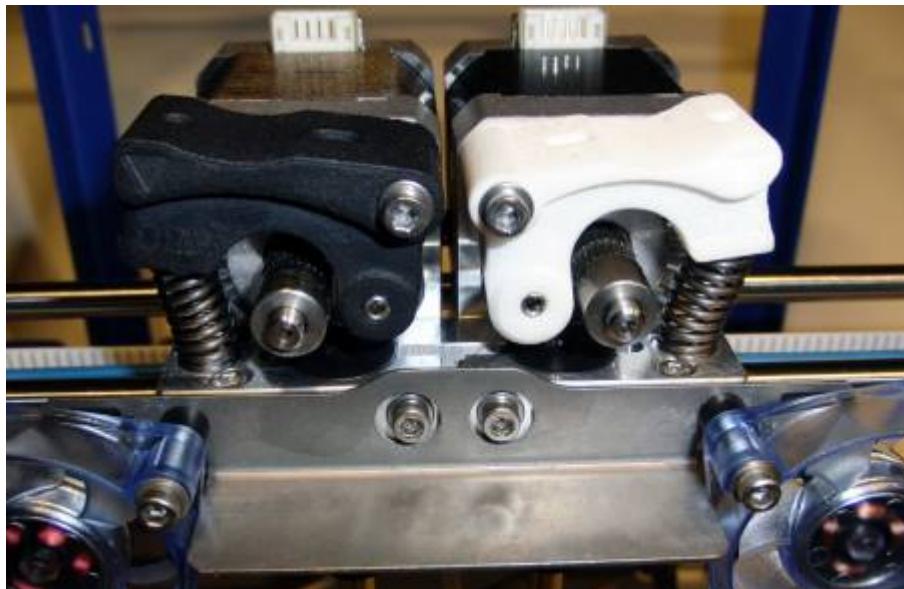
amount	description	item number
1	spring D-197A	601047

The additional parts for the dual-extruder are marked with a blue rectangle. The dual-extruder is mounted mirrored

Finally the spring is placed opposite the ball bearing. The spring has to be fixed inside the dent of the thermal-barrier mounting-block and the hinge. Therefore the spring must be precompressed (e.g. by hand) to place it between the parts.



There is a pinch point hazard while the attachment of the spring and later in during filament change.



fully assembled extruder

## The print surface

If your PRotos V3 3D printer is going to be equipped with a heated bed, please skip this chapter and continue at ["The heated bed"](#).

### Attachment print surface

This section only needs to be performed if the PRotos V3 3D printer is assembled **without** a heated bed.



material overview attachment print surface

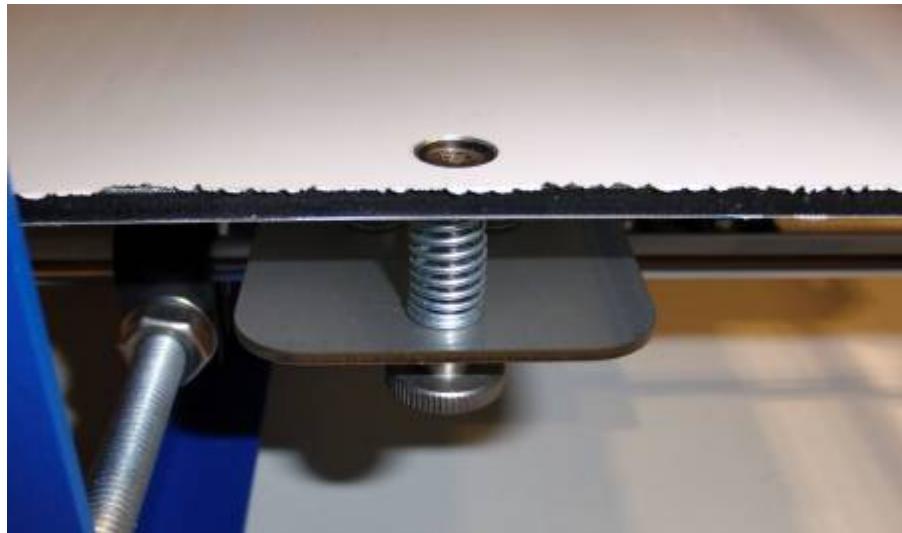
#### bill of material attachment print surface

amount	description	item number
1	print surface	601311
3	screw DIN7991 VG M4x35	601365
3	spring 1,0/AD10/IG11/LO32	600081

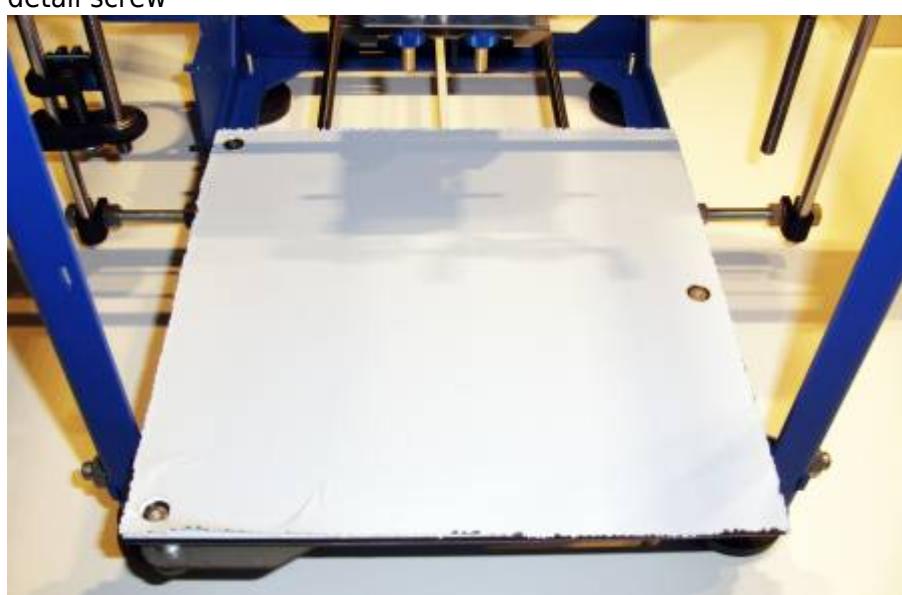
3	knurled nut M4	601320
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Plug the countersunk screws through the countersink in the print surface and position the springs between the print surface and the mounting plate. Secure the print surface with the knurled nuts provided.

By tightening/loosen the knurled nuts you can easily align the print surface horizontally.



detail screw



mounting print surface

## Mounting the acrylic print surface

This section only needs to be performed if the PRotos V3 3D printer is assembled without a heated bed.

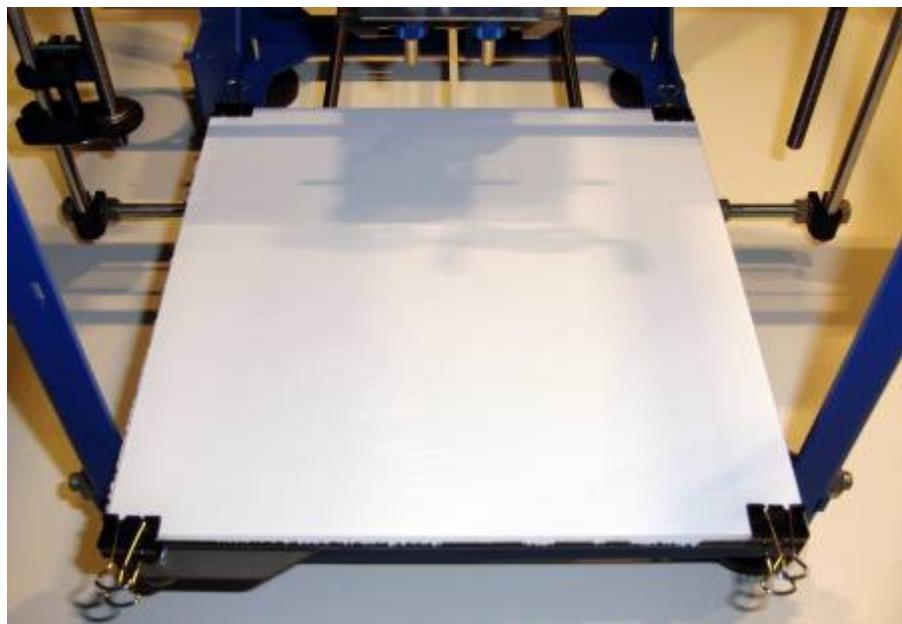


material overview mounting the acrylic print surface

#### bill of material mounting the acrylic print surface

amount	description	item number
1	acrylic print surface	601346
4	foldback clamp	600111

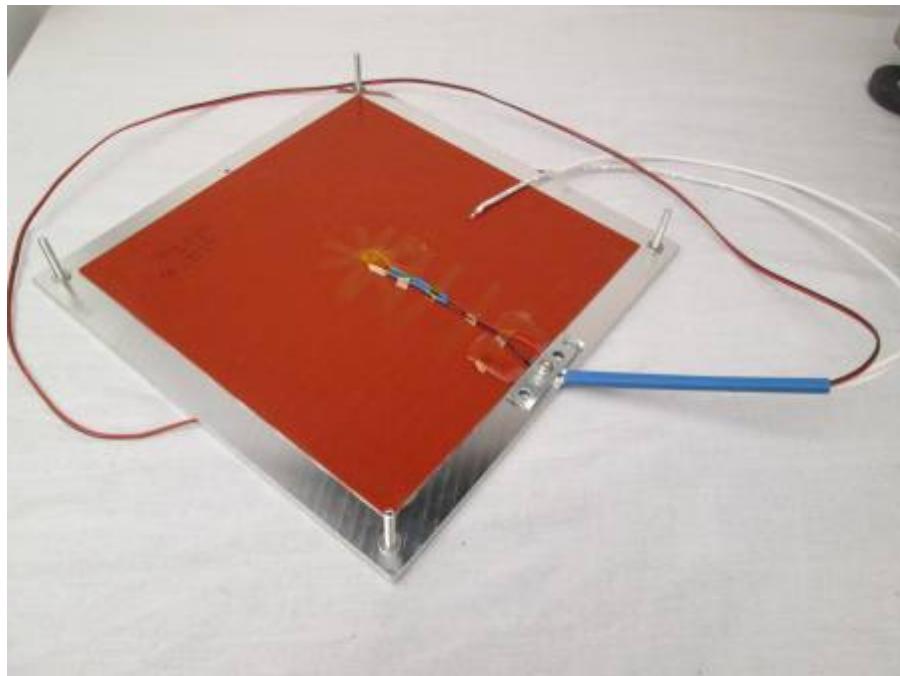
Use the foldback clamps to fasten the acrylic print surface onto the base plate.



fully assembled acrylic print surface

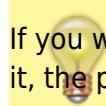
## The heated print bed

If your PRotos V3 3D printer is **not** going to be equipped with a heated bed, please go back to the section "[The print surface](#)".



the heated bed

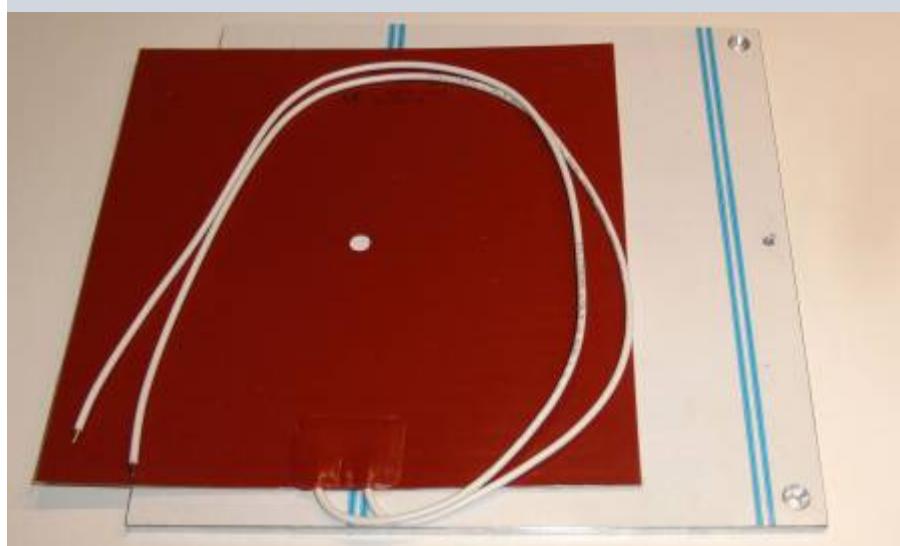
The heated bed is optional but recommended for larger 3D prints to reduce warping especially at the corners of the model. For smaller objects and PLA filament it's not required.



If you want to print with [ABS \(Acrylnitril-Butadien-Styrol\)](#) a heated bed is essential, without it, the print won't stick to the print surface.

## Installation heating pad

This section only needs to be performed if the PRotos V3 is assembled **with** a heated bed.



material overview installation heating pad

### bill of material installation heating pad

amount	description	item number
1	aluminium plate, 230x230x5mm	601371
1	heating pad, 12V	100016

Remove the plastic foil and attach the pad in the center of the plate. Make sure there are no bubbles in the pad. The leads have to exit where the stud hole is located.

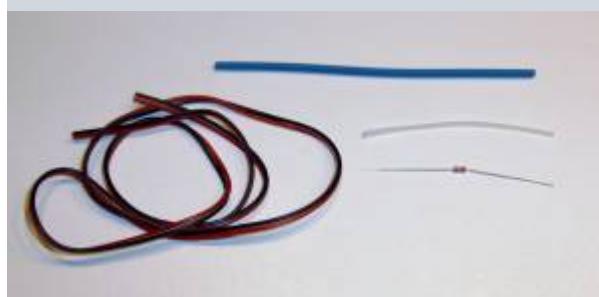
Make sure that the heating pad has a equal distance from the edges of the aluminum plate.(approx. 3cm)



finished installation heating pad

## Pre-assembly thermistor

This section only needs to be performed if the PRotos V3 is assembled **with** a heated bed.



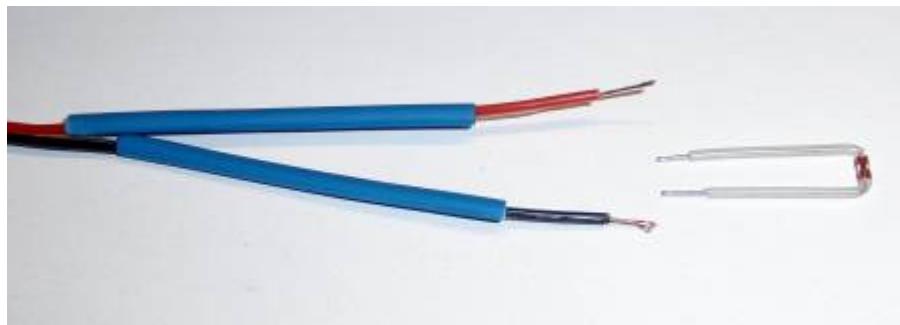
material overview pre-assembly thermistor

### bill of material pre-assembly thermistor

amount	description	item number
1	two wire cable, BK/RD SW/RT 2x0,14mm 0,6m	600543
1	thermistor NTC-100KOhm	100061
1	shrink tube Ø2,4mm 10cm	600467
1	silicon tubing 6cm	600727

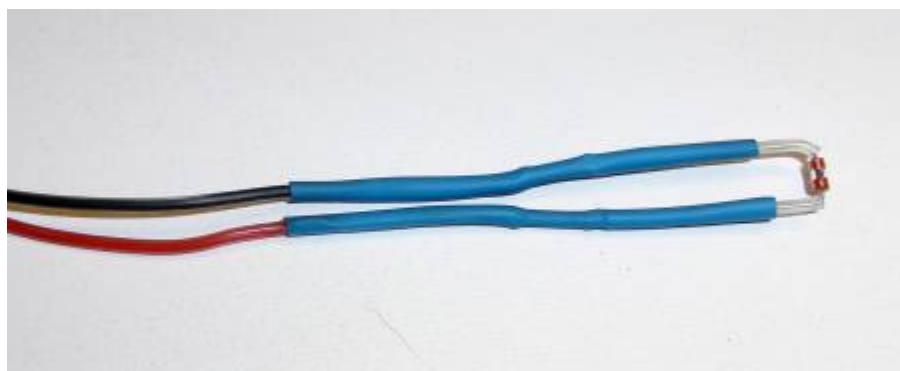
The heating pad has a hole in its center for the thermistor. This device will measure the actual temperature of the aluminium plate.

Slip the shrink tubing on the cable ends first and the silicon tubing on the leads, then solder the cable to the leads.



finished pre-assembly thermistor 1

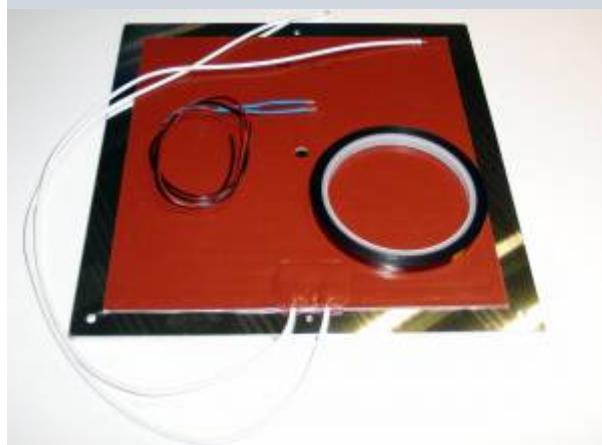
Shrink the blue tubing over the silicone with hot air, either from a hot air gun or from a lighter flame.



finished pre-assembly thermistor 2

## Mounting thermistor

This section only needs to be performed if the PRotos V3 is assembled **with** a heated bed.



material overview mounting thermistor

**bill of material mounting thermistor**

amount	description	item number
1	aluminium plate, preassembled	
1	thermistor, preassembled	
1	Kapton tape, 5mm	100058

Wrap the thermistor cable for about 130 mm with the provided Kapton tape.



detail preassembled thermistor

Stick one layer of Kapton tape on the aluminium plate in the opening in the center of the heating pad. Next place the thermistor on it and secure it with more Kapton or PET tape.



detail heating pad

To get an accurate reading, make sure the thermistor is close to the aluminium plate.



finished mounting thermistor

## Cable holder

This section only needs to be performed if the PRotos V3 is assembled **with** a heated bed.



material overview cable holder

### bill of material cable holder

amount	description	item number
1	printing bed, preassembled	
1	perforated metal strip 3mm-B12mm	600421
1	shrink tubing 15 cm, Ø6,4mm	600703
1	screw DIN912 M3x8	600896
1	washer DIN125 D3,2	600631

Start by securing all leads inside the spring tubing.

The piece of perforated metal secures the cables and acts as a strain-relief. For best results, bend the perforated metal strip as shown.

To mount the metal strip slip the washer on the bolt, then insert it into the perforated metal strip and screw the bolt into the stud hole, pinning down the cables as shown.



finished cable holder

## Mounting heated bed

This section only needs to be performed if the PRotos V3 is assembled **with** a heated bed.



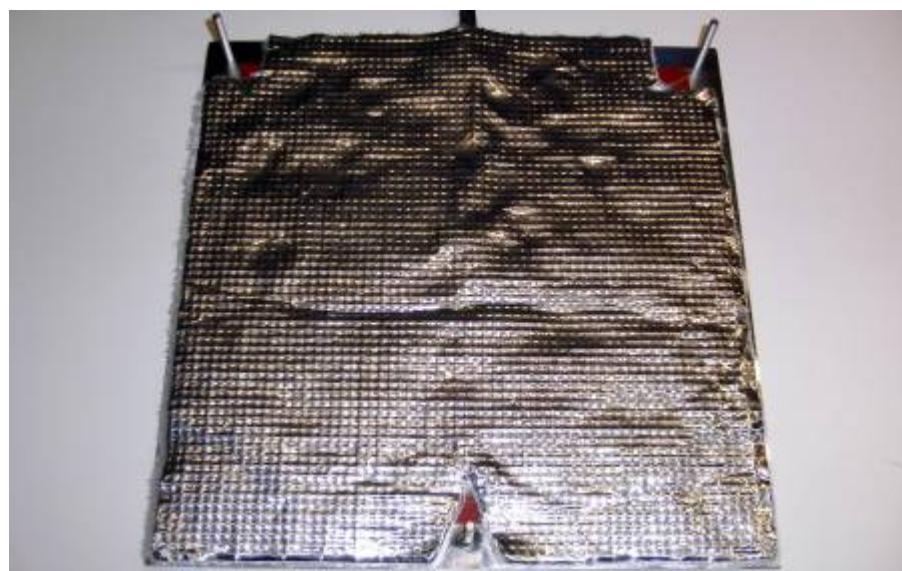
material overview mounting heated bed

### bill of material mounting heated bed

amount	description	item number
1	heated bed, preassembled	
1	insulation pad	601372
3	screw DIN7991 VG M4x35	601365
3	spring 1,0/AD10/IG11/LO32	600081
3	knlurled nut M4	601320

Extended skin contact with the padding material might cause minor skin irritations. Minimise the handling time or wear protective gloves during this step.

Attach the insulation pad as shown on the picture (insulation wool onto the heating pad). Make sure that the drill-holes are still accessible.



bottomside of the heated bed incl. screws)

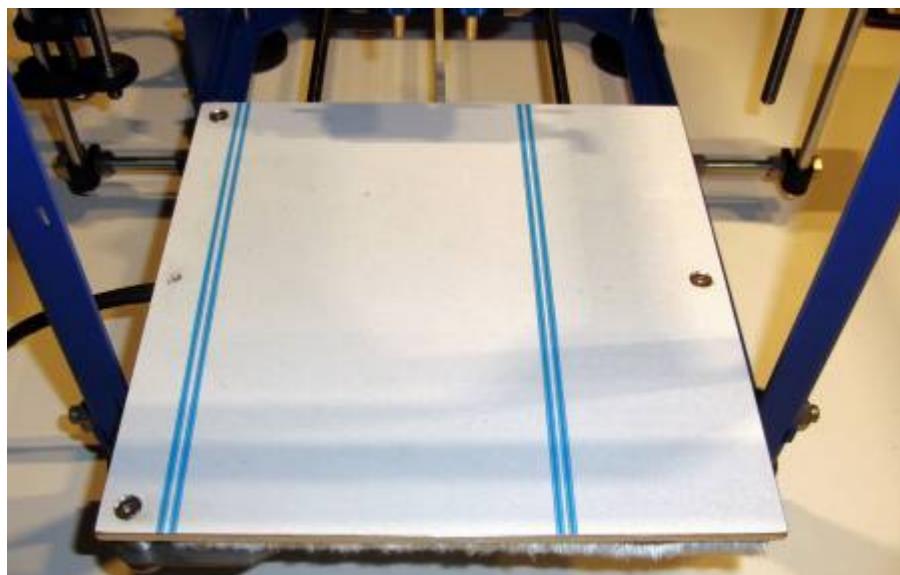
Plug the countersunk screws through the countersink in the aluminum plate and position the springs between the print surface and the mounting plate. Secure the print surface with the knurled nuts provided.

By tightening/loosen the knurled nuts you can easily align the print surface horizontally.



detail screw connection

**Don't** remove the protective film on the 5mm aluminum plate yet.



total view heated bed

## PET-foil

This section only needs to be performed if the PRotos V3 is assembled with a heated bed.



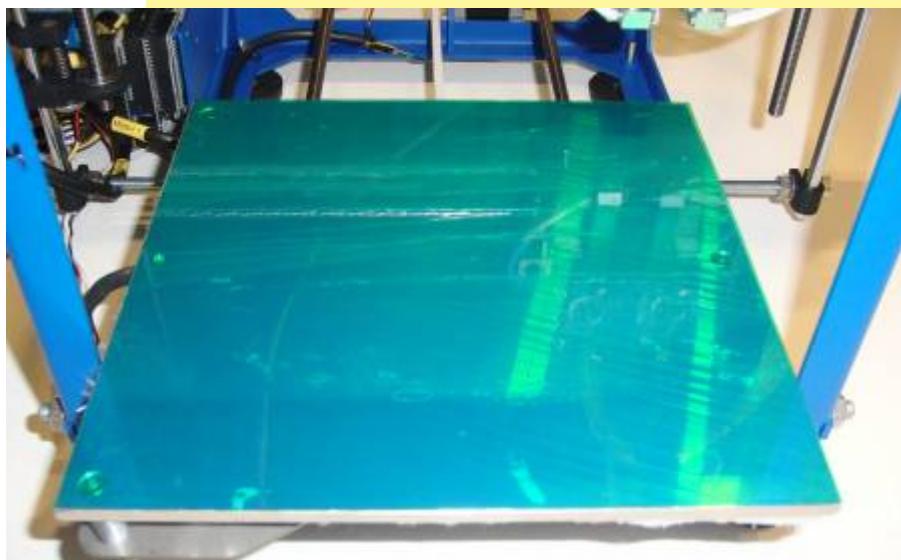
material overview PET-foil

#### bill of material attaching PET-foil

amount	description	item number
1	PET-foil, 230x230mm	100021

Remove the protective coating from the thick aluminium plate first, if not done yet. After that attach the PET-foil bubble-free onto the aluminum plate.

Tips for bubble-free sticking you find here [Troubleshooting ->](#)  
[Glue on of the PET-foil bubble-free](#)



attached PET-foil

## MOSFET cooling fins

This section only needs to be performed if the PRotos V3 is assembled with a heated bed.



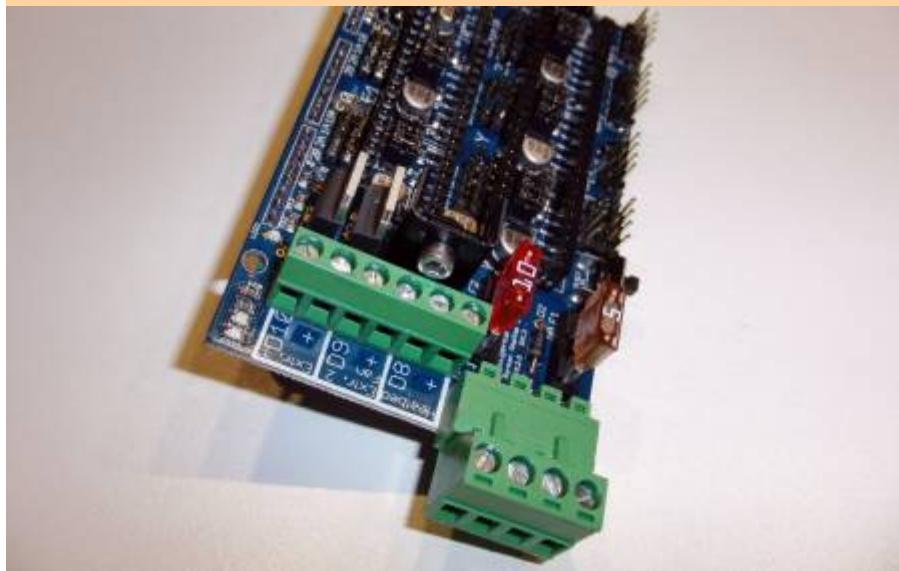
material overview mosfet cooling fins

#### bill of material mosfet cooling fins

amount	description	item number
1	cooling fins	600443
1	screw DIN912 M3x5	600706
1	nut DIN934 M3	600526

If using the 12V heating pad you must fit cooling fins to the mosfet in socket Q3. Screw the cooling fins onto the flat metal side of the mosfet.

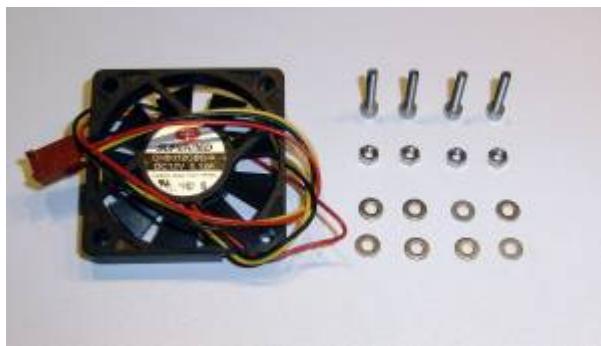
It's very important that the cooling fins don't touch any other device. This would cause a short circuit.



assembled mosfet cooling fins

## The electronics

### RAMPS fan

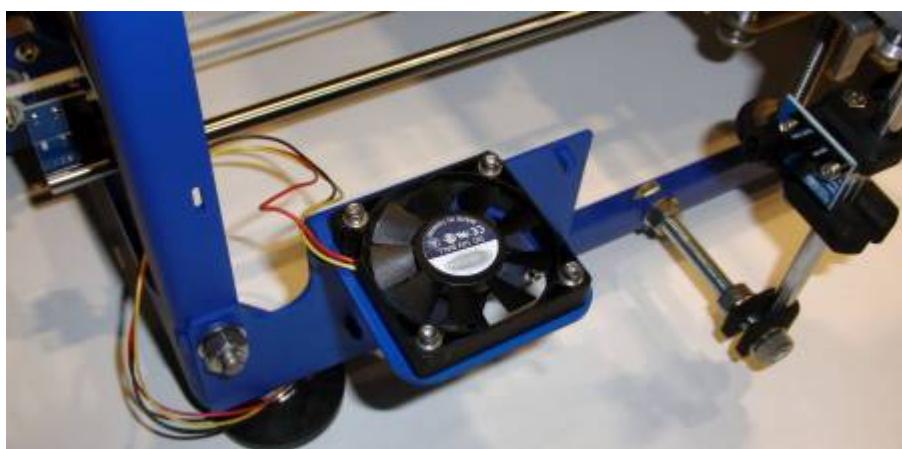


material overview RAMPS fan

#### bill of material RAMPS fan

amount	description	item number
1	fan 40mm	600183
4	screw DIN912 M3x16	600644
8	washer DIN9021 D3,2	600451
4	nut DIN934 M3	600526

Install the fan on the electronics holder as shown. Note that the air should flow downwards to the board.



RAMPS fan

## RAMPS



material overview RAMPS

#### bill of material RAMPS

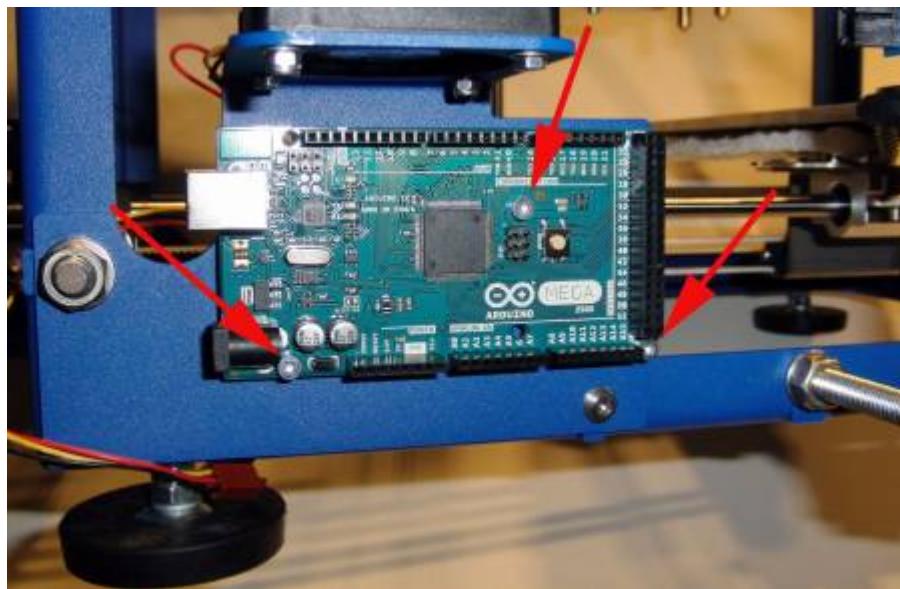
amount	description	item number
1	RAMPS	100279
1	©Arduino MEGA 2560	100164
1	Pololu X, Y, Z	601140
1	Pololu extruder	601139
3	screw DIN912 M3x8	600896

**Additional parts for the dual-extruder**

amount	description	item number
1	Pololu extruder	601139

The additional parts for the dual-extruder are marked with a blue rectangle.

Use the three screws to attach the ©Arduino board to the electronics holder. **Don't** use any washers.



©Arduino

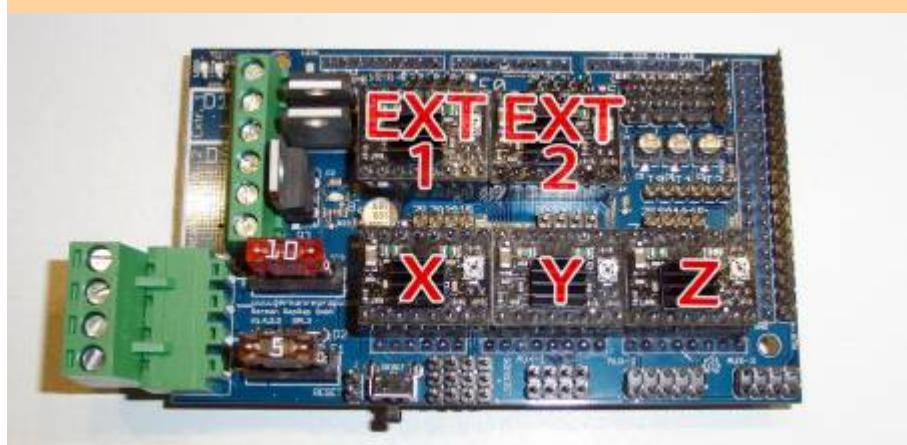
Every single Pololu is preconfigured for a certain axis or extruder, **DO NOT** change their order and **DO NOT** adjust the potentiometers!



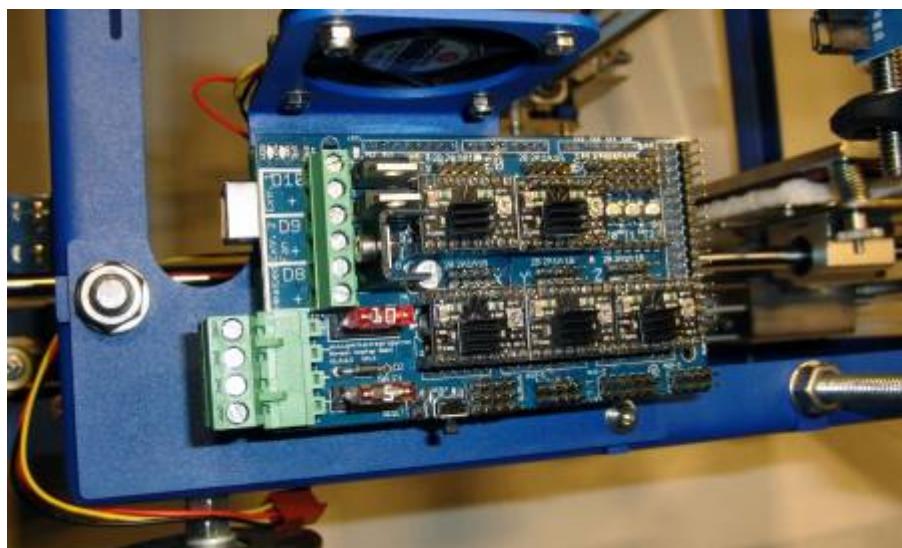
Pololu extruder

Install the Pololus on the RAMPS board as shown. Please check that all potentiometers point away from the power supply connector. If all Pololus are in position, attach the RAMPS onto the ©Arduino board.

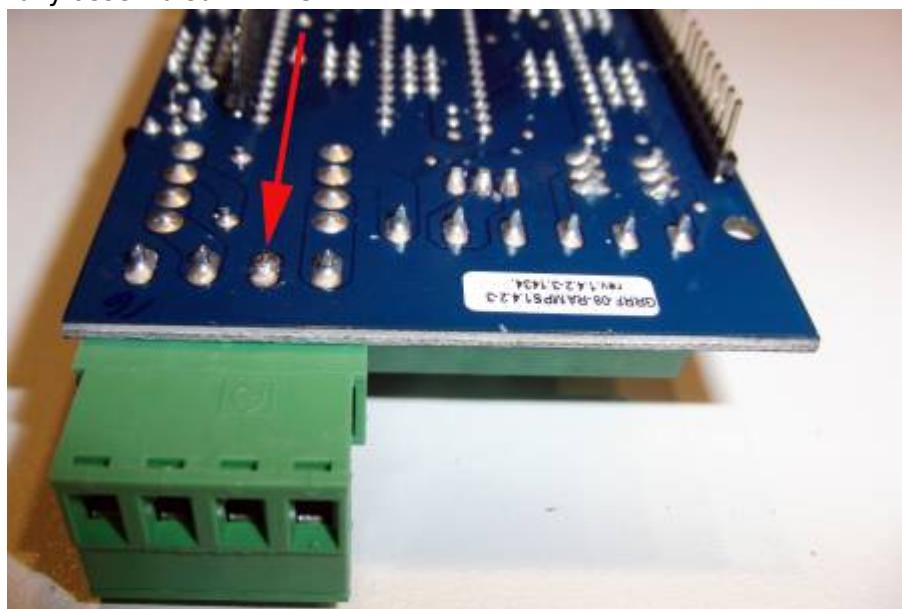
Please verify that all pins fit correctly inside the sockets of the ©Arduino board.



RAMPS with Pololus



fully assembled RAMPS 1.4



power supply RAMPS

To make the RAMPS fit perfectly onto the ©Arduino board you can trim (a little bit) the soldered joint shown on the picture. This is **optional** and has no effect on the ongoing operation.

## RAMPS LCD-display adapter board

This section only needs to be performed if the PRotos V3 is assembled with a LCD-display.

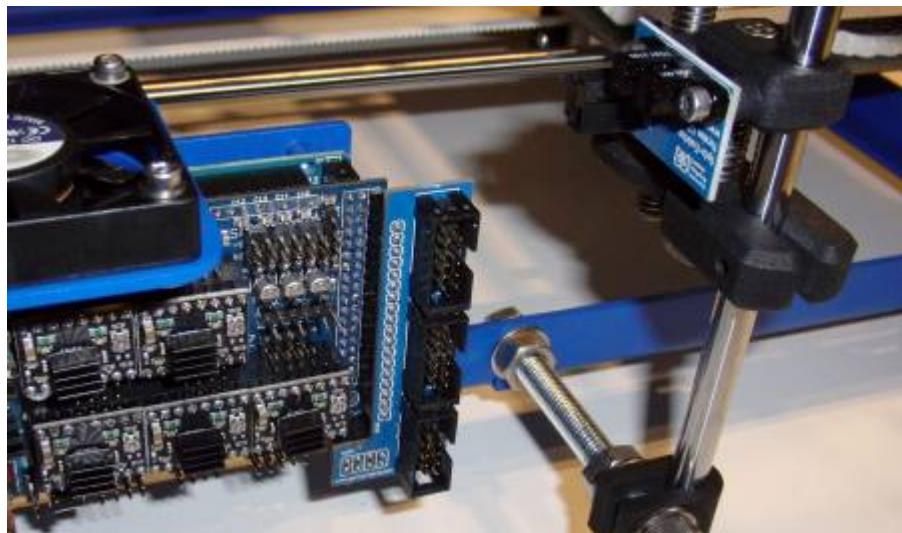


material overview RAMPS LCD-display adapter board

**bill of material RAMPS LCD-display adapter board**

amount	description	item number
1	LCD-Display adapter board	600726

Install the adapter board on the RAMPS like shown on the picture (socket AUX-4).



attached adapter board

## Mounting LCD-Display

This section only needs to be performed if the PRotos V3 is assembled with a LCD-Display.



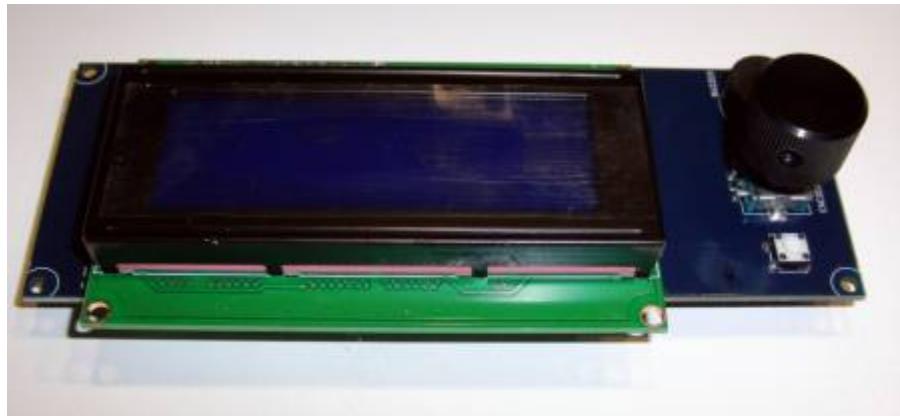
material overview mounting LCD-Display

**bill of material mounting LCD-Display**

amount	description	item number
1	LCD-Display	600808
1	turning knob	601196

2	screw DIN912 M3x16	600644
2	spacer sleeve, plastic L: 5mm	600494

With the LCD-Display you have total control over the PRotos V3, use the turning knob to move the axis, preheat the extruder or start your 3D print. Just attach the turning knob to the LCD-Display using the screw inside the knob.



☞ turning knob

Install the display on the upper front frame using M3x10 bolts and plastic sleeves as shown.



☞ attached LCD-Display

## The cabling

The cable looms have tags to identify them. The correct orientation of the loom is important.

## Cabling y-axis



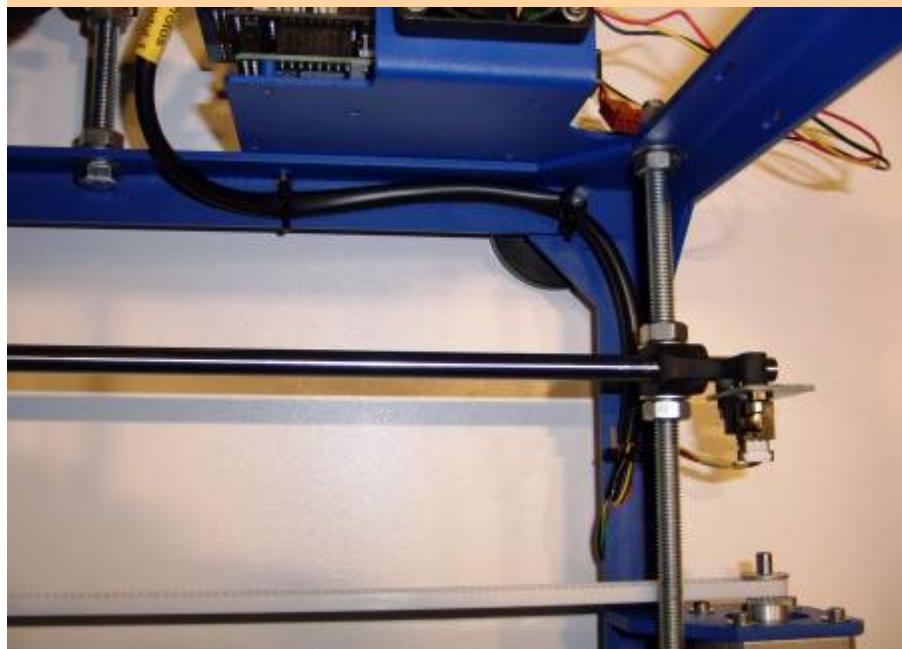
cable loom 1

### bill of material cabling Y-axis

amount	description	item number
1	cable loom 1 (Protos Modul 1)	600788
	cable ties	

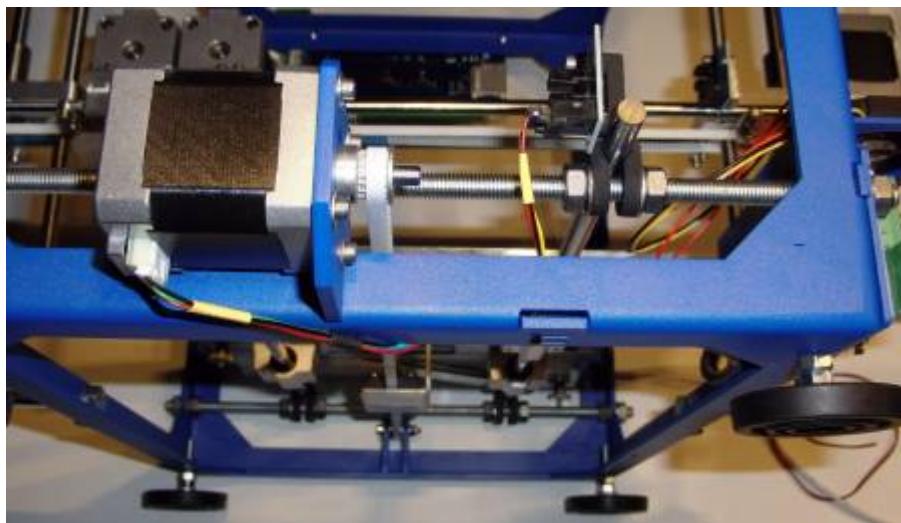
Attach the cable loom to the frame using cable ties. When clipping the cable ties always leave about 2mm on the tip to prevent them from slipping and coming undone.

Make sure to keep the loom away from all moving parts of the y-carriage.



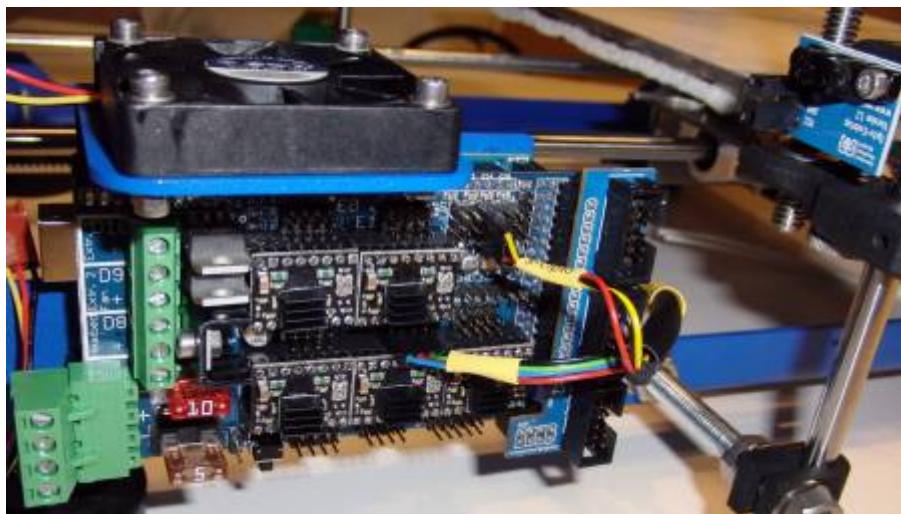
attachment cable loom 1 (part 1)

Use the cable ties to fasten the cable loom on the inside of the frame, to prevent any kind of collisions.



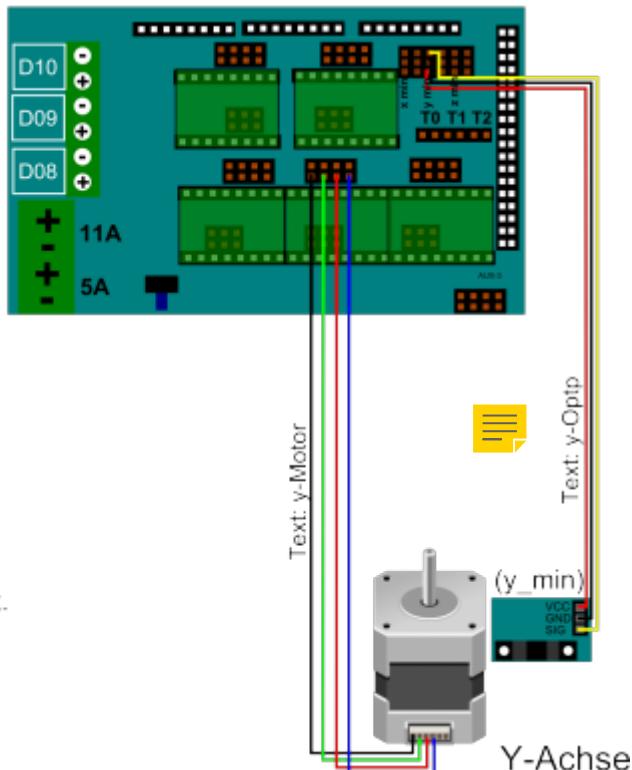
attachment cable loom 1 (part 2)

The photo above shows the y-opto end stop being connected. Keep the cable loop very short to prevent the y-carriage from snagging and ripping it out.



attachment cable loom 1

Alle Motorleitungen werden mit dem schwarzen Kabel links angesteckt.



circuit diagram cable loom 1

## Cabling z-axis



cable loom 3

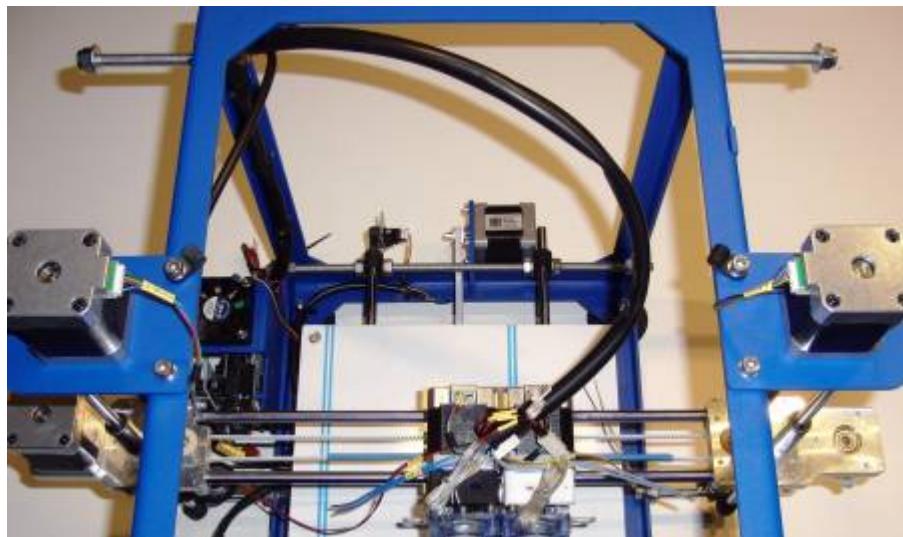
### bill of material cabling z-axis

amount	description	item number
1	cable loom 3 (Protos Modul 3)	600789
	cable ties	

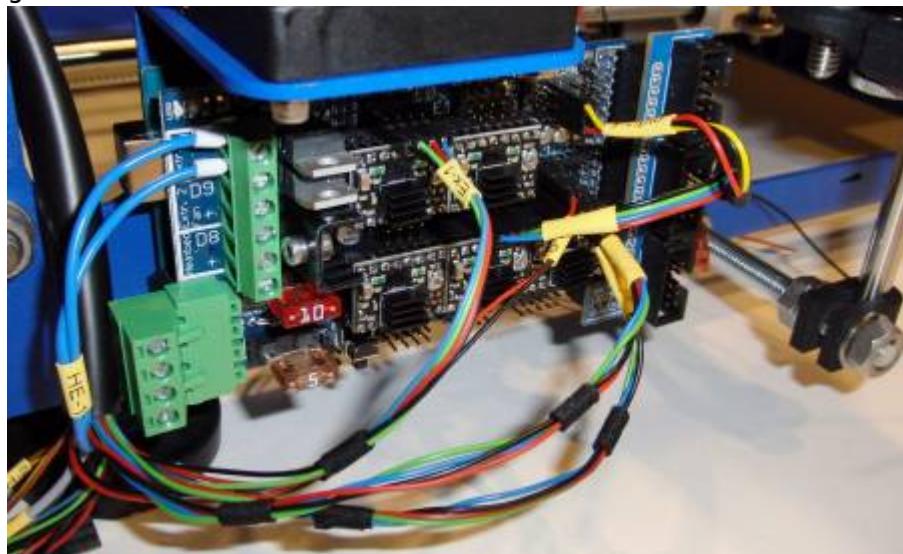
Cable loom 3 is preconfigured for dual-extruder, if you are only using a single-extruder tie the additional connector safely to the cable loom.

Attach the cable loom to the frame using the cable ties. When clipping the cable ties always leave about 2mm on the tip to prevent them from slipping and coming undone.

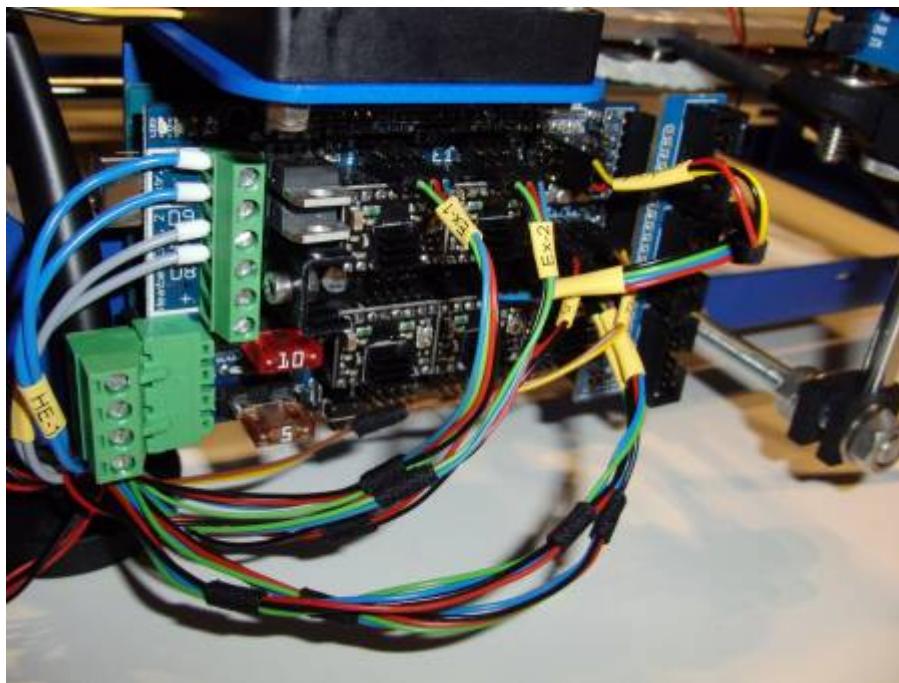
Make sure to properly secure the branching point of the loom as shown in the upper left hand corner of the photo below. This is where you'll have the main forces on the loom during operation.



guidance cable loom 3

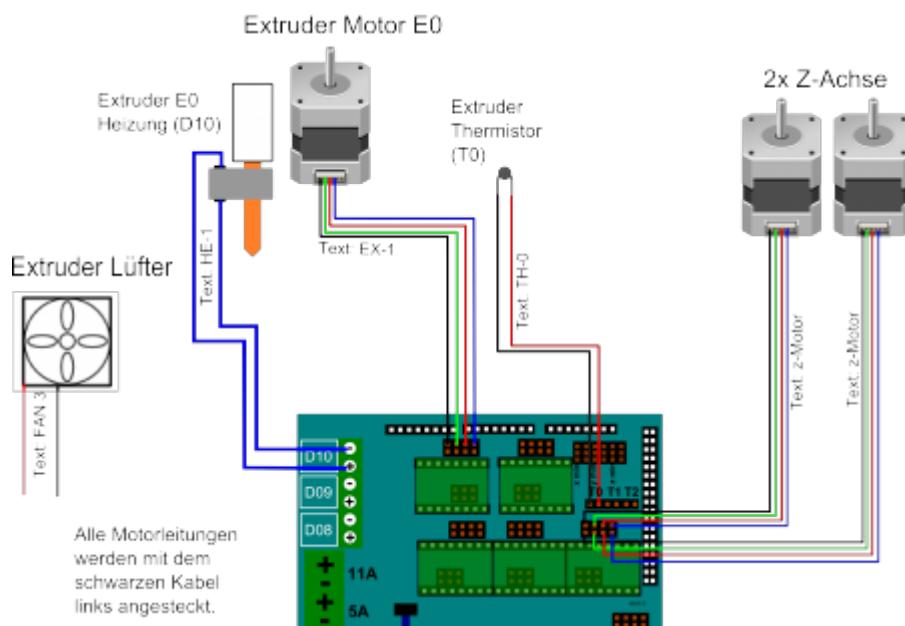


cabling cable loom 3 single-extruder



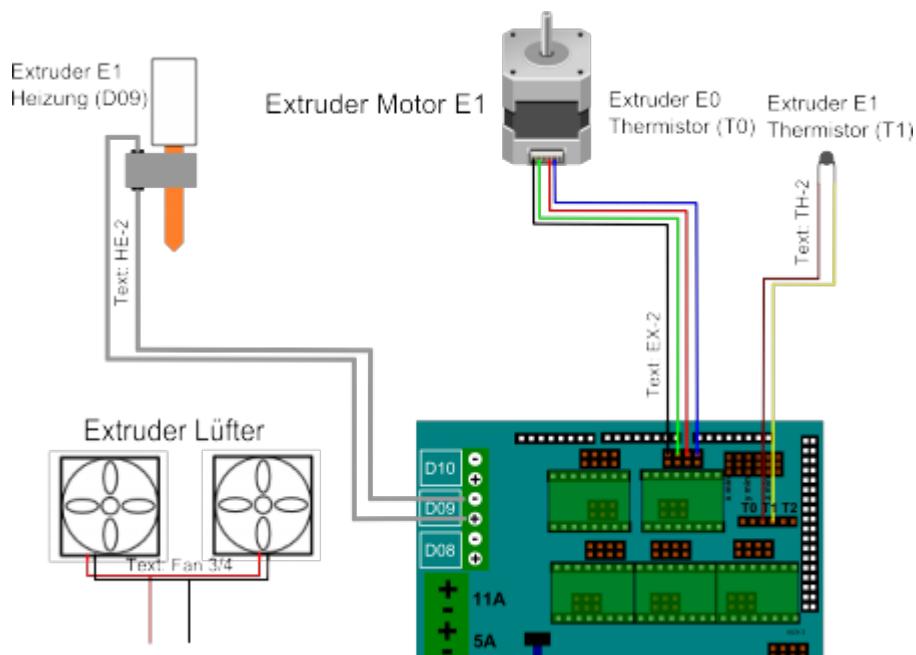
cabling cable loom 3 dual-extruder

If you are using a single-extruder the sockets D9 and EXT1 stay empty.



circuit diagram cable loom 3

If you are using a dual-extruder the thermistor TH-2 needs to be plugged into the T1 socket.



circuit diagram cable loom 3 (dual-extruder)

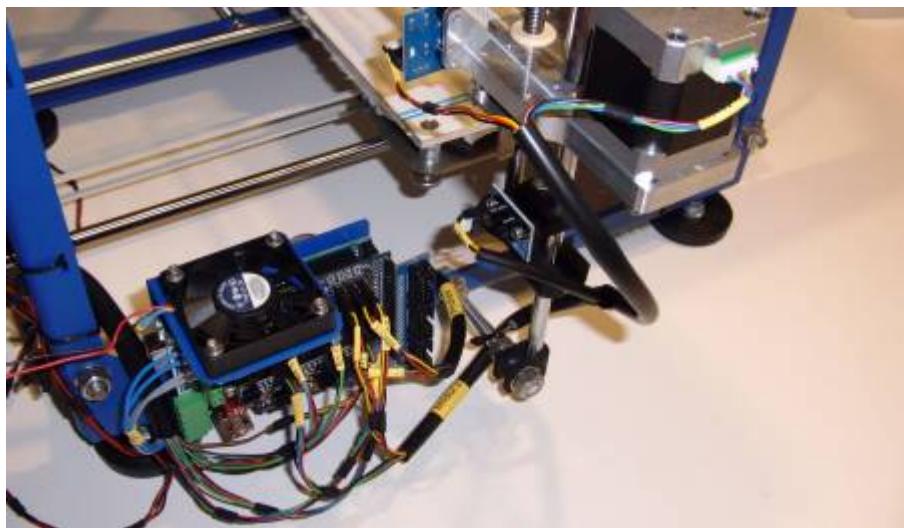
## Cabling x-axis



cable loom 2

### bill of material cabling X-axis

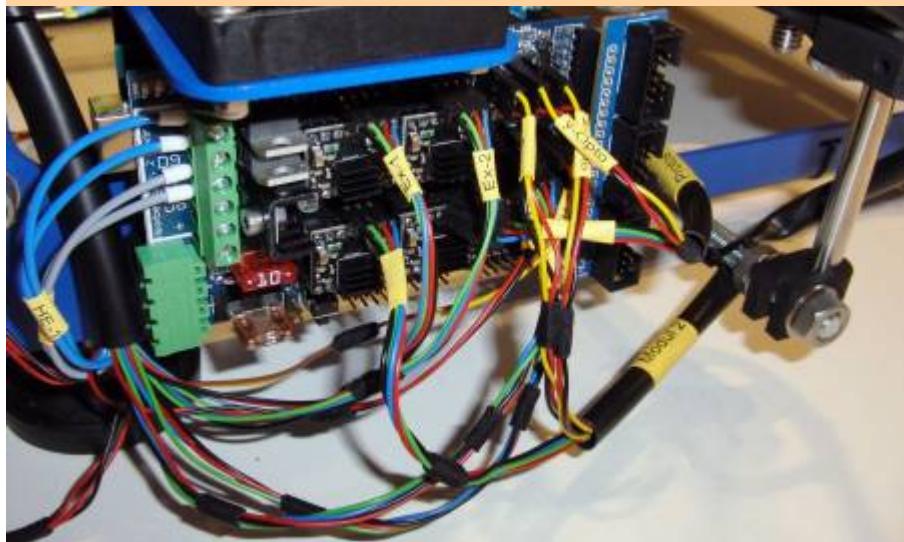
amount	description	item number
1	cable loom 2 (Protos Modul 2)	600790
	cable ties	



guidance cable loom 2

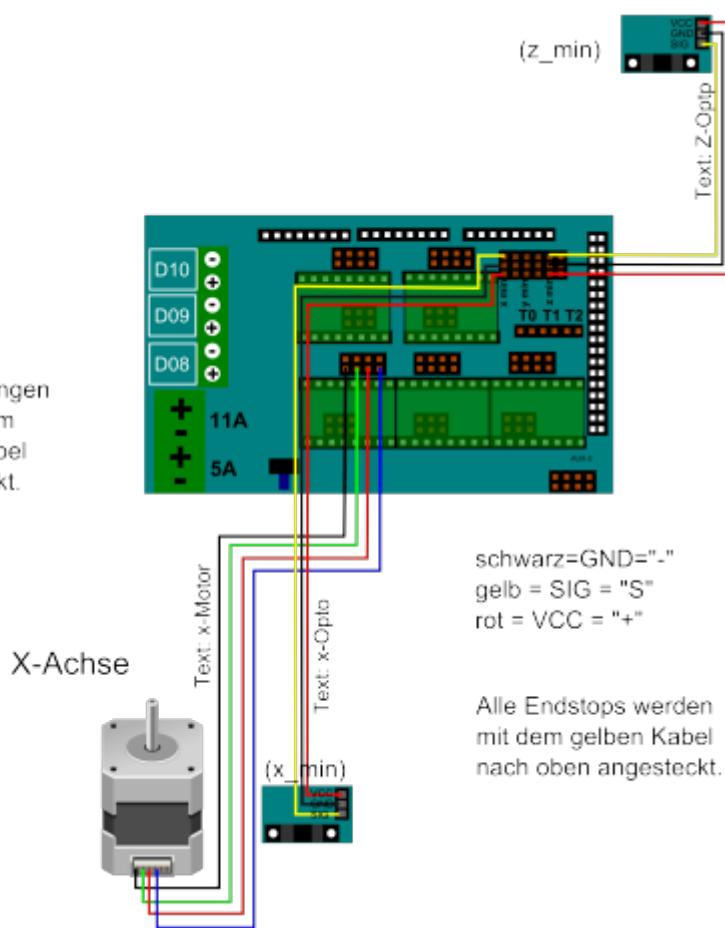
Tie the cable loom to the z-axis mounting, as shown on the picture below.

Make sure that the cable for the stepper motor and endstop (x-axis) is still long enough, for the x-axis to move upwards the z-axis.



cabling cable loom 2

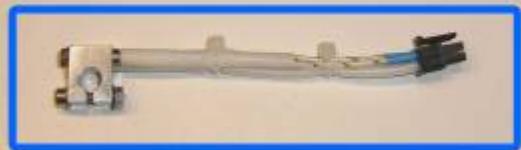
Alle Motorleitungen werden mit dem schwarzen Kabel links angesteckt.



circuit diagram cable loom 2

## Cabling hot-end

This section is for hot-ends with plug connection. If your hot-end doesn't have a plug connector please visit the following page for further instructions: [PRotos V3 cabling hot-end without plug connectors](#)



material overview cabling hot-end

### bill of material cabling hot-end

amount	description	item number
1	heating block wit plug connection	100456
<b>additional parts for the dual-extruder</b>		
1	heating block wit plug connection	100456

The additional parts for the dual-extruder are marked with a blue rectangle.

Use the connectors HE-1 and TH-0 for the single-extruder and attach the heating block the the brass nozzle.



finished hot-end cabling

## Cable bundling at the extruder



material overview cable bundling at the extruder

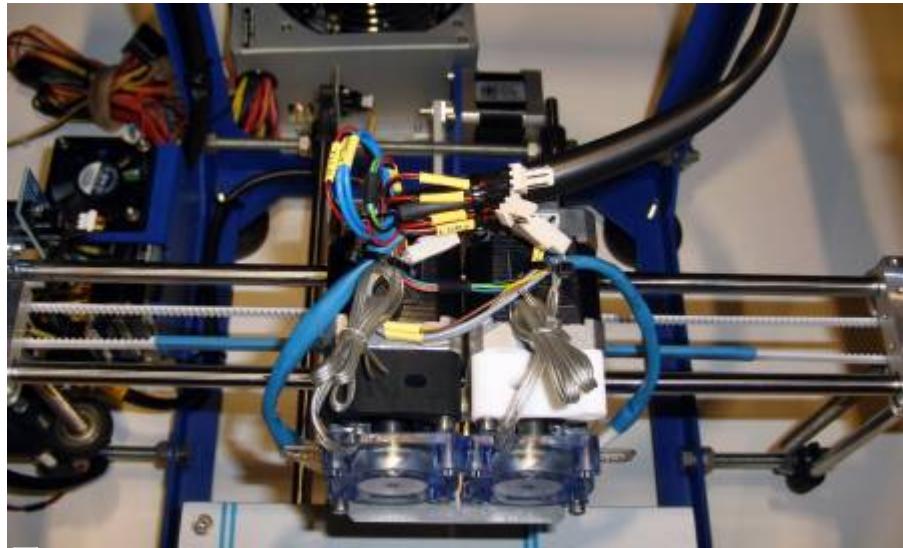
<b>bill of material cable bundling at the extruder</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	self-adhesive pad	600725
	cable ties	

## additional parts for the dual-extruder

<b>amount</b>	<b>description</b>	<b>item number</b>
1	self-adhesive pad	600725
	cable ties	

The additional parts for the dual-extruder are marked with a blue rectangle.

Stick the self-adhesive pad onto the extruder and tie all cables, including the additional leads for the dual-extruder together.



cable guidance at the extruder

## Cabling ATX connector and RAMPS



material overview cabling ATX connector and RAMPS

### bill of material cabling ATX connector and RAMPS

amount	description	item number
1	ATX power supply, 500W	100446
	shrink tube	600467

The picture below shows the RAMPS connector, one of the power supply PCI-E connectors and a pair of side cutters in the foreground.



power supply (6Pin PCI-E)

On the picture below two yellow and two black leads from the 6pin PCI-E connector are cut off. **If your power supply also has a 4pin ATX connector use that one instead.**

Attach the leads to the RAMPS connector like shown on the picture. (yellow : 12v | black: GND)

The following step of insulating the other two cables can be skipped if using a 4pin PCI-E connector



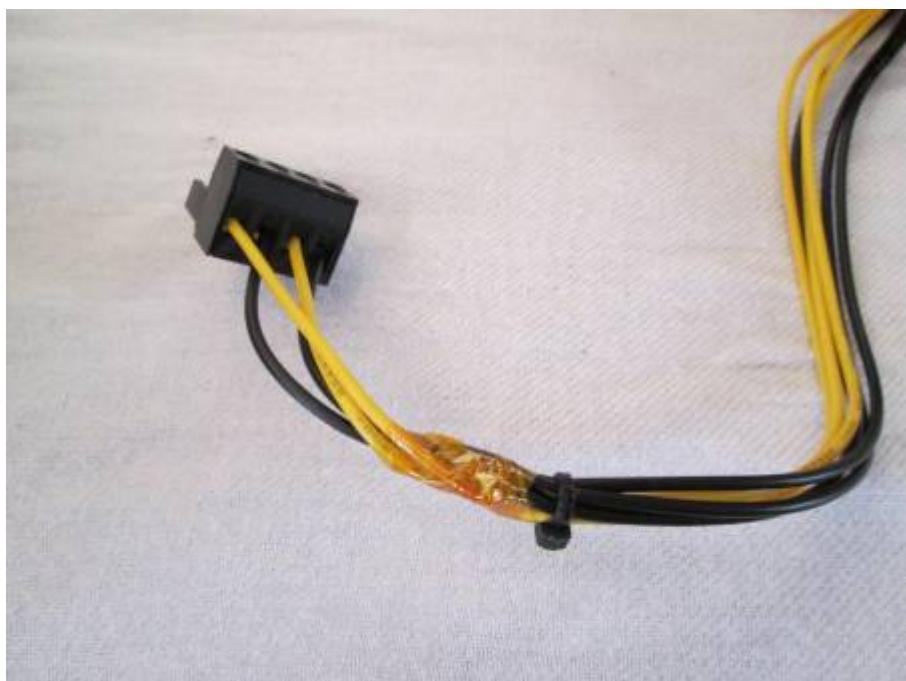
RAMPS power supply

Here the other two leads were clipped at slightly different lengths to further reduce the chance of a short circuit. The yellow leads are +12V and the black leads are minus (or 0V).



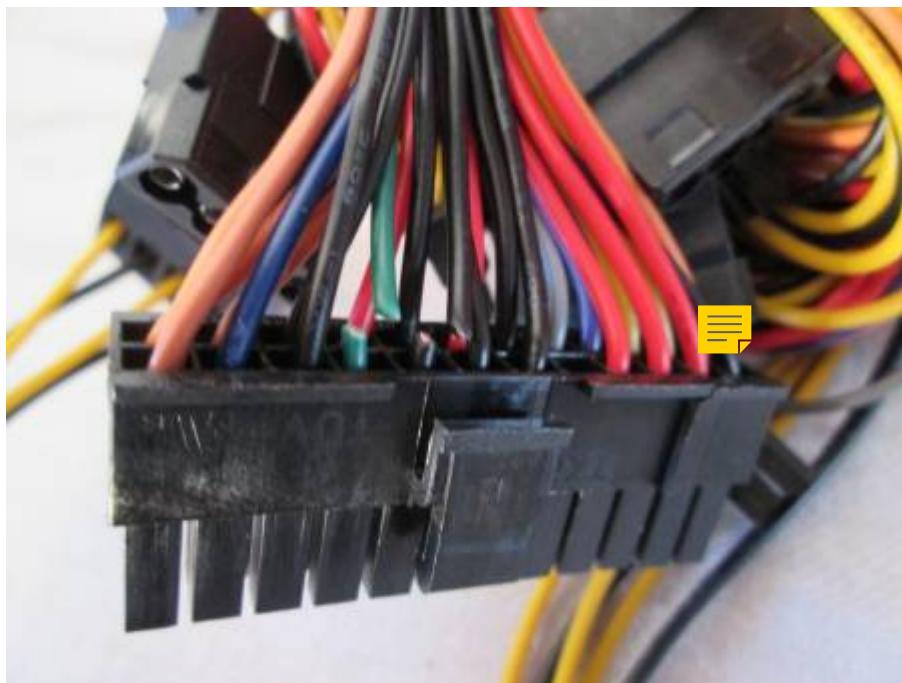
RAMPS connector 1

Next insulate the cables individually, then stick them to the rest of that bundle.

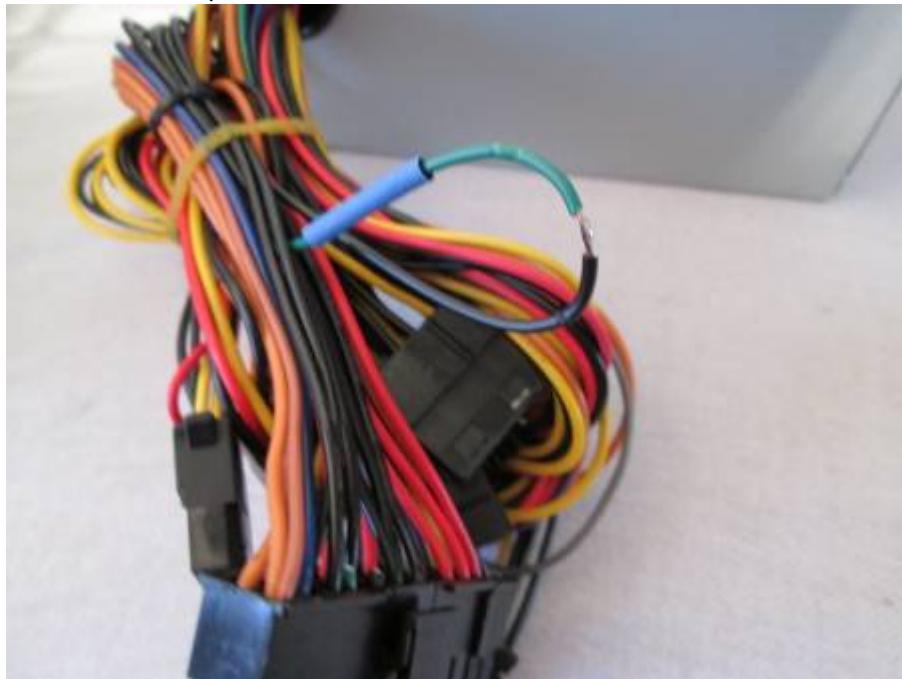


RAMPS connector 2

In this step we cut the green (power on signal) cable and connect it permanently to ground by cutting the black cable next to it and solder the ends together. This is shown below before shrinking the blue tubing over the solder joint.

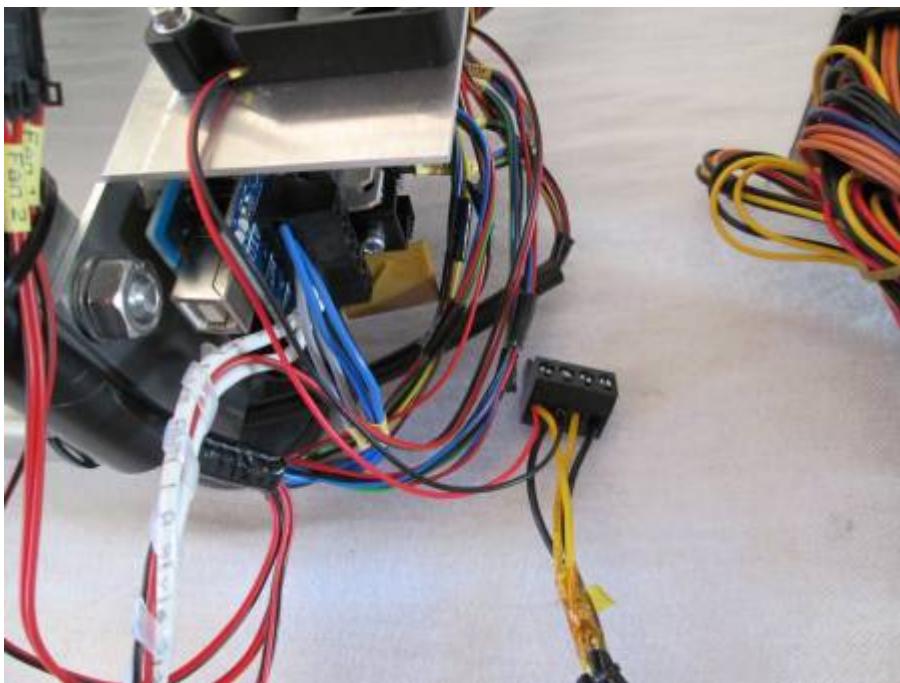


ATX connector power-on

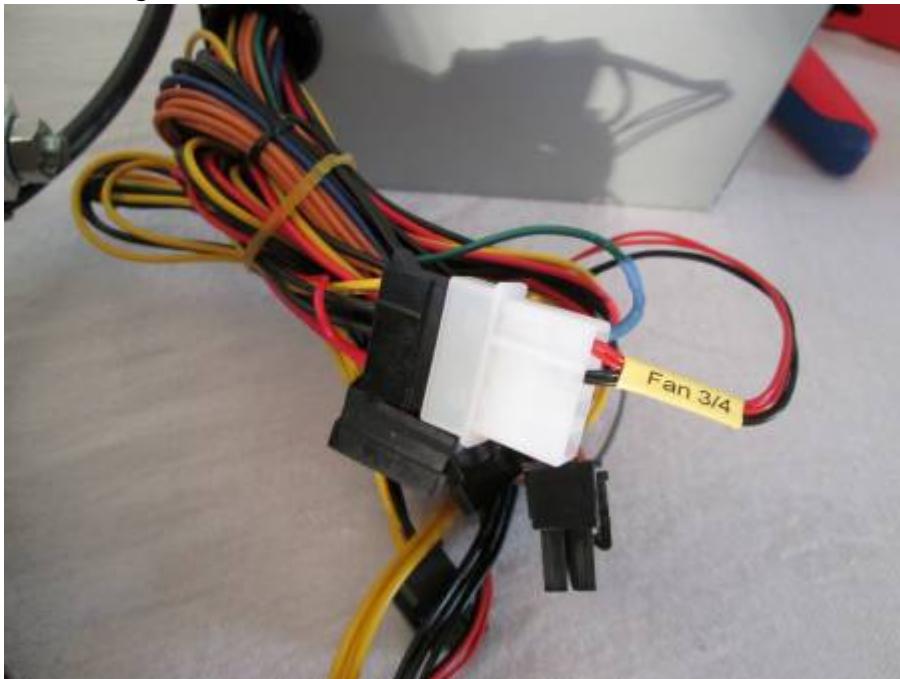


ATX connector solder joint

Shorten the black and red leads from the RAMPS fan. The yellow lead can be cut off at the fan itself as it is not being used here. Strip the cables ( 3mm ) and connect the red one to a terminal screw that has a yellow cable and the black one to any other terminal that already has a black cable going in.

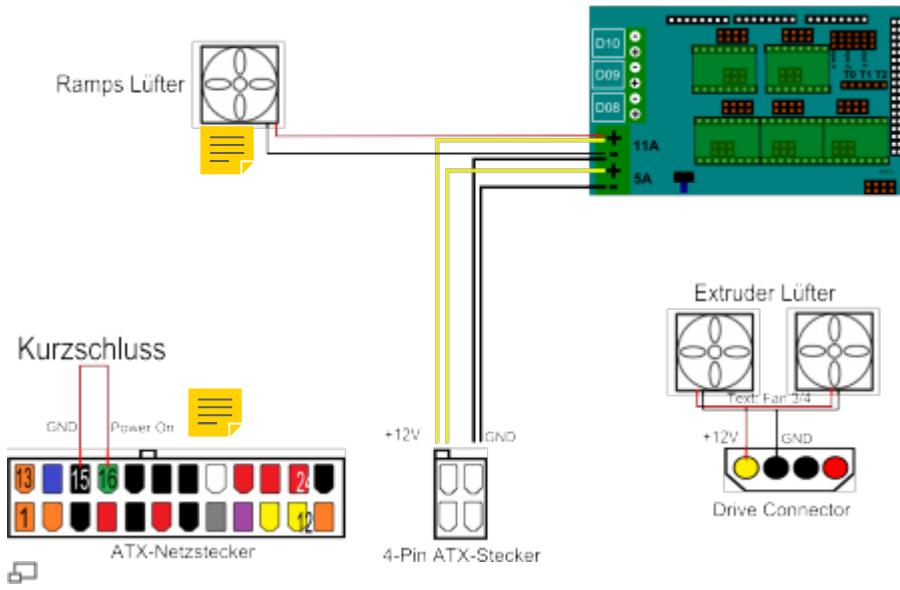


connecting RAMPS-fan



connecting extruder-fan

Connect the fan connector labeled “FAN 3/4” with one of the molex connectors from the power supply as shown below. The fan connector for Fan1 and Fan2 need a separate optional PCB which will be available in the future.

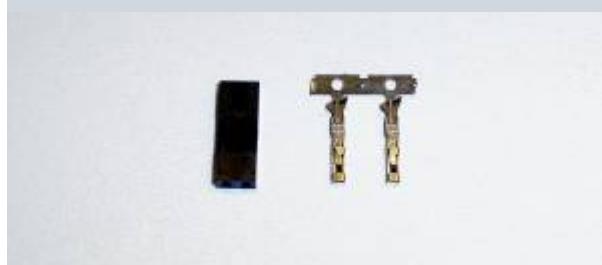


circuit diagram Ramps

You can use an end splice or wire end sleeve (not supplied) for a stronger connection.

## Cabling heated bed

This section only needs to be performed if the PRotos V3 is assembled with a heated bed.



material overview cabling heated bed

### bill of material cabling heated bed

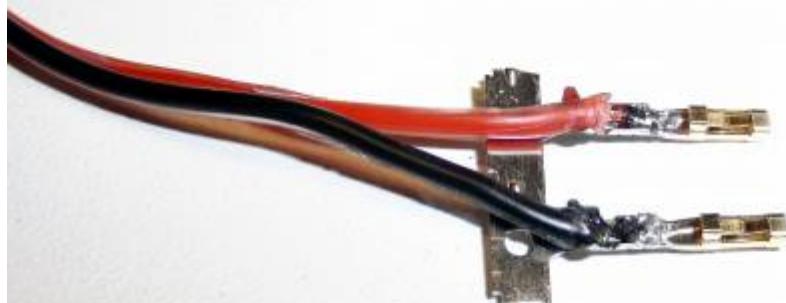
amount	description	item number
1	crimp connector housing R1P2	600428
2	crimp connector 24-28AWG	600429

Keep in mind that all cables of the heated bed need to move during printing, don't cut off too much.

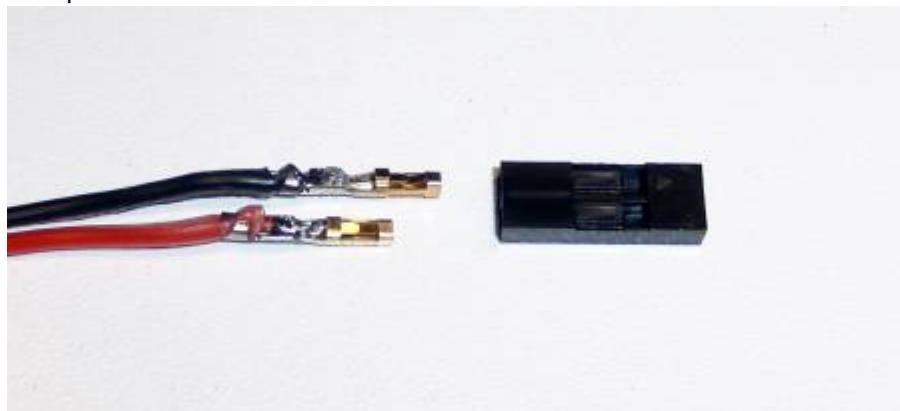
Have a look at the picture -*finished cabling heated bed*- on how the finished heated bed supposed to look.

Trim and crimp (or solder) the connectors on the two leads from the thermistor then insert them in the housing until they snap. The polarity doesn't matter here.

If you solder the crimp connector, pay attention to **only** solder within the dedicated areas. Don't let any solder run down the socket .

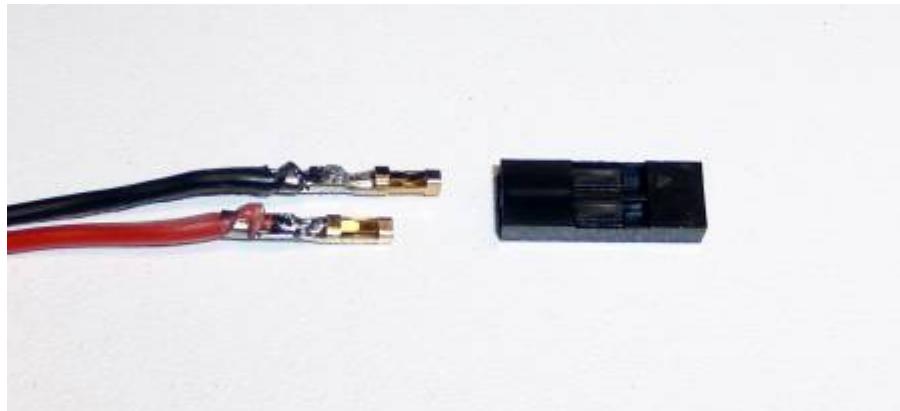


☞ crimp connector soldered



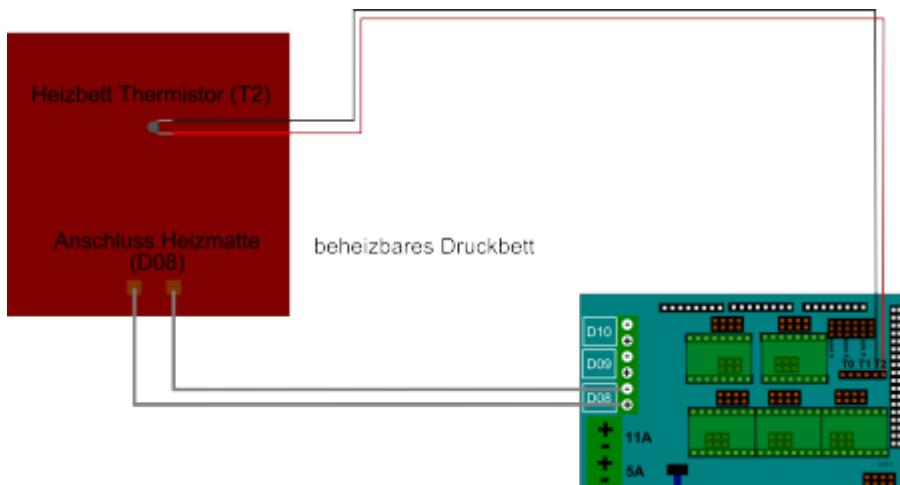
☞ crimp connector housing

Strip the leads of the heating pad and connect them to the output D08.

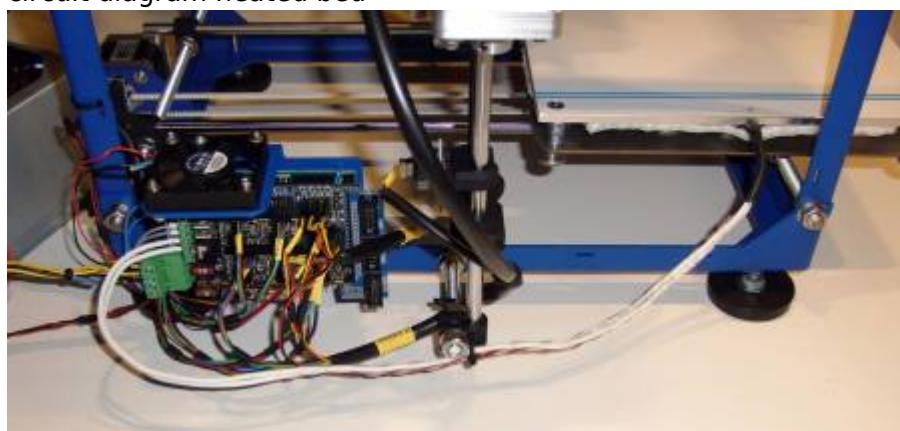


☞ connector cable heated bed

Connect all leads to the RAMPS as shown in the circuit diagram.



☞ circuit diagram heated bed



☞ finished cabling heated bed

Use cable ties, Kapton-tape or a spiral belt to secure the cabling of the heated bed.

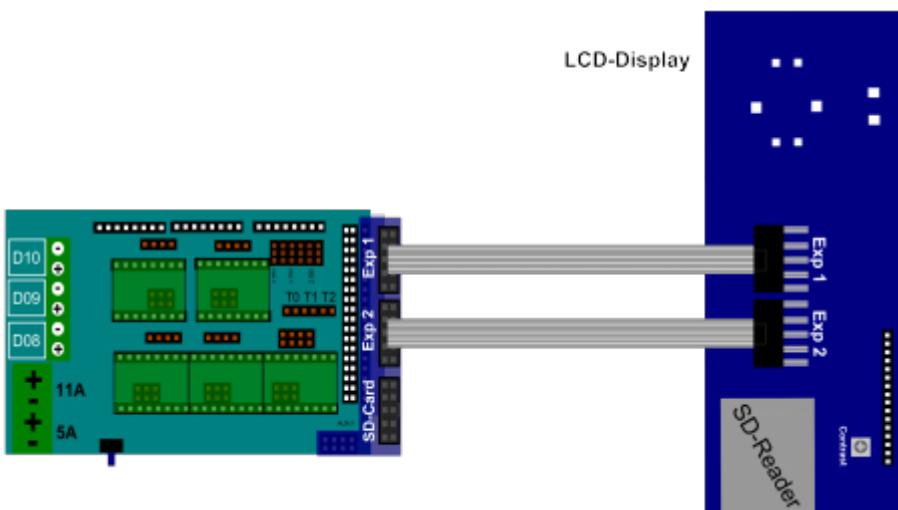
## Cabling LCD-Display

This section only needs to be performed if the PRotos V3 is assembled with a LCD-Display.



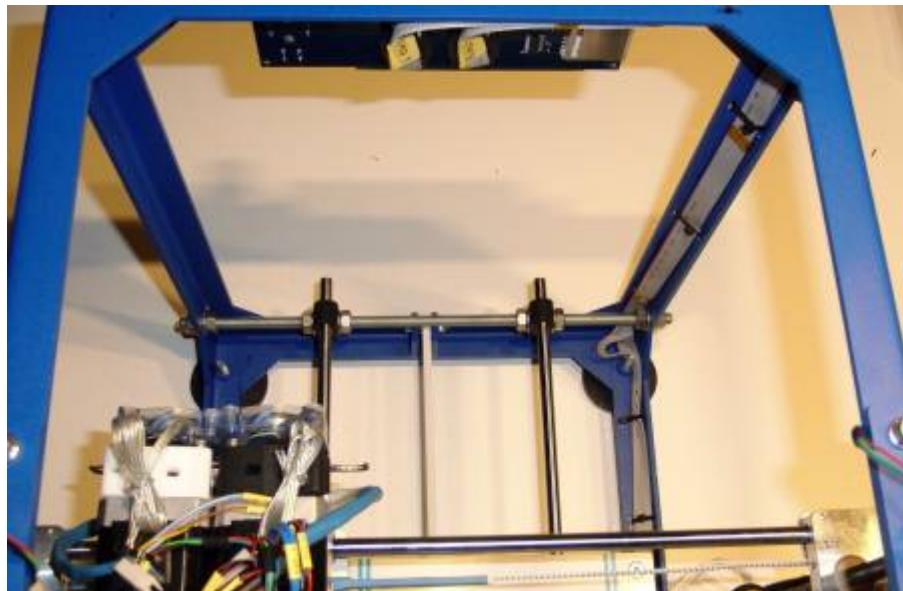
☞ material overview cabling LCD-Display

amount	description	item number
2	falt ribbon cable	600770
	cable ties	



☞ circuit diagram LCD

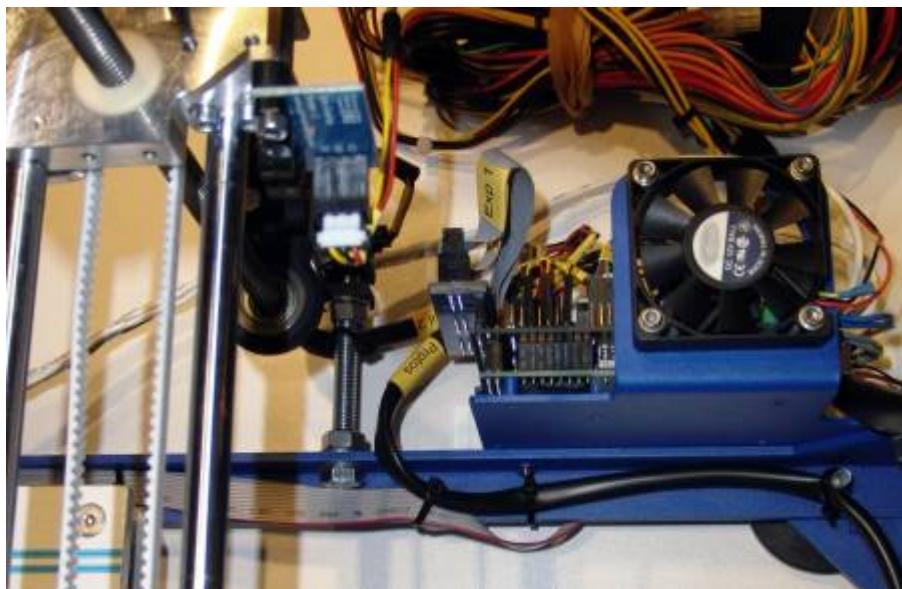
Run both ribbon cables together to the LCD. Tie them to the frame about every 100mm.



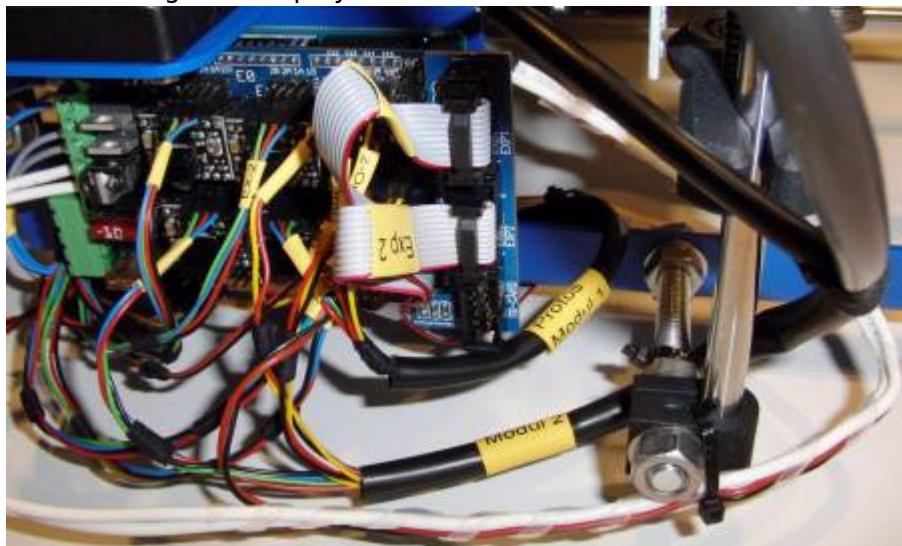
☞ cable routing LCD-Display 1

Guide the ribbon cable as shown on the picture.

After connecting the ribbon cable to socket EXP 1 and EXP 3, all other connectors should still be accessible.



cable routing LCD-Display 2



cabling LCD-Display

If after commissioning the display won't work, please check if you chose the correct firmware. If it is still not working, adjust the contrast of the display using the potentiometer on the back of the display.

## Filament tubing



material overview filament tubing

**bill of material filament tubing**

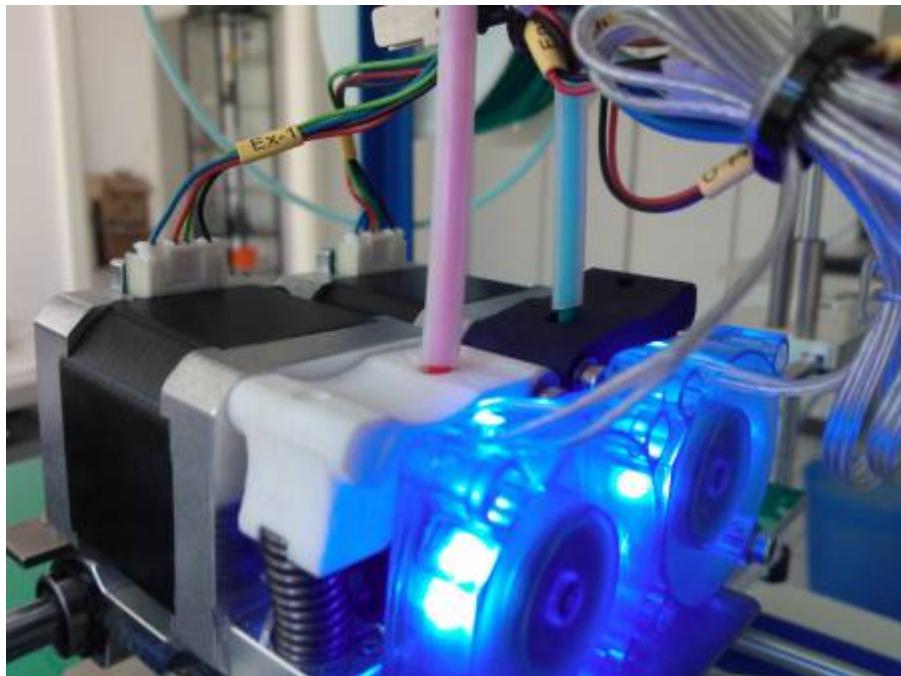
amount	description	item number
1	bowden	600140

**additional parts for the Dual-Extruder**

amount	description	item number
1	bowden	600140

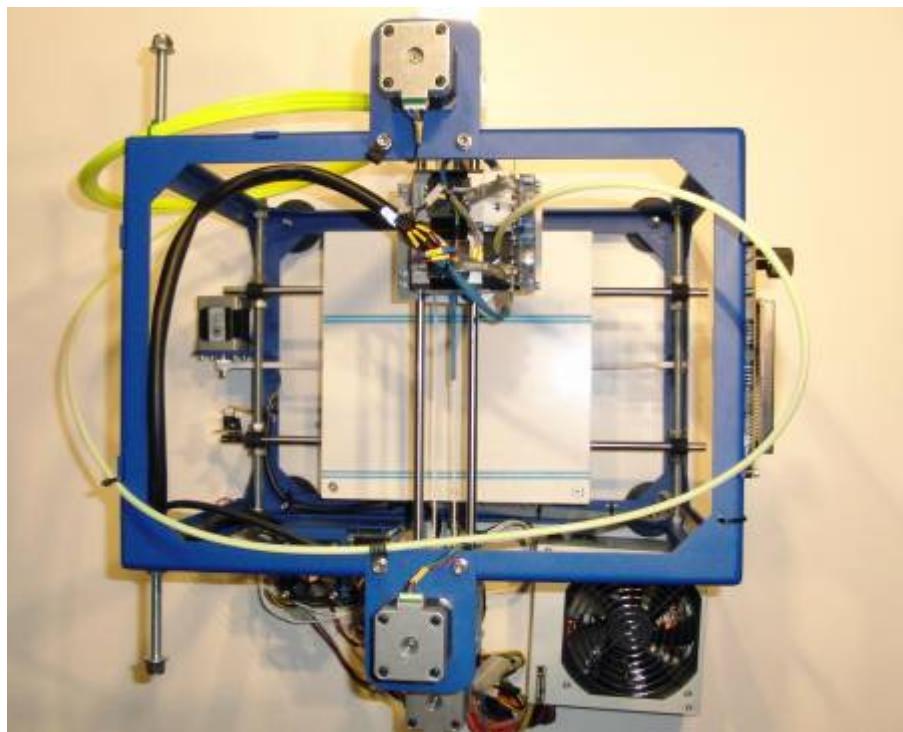
The bowden tubing is used for filament guidance and makes sure the filaments runs smoothly into the extruder.

Don't push the bowden inside the extruder.



bowden dual mounted

Make sure there are no kinks in the tubing that would restrict the movement of the filament.



attached tubing -Single-

## Completion of assembly



material overview completion of assembly

<b>bill of material completion of assembly</b>		
<b>amount</b>	<b>description</b>	<b>item number</b>
1	USB cable	100164
1	power supply connector	600530

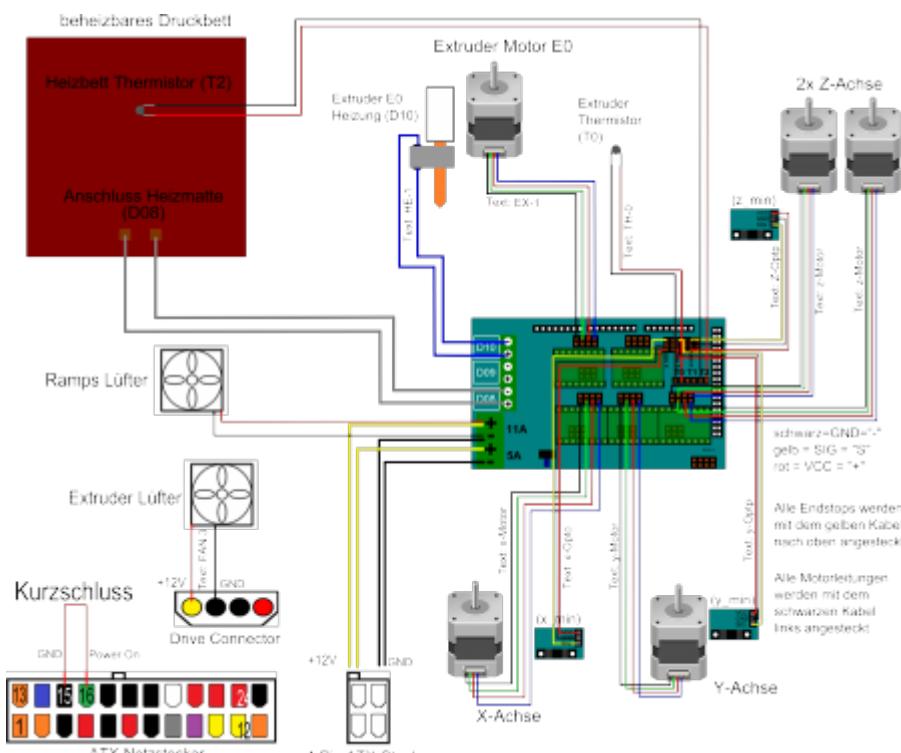
The last thing to complete the assembly is to plug the power supply connector into the power supply and connect the PRotos V3 to your computer using the USB cable.



completion of assembly

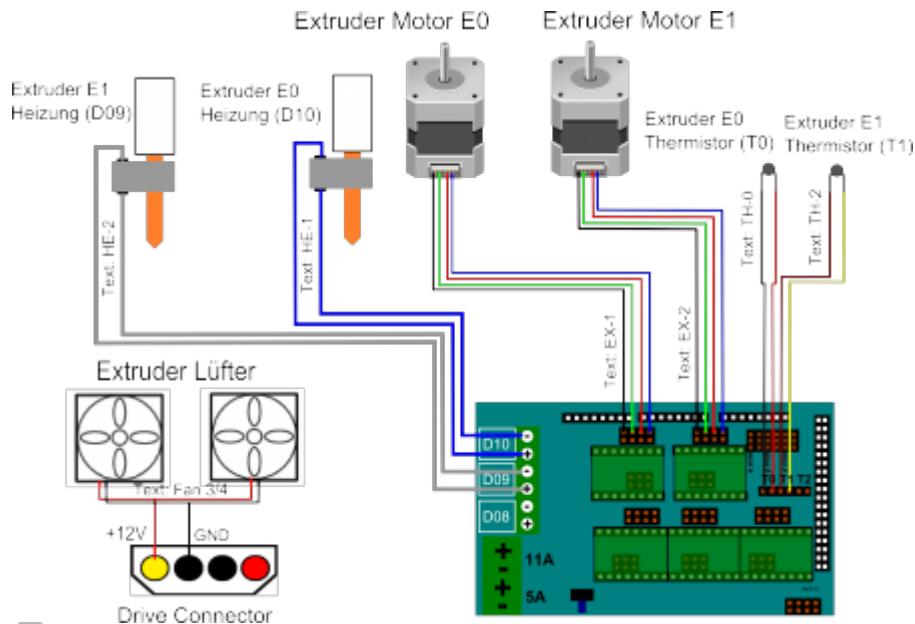
Make sure, to place the power supply in that way, that it doesn't affect the functionality of the PRotos V3 during operation.

Please plug in or check again the cables according to the circuit diagram below.

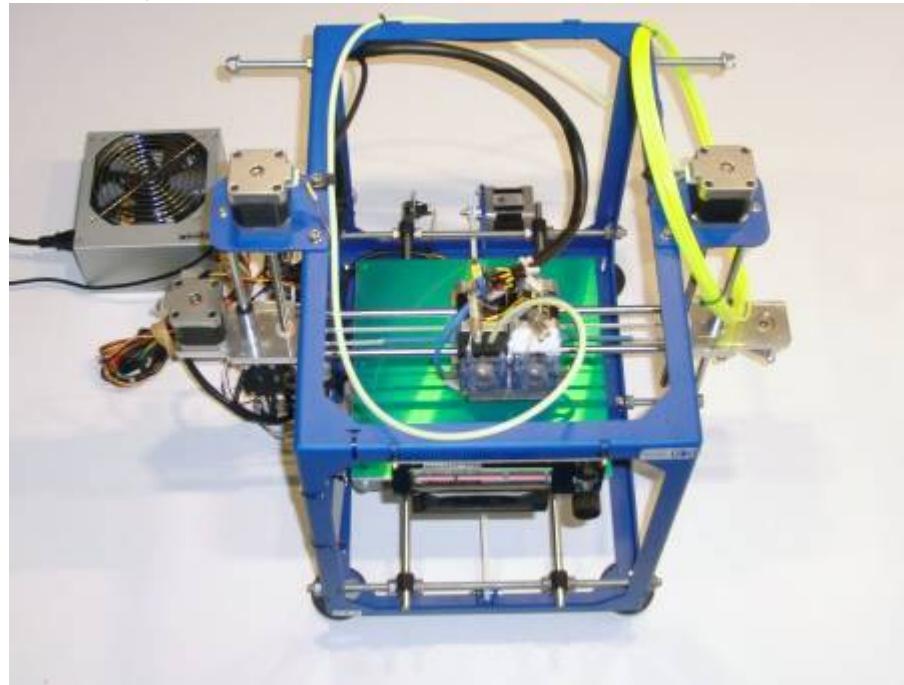


circuit diagram -single-extruder-

## PRotos V3 3D-printer manual



circuit diagram -dual-extruder-



PRotos V3 FULL-KIT

# Commissioning

A personal computer running Microsoft Windows®, Apple [Mac OS X®](#) or Linux is needed to get the most out of your PRotos.

## Firmware

To achieve an efficient communication between the Ramps and the Arduino, the right firmware has to be installed on the Arduino board [21](#).

Link	Description
<a href="http://reprapworld.com/mt/arduino/rrw-arduino-1.0.4-windows.zip">http://reprapworld.com/mt/arduino/rrw-arduino-1.0.4-windows.zip</a>	Arduino Version 1.0.4
<a href="http://wiki.germanreprap.com/en/download/firmware">http://wiki.germanreprap.com/en/download/firmware</a>	Firmware download

There is a firmware for our printers, adapted by German RepRap GmbH.

To be able to install this firmware on the Arduino board, the Arduino software version 1.0.4 has to be loaded at first.

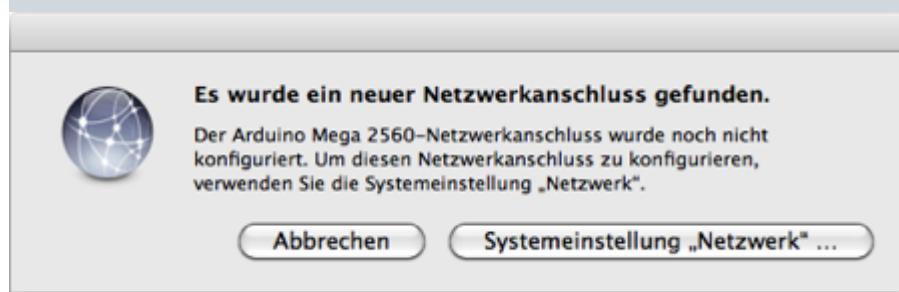
**It is important to choose version 1.0.4.**

If your 3DPrinter has **no** heated printing bed, you have to set the temperature of your heated bed to "0" inside your printingsoftware (i.e. Repetier Host or Simplify3D)!

**Otherwise your Hot-End wouldn't heat up an you are unable to print!**

### Only [Mac OS X](#)

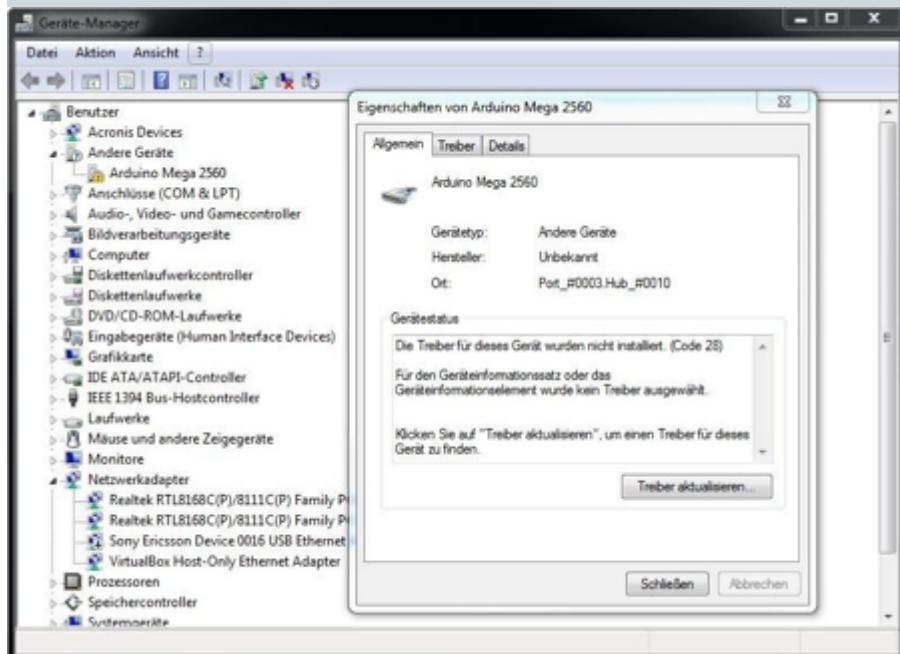
After connecting the board via USB, a note appears that a new network connection was found. Click the cancel (in German: Abbrechen) button here.



Detecting the Arduino board

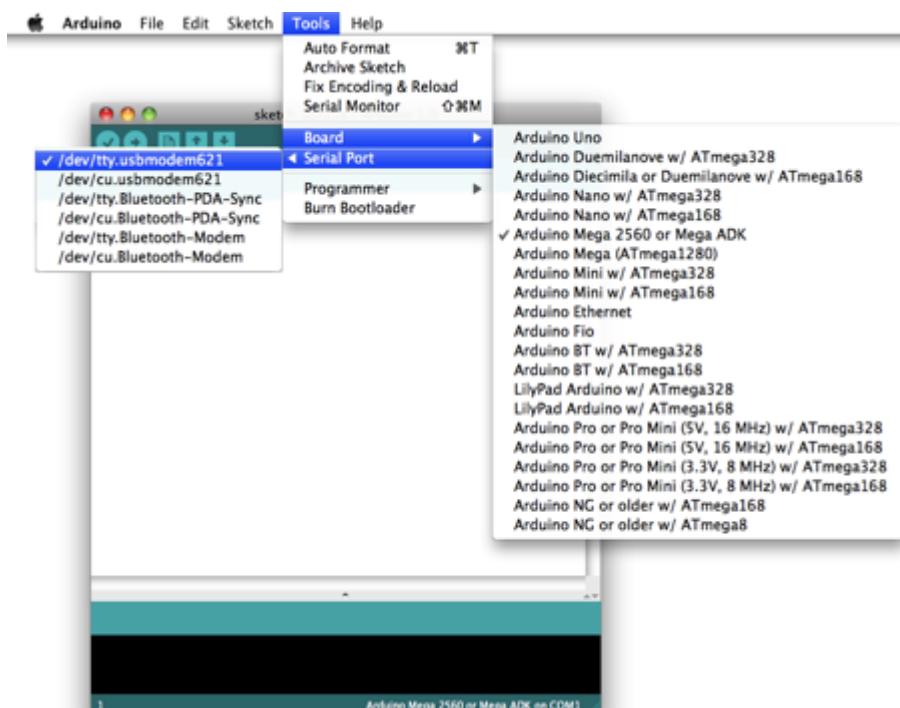
**Only Windows** After connecting the board via USB, a Windows request appears, in which the drivers can be selected for the installation. If this request does not appear, the drivers have to be updated manually, via Control panel → Hardware and Sound → Device manager. Therefore please select the following: Arduino Mega 2560 → right click → Properties → Driver update. Search for drivers on the

computer and select the path ..\arduino-1.0\drivers\FTDI USB Drivers.



### Installation driver Arduino board

Afterwards, "arduino.exe" in the arduino-1.0 folder and the **Arduino Mega 2560** can be selected below the menu item Tools → Board. For the application of the USB connection, the port COMx (the COM port is variable depending on the system) has to be selected below the menu item Tools → Serial Port.

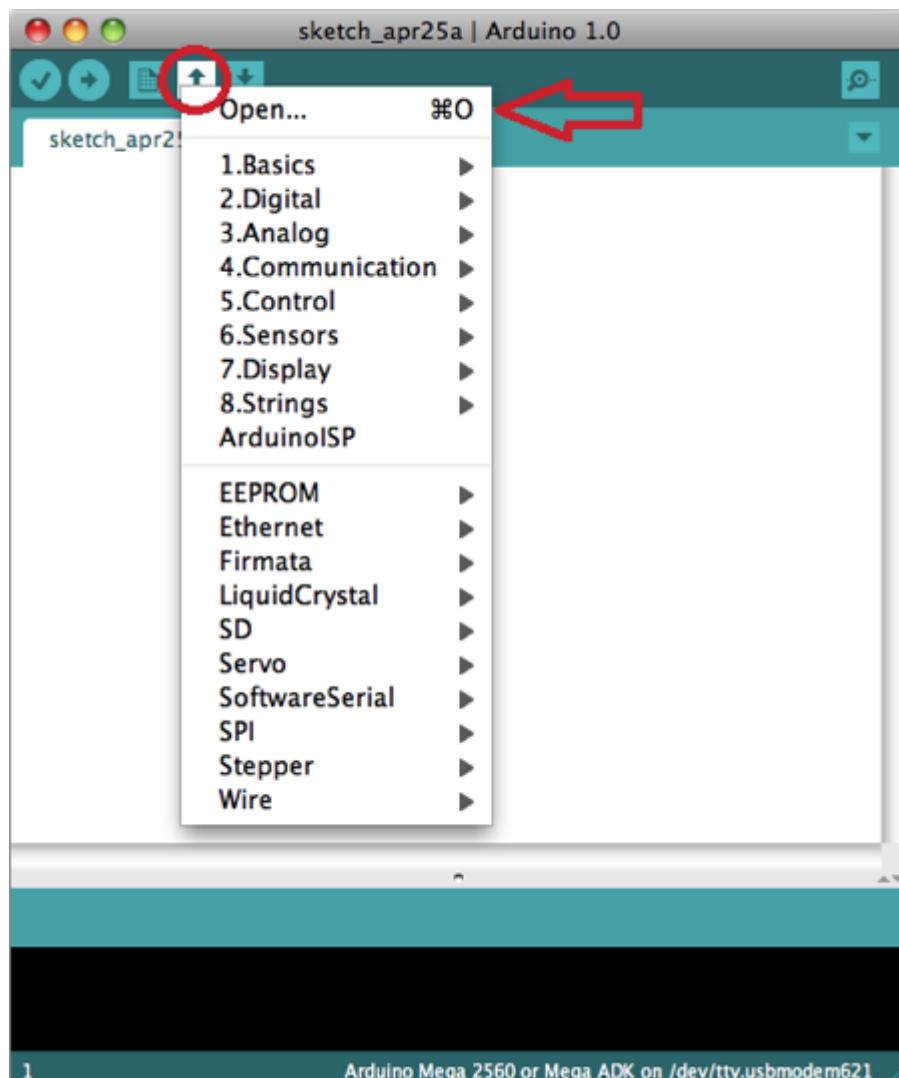


### Selection board and port

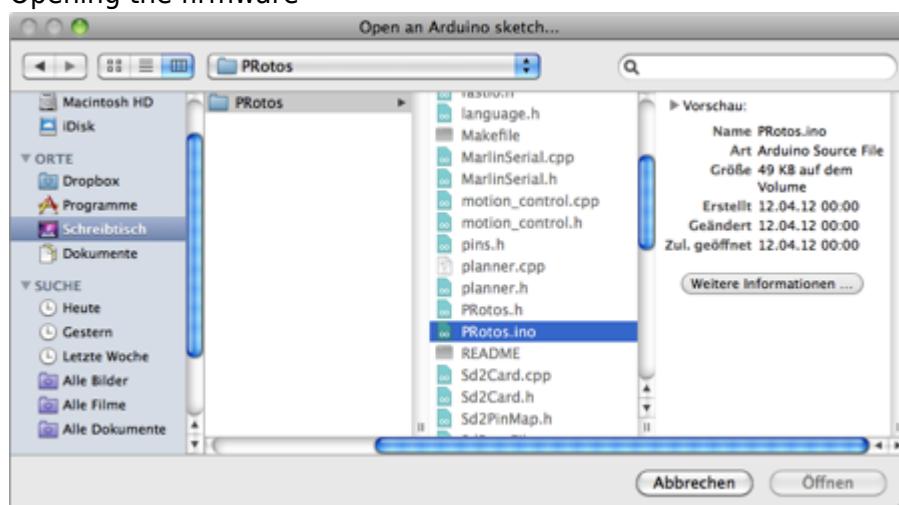
**Mac OS X:** e.g. /dev/tty.usbmodemxxx

**Windows:** e.g. COM3

To install the firmware, the correct and most current firmware has to be downloaded first. Afterwards, click open button in the Arduino program and select the file ending with .ino in the firmware folder via "Open...". This loads all header and source files (.h und .cpp) in the Repetier folder, automatically.



Opening the firmware



Selecting the .ino file

In the configuration.h file, the firmware is adjusted to the individual needs. It is not necessary to change anything in there.

**We assume no liability for damages for wrong parameter settings!**

Now a new window opens, in which the source code of the firmware appears (image: "Upload"). To transfer the firmware, the Upload-Button may now be selected below the menu bar.

```
PRotos | Arduino 1.0
Upload
PRotos Configuration.h Configuration_adv.h EEPROMwrite.h
/*
 * PRotos firmware based on Marlin, Sprinter and grbl.
 */

#include "PRotos.h"

#include "planner.h"
#include "stepper.h"
#include "temperature.h"
#include "motion_control.h"
#include "cardreader.h"
#include "watchdog.h"
#include "EEPROMwrite.h"
#include "language.h"

#define VERSION_STRING "1.0.0.3"

// look here for descriptions of gcodes: http://linuxcnc.org/handbook/gcode/g-code.html
// http://objects.reprap.org/wiki/Mendel\_User\_Manual:\_RepRapGCodes

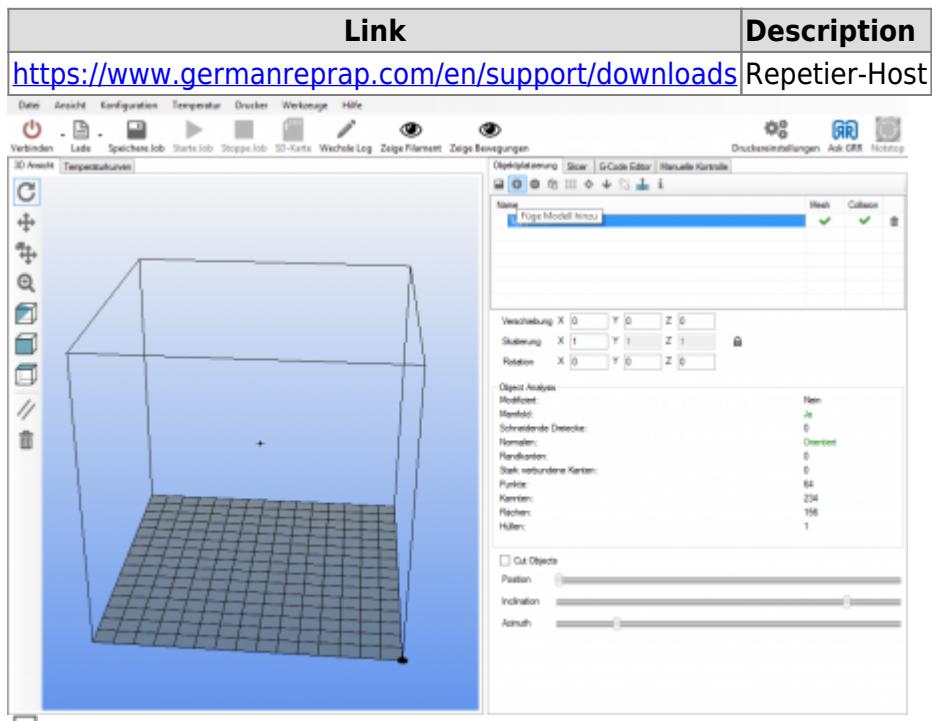
//Implemented Codes
//-----
// G0 -> G1
// G1 - Coordinated Movement X Y Z E
// G2 - CW ARC
// G3 - CCW ARC
Done uploading.
Binary sketch size: 46914 bytes (of a 258048 byte maximum)

11 Arduino Mega 2560 or Mega ADK on /dev/tty.usbmodem621
Upload
```

The status LEDs are flashing during the uploading process. After the upload, it is displayed beneath the source code that the upload is completed.

## Repetier-Host

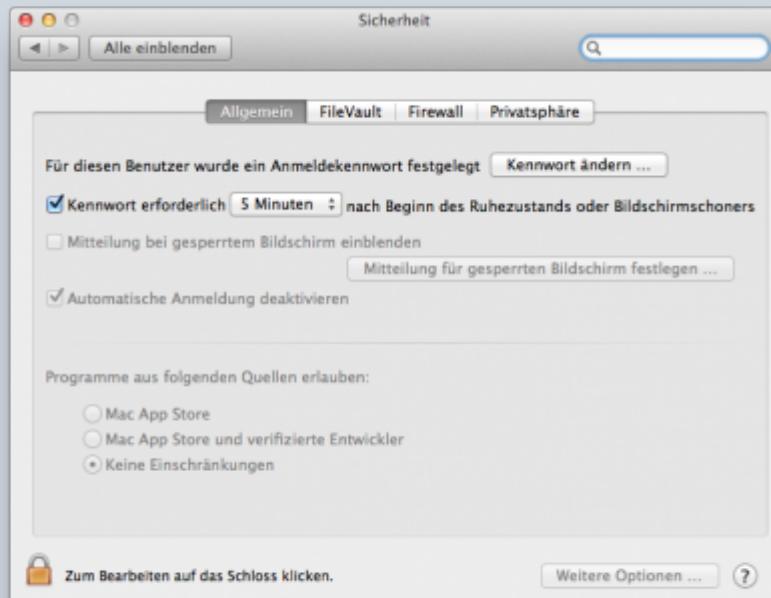
To operate the 3D printer, the Repetier-Host is downloaded to the system.



Repetier-Host (Windows)

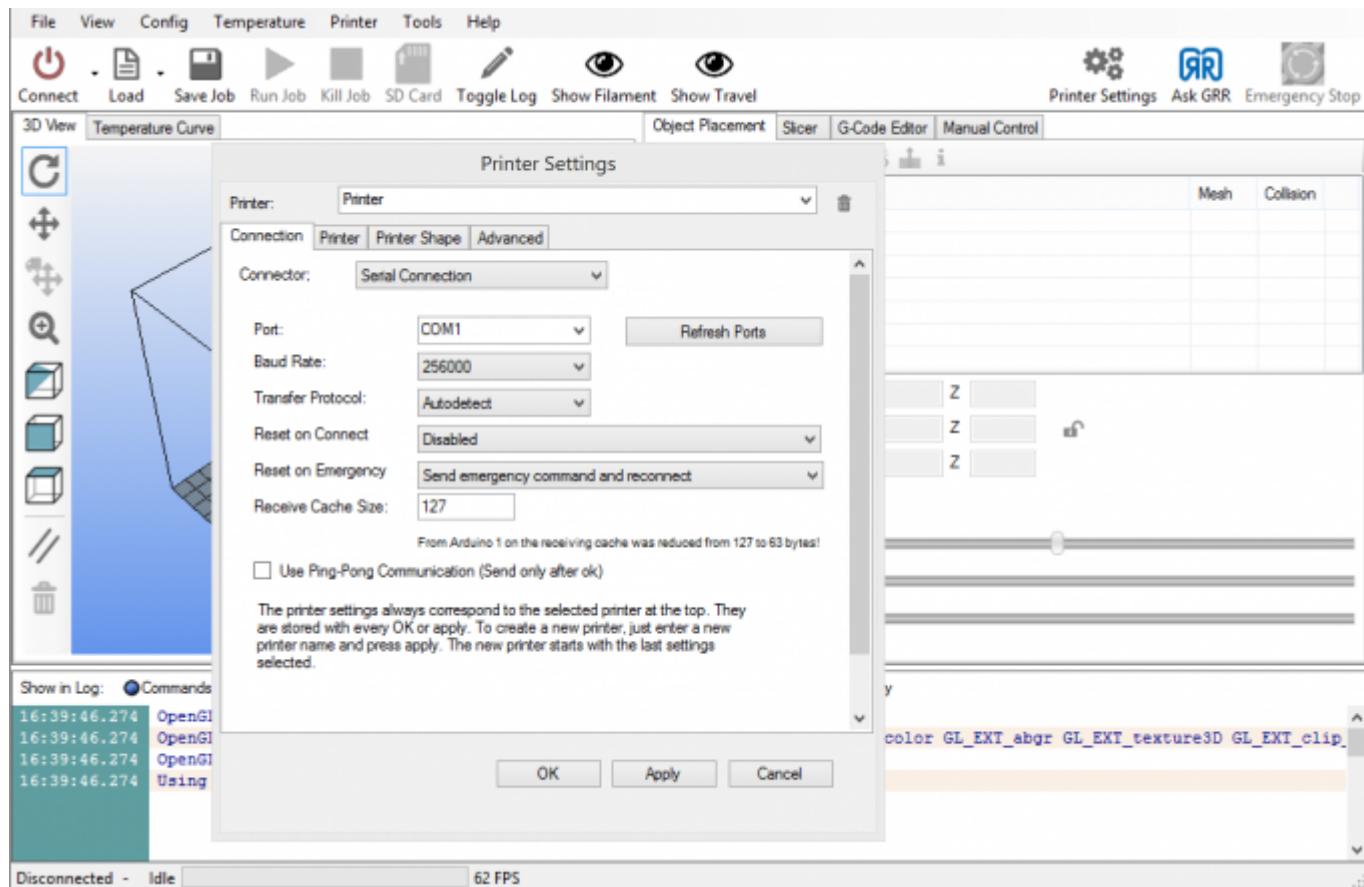
Now the latest version of Repetier-Host is downloaded and installed. After that, Repetier-Host is ready for use.

**Only Mac OS X** Using Mountain Lion (10.8.x), the installation of an unsigned code has to be permitted. You can set this in System Preferences → Security & Privacy, and click “Allow” if the window pops up when you start Repetier-Host.



Mac OS X Mountain Lion (10.8.x) not signed code permitted

Once the Repetier-Host software is running select the pre-configured profile (PRotos) and the correct port and baud rate for the Protos V2.



## PRotos settings Repetier-Host

Only [Mac OS X](#) and Linux:

For these operating systems the printer settings have to be entered by hand:

### Tab Printer:

- **Traval Feed Rate:** 6000 [mm/min]
- **Z-Axis Feed Rate:** 300 [mm/min]
- **Default Extruder Temperature:** 200 °C
- **Default Heated Bed Temperature:** 60 °C
- **Number of Extruder:** 1
- **Check Extruder & Bed Temperature:** [X]
- **Remove temperature requests from Log:** [X]
- **Check every 1 seconds.**
- **Park Position:** X:0, Y=0, Z-Min=0 [mm]
- **Send ETA to printer display:** [X]
- **Go to Park Position after Job/Kill:** [ ]
- **Disable Extruder after Job/Kill:** [X]
- **Disable Heated Bed after Job/Kill:** [X]
- **Disable Motors after Job/Kill:** [X]
- **Add to comp. Printing Time:** 0 [%]

## Tab Printer Shape:

- **Pinter Type:** Classic Printer
- **Home X:** Min
- **Home Y:** Min
- **Home Z:** Min
- **X Min:** 0
- **X Max:** 200
- **Bed Left:** 0
- **Y Min:** 0
- **Y Max:** 200
- **Bed Front:** 0
- **Print Area Width:** 200 [mm]
- **Print Area Depth:** 200 [mm]
- **Print Area Height:** 110 [mm]

## Tab Advanced:

- **FilterPath and Parameter:** yourFilter #in #out
- **Run Filter after every Slice:** [ ]

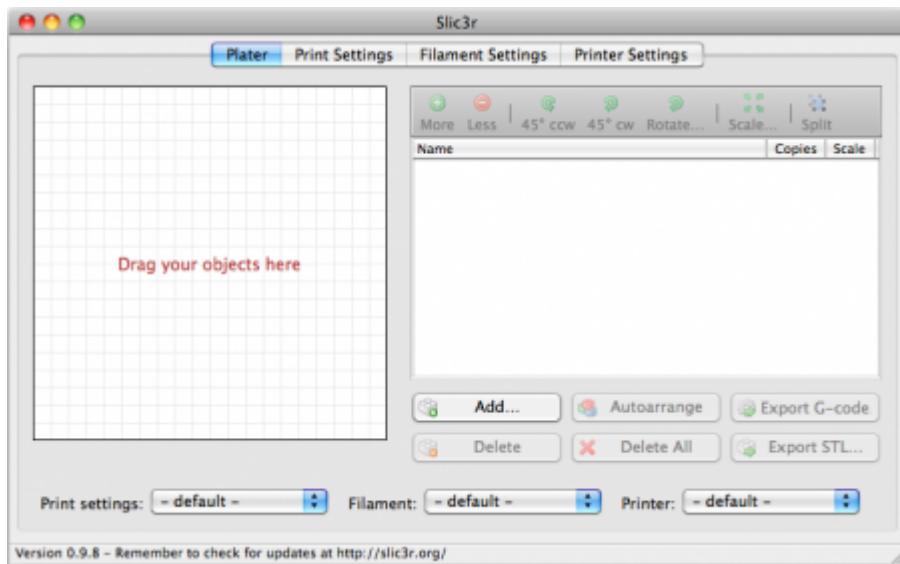
# Slic3r

Link	Description
<a href="http://slic3r.org/download">http://slic3r.org/download</a>	Slic3r - STL to GCode converter for 3D printers



Our [Repetier-Host](#) Software for Windows has an integrated version of Slic3r. An advanced user can use a newer oder beta version of Slic3r from the link above.

The program slic3r can be used to create a machine-readable code in the format .gcode from CAD files in the format .stl later on.



## Slic3r (OS X)

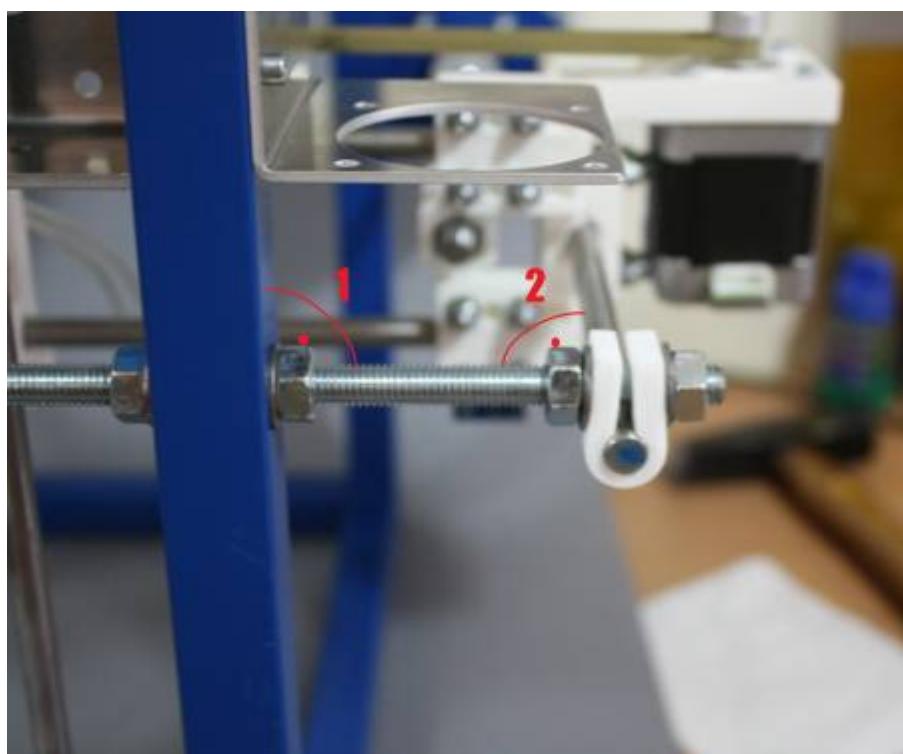
A detailed description of Slic3r can be found here: [Slic3r User Manual](#).

# Calibration

After installing the necessary software packages on your computer we can now calibrate the printer. This is important in order to achieve the highest accuracy with your printing results.

## Alignment of the axes

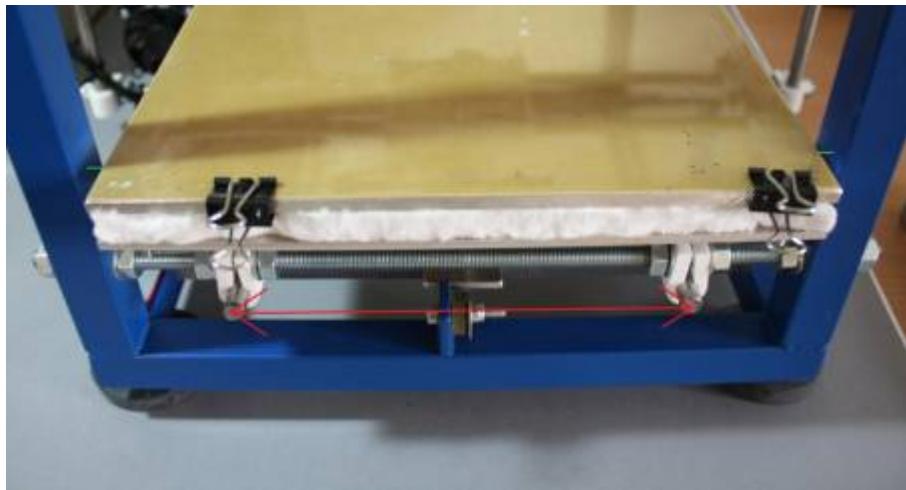
Prepare by leveling the print bed using a (spirit or laser) level.



Alignment z-axis

1 = This angle will always be 90°

2 = Initially this angle is 90°. Adjust the bar clamps to allow a smooth travel of the x-axis carriage along the z-axis guiding rods.



#### Alignment y-axis

**green marks:** the distance between the y-carriage and the frame should be equal on both sides.

**red marks:** ensure 160 mm distance between the centers of the guiding rods.

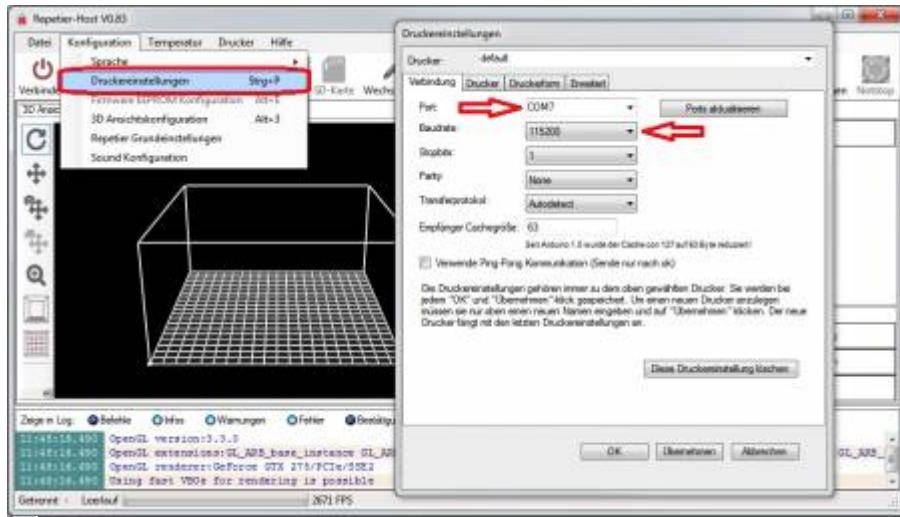
Manually move the y-carriage to one end and loosen the respective bar clamps. This allows to move them in their correct position. Make sure the guiding rods are 160mm apart and the gap to the frame is equal on either side. Next evenly tighten the nuts without moving the guiding rods, then repeat on the other side.

Rods and bearings go through a break-in phase where the surfaces slightly adapt to each other. The friction varies during this phase until it reaches a constant value.

## Configuration

We use the control software on the computer to check the end-stop settings, particularly the z-axis end-stop.

Start the repetier-host software and configure the communication port and baud rate. Use the same port as when flashing the firmware onto the Arduino, e.g. usbmodem1411 for Mac OS or COM7 on Windows. The baud rate should be 115200 if that's what you've configured earlier. Alternatively, it could be 250000.



Select port and baud rate

Connect to your printer by clicking on the “connect” button in the top-left corner.

If you don't see the printer welcome message in the bottom window or you get an error message, make sure there is no other software active that uses (and blocks) that communication port to the printer. If there is, terminate that program and try again. You could reset the printer by briefly pressing the reset button on the RAMPS board. It is the only button there is. Alternatively unplug and re-plug the USB cable into the Arduino. Now try again to connect. If it still doesn't work, check the port and baud rate again or try a few alternatives if you were unsure to start with.

The default setting in the firmware for the print size is 200 x 200mm. This can be changed in the software settings.

If the (invisible infrared) light barrier between the prongs of the end stop is broken by the metal end stop flag (or a piece of paper or business card for testing), the printer stops moving any further in that direction and records this as the home (or zero) position. The limit at the other end of that axis is only defined in the software.

We'll check the functionality of the end-stops and the cabling and connectors now. Move the print head in a center position for all axes using the software before clicking on the HOME button. At this stage the software only allows to click on the plus button. If the carriage is already past the half way position away from the end-stop you don't need to move it.

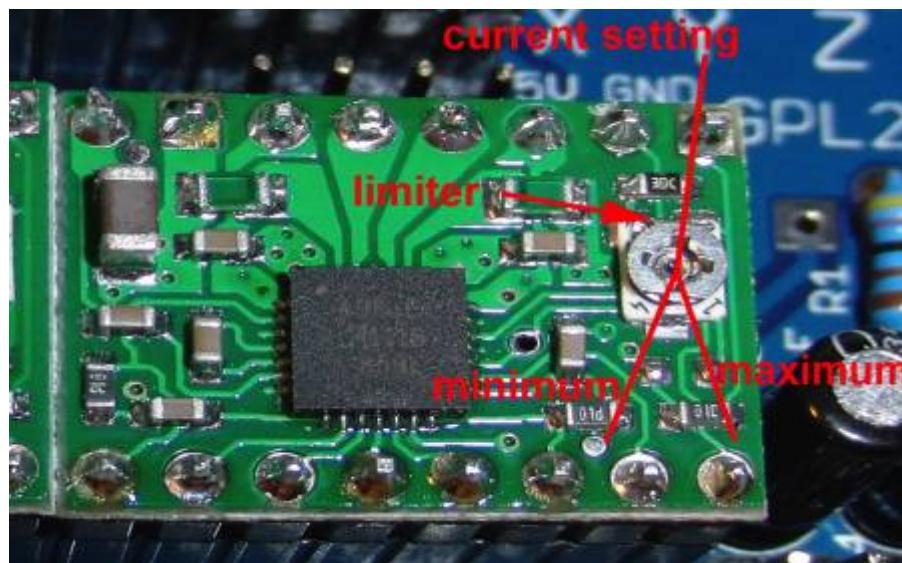
If, however, the printer makes a loud noise or is hitting the far end of the axis unplug the mains power immediately. Also reset the Arduino and reconnect the computer to the printer by clicking on the “connect” button. Then plug the power cable back in.

If all the potentiometers (aka pots) are still in a 12 o'clock position use the “home” button in the software to individually move them to the zero position. For the initial test, you can use a business card or a small flat head screwdriver to set off the end-stop signal shortly after hitting the “home”

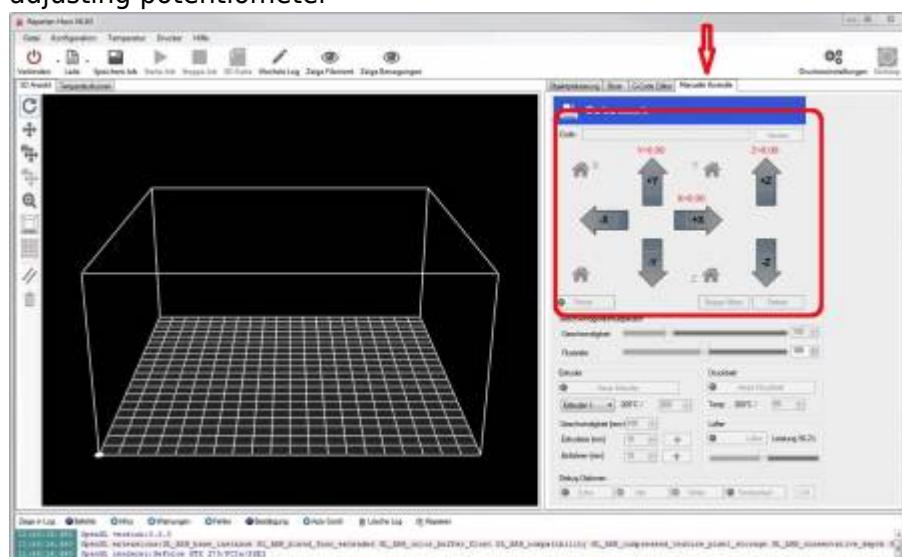
button. If the carriage doesn't stop, unplug the power cable as mentioned above. Then check that the green LED on the end-stop is on while idle but turns off when the light barrier gets broken. If the carriage does stop as expected, press the "Home" button again and let the metal strip break the barrier. Once all axes are in the home position we need to adjust the current to the stepper motors individually.

Use a small non-conductive screwdriver to adjust the pots while the printer is turned on. Turn the pots counterclockwise to the limiter (labeled Begrenzer in the photo) which is in a 7 o'clock position. Click on the +10 button in the software to move one axis at a time. Increase the current by turning the pot clockwise until the stepper motor just started to move smoothly. Don't turn it too high or the motor might get too hot during long prints. You might have to click the +10 (or -10) button repeatedly to adjust this.

If you don't have a non-conductive screwdriver, turn the printer off between adjustments of the pots. As mentioned, a 10 o'clock position on all pots is generally the correct setting. The photo shows the pot roughly in the 1 o'clock position.



adjusting potentiometer

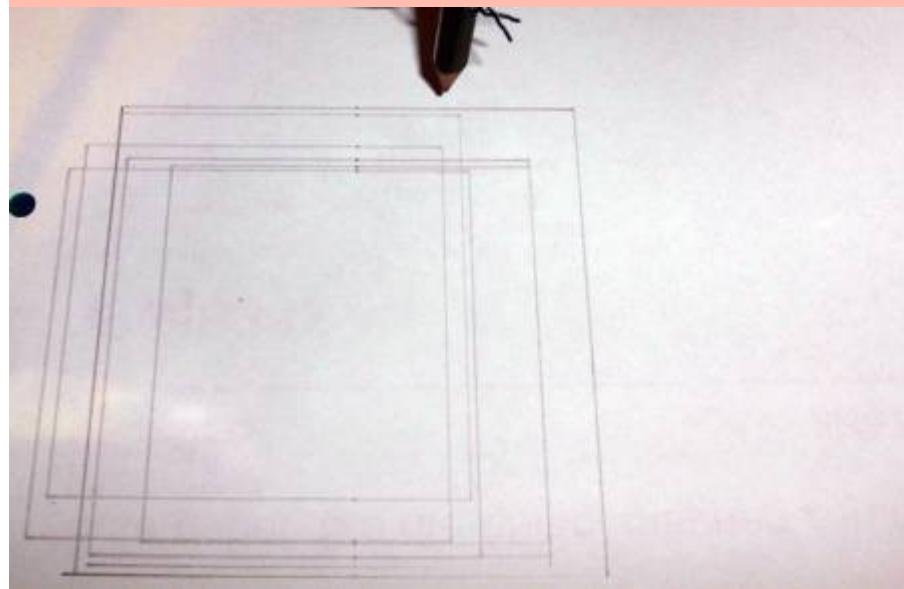


manual check

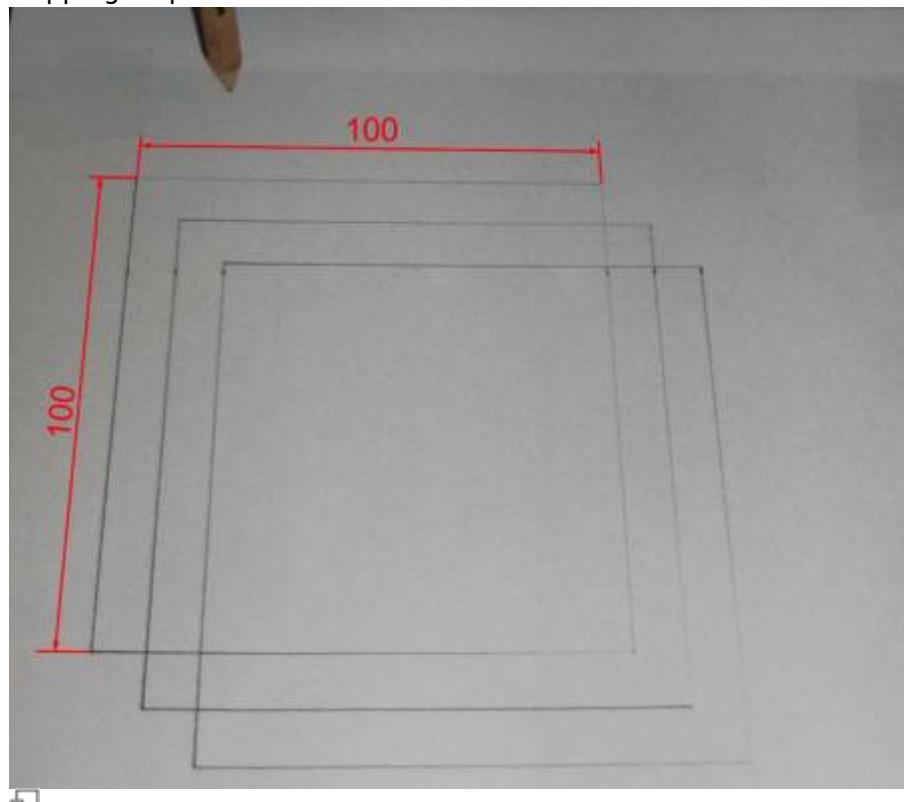
The pots are set correctly if the stepper motor is not losing or skipping any steps. This means it moves the head smoothly from one end to the other. You can also check this by attaching a pencil to the extruder facing downwards onto a piece of paper that you have taped to the print bed. All lines in the photos should be 100mm. If they are not, adjust the respective pot.

After every reset or reconnect click on the “home” button for the x- and y-axis first to initialize the software. Note that at this stage we haven't adjusted the z-axis yet.

The motor can also skip some steps if the pots are turned too high.



skipping steps

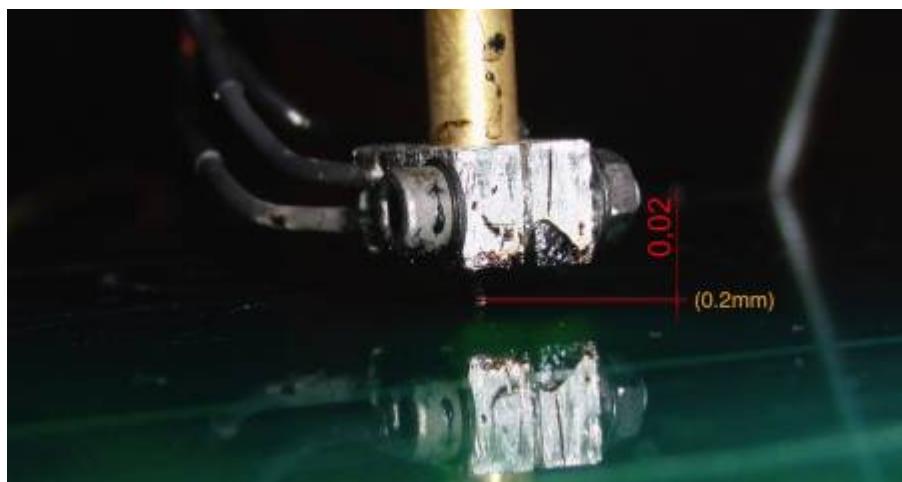


no skipping

Next adjust the z-end-stop to break the light barrier once the distance between the print bed and the tip of the hot end is 0.2 mm (this is the same for all extruder and nozzle sizes). The photo below is marked as 0.02 (cm) which is equal to 0.2 mm.

Use a feeler gauge (not supplied) or use a standard paper business card (like the one you got from us) and adjust the bed so that it just fits in between snugly. The gauge (or card) must not lift the extruder but shouldn't slide in the gap without any resistance at all either. A slight scarring of the edge of the business card is ideal. Adjust the print bed equally in all four corners using the spring loaded bolts and then also check the center positions for x and y.

If the distance in the center varies noticeably from the edges one might think the print bed is somehow warped or bent. In almost all cases the reason for that is instead a misalignment of the x-axis carriage or a slight twist in the y-guiding rods.



hot end adjustment

## Screw locking

We recommend to use screw locking glue for the nuts. You should put a drop on the thread where the nut is located later.



 Screw locking (recommended)

# Operation

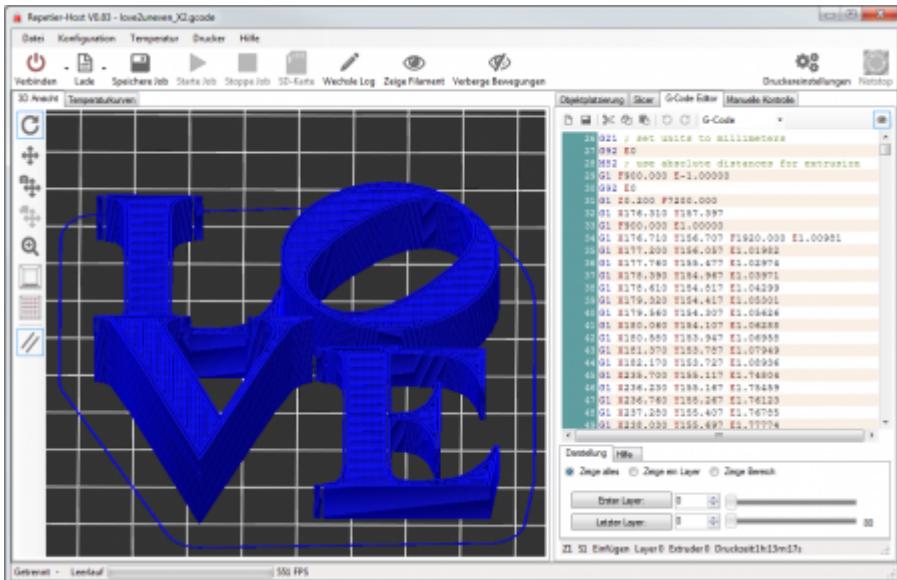
It's not difficult to operate a 3D printer. A .gcode file is loaded into the printer interface and the print is started. To get the GCode for the 3D printer can be more difficult. Only self-generated .gcode files should be used as they contain meta information specific to this printer.

## GCode generation

There are different programs for the generation of the GCode, e.g. Slic3r or Skeinforge Note that Skeinforge is only recommended for experienced users. The main principles of those programs are quite similar, but they differ in the extent of the adjustment possibilities. The GCode is created from a .stl file (see image “Example Love in STL format”), which is a common standard in computer-aided construction. This GCode contains the settings of the extruder, as well as the path to be driven and how much material is necessary on the different spots. The example in the image “Example Love in GCode format (in Repetier-Host)” shows the preview as it is displayed in Repetier-Host.



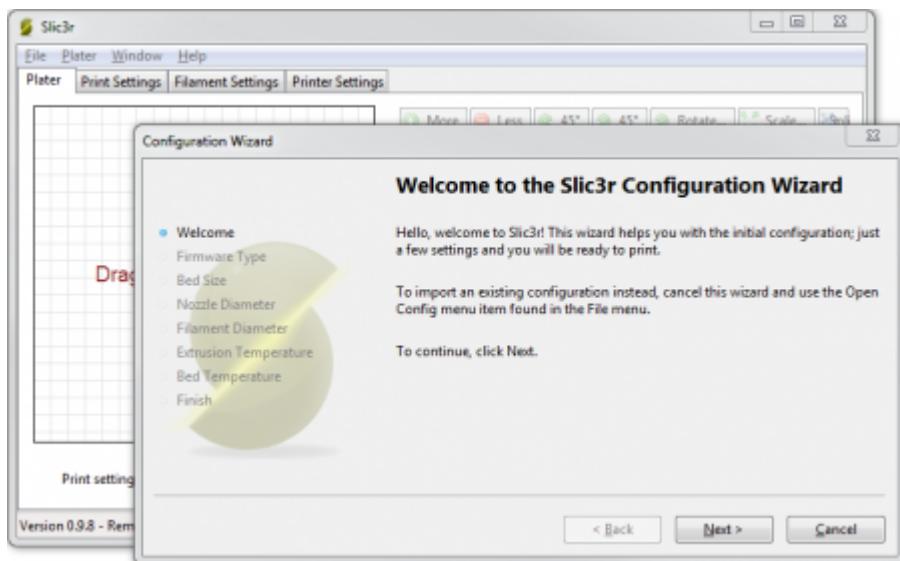
Example Love in STL format<sup>3)</sup>



Example Love in GCode format (in Repetier-Host)<sup>41</sup>

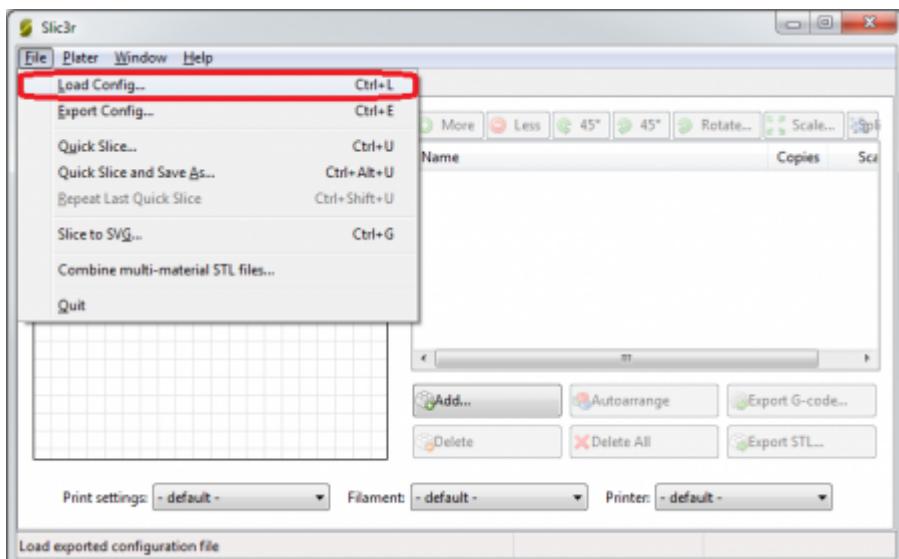
## Slic3r

The tool [Slic3r](#) is more suitable for beginners. There is a preset profile for the printers by German RepRap GmbH that can be used even though the printer will work with the default parameters as well. In case the profile is used, the “Configuration-Wizard” may be canceled.



Slic3r Interface Wizard

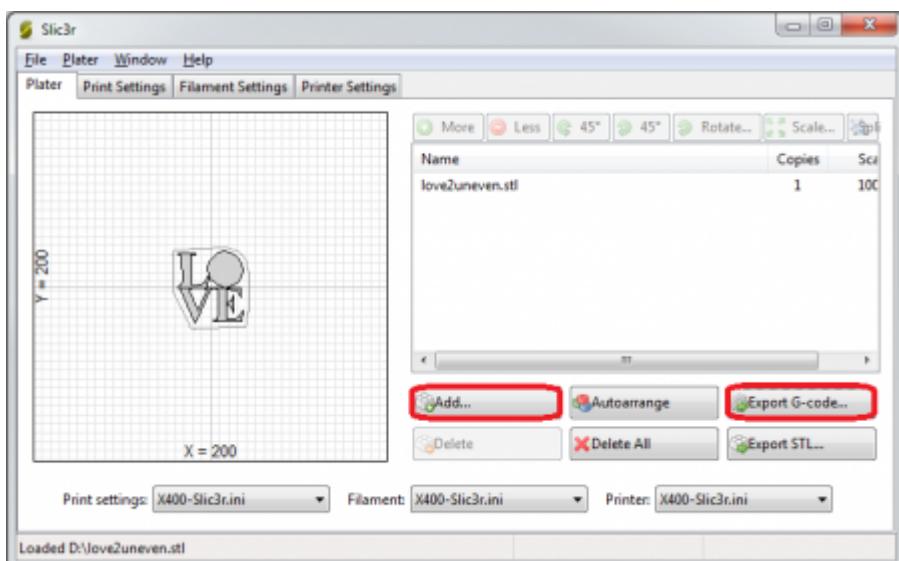
For the usage of the preset profile, it is loaded via “File → Load Config...”.



### Slic3r Interface Load Config

The printing results of GCodes made with slic3r become visible at an early stage. The settings for Slic3r are kept very easy and can be entered quickly. An explanation of all parameters can be found on the developers web site or here: [Slic3r User Manual](#).

Slic3r does not offer an internal possibility for a preview of the GCode, but it can be viewed via other programs. As soon as all adjustments are done, the .stl file is selected through “Add...” (Image: “Slic3r interface export G-Code (Windows)”) and saved as .gcode via “Export G-Code...” afterwards.



### Slic3r interface export G-Code<sup>5)</sup>

A detailed English documentation is available here:  
<https://github.com/alexrj/Slic3r/wiki/Documentation>

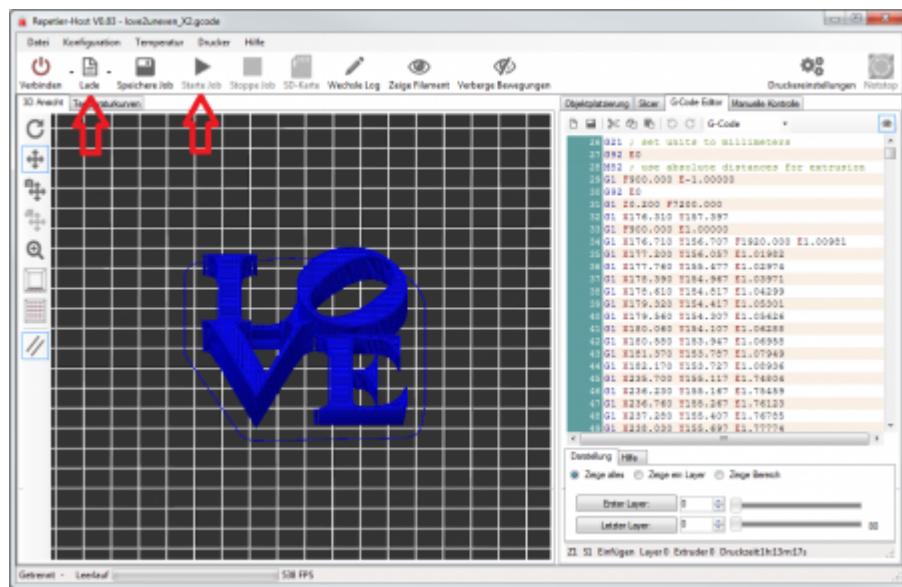
There are different programs for the operation of the printer. We recommend to use “Repetier-Host”, as it is simple to use and has the largest range of functions.

However, it is possible to use a different software to operate the printer, as it is compatible with all

common RepRap printer operating programs.

## Repetier-Host

The Repetier-Host is the central point to operate the printer. The item “Load” (Image “Repetier-Host loading and printing”) is selected to load a .gcode file. Afterwards, the object is displayed in the virtual printing room.



Repetier-Host loading and printing <sup>6)</sup>

After the object has been checked regarding position, size and possible bugs in the object, the print job may be started using “Start job” (image “Repetier-Host loading and printing”).

By the end of the process, the completed part should lie on the printing bed (image “LOVE printed”) and when cooled down, it can simply be removed or pried from the bed.





LOVE printed [21](#)

# Troubleshooting

If you have questions regarding the commissioning or operation or in case of a problem, please contact your stockist or the support of the company German RepRap GmbH via our support (<https://support.germanreprap.com>).

Please make sure that, before starting with the troubleshooting, the proper firmware is installed on your printer. (only X400 & PRotos/V2/V3)

 The X400CE has the correct firmware installed ex factory.

# The motors cannot be controlled

Problems with the controlling of the motors can have different reasons. At first it should be verified that the power supply of the RAMPS electronics is switched on and correctly wired. In case the electrical supply is not the problem, the wiring of the motors may be at fault.

If the difficulty with the motors still persists, check whether the firmware was correctly transferred onto the Arduino board. This can simply be validated by heating up the hot end.

# The motors rotate in one direction only

If the motors only rotate in one direction, the problem lies with the end stops. In that case, the functionality of the end stops has to be checked. The LED has to flash when switched on and the light barrier is not broken. The LED should stop flashing when the light barrier is broken, e.g. with a screwdriver.

Once the function of the end stops has been verified, the cabling has to be checked. Also, the end stops have to be plugged on the “min” contacts of the Ramps, as those limit the downward movements. The upper restriction of the movement is preset via the firmware.

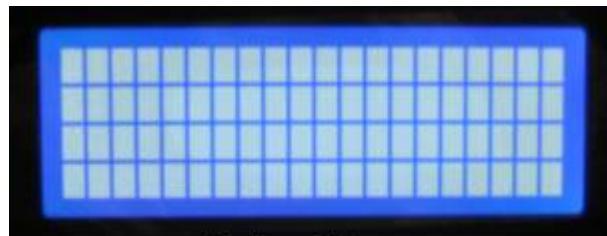
# The printer breaks off printing and stops responding

If the printer breaks off the printing process there are three possible reasons. First, it should be checked whether the power supply was interrupted. The problem may also be caused by an interruption of the data connection to the computer, the crashing of a program or a disconnected USB cable.

If neither is the case, it is possible that the Pololu shut down due to overheating. This can easily be validated by touching the Pololu heat sink. Thirdly, the Ramps fan might not sufficiently cool the Pololos or the potentiometer may be set too high.

If the potentiometer can not be decreased due to possible step losses, it has to be examined whether the motor works against an increased resistance, e.g. some misalignment of the rods after moving or bumping the device. This resistance would have to be eliminated and the potentiometer readjusted afterwards.

# Contrast wrong on the LCD-Controller



Display zu hell



Display richtig eingestellt

☞ LCD-Controller contrast, top to high, bottom alright

At the backside of the LCD-Controller the contrast can be adjusted with a small screwdriver.



With the X400, therefore a acrylic panel must be dismantled.



☞ LCD-Controller X400 setting contrast (red circle)

[Here](#) you find a detailed view of the LCD-Controller menu guidance.

# The printer cannot be connected to the host PC

In case the connection with the printer via Repetier-Host fails, it has to be checked whether a different program uses the port "COMx" for the communication with the printer, e.g. the Arduino software. Quit the other software if necessary. After that, or if no other program uses the port "COMx", the reset button has to be pressed to restart the printer. Unplugging and replugging the USB cable has the same effect. Now the printer should be available.

# No commands are transmitted to the printer

If no commands like movements of the axes or heating of the hot end are transmitted to the printer via the Repetier-Host, the electrical supply has to be checked. Make sure the power supply is switched on and connected to the RAMPS.

If your printer is used with a door-safety switch the door has to be closed.

# Too little material is printed

At first, it has to be checked whether there is a mechanical problem. If the extruder motor rotates but no material is coming out of the hot end, the hot end might be blocked. Also, the filament screw might be at fault or the temperature is set to low, so that it is not conveying material to the hot end.

Once the mechanics are checked, the flow rate has to be increased. In Slic3r, this is adjusted via the item "Extrusion multiplier".

# Glue on of the PET-foil bubble-free

To attach the PET-foil bubble-free on the printing bed we advise the following:

- moiste the printing bed with water oder window cleaner (**silicone-free!**)
- apply the [PET \(Polyethylenterephthalat\)](#)-Foil on the dampish surface (remove carrier foil from the [PET \(Polyethylenterephthalat\)](#)-foil)
- displace and absorb the excess fluid (with such as squeegee or check card)
- heat up the bed at 30°C until all the fluid is not longer present.

## Printing interruption with windows

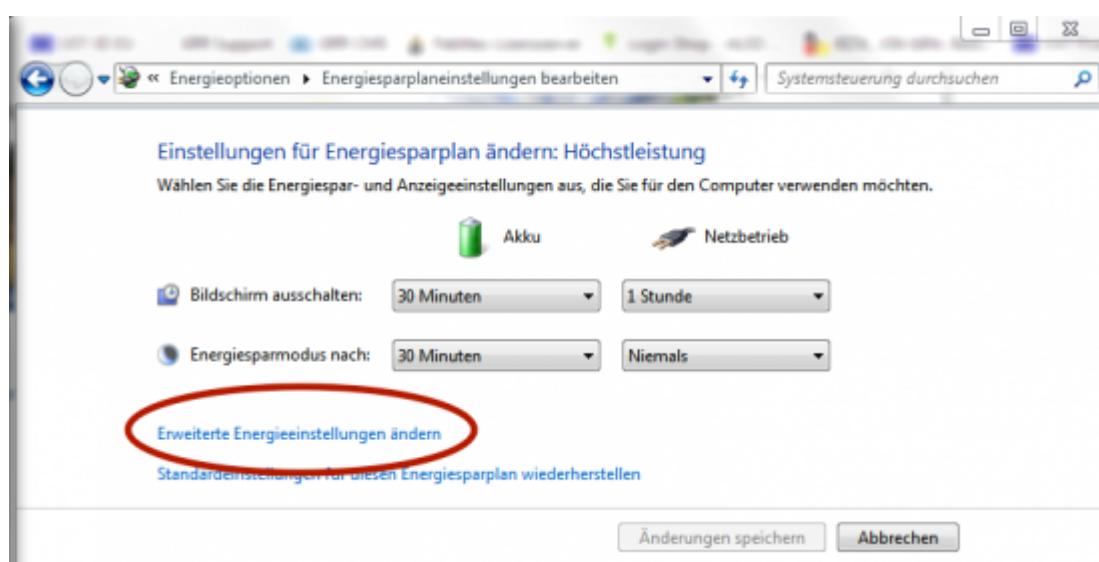
### Fix Me!: Translation not complete

If your 3D-Printer is operated with Windows and get the printdata via USB the following problem may occure.

Your 3D-Printer usddenly stop printing without any obviously reason. This may result of a wrong energy saving setting which is defined by default at Windows. Please check the following settings:

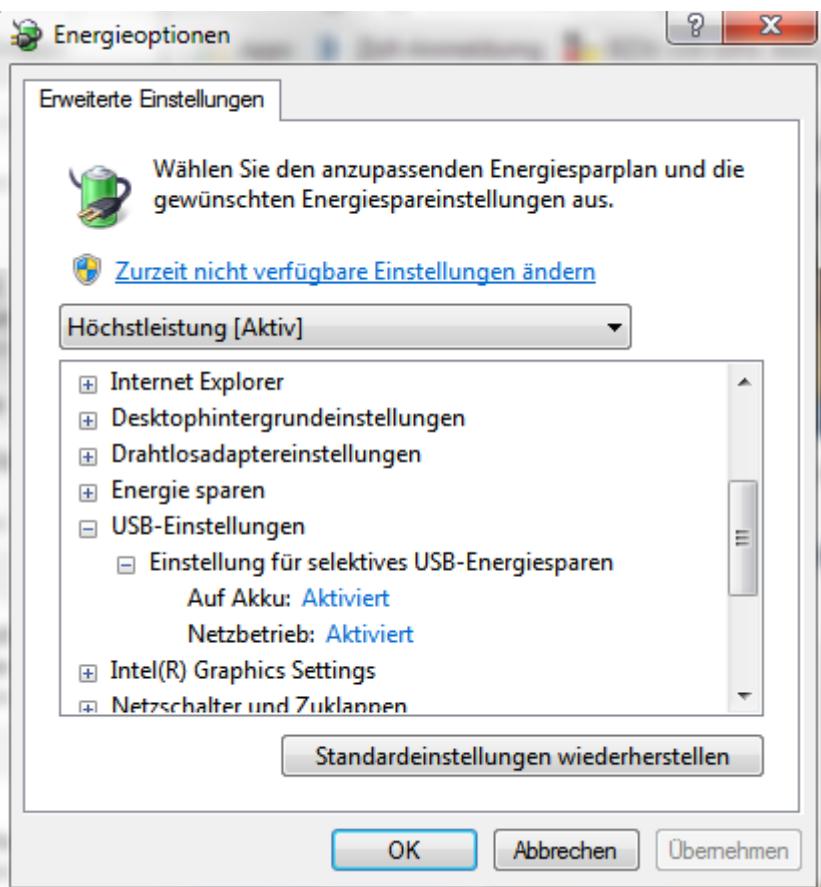
Go to your energy settings: *Start → Systemsettings → Energy saving → Energy saving plan*

Setup your energy saving mode to *Never*



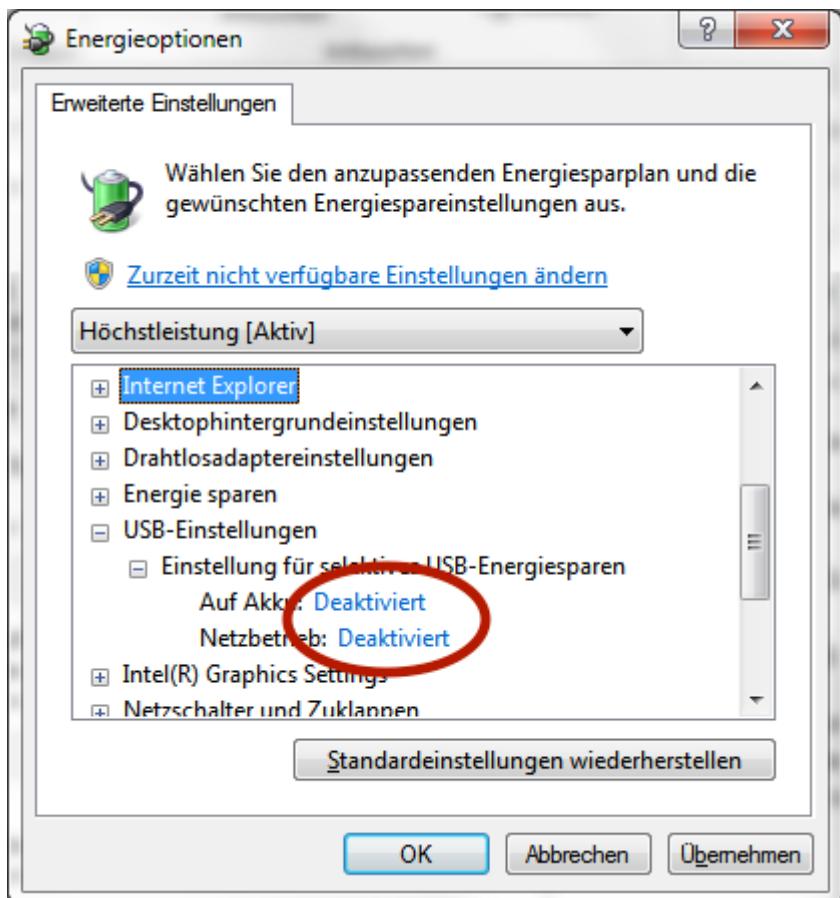
Energy saving plan

Go to: *Erweiterte Energiespareinstellungen ändern*



Erweiterte Energiespareinstellungen

Deactivate *Einstellungen für selektives USB-Energiesparen*



Erweiterte Energiespareinstellungen

Confirm all changed settings.

# Support

We provide support and all the documentation.

## Documentation

You'll find all the documentation online at <http://wiki.germanreprap.com>. Please register with the site at [wiki.germanreprap.com](http://wiki.germanreprap.com) in order to be able to automatically send notifications and changes of documents you are interested in via email.

## Telephone

Our hotline is staffed from Monday to Friday (excluding public holidays) between 10:30 - 16:00 and can be reached at  [+49 9001 RepRap](tel:+499001737727) ( [+49 9001 737727](tel:+499001737727)) <sup>8)</sup>. We answer your technical questions and provide consulting for more complex setups.

0.99 € per minute from a landline in Germany, prices may vary depending on your landline telephone, VOIP or mobile phone provider

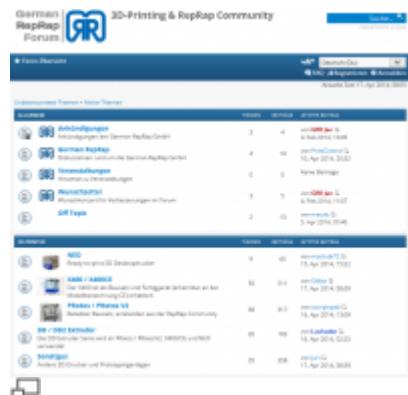
## Support tickets / E-mail



Please use our support pages at <https://support.germanreprap.com> to lodge a new ticket and check the status of an old one, all free of charge.

Alternatively you can send an email to [support@germanreprap.com](mailto:support@germanreprap.com) which generates a ticket, also free of charge.

# Forum (Community)



The screenshot shows a forum interface with a sidebar on the left containing links like 'Home', 'Log in', 'Logout', 'Search', and 'Help'. The main area displays a table of topics. The first topic is 'Anleitungspapiere' with 3 posts and 4 replies. The second is 'Normen RepRap' with 4 posts and 10 replies. The third is 'Installationsanleitungen' with 0 posts and 2 replies. The fourth is 'Reinigung' with 0 posts and 1 reply. The fifth is 'GRR Tapis' with 2 posts and 0 replies. The sixth topic is 'NFO' with 4 posts and 40 replies. The seventh is 'KABEL / KABELS' with 32 posts and 0 replies. The eighth is 'PROTOS / PROTOS V3' with 44 posts and 132 replies. The ninth is 'RF - FIRMWARE' with 39 posts and 108 replies. The tenth is 'Sonstiges' with 73 posts and 279 replies.

At <https://forum.germanreprap.com> you can interact with our 3D printing community in different languages and exchange tips and tricks.

# Legal disclaimer

## Software-Changes / Use of applications

Modifications to the software or using software not supplied by German RepRap GmbH void the warranty of the device. Shipping costs as well as costs for repairs caused by using unsupported software are billed to the customer.

Only use the software packages provided by German RepRap GmbH through their website as well as the original CD-ROM that came with the device.

German RepRap GmbH cannot be held liable for the loss of data on any internal or external storage medium.

The device has been pre-installed with software and works as can be reasonably expected. It cannot be guaranteed that the software is error-free. As long as it is possible to use the printer as designed an error in the software does not constitute a faulty device and hence provides no grounds to a warranty claim. The warranty only covers faults in the software that would prevent the normal use of the printer.

Limitations of the software caused by hardware faults, the environment the printer is being used in, operating error or similar reasons are not considered software faults.

## Contact

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<sup>1)</sup> for some materials a heated bed is necessary

<sup>2)</sup> on a X400CE this firmware is preinstalled

<sup>3)</sup> , <sup>4)</sup> , <sup>5)</sup> , <sup>6)</sup> , <sup>7)</sup> <http://www.thingiverse.com/thing:6495>

<sup>8)</sup> 0.99€/minute from a landline in Germany, prices may vary depending on your landline telephone, VOIP or mobile phone provider

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