

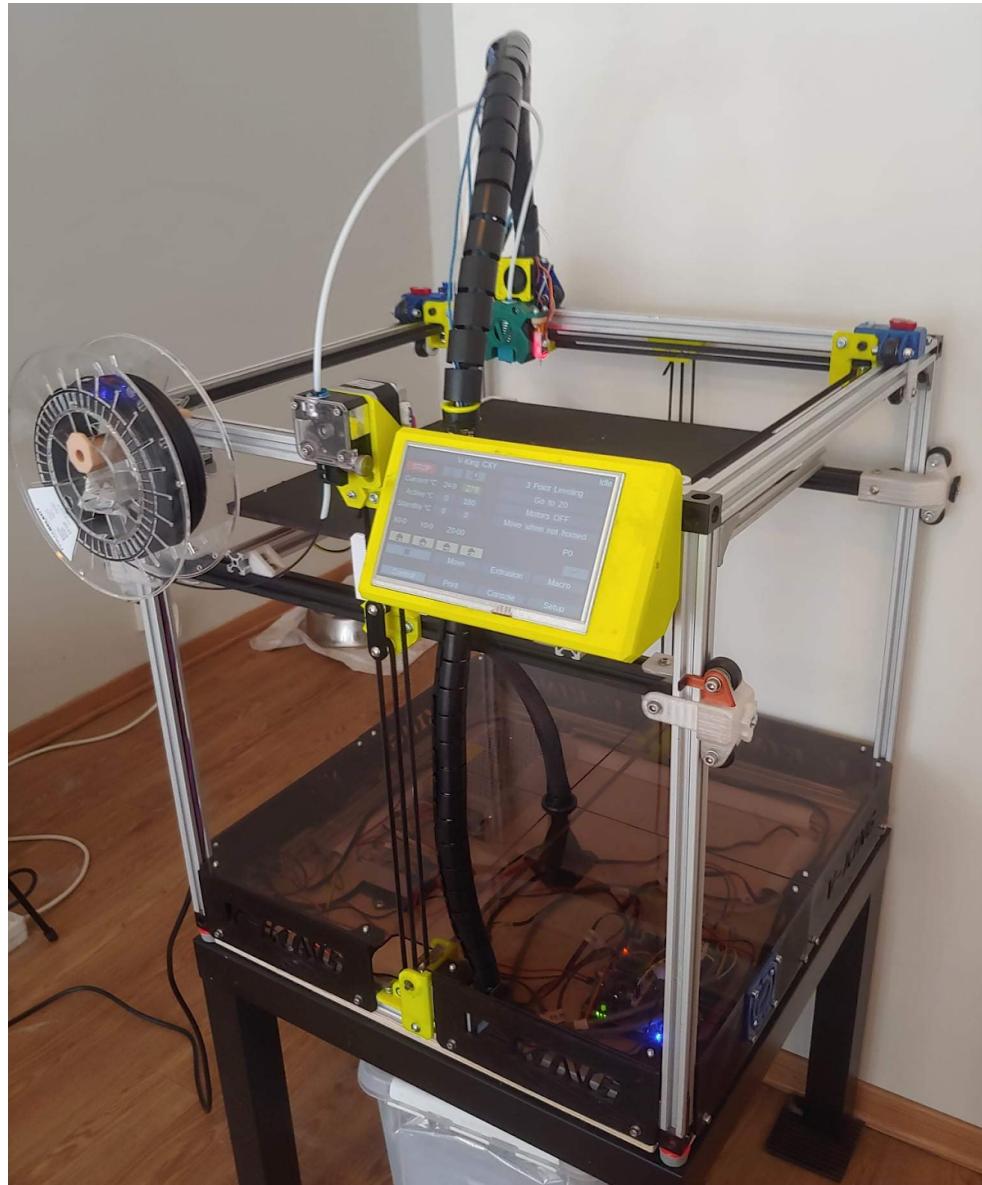
V-King 3D Printer MK2

Assembly Manual

For further questions:

[Facebook Group: Viking 3D Printers - Builders Club](#)
[Discord server](#)

For comments, input and suggestions for changes in the documentation - feel free to add a comment in this document.



V-King MK2

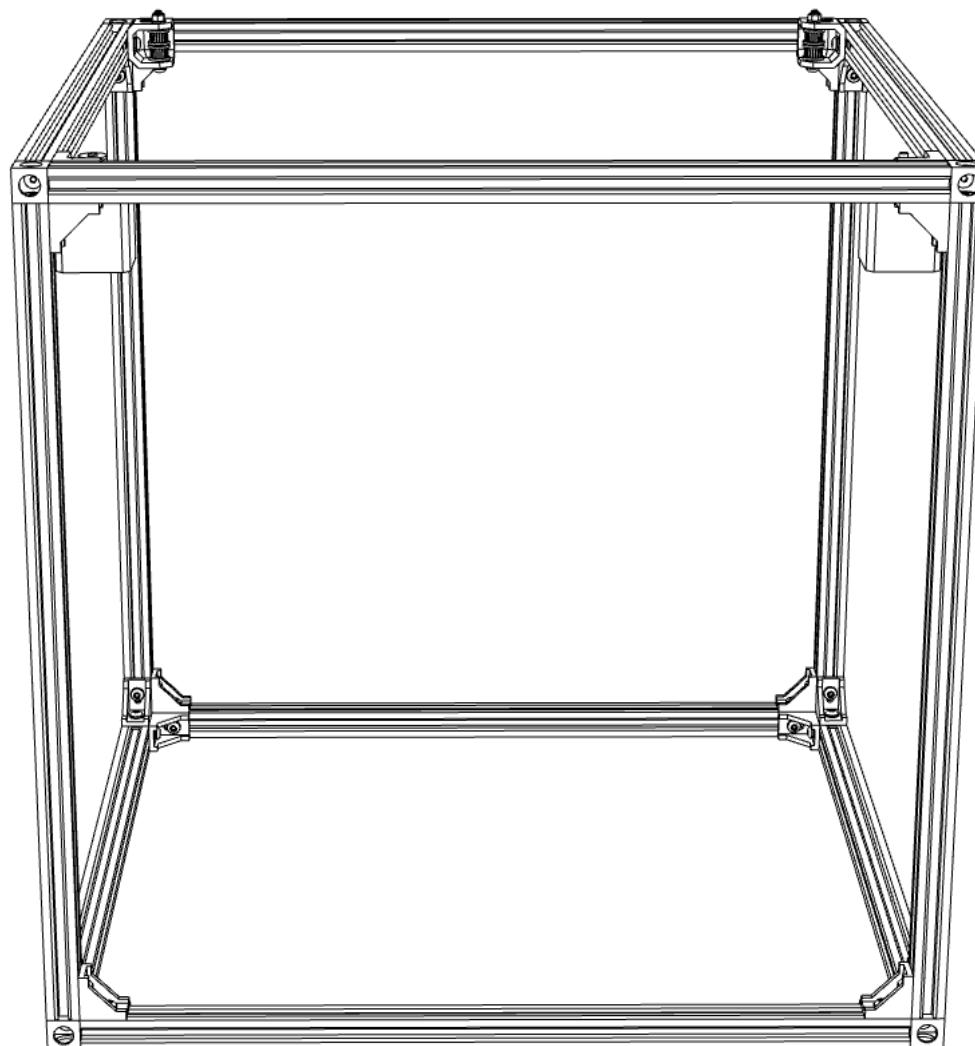
The V-King MK2 was released in May 2020. All parts changed from MK1 are colored yellow in the [Fusion 360 model](#).

The changes done in MK2 are:

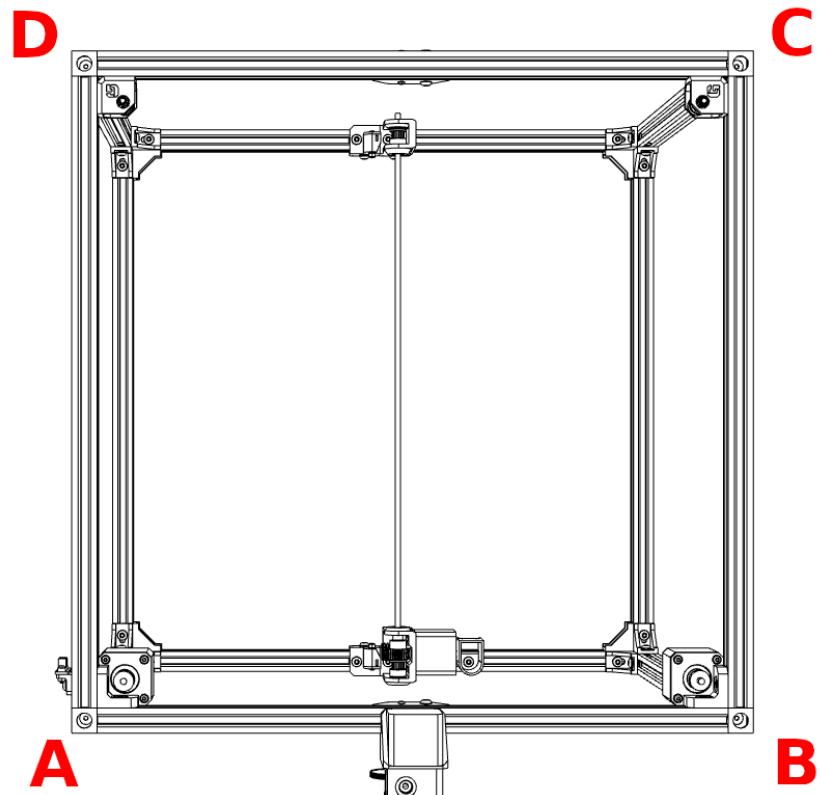
- Simplified worm gear and rod brackets, easier to assemble
- All X, Y, and Z Idler buddies adjusted to accommodate better (larger) idlers from Gates/Mellow ([Video](#) and [Stream](#))
- Improved and adjusted X carrier

1. Introduction
 - a. printing the parts (choosing filament, settings)
 - b. how to get help (Discord, FB group)
 - c. required hardware (with images)
 - d. Required tools
 - e. How to look at the drawings in Fusion 360
2. Sourcing Guide
3. Base Frame Assembly
 - a. Corner part of the frame
 - b. XY motors with brackets
 - c. XY idler corner pulleys
4. X-Axis Assembly
 - a. XY Forks
 - b. X Idlers
 - c. X Carrier
 - d. X Carrier - cable loom bracket
 - e. X Carrier - hotend and fans
 - f. Y Carriers
 - g. X-axis assembly
5. Mounting and tensioning the X/Y belts
 - a. How to add belts
6. Z Drive Assembly
 - b. Tensioning
7. Extruder
 - a. Bowden tube
 - b. Cable loom
8. Electronics
 - a. Mount the components
 - b. Wiring, cable management
9. Firmware
10. Panels
 - a. Bottom panels
11. Get started printing
 - a. Tune extruder
 - b. Bed leveling

Base Frame Assembly



Naming of the corners



Overview of additional placed T-nuts

Lower V slots

- A-B facing out: 3 for the gear buddy and tensioner
- A-B facing up: 2 for the gear buddy
- A-B facing in: 3 for gear buddy and tensioner

- D-C facing out: 3 for the gear buddy and tensioner
- D-C facing up: 2 for the gear buddy
- D-C facing in: 3 for gear buddy and tensioner

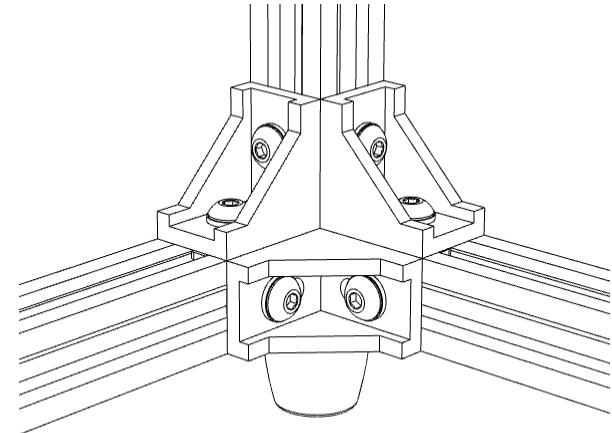
Upper V slots

- A-B facing up: 4 for extruder and cable conduit,
- A-B facing down: 2 for Z belt
- D-C facing out: 4 for belt tensioners
- D-C facing down: 2 for Z belt

Corner part of the frame

Hardware parts

12 500 mm V-slot Rails with M5 threaded/tapped ends
8 Corner Cubes
24 M5 x 8mm Countersunk Bolts
20 Cast Corner Brackets, large 20mm x 28mm x 28mm
40 M5 x 10 mm Button Head Screws
40 M5 Washers
68 M5 Tee Nuts



Printed parts

none

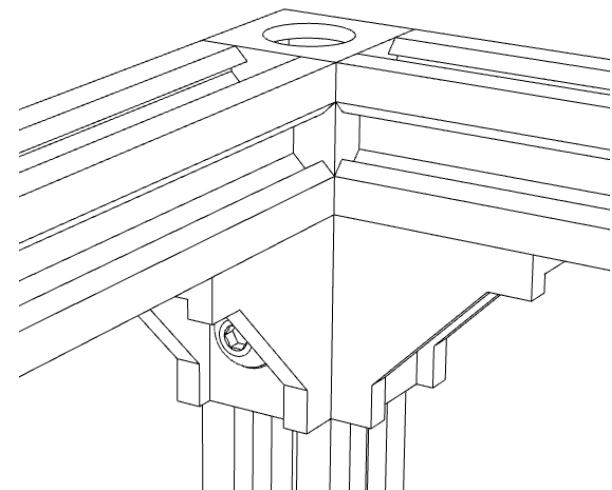
Videos

[Fusion 360 animation - Base Frame Assembly](#)

[Live Build - Main Frame - The Corners](#)

Step by step

1. Make sure you're building on a completely flat surface.
2. Start with loosely fastening the corner brackets with the button head screws and washers.
3. Add the right amount of tee nuts before mounting the corner cubes, see separate overview.
4. Add the corner cubes using the countersunk screws. Tighten the corner cubes first - do not use too much force when tightening.
5. Tighten the corner bracket screws carefully.
6. In real life it is almost impossible to square the frame TRUE 90 degrees in 3 dimensions. Do your best. What is important is that the Y-axis is parallel to each other, and that the X-axis is adjusted 90 degrees to the Y axis.



XY motor corner brackets

The XY motors are located in corners A and B.

Hardware parts

4 M5 x 10 mm Button Head Screws

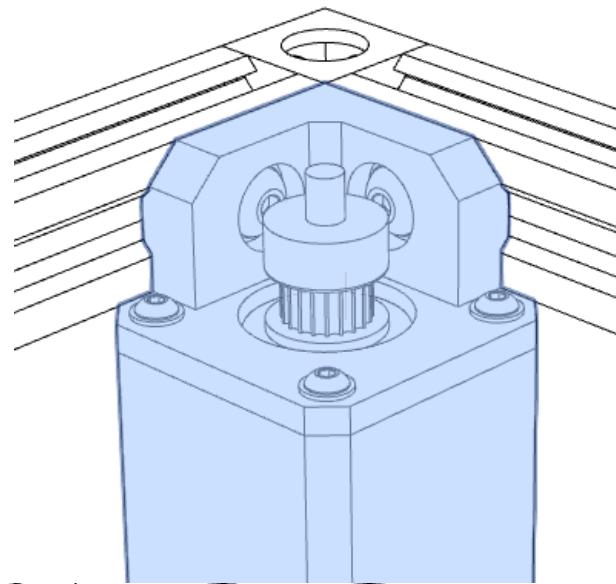
4 M5 Washers

6 M3 x 8 mm Button Head Screws

6 M3 Washers

2 Nema 17 Stepper Motors 17HS4401S

2 GT2 Motor Pulleys with 20 Teeth



Printed parts

2 XY Motor Corner Bracket_2x_SN_BN_100%.stl

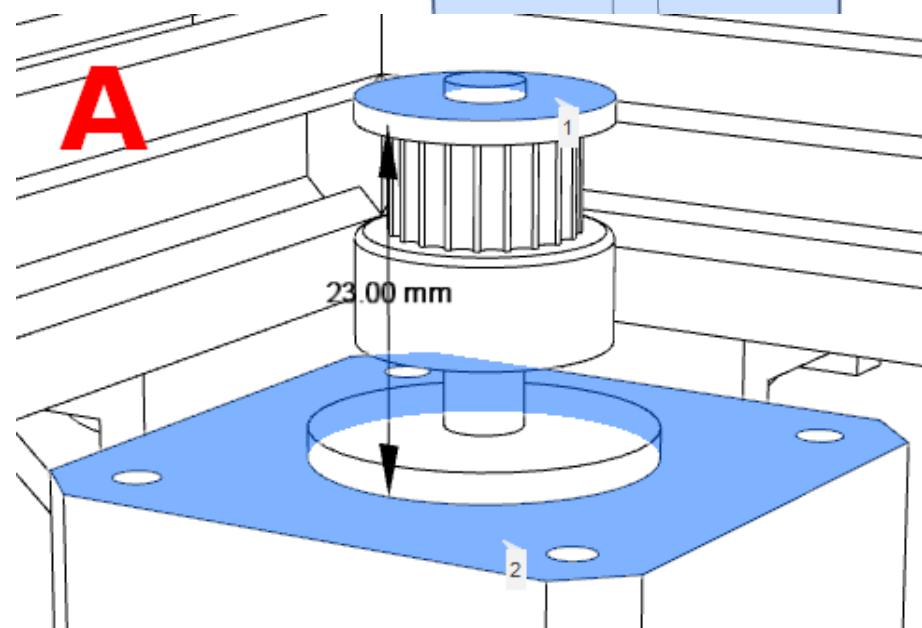
Videos

[Fusion 360 animation - XY Gantry Assembly](#)

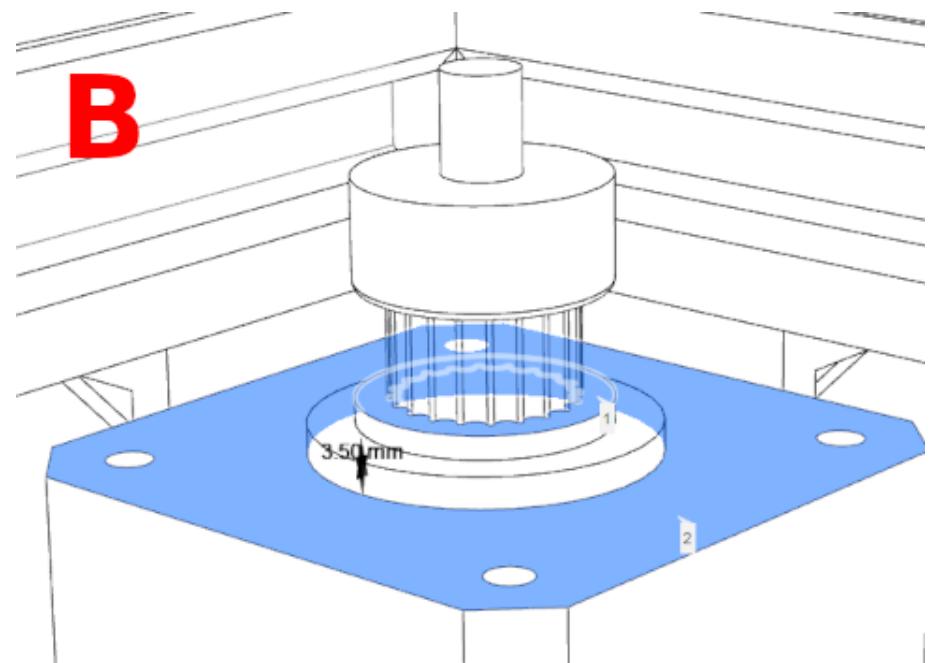
[Live build \(MK1\) - Motor pulleys](#)

Step by step

1. Mount the brackets with the M5 screws and washers
2. Mount the motors with the M3 screws and washers.
3. The A motor pulley mounts with the teeth up. The top of the pulley should be 23 mm from the top of the motor housing.
- 4.



5. The B motor pulley mounts with the teeth down. The pulley should be mounted 3.50 mm from the bottom flange to the top of the motor housing.



XY corner idlers

The XY corner idlers are located in the corners C and D.

Hardware parts

4 M5 x 10 mm Button Head Screws
8 M5 Washers
2 M5 x 35 mm Button Head Screws
2 M5 x Lock nuts
4 M5 washers
6 M5 precision shims, 5 mm ID x 6 mm OD x 1 mm
4 GT2 Idlers with 20 teeth

Lithium based lubricating grease

Printed parts

2 XY Corner Idler Buddy_2x_SN_BN_100%.stl

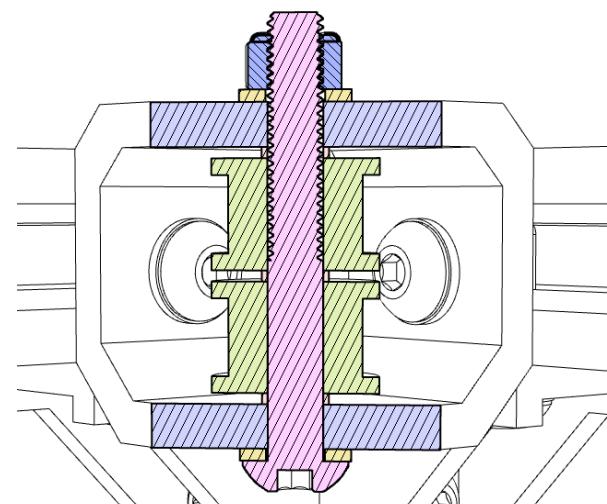
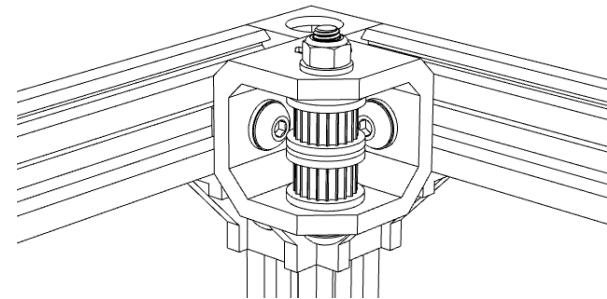
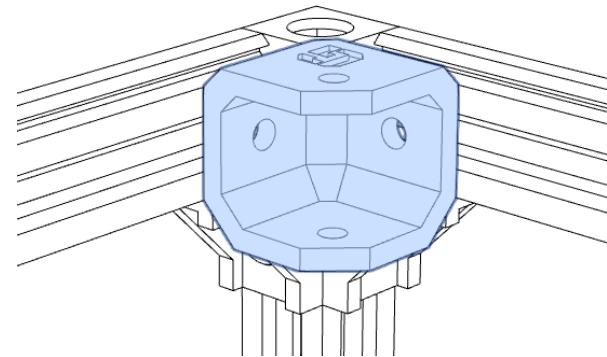
Videos

[Fusion 360 animation - XY Gantry Assembly](#)

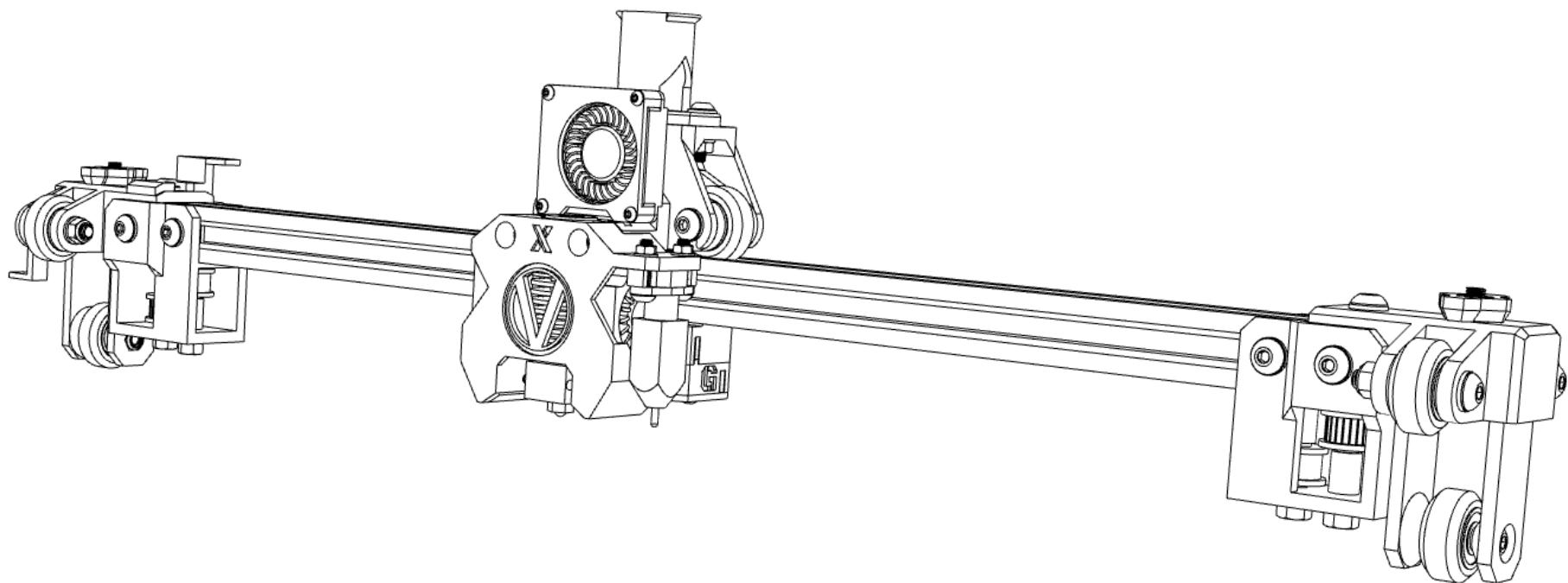
[Live build - Corner Idler Bracket Assembly](#)

Step by step

1. Mount the brackets with the specified screws and washers
2. Lube up the pulleys with the lithium grease before mounting.
3. Mount the washers on the outside, and the shims on each side of the pulleys. If the opening in the buddy is tight, the upper shim can be dropped.
4. Attach the lock nut on top. The lock nut should not be pressing against the buddy. Leave a small gap between them.



X-Axis Assembly



XY Forks

2 Y Carrier forks, 1 X Carrier fork, 4 Z Carrier forks

Hardware parts

Wheels:

3 Solid V Wheels (with included shims)
6 Ball Bearings 625 RS 5x16x5
6 M5 x 6,5 mm x 1 mm Precision Shims

Forks:

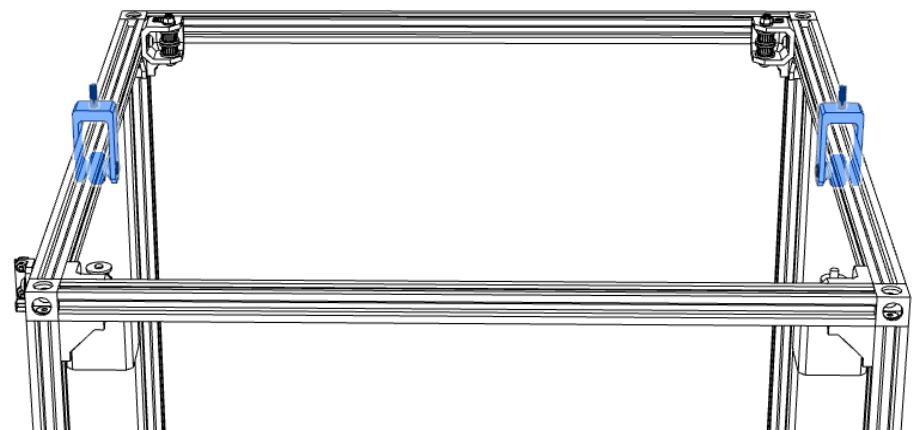
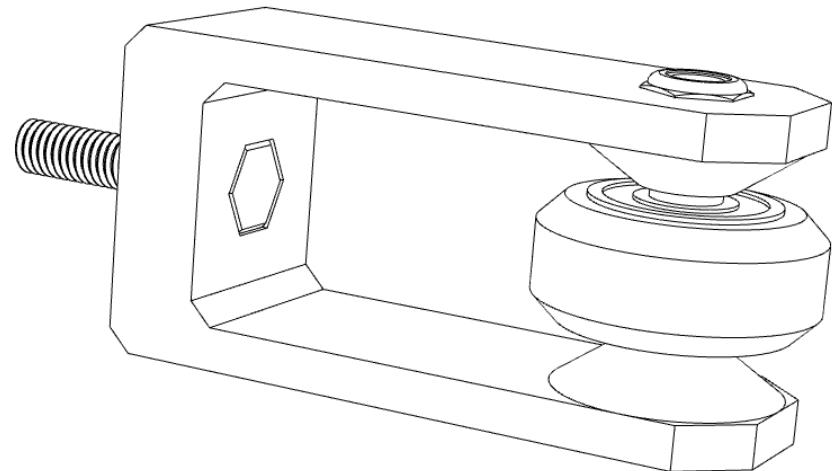
3 M5 x 20 mm Hex Bolts
3 M5 x 25 mm Button Head Screws
3 M5 Lock Nuts
3 M5 Nuts

Printed parts

3 XYZ Carrier Fork_7x_SN_BO.stl
3 XYZ ThumbScrew_7x_SB_BN.stl

Step by step

1. Mount the bearings in the wheels, with the included shim between the bearings.
2. Insert the hex head screw into the fork. Make sure the head is properly aligned.
3. Place the two Y carrier forks on top of the A-D and B-C top rails.
4. Mount the wheels in the fork, with one precision shim between the bearing and the fork on each side Use the M5 x 25 mm Button Head Screw for the wheel.
5. Assemble the last fork for the X carrier, and set it aside.



X Idlers

Hardware parts

4 M5 x 35 mm Hex Bolts
4 M5 Nuts (with low-strength threadlocker)
4 M5 Washers
2 GT2 Idlers without teeth
2 GT2 Idlers with 20 teeth
8 M5 Precision Shims, 5 mm ID x 6 mm OD x 1 mm

Printed parts

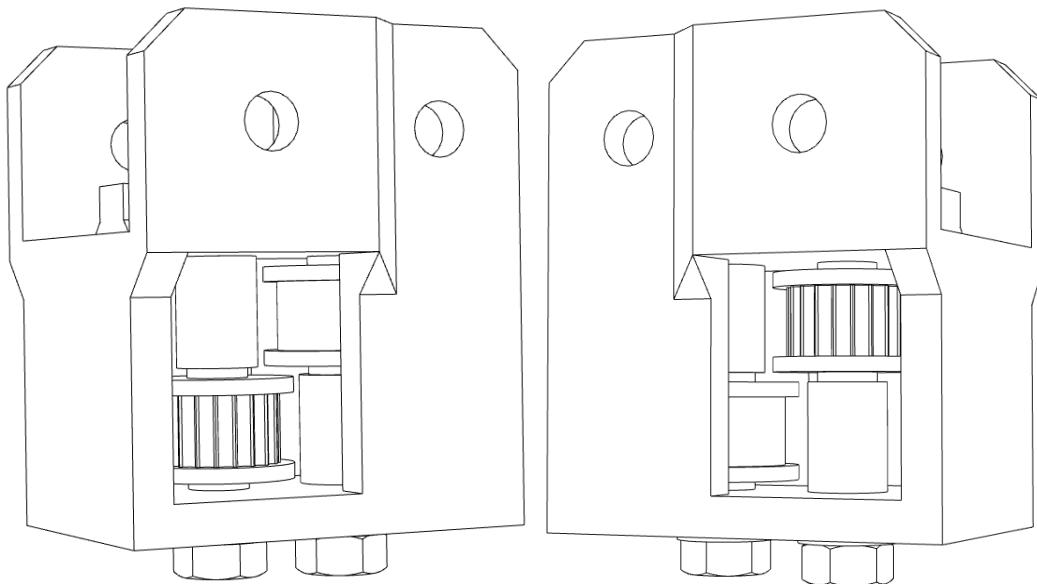
2 GX Axis Idler Buddy_2x_SA_BN.stl
4 GX Axis Idler Spacer_4x_SN_BY.stl

Videos

[Fusion 360 Animation - Adding the X-axis and the X idlers](#)
[Live Build - X Idler Bracket Assembly](#)

Step-by-step

1. Be aware that the two idlers are not equal.
2. Mount the hardware parts as shown in the images, there should be a precision shim on each side of the idler.
3. Fasten the M5 hex bolt loosely, as it has to be tightened after mounting it on the X-axis.



X Idler A-D Side

X Idler B-C Side

X Carrier

Hardware parts

1 assembled XYZ fork with thumb screw

Wheels:

2 Solid V Wheels (with included shims)
4 Ball Bearings 625 RS 5x16x5
4 M5 x 6,5 mm x 1 mm Precision Shims

2 M5 x 35 Button Head Screws
2 M5 Lock Nuts
4 M5 Washers
2 M3 Nuts

Printed parts

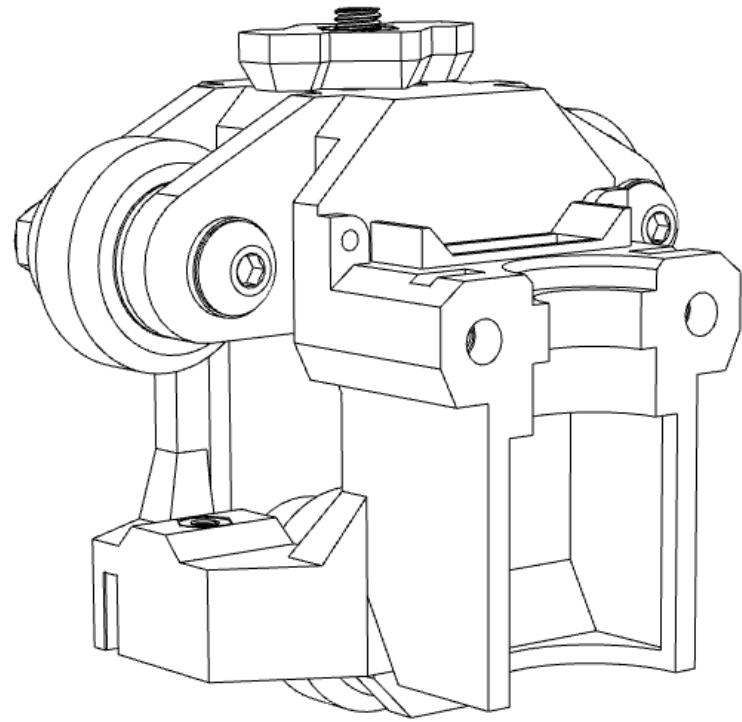
1 X Carrier V2 201_1x_SA_BN.stl

Videos

[Fusion 360 Animation - Assemble the X Carrier](#)

Step-by-step

1. Mount the bearings in the wheels, with the included shim between the bearings.
2. Mount the wheels into the X carrier with the M5 bolts, washers, and locknuts.
3. Slide the prebuilt XYZ fork into the X carrier, and fasten it loosely with the thumbscrew.
4. Add the M3 nuts in the recesses in the X carrier. Be sure to remove all supports in the holes. TIP: if it is difficult to get the nuts in place, you can heat them up with the tip of a soldering iron and gently press them into place.



X Carrier - cable loom bracket

Hardware parts

2 M4 x 16 mm Button Head Bolts

4 M4 Washers

2 M4 Nuts

1 Optical Sensor

2 M3 x 12 mm Button Head Bolts

2 M3 Nuts

Printed parts

1 X Carrier Cable Loom Bracket_1x_SB_BO.stl

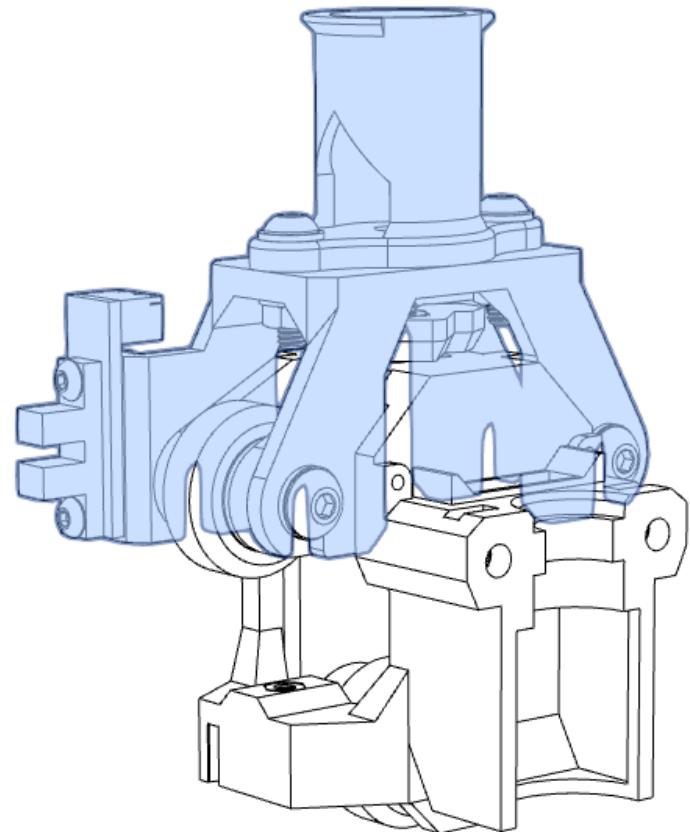
1 X Carrier Cable Loom Tube_1x_SN_BN.stl

Videos

None

Step-by-step

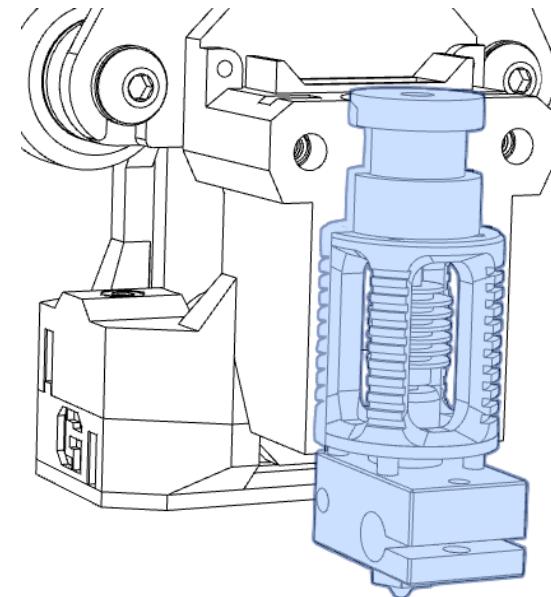
1. Fasten the cable loom tube to the bracket with the M4 bolts, washers, and nuts.
2. Fasten the optical sensor to the bracket with the M3 bolts, washers, and nuts.
3. Fasten the bracket loosely to the X carrier.



X Carrier - hotend and fans

Hardware parts

1 Dragon Hotend
1 BL Touch Probe with mounting bolts, nuts, and washers
2 3010 Blower Fans, 30x30x10 mm
1 4010 Blower Fan, 40x40x10 mm
2 M4 Nuts
2 M4 x 12 mm Button Head Bolts
2 M2,5 x 12 mm Button Head Bolts
2 M2,5 x 16 mm Button Head Bolts
2 M2 x 6 mm Button Head Bolts



Printed parts

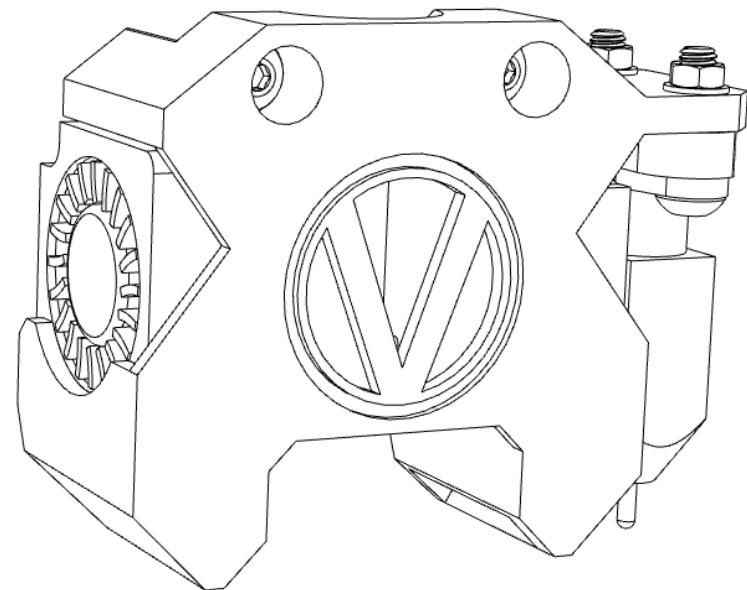
1 X Carrier Hotend Buddy_1x_SA_BN_100%.stl
1 BL Touch Spacer 5mm_1x_SN_BN.stl
1 X Carrier Blower Fan Grill_1x_SN_BN_100%.stl

Videos

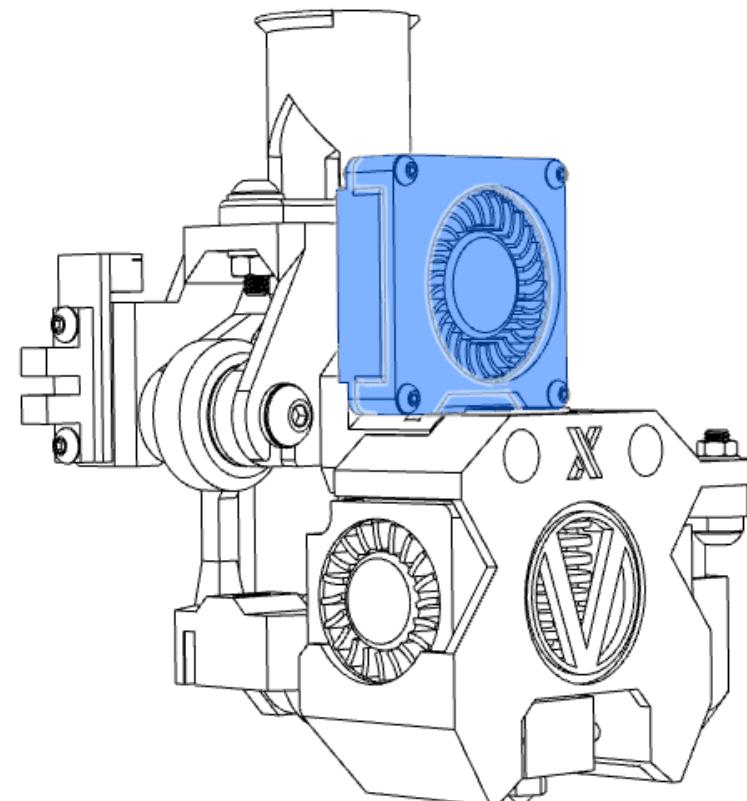
None

Step-by-step

1. Insert the 3010 fans into the fan shroud, and fasten with the M2 x 6 mm bolts
2. Mount the BL Touch with the included bolts, nuts, and washers. Insert the printed spacer between the BL touch and the fan shroud. Note that some have had to print a higher (8 mm) spacer than the original.
3. Mount the hotend in the X carrier.



4. Slide 2 M4 nuts into the holes in the X carrier, and fasten the fan shroud with the 12 mm M4 bolts.
5. Mount the 4010 fan and the printed fan grill on top of the X carrier, with the M2.5 Bolts. Use the 16 mm bolts to fasten the fan to the carrier, and the 12 mm bolts on top.



Y Carriers

Hardware parts

Wheels:

- 4 Solid V Wheels (with included shims)
- 8 Ball Bearings 625 RS 5x16x5
- 8 M5 x 6,5 mm x 1 mm Precision Shims

Y Carriers:

- 4 M5 x 30 mm Button Head Screws
- 4 M5 Lock Nuts
- 8 M5 Washers

Y Endstop bracket:

- 1 Optical Sensor
- 2 M3 x 12 mm Button Head Bolts
- 2 M3 Nuts

Printed parts

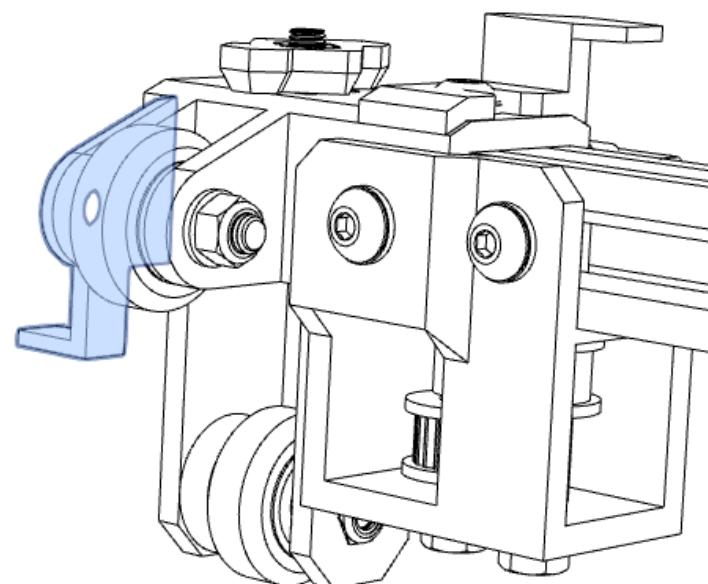
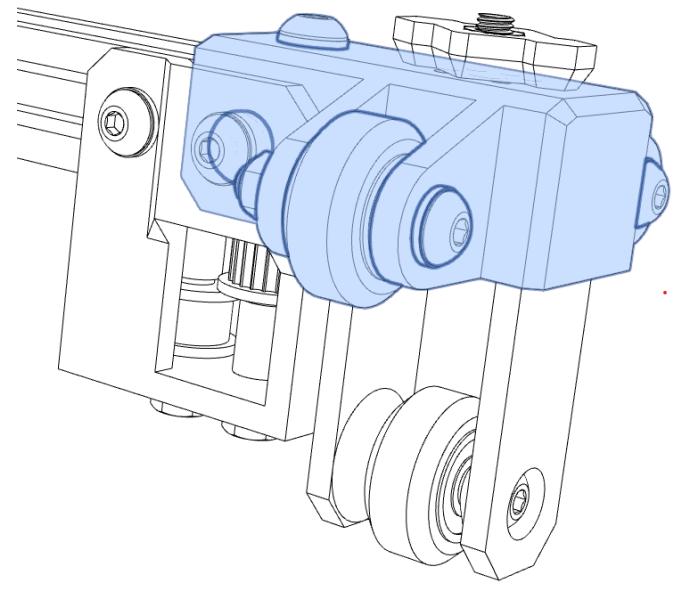
- 2 Y Carrier_2x_SB_BO.stl
- 1 Y EndStop Flag_1x_SN_BN.stl
- 1 Y EndStop Bracket_1x_SN_BO.stl

Videos

[OpenBuilds V Wheel assembly](#)

[Fusion 360 animation - Y Carrier](#)

[Live build - Y Carriers and X-axis to the Frame](#)



Step by step

1. Mount the bearings in the wheels, with the included shim between the bearings.
2. Remember to mount the endstop flag on the carrier on the A-D side, while mounting the wheel.
3. Mount the wheels in the Y carrier, with one precision shim on each side of the wheel. Use the M5 x 30 mm Button Head Screw for the wheel, with washers and locknuts.
4. Fasten the optical sensor to the endstop bracket with the M3 bolts, washers, and nuts.
5. Fasten the endstop bracket to the top rail in the base frame near motor A.

X-Axis Assembly

Hardware parts

1 480 mm V-slot Rails

X idlers:

5 M5 10 mm Bolt Head Screws

5 M5 14 mm Bolt Head Screws

10 M5 Washers

10 M5 Tee Nuts

Low-strength threadlocker ie. Loctite® Purple 222

Printed parts

1 X EndStop Flag_1x_SN_BY.stl

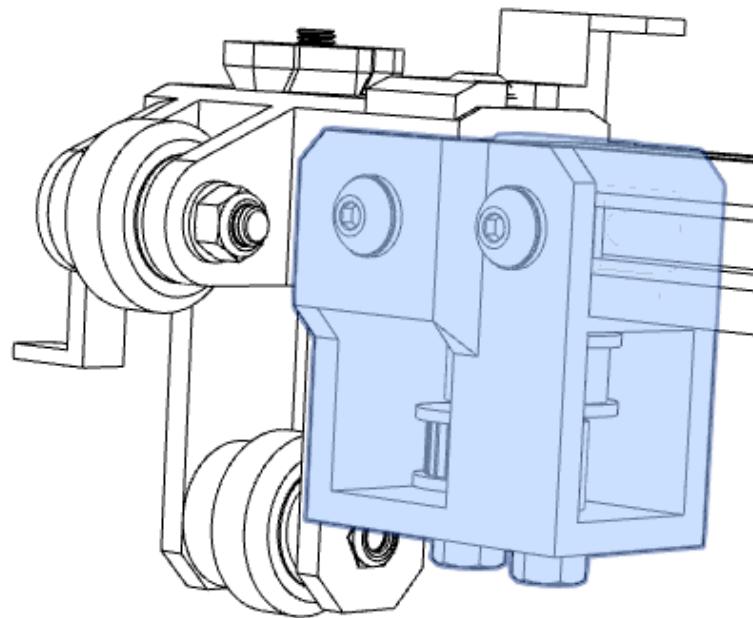
Videos

[Fusion 360 Animation - Assemble the X Carrier](#)

[Live Build - X Carrier to X-axis](#)

Step-by-step

1. Slide the first X idler buddy on the V-rail. Make sure that the bolt heads are loose, and fit into the rail. Fasten the X idler buddy loosely with the M5 10 mm screws closest to the X carrier. Push it 5 cm into the end.
2. Slide the X carrier loosely on the V-rail. Be sure to mount it the right way, with the thumbscrew lose.
3. Mount the last X idler loosely on the V-rail, the same way as the first one.
4. Insert a tee nut on both sides and at the top of the V-rail. Do this at both ends.
5. Slide the x-axis gently into the Y carriers, with equal distance from the X-carrier rail to the bottom of the Y carriers.



6. Attach the Y carriers on top of the forks. Be sure to align the wheels on the Y carriers to the rails.
7. Insert the nut in the thumbscrew, and tighten with the Y carriers.
8. Align the X-axis perpendicular to the Y-axis before continuing. As long as the corners are 90 degrees, you can slide the X-axis to the motors - and use them as a reference.
9. Fasten the X-axis to the Y carrier on the B-C side with an M5 10 mm bolt at the top.
10. Fasten the X-axis to the Y carrier and the X end stop flag on the A-D side with an M5 14 mm bolt at the top.
11. Slide the X idlers outside the Y carrier. Use an allen key or similar to ensure that the holes on the sides align. Ensure that the tee nut is placed properly.
12. Insert the M5 14 mm screws, and tighten carefully.
13. Tighten all screws carefully. Do not use too much force.
14. Apply a little low-strength threadlocker on the hex bolts under the X idler, before fastening the M5 nut. Do not tighten too much, or you will break the plastic.

Mounting and tensioning the X/Y belts

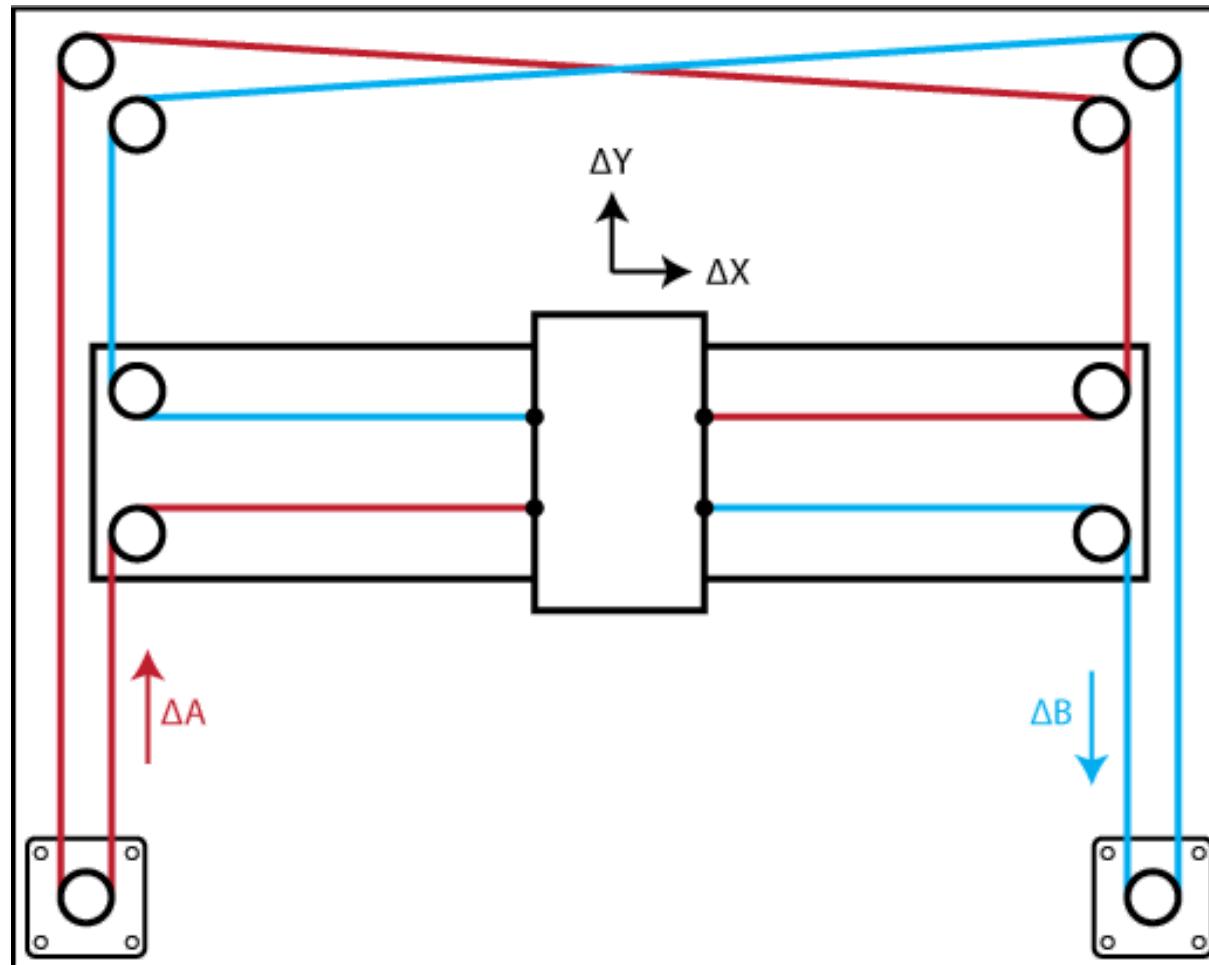


Image source: <http://corexy.com/>

Add the X/Y belts

Hardware parts

2 M3 x 25 mm Button Head Bolts

4 meters of GT2 Timing Belt, 6 mm wide

Printed parts

2 X Carrier V2 Belt Loop_2x_SN_BO.stl

1 X Carrier Belt Lock_1x_SN_BN_100%.stl

Videos

[Live build - Adding the GT2 Timing Belts](#)

[Live build - Securing the Belts](#)

Step-by-step

1. See both videos first.
2. Cut the timing belt into 2 parts of 200 cm.
3. Start with fastening the belt in one of the tensioners. The teeth on the belt should point away from the motors at the X carrier.
4. Thread the belt around the different idlers and pulleys.
5. Fasten the last tensioner, so that the x-axis skews around 3-4 mm.
6. Continue with the next belt, and fasten this so that the x-axis is perpendicular to the Y-axis.
7. Add the belt locks and the belt lock cover, and fasten them loosely with the M3 bolts.

Tensioning the X/Y belts

Hardware parts

none

Printed parts

There is an optional belt tensioner in the parts folder, which is not covered by this guide (at least for now).

Videos

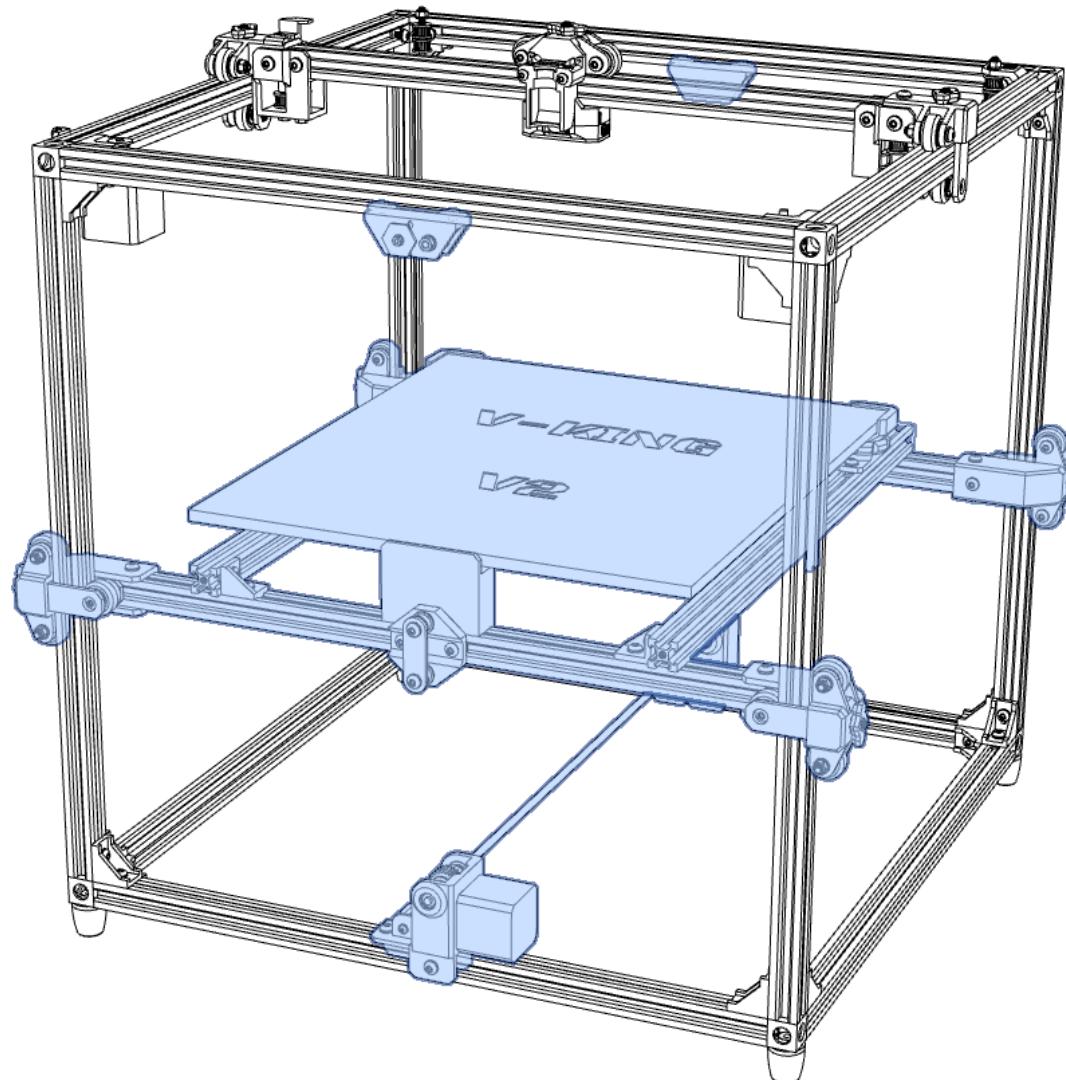
[Live build - Gates GT2 Belt Tensioning by note](#)

[Live build - Add Individual XY Belt Tensioners](#)

Step-by-step

1. Tensioning the belts could be done both manually, and by using an app on your phone to measure the frequency when playing on the belts. Tension the belts to 55 Hz / Tone A1

Z Drive Assembly

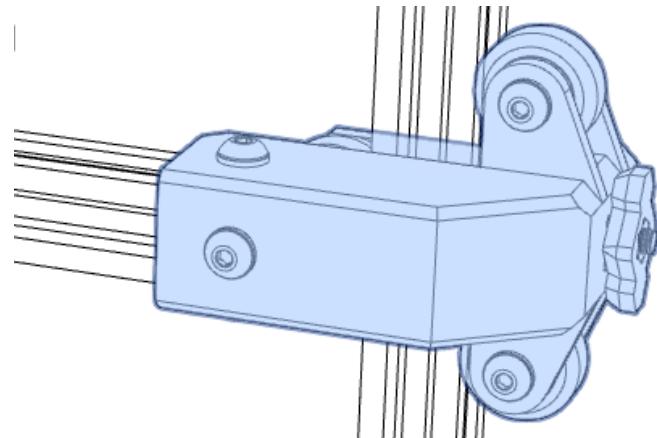


Z carriers

Hardware parts

Wheels:

- 12 Solid V Wheels (with included shims)
- 24 Ball Bearings 625 RS 5x16x5
- 24 M5 x 6,5 mm x 1 mm Precision Shims



Forks:

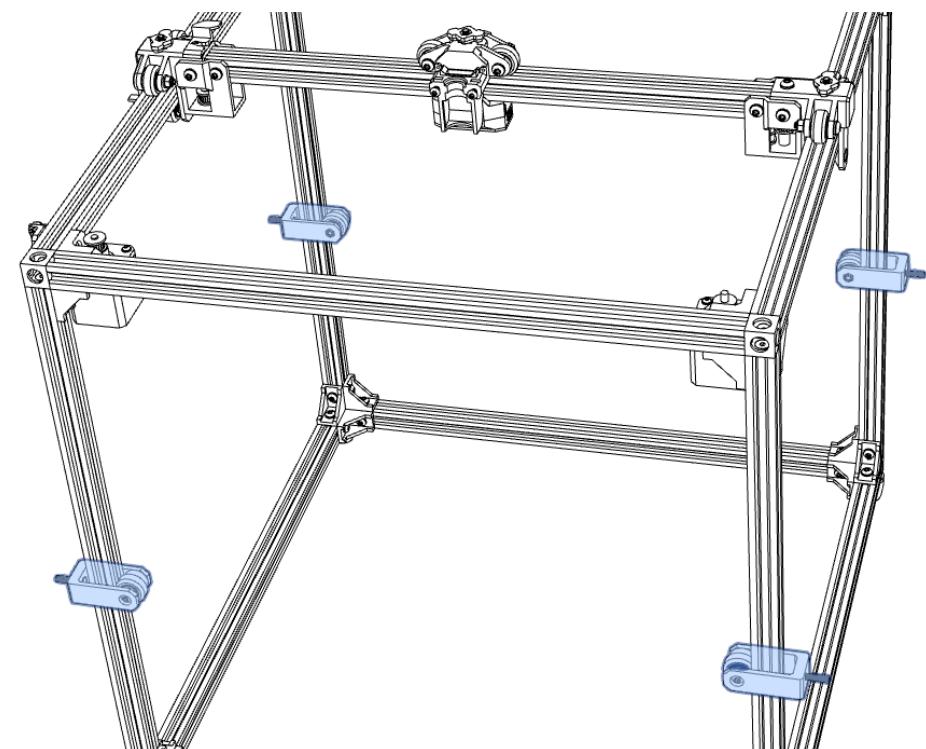
- 4 M5 x 20 mm Hex Bolts
- 4 M5 x 25 mm Button Head Screws
- 4 M5 Lock Nuts
- 4 M5 Nuts

Z carrier:

- 8 M5 x 30 mm Button Head Bolts
- 8 M5 Locknuts
- 16 M5 Washers

Printed parts

- 4 XYZ Carrier Fork_7x_SN_BO.stl
- 4 XYZ ThumbScrew_7x_SB_BN.stl
- 4 Z Carrier_4x_SB_BO.stl

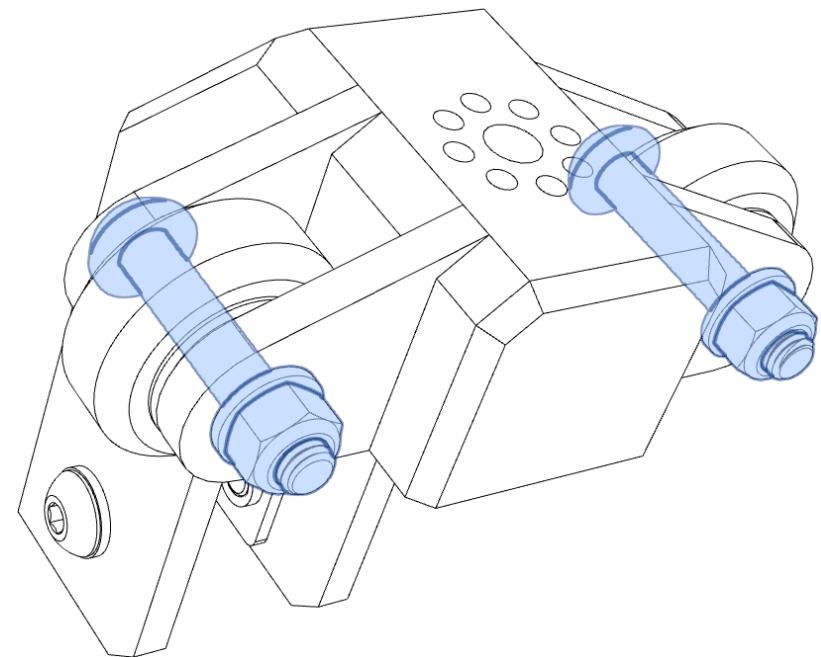


Videos

- [Fusion 360 animation - Assemble the Z Carriers](#)
- [Live build - Adding the Z Carriers](#)

Step-by-step

1. Insert the hex bolt into the forks.
2. Place the fork on the frame with the hex bolt pointing outside the frame, in the same direction as the X-axis. Place the hole for the locknut inside the frame.
3. Assemble all the wheels, and place one wheel in each fork. Use precision shims on each side of the wheel, and use the M5 x 25 mm bolts and M5 locknuts to secure the wheels in the forks. Do not use washers here.
4. Place the rest of the wheels in the Z carriers. Use precision shims on each side of the wheel, and use the M5 x 30 mm bolts and M5 locknuts to secure the wheels in the forks. Use washers here.



Bed idlers

Hardware parts

4 GT2 Idlers without teeth
8 M5 Precision Shims, 5 mm ID x 6 mm OD x 1 mm
4 M5 x 25 mm Button Head Bolts
4 M5 Nuts

Printed parts

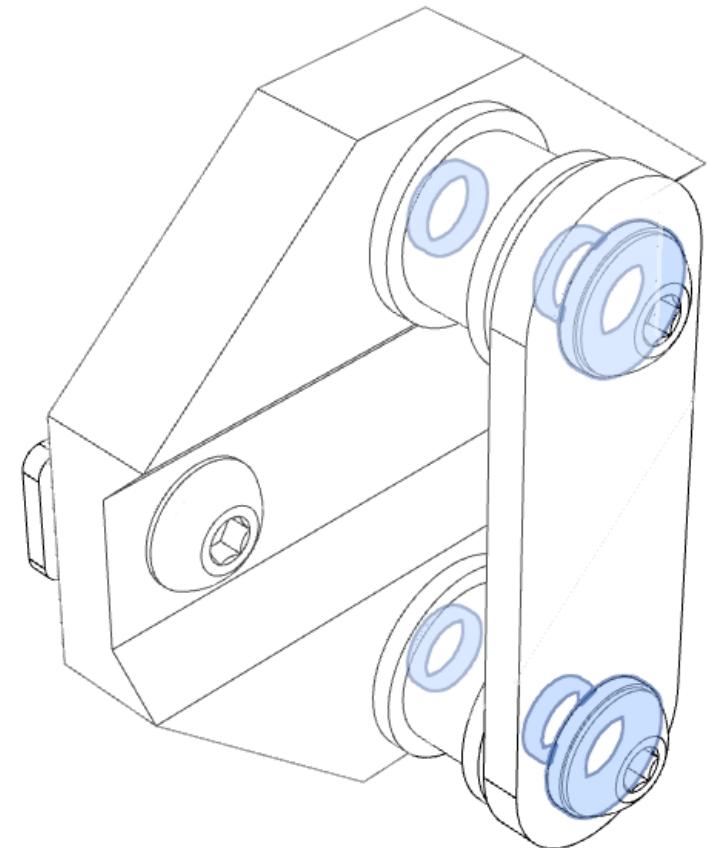
2 GZ Axis Belt Idler Buddy_2x_SN_BN.stl
2 GZ Axis Belt Idler Lock_2x_SN_BN.stl

Videos

[Fusion 360 animation - Attaching the bed frame](#)

Step-by-step

1. Place the nut into the recess in the buddy. TIP: if it is difficult to get the nuts in place, you can heat them up with the tip of a soldering iron and gently press them into place.
2. Mount the idlers to the buddy with the 25 mm bolts. Use precision shims on each side of the idler, and a washer outside the lock.



Bed frame, bed support

Hardware parts

For fastening the Z carriers:

12 M5 x 10 mm Button Head Bolts

12 M5 Washers

12 M5 T-Nuts

For the bed idlers:

4 M5 x 10 mm Button Head Bolts

4 M5 T-nuts

4 M5 Washers

For the bed profile L brackets:

8 M5 x 10 mm Button Head Bolts

For the build plate support:

7 M5 x 10 mm Button Head Bolts

7 M5 Washers

7 M5 T-Nuts

2 M5 x 20 mm Hex Head Bolts

2 M5 Nuts

Printed parts

4 Bed L Bracket_4x_SN_BN.stl

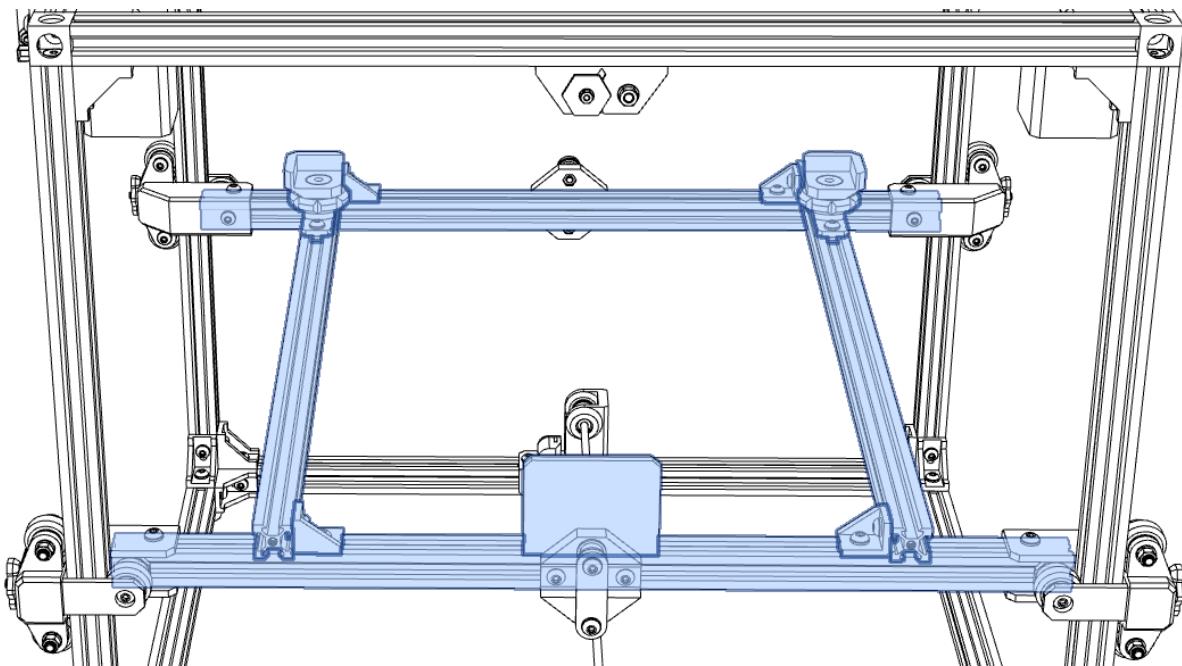
2 Bed Support Base_2x_SN_BN.stl

1 Bed Support Center_1x_SN_BN.stl

2 Bed Support Corner_2x_SN_BO.stl

2 Bed Support Thumb Screw_2x_SN_BO.stl

4 Bed Frame Hooks_4x_SN_BO.stl



Videos

[Fusion 360 animation - Attaching The Bed Frame](#)

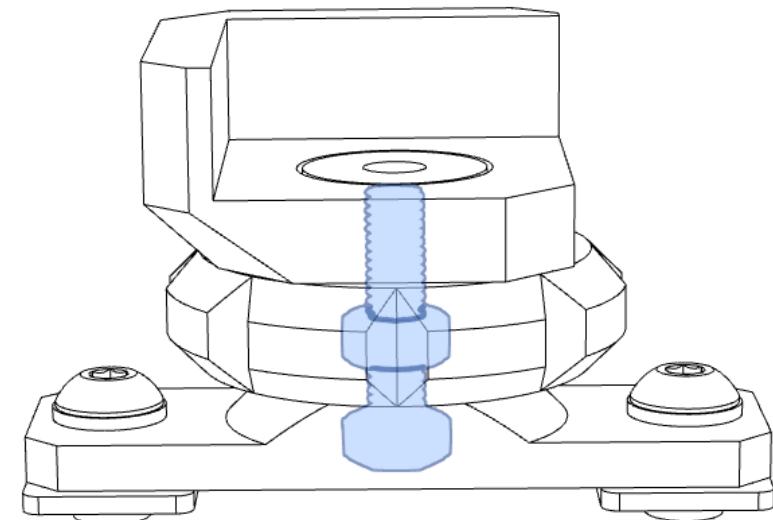
[Live build - Bed Transverse X-profile](#)

[Fusion 360 animation - Bed supports explained](#) OBS! Bed support orientation is rotated in an upgraded version.

[Live build - The Build-plate Support System](#)

Step-by-step

1. Add one end of the V-slot rail into the Z carrier. Place the Z carrier to the frame, and align how deep the horizontal V-slot rail should be placed to the Z carrier. Fasten both horizontal V-slot rail to the Z carriers in one of the ends with M5 10 mm bolts, washers and tee nuts.
2. Mount the bed idlers exactly in the middle of the bed frame (250 mm from the main frame)
3. Mount the perpendicular V-slot rails with the 4 L brackets.
4. Add the center bed support and fasten it.
5. Thread the carriers over the forks and hang the bed frame in the frame hooks.
6. Mount the last 2 Z carriers, and fasten them.
7. Mount the M5 x 20 mm hex head bolts into the bed support base brackets.
8. Mount one bed support base bracket on each of the two perpendicular V-slot rails, with M5 10 mm bolts, washers, and tee nuts.
9. Add the M5 nuts into the bed thumb screws, and place them on top of the base brackets.
10. Add the bed support corners on top of the thumbscrews.



Belt anchors (top)

Hardware parts

2 GT2 Idlers with 20 teeth
4 M5 Precision Shims, 5 mm ID x 6 mm OD x 1 mm
2 M5 x 25 mm Button Head Bolts
2 M5 Nuts
4 M5 x 10 mm Button Head Bolts
4 M5 T-nuts (already placed in the frame)
6 M5 Washers
2 M3 x 25 mm Button Head Bolts
2 M3 Nuts
2 M3 Washers

Printed parts

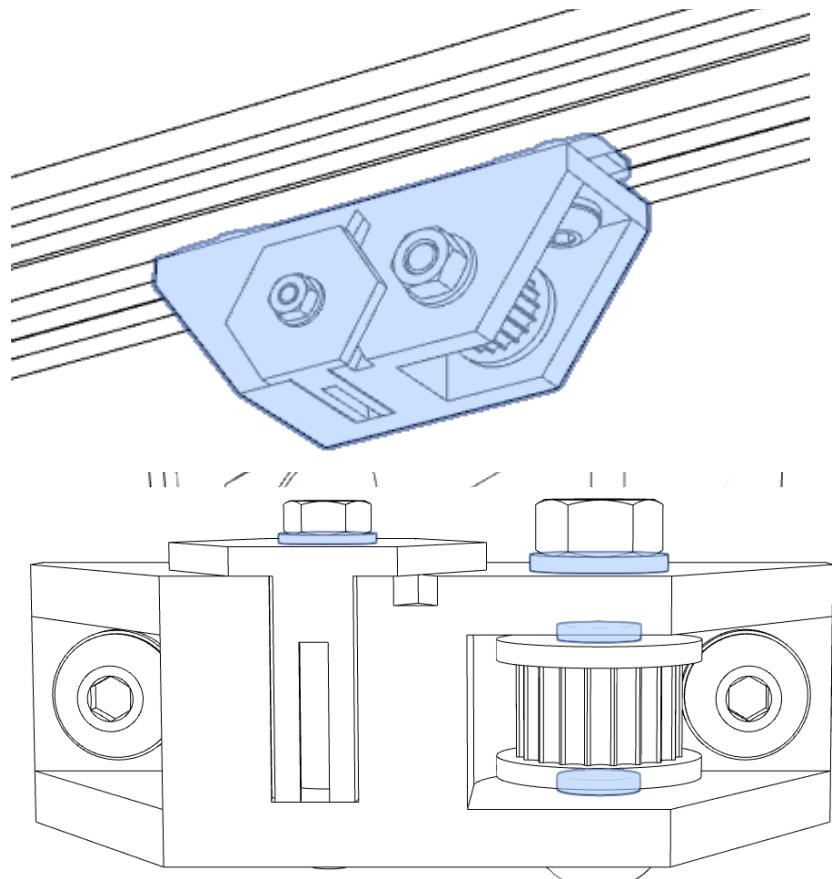
1 GZ Axis Belt Anchor Top M_1x_SN_BN.stl
1 GZ Axis Belt Anchor Top R_1x_SN_BN.stl
2 Z Axis Belt Top Lock 2x_SN_BN_100%.stl

Videos

[Fusion 360 animation - Top Belt Anchor Point](#)

Step-by-step

1. Start mounting the toothed idlers in the top belt anchors. Use the M5 x 25 mm bolts, nuts, and washers. Remember to use precision shims on each side of the idler.
2. Mount the top belt anchors to the frame with the arrow/diamond pointing exactly to the middle of the frame (250 mm from the inside corner). Be aware that the top belt anchors are not the same for the Rod side and the Motor side.
3. Fasten the belt locks loosely with the M3 parts.



Worm gear, rod, rod buddy

Hardware parts

1 Nema 17 Stepper Motor
4 M3 x 8 mm Button Head Bolts

1 Worm Gear Pinion 20:1
1 Worm Gear Helical 20:1
2 GT2 Motor Pulleys with 20 Teeth

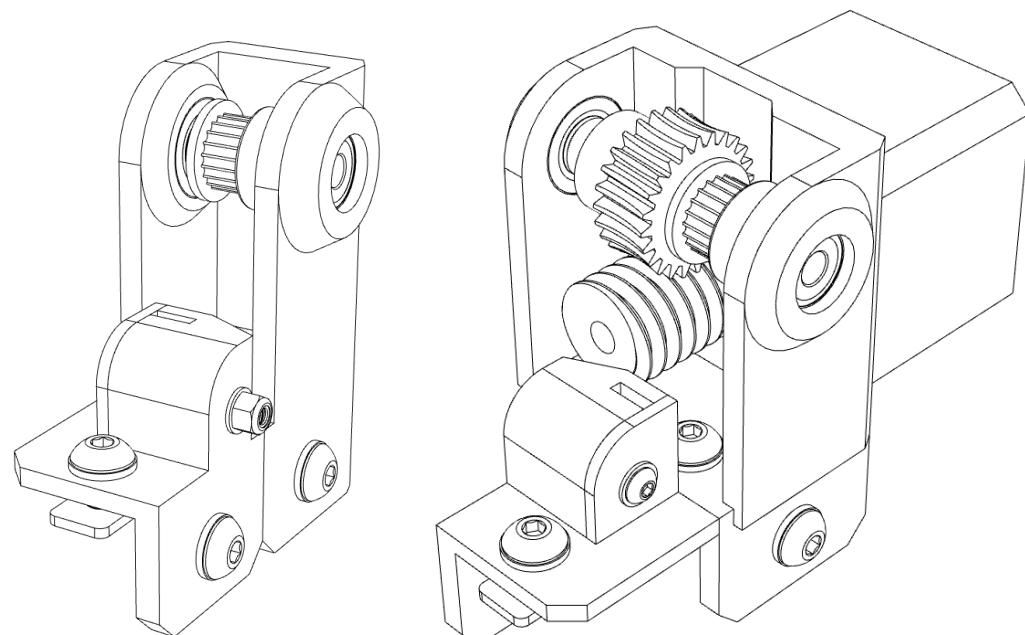
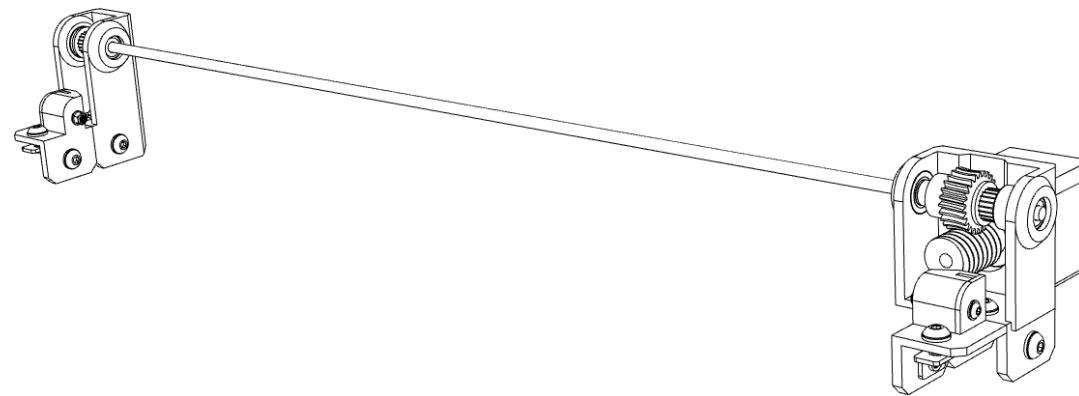
3 M5x6,5x1 Precision Shim
4 Bearings 625ZZ (5 ID x 16 OD x 5 W)
1 M5 x 560 mm Rod

2 M3 x 20 mm Button Head Bolts
2 M3 Lock Nuts
4 M3 Washers

10 M5 Tee Nuts
12 M5 Washers
10 M5x10 Button Head Bolts

Printed parts

1Z Axis Worm Gear Buddy_1x_SN_BN_100%.stl
1 Z Axis Worm Gear Rod Buddy_1x_SN_BN_100%.stl
2 Z Belt Anchor Belt Lock_2x_SN_BN.stl
1 Z Belt Anchor Bottom M_1x_SN_BN.stl
1 Z Belt Anchor Bottom R_1x_SB_BO.stl
1 Worm Spacer_1x_SN_BO_100%.stl



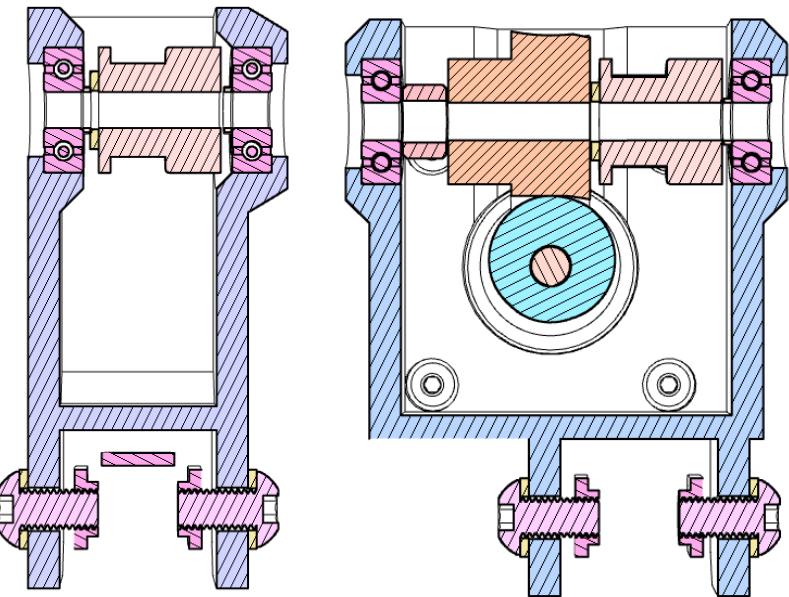
Videos

[Fusion 360 animation - Adding the Worm Gear & Final Parts!](#)

[Live build - Adding the Worm Gear Buddys](#)

Step-by-step

1. Add the worm gear pinion to the stepper motor, and tighten the set screw.
2. Add the stepper motor to the worm gear buddy, and fasten it with the 8 mm M3 bolts.
3. Measure the exact midpoint on the bottom v-slot rail, and make a pencil mark. Place the worm gear buddies on the bottom frame with the notch exactly at the pencil mark, and fasten them with the M5 bolts and washers. Use drop nuts if you forgot to place tee nuts in the frame.
4. Add the bottom belt anchors on the bottom frame, and fasten them the same way.
5. Press the bearings into the buddies. Make sure they are pressed fully in.
6. Insert the rod in the first bearing in the rod buddy.
7. Add a precision shim, M5 washer, motor pulley, and a precision shim to the rod before inserting it into the second bearing.
8. Thread the rod through the first bearing in the motor buddy.
9. Add the spacer, worm gear helical, M5 washer (optional), motor pulley, and a precision shim to the rod before inserting it into the last bearing.
10. Adjust and tighten the set screws for the motor pulleys and the helical.



Add the Z belts

Hardware parts

3 meters of GT2 Timing Belt, 6 mm wide

Printed parts

none

Videos

[Live build - Explaining the belted Z-axis](#)

Step-by-step

1. Cut the timing belt into two 150 cm pieces, and thread it as shown in the video.
2. Tighten the belt equally on both sides. They should sound the same when “playing” on them.

Electronics and cable management

Wiring minimum gauges

Mains power switch to PSU

The draw from our 1000W Silicone heater + 240W PSU = 1240W

220V (5,64 Amp): AWG 18 (0,82 mm²)

110V (11,27 Amp) : AWG 15 (1,65 mm²)

Use the same gauge for cables to SSR and mains powered bed heater.

PSU to controller (24V system)

3 Nema 17 Motors = 6A

40W 24V hotend heater = 2A

Miscellaneous = 2A

Total 10A: AWG 16 (1,30 mm²)

Controller cables: AWG 24 (0,20 mm²)

Hotend cables 40W 24V (2A): AWG 22 (0,33 mm²)

Cable lengths

X-carrier to controller

It depends on whether you terminate the cables in the junction box; The distance from the X carrier to the junction box through the bowden loom is approximately 90-100 cm. The distance from the junction box to the controller is approximately 90-110 cm.

Total length 180-200 cm

Motor and endstop cables

X Motor A cable: at least 120 cm

Y Motor B cable: at least 100 cm

Z Motor cable: about: 30-40 cm

E extruder cable: at least 100 cm

Y endstop cable: at least 120 cm

Z endstop cable: at least 120 cm

Wiring

2 x layer fan = 2 x 2-core wire (You can wire these in parallel at the X carrier so 1 x 2 core wire)

Optical endstop = 1 x 3-core wire

BLtouch = 1 x 3-core + 1 x 2-core wire

Hotend fan = 1 x 2-core wire

Heater = 2 wires

Thermistor = 2 wires

Suggestion: use flexible drag chain cable 12-core AWG 24 for fans, endstop and BLtouch. Regular network CAT5 patch cables could also be used.

Proper preparation of Wire Ends

By Markus.Flaig - [Original version on the wiki](#)

Why all the fuzz about wire ends?

You might ask why should you even care about wire ends. You could just cramp them in and screw those suckers down, what works isn't stupid! Isn't it?

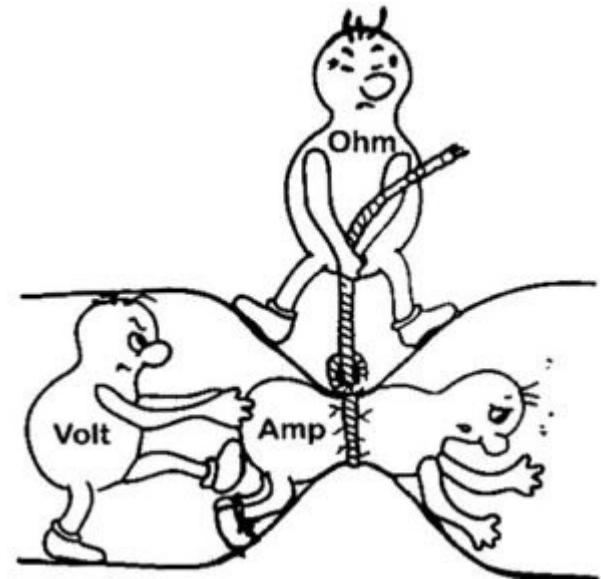
Well, let me introduce you to Ohms Law, but in a rather funny way.

What you see in this simple cartoon is the basic principle of how electrical current flows through an electrical conductor. Ohms Law basically states that a thin wire has a higher electrical resistance than a thick wire of the same material.

Now when you think about your poor un-crimped wire ends wrapped around some screw inside a terminal it is easy to imagine that since they don't form a solid object the resistance will be higher since only some of the fine wire strands will actually act as a conductor. Some of the wires just stray around and don't contribute to conduction and therefore increase the resistance.

Too much electrical resistance leads to higher temperatures at that exact tight spot of the cartoon. If the conductor is really thin and therefore the resistance very high you have all the ingredients of a decent cable fire!

Luckily this all can be avoided with very little effort which I will explain to you in this article.



Equipment needed for bootlace ferrules

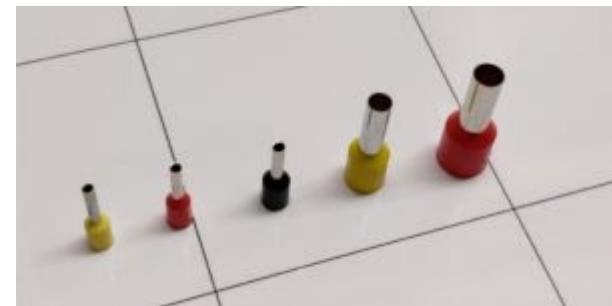
There are a few things you will need in order to do this the right way.

Mainly you will need:

1. Side Cutters
2. Ferrule Crimp Pliers
3. Bootlace Ferrules



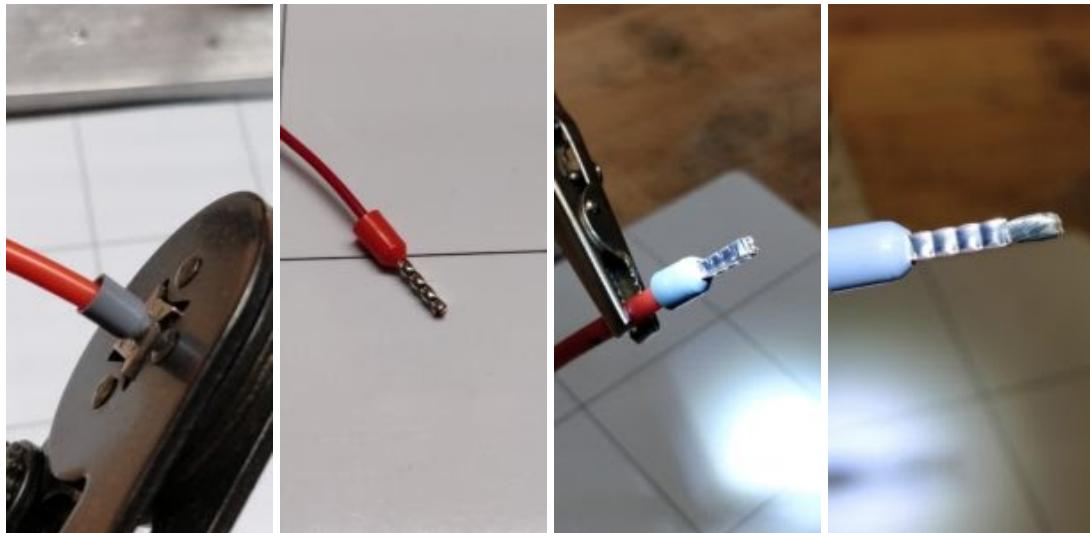
Identify the right sized ferrule



Ferrule Too Big

How to do a proper crimp

Never solder wires before crimping!



Connectors



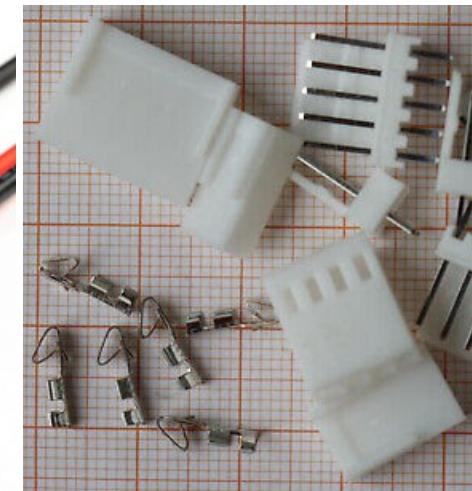
Dupont
Universal connectors



JST XH
Board Connectors

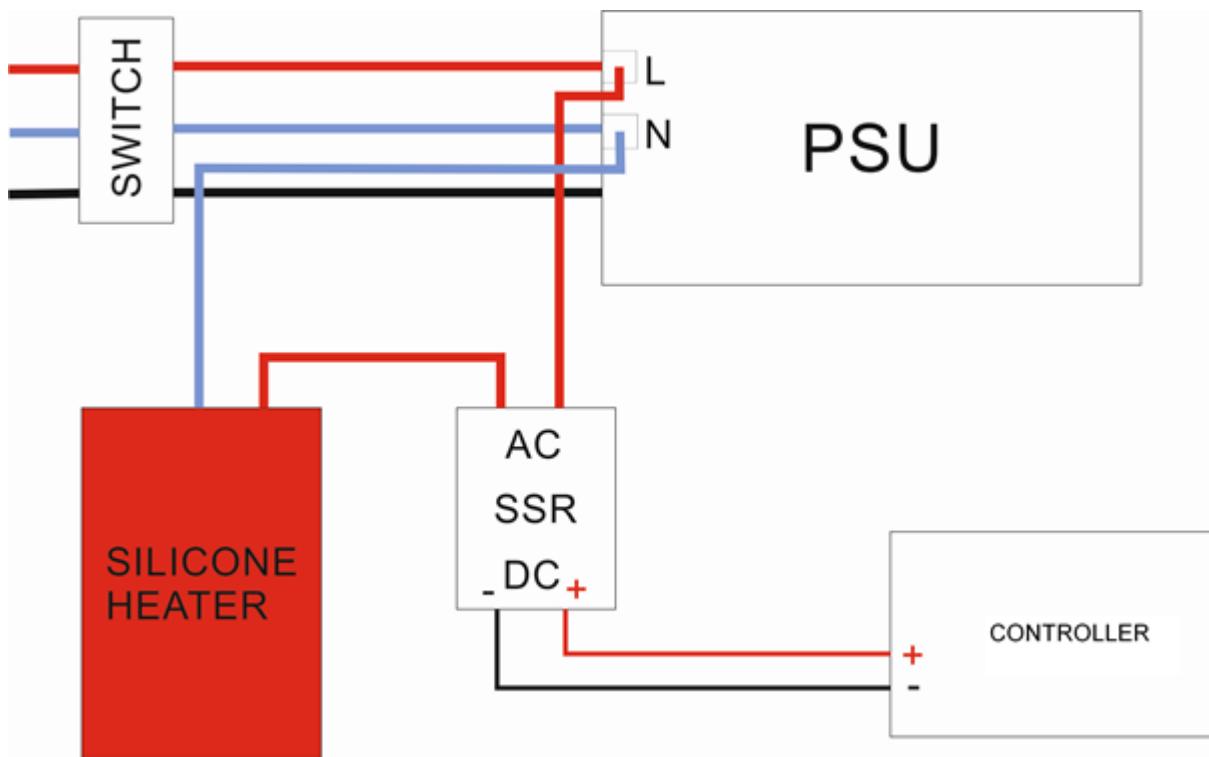


JST SM
General Cable Connectors

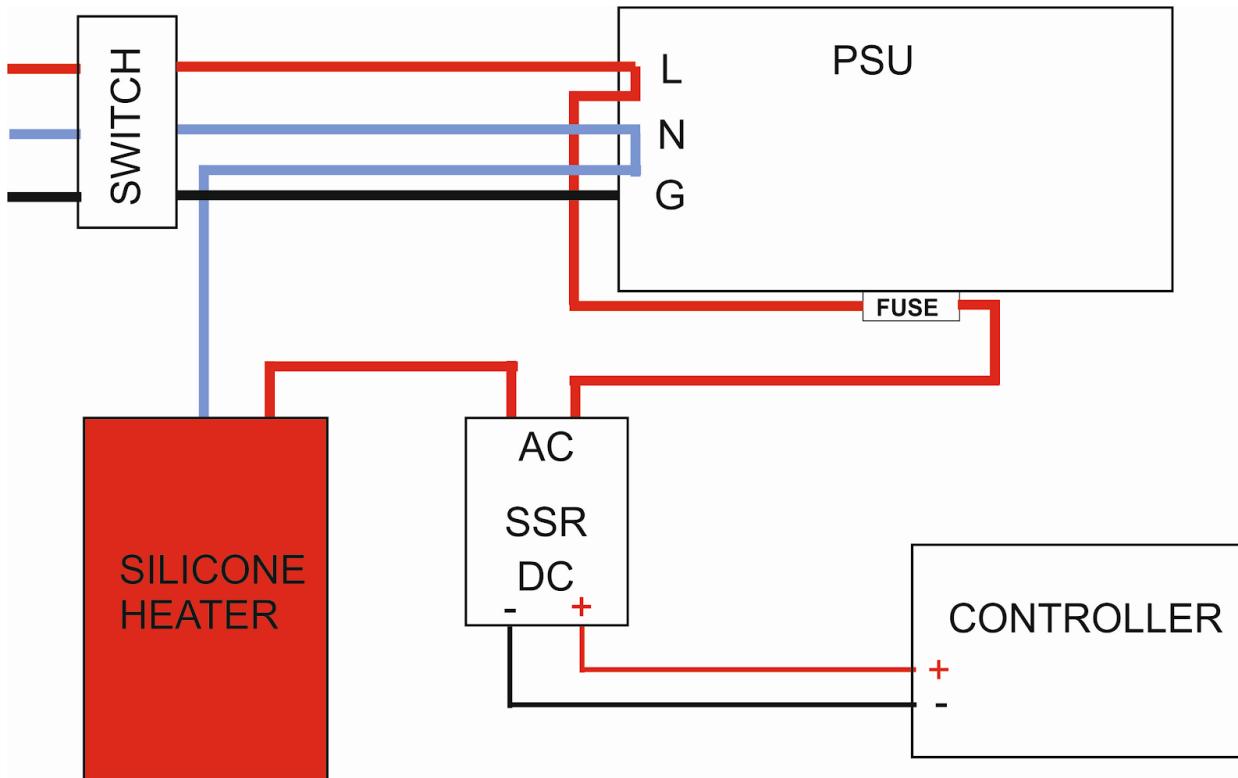


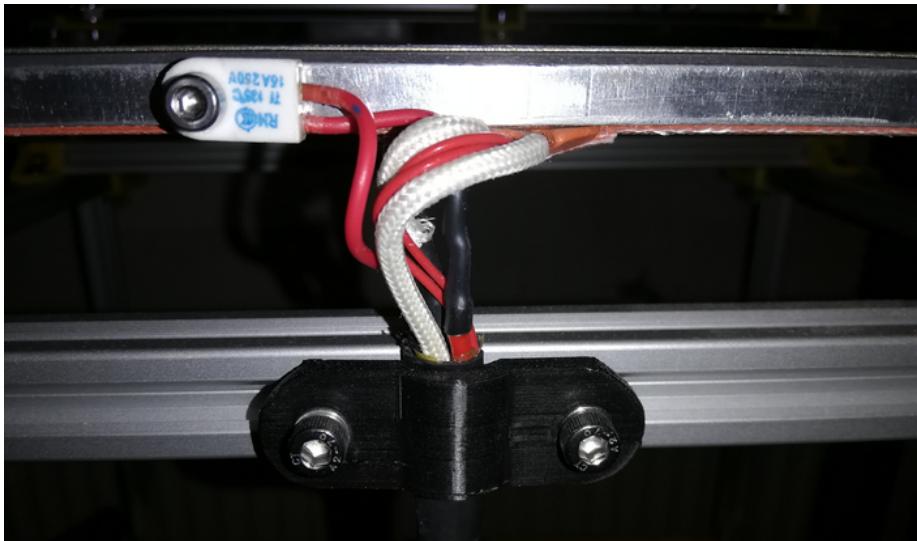
Molex KK 254
Duet board Connectors

Using a solid state relay with a 220V (110V) heated bed



It is advisable to mount a thermal fuse at the bed that disconnects power above 135 °C, in case of failure of the SSR.





Thermal fuse mounted on the bed

Wiring

[Thomas Sanladerer - How to wire your 3D printer!](#)

<https://www.voron.dev/home/voron-2-2-supplement/electronics#content>

[Voron V2 Thermal fuse mount](#)