



SWITCHWIRE ASSEMBLY MANUAL

We build space shuttles with gardening tools
so anyone can have a space shuttle of their own.

VERSION 2021-11-26



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

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

Please, read the entire manual before you start assembly. As you begin wrenching, please check our Discord channels for any tips and questions that may halt your progress.

Most of all, good luck!

THE VORON TEAM

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PART PRINTING GUIDELINES

The Voron Team has provided the following print guidelines for you to follow in order to have the best chance at success with your parts. There are often questions about substituting materials or changing printing standards, but we recommend you follow these.

3D PRINTING PROCESS

Fused Deposition Modeling (FDM)

MATERIAL

ABS

LAYER HEIGHT

Recommended: 0.2mm

EXTRUSION WIDTH

Recommended: Forced 0.4mm

INFILL TYPE

Grid, Gyroid, Honeycomb, Triangle or Cubic

INFILL PERCENTAGE

Recommended: 40%

WALL COUNT

Recommended: 4

SOLID TOP/BOTTOM LAYERS

Recommended: 5

PRINT IT FORWARD (PIF)

Often times our community members have issues printing ABS will bootstrap themselves into a VORON using our Print It Forward program. This is a service where approved members with VORON printers can make you a functional set of parts to get your own machine up and running.

Check Discord if you have any interest in having someone help you out.

HOW TO GET HELP

If you need assistance with your build, we're here to help. Head on over to our Discord group and post your questions. This is our primary medium to help VORON Users and we have a great community that can help you out if you get stuck.



<https://discord.gg/voron>

THIS IS JUST A REFERENCE

This manual is designed to be a simple reference manual. Building a Voron can be a complex endeavour and for that reason we recommend downloading the CAD files off our Github repository if there are sections you need clarification on. It can be sometimes be easier to follow along when you have the whole assembly in front of you.



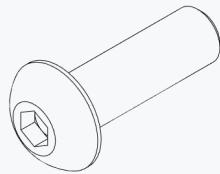
<https://github.com/vorondesign>



<https://docs.vorondesign.com/>

HARDWARE

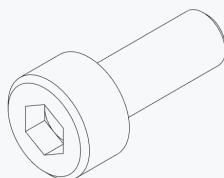
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BUTTON HEAD CAP SCREW (BHCS)

Metric fastener with a domed shape head and hex drive. Most commonly found in locations where M5 fasteners are used.

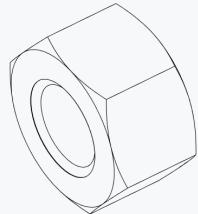
ISO 7380-1



SOCKET HEAD CAP SCREW (SHCS)

Metric fastener with a cylindrical head and hex drive. The most common fastener used on the Voron.

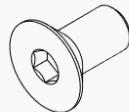
ISO 4762



HEX NUT

Hex nuts couple with bolts to create a tight, secure joint. You'll see these used in both M3 and M5 variants throughout this guide.

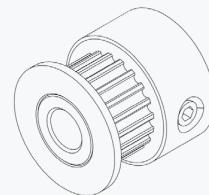
ISO 4032



FLAT HEAD COUNTERSUNK SCREW (FHCS)

Metric fastener with a cone shaped head and a flat top.

ISO 10642



PULLEY

GT2 pulley used on the motion system of the Voron.



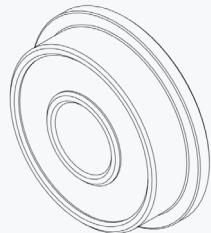
SHIM

Not to be confused with stamped washers. These are used in all M5 call-out locations in this manual.

DIN 988

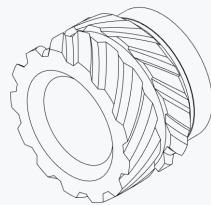
HARDWARE

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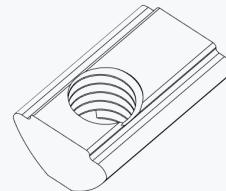
F695 BEARING

A ball bearing with a flange used in various gantry locations.



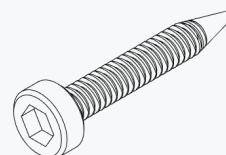
HEAT SET INSERT

Heat inserts with a soldering tip so that they melt the plastic when installed. As the plastic cools, it solidifies around the knurls and ridges on the insert for excellent resistance to both torque and pull-out.



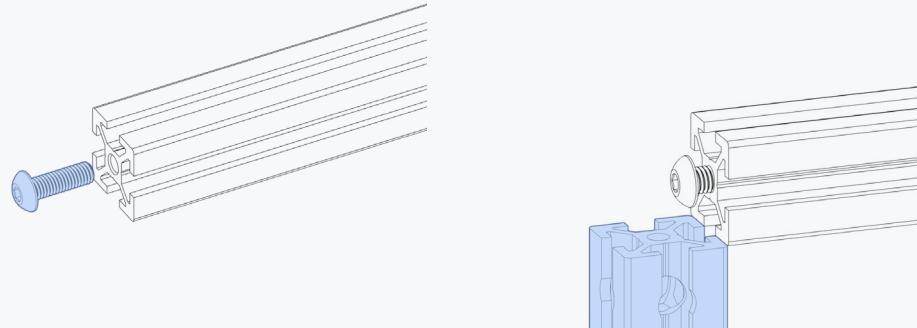
POST INSTALL T-SLOT NUT

Nut that can be inserted into the slot of an aluminium profile. Used in both M3 and M5 variants throughout this guide.



SELF TAPPING SCREW

Fastener with a pronounced thread profile that is screwed directly into plastic.



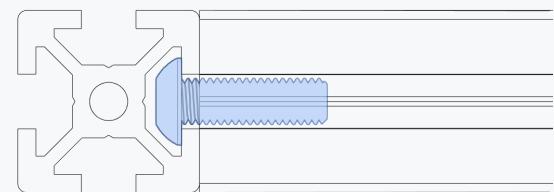
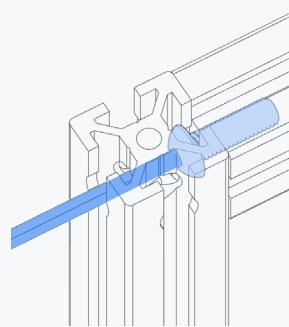
BLIND JOINT BASICS

Blind Joints provide a cost effective and rigid assembly method.

The head of the BHCS is slid into the channel of another extrusion and securely fastened through a small access hole in the extrusion.

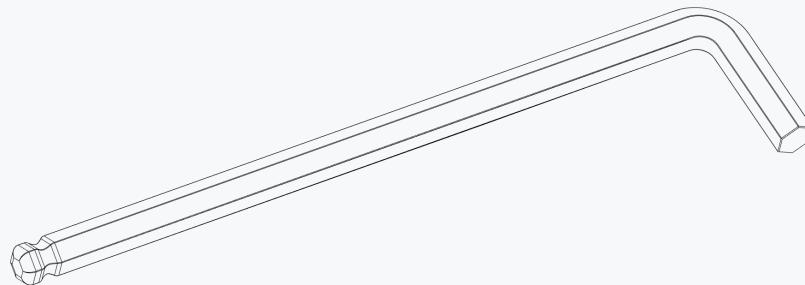


<https://voron.link/onjwmcd>

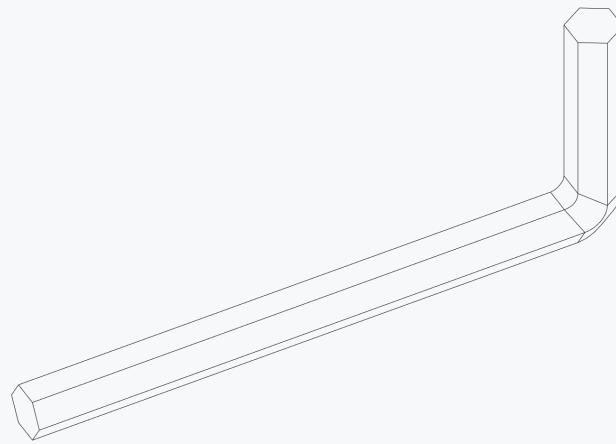


BALL-END DRIVER

Some parts of this design require the use of a ball-end hex driver for assembly. We recommend you get a 2.5mm and 3mm one.

**2.5MM HEX DRIVER**

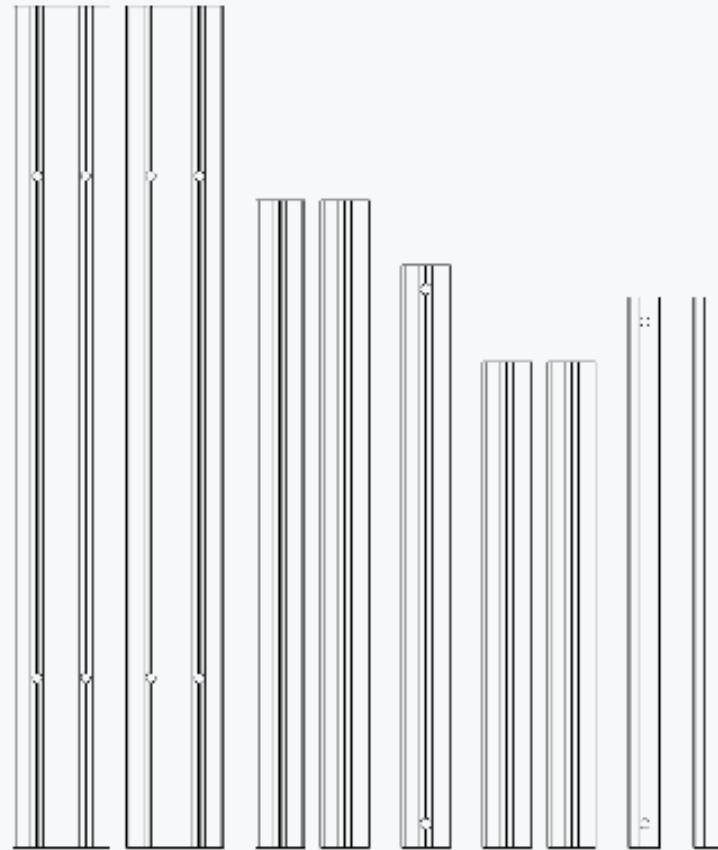
The 2.5mm hex driver will see a lot of use in this build. A quality driver is strongly recommended. Refer to the sourcing guide for suggestions.



FRAME

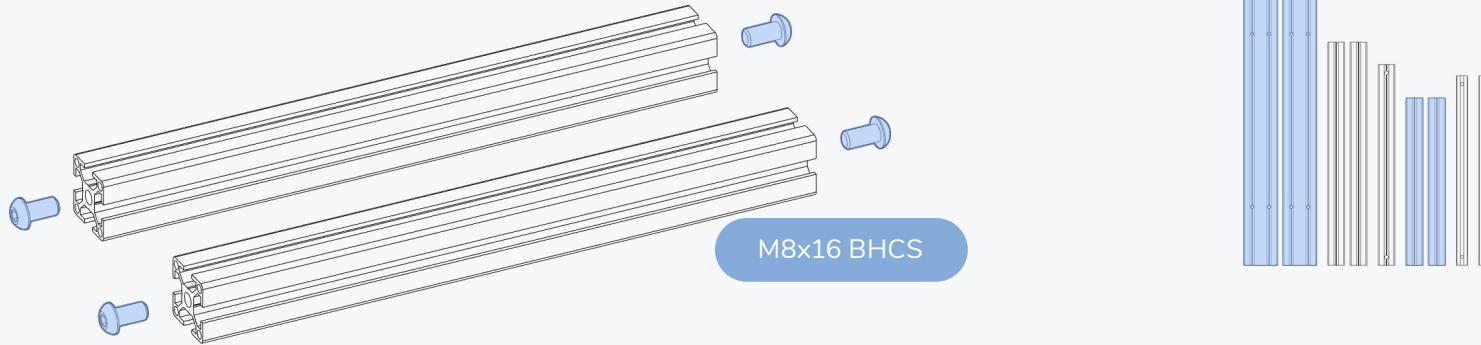
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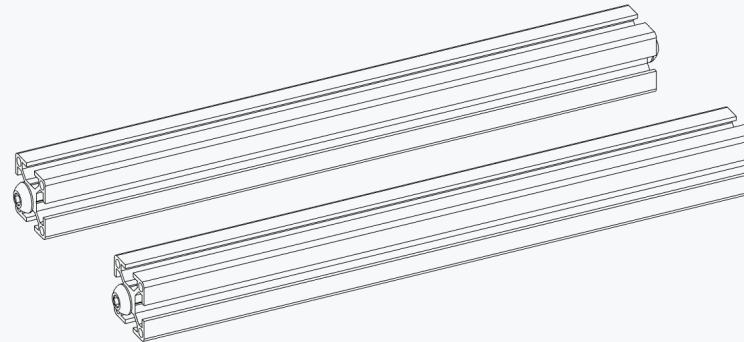
GETTING EXTRUSIONS TOGETHER

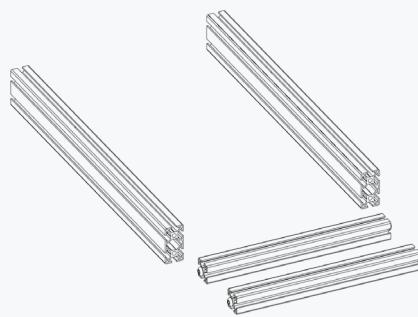
Separate the extrusions you're going to need for this section of the build. We've laid out all the parts you should have and highlighted the ones that will be used in the following sections.



BLIND JOINT BASICS

Blind Joints provide a cost effective and rigid assembly method. The head of the BHCS is slid into the channel of another extrusion and securely fastened through a small access hole in the other extrusion.



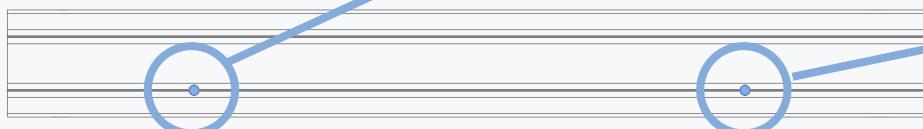


UPSIDE DOWN ASSEMBLY

For ease of assembly we often recommend to assemble components upside down. Assemble on a flat surface to ensure that the base is square.

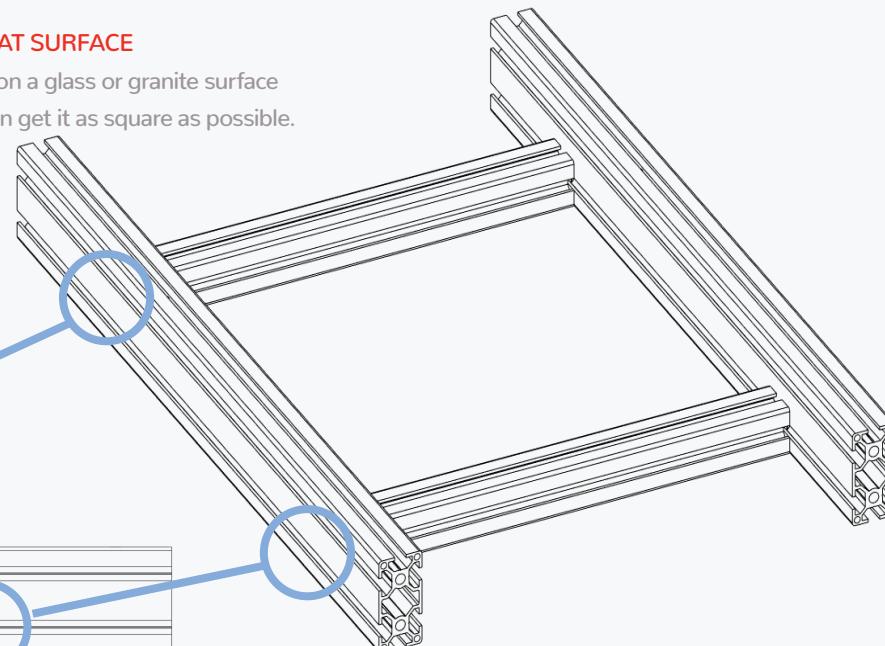
BLIND JOINT ACCESS HOLES

Use the access holes to fasten the bolts.



BUILD ON A FLAT SURFACE

Build the frame on a glass or granite surface to ensure you can get it as square as possible.



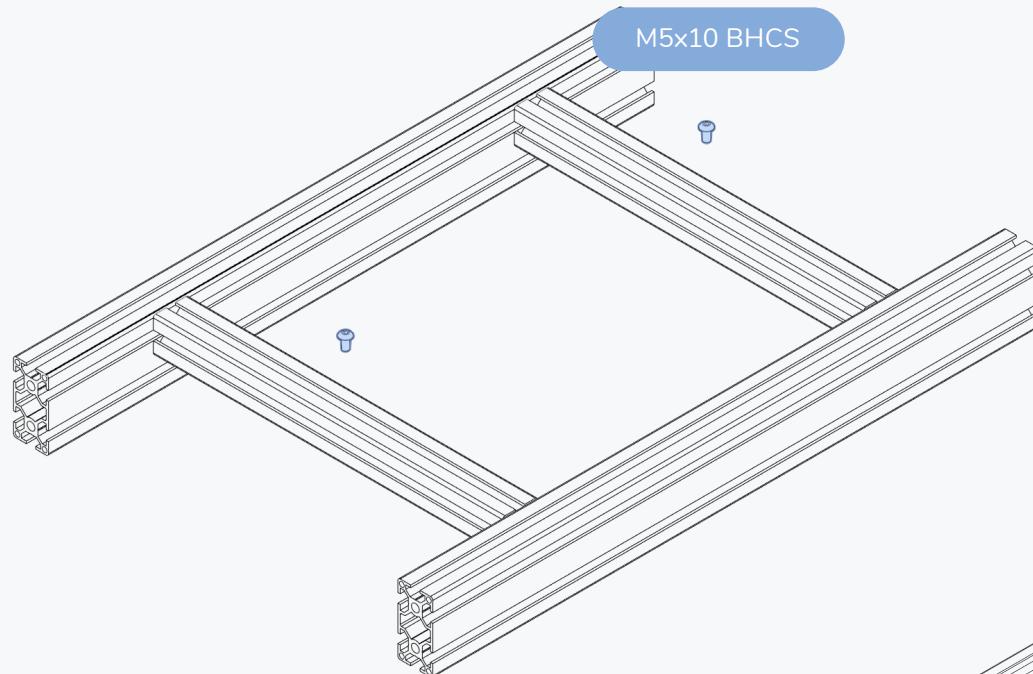
FIRST BLIND JOINT

This design relies on blind joints to assemble the frame. We outlined the basics of blind joints on page 8.

If you've never assembled one before we recommend you watch the linked guide.

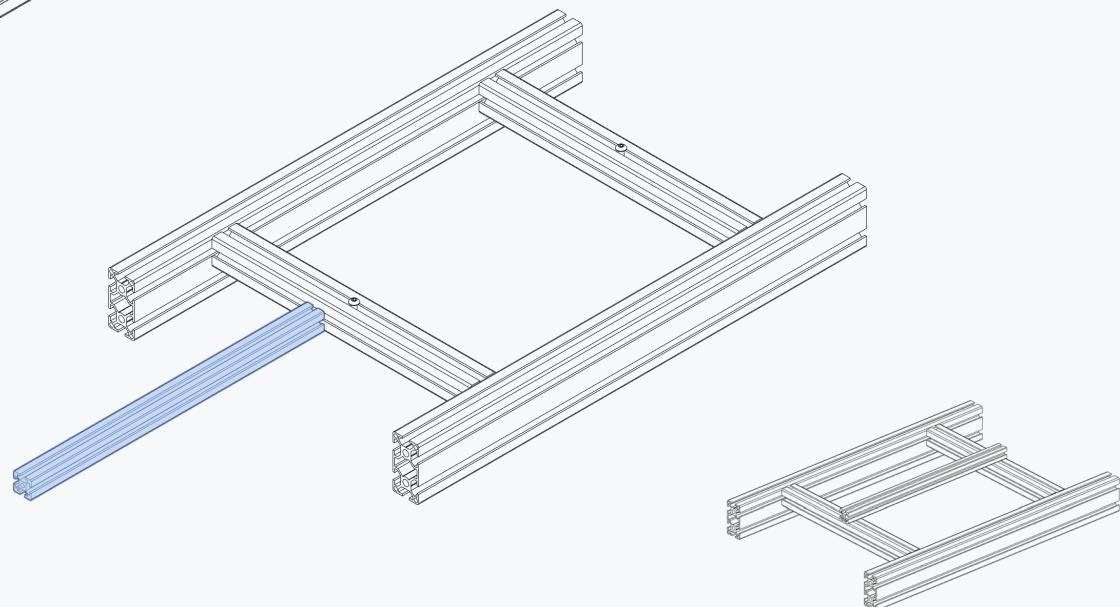
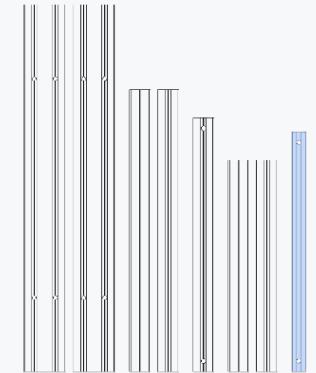


<https://voron.link/onjwmcd>

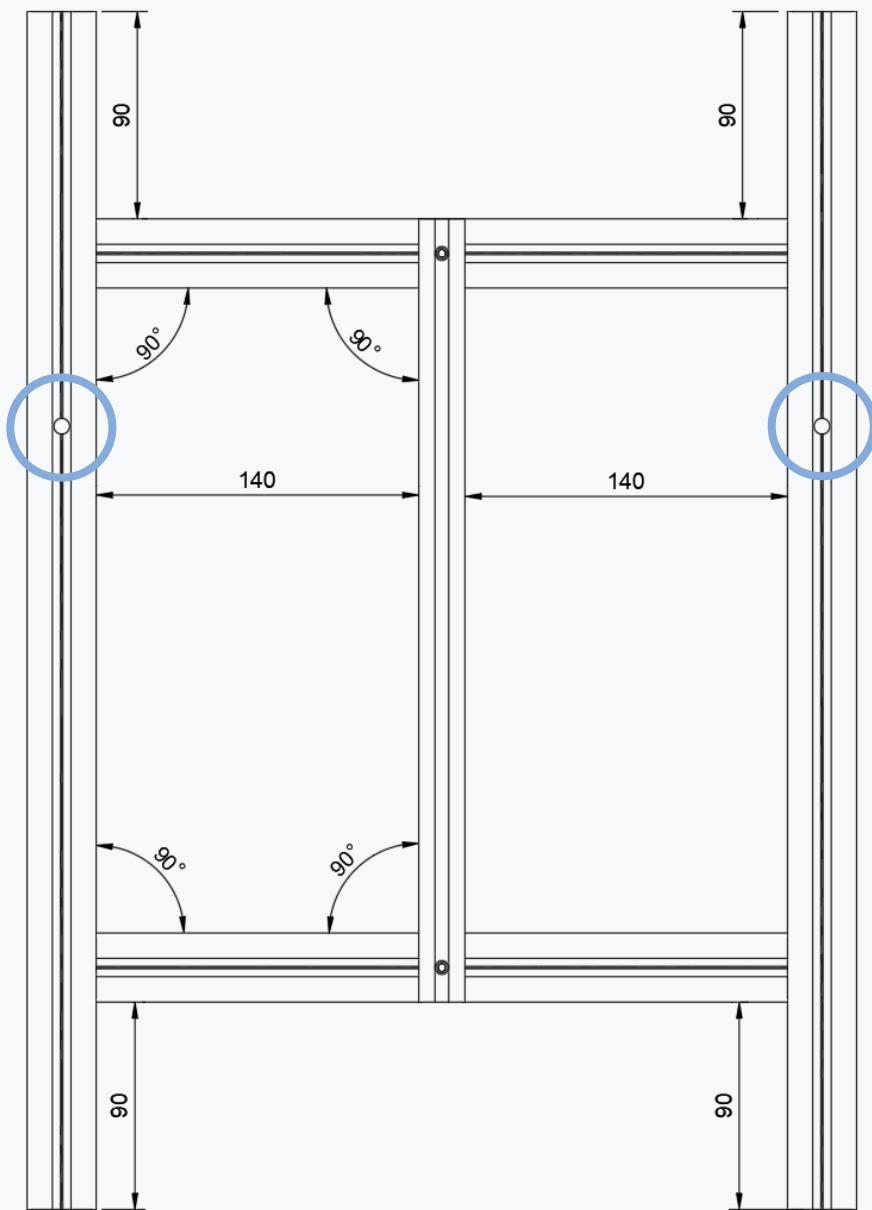
**T-NUTS?**

We don't show the insertion of T-Nuts in our assembly manuals.

The T-Nuts we recommend can be inserted at any point during the installation.



FRAME



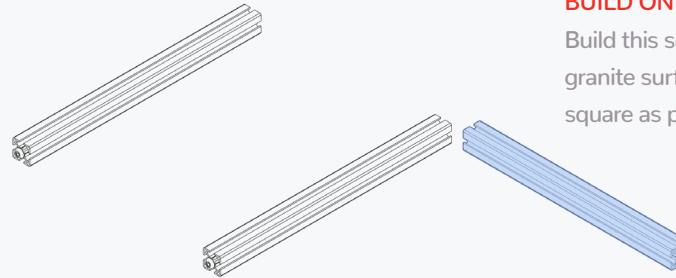
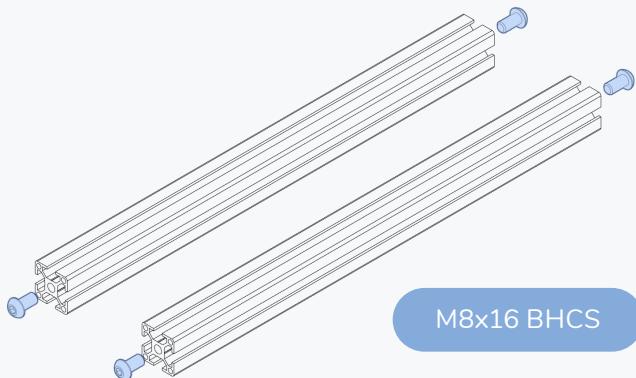
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VERIFY DIMENSIONS

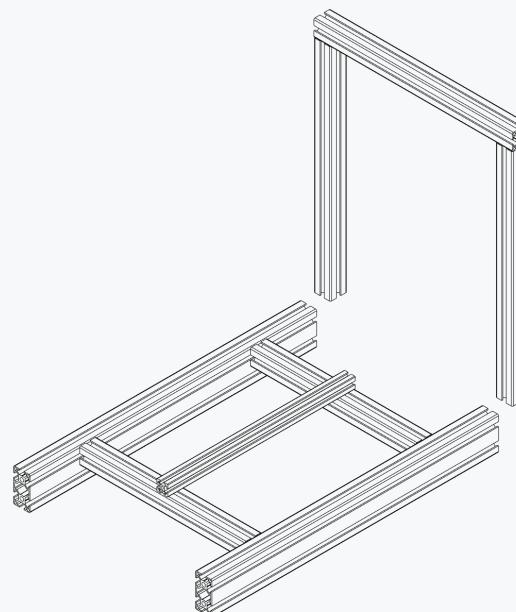
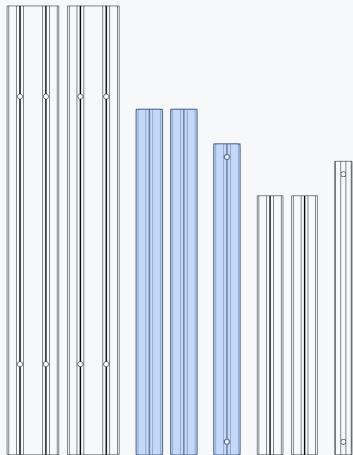
Make sure the frame is square and that all positions are set correctly before moving on. Check the 90° angles with a machinist square.

MIND ACCESS HOLE POSITION

We do our best to call out things that may bite you later in the assembly process but may skip things that seem obvious to us. If in doubt please refer to the CAD model, it might save you some considerable time down the road.

**BUILD ON A FLAT SURFACE**

Build this section of the frame on a glass or granite surface to ensure you can get it as square as possible.

**TILT FRAME 90°**

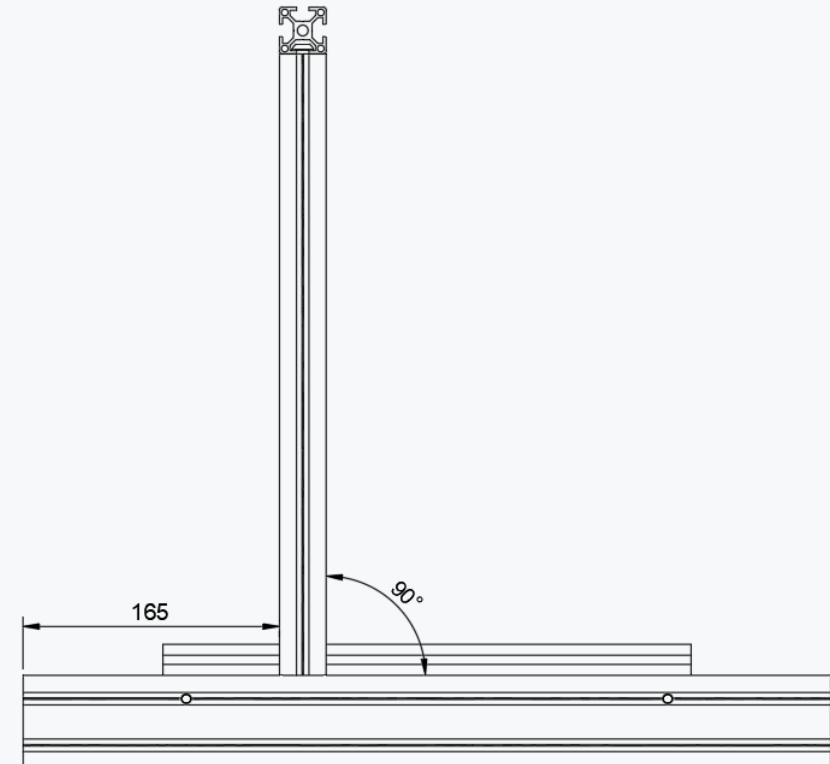
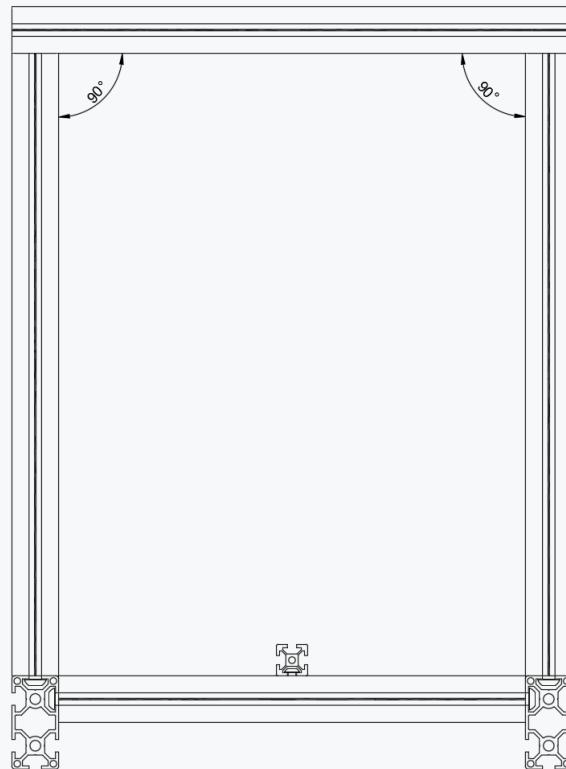
The access holes for the Blind Joints are at the bottom. Lay the frame flat on its side to access them. This also helps in mounting the uprights flush to the base.

VERIFY DIMENSIONS

Check the corners and make sure that they are at 90° angles. Use a small machinist square.

If you have the measuring equipment verify that both uprights are dead on parallel.

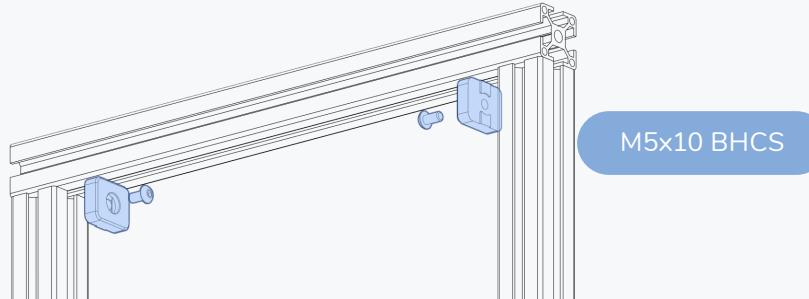
Correct the angle is required. Failure in doing so may result in a sticky Z Axis.



MIND THE CARRIAGE

The carriages are designed to slide along the rail easily.
This unfortunately also includes sliding off the rails.

Dropping the carriage likely irreparably damages it.



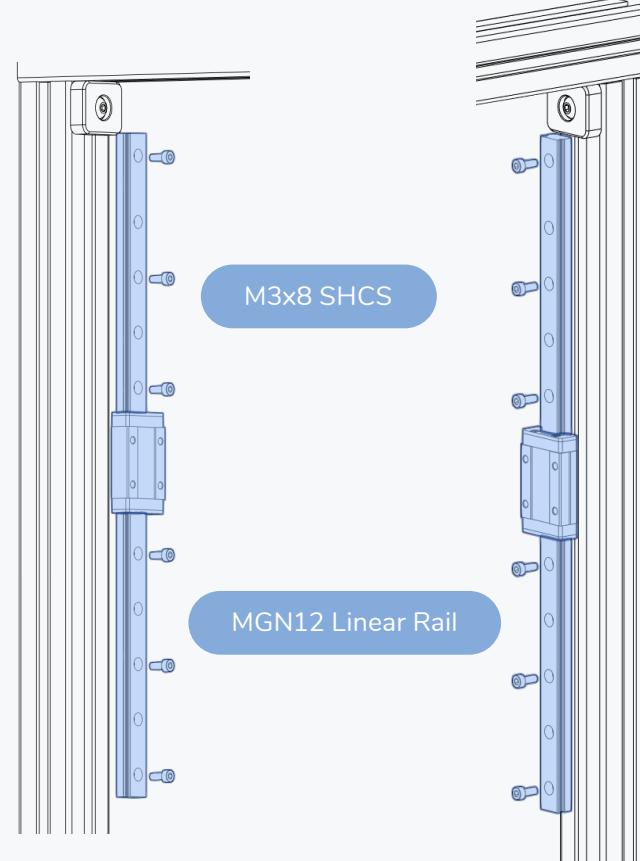
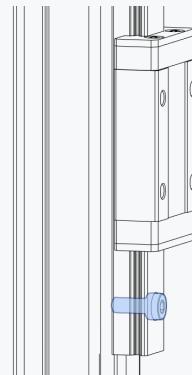
M5x10 BHCS

NO STOPPER ON LEFT RAIL

The left rail does not have a stopper in place
to prevent the carriage from sliding off the rail.
Some rails come with little plastic stop pins,
you can leave the bottom one in place.

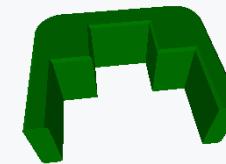
If your rail does not have these stop pins leave
the last bolt slightly loose to act as a stopper.

Tip: Mark the location with some tape to draw
your attention to it later.

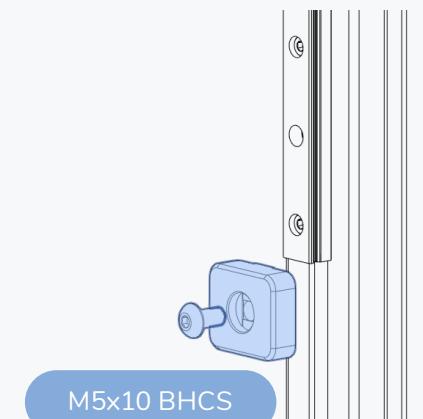


M3x8 SHCS

MGN12 Linear Rail

**CENTERED RAIL INSTALLATION GUIDE**

Use the guides to position the rail in the center
of the extrusion prior to fastening the bolts.



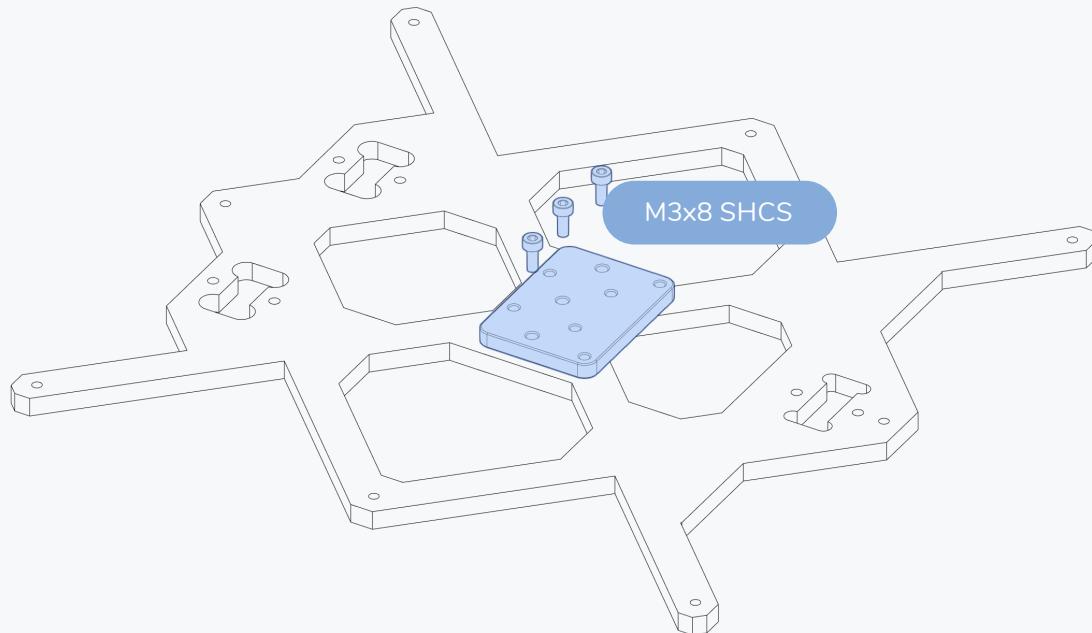
M5x10 BHCS

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Y AXIS

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CARRIAGE MODIFICATION

If you sourced an unmodified carriage (e.g. a Prusa replacement part) you'll need to modify the hole pattern.

Temporarily mount the drill jig to the carriage.
Drill the 6 holes marked on the right with a 3mm or 3.2mm
drill bit.

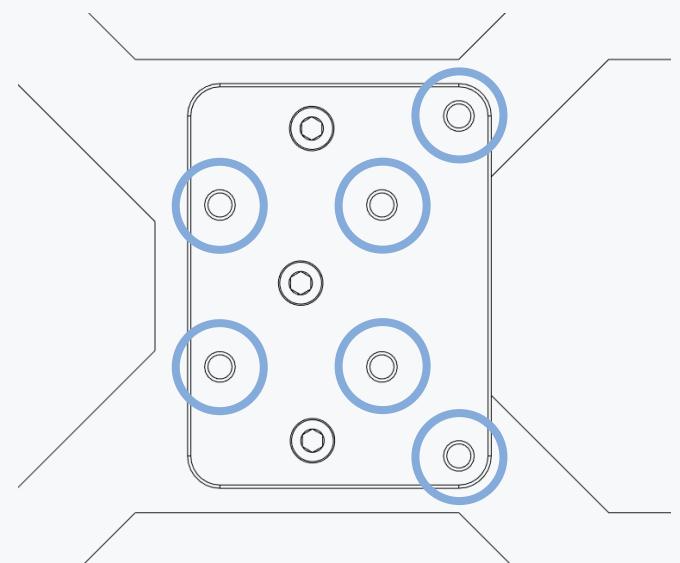
Remove the jig after you have drilled the holes.

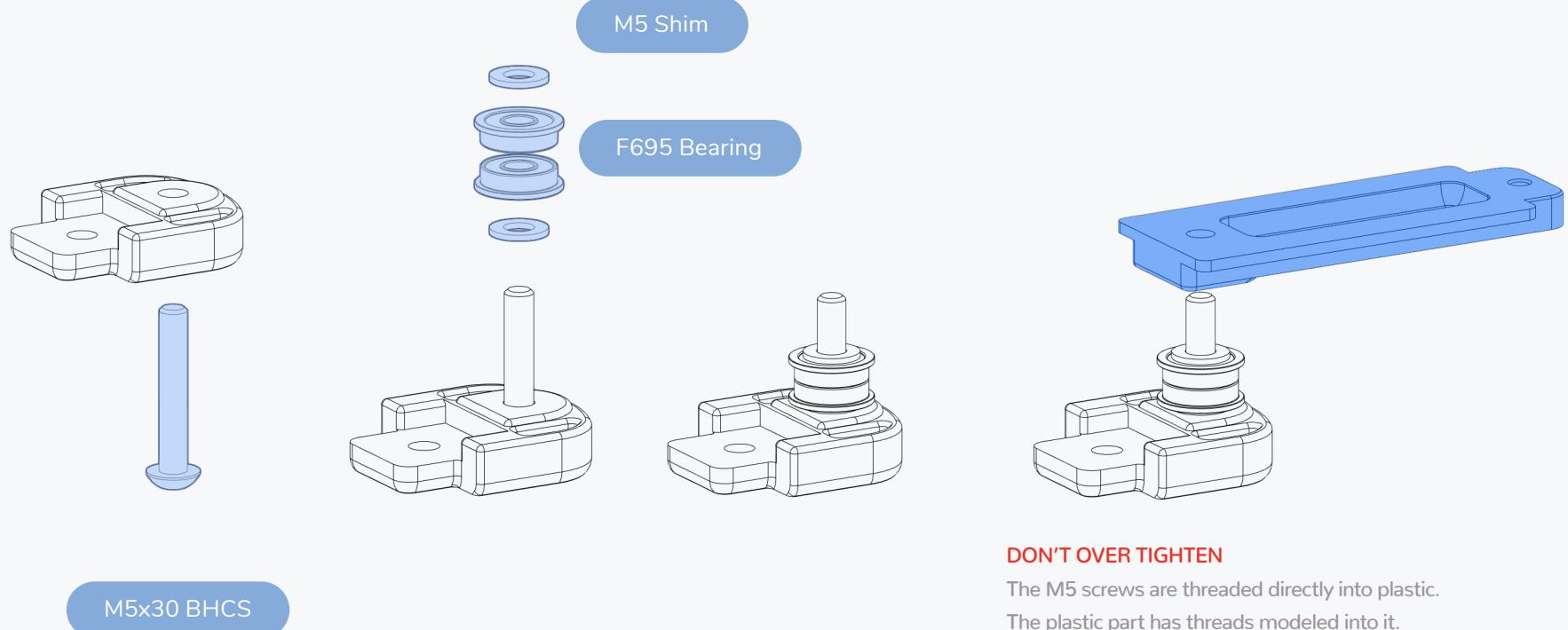
FINISHED CARRIAGE



Some vendors offer carriages with the bolt pattern required for the Voron Switchwire.

If you sourced a premachined carriage you can skip this step.

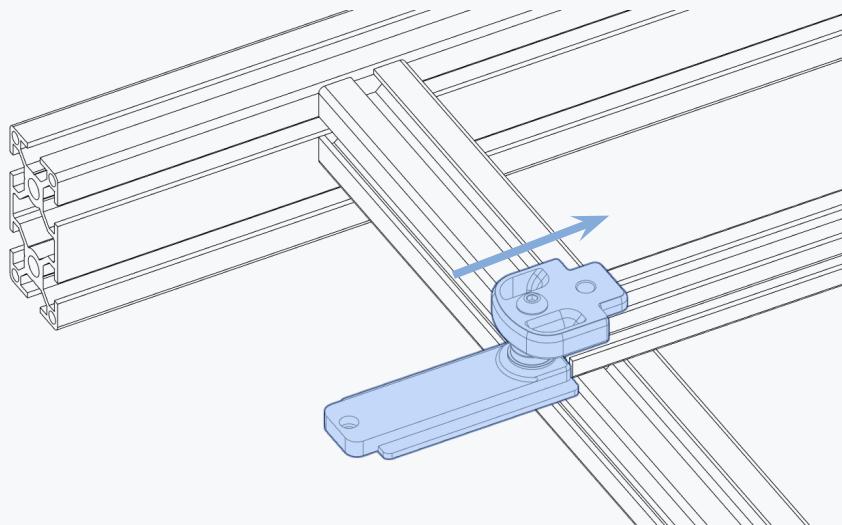


**DON'T OVER TIGHTEN**

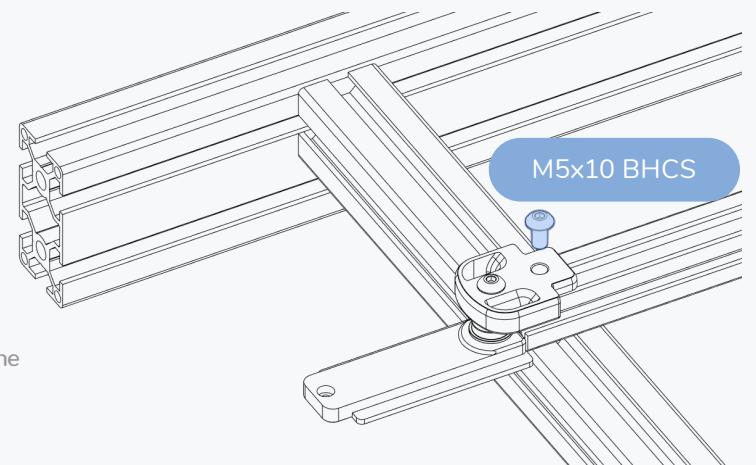
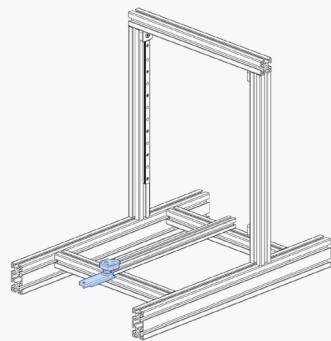
The M5 screws are threaded directly into plastic.
The plastic part has threads modeled into it.

UPSIDE DOWN ASSEMBLY

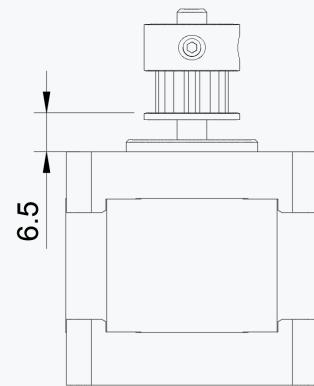
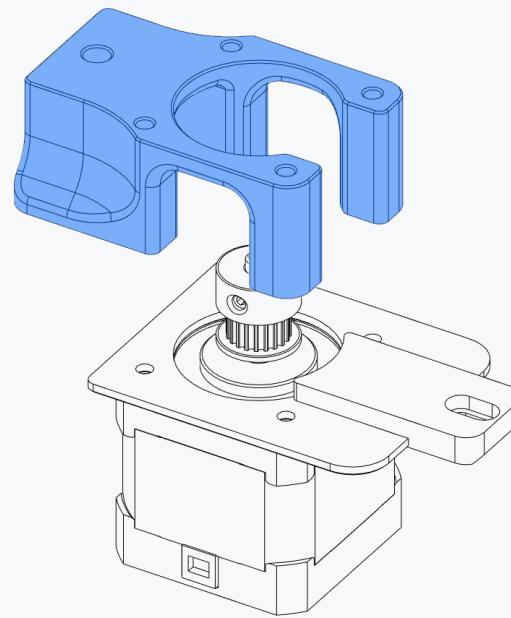
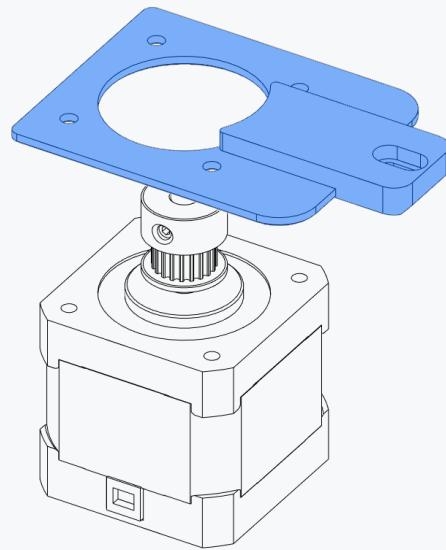
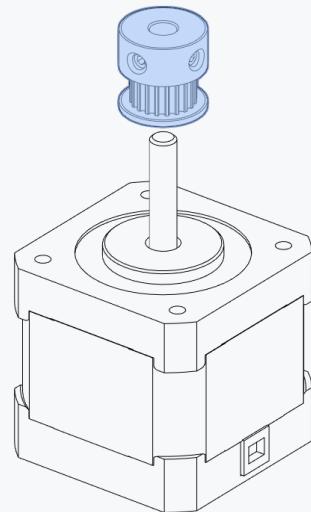
Why fight gravity if it can work for us.

**FULLY SEAT**

Make sure the part is installed flush against the extrusion.



GT2 20T Pulley



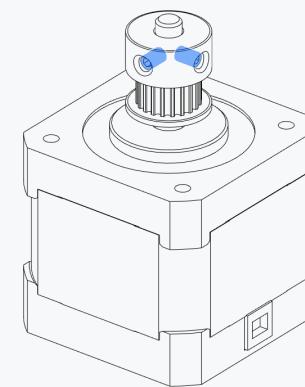
GRUB SCREWS

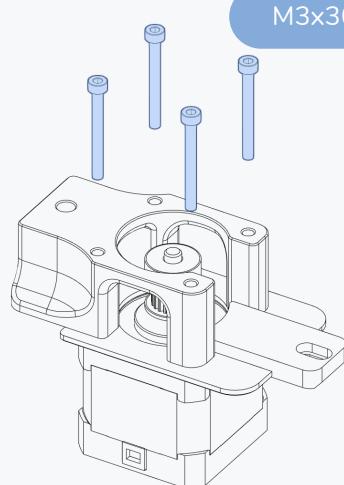
AKA THE ROOT OF ALL ISSUES

Use thread locker on all grub screws after you set their position.

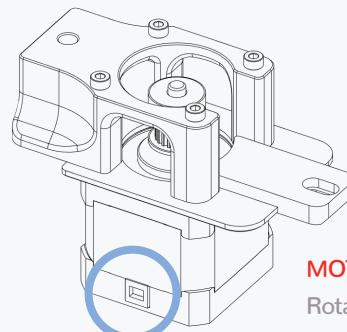
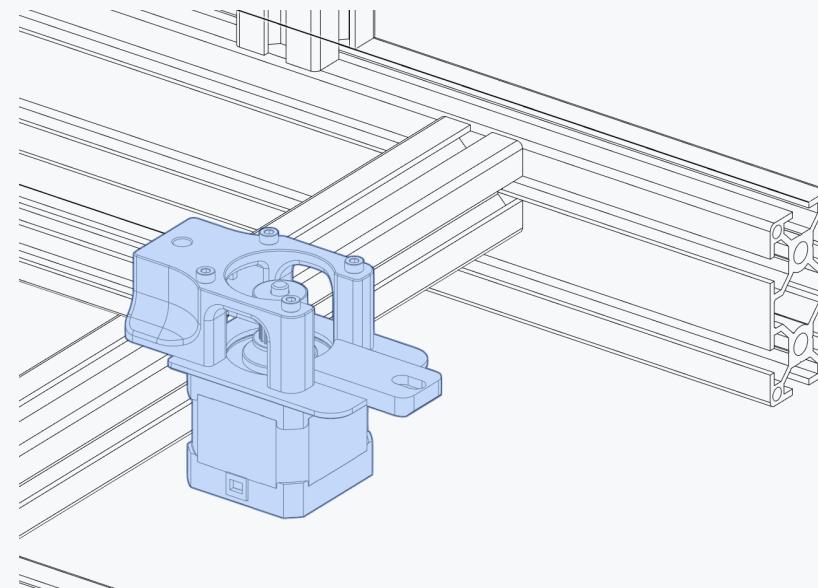
Loose grub screws account for the majority of issues that our users report. Save yourself hours of troubleshooting and apply thread locker to all grub screws during the build.

See the products application notes for instructions.



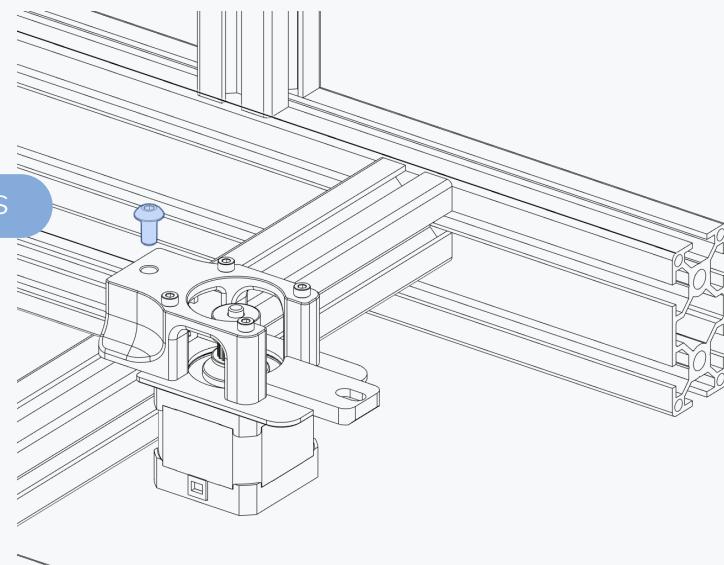


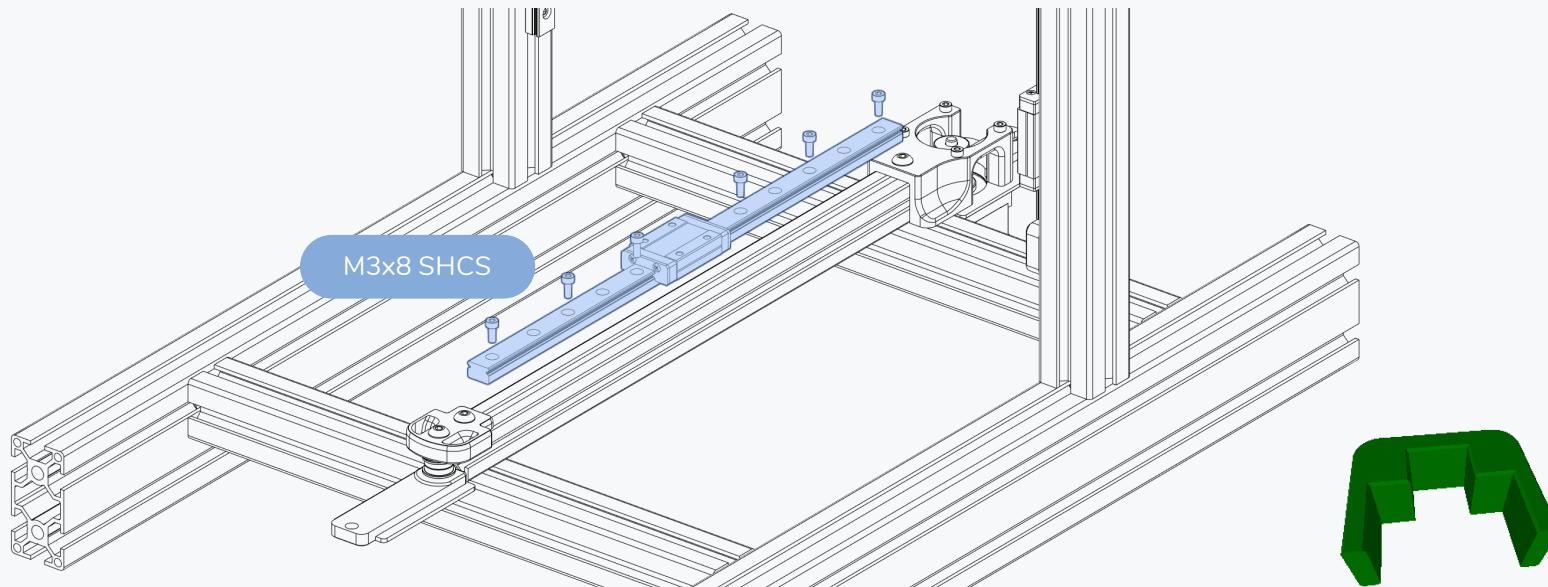
M3x30 SHCS

**MOTOR ORIENTATION**

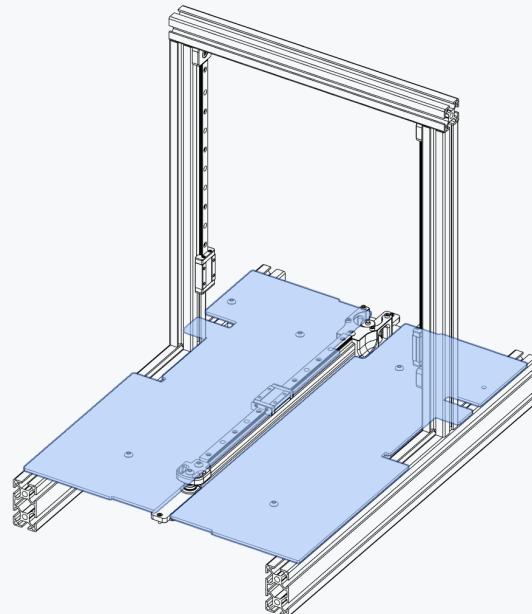
Rotate the motor in such a way that
the connector/wires are on the left side
when looking at it from the back.

M5x10 BHCS



**CENTERED RAIL INSTALLATION GUIDE**

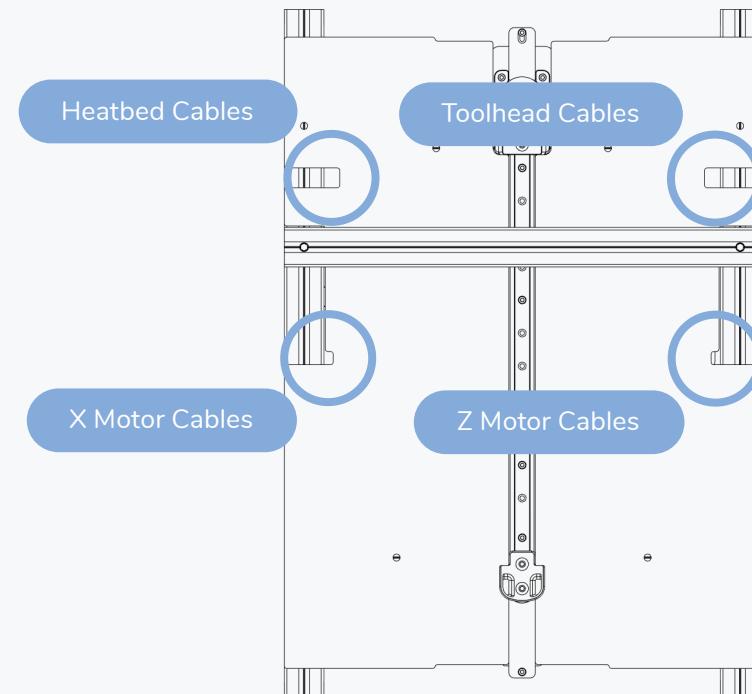
Use the guides to position the rail in the center of the extrusion prior to fastening the bolts.

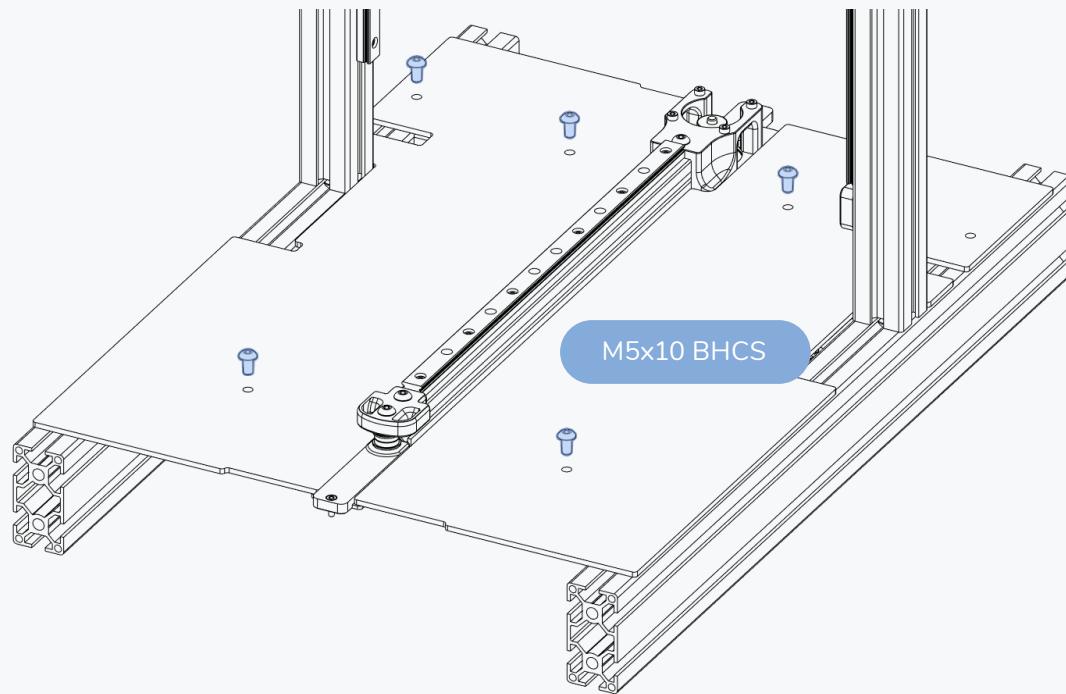
**DECK PANELS?!**

You can install the deck panels at this point if you like.
We didn't show them to make some captures easier.

PREMADE WIRE HARNESS

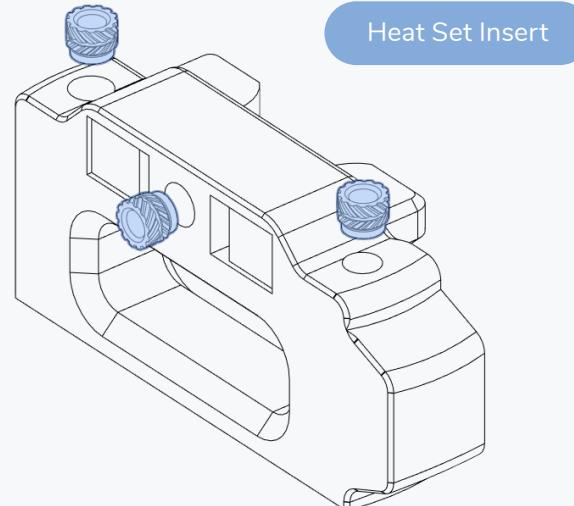
If you sourced a premade wire harness add the cables
that pass through the deck panels now.





SENSORLESS HOMING FOR Y  **LDO MOTORS**

Should you desire to use a microswitch as an endstop follow the instructions on the next page instead.

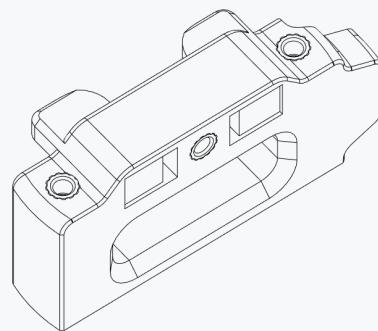
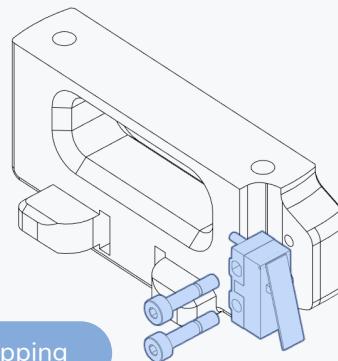
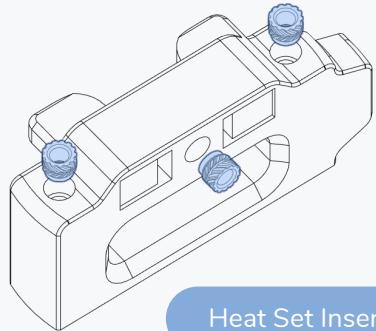
**HEAT SET INSERTS**

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

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

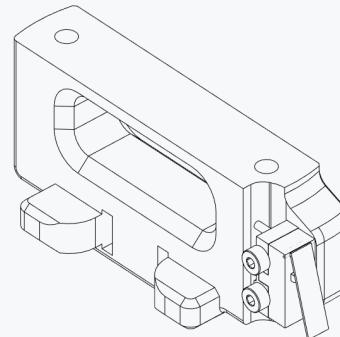


<https://voron.link/m5ybt4d>



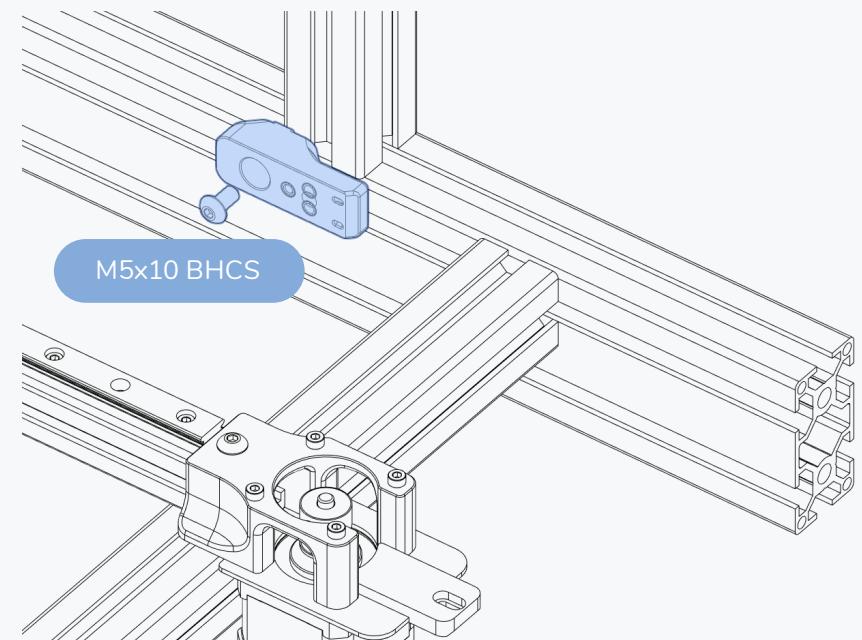
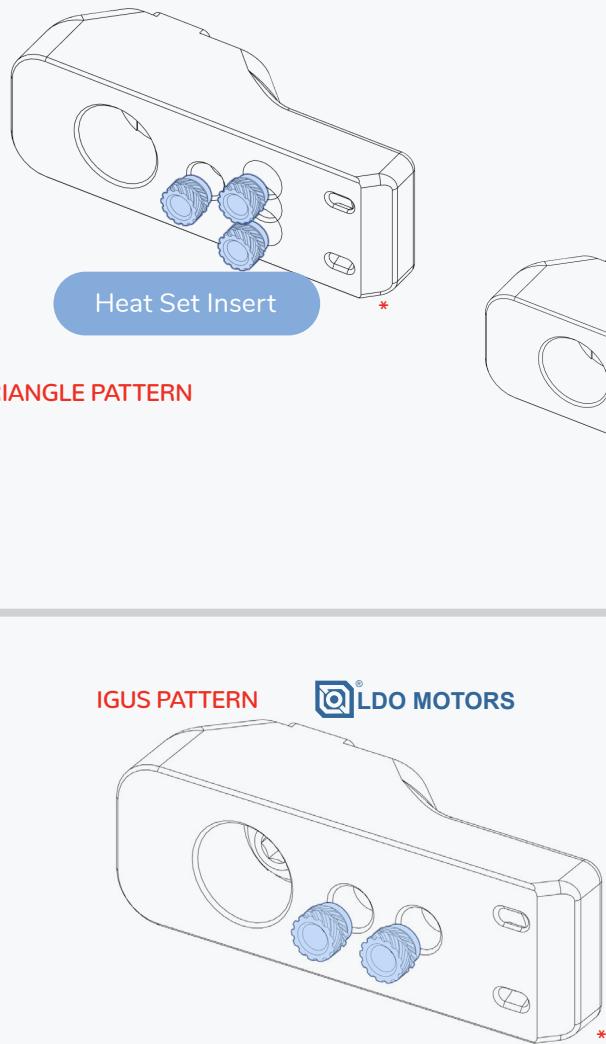
SOLDER WIRES

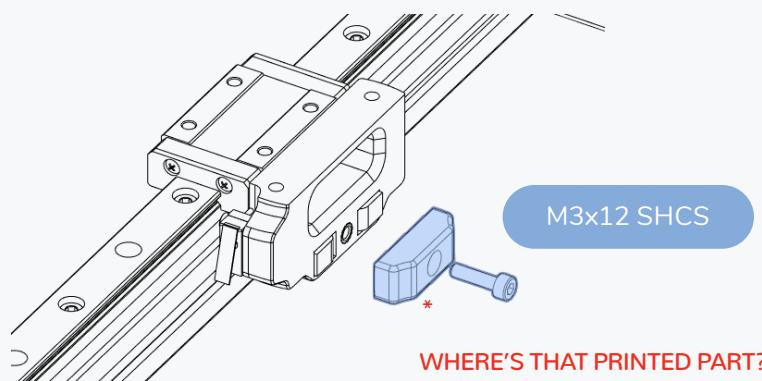
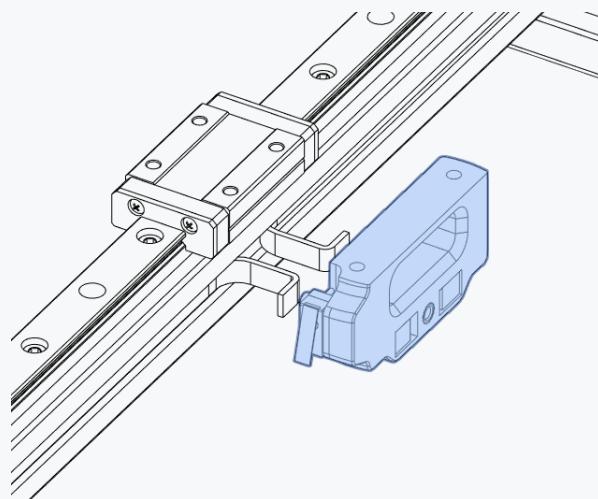
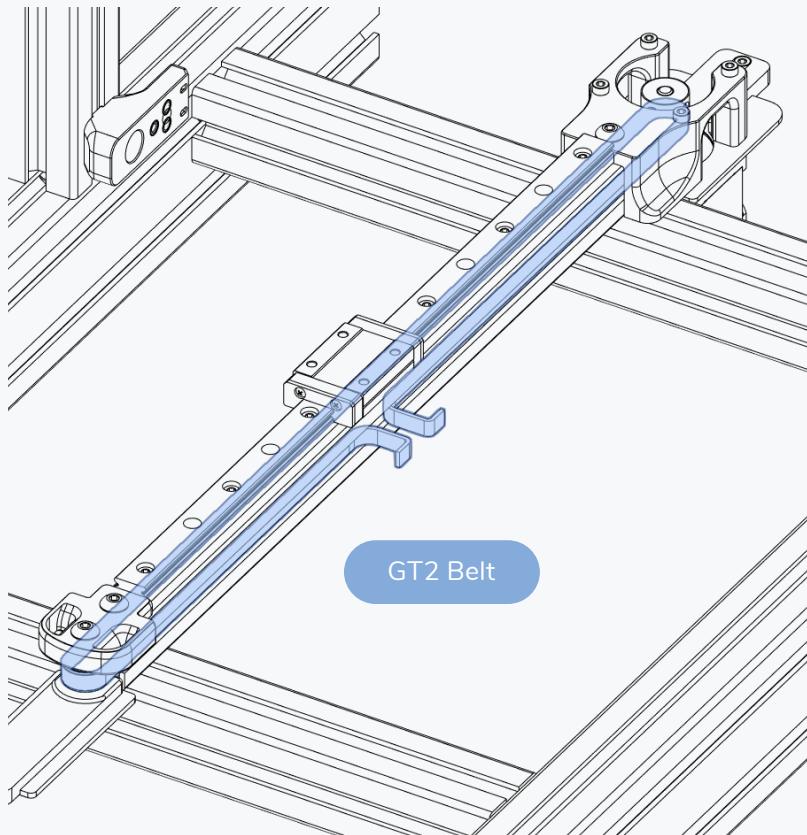
Solder approx. 100mm of wire to the mircoswitch before installing it.
See setup guide for details.



Y CABLE CHAIN MOUNT

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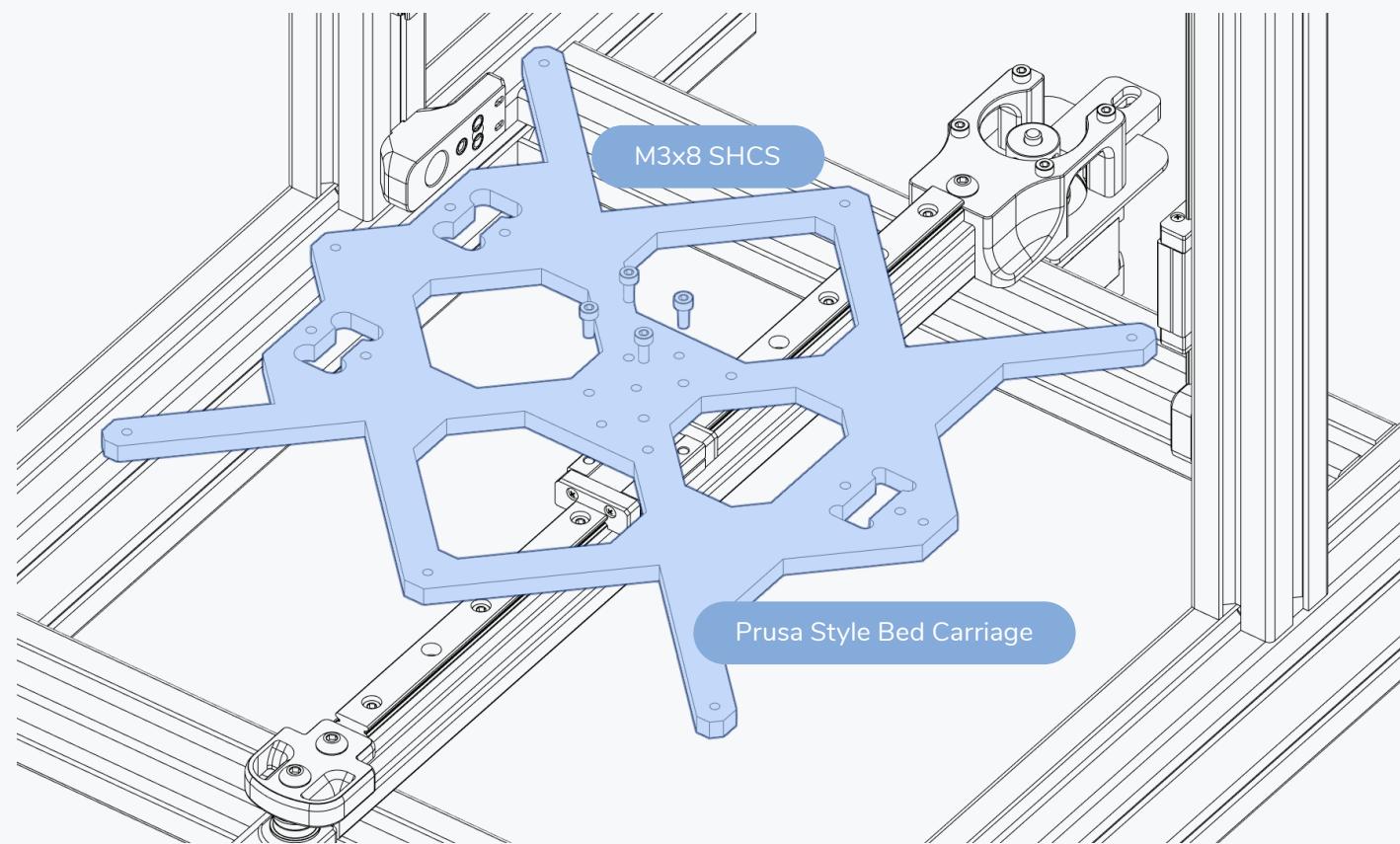


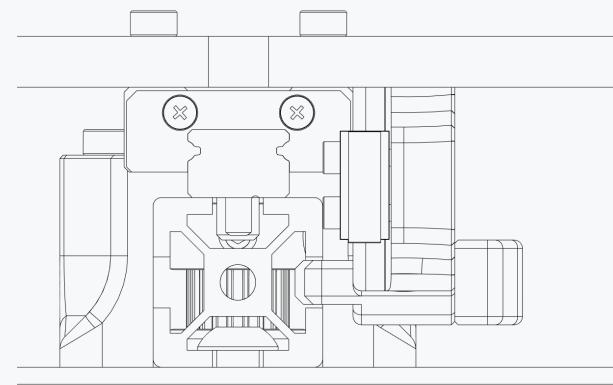
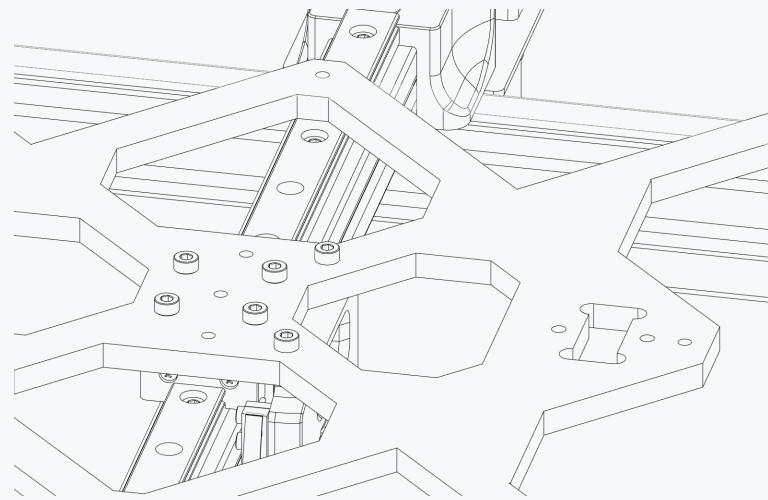
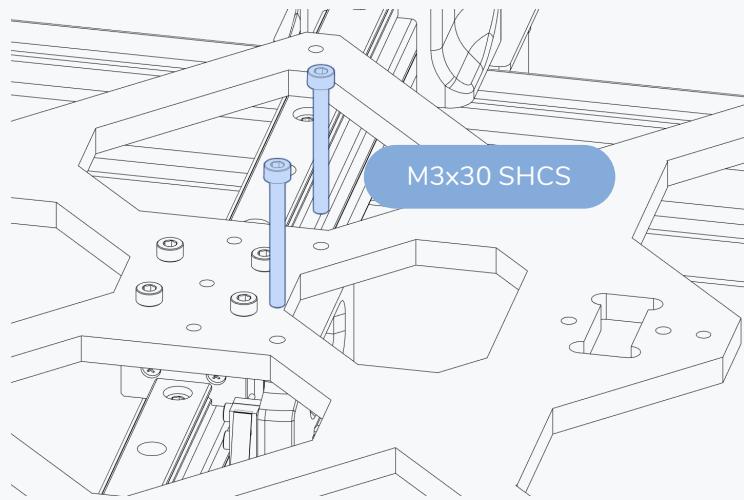


WHERE'S THAT PRINTED PART?

Look for asterix next to the part.

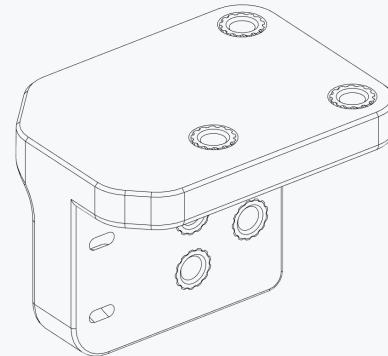
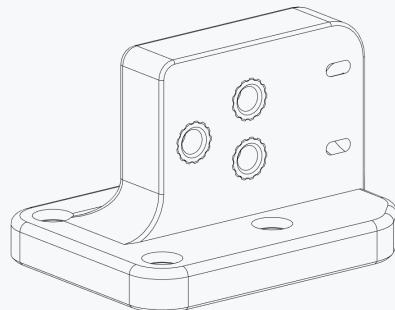
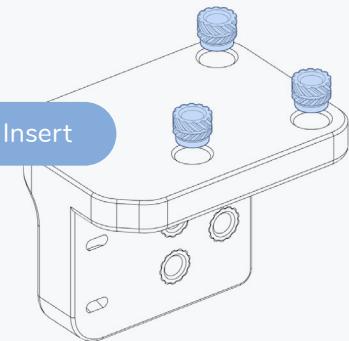
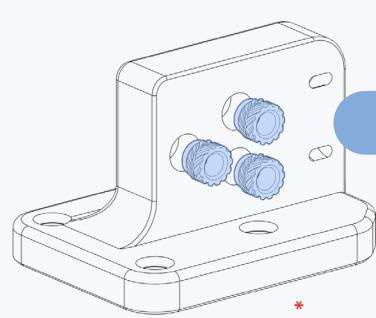
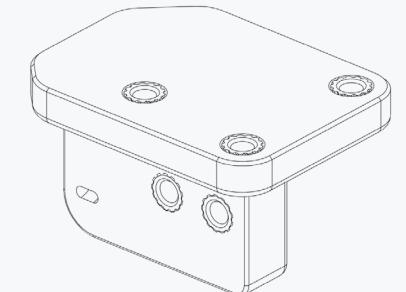
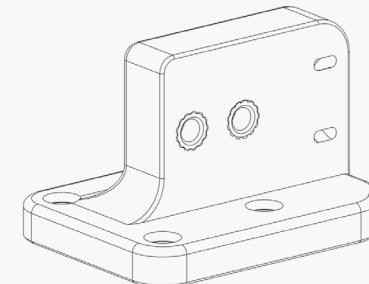
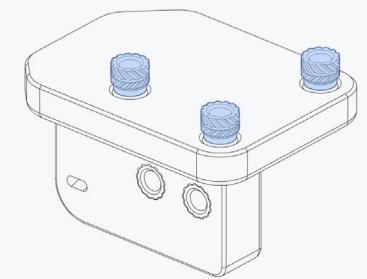
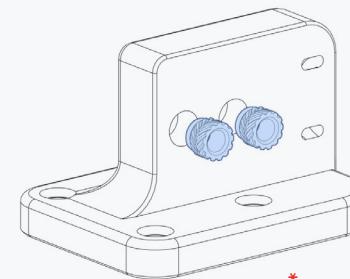
It indicates that this is an accent part.

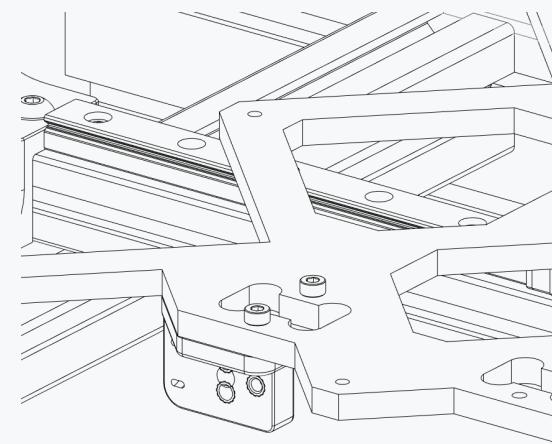
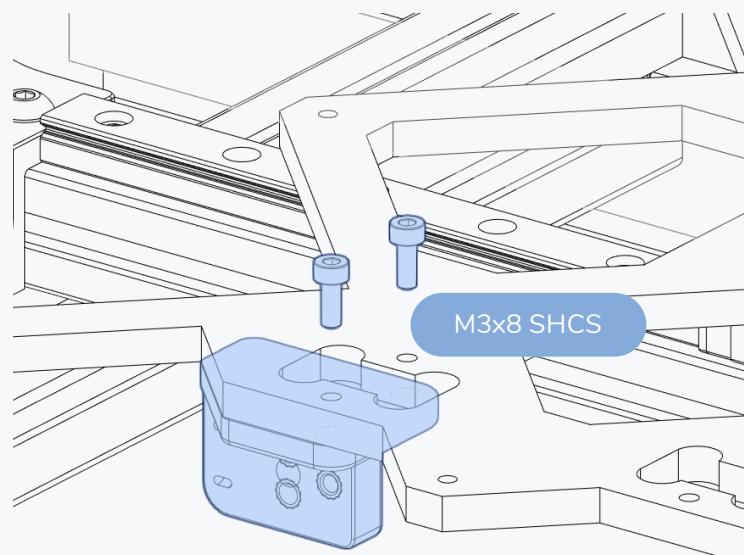




CABLE CHAIN HOLE PATTERN

Cable chains ends have a couple of different hole patterns. We offer mounts for both the inline pattern used on IGUS chains, and the triangle pattern present on budget chains.

TRIANGLE PATTERN**IGUS PATTERN**

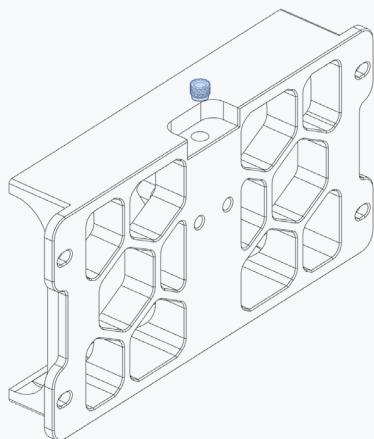


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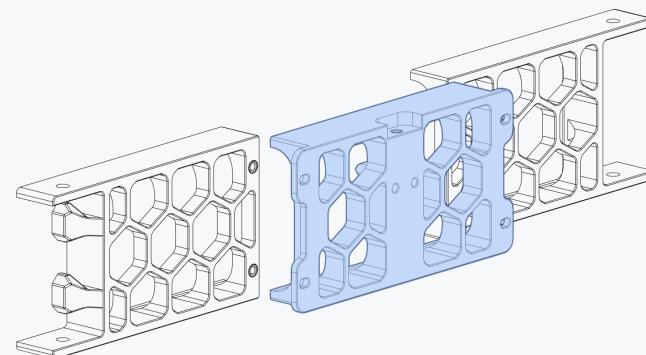
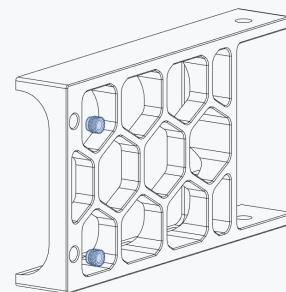
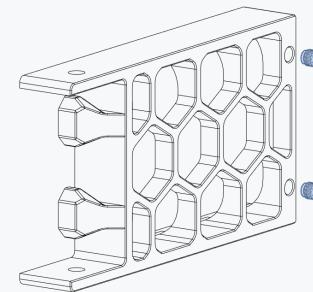
SKIRTS

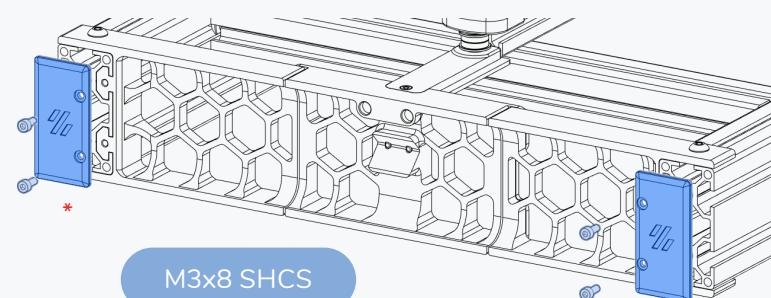
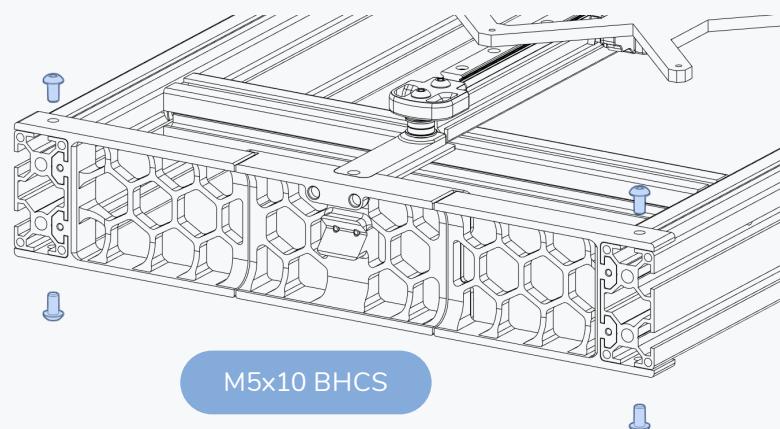
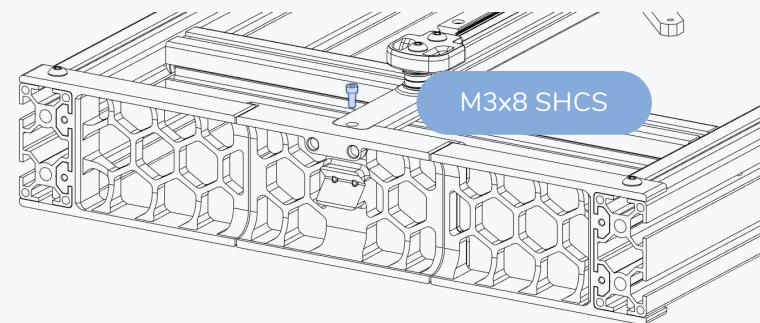
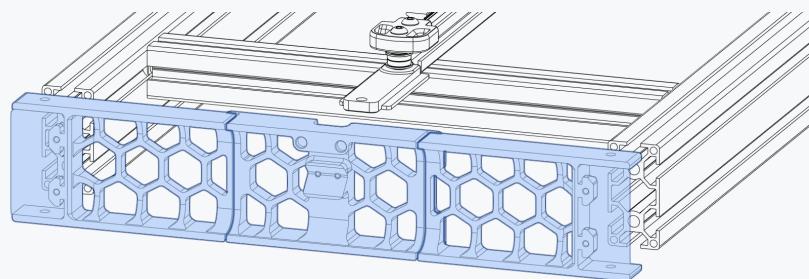
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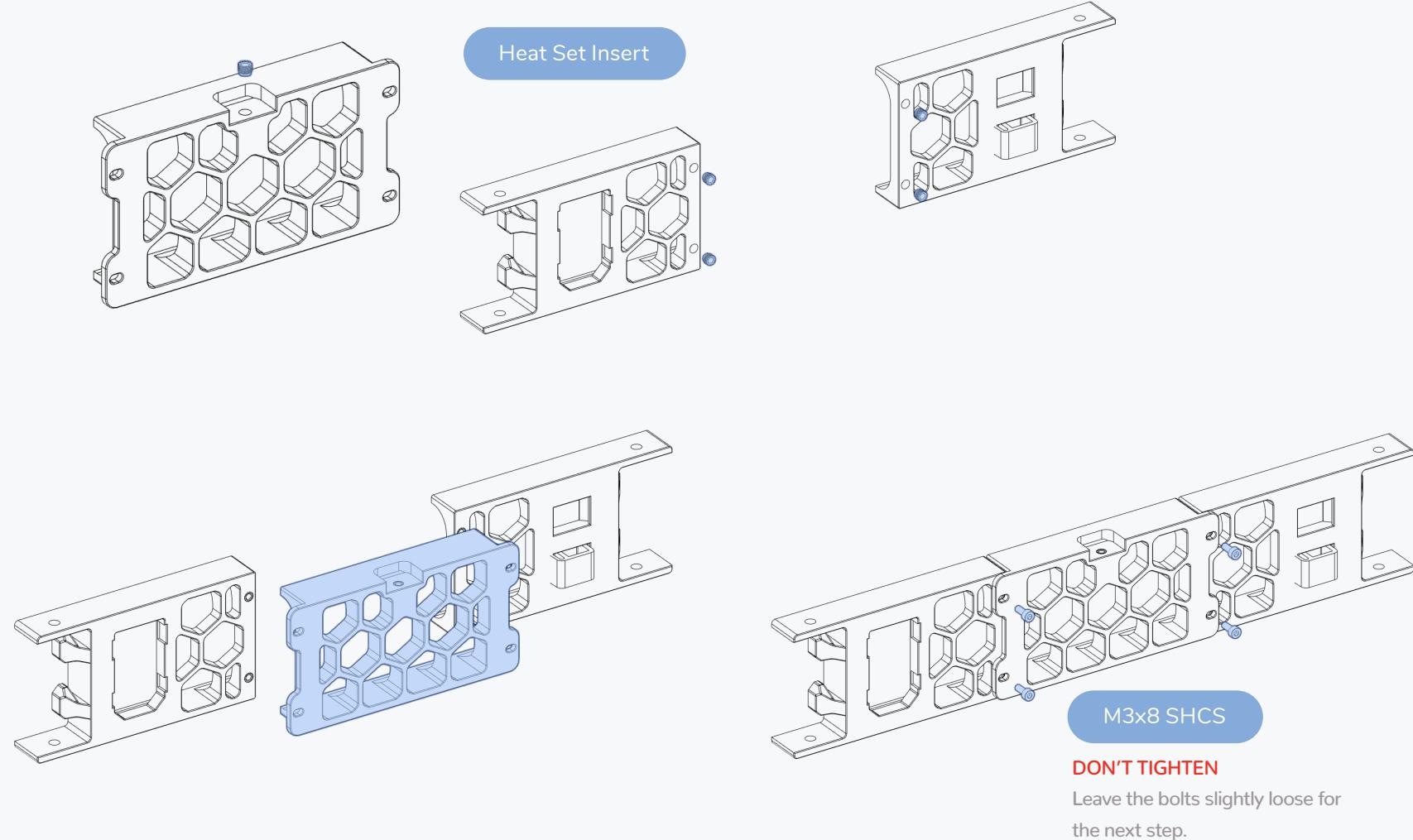
Heat Set Insert





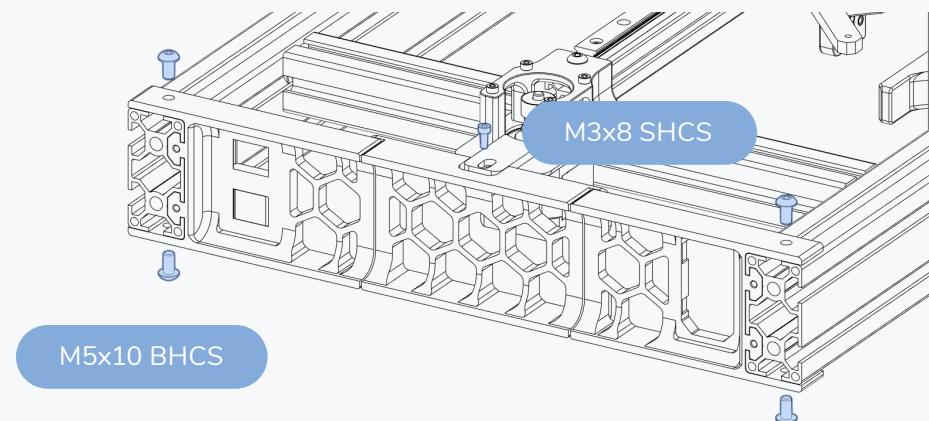
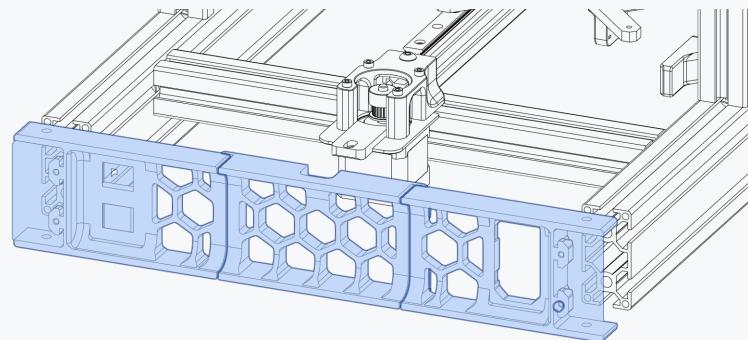
TIGHTEN BOLTS

Tighten the bolts that connect the centre piece once installed on the frame.



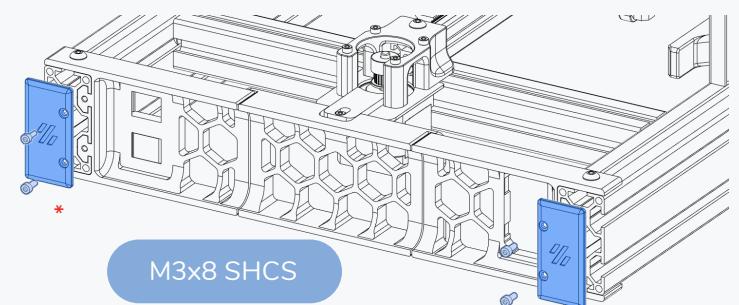
BACK SKIRT

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TIGHTEN BOLTS

Tighten the bolts that connect the centre piece once installed on the frame.



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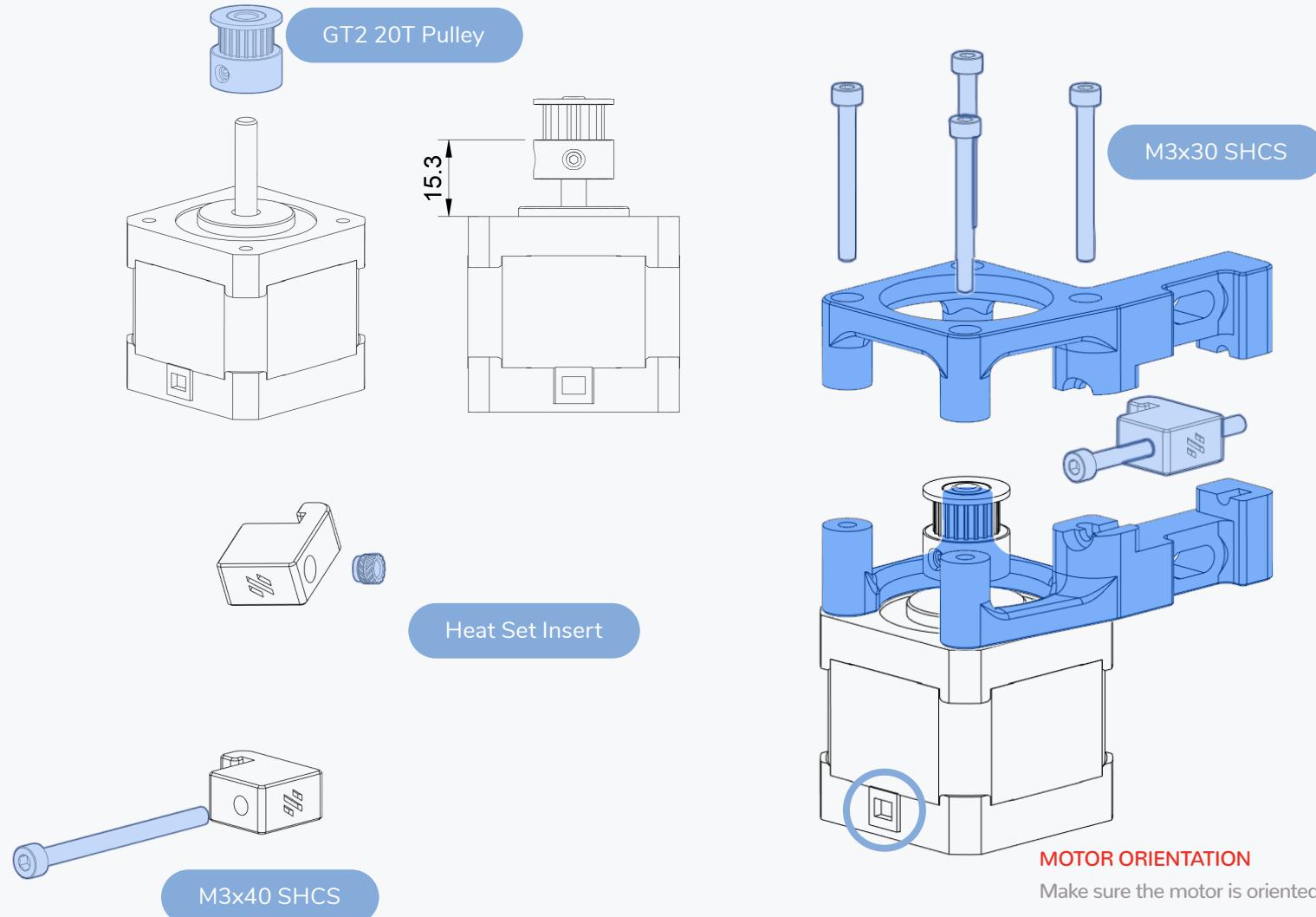
X&Z AXIS

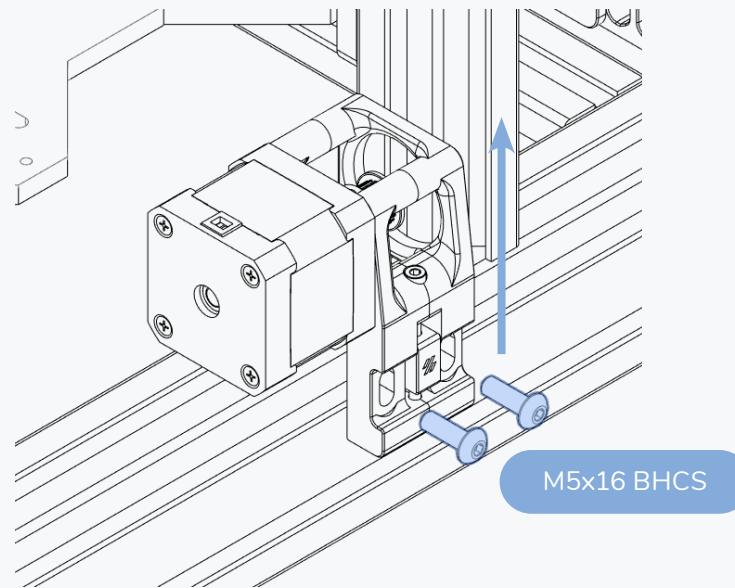
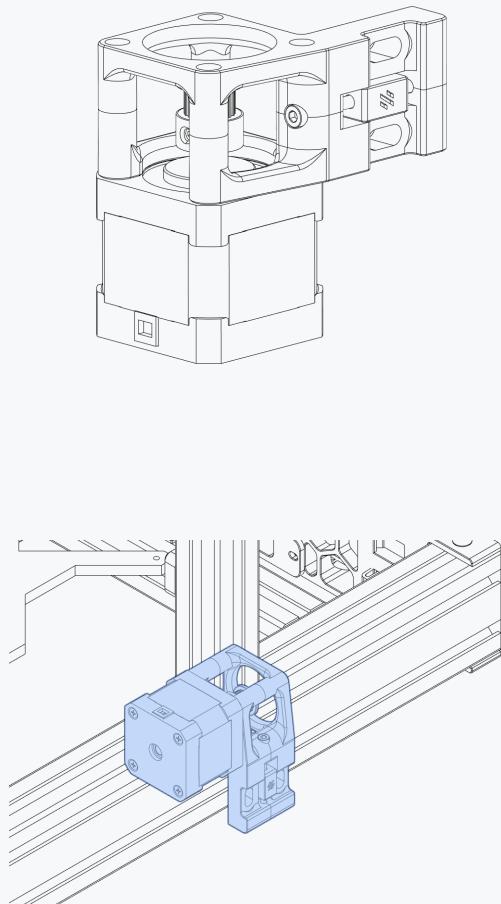
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"Z" MOTOR MOUNT

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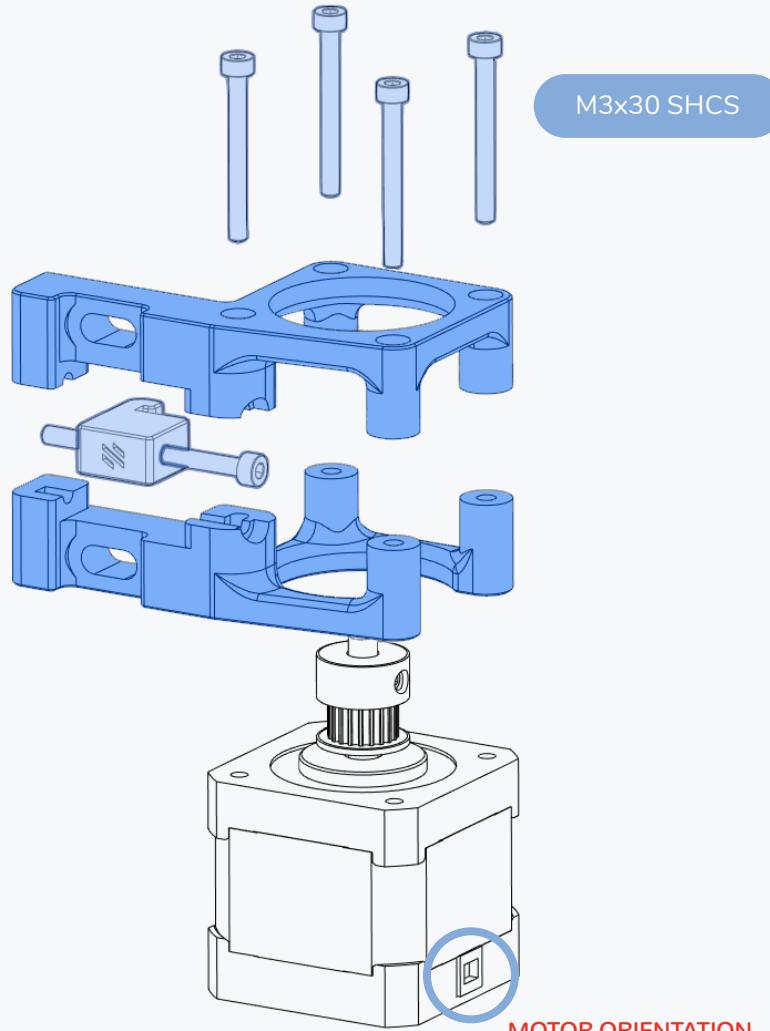
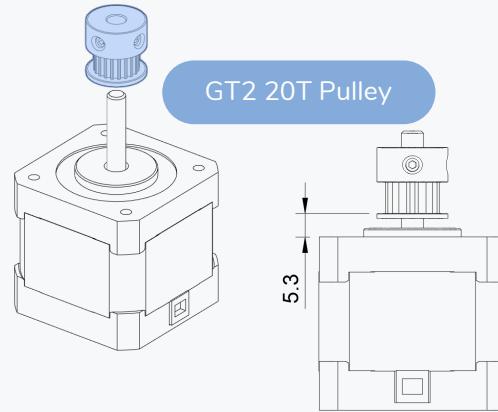


MOTOR MOUNT INSTALLATION

Push the motor mount as far up as the slots in the parts allow you to before fastening the bolts. You may need to turn the M3x40 counter clock wise to fully bottom out in the slot.

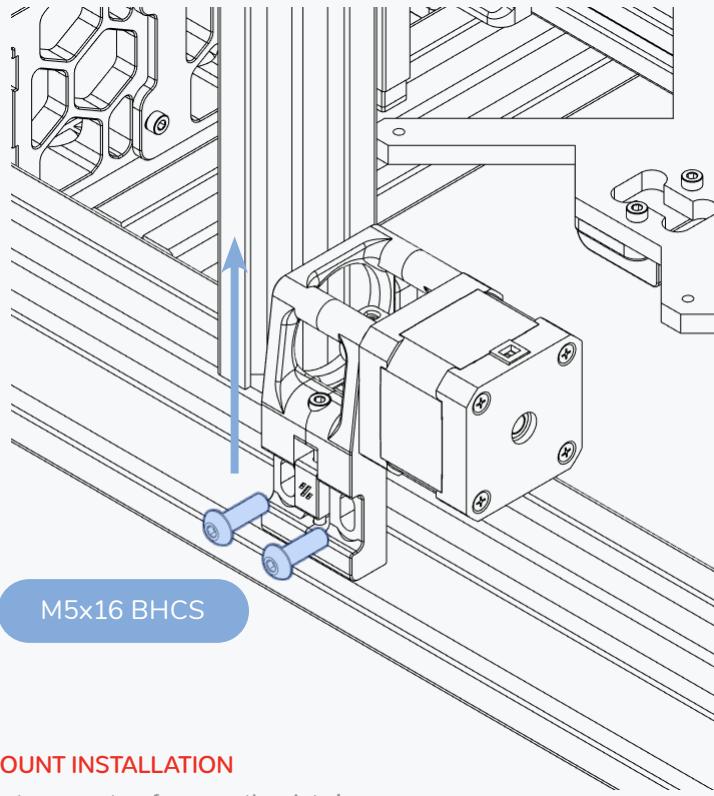
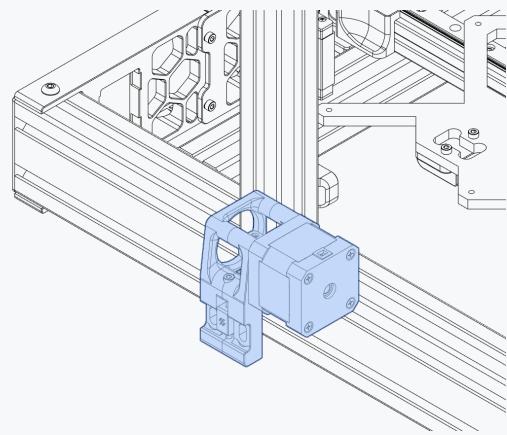
“X” MOTOR MOUNT

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MOTOR ORIENTATION

Make sure the motor is oriented as shown.

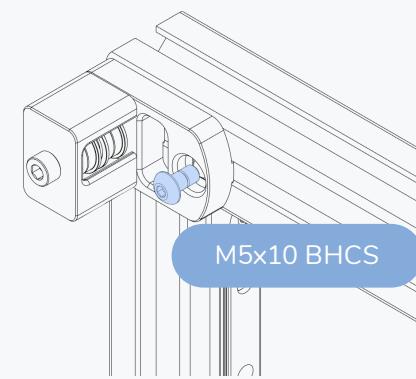
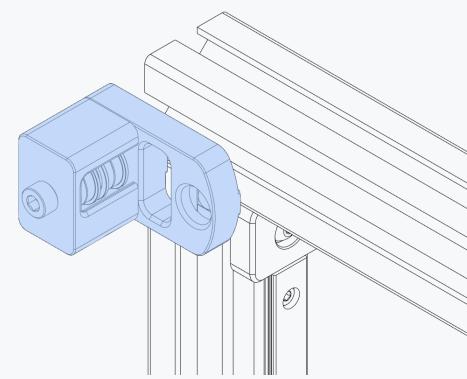
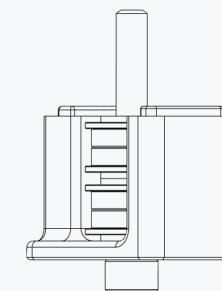
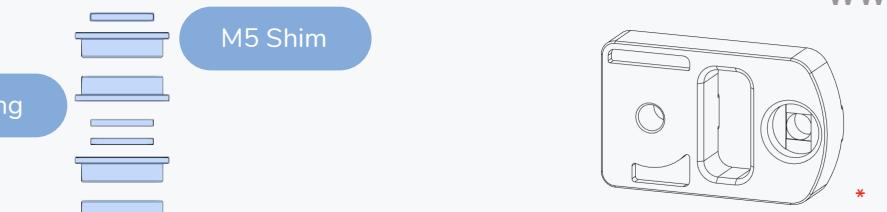
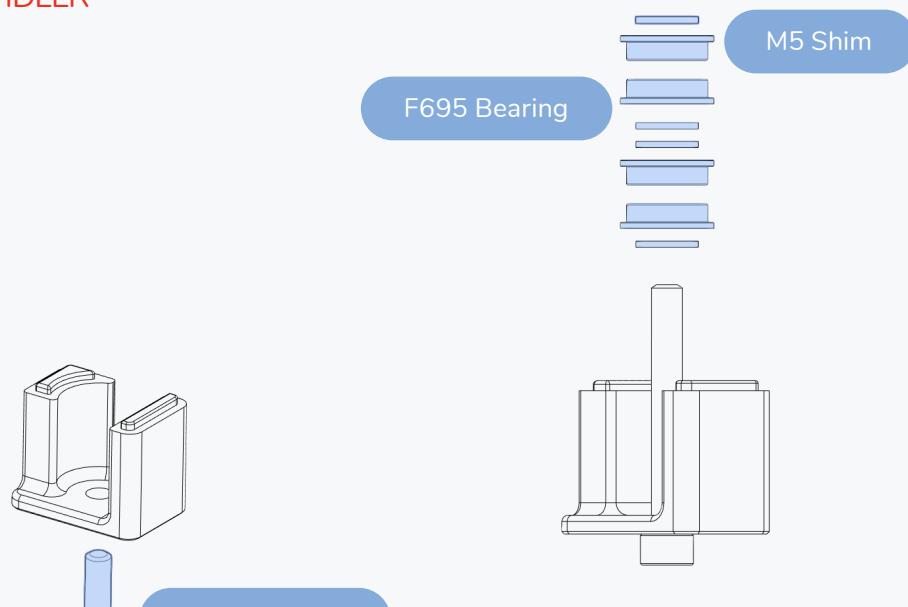


MOTOR MOUNT INSTALLATION

Push the motor mount as far up as the slots in the parts allow you to before fastening the bolts. You may need to turn the M3x40 counter clock wise to fully bottom out in the slot.

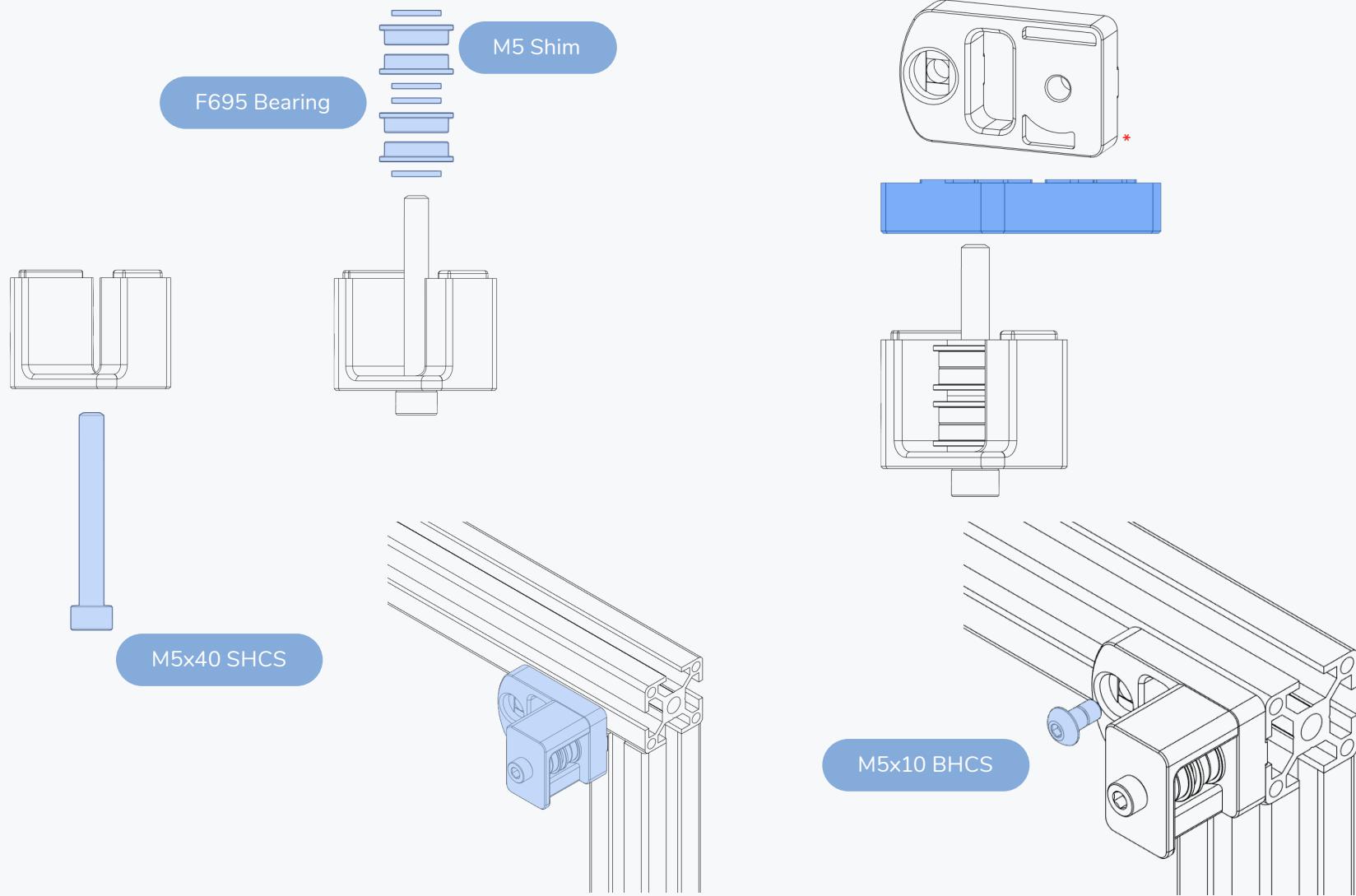
LEFT IDLER

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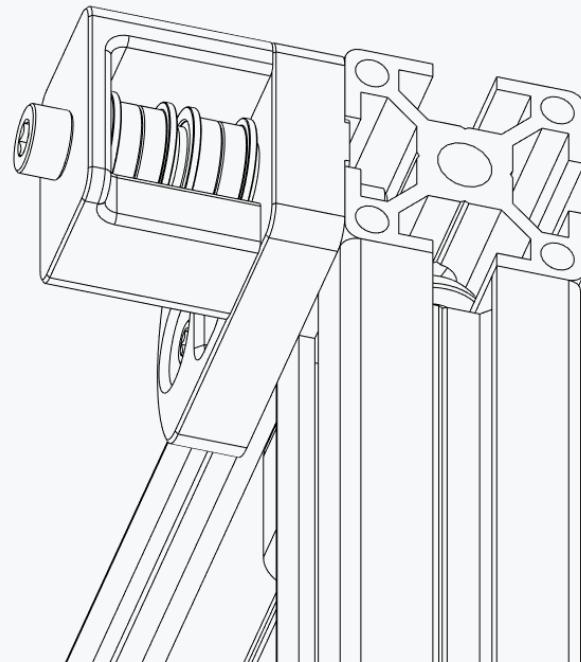
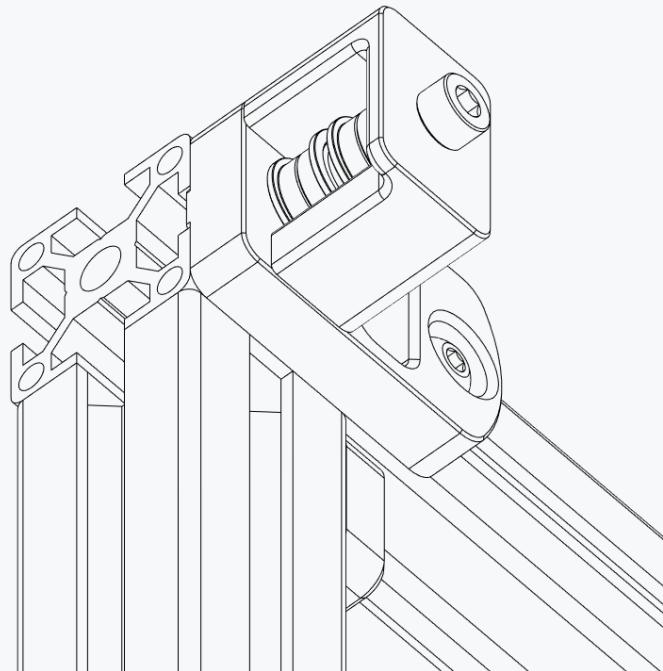
RIGHT IDLER

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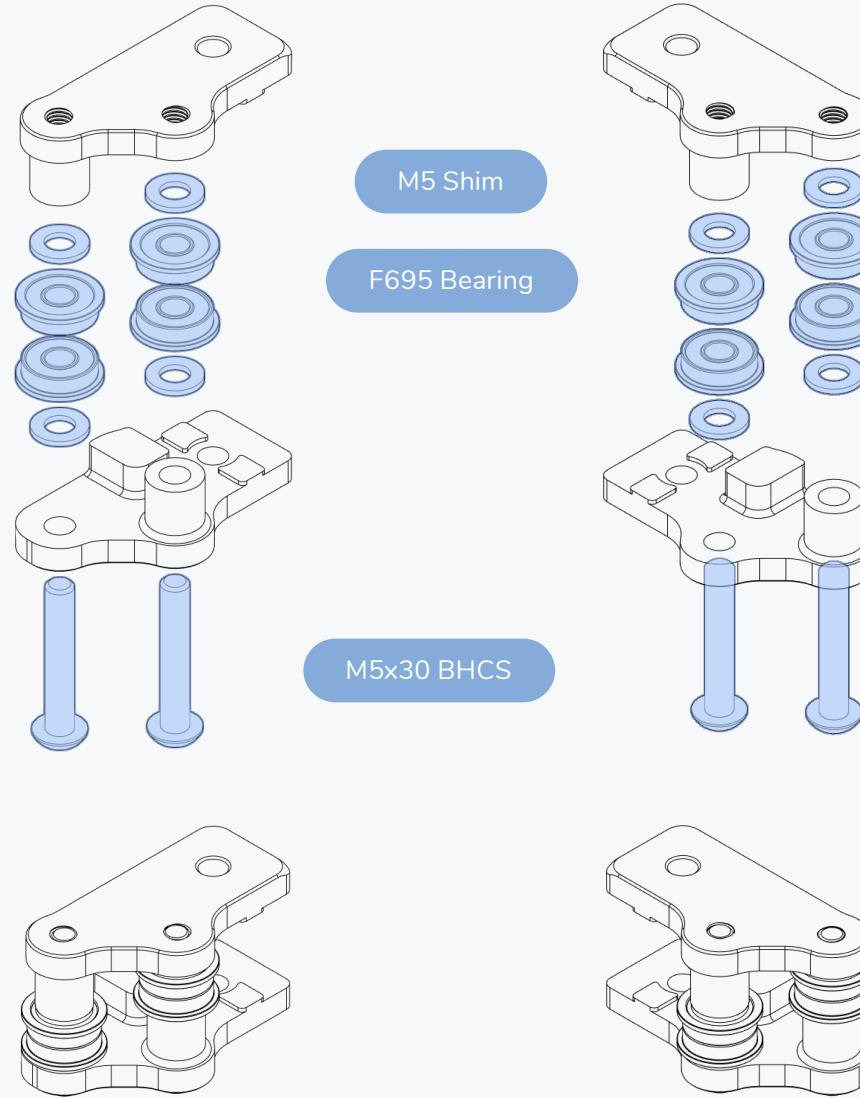
CHECK ORIENTATION

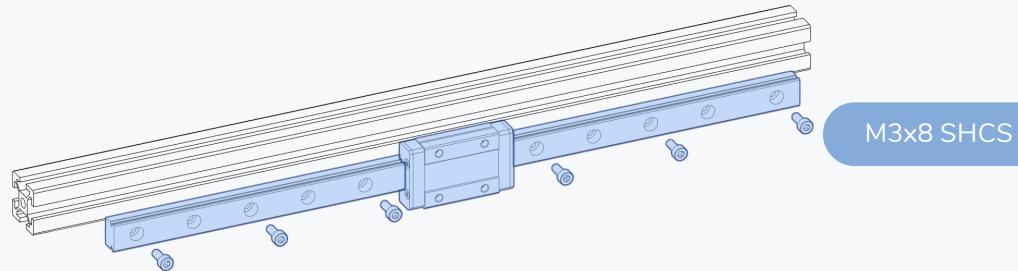
Make sure the cut-out is facing down.



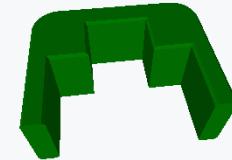
UPSIDE DOWN ASSEMBLY

We'll flip these components a few times.
Pay attention to their final orientation

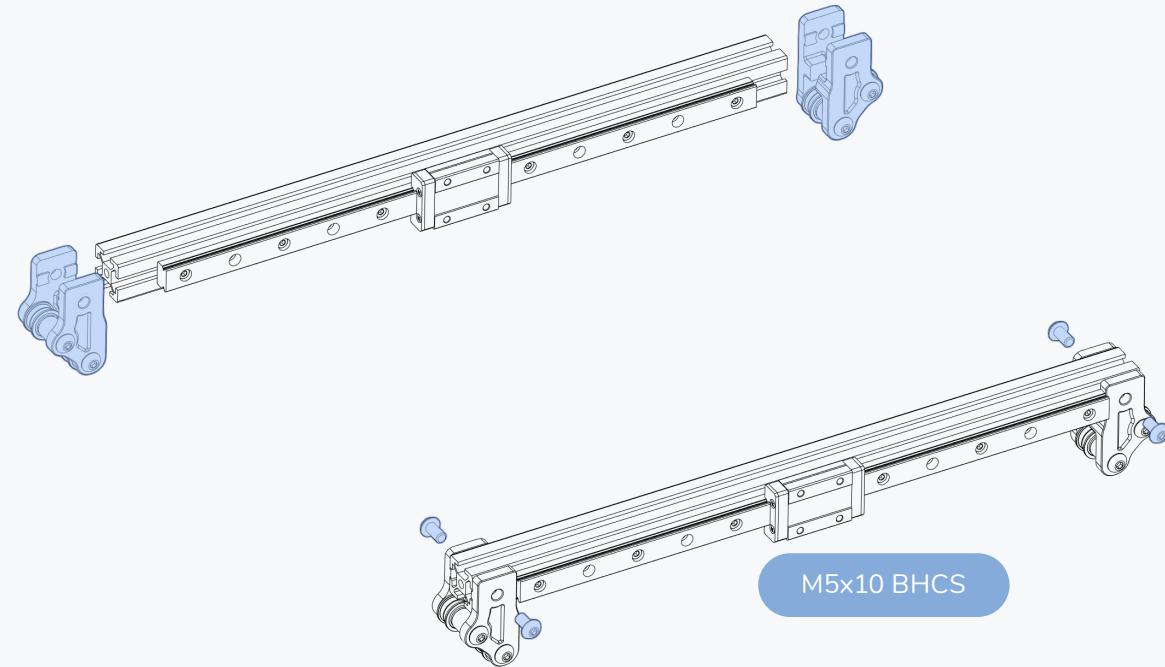


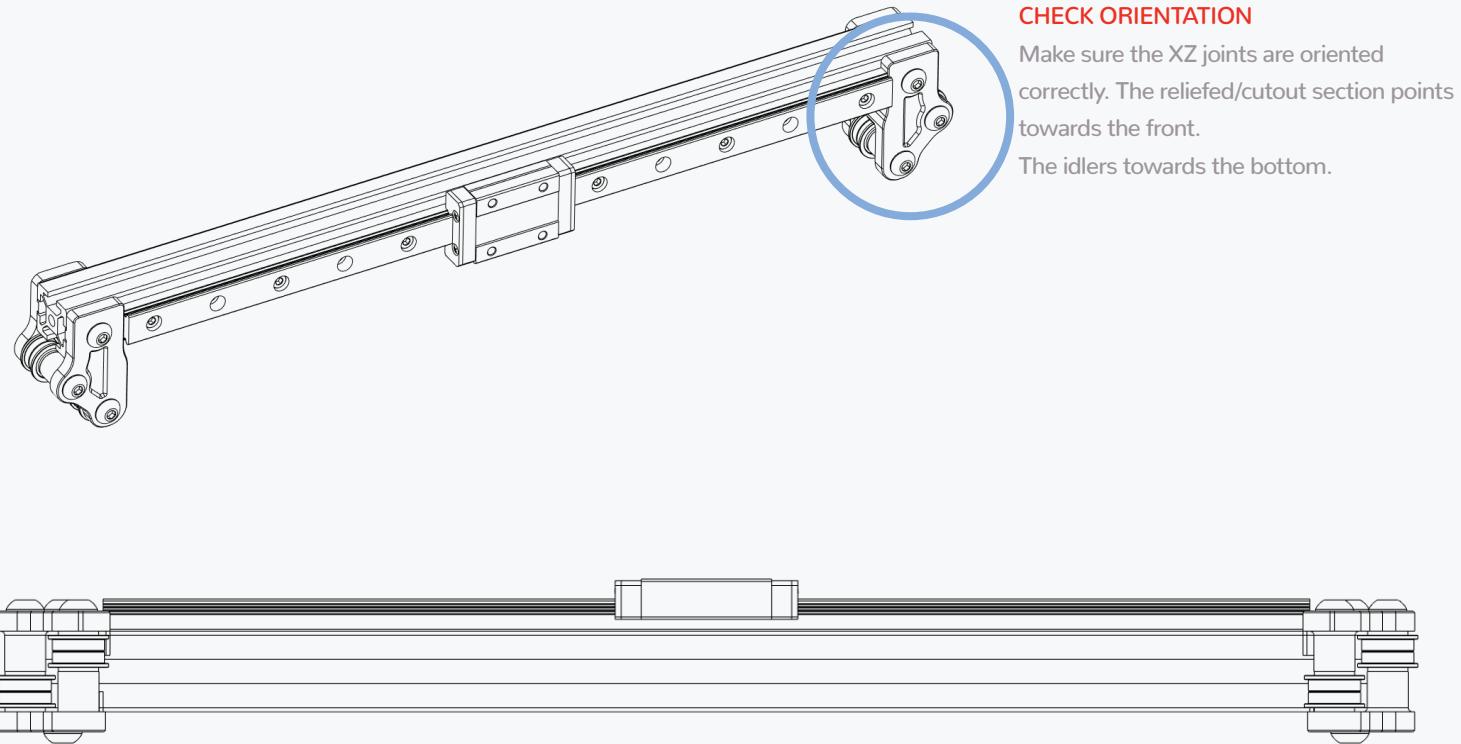


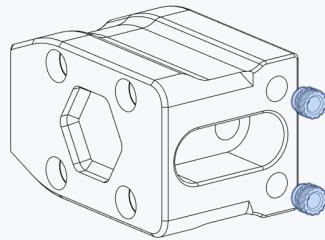
MGN12 Linear Rail

**CENTERED RAIL INSTALLATION GUIDE**

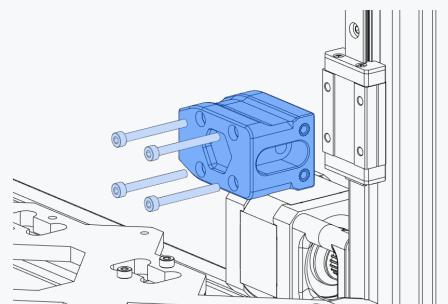
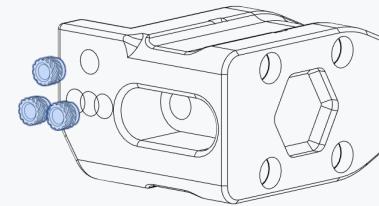
Use the guides to position the rail in the center of the extrusion prior to fastening the bolts.



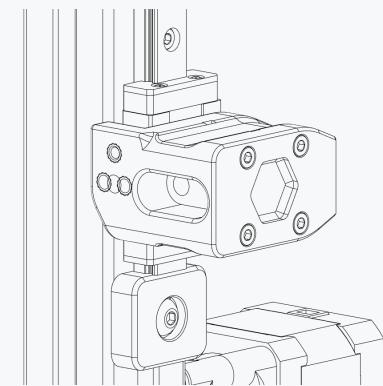
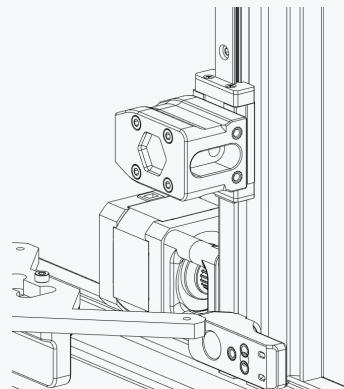
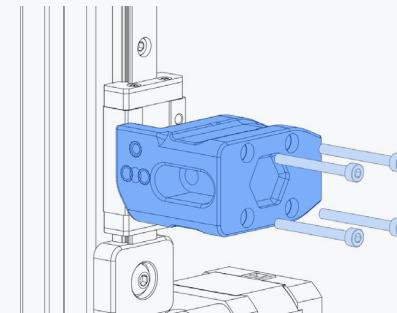


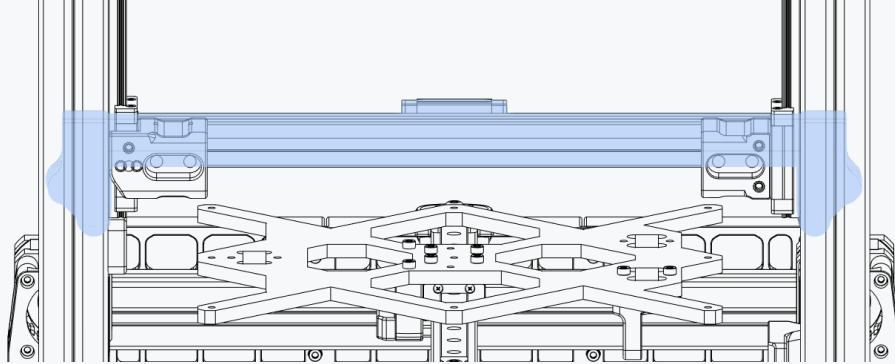


Heat Set Insert



M3x30 SHCS

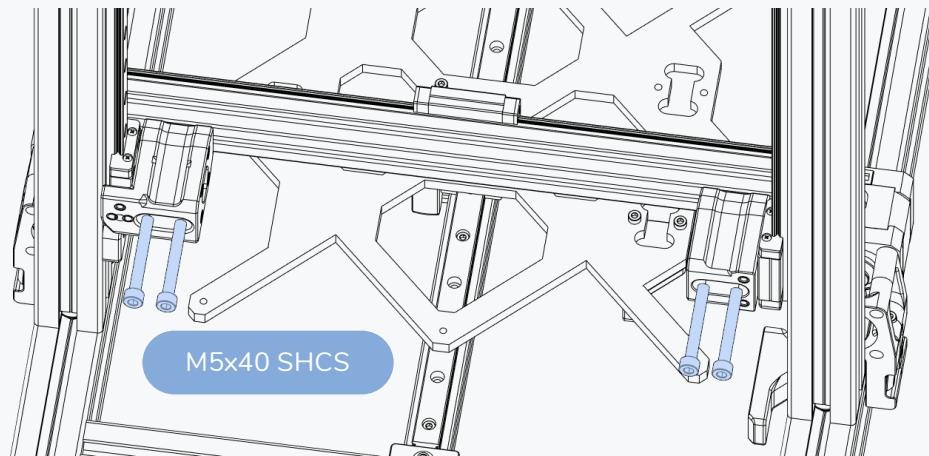




X AXIS INSTALLATION

Lightly tighten the M5x40 bolts and align the X axis horizontally by moving it all the way to the top. Make sure it is centered across the front.

Hold the X axis against the stoppers and fully tighten the bolts. Move the axis up and down and check for binding.



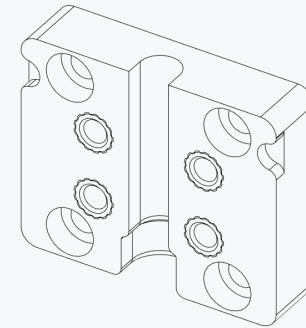
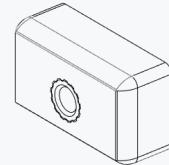
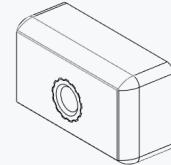
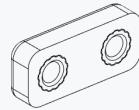
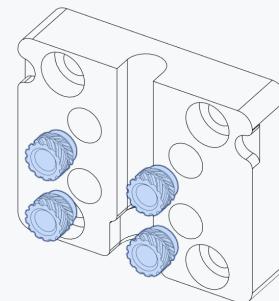
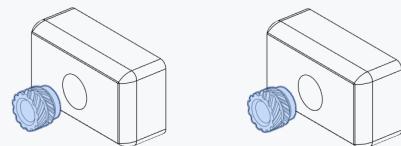
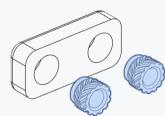
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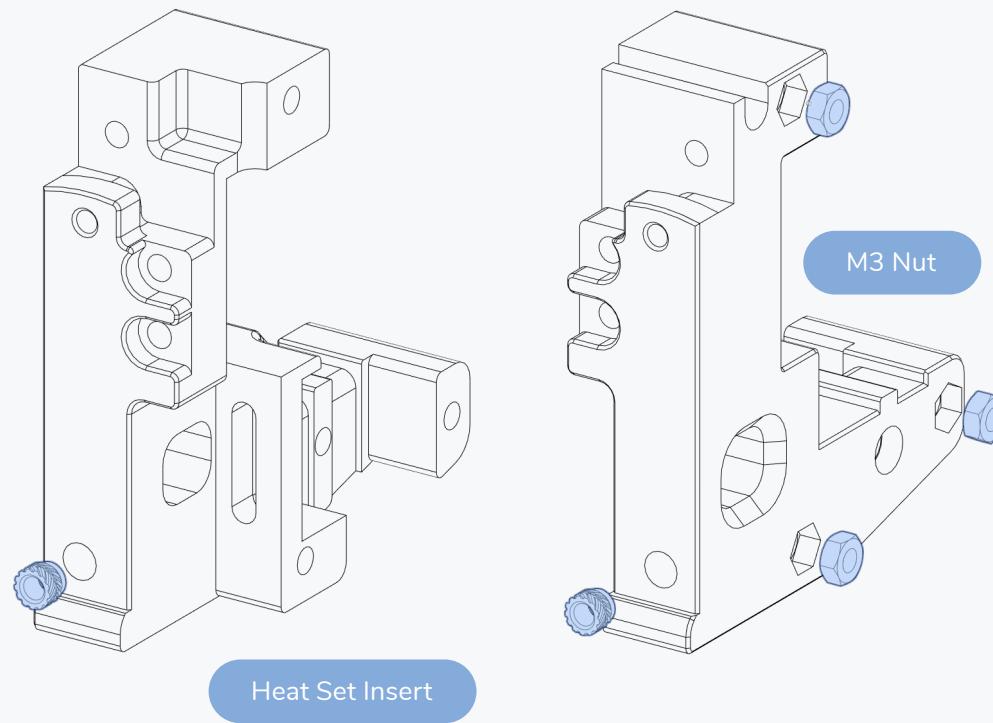
X CARRIAGE

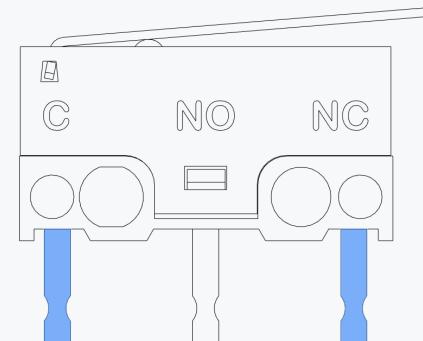
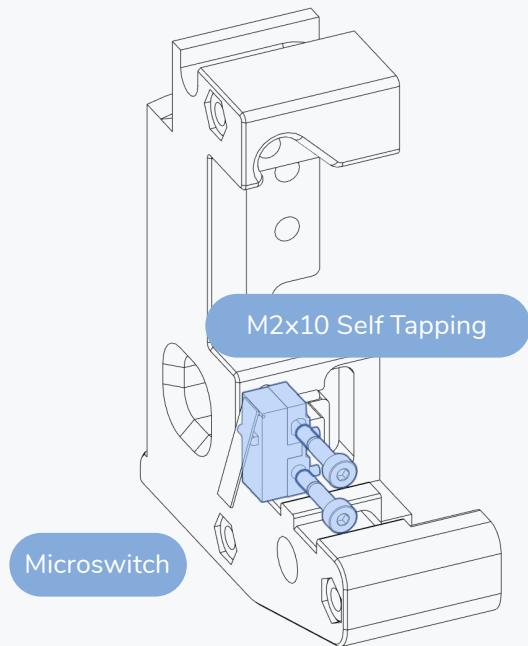
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Heat Set Insert







END-STOP SWITCHES FOR X AND Y

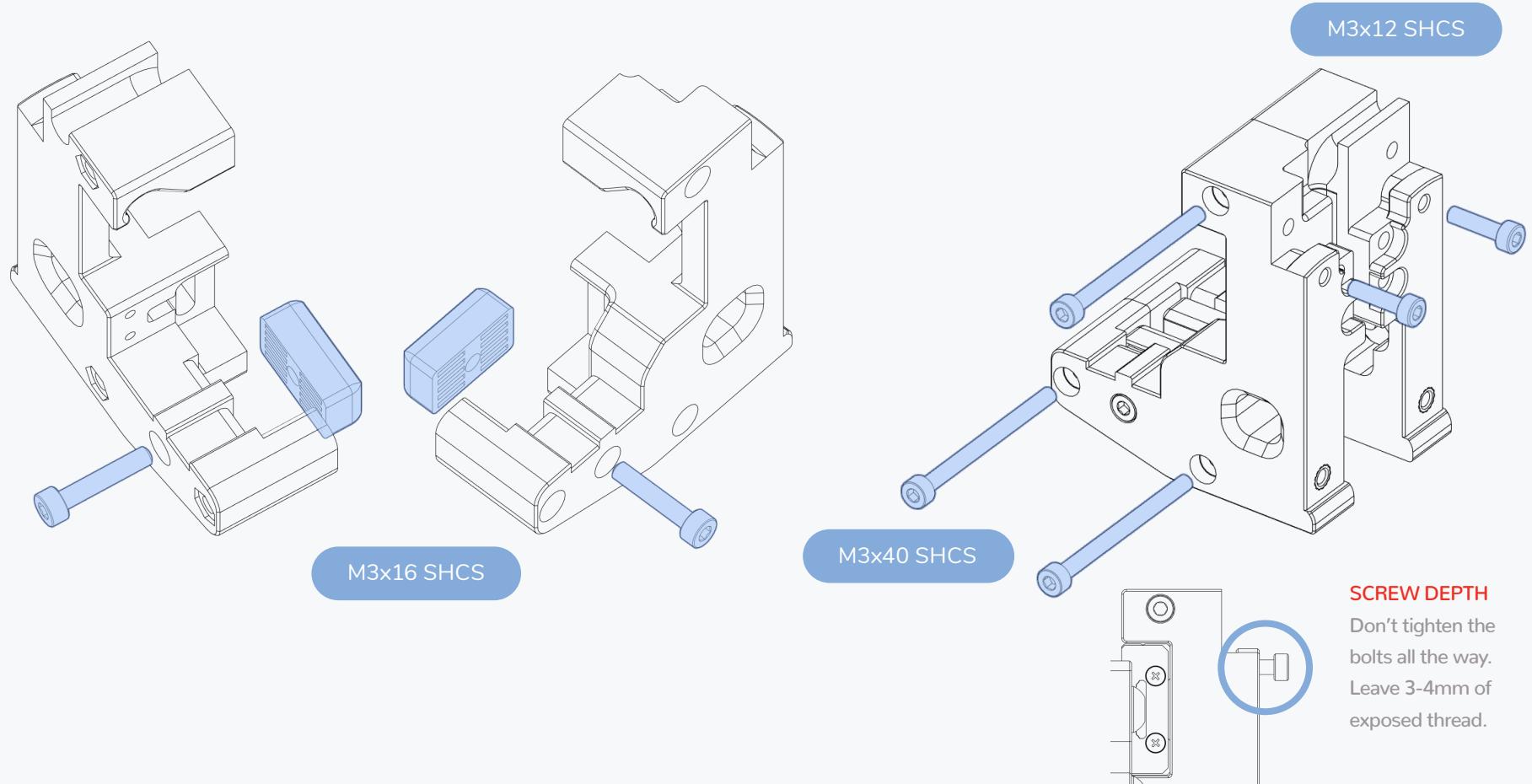
End-stops are wired in a “Normally Closed” configuration. On microswitches those are the 2 outer terminals indicated by C and NC.

Prepare the switches for X by soldering 150mm of wire to each of the outer terminals.

PRESOLDERED WIRES

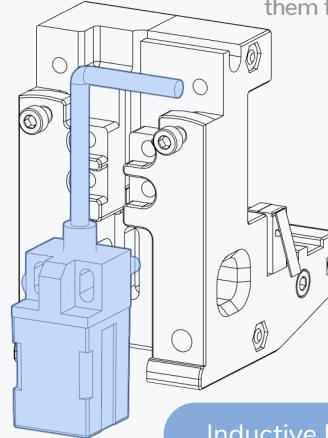
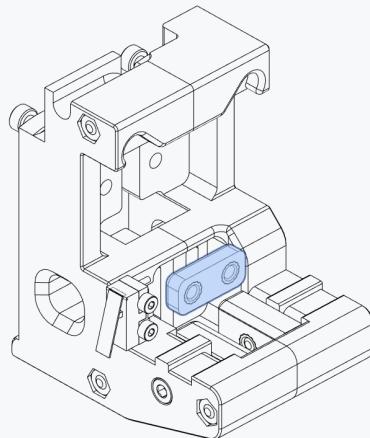


Route the wires through the slot to the front of the carriage. Only attach the connector on the crimps after you routed them to the front.



X CARRIAGE

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PROBE WIRES

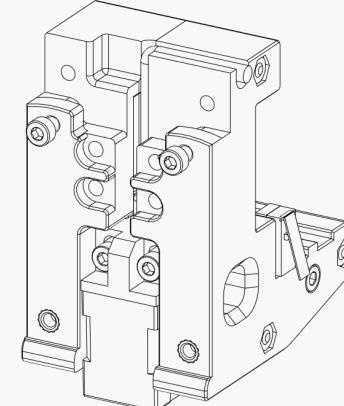
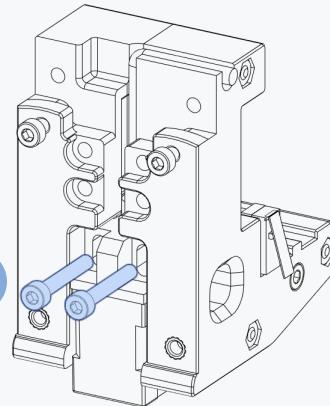
Unless your probe comes preterminated cut the probes wires to about 15cm. Don't cut them flush with the carriage frame.

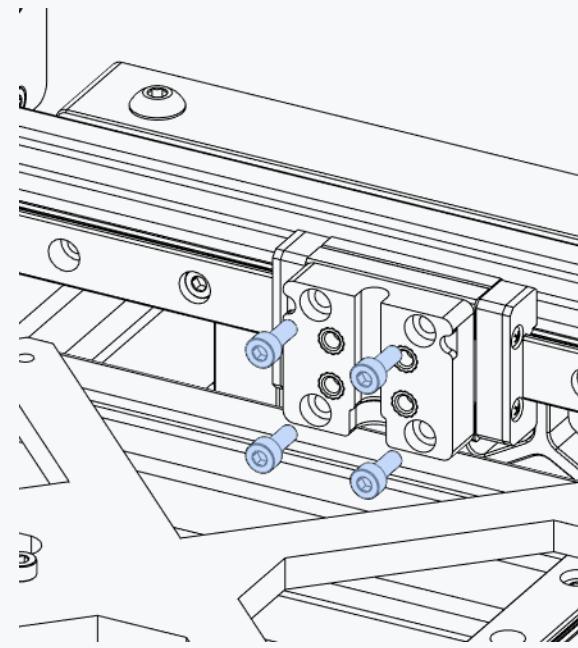
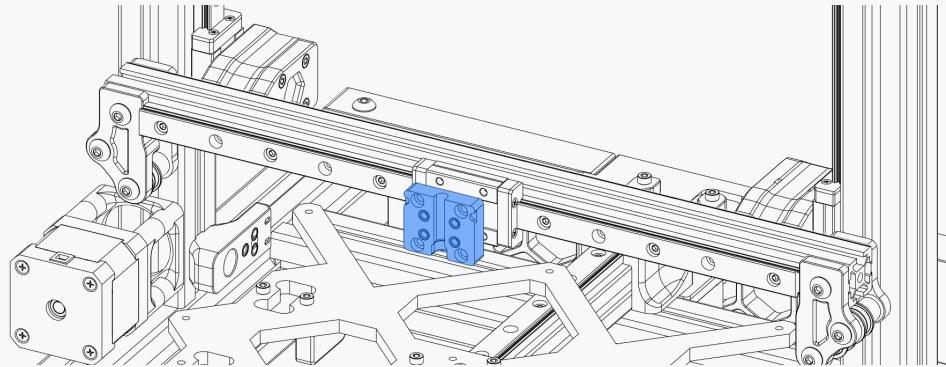
OTHER PROBE TYPES ALDO MOTORS

The picture shows a PL-08 probe. The recommended Omron TL-Q5MC probe will fit in the same space but requires M3x25 SHCS.

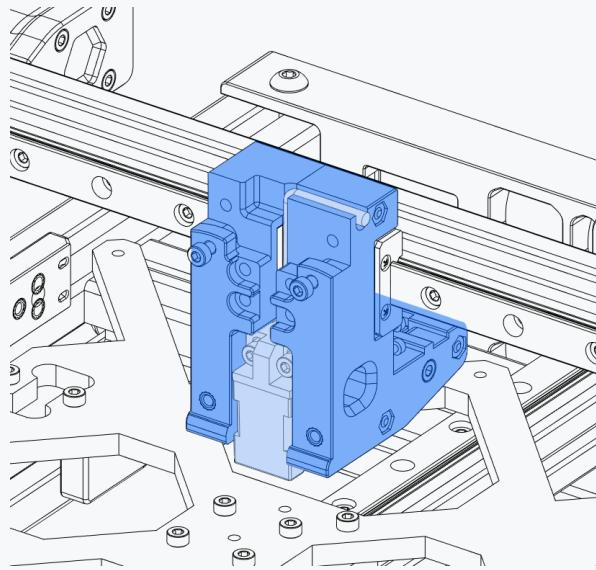
M3x20 SHCS

Other probes with a similar form factor and characteristics might work as well.

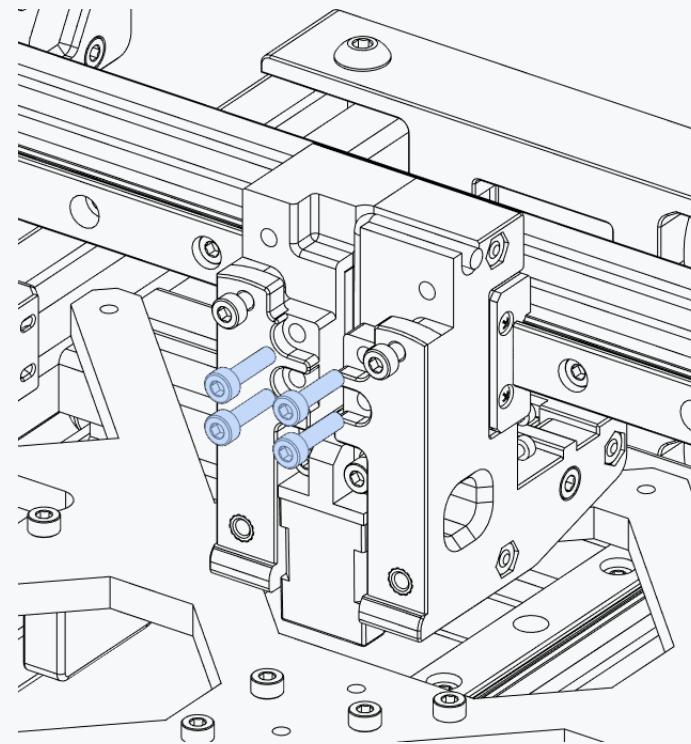




M3x8 SHCS

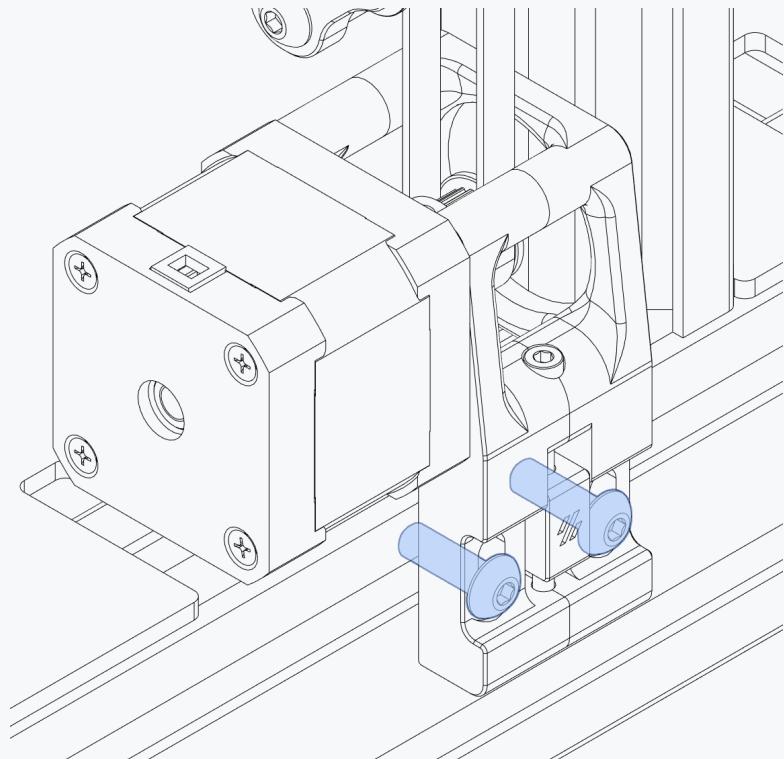


M3x12 SHCS



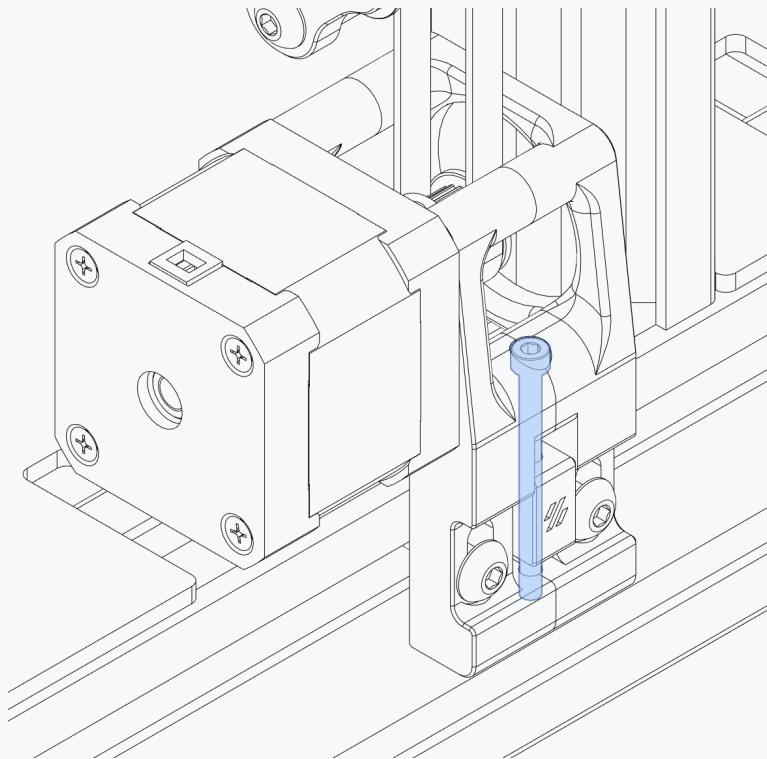
BELT TENTIONER FOR "X" AND "Z"

The motor mounts for the "X" and the "Z" motors have build in tentioners.

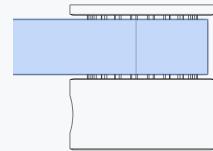
**LOCK SCREWS**

Slightly loosen these screws before adjusting the belt tension.

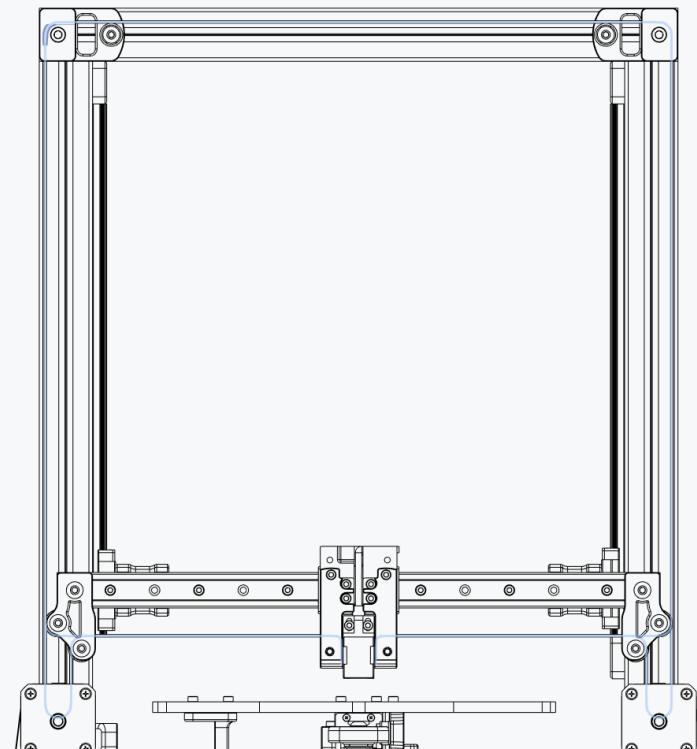
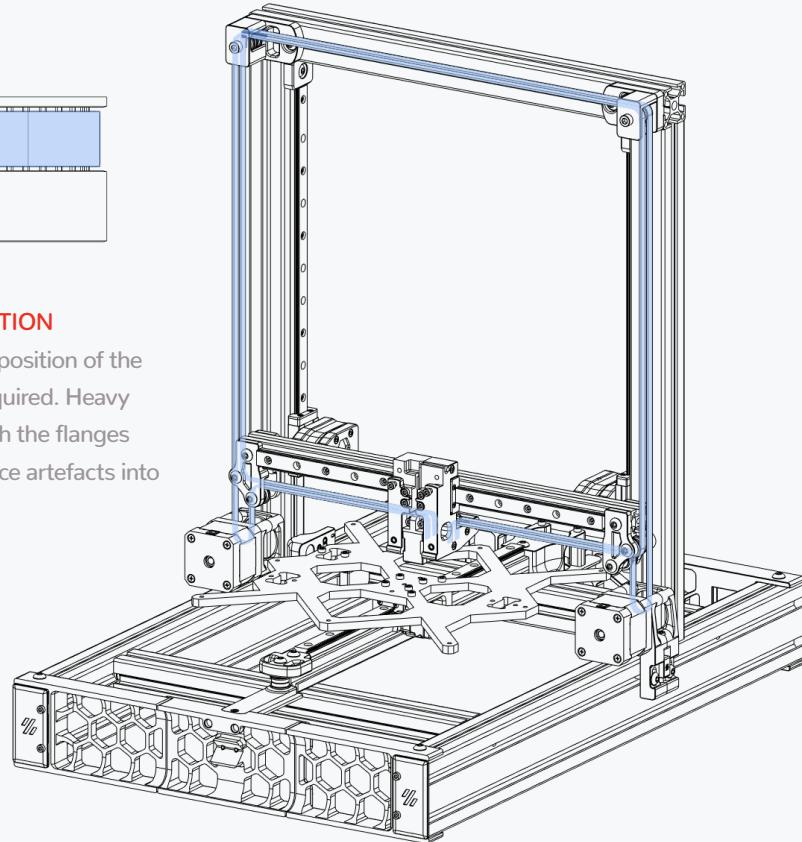
Fasten them again after adjusting the tension.

**ADJUSTMENT SCREW**

Turn the screw clockwise to pull a higher tension on the belt.

**BELT POSITION**

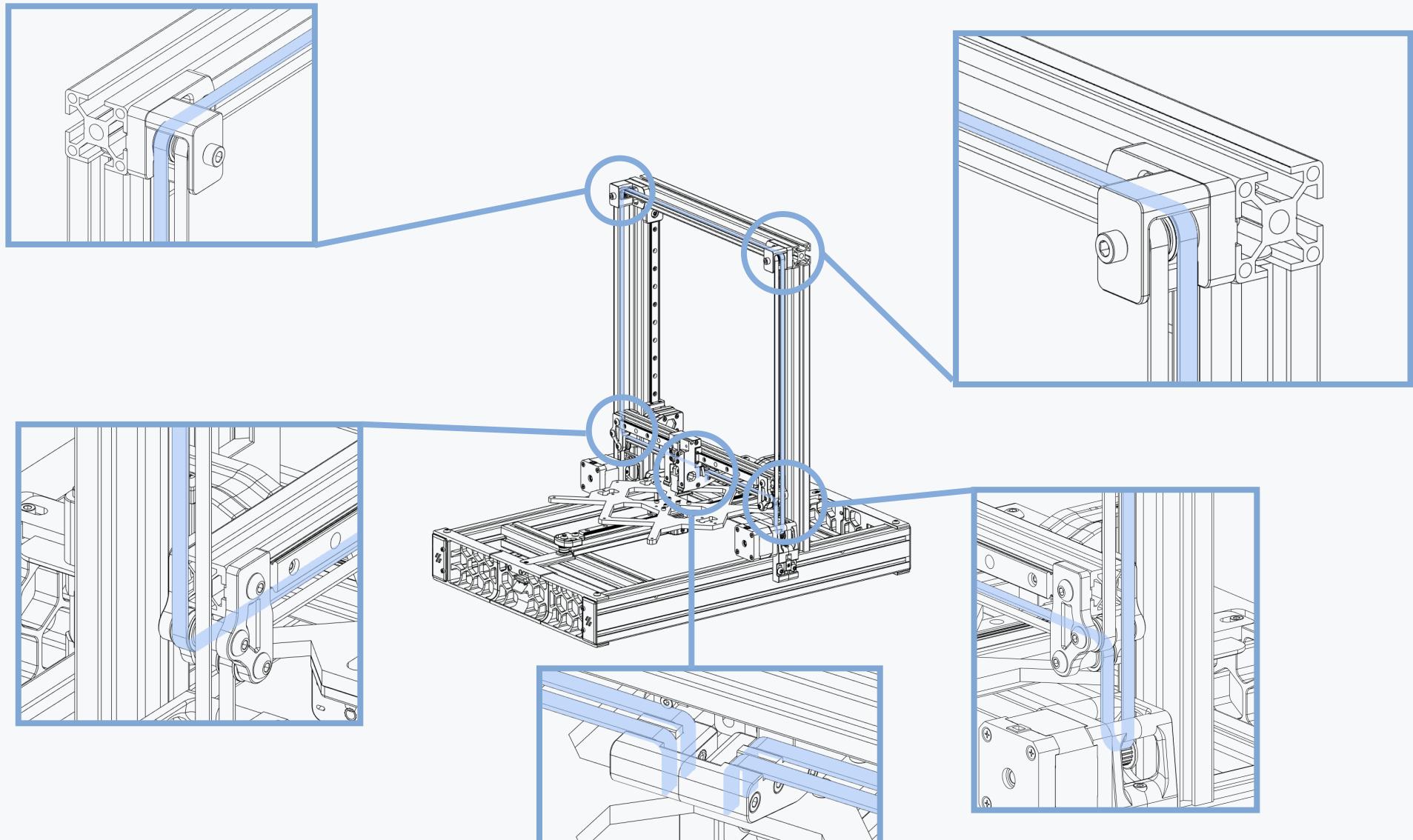
Adjust the position of the pulley if required. Heavy contact with the flanges will introduce artefacts into your prints.

**BELT PATH**

Take your time and make sure your belt routing is as intended.
Belts should never rub on plastic parts.

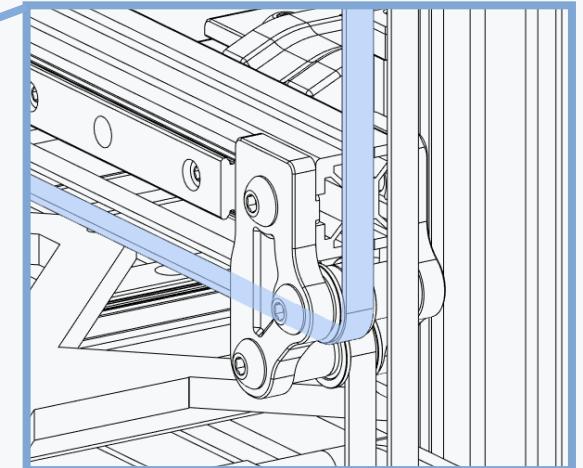
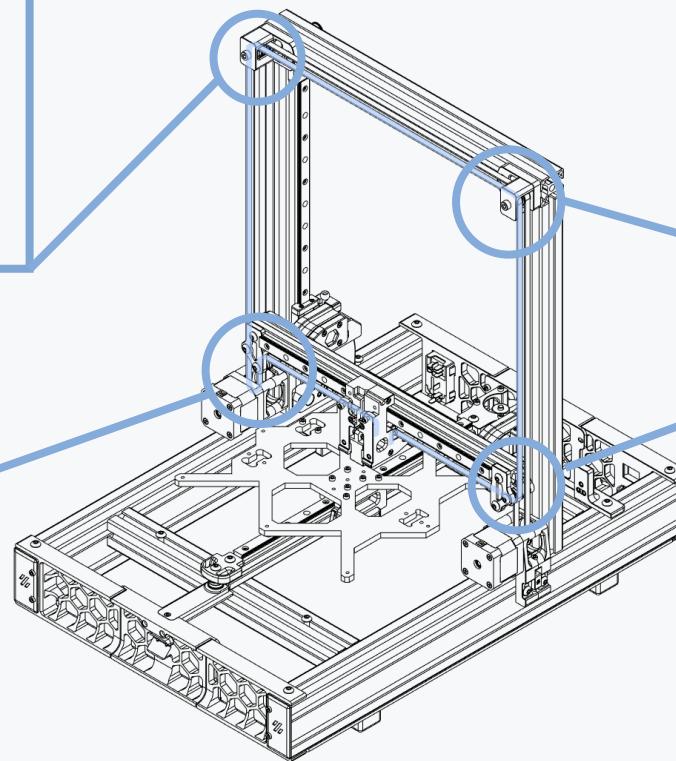
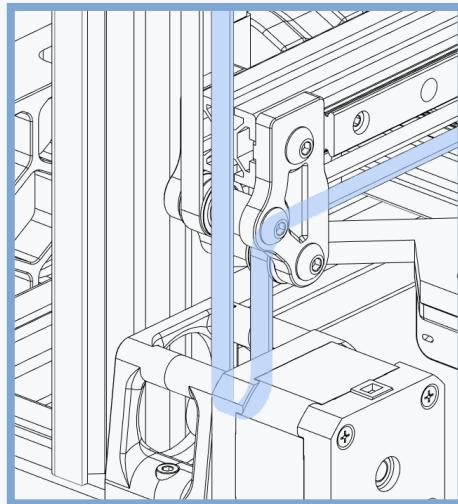
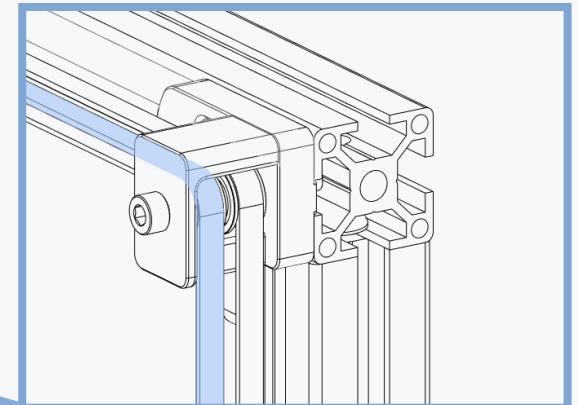
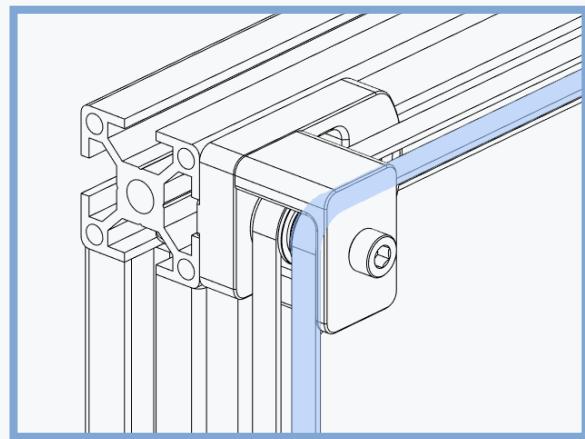
"Z" BELT

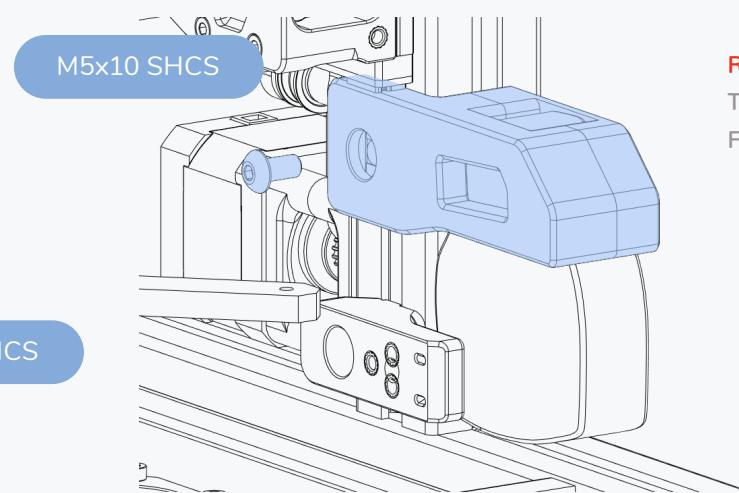
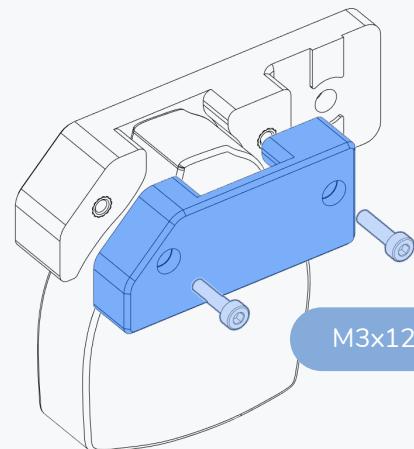
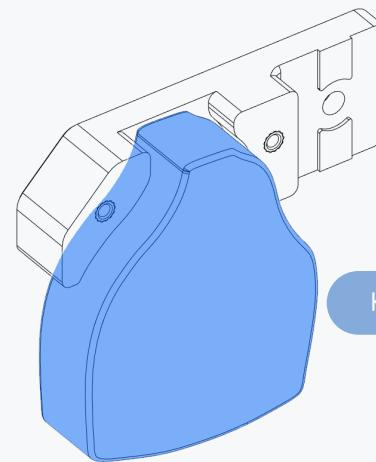
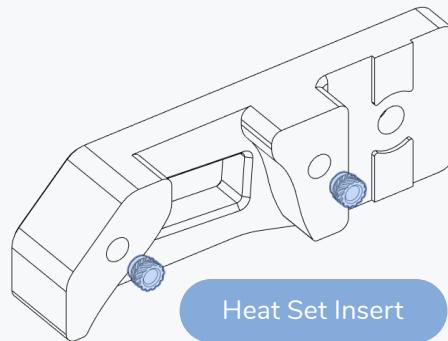
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"X" BELT

WWW.VORONDESIGN.COM





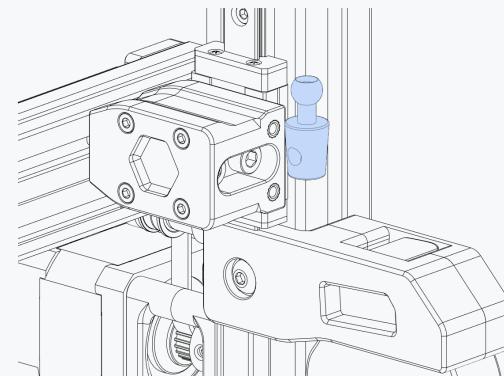
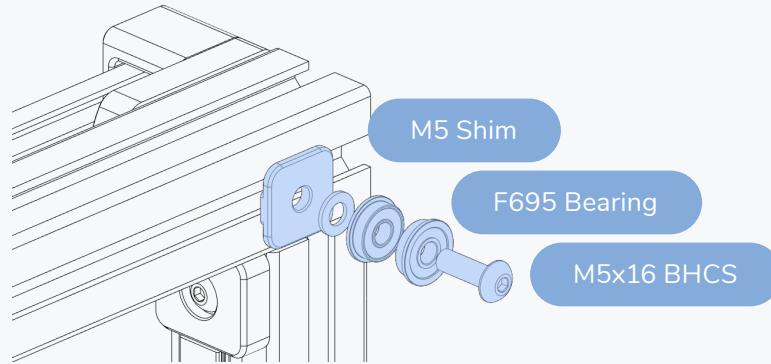
WEAR EYE PROTECTION

The Key-Bak will violently retract if you lose grip of the end piece.

Wear eye protection or a face shield until it is securely mounted.

RAIL CARRIAGE

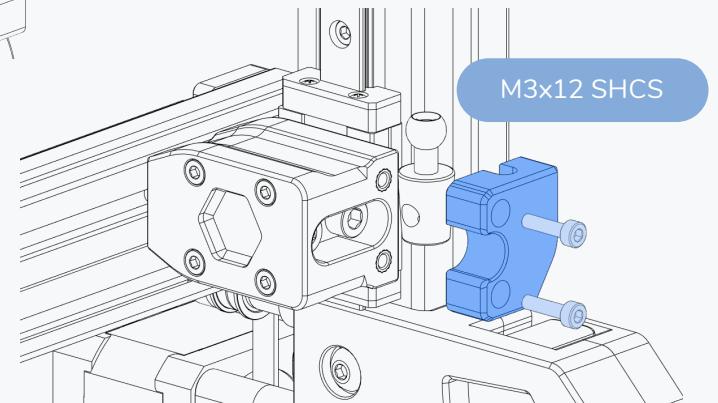
The rail carriage is now secure.
Fully fasten the bottom most bolt.



MOUNTING THE KEYBACK END PIECE

Pull the end piece of the Key-Bak and mount it as shown.

Extend more of the cord and hook it in the idler mounted above.



AFTERBURNER

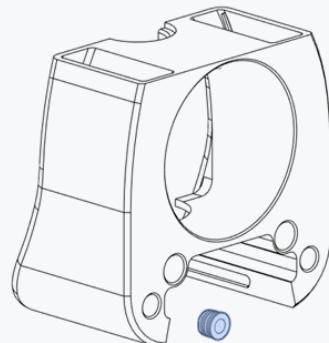
WWW.VORONDESIGN.COM



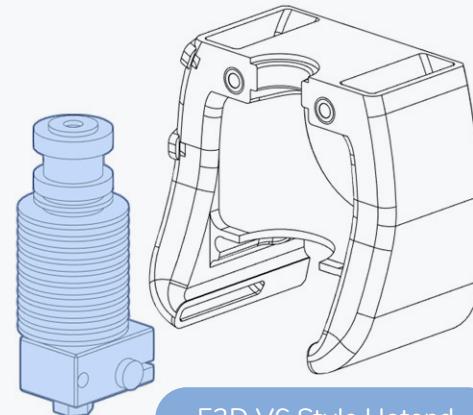
AVAILABLE MOUNTS

We also provide mounts for the Slice Engineering Mosquito and TriangleLab/Phaetus Dragon Hotend.

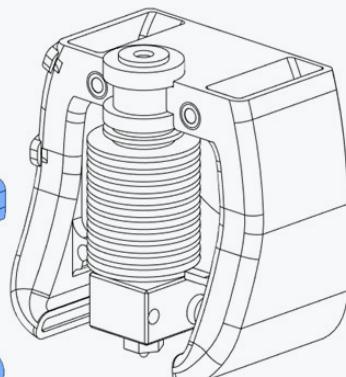
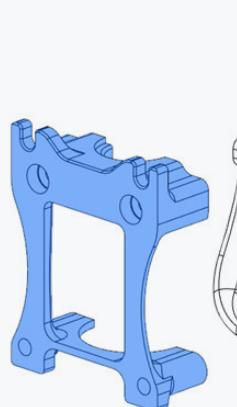
They are assembled in a similar manner.



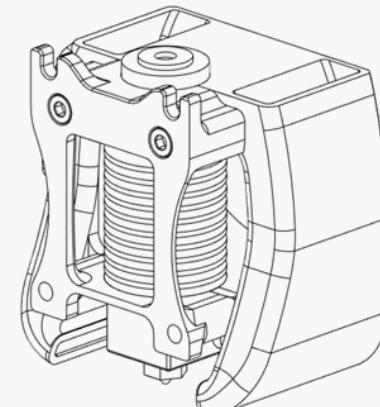
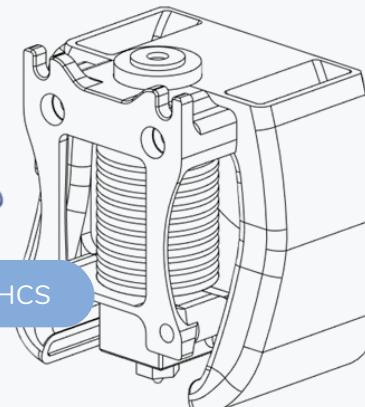
Heat Set Insert

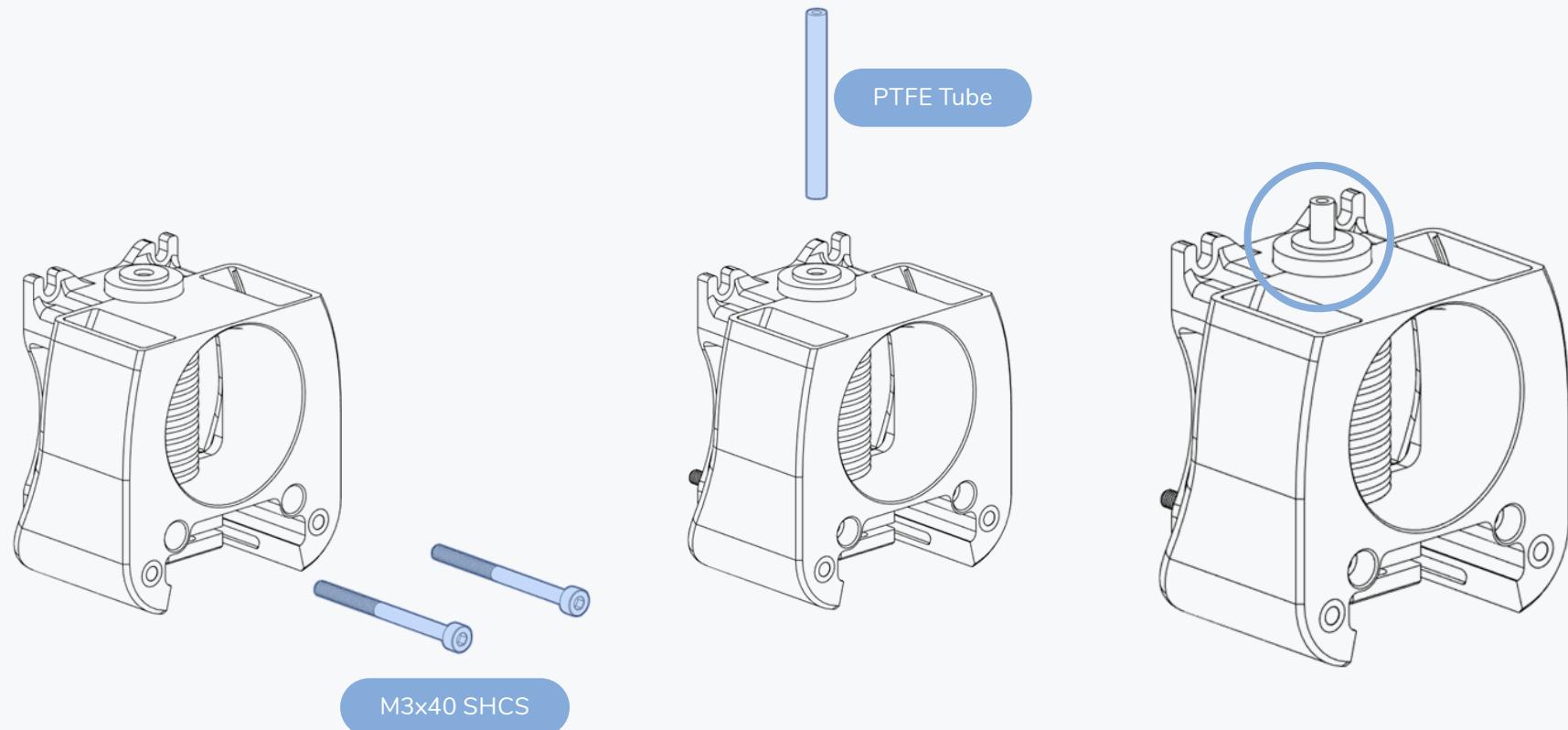


E3D V6 Style Hotend

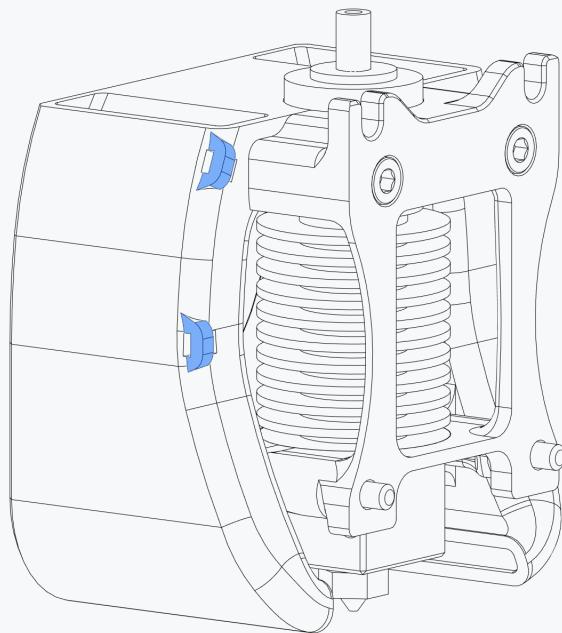


M3x16 SHCS

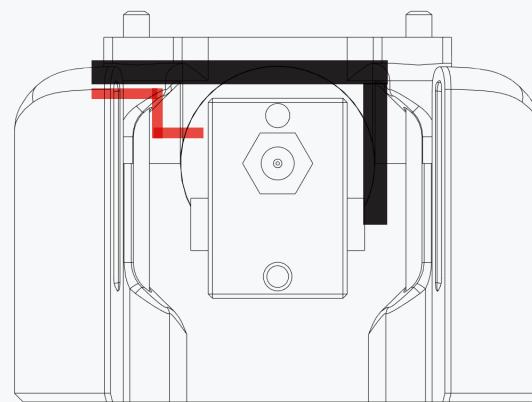


**PTFE STICKOUT**

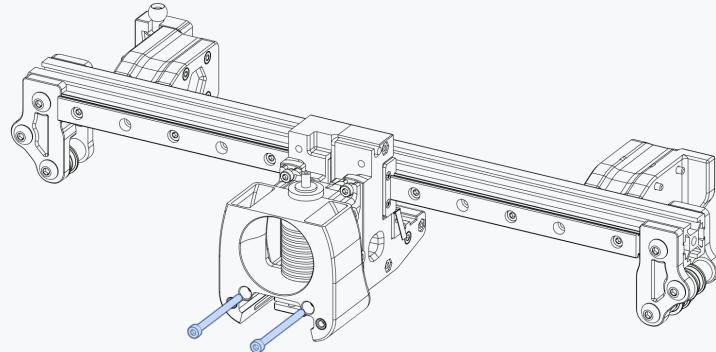
The PTFE tube should end 10mm above the surface of the printed part.

**WIRING PATH**

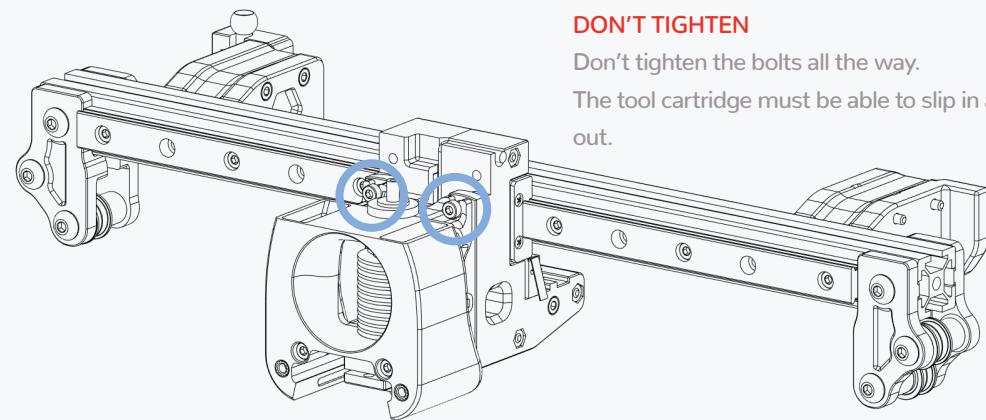
Guide the wires in the highlighted path.

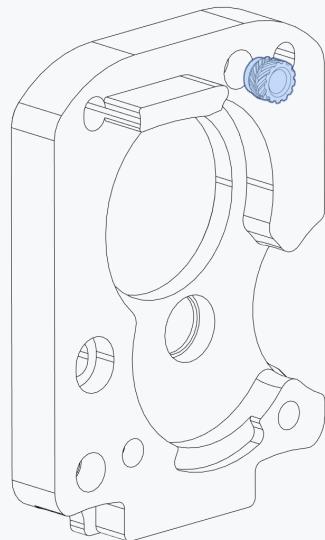
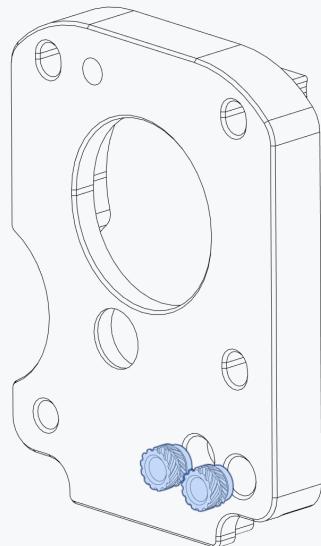
**CHECK ORIENTATION**

The heater block must point forwards.



M3x40 SHCS





HEAT SET INSERTS

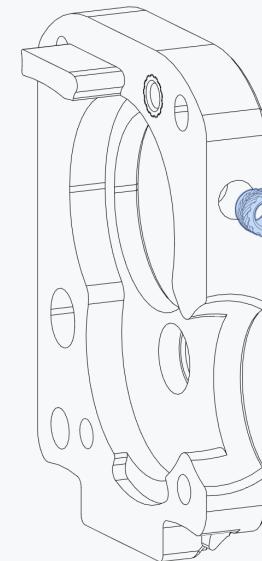
You will need to install heat set inserts into various plastic parts.

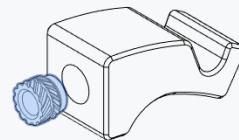
If you need help on the correct procedure, ask in Discord.

OPTION: TOOLHEAD PCB



If you opt to use a toolhead pcb add an aditonal heat set insert into the alternate part.

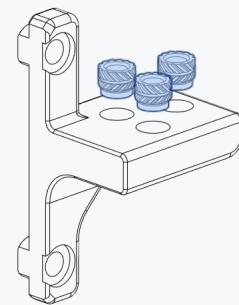




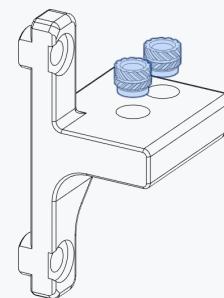
Heat Set Insert

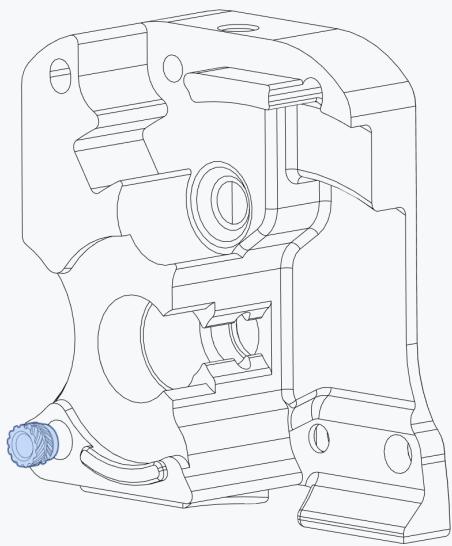
GENERIC CABLE CHAIN

The 3 hole pattern is usually found on generic cable chains.

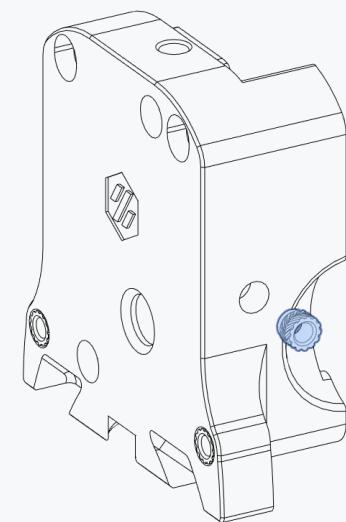
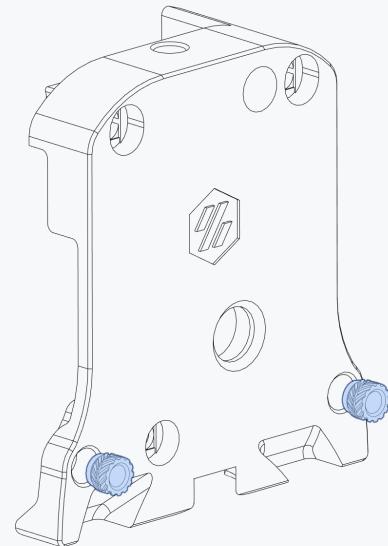
**IGUS CABLE CHAIN**  **LDO MOTORS**

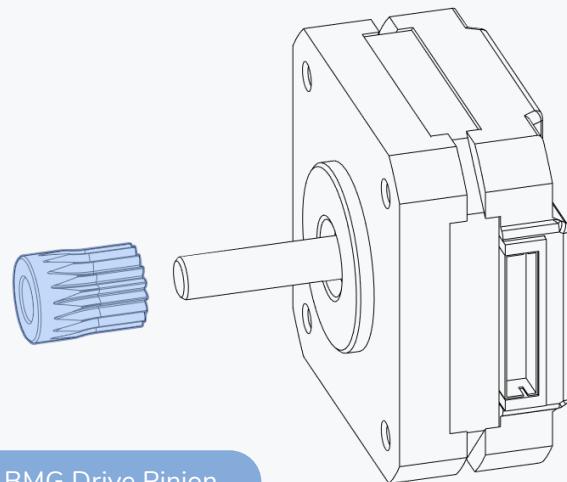
IGUS chain have 2 mounting holes.



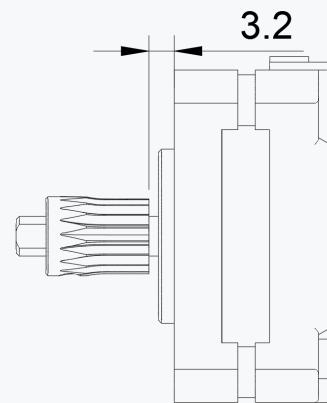


Het Set Insert

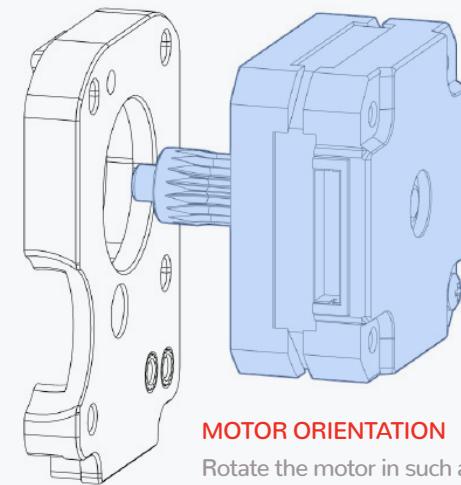




BMG Drive Pinion

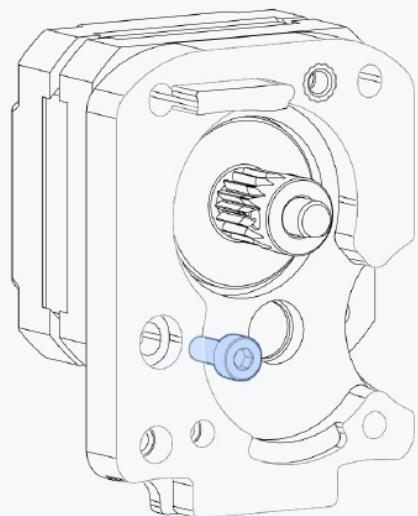
**ALL UNITS ARE METRIC**

If a unit is not specified
assume it's metric.

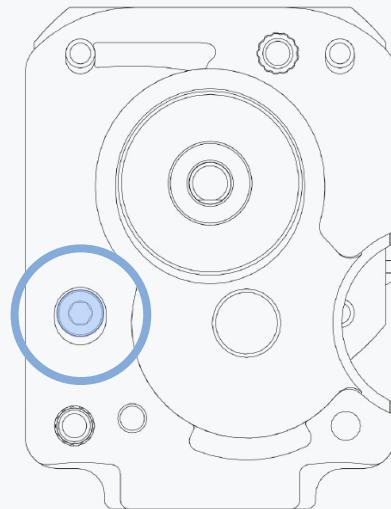
**MOTOR ORIENTATION**

Rotate the motor in such a way that
the connector/wires are on the left side
when looking at it from the back.

This side will be covered by the cable
cover later.



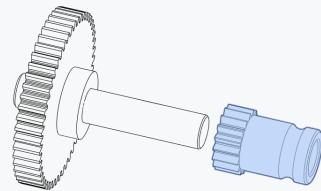
M3x8 SHCS



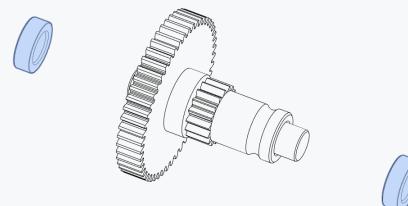
ADJUSTABLE MOTOR POSITION

The motor position is adjustable to allow for a proper meshing of the drive gears.

Start in the top most position of the slot.



BMG Drive Gear

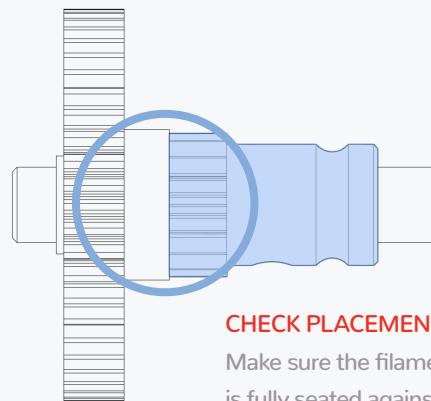


MR85 Bearing

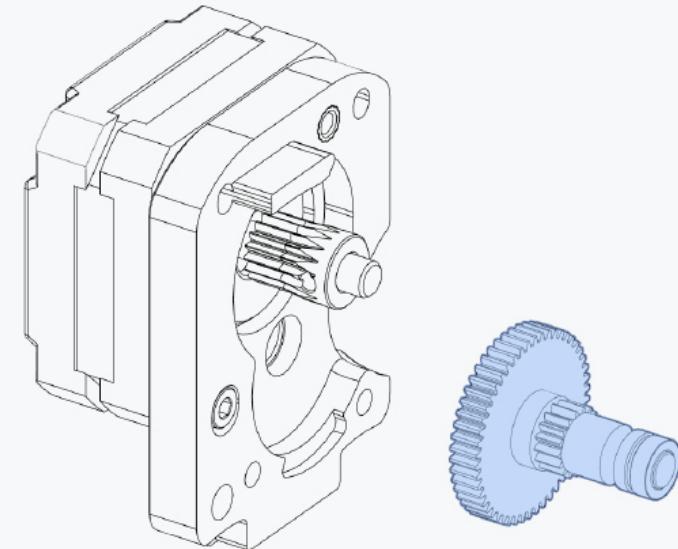
CHECK BEARING FIT

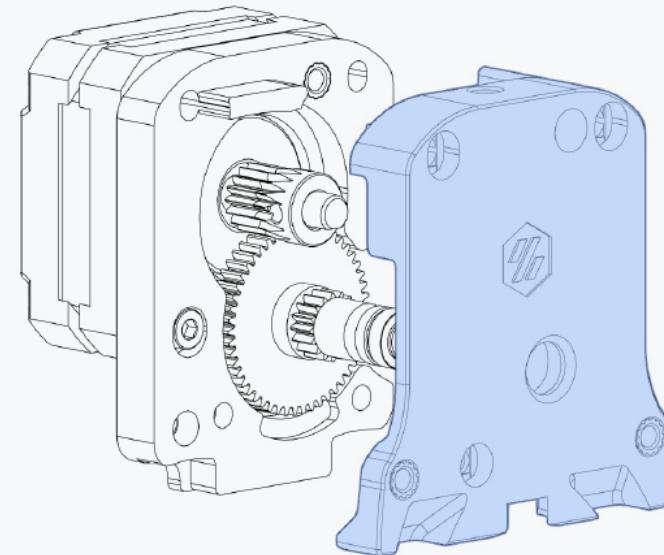
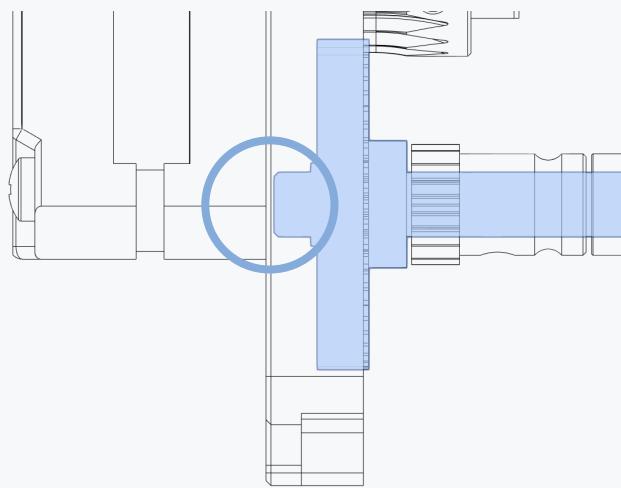
The bearings must slip on and off the shaft easily to allow the gear to self centre. Do not shim into position.

Pressing the bearings on the shaft will damage them.
Lightly sand the shaft if required.

**CHECK PLACEMENT**

Make sure the filament drive gear is fully seated against the drive shaft gear.



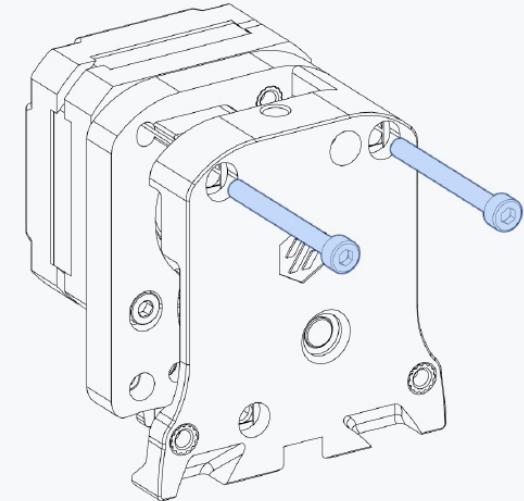


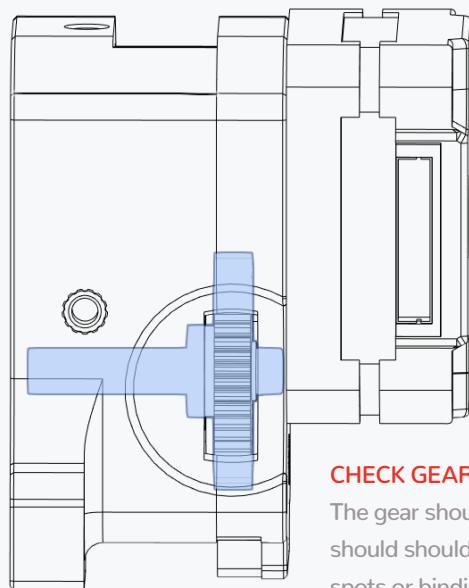
M3x30 SHCS

CHECK CLEARANCE

The drive shaft must not touch the motor housing.

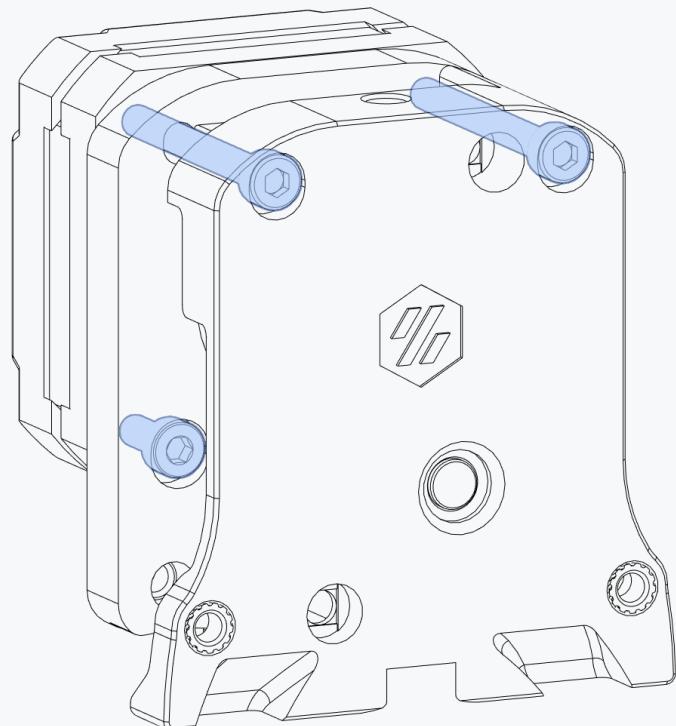
You can sand the face of shaft if required.

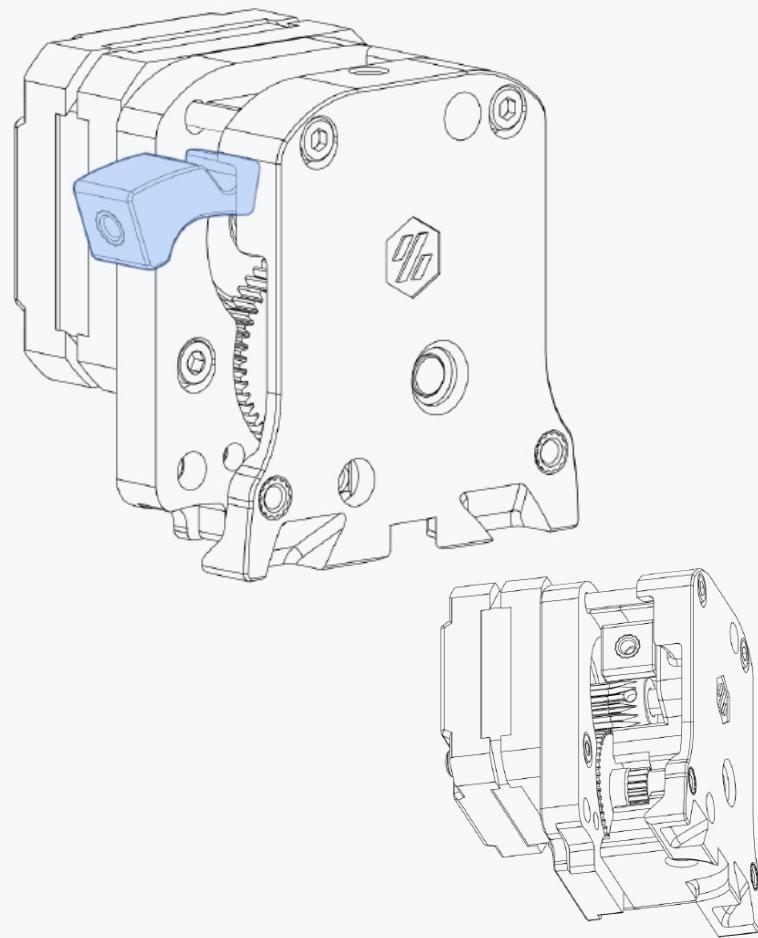


**CHECK GEAR PLAY**

The gear should have a slight play and should turn without any tight spots or binding.

Adjust the position of the motor if required. See page 71.

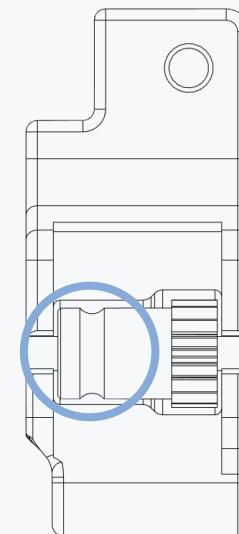
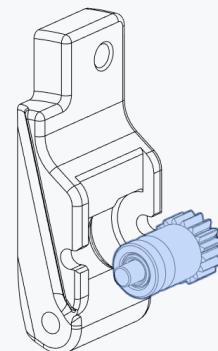


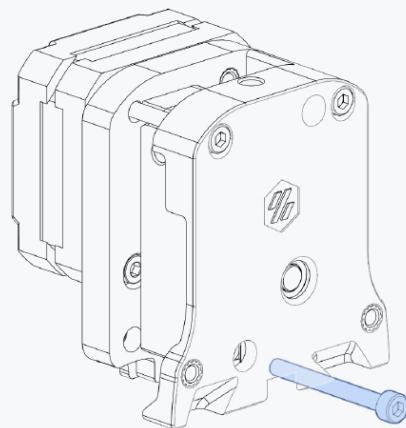
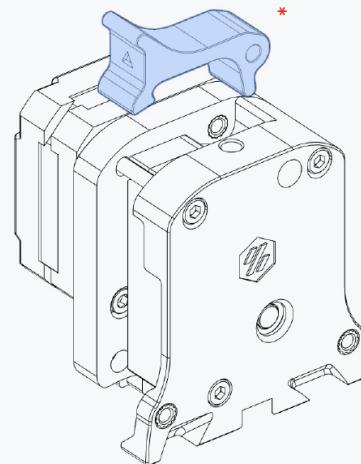
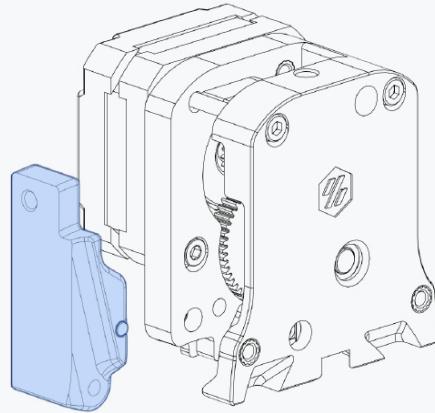


BMG Idler Assembly

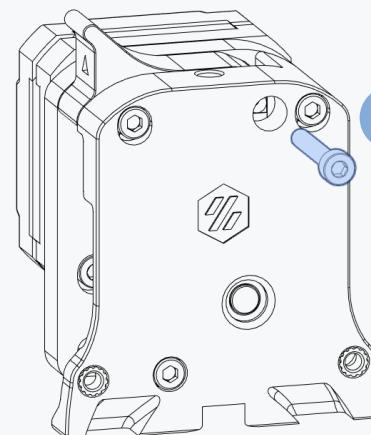
**LUBRICATE BEARINGS**

A lubrication film is required to ensure smooth operation and longevity.
Refer to the BOM for lubricant options.

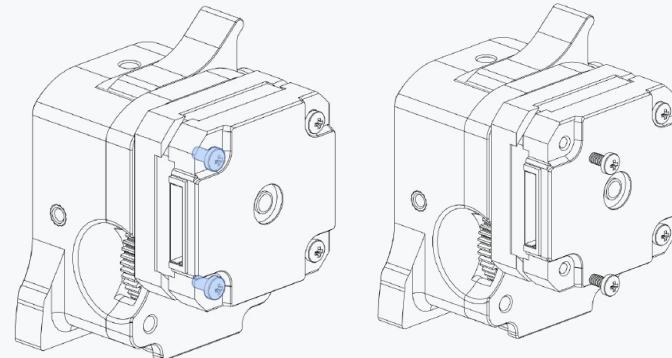




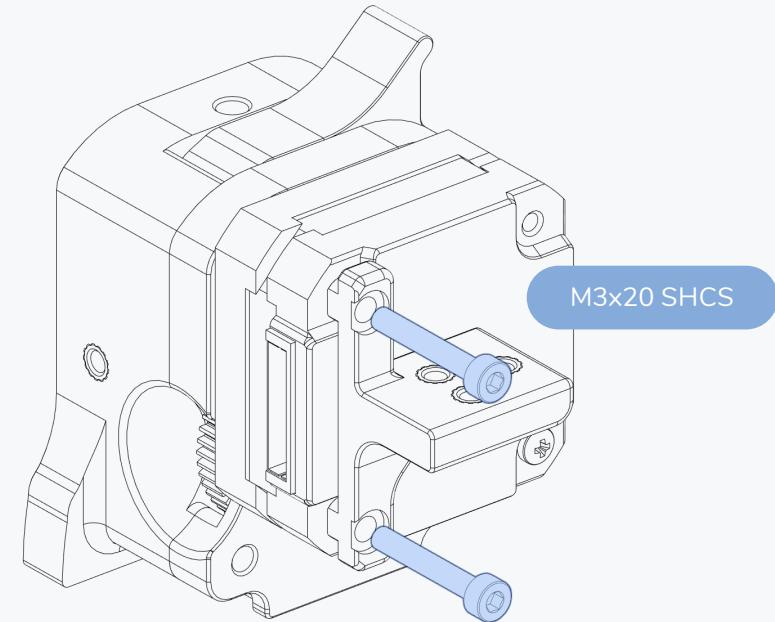
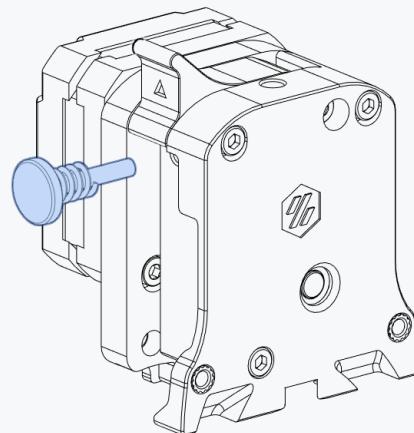
M3x30 SHCS



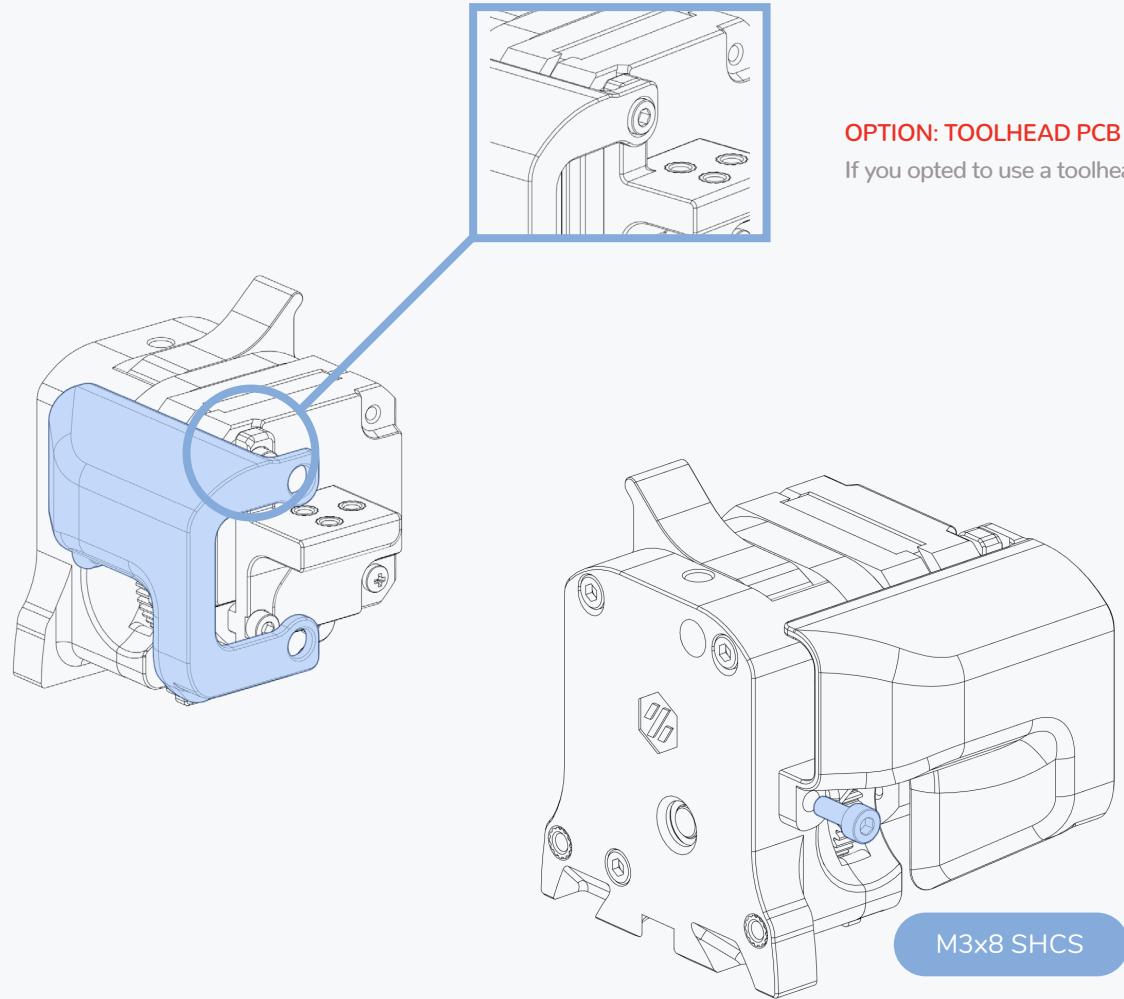
BMG Thumb Screw

**REMOVE BOLTS**

Carefully remove the bolts from the left side of the motor. They will be replaced with new bolts in the next step.



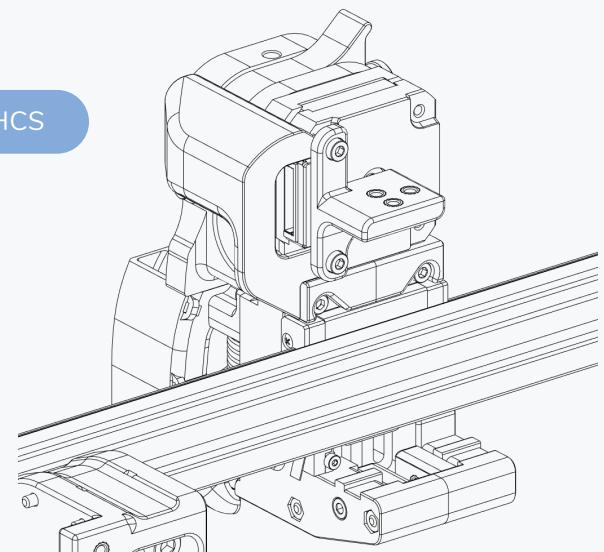
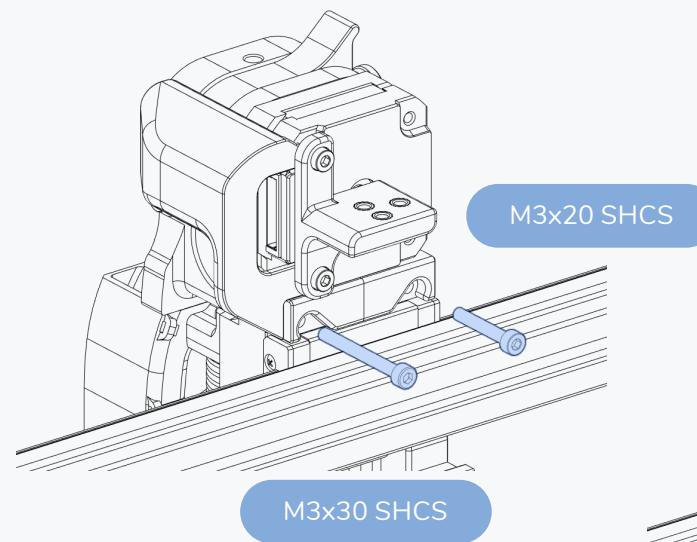
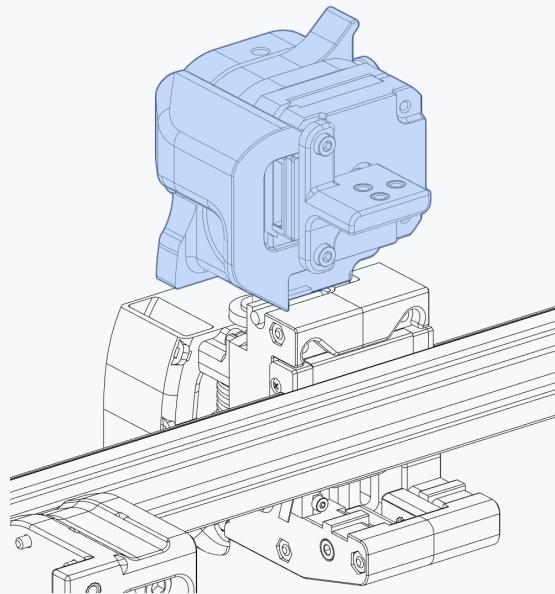
M3x20 SHCS

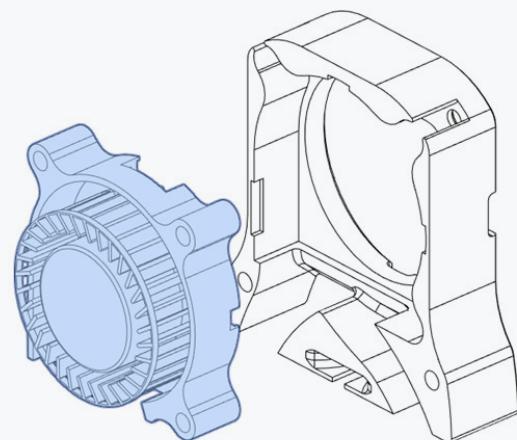


OPTION: TOOLHEAD PCB

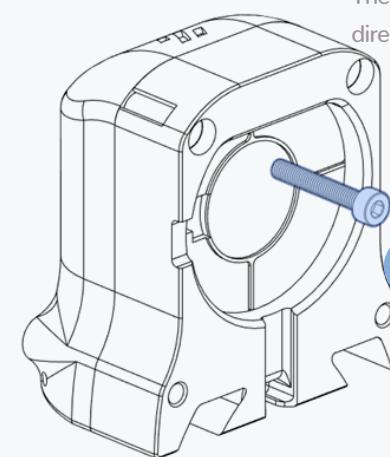
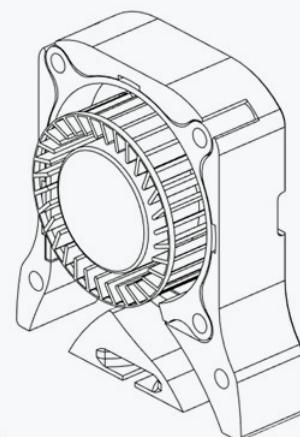
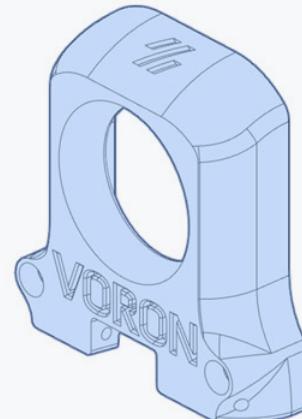
If you opted to use a toolhead pcb skip this step.

LDO MOTORS



**REMOVE TOP COVER**

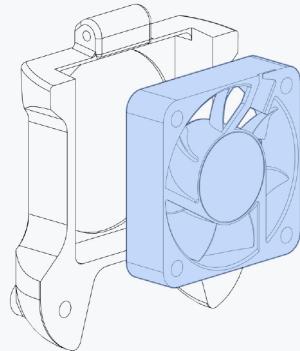
Split the fan open by bending the tabs on the side.

**M3x16 SHCS****DON'T OVER TIGHTEN**

The screws are screwed directly into plastic.

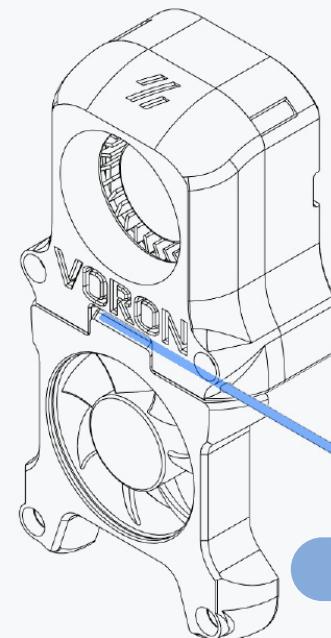
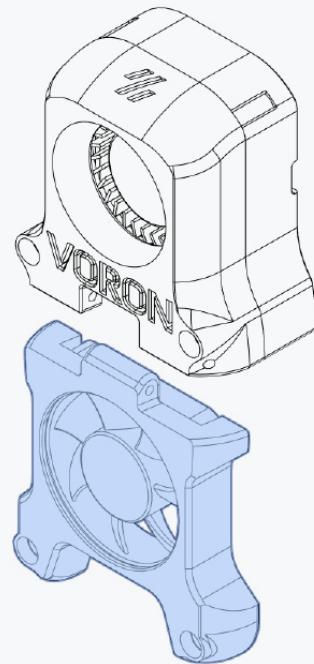
WIRING PATH

Route the wires through the large opening in the back.

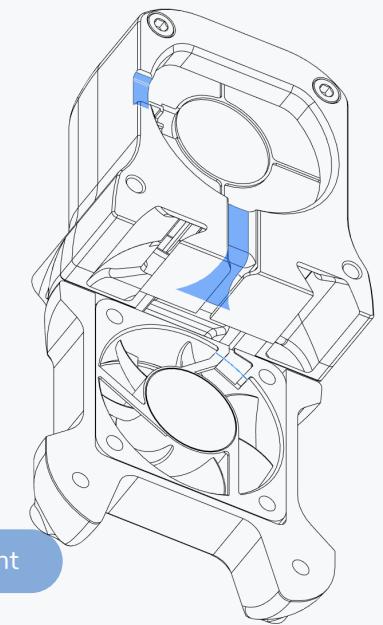
**AIRFLOW DIRECTION**

Make sure the fan blows air towards the hotend.

Look for a small arrow on the fan housing.



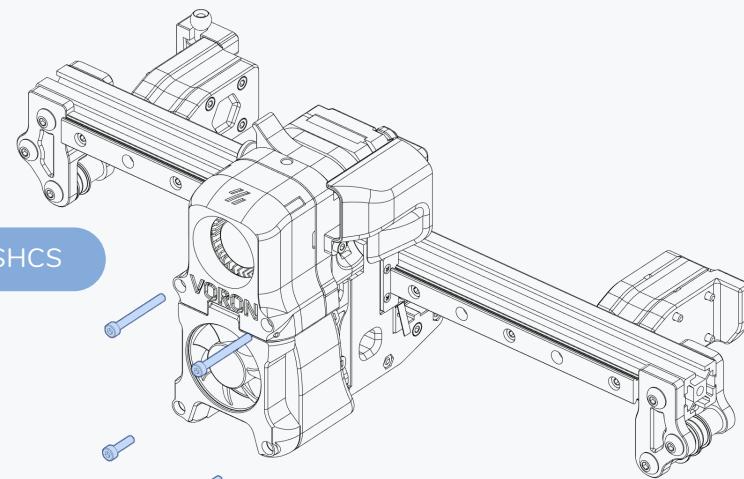
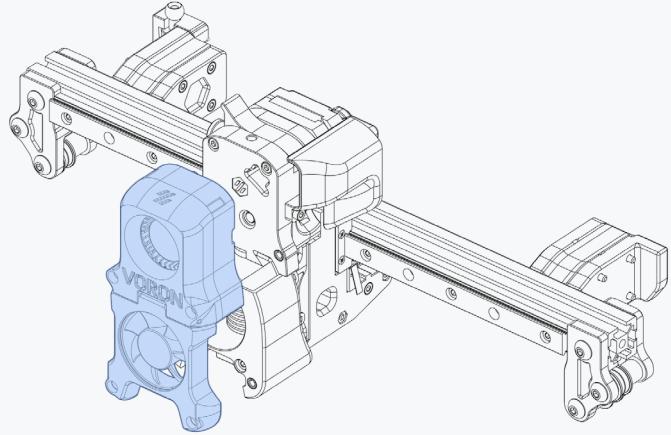
Piece of Filament

**WIRING PATH**

Guide the wires in the highlighted path.

FAN ASSEMBLY

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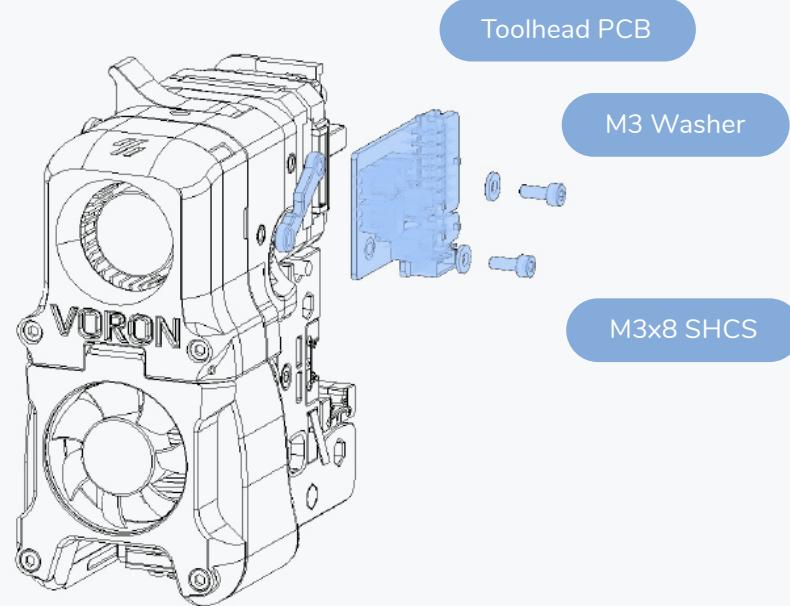
M3x30 SHCS

M3x12 SHCS

OPTION: TOOLHEAD PCB

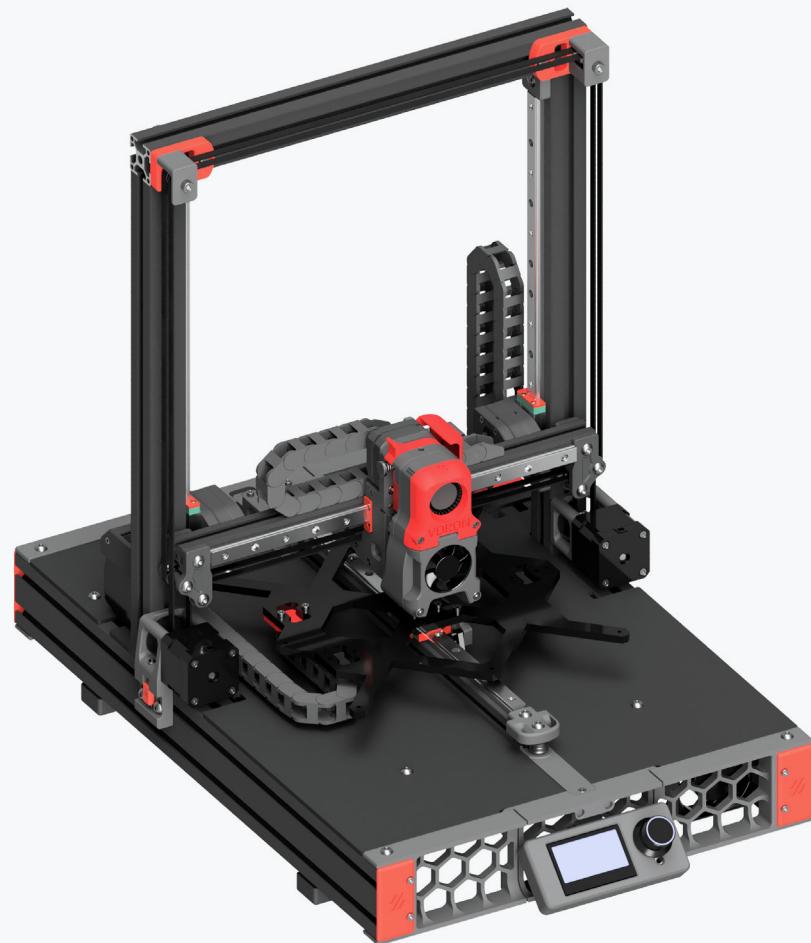


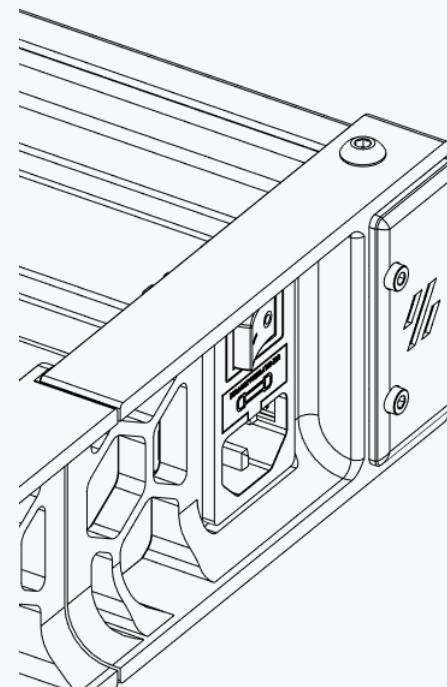
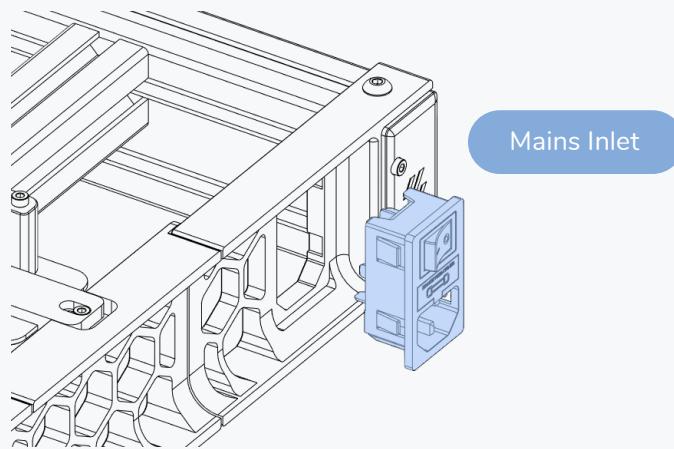
If you opted to use a toolhead pcb install it instead of the cable cover.

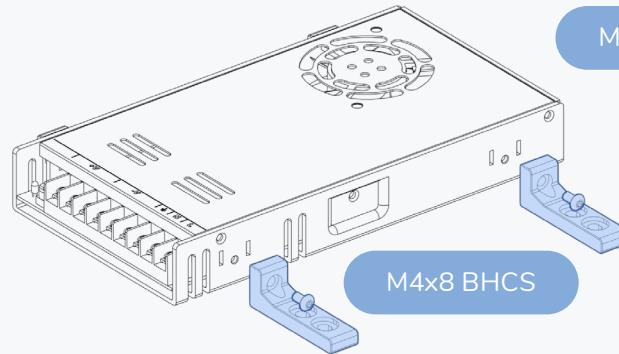


ELECTRONICS AND PANELS

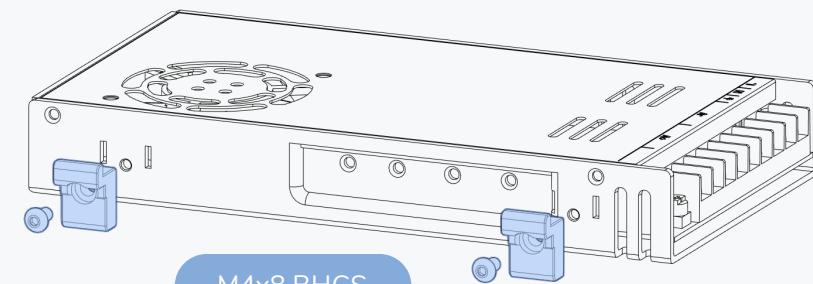
WWW.VORONDESIGN.COM



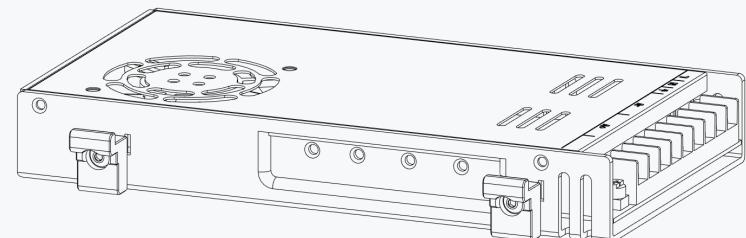


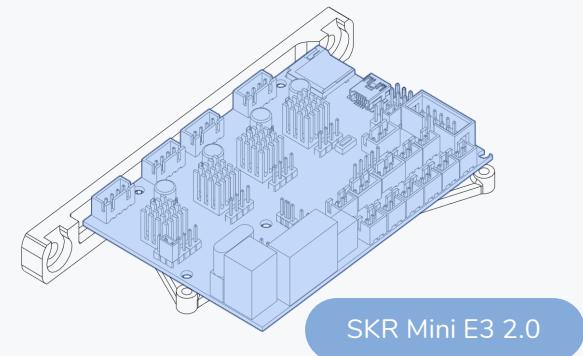
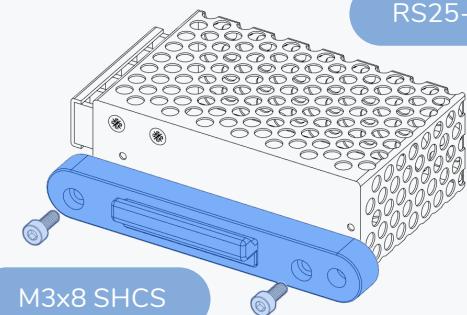
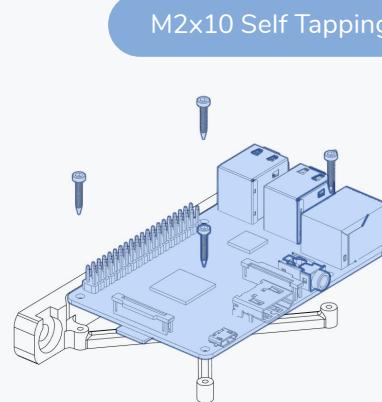


Meanwell LRS350-24

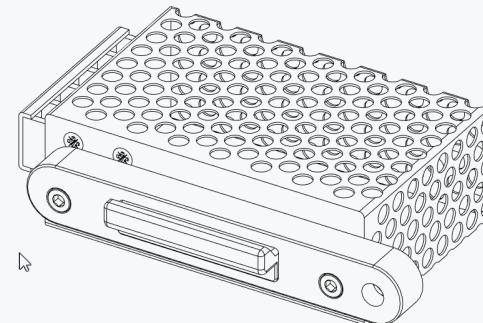


M4x8 BHCS

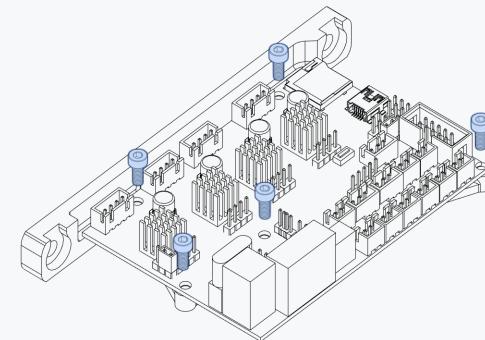




Dunar's Cursor

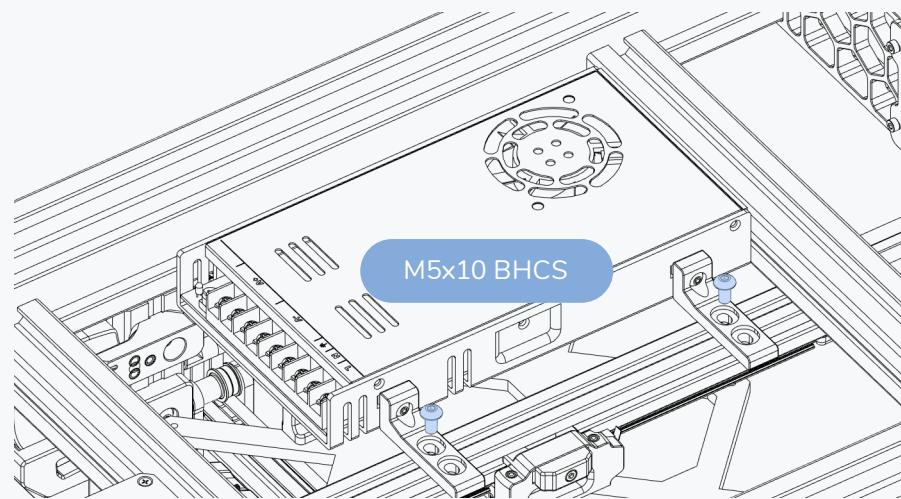
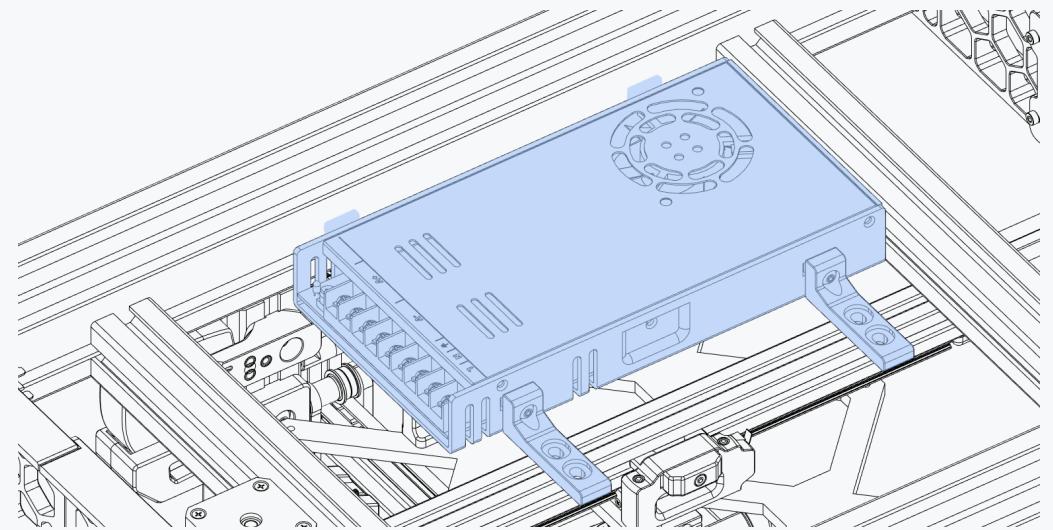
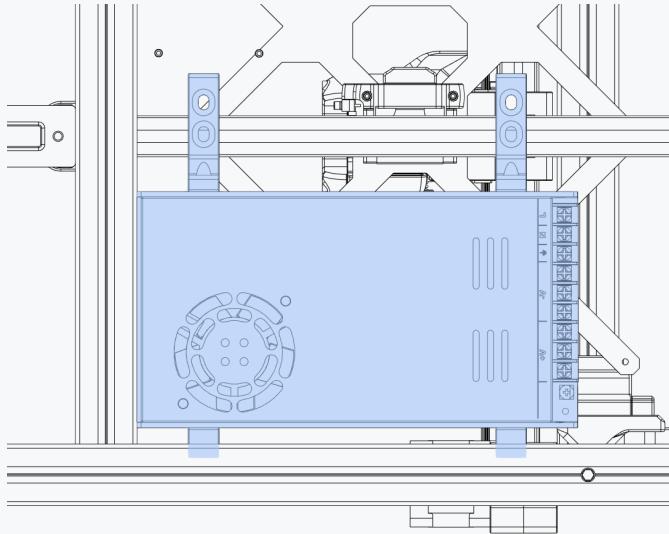


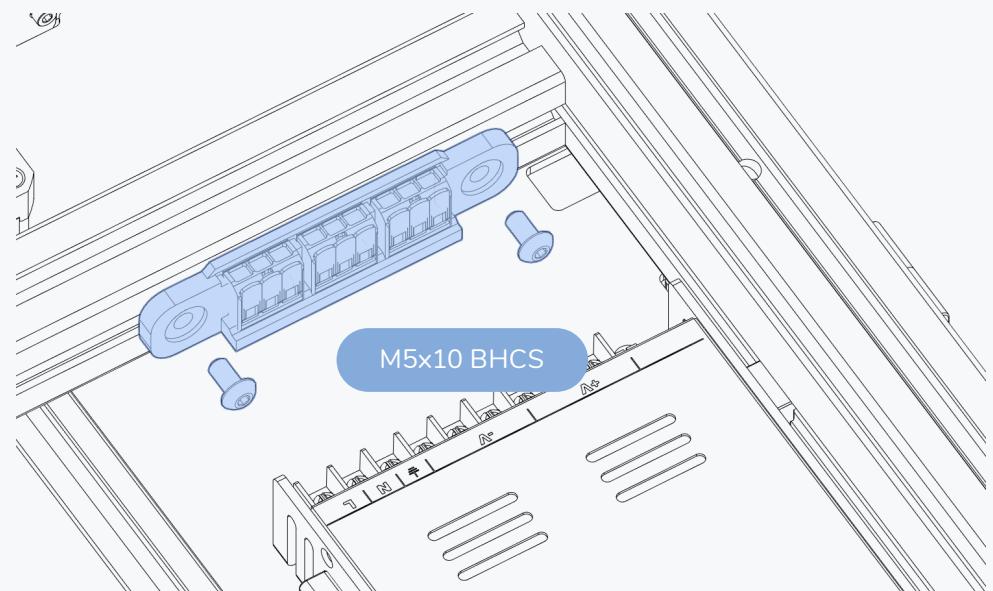
M3x8 SHCS



PSU INSTALLATION

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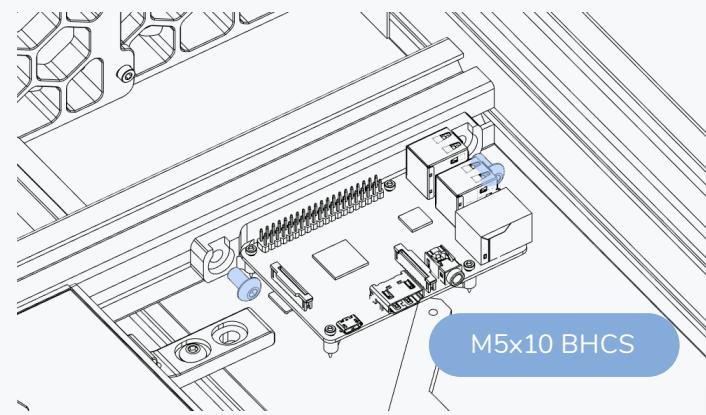
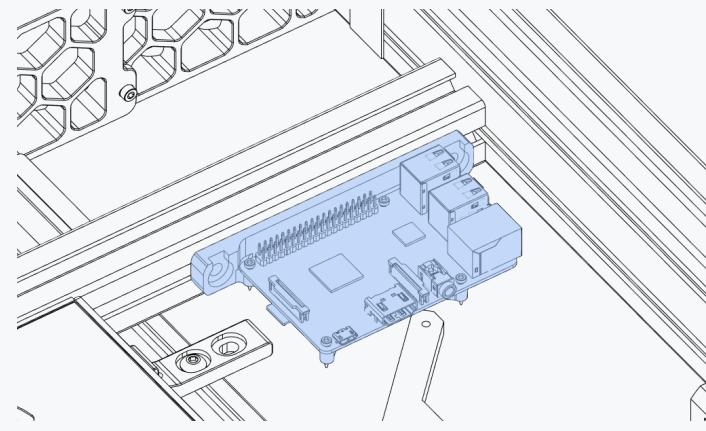
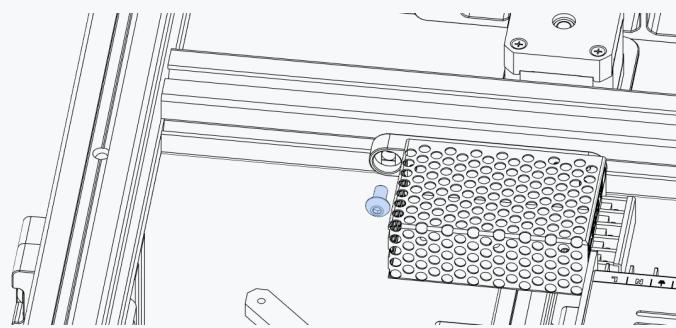
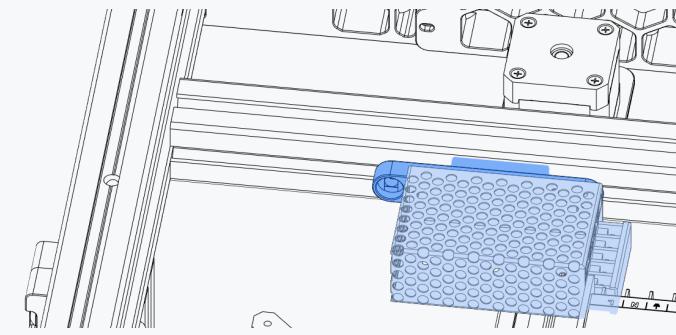


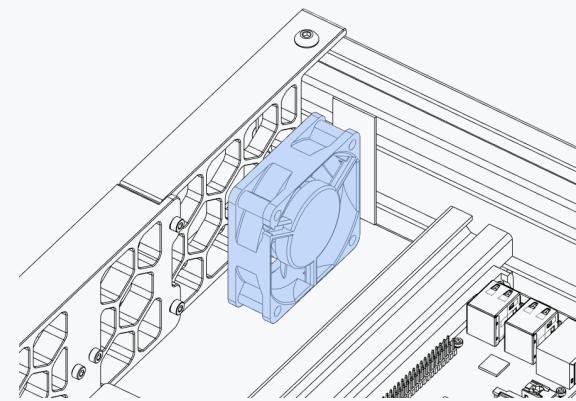
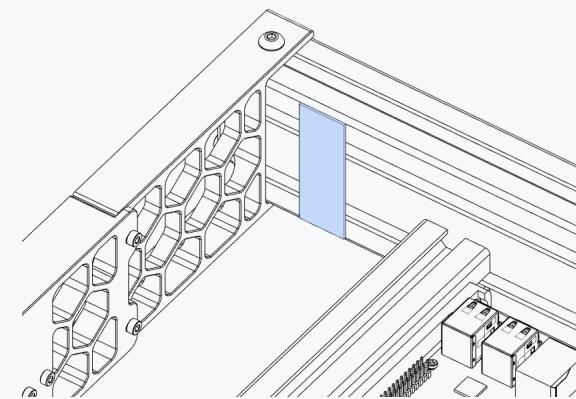
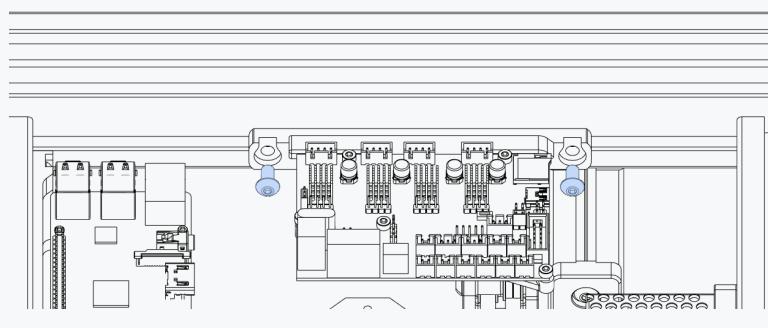
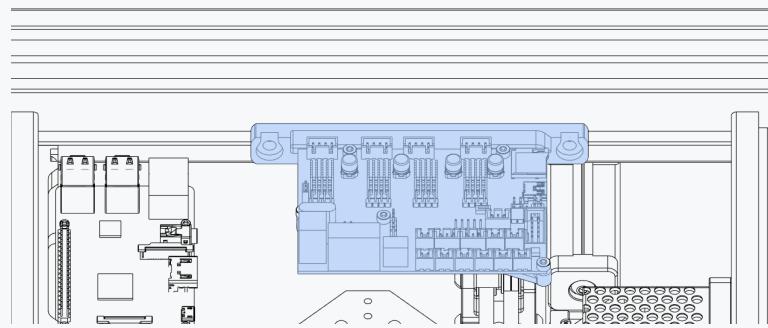
OPTION: WAGO TERMINAL STRIP  LDO MOTORS

WAGO 221 series clamps can be used to simplify the mains wiring.

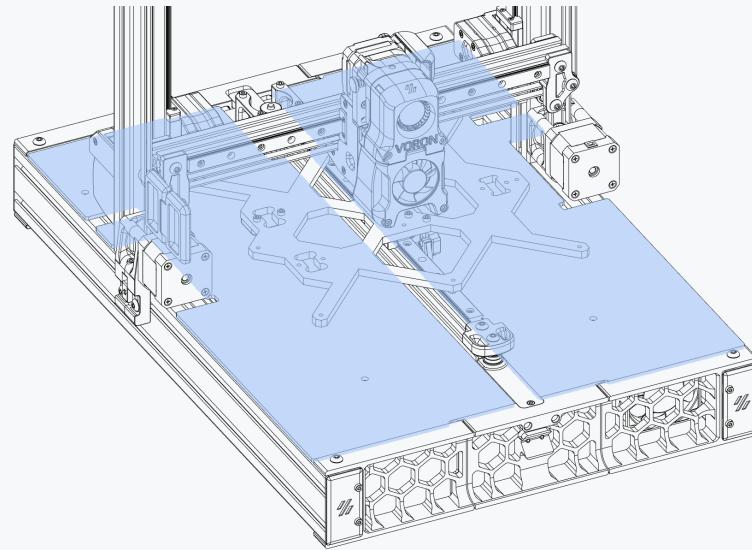
SECONDARY PSU/PI INSTALLATION

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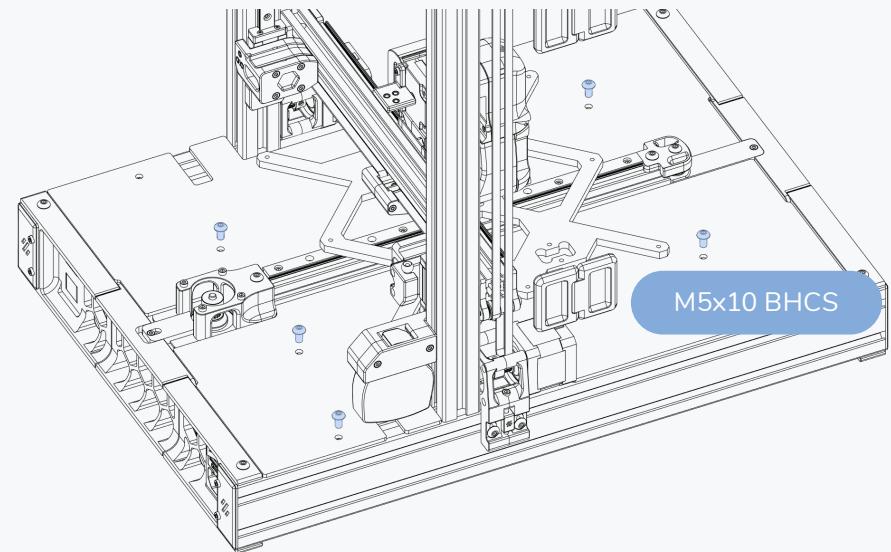


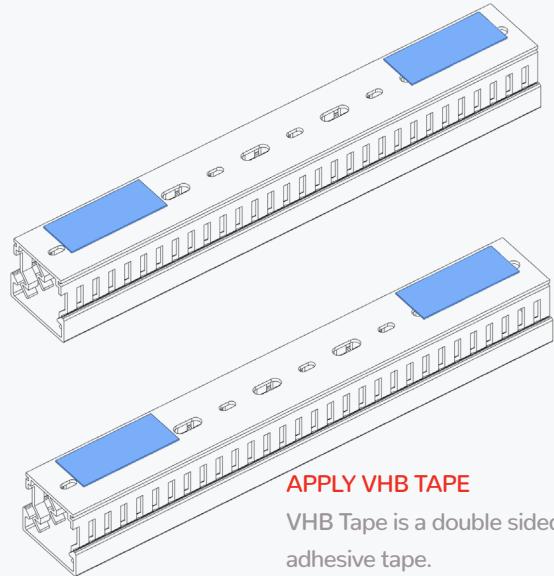


6020 Fan

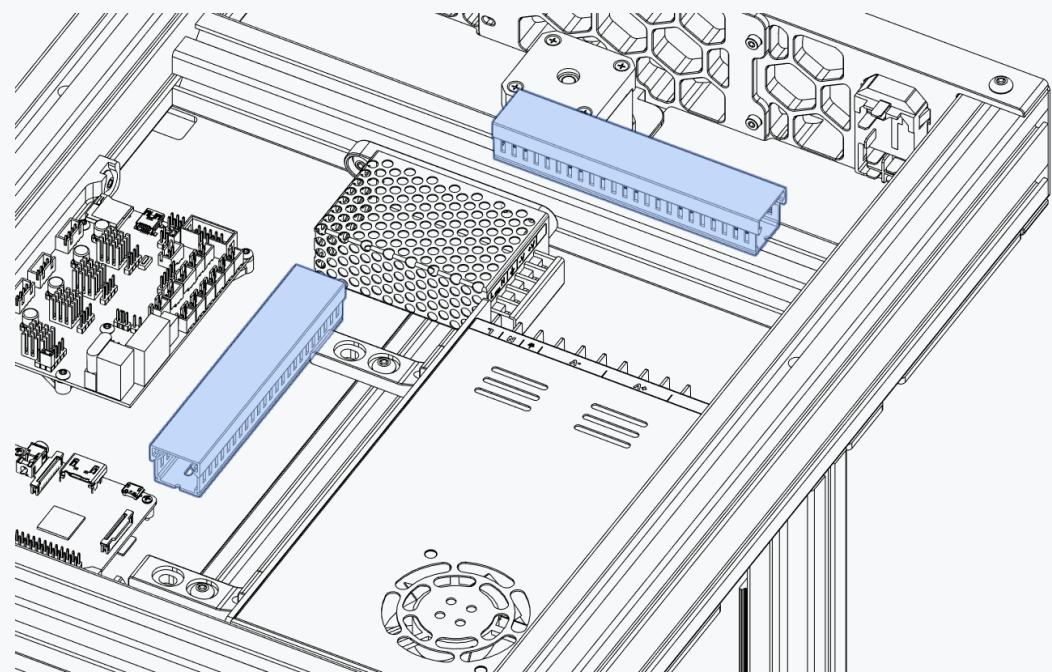
**DECK PANELS**

Unless you installed the panels earlier undo the 6 bolts on the bed carriage and remove the bed carriage to install the panels.



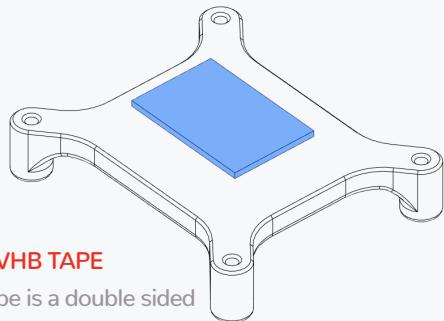
**APPLY VHB TAPE**

VHB Tape is a double sided adhesive tape.

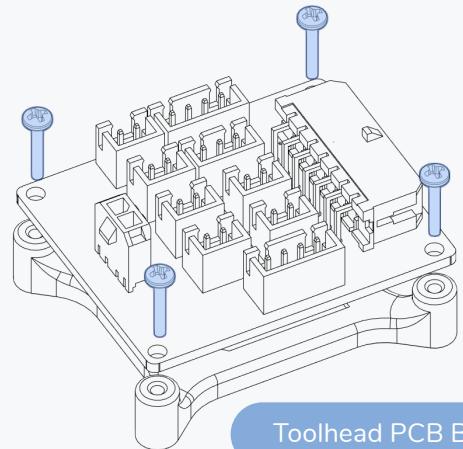
**OPTION: CABLE RACEWAYS**

Raceways help in keeping the electronics compartment organized and clutter free.

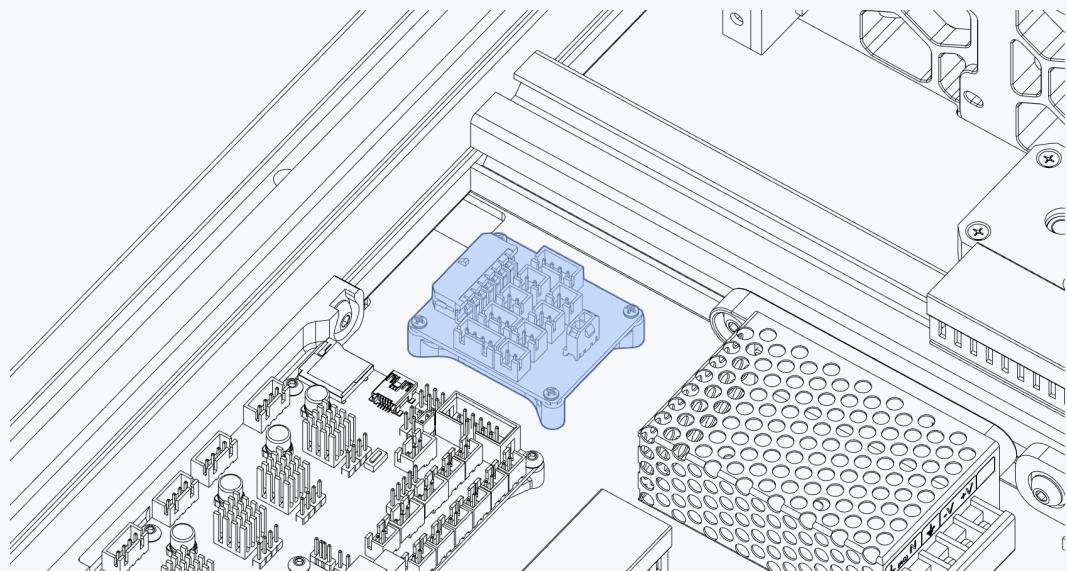


**APPLY VHB TAPE**

VHB Tape is a double sided adhesive tape.

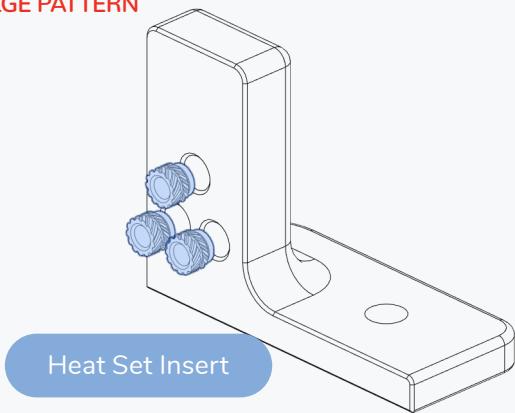


Toolhead PCB Breakout Board

**OPTION: TOOLHEAD PCB BREAKOUT BOARD**

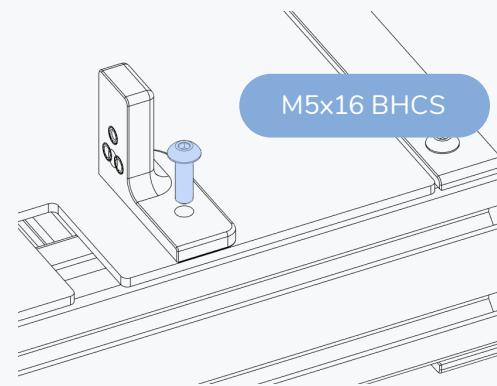
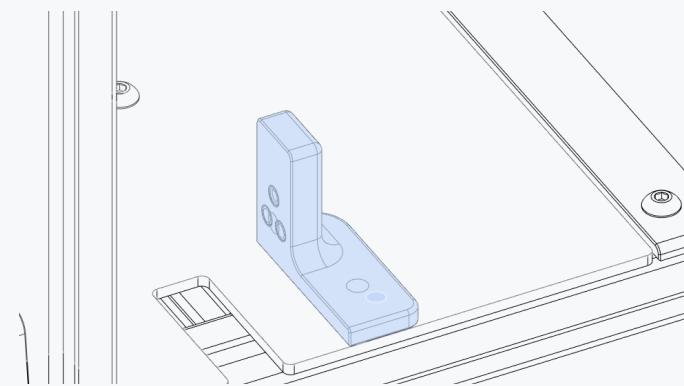
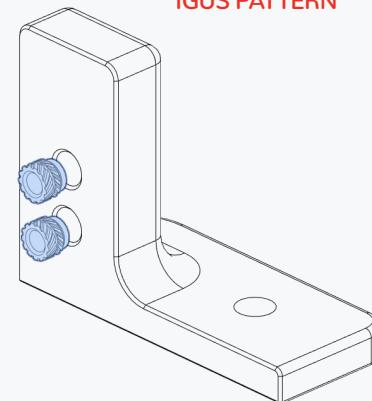
Some premade wiring harnesses come with a breakout board for the electronics compartment. If yours did install it now.

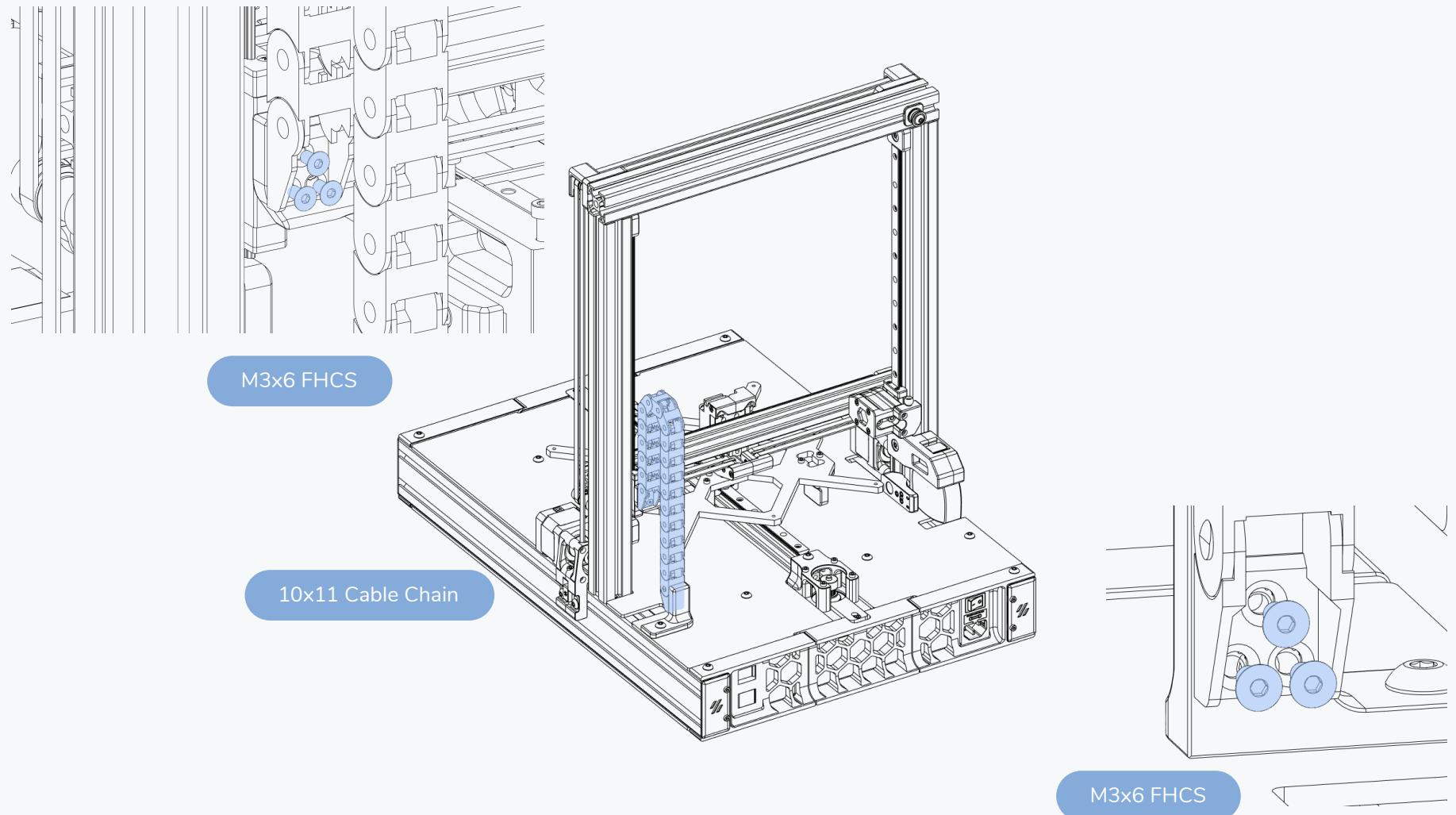
TRIANLGE PATTERN

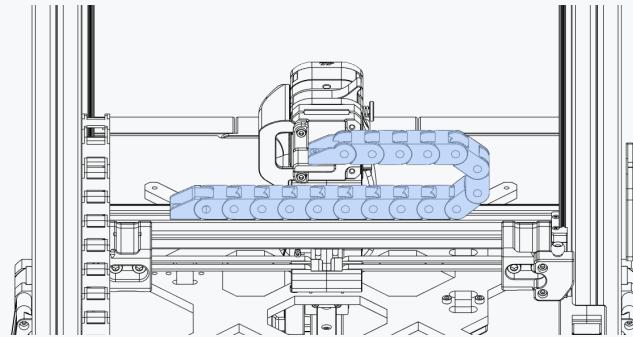


IGUS PATTERN

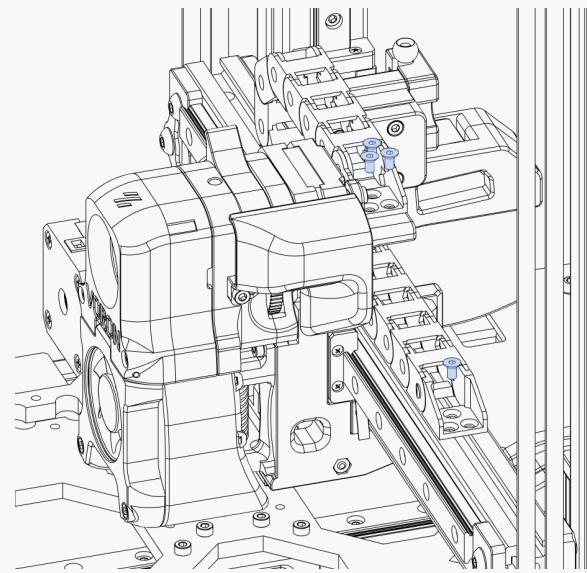
 LDO MOTORS







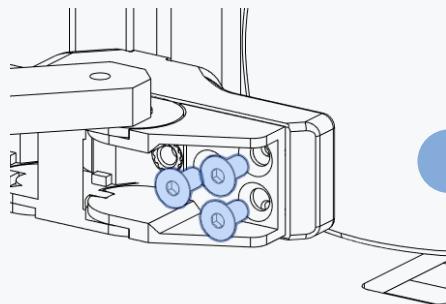
10x11 Cable Chain



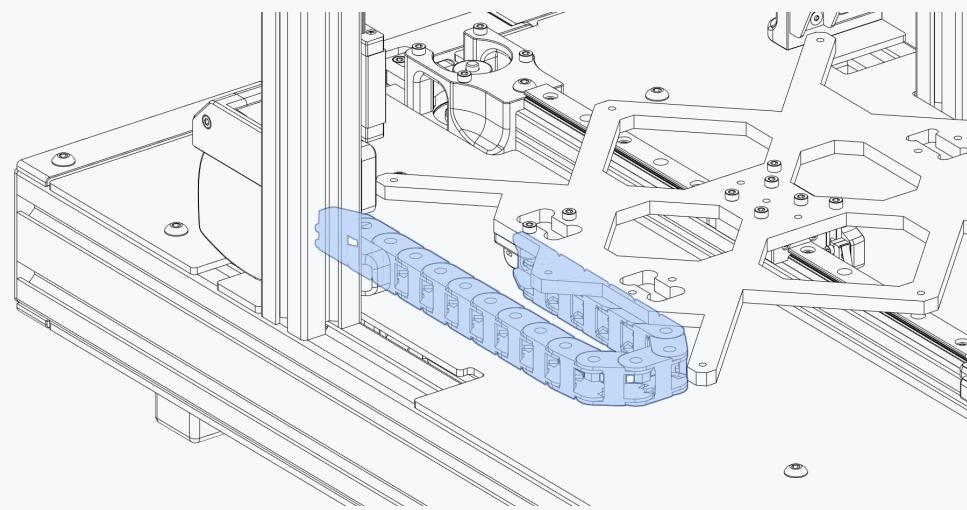
M3x6 FHCS

Y CABLE CHAIN

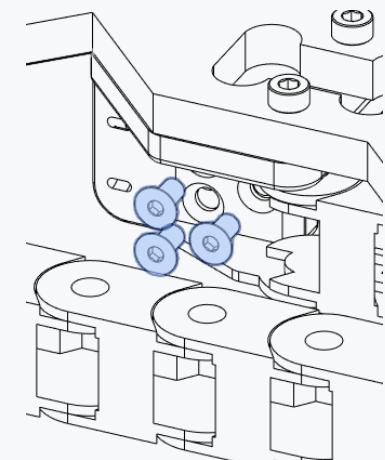
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M3x6 FHCS

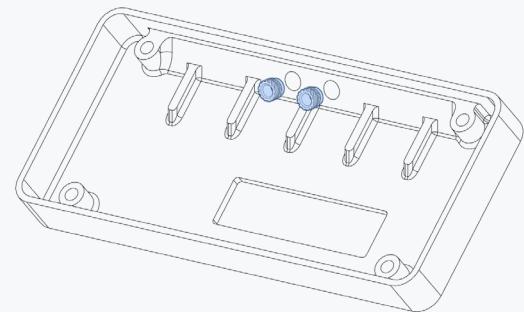


10x11 Cable Chain



M3x6 FHCS

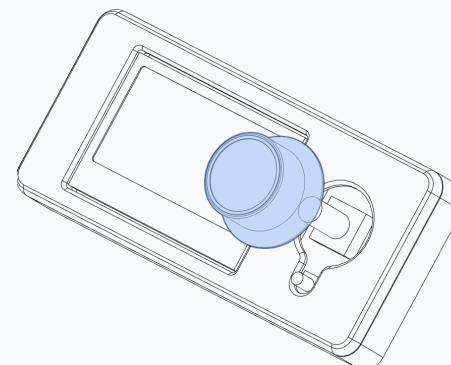
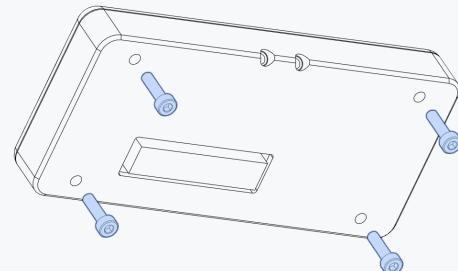
Heat Set Insert

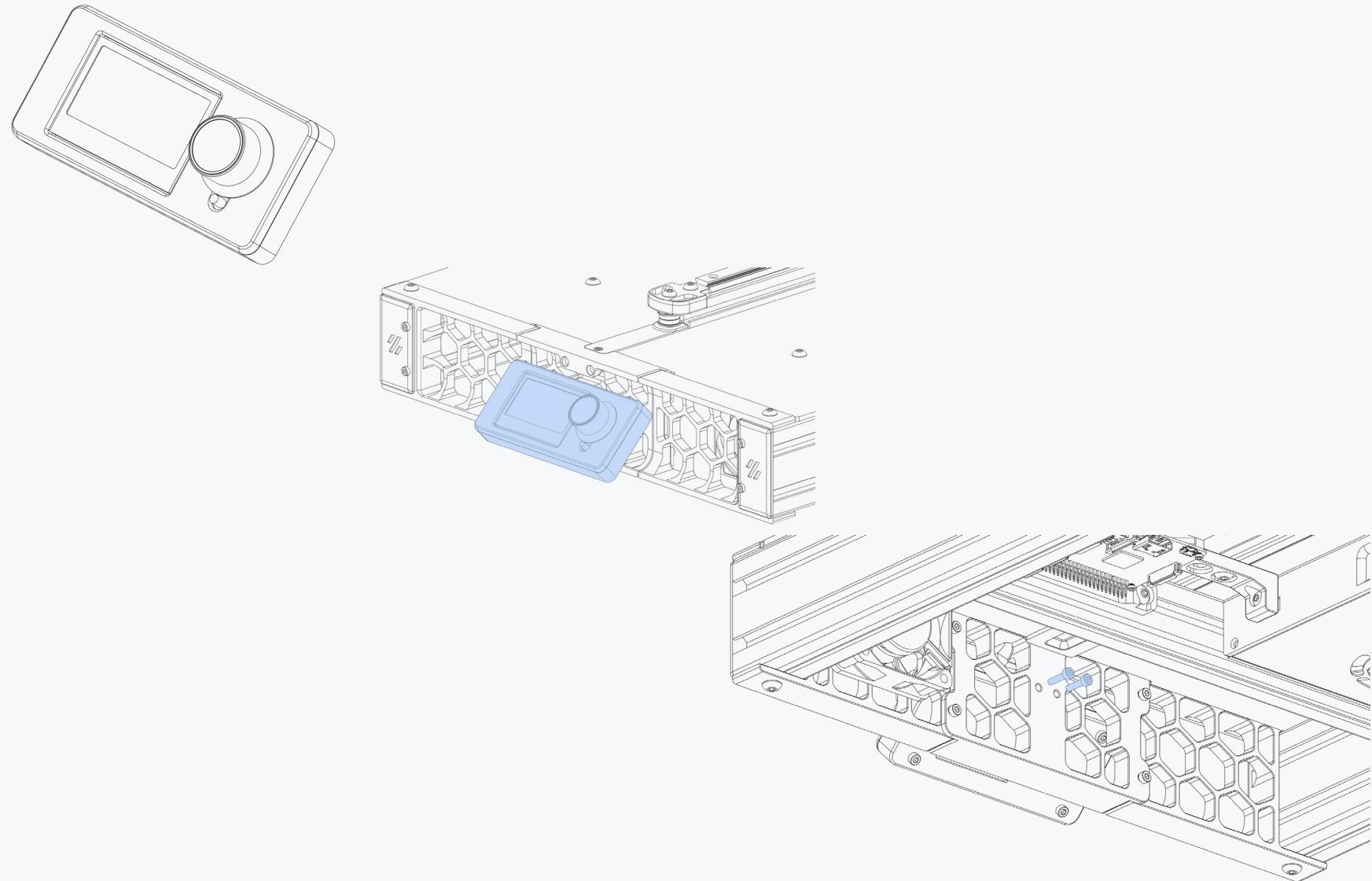


Mini12864 Display

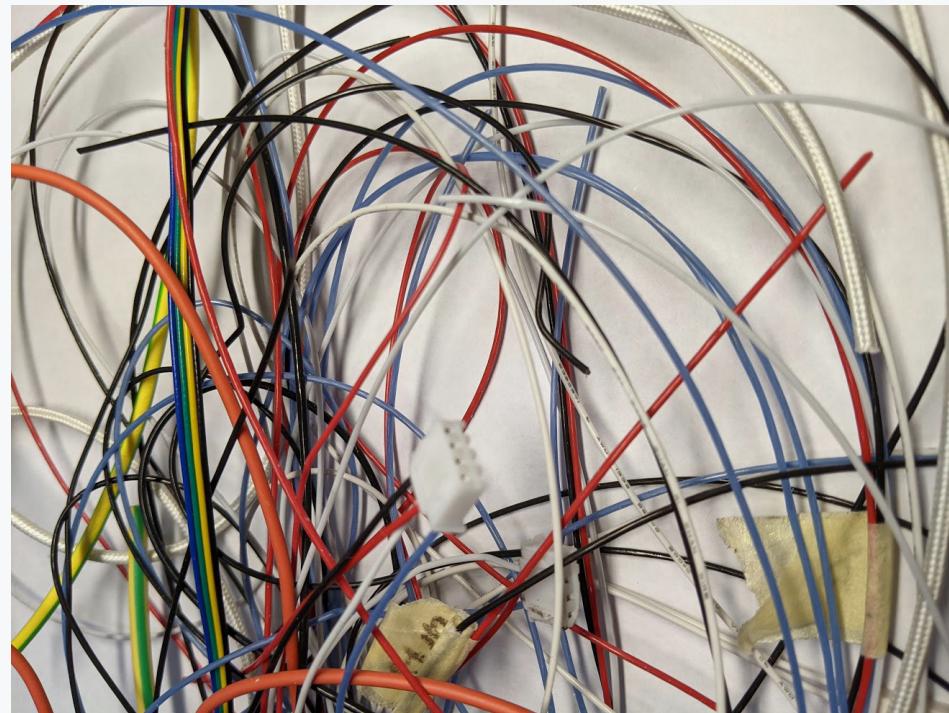


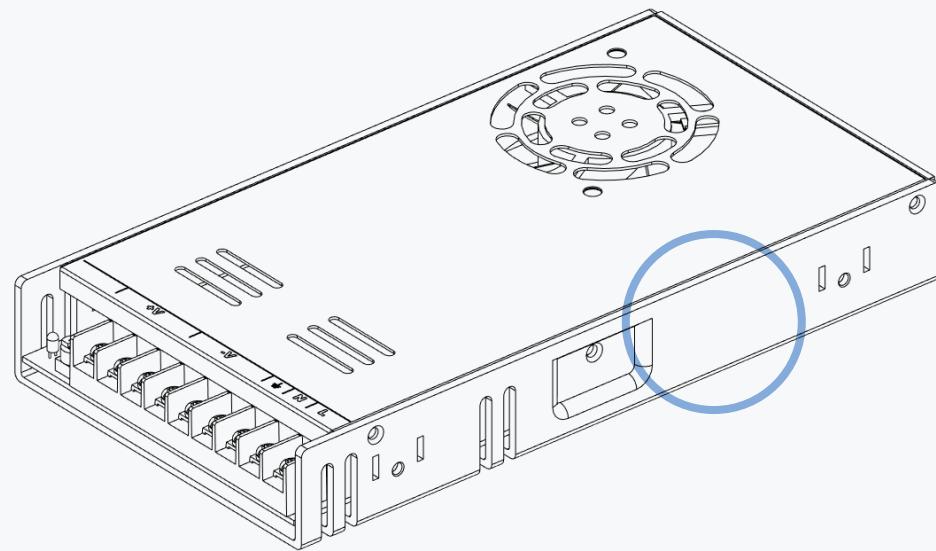
M3x12 SHCS





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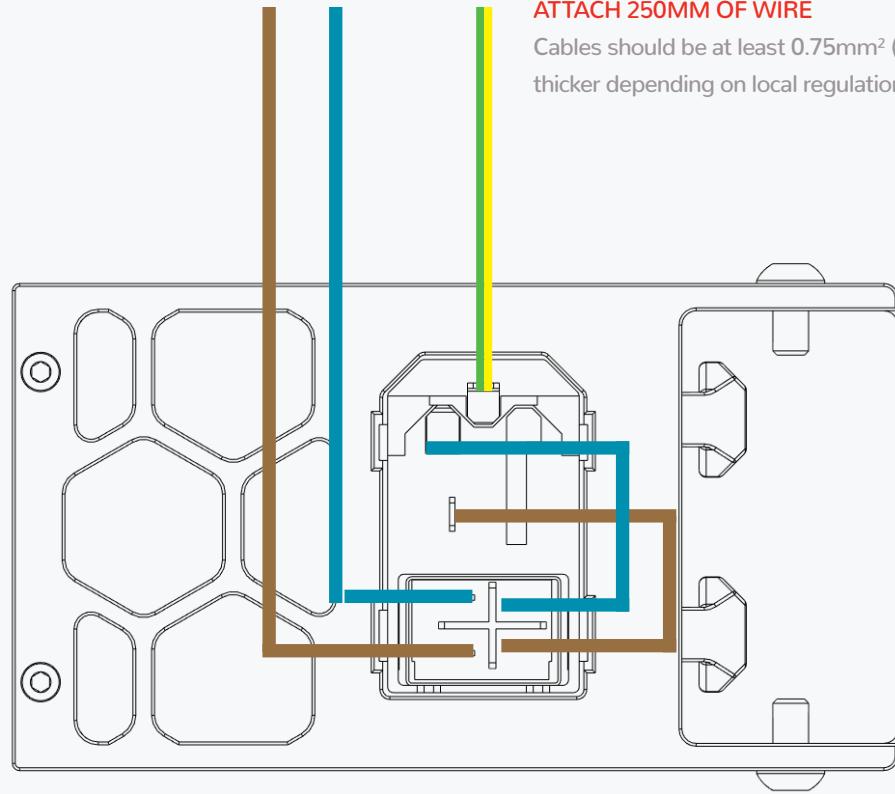




INPUT VOLTAGE SWITCH

Check the input voltage switch of the power supply. It is located in the highlighted area behind the metal mesh.

Make sure the selection matches your local mains voltage. Refer to the Mean Well LRS-350 datasheet for possible settings.



ATTACH 250MM OF WIRE

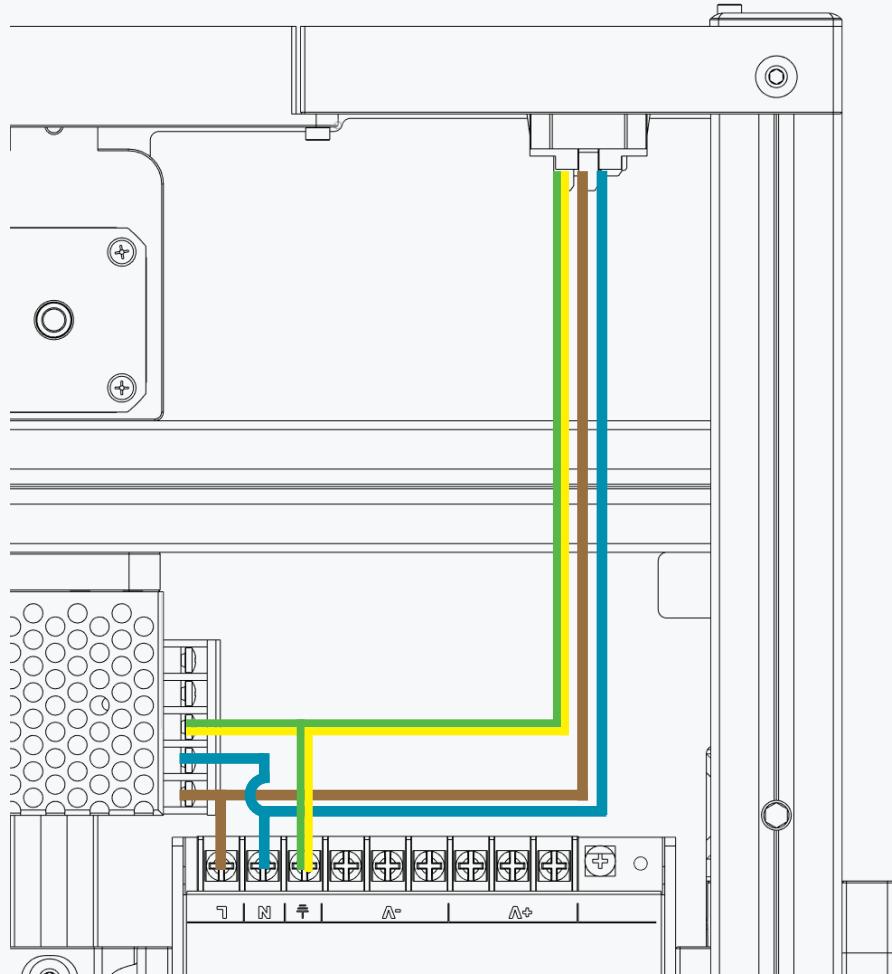
Cables should be at least 0.75mm^2 (AWG18) or thicker depending on local regulations.

MAINS INLET WIRING

We show the wiring in the IEC colour scheme. Depending on your region the colour scheme and wiring standards will differ.

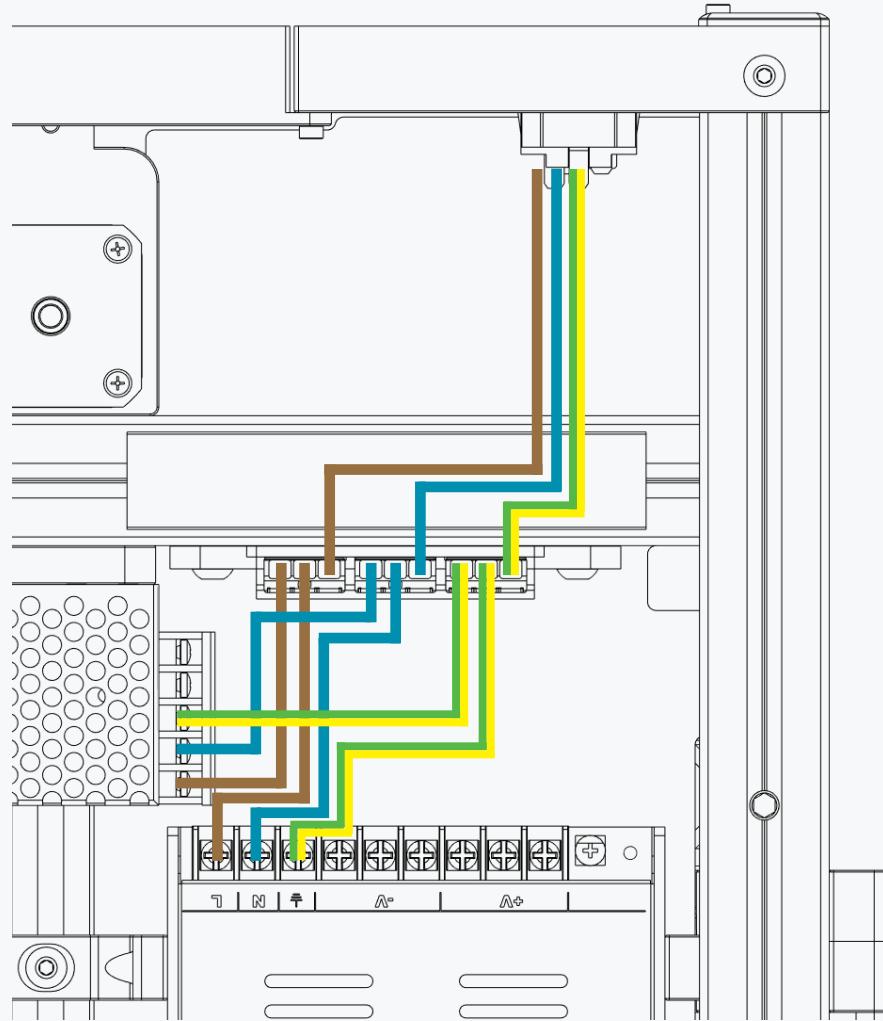
Mains wiring should only be done by qualified personnel trained in local regulations and safety standards.

Failure to observe those could result in bodily harm.

**MAINS WIRING CONTINUED**

Secure the wires with cable clips / cable tie anchors.

Observe your local regulations in regards to grounding the frame/other components.

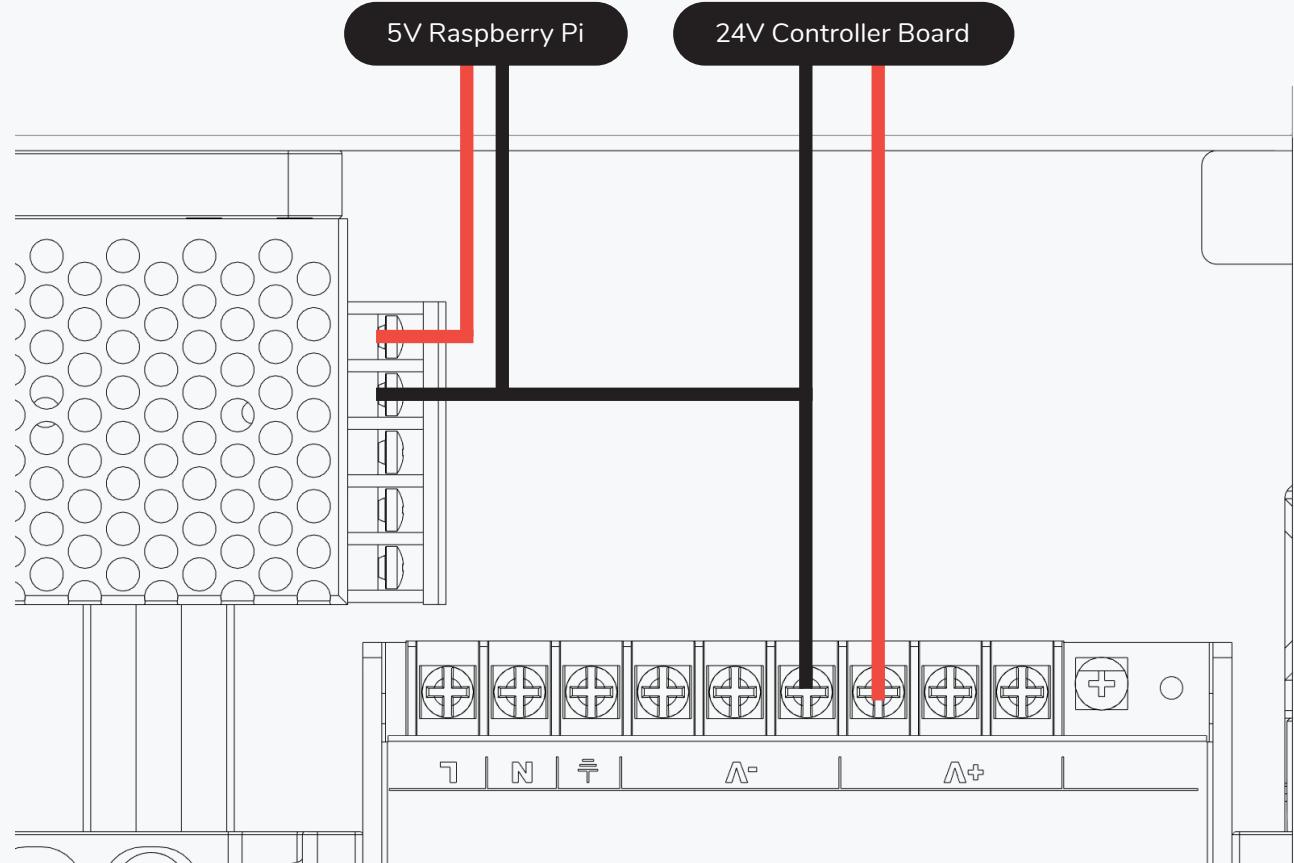


MAINS WIRING CONTINUED



Some vendors provide preprovisioned mains wiring components along.

Observe your local regulations in regards to grounding the frame/other components.

**CABLE CROSS SECTION**

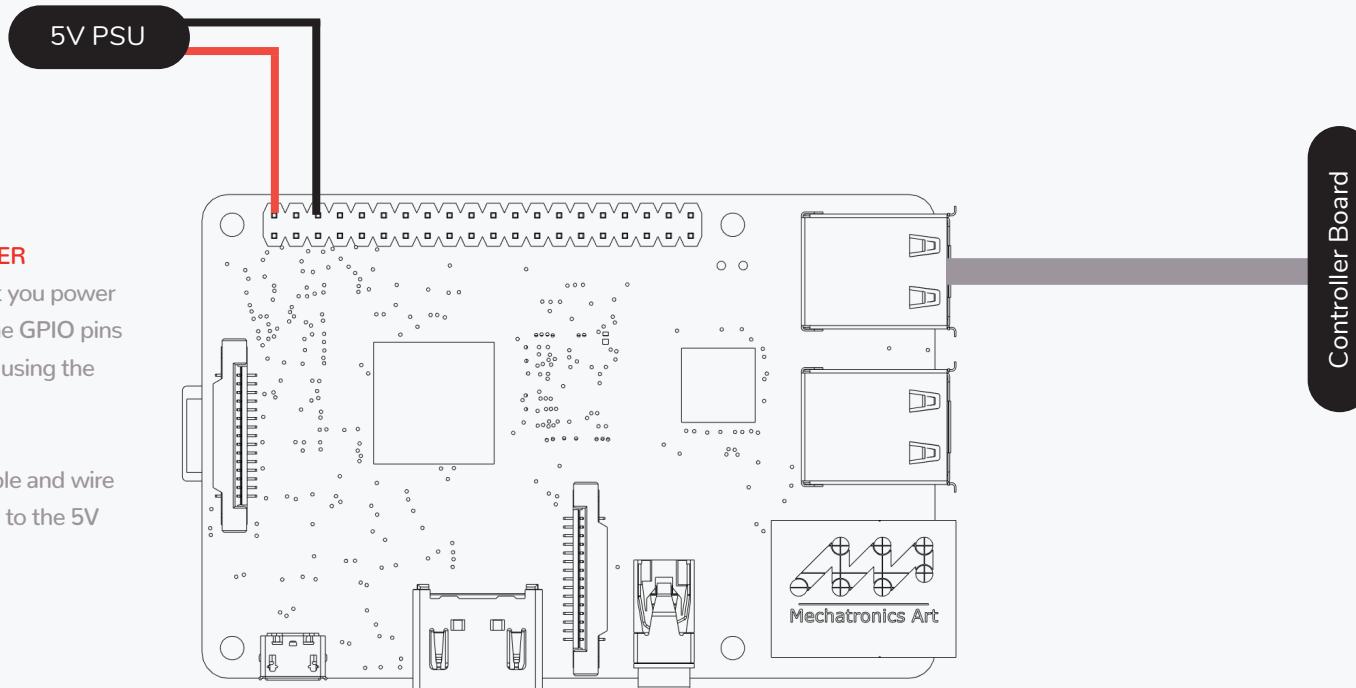
Cables to the controller board should be 2.5mm^2 (AWG14) or larger.

0.5mm^2 (AWG20) is sufficient for the connection to the Raspberry Pi.

RASPBERRY PI POWER

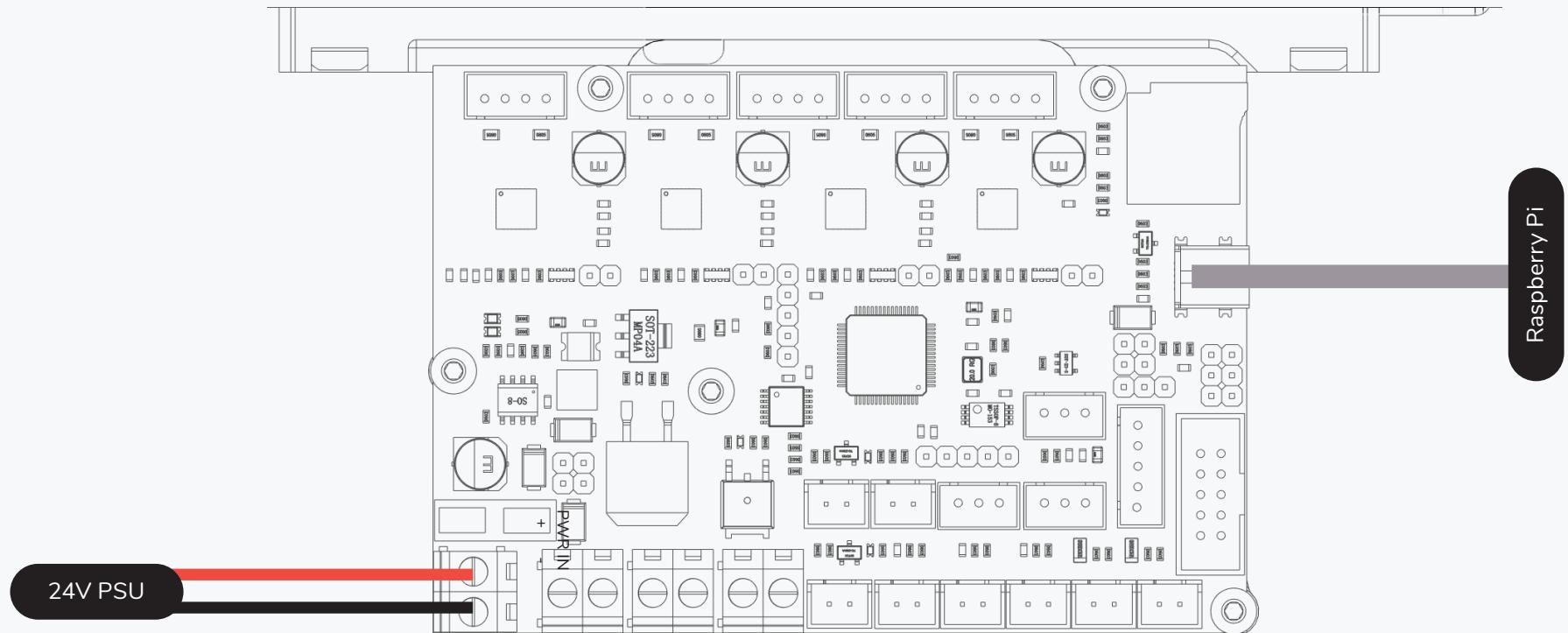
While we suggest that you power the Raspberry Pi via the GPIO pins you may also power it using the "Power-In" USB port.

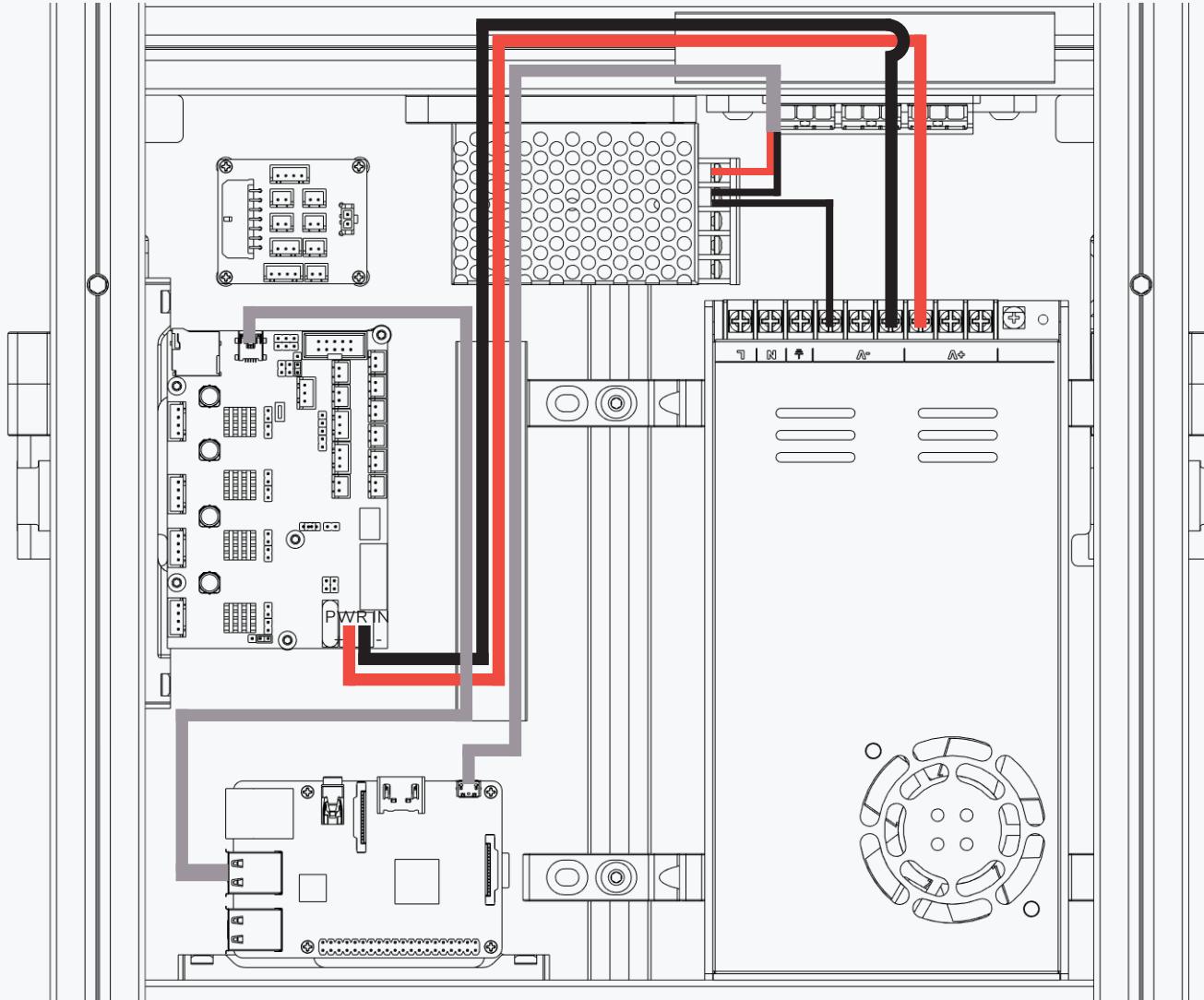
Cut a suitable USB cable and wire the + and ground lines to the 5V PSU instead.



CONTROLLER BOARD

The assembly manual will outline the wiring for a BTT SKR Mini E3 2.0. You can find additional documentation and alternative configurations on docs.vorondesign.com

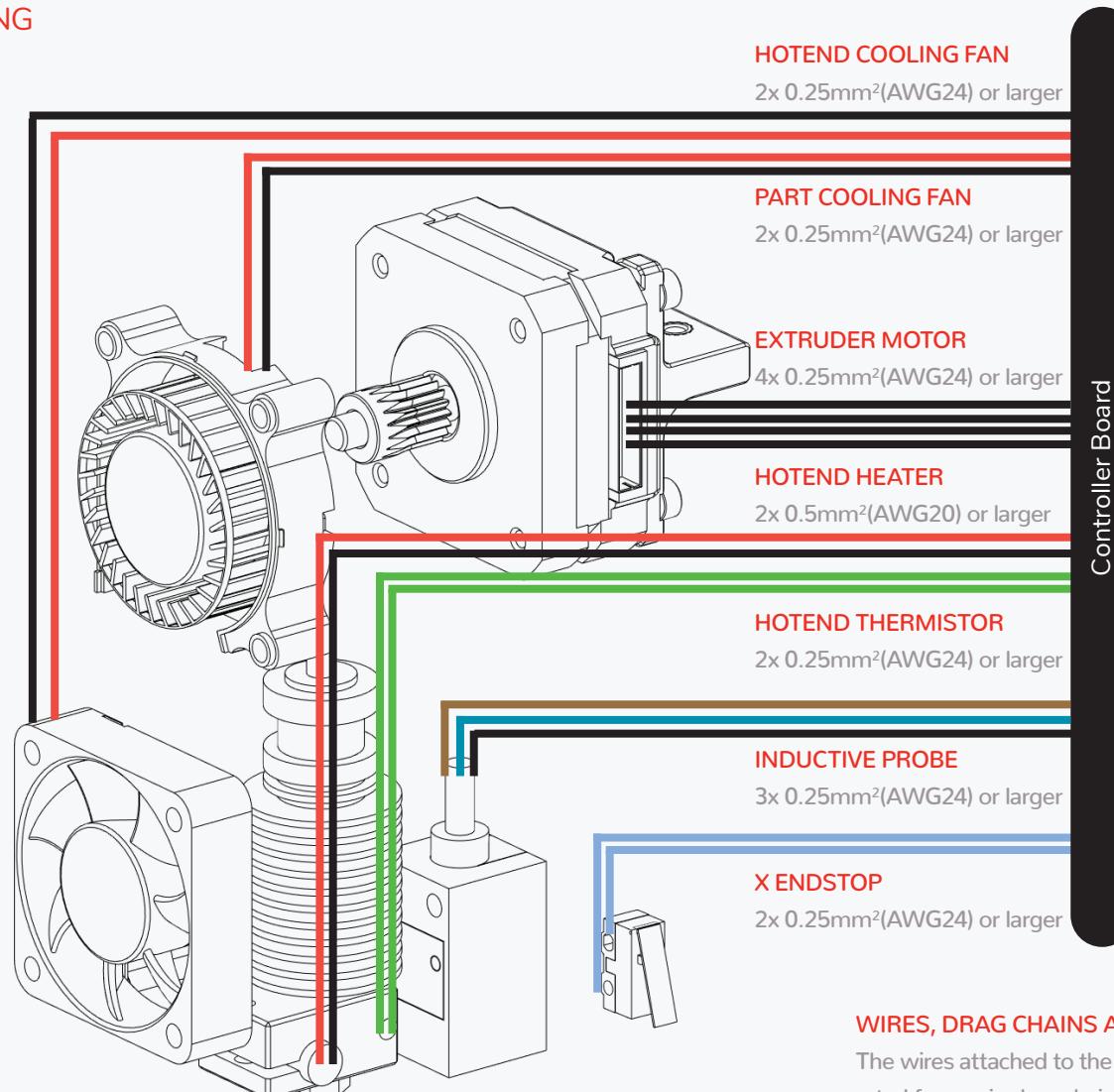




LDO MOTORS

PREMADE CABLES

Uptis velicatur sequam sunte
voloresed magnisit inhit,
ommodicia vit ad quis maio.

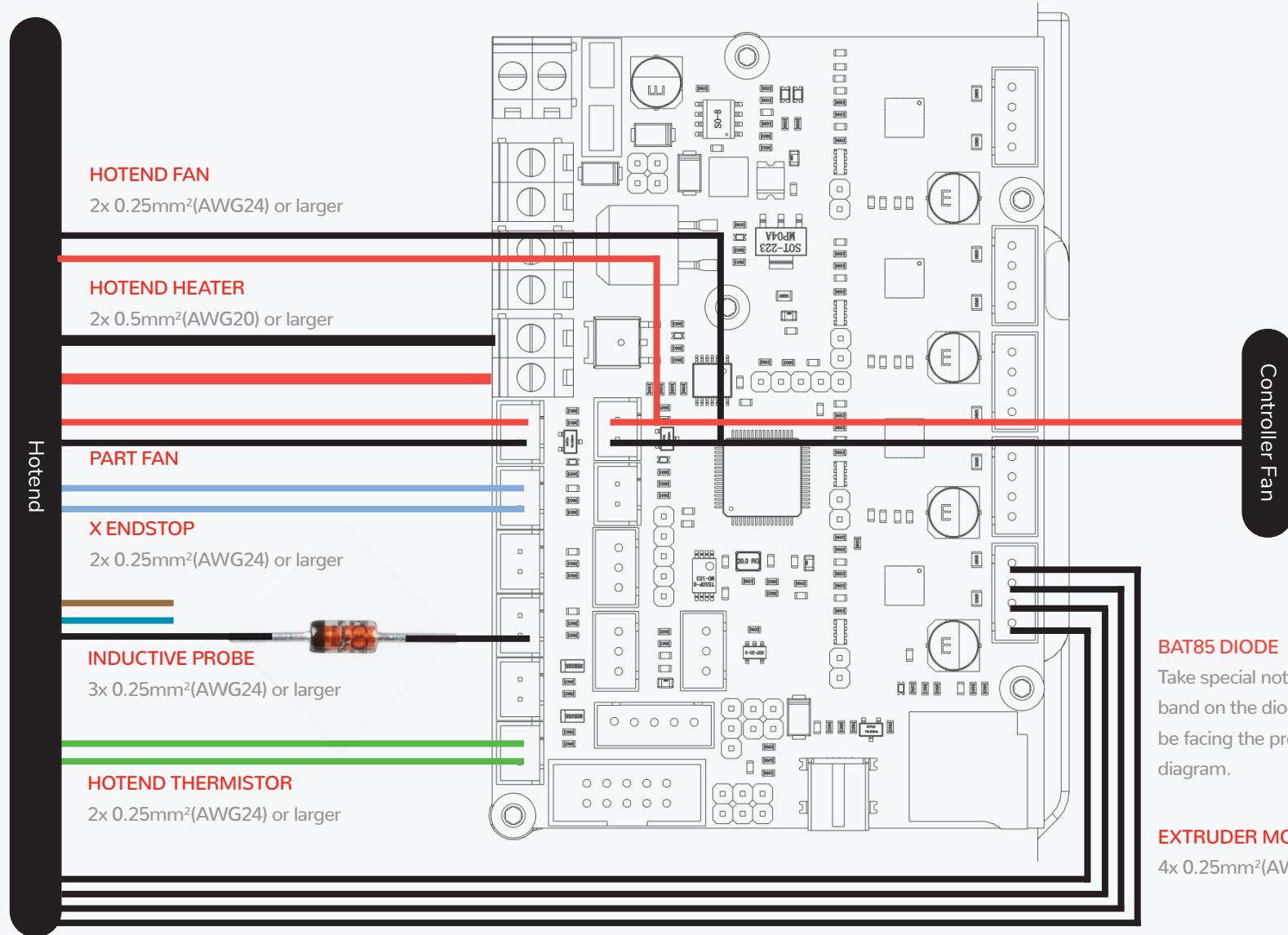
**OPTION: TOOLHEAD PCB**

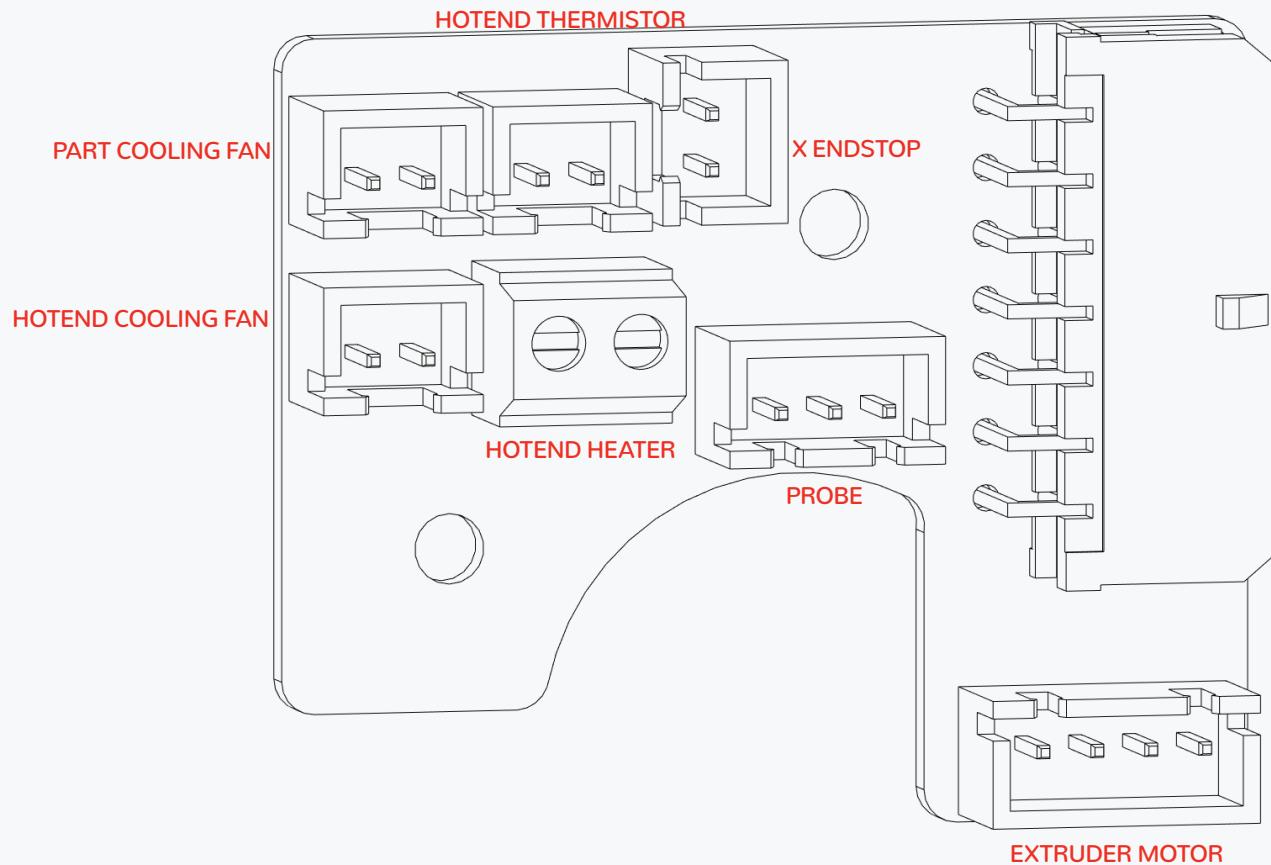
If you are planning to use a toolhead PCB skip forward to the toolhead PCB section.

WIRES, DRAG CHAINS AND CRIMPS

The wires attached to the probe, fans, heater, etc. are usually not rated for use in drag chains.

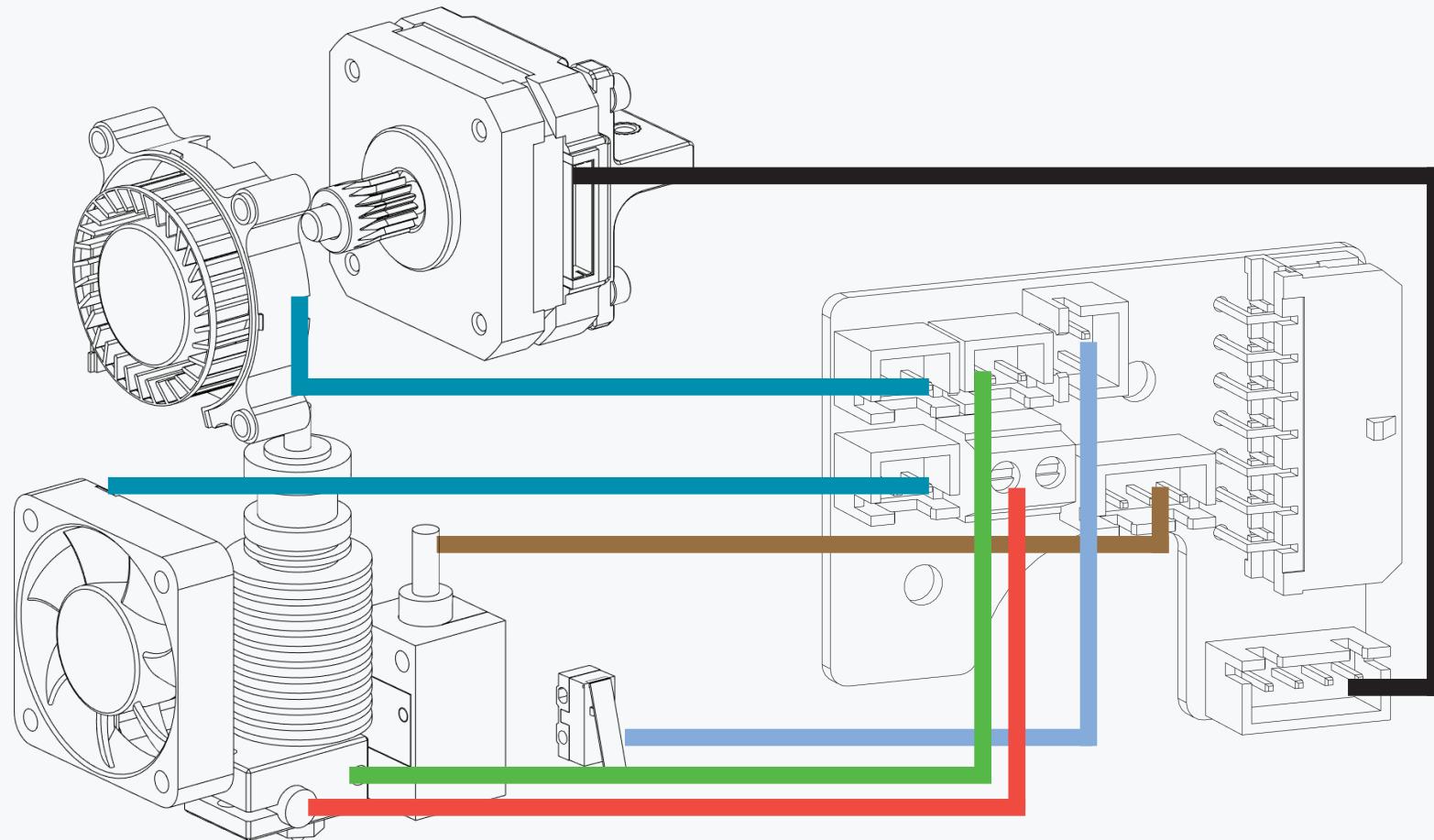
Add crimp connectors at the toolhead and run suitable wire down the drag chains. Refer to the sourcing guide for options.





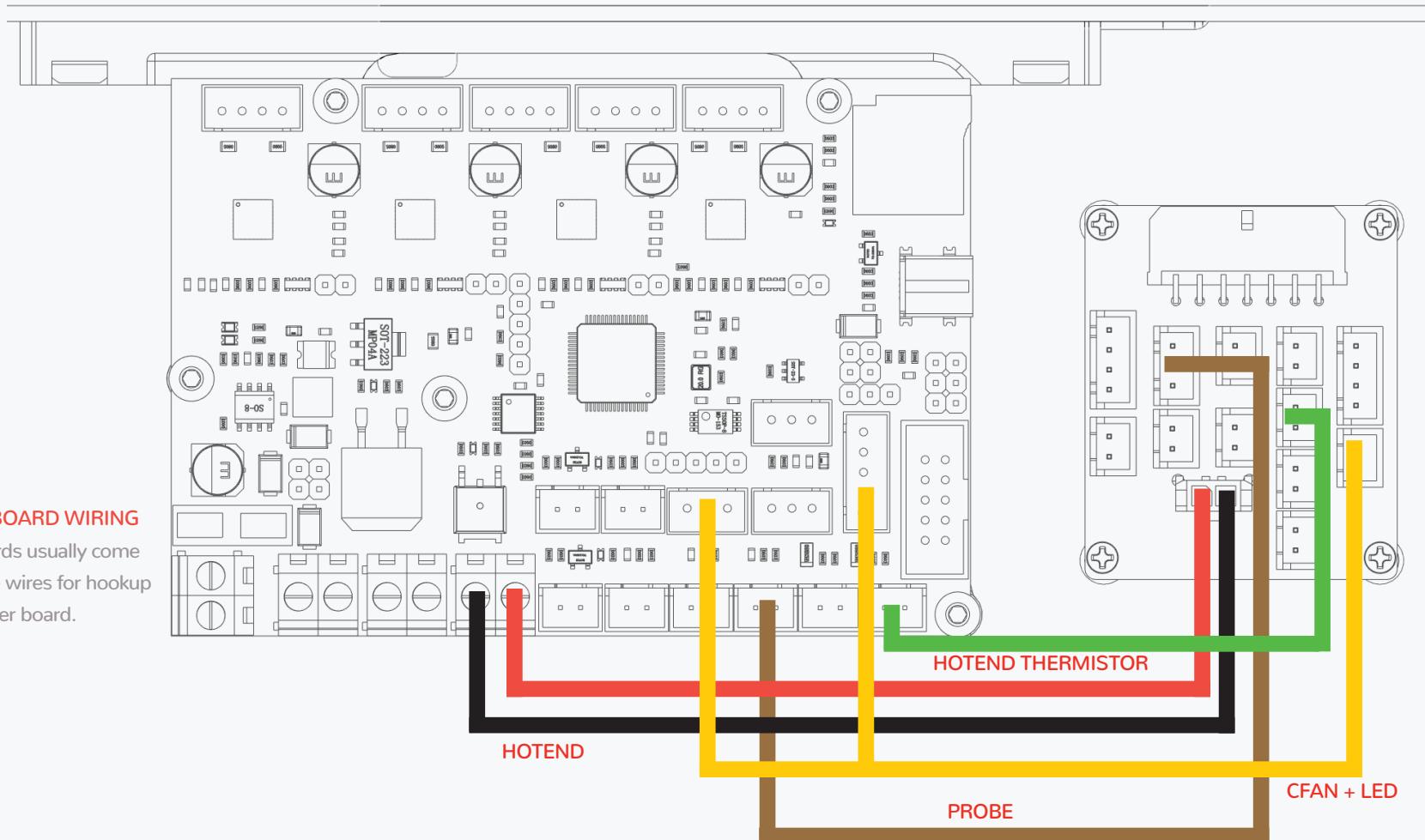
OPTION: TOOLHEAD PCB  LDO MOTORS
The layout of the toolhead pcb changed over the versions. For a full breakdown visit the link below.



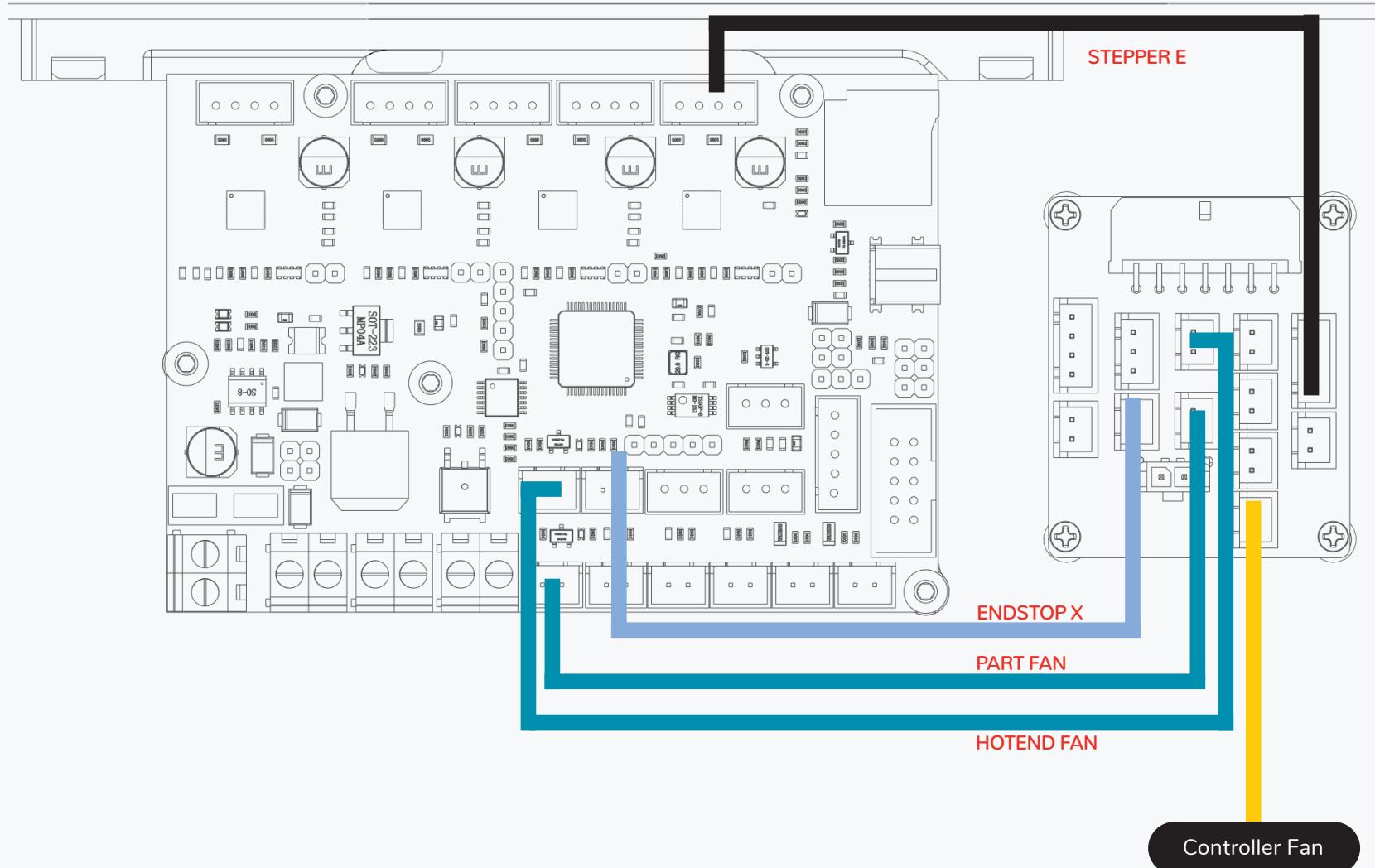


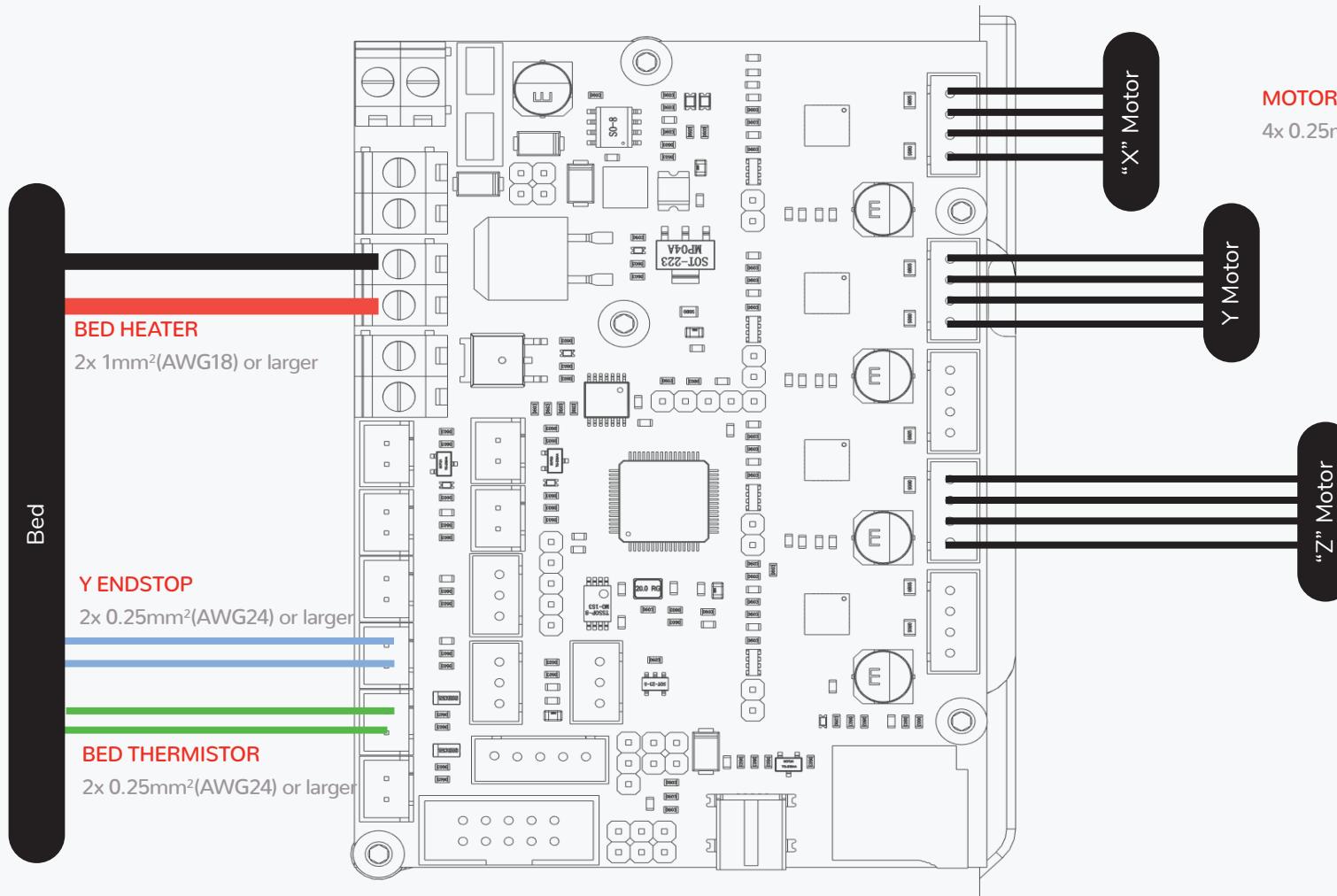
BREAKOUT BOARD WIRING

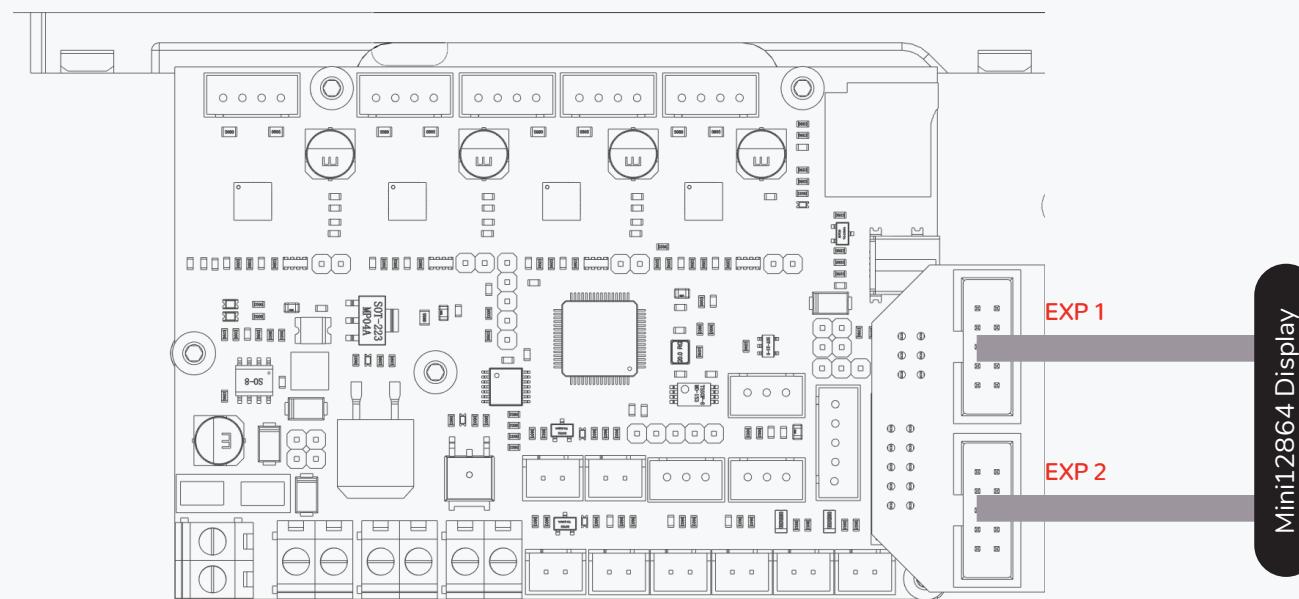
Breakout boards usually come with premade wires for hookup to the controller board.



CONTROLLER WIRING - TOOLHEAD PCB



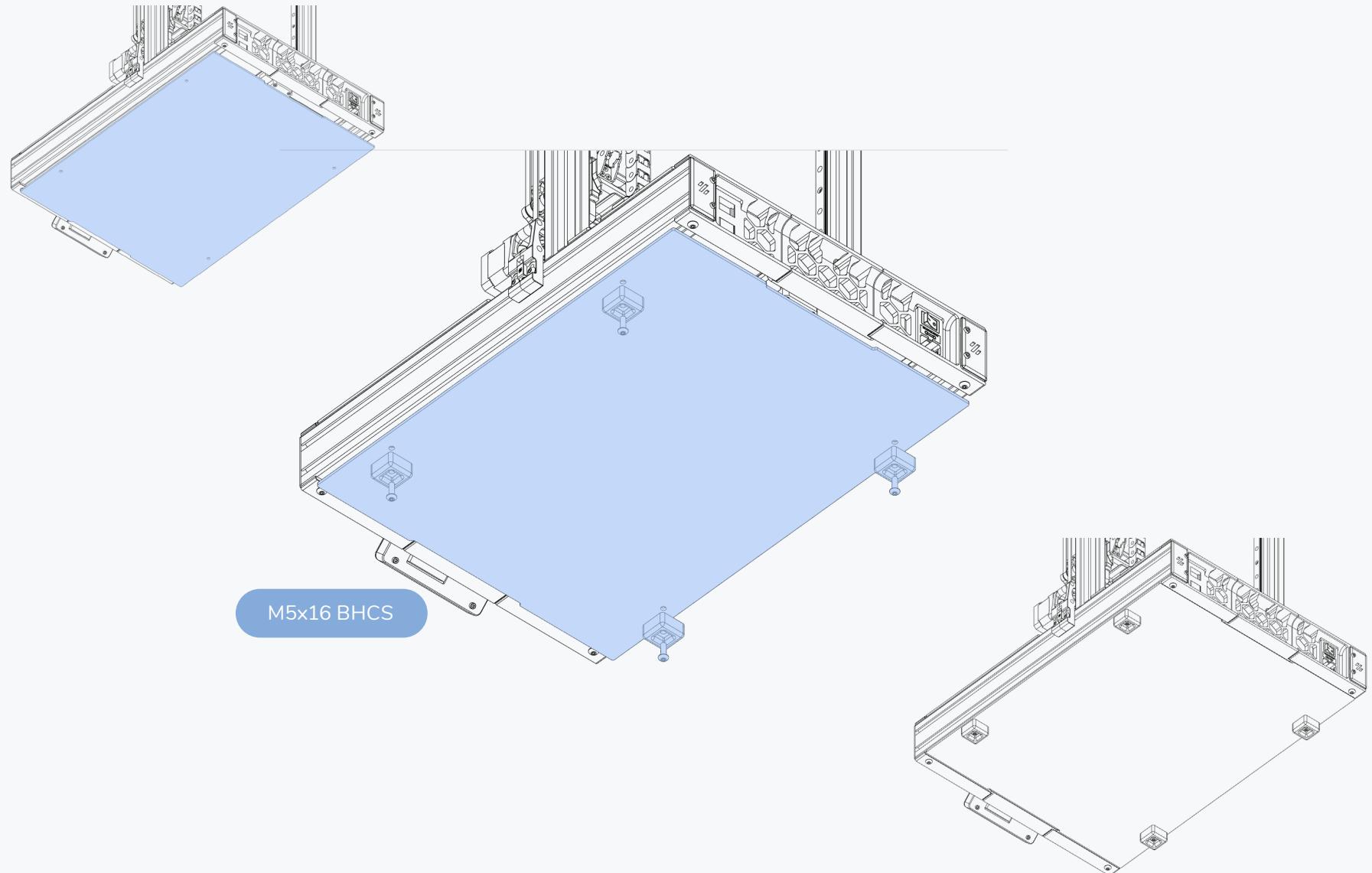




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BOTTOM PANEL

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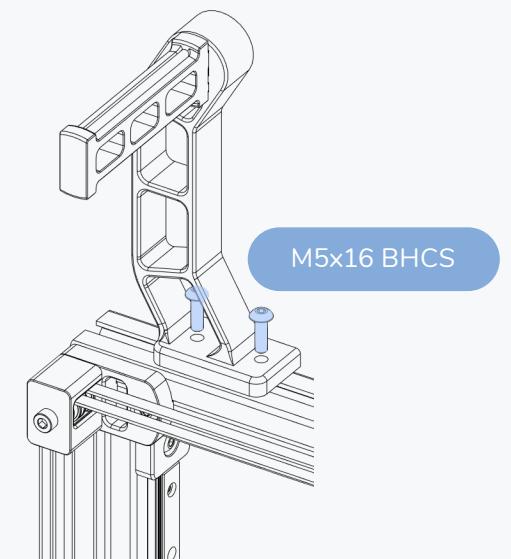
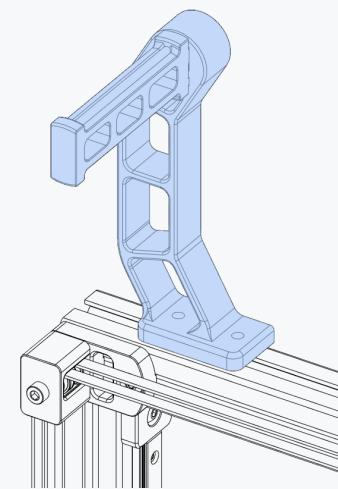
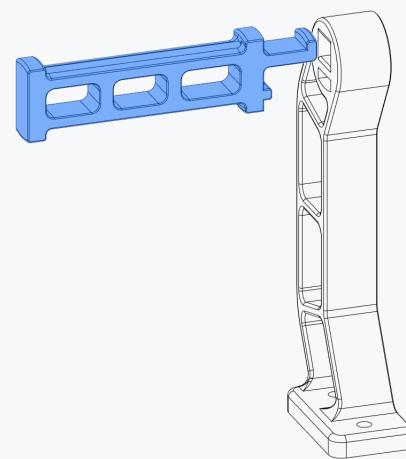
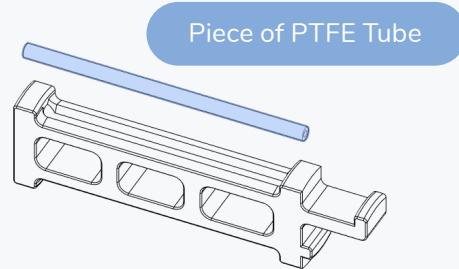
FINAL TOUCHES

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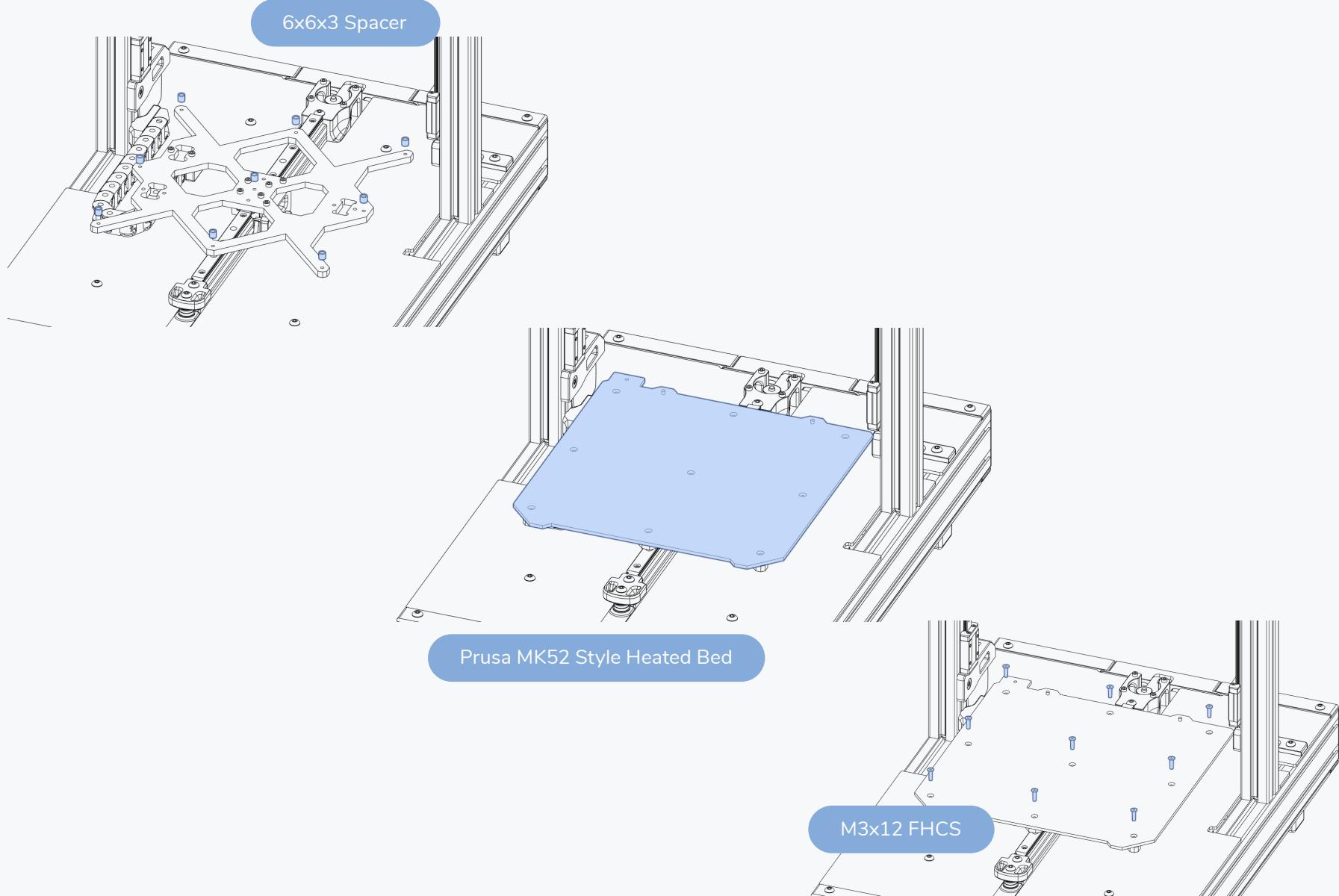
SPOOL HOLDER

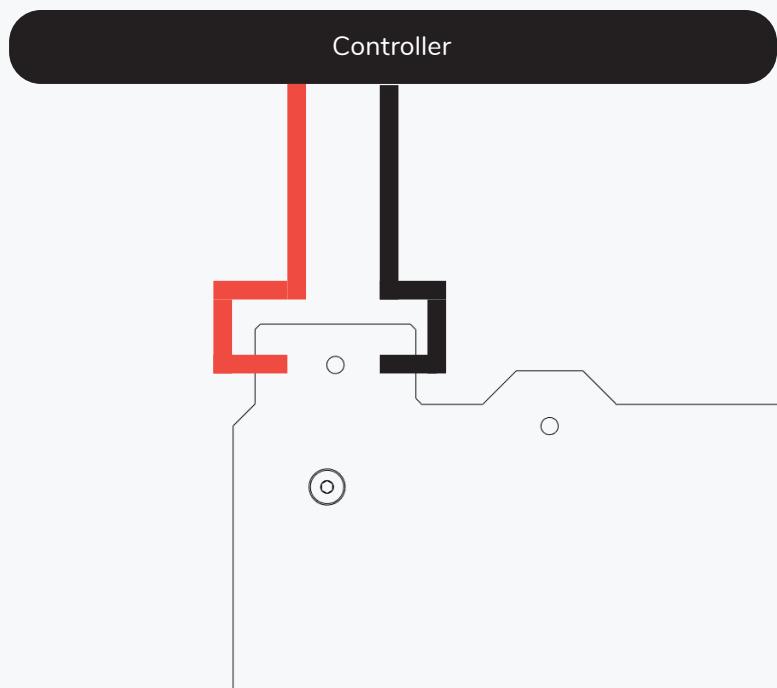
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HEATED BED

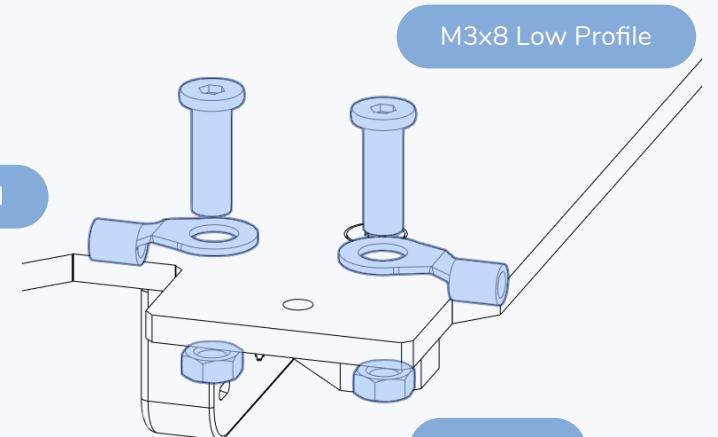
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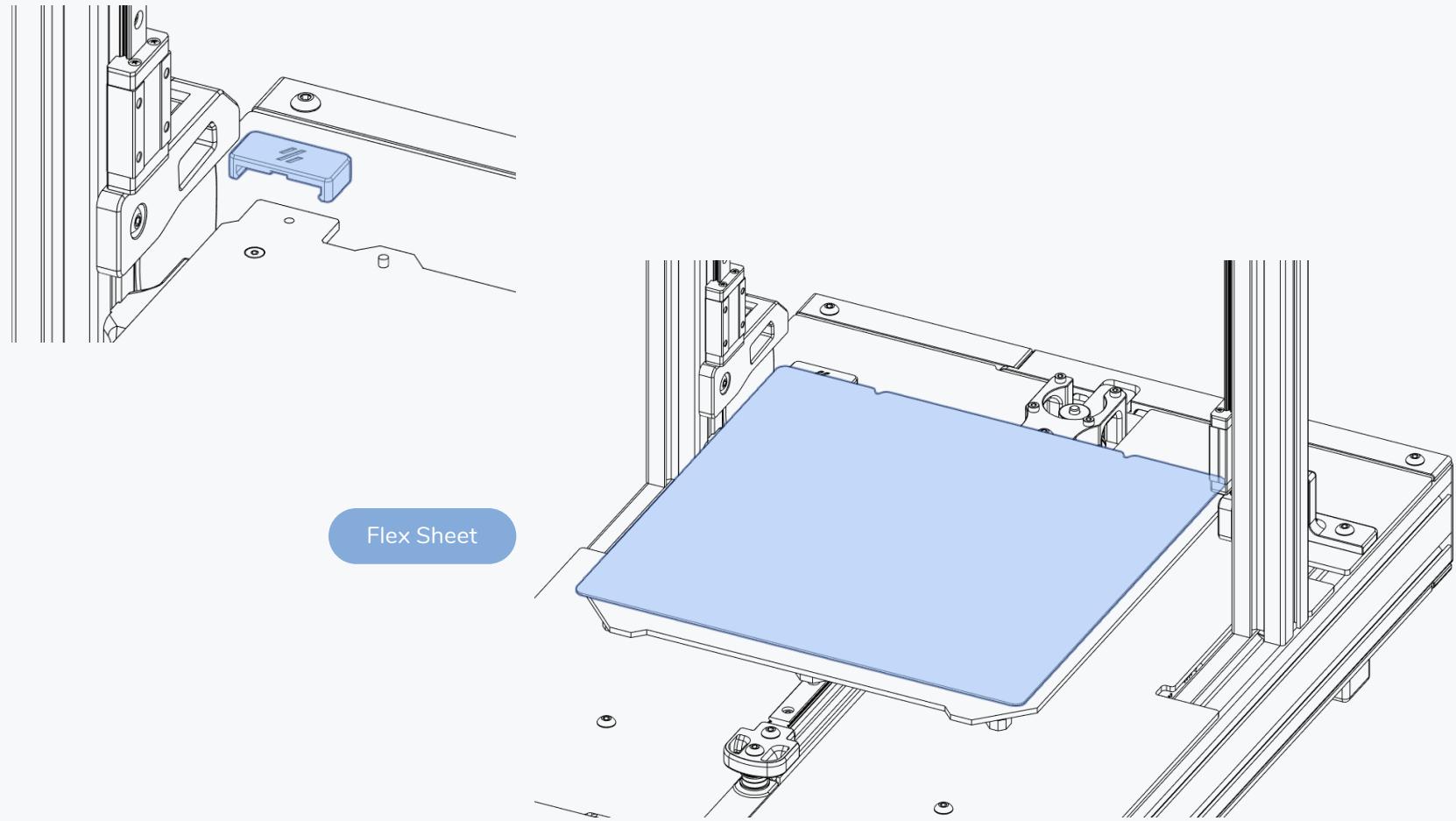


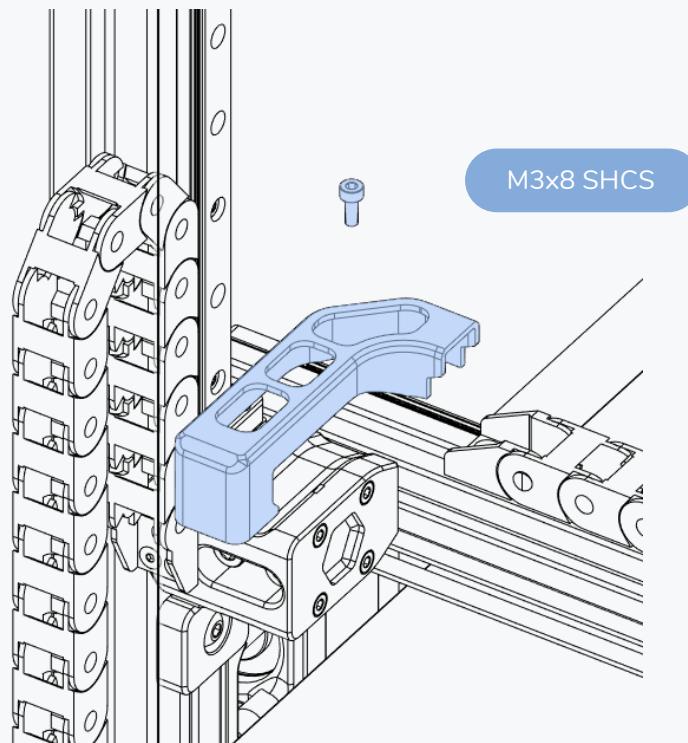
**BED HEATER WIRING**

Attach the cables for the bed heater from the sides. Use low profile bolts to secure the ring terminals to the heater.

Ring Terminal







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ASSEMBLY COMPLETED! ... NEXT STEP: SETUP & CALIBRATION

This manual is designed to be a simple reference manual for the build process.

For details on the setup of the electronics and other initial steps of your new printer please visit our documentation available on github and docs.vorondesign.com.



<https://docs.vorondesign.com/>



<https://github.com/VoronDesign/Voron-Switchwire>

HOW TO GET HELP

If you need assistance with your build, we're here to help. Head on over to our Discord group and post your questions. This is our primary medium to help VORON Users and we have a great community that can help you out if you get stuck.



<https://discord.gg/voron>



Website
www.vorondesign.com

Github
<https://github.com/vorondesign>

Discord
<https://discord.gg/voron>

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