VORON

M4 ASSEMBLY MANUAL

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

VERSION 2020-10-19

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

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

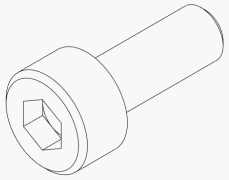
If you need assistance with your build, we're here to help. Head on over to our Discord group and post your questions. This is our primary medium to help VORON Users and we have a great community that can help you out if you get stuck.

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.

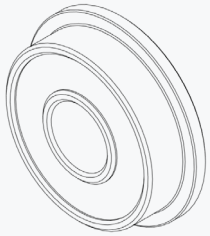
https://github.com/vorondesign



SOCKET HEAD CAP SCREW (SHCS)

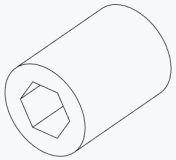
Metric fastener with a cylindrical head and hex drive. The most common fastener used on the Voron.

ISO 4762



F695 BEARING

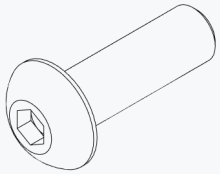
A ball bearing with a flange used in various gantry locations.



GRUB SCREW

Small headless screw with an internal drive.

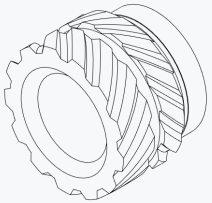
ISO 4026



BUTTON HEAD CAP SCREW (BHCS)

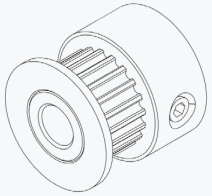
Metric fastener with a domed shape head and hex drive. Most commonly found in locations where M5 fasteners are used.

ISO 7380-1



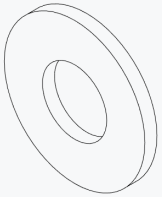
HEAT SET INSERT

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.



PULLEY

GT2 pulley used on the motion system of the Voron.

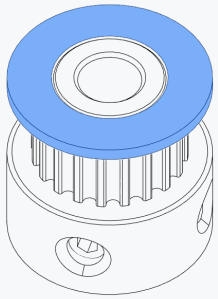


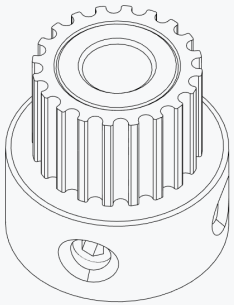
WASHER

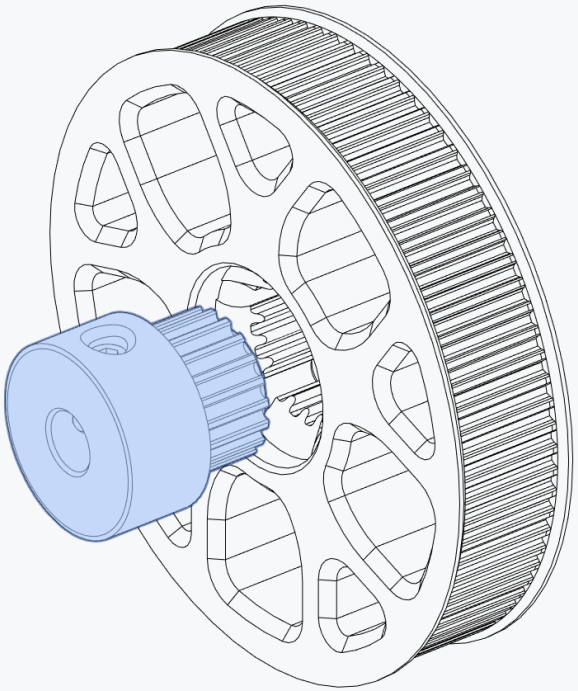
Small metal disc to increase the surface area.

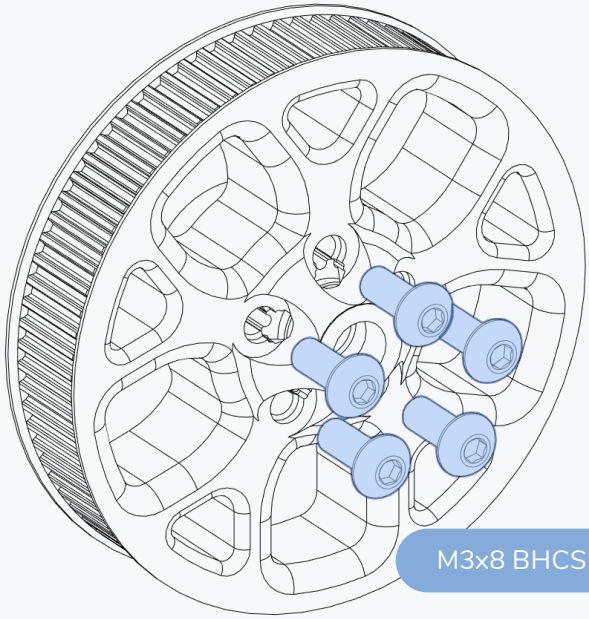
DIN 988

GT2 Pulley





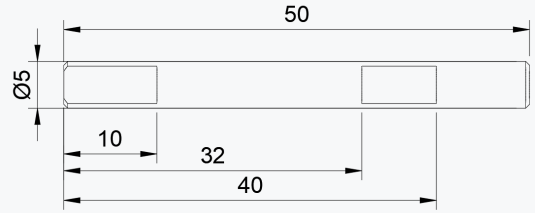




M3x8 BHCS

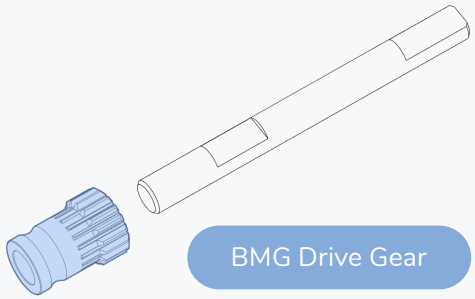
REMOVE FLANGE

Use a bottle opener or some pliers to remove the top flange.



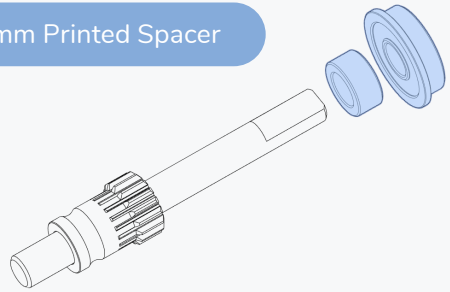
5x50mm Shaft w/ Flats

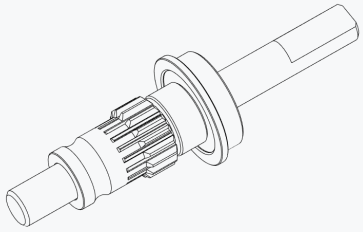
F695 Bearing



BMG Drive Gear

4mm Printed Spacer





FLAT FACE ON THE SHAFT

Align the flat face of the shaft with the grub screw of the drive gear. If your shaft is fully round make a small flat spot with a file to ensure proper seating.

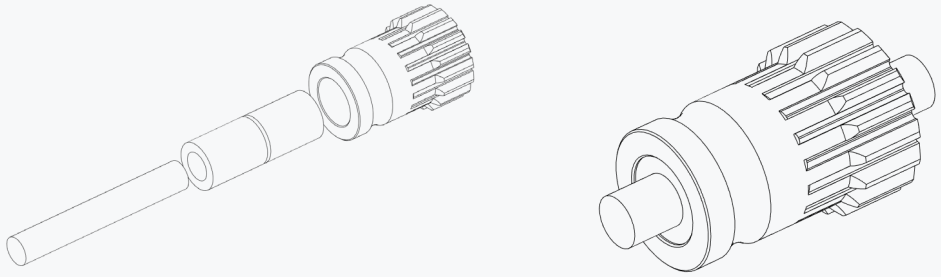
DRIVE GEAR POSITION

Position the drive gear 8mm from the end of the shaft and tighten the grub screw.
Use thread locker.

CHECK BEARING FIT

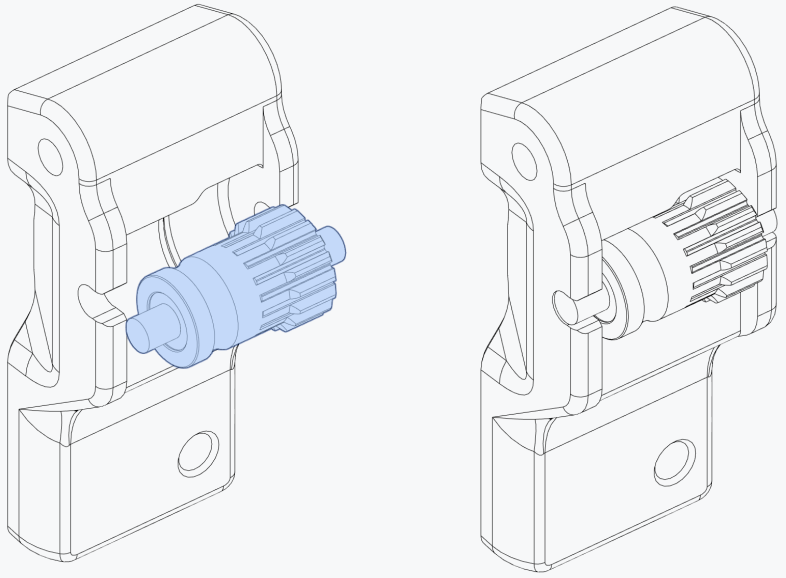
The bearings must slip on and off the shaft easily. Pressing the bearings on the shaft will damage them. Lightly sand the shaft if required.

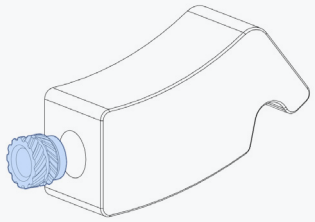
BMG Idler Assembly



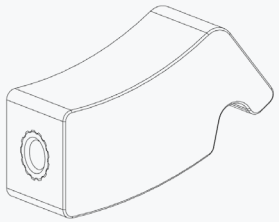
LUBRICATE BEARINGS

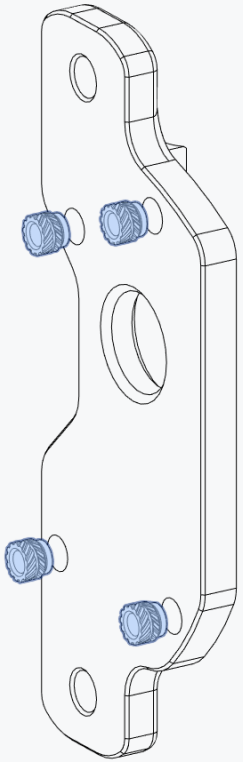
A light lubrication film will help with smooth operation and longevity.

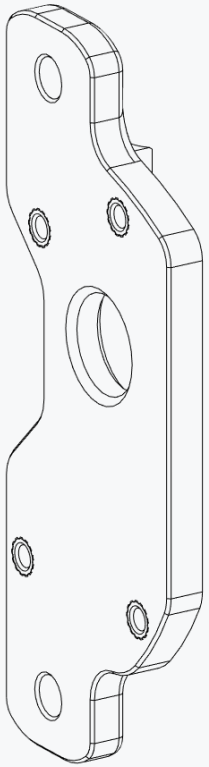


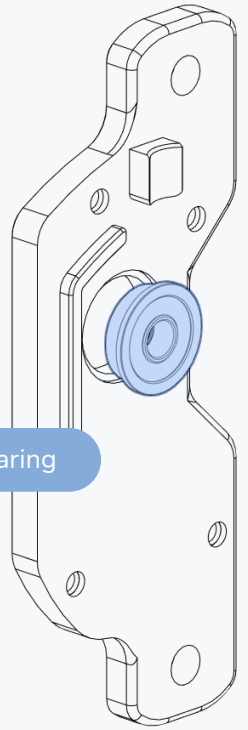


Heat Set Insert





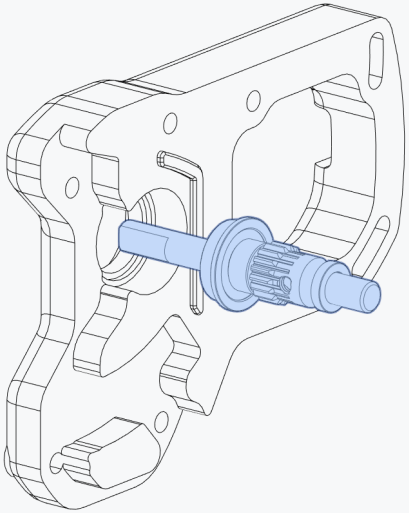


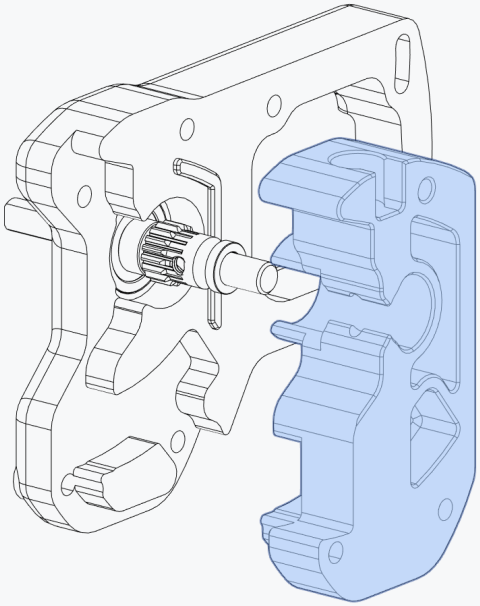


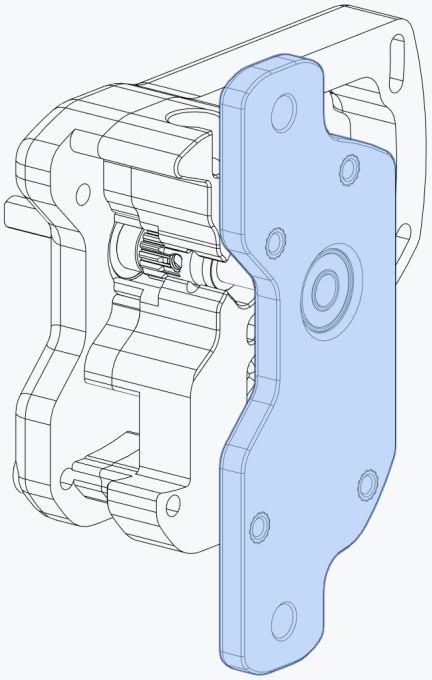
F695 Bearing

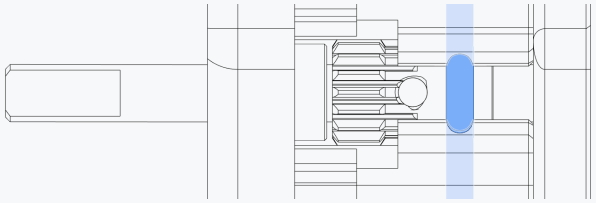
HEAT SET INSERTS

You will need to install heat set inserts into the tension arms. If you need help on the correct procedure, ask in Discord.





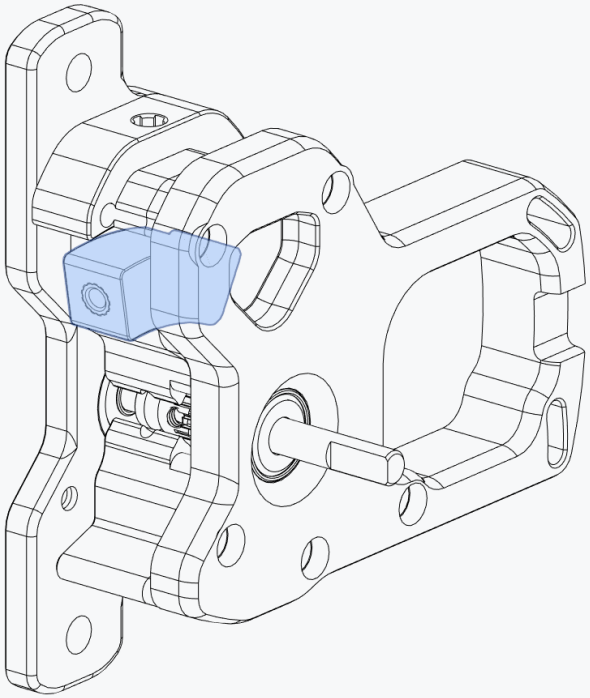


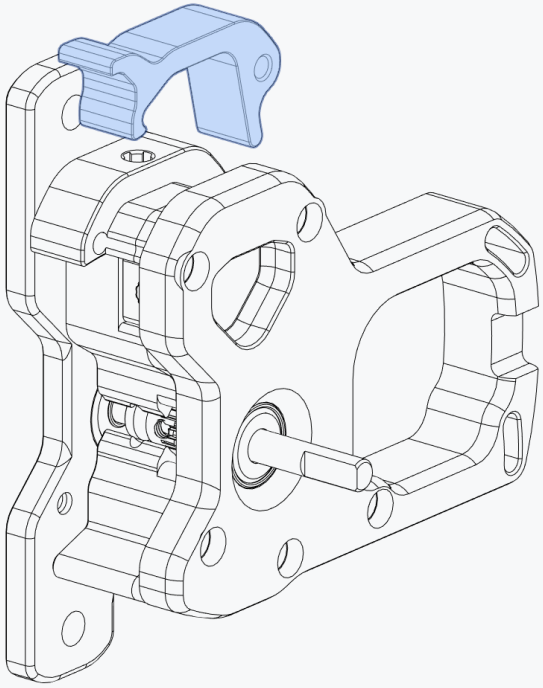


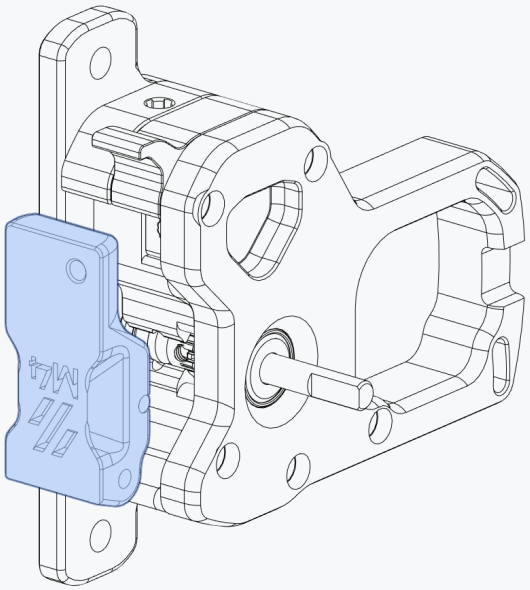
CHECK ALIGNMENT

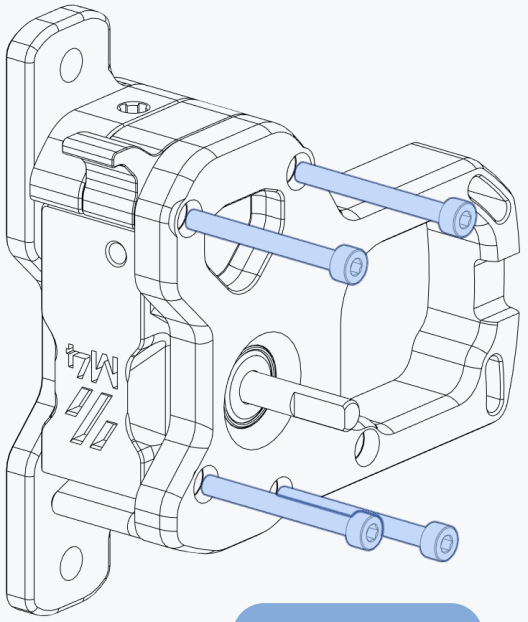
The hobbed section of the drive gear must be aligned with the filament path. There is a small amount of play to allow for self adjustment.

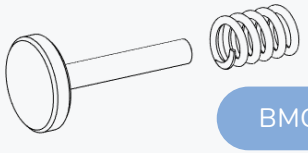
Correct the gears position if required.



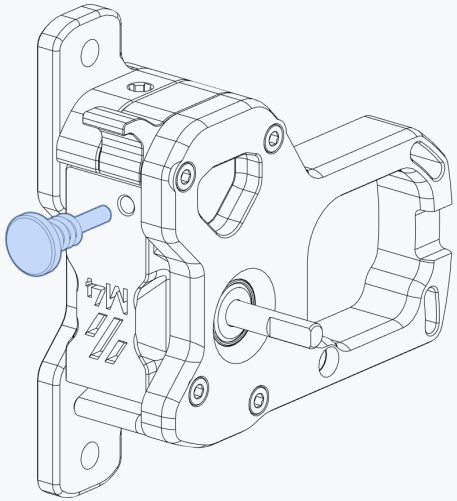




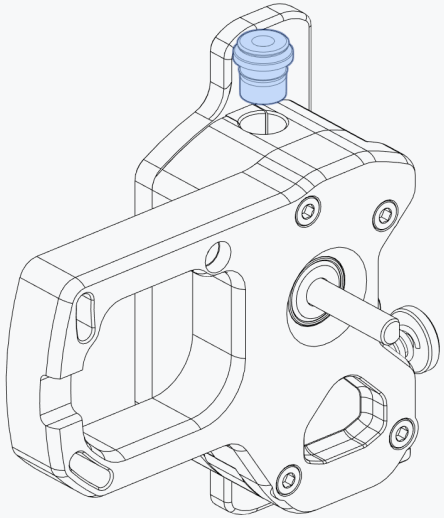

M3x30 SHCS

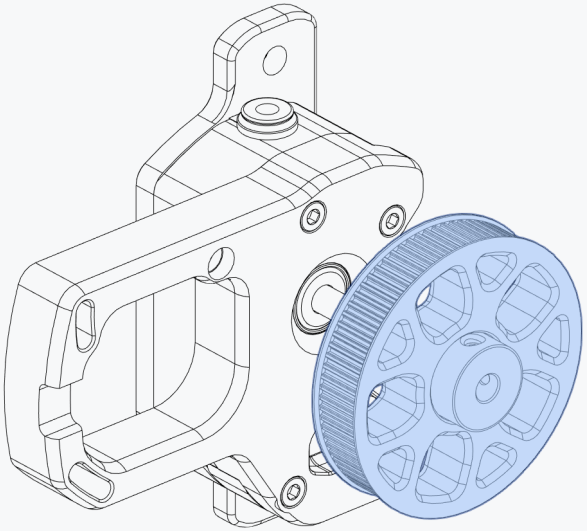


BMG Thumb Screw



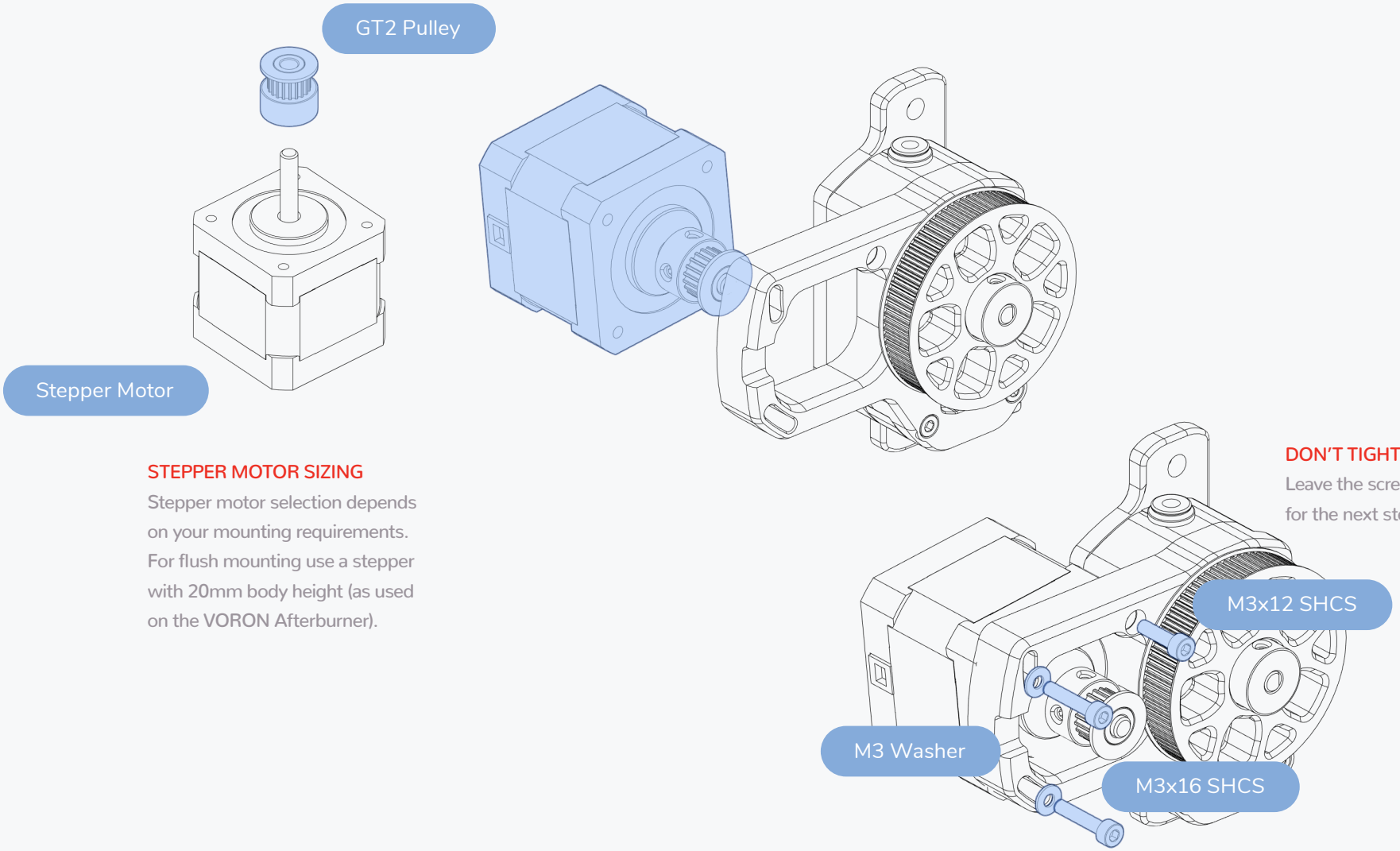
ECAS04 Bowden Collet





GRUB SCREWS

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.

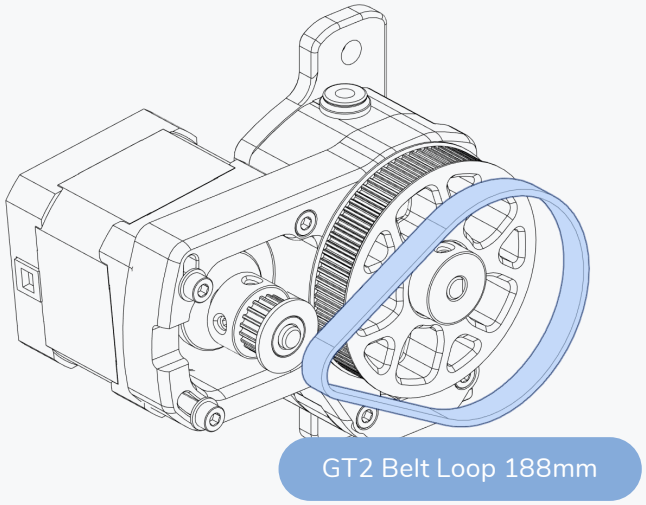


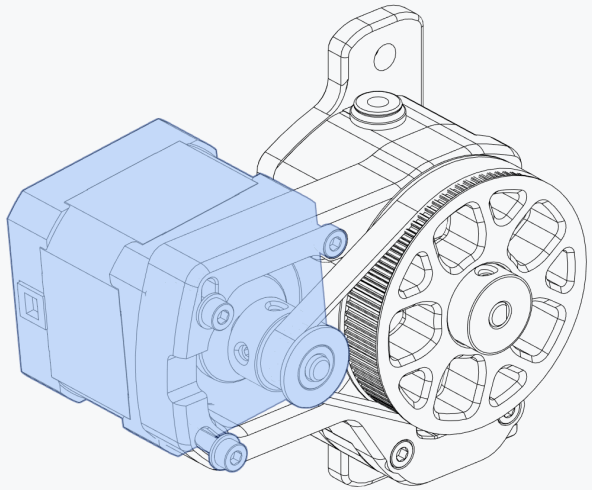
STEPPER MOTOR SIZING

Stepper motor selection depends on your mounting requirements. For flush mounting use a stepper with 20mm body height (as used on the VORON Afterburner).

DON'T TIGHTEN

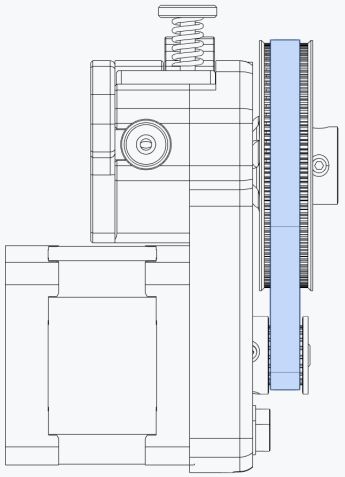
Leave the screws slightly loose for the next step.





ROTATE STEPPER TO TIGHTEN

Fasten the screws after applying a light pressure to tighten the belt.



CHECK ALIGNMENT

Adjust the position of the pulley on the stepper if required. Belt must not rub on the flanges.

Website
www.vorondesign.com

Github
https://github.com/vorondesign

Discord
https://discord.gg/voron