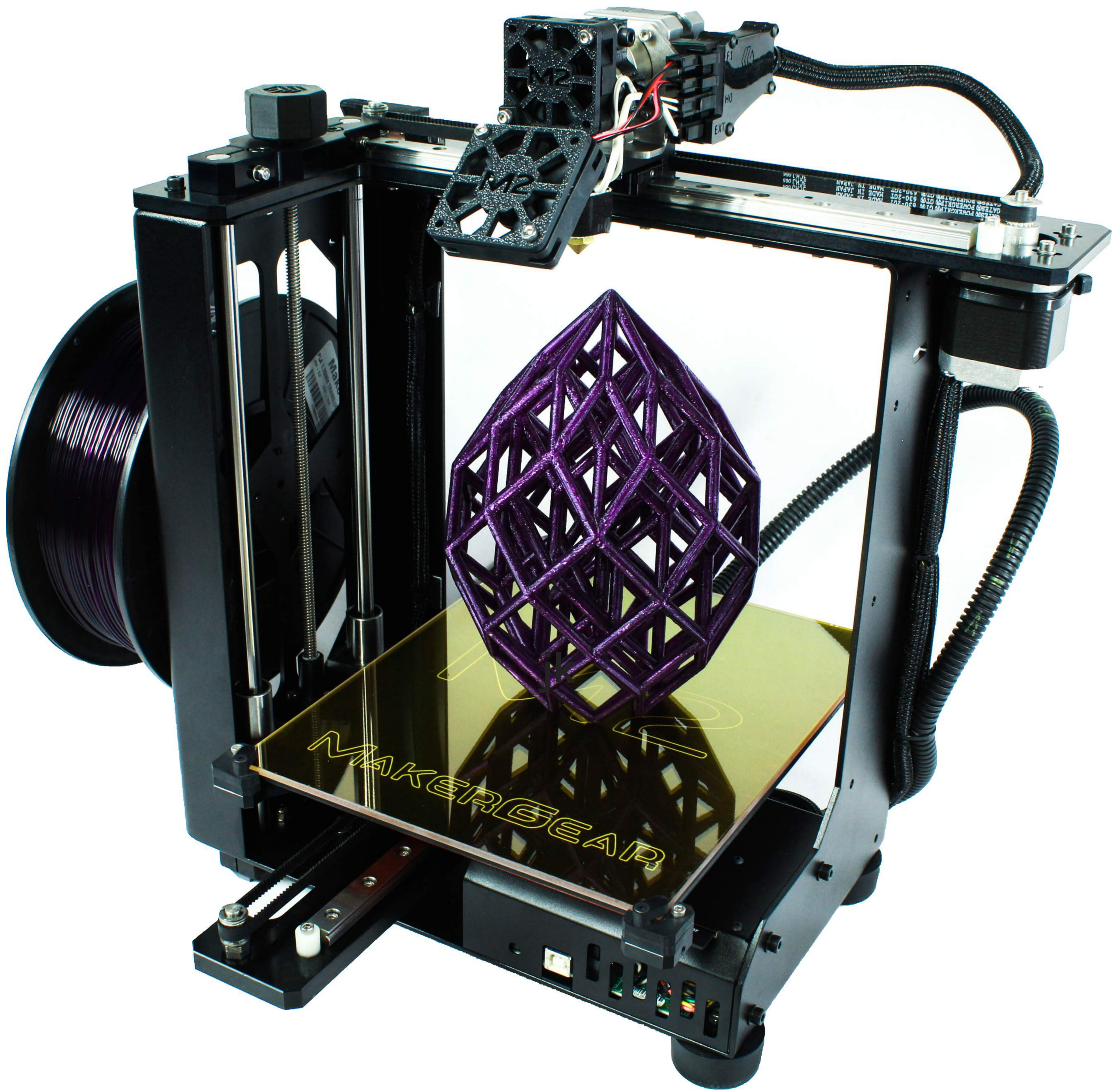


# MAKERGEAR



USER GUIDE



# M2

V4 REV. E

MADE IN THE USA SINCE 2009

# Contents

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- 4 - What's Included
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# WELCOME



Your MakerGear M2 3D Printer has arrived!

To ensure both safety and high quality printing, carefully follow the Set Up instructions included in this booklet. This machine was assembled and tested at the MakerGear shop in Beachwood, Ohio, USA and was fully operational at the time that it was shipped, as demonstrated by the sample objects included with your M2—these were printed on your machine before shipping.

This booklet can also be found on the MakerGear website at [www.makergear.com/pages/m2-assembled](http://www.makergear.com/pages/m2-assembled), where you can also access more specific instructions and resources. For additional assistance, you can always visit our support page at [www.makergear.com/pages/support](http://www.makergear.com/pages/support).



PLEASE

READ ALL INSTRUCTIONS  
CAREFULLY BEFORE  
PRINTING!



SAFETY FIRST,  
INSTRUCTIONS SECOND!

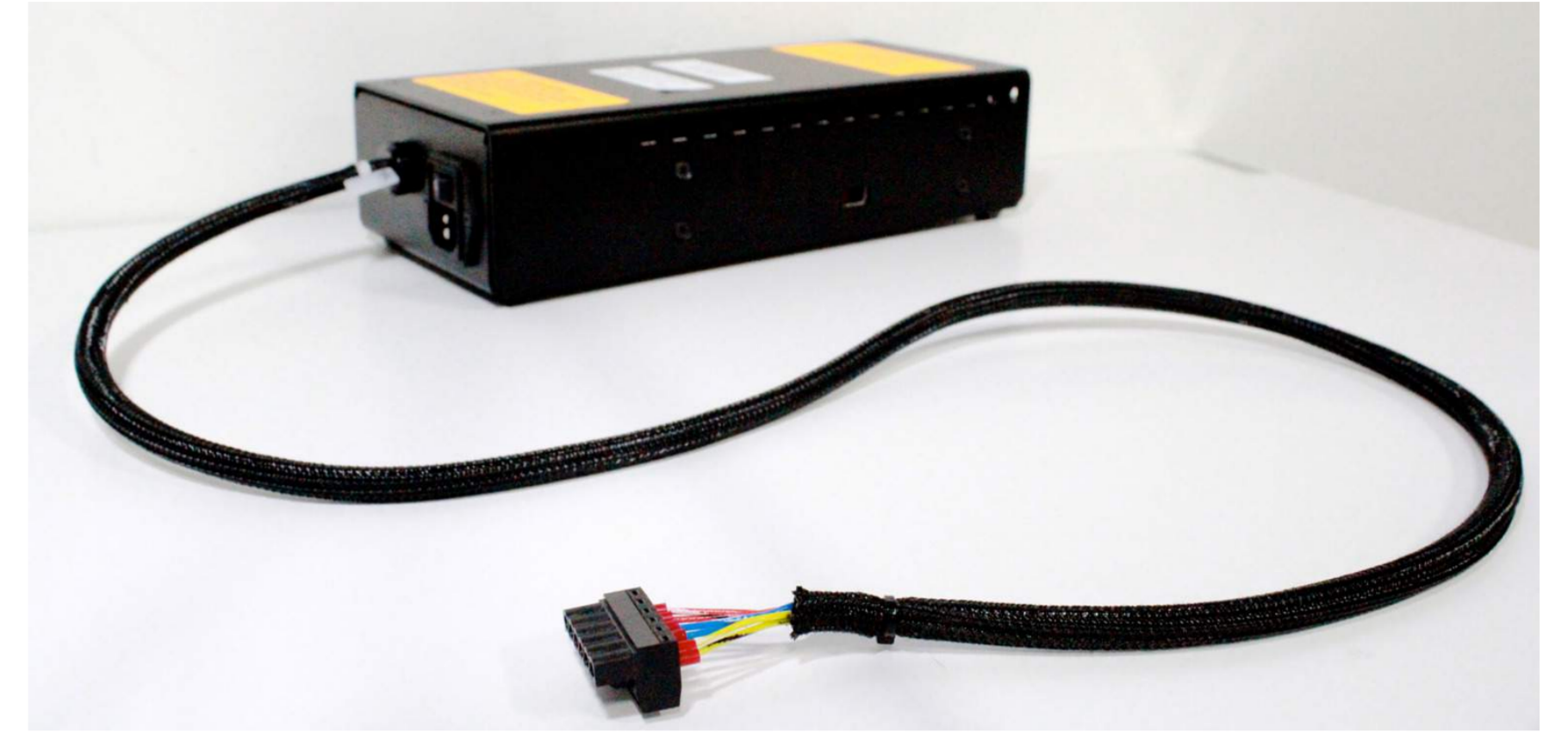
# Important Safeguards

1. To protect against electrical shock, do not put the machine body, cord or electrical plug in liquid. If your printer falls into liquid, do not touch it. Instead, unplug the unit, then remove it immediately. Do not reach into the liquid without unplugging the unit first.
2. This machine should not be used by children unless supervised by an adult who understands the risks and precautions involved in using this machine. To avoid potential injuries, close supervision is necessary when unit is used by or near children.
3. Unplug power cord from outlet when not in use. To unplug, grasp the plug and firmly pull it from electrical outlet. You should not ever pull the cord.
4. Avoid any contact with moving parts.
5. Keep hands/hair/clothing away from attachments of printer while the unit is operating to reduce risk of injury to persons, and/or damage to the unit.
6. Do not operate your unit if: damaged cord/plug, malfunctioning, dropped or damaged in any way, or not operating properly.

# What's Included



Power Supply—Please read instructions to ensure that your voltage is correctly set before powering on.



Tool kit, M3 driver, tweezers, filament guide tube, polyimide tape, USB cord, feeler gauge, and 4 extra bed hold-down clips.



1 kg spool of 1.75 mm PLA (color may vary).



Spool holder with screws and sample objects, which were printed on your M2 using files on the included SD card.





# Set Up



\* Do not update the firmware on your M2 unless you've made a hardware change that requires an update.

- 1** Carefully remove the foam from the top of the printer and from inside the printer frame. Remove the HBP from its slot in the foam and place it on the 4 legged “Spider” inside the frame, with the glass facing up. Remove the printer from the bottom foam. **Remove and read WARNING sheet from underneath your borosilicate glass bed** by removing the binder clips. Then secure the bed to the HBP using the bed hold-down clips on each corner of your bed. Do not remove the yellow polyimide tape from the glass.
- 2** Unpack the power supply and set the Voltage Switch to the voltage supplied through your outlet. There are only two settings: 115 V (for 100 – 130 V) and 230 V (for 220 – 240 V). To find the standard voltage level for your country, visit [www.worldstandards.eu/electricity/plug-voltage-by-country/](http://www.worldstandards.eu/electricity/plug-voltage-by-country/)
- 3** Insert the 6 Position Power Supply Connector into the 6 Position Electronics Connector **SECURELY IN PLACE** in the electronics case—note that the power supply connector should run under all other wires. Next, plug the power supply into a wall outlet and flip the power supply switch to the on position.

4 **Install the Spool Holder** with the four screws using the 3 mm allen key, ensuring that the longer side is facing upward. **Place your PLA spool on the Spool Holder** so that it unwinds upwards through the Filament Guide and feed it through. **Cut the PLA so the tip is flat**, then **feed the filament** into the filament guide tube and into the Filament Drive (if you have trouble feeding filament with a flat tip, then try cutting it at a 45 degree angle).

5 "Download the MakerGear **Quick Start App** via the link included in "QuickStart.pdf" on your SD card (or via [www.MakerGear.com/pages/QuickStart-App](http://www.MakerGear.com/pages/QuickStart-App)). Carefully follow the app's step-by-step instructions in order to create your first print:

- **Connect** Install driver (Windows users only), connect to M2.
- **Check Platform** Check starting height, check bed level, make adjustments using instructions provided by the app.
- **Load Filament** Heat HBP & extruder, properly extrude filament.
- **Print** Select "Bracelet.g" from your SD card, click "Print"

**Visit our Youtube channel to access the  
M2 Quick Start App Tutorial**



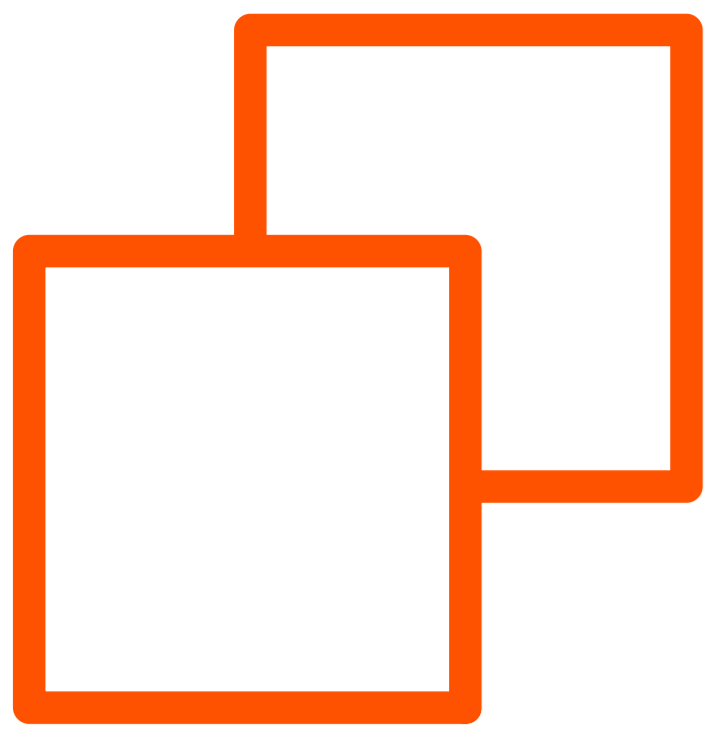
- 6 After printing "bracelet.g", you will be given three options:
- Click **Retry** if your first print was unsuccessful - this will return you to the check platform section in order to identify and address any issues with your platform that may have caused print defects.
- Click **Print Another File** if your first print was successful and you want to experience more MakerGear Magic.
- Click **Done** to navigate to the "Advanced" tab, where you can find manual controls for your M2 as well as a real-time display of the temperatures and coordinates of your extruder and HBP.

## A Note About Nozzles

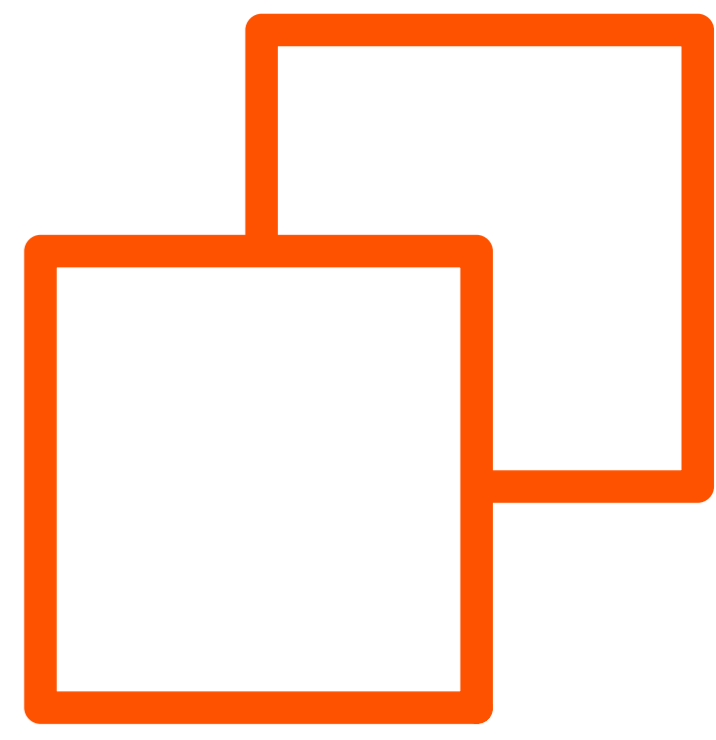
If you wish to remove or change your nozzle, you must first remove the entire hot end. Any attempts to unscrew the nozzle directly from your M2 will damage the hotend.

Some of our users choose to print with a nozzle that is either larger or smaller than the .35 mm nozzle included on the M2 in order to accommodate specific printing needs. If you plan to print with different sized nozzles, we recommend keeping each nozzle installed in a separate hotend - this allows you to switch between nozzles more easily.

**Visit our Youtube channel** for step-by-step instructions on how to remove the V4 hot end and remove/mount a nozzle.



# Slicing Files



If you try to download and print a file from the internet, you'll notice its format is either .STL or .OBJ, which your M2 is unable to read. In order to print these files, you must use special software designed to “slice” them into “.g” files—this file format, known as G-Code, gives your M2 step-by-step commands for how to print the part. The steps listed below will help you set up your slicer settings to slice a .STL file stored on your SD Card into .g format..

- 1** Remove your SD Card from the card reader on your M2 and insert it into your computer's card reader—this will enable significantly faster transfer of files between your computer and the SD card (if your computer does not have an SD card reader, then you can use an external USB card reader).
- 2** Move tallthin.stl from your SD card onto a folder stored on your computer, then open your slicing software. This file will be imported into your slicing software.

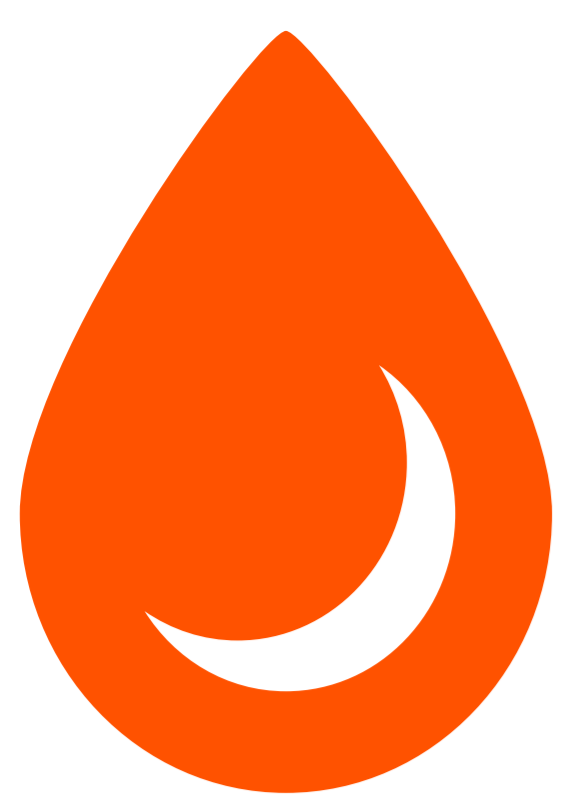
3 a) If you are using Simplify3D, select the MakerGear M2 V4 default setting.

OR

b) Download the most recent version of Slic3r from slic3r.org. Your slicer settings will be incorrect. To correct them, click "Load Config" under "File" and select the config.ini file available on your SD Card.

4 Import tinythin.stl into your slicing software, rotating it to ensure that it stands vertically with the hollow end facing up, slice the file (i.e., export in .g format), and then name it tiny2.g. Transfer this new .g file to your SD card, eject the card from your computer, and then insert it back into the card reader on your printer.

5 Use your printer control software to instruct your M2 to print tiny2.g from your SD card. If this print does not have similar strength and appearance to the sample you printed using the Set Up instructions, experiment with your slicing software settings in order to familiarize yourself with their various impacts on print quality. If you experience persistent issues, visit the MakerGear Support page.



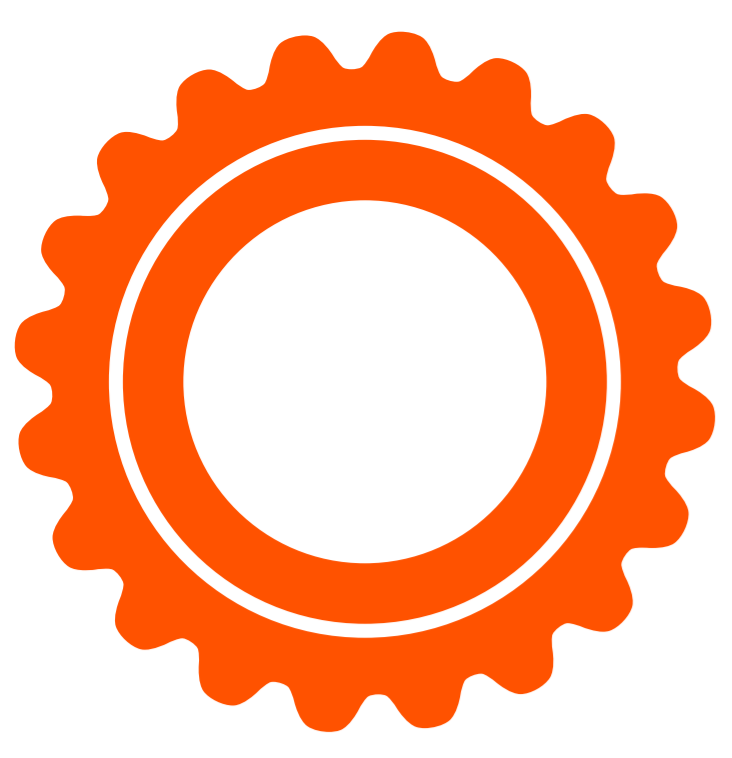
# Changing Filament



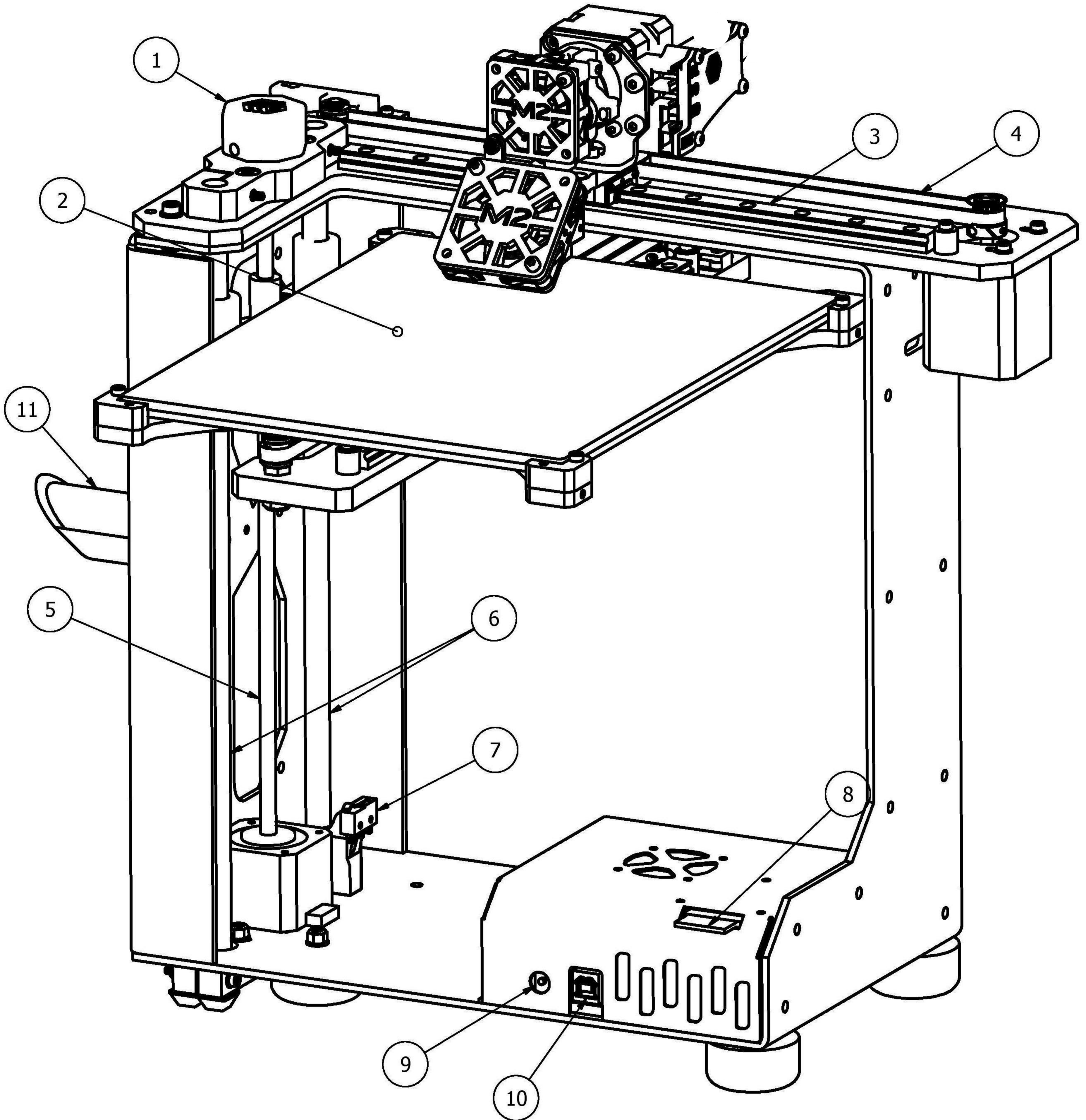
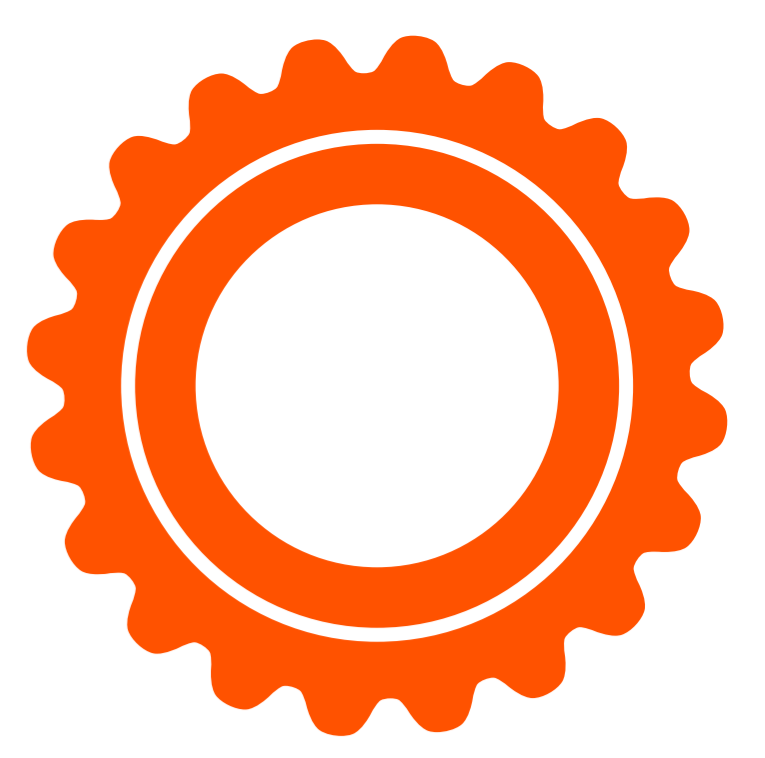
- 1 After ensuring that your hot end is hot enough to print with your current filament material, use the manual controls in your software package to "Retract" while pulling filament gently until it is released from filament drive.
- 2 If switching between filament material types (e.g. PLA to ABS), heat your extruder to the hottest printing temperature of the two materials in order to purge the old material and properly extrude the new material.
- 3 Cut the end of your new material so the tip is flat/round, and feed it into the filament drive.
- 4 After placing the tip of the new material into the filament drive, use the manual controls in your software package to "Extrude" the filament until you can see it extruding from the nozzle. This may require gentle downward pressure.

\* If unable to feed filament properly, then try cutting the tip at an angle before feeding it into the filament drive.

\*The M2 allows you to print with many different filament materials; however, we recommend using non-experimental filament materials provided by MakerGear.

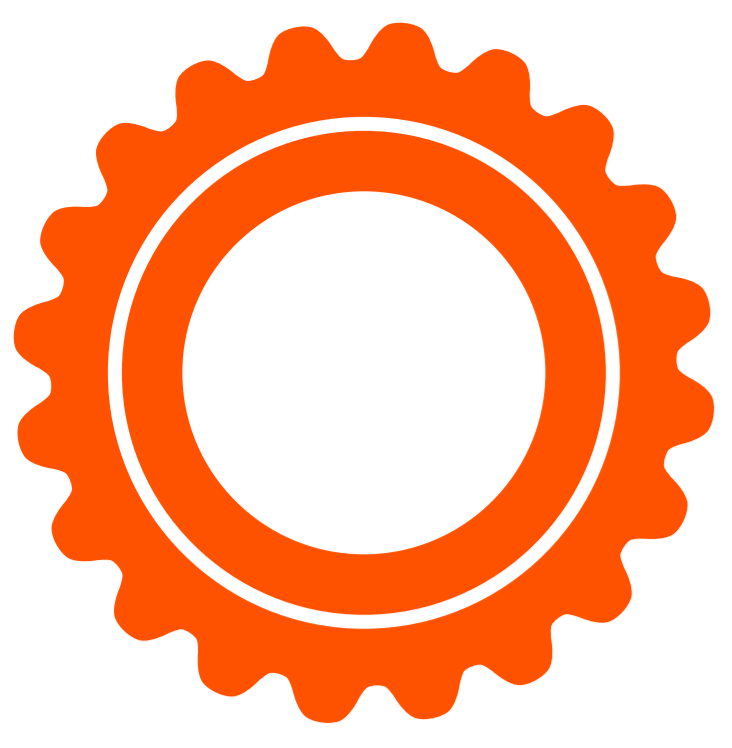


# M2 Features

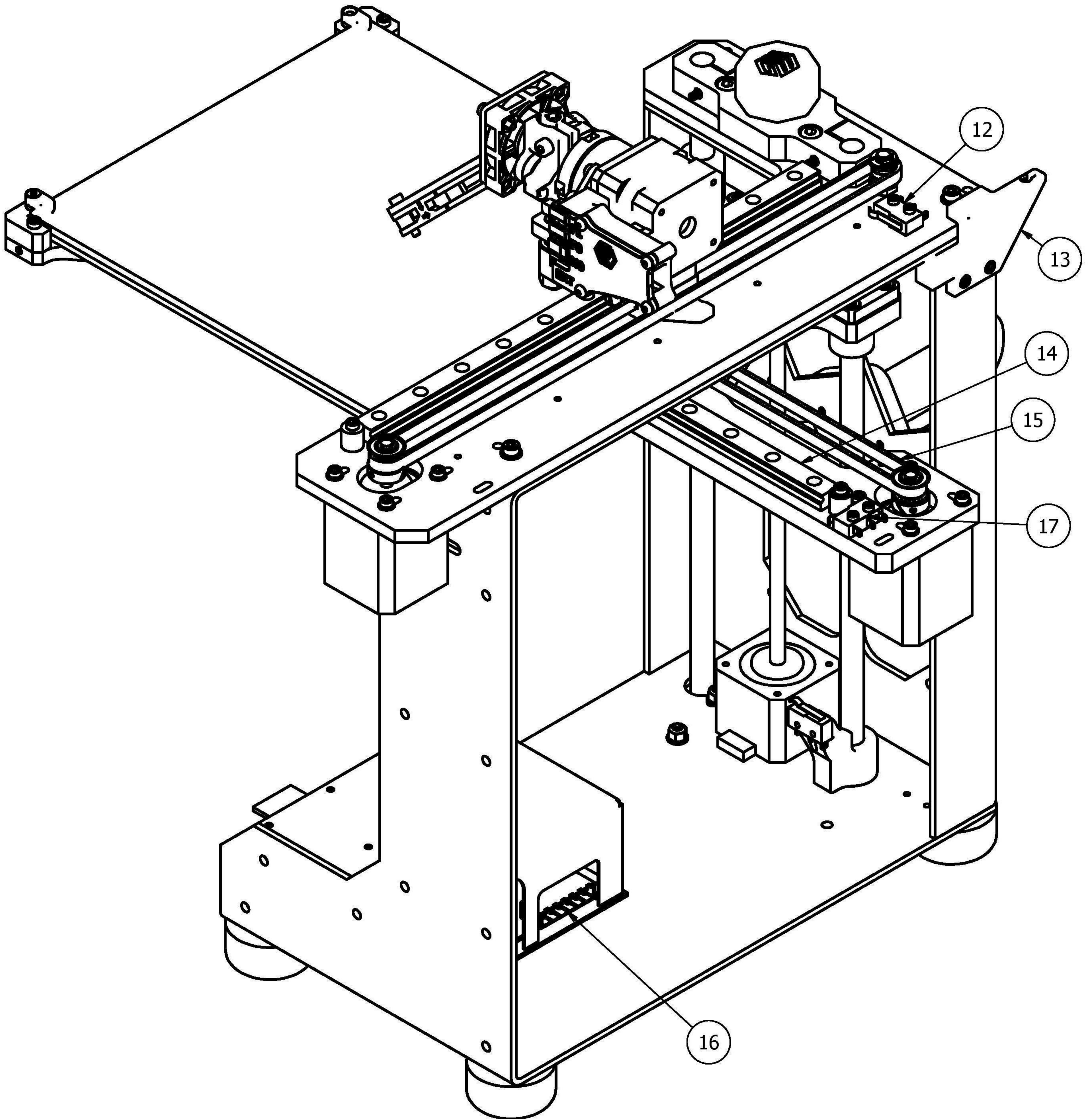
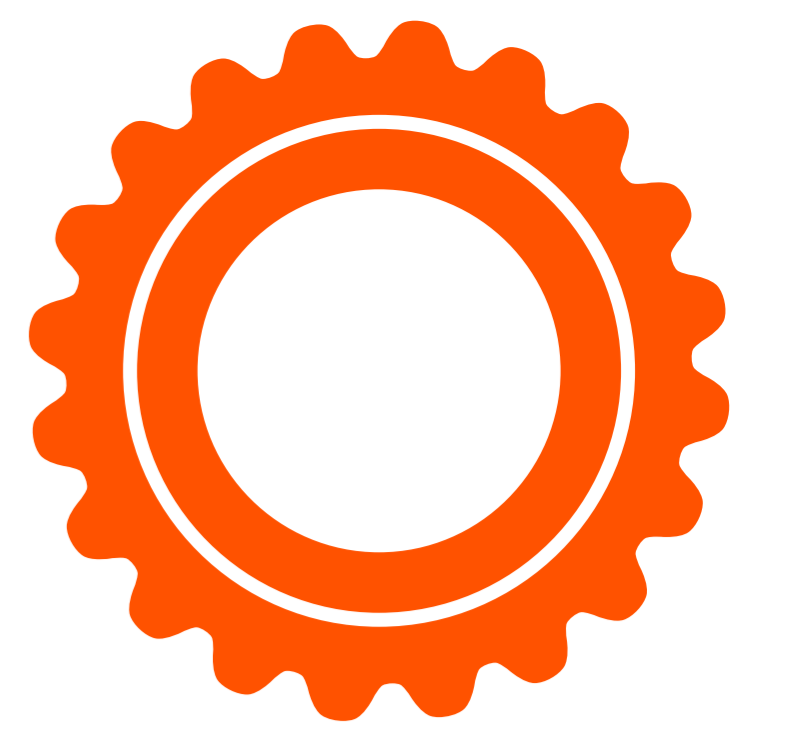


- 1 Z-Fine Adjust Knob
- 2 Heated Build Platform
- 3 X-Axis Rail
- 4 X-Axis Belt
- 5 Z-Axis Leadscrew
- 6 10mm Linear Rods

- 7 Z-Axis Limit Switch
- 8 SD Card Reader Slot
- 9 Manual Reset Button
- 10 USB Port
- 11 Spool Holder



# M2 Features



12 X-Axis Limit Switch

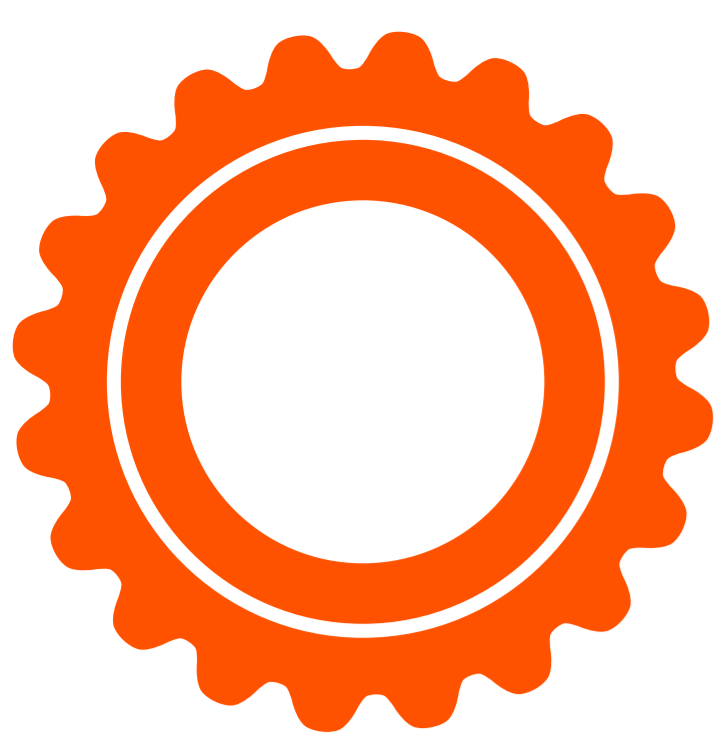
13 Filament Guide

14 Y-Axis Rail

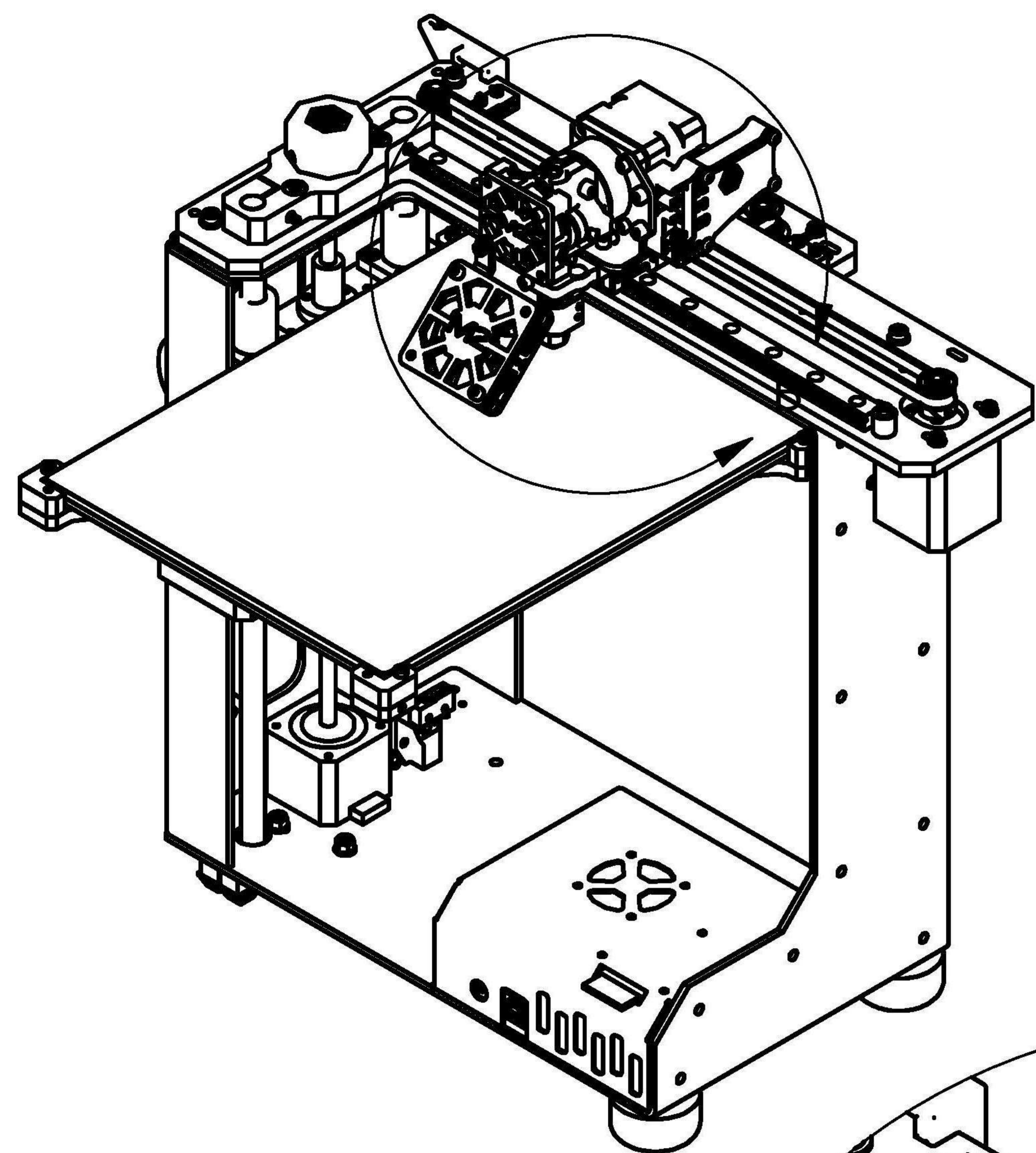
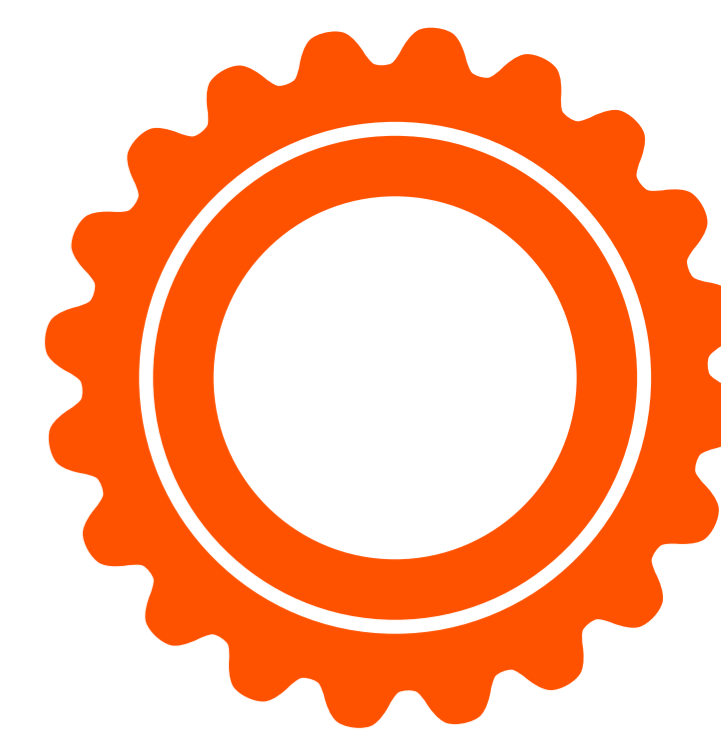
15 Y-Axis Belt

16 6 Position Electronics Connector

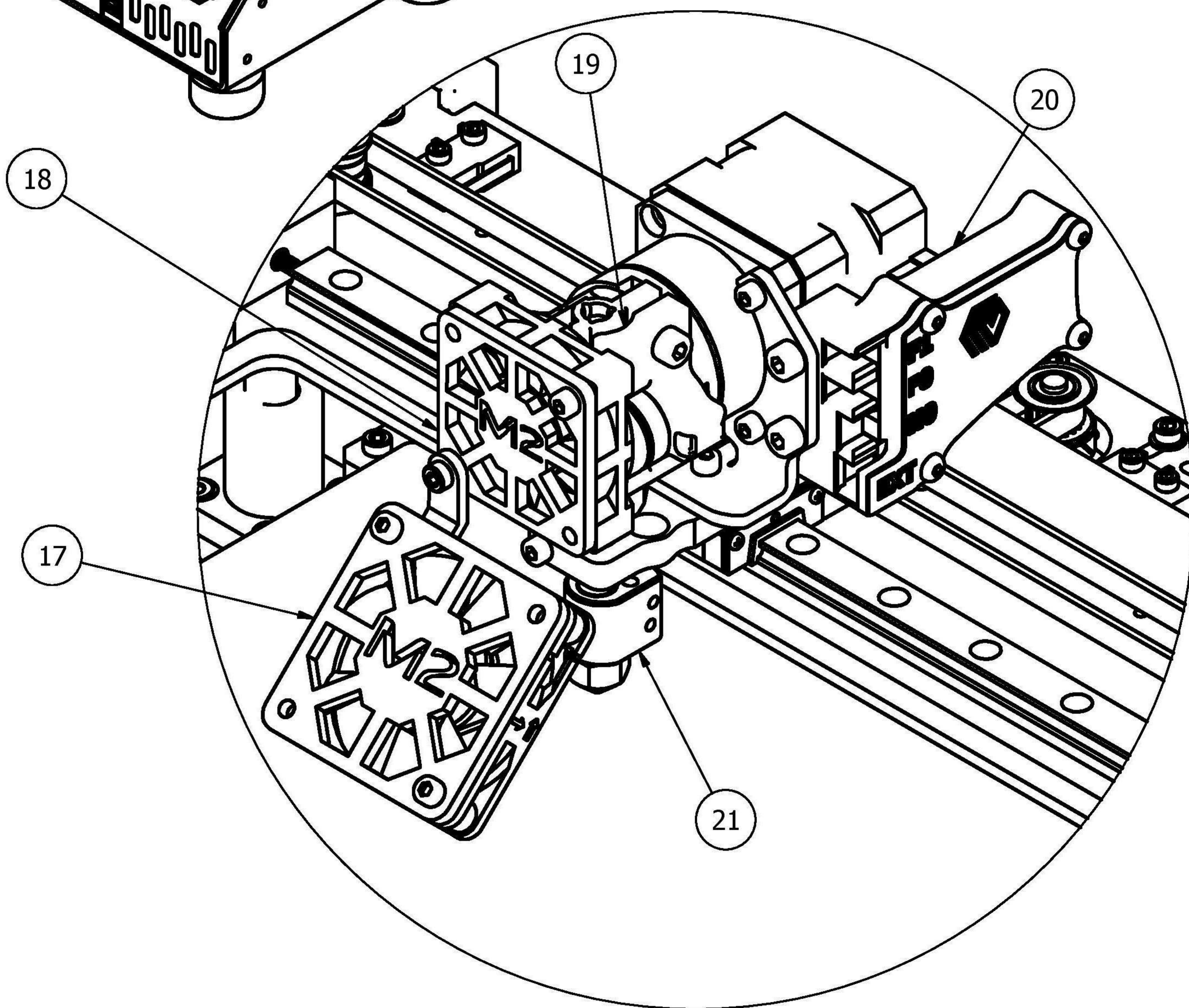
17 Y-Axis Limit Switch

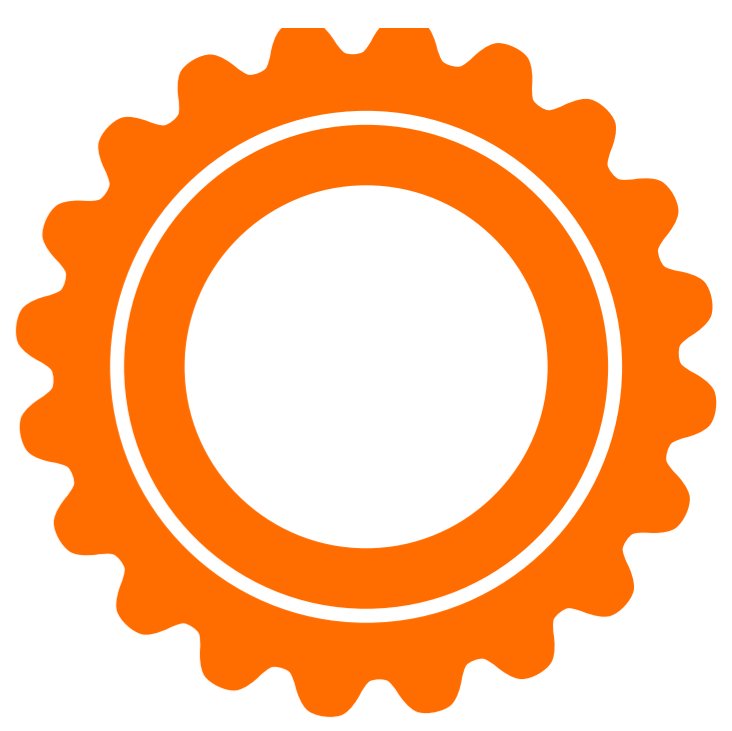


# M2 Features

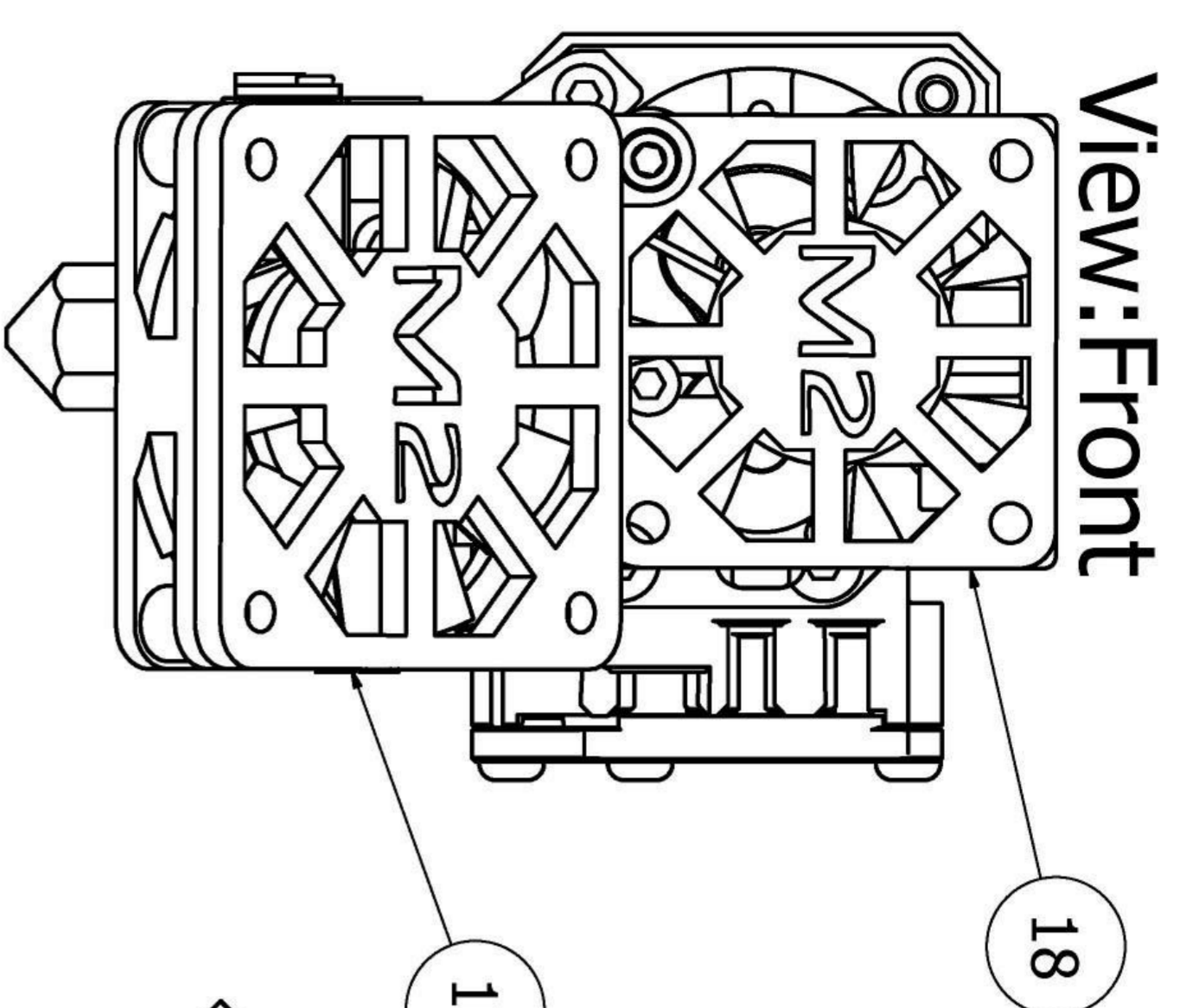
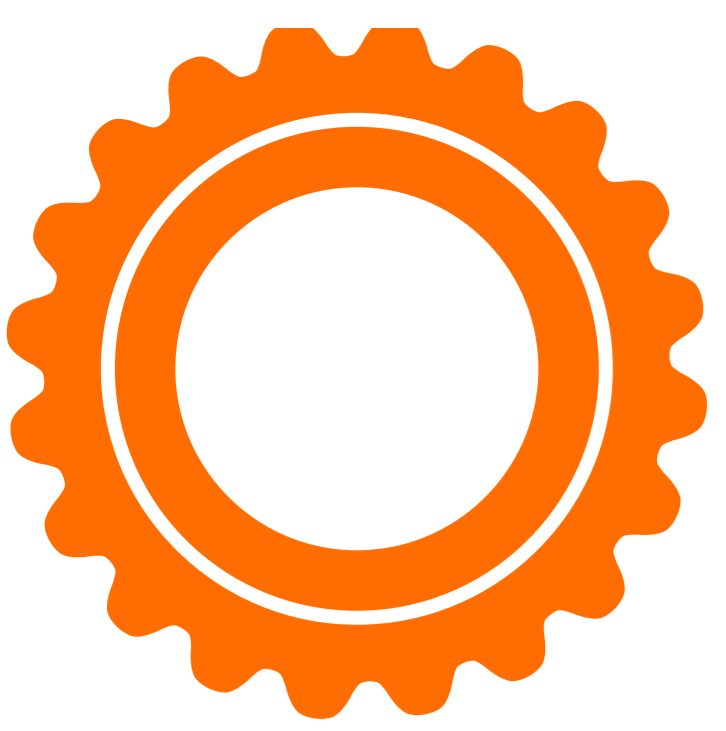


- 17 50 mm Fan
- 18 40 mm Fan
- 19 Filament Drive
- 20 Extruder Wire Mount
- 21 V4 Hot End

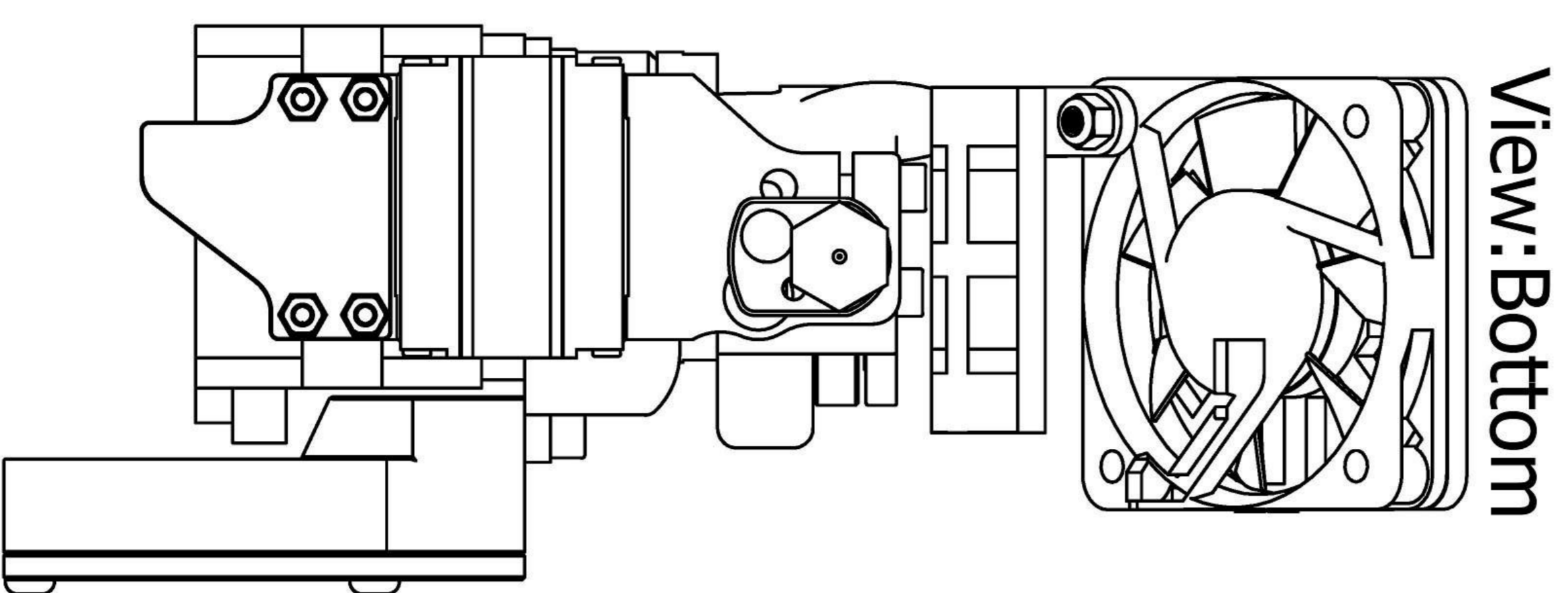




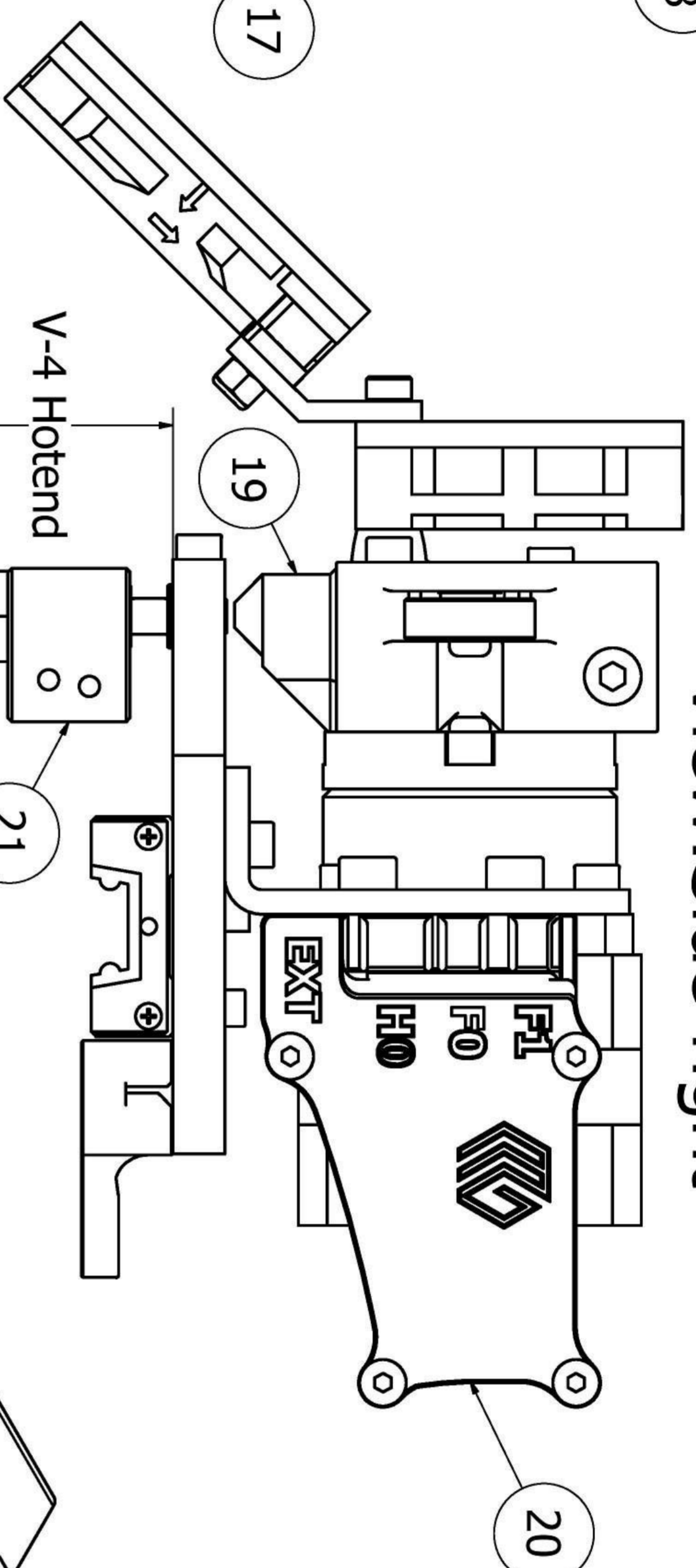
# M2 Features



View: Front



View: Bottom

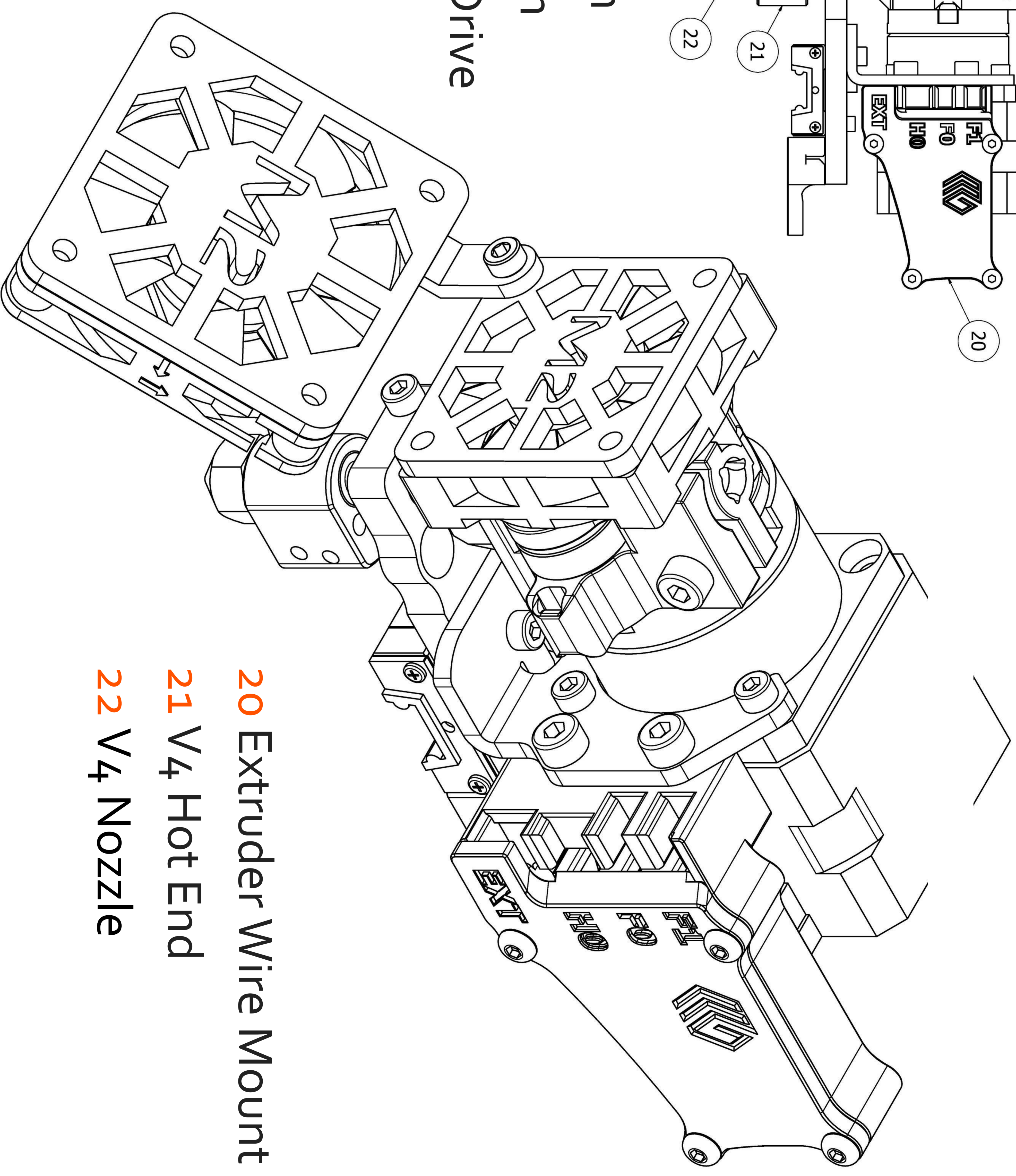


View: Side-right

17 50 mm Fan

18 40 mm Fan

19 Filament Drive

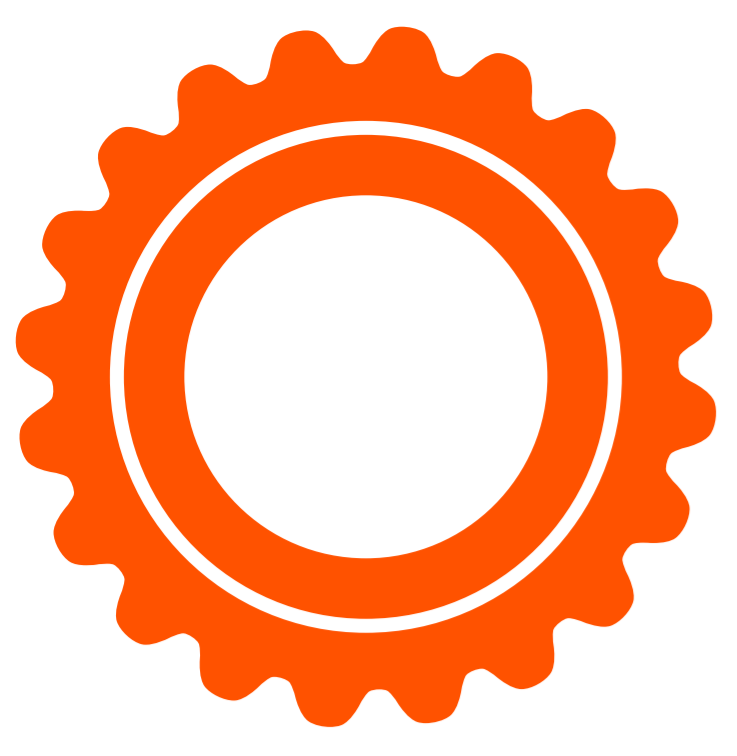


20 Extruder Wire Mount

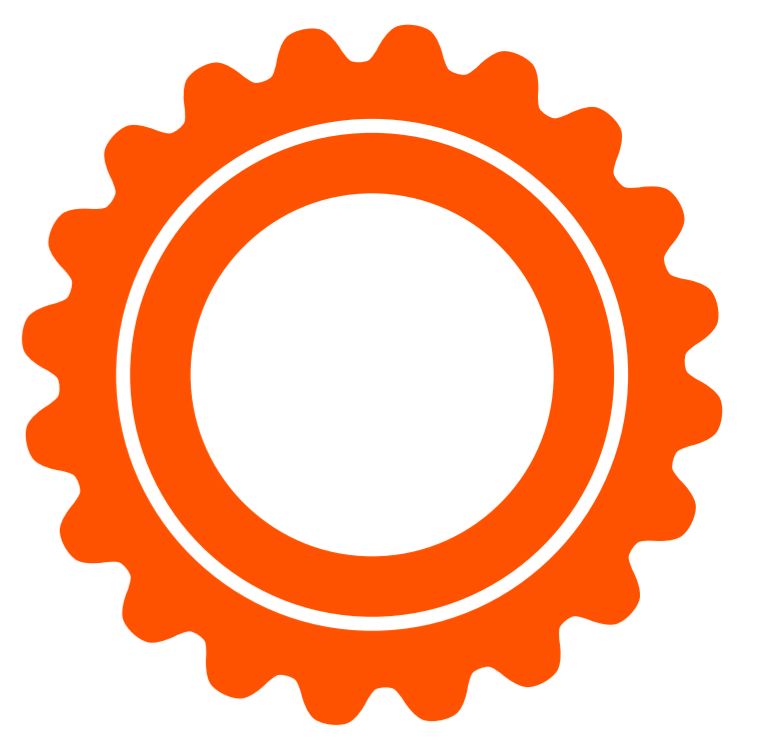
21 V<sub>4</sub> Hot End

22 V<sub>4</sub> Nozzle





# What's The Function?



Simple explanations of M2 Features.

**Z-Fine Adjust Knob** For last-minute changes to the distance between your nozzle & bed.

**Heated Build Platform (HBP)** Controls glass bed temperature.

**X-Axis Rail** Guides your extruder during side-to-side movement.

**X-Axis Belt** Keeps your extruder in-sync with your X-motor.

**Z-Axis Leadscrew** Rotates to move bed up & down.

**10 mm Linear Rods** Guide your bed up & down.

**Z-Axis Limit Switch** Sets "home" position for Z-axis motion.

**SD Card Reader Slot** Retrieves stored command info.

**Manual Reset Button** Stops all current M2 operations.

**USB Port** Receives command info.

**Spool Holder** Keeps your filament spool secure during printing.

**X-Axis Limit Switch** Sets "home" position for X-axis motion.

**Filament Guide** Guides your filament from spool to guide tube.

**Y-Axis Rail** Guides your bed during front-to-back movement.

**Y-Axis Belt** Keeps your bed in-sync with your Y-motor.

**6 Position Electronics Connector** Brings power to your M2.

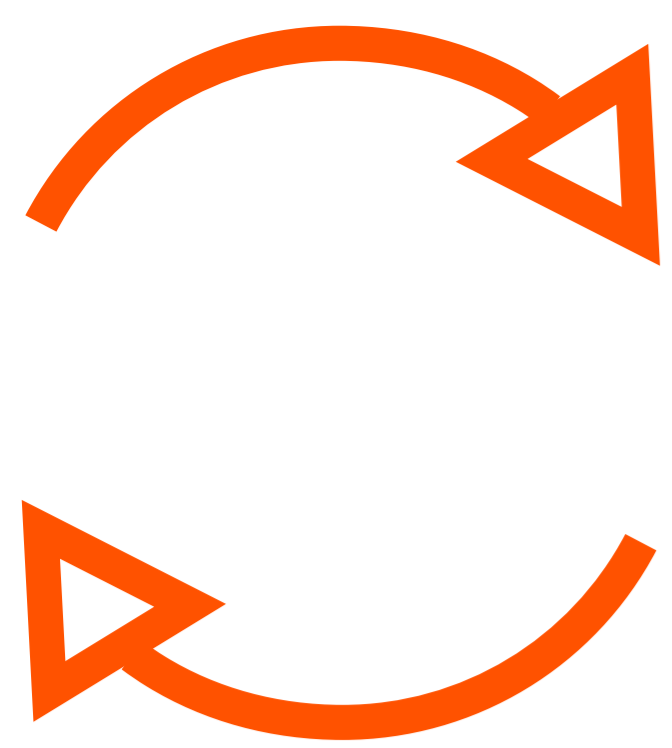
**Y-Axis Limit Switch** Sets "home" position for Y-axis motion.

**Extruder Wire Mount** Houses wiring for the extruder.

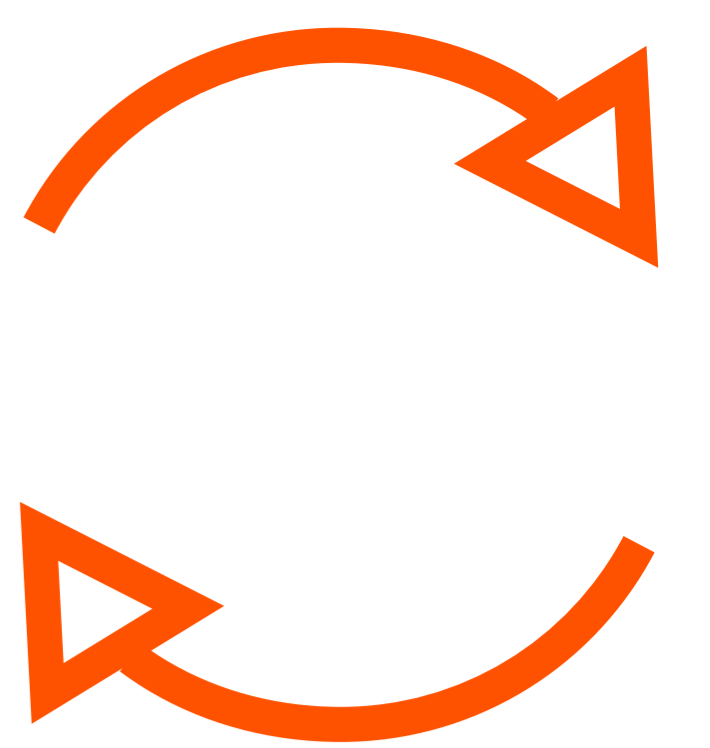
**40 mm Fan** Cools your filament drive.

**50 mm Fan** Helps solidify printed layers (as needed).

**Filament Drive** Pulls filament into your extruder.



# Maintenance & Support



## Weekly (every 50 hours)

Ensure that your bed is at the correct height and properly leveled. To do so, open the MakerGear Quick Start application and follow the commands within the Set Up process in order to complete the following steps:

- 1) Check Starting Height
- 2) Check Bed Level

Ensure that the print surface is free of defects (torn or bubbled tape) and dust/dirt/grease, and replace tape or clean surface with appropriate cleaner (alcohol/water at 50%/50% recommended).

## Monthly (every 200-250 hours)

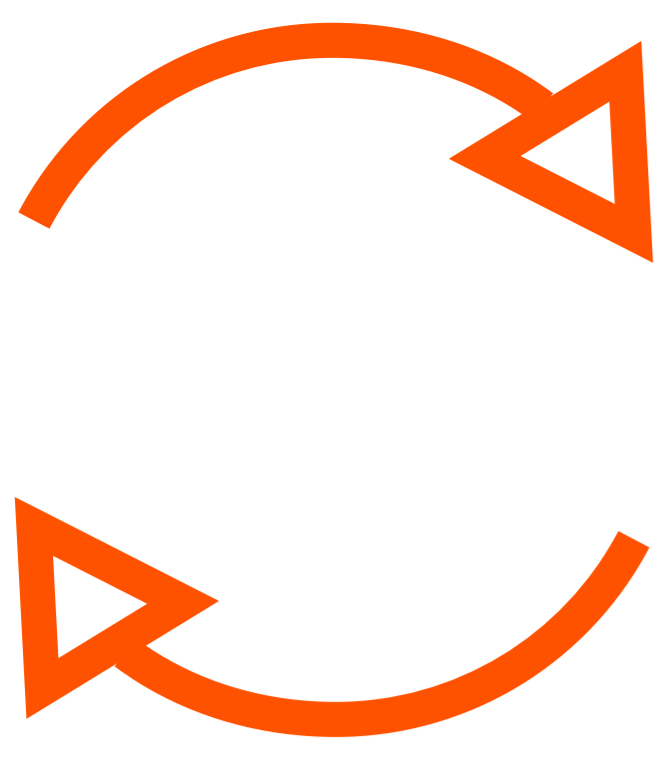
Ensure the machine is free of dust and filament debris, and clean if necessary. Focus areas include fans and fan guards, filament surface and filament drive, and the entire frame. Clean oil from the X and Y linear rails and apply a fresh coat to each. A dot of oil in each of the long grooves on the X and Y rails is sufficient. Once applied, move that axis through its full travel multiple times to spread the oil.

**For more maintenance tips**  
**visit [MakerGear.wikidot.com](http://MakerGear.wikidot.com)**

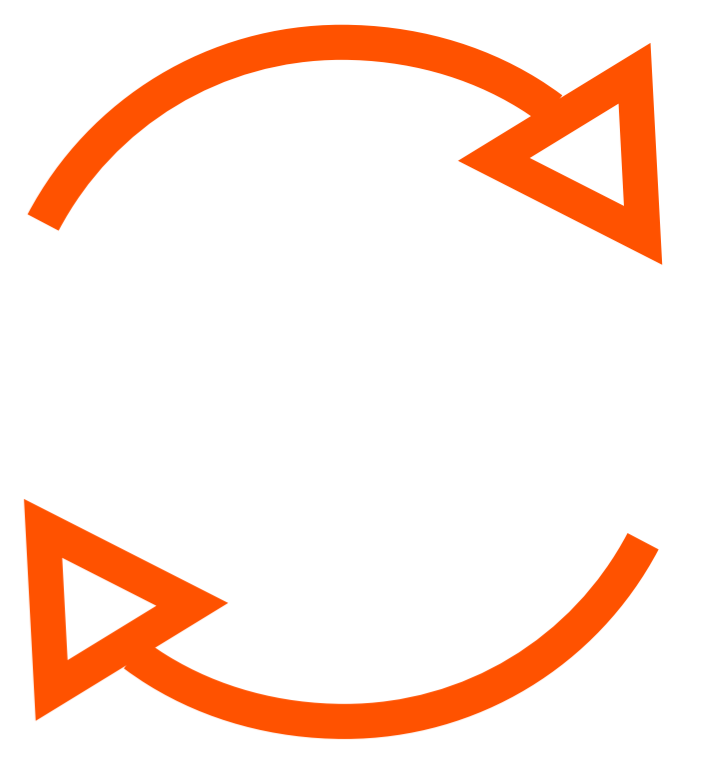


**Technical Support** lives on our website  
at [www.makergear.com/pages/support](http://www.makergear.com/pages/support)





# Shutdown & Storage



If using your M2 regularly, then turn off the power supply and unplug both the power supply and USB cords when finished.

If storing your M2 for a period of 1-2 weeks, follow the instructions listed above AND store the filament spool in its original bag (fully sealed, with the desiccant packet inside).

If storing your M2 for a period of 2 weeks or more, follow the instructions listed above THEN cover your entire machine in order to protect it from the buildup of dust and other airborne particles.

**DO NOT unscrew your nozzle directly from your M2!**

To change or remove its nozzle, you must first remove the entire hot end. Visit our website and Youtube channel for step-by-step instructions on how to remove the hot end and change its nozzle.



**Technical Support** lives on our website at [www.makergear.com/pages/support](http://www.makergear.com/pages/support)



# Warranty



New M2s ordered from MakerGear or from an authorized MakerGear distributor have a Six-Month Non-Transferable Limited Warranty. MakerGear will replace defective parts on M2s that are under warranty. Replacement parts may be new or refurbished and include free shipping in the US only. Non-US customers are responsible for the shipping costs for replacement parts.

## Exceptions

The M2 has an open design (no proprietary cartridges) and M2 owners are free to use 3rd party filament. However, the MakerGear hot end is only covered when MakerGear filament and authentic MakerGear components are used. Due to variances in quality, MakerGear is unable to provide tech support for issues related to third party filament. If you are using filament or extruder components from a third party, you must contact your vendor for technical support. The six-month warranty offered by MakerGear does not cover machine abuse.

**Technical Support** lives on our website at  
[www.makergear.com/pages/support](http://www.makergear.com/pages/support)



# What does "M2 V4 Rev. E" mean?



Machine Component	Replacement Part Name*	Additional Specifications
Bed Fan (Fan 0)	50 mm fan, 24 V	0.1 A
Extruder Fan (Fan 1)	40 mm fan, 24 V	0.1 A
Electronics Case Cooling Fan	40 mm fan, 24 V	0.1 A
Hot End	V4 Hot End, 0.35 mm	
Hot End—Nozzle	V4 Nozzle, Brass, 0.35 mm	
Hot End—Thermistor	Thermistor, Hot End	300 °C thermistor
Hot End—Barrel	V4 Barrel	Stainless Steel
Hot End—Cartridge Heater	V4 Cartridge Heater	24 V
Hot End—Heater Block	V4 Heater Block	24 V
Filament Drive	V4 Filament Drive	rev 2
Motor Mount	Metal with Printed Extruder Wire Mount	
HBP	HBP, 24 V	with flexible conduit
HBP-Thermistor	Thermistor, HBP, 31"	
Glass Build Surface	Glass with Polyimide Tape	8" x 10" x 3.3 mm, borosilicate
Power Supply	Power Supply	24 V, 450 W, metal case, rev 1
Z Motor	Z Motor	HK Black, Fine Pitch Screw
Extruder Motor	Extruder Motor, Geared Stepper (5.2:1)	42BYGH243-5
Extruder Motor—Drive Gear	Extruder Motor Drive Gear	24 Tooth Involute Spline
X/Y Motor	X or Y Motor	42BYGH4803-C6
Controller Board	RAMBo 1.3L	
Belt Set	Belt Set	702 mm (Y) & 630 mm (X)
Filament Guide Tube	Filament Guide Tube	2 mm ID
Carriage	X or Y Carriage	
Spider	Four Screw Leveling Spider	With Bed Holddown Clips
Z Axis Endstop	Bottom Z-Axis Endstop	
Firmware	M2E v100 (SnNRd)	

**Technical Support** lives on our website at  
[www.makergear.com/pages/support](http://www.makergear.com/pages/support)



# About Us



**Welcome to the family!**

**Our company** began as a hobby in an unheated garage in Northeast Ohio way back in 2009 when our Founder & CEO, Rick, was hand-making parts for the fledgling desktop 3D printing community. Today, we apply strict standards to our machines, which are assembled in the USA using both domestic and foreign parts. In spite of numerous improvements and advancements during the years since MakerGear's humble beginnings, our dedication to quality and community remains unchanged.

**Our work** revolves around providing three things: quality machines, excellent customer service, and a user-centric 3D printing experience. Focusing on these core values has resulted in outstanding customer reviews, awards, and top-rated recognition in publications both in and out of the 3D printing world.

**Our customers** include schools, engineers, entrepreneurs, designers, businesses, and DIYers in more than 75 countries, many of whom are involved in our active, growing, and extremely helpful support community at [forum.MakerGear.com](http://forum.MakerGear.com)

For general inquiries, you can reach us by email at [info@MakerGear.com](mailto:info@MakerGear.com).

For technical assistance, please follow the instructions on our website's support page.

**We're here when you need us. Now it's time to roll up your sleeves and create something!**  
**Thanks for choosing MakerGear.**

**THE MAKERGEAR TEAM**

Please register as an M2 owner so that we can contact you with important information about your machine when necessary - THIS IS NOT OUR EMAIL SUBSCRIBER LIST - To register, visit [www.MakerGear.com/register](http://www.MakerGear.com/register)

What are *you* making? Tag  
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for a chance to be featured!



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