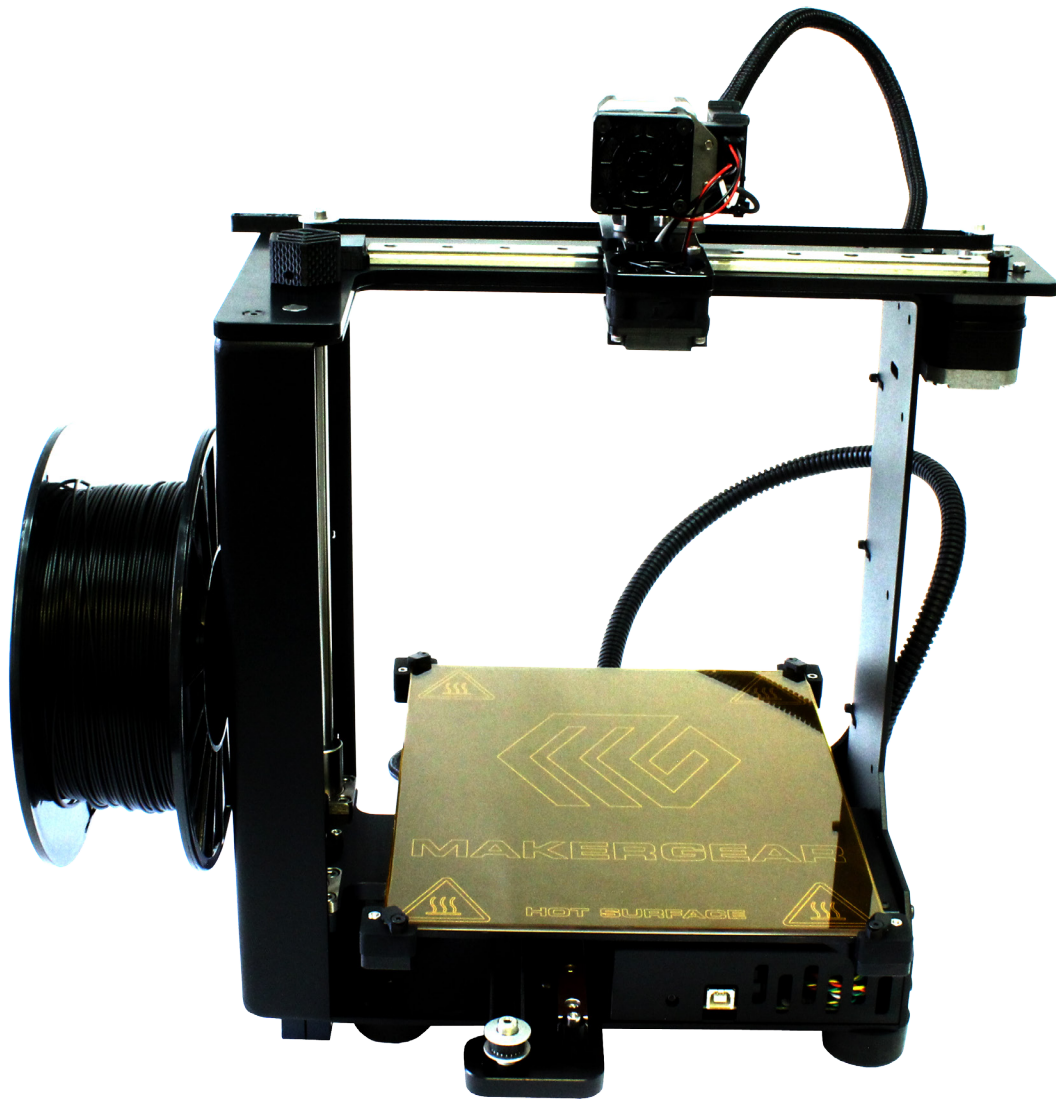

















MAKERGEAR

M2 rev G



USER GUIDE

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Welcome



Your MakerGear M2 3D Printer has arrived!

Following minimal setup, your M2 is ready to print out-of-the-box. To ensure safety as well as high quality printing, carefully follow the setup instructions included in this User Guide.

This printer was assembled at the MakerGear factory in Beachwood, Ohio, USA, and was tested for at least six hours to ensure that it was fully operational at the time of shipping.



Do not remove the film of yellow polyimide tape from the M2's glass build plate; this functions as the print surface, and should be facing up.



Do not change the M2's firmware unless you know exactly what you're doing or have been instructed to do so by MakerGear support.

This User Guide can also be found on the MakerGear website at www.makergear.com/pages/user-guides, where you can access additional, more specific information and resources.



Important Safeguards



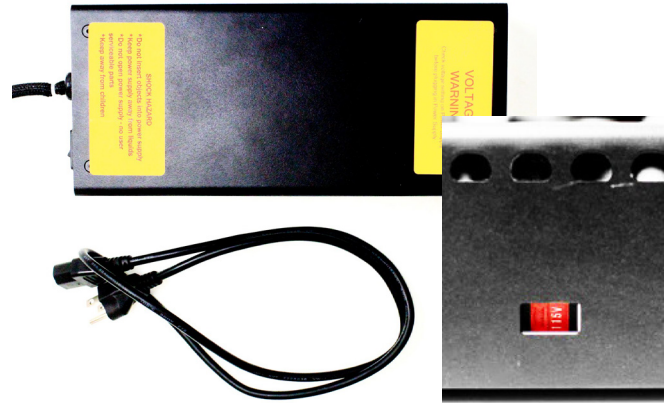
1. The following safeguards exist to ensure the safety of users and to avoid potential risks. Ignoring these safeguards can cause damage to the printer and its environment.
2. Unplug the power cord when the printer is not in use. To unplug, grasp the plug and firmly pull it from power outlet. You should never
3. To protect against electrical shock, do not put the printer body, cord, or electrical plug in liquid. If the printer falls into liquid, do not touch it. Instead, unplug the printer from power outlet, then remove it immediately. Do not reach into the liquid without unplugging the
4. This printer should not be used by children unless supervised by an adult who understands the risks and precautions involved in its use. To avoid potential injuries, close supervision is necessary when the printer is used by or near children.
5. Avoid any contact with moving parts. The printer can move quickly, so stay clear to avoid being struck or pinched.
6. Keep hands/hair/clothing away from printer attachments while the printer is operating to reduce risk of injury to persons and/or damage to
7. Do not operate the printer if it has a damaged cord/plug, is malfunctioning, or has been dropped or damaged in any way. If you are having any problems with the printer (such as temperature errors, unexplained shutdowns, or other erratic behavior), unplug the printer from power outlet and contact support. Do not operate a malfunctioning printer.
8. Keep area around the printer clear. The heated build platform moves horizontally and vertically and may cause the printer to move or damage other pieces of equipment if it strikes them.



What's Included



Power supply and cord. If your power supply has a voltage switch as shown to the right, ensure that it is set to the correct voltage.



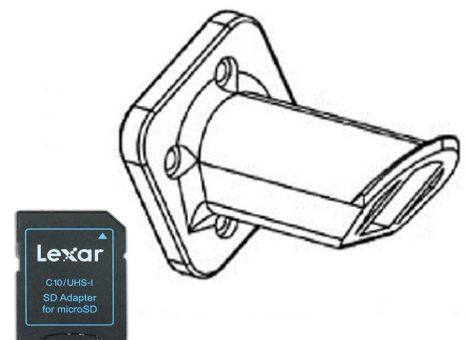
Tool kit: hex drivers, tweezers, filament guide tube, polyimide tape, USB cord, feeler gauge, brush, and 4 extra build plate hold-down clips.



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

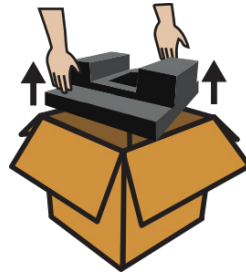


Spool holder with screws which was printed on your M2 using the included SD card.

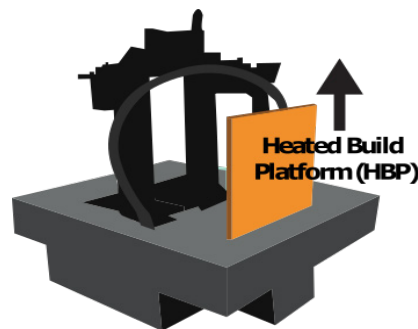




Hardware Setup



1. Carefully compress and remove the foam from the top of the printer and from inside the printer frame.

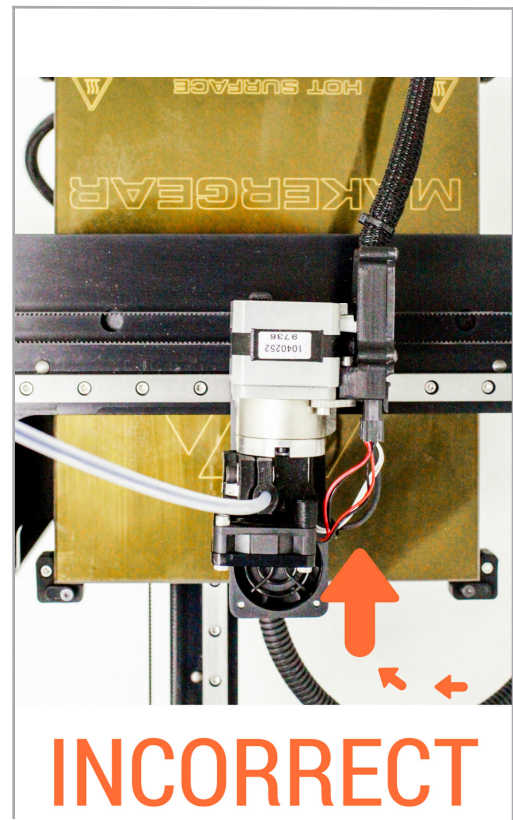
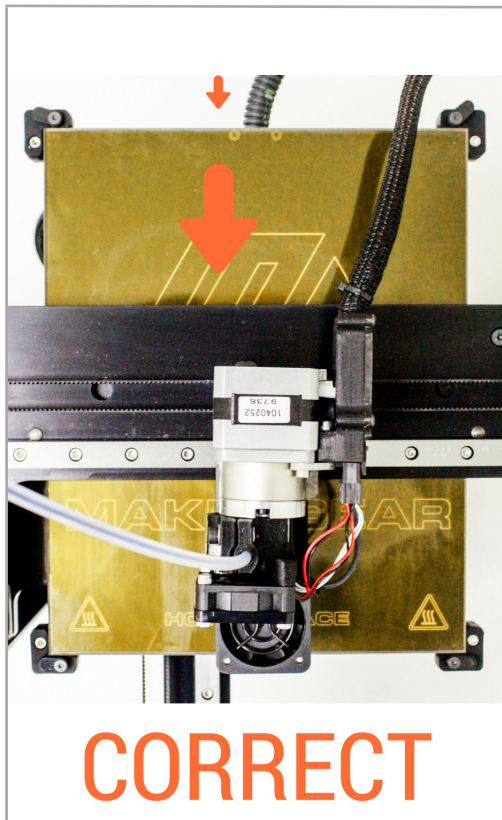


2. Remove foam from above and below the 4-legged “spider” inside the frame. Remove the heated build platform from its slot in the foam and place it on the spider with the glass build plate facing up, as shown on page 5.

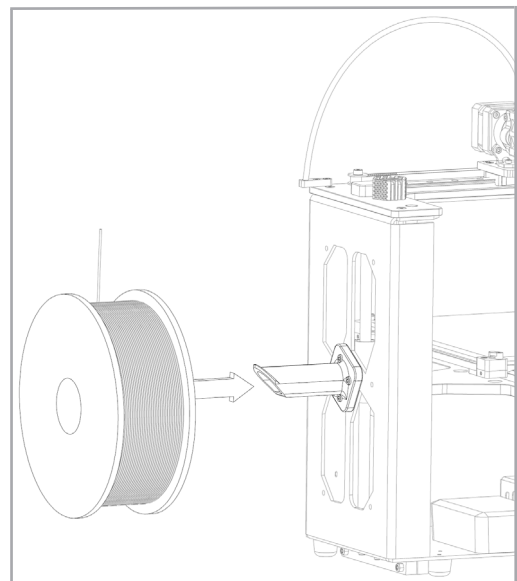
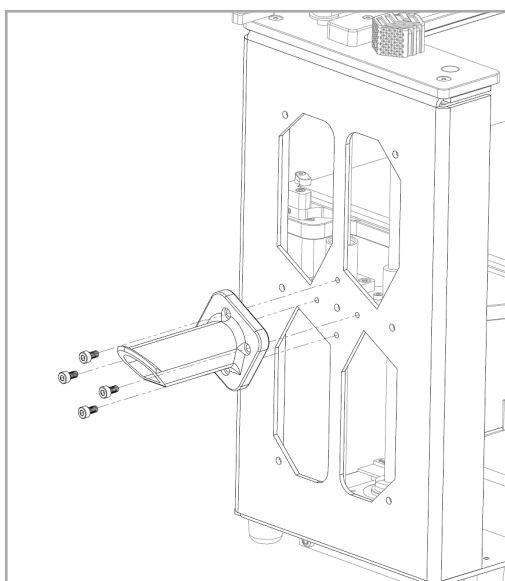


3. Grasp the printer where the arrows indicate, and remove it from the box.

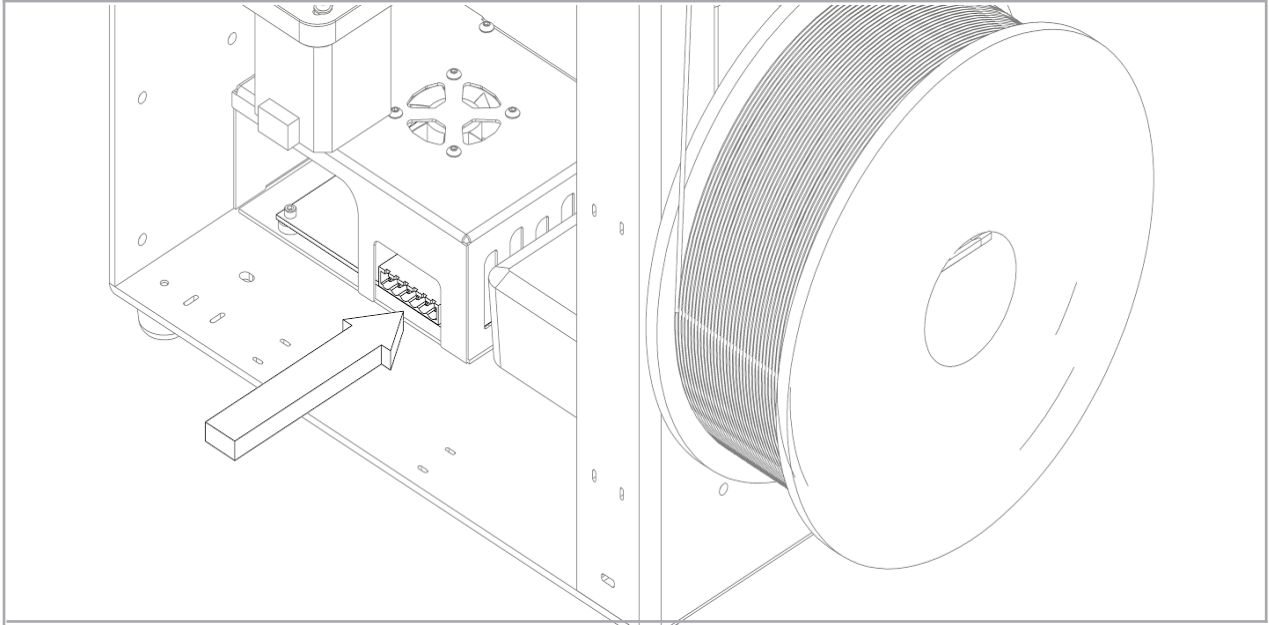
4. Remove the binder clip, and rotate the hold-down clips to point toward the front and back of the glass build plate in order to secure it in place.



5. Install the spool holder with the 4 included screws using the 3 mm allen key, ensuring that the longer side is facing up. Place your PLA spool on the spool holder so that the filament unwinds clockwise.



6. Insert the 6-position power supply connector into the 6-position electronics connector, making sure that it is **SECURELY IN PLACE** in the electronics case. Connect the power supply cord to the power supply. Next, plug the power supply into power outlet, and flip the switch on the power supply to the on position.



7. Visit www.makergear.com/pages/get-started to register your printer, download the QuickStart App, and watch a tutorial on the process.

8. In the QuickStart App, you will:

- a. Connect install driver (Windows only)
- b. Check your build platform's level and starting height
- c. Heat your build platform & extruder and load filament.
- d. Print "Bracelet.g" from your SD Card

9. After printing "Bracelet.g", you will be given three options:

- a. Print Another File: click this to print another file stored on your SD Card.
- b. Retry: this will return you to re-check your build platform in order to address any issues that may have caused print defects.
- c. Done: click this 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.



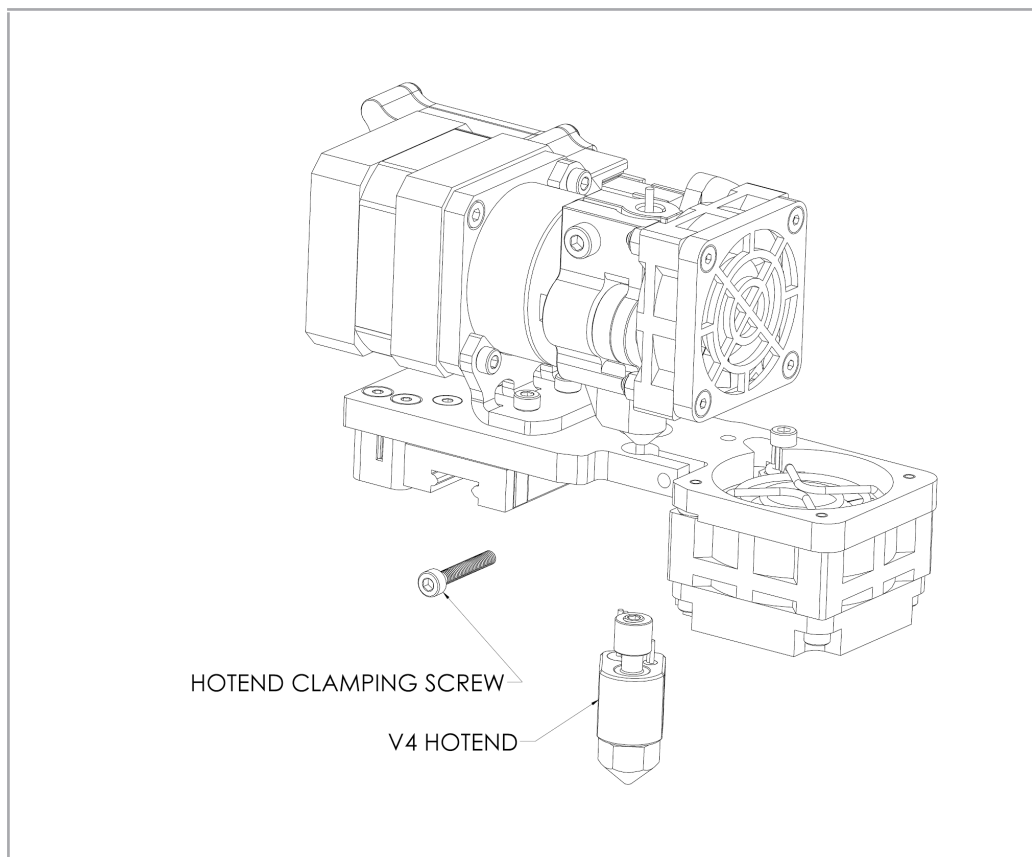
A Note About Nozzles



The nozzle is the brass conical piece with a six sided base. It attaches to the other parts of the hot end and dispenses material through a precisely sized hole.

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

Some of our users choose to print with nozzles that are either larger or smaller than the 0.35 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 hot end, as this allows you to switch between nozzles more easily.



Visit the MakerGear 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” or “.gcode” format — this file format, known as G-Code, gives your M2 step-by-step commands for where/how to extrude material. 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.

Step 1: Using the QuickStart App, print “hexa.g” from the included SD card, which we have sliced for you using Simplify3D software. This should take about 15 minutes to print and will serve as a comparison to your sliced version of the same model.

Step 2: 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. For computers that do not have an SD card reader, external card readers that connect to your computer via USB are available.

Step 3: Download the most recent Slic3r from slic3r.org. Your slicer settings will be incorrect. To correct them, click “Load Config Bundle” under “File” and select the “config.ini” file available on your SD card.

Step 4: Import “hexa.stl” into your slicing software, slice the file (i.e., click export in .g format), and then name it “hexa2.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.

Step 5: Use your printer control software (e.g., Printron by Pronterface, available at <http://www.pronterface.com/#download>) to instruct your M2 to print hexa2.g from your SD card.

If the “hexa2.g” print does not have similar strength and appearance to the “hexa.g” sample that you printed, see the online resources offered by your slicing software provider in order to familiarize yourself with different slicing settings’ impact on various aspects of print quality.

If you experience persistent issues, contact MakerGear support via:

<http://www.MakerGear.com/support>



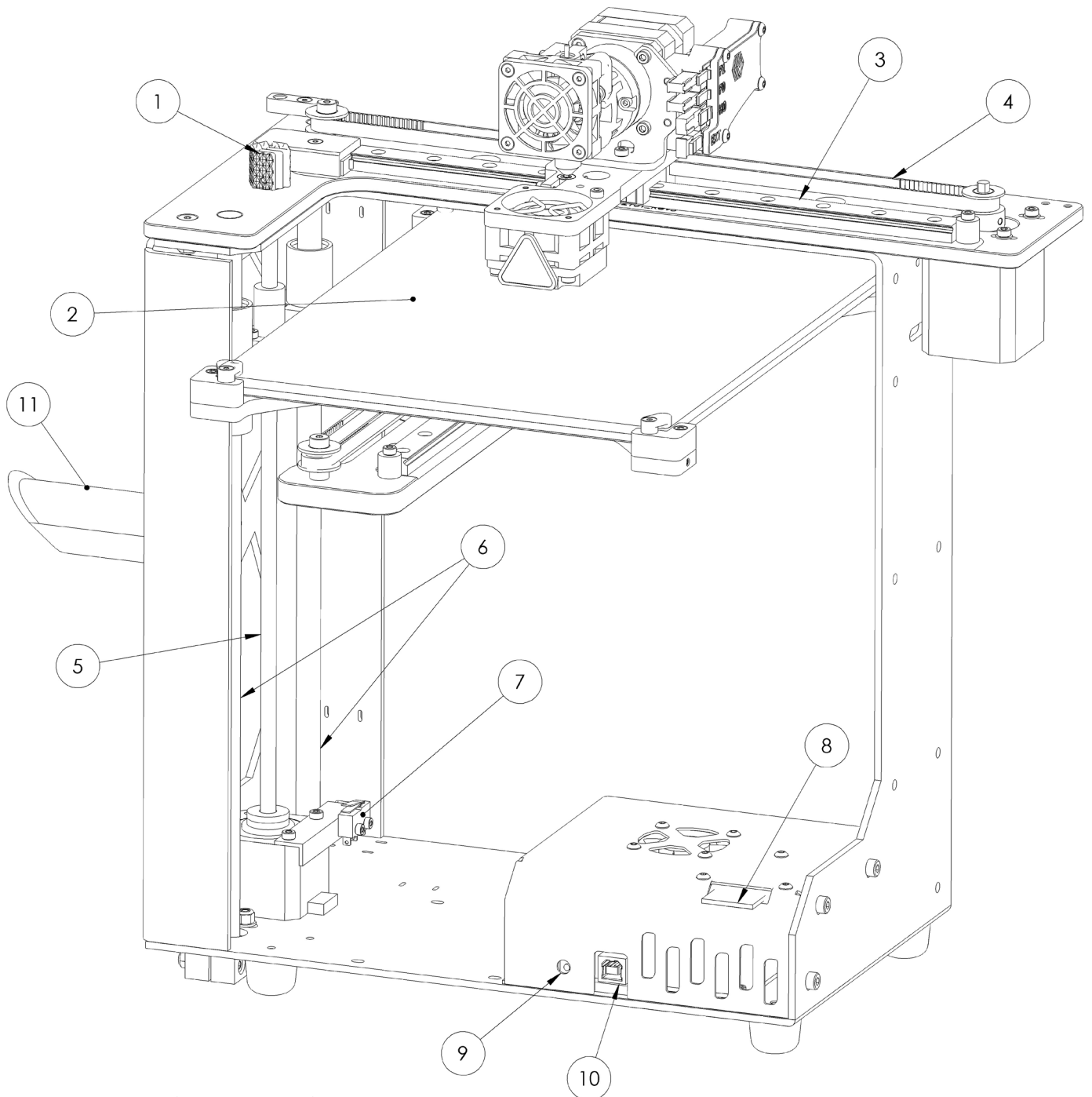
Changing Filament



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 the filament drive.
2. If switching between filament material types (e.g., PLA to ABS), heat your extruder to the hotter of the two printing temperatures in order to purge the old material and properly extrude the new material.
3. Cut the end of the new material at an angle and feed it into the filament drive. While applying gentle downward pressure, use the manual controls of your software package to “Extrude” until you can see the filament extruding from the nozzle.



M2 Features Front



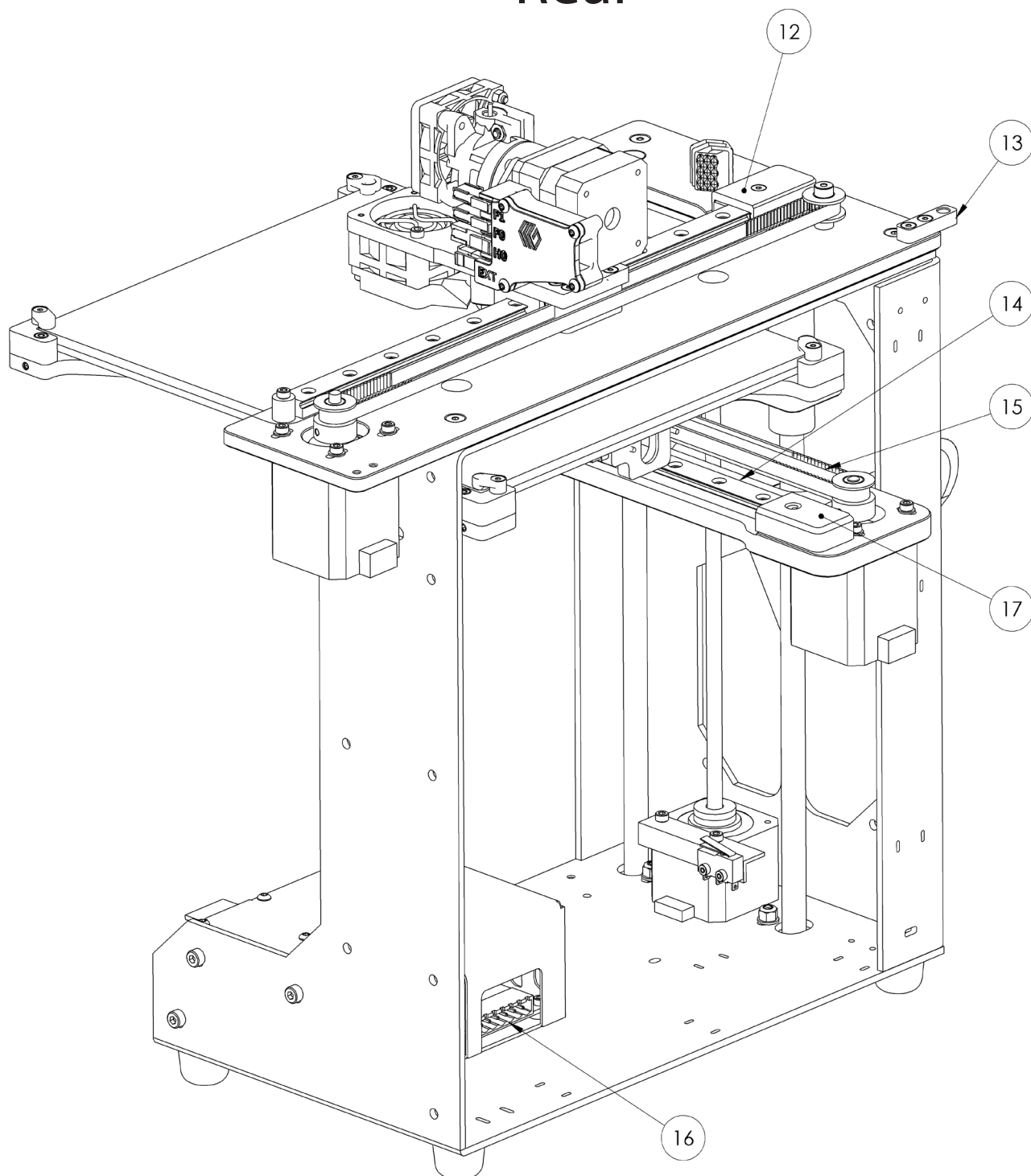
- 1 Z Fine Adjust Knob
- 2 Heated Build Platform (HBP)
- 3 X Axis Linear Rail
- 4 X Axis Belt
- 5 Z Axis Lead Screw
- 6 Z Axis Linear Rods

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



M2 Features

Rear



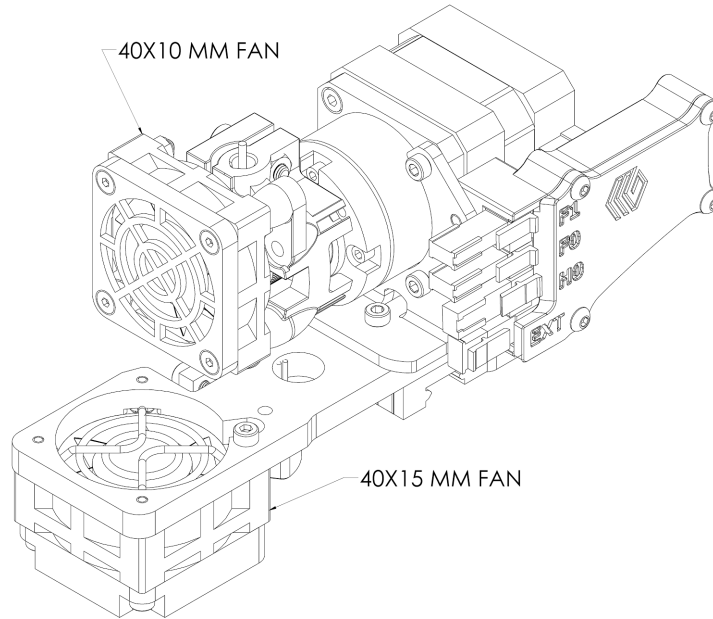
- 12 X Axis Limit Switch
- 13 Filament Guide
- 14 Y Axis Linear Rail
- 15 Y Axis Belt
- 16 6-Position Power Connector
- 17 Y Axis Limit Switch



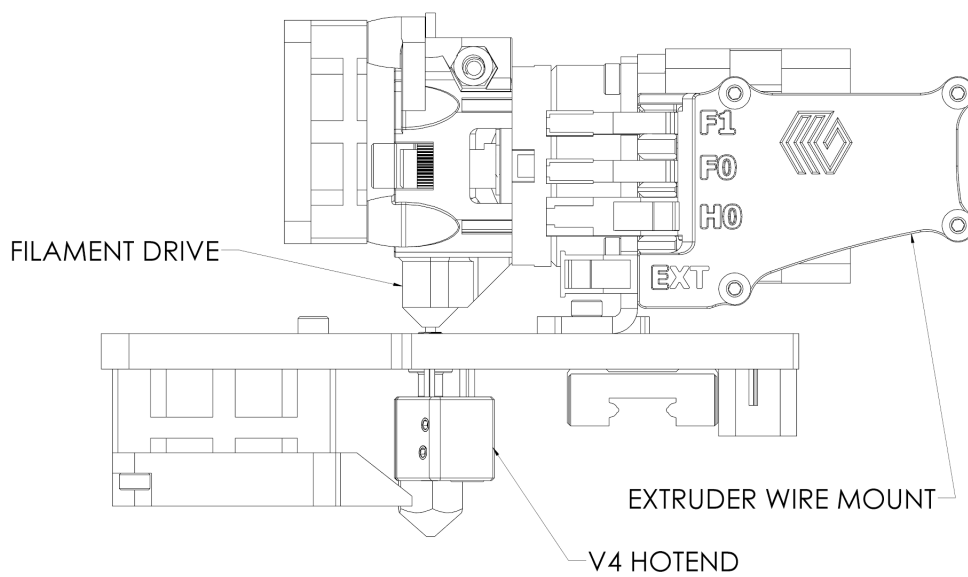
M2 Features Extruder Assembly



ISOMETRIC VIEW



SIDE VIEW





What's the Function?

Simple explanations of M3-ID Features

40x10 mm Fans (24 V) cool filament drive and RAMBo board.

40x15 mm Fan (24 V) cools printed layers (as needed).

6-Position Power Connector brings low voltage DC power to M2.

Extruder Wire Mount locates and clamps connectors for extruder.

Filament Drive pulls filament into extruder.

Filament Guide guides filament from spool to filament guide tube.

Filament Guide Tube guides filament from filament guide to filament drive.

Glass Build Plate (with polyimide film) serves as the print surface.

Heated Build Platform (HBP) controls glass build plate temperature.

M2 Serial Number is a unique identifier for each printer.

RAMBo Housing shields and cools RAMBo processor board.

Reset Button resets the control electronics and shuts down the printer.

SD Card Reader reads stored command info from SD Card.

Spool Holder secures the filament spool during printing.

USB Port allows communication between external computer and RAMBo.

V4 Hot End melts filament and controls extruded diameter of filament.

X-Axis Belt keeps extruder in sync with X-motor.

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

X-Axis Rail guides extruder during side-to-side movement.

Y-Axis Belt keeps heated build platform in sync with Y-motor.

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

Y-Axis Rail guides heated build platform during front-to-back movement.

Z-Axis Fine Adjust Knob is for last-minute changes to the distance between nozzle and glass build plate.

Z-Axis Leadscrew rotates to move HBP up and down.

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



Filament Settings



The MakerGear M2, with its V4 hot end operable at 300 °C, is capable of running a wide variety of materials. The table below recommends settings for a few of the most popular materials.

Material	Temperature, °C		Recommended Printing Speed, mm/min	Extrusion Multiplier	Fan Setting	Recommended Nozzle
	Hot End	Bed				
PLA	215 - 220	60 - 70	2800 - 4000	0.95	100% After First Layer	0.35 mm Brass
ABS	255 - 265	105 - 115	2800 - 4000	1	No Fan	0.35 mm Brass
PET-G	240 - 250	65 - 75	2800 - 4000	0.95	100% After First Layer/No Fan	0.35 mm Brass
Carbon Fiber Nylon	255 - 265	105 - 115	2800 - 4000	1	No Fan	0.5 mm Stainless Steel
TPE/TPU (Shore A 95)	210 - 225	55 - 60	500 - 1500	1.1	100% After Second Layer	0.5 mm Brass



Maintenance & Storage

Weekly Maintenance (every 50 hours)

Ensure that the heated build platform (HBP) is at the correct height and properly leveled. To do so, open the MakerGear QuickStart app and follow the Set Up process in order to complete the following steps:

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

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

Monthly Maintenance (every 200-250 hours)

Ensure that the printer is free of dust and filament debris, and clean it if necessary. Focus areas include fans and fan guards, filament surface and filament drive, and the entire frame. Clean the 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 each axis through its full travel multiple times to spread the oil.

M2 Storage

- If you are using the M2 regularly, turn off and unplug the power supply when finished.
- If you are storing the M2 for a period of 1-2 weeks, follow the instructions listed above. Additionally, fully seal the filament spool in a bag, preferably with a new desiccant packet inside.
- If you are storing the M2 for a period of 2 weeks or more, follow all above instructions, THEN cover the entire printer in order to protect it from the buildup of dust and other airborne particles.

DO NOT unscrew the nozzle directly from the M2. To change or remove the nozzle, the entire hot end must be removed. Visit our website or the MakerGear YouTube channel for step-by-step instructions on how to remove a hot end and change the nozzle.



Warranty & Support



Warranty

New M2s ordered from MakerGear or from an authorized MakerGear distributor have a Six-Month 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. Non-US customers are responsible for shipping costs for replacement parts. If you need to return your printer to us for any reason and do not have the original packaging, there will be a cost (\$100 within the US) for us to send a new box and foam out to you.

Exceptions

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

Support

Technical Support lives on our website at
www.makergear.com/pages/support

Notice

This is a Class A product. In a domestic environment, this product may cause radio interference requiring the user to take adequate measures to mitigate. The MakerGear M2 can, in very rare cases, stop operating due to electrostatic discharge (ESD). Operation can be restored by turning the machine off and on again.



About Us



Welcome to the family!

Our company began as a hobby in an unheated residential garage, 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 printers, which are made and tested in the USA using domestic and foreign parts. Yet despite countless 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 printers, excellent customer service, and a user-centric 3D printing experience. Focusing on these three pillars 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 community, located at forum.makergear.com.

For general inquiries, you can reach us by email at info@makergear.com.

For technical assistance, please visit our website's support page to access our support resources as well as instructions for how to submit a support ticket.

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

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



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©2018 MakerGear. MakerGear LLC
23632 Mercantile Road Unit G
Beachwood, Ohio, US 44122