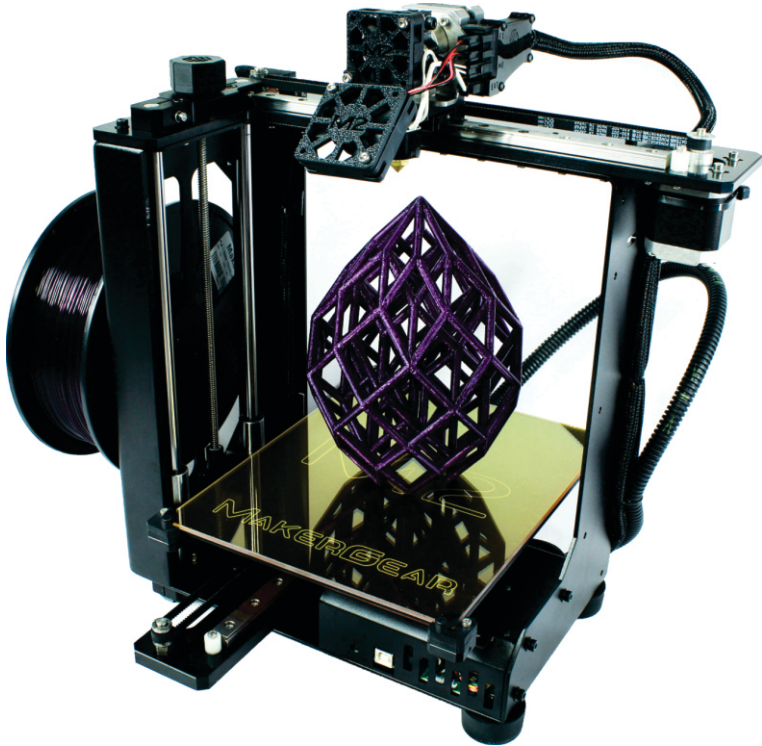


MAKERGEAR



USER GUIDE



M2

V4 REV. E

MADE IN THE USA SINCE 2009

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WELCOME



Your MakerGear M2 3D Printer has arrived!

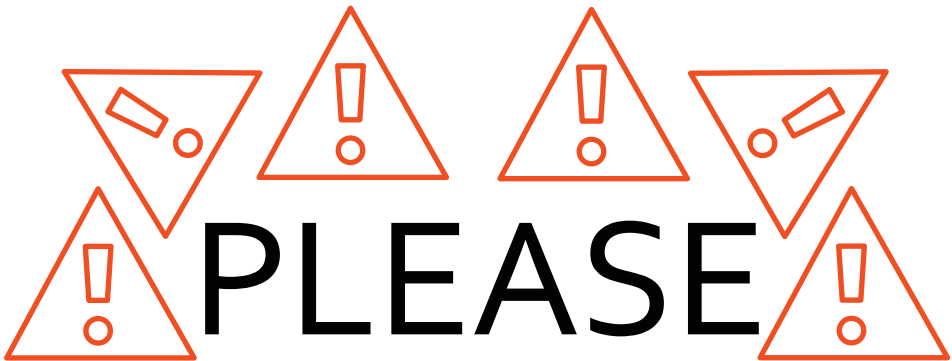
With the exception of minimal set up, your M2 is ready to print out-of-the-box. To ensure both safety and high quality printing, carefully follow the Set Up instructions included in this booklet. This machine was assembled and tested at the MakerGear shop in Beachwood, Ohio, USA and was fully operational 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, where you can also access more specific instructions and resources.



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



Do not change your M2's firmware unless you know exactly what you're doing or have been instructed to do so by MakerGear 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— ensure that the voltage setting is correct for your outlet before powering on.



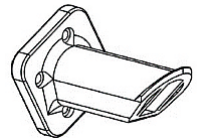
Tool kit, M3 driver, tweezers, filament guide tube, polyimide tape, USB cord, feeler gauge, and 4 extra bed hold-down clips.



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



Spool holders with screws and a sample print, both of which were printed on your M2 using files on the included SD card.





Set Up



- 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 please read) WARNING sheet from underneath your glass bed** by removing the binder clip. Rotate the bed hold-down clips to point toward the front and back of the bed in order to secure the glass in place.
- 2 Unpack the power supply and set the Voltage Switch to the voltage supplied through your outlet. There are only two settings: 115V (for 100 – 130V) and 230V (for 220 – 240V). To find the standard voltage level for your country, visit www.worldstandards.eu/electricity/plug-voltage-by-country/.
- 3 **Install the Spool Holders** with the four screws using the 3 mm allen key, ensuring that the longer side is facing up. **Place your PLA on the Spool Holders** so that each tip unwinds upwards through its Filament Guide Tube. Cut the PLA so the tips are 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).

4 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.

5 "Download the MakerGear **Quick Start App** via www.MakerGear.com/pages/QuickStart-App. Carefully follow the instructions below to set your starting height and align your extruders' nozzles.

6 To use the Quick Start App with your M2e Dual, you must first elevate your nozzle 2 (right) approximately 2mm higher than nozzle 1 (left). After tightening the screw to secure nozzle 2 in its elevated position, simply follow the instructions provided by Quick Start in order to complete the "Check Platform" step for Extruder 1.

7 Loosen the adjacent screw slightly in order to lower Extruder 2 so that both nozzles are horizontally aligned. Use your feeler gauge to ensure that Extruder 2 is at the correct position. After you've placed Extruder 2 in the correct position, tighten the screw to secure it in place.

To access the

M2 Quick Start App Tutorial, visit

<http://www.makergear.com/pages/quickstart-app>



Printing - Dual Extruder

Both Pronterface and Simplify3D work with Dual Extruder units with only minor changes.

- 1 In S3D, to control the second extruder, you need only select "Tool 1" from the "Active Toolhead" drop-down menu in the Machine Control Panel; this will send any extruder control commands (Extrude, Retract or Set Temperature) to Tool 1, instead of the default Tool 0. Switching back to "Tool 0" as the Active Toolhead will allow you to control Tool 0 again.
- 2 In Pronterface, you first need to change the machine settings - click on the Settings menu, and then the Options item. In the "Edit settings" window that opens, you can change your machine preferences - we are most concerned with "Extruders count" at the bottom, which you will need to change from "1" to "2". Once changed, click "OK" to save the settings and close the window, and then close and open Pronterface to refresh everything.
- 3 Once that change has been made, you will have a "Tool: " item next to the Extruder controls, which will let you toggle between Tool 0 and Tool 1. All Extruder related commands (Set Temperature, Extrude and Retract) will apply to the selected Tool.
- 4 To preheat both nozzles for printing, you would first ensure that Tool 0 is select, and then Set your target temperature; then, select Tool 1, and Set that target temperature as well.
- 5 Once both extruders are up to temperature, you can select either and click Extrude to extrude filament; before attempting a print, ensure that both Tool 0 and Tool 1 have extruded filament.
- 6 Select Tool 0, and then select "MGkey.g" from the SD card to being printing. In S3D, that is done by clicking "Print from SD Card" and selecting "MGkey.g" from the list that pops up; in Pronterface, the same list can be accessed by clicking on "SD", and then "SD Print".



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 convert .STL files 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 "MGkey1.stl" and "MGkey2.stl" from your SD card onto a folder stored on your computer.
- 3 Download the most recent version of Slic3r from slic3r.org. Your slicer settings will be incorrect. To correct them, click "Load Config Bundle" under "File" and select the "DualConfig.ini" file available on your SD Card.

- 4 Import "MGkey1.stl" and "MGkey2.stl" into your slic3r, and arrange them on the bed to mimic the sample print included with your M2E Dual. Double-click one of the two models to bring up its properties, and select "Extruder 2" for that model, to have it print with the second (Tool 1) Extruder. Slice the plate (click "Export G-code..."), and then name it "myMGkey.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 (e.g., Printron by Pronterface, available at <http://www.pronterface.com/#download>) to instruct your M2 to print "myMGkey.g" from your SD card.

- * If this print does not have similar strength and appearance to the sample print included with your M2e Dual, reference 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, you can always contact MakerGear Support via www.MakerGear.com/support.



Changing Filament



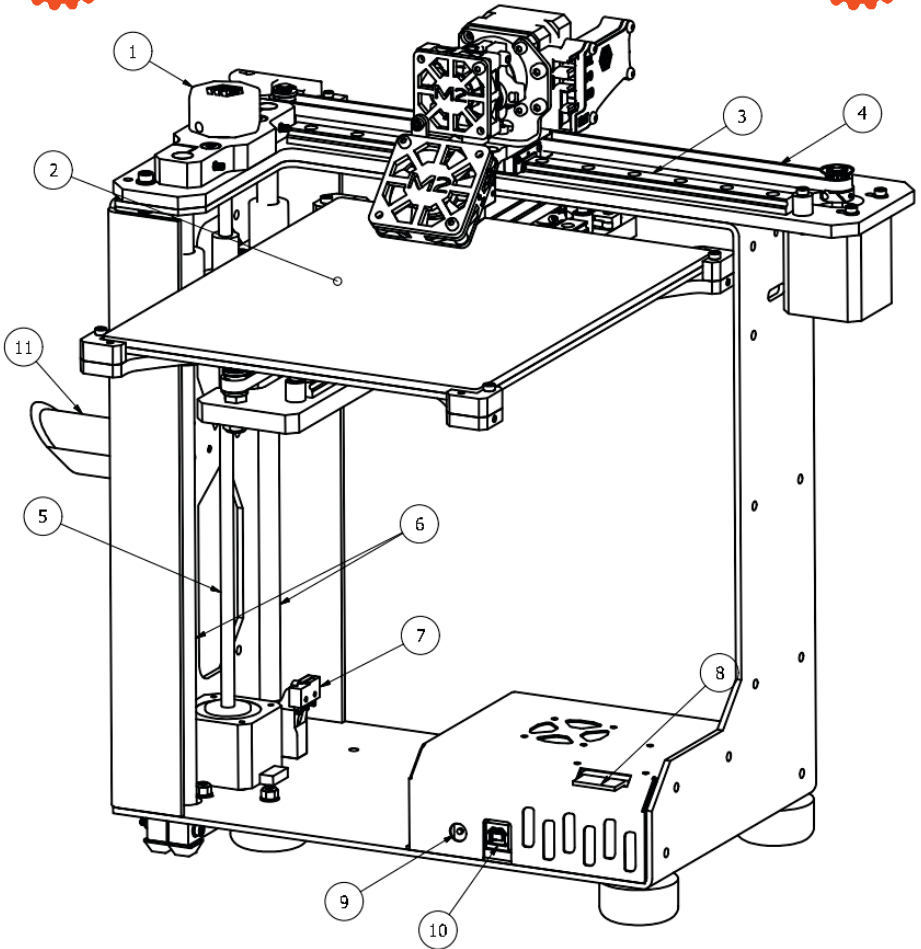
- 1 After ensuring that your hot end is hot enough to print with your current filament material, use the manual controls in your software package to "Retract" while pulling filament gently until it is released from filament drive.
- 2 If switching between filament material types (e.g., PLA to ABS), heat 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.



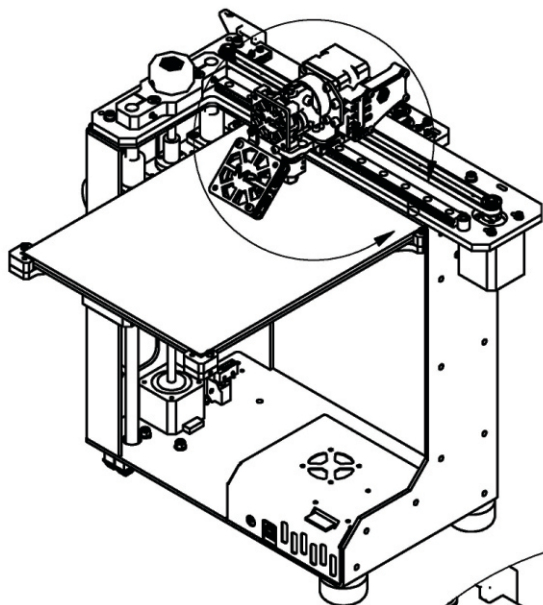
M2 Features



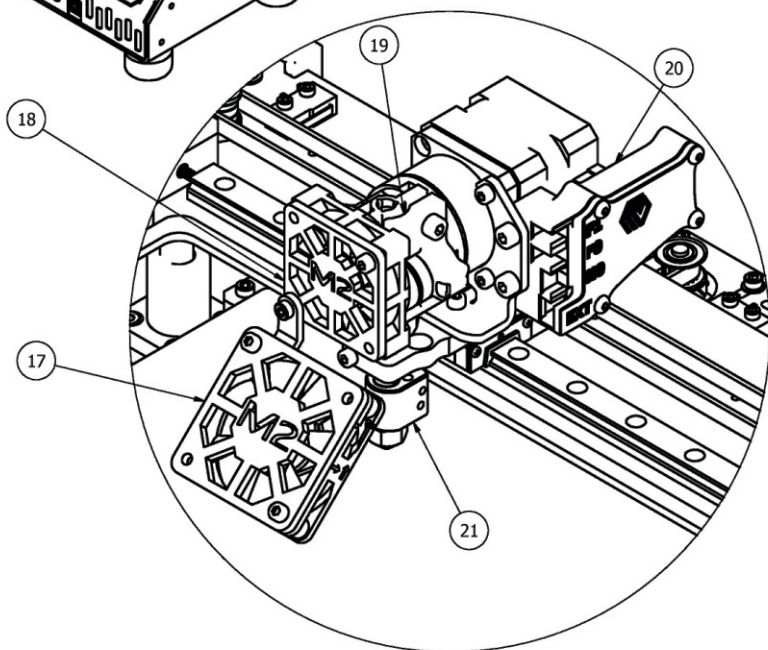
- 1 Z-Fine Adjust Knob
- 2 Heated Build Platform
- 3 X-Axis Rail
- 4 X-Axis Belt
- 5 Z-Axis Leadscrew
- 6 10mm Linear Rods
- 7 Z-Axis Limit Switch
- 8 SD Card Reader Slot
- 9 Manual Reset Button
- 10 USB Port
- 11 Spool Holder



M2 Features

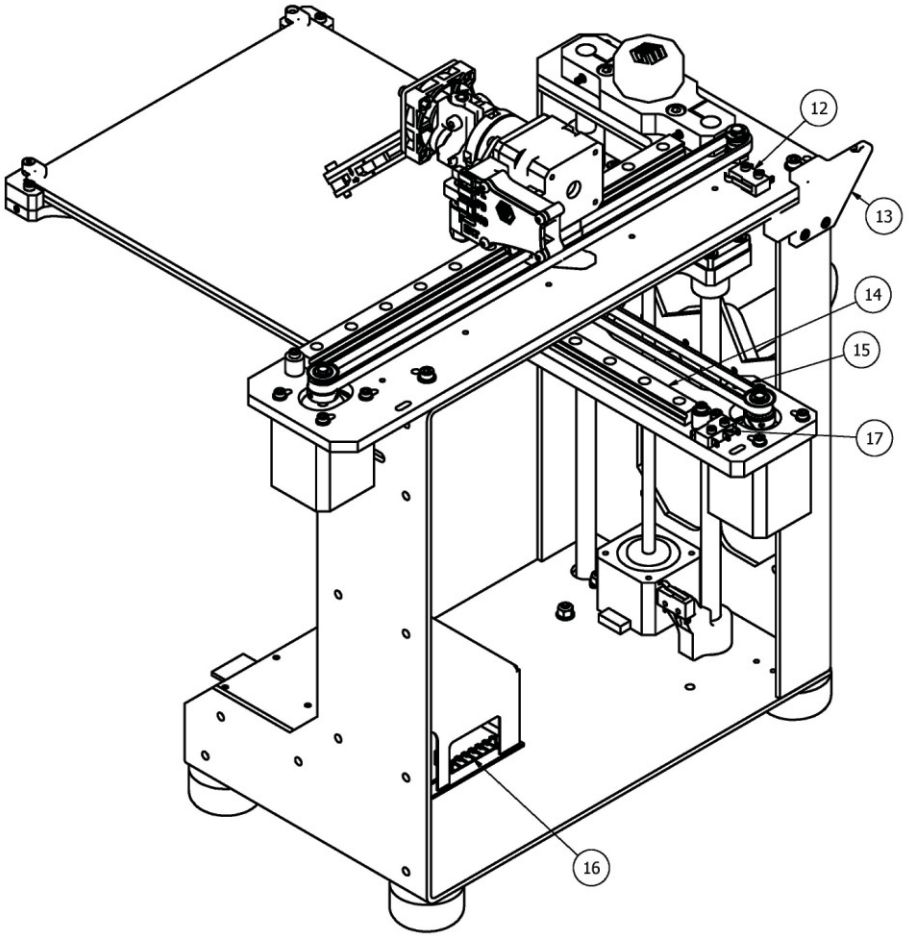


- 17 50 mm Fan
- 18 40 mm Fan
- 19 Filament Drive
- 20 Extruder Wire Mount
- 21 V4 Hot End



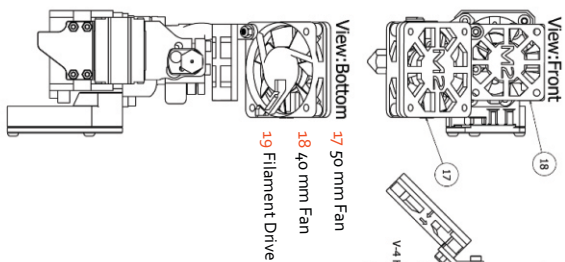


M2 Features



- 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



View: Front

View: Bottom

View: Side-right

View: Orthographic Projection

17 50 mm Fan

18 40 mm Fan

19 Filament Drive

20 Extruder Wire Mount

21 V/4 HotEnd

22 V/4 Nozzle





What's The Function?



Simple explanations of M2 Features.

6 Position Electronics Connector Brings power to your M2.

10 mm Linear Rods Guide your bed up & down.

40 mm Fan Cools your filament drive.

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

Extruder Wire Mount Houses wiring for the extruder.

Filament Drive Pulls filament into your extruder.

Filament Guide Guides your filament from spool to guide tube.

Heated Build Platform (HBP) Controls glass bed temperature.

Manual Reset Button Stops all current M2 operations.

SD Card Reader Slot Retrieves stored command info.

Spool Holder Keeps your filament spool secure during printing.

USB Port Receives command info.

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

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

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

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

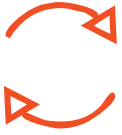
Y-Axis Limit Switch Sets "home" position for Y-axis motion.

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

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

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

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



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



Technical Support lives on our website
at 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



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



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



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 made and tested in the USA using domestic and foreign parts. Despite 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 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 support community 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

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

What are *you* making? Tag

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for a chance to be featured!



MAKERGEAR

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23632 Mercantile Road Unit G
Beachwood, Ohio, US 44122