DESKTOP PRINTER
QUICK START GUIDE

Markforged

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Version 1.0 / September 2019

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MATERIAL NOMENCLATURE

In this guide, "Onyx" refers to Onyx and Onyx FR; "Nylon" refers to Tough Nylon and Nylon White.

TABLETOP USE ONLY

Markforged Desktop Series printers are approved for tabletop use only. Set up your printer on a sturdy level surface with sufficient access on all sides. The printer is not approved for free-standing floor use.

POWER DISCONNECT ACCESS

Take care to set up your Desktop Series printer so that the disconnecting device (power switch on the rear face of the printer) is accessible at all times. Note that the power cord can be disconnected as a backup if the power switch becomes inoperable or inaccessible.

CLEANING/DECONTAMINATION

The printer interior and exterior can only be wiped down using a damp microfiber cloth. The clear shield can be cleaned with a microfiber cloth and non-abrasive window cleaner, as other cleaning agents could permanently fog or scratch the surface. Please follow instructions below (*Reducing Burn Risks*) when cleaning your printer.

REDUCING BURN RISKS

- Do not touch the nozzles and print head when hot, unless explicitly instructed to do so by Markforged documentation or personnel
- During a print run, leave all doors closed

ALWAYS FOLLOW SAFETY INSTRUCTIONS

Failing to use your Desktop Series printer in the manner specified by the manufacturer may lead to unsafe operating conditions. Follow all safety instructions posted on the unit and in the written documentation.

Note: Consult the included Safety Sheet *for an explanation of the safety icons used in this manual.*

NOTE ON FIBER CAPABILITY

This *Quick Start Guide* covers all models of Markforged Desktop Series printers. If your printer model is not fiber-capable, some of the sections in this *Quick Start Guide* may not apply. Such sections are indicated by the Markforged logo icon at left.

UNBOXING AND ASSEMBLY

WHAT'S IN THE BOX

Your Desktop Series printer ships with a number of accessories, listed below. With the exception of the last four items, everything on the list below can be found in the accessory kit shipped inside your printer.

Note: To make full use of your Desktop Series printer, you will need these additional items: wire cutters; masking tape, painter's tape, or similar; a scale accurate to 1 gram.

- Drybox adapter plug
- 2mm hex key
- 2.5mm hex key
- 3mm hex key
- Plastic shim (in envelope)
- Fiber shim (in envelope)
- 3 fiber nozzles with PTFE tubes installed
- 5 fiber PTFE tubes
- Fiber nozzle torque bit (10mm)
- Plastic nozzle torque bit (7mm)
- Torque wrench
- Plastic feed tube
- USB-A to USB-B cable and cable extender
- Tweezers
- Glue stick (applied to print bed before each print)
- Anti-Seize (applied to plastic/fiber nozzles when installing)
- 3 plastic nozzles
- Wi-Fi antenna
- Scraper
- TrueBed
- 2 50cc spools of carbon fiber (for Mark Two only)
- 50cc fiberglass
- 50cc Kevlar (for Mark Two only)
- 50cc HSHT (for Mark Two only)
- Drybox — shipped separately
- Plastic (Onyx or nylon) spool — in drybox
- Spindle and spindle cap — in drybox
- Power cord — on top of printer

UNBOX AND ASSEMBLE YOUR PRINTER

Supplies

- 3mm hex key
- Wire cutters or similar tool

Please take care when unboxing and assembling your Desktop Series printer. The printer is heavy and may require two people to move or set up. Never lift the printer by its plastic visor. When you finish unboxing your printer, retain the box and protective foam for future shipping.

1. Review the *Safety Sheet* that came with your printer.
2. After opening the box containing your printer, perform a two-person lift to remove the printer from the box and set it up in its operating location, on a table or stand rated to support its weight. Position the printer such that its visor opens from the front and the back face remains accessible.
3. Remove the *Getting Started* card from the visor and set it aside, then remove and discard the plastic wrap and any tape.
4. Remove the accessory kit from the printer. Remove and discard the plastic wrap.
5. Using wire cutters or a similar tool, carefully remove the two zip ties from the print chamber.
6. Screw the Wi-Fi antenna onto the SMA jack in back of the printer, or plug the Ethernet cable into the Ethernet port.
7. **Adjust belt tension:** Manually move the print head to the back left corner of the print chamber. Download a tuning app on your mobile device (see note). Place your phone's microphone close to, but not touching, the back belt and pluck the front stretch of the back belt like a guitar string. Use a 3mm hex key to adjust the rear belt tensioner until the app reads a frequency of **49Hz**. Repeat this process with the *back* stretch of the *front* belt and adjust the *front* belt tensioner until the app reads a frequency of **62Hz**. *Note: We recommend the free version of either the Fine Tuner app (for iOS) or the Fine Chromatic Tuner app (for Android).*
8. Plug the power cord into the printer and wall outlet.
9. Turn your printer on and wait for it to power up; initial startup will take several minutes.
10. Connect your printer to the Internet via:

    - **Ethernet:** Select the Ethernet icon from the dashboard and navigate to **Ethernet > Done**.
    - **Wi-Fi:** Select the Wi-Fi icon from the dashboard and navigate to **Wi-Fi > Configure**. Use the arrow button to select a network from the **Network Name** drop-down menu and enter the password if necessary. Then, press **Save**.
    Note: If there are no networks listed in the drop-down menu, power cycle your printer and repeat these steps.

11. Update firmware by selecting the menu icon from the dashboard and navigating to **Settings > Update Manager > Cloud Update**. To update firmware via USB, please see *Updating Firmware* in the *Desktop Printer User Guide*.

QUICK START GUIDE

GUIDE INTRODUCTION

This guide is designed to walk you through the process of setting up your printer and printing for the first time.

Before diving into the printing process, please ensure that you have completed the following steps as described in this *Quick Start Guide:*

- Unbox or unpack your printer, drybox, and all other components that were shipped with your printer.
- Review the safety instructions that came with your printer
  Note: Please consult the Safety Sheet *for explanations of the icons used in this document*
- Review the *Network Requirements* section at the end of this *Quick Start Guide*
- Connect your printer to the Internet and apply any available firmware updates

Most Desktop Series users print online via Wi-Fi or Ethernet. This guide will walk you through the setup necessary for online printing. If you experience network issues or cannot print online at any point, a version of this guide for offline printing can be made available.

Supplies

- Drybox
- Plastic feed tube
- Unopened bag of plastic filament
- Unopened spool of fiber filament (if applicable)
- Tweezers
- Glue stick
- Leveling shims (in envelope)
- Scraper
- 2.5mm hex key
- Wire cutters or similar tool (not included in accessory kit)
- Masking tape, painter's tape, or similar (not included in accessory kit)

LOAD PLASTIC

Note: The print head will become hot during the plastic loading process. Exercise caution when working near the nozzles.

Only use materials that have been approved by Markforged for use with this printer. The Desktop Series is designed to work only with proprietary materials and consumables from Markforged.

Always follow proper procedures when storing plastic materials. Nylon or Onyx that has absorbed too much moisture from the air will often cause underextrusion, which can cause print failures. Please take special

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care to **never** leave plastic materials exposed to ambient air, and **always** keep plastic materials in the provided drybox.

1. Open your drybox and remove the spindle from the inside. Pull the magnetic spindle cap and spindle body apart.

2. After verifying that the plastic filament material bag has no holes, remove the spool from its packaging. Place the provided desiccant packs in the corners of the drybox.

3. Place the spindle through the center of the spool of plastic filament and attach the spindle cap such that the magnets connect.

4. Place the spool and spindle in the drybox such that filament exits from the **top** of the spool.
Note: The plastic spool is wound under tension. Always hold the plastic against the spool to prevent unwinding during the loading routine.

5. Cut the plastic filament at a 45° angle.

6. Insert one end of the plastic feed tube into the adapter on the side of the drybox, then feed the plastic filament all the way through the tube such that it extends out the other end.

7. Close the drybox cover and press the latches closed until they click **twice each**.
    Note: Ensure that the drybox remains closed and fully latched at all times, except when quickly loading or replacing filament.

8. Feed the plastic feed tube through the opening in the back of your printer and let it hang freely.

9. Run the Load Plastic routine by selecting **Menu > Materials > Load Plastic > Meter Load** on your printer's touchscreen. Input the type of plastic that you are loading and select **Full Spool**. Follow the onscreen instructions to load plastic before moving on to the next section.

    A. Wait for the plastic nozzle to heat up before feeding filament into the plastic extruder.
    B. Once the extruder motor catches the filament, insert the unattached end of the plastic feed tube into the fitting on the back of the plastic extruder.
        Note: The plastic extruder will start to click as material is extruded from the nozzle. This is normal and expected behavior for the material loading process.

10. Use tweezers to remove extruded plastic material from the nozzle.

LOAD FIBER

1. Open your fiber filament material bag and remove the fiber spool.

2. Hold the end of the fiber to keep it from unspooling and remove the tape from it.

3. Carefully unwind two and a half feet of material from the spool, then re-apply the tape to keep the rest of the material from unspooling.
   *Note: To avoid bending the material, tape it to the **inside** of the spool wall.*

4. Use wire cutters or a similar tool to trim off any filament that appears bent, as it may be difficult to load.

5. Feed the cut end of the material through the fiber feed tube until it reaches the fiber extruder.

6. Run the Load Fiber routine by selecting **Menu > Materials > Load Fiber > Meter Load** on your printer's touchscreen. Input the type of fiber that you are loading and select **50cc Full** or **150cc Full**, depending on the spool size. Follow the onscreen instructions to load fiber. As the fiber is loading, follow steps 7 and 8 below to place your fiber spool on the spindle without letting it unravel.

7. As the fiber feeds through the fiber extruder, put the fiber spool on the spindle such that material exits from the bottom of the spool. Place the magnetic cap on the spindle to keep the spool in place.
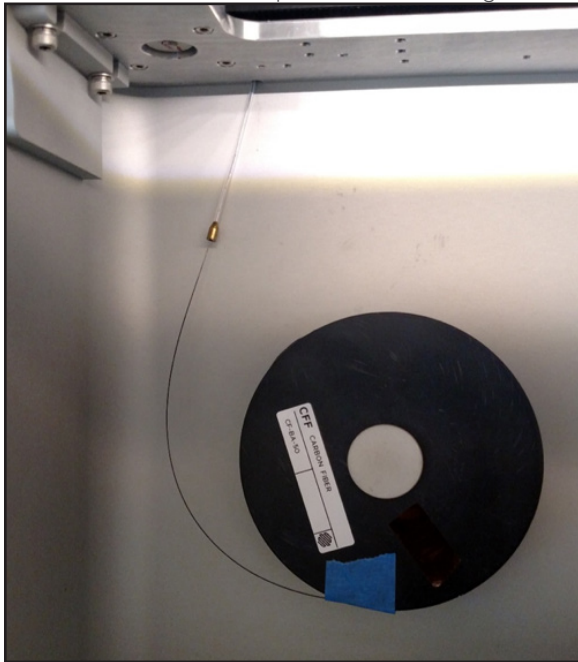
8. When the fiber is under tension on the spool, remove the tape from inside the spool and set it aside for later use. We recommend taping it to the front face of the spool.


9. At the end of the Load Fiber routine, remove the cut piece of fiber from the print head.

SET UP YOUR PRINT BED

Before printing a part, you will need to level your print bed and apply glue to the region of the bed where the parts will print. Leveling the print bed provides the best chance of print success and minimizes warping. Applying glue ensures a well-adhered first layer and allows for easier part removal.
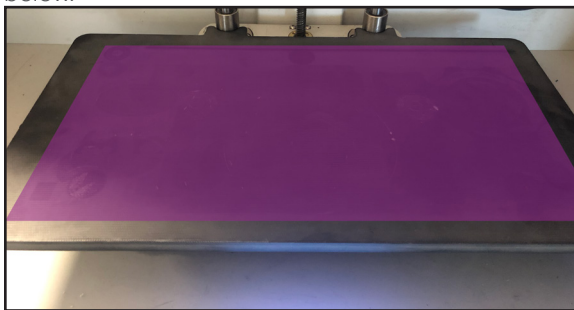
1. Install the print bed on the printer.
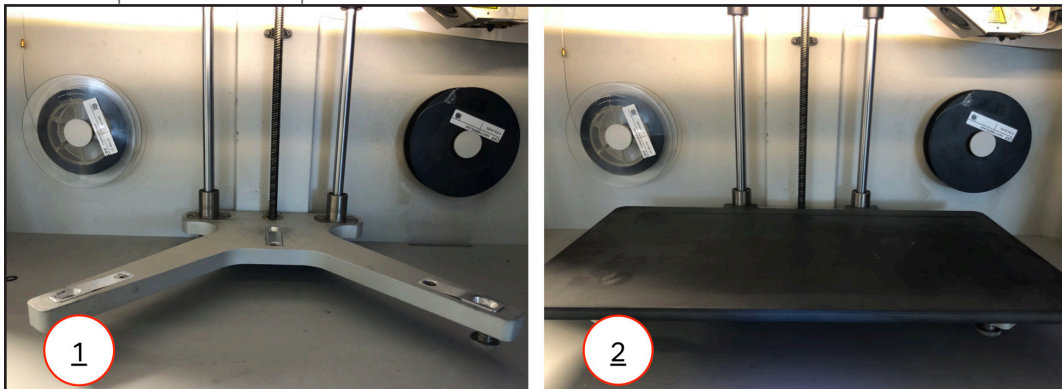
2. Run the Shim Bed Level utility by selecting **Menu > Bed Level > Shim Bed Level** on your printer's touchscreen and following the onscreen instructions.
   *Note: The print head will move autonomously during this utility.*

3. Apply a thin layer of glue from the provided glue stick to the print bed, as shown in purple in the image below.
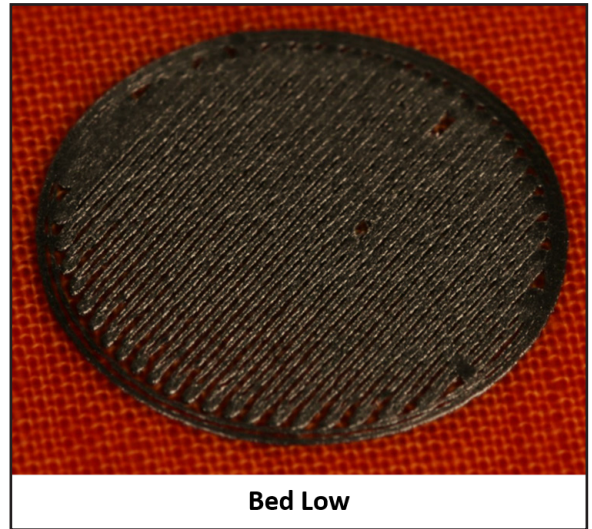

4. Run the Bed Level Test Print utility by selecting **Menu > Utilities > Test Prints > Bed Level Test Print** on your printer's touchscreen.
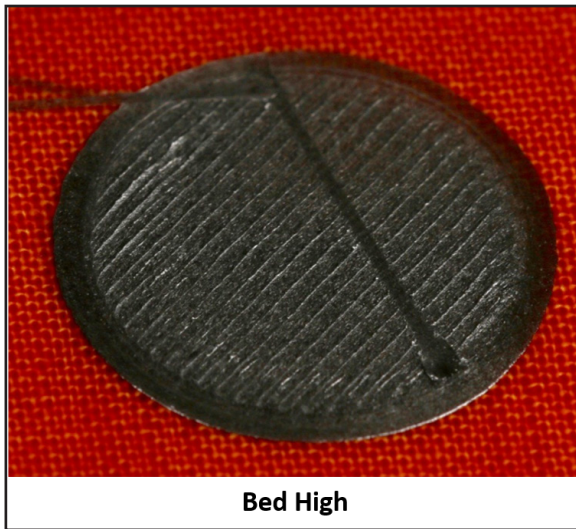
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5. Evaluate the resultant disks to see if your bed needs to be adjusted. Compare your results with each of the example disks below.
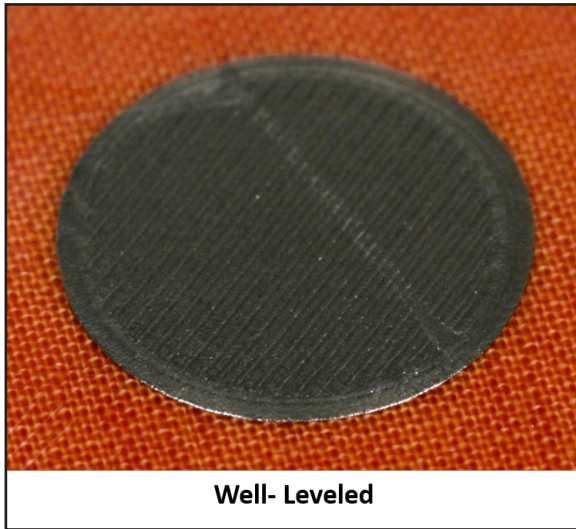
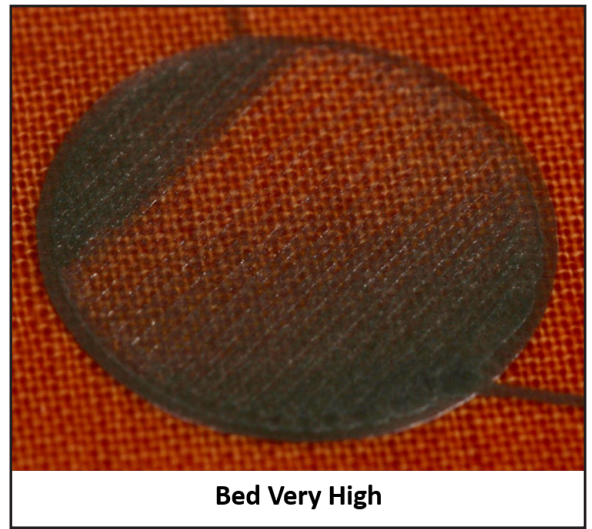**Well- Leveled**

Uniform and solid: Well-leveled

Bed Low

Stringy material or the lines don't connect completely to the outer circle: Bed low

Bed High

Flattened or overly pressed down: Bed high

**Bed Very High**

Inconsistently or not entirely laid down: Bed very high

6. If the disks over each of the adjustment thumbscrews indicate proper leveling, skip to step 7. If any of your disks indicate a high or low nozzle, complete the following steps and then re-evaluate your results:

- Remove the print bed from the printer and use the provided scraper to peel the disks off the print bed
- Use warm water to clean the glue off of your print bed
- Reapply glue to the print bed in the same spots as before
- Run the Shim Bed Level utility again but do not loosen the thumbscrews under the print bed when prompted to do so. Base your adjustments off of the results of the previous test print

7. Apply glue to the print bed as shown below.
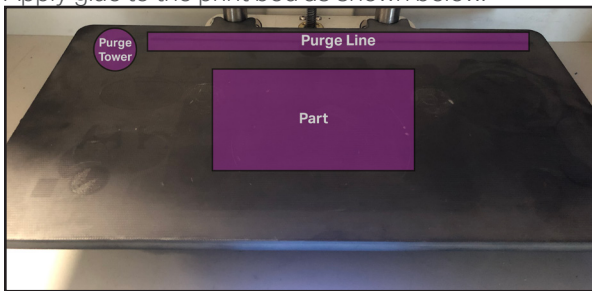
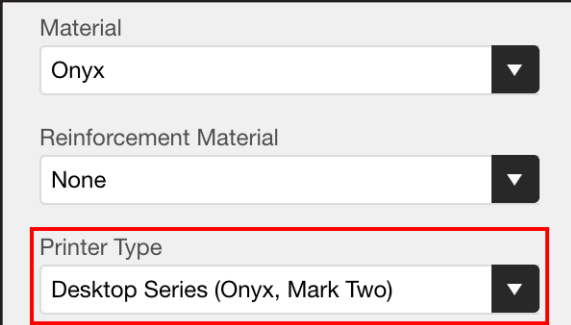8. Re-install the print bed on the printer.

PRINT YOUR FIRST PART - ONLINE VERSION

Note: We recommend that users use the online version of Eiger and print via Wi-Fi or Ethernet, but if you are unable to connect your printer to Eiger, please see the section titled Offline Printing *in the* User Guide*.*

Each user has an Eiger **account** belonging to a single Eiger **organization**. You can only use printers registered to your organization; printers can only belong to only a single Eiger organization.

- If you have an Eiger account in the appropriate organization, proceed to step 1.
- If you do not yet have an Eiger account and wish to create a new Eiger organization, navigate to *eiger.io* in your Google Chrome browser and create a new Eiger account and organization. Proceed to step 2.
- If you do not yet have an Eiger account and wish to register your printer to an existing Eiger organization, request an invitation from the organization's administrator. Follow the instructions in the invitation email to create your Eiger account, then proceed to step 1.
- In the unusual event that you need to switch organizations before registering your printer, you must first delete your Eiger account (**Settings > Account > Delete Account**), then follow the appropriate instructions above.

1. Log in to your Eiger account: navigate to *eiger.io* in your Google Chrome browser and enter your login credentials.

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2. In Eiger, select **Settings > Account > Printers > Register Device**. Enter your printer's information in the respective fields. This information can be found on the sticker on your *Getting Started* card, as well as by selecting the menu icon from the dashboard and navigating to **Settings > System Info**.
*Note: You do not need to include any hyphens in the **Device ID** field.*

3. Select the **Logo Keychain Onyx** project from your Eiger library.

4. Select **Desktop Series** from the **Printer Type** drop-down menu in the **Part Settings** panel on the right side of the screen.
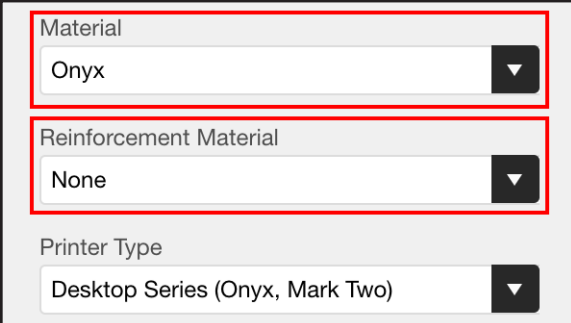
Material
Onyx

Reinforcement Material
None

Printer Type
Desktop Series (Onyx, Mark Two)

5. Select the material types that you will use for this print from the **Material** and **Reinforcement Material** drop-down menus in that same panel.
Note: This part can be printed with any combination of fiber and plastic. If you have loaded materials other than the defaults for this part, please update the materials field in Eiger to reflect your materials. If you print this part in nylon, consider changing the name of the part in the top left corner of the page to reflect the material change.
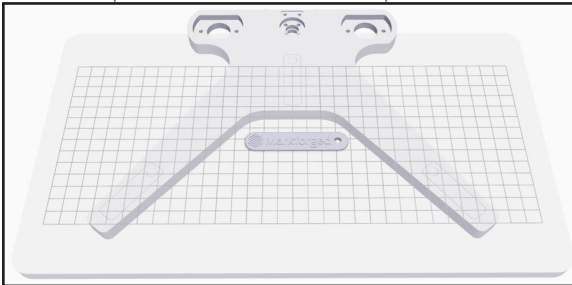
Material
Onyx

Reinforcement Material
None

Printer Type
Desktop Series (Onyx, Mark Two)

6. Click **Save**.

7. Click **Print** at the bottom right corner of the screen.

8. Move the part to the center of the printable area displayed on the screen.

9. Select your printer from the drop-down menu in the **Printing Settings** panel at the right side of the screen.

10. Wait for the print to finish successfully; this should take less than an hour.

11. Remove the print bed from the printer and use the provided scraper to remove the part from the print bed.

__Warning: The scraper provided with Markforged printers is sharp and can cause injury if used incorrectly.__

Tip: Always scrape away from your body. When removing a part, brace the bed in a vertical position against a sturdy level surface. Slide the scraper under the corner of the part. Always keep fingers or other body parts out of the path of the scraper when removing a part from the print bed. Maintain an acute angle between the scraper and the print bed while you are removing your part.

12. Use warm water to clean the glue off the print bed.
    Note: Do not use soaps or other cleaners, as these may damage or leave residue on the bed.

NETWORK REQUIREMENTS

Markforged devices communicate on the 2.4GHz Wi-Fi band. For assistance with setting up your network, contact your internal IT team.

WIRED CONNECTIONS

Ethernet connections must utilize cables less than 30 meters in length.

DHCP

Markforged products support DHCP only. Static IP functionality is not supported.

PORTS/HOSTNAMES

Markforged products must have access to the following hostnames and ports:

HOSTNAME	PORT	PROTOCOL	REQUIRED?	REASON
s3.amazonaws.com	443	TCP	yes	device operation
mfeiger-production. s3.amazonaws.com	443	TCP	yes	device operation
cdn.eiger.io	443	TCP	yes	device operation
www.eiger.io	443	TCP	yes	device operation
*.pool.ntp.org	123	UDP	yes	network time protocol
ipv4.connman.net	80	TCP	no	online status check
data.logentries.com	443	TCP	no	remote logging
data.logentries.com	10000	TCP	no	legacy remote logging if software version older than 9/14/2018

BROWSER

Markforged products require the Google Chrome browser. WebSockets must be enabled.

If you are unable to connect to your printer due to network issues, you will still be able to print offline via USB.