

# MONOPRICE

MP Mini Deluxe SLA LCD High Resolution Resin 3D Printer



P/N 30994

**User's Manual**

# CONTENTS

- SAFETY WARNINGS AND GUIDELINES .....4
- INTRODUCTION.....6
- FEATURES.....6
- CUSTOMER SERVICE.....6
- PACKAGE CONTENTS .....7
- MINIMUM SYSTEM REQUIREMENTS.....7
- RECOMMENDED ITEMS.....7
- PRODUCT OVERVIEW .....8
  - Front View.....8
  - Rear View.....8
- INSTALLATION .....9
- MP CREATION WORKSHOP REFERENCE.....12
  - Main Screen.....12
  - Loading a File .....14
  - Scene View.....14
  - Move View.....15
  - Mirroring Objects.....16
  - Scaling Objects .....17
  - Rotating Objects.....18
  - View Options.....19
  - Working with Model Support Tools .....20
  - Saving a Scene .....21
  - Slice View .....21
  - Control Screen.....22

Configure Machine .....	23
Configure Slicing Profile .....	24
Slicing a Model.....	26
Connecting the Software to the Printer.....	26
SPECIFICATIONS.....	27
TECHNICAL SUPPORT.....	28
REGULATORY COMPLIANCE.....	28
Notice for FCC.....	28
Notice for Industry Canada.....	29

# SAFETY WARNINGS AND GUIDELINES

Please read this entire manual before using this device, paying extra attention to these safety warnings and guidelines. Please keep this manual in a safe place for future reference.

- This device is intended for indoor use only.
- Take care to avoid spilling resin on or in the printer. Wipe up any spills immediately. If resin or moisture does get in the printer, immediately unplug it from the AC power outlet and allow it to fully dry before reapplying power.
- Do not touch the device, the power cord, or any other connected cables with wet hands.
- Do not install this device on an unstable surface where it could fall and cause either personal injury or damage to the device and/or other equipment.
- Do not expose this device to excessive vibration. Do not subject the product to extreme force, shock, or fluctuations in temperature or humidity.
- Ensure that the cooling fan is not blocked and that it operates as intended.
- This device ventilates excessive heat through the slots and openings in the case. Do not block or cover these openings. Ensure that the device is in an open area where it can get sufficient airflow to keep from overheating.
- Prior to operation, check the unit and power cord for physical damage. Do not use if physical damage has occurred.
- Before plugging the unit into a power outlet, ensure that the outlet provides the same type and level of power required by the device.
- This device uses a grounded power cord and requires a ground connection for safe operation. Ensure that the power source has a proper ground connection. Do not modify the plug or use a "cheater" plug to bypass the ground connection.
- Disconnect the unit from the power source when replacing the fuse. Replace the fuse only with the same type.
- Unplug this device from the power source when not in use.

- Take care to prevent damage to the power cord. Do not allow it to become crimped, pinched, walked on, or become tangled with other cords. Ensure that the power cord does not present a tripping hazard.
- Never unplug the unit by pulling on the power cord. Always grasp the connector head or adapter body.
- This device has no user serviceable parts. Do not attempt to open, service, or modify this device.
- In the event of serious operating problem, stop using the unit immediately.
- This device is intended for use by persons 14 years of age or older. Adult supervision is required.
- Keep out of reach of children.
- Keep away from corrosive materials.
- This printer is designed to operate at temperatures ranging from +59 ~ +86°F (+15 ~ +30°C) with relative humidity from 20 ~ 50%. Printing outside this range is likely to result in lower quality prints.
- Do not leave the printer unattended during operation.
- The resin used in this printer is an irritant to skin and eyes. Always wear gloves and eye protection when handling resin.
- Always wear eye protection when cleaning or sanding printed models to avoid getting small particles in your eyes.
- Take care when using the scraper. Never direct the scraper toward your fingers or body.

## INTRODUCTION

This MP Mini Deluxe SLA LCD High Resolution Resin 3D Printer is a new type of 3D printer that uses the Direct UV-light Printing (DUP) technology. This printing method uses an LCD screen to expose the resin to focused UV light, which causes it to harden and form the model. It can print layers as thin as 20 microns, which results in extremely fine detail, making it ideal for medical, dental, and jewelry applications. It can print vertically at speeds up to 30mm/hour.

## FEATURES

- 5.5 inch IPS LCD curing screen
- 5.5 inch color LCD touchscreen control
- Layer thickness as low as 20 microns
- 4.8" x 2.7" x 7.1" (121 x 69 x 180 mm) print area
- Can print vertically as fast as 30mm/hour
- 0.00001mm X-axis and Y-axis accuracy, 0.004mm Z-axis accuracy
- Machined aluminum build plate
- 110 VAC 50/60Hz or 240 VAC, 50/60Hz input power (auto switching)
- Includes MP Creation Workshop software
- Compatible with Windows® and Linux® operating systems

## CUSTOMER SERVICE

The Monoprice Customer Service department is dedicated to ensuring that your ordering, purchasing, and delivery experience is second to none. If you have any problem with your order, please give us an opportunity to make it right. You can contact a Monoprice Customer Service representative through the Live Chat link on our website [www.monoprice.com](http://www.monoprice.com) during normal business hours (Mon-Fri: 5am-7pm PT, Sat-Sun: 9am-6pm PT) or via email at [support@monoprice.com](mailto:support@monoprice.com)

## PACKAGE CONTENTS

Please take an inventory of the package contents to ensure you have all the items listed below. If anything is missing or damaged, please contact Monoprice Customer Service for a replacement.

1x 3D printer	1x Latex gloves (pair)
1x Full enclosure hood	1x Print removal tools
1x AC power cord	1x Cleaning container
1x Replacement vat film	1x 250ml bottle of UV resin
1x Plastic spatula	1x User's manual

## MINIMUM SYSTEM REQUIREMENTS

- Dual core processor
- 4 GB RAM
- Double-output video card with HDMI® output and at least 500MB video RAM
- Windows® or Linux® operating system

## RECOMMENDED ITEMS

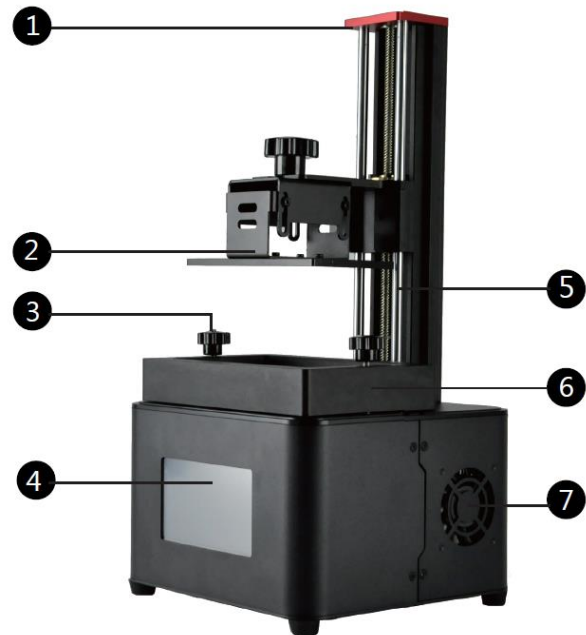
The following items are recommended to use when printing.

- Gloves
- Paper towels
- Industrial alcohol
- Soft brush or sponge to clean the object
- Plastic container to rinse the object

# PRODUCT OVERVIEW

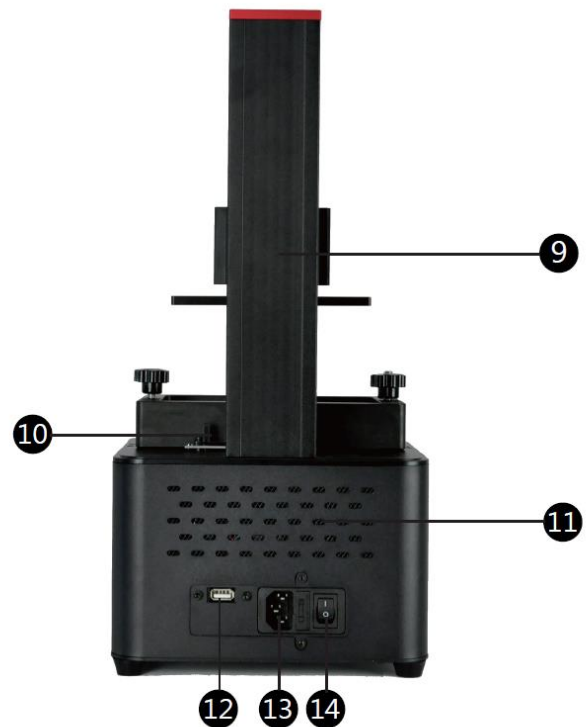
## Front View

1. Red anti-wobble cover
2. Machined aluminum build plate
3. Vat locking screw
4. LCD touchscreen
5. Double rail anti-wobble guide system
6. Re-usable resin vat
7. Triple cooling fan



## Rear View

9. Aluminum vertical beam
10. Photoelectric end stop switch
11. Ventilation holes
12. USB port
13. AC power socket
14. Power switch



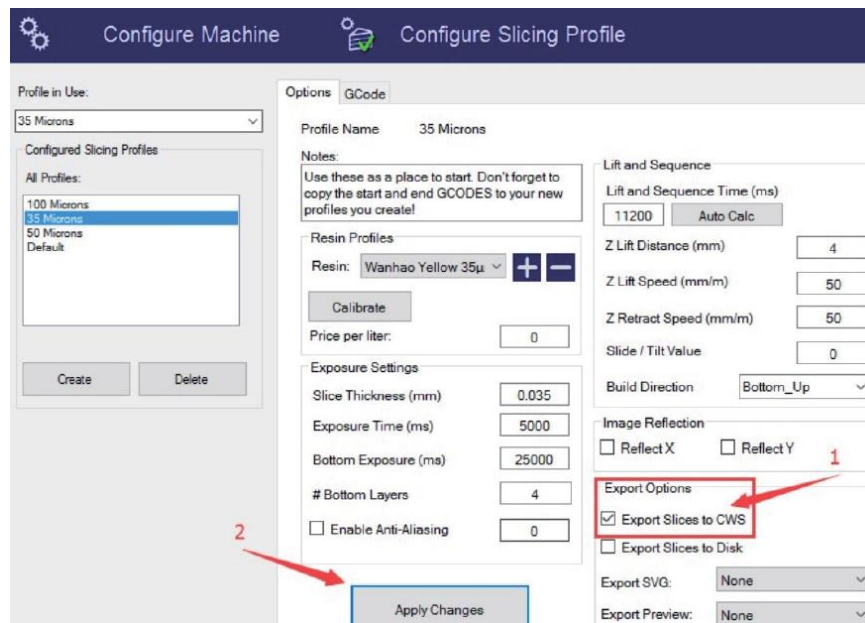


# INSTALLATION

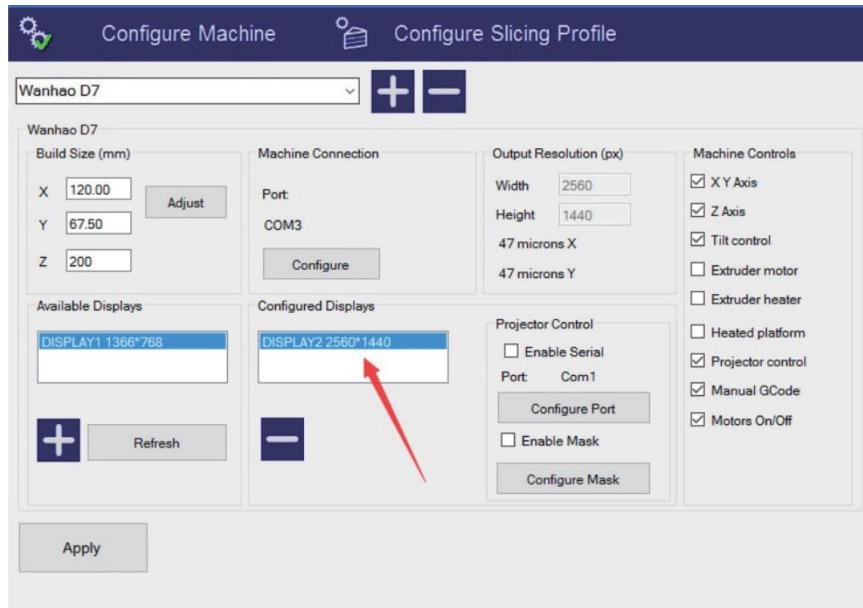
MP Creation Workshop is a .NET 3.5 application written in the C# programming language. This is native to the Windows® operating system, but also runs on many versions of Linux®/Posix using the Mono Framework ([http://www.mono-project.com/Main\\_Page](http://www.mono-project.com/Main_Page)). You will need to download and install the Mono Framework when using MP Creation Workshop on a Linux-based system. Windows users may need to run the application as Administrator.

Perform the following steps to install and setup the printer and software.

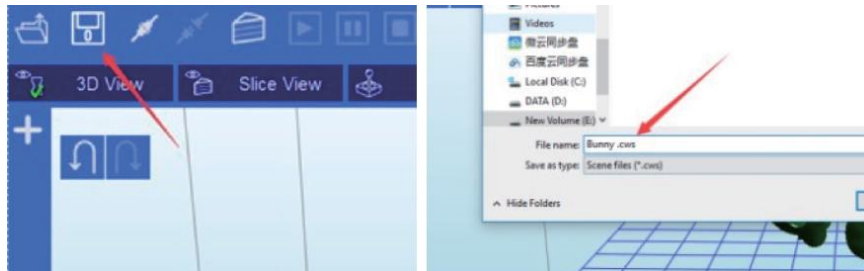
1. Launch the **MP Creation Workshop** software package.
2. Click the **Configure Slicing Profile** entry at the top of the screen.
3. Click the **Options** tab.
4. Locate the **Export Options** section and place a check mark in the box to the left of the **Export Slices to CWS** entry, then click the **Apply Changes** button.



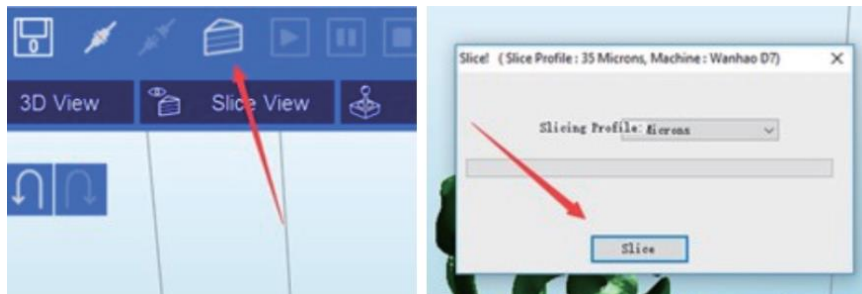
- Click the gears icon in the upper left corner, then ensure that the **Configured Displays** value is set to **2560 x 1440**.



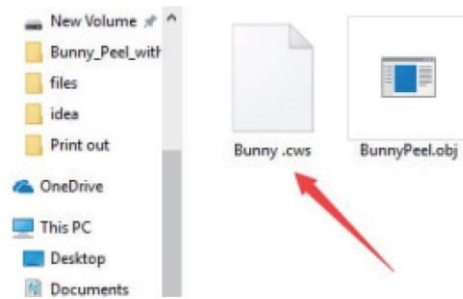
- Close the software, then restart it. The software will remember the settings you saved, so you don't have to configure it each time.
- Load a model, then save it with a **.CWS** file extension on your desktop or any folder. This will be the directory that the sliced model file will be saved to.



- Click the **Slice** button. The software will slice the model file and save it to the directory where the original model file is located. Depending on the size of the model and resolution, it can take some time to slice the model.

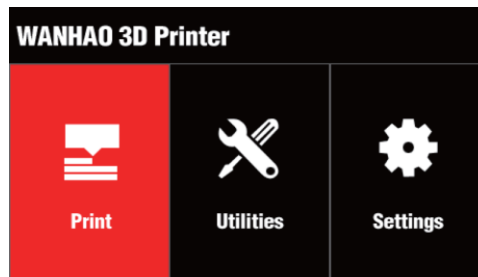


9. Once the sliced file is created, copy it to a USB flash drive for use with the printer.



10. Insert the USB flash drive into the USB port on the printer's rear panel, then flip the power switch to turn the printer on.

11. Touch the **Print** button on the printer's LCD display.



12. Touch the + button to add a file.



13. Locate and touch the file you saved to the USB flash disk, then touch the check mark to load the selected file.

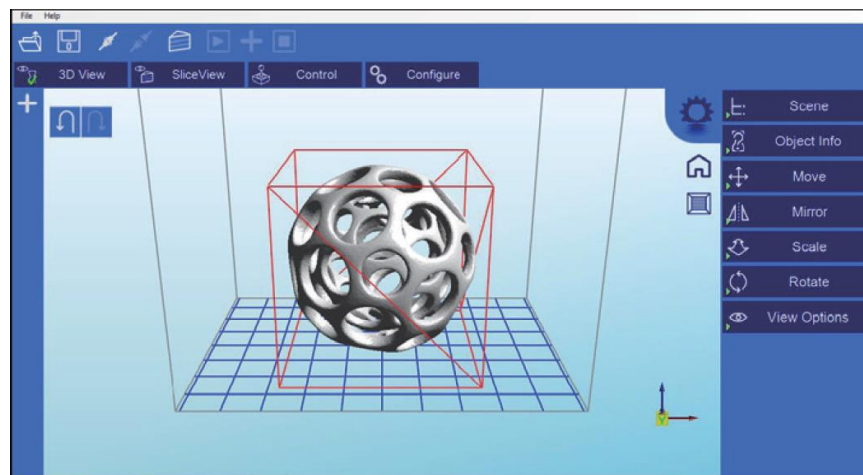


14. Touch the  button to begin printing.











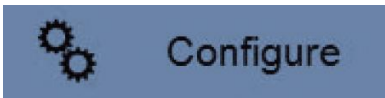
## MP CREATION WORKSHOP REFERENCE

### Main Screen

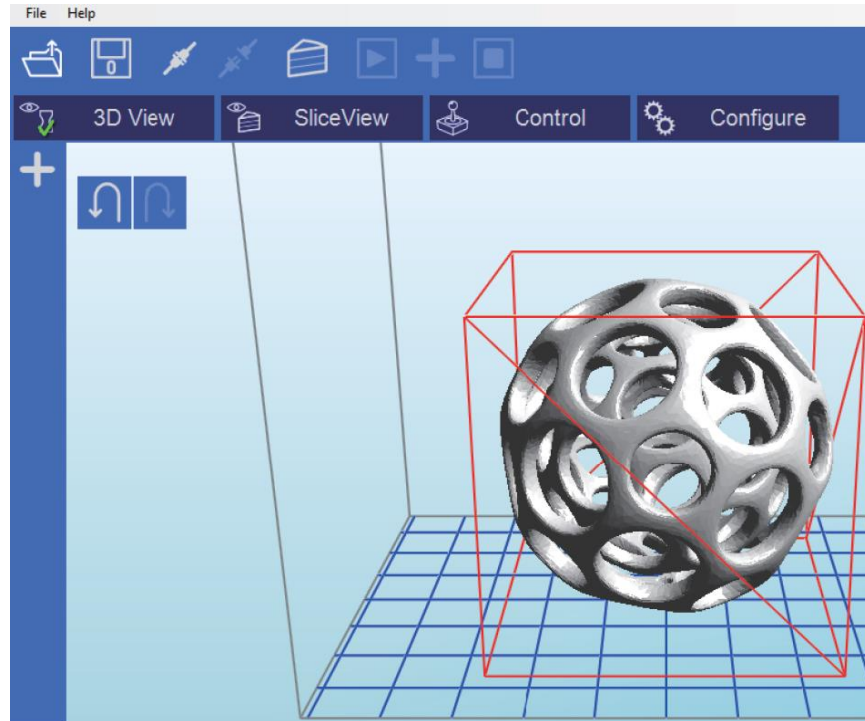



The following table shows the functions of the buttons on the Main Screen.

Button	Function
	Click this button to open object files in the .STL, .OBJ, .3DS, or .AMF formats. You can also open scene files with the .CWS extension
	Click to save the current object as a .STL or .CWS file. The .CWS format allows you to prepare a scene to be printed repeatedly in the future, together with supports and positioning.

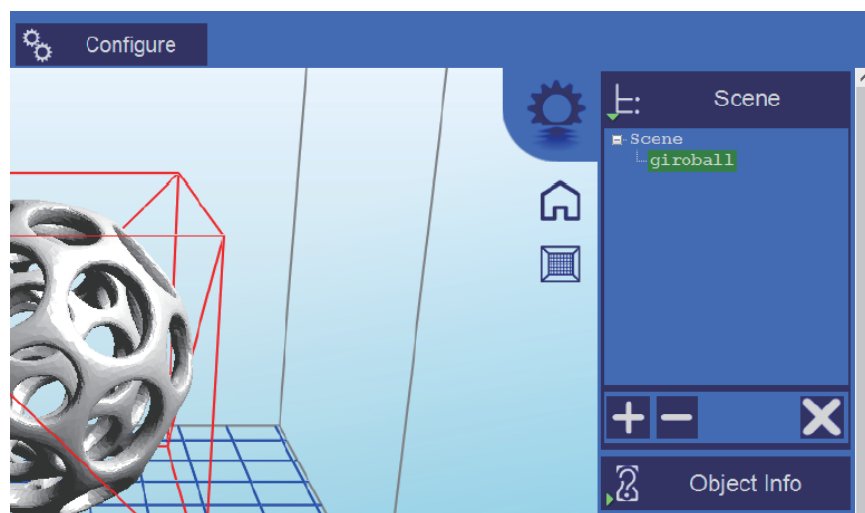
Button	Function
	<p>Click to establish a connection between the printer and the computer. If the printer and computer are already connected, the button will be grayed out.</p>
	<p>Click to disconnect the printer and computer. If the printer and computer are already disconnected, the button will be grayed out.</p>
	<p>These three buttons allow you to start, pause, or stop printing. These buttons become active only after you have sliced the object.</p>
	<p>Click this button to view the 3D objects within their boundary boxes. This mode allows you to add supports.</p>
	<p>Click this button to access the Slicing Screen, which allows you to see the individual slices that have been generated, as well as the GCode.</p>
	<p>Click this button to control the Z-axis motor to home it and lift it after a print has finished.</p>
	<p>Click this button to access the Setup Screen, which allows you to configure the slicing and printing profiles.</p>

## Loading a File



Click the  button to load a .STL, .OBJ, .3DS, or .AMF object file. You can load multiple objects and manipulate them independently. You can also open scene files with .CWS file extension, which can contain multiple objects and supports.

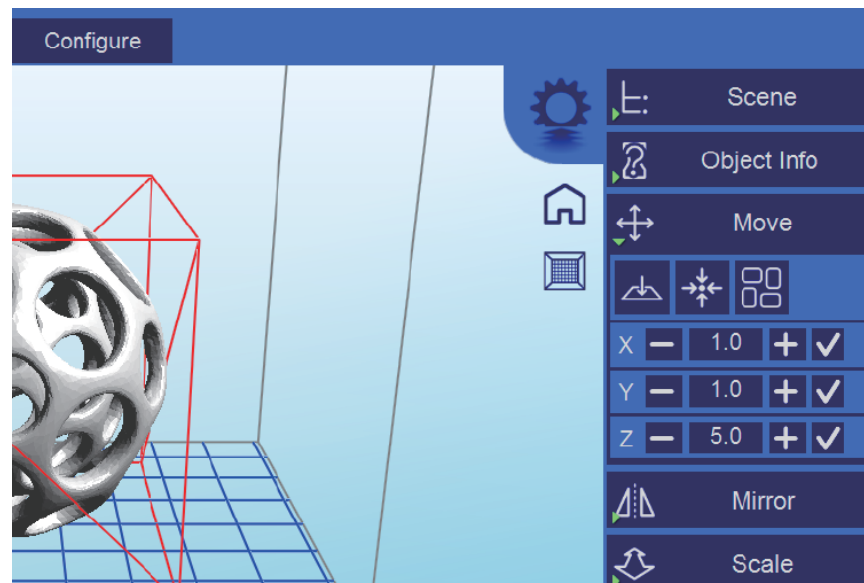
## Scene View






The **Scene View** allows you to manipulate various aspects of the scene.

- **Selecting a Model:** You can select a model by double-clicking on the model or by clicking the name in the Scene View list.
- **Removing a Model:** You can remove a model by right-clicking the name in the Scene View list and selecting the **Remove** option. You can also remove a model by clicking the name in the Scene View list or the model itself in the Scene View and clicking the **Minus (-)** button. Alternatively, click directly on the model in the Scene View, then press the **Del** key on your keyboard.
- **Cloning a Model:** You can clone a model by clicking its name in the Scene View list or by clicking directly on the model in the Scene View, then clicking the **Plus (+)** button. The cloned object will appear in the Scene View.

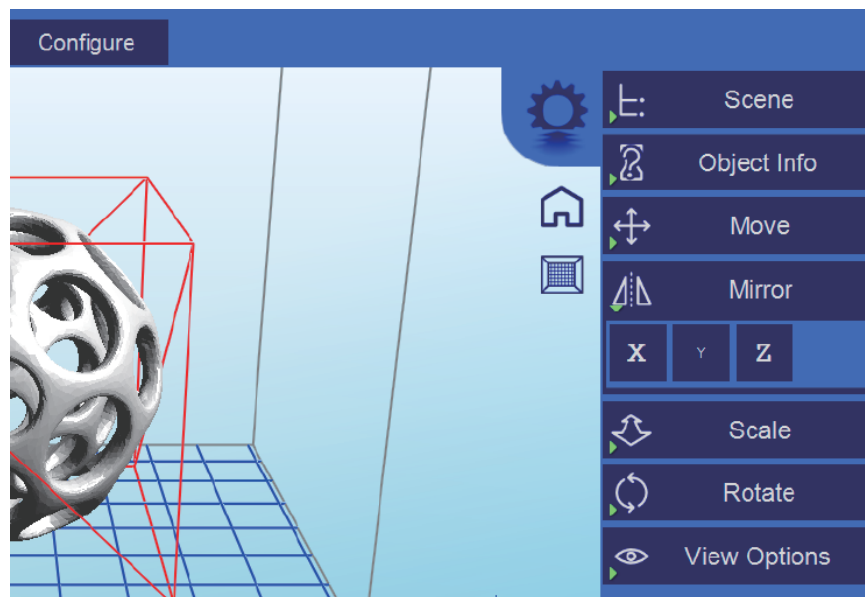
## Move View



- **Moving Objects:** To move an object, click directly on the object in the Scene View, then use the **Plus (+)** and **Minus (-)** buttons to move the object in the X, Y, and/or Z axes. Alternatively, you can type a value directly into the box between the **Plus (+)** and **Minus (-)** buttons.

- **Place on Platform:** Click the  button to place the selected object on the platform.
- **Center:** Click the  button to center the selected object in the X and Y axes.
- **Auto Arrange:** Click the  button to automatically arrange all objects on the platform.

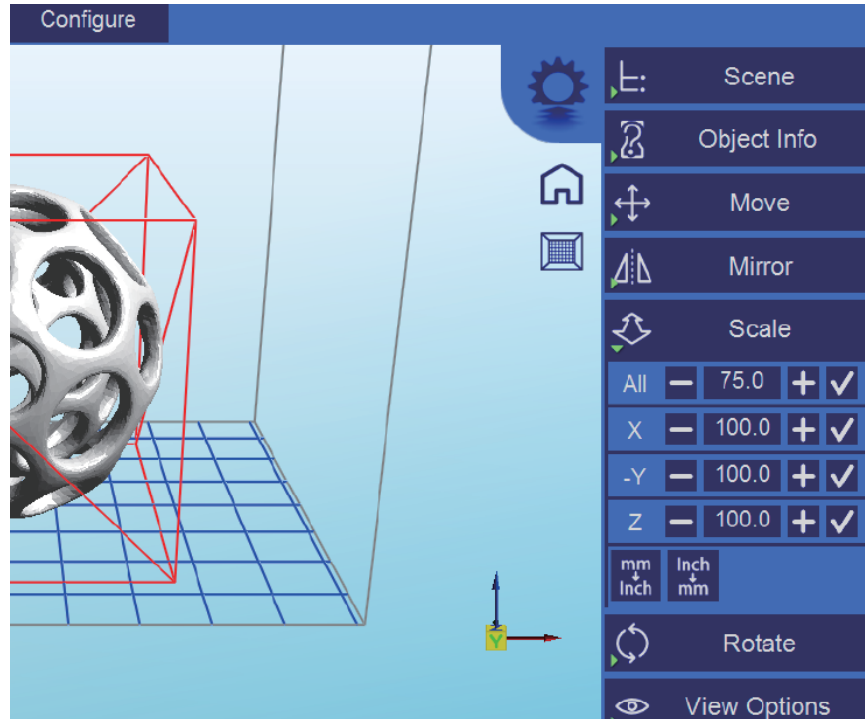
## Mirroring Objects



Click the X, Y, and/or Z buttons to mirror the selected object in the X, Y, and/or Z axes.

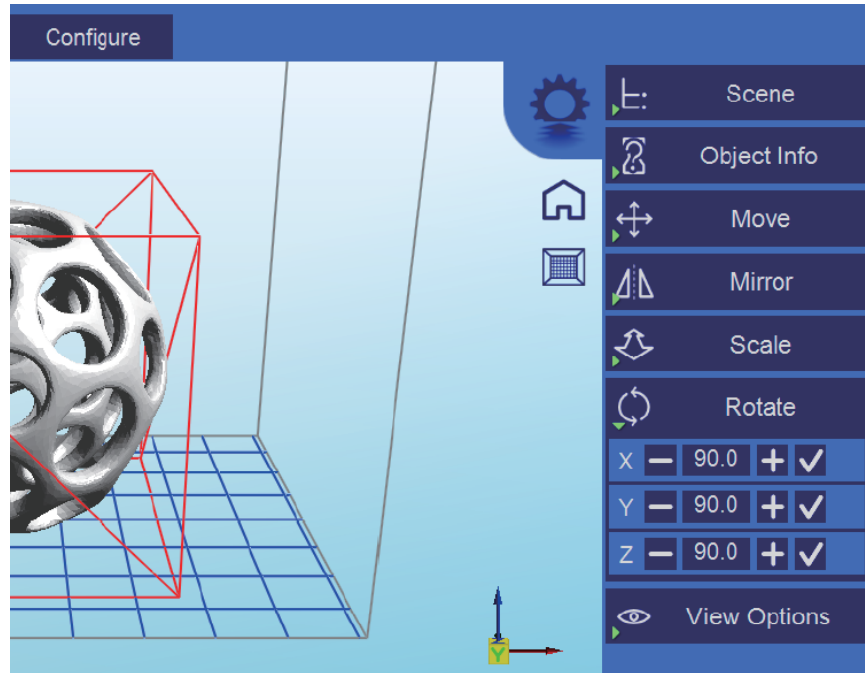


## Scaling Objects



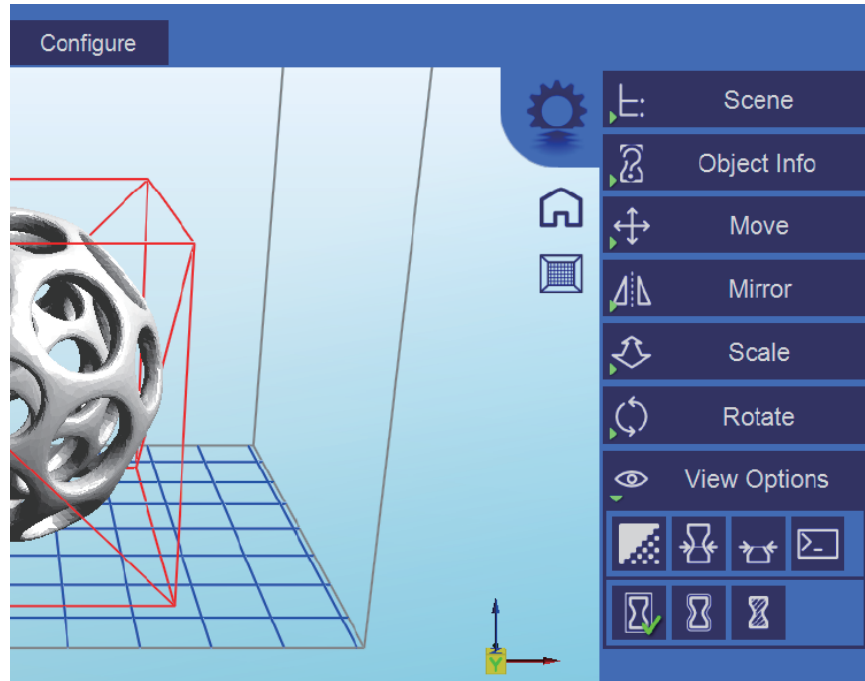
You can scale the selected object to make it larger or smaller in any or all axes by clicking the **Plus (+)** and **Minus (-)** buttons for the **All**, **X**, **Y**, and/or **Z** axes. Alternatively, you can type a value directly into the box between the **Plus (+)** and **Minus (-)** buttons.








## Rotating Objects



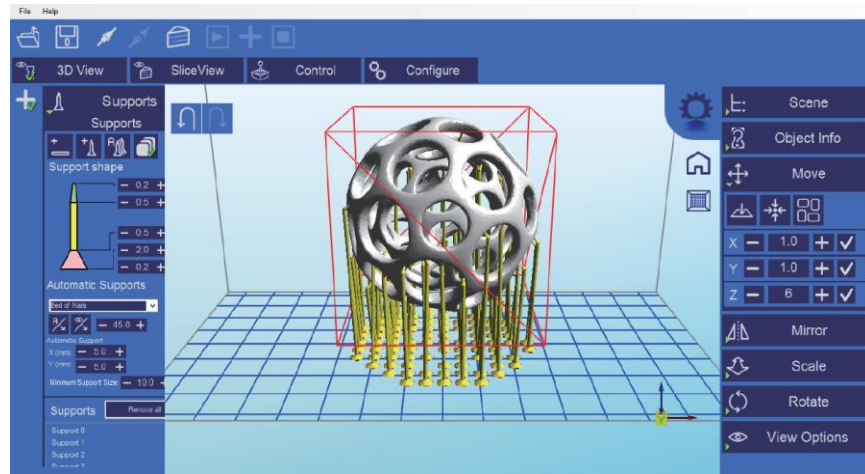
You can rotate the selected object by clicking the **Plus (+)** and **Minus (-)** buttons in the **X**, **Y**, and/or **Z** axes. You can also type a value directly into the box between the **Plus (+)** and **Minus (-)** buttons.

## View Options



- Click the  button to enable 50% Alpha-Blending, which allows you to see through the objects in the scene to see the geometry.
- Click the  or  button to show the Slice Preview, which allows you to view the 3D view of the currently selected slice layer as selected by the horizontal bar.
- Click the  button to toggle the debug window on or off.
- Click the  button to show the objects within bounding boxes.
- Click the  button to show the objects with an outline.
- Click the  button to show the selected objects in a different color.

## Working with Model Support Tools



Supports are sometimes required to properly attach a model to the build plate. Because of the nature of photopolymer printing, the lower layers must be supported unless it has lower layers larger than the upper layers.


- **Adding a Single Support:** Click the **Manual Support** button to add a single support.
- **Moving Supports:** After a manual or automatic support has been generated, individual supports can be moved in the X and Y axes the same way you move models. Select the support by double-clicking it, then hold down the **SHIFT** key on your keyboard and move the mouse. Supports will automatically scale vertically under the model they support.
- **Angled Supports:** Supports can be angle inwards towards the objects they support. They can often resolve clearance issues with vertical supports. You can turn a vertical support into an angle support by selecting it, holding the **CTRL** key, and clicking on the model you want to support.
- **Manual Configuration:** In the **Support Generation** view, you can click the **Show downward facing polys** option to highlight all polygons in the model that are facing downward by the specified degree. This helps you manually place supports under the unsupported downward facing areas of the model.
- **Auto Support on Grid:** After a model has been loaded into the scene and selected, you can automatically generate a **Bed of Nails** support for the model. You can specify the grid spacing and size of the generated supports. If you wish to only

generate supports on downward facing polygons, check the boxes under **Support General** and **Generate Only on Downward**.

- **Adaptive Supports:** You can add supports to areas in the model that are unsupported. There are two algorithms to help you accomplish this.

## Saving a Scene

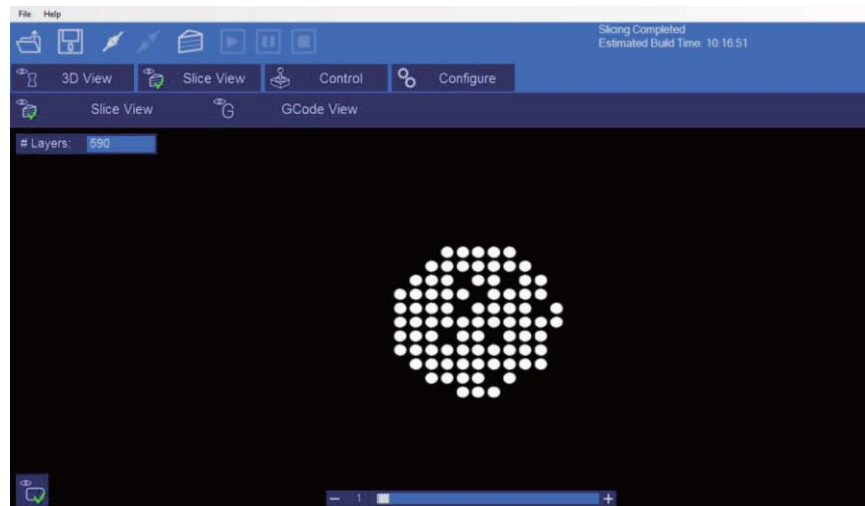
After one or more models have been loaded and manipulated on the build platform, you

can click the  button to save the entire scene as a .STL file or as a .CWS file.

The advantage of saving the scene as a .STL file is that all the models and their positions will be saved as a single object file, which can be loaded and manipulated at a later time.

The advantage of saving the scene as a .CWS file is that the save will contain all the support and slicing information, so you can load and print it at a later time without re-slicing the model(s).

## Slice View



The Slice View offers two options: **Slice View** and **GCode View**.

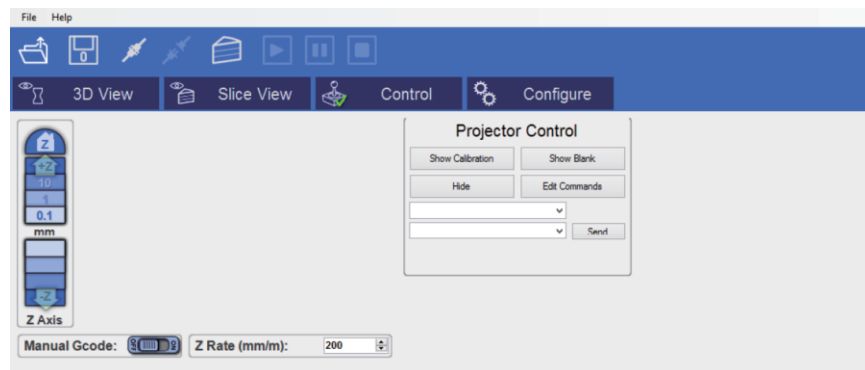
When the **Slice View** option is selected, you can see individual layers of the slice model. In the upper left corner, you can see the total number of layers in the sliced model. Use the



horizontal scroll bar at the bottom of the screen to select individual layers. The button in the lower left corner allows you to turn the projector on or off to expose the selected layer. This can be useful for checking the positioning of the vat.

The **GCode View** allows you to see the GCode generated during the slicing operation. This is intended for advanced users only.

## Control Screen



The **Control Screen** allows you to control the motors, which lets you displace the build plate in the Z axis, as well as control the LCD.

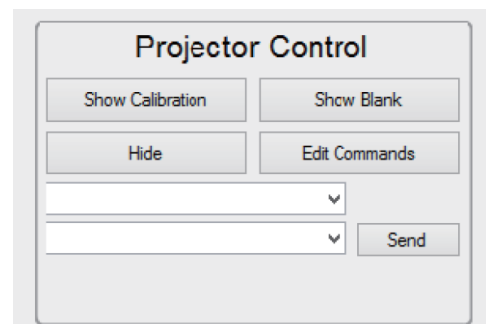
Use the **Z Rate (mm/m): 200** control at the bottom to set the maximum movement rate (mm per minute) of the build plate in the Z axis.

The **Movement Control Panel** on the left side of the screen allows you to move the build plate up or down by **50mm**, **10mm**, **1mm**, or **0.1mm**, depending on which button is clicked. Click the **Z** button at the top of the control moves the build plate to the "home" position.



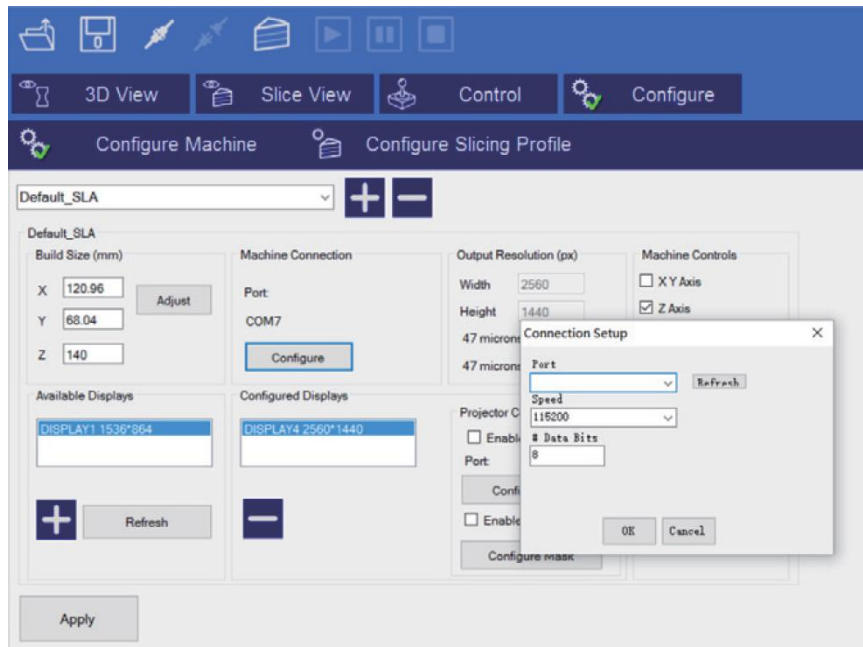
The **Projector Control** section allows you to control the image exposed by the LCD with the following options:

- **Show Calibration:** A red grid is projected, allowing you to check to see if the projector is well-focused on the vat bottom.



- **Show Blank:** Projects a black screen that will not cure resin instantly.
- **Hide:** This option hides the slice projection screen, allowing the projector to display the main desktop background.
- **Edit Commands:** This option allows you to edit commands to control the projector. The fields beneath this option are not recommended for use.

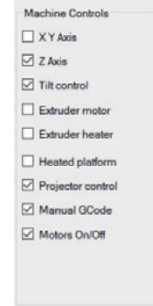
## Configure Machine



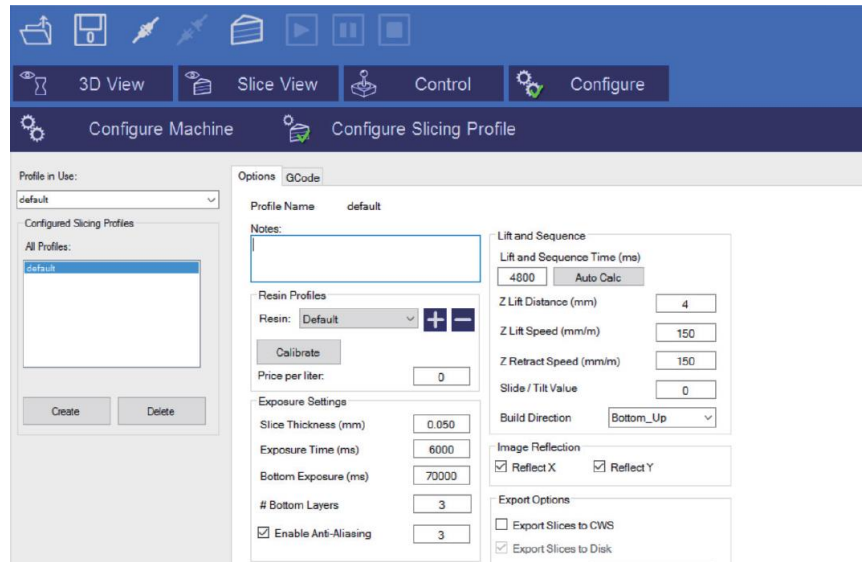
- **Configure Machine:** Once a machine profile has been selected, the **Configure Machine** button can be selected to show the **Connection Setup** screen. This screen allows you to choose the correct COM port and to set the serial connection speed. The current version will allow connections up to 115200 bps. Please ensure your controller firmware is configured for the speed chosen.
- **Available Displays:** This section of the screen shows the available configured and connected displays on the system. You can click the **Refresh** button to refresh the list of displays. The **+** button allows you to add a display to the **Configured Displays** box.
- **Configured Displays:** This box shows the displays that will be used for projection on the system. Once a display is added to this area, it can be selected to configure the

LCD controls. Typically, only one display is used. MP Creation Workshop can support two projectors, each with the same resolution and projection size, either in a horizontal or vertical format.

- **Machine Controls:** The column of check boxes on the right side of the screen allows you to customize the controls that appear on the **Manual Control** screen.
- **Saving Changes:** After you have finished configuring your machine profile, be sure to click the **Save Changes** button to save and apply the changes.



## Configure Slicing Profile



In order to slice a model into images, you must first set up a slicing profile. A default profile is created the first time MP Creation Workshop is run. You can create new slicing profiles and manage them in much the same way as you can manage machine profiles.

- **Profile in Use:** Use this drop down list box to select a profile for use. The software comes preloaded with a number of preset profiles based on different resins. We recommend using the XY resolution of 100  $\mu\text{m}$ . This profile allows you to perform your first prints with the test models provided.
- **Configured Slicing Profiles:** This section of the screen displays a list of all profiles that are available. The program comes preloaded with several profiles created at




different resolutions and for different resins. Click the **Create** button to create a new profile. Click the **Delete** button to delete the selected profile.


- **Slice Thickness:** This field sets the thickness of each slice in millimeters. The default is 0.05mm (20 slices per millimeter).
- **Exposure Time per Layer:** This time value specifies how long the projector will display a slice image on a per layer basis.
- **Bottom Layer Exposure Time:** In order to ensure the model is properly adhered to the bottom of the vat, a longer exposure time can be used for a specified number of bottom layers.
- **# Bottom Layers:** This specifies the number of bottom layers that will receive the longer exposure time.
- **Blanking Time Between Layers:** This specifies a time delay that allows the machine to perform a Lift/Tilt/Slide. You may have to experiment with this value to determine a proper timing for your machine.
- **Resin Price per Liter:** You can specify the cost of the resin used. This is used to calculate the printing cost in the **File > Calculate Volume & Costs** menu entry.
- **Lift and Sequence Time:** This value specifies in milliseconds how long the lift and retract sequence takes. You can use the **Auto Calc** button to generate a time estimate for the lift and retract. This value may need to be modified based on the speed of your machine.
- **Lift Distance:** This is the distance that the printer will raise and lower the Z axis after exposure has taken place.
- **Z Lift Speed:** When a layer is printed on a bottom up machine, a large amount of force may be required to separate the slide from the vat. This speed indicates how fast to perform the lift. A slower speed may be required to help vat separation.
- **Z Lift Retraction Speed:** After the lift occurs, this speed indicates how fast the Z axis should travel back to the initial start position.
- **Slide/Tilt Value:** For a machine with a slide or tilt mechanism connected to the X axis, this value specifies how much to move in conjunction with the lift.

- **X/Y Pixel Offset:** This X/Y value allows you to offset the rendered image by a pixel amount.
- **Build Direction:** This allows you to specify if the machine builds the model from the **Top Down** or from the **Bottom Up**. For a **Bottom Up** type machine, this is used to peel the model from the bottom of the build vat, sometimes in conjunction with a tilt/slide. For a **Top Down** type machine, this makes the lift operation dip into the resin.
- **Image Slice Export Options:** This allows you to control how the generated image slices and GCode files are saved. You have the option of exporting to .ZIP file or to a subdirectory when the **Export Images and GCode** button is checked. If this is left unchecked, slices and GCode will still be generated, but not saved to disk.


## Slicing a Model

Once you have loaded one or models, configured your machine profile, and configured

your build and slicing profile, you can slice a model. Click the  button to access the **Slicing Screen**.

You can change the currently selected slicing profile to use. Click the  button to being slicing. You can stop slicing by clicking the **Cancel** button. If your slicing profile is configured to export images, a progress bar will appear here. Otherwise, just the GCode for the scene will be generated and the images will be rendered during build time.

## Connecting the Software to the Printer

Click the  button to connect the MP Created Workshop software to the printer. Ensure that you have properly configured your machine profile, as well as setting the correct COM port before connecting.

## SPECIFICATIONS

Model	30994
Extruder System	405 nm UV Lamp, LCD Curing System
Insulated Cover	Total Blinding Hood
Maximum Print Area	4.8" x 2.7" x 7.1" (121 x 69 x 180 mm)
Software	MP Creation Workshop
Filament Diameter/Light	405 nm UV Light
Material Support	405 nm Resin
Vertical Print Speed	Up to 30 mm/hour
Case Material	Steel Casing
Projection Size	5.5" LCD
Accuracy	X: 0.00001 mm Y: 0.00001 mm Z: 0.004 mm
Layer Thickness	20-100 microns
Build Platform Leveling	4 Bolt Adjustment System
Rail Locking System	Steel Bolt Locking Frame
Build Platform	Aluminum Building Plate
Input Power	110 VAC 50/60 Hz or 240 VAC, 50/60 Hz (auto switching)
Dimensions	7.8" x 7.8" x 16.0" (198 x 198 x 406 mm)
Weight	19.8 lbs. (9.0 kg)

## TECHNICAL SUPPORT

Monoprice is pleased to provide free, live, online technical support to assist you with any questions you may have about installation, setup, troubleshooting, or product recommendations. If you ever need assistance with your new product, please come online to talk to one of our friendly and knowledgeable Tech Support Associates. Technical support is available through the online chat button on our website [www.monoprice.com](http://www.monoprice.com) during regular business hours, 7 days a week. You can also get assistance through email by sending a message to [tech@monoprice.com](mailto:tech@monoprice.com)

## REGULATORY COMPLIANCE

### Notice for FCC



This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Modifying the equipment without Monoprice's authorization may result in the equipment no longer complying with FCC requirements for Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the

user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## Notice for Industry Canada



This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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