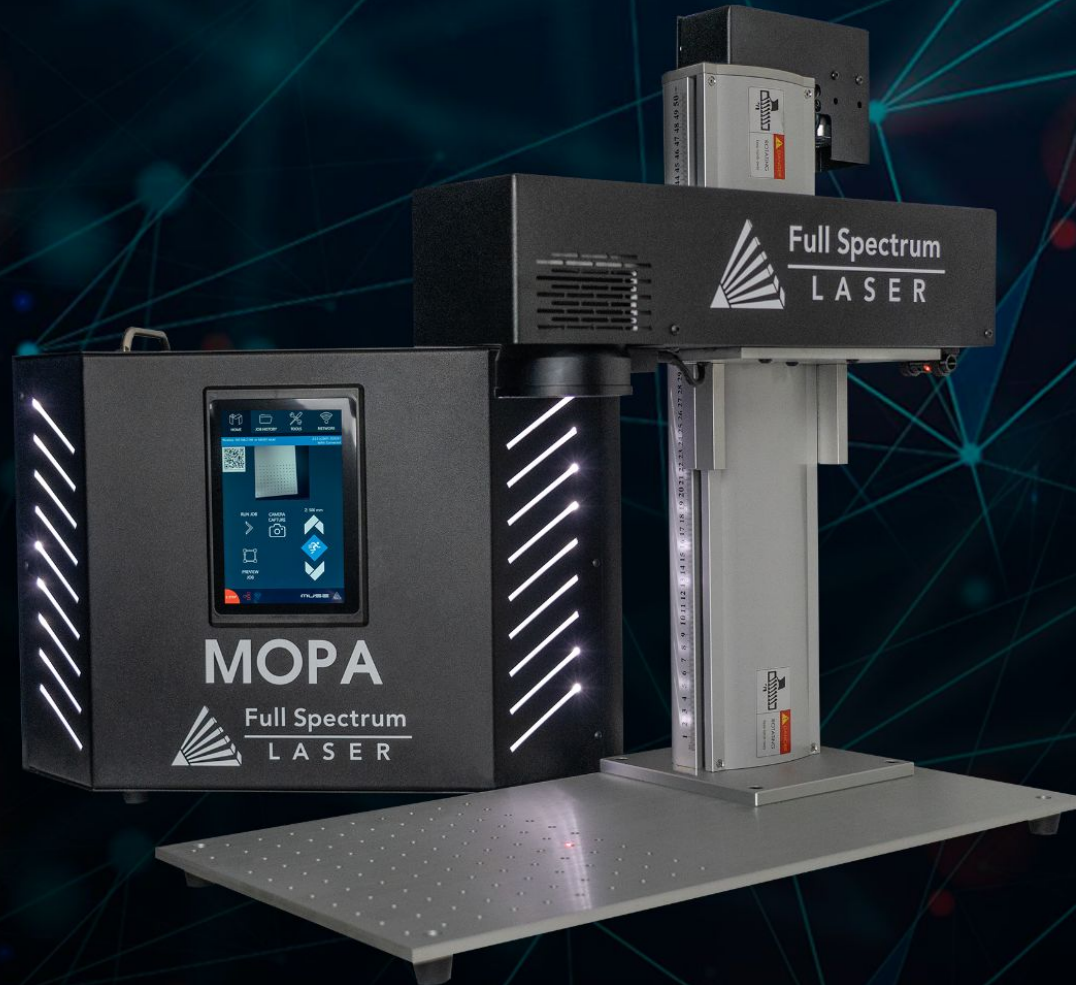


# MUSE MOPA

## USER MANUAL



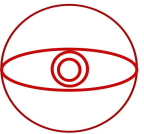
## Safety Warning:



Do not leave your machine unattended.



Avoid using machines made of carbon or that contain carbon components.



Always keep a fire extinguisher and first aid kit nearby.

Do not attempt to access any electrical areas while the machine is on. Unplug the machine and wait for an hour before accessing panels.



Never stare directly into the laser when running a project. Always wear the provided safety goggles.

Inspect your machine before each use. Do not use if the machine or its accessories are damaged in any way.

Always maintain a clean work area.

Looking for financing or eager to buy, contact Sales:



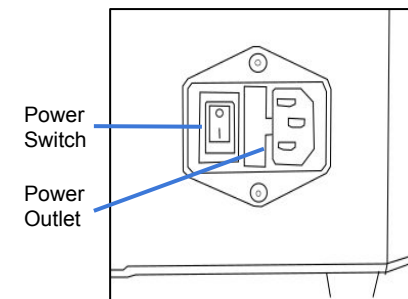
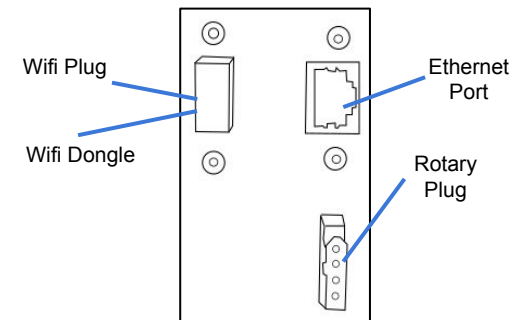
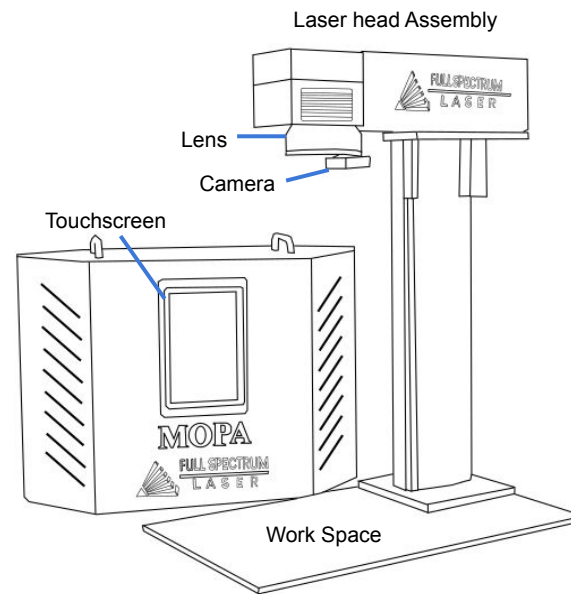
M-F 8AM-5PM PST  
[sales@fslaser.com](mailto:sales@fslaser.com)  
702-802-3101

Need help, visit us at our [Help Center](#) or contact Support:

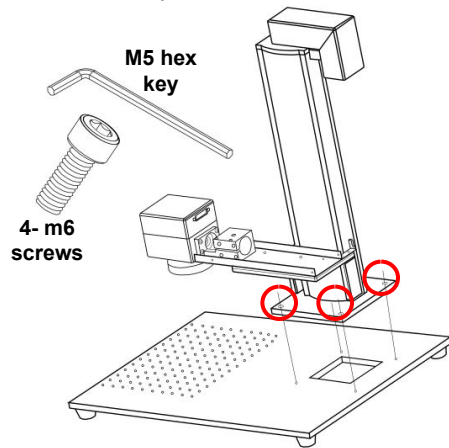


M-F 8AM-5PM PST  
[support@fslaser.com](mailto:support@fslaser.com)  
702-802-3103

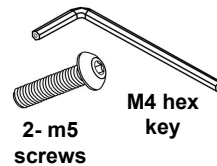
## Diagrams:



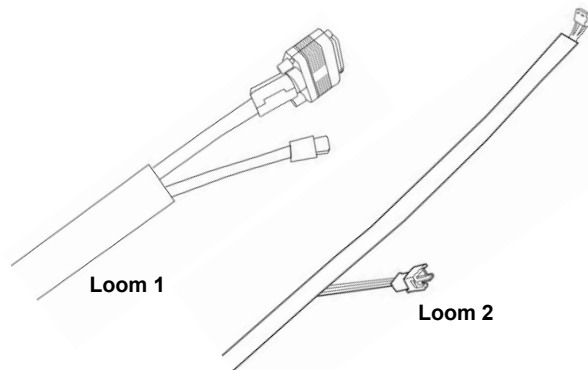
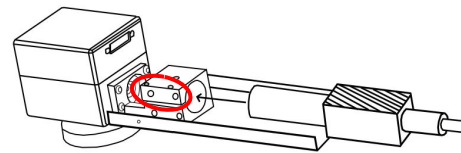
## Assembly:



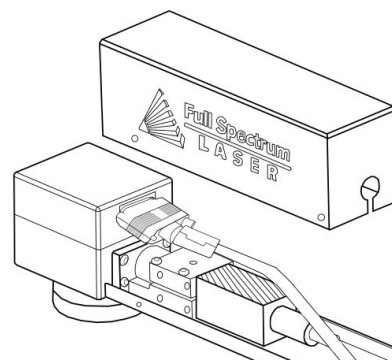
1. Secure the stage to the base using the m6 screws.



2. Slid the isolator into position and screw in place using the m5 screws.



3. Grab Loom 1 connect the VGA cable to the back of the scanhead and the Type C cable to the camerahead. Then grab Loom 2, connect the 3 pin cable to the cable hanging near the motor and the other into the motor.



4. Place the machine cover over the laser head assembly and secure it in place.

## Connecting to Internet:

### Connect Via Router (Recommended):

To establish a reliable link to RE3, it is recommended to connect the Fiber Galvo to the router. The Fiber Galvo is equipped with an ethernet cable that should be plugged into the ethernet ports of both devices

**Note: Ethernet port looks the same on all devices**

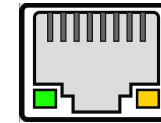


Fig. 18

### Connect to Wi-Fi:

Make sure that the dongle, a device attached to the USB port of your machine, is present and connected as it enables your machine to connect to the WiFi network.

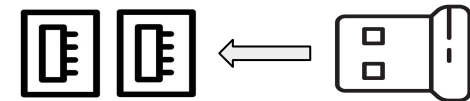


Fig. 19

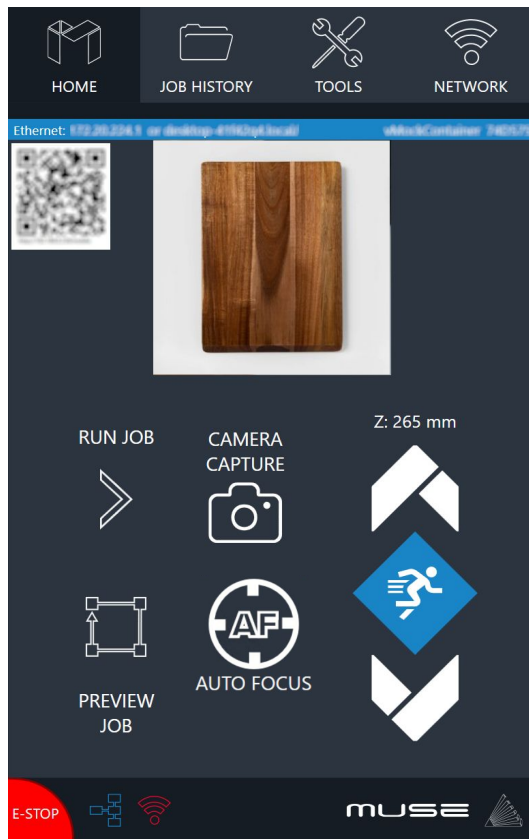
1. To connect to the WiFi network, select the Network button located on the top right of the Touchscreen.
2. Then, choose the WiFi option and search for your network. Once you have located your network, select it and enter your password.

### Connecting Directly Using Computer:

This option is only advisable when the other two methods are not possible. The Fiber Galvo can connect to the computer through Ethernet, but an adapter might be required for your computer.



# Touchscreen Interface:



## Movement Controls:

The movement icon allows the user to adjust the stage's vertical movement through three adjustable speed settings. The speed settings can be modified by selecting the prism icon.

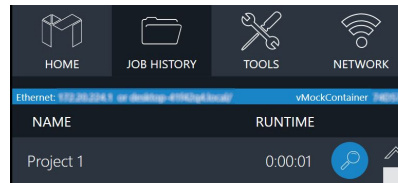


## Home

The Home screen displays important information such as the device's IP address, the QR Code for RE3, and controls for the laser head.

## Job History

The Job History icon provides easy access to previous projects. Users can select the file and view its contents, or choose to re-run the job. Note that an internet connection is not required to use files saved in this section.



## Machine Indicators:

### Wired IP Indicator:

The IP indicator shows if the machine is connected to an ethernet cable.



Connected



Not Connected

### Wi-Fi Indicator:

The Wi-Fi indicator will indicate if the machine is connected to the Wi-Fi.



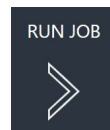
Connected



Not Connected

### Run Job Icon:

Selecting the icon will run the job.



## Network ⇄ Wi-Fi

Enables users to connect to a Wi-Fi network.

## Mobile Version

A mobile version of the device is accessible by either scanning the QR Code or entering the device's IP address into the web browser of a mobile device.

## Tools

The Tools icon enables the user to verify and modify the machine settings, activate rotary attachments, home the laser, and retrieve relevant information regarding the device.

### AutoFocus Icon:

The Autofocus icon automatically moves your machines Z-stage to the height needed to perform an engraving. (Needs QR card to work.)



### Camera Capture Icon:

The Camera Capture icon takes images of the workspace.



### Preview Job Icon:

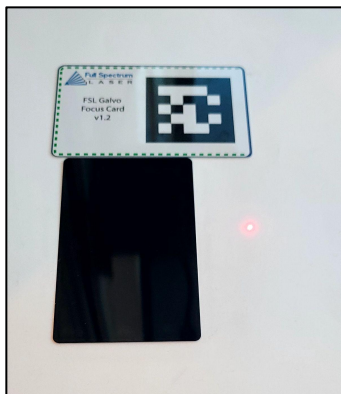
Selecting the icon will make the machine outline the area of your project on your workspace.



# Focusing:

## Autofocus

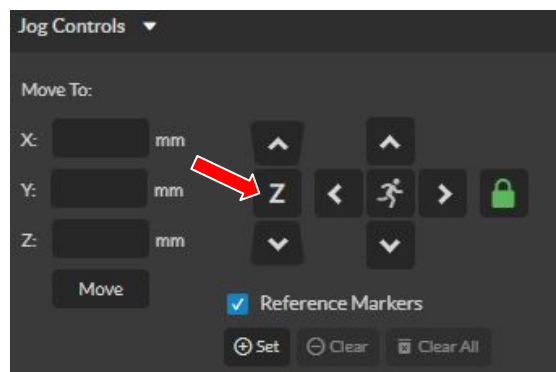
To autofocus your machine, you need to retrieve your April tag card first. Ensure that the side of the card which says "Focus Card V1.2" is facing up, and position it under the camera.



There are two methods to autofocus your machine.

1. The first method involves navigating to the touch screen and selecting the Autofocus icon located on the Home page.

2. The second method requires you to go to the Jog Controls, select the Autofocus Icon, and enter RE3.



Note: If your machine does not move when the autofocus button is hit, then lower the gantry and try again.

## Manual Focus

The focal length of the lens determines the distance between your laser head and the material. Refer to the chart below for the required distance for each of our lenses.

Lens Focal Length	Distance from Material
163mm	203mm
254mm	294mm
330mm	370mm
420mm	460mm

Note that the numbers in the chart refer to the distance from the lens to the object and not from the lens to the workspace. If you switch to a larger object, adjust the stage accordingly.

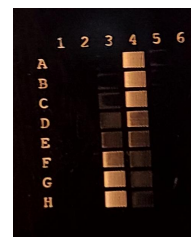
During manual adjustments, keep an eye on the red diode. When the laser turns on and begins to home, the red diode will appear large and fuzzy. As the laser head moves down the stage, the red diode becomes smaller and more focused. Once the diode appears clearest, you can run the focusing test to ensure that it falls within the desired range.

## Focus Test

After you have focused your machine, locate the Focus Test Icon and click on it.



This will bring up a focus test window. Ensure that you have selected the appropriate lens size and click on the "Generate Test Pattern" button to produce a grid.



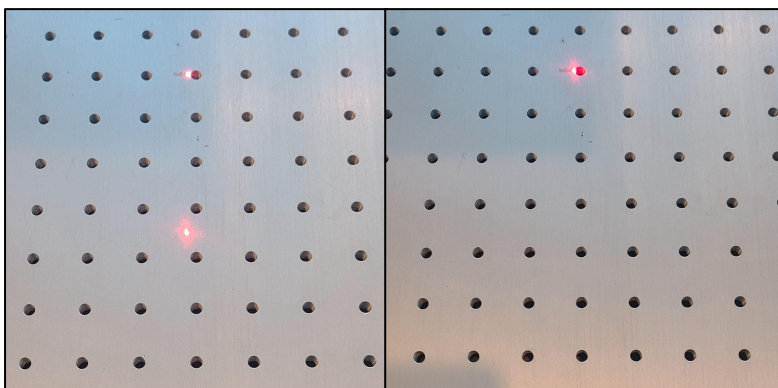
From the grid, choose the two markings that appear most similar to one another. Enter these markings into the pattern selection and save the results. For instance, you may choose 3F and 4D as they appear to be similar.

## Focusing:

### Dual Diode:

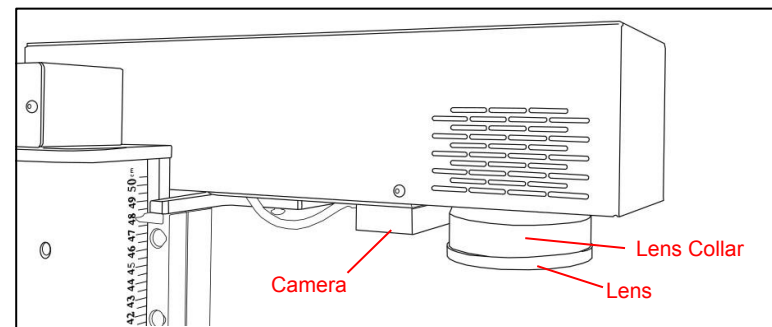


A diode is affixed to the rear of the machine and positioned according to the focal length of the lens. The laser can be focused by lowering the Z-stage until the machine diode aligns with it.



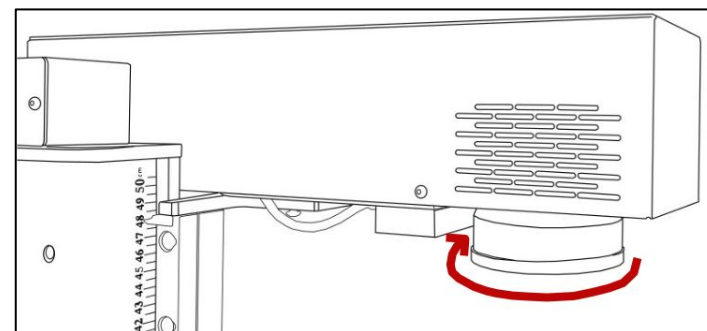
When switching lenses, the rear diode will need to be readjusted to accommodate the new focal length. This can be achieved by autofocusing your machine and then adjusting the position of the back diode until it aligns with the laser. Once the adjustment is made, perform a focus test to ensure optimal results.

## Lens Replacement:



1. Remove any objects or work pieces from underneath the lens work area. Ensure laser head is in a reachable position to remove lens.
3. Place the lens cap onto your lens to protect the lens from potential damage.
4. Carefully twist counter-clockwise to loosen the lens.

**Try not to damage the camera or camera shutter located on the side of the scanhead.**

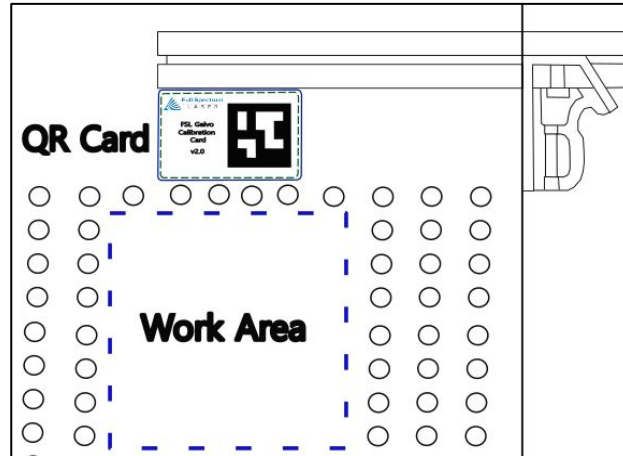


Avoid touching the glass surface of the lens to prevent scratches. The lens collar may come loose with the lens, if that occurs remove both together and separate once dismantled.

5. Replace the collar to the scanhead before inserting a new lens.



# Lens Calibration:



## Preparation:

To perform a lens calibration, ensure that the QR card is positioned within the camera's view, with the Calibration April Tag facing upwards. The card should be placed outside the work area and parallel to it for accurate calibration. The size of the work area is determined by the lens in use (refer to the chart below).

Lens Size(mm)	Working Area Approx. (mm)
163	110X110
210	140X140
254	175X175
330	220X220
420	300X300

Access the "Laser Tools" page by navigating to the Machine name, locating Diagnostics, and selecting Galvo Calibration. Alternatively, you can type the IP Address/setup in your web browser to access the same page.

1. Once the Laser Tools page is loaded, locate the Laser Focus and Lens Calibration section.

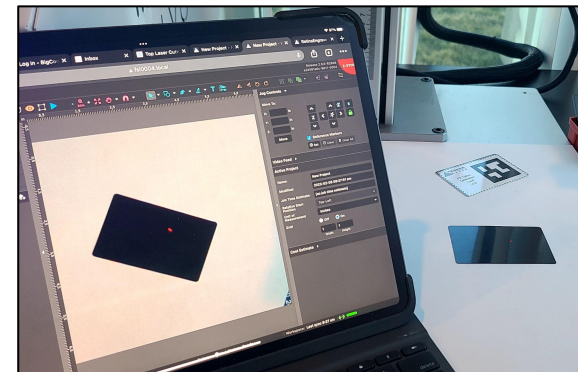
Ensure that the correct lens size is saved in the lens section. If the wrong lens setting is saved, then all subsequent calibrations will need to be redone.

2. Select Run Lens Calibration.

The red diode will disappear, and the camera will slowly turn off. The diode will start scanning the work area. After the calibration is finished, you will be given a pass or fail result.

If your test fails, it could be due to lighting in your work area. If it is too bright, close any open blinds or turn off lights before retrying. If it is too dark, try placing a white piece of paper under the laser diode to improve visibility.

After the machine passes the calibration test, we recommend performing a camera capture to ensure the QR card was positioned correctly. If the QR card was not placed parallel to the work area, the camera may be calibrated improperly.



An example of a wrongly calibrated camera is when the workspace is shifted by the angle of the QR card. If this happens, you should re-run the calibration.

Once the machine is successfully calibrated to the lens, we need to perform mark and preview adjustments to ensure the laser properly engraves in its new work area.

## Mark Adjustment:

### Mark Adjustment

Enter the size of the square to mark and click the "Mark Square" button.

The recommended sizes are:  
50 for 100mm lens, 100 for 160mm lens, 110 for 163mm lens, 145 for 254mm lens, 225 for 330mm lens, and 288 for 420mm lens.

Speed (mm/sec):

300

Power (%):

100

Size (mm):

145

Preview Square

CANCEL

Mark Square

To verify the success of the lens calibration process, run the mark adjustment. Ensure that the speed and power settings remain unchanged, but adjust the size parameter. The size refers to the dimensions of the square that will be marked, and its value depends on the lens size being used.

1. Place a flat piece of test material under the laser for marking.
2. Preview the square before proceeding to ensure that only the test material will be marked.
3. Select "Mark Square".

Measure the marked square. It should match the size chosen earlier. If the lens calibration was not done correctly, the marked square may be off by approximately 2mm. In that case, re-run the lens calibration and redo the lens adjustment.

Please note that the intentional cut-off of the top left corner of the square.

4. Select "Save Mark Adjustment".

## Preview Adjustment:

### Preview Adjustment

Click the "Preview Square" button then use the "X/Y Scale/Offset Up/Down" buttons to line up the red laser preview with the previous square mark. Click the "Save Preview Adjustment" button to save the results. Unsaved changes will persist until power cycle or the "Reset" button is clicked.

Use the buttons below to adjust the width, height, or horizontal/vertical offset so that the red laser preview matches the previous square mark

PREVIEW SQUARE

CANCEL

↔

→

↑

↕

↖

←

↓

↗

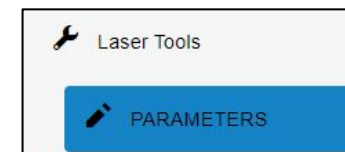
SAVE

RESET

After confirming that the mark adjustment is accurate, proceed to mark a new square by selecting the "Mark Square" button.

1. Without moving the previously engraved material, press the "Preview Square" button.
2. Make use of the adjustment buttons to align the tracing made by the red dot precisely with the marked square.
3. Finally, select "Save Preview Adjustment" to save the adjustments made.

## Parameter Test:



If you're not sure what types of settings you want to use for your materials, then try using the **Laser Parameter Test**. It can be found directly under the Laser Tools tab on the Setup page. The Parameters Test will generate a graph to test the two parameters chosen at their minimum and maximum values, with the spaces in between determined by the grid size. This means that a larger grid size makes it easier to narrow down your selection.

The parameters you can test are: Power, Speed, Frequency, DPI, and Pulse Width. Pulse Width is a parameter only used in MOPA machines. To access the Setup page, go to the Machine name, then go to Diagnostics and select Galvo Calibration. Next, select the Parameters tab.



# Focus Tag Calibration:

## Galvo Autofocus Calibration

Select Autofocus Mode

TwoDots

Two Dots Autofocus

RedLaser Brightness: 0

Set current position as reference.

Ref.X  
52.20000

Ref.Y  
62.80000

UPDATE REF POSITION

TEST AUTOFOCUS

AprilTag Autofocus

Ensure that your machine is properly focused before starting the calibration process. Take note of the Z-stage coordinates displayed on the Main Unit screen to ensure accurate calibration.

Navigate to the Laser Tools page and locate the Galvo Autofocus Calibration section. Select the Autofocus Mode.

### AprilTag:

Choose the **AprilTag** option to calibrate the **Focus card**. Place the Focus tag in the center of the work space.

Click on the **Take Snapshot** button to capture an image with the camera. The Focus Tag should appear on the screen with a red box above it. If the box does not appear, it may indicate a damaged Tag.

Ensure that the tag size is saved as **19.44**.

Set the lower offset for your stage. It is recommended to start with a value of 120 and adjust from there.

Saving the focus will cause the machine to move to the lower offset position. If the lower offset is set too low, it may hit zero and return to the previous location. Set the lower offset as close to the bottom as possible for optimal accuracy.

After saving the focus, move the stage from its position and test the autofocus. If done correctly, the stage will return to its previous focus location.

Note: The mode that is not selected will be inaccessible.

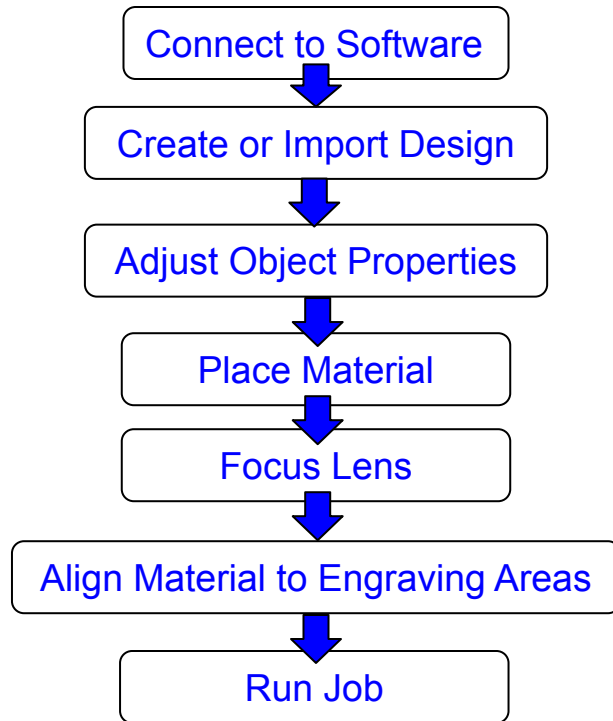
### Red Diode:

To adjust the red diode, select the **TwoDots** option.

Position the back diode to the desired location.

Select **Update Ref. Position**.

## Project Procedure:



For more information on your machine refer to your user manual. For information on RE3, refer to the RE3 Guide found in our [website](#).

## Troubleshooting:

Q: What should I do if my laser isn't marking?

A: Check if the laser is properly focused. If the machine is not at the right height, it won't engrave. Refocus the laser head after changing to a new material. Still having difficulties, make sure that your material is compatible with your laser engraver.

Q: Why are my marks turning out incorrect?

A: Experiment with different settings to find the ones that work best for your requirements. Here are some initial guidelines to get started:

- To get darker/lighter engravings, adjust the power or speed.
- To get deeper engravings, decrease the speed or increase passes.
- For clearer engravings, use a picture with a high resolution.

Q: What should I do if my engravings are too shallow?

A: You may need to increase the power and/or decrease the speed. Multiple passes can also add more depth. You can also use a smaller lens to engrave in more detail. For precise engravings, ensure that the laser is fully focused by performing a laser focus test every time you switch to a new material.

Q: How can I solve issues with focusing my laser?

A: If using auto-focusing with the QR tag, ensure that the QR tag is visible in the camera during the entire process. If the tag goes off-screen, the machine won't focus. If it doesn't work, try manual focusing.

Q: What should I do if my engravings look wobbly and uneven?

A: If you've recently calibrated your camera, check that you did it on a flat, smooth, and level surface. Otherwise, recalibrate on a different surface. Another reason could be that your material is not flat while engraving, it can come out uneven. Flatten and/or weigh down your material before engraving to avoid this issue.

If you're having an issue not listed here, visit our [Help Center](#). We provide comprehensive videos, and useful resources for troubleshooting to helping you get the most out of your investment in our products.