



EpilogLaser

17000Series

Fusion Edge & Maker Laser System Manual | Model 17000
Original Instructions



Register your system now for driver updates and access to our Training Suite!
SUPPORT.EPILOGLASER.COM/TRAINING

Knowledge Base: support.epiloglaser.com
System Registration: epiloglaser.com/register
Driver/Firmware: epiloglaser.com/support/drivers

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Get the resources and techniques you need to succeed with your Epilog Laser machine.



Whatever your ability level, Epilog's Support Center is the best place to answer all of your questions,

FIRE WARNING

Fire Warning



Your laser system uses a high intensity beam of light that can generate extremely high temperatures when it comes into contact with the material being engraved, marked or cut. Some materials are extremely flammable and can easily ignite and burst into open flame setting the machine afire. This open flame is very dangerous and has the potential to destroy not only the machine, but the building in which it is housed.

Experience shows that vector cutting with the laser has the most potential to create an open flame. Many materials are susceptible to igniting, but acrylic, in all its different forms, has been shown to be especially flammable when vector cutting with the laser.

Please read the following warnings and recommendations and follow them closely at all times!

- **Stay with the laser.** Never operate the laser system while unattended.
- **Keep the area clear.** Clean around the machine and keep the area free of clutter, combustible materials, explosives, or volatile solvents such as acetone, alcohol, or gasoline.
- **Be prepared with a fire extinguisher.** Always keep a properly maintained and inspected fire extinguisher on hand. Epilog recommends a CO2 fire extinguisher or a multi-purpose dry chemical fire extinguisher.
- **Use Air Assist.** Always use the system's Air Assist feature when vector cutting.
- **Use caution when vector cutting.** Many materials have the potential to suddenly burst into flames when cut with a laser – even materials that may be very familiar to the user. Always monitor the machine when it is operating.
- **Clean the laser.** A buildup of cutting and engraving residue and debris is dangerous and can create a fire hazard in its own right. Keep your laser system clean and free of debris. Regularly clean underneath the Vector Cutting Table to clean any small pieces that have fallen through the grid.

INTRODUCTION

How to Use This Owner's Manual

Thank you for purchasing an Epilog Fusion Edge / Fusion Maker Laser system. Your Epilog system has been designed to be easy to operate, but you will utilize it to its fullest potential by taking some time to read this owner's manual prior to use. You will be ready to use the Epilog Laser system as soon as you read the first few sections. Then you can refer to topics in the remaining sections, as you work.

Icons Used in this Manual

Look for these symbols to help you find valuable information throughout the text:



Helpful notes to keep in mind when running the laser!



This icon signifies advice you can try that will save you significant time.



This icon highlights current contact information for receiving help.



Warnings and cautions to keep in mind when running the laser.



This icon indicates the potential for fire damage when operating the laser.

SECTION 1: SAFETY

Laser Safety

The Epilog Model 17000 Laser Systems are a Class 2 laser product, as defined in International Standard IEC 60825-1.

The Epilog Model 17000 complies with 21 CFR 1040.10 and 1040.11, the Federal Performance Standards for Light-Emitting Products, except for deviations pursuant to Laser Notice No. 56, dated May 8, 2019. The Center for Devices and Radiological Health, of the US FDA, issued Laser Notice No. 56 to permit manufacturers to classify and manufacture their products in accordance with the International Standard.

The output of the embedded laser is fully contained. The laser cabinet has safety interlocks that turn the laser off if any access door is opened during operation, and no special precautions are necessary to operate the laser safely. Access doors are interlocked and can be opened without the use of a tool. Any interlocked door that is opened while the machine is operating will immediately stop the laser from firing.

Access panels are not interlocked and require a tool for opening or removal. Access panels should always be installed when the laser is operating. Never operate the laser system with an access panel removed.

The visible output beam of the Laser Diode Pointer (Red Dot Pointer) is accessible to the operator. While this device employs the same technology as the familiar laser pen-pointers, like them it is potentially hazardous if its beam is directed into the eye. We have made every effort to make the Laser Diode Pointer (Red Dot Pointer) as safe as possible. Its beam path is located well inside the cabinet, and under normal conditions, no hazardous levels of laser radiation can escape.

The operator of the Epilog Model 17000 should observe the following general precautions:



DO NOT disassemble the machine or remove any of its protective covers while the unit is plugged in.

DO NOT attempt to defeat the door interlocks.

DO NOT view directly into the beam of the Laser Diode Pointer (Red Dot Pointer).

DO NOT operate the Laser Diode Pointer (Red Dot Pointer) without the machine's focus lens in place. If the unfocused beam strikes a reflective surface, it could be directed out of the cabinet.

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

The standard reference for laser safety is the American Standard for the Safe Use of Lasers, Z136.1-2022, developed by the American National Standards Institute (ANSI). This reference is the basis for many of the federal regulations for laser and laser system manufacturers, and for the Occupational Safety and Health Administration (OSHA) laser safety guidelines. It contains detailed information concerning proper installation and use of laser systems.

While the ANSI standard itself does not have the force of law, its recommendations, including warning signage, training, and the designation of a laser safety officer, may be compulsory under local workplace regulations when operating laser systems above Class I. It is the operator's responsibility to ensure that the installation and operation of the Epilog Model 17000 Laser System is performed in accordance with all applicable laws.

SECTION 1: SAFETY

Copies of ANSI Standard Z136.1-2022 are available from Epilog Corporation or from:



Laser Institute of America
12424 Research Parkway, Suite 125
Orlando, FL 32826
(407) 380-1553

Electrical Safety

The AC input power to the Epilog Model 17000 Laser System is potentially lethal and is fully contained within the cabinet.



- **DO NOT** open any of the machine's access panels while the unit is plugged in. Opening a panel may expose the operator to the unit's AC input power.
- **DO NOT** make or break any electrical connections to the system while the unit is turned on.

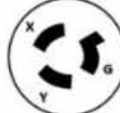
Fusion Edge Electrical Specifications

Model	Wattage(s)	Voltage	Amp draw-MAX
Edge 12	50, 60	100-120	13A
Edge 12	50, 60	220-240	6.5A
Edge 24/36	50, 60, 80	100-120	13A
Edge 24/36	50, 60, 80	220-240	6.5A
Edge 36	100	220-240	6.5A

Fusion Maker Electrical Specifications

Model	Wattage(s)	Voltage	Amp draw-MAX
Maker 12, 24, 36	30, 40, 50	100-120	13A
Maker 12, 24, 36	30, 40, 50	220-240	6.5A

SECTION 1: SAFETY

Voltage	Type	15 Amperes For 100 and 120 watt Lasers		20 Amperes For 200 watt Lasers	
		Receptacle	Plug	Receptacle	Plug
2 POLE, 3 WIRE, GROUNDED					
220 - 240V	L6	L6-15R	L6-15P	L6-20R	L6-20P
					

SECTION 1: SAFETY

Safety Features and Regulatory Compliance

Epilog has incorporated specific safety features into the Model 17000 Laser System in order to meet the requirements of 21 CFR 1040 and the International Standard IEC 60825-1. These safety features include:

- A safety enclosure (cabinet), which fully encloses the engraving laser and its beam path.
- Dual redundant interlock systems that turn off the engraving laser when the window is opened.
- A visible emission indication when the Laser Diode Pointer (Red Dot Pointer) is operating. There is an LED indicator on the machine's front panel.

21 CFR 1040 and IEC 60825-1 require that certification, identification, and warning labels be placed on laser products. Reproductions of labels on the Epilog Model 17000 Laser System follow, with their locations specified:

1. **Certification/Identification Plate:** This engraved plate is located on the right side of the machine's cabinet.



2. **Warning Logotype:** Indicates that invisible and visible laser danger is present if the cover is opened or removed.

SECTION 1: SAFETY



3. **Descriptive Label:** This label identifies the classification of the Model 16000 & 17000 in accordance with 21 CFR 1040.10 and IEC 60825-1.



4. **Non-interlocked Protective Housing Safety Labels**

5. **Defeatably-interlocked Protective Housing Safety Labels**



6. **Electrical Safety Label:** Potentially dangerous electrical exposure is present if the cover is removed.

7. **Main Breaker Label**

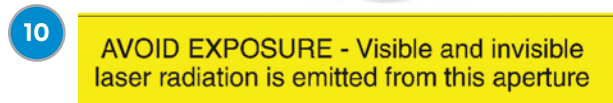
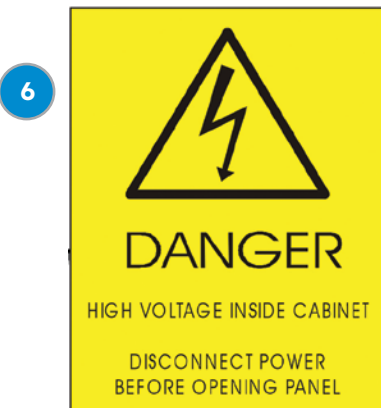
8. **Mechanical Safety Label:** Dangerous rotating moving parts are accessible if this cover is opened or removed.

9. **Consult Manual Label:** There is additional information in the manual.

10. **Aperture Safety Label**

11. **Power Labels:** Indicates the correct input power of the main electrical connection.

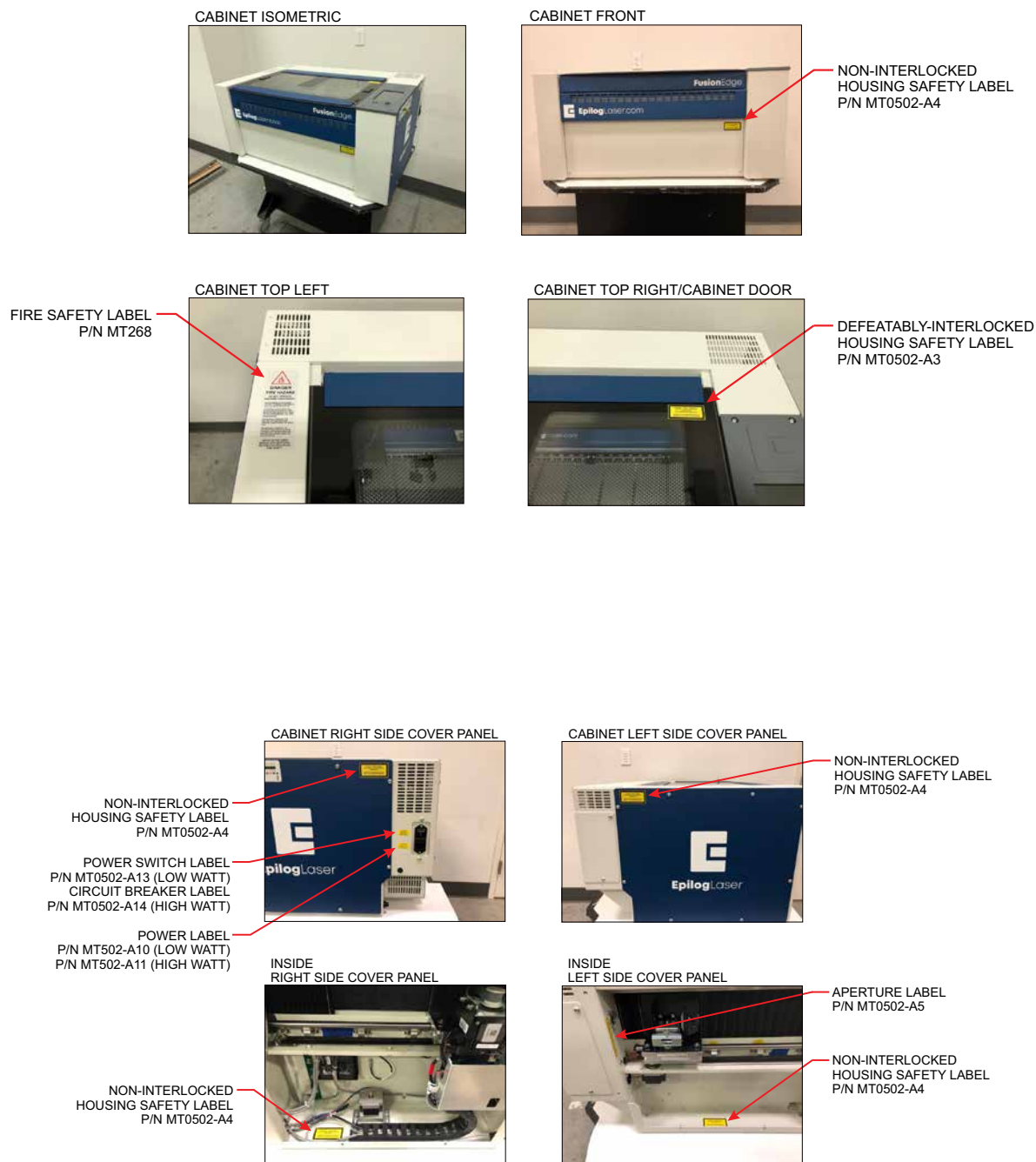
12. **Fire Warning Label:** Indicates potential fire risk.



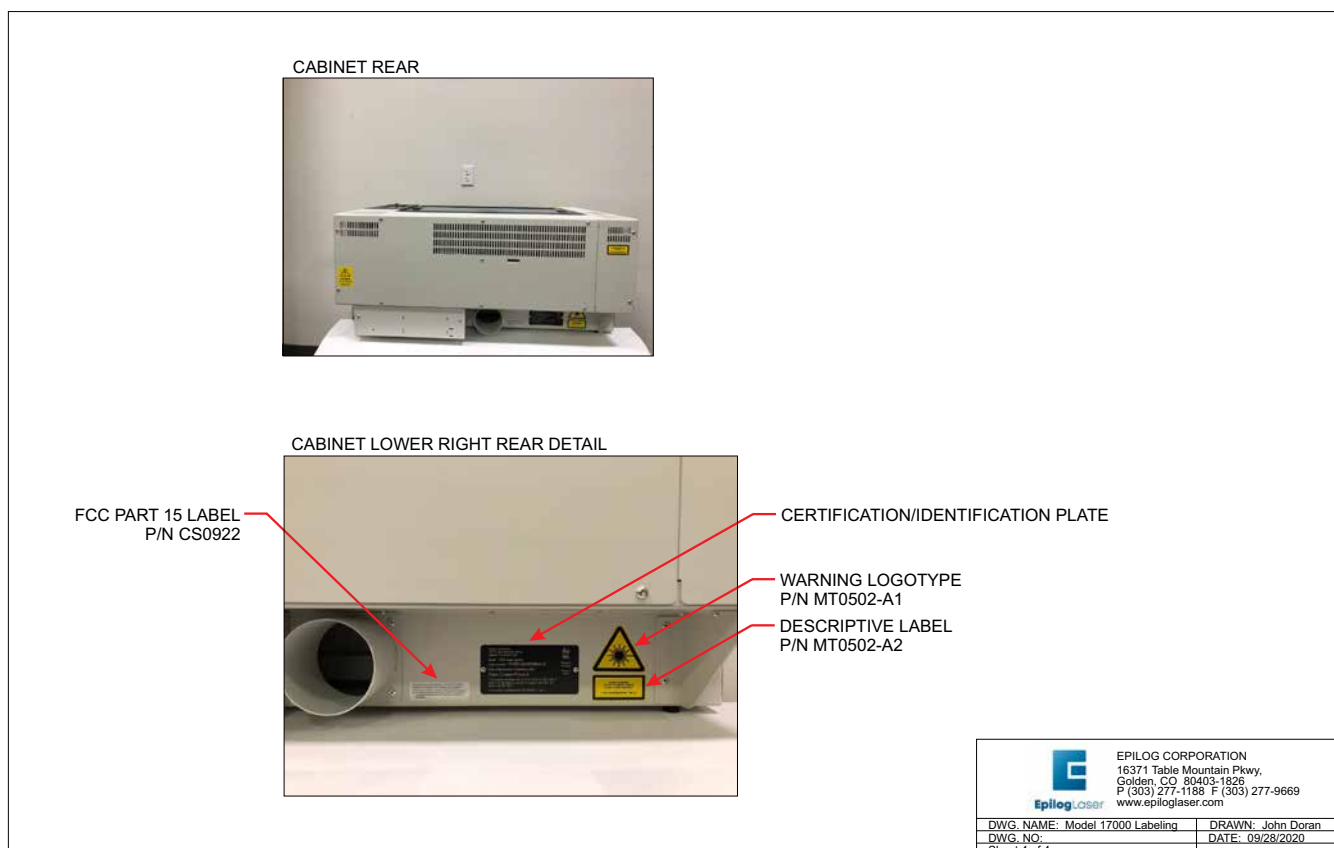
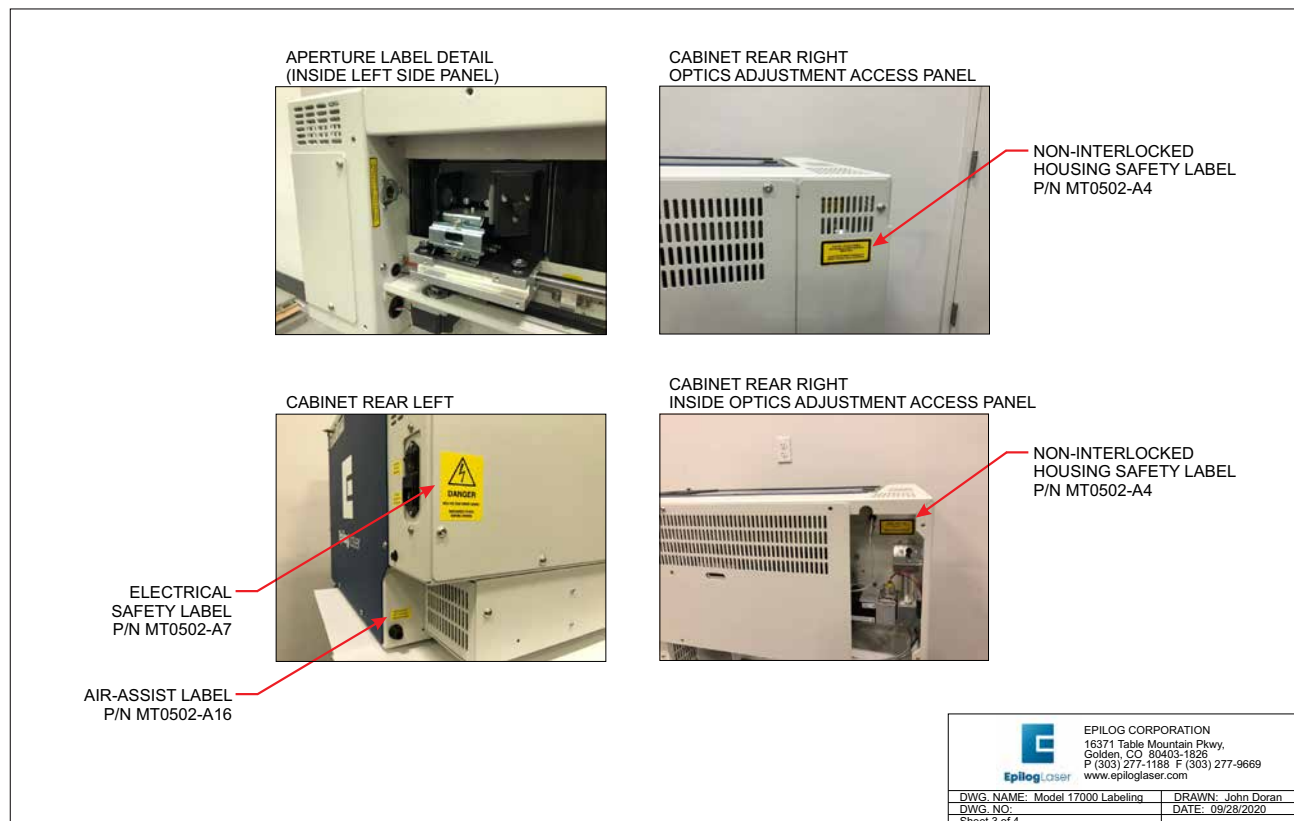
SECTION 1: SAFETY

The following diagrams show the location of each specific label.

Fusion Maker/Edge:



SECTION 1: SAFETY



SECTION 1: SAFETY

Fusion Edge/Maker FCC:

**Supplier's Declaration of Conformity
47 CFR Paragraph 2.1077 Compliance Information**

Laser Materials Processing System Model 17000

Epilog Laser Corporation
16371 Table Mountain Parkway
Golden, CO 80403

Telephone: (303) 277-1188

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..

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This product contains a Certified transmitter module (wireless network interface), FCC ID: Z64-WL18DBMOD

SECTION 1: SAFETY

Do and Don't



Don't

Do Not Run the Laser Unvented: Never operate the machine without a properly operating vent to the outside or to a filtration unit! Most material will only produce an irritating smoke when engraved. Some materials, including but not limited to paint, varnish, composition board and plastics, produce compounds that can be harmful if concentrated. A properly installed vent is the only way to ensure that problems do not occur.

Do Not Engrave or Cut PVC: Never engrave or cut **any material** containing PVC or vinyl. When engraved, a corrosive agent is produced that will destroy your machine. Your warranty will be void if your machine is damaged by corrosion from engraving or cutting PVC or Vinyl.

Do Not Operate Machine While Unattended: Never operate your machine without someone watching the system. There is a significant risk of fire if the machine is set improperly, or if the machine should experience a mechanical or electrical failure while operating.

Do Not Vector Cut While Machine is Unattended: Never laser cut any material with the laser without someone watching the system. Because vector cutting moves relatively slowly compared to raster engraving, a tremendous amount of heat is applied to the material being cut. This buildup of heat can cause significant fire risk and the machine should always be monitored. Additionally, the Air Assist should always be turned on when vector cutting to reduce the risk of fire.

Do Not Operate The System While Doors are Open: Never operate with any of the covers or enclosures removed, and never modify the enclosure. The laser beam is invisible and is very dangerous!



Do

Clean the System: Please allow a few minutes a week for cleaning your machine. Just a small amount of effort at the end of the week will pay off with years of trouble-free operation of your machine.

See the section “**SYSTEM MAINTENANCE**” on page 47 for specifics.

SECTION 1: SAFETY

Fusion Maker & Edge Care Instructions

- **Operating altitude** – 3,500 meters max
- **Relative Humidity** – 100% max, non-condensing
- **Disposal** – The Edge 12/24/36 is recyclable. Do not dispose of the machine in the trash. Electronic components should be disposed of in accordance with regional directives.
- **Protective Grounding** – Notice: Only connect the Maker / Edge to a power source having a three-wire grounded outlet.



Note: The Maker & Edge 12/24/36 is not suitable for wet locations or pollution degree greater than 2.

Fusion Maker & Edge Lifting Instructions

Maker & Edge 12 & 24

The Edge and Maker 12 & 24 laser systems can be lifted and carried using two or more people on the sides of the machine.

Maker & Edge 24 & 36

The Maker & Edge 24 and 36 are not designed to be lifted or carried, they can be moved on the attached wheels.

SECTION 2: GETTING STARTED

Setting up your Epilog Laser System is easy to do! If you've ever installed a paper printer, this is only slightly more difficult. The following information will help you understand the entire system and how it works.

The Fusion Edge, & Maker laser systems consist of the following components:

1. Fusion Edge or Maker Laser System
2. Epilog USB thumb drive with Software Suite installation files
3. USB and Ethernet Cables
4. Training Suite Kit

You will also need:

1. A computer or laptop.
2. An exhaust fan: The exhaust fan is mandatory and is used to remove smoke and debris from the work area. The exhaust air can be ported to the outside or into a filter box.

Follow these steps to set up your Epilog Laser system after unpacking it:

1. Choose where to locate the system.
2. Connect the exhaust system to your laser.
3. Connect the electrical power.
4. Connecting the laser to your computer.
5. Power on the laser and select your settings in the unboxing wizard.
6. Sign up for driver updates and register your system at www.epiloglaser.com/register.

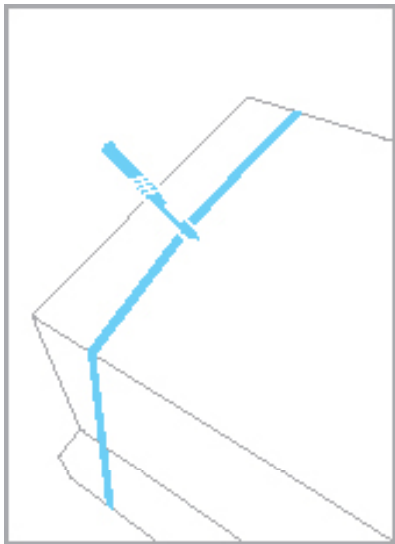
SECTION 2: GETTING STARTED

1. Unpacking

Fusion Edge 12 / Fusion Maker 12 & 24

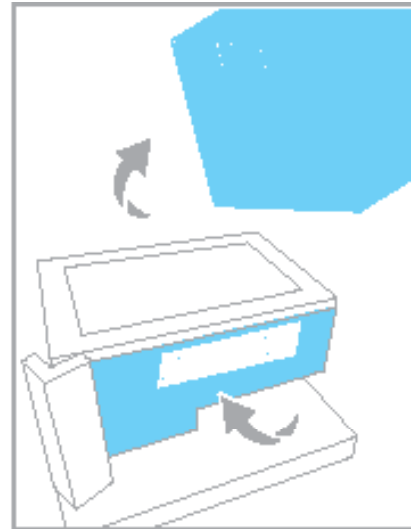
Unpack the laser system from the crate provided by Epilog. Please be sure to hold on to all packing materials and crating in case you need to move the system in the future.

1. Start by using scissors or a utility knife to cut the box straps. Stand clear of the straps, as they are under high tension and may pop out at high speed when cut.



2. Remove any smaller boxes from the top of the large, primary box (which contains your Fusion Edge). These smaller boxes will contain any optional accessories you purchased with your machine. Set them aside for later use.
3. Now remove the strapping and the wooden box topper.
4. Cut the tape that is securing the box, then open the box.
5. Remove the foam topper and the foam corner inserts.

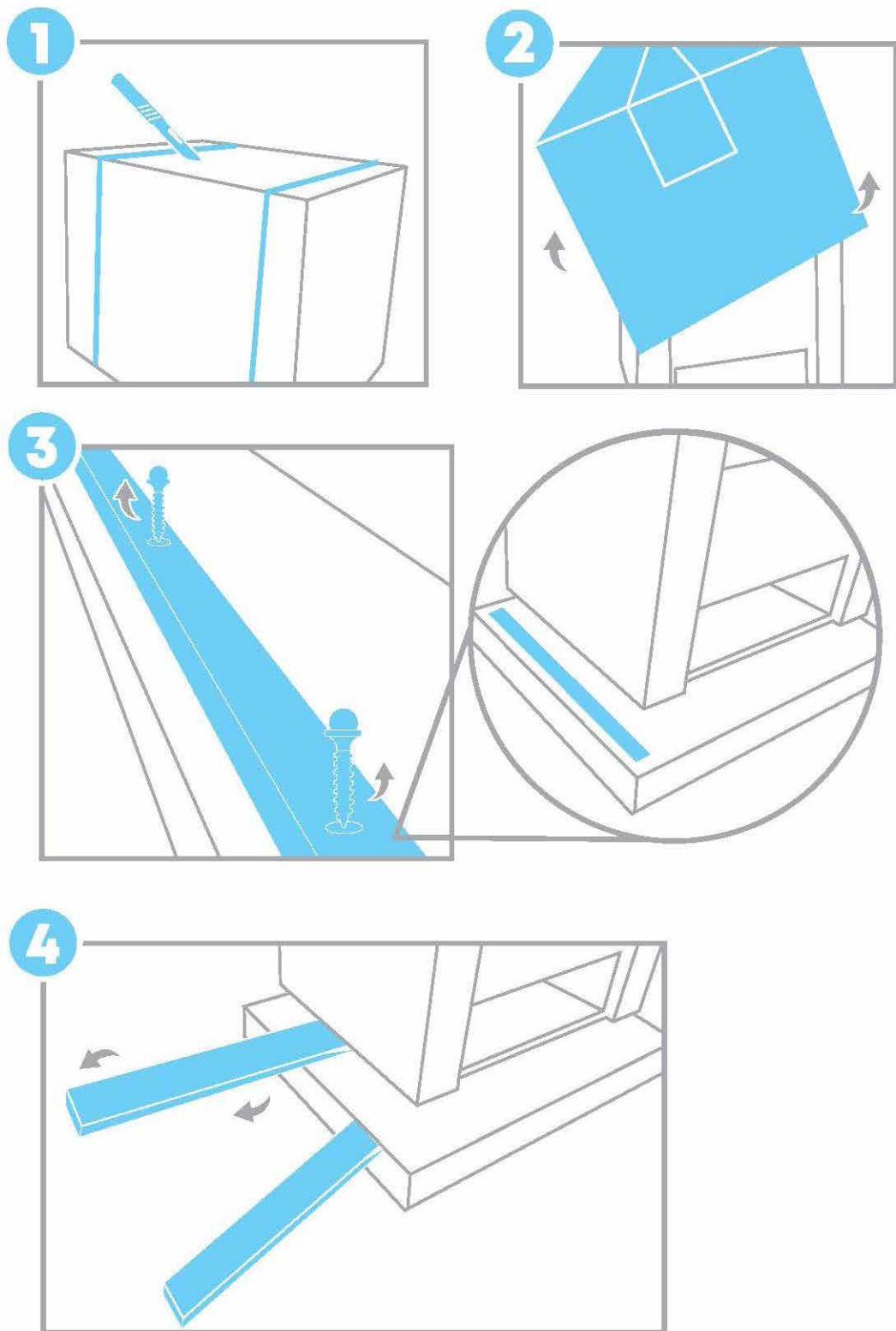
6. With the foam inserts removed, pull the box up and away from the pallet.



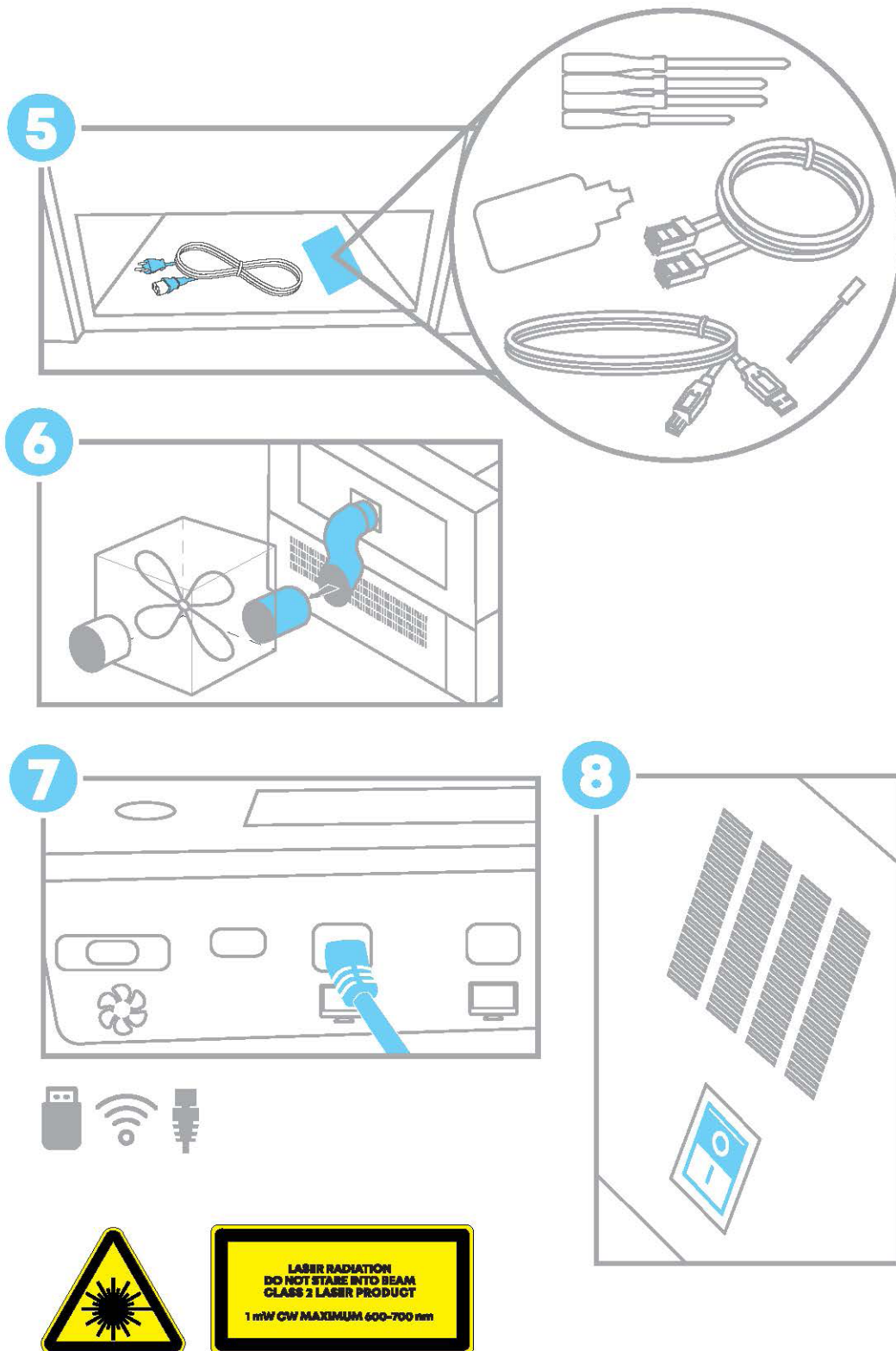
7. Cut the tape that's holding the bag closed, then spread the bag over the sides of the machine.
8. If you purchased a stand with your machine and you'd like to use it as the base for your Fusion Edge/Maker machine, assemble the stand now, before continuing on with this lesson.
9. The Fusion Edge 12 weighs approximately 138 lbs (63 kg). With the help of an additional person, lift your Fusion Edge laser system from the pallet and place it on a sturdy, level surface.
10. Once you've removed the machine from the pallet, remove the plastic bag
11. You'll find the included items and materials stored underneath:
 - Power cord
 - Ethernet cord
 - USB cord
 - Software Installation USB
 - Quick Start Guide
 - Owner's Manual
 - Training Suite Signup Card and Kit
 - Vendor Material Sample Kit
 - Lens Cleaner
 - Laser Beam Alignment Target
 - Camera Calibration Sheet

SECTION 2: GETTING STARTED

Fusion Maker & Edge 24/36



SECTION 2: GETTING STARTED



SECTION 2: GETTING STARTED

2. Choose Where to Locate the System

Cooling Requirements and Operating Temperatures

All Epilog Laser systems use air-cooled laser tubes. Laser technology is such that the laser tubes generate a lot of excess heat and the tubes must be cooled for proper operation. There are cooling fans located on both sides of the laser. The fans and vents should always be clear of restrictions and should never be covered.



Warning: The cooling fans and vents are located on both sides of the Fusion Edge and Maker should never be covered or blocked in any way. Lasers that overheat will not operate properly and may begin to produce erratic laser output or possibly complete failure.

Ambient air temperature where the laser system is operating should not exceed 90 degrees F (32 C). Operating in an environment where the ambient air temperature is above 90 degrees F (32 C) will void the Epilog warranty. **For more information, see the “Warranty Statement for the Fusion Maker & Fusion Edge Laser” on page 69.**

SECTION 2: GETTING STARTED

3. Connecting the Exhaust

In this manual, the term “exhaust” refers to either an exhaust fan or a filter unit and the term “exhaust” is used for simplicity. The important point is that it is mandatory that an exhaust unit or filter system is incorporated as part of your laser system. Never operate your laser system without a properly functioning exhaust. The exhaust removes the dust, debris and smell from the engraving cavity and exhausts it to the outside of the building or to the filter unit. Prior to the installation of the laser system, you may need a contractor to install the exhaust system. The blower should be mounted outside your building for noise considerations. Ideally, the blower should not be more than twenty feet (6 meters) from the laser. You should provide a metal duct (flexible aluminum or galvanized sheet metal) from the blower to the laser.

- **All Epilog Fusion Maker 12/24/36, Edge 12/24** require an exhaust fan that is rated at a minimum of **350-400 CFM** for external exhaust.

Epilog provides recommended exhaust flow rates (CFM) only for direct ventilation exhaust systems that are ported to the outside. Please note that this is also a recommendation and not a requirement, because factors such as length and type of tubing from the Epilog laser to the exhaust fan and from the exhaust fan to the outside of the building can produce significant losses on the true amount of air that is drawn from the Epilog laser.

Exhaust flow rates (CFM) for filter systems are not specified in this document. However, exhaust flow rates for filtration units will be lower than a direct ventilation exhaust system because filters are designed to be placed directly adjacent to the laser system and do not exhibit the air-flow losses that are typically found with direct exhaust fans. Epilog has worked with most major filter manufacturers to recommend a specific filter system for each model of Epilog laser. Please contact your Epilog distributor to match a filter to the Epilog laser system you are using.



Note: Remember to put the blower switch for the laser system in an obvious and accessible place so it can be routinely switched on prior to using the engraver. Please connect the exhaust blower to the laser as shown on the following pages.

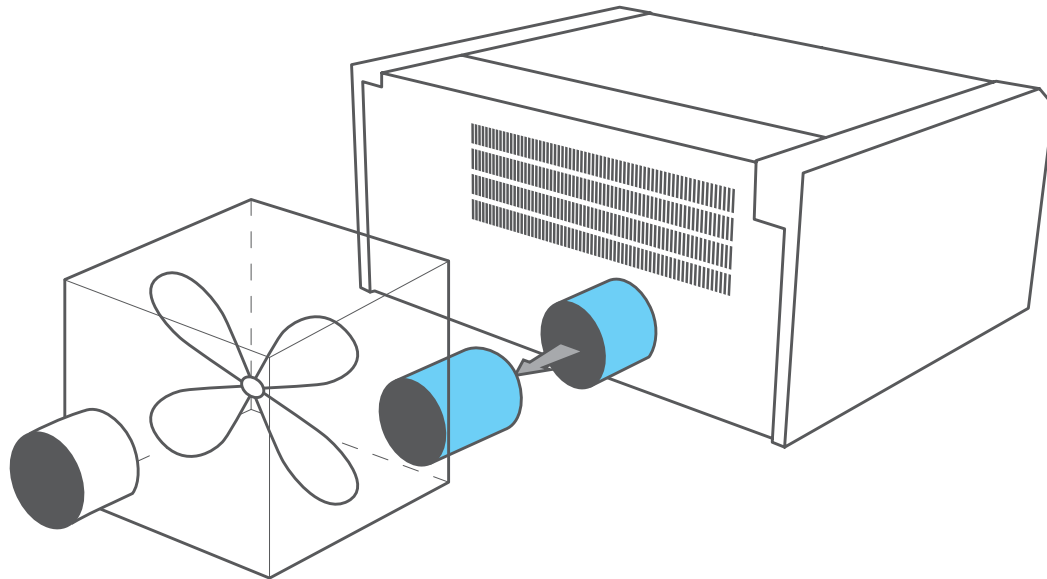
Remember, you may need a contractor to install the exhaust. This must be done PRIOR to installation of the laser system.



Warning: It's important that either rigid or flexible metal ducting be used for all connections leading to and from the laser system and the exhaust fan. Vinyl, plastic, or any type of “soft” ducting is potentially flammable and should not be used unless provided by the filtration system manufacturer and made from fire-proof materials.

SECTION 2: GETTING STARTED

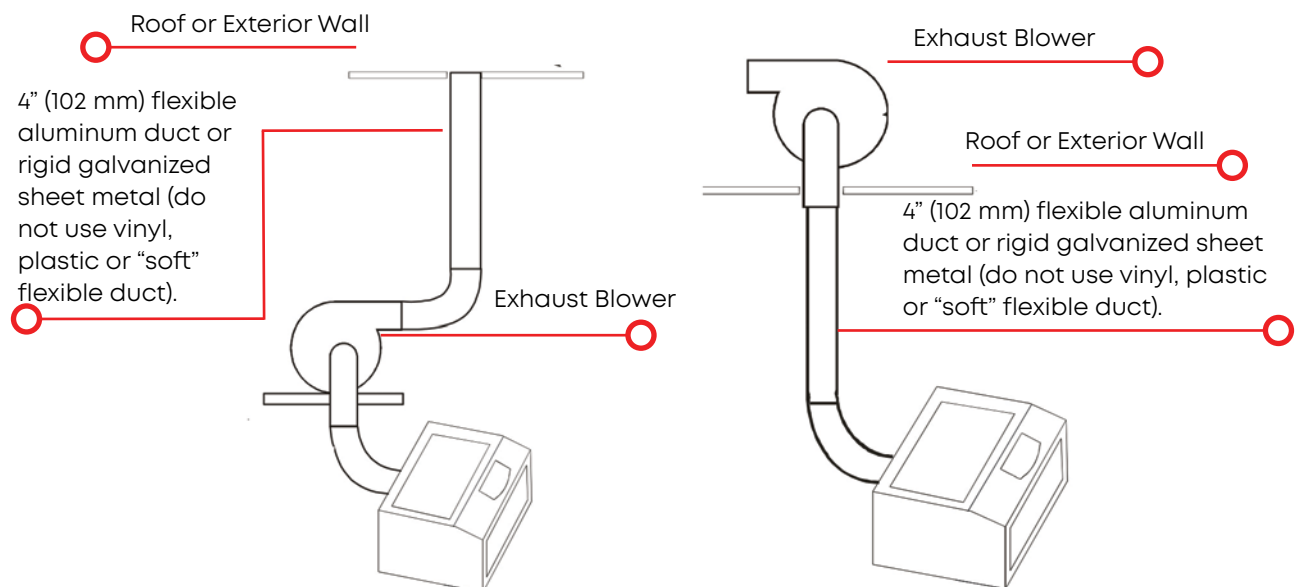
Fusion Edge 12/24/36 & Maker 12/24/36 Exhaust Setup:



Epilog Exhaust/Filter Connections

There is one 4" (102 mm) port attached to the back of the Fusion Edge 12/24/36, and Fusion Maker 12/24/36 laser systems. Check your exhaust system for leaks. Most small leaks can be remedied with duct tape. DO NOT OPERATE your laser with inadequate or leaking exhaust.

The drawings above show the typical exhaust setup. The left drawing shows the exhaust near the machine and the right drawing shows the exhaust fan on the roof. Where the exhaust fan is placed is a choice of personal preference. Some users like the exhaust fan outside because of noise considerations.



SECTION 2: GETTING STARTED

Air Assist Pump

Epilog's optional Air Assist Pump is available to work with the included Air Assist features of the laser systems, directing a constant stream of air to your cutting surface to remove heat and combustible gases from the work area. The Air Assist Pump feeds 30 psi of air through the Air Assist structure.

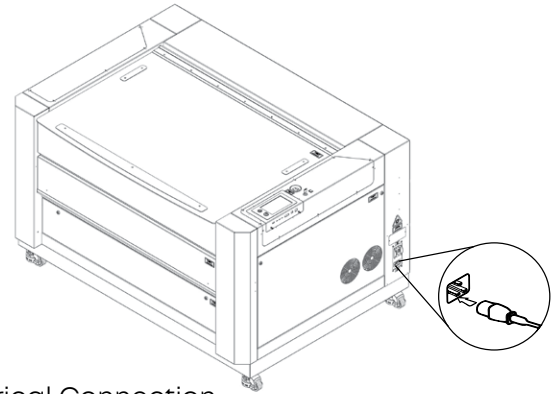
The pump can be connected quickly to the machine via inlet and outlet ports on the compressor and the laser system. The Fusion Pro & Edge systems have a port on the back of the machine to hook up an Air Assist Pump.



SECTION 2: GETTING STARTED

4. Connecting Electrical Power

Epilog supplies the appropriate power cord for the system you ordered. The power cord is found in the accessory package with your machine. The power cord for the laser plugs into the power receptacle located on the right side of the machine in the rear corner.



Electrical Connection
220 V-50/60 Hz

- All 30-80 watt- equipped machines, regardless of model, can run on 100v or 220v with a 15 amp outlet. The plug type for 110v is NEMA 5-15P (for wall receptacle NEMA 5-15R). The plug type for the 220v is NEMA L6-15P (for wall receptacle NEMA L6-15R)

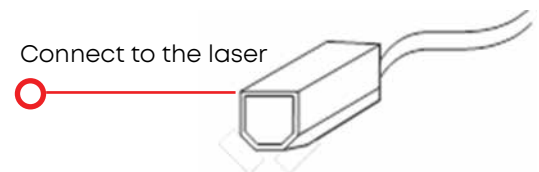
5. Connecting the Laser to Your Computer

You are now ready to connect your computer to the laser. The following connections can be used:

1. **USB only connection:** You can use the USB port for connecting to the Software Suite, however, multiple laser systems cannot be operated from a single computer through a USB connection.
2. **Ethernet only connection:** With an Ethernet connection you can print from the Software Suite to multiple machines at once.
3. **Wireless connection:** To connect to the laser via wireless connection, boot up the laser and follow the instructions **“Wireless Setup” on page 26.**

USB Connection

A USB cable is included in the accessory kit. The USB port is located on the right-hand side of the machine. USB cables have different connectors on each end. The USB connection will behave similarly to an Ethernet cable when communicating with the laser. Both the computer and machine should recognize the USB without any need to reboot.



SECTION 2: GETTING STARTED

Ethernet Connection

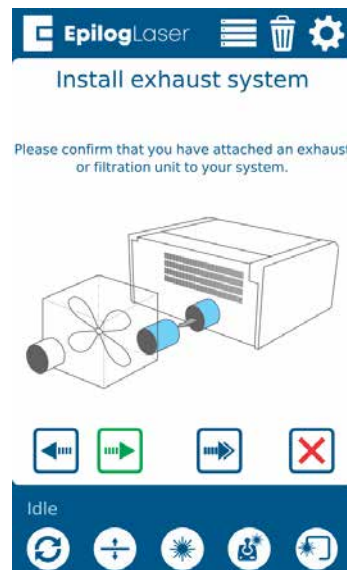
The Ethernet Port is a standard 1000Base-T connection, and is backwards compatible with 100 and 10Base-T. Your Epilog Laser has all of the versatility of a network capable peripheral. As such, there are many different ways that the laser can be connected to a computer or a network. Connect the Ethernet cable (included in the accessories kit) to the Ethernet port, located on the right-hand side of the machine. Plug the cable into the Ethernet port on the laser, then plug the other end into the Ethernet port on your computer.

6. Power on the Laser

1. When you boot up the Fusion Edge or Fusion Pro for the first time, you will need to set up a few settings in the unboxing wizard to get started. On the first screen, select your preferred language and then click the next arrow.



2. Confirm that your laser's exhaust system has been set up by pressing the green next arrow.



SECTION 2: GETTING STARTED

- Follow the steps on the screen to run your first engraving using the anodized aluminum piece included in your Training Suite Kit. Press the green next arrow.



Run Your First Engraving!

Place the 3.5" x 2" (88 x 50 mm) piece of anodized aluminum from your Training Suite Kit in the upper left corner of the table.

On the next screen, you will select the Epilog Demo File, then press the Go button on the laser.



- At the Job Menu, select the job "Epilog Demo" and then press the Go/Stop button at the machine to begin running your first job. The machine will automatically focus to the piece of anodized aluminum and then engrave it.



- Once the engraving is complete, it's time to connect your Fusion Pro to your computer. You can connect via Ethernet, USB, or Wireless connection in the steps on the following pages.
 - For Ethernet Setup, see **"Ethernet Setup" on page 24.**
 - For USB Setup, see **"USB Cable Setup" on page 25.**
 - For Wireless Setup, see **"Wireless Setup" on page 26.**

SECTION 2: GETTING STARTED

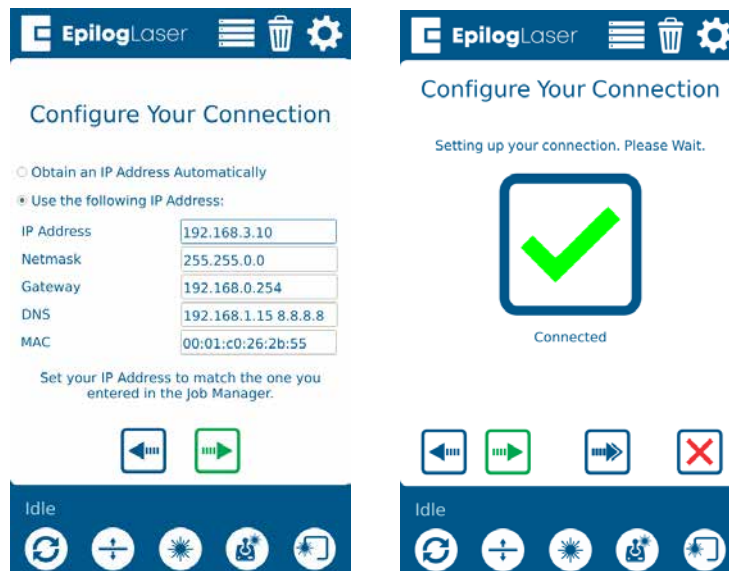
7. Set the IP Address

Ethernet Setup

1. A screen will appear asking how you would like to connect your laser. Select “**Ethernet**”.



2. Select the text in the IP Address box and type in whichever IP Address you prefer to use. Most Epilog users will use the IP Address of **192.168.3.10** which is what we use in this manual. Press the **Green** arrow to complete the setup.



3. This will be the IP Address you use in the Job Manager when you set up your machine.

SECTION 2: GETTING STARTED

USB Cable Setup

1. A screen will appear asking how you would like to connect your laser. Select **“USB”**.



2. Under **“IP Address”** the IP Address will be **169.254.7.2**. Press the **Green** arrow to complete the setup.



3. This will be the IP Address you use in the Job Manager when you set up your machine.

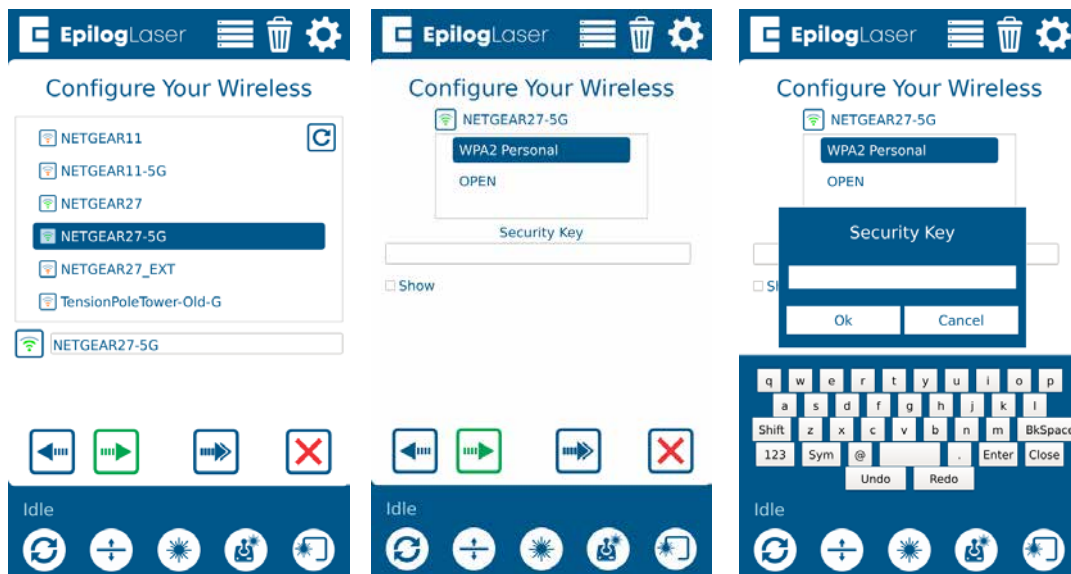
SECTION 2: GETTING STARTED

Wireless Setup

1. A screen will appear asking how you would like to connect your laser. Select **“Wireless”**.



2. On the next screen, select your wireless network from the list and press the green next arrow. Select “WPA2 Personal” if you are connecting to a secured network. Select Open if you are connecting to an open network. Tap the box under “Security Key” and type in your password. Then press the green next arrow to connect.



Note: You must select the same network that your computer is connected to.

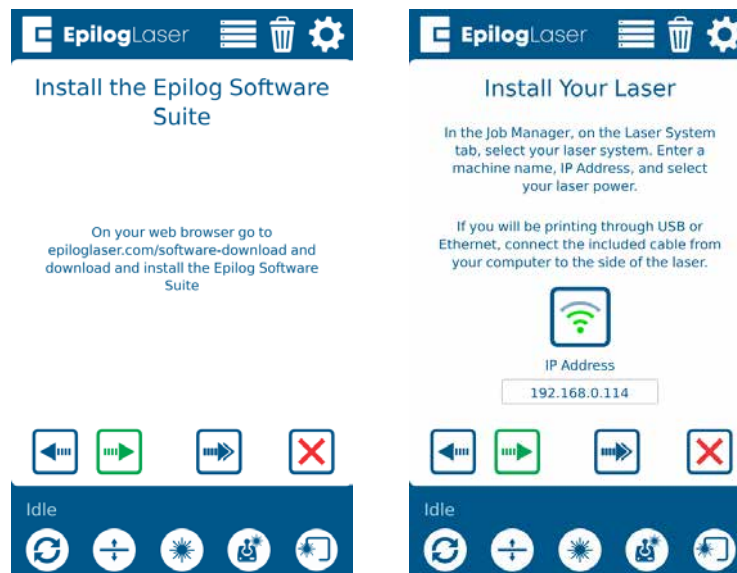
SECTION 2: GETTING STARTED

3. Select “Obtain an IP Address Automatically” and click the green arrow to finish setup. Once connected, your screen will show a green check mark. Press the green next arrow.



8. Install the Software Suite & Set Up Your Laser

Follow the instructions for the remainder of the setup. For more detailed instructions on installing the Software Suite or setting up your machine in the Job Manager, go to support.epiloglaser.com.



SECTION 2: GETTING STARTED

9. Sign Up for Driver Updates and Register Your System

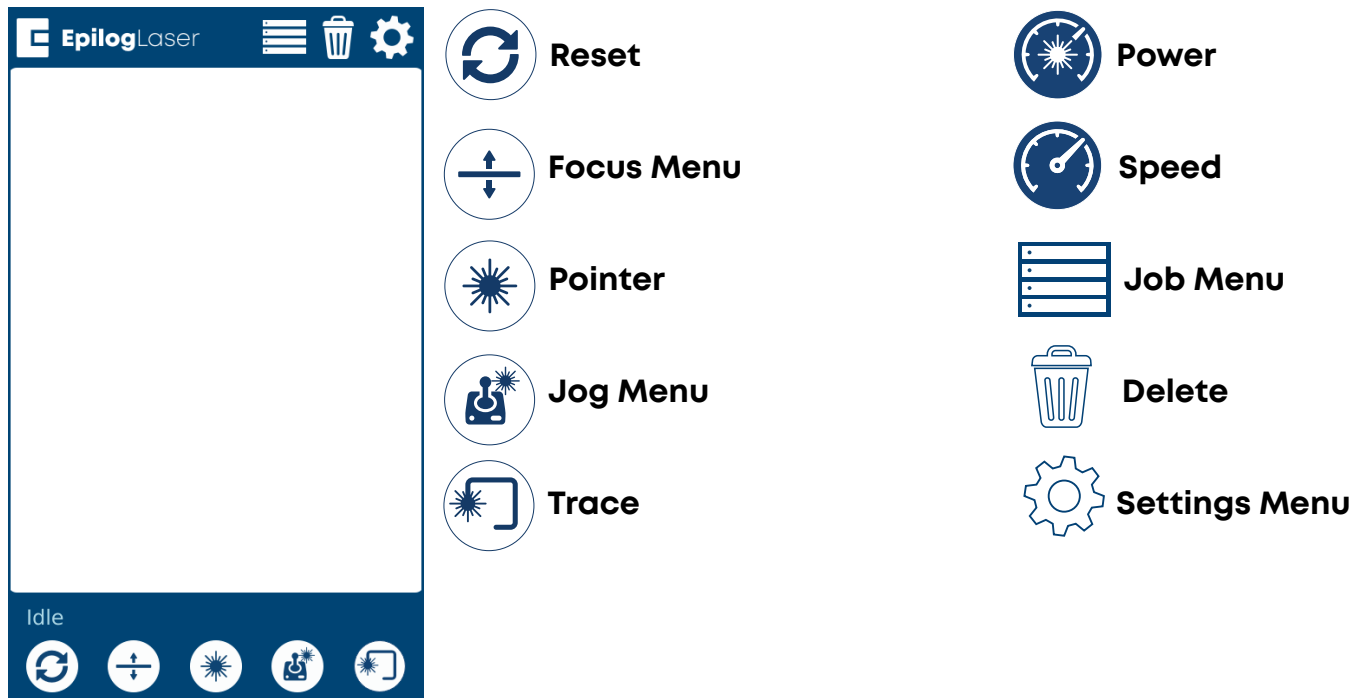
Go to www.epiloglaser.com/register and register your system.



SECTION 3: CONTROL PANEL

Display

The display shows valuable information associated with the highlighted Functional Menu items. We will explain the different information that will be displayed as we go through the description of each menu item.



Status Indicator

In the bottom left corner of the screen you will see text displaying the current status of the machine.

- **Homing:** This indicates the machine is still powering on. None of the functions are available until powering on is completed.
- **Idle:** The machine is inactive and ready to run or resume a job.
- **Running:** A job is in progress when this is displayed.
- **Parking:** The axis is returning to Home position.
- **Jogging:** Jog mode is active.

Symbols



Go/Stop Button

Press the Go/Stop button to start and pause a job.

SECTION 3: CONTROL PANEL

- Pressing the Go/Stop button during a running job will stop the lens carriage and the laser beam will be shut off. If the Go/Stop button is pressed during raster engraving mode, the lens carriage will pause on either the far left or far right of the engraving line that is in process. If the Go/Stop button is pressed while in vector cutting mode, the lens carriage will stop at the end of a line segment or at the next line node location.
- Once the lens carriage has stopped, you can open the door to examine the job. By closing the door and pressing the Go/Stop button, the job will commence where it left off. If the item being engraved/cut has not been moved, the engraving/cutting registration will not be affected.
-  **Note:** Opening the door on the laser during engraving or cutting will stop the laser from firing; however, the lens carriage will continue to move. It is important to stop the job before you open the door to ensure the engraving/cutting is completed.
- If you press the Go/Stop button while in vector mode it may take some time for the system to actually stop. The system needs to get to the next node in a vector before it can stop.

LED Status

The ring around the Go/Stop button will change certain colors depending on the machine's status.

- **White:** The machine is booting.
- **Purple:** The machine is waiting for the touch screen configuration to load.
- **Multi-colored:** The machine is Homing.
- **Alternating Light Blue to Green:** Machine is Idle and ready to run a job.
- **Green:** Machine is actively running or tracing a job.
- **Red:** A drive has failed. The number of flashes determines the drive number that failed. If more than one drive has failed, it flashes for the first sequential drive.
 - 1 - X Axis
 - 2 - Y Left Axis
 - 3 - Y Right Axis

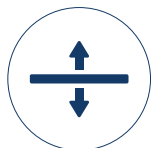
Reset Key

- Pressing the Reset key will move the carriage back to its Home Position. Press the Reset key after you have moved the carriage when in Jog mode.
- You may also press this key if you want to start a job over after pausing it with the Go/Stop button. Reset does not erase the job from the laser systems memory; rather it will stop the engraving job in process and send the carriage back to the Home Position.



Focus

The Focus function allows you to manually set the table to the correct height for engraving while using the Focus Gauge. With Focus highlighted, use the Joystick to move the table up or down. The display will show a digital readout of the table position. Press once to enable the Focus feature and the icon will turn green. Press again to exit this feature.



SECTION 3: CONTROL PANEL

Pointer

The Pointer key is a toggle switch that turns the laser system's Red Dot Pointer on and off. **For more information visit "Red Dot Pointer" on page 45.**



Jog

The Jog function allows you to move the laser head around the table with the use of the Joystick. To make it easier to use, turn on the Red Dot Pointer for a visual indicator of where the carriage is moving. The carriage can be moved in X, Y or diagonally. The display will show a digital readout of the carriage position. This function is useful for bringing the focus gauge to any object on the table to ensure it's focused properly. **For more information see "Auto Focus vs Manual Focus" on page 43.**

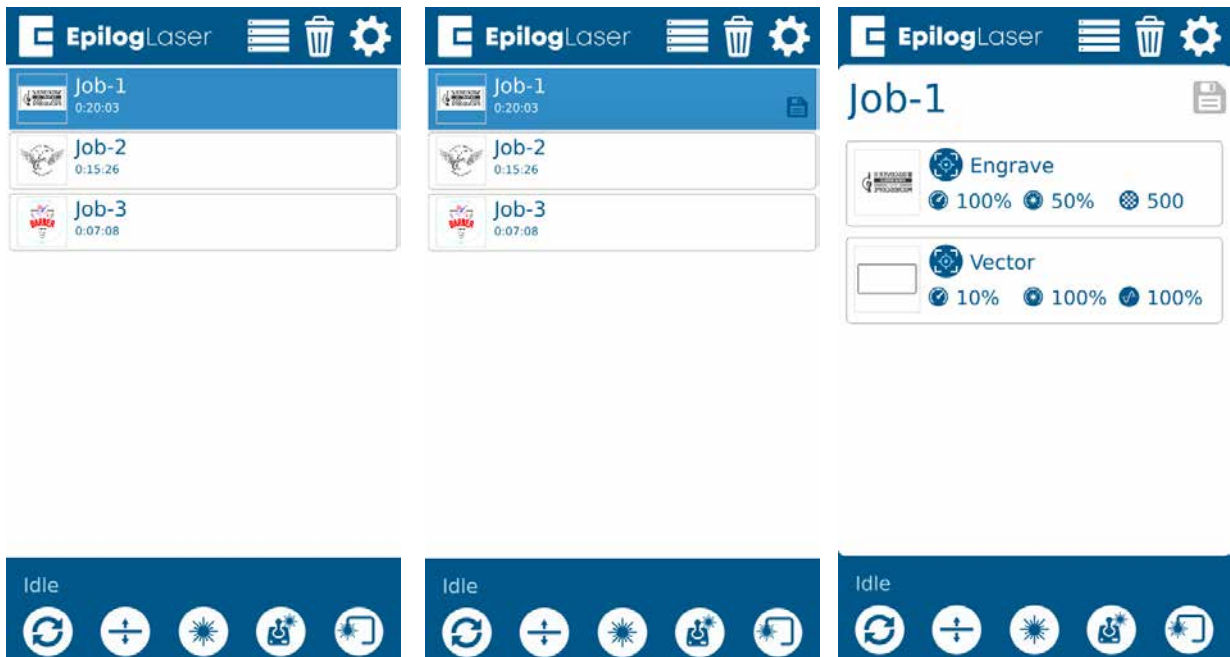


Trace

The Trace function allows you to preview the placement of your artwork on your work piece before you run the job. To use, turn on the Red Dot Pointer, select your job from the Job Menu, and press the Trace key. The laser head will begin tracing the entire outline of your job repeatedly. To stop tracing, press the Trace key again.



Job Menu



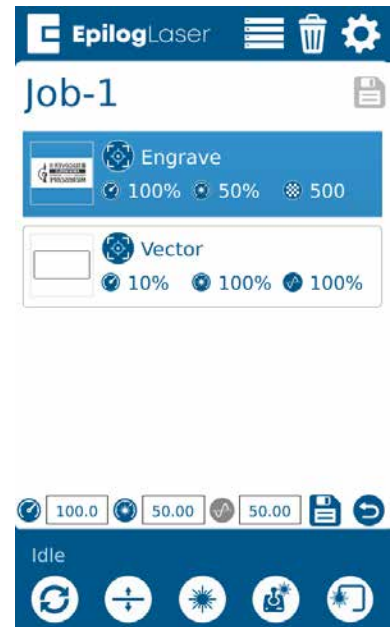
- The Job Menu allows you to scroll through the jobs in your laser system. You will be able to see a list of jobs that have been sent to the laser. The job name displayed is the same as the file name that you printed to the laser.
- When the job you want has been selected, it will be highlighted in blue. Press the Go/Stop button to start the job.

SECTION 3: CONTROL PANEL

- After the job starts, the job's settings and a timer will be activated and will be shown at the bottom of the display.
- Saved jobs will always be visible at the bottom of the list with a save icon next to the job name.
-  Pressing and holding down your finger on a job will pull up the job's settings, allowing you to view the Speed, Power, and Resolution or Frequency. A save button will also be visible in the upper right corner that allows you to save the job permanently to the laser.

Editing Job Settings at the Machine

1. Print a job to the machine.
2. Long press on the job and the Speed and Power values will come up.
3. Press the job again and the Speed and Power boxes will come up at the bottom of the screen
4. Highlight the one you want to change and another dialog box will come up at the bottom of the screen.
5. Delete the number in the box and then insert the new value(s).
6. Press the Save icon to save the change. If you exit this screen without pressing the Save icon, your changes will not be saved.



Speed

This icon indicates the speed settings on the selected job. It ranges from 1-100%.



Power

This icon indicates the power settings on the selected job. It ranges from 1-100%.



DPI

This icon indicates the resolution settings on the selected job. It ranges from 75-1200.



Frequency

This icon indicates the frequency settings on the selected job. It ranges from 1-100%.

SECTION 3: CONTROL PANEL

Delete Button



The Delete Button will permanently erase jobs from the Job Menu. To delete a job, select the job in the Job Menu, and then select the Delete Button. A dialog will pop up to confirm that you want to delete the file. Select “Yes” and the file will be removed from the Job Menu.



Note: If you have marked a job as “Saved” and delete the file, it will still be erased from the Job Menu.



Settings Menu

The Settings menu has 8 sub-menus.

Home

This menu allows you to set an offset to the Home position.

Tutorial

This menu allows you to set up your machine. It is the same process as when you set up your laser for the first time, including a demo job to test the machine.

Focus

This menu includes options to calibrate the table, CO2 or fiber focus, or the plunger.

Laser

This menu allows you to fine-tune your laser's settings.

Backup

This option allows you to backup and restore the machine's factory settings.

Network

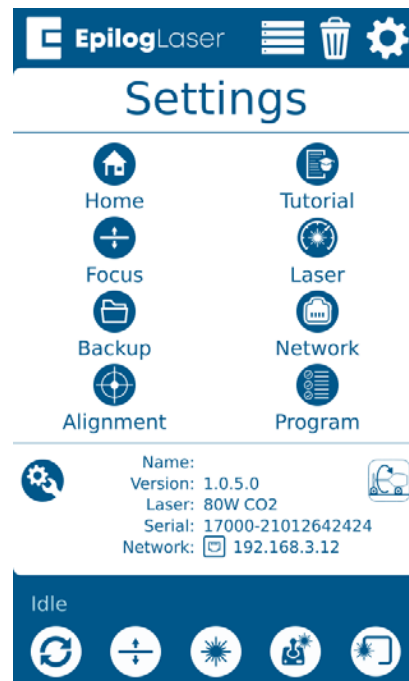
This menu allows you to set up your machine's network settings via Ethernet, Wifi or USB.

Alignment

This menu is used for aligning the laser of the machine.

Program

This menu is used for updating the peripherals of the machine.



SECTION 3: CONTROL PANEL

Configuration Menu

The Config menu has three sub-menus, System, Network, and About Machine.

System

Once selected, the System Settings display detailed information about the machine. These are factory settings that should not be changed unless instructed by Epilog Technical Support.

Network

Once selected, the Network Settings allow you to change the IP Address and the Netmask. The IP Address on this screen should match the IP Address you have assigned your machine in the Job Manager. If you have multiple machines, each one will need its own IP Address. For more information, see **“7. Set the IP Address” on page 24**.

About Machine

Once selected, this section displays info about your laser's firmware version, laser power, and Serial Number.

Park Axis

Pressing Park Axis returns the Laser to the Home Position.

Home Axis

Pressing Home Axis repeats the Homing process that happens when the machine powers on.

Home Table

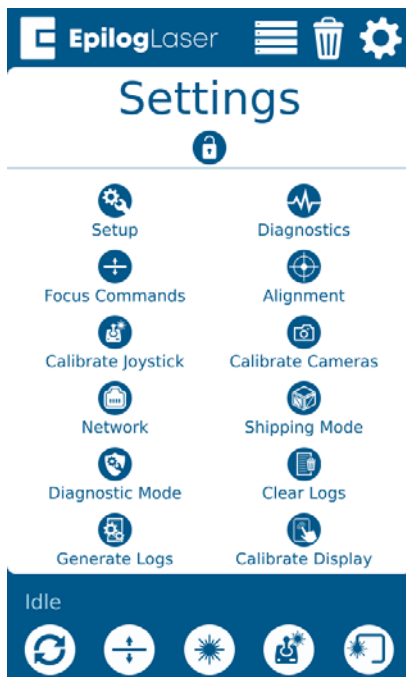
Home Table resets the table height to its Home Position.



SECTION 3: CONTROL PANEL

Advanced Settings

Access the Advanced Settings Menu by first going to the Settings Menu, then long pressing the text “Settings” at the top of the screen.



In this menu you have options for calibrating various parts of the machine, including the Joystick, Cameras and Auto Focus. Each option provides step by step instructions for each process.

For more information about Camera Calibration, **see “Camera Calibration” on page 83.**

For more information about Auto Focus Calibration, **see “Calibrating the Auto Focus” on page 85.**

SECTION 3: CONTROL PANEL

Jog Menu



Access the Jog Menu by pressing the Jog key, which will turn green when active. The Jog Menu allows you to adjust the current X and Y axis positions of the laser head. You may change the current position of the laser head either using the Joystick, or by entering precise coordinates under “Move To”.

Locking Coordinates



The X and Y coordinates may be locked and unlocked to help you fine-tune the laser head's position. Tap the lock icons to lock or unlock the X and Y coordinates. When only the X coordinate is locked, the joystick will only move the laser head in the Y direction (toward the front or back of the machine). When only the Y coordinate is locked, the joystick will only move the laser head in the X direction (left or right). If both the X and Y coordinates are locked, the laser head will not move until they are unlocked.

Move To

Enter X and Y coordinates to move the laser to a specific location on the table.

Centering Point

Pressing this button tells the laser where you want the center of your artwork to be. While jogging the laser head across the table, use the red dot pointer to help identify the center point of your engraving. The Centering Point feature is used with Center-Engraving enabled jobs. To return to the Centering Point you have previously set, long-press the Centering Point button and the laser head will return to that point.



Park Axis

Park Axis returns the laser head to the default home position in the upper left corner of the table. To change the default park position, see “Setting Park Position / Resetting Park Position” on page 38.

Home Axis

The Home Axis button homes the laser head and then returns it back to the home position, the default every time you turn on the machine.

Nudge

The Nudge arrows allow you to fine-tune the position of the laser down to a thousandth of an inch. To change the increments you want to nudge the laser's position, click the text box under “Nudge” and enter an amount.

Auto Focus



The Auto Focus button is in the center of the Nudge arrows. When you have jogged the lens carriage above your material, press the Auto Focus button to use the plunger Auto Focus. The table will rise until the material touches the plunger, then set the table to the correct height. Your job should now be in focus.



SECTION 3: CONTROL PANEL



Note: For more information about Auto Focus, see “Auto Focus” on page 43.

Focus Menu



To access the Focus Menu press the Focus key, which turns green when active. The Focus Menu is used for raising or lowering the table level to focus the laser precisely to your engraving or cutting material using the Focus Gauge. The height of the table is adjustable by either using the joystick, or using the Nudge arrows. Once you are finished using the Focus Menu, press the Focus key again to return to the main Job menu.

Move To

Enter an amount to focus the table to the laser at a specific height.

Nudge

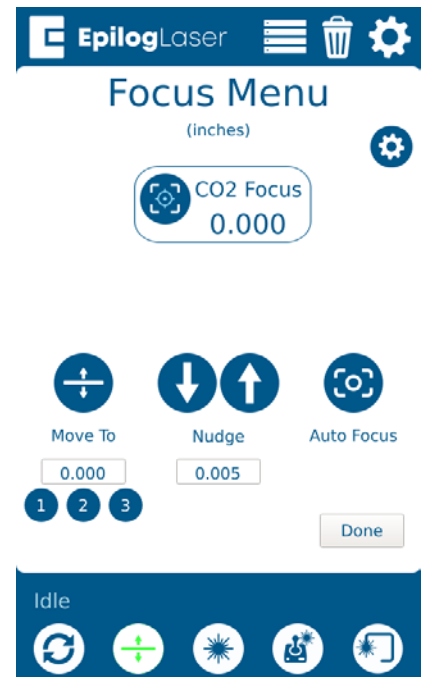
The nudge arrows allow you to fine-tune the position of the laser down to a thousandth of an inch. To change the increments you want to nudge the laser’s position, click the text box under “Nudge” and enter an amount.

Auto Focus

When you have jogged the lens carriage above your material, press the Auto Focus button to use the plunger Auto Focus. The table will rise until the material touches the plunger, then set the table to the correct height. Your job should now be in focus.

Settings

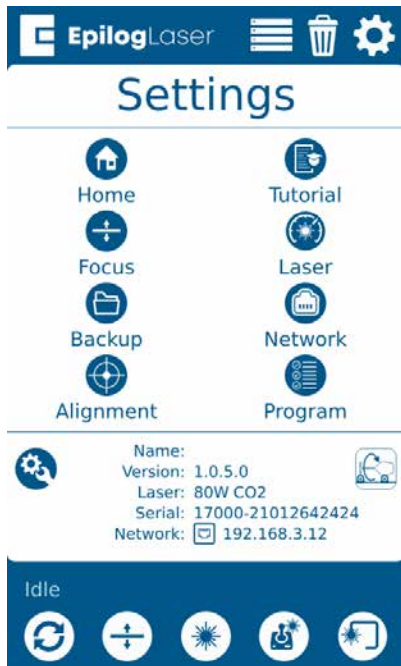
Pressing the gear icon on the Focus menu allows you to save “Thickness Presets” which can be useful for items you work with regularly that have a consistent thickness. Simply type in the table height you wish to use and save the presets by pressing the save icon. Now when you press the numbers 1, 2, or 3 on the focus menu, and then press “Move To”, your machine will adjust the table to that height.



SECTION 3: CONTROL PANEL

Setting Park Position / Resetting Park Position

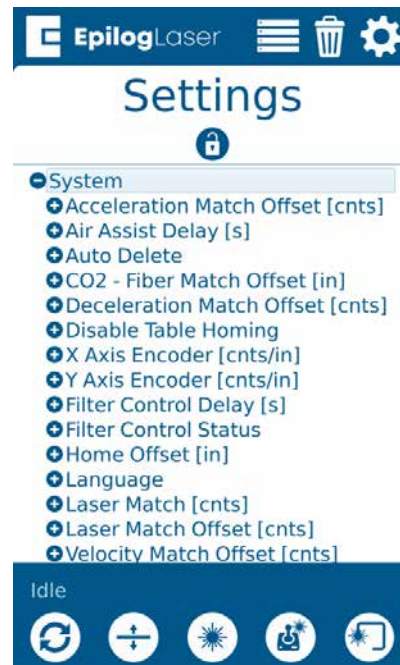
1. To set a new Park Position, press the Settings gear button in the upper right corner.



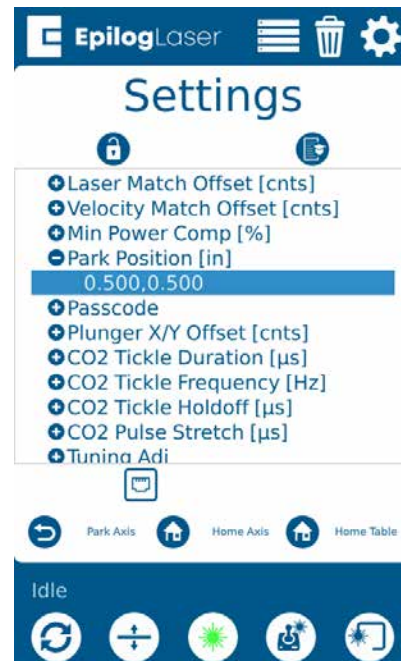
2. Under the Settings menu, press the wrench and gear icon in the bottom left corner to open the Config Settings Menu.



3. Press **“System”** to expand the menu.



4. Scroll down to **“Park Position”** and press it to open up the submenu.



- 5.

SECTION 3: CONTROL PANEL

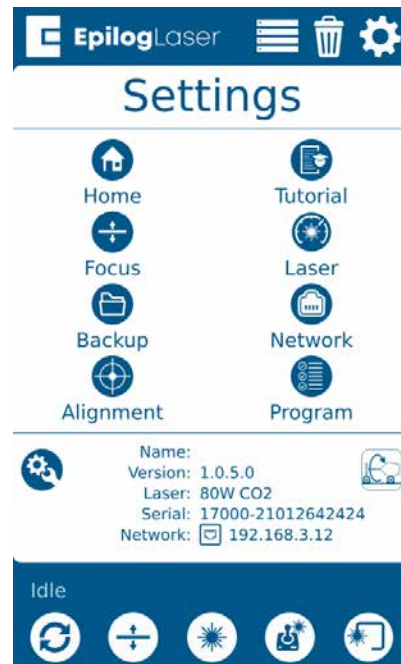
6. Tap the current number value below Park Position to change it to the X & Y coordinates of your choice. Press “**Ok**” to save the new coordinates.



7. To reset Park Position to its **default position**, follow the previous steps and change both the X & Y value to “1”.

Enabling/Disabling Wireless

1. To enable or disable the Wireless connection option on your machine, first go to the **Settings Menu**.



2. Under the Settings Menu, select “**Network**”.

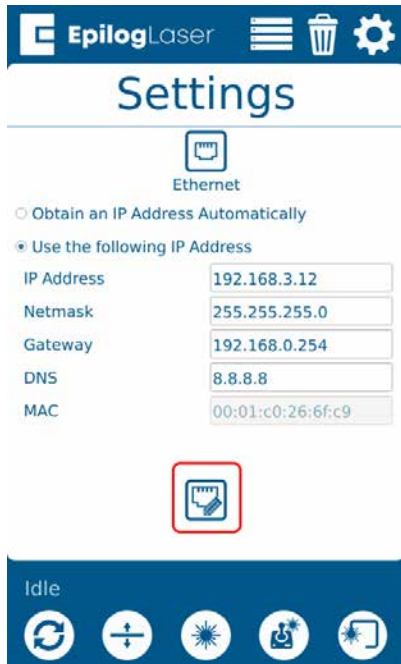


3. Press the minus symbol to turn off wireless, and the plus symbol to turn it back on.

SECTION 3: CONTROL PANEL

4. **Note:** If you are already set up with an ethernet connection and the Network Menu does not display, press the “ethernet” icon to

return to the Network Menu first.



Joystick

The Joystick feature is used in Jog mode and Focus mode. The Joystick is progressive and touch sensitive and provides a continuously variable range of adjustments. It is sensitive to the degree of tilt that is being applied. The more you tilt the Joystick, the bigger your impact on the function you are using.

Job Storage

The Fusion Maker & Fusion Edge have 1 GB of permanent storage. While powered on, the machine will store any and all jobs sent until there is no free memory left. This feature allows you to save your most run jobs right at the laser without needing to first print them from the computer.

To save a job, press and hold down on a job in the Job Menu until it pulls up the job's settings. Select the save button in the upper right corner and the job will save permanently to the laser until manually deleted. If you do not save a job, it will be deleted upon powering down the machine.

SECTION 4: SYSTEM FEATURES

IRIS™ Camera Positioning System



The Fusion Edge & Fusion Maker include the IRIS™ Camera Positioning System which allows you to precisely place your artwork on screen in seconds. The overhead camera(s) provide a live picture of the working area for accurate artwork placement, and a camera at the lens allows the system to find preprinted registration marks. Your machine will either have 1 or 2 overhead cameras, depending on your machine's model.

Using the IRIS™ Camera

The live preview of your projects can be viewed within the Epilog Dashboard under the Preview tab. The IRIS™ Camera Positioning System will provide the most accurate results when:

1. The piece being cut or engraved is placed **directly underneath the camera(s)**, and
2. The table level is **focused to the piece**. If the piece is not in focus on the table, the artwork may not be aligned properly in the live preview on the Dashboard.

The camera(s) may also be calibrated for improved accuracy. **For more information, see “APPENDIX C: SYSTEM CALIBRATION” on page 83.**



Note: The top door of the machine must be completely shut to use the live preview in the Epilog Dashboard.

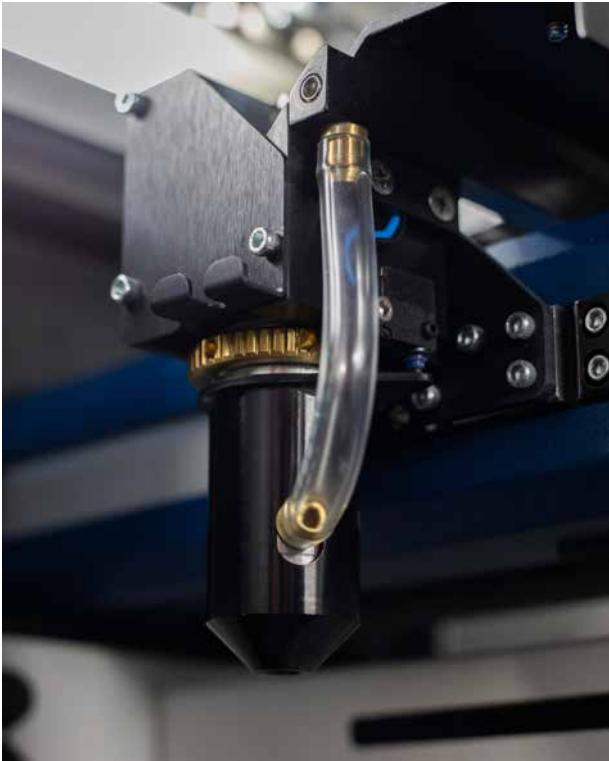
Touch Screen

The Fusion Edge & Maker are controlled by a 7” capacitive resolution touch screen. This feature allows you to select between jobs, change settings, and more. For more information on how to use the touch screen, see **“SECTION 6: CONTROL PANEL” on page 33.**



SECTION 4: SYSTEM FEATURES

Air Assist



The Air Assist feature on the Fusion Edge and Fusion Maker Laser is used to keep combustible gases away from the cutting surface and to reduce flare-ups of more flammable materials as you cut through it, such as wood and acrylic.

The Air Assist directs a constant stream of compressed air across the material surface at the point of burn removing the heat and combustible gases from the work surface. The constant air stream helps reduce charring and scorching associated with materials, such as wood, rubber, and acrylic.

The Fusion Edge & Maker systems have cone air assist. This feature directs air through the cone shaped part of the assembly, and permanently remains on while running any job to help keep the lenses clean.

Air Assist should always be activated during vector cutting operations to reduce the risk of fire! **For more information, see “Fire Warning” on page 1 of the manual.**

The Fusion Maker & Fusion Edge systems have been pre-plumbed for Air Assist so that all you need to do is to attach a small compressor pump to the back of the machine. The pump can either be purchased through your Epilog representative or you can connect your existing compressed air supply to the 5/16 inch (8 mm) receptacle at the back of the machine (30 PSI max). **See “Air Assist Pump” on page 20 for more information.**

SECTION 4: SYSTEM FEATURES

Auto Focus vs Manual Focus

In order to engrave or cut a crisp, clean image, your material must be the correct distance from the bottom of the focus lens. Setting the distance from the bottom of the focus lens to the top of your material is the process of focusing, and is accomplished by placing your material on the table and moving the table up or down.

Auto Focus

Activating the Auto Focus can be done on your computer in the Auto Focus box in the Dashboard. The default setting is “Off”, however you may also choose between Thickness mode or Plunger mode.

Thickness Mode: If you select this mode, you must enter the thickness of your object in the Processes Section under each individual process. If all processes in your job need to be focused at the same level, it may save you time to enter the thickness before splitting the job into multiple processes.



Please note: The material thickness is still required when using the Vector Cutting Table. If a thickness is not specified the system will Auto Focus to the top of the grid, not to the top of your material. To enter the material thickness of the object you will be engraving/marketing/cutting use a pair of calipers for an accurate measurement and enter this value in the “Thickness” box in the driver.

Plunger: When you enter Jog mode and have jogged the lens carriage above your material, press the Auto Focus button to use the plunger Auto Focus. The table will then rise until the material touches the plunger, then set the table to the correct height. Your job should now be in focus. You may also set up Plunger Mode in the Dashboard.



WARNING: Do not use the Auto Focus plunger to focus directly on the Vector Cutting Table or Slat Table.

For more information on dividing jobs, thickness, or the auto focus plunger, visit our training site:



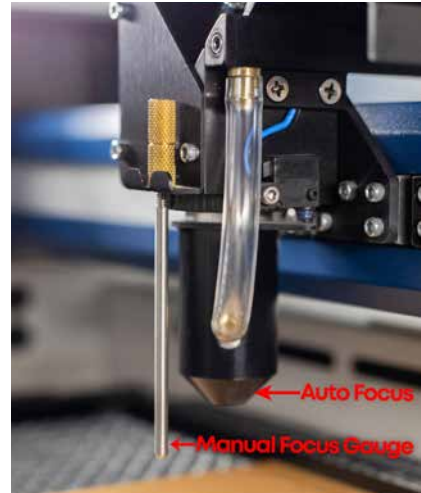
SECTION 4: SYSTEM FEATURES

Manual Focus

These photos show the Manual Focus Gauge that is used to determine the correct distance from the focus lens to the top of your material. This gauge is included with your system.

Place the object to be cut or engraved anywhere on the table of the machine. Select the **Jog** button on the touch screen and use the **Joystick** to bring the focus gauge to the object. Deselect the Jog button, then select the **Focus** button on the touch screen and move the **Joystick** up or down to move the table appropriately until your material just touches the bottom of the gauge. The speed at which the table rises or lowers can be controlled by applying varying pressure upwards or downwards on the **Joystick**.

You may also fine-tune the table height in the Focus Menu. Once the focus position has been established, flip the gauge back up into its locked position. Press the Focus button to leave the menu and then press the **Reset** key to bring the laser head back to its Home Position.



WARNING: Do not leave the Manual Focus Gauge down when running jobs or when using Auto Focus!

If your material has a taper or curve, pick an intermediate point between the highest and lowest points being engraved and focus on that point. In general, the area of the material being engraved needs to be relatively flat. If the area being engraved differs in height by more than about an .125" (3 mm), the image will begin to look "fuzzy" or out of focus.



WARNING: If you are using Auto Focus or the Manual Focus Gauge and you know there is not enough clearance between the lens carriage and your material, you will need to lower the table before you insert your material and start the job. To lower the table, use the Joystick while in the Focus menu to lower the table enough to accommodate your part.

SECTION 4: SYSTEM FEATURES

Red Dot Pointer

The Red Dot Pointer is a visible laser beam that runs in the same line as the invisible CO2 laser beam. It is useful for showing the location of the laser head when using Jog or Focus mode.

Vector Cutting Table

On all Fusion Maker & Edge models, the Vector Cutting Table is used for both standard engraving jobs, as well as vector jobs where the laser penetrates all the way through the material being cut. The Vector Cutting Table lifts your work material away from the crumb trays and allows the laser beam to penetrate all the way through the material without reflecting back up onto the backside of your work.



Exhaust Plenum

The Fusion Edge & Fusion Maker incorporate an Exhaust Plenum. The exhaust fan moves air from the front towards the rear of your machine and out the exhaust plenum. This air removes combustible gases and smoke through the exhaust plenum.

SECTION 5: SYSTEM MAINTENANCE

Reduce Fire Risk with a Clean Laser



Cleaning your machine is an excellent way to prevent fire with the laser. A buildup of cutting and engraving residue and debris is dangerous and can create a fire hazard in its own right. Keep your laser system clean and free of debris. Regularly remove clean any small pieces that have fallen through the cutting grid. **For more information on fire safety, see “FIRE WARNING” on page 1.**

As with all equipment, preventive maintenance & service is an important part of owning your Epilog Laser system. A laser system by its very nature creates debris and residue on every job. Over time, these by products can build up and start to clog the components of your system. Like anything, the build up can be almost imperceptible and easy to ignore. Since it 's guaranteed that these by products will build up over time, it's worth spending just a few minutes each week keeping your system clean. To extend the life of your investment, follow these simple guidelines outlined below.

WEEKLY	Why Do I need to Clean This?	Materials Needed	Instructions
Optics	If smoke, resin, or other contaminants are allowed to accumulate too heavily, they will reduce the available laser power and will cause damage to the optics and/or mirror.	Cotton swab, optics cleaning fluid.	1. Use a cotton swab that is soaked with optics cleaning fluid. 2. Gently swab the optics to remove dust and debris. 3. Prepare a fresh swab and clean the surface with a gentle zigzag motion across it.
Auto Focus Plunger	Removing residue helps ensure precise focusing.	Cotton swab or soft cloth, mild household cleaner or isopropyl alcohol.	Use a soft cotton cloth and mild household cleaner or isopropyl alcohol to gently wipe the Auto Focus plunger until it is clean.
Under the Cutting Table	This will reduce any fire hazards by removing debris that has fallen through the table.	Small brush or vacuum cleaner.	Remove the Cutting Table and clean out the table tray using a small brush or vacuum cleaner.
Bearing Rails	Proper cleaning ensures bearings perform at their best.	Cotton swab or soft cloth, mild household cleaner or isopropyl alcohol.	Using the cloth or swab with liquid, clean all of the bearing tracks.
Interior Work Space	This keeps corrosive dust and debris from building up on interior surfaces.	Soft cloth and mild household cleaner or isopropyl alcohol.	Use the soft cloth to wipe all surfaces that are exposed to dust and debris.

SECTION 5: SYSTEM MAINTENANCE

3 MONTHS	Why Do I need to Clean This?	Materials Needed	Instructions
Under the Cutting Table	This will reduce any fire hazards by removing debris that has fallen through the table.	Small brush or vacuum cleaner.	Remove the Cutting Table and clean out the table tray using a small brush or vacuum cleaner.
6 MONTHS	Why Do I need to Clean This?	Materials Needed	Instructions
Exhaust	Cleaning the exhaust system removes built-up debris and reduces fire hazards.	Wire Brush.	Make sure the exhaust blower you are using receives proper maintenance. Periodically clean the exhaust blower and duct system to remove built-up debris.
12 MONTHS	Why Do I need to Clean This?	Materials Needed	Instructions
Overall Machine	Preventative maintenance.		Book technician for preventative maintenance and service

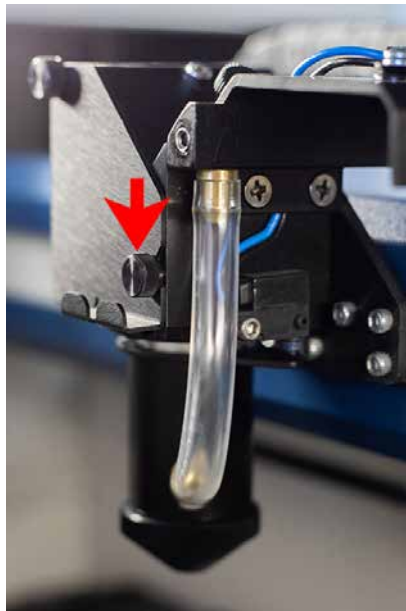
SECTION 5: SYSTEM MAINTENANCE

Cleaning the Optics on the Fusion Maker & Fusion Edge

Cleaning the Lens on the Fusion Maker & Fusion Edge

The focus lens is contained within the lens tube. The lens tube is a single assembly and is fairly easy to clean.

1. Remove the lens tube from the machine for cleaning by rotating the front plate upward to reveal the inside of the lens assembly. You may need to loosen the bottom captive screw slightly first.



SECTION 5: SYSTEM MAINTENANCE

2. After swinging the lens plate cover out of the way, use the tip of the focus gauge in one of the holes in the ridged ring at the top of the lens tube to loosen it slightly.



3. Unplug the air assist tube from the top of the lens assembly.



SECTION 5: SYSTEM MAINTENANCE

4. The lens tube then slides out of the front of the lens assembly.



5. Twist off the cone piece at the bottom of the tube to reveal the bottom side of the lens.



6. To clean the lens, use a high-quality cotton swab moistened with the optics cleaner supplied in the accessory kit. Please read the label on the bottle carefully.
7. Allow the optics to dry, then twist the cone piece securely back on to the bottom of the lens tube.
8. Slide the lens tube back into the lens assembly making sure the air assist port is facing the right side. Then connect the top of the air assist tube back to the port on the lens assembly.
9. Tighten the ridged ring at the top of the lens tube using the focus gauge.

SECTION 5: SYSTEM MAINTENANCE

Cleaning the Mirror on the Fusion Maker & Fusion Edge

1. The mirror is located on the front side of the assembly and also has a simple cleaning process. Start by opening the door latched onto the front of the assembly.



2. Next, twist the knob on the top right side of the assembly counterclockwise to loosen the mirror, preparing it for removal.



SECTION 5: SYSTEM MAINTENANCE

3. Now remove the mirror from the assembly by sliding it out towards the front of the machine.



4. To clean the mirror, use a high-quality cotton swab moistened with the optics cleaner supplied in the accessory kit. Please read the label on the bottle carefully.



5. After the mirror has been cleaned and is completely dry, place it back into the assembly with the mirror angled down towards the table. Tighten the knob that secures it, and close the small door on the back of the assembly.

If you run out of the cleaner supplied by Epilog, Reagent or laboratory grade Alcohol can be substituted. Also, if “Golden Grain” or “Everclear” are available in your area these are also good substitutes for the optical cleaning solution.



Note: Never use Isopropyl Alcohol or Hardware grade Acetone, they contain impurities which can damage the optics in your machine.

Wet the swab thoroughly with the solvent, and then blot it against a piece of cotton so that it is no longer soaking-wet. Then daub the lens gently, rotating the swab after each daub to expose clean cotton to the surface until the optic is free of visible contamination. At that point, prepare a fresh swab and clean the surface with a gentle zigzag motion across it. Avoid any hard “scrubbing” of the surface, especially while there are visible particles on it, and try not to use repetitive circular motions. When you are done, be careful to remove any cotton threads that may have snagged on the mountings.

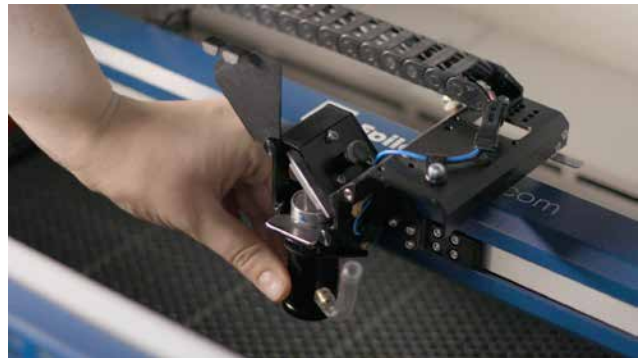
SECTION 5: SYSTEM MAINTENANCE

Replacing the Lens on the Fusion Maker & Fusion Edge

Whether you are replacing an old lens with a new one, or switching from a 2-inch lens to a 4-inch lens, the process is quick and easy. The lens always comes contained within the lens tube, so replacing it is as simple as removing one tube, then placing the new one in and securing it properly.



Remove the lens tube from the machine by loosening the captive screws on the front of the lens assembly and opening the door latch. Tighten the top captive screw to help keep it open.



Use the manual focus gauge to loosen the ridged ring at the top of the lens tube, turning it clockwise. Disconnect the Air Assist tube from the lens assembly and remove the lens tube.

When replacing the tube, slide it into the assembly with the Air Assist valve on the right side of the assembly. Connect the Air assist tube to the valve on the new lens tube. Tighten the ridged ring at the top of the lens tube using the manual focus gauge, turning it counter-clockwise. Close the door latch at the top of the assembly by loosening the top captive screw, allowing it to swing shut. Tighten the captive screws to secure the door shut.

SECTION 5: SYSTEM MAINTENANCE

Cleaning the Exhaust Plenum

Make sure the exhaust blower you are using receives proper service. Periodically clean the exhaust blower and duct system to remove built-up debris. If you detect odor while engraving, or if the smoke in the cabinet is visible in the area of the lens carriage, inspect the exhaust system. Check for loose or broken pipe/hose connections, or obstructions. The following photos show where to clean the duct work of your machine. You should also occasionally check your exhaust blower and the connected duct work.

Cleaning the Vents

Clean the vents from the inside of the machine. It is best to use a flexible or wire brush that can access the inside of the vent.



Cleaning the Exhaust Plenum

In addition to cleaning the inside of the machine, you should occasionally clean the exhaust plenum on the back of the system. The exhaust plenum can be completely removed from the Fusion Pro by unscrewing the mounted screws on the back of the machine.

Laser Tube

The laser tube used in your system does have a maximum service life, and there is very little maintenance that is required. At some point in the life of the laser you will need to replace it for gas recharge, electrical repair or mechanical repair. Replacing laser tubes is common practice and Epilog has made the process of changing tubes extremely easy for users to perform with a minimum amount of effort. The laser tubes can be refurbished and are available on an exchange basis by contacting Epilog technical support.

Ensure that all of the laser cooling fans are properly working at all times. The fans keep the laser tube cool and prevent it from overheating. An overheated laser tube will produce erratic output and may fail completely.

If the laser system is in a dirty or dusty environment, make sure that the cooling fins on the laser tube are kept free of dust buildup. Use compressed air to blow the dust and debris off of the laser tube fins. Be sure that the system is unplugged before performing any maintenance on the machine!

SECTION 6: SPECIFICATIONS

Fusion Edge 12/24 Laser Technical Specifications

	Fusion Edge 12 (CO2)	Fusion Edge 12 (Fiber)	Fusion Edge 24 (CO2)
Maximum Engraving Area	24" x 12" (610 x 305 mm)		24" x 24" (610 x 610 mm)
Max Material Thickness	7" (178 mm)		10" (254 mm)
Max Table Weight	Static table weight: 40 lbs (18.1 kg) Lifting table weight: 25 lbs (11.4 kg)		
Laser Source Wattages	30, 40, 50, or 60 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.	30 watt Fiber MOPA, air-cooled, includes collimator, 1064nm. Beam quality: M2 <1.1	50 or 60 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.
Standard Features	Radiance High Definition Optics (CO2), Air Assist, Red Dot Pointer, relocatable Home Position, LED lighting, integrated floor stand, brushless servo motors, Super-Silent Cooling Fans, Joystick controls, removable exhaust plenum.		
Intelligent Memory Buffer	Multiple files up to 1GB. Engrave any file size.		
Operating Modes	Optimized Raster, Vector & Combined modes.		
Motion Control System	High-speed, continuous-loop, brushless DC servo motors using rotary encoding technology for precise positioning.		
X-axis Bearings	Ground & polished stainless steel, Teflon-coated, self-lubricating bearings.		
Belts	Advanced B-style double-wide Kevlar precision drive belts.		
Resolution	Fully-flexible and user-controlled from 75 to 1200 DPI.		
Speed and Power Control (engraving depth)	120 IPS (3.05m/s) with 5G acceleration. Computer-controlled in .001 increments up to 100%. Color mapping feature links Speed, Power, Frequency, and Raster/Vector mode.		
Print Interface	10Base-T Ethernet, or USB. Compatible with Windows or Mac*.		
Size (W x D x H)	39.4" x 26.4" x 17.9" (1000 x 671 x 455 mm)		41.52" x 32.81" x 38.04" (1055 x 834 x 967 mm)
Weight	138 lbs (63 kg)		225 lbs (102 kg)
Electrical Requirements	See "Electrical Safety" on page 4.		
Exhaust Requirements	350-400 CFM (595-680 m3/hr) external exhaust to the outside or internal filtration unit required.		
Exhaust Ports	One output Port 4" (102 mm) diameter.		
Laser System Classification	Class 2 Laser Product - 1 mW CW Maximum 600-700 nm.		

*The Fusion Edge and Maker machines are now compatible with Mac computers and tablets, using the Epilog Pulse web app.

Technical specifications and product configurations subject to change without notice.

SECTION 6: SPECIFICATIONS

Fusion Edge 36 Laser Technical Specifications

Fusion Edge 36 (CO2)	
Maximum Engraving Area	36" x 24" (914 x 610 mm)
Max Material Thickness	10" (254 mm)
Max Table Weight	Static table weight: 40 lbs (18.1 kg) Lifting table weight: 25 lbs (11.4 kg)
Laser Source Wattages	60, 80, or 100 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.
Standard Features	Radiance High Definition Optics (CO2), Air Assist, Red Dot Pointer, relocatable Home Position, LED lighting, integrated floor stand, brushless servo motors, Super-Silent Cooling Fans, Joystick controls, removable exhaust plenum.
Intelligent Memory Buffer	Multiple files up to 1GB. Engrave any file size.
Operating Modes	Optimized Raster, Vector & Combined modes.
Motion Control System	High-speed, continuous-loop, brushless DC servo motors using rotary encoding technology for precise positioning.
X-axis Bearings	Ground & polished stainless steel, Teflon-coated, self-lubricating bearings.
Belts	Advanced B-style double-wide Kevlar precision drive belts.
Resolution	Fully-flexible and user-controlled from 75 to 1200 DPI.
Speed and Power Control (engraving depth)	120 IPS (3.05m/s) with 5G acceleration. Computer-controlled in .001 increments up to 100%. Color mapping feature links Speed, Power, Frequency, and Raster/Vector mode.
Print Interface	10Base-T Ethernet, or USB. Compatible with Windows or Mac*.
Size (W x D x H)	53.52" x 32.81" x 38.04" 1359 x 834 x 967 mm
Weight	260 lbs (117 kg)
Electrical Requirements	See "Electrical Safety" on page 4.
Exhaust Requirements	350-400 CFM (595-680 m3/hr) external exhaust to the outside or internal filtration unit required.
Exhaust Ports	One output Port 4" (102 mm) diameter.
Laser System Classification	Class 2 Laser Product - 1 mW CW Maximum 600-700 nm.

*The Fusion Edge and Maker machines are now compatible with Mac computers and tablets, using the Epilog Pulse web app.

Technical specifications and product configurations subject to change without notice.

SECTION 6: SPECIFICATIONS

Fusion Maker 12/24/36 Laser Technical Specifications

	Fusion Maker 12 (CO2)	Fusion Maker 24 (CO2)	Fusion Maker 36 (CO2)
Maximum Engraving Area	24" x 12" (610 x 305 mm)	24" x 24" (610 x 610mm)	36" x 24" (915 x 610mm)
Max Material Thickness	7" (178 mm)	7" (178 mm)	10" (254 mm)
Max Table Weight	Static table weight: 40 lbs (18.1 kg) Lifting table weight: 25 lbs (11.4 kg)		
Laser Source Wattages	30 or 40 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.	40 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.	40 or 50 watt, CO2, air-cooled, metal/ceramic tube, 10.6 micrometers.
Standard Features	Radiance High Definition Optics (CO2), Air Assist, Red Dot Pointer, relocatable Home Position, LED lighting, integrated floor stand, High-Speed Stepper Motors, Super-Silent Cooling Fans, Joystick controls, removable exhaust plenum.		
Intelligent Memory Buffer	Multiple files up to 1GB. Engrave any file size.		
Operating Modes	Optimized Raster, Vector & Combined modes.		
Motion Control System	High-speed, continuous-loop, stepper motors using rotary encoding technology for precise positioning.		
X-axis Bearings	Ground & polished stainless steel, Teflon-coated, self-lubricating bearings.		
Belts	Advanced B-style double-wide Kevlar precision drive belts.		
Resolution	Fully-flexible and user-controlled from 75 to 1200 DPI.		
Speed and Power Control (engraving depth)	60 ips (1.5m/sec) with 3.5G acceleration. Computer-controlled in .001 increments up to 100%. Color mapping feature links Speed, Power, Frequency, and Raster/Vector mode.		
Print Interface	10Base-T Ethernet, or USB. Compatible with Windows or Mac*.		
Size (W x D x H)	39.4" x 26.4" x 17.9" (1000 x 671 x 455 mm)	39.5" x 38.25" x 18.25" (1000 x 971 x 463 mm)	53.52" x 32.81" x 38.04" 1359 x 834 x 967 mm
Weight	138 lbs (63 kg)	165 lbs (102 kg)	260 lbs (117 kg)
Electrical Requirements	See "Electrical Safety" on page 4.		
Exhaust Requirements	350-400 CFM (595-680 m3/hr) external exhaust to the outside or internal filtration unit required.		
Exhaust Ports	One output Port 4" (102 mm) diameter.		
Laser System Classification	Class 2 Laser Product - 1 mW CW Maximum 600-700 nm.		

*The Fusion Edge and Maker machines are now compatible with Mac computers and tablets, using the Epilog Pulse web app.

Technical specifications and product configurations subject to change without notice.

SECTION 6: SPECIFICATIONS

Compatibility

Your Epilog Laser has been designed as an “open architecture” product that can be run from almost any Windows based software.

Recommended PC

For Optimum Computer Performance

Investing in a new computer is a great way to make sure you’re getting the most out of your new laser equipment. Why? Because today’s software (CorelDraw for instance) requires a lot of computer processing speed and memory to function properly. A good computer won’t make a big difference in how your laser runs, but when compared to a slow computer it will save untold amounts of time and frustration setting up the artwork that you “print” to the laser. Many users do not purchase new computers for use with their new laser because their current computers are perfectly adequate. There’s no magical cut-off that makes a computer too slow. If you’re comfortable with the performance and speed of your current computer, there’s probably no reason to purchase another one. The following recommendations are just advice to consider if a new computer is necessary.

A new computer doesn’t have to be expensive to work great. The minimum requirements are included in just about any new laptop or desktop that can be purchased.

Operating System

Windows 8.1, or Windows 10 will work with the Fusion Maker & Edge and the Epilog Software Suite. Operating system should have all system updates before installation of the Epilog Software Suite. The Fusion Edge and Maker machines are also compatible with Mac computers and tablets, using the Epilog Pulse web app.

RAM – Random Access Memory

4GB RAM is the minimum that is required, however we recommend 8GB or more if possible. RAM is like short-term memory. It’s fast and readily available for the computer to access and makes time consuming tasks go much quicker if you have lots of it. Having more than 4GB of RAM is nice if you demand a lot from your computer.

Processor Speed

A faster processor will allow you to do more tasks in less time. While it’s not necessary to purchase the fastest processor available, you’ll want adequate speed to operate your graphics program. Processor speeds are always improving, but processor speeds of about 3.0 GHz or faster are a good place to start.

Graphics Card

Your computer’s graphics card will need to support OpenGL 3.0 (or higher) or OpenGL 2.0ES (or higher) to operate the Epilog Software Suite. For example, an Intel HD 2000 or greater, nVidia GeForce 8000 series or greater, or an AMD/ATI Radeon HD2000 series or greater will be sufficient.

10/100 Network Interface Card (NIC)

All new computers have a 10/100 network connection as standard equipment. As well as allowing multiple computers to be linked together in a network, this technology also allows direct printing from the computer to the laser. Epilog supplies a network Crossover cable with each laser system that allows one computer to print to a single Epilog Laser system.

Hard Drive

SECTION 6: SPECIFICATIONS

This is the permanent memory in your computer. Many users feel that you can never have a large enough hard drive. Luckily, most computer manufacturers put high capacity drives in new computers these days. When in doubt, buy bigger than you think you might need. It's so in-expensive that it's worth the peace of mind to have it available.

Software

Many users use Corel as their graphics software. Many other Windows software applications can also be used, although all software is different and may not be predictable, user friendly or functional. Additionally, the technical support staff at Epilog may be less familiar with software other than Corel and less able to help with questions. Consult with your Epilog distributor on software compatibility issues. Epilog does not guarantee compatibility with any software.

PhotoLaser Plus is a third-party software for converting photos to laser compatible format. This is an indispensable option for engraving photos.

Heavy Duty Surge Protector

The need for a surge protector varies greatly throughout the world. If the laser is operated anywhere that the electrical power is subject to spikes, outages, lighting, fluctuations, etc, a surge protector should be used on both the laser and the computer. A surge protector is a very cheap insurance policy against catastrophic electrical damage. A surge protector is designed to be an inexpensive device that absorbs any electrical problems before they can damage the expensive equipment (computer and laser) they are protecting.

About The CO2 Laser Source

Your Epilog CO2 laser system uses the latest in laser technology to provide a powerful tool that is simple and safe to setup and operate. The Epilog Laser can mark, engrave, and cut a variety of non-metallic materials.

The CO2 laser beam itself is invisible and operates at a wavelength of 10.6 microns. The beam is about half the diameter of a #2 pencil. Unfocused, it will just make an ugly burn, leaving lots of charred material behind. The focus lens gives the beam an hourglass shape. At the center point the energy density is concentrated, allowing the very precise and clean material removal that is characteristic of laser engraving. The center of the hourglass is the focal point.

The laser beam path is completely enclosed within the cabinet. Please do not disassemble or modify any of the covers or windows on the machine. If at any time you notice that the laser operates with a door or window open, please contact Epilog technical support immediately.

The laser has two basic operating methods. For cutting (vector), the laser is driven along a path and the laser is left on all the time. The path could be the outline of a letter or a geometric shape like a circle. The laser will cut entirely through the material, separating the part from the background. For marking (engraving), the laser is swept across the work from left to right, and the laser is turned on and off at the correct points to produce the first line of the image. Then the carriage advances one line and the process is repeated, eventually assembling a full image.

SECTION 6: SPECIFICATIONS

About the Fiber Laser Source

The fiber laser source generates a laser beam by pumping intense diode light into the end of fiber optic cables that have been doped with ytterbium. The energy from the diode light is absorbed by the ytterbium in the fiber optic cables. The ytterbium then releases the energy in the form of photons that travel down the optic cables. The photons that leave the optic cables create the laser beam. The wavelength of light generated from a fiber laser is 1062 nm.

The fiber laser source generates laser light by pumping intense diode light into fiber optics cables that are doped with the rare-earth element, ytterbium (Yb^{3+}), which is referred to as the medium or gain medium. As this diode light energy travels into the fiber optic cable, it energizes the electrons in the ytterbium and the ytterbium electrons go from a ground or stable state, to an excited state.

Essentially, all that is happening in this first step is that the electrons in the medium are absorbing and storing the energy that's coming from the external energy source (diodes). For reference, the CO₂ medium is the CO₂ gas in the tube, and the external energy source is RF electrical current. In the fiber laser (and also most YAG lasers these days and YVO lasers) the external energy source is a laser diode.

The electrons in the medium don't really want to store the external energy they've absorbed, so they emit the extra energy by releasing a photon (a quantum packet of light). Once a photon has been emitted by one electron in the medium it stimulates other excited electrons to also emit photons, creating a chain reaction where the absorption and emission of energy is at a constant rate. The photons travel through the optic fibers and some are released through the end of the fibers as the laser beam.

By continually pumping energy into a medium, that medium tries to shed the excess energy by emitting photons. The type of medium is important because different mediums absorb different types of energy (for instance, a CO₂ gas medium is not going to absorb the energy from a diode in a way that will make the CO₂ gas lase). Different mediums also emit different wavelengths of photons, and hence, the different properties of different wavelength lasers.

Federal Communications Commission (FCC)

Notice



This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy; and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

SECTION 6: SPECIFICATIONS

Epilog's CO2 Laser Line Specification:

Model	A	B	C	D*	E*	F*	G*	H*	J*	K*
Rated Output Power (watts)	40	30	50	60	120	75	80	100	120	200
Peak Power (watts)	100	100	150	150	350	150	150	200	240	400
Power Stability from cold (10 min)	±6%	±6%	±7%	±7%	±9%	±7%	±7%	±10%	±10%	±10%
Mode Quality (M ²)	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Ellipticity	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Polarization	Linear									
Beam Diameter (1/e ²)**	1.7	1.7	1.7	7	2.0	2.7	7	7	7	7
Beam Divergence (full angle)**	7.0	7.0	7.0	1.7	6.0	4.4	1.7	1.7	1.7	1.7
Rise Time (µs)	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Energy/pulse (J) - peak power	Depends on pulse frequency and duty cycle									
Pulse Duration	Depends on pulse frequency and duty cycle									
Pulse Rate (kHz) - repetition frequency	0-100									
Center Wavelength (µm)	10.6									
Wavelength Range (µm)	10.5-10.7									
Cooling	Air									

* Measurements taken after beam correction

** Some lasers may be equipped with beam expanders, properties are subject to change.

SECTION 7: TECHNICAL SUPPORT

Contacting Technical Support

The technical support department at Epilog is available to assist with solving problems you may encounter using your Epilog. Please review first the common problems and solutions as noted below, then if you are still in need of assistance you may contact Epilog's technical support department at the number or website listed below. Technical support is available in Golden, Colorado USA during the hours of 6 a.m. and 6 p.m. Mountain Time.



Technical Support Online: support.epiloglaser.com

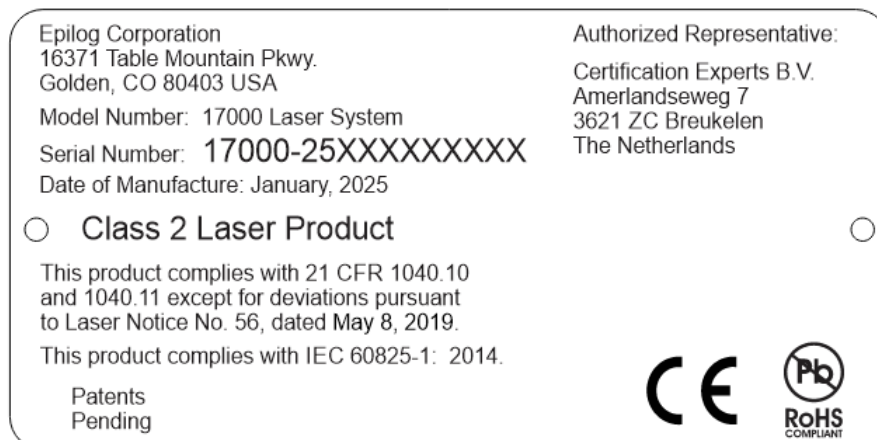


Submit a Ticket

What to do prior to contacting Epilog Technical Support:

1. Have the machine serial number available.
2. Have time to work on machine. Many issues will require troubleshooting.
3. Clean your machine (especially the optics), this will solve many issues.

The machine serial number can be found on the Certification/Identification Label. This engraved plate is located on the back of the machine's cabinet. The machine's serial number can also be found at the control panel under the settings icon. The ID label above is for the Model 17000 product.



SECTION 7: TECHNICAL SUPPORT

Frequently Asked Questions

Engraver Will Not Vector

1. Verify that the print driver is set to Vector or Combined mode.
2. Verify that the lines that you want to vector are set to .003" (0.077 mm) or less in CorelDraw, or .001" (0.025 mm) or less in Adobe Illustrator. You may also separate the desired Vector line and set it to a Vector process in the Dashboard.
3. Make sure the images are vector lines. Scanned and raster images will not vector.
4. Filled or solid images will not vector (outlines only).

Vector mark appears uneven at one end

You may try adjusting the "Minimum Power Compensation" setting in the System Settings of your machine. The default is set to 1.5% but adjusting it between the range of 1-2% can yield different results. Contact Technical Support for additional guidance.

Engraving Appears Lighter Than Usual

1. All mirrors and lenses need to be cleaned and inspected for damage.
2. Verify that the lens is in correct focus.
3. Verify correct Speed, Power and Frequency settings for the type of material that you are engraving.

The Exhaust Is Not Pulling Enough Air

1. Move the blower closer to the machine. The closer the two are, the better exhaust you will receive.
2. Clean your exhaust system on a regular basis, including the engraver and blower. Use a bottle-brush and a vacuum on the areas where the exhaust buildup accumulates.

The Engraving Quality is Poor/Blurry/Double Image

1. If you feel you are not getting quality you once were, this is probably a maintenance issue.
2. Clean the lenses of the system.

SECTION 7: TECHNICAL SUPPORT

The Laser Won't Turn On

Make sure the Emergency Stop Button on the top of the machine is not pressed in.

IP Address is not visible in the Settings Menu of the Machine

Make sure that your Ethernet or USB cable is plugged in fully, both at the machine and your computer.

How Can I Increase the Life of my Laser System?

- **Clean your system:** Debris in the laser and on the mechanics of the system can reduce the life of parts in your system. Wipe down your system on a regular schedule to keep the mechanics clean and long lasting.
- **Clean the lenses:** Lens life is greatly increased by keeping them clean and free of debris. Get in the habit of wiping them off on a regular schedule to keep them clean and well maintained.
- **Reduce speed when running very small items:** When you run at 100% speed on a graphic with a very short stroke, the lens assembly comes up to speed and slows down extremely quickly, which can place wear on the mechanics of the laser. Slow down to 80 - 90% speed and increase the lifetime of your laser system.

How to Shorten Your Engraving/Cutting Time

- **Lower the Resolution:** How important is the highest resolution image? Processing jobs at 400 DPI vs. 600 DPI can reduce cycle times by up to 30%, and processing at 300 DPI could mean half the cycle time.
- **Reduce White Space:** Orientate the parts to minimize engraving dead space (area where head travels, but has nothing to engrave).
- **Horizontal Layout:** If an option, horizontal text will engrave faster than vertical or curved (fit text to curve) text.
- **Split by Color:** Use the Split by Color feature to save time by adjusting the order in which the objects engrave/mark.
- **Run Multiples:** If you need to engrave multiples of the same image. You'll find you have a time savings per piece.

If these do not correct your issue or your issue is not listed, please contact the Technical Support Team.

SECTION 7: TECHNICAL SUPPORT

Join Epilog Laser's Online Community

Find out the latest Epilog news, keep in touch with our customers, and stay connected through our social media channels!



Facebook page: www.facebook.com/epiloglaser



Youtube channel: www.youtube.com/epiloglaser



X: www.x.com/EpilogLaser



Instagram: www.instagram.com/epiloglaser/



Pinterest: www.pinterest.com/epiloglaser/



LinkedIn: www.linkedin.com/company/epilog



APPENDIX A: WARRANTY STATEMENT

Warranty Statement for the Fusion Maker & Fusion Edge Laser

Epilog Corporation warrants to the original purchaser of Epilog Fusion Model 17000 that the product will be free from defects in material or workmanship when purchased, and under proper, normal use within two (2) years from the original date of purchase.

Epilog will replace or, at its option, repair the defective part(s). Normally, Epilog will supply a replacement part for the customer to replace. Once the replacement has been performed, the replaced part must be returned to Epilog. In the case where repair is required, Epilog requires that the defective part, or machine, be returned to the Epilog factory or other Epilog designated facility. Epilog will be responsible solely for the cost of repairs, including parts and labor, which are made at an authorized Epilog facility. All other costs for replacement or repair, including, but not limited to, packaging and shipping both to and from Epilog, shall be paid by the owner. A "Core" charge may be required by Epilog to insure the return of replacement and repair parts. This warranty excludes any damage from abuse (including, without limitation, incorrect voltages, power surges, fires, improper or insufficient ventilation "acts of God" or other situations out of the control of Epilog), failure to operate in accordance with instructions provided in the Owner's Manuals for the Epilog model 17000, including specific safety and operational warnings contained therein, cosmetic damage sustained in use, and damage caused by unauthorized modifications of any equipment. All warranties to original purchasers are non-transferable. The registered owner must initiate warranty claims within the warranty period.

THE ABOVE AND FOREGOING IS THE ONLY WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED; INCLUDING BUT NOT LIMITED TO ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, THAT ARE MADE BY EPILOG ON MODEL 17000. ANY WARRANTIES IMPLIED BY LAW ARE HEREBY EXPRESSLY DISCLAIMED.

No oral or written information or advice given by Epilog, its dealers, its distributors, agents, officers, or employees shall create a warranty or in any way increase the scope of this warranty. Neither Epilog nor anyone else who has been involved in the creation, production, or delivery of the Epilog Fusion Model 17000 shall be liable for any direct, indirect, consequential, or incidental damages, including but not limited to damages for loss of business profits, business interruption, loss of business information, adverse health impacts, fire, and the like, arising out of the use or inability to use these products.

Epilog Corporation provides no warranties whatsoever on any software used in connection with Epilog Fusion Model 17000.

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (CO2)						
Material	DPI/Freq.	30 watt	40 watt	50 watt	60 watt	80 watt
Acrylic						
Photo Engraving	300 DPI	100s 75p	100s 70p	100s 65p	100s 60p	100s 50p
Text/Clipart Engraving	300 DPI	100s 75p	100s 70p	100s 65p	100s 60p	100s 50p
Text/Clipart Engraving	500 DPI	100s 70p	100s 65p	100s 55p	100s 50p	100s 40p
Cutting 1/8" (3 mm)	100 f	6s 100p	8s 100p	12s 100p	20s 100p	30s 100p
Cutting 1/4" (6 mm)	100 f	3s 100p	4s 100p	6s 100p	8s 100p	10s 100p
Cutting 3/8" (9.5 mm)	100 f		2s* 100p	3s 100p	4s 100p	5s 100p
Cutting 1/2" (13 mm)	100 f				1s 100p	2s 100p
Cutting Note: Adjusting the standard focus distance so it is closer to the lens by about .080" (2 mm) will produce better edge quality when cutting 1/4" (6mm) acrylic and thicker. Two passes can be used for cutting thicker materials. There are two types of acrylic: cast is better for engraving (it creates a frosted look when engraved) and extruded acrylic produces a much better flame polished edge.						
Alumamark						
Engraving	500 DPI	100s 35p	100s 30p	100s 25p	100s 15p	100s 10p
Anodized Aluminum						
Photos/Clipart	400 DPI	100s 65p	100s 55p	100s 45p	100s 35p	100s 30p
Photos/Clipart	500 DPI	100s 60p	100s 50p	100s 40p	100s 30p	100s 30p
Text	500 DPI	100s 70p	100s 60p	100s 50p	100s 40p	100s 30p
We find when engraving anodized aluminum, text appears best at 500 DPI, but photos and clipart can be engraved with great detail down to 400 DPI.						
Cork						
Engraving	500 DPI	100s 70p	100s 60p	100s 50p	100s 40p	100s 20p
Fleece						
Engraving	200 DPI	100s 50p	100s 40p	100s 30p	100s 20p	100s 15p
When engraving fabric, try changing the graphic to 80% gray and use the Jarvis dithering pattern for the best results. Every fabric you are cutting will need to have adjusted setting - find a small swatch of the fabric you can test first.						
Glass						
Engraving	500 DPI	30s 100p	40s 100p	50s 100p	60s 100p	70s 100p
When etching glass, try changing the graphic to 80% gray before engraving and using the Jarvis dithering pattern. You can also diffuse heat by covering the glass with a thin layer of dish soap.						
Leather						
Photo Engraving	300 DPI	100s 80p	100s 70p	100s 60p	100s 50p	100s 40p
Text/Clipart Engraving	500 DPI	100s 70p	100s 60p	100s 50p	100s 40p	100s 30p
Cutting 1/8" (3 mm)	50 f		10s 100p	15s 100p	20s 100p	25s 100p
Mat Board						
Cutting	50 f	25s 40p	25s 30p	30s 40p	30s 30p	30s 25p

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (CO2)						
Material	DPI/Freq.	30 watt	40 watt	50 watt	60 watt	80 watt
Marble						
Photo Engraving	300 DPI	100s 90p	100s 80p	100s 70p	100s 60p	100s 50p
Text Engraving	500 DPI	100s 80p	100s 70p	100s 60p	100s 50p	100s 40p
Every marble is very different for settings. Start low and increase the power with a second run if you haven't used that marble before.						
Painted Brass						
Engraving	300 DPI	100s 35p	100s 30p	100s 25p	100s 15p	100s 10p
Engraving	500 DPI	100s 30p	100s 25p	100s 20p	100s 15p	100s 10p
Plastics						
Engraving	300 DPI	100s 45p	100s 40p	100s 35p	100s 30p	100s 25p
These settings work well with many plastics, including plastic phones and covers. Even one color plastics can achieve a great look when engraved.						
Plastic (2 Layer Laser Engraveable)						
Engraving	300 DPI	100s 70p	100s 65p	100s 40p	100s 35p	100s 25p
Engraving	500 DPI	100s 60p	100s 50p	100s 40p	100s 30p	100s 20p
Cutting 1/16" (1.5 mm)	100 f	10s 65p	10s 55p	10s 40p	20s 40p	20s 25p
Stainless Steel w/ Metal marking solution						
Engraving	500 DPI	15s 100p	20s 100p	25s 100p	30s 100p	40s 100p
Twill						
Cutting	25 f	70s 100p	90s 100p	90s 80p	90s 60p	90s 50p
Wood						
Photo Engraving	500 DPI	50s 100p	60s 100p	70s 100p	80s 100p	90s 100p
Clipart/Text Engraving	300 DPI	40s 100p	50s 100p	60s 100p	90s 100p	100s 100p
Clipart/Text Engraving	500 DPI	30s 100p	40s 100p	50s 100p	60s 100p	80s 100p
Deep Engraving	500 DPI	20s 100p	30s 100p	40s 100p	50s 100p	60s 100p
Thin Veneer (Cutting)	10 f	40s 100p	40s 90p	50s 80p	50s 60p	50s 40p
Cutting 1/8" (3 mm)	10 f	10s 100p	15s 100p	20s 100p	25s 100p	30s 100p
Cutting 1/4" (6 mm)	10 f		2s 100p	3s 100p	4s 100p	12s 100p
Cutting 3/8" (9.5 mm)	10 f			5s 100p	6s 100p	8s 100p
Cutting 1/2" (12 mm)	10 f					4s 100p
When cutting wood, multiple passes may allow cutting of thicker materials. Using Color Mapping you can adjust the focus point between passes down to the center point of the cut for the best results.						

APPENDIX B: MATERIAL SETTINGS

- **These are only suggestions:** Every type of material will react differently with the laser, even from one plastic to the next. Use these settings as your starting point then adjust one variable at a time until you achieve the result you desire. Settings for any material are a matter of personal preference. Not every material that can be run at high speed should be run at high speed. A better mark can often be achieved by slowing your laser and giving the laser longer to react to your material.
- **Test your material:** If you have a small area of the material you won't be using, or an extra item, take advantage of this area to test out your settings by engraving a small square or cutting a small circle. You can fine tune your settings in these areas.
- **Similar materials use similar settings:** When you are working with a material you aren't familiar with, think about a similar material and what settings you would use with that product. Most anodized aluminums will react well with similar settings, as will most plastics.
- **When in doubt, start low:** Remember, you can always re-run your job as long as you don't move it in the machine. Let's say you're running a photograph in a one-of-a-kind wood plaque. Start with a lower power setting, look at the engraving, then run the project a second time at high speed and lower power a second time to add a little more depth if needed.
- **Run only one part of the file:** If running a job on a new material, you can always just select one piece of the engraving, like a piece of text, and run that part first to make sure your settings are perfect before running the whole file.



To print a copy of these settings to keep next to your laser, go to www.epiloglaser.com/support/material-settings

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (Fiber)			
Material	DPI/Freq.	30 watt	30 watt MOPA
Acrylic			
Black Acrylic White Mark	600 DPI	n/a	Speed: 100% Power: 50% Frequency: 1% Waveform: 12 Focus: 0
Aluminum (Anodized)			
Etching/Marking	800 DPI 500 (MOPA)	Speed: 30% Power: 100% Frequency: 1% Focus: 0	Speed: 100% Power: 80% Frequency: 1% Waveform: 15 Focus: +.03"
Polishing	800 DPI	Speed: 75% Power: 60% Frequency: 1% Focus: +.003"	n/a
The contrast / brightness of marks achievable on the fiber laser are excellent and can often be much brighter than marks from a CO2 laser. Taking the fiber laser out of focus by +.03" - .09" broadens the beam and produces a very bright mark on anodized coating. Lower frequency and higher power settings help offset the change in focal point. Different grades of anodized & core aluminum alloy will affect how the final marks look.			
Aluminum (Bare)			
Etching/Marking	600 DPI 500 DPI (MOPA)	Speed: 20 - 25% Power: 100% Frequency: 1% Focus: -.01 to +.01"	Speed: 25% Power: 100% Frequency: 1-12% Waveform: 15 Focus: 0
Engraving aluminum will result in various shades of gray, not black. Fine tuning the settings can provide a bit more contrast but the range of applicable marks is very narrow. If the application calls for a black etch, consider using an oxidizer after engraving. Oxidizers are used most commonly if the aluminum has a protective coating (urethane, clear coat, clear anodized) covering the area that is not engraved. Deep metal engraving on aluminum can be done using multiple passes. Consider deep engraving and using a black epoxy/color fill. Although the marks on aluminum are not black like they are on steel, we have no difficulty getting 2D, UID barcodes to scan and verify.			
Brass			
Etching/Marking	600 DPI 1200 DPI (MOPA)	Speed: 20 - 25% Power: 100% Frequency: 1% Focus: 0	Speed: 25% Power: 100% Frequency: 1% Waveform: 15 Focus: +.02"
Generic Metal			
Annealing	600 DPI	n/a	Speed: 6% Power: 56% Frequency: 1% Waveform: 7 Focus: +.08"
Etching/Marking	500 DPI	n/a	Speed: 20% Power: 100% Frequency: 1% Waveform: 15 Focus: 0

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (Fiber)			
Material	DPI/Freq.	30 watt	30 watt MOPA
Polishing	800 DPI	n/a	Speed: 80% Power: 22% Frequency: 1% Waveform: 10 Focus: 0
Laserable Plastic			
Etching/Marking	600 DPI	Speed: 60% Power: 60% Frequency: 60% Focus: 0	n/a
Black Plastic Contrast Mark	600 DPI	n/a	Speed: 100% Power: 50% Frequency: 1% Waveform: 12 Focus: 0
White Plastic (Polystyrene) Contrast Mark	400 DPI	n/a	Speed: 85% Power: 100% Frequency: 1% Waveform: 13 Focus: 0
Stainless Steel			
Annealing	600 DPI	Speed: 5-7% Power: 100% Frequency: 1% Focus: +.06 to +.12"	Speed: 6% Power: 56% Frequency: 1% Waveform: 7 Focus: +.08"
Etching/Marking	600 DPI 500 (MOPA)	Speed: 15 - 20% Power: 100% Frequency: 1% Focus: 0	Speed: 20% Power: 100% Frequency: 1% Waveform: 15 Focus: 0
Polishing	800 DPI	Speed: 75% Power: 25% Frequency: 75% Focus: 0	Speed: 80% Power: 22% Frequency: 1% Waveform: 10 Focus: 0
Etching: Like our CO2 counterparts, the slower the speed setting, the deeper the etching. However, many metal applications can be processed at higher speed settings. Again, consider the marking requirements. Annealing: To achieve an annealed mark, the focal point should be significantly away from zero. The unfocused, broader beam provides the heat to change the surface color without actually penetrating the metal. The focal point can be either closer to or away from zero. Focusing away from the material should be in the range of .060" to .090". Focusing closer to the material is generally in the range of -.070" to -.110". Both focusing methods will result in annealing of the metal. Focusing up typically results in a slight indentation of the metal. Multiple passes can darken the mark even more (no data to confirm whether multiple passes offer more permanency). Polishing: Some steel alloys are easier to polish than others. For best results, clean off the surface with alcohol prior to processing. Any leftover grease, oils or residue can affect how well the polished mark turns out. Polishing the metal where the final marks result in a bright white engraving requires finer tuning of settings, more so than the etched or annealed marks. Determine a base speed and frequency setting and adjust the power in small increments/decrements. If you are unable to get a white bright mark, increase the frequency setting and try again by adjusting only the power.			

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (Fiber)			
Material	DPI/Freq.	30 watt	30 watt MOPA
Titanium/Stainless Steel			
Annealing	600-1200 DPI 600 (MOPA)	Speed: 5-7% Power: 100% Frequency: 1% Focus: +.08 to +.110"	Speed: 6% Power: 56% Frequency: 1% Waveform: 7 Focus: +.08"
Etching/Marking	600-800 DPI 500 MOPA	Speed: 20 - 25% Power: 100% Frequency: 1-5% Focus: -.01 to +.01"	Speed: 20% Power: 100% Frequency: 1% Waveform: 15 Focus: 0
Polishing	800 DPI	n/a	Speed: 80% Power: 22% Frequency: 1% Waveform: 10 Focus: 0
Titanium and Ti alloys are highly amenable to marking at this wavelength. Similar to aluminum, a black mark from the etching process is difficult to achieve. Various shades of gray can be made, from very dark gray to light gray. Annealed marks can also be made on titanium materials using the same processing parameter described for stainless steel. Depending on the Ti alloy, marks of various colors can be achieved by changing the frequency values for 1% up to 100%. It is common to see red, blue, green, orange, yellows and purple marks, depending on the frequency selected.			
Plated Metals			
Etching/Marking	600 - 1200 DPI	Speed: 15 - 20% Power: 100% Frequency: 1 - 5% Focus: -.09 to -.100" +.09 to .100"	n/a
Metals are often plated to assist with conductivity, to provide a protective coating against rust and elements and for aesthetic purposes. Plating thickness will depend on application and purpose. Most of the plated metals processed through the applications lab are electronic components (to enhance conductivity) and various fittings (protection against environment & rust). The typical plating thickness varies from .001" up to .005". Our recommended settings for general metal engraving works well for ablating through the plating; exposing the base metal. Ablating the plating will also provide high contrast. Using an oxidizer will enhance the look. Our recommended settings for polishing of metals are a good starting point where ablating through the plating isn't an option. This is likely the most common plated metal application as exposing the raw metal underneath will break continuity and / or expose the bare metal to rust and other elements. Note that the contrast of polishing of plated metals won't be as consistent or contrasting as a direct ablation. Multiple passes will help and end results will vary based on the metal used for plating, thickness of plating & size of mark. Our recommended settings for annealing will often work for plated metals where the plating has a thicker wall and material used has high levels of carbon or metal oxides.			

APPENDIX B: MATERIAL SETTINGS

Fusion Edge Suggested Material Settings (Fiber)			
Material	DPI/Freq.	30 watt	30 watt MOPA
Powder Coating			
Etching/Marking	600 DPI	Speed: 25 - 30% Power: 100% Frequency: 100% Focus: +.05 to .07"	Speed: 20% Power: 100% Frequency: 1% Waveform: 13 Focus: +.03"
Two to three passes are suggested (one pass to ablate the powder coating, 2nd or 3rd pass to polish up the metal underneath). A little less power, higher frequency and less focus adjustment will be required for the 2nd or 3rd pass, depending on the base metal. The idea is to ablate then polish. An alternative to running two or more passes is to run one pass and then use a common cleaner such as Simple Green or a citric-based cleaner with short, stiff bristle brush to scrub out the residual material remaining in the mark area. If using this technique, it may be necessary to raise or lower the marking table from around 0.07" to 0.10".			
Deep Metal Engraving			
	1200 DPI	Speed: 20% Power: 100% Frequency: 1% Focus: 0	n/a
Multiple passes. Slower speeds tend to erupt material rather than ablate.			

- **These are only guidelines:** Brightness or darkness of a mark is a matter of personal preference and can be very dependent of the type of material being marked. As such, there is no "correct" setting. Working with the four different fiber settings becomes fairly intuitive in a very short period of time for most users. If you have a material that is not listed, try to compare it to similar materials listed and use those settings as your starting point.
- **Speed Settings:** The speed setting scale of 1% to 100% is not linear – i.e. 100% speed will not be twice as fast as 50% speed. This non-linear scale is very useful in compensating for the different factors that affect engraving time.
- **Power Settings:** The power settings are linear – i.e. 50% power is half as much as 100% power.
- **General Metal Engraving / Base Settings:** In the world of metals the grade, type, hardness and chemical composition are endless. Metal alloys are engineered for specific applications and have their own strengths and weaknesses. Metals can be engraved at just about any settings. Of course, there are many variables to consider for metal engraving. The lasers wattage, hardness of metal, desired mark (etch, polish, anneal) and the required time/contrast/depth will have to be considered when deciding on the final settings.
- **General Annealing Settings:** Producing an annealed mark is very dependent on the material being out of focus. Run the laser at slow speed and full power then adjust the focus while the machine is running until you achieve the annealed mark you need.

APPENDIX B: MATERIAL SETTINGS

- **Test your material:** If you do not achieve the results you are looking for with the recommended settings, try resending the job and start by changing only one variable at a time. Changing only one variable at a time will help to determine the correct setting for your material.
- Laser settings can sometimes be confusing because many materials can be marked over such a broad range of settings. If you have difficulty in finding the correct setting you can send a sample to the Epilog Laser Applications lab. We will determine if the material can be marked and provide appropriate setting for your laser.
- To print a copy of these settings to keep next to your laser, go to www.epiloglaser.com/support/material-settings

APPENDIX B: MATERIAL SETTINGS

Fusion Maker Suggested Material Settings (CO2)				
Material	DPI/Freq.	30 watt	40 watt	50 watt
Acrylic				
Photo Engraving	300 DPI	100s 55p	100s 40p	100s 30p
Text/Clipart Engraving	300 DPI	100s 75p	100s 60p	100s 45p
Text/Clipart Engraving	500 DPI	100s 55p	100s 40p	100s 25p
Cutting 1/8" (3 mm)	100 f	8s 100p	10s 100p	12s 100p
Cutting 1/4" (6 mm)	100 f	2s 100p	4s 100p	6s 100p
Cutting Note: Adjusting the standard focus distance so it is closer to the lens by about .080" (2 mm) will produce better edge quality when cutting 1/4" (6mm) acrylic and thicker. Two passes can be used for cutting thicker materials. There are two types of acrylic: cast is better for engraving (it creates a frosted look when engraved) and extruded acrylic produces a much better flame polished edge.				
Alumamark				
Engraving	300 DPI	100s 55p	100s 40p	100s 25p
Engraving	500 DPI	100s 40p	100s 30p	100s 20p
Anodized Aluminum				
Photos/Clipart	400 DPI	100s 75p	100s 65p	100s 55p
Photos/Clipart	500 DPI	100s 65p	100s 55p	100s 45p
Text	500 DPI	100s 65p	100s 55p	100s 45p
We find when engraving anodized aluminum, text appears best at 500 DPI, but photos and clipart can be engraved with great detail down to 400 DPI.				
Cork				
Engraving	300 DPI	100s 40p	100s 25p	100s 20p
Fleece				
Engraving	200 DPI	100s 25p	100s 15p	100s 10p
When engraving fabric, try changing the graphic to 80% gray and use the Jarvis dithering pattern for the best results. Every fabric you are cutting will need to have adjusted setting - find a small swatch of the fabric you can test first.				
Glass				
Engraving	300 DPI	30s 100p	40s 100p	50s 100p
When etching glass, try changing the graphic to 80% gray before engraving and using the Jarvis dithering pattern. You can also diffuse heat by covering the glass with a thin layer of dish soap.				
Leather				
Photo Engraving	300 DPI	100s 35p	100s 25p	100s 15p
Text/Clipart Engraving	500 DPI	100s 40p	100s 30p	100s 20p
Cutting 1/8" (3 mm)	10 f	20s 100p	30s 100p	40s 100p
Mat Board				
Cutting	100 f	15s 100p	20s 100p	25s 100p

APPENDIX B: MATERIAL SETTINGS

Fusion Maker Suggested Material Settings (CO2)				
Material	DPI/Freq.	30 watt	40 watt	50 watt
Marble				
Photo Engraving	300 DPI	100s 50p	100s 40p	100s 30p
Text Engraving	500 DPI	100s 50p	100s 40p	100s 30p
Every marble is very different for settings. Start low and increase the power with a second run if you haven't used that marble before.				
Painted Brass				
Engraving	300 DPI	100s 50p	100s 40p	100s 30p
Engraving	500 DPI	100s 40p	100s 30p	100s 20p
Plastics				
Engraving	300 DPI	100s 35p	100s 25p	100s 20p
These settings work well with many plastics, including plastic phones and covers. Even one color plastics can achieve a great look when engraved.				
Plastic (2 Layer Laser Engraveable)				
Engraving	300 DPI	100s 80p	100s 60p	100s 40p
Engraving	500 DPI	100s 70p	100s 50p	100s 30p
Cutting 1/16" (1.5 mm)	100 f	15s 100p	20s 80p	25s 60p
Stainless Steel w/ Metal marking solution				
Engraving	500 DPI	15s 100p	20s 100p	25s 100p
Twill				
Cutting	100 f	35s 40p	50s 40p	65s 40p
Wood				
Photo Engraving	500 DPI	35s 100p	50s 100p	60s 100p
Clipart/Text Engraving	300 DPI	25s 100p	35s 100p	45s 100p
Clipart/Text Engraving	500 DPI	35s 100p	50s 100p	60s 100p
Deep Engraving	500 DPI	20s 100p	30s 100p	40s 100p
Thin Veneer (Cutting)	20 f	35s 100p	50s 100p	60s 100p
Cutting 1/8" (3 mm)	20 f	15s 100p	20s 100p	25s 100p
Cutting 1/4" (6 mm)	20 f	2s 100p	4s 100p	6s 100p
When cutting wood, multiple passes may allow cutting of thicker materials. Using Color Mapping you can adjust the focus point between passes down to the center point of the cut for the best results.				

APPENDIX B: MATERIAL SETTINGS

- **These are only suggestions:** Every type of material will react differently with the laser, even from one plastic to the next. Use these settings as your starting point then adjust one variable at a time until you achieve the result you desire. Settings for any material are a matter of personal preference. Not every material that can be run at high speed should be run at high speed. A better mark can often be achieved by slowing your laser and giving the laser longer to react to your material.
- **Test your material:** If you have a small area of the material you won't be using, or an extra item, take advantage of this area to test out your settings by engraving a small square or cutting a small circle. You can fine tune your settings in these areas.
- **Similar materials use similar settings:** When you are working with a material you aren't familiar with, think about a similar material and what settings you would use with that product. Most anodized aluminums will react well with similar settings, as will most plastics.
- **When in doubt, start low:** Remember, you can always re-run your job as long as you don't move it in the machine. Let's say you're running a photograph in a one-of-a-kind wood plaque. Start with a lower power setting, look at the engraving, then run the project a second time at high speed and lower power a second time to add a little more depth if needed.
- **Run only one part of the file:** If running a job on a new material, you can always just select one piece of the engraving, like a piece of text, and run that part first to make sure your settings are perfect before running the whole file.



To print a copy of these settings to keep next to your laser, go to www.epiloglaser.com/support/material-settings

APPENDIX C: SYSTEM CALIBRATION

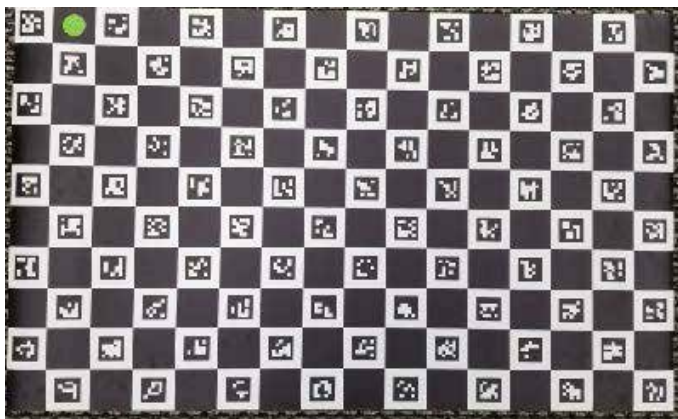
Camera Calibration



Important Notes:

- Camera calibration is only necessary if recommended by Epilog's Technical Support.
- Before beginning, reboot your machine if you have recently run any jobs.
- For Fusion Maker & Fusion Edge machines, you will use a 24" x 12" piece of anodized aluminum.
- It is advised to remove the calibration mat from the cardboard tube it is shipped in and laying it checkerboard side down on a flat surface at least an hour before completing the camera calibration. This ensures that the calibration mat will lay flat in the engraver and will result in a more accurate camera calibration.

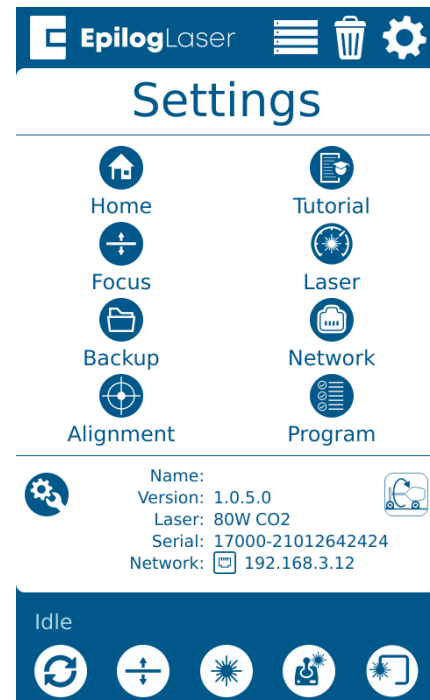
Camera Calibration Mat



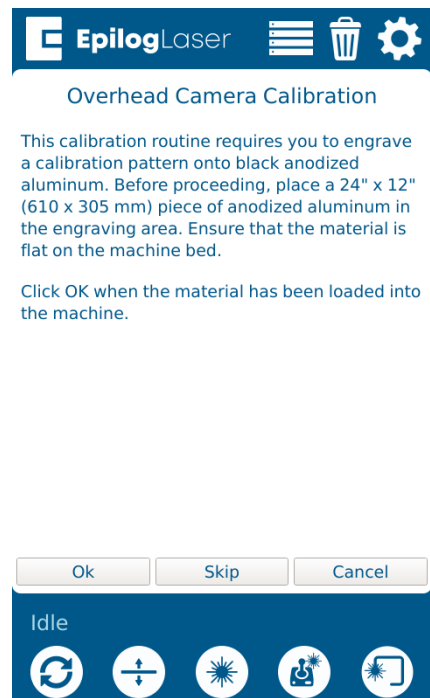
- This procedure should not be completed with the vector grid or slat assembly in the engraver. Ensure that the raster table is installed while completing this procedure.

Overhead Camera Calibration

1. Press the **gear** icon to enter the Settings Menu.



2. Long Press the **"Settings"** text for 5 seconds to enter the Advanced Settings Menu.



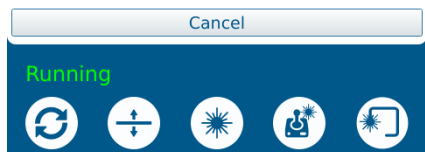
APPENDIX C: SYSTEM CALIBRATION

3. Click on **“Calibrate Cameras”** to enter the Camera Calibration menu.
4. While the machine is Idle, follow the prompt, and begin the calibration routine by selecting **“Ok”**.
 - You will place a piece of anodized aluminum on the table at this time.
5. Follow the prompt and close the top door of the engraver.
 - If you are calibrating on a Fusion Edge, once **“OK”** is pressed the laser will start engraving the calibration pattern. The engraver will automatically focus to the 0.635mm thickness of the anodized aluminum, then engrave a calibration pattern.



The job is currently running.

-Once complete, the calibration will continue automatically.

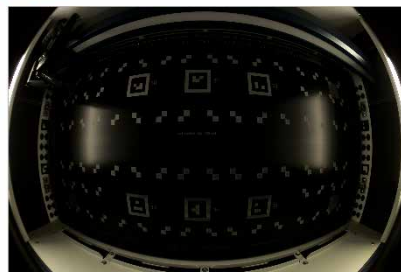


6. Allow the job to run until completion.
7. Once the job has finished engraving (Fusion Edge only), the camera at the laser head will take pictures of the engraving to calibrate itself. This process takes several minutes.



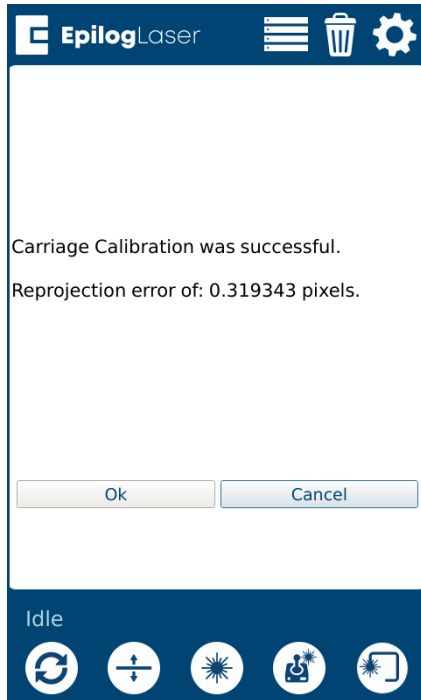
Overhead Camera Calibration

Please wait while the calibration routine is in progress. Press cancel at any time to abort the process.



APPENDIX C: SYSTEM CALIBRATION

- Once the calibration has successfully finished, a dialog will appear. The “Reprojection error” will be listed and is used to determine the quality of the calibration. The lower the value, the better. If the reprojection error is above 2.0, the user will see an error “Calibration unsuccessful. Error too high”. A value of 0.6 or lower is desired.



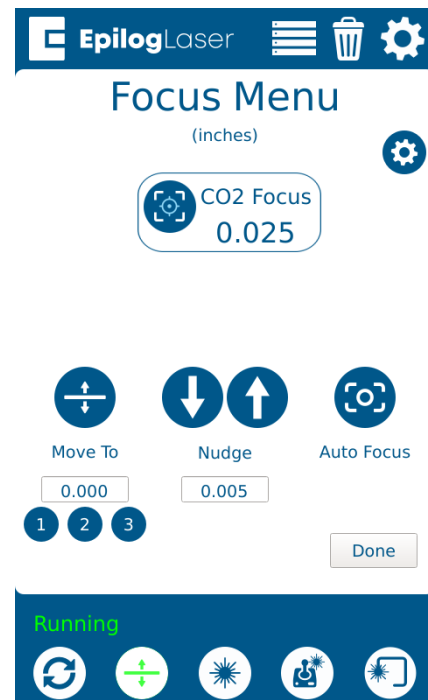
Calibrating the Auto Focus

Calibrating CO2 Focus



Note: These steps will walk you through calibrating the auto focus of a Fusion Edge or Fusion Maker with a CO2 laser only.

- Run a test job with a piece of anodized aluminum. Set up a small solid square as your artwork and run the job with high speed and low power settings.
- Once the job is running, press the Focus Menu button on the touch screen, and slightly raise and lower the table with the joystick while keeping an eye on the spark coming from the laser hitting the anodized aluminum.

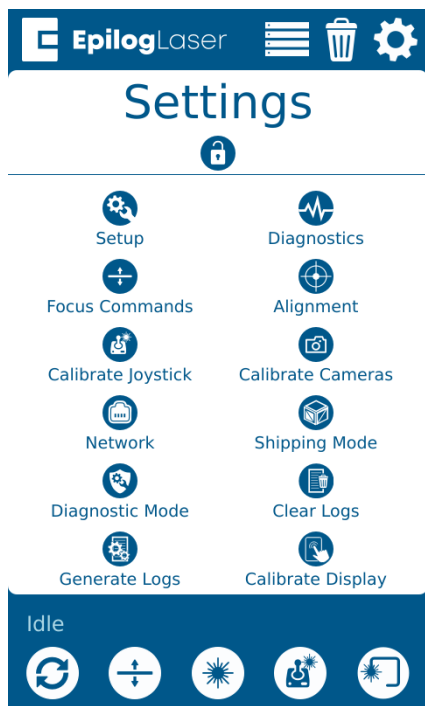


- While raising the table up and down, find the height where the spark appears the brightest. If it's difficult to tell, turn off any overhead lights in the room.
- Once you've found the brightest spark, let go

APPENDIX C: SYSTEM CALIBRATION

of the joystick and press the Go/Stop button to stop the job. Then press the “Reset” button to return the laser head back to its home position.

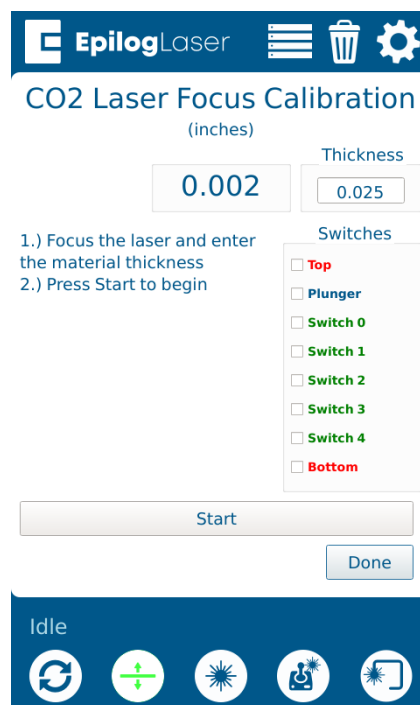
5. Remove the material from the engraving bed.
6. Press the Settings button, and then long press the “Settings” text until the Advanced Settings menu appears.



7. Select “Focus Commands” from the menu. Then select “CO2 Focus”.

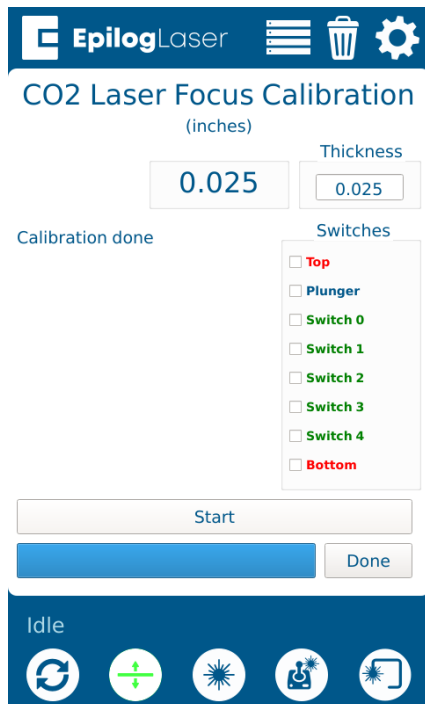


8. Select “Calibrate CO2 Focus”. Ensure the material thickness used during calibration is entered in the Thickness text box (The default of 0.025” corresponds to the supplied anodized aluminum). Press “Start”.



APPENDIX C: SYSTEM CALIBRATION

- Once the calibration is complete, press “Done.”



- The CO2 auto focus should now be calibrated properly, and you will now need to calibrate the Auto Focus Plunger. See **“Calibrating the Auto Focus Plunger”** on page 87.

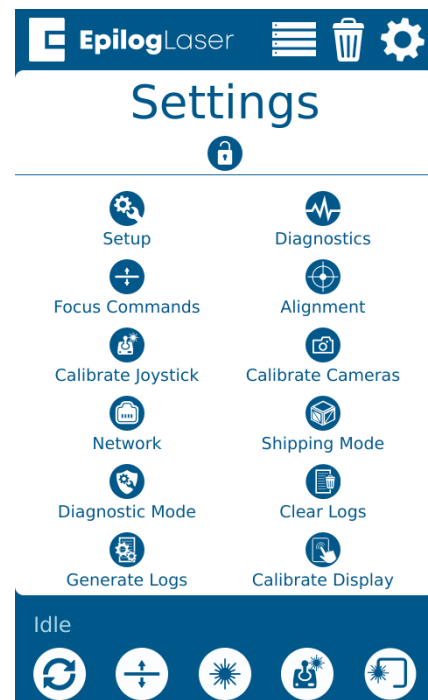
Calibrating the Auto Focus Plunger

- Before beginning, engrave a job to ensure that the material is in focus on the table. We recommend using a piece of anodized aluminum, but any flat material should work.



Note: The Task Plate must be in the machine, you can **NOT** calibrate the Auto Focus Plunger using the Slat Table or the Vector Cutting Grid.

- Leave the material on the table once it is in focus. Turn on the red dot pointer and jog the laser head til the red dot is centered on the material.
- Press the Settings button, and then long-press the “Settings” text until the Advanced Settings menu appears.

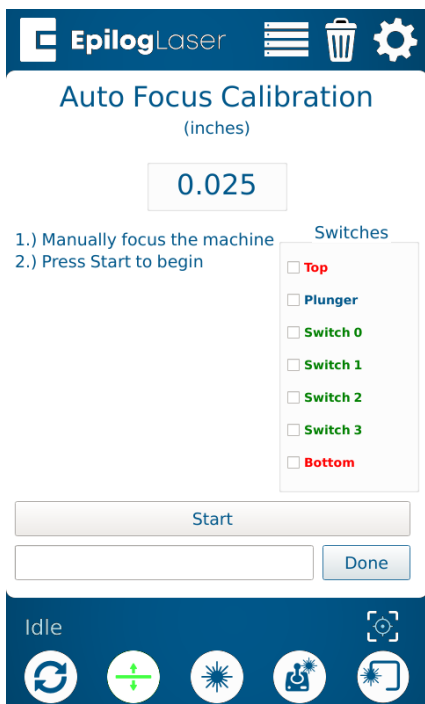


APPENDIX C: SYSTEM CALIBRATION

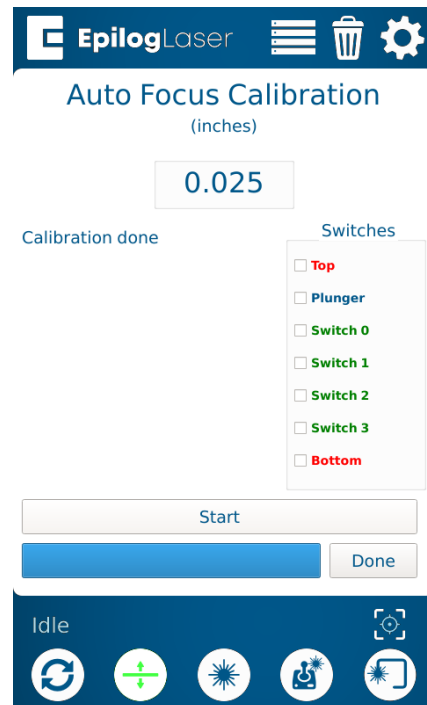
4. Select “Focus Commands” from the menu.



5. Select “AF Plunger” and then press “Start”. The plunger will automatically move down to the table surface and calibrate the focus plunger.



6. Once the calibration is complete, press “Done”.



7. The Auto Focus Plunger calibration should now be complete.

APPENDIX C: SYSTEM CALIBRATION

Machine Settings:

- **Acceleration Match Offset [cnts]**
 - Number of encoder counts to delay firing laser when accelerating. Used for raster quality adjustments
- **Deceleration Match Offset [cnts]**
 - Number of encoder counts to delay firing laser when decelerating. Used for raster quality adjustments
- **Bed Margins [in]**
 - The margins around the bed, in inches that the carriage can travel to.
 - Format is as follows:
TOP,LEFT,BOTTOM,RIGHT
- **Bed Size [in]**
 - The size of the bed in the machine in inches
 - Format is as follows: WIDTH,HEIGHT
 - Requires “Home Axis” to take effect
- **Disable Table Homing**
 - Setting to disable homing the table when the machine boots. For optimal operation, leave this at a value of 0
 - A value of 1 will disable table homing
 - Will take effect after reboot
- **Rotary Encoder [cnts/in]**
 - The number of encoder counts per inch of travel for the rotary device
 - Requires “Home Axis” to take effect
- **X Axis Encoder [cnts/in]**
 - The number of encoder counter per inch of travel for the X Axis
 - Requires “Home Axis” to take effect
 - Must recalibrate cameras if this changes
- **Y Axis Encoder [cnts/in]**
 - The number of encoder counter per inch of travel for the Y Axis
 - Requires “Home Axis” to take effect
 - Must recalibrate cameras if this changes
- **Home Offset [in]**
 - The offset of the table origin, relative to the X and Y limit switches
 - Requires “Park Axis” to take effect
 - Must recalibrate cameras if this changes
- **Joystick Center X**
 - The center X position of the joystick, in joystick units
- **Joystick Center Y**
 - The center Y position of the joystick, in joystick units
- **Joystick Deadzone [%/100]**
 - The percentage of dead zone around the center of the joystick
- **Joystick Limit X**
 - The MIN and MAX limits for the X axis of the joystick, in joystick units
 - Format is as follows: MIN,MAX
- **Joystick Limit Y**
 - The MIN and MAX limits for the Y axis of the joystick, in joystick units
 - Format is as follows: MIN,MAX
- **Laser Match [cnts]**
 - Adjustment to synchronize left to right and right to left raster lines. Units are in number of encoder counts
- **Laser Match Offset [cnts]**
 - Offset of the raster data in X. Used to align raster and vector if needed. Units are in number of encoder counts
- **Velocity Match Offset [cnts]**
 - Offset of the raster data proportional to velocity. Units are in number of encoder counts
- **Park Position [in]**
 - The position in inches to park the laser head when the machine is idle
 - Requires “Park Axis” to take effect
- **Plunger Offset [cnts]**
 - The number of table encoder counts from the laser zero focus position, to the auto focus plunger
- **Rotary Offset [in]**
 - The offset of the rotary origin, relative to the X and Y limit switches
- **Rotary Table Height [in]**
 - The distance in inches to clear the rotary device
- **Scale [mm/in]**

APPENDIX C: SYSTEM CALIBRATION

- A scale factor to adjust the scale of the X and Y axis
- Format is as follows: X,Y
- Requires “Home Axis” to take effect
- Must recalibrate cameras if this changes
- **Table Switch Locations [cnts]**
 - A list of the locations in which the table switches were located
- **Table Current [A]**
 - The current in Amps to run the table drive
- **Table Resolution [cnts/in]**
 - The number of encoder counts per inch of travel for the table
 - Must “Home Table” if this value is changed
- **CO2 Tickle Duration [us]**
 - The duration of the laser tickle pulse in microseconds
- **CO2 Tickle Frequency [Hz]**
 - The frequency of the laser tickle pulse in hertz
- **CO2 Tickle Holdoff [us]**
 - The duration in which the laser tickle is stalled after a laser pulse in microseconds
- **CO2 Pulse Stretch [us]**
 - The amount to stretch all laser pulses in microseconds
- **Table Focus Offset [cnts]**
 - The distance in table encoder counts from the top crash switch, to the laser focus position
- **RHS Y Skew [cnts]**
 - The number of encoder counts to skew the right hand side of the Y axis after homing
 - Requires “Home Axis” to take effect
- **Air Assist Delay [s]**
 - The number of seconds to delay turning ON and turning OFF the air assist before and after a job finished
 - Format is as follows: ON,OFF

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