



Cabinet Laser Engraver User Manual



Read Carefully Before Use
Keep for Future Reference

PREFACE

Thank you for choosing our laser equipment.

Your CO₂ laser engraving machine is intended for personal and professional use. It comprises a Class 4 laser system but some components remain **EXTREMELY** dangerous. Never disable the preinstalled safety devices and always use your laser safely and responsibly.

Read this manual carefully before operation. It covers the details of correct installation, adjustment, maintenance, and—most importantly—safe operation of your new laser. It is intended to be used in conjunction with your engraving software manual, as the software typically does not only provide image design but also serves as an alternative interface for the laser settings and machine controls. You and any other users of this device should thoroughly understand **BOTH** manuals before attempting to operate the laser.

Keep both manuals for future reference and provide them to **ANYONE** who will install, operate, maintain, or repair this machine. Both manuals should be included if this device is given or sold to a third party.

If you have any questions after reading these manuals, please contact us and our support department will address your concerns as soon as possible.

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1. Introduction

1.1 General Information

This manual is the designated user guide for the installation, setup, safe operation, and maintenance of your cabinet laser engraver. It is divided into six chapters covering general information, safety instructions, installation steps, operation instructions, maintenance procedures, and contact information.

ALL personnel involved in the installation, setup, operation, maintenance, and repair of this machine should read and understand this manual, particularly its safety instructions. Some components are extremely high voltage and/or produce powerful laser radiation. Substandard performance and longevity, property damage, and personal injury may result from not knowing and following these instructions.

Your laser engraver works by emitting a powerful laser beam from a glass tube filled with insulating carbon dioxide (CO₂), reflecting that beam off three mirrors and through a focus lens, and using this focused light to etch designs into certain substrates. The first mirror is fixed near the end of the laser tube, the second mirror travels along the machine's Y axis, and the third mirror is attached to the laser head that travels along the X axis. Because some dust from the engraving process settles on the mirrors, they require frequent cleaning. Because they move during operation, they also require periodic readjustment using their attached positioning screws to maintain the proper laser path. A water cooling system—typically a pump or chiller—must be used with this engraver to dissipate the heat produced by the laser tube. Similarly, an exhaust system—typically either an external vent or a dedicated air purifier—must be used to remove the dust and gases produced by the engraving process.

With low intensity use, the provided laser tube has an average lifespan around 12000 hours before requiring replacement. However, constantly running your laser above 70% of its maximum rated power can significantly shorten its service life. It is recommended to use settings from 10–70% of the maximum rated power to enjoy optimal performance and longevity.

Note that this is a high-voltage device and, as a safety precaution, it is recommended to only touch its components with one hand at a time during use.

Note that the active laser is invisible to the human eye. This device should never be used while any cover is open to avoid potentially permanent injury.

Note also that the water cooling system and exhaust system are both absolutely essential to the safe use of this device. Never operate the engraver without both of these systems operating properly. Water should always be kept clean and around room temperature, and the exhaust system should always comply with all applicable laws and regulations for workplace and environmental air quality.

1.2 Symbol Guide

The following symbols are used on this machine's labeling or in this manual:



These items present a risk of serious property damage or personal injury.



These items address similarly serious concerns with regard to the laser beam.



These items address similarly serious concerns with regard to electrical components.



Protective eyewear should be worn by anyone around this machine during operation.



This product is sold in conformity with applicable EU regulations.



This product contains electrical components that should not be disposed of with regular garbage.

1.3 Designated Use

This machine is intended for use engraving signs and other consumer products on applicable substrates. This laser can process a wide variety of materials including wood and cork, paper and cardboard, most plastics, glass, cloth and leather, and stone. It can also be used with some specially coated metals. Use of this system for nondesignated purposes or materials is not permitted.

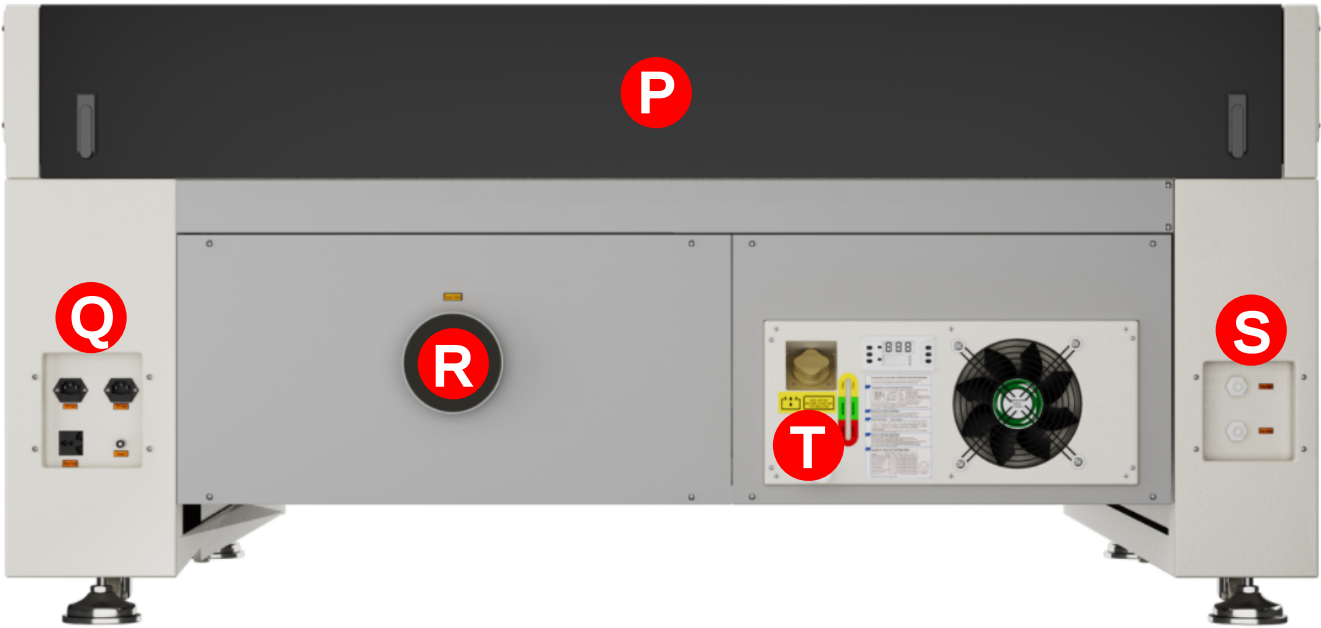
The system must be operated, maintained, and repaired by personnel familiar with the field of use and the dangers of the machine and the material being engraved including its reflectivity, conductivity, potential for creating harmful or combustible fumes, etc.

Laser beams are dangerous. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any improper use of this device or for any damage or injury arising from such use. The operator is obliged to use this cabinet laser engraver only in accordance with its designated use, the other instructions in its manuals, and all applicable local and national laws and regulations.

1.4 Technical Specifications

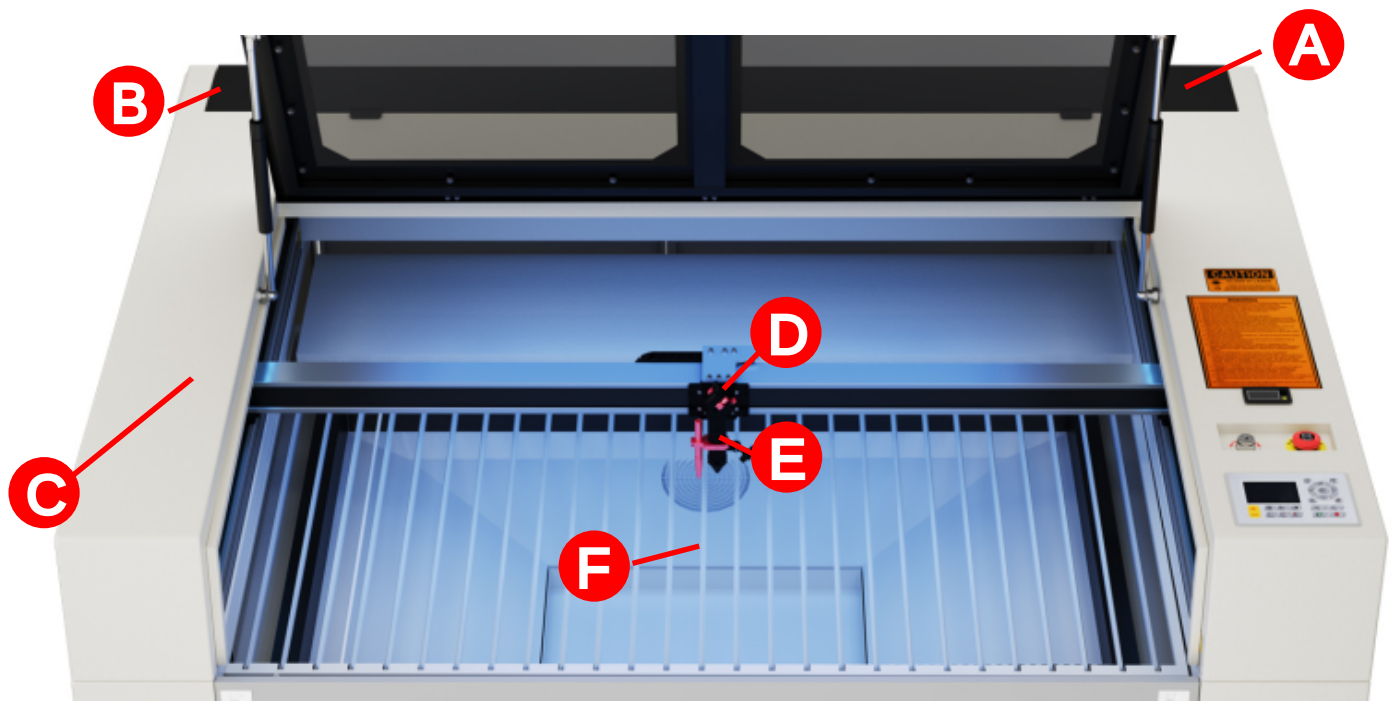
Product Name		Effi9S	Effi10S	Effi13S	Effi16S
Laser Tube	Diameter	2.36 in.(60mm)		2.76 in.(70mm)	3.15 in.(80mm)
	Length	48.82 in.(1240mm)	56.69 in.(1440mm)	64.96 in.(1650mm)	72.83 in.(1850mm)
Focus Lens	Diameter	0.8 in. (20mm)			
	Thickness	0.08 in. (2mm)			
	Focal Length	2.5 in. (63.5mm)			
Mirror	Diameter	0.98 in. (25mm)			
	Thickness	0.12 in. (3mm)			
Input Power		the United States and Canada regions : 110-120V 60Hz Europe, UK,and Australia regions : 220-240V 50Hz			
Power Consumption		1100W ; 1500W(built-in cw5200 version)	1400W ; 1900W(built-in cw5200 version)	1500W ; 2000W(built-in cw5200 version)	1600W ; 2100W(built-in cw5200 version)
Laser Rated Power		90W	100W	130W	150W
Laser Peak Power		100W	130W	160W	180W
Expected Service Life at <40% / 40 – 70% / >70% Power		12000/10000/7000 hr.			
Laser Wavelength		10640nm			
Processing Area		900 x 600mm (36x24 in.)	1000 x 600mm (40x24 in.)	1300 x 900mm (51x35 in.)	1600 x 1000mm (63x40 in.)
Front/Back Pass-Through Size		960*∞*20mm	1060*∞*20mm	1360*∞*20mm	1660*∞*20mm
Workbed Blades		18 pcs	21 pcs	27 pcs	33 pcs
Max. Processing Speed		1400mm/s (55.1ips)			
X-Axis Max Acceleration		15000mm/s ² (1.5 G)			
Min. Engraving Depth		0.01 mm			
Max. Engraving Depth		10 mm			
Min. Letter Size		1 × 1 mm			
Required Operating Environm ent	Max. Humidity	70%			
	Temp. Range	40 – 95 ° F (5 – 35 ° C)			
Provided Operating Software		RDWorks			
Supported Operating Software		LightBurn,CorelLaser,etc			
Supported Image Formats		.ai, .bmp, .dxf, .gif, .hpgl, .jpeg, .pdf, .plt, .png, .rd, . svg, .tiff, .tga, etc			
Graphic Operating Modes		Raster, Vector, Combined			
Certification		CE, FDA , IEC60825-1(SGS)			
Net Weight		220KG ; 240KG(built-in cw5200 version)	280KG ; 300KG(built-in cw5200 version)	330KG ; 350KG(built-in cw5200 version)	380KG ; 400KG(built-in cw5200 version)

1.5 Components



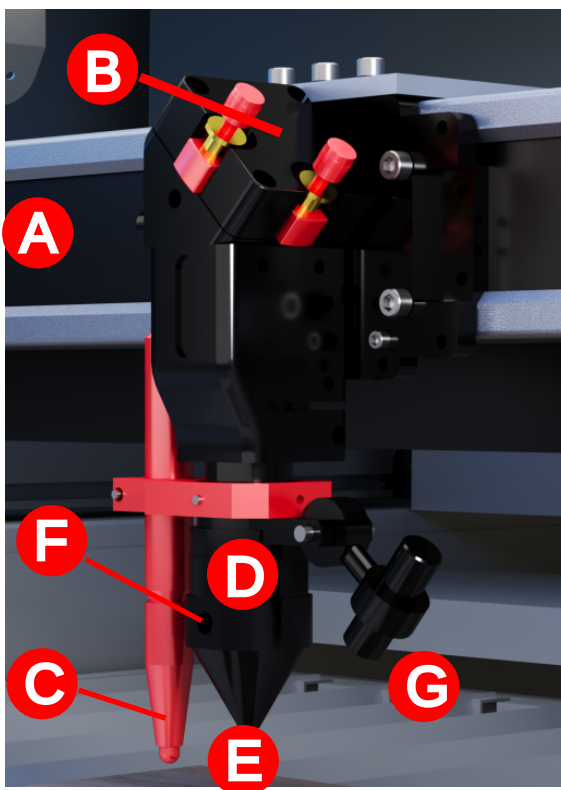
Main Parts

- A. Cover**—The cover provides access to the main bay for placing and retrieving materials, as well as fixing the laser path alignment and other maintenance. Power to the laser is automatically cut when the cover is opened.
- B. Viewing Window**—The polycarbonate window is shielded to protect you and others from the laser and its reflection, allowing monitoring of the engraving process. However, you should never stare continuously at the laser during operation, even through the window.
- C. Y-Axis Rail**—The Y-axis rail supports the movement of the X-axis rail up and down the workbed.
- D. X-Axis Rail**—The X-axis rail holds the 2nd mirror and supports the movement of the laser head left and right across the workbed.
- E. Laser Head**—The laser head holds the 3rd mirror, the focus lens, the red dot guidance, and the air assist outlet.
- F. Workbed**—The workbed can be adjusted in height to fit thinner and thicker materials, as well as adjusted between the aluminum and honeycomb platforms. This is also where the accessories is located when the engraver first arrives.
- G. Warnings**—This notice supplements the Safety Information chapter of this manual. Read it carefully before using the machine.
- H. Emergency Stop**—This button immediately cuts all power to the laser tube in the event of an emergency.
- I. Control Panel**—The control panel offers hands-on control of the engraving process, including manual movement of the laser head and firing of the laser.
- J. Pass-Through Doors**—These doors open to allow larger pieces of material to be fed through the workbed. Additional care must be taken to avoid seeing or suffering exposure to the laser beam and its reflection.
- K. Bottom Front Access Door**—This door provides access to the waste hopper for easy cleanup after each project.
- L. Inputs**—This panel includes the ports for the machine's USB, computer, and internet connections.
- M. Right Access Door**—This door provides access to the mainboard, motor drivers, and power supplies.
- N. Feet**—These feet can be rotated down to help anchor the machine in place.
- O. Caster Wheels**—The front wheels include locks to hold the engraver in place.
- P. Top Rear Access Door**—This door opens to the laser bay, holding the laser tube and its connections.
- Q. Power Sockets**—These sockets connect to your main power supply, ground the machine, and provide an additional socket for your pump if needed. It is recommended, however, that you use a separate socket on a different fuse for your pump and that, for an abundance of safety, you use an industrial chiller to cool your engraver. Periodically check its filter to keep it clear of any obstruction.
- R. Exhaust vent**—Connect the fan through your ventilation opening to deliver smoke to the window or air purifier.
- S. Water Ports**—These ports connect to your water chiller to keep your laser tube cool and stable. If you purchased the built-in chiller version, this interface is not available.
- T. Built in CW5200 Water Chiller**—If the machine you purchased is a built-in chiller version, there is no need to connect an additional chiller; If the machine you purchased is not the built-in chiller version, then this device is not available.
- U. Laser key switch**—Separate control of laser switch.
- V. Ammeter**—Real time display of laser current during current operation You can directly adjust the current of the laser tube by rotating the knob to control the power level.



Laser Path

- A. Laser Tube**—This long glass tube is filled with helium, nitrogen, and CO₂ gas and water cooled to safely produce your engraving laser. Its connection to the laser power supply is extremely high voltage and extremely dangerous.
- B. 1st Mirror**—This adjustable-angle mirror is fixed in place to transfer the engraving laser from the tube to the 2nd mirror.
- C. 2nd Mirror**—This adjustable-angle mirror moves with the X-axis rail to allow the laser beam to travel along the Y axis.
- D. 3rd Mirror**—This adjustable-angle mirror moves with the laser head to allow the laser beam to travel along the X axis.
- E. Focus Lens**—This lens directs and focuses the laser to the material.
- F. Workbed**—The bare workbed can be adjusted in height or fitted with aluminum or honeycomb tables for different projects.



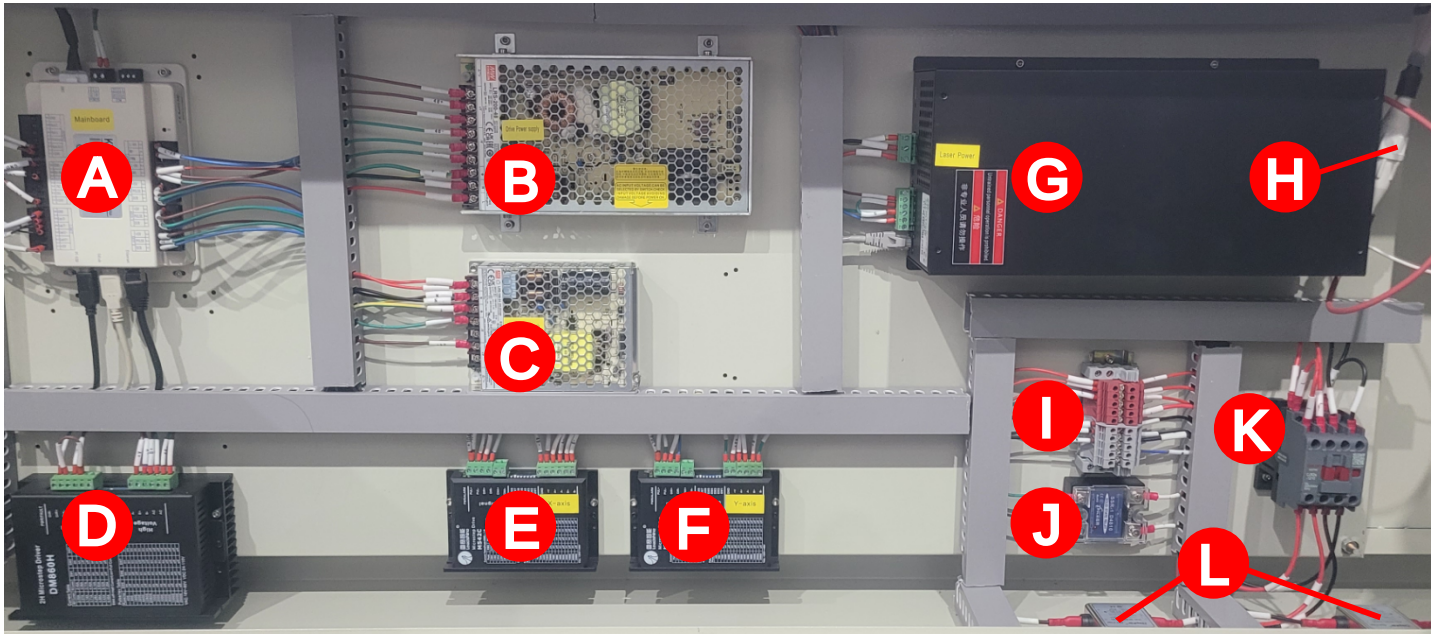
Laser Head

- A. X-Axis Rail**—This rail moves along the Y axis, with its movement controlled by limit switches.
- B. 3rd Mirror**—This adjustable-angle mirror transfers the laser from the 2nd mirror to the focus lens.
- C. Autofocus Sensor**—This sensor is used by your engraver to focus the laser correctly at the push of a button.
- D. Focus Lens**—This 18 mm lens directs and focuses the laser beam to its point of contact with the engraving material.
- E. Laser**—The engraving laser itself is invisible but highly dangerous. Avoid any direct exposure to your skin or eyes.
- F. Air Assist**—This device blows pressurised air to kill sparks and blow away gas and debris as you engrave.
- G. Red Dot Pointer**—This device helps you see the exact position of the invisible engraving laser.



Connection Inputs

- A. USB Line Port**—This port connects to your control computer and its engraving software using any of its USB ports.
- B. USB Port**—This port allows you to load and save designs and parameters directly onto the engraver.
- C. Ethernet Port**—This port connects to your control computer and its software either directly or via the internet.



Right Access Door

- A. Mainboard**—This circuit board controls the engraving process, responding to commands from your engraving software or the machine's control panel.
- B. Drive Power Supply**—This device powers the machine's 3 drives.
- C. Control Power Supply**—This device powers the machine's control panel.
- D. Z-Axis Driver**—This device moves the workbed up and down.
- E. X-Axis Driver**—This device moves the laser head along the X rail.
- F. Y-Axis Driver**—This device moves the X rail along the Y rail
- G. Laser Power Supply**—This device transforms standard electricity into the extremely high voltage charge necessary for the laser tube.
- H. High-Voltage Wire**—This line is connected to the laser tube's anode or positive end, providing high-voltage current to power the laser.
- I. Connecting Terminal**
- J. Solid State Relay**
- K. AC Contactor**
- L. Wave Filter**

2. Safety Information

2.1 Disclaimer

Your engraver may differ somewhat from those shown in this manual due to options, updates, etc. Please contact us if your engraving machine came with an outdated manual or if you have any other questions.

2.2 General Safety Instructions

- Your device should come with instruction labels. If any of these labels is missing, illegible, or becomes damaged, it must be replaced.
- Use this laser engraving device only in accordance with all applicable local and national laws and regulations.
- Use this device only in accordance with this instruction manual and the manual for the engraving software included with it. Only allow this device to be installed, operated, maintained, repaired, etc. by others who have also read and understood both manuals. Ensure that this manual and the software manual are both included with this device if it is ever given or sold to a third party.
- **DO NOT** operate continuously for more than 5½ hours. Stop for at least 30 minutes between uses.
- **DO NOT** leave this device unattended during operation. Observe the device throughout operation and, if anything seems to be operating strangely, immediately cut off **ALL** power to the machine and contact either our customer service or your dedicated repair service. Similarly, ensure the device is **FULLY** turned off (including by means of the emergency stop switch) after each use.
- **DO NOT** allow minors, untrained personnel, or personnel suffering from physical or mental impairment that would affect their ability to follow this manual and the software manual to install, operate, maintain, or repair this device.
- Any untrained personnel who might be near the device while it is in operation **MUST** be informed that it is dangerous and fully instructed on how to avoid injury during its use.
- Always keep a fire extinguisher, water hose, or other flame retardant system nearby in case of accidents. Ensure that the local fire department's phone number is clearly displayed nearby. In the case of a fire, cut electrical power before dousing the flame. Familiarize yourself with the correct range for your extinguisher before use. Take care not to use the extinguisher too close to the flame, as its high pressure can produce blowback.



2.3 Laser Safety Instructions

When used as instructed, this machine comprises a Class 4 laser system safe for users and bystanders. However, the invisible engraving laser, the laser tube, and its electrical connections remain **EXTREMELY** dangerous. Used or modified without care, they can cause serious property damage and personal injury including but not limited to the following:



- The laser will easily burn nearby combustible materials
- Some working materials may produce radiation or harmful gases during processing
- Direct exposure to the laser will cause bodily harm including serious burns and irreparable eye damage

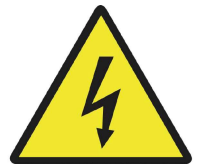
As such,

- **DO NOT** modify or disable this device's provided safety features. Do not modify or disassemble the laser and do not use the laser if it has been modified or disassembled by anyone except trained and skilled professionals. Dangerous radiation exposure and other injury may result from the use of adjusted, modified, or otherwise incompatible equipment.
- **NEVER** leave any part of the cabinet open during operation except (when needed) the pass-through doors. Never interfere with the laser beam, do not place any part of your body in any part of the laser path during operation, and never attempt to view the laser directly. When using the pass-through doors or otherwise risking exposure to the laser beam, take measures to protect yourself from potentially reflected laser beams including the use of personal protective equipment such as protective eyewear specially designed to filter the specific wavelength of your engraver's laser with an optical density (OD) of 5+.
- **DO NOT** stare or allow others to stare continuously at the laser beam during operation even when the cover is closed and/or wearing protective eyewear.

- **ONLY** use this engraver if its automatic shutoffs are working properly. When you first get this engraver and if you subsequently notice any problems, test them (see below) before undertaking any other work. Do not continue use if the shutoffs do not occur. Turn off the device and contact customer service or your repair service. Never disable these shutoffs.
- **DO NOT** ever under **ANY** circumstances use this laser engraver if the water cooling system is not working properly. Always activate the water cooling system and visually confirm that water is flowing through the entire system before turning on the laser tube. Use this engraver with an industrial water chiller or its equivalent. We do not recommend using a water pump and bucket for cooling high-powered laser tubes such as the one in this engraver. Do not use ice water or water that has become hotter than 100°F (38°C). For best results, keep it between 60–70°F (15–21°C). Replace heated water but never allow the system to run without water or allow the water to become colder than 50°F. Immediately stop use if the water cooling system malfunctions.
- **DO NOT** use generic coolant or antifreeze in your cooling water, as they may leave corrosive residues and solidify inside your hoses and piping, causing malfunctions and even explosions. Use custom laser-safe formulations or use and store your engraver in a climate-controlled area.
- **DO NOT** leave potentially combustible, flammable, explosive, or corrosive materials nearby where they could be exposed to the direct or reflected laser beam.
- **DO NOT** use or leave sensitive EMI equipment nearby. Ensure the area around the laser is free of strong electromagnetic interference during any use.
- **ONLY** use this machine for working the materials described in the Material Safety section of this manual. The laser settings and engraving process must be properly adjusted for specific materials.
- Ensure the area is kept free of other airborne pollutants, as these might pose a similar risk of reflection, combustion, etc.

2.4 Electrical Safety Instructions

- **ONLY** use this device with a compatible and stable power supply with less than 5% fluctuation in its voltage.
- **DO NOT** connect other devices to the same fuse, as the laser system will require its full amperage. Do not use with standard extension cords or power strips. Use only surge protectors rated over 2000J.
- **ONLY** turn on the power to this device when it is well grounded, either via a firm connection to a 3-prong outlet or via a dedicated grounding cable firmly connected to the proper slot on the cabinet. Do not use with an ungrounded 3 to 2 prong adapter. The device's grounding should be checked regularly for any damage to the line or loose connections.
- The area around this laser engraving device should be kept dry, well ventilated, and environmentally controlled to keep the ambient temperature between 40–95°F (5–35°C). For best results, keep the temperature at 75°F (25°C) or below. The ambient humidity should not exceed 70%.
- Adjustment, maintenance, and repair of the electrical components of this device must be done **ONLY** by trained and skilled professionals to avoid fires and other malfunctions, including potential radiation exposure from damage to the laser components. Because specialized techniques are required for testing the electrical components of this marking system, it is recommended such testing only be done by the manufacturer, seller, or repair service.
- Unless otherwise specified, **ONLY** undertake adjustment, maintenance, and repair of the device when it is turned off, disconnected from its power supply, and fully cooled.



2.5 Material Safety Instructions

- Users of this laser engraving machine are responsible for confirming that materials to be processed can withstand the heat of the laser and will not produce any emissions or byproducts either harmful to people nearby or in violation of local or national laws or regulations. In particular, do not use this device to process polyvinyl chloride (PVC), teflon, or other halogen containing materials under any circumstances.

- Users of this laser engraver are responsible for ensuring that every person present during operation has sufficient PPE to avoid the injury from the emissions and byproducts of the materials being processed. In addition to the protective laser eyewear described above, this may require goggles, masks or respirators, gloves, and other protective outer clothing.
- **DO NOT** ever under any circumstances use this laser engraver if the exhaust system is not working properly. Always ensure that the exhaust fans can remove the dust and gas produced by the engraving process in accordance with all applicable local and national laws and regulations. Immediately stop use if the exhaust fans or vent pipes malfunction. Periodically check the air assist intake filter to ensure it stays free of any dust or debris.
- Users must exercise special caution when working with conductive materials as buildup of their dust and ambient particles may damage electrical components, cause short circuits, or produce other effects including reflected laser radiation.

This machine can be safely used with the following materials:

Plastics

- Acrylonitrile Butadiene Styrene (ABS)
- Nylon (Polyamide, PA, etc.)
- Polyethylene (PE)
- High-Density Polyethylene (HDPE, PEHD, etc.)
- Biaxially-Oriented Polyethylene Terephthalate (BoPET, Mylar, Polyester, etc.)
- Polyethylene Terephthalate Glycol (PETG, PET-G, etc.)
- Polyimide (PI, Kapton, etc.)
- Polymethyl Methacrylate (PMMA, Acrylic, Plexiglass, Lucite, etc.)
- Polyoxymethylene (POM, Acetal, Delrin, etc.)
- Polypropylene (PP, etc.)
- Styrene

Other

- Cardboard
- Ceramics, including Dishes, Tile, etc.
- Glass
- Leather
- Paper & Paperboard
- Rubber
- Stone, including Marble, Granite, etc.
- Textiles, including Cotton, Suede, Felt, Hemp, etc.
- Wood, including Cork, MDF, Plywood, Balsa, Birch, Cherry, Oak, Poplar, etc.

See §4.3 for the recommended parameters for the most commonly engraved materials.

This machine **CANNOT** be used with the following materials or with any materials which include them:

- Artificial Leather containing Hexavalent Chromium (Cr[VI]), due to its toxic fumes
- Astatine, due to its toxic fumes
- Beryllium Oxide, due to its toxic fumes
- Bromine, due to its toxic fumes
- Chlorine, including Polyvinyl Butyral (PVB) and Polyvinyl Chloride (PVC, Vinyl, Cintra, etc.), due to its toxic fumes
- Fluorine, including Polytetrafluoroethylenes (Teflon, PTFE, etc.), due to its toxic fumes
- Iodine, due to its toxic fumes
- Metals, due to their conductivity and reflectivity
- Phenolic Resins, including various forms of Epoxy, due to their toxic fumes
- Polycarbonate (PC, Lexan, etc.), due to its toxic fumes

For all other materials, if you are unsure about its safety or laserability with this device, seek out its material safety data sheet (MSDS). Pay especial attention to information about safety, toxicity, corrosiveness, reflectivity, and reaction(s) to high heat. Alternatively, contact our support department for further guidance.

3. Installation

3.1 Installation Overview

A complete working system consists of the laser engraving cabinet, its vents, an industrial water chiller, all applicable connection cables, and the laser and access keys. The cabinet can use designs provided by the enclosed engraving software by direct or internet connection with your computer; it can also engrave designs loaded directly from a flash drive. Users can configure other additional accessories (such as an industrial water chiller, fume extractor, or rotary axis) to suit their needs.



Use only the hardware, wiring, and power sources that came with or are compatible with this device. Installing equipment that your device is not designed to work with can lead to poor performance, shortened service time, increased maintenance costs, property damage, and personal injury.

Please note the specific requirements of your system's installation. Every customer must understand these notes before installation to execute a proper setup and achieve safe laser performance. If you have any installation questions or problems, contact our technicians and customer support team.

Any auxiliary equipment must be adjusted to the base machine. Queries may be directed to the dealer or manufacturer of such equipment.

3.2 Location Selection

Before you install your engraver, select an appropriate location for its use.

Be sure that it meets all of the requirements discussed in the Safety Information above. The location should be stable, level, dry, and climate controlled to ensure an ambient temperature of 40–95°F (5–35°C) and an ambient humidity under 70%. In particular, the temperature and humidity together should not be close to the dew point. It is also advisable to use a windowless room or to use blinds and/or curtains to avoid exposure to the potential additional heat of direct sunlight. The location should be free of dust and other airborne pollutants and well ventilated enough to process any fumes produced by the engraving process in accordance with all applicable laws and regulations. Depending on the materials to be processed, this may require construction of a dedicated ventilation system. It should be away from children; combustible, flammable, explosive, or corrosive materials; and sensitive EMI devices. The power cord should be plugged into a compatible and stable power source via a grounded 3-prong outlet. No other item should be drawing current from the same fuse. There should be firefighting equipment nearby and the local fire department's phone number should be clearly displayed.

It is highly recommended to have an extra work table nearby in order to avoid placing objects on or directly adjacent to the machine, which could become a fire or laser hazard.

3.3 Unpacking Your Engraver

Your engraving machine arrives in a wooden crate with its accessories (including this manual) packaged in the main bay. You should have placed the crate in a spacious flat area for unpacking, ideally where you plan to operate the machine permanently.

Step 1. If you have not already done so, finish removing the crate from around your engraver. Each foot is attached to the base of the crate with a hex screw. Use a hex wrench to remove them. Rotate the feet up, unlock the wheels, and roll the machine into place.

Step 2. Fix it in place by pressing down on the brake pads on the 2 front wheels and rotate the feet down to anchor them. If needed, suitable fasteners can also be used with the 0.2 inch (5 mm) holes to further secure your engraver.



- Step 3.** Check that you have received all of the following: a power cord, a ground wire, USB and Ethernet cables, a USB flash drive with engraving software included, an exhaust pipe with a hose clamp, a set of hex wrenches, an acrylic focusing tool, keys, and this manual.
- Step 4. CAREFULLY** remove the rest of the foam packaging material from around the laser tube, the viewing window, and the rest of the machine. The laser tube is a highly fragile object and should be handled delicately and as little as possible.
- Step 5.** Inside the main bay, remove the nylon cable ties from the X axis and the honeycomb table.
- Step 6.** You may keep the packaging in case of future return but, if you dispose of it or any accessories, be sure to do so in compliance with applicable waste disposal regulations.

3.4 Electrical Grounding

This device employs a powerful laser. As discussed in the Safety Information above, it is extremely high voltage and potentially dangerous, so users must securely ground it to avoid the buildup of static electricity. Using a standard 3-prong outlet will provide sufficient grounding. If you do not have access to a 3-prong outlet, you **MUST** use the grounding cable and ensure its proper connection. The far end of the cable should be securely connected to a single metal rod driven at least 8 feet (2.5 m) deep or to two separate metal rods driven at least 4 feet (1.2 m) deep into soil located at least 5 feet (1.5 m) from the machine. The resistance along the line should be no greater than 5Ω.



Poor grounding **WILL** cause equipment failure and create a serious electrical shock hazard. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any damage, accidents, or injuries caused by bad grounding connections.

3.5 Water Cooling Installation



Using a water chiller (not incl.) is essential to your engraver's performance and longevity. When this laser works without a properly maintained cooling system, its glass tube **WILL** explode from excess heat.

To install your chiller, follow the instructions in its separate manual. Always fill it with distilled water. Using deionized or tap water will gradually degrade the quality of your engraver and may even cause dangerous mineral buildup in the cooling system. **NEVER** use generic antifreeze for the same reason. Use custom laser-safe formulations or store your engraver in a climate-controlled area.

Connect the two hoses that came with your engraver to the water inlet (marked "Water Inlet") and water outlet (marked "Water Outlet") on the back of your engraver. Attach the other end of the inlet tube directly to your chiller and ensure that all connections are watertight and allow no leaks during use.

Connect the chiller to its power supply. For best results, use a power outlet on a separate fuse from the engraver itself. Once the chiller is fully installed and turned on, water should begin to run through your machine and back into your tank. **ALWAYS** obtain visual confirmation that the water is flowing through the laser tube before starting your laser.

NEVER allow the water in the tank to become too hot to cool the laser. Periodically check the water's temperature during prolonged use. It should remain between 60° and 70°F (15–20°C) at all times. Consult the chiller's manual to adjust its settings if needed or operate the laser at a lower power level to allow the water to return to its proper temperature. Never allow the water to become hotter than 100°F (38°C) or colder than 50°F (10°C) as such conditions could shatter the glass laser tube. Remember to connect the chiller's *outlet* port with the engraver's *inlet* port and to connect the chiller's inlet with the engraver's outlet.

Note: If you have purchased the built-in chiller version, there is no need to purchase an additional chiller.

3.6 Exhaust System

Install the provided exhaust pipes directly to the Exhaust vent. The pipes can be expanded to a full length of about 5 feet (1.5 m).

The other end should be connected to the 550W exhaust system and ultimately discharged outdoors (if the smoke is not dangerous and meets local and national air safety standards). NEVER operate the laser if the vents are not purifying or removing the fumes produced by the target material. Research materials before use and never operate the laser on any (such as PVC, teflon, and other halogen-containing substances) that can produce corrosive, hazardous, or even deadly fumes.

3.7 Main Power Connection

Confirm that the labeling beside the connection socket on the machine matches your power supply. Connect one end of the main cable to the connection socket and the other end to a grounded outlet. Under **NO** circumstances should you switch on the device if the voltages do not correspond.

Fluctuation along the line should be less than 5%. If this is exceeded, the fuses will blow. They are located in the connection socket and are accessible from the exterior. Similarly, do not connect this device to standard extension cords or power strips. Connect it directly to a grounded outlet or use a surge protector rated over 2000J.

3.8 Control Computer

See the software manual for details on the requirements for the control computer. The control computer can be connected using the provided USB cable (via the port marked “USB Cable to PC”), using the provided Ethernet cable (via the port marked “Ethernet Cable”), or using the internet if the engraver has been connected to it using the Ethernet cable. If the control computer is directly connected to the engraver, it should not be placed more than 15 feet (4.5 m) away in order to avoid possible interference to the signal on its line. Familiarize yourself with the software's image design features and laser control settings before using it to operate the laser.

3.9 Initial Testing

Emergency Shutoff

Because of the risk of fire and other hazards during engraving, this engraver includes a large and easy-to-reach emergency stop button near the control panel. Press it down to stop the laser tube instantly.

When your engraver arrives, its e-stop is already pressed and must be pulled up to allow the laser to function. You should test that it works properly before conducting **ANY** other work with your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press **PULSE** to fire the laser. Hit the emergency stop button and observe whether the laser stops instantly. If the laser continues to fire, the emergency stop is not working and must be replaced before the engraver can be used. Turn off the machine and contact customer service.

Cover Shutoff (Interlock)

Because of the risk of blindness, burns, and other injury from direct exposure to the invisible engraving beam, this device also shuts off the laser automatically when the protective cover is raised during operation.

After ensuring that the emergency stop button works, you should also test that the cover shutoff works properly before conducting any other work on your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press **PULSE** to fire the laser. Release the button. Taking care not to expose yourself to seeing or being hit by any possible reflected laser light, open the cover as little as possible and attempt to fire the laser again. If the laser fires, the automatic shutoff is not working and must be repaired before the engraver can be used. Turn off the machine and contact customer service.

Water Shutoff

Because of the danger posed by an uncooled laser tube, this engraver also shuts off the laser automatically when the water cooling system malfunctions.

After ensuring that the emergency stop button and cover protection both work, you should also test that the water shutoff works properly before conducting any other work on your machine. Start the water cooling system, place a piece of laserable scrap material on the workbed, close the cover, and press **PULSE** to fire the laser. Release the button. Cut off the flow of water by crimping or tying the two hoses. (Take care not to damage the hoses themselves in this procedure.) Attempt to fire the laser again. If the laser fires, the automatic shutoff is not working and must be repaired before the engraver can be used. Turn off the machine and contact customer service. If the laser does not fire, the automatic shutoff is working fine; simply release the two hoses to begin circulating water again and continue setting up your engraver.

Laser Path Calibration

Although our factory calibrates your entire system during assembly, it is possible for the laser tube, the focus lens, and/or one or more of the mirrors to be jostled out of alignment during shipment. As such, it is recommended that you perform an optical alignment test as part of setting up your machine. You can consult Monport technical support for relevant guidelines.

Air Assist

Your air assist should arrive preinstalled and correctly wired. Simply check that it is correctly configured and connected as shown. If any tubing or wiring needs to be reconnected, shut off all power to the machine (including by pressing the emergency stop) before adjusting anything. Check that its air intake filter is in place, clean, and not obstructed by any nearby objects.

3.10 Security

For your own safety and that of passersby, this engraver can be locked shut using the provided key. It is recommended that you use it to lock the machine between sessions, preventing any unauthorized operation of the machine.

4. Operation

4.1 Operation Overview

 Operate this laser marking machine only in accordance with all the instructions provided in this manual. Failure to follow the proper guidelines detailed here can result in property damage and personal injury.

This section will address only some of the options and features provided by the operation software. Before beginning to use the machine, make sure that you have read this entire manual (particularly the Safety Information above), the separate software manual, and any and all warnings provided on the machine itself.

4.2 General Operation Instructions

- Step 1.** Create your design that you'd like to engrave. You can do this directly in your engraving software or use any other graphics program, saving or converting the file to a format compatible with the engraver. See the full list of acceptable file types in the Technical Specifications section above.
- Step 2.** Check that your water chiller is full of clean and cool but not cold distilled water. Replace the water if it is not clean or cool. Turn it on and check that it is in proper working order. Visually confirm that the water is flowing through the whole system either by opening the top rear door to look at the laser tube itself or by observing that water is entering the machine and returning to the tank through the outlet tube. If the laser tube is examined directly, remember to close its access door before continuing. The water system should be allowed to run, filling the pathway and completely clearing any air and bubbles, before **ANY** use of the laser tubes. Add more distilled water to the chiller's tank if necessary after filling the engraver's water tubing.

- Step 3.** Turn on your fume extractor or ventilation system, if any.
- Step 4.** Pull up the emergency stop button and turn on the engraver's control panel using its switch on the side of the cabinet. Load your chosen design directly from a USB flash disk or through your computer's connection with the engraver.
- Step 5.** Open the engraver's cover, check that the air assist is working properly, and adjust the workbed if necessary. The honeycomb bed is recommended for most applications. The bed can be raised or lowered using the control panel or the manual adjustment knob to accommodate different thicknesses of various materials. Alternatively, the honeycomb bed can be removed to expose the aluminum knife bed and provide a little more space for thicker projects. For heavier substrates, be careful to distribute the weight as evenly as possible across the reinforced aluminum supports.
- Step 6.** Place a sample piece of your material on the workbed. This can be changed by moving either your design or the location of the engraver's origin using either the control panel or your engraving software.

To work on larger pieces of material, you may open the front or rear pass-through door or both together.



DO NOT insert anything onto the workbed through the pass-through doors other than the material while the laser is active. Pay special attention to the fumes and dust that may be released through these doors. Be sure that your ventilation system is strong enough to pull in all of byproducts or wear the necessary PPE to ensure the health of users and passersby.

- Step 7.** Focus the laser by using the control panel's autofocus feature or by placing the acrylic focus tool on top of the material and carefully raising the workbed. The laser head should barely touch the top of the acrylic tool without applying any pressure, ensuring the engraving distance is correct. (Again, never attempt to focus the laser either way without some material on the workbed.) Close the cover.
- Step 8.** Customize your design's contrast and engraving depth by adjusting the parameters in your engraving software or directly through the control panel.

The threshold for the lowest setting is 10%. The laser will not fire at any setting lower than this. It is **NOT** recommended to use the laser tube at full capacity, especially for extended periods. The recommended maximum power setting is 70%, as prolonged use above that amount will shorten your laser's service life. To increase engraving depth, increase the amount of energy per unit area by increasing the laser's power or the number of loops or by slowing down the speed parameter. Engraving too deep, however, reduces image quality, especially for coated materials.

When working with new materials, remember that you should always start on the low end of likely settings. If the effect is not yet strong enough, you can always rerun the design loop several times or rerun it with more powerful settings until you create the effect that you want.

Resolution should usually be set to 500 dots per inch. Reducing your image resolution can be helpful in some cases, reducing flaming and increasing the energy of the pulse in a way that improves the quality of the resultant image in some materials such as some plastics.

- Step 9.** Turn on the laser tube by inserting and turning your laser key. To reduce the risk of electric shock, once the laser tube is on, try to touch the engraver with only one hand at a time.
- Step 10.** Press **Start/Pause** to engrave your design. Again, do not stare continuously at the laser even through the protective polycarbonate window. Watch for possible issues like sparks or fires, however, and be prepared to quickly extinguish a fire if necessary.
- Step 11.** Once the laser has stopped, examine the quality of your first run and adjust the laser parameters on the control panel or in your software as necessary to create the desired effect.
- Step 12.** When you have finished engraving, close your engraving software and then turn off your machine in the following order: laser power supply, control panel, any ventilation device, the water cooling system, and the emergency power button. Remove your laser key from the control panel.
- Step 13.** Fully clean the workbed and empty the waste bin.
- Step 14.** For best results, lock and disconnect your laser engraver from its power supply between uses. Unplug it or turn off its intermediary surge protector.

4.3 Instructions for Specific Materials

The following instructions are suggestions to help speed safe work with a range of materials. The user should research the specific safety and engraving requirements of their specific material to avoid the risk of fire, hazardous dust, corrosive and poisonous fumes, and other potential problems. Once the product is known to be safe or appropriate protective equipment has been set up, it can be helpful to engrave a test matrix of small boxes produced at various speed and power settings to discover the ideal settings for your design. Alternatively, start with low power and fast speed settings and rerun your design as many times as needed, using progressively greater laser intensity.

Ceramics

When engraving on ceramics, generally use moderate to high power. Using more loops rather than higher power and lower speed can help avoid cracking the material during work. Be mindful of the health risk posed by dust generated from ceramic engraving, especially for repetitive industrial applications. Depending on the material and the amount of work, a fan or even full ventilation system may be required to address the problem. Similarly, operators and others in the work area may need to use breathing PPE such as masks and respirators.

Glass

When engraving glass, generally use high power and low speed. As with ceramics, it can be helpful to run more loops at lower settings to avoid cracks. Care must be taken when engraving fiberglass and carbon fiber to avoid combinations of settings that produce a laser intensity great enough to damage the structural integrity of its component fibers, producing blurry marking. PPE should be worn to avoid exposure of the eyes, nose, mouth, and skin to the dust produced by working with either material, especially for repetitive industrial applications. Clothing worn while working with fiberglass should be washed separately afterwards.

Leather

When engraving leather products, generally use low to moderate power at high speed. Be especially attentive to the possibility of fire, as well as the dust produced in repetitive applications.

Metal

CO₂ laser engravers should not be used for marking, engraving, or cutting metal. They are best suited for working coatings applied to a metal base, and care must be taken not to attempt work on the underlying metal itself. A variety of coatings specialized for CO₂ engraving are available, and the user should follow the instructions provided as the parameters vary from product to product and metal to metal. Generally, work on aluminum coatings should be done more quickly at lower power and work on steel coatings can be done more slowly at higher power.

Paper and Cardboard

When engraving various paper products, generally use low to moderate power and fast speed. Test samples from each batch, as only small parameter differences can separate effects that are too light from those that burn through the substrate. As with leather, be especially attentive of the possibility of fire, as well as the dust produced in repetitive applications.

Plastics

Plastics for engraving are available in many different colors and thicknesses and with many different coatings and surfaces. The majority of available plastics can be well engraved and cut with the laser. Plastics with a microporous surface seem to give the best result, because less surface material needs to be removed. When engraving plastics, generally use low power and high speed settings. Marking and engraving with too much power or at too low a speed can concentrate too much energy at the point of contact, causing the plastic to melt. Among other problems, this may produce poor engraving quality, noxious fumes, and even fires. High resolution engraving can cause the same problem, so medium to low resolution designs should be preferred for most plastics.

Rubber

The various compositions and densities of rubber cause slightly varying engraving depth. Testing various settings on sample pieces of your specific rubber is highly recommended for best results. When engraving rubber, generally use a consistent high power setting and create your effects by varying the laser's speed. Microporous rubber materials require a significantly higher speed than standard rubber. Engraving any kind of rubber produces a considerable amount of dust and gas. Depending on the amount of work, breathing PPE and/or a full ventilation system may be required to address the problem.

Stone

When engraving various kinds of stone, generally use moderate power and moderate to fast speed. As with ceramics and glass, be mindful of the dust created (especially for repetitive industrial applications) and take similar measures to ensure the safety of users and others in the work area.

Textiles

When engraving textiles like cloth and fleece, generally use low power and fast speed. As with leather, be especially attentive to the possibility of fire and dust.

Wood

As with rubber, there is a huge variety of woods and testing your specific material is essential to get the best results. In general, wood with consistent grain and coloring engraves more evenly. Knotted wood produces uneven effects, while resinous wood produces greater edge contrast. Some soft woods like balsa, cork, and pine engrave well (albeit with low contrast) at low or moderate power settings and high speed. Others like fir suffer from uneven fibers that usually produce a poor effect no matter what you do. Hard woods like cherry and oak engrave well at high power settings and low speed. Manufactured wood products can vary from brand to brand, mostly based on its glue composition and abundance. MDF works well but creates dark edges when cut.

In addition to the risk of fire with any wood product, extra care must be taken with the fumes from the glue used in plywood and other manufactured woods. Some are too dangerous to work with at all, while others require careful ventilation and the use of breathing PPE for repetitive industrial applications. Wood toxicity should also be examined, as the dust from some natural woods including oleander and yew can also cause nausea and cardiac problems in high enough amounts.

4.4 Control Console Instructions

You can control your engraver directly from the built-in control panel, through a direct connection with your computer, or over the internet. For details on operating your engraving software, see its separate manual. The built-in control panel can operate the laser manually or engrave designs loaded onto flash drives and external hard drives connected to the USB port on the right side of the cabinet.



If there is ever an emergency situation such as a fire, do not use the control panel to pause or stop the engraving. Hit the emergency stop button immediately.

5. Maintenance

5.1 Maintenance Overview



The use of procedures other than those specified herein may result in hazardous laser radiation exposure. Before any cleaning or maintenance work, always switch off the device and disconnect it from its power supply. Always keep the system clean, as flammable debris in the working and exhaust areas constitutes a fire hazard. **ONLY** allow trained and skilled professionals to modify or disassemble this device.

- Clean and cool water must be provided to the system at all times.
- The working table must be cleaned and the waste bin emptied on a daily basis.
- The 3rd mirror and the focus lens must be checked every day and cleaned if required.
- The other mirrors, exhaust system, and air intake filter must be checked every week and cleaned if required.
- The beam alignment should be checked weekly.
- The wiring should be checked every week for loose connections, especially the wiring for the laser tube power supply.
- The guide rails should be cleaned and lubricated at least twice a month.
- The air assist must be checked every month and cleaned if required.
- The whole laser machine including the other components such as the water cooling system must be checked every month and cleaned where required.

5.2 Water Cooling System



NEVER touch or adjust your engraver's water supply while the pump is still connected to power.

The laser tube requires cool and clean distilled water to avoid overheating. Tepid water at room temperature or a little below is ideal. The laser tube requires at least 2 gallons (7.5 L) of cool and clean distilled water or other laser-safe coolant to avoid overheating. If the temperature of the water ever approaches 100°F (38°C), discontinue work until it has cooled or find a way to reduce its temperature without interrupting the supply of water to the laser tube. The water should never be allowed to become too cold either, which could also cause the glass laser tube to shatter during use. During winter or if ice is used to cool hot water, ensure the temperature never falls below 50°F (10°C).

More water should be added every few days to ensure evaporation does not cause the pump to become exposed during use.

5.3 Cleaning

5.3.1 Cleaning the Water System



NEVER touch or adjust your engraver's water supply while the pump is still connected to power.

The water chiller should be shielded from ambient dust created during work. If the water ever becomes visibly dirty, discontinue work. The debris in the water will reduce its cooling efficiency, can heat up itself, and can damage the cooling pipes. Change the water, place the water outlet tube into a separate bucket, and run the cooling system until all contaminated water has been flushed from the engraver. Clean the water chiller's tank itself before refilling it with clean and cool distilled water, replacing the outlet tube, and continuing operation.



No matter which you use to cool your laser engraver, be it an industrial water chiller or a water pump, **ALWAYS** follow its separate instructions for maintenance and ensure that the water used remains cool, clean, and pure.

5.3.2 Cleaning the Main Bay and Engraver

Check at least once a day whether dust has accumulated in the main engraving bay. If so, it must be removed. The exact cleaning interval and requirements strongly depend on the material being processed and the operating time of the device. A clean machine guarantees optimal performance and reduces service costs, as well as reducing the risk of fire or injury.

Clean the viewing window with mild cleansers and a lens or cotton cloth. **DO NOT** use paper towels as they can scratch the acrylic and reduce the cover's ability to protect you from laser radiation. Clean the interior of the main bay thoroughly, removing any debris particles or deposits. Paper towels and window cleaner are recommended. When necessary, clean the cover of the laser tube after it has been allowed to cool completely. Allow any fluid used in any cleaning to dry completely before further use of the engraver.

5.3.3 Cleaning the Focus Lens

The lens has a durable coating and won't be damaged by correct and careful cleaning. You should check the lens and the 3rd mirror daily and clean them if there is any debris or haze on their surface. Your laser will be less efficient and heat buildup on the oil or dust itself can damage the lens.

1. Move the engraving table to a distance approximately 4" (10 cm) under the lens holder.
2. Move the laser head into the center of the workbed and put a cloth under the lens holder so that the lens will not be damaged if it accidentally falls from its holder.
3. Unscrew the lens holder, rotating to the left.
4. Remove the pressurized air hose and laser guide connections.
5. Once positioned over your clean lens-cleaning tissue, remove the lens from the lens holder by carefully turning the lens holder and letting the lens and its O-ring drop onto the cleaning cloth.
6. Examine the O-ring and, if necessary, clean it with a cotton bud and a lens-cleaning tissue or cloth.
7. Remove coarse dust as well as possible by blowing air onto the lens surface.
8. Check the surface and if necessary clean the lens with the lens cleaning liquid and lens tissue or cloth.
9. Hold the lens assembly by its edge with a lens-cleaning tissue and use a drop of lens-cleaning liquid. While holding the lens at an angle, flush both surfaces to wash away grime.
10. Put the lens on a clean lens-cleaning tissue and put some lens-cleaning liquid on one side of the lens. Leave the liquid to take effect for approximately one minute and then gently wipe it away with lens-cleaning tissues soaked with lens-cleaning liquid. Dry this side of the lens with dry lens-cleaning tissues/cloth.
11. Repeat the same cleaning process on the other side of the lens.

 **NEVER** use a cleaning tissue twice. Dust accumulated in the cleaning tissue could scratch the lens surface.

12. Examine the lens. If it is still dirty, repeat the cleaning process above until the lens is clean. Do not touch the surface of the lens after cleaning.
13. Carefully insert the lens into the lens holder, ensuring that its rounded convex side is facing upwards. Put the O-ring on top of the lens.
14. Carefully reassemble the lens and laser head attachments in reverse order.

For detailed instructions, please contact Monport technical support and we will provide you with instructional videos.

5.3.4 Cleaning the Mirrors

The mirrors should be similarly cleaned if there is any debris or haze on their surface to improve performance and avoid permanent damage. The 1st mirror is located in the back left of the machine beyond the far end of the Y axis. The end of the laser tube closest to this mirror is itself a semitransparent mirror that should be checked at the same time. The 2nd mirror is located on the Y axis at the left end of the X axis. The 3rd mirror is located on top of the laser head on the X axis. The most detritus accumulates on the 3rd mirror and it should be checked daily along with the focus lens. The laser tube and the 1st and 2nd mirrors can be checked daily if desired but are usually fine if they are only checked once a week.

The semitransparent mirror at the end of the laser tube should only be cleaned when the engraver is fully disconnected from power and the tube is fully cooled. Clean all four mirrors with lens-cleaning tissue or with cotton wetted with lens-cleaning liquid or isopropyl alcohol. The 3 positioning mirrors can be cleaned in place or removed for cleaning by turning them counterclockwise. Take care not to touch the surface of any mirror directly. Clean with gentle circular motions and avoid pressing hard enough to grind any debris or cause scratching. If any mirrors are removed for cleaning, reinstall them by turning them into place clockwise while again being careful to avoid any scratching.

5.4 Laser Path Alignment

Having a proper beam alignment is important for the overall efficiency of the machine and quality of its work. This machine went through a complete beam alignment before shipping. When the engraver first arrives and about once a week during normal operation, however, it is recommended that users confirm that alignment is still at acceptable levels and that the mirrors and focus lens have not shifted due to the movement of the machine.

You will need to place a piece of tape at each stage of the laser path, marking it to confirm that that stage remains correctly aligned. When it is not, you will use the laser tube's brackets or the screws on the back of the misaligned mirror to correct the problem. Once the provided tape runs out, we recommend masking tape as it is easy to manage and use.

 Performing a beam alignment can expose the operator to small amounts of radiation if performed carelessly. Follow these procedures correctly and always take caution when performing a beam alignment.

 Perform a beam alignment at low power levels: 15% or less. Any higher percentage will cause the laser to ignite the testing tape instead of marking it. Be sure that you set the Max. Power (not Min.) to 15%.

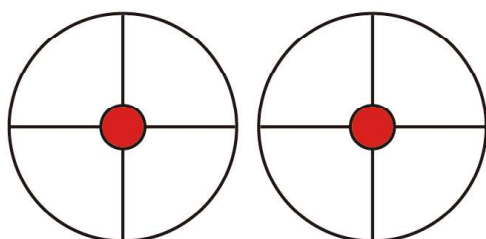
5.4.1 Laser Tube Alignment

To test the alignment of the laser tube with the 1st mirror, cut out a piece of tape and place it on the mirror's frame.

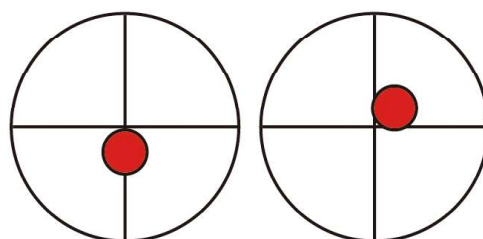
DO NOT place the tape directly onto the mirror. Turn on the machine and set the power level to 15% or lower.

Press **PULSE** to manually fire the laser. You should be able to see a small mark on the tape. If it is not noticeable, press **PULSE** again.

 Pressing **PULSE** activates the laser. Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Take care not to leave any part of your body in the laser path while pressing the **PULSE** button.



These marks are OK.



These marks require adjustment.

The laser mark should be near the center of the hole. If the laser is not centered on the 1st mirror, cut the power to your laser and carefully adjust the laser tube in its brackets. This may require loosening the screws on its stand and adjusting its brace wheel. Be careful not to overloosen the screws and not to overtighten them. Only adjust one stand at a time.

5.4.2 1st Mirror Alignment

After ensuring the laser is well aligned between the laser tube and 1st mirror, check the alignment between the 1st and 2nd mirrors. First, use the direction arrows on the control panel to send the 2nd mirror to the back of the bed along the Y axis.

Once set, place a piece of tape on the 2nd mirror's frame. **DO NOT** place the tape directly onto the mirror. Repeat the steps from §5.4.1. If the laser is not centered on the 2nd mirror, you will need to adjust the 1st mirror's set screws accordingly.

To adjust the mirror, loosen the nut on the screw and then slightly turn the screw either clockwise or counterclockwise. Each screw adjusts a different position or angle. Keep track of which screw you are adjusting and the direction of adjustment. Do not turn the screw more than ¼ turn at a time and, especially at first, test the position of the laser after each adjustment so that you learn the effect of each change. Test until the beam is well aligned and then retighten the nuts on the screws once all adjustments are completed.

Next, use the direction arrows on the control panel to send the 2nd mirror to the front of the bed along the Y axis. Once set, place another piece of tape on the 2nd mirror's frame. **DO NOT** place the tape directly onto the mirror. Repeat the steps from §5.4.1 and, if necessary, adjust the set screws on the 1st mirror. Test again until the beam is well aligned and retighten the nuts on the set screws.

5.4.3 2nd Mirror Alignment

After ensuring the laser is well aligned between the 1st and 2nd mirrors, check the alignment between the 2nd and 3rd mirrors. Repeat the steps and adjustments above, taking care to use the tape on the mirror's frame and not its surface.

5.4.4 3rd Mirror Alignment

After ensuring the laser is well aligned between the 2nd and 3rd mirrors, check the alignment between the 3rd mirror and the workbed. First, unplug the air assist hose from the laser head. Then, place a piece of tape across the bottom of the laser head and press it onto the nozzle with some force. This will leave a ring mark that can help you check the accuracy. Repeat the steps from §5.4.1. If the laser is not centered through the laser head, adjust the 3rd mirror's set screws accordingly as in §5.4.2. Test again until the beam is well aligned and retighten the nuts on the set screws. When the laser is well centered along the entire path from the tube to the workbed, your laser mirrors are all correctly calibrated and (assuming they are clean) performing at optimum efficiency.

For detailed instructions, please contact Monport technical support and we will provide you with instructional videos.

5.5 Lubrication Instructions

For best results, clean and lubricate the engraver's guide rails every two weeks. Turn off the laser engraver. Gently move the laser head out of the way. Wipe away all dust and debris along the X and Y axis rails with a dry cotton cloth until they are shiny and clean. Do the same to the Z axis screws. Lubricate both the rails and screws with white lithium grease. Gently move the laser head and X axis to distribute the lubricant evenly along both rails and raise and lower the bed to distribute the lubricant evenly along the screws.

5.6 Parts Replacement

The engraver should not be modified or disassembled by anyone except trained and skilled professionals, but some consumable parts may require replacement after prolonged use. Be sure only to use identical or compatible replacement parts with this engraver. Contact your vendor or our technicians if you have any questions about fitment. Using incompatible components is highly dangerous and waives all the manufacturer's liability for any damage or injury caused.



ALWAYS completely disconnect the engraver from its power supply before replacing any parts.

Take special care when replacing the laser tube or its power supply, as both have extremely high voltage connections. If you replace the power supply with an identical model, you will be able to use the same screw terminal blocks as a unit. If you change to a different laser power supply, please consult with Monport technical support.

For detailed instructions, please contact Monport technical support and we will provide you with instructional videos.

5.7 Disposal Instructions



Electrical products should not be disposed of with household products. In the EU and UK, according to the European Directive 2012/19/EU for the disposal of electrical and electronic equipment and its implementation in national laws, used electrical products must be collected separately and disposed of at the collection points provided for this purpose. Locations in Australia, Canada, and the United States may have similar regulations. Contact your local authorities or dealer for disposal and recycling advice.

Contact Us

Thank you again for choosing our laser equipment for your needs!

If you're satisfied with the machine's performance, please consider leaving a positive review on the website where you made your purchase. If you encounter any problems with this engraver, please contact us with your order ID.

Monport Laser Customer Support email: support@monportlaser.com.

Amazon/eBay Customer Support email: support@monportlaser.com.

Our customer service team will respond within 24 hours.

Thank you, and we hope you will choose us again for your next purchase!

