

V20241206

# SH-G570 | 80W | CO<sub>2</sub> Cabinet Laser Engraver User Manual



Read Carefully Before Use  
Keep for Future Reference

A blue and white Omtech CO2 laser engraving machine is the central focus, positioned in a workshop or studio. The machine has its lid open, revealing the engraving bed. The brand name 'omtech' is visible on the front. The background is a creative workspace with a pegboard displaying various sketches and a 'Mountain EXPEDITION' poster. A desk with a computer monitor, a lamp, and other tools is visible to the right. The overall atmosphere is one of a professional yet creative environment.

# BEAMING WITH POSSIBILITIES!

Thank you for choosing our laser equipment.

Your CO<sub>2</sub> laser engraving machine is intended for personal and professional use. When used under these instructions, it falls under the category of a **CLASS 1** laser product. But it includes a **CLASS 4** laser and some components remain **EXTREMELY** dangerous under improper and/or non- intended use. 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 comments, suggestions, or questions after reading these manuals, feel free to contact us, and we will address your concerns as soon as possible. Your feedback is invaluable to us in our ongoing efforts to enhance the user experience!



## Welcome to the OMTech Community!

For helpful hints and instructional videos, visit our **Help Center** or join our official laser group! If you encounter any issues with your engraver, please feel free to contact us. Our support team will respond **ASAP** to resolve your concerns.

### Help Center

[help.omtechlaser.com/hc/en-us](https://help.omtechlaser.com/hc/en-us) | 🔍

[First Time Setup](#) | [Safety](#) | [Maintenance](#) | [Troubleshooting](#) | [FAQ](#) | [Hot Tips](#)



Explore on your smart device

@omtechlaser



**Official Website:** [omtechlaser.com](https://omtechlaser.com)

**Technical Support:** [support@omtechlaser.com](mailto:support@omtechlaser.com)

**Support Tel:** +1 (949) 438-4949, Monday – Friday from 9:00 am – 5:00 pm (PT)

**Address:** Rygel Advanced Machines, 1150 N Red Gum St Ste F, Anaheim, California 92806, USA.

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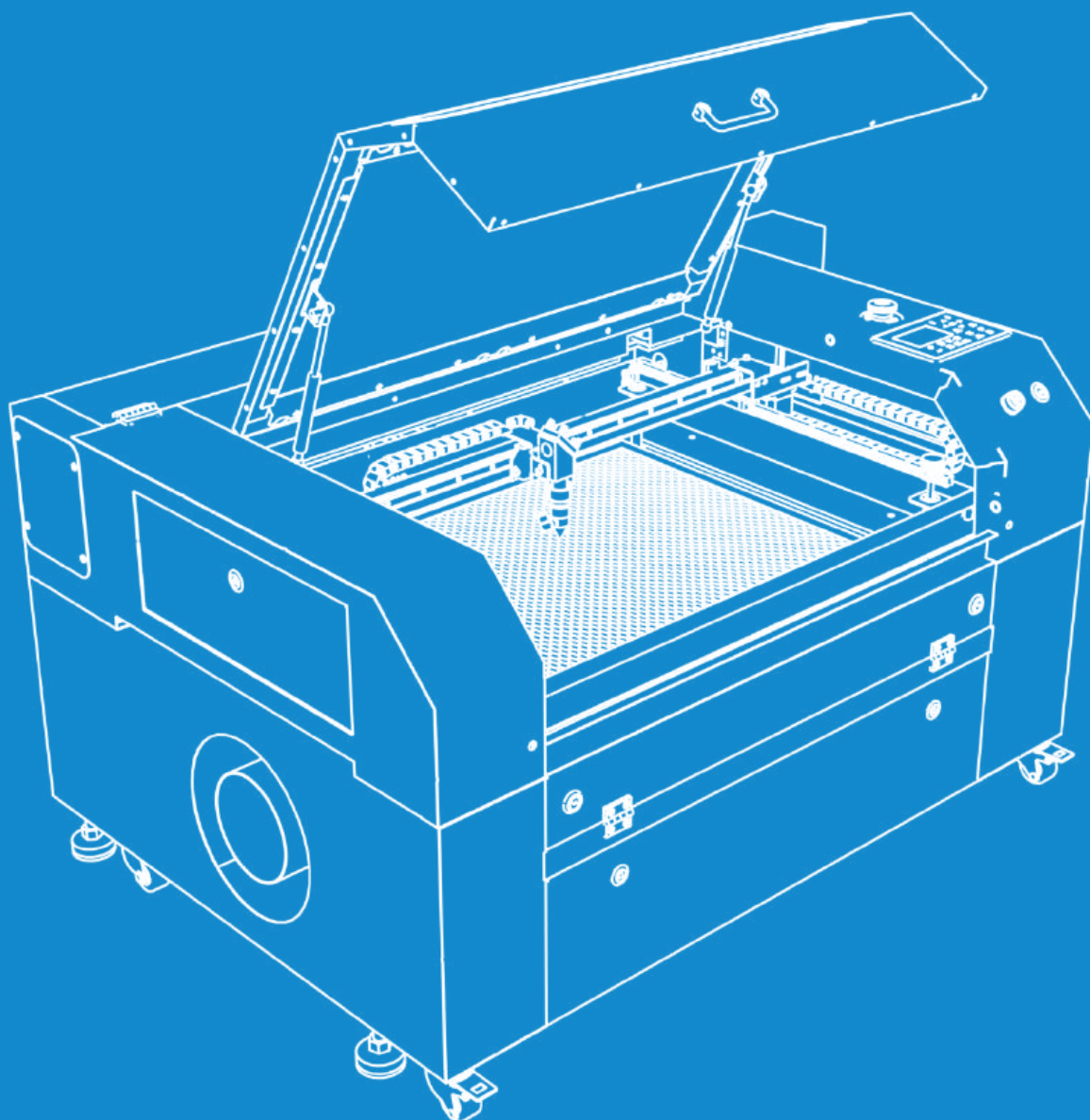
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# 1 Safety Information

## 1.1 Disclaimer

Read this disclaimer completely and carefully before proceeding with the rest of the manual content.

### 1. **As-Is**

This OMTech product is sold 'as is' and without any express or implied warranties, including but not limited to the implied warranties of merchantability and fitness for a particular purpose.

### 2. **Product Modifications**

Any modifications or alterations to OMTech products void any warranties and may result in damage or injury. OMTech shall not be liable for any damages resulting from such modifications or alterations.

### 3. **Compliance with Laws**

Customers shall be liable for ensuring that the use of OMTech products complies with all applicable laws and regulations in their respective jurisdictions. OMTech assumes no responsibility for any violations of laws or regulations resulting from the use of OMTech products.

### 4. **Correct Use**

Always use OMTech products only as directed in the accompanying manuals. Failure to follow instructions may result in injury or damage.

Always ensure the assembly, installation, operation, maintenance, or repair of OMTech products is carried out by a competent person.

Always make maintenance regularly throughout OMTech products' lifecycles; you have the liability to keep the products operating as intended.

Always wear appropriate protective gear.

### 5. **Third-Party Products**

OMTech shall not be liable for any damages or losses resulting from the use of third-party products in conjunction with OMTech products. Customers shall refer to the third-party's guidelines or/and warranties (if any) for any third-party products used.

### 6. **Limitation of Liability**

OMTech shall not be liable for any direct, indirect, punitive, incidental, special, or consequential damages to property or life, whatsoever arising out of or connected with the use or misuse of OMTech products. In no event shall OMTech's liability exceed the value of the products sold.

This disclaimer states the entire obligation of OMTech with respect to OMTech products. If any part of this disclaimer is determined to be void, invalid, unenforceable, or illegal, including but not limited to the warranty disclaimers, liability disclaimers, and liability limitations set forth above, the invalid or unenforceable provision will be deemed superseded by a valid and enforceable provision that most closely matches the intent of the original provision and the remainder of the agreement shall remain in full force and effect.



## 1.2 Designated Use

This laser engraver is intended for engraving signs and logos on consumer products or applicable substrates. Its 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 non-designated purposes or materials is not permitted.

## 1.3 Symbol Guide

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



These items indicate an imminent hazard that **WILL** result in death or severe injury if not avoided.



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



These items indicate a potential risk that **COULD** result in death or serious injury, as well as significant equipment damage.



These items address that a forklift is required for handling this machine.



These items address similarly serious concerns about the laser beam.



These items address tips that help.



These items address similarly serious concerns about electrical components.



This product is sold in conformity with applicable EU regulations.



These items address similarly serious concerns about fire hazards.



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

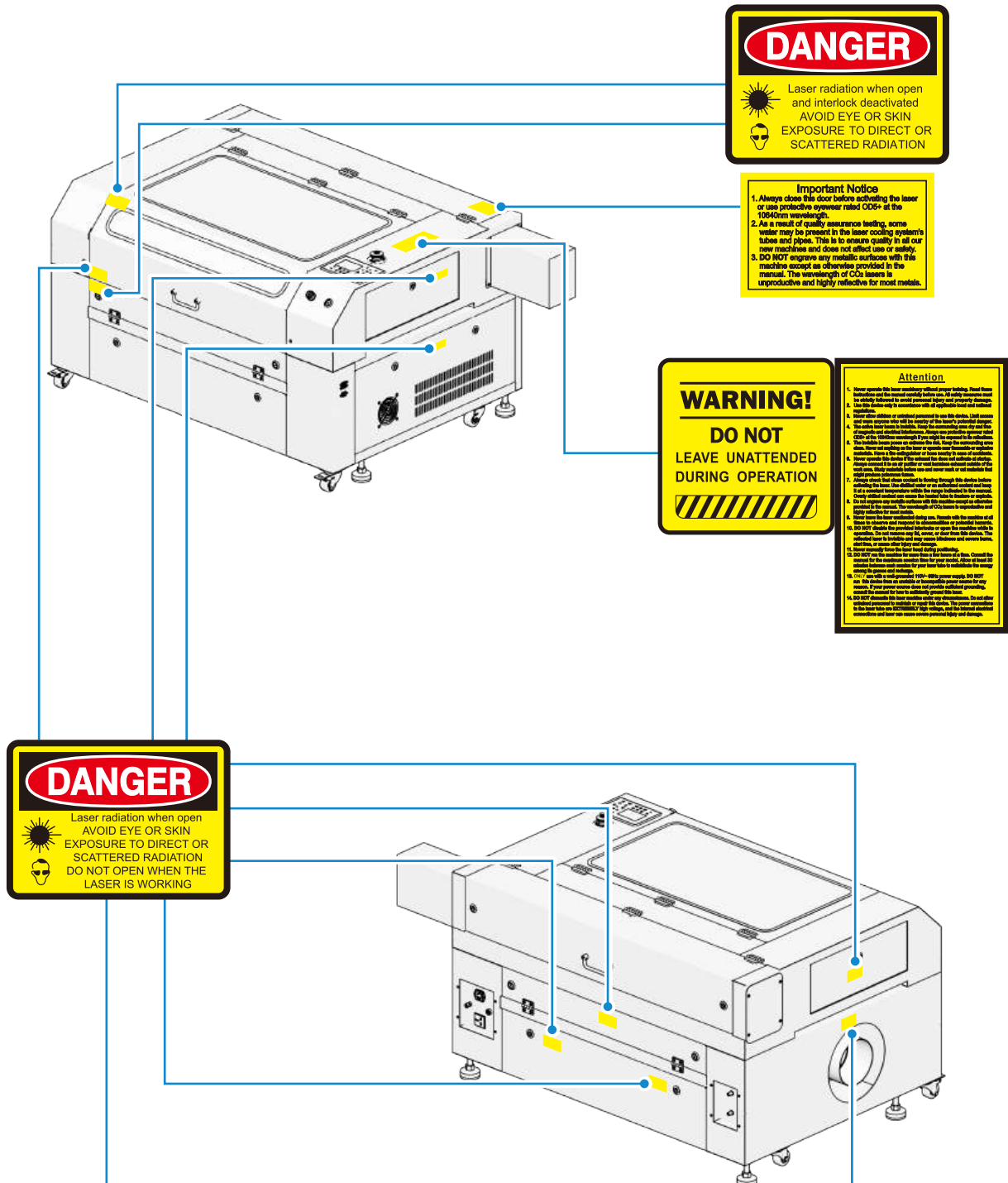


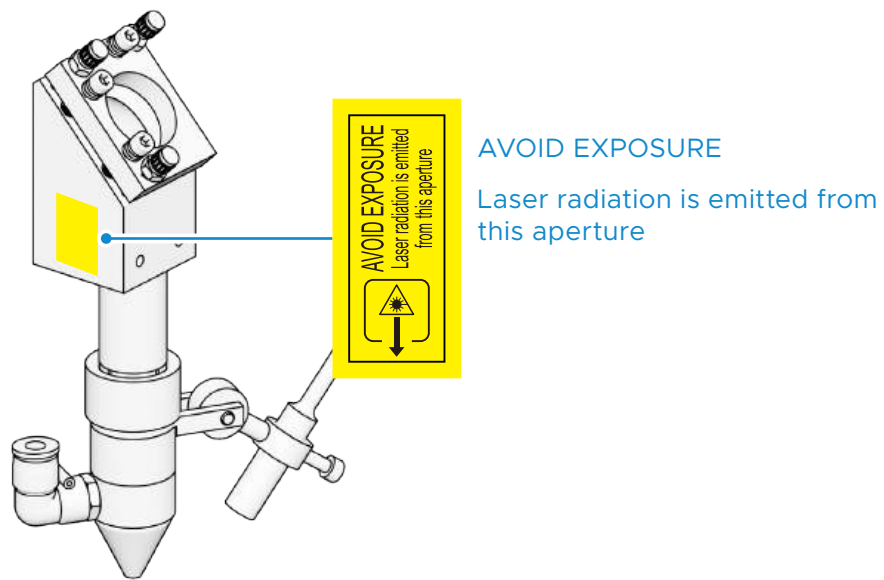
These items address pinching and crushing hazards.

# 1 Safety Information

## 1.4 Safety Instruction Labels

Your device should come with instruction labels in the following locations:





For specific details of the nameplate, see the nameplate attached to the machine. If any of these labels is missing, illegible, or becomes damaged, it must be replaced.

## 1.5 General Safety Instructions



- **DO NOT** operate this machine with its cooling liquid hotter than 100 °F (38 °C). If this temperature is ever approached, stop using the laser but allow the exhaust and water-cooling systems to continue running to clear and cool the machine.
- **DO NOT** leave this machine unattended during operation. Observe the machine throughout the 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 machine is **FULLY** turned off (including using 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 machine.
- **ALWAYS** keep a fire extinguisher or other flame-retardant system nearby in case of accidents. Ensure that the local fire department's phone number is 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.

# 1 Safety Information



- Use this laser machine only in accordance with all applicable local and national laws and regulations.
- Use this machine only in accordance with this instruction manual and the manual for the software included with it. Only allow this machine 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 machine if it is ever given or sold to a third party.
- Any untrained personnel who might be near the machine while it is in operation **MUST** be informed that it is dangerous and fully instructed on how to avoid injury during its use.

## 1.6 Laser Safety Instructions



This machine complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56, dated May 8, 2019.

When used in accordance with these instructions, it is a **CLASS 1** laser product. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure. Used without care, it can also 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 gasses during processing
- Direct exposure to the laser will cause bodily harm including serious burns and irreparable eye damage



- **DO NOT** modify or disable this machine'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 machine'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. Exercise caution with the red dot positioning light as well, as its direct beam is a Class 4 laser in its own right.
- **ONLY** use this machine if its automatic shutoffs are working properly. When you first get this machine and if you subsequently notice any problems, test them before undertaking any other work. Do not continue use if the shutoffs do not occur. Turn off the machine and contact customer service or your repair service. Never disable these shutoffs.
- **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** 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. If using the provided water pump, ensure that it is placed in a tank full of cool or tepid distilled water. Do not use ice water or water that has become hotter than 100 °F (38 °C). For best results, keep it between 60 °F–70 °F (15 °C–21 °C). Replace heated water or add sealed bottles of frozen water to cool it, while never allowing the system to run without water or allowing the water to become colder than 50 °F (10 °C). 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 machine in a climate-controlled area.
- **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 the materials described in this manual. The laser settings and cutting 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.

# 1 Safety Information

## 1.7 Electrical Safety Instructions



- **ONLY** use this machine 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 2000 J.
- **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.
- **DO NOT** use standard surge protectors, extension cords, or power strips. Only use additional wiring thick enough to safely handle the full load of the machine.
- **DO NOT** open the electrical cabinet door. **DO NOT** change the parameters of the components inside the cabinet. If changes are necessary, they must be performed by professional personnel who have been trained by the equipment manufacturer, and the parameters before the change should be recorded so that the original state can be restored if necessary.
- **DO NOT** touch any live components inside the electrical cabinet while it is powered.



- The area around this machine should be kept dry, well-ventilated, and environmentally controlled to keep the ambient temperature between 40 °F–95°F (5 °C–35 °C). For best results, keep the temperature at 75 °F (25 °C) or below. The ambient humidity should remain between 70%.
- Do not handle the water pump or the water in which it is submerged while the pump is attached to its power supply. Place it in water before connecting it to power and disconnect it from power before removing it.
- Adjustment, maintenance, and repair of the electrical components of this machine 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 machine when it is turned off, disconnected from its power supply, and fully cooled. For maximum safety, wait about 3 minutes after turning the machine off before adjusting the integrated chiller or other electronic parts. This will allow time for the ground connection to clear any residual charge.

## 1.8 Material Safety Instructions



- Users of this laser machine are responsible for confirming that the 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 machine to process polyvinyl chloride (PVC), Teflon, or other halogen-containing materials under any circumstances.
- Users of this laser machine are responsible for ensuring that every person present during operation has sufficient PPE to avoid 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. Always wear hand protection when working with metal to avoid cuts and burns.



- **DO NOT** ever under **ANY** circumstances use this laser machine if the exhaust system is not working properly. Always ensure that the exhaust fan can remove the dust and gas produced by the cutting process in accordance with all applicable local and national laws and regulations. Immediately stop use if the exhaust fan or vent hose malfunctions. Periodically check the air assist intake filter to ensure it stays free of any dust or debris.
- Exercise special caution when working with moderately conductive materials as prolonged work can build up residual heat and reflective dust and particles that may damage electrical components, cause short circuits, or produce other effects including reflected laser radiation.

# 1 Safety Information

This machine **CAN** be safely used with the following materials:

## CAN be used

### 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

### Others

- 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.

For the recommended parameters for the most commonly engraved materials, you can check, see [§4.6 Instructions for Specific Materials](#) on Page 58 for reference.



This machine **CANNOT** be used with **THE FOLLOWING MATERIALS OR WITH ANY MATERIALS WHICH INCLUDE THEM:**

### **CAN NOT** be used

- 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). Alternatively, contact our support department for further guidance.

Pay especial attention to information about safety, toxicity, corrosiveness, reflectivity, and reaction(s) to high heat. Never operate the laser on any (such as PVC, teflon, and other halogen- containing substances) that can produce corrosive, hazardous, or even deadly fumes.

## **1.9 Disposal Safety 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.

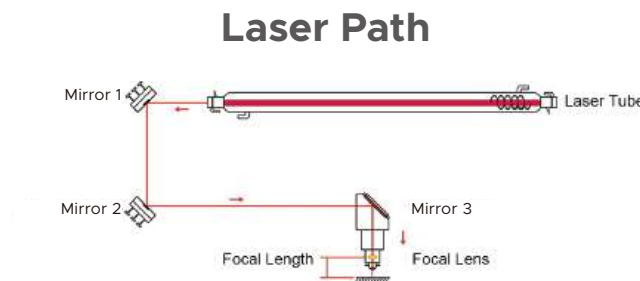


# 2 Introduction

## 2.1 General Information

Your laser engraver works by emitting a powerful laser beam from a glass tube filled with excited carbon dioxide ( $\text{CO}_2$ ), catalyzing nitrogen ( $\text{N}_2$ ), and insulating helium ( $\text{He}$ ), reflecting that beam off three mirrors and through a focus lens, and using this focused light to cut and 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.



With low-intensity use, the provided laser tube has an average lifespan around 12,000 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.

## 2.2 Technical Specifications

Model		SH-G570	
Input Power		AC 110 V–120 V, 60 Hz	
Power Consumption		1100 W	
Rated Laser Power		80 W	
Expected Service Life at <40% / 40–70% / >70% Power		12000/10000/8000 (hr.)	
Laser Wavelength		10640 nm	
Laser Tube	Diameter	2.36 in.	60 mm
	Length	49.2 in.	1250 mm
Focus Lens	Diameter	0.71 in.	18 mm
	Thickness	0.08 in.	2 mm
	Focal Length	2 in.	50.8 mm
Mirror	Diameter	0.98 in.	25 mm
	Thickness	0.12 in.	3 mm
	Material	Molybdenum	
Processing Area		27.5×19.7 (in.)	700×500 (mm)
Front/Back Pass-Through Area (L×H)		32.9×3.7 (in.)	835×95 (mm)
Side Pass-Through Size		20.5×0.8 (in.)	520×20 (mm)
Aluminum Blades		19	
Max. Processing Speed		23.6 ips	600 mm/s
Max. Acceleration	X-Axis	315 ips <sup>2</sup>	8000 mm/s <sup>2</sup>
	Y-Axis	78.8 ips <sup>2</sup>	2000 mm/s <sup>2</sup>
Min. Engraving Depth		0.0004 in.	0.01 mm
Max. Engraving Depth		0.4 in.	10 mm
Min. Letter Size		0.04×0.04 (in.)	1×1 (mm)
Req. Operating Environment	Humidity Range	70%	
	Temp. Range	40–95 (°F)	5–35 (°C)
Provided Operating Software		RDWorks	
Compatible Operating Software		CorelLaser, LightBurn	
Supported Image Formats		.ai, .bmp, .dxf, .gif, .hpgl, .jpeg, .pdf, .plt, .png, .rd, .svg, .tiff, .tga	
Graphic Operating Modes		Raster, Vector, Combined	
Certification		CE, FDA	
Dimensions (L×W×H)		47.2 (57.1)×34.3×27.6 (in.)	120 (145)×87×70 (cm)
Net Weight		227.1 lb.	103 kg

## 2 Introduction

### 2.3 Package List



A



B



C



D



E



F



G



H



I



J



K



L



M



N



O



P



Q



R



S



T



U



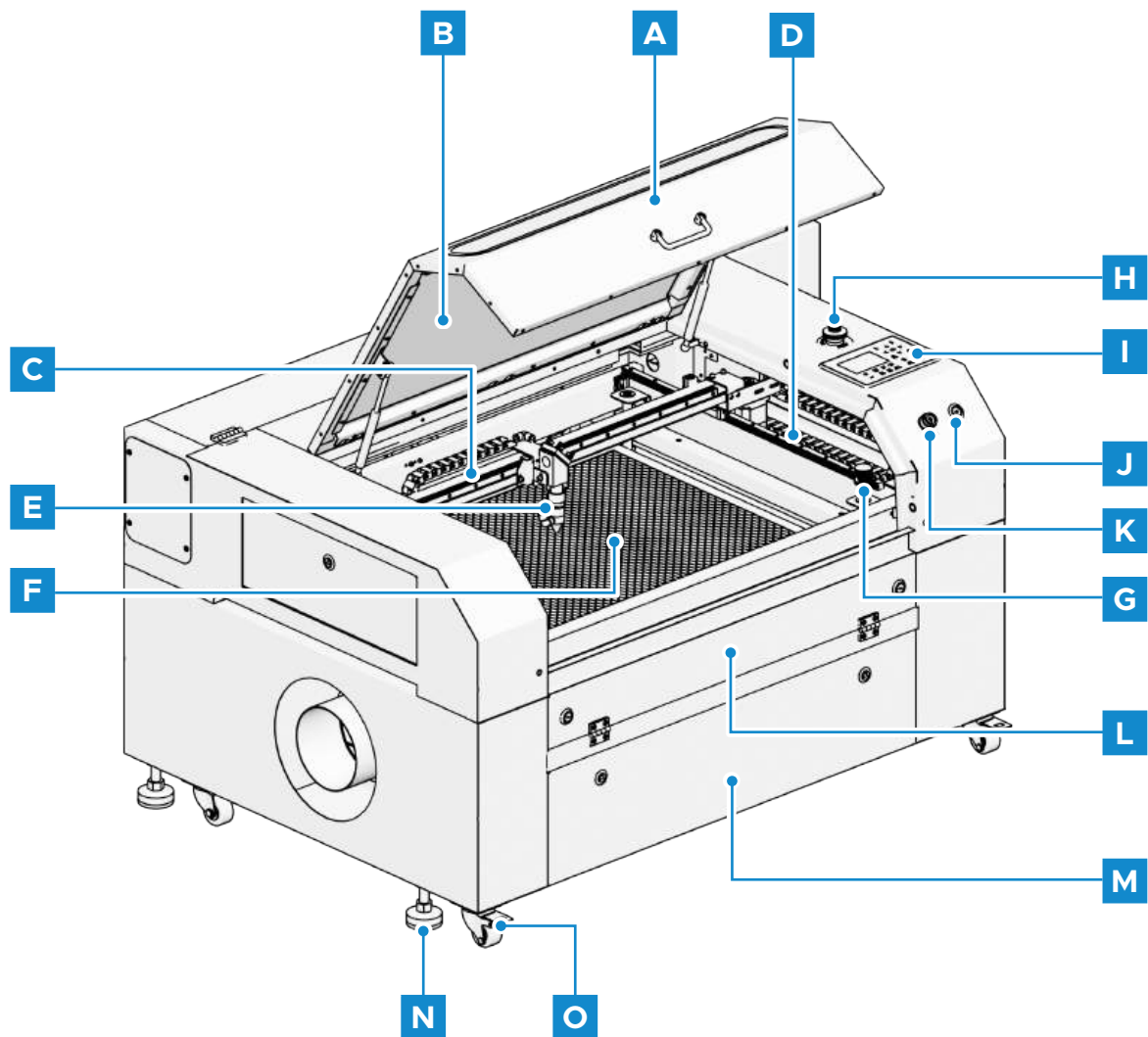
V

No.	Item	Qty.
<b>A</b>	Power Cord	1
<b>B</b>	USB Flash Drive (Engraving Software Included)	1
<b>C</b>	USB Cable	1
<b>D</b>	Ethernet Cable	1
<b>E</b>	Double-sided Tape	1
<b>F</b>	Set of Hex Wrenches	1
<b>G</b>	User Manual	1
<b>H</b>	Silicone Sealant	1
<b>I</b>	Ceramic Testing Resistor	1
<b>J</b>	Exhaust Pipe (Ø150 mm and 1.5 m Long)	2
<b>K</b>	Pipe Clamp (Ø150 mm)	3
<b>L</b>	Set of Water Pump	1
<b>M</b>	Bundle of Wires	1
<b>N</b>	Water Hoses (Ø12 mm)	2
<b>O</b>	Triangle Keys	2
<b>P</b>	Laser Power Keys	2
<b>Q</b>	Pass-Through Door Access Keys	2
<b>R</b>	Focusing Rulers	2
<b>S</b>	Water Hose Clamps (Ø12 mm)	2
<b>T</b>	Bag	1
<b>U</b>	Exhaust Fan	1
<b>V</b>	Water Tank	1

# 2 Introduction

## 2.4 Components

### 2.4.1 Front View

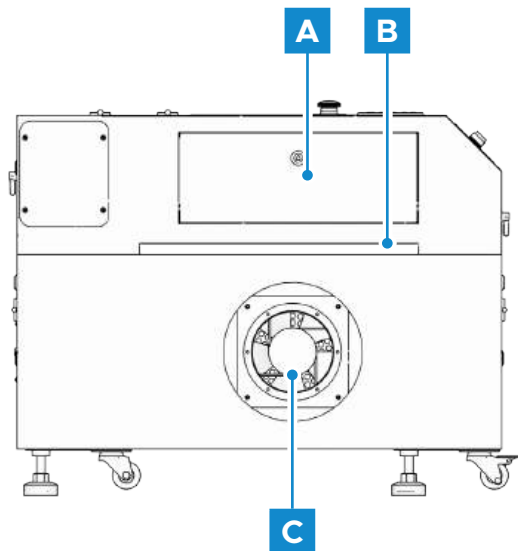


A	<b>Cover</b>	Provides access to the main bay for placing and retrieving materials, as well as fixing the laser path alignment and other maintenance. Power to the laser is automatically cut when the cover is opened.
B	<b>Viewing Window</b>	Protects you and others from the laser and its reflection, allowing monitoring of the engraving process. However, you should never stare continuously at the laser during operation, even through the window.
C	<b>X-Axis Rail</b>	Holds the 2nd mirror and LED lighting, supports the movement of the laser head left and right across the workbed.
D	<b>Y-Axis Rail</b>	Supports the movement of the X-axis rail up and down across the workbed.
E	<b>Laser Head</b>	Holds the 3rd mirror, the focus lens, red dot pointer, and the air assist outlet.
F	<b>Workbed</b>	Can be adjusted in height to fit thinner and thicker materials, as well as adjusted between the aluminum and honeycomb workbeds.
G	<b>Workbed Adjustment Knob</b>	Allows manual raising and lowering of the workbed along the Z-axis.
H	<b>Emergency Stop</b>	Stops the machine instantly by pressing it down in an event of emergency. Turning it clockwise releases the button.
I	<b>Control Panel</b>	Provides hands-on control of the engraving process, including manual movement of the laser head and firing of the laser.
J	<b>Control System Power</b>	Turns on your engraver's control system, exhaust fan, LED light, motorized Z axis, and cabinet sockets. Turn it on before the laser key and turn it off after.
K	<b>Laser Lock</b>	Controls the laser power supply to your laser tube by using the laser keys. Turn it on after the control system power and turn it off before.
L	<b>Pass-Through Door</b>	Opens 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, and avoid the heavy material falling down to your feet when taking it out.
M	<b>Front Access Door</b>	Provides access to the area below the workbed for easy cleanup.
N	<b>Feet</b>	Can be rotated down to help anchor the machine in place.
O	<b>Caster Wheels</b>	Help move the machine into place.

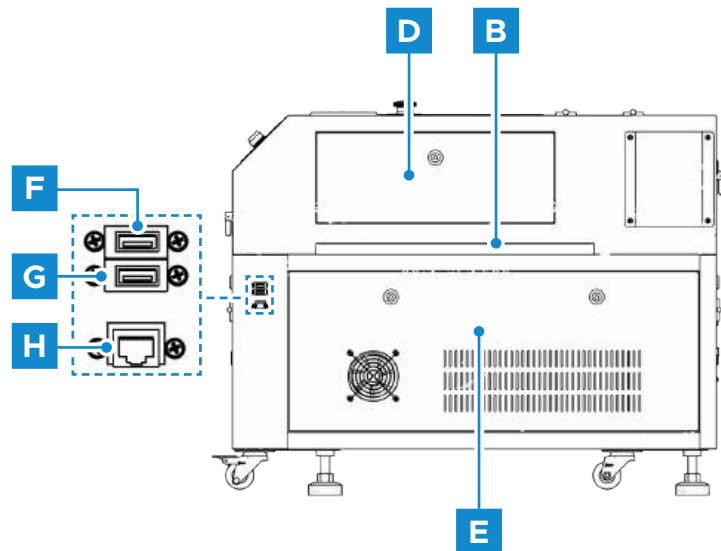
## 2 Introduction

### 2.4.2 Left and Right View

Left



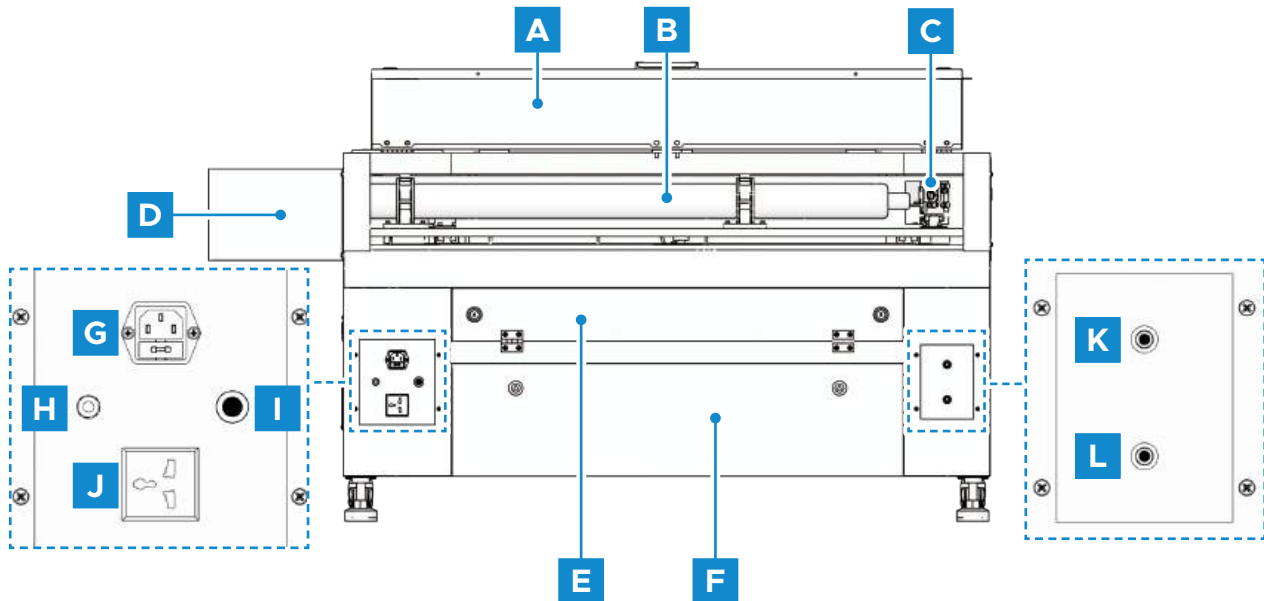
Right



A	<b>Left Access Door</b>	Provides access to the second mirror for maintenance and repair.
B	<b>Pass-Through Doors</b>	Opens 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, and avoid the heavy material falling down to your feet when taking it out.
C	<b>Exhaust Vent</b>	With the provided exhaust fan, the gases and airborne debris from the worktable can be sent out to a dedicated air purifier through this vent and an exhaust pipe.
D	<b>Top Right Access Door</b>	provides access to the underside of the control panel for troubleshooting and wiring repairs.
E	<b>Bottom Right Access Door</b>	Provides access to the mainboard, motor drivers, and power supplies. Its vents and cooling fan keep components from overheating during prolonged use and should not be obstructed.
F	<b>USB Drive</b>	Allows you to load and save designs and parameters directly onto the engraver.
G	<b>USB Cable</b>	Connects to your control computer and its engraving software via a USB cable.
H	<b>Ethernet Cable</b>	Connects to your control computer and its engraving software via an Ethernet cable.



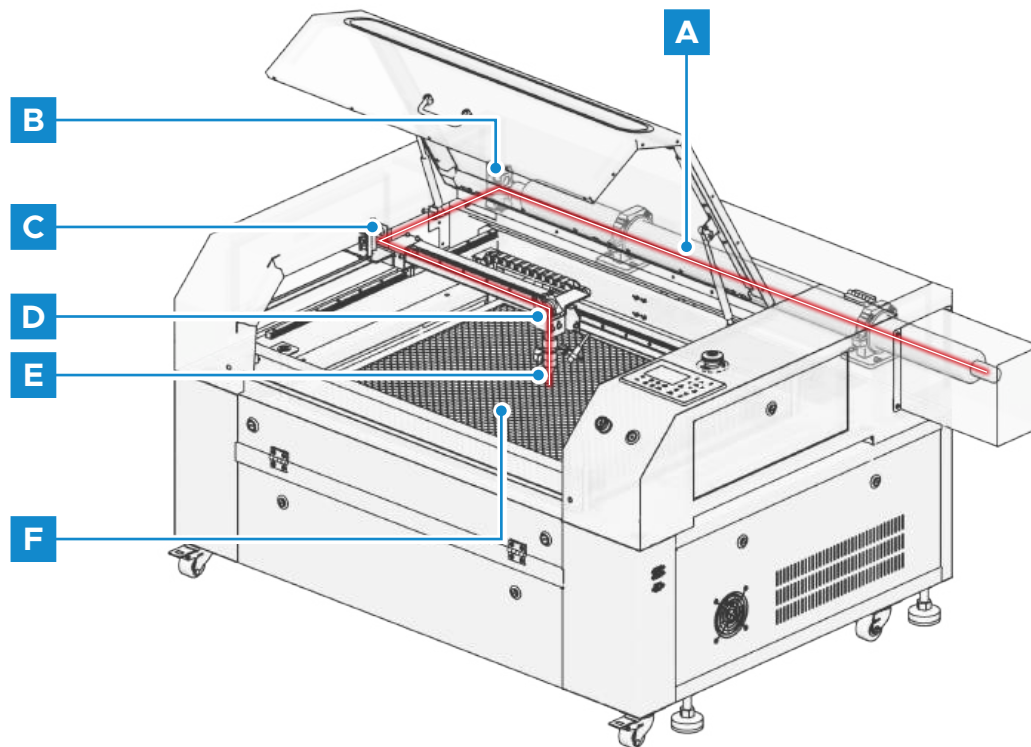
### 2.4.3 Back View



A	<b>Top Rear Access Door</b>	Opens to the laser bay, holding the laser tube, its connections, and the red dot locator.
B	<b>Laser Tube</b>	Produces your engraving laser safely with helium, nitrogen, and CO <sub>2</sub> gas and water cooled filled inside. Its connection to the laser power supply is extremely high voltage and extremely dangerous.
C	<b>1st Mirror</b>	This adjustable-angle mirror is fixed in place to transfer the engraving laser from the tube to the 2nd mirror.
D	<b>Extension Box</b>	Allows your laser tube to be longer and more powerful without wasted space or greater expense. Do not place things on this box and protect it from any collisions.
E	<b>Rear Pass-Through Door</b>	Used as the rear equivalent of the front pass-through door and requires similar care during use.
F	<b>Bottom Rear Access Door</b>	Provides access to the air pump for easier maintenance.
G	<b>Main Power Port</b>	Provides main power supply with the standard 3-prong main power cable.
H	<b>Grounding</b>	Connects to the dedicated grounding cable for safety if applicable.
I	<b>Air Assist Intake</b>	Connects to the air assist pump with a hose of 8 mm diameter to provide its pressurized air. Periodically check its filter to keep it clear of any obstruction.
J	<b>Water Pump Port</b>	Provide an additional socket for your water pump if needed. It is recommended, however, to use a separate plug on a different fuse for your water cooling system.
K	<b>Water Inlet</b>	Connects to the outlet of your water pump or chiller to keep your laser tube cool and stable.
L	<b>Water Outlet</b>	Connects to the inlet of your water pump or chiller.

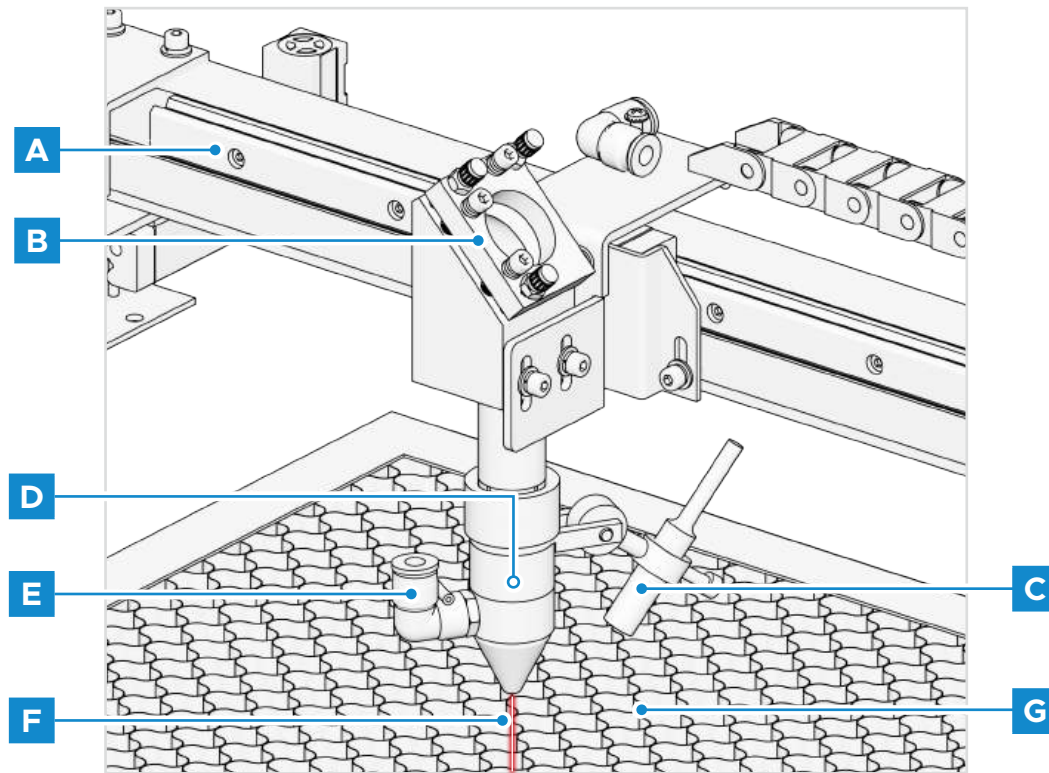
## 2 Introduction

### 2.4.4 Laser Path



A	<b>Laser Tube</b>	Mounted on brackets and immobile, it produces the laser. Its connection with the laser power supply is extremely high voltage and extremely dangerous.
B	<b>1st Mirror</b>	Transfers the invisible engraving laser from the tube to the 2nd mirror.
C	<b>2nd Mirror</b>	Moves with the X-axis rail to allow the laser beam to travel along the left Y axis.
D	<b>3rd Mirror</b>	Moves with the laser head to allow the laser beam to travel along the X axis.
E	<b>Focus Lens</b>	Directs and focuses the laser to the material. For the best effect, it should be at the correct focal length from the upper surface of the material.
F	<b>Workbed</b>	Can be adjusted in height to fit thinner and thicker materials, as well as adjusted between the aluminum and honeycomb tables for different projects.

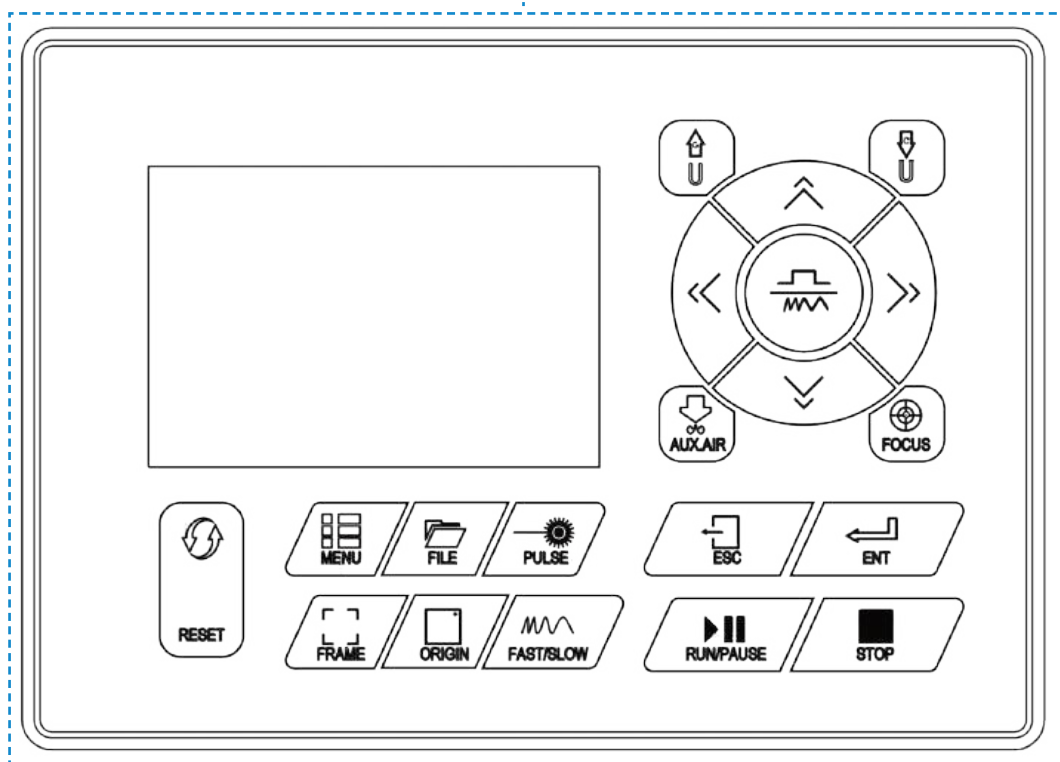
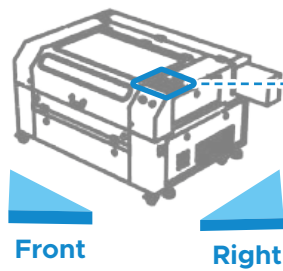
## 2.4.5 Laser Head









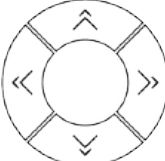









A	<b>X Axis Rail</b>	Moves along the Y axis, with its movement controlled by limit switches.
B	<b>3rd mirror</b>	Transfers the laser from 2nd mirror to the focus lens. Can adjust its angles.
C	<b>Red Dot Pointer</b>	Helps you see the exact position of the invisible engraving laser.
D	<b>Focus Lens</b>	With a diameter of 18 mm, directs and focuses the laser beam to its point of contact with the engraving material.
E	<b>Air Assist</b>	Blows pressurized air to kill sparks and blow away gas and debris as you engrave.
F	<b>Laser</b>	The engraving laser itself is invisible but highly dangerous, thus avoid any direct exposure to your skin or eyes.
G	<b>Workbed</b>	Holds the target material, moves the material up and down. You can use the provided focal length ruler to get the correct height for perfect focus for any thickness of material.

## 2 Introduction

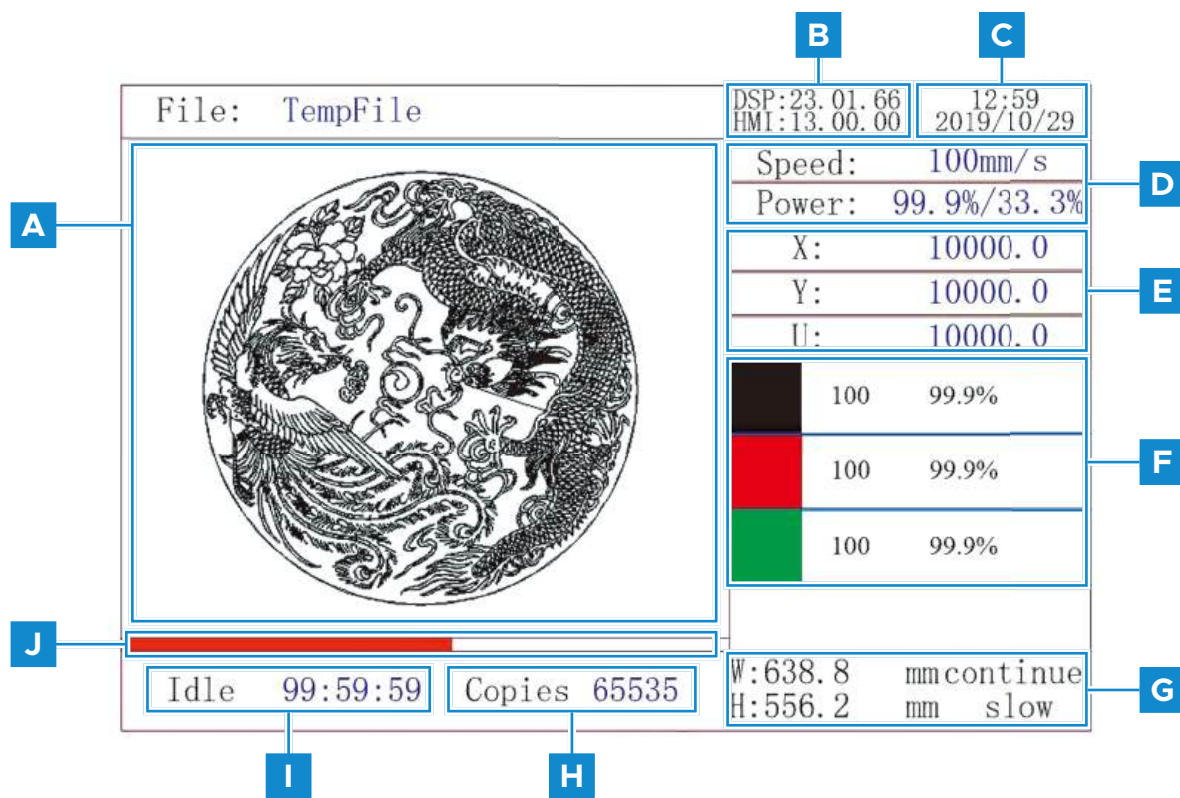
### 2.4.6 Control Panel



Button	Description
	Returns the machine to the saved default parameters.
	Opens the main menu.
	Opens the file control menu.
	Manually fires the laser.
	Traces the outline of the current design for sizing.
	Sets the starting point for the laser head.
	Sets the speed of the current running layer or of the direction keys' movement.
	Controls a rotary axis or automatic feed when one is installed.
	Moves the laser head along the X and Y axes or moves the cursor when selecting parameters.
	Toggles between fixed and continuous movement of the laser head.
	Controls the pressurized air near the laser head.
	Automatically focuses the lens when a motorized Z axis is installed.
	Stops work or returns to a previous menu.
	Enters a command or confirms your selection.
	Starts or pauses the work.
	Stops the current work.

## 2 Introduction

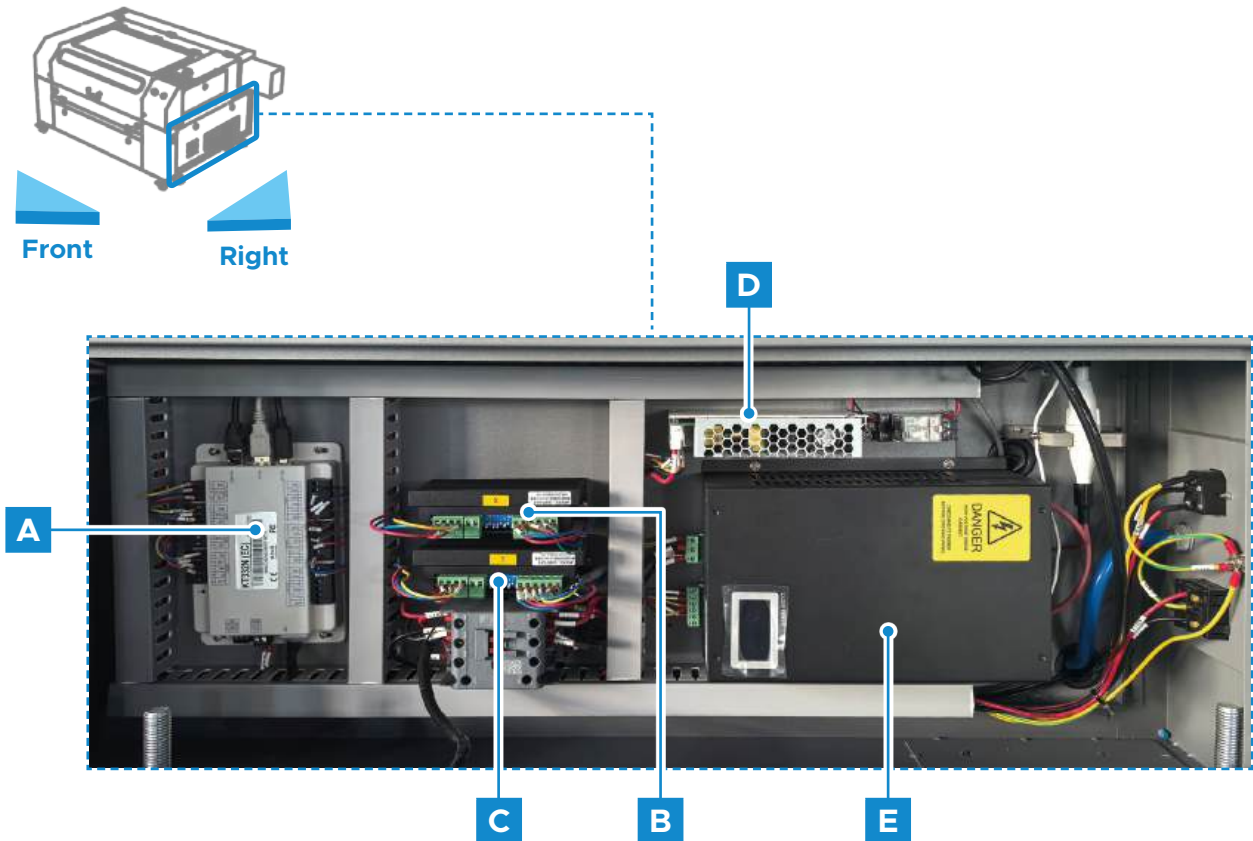
### 2.4.7 Panel Screen



A	<b>Graphic Display Area</b>	Traces the processed file image during file preview display and processing.
B	<b>Version Number</b>	Displays the version numbers of the panel and motherboard.
C	<b>System Time</b>	Displays the current system time.
D	<b>Parameter Display Area</b>	Displays the file number, speed, and maximum power of the current processing file.
E	<b>Coordinate Display Area</b>	Displays the coordinate values of the current position of the laser head.
F	<b>Layer Display Area</b>	Displays the layer parameters of the current processing file or the layer parameters of the preview file. The parameters from left to right are layer, color, layer speed, and layer maximum power.
G	<b>File Dimensions:</b>	Displays the dimensions of the current file.
H	<b>Batch Process Number</b>	Displays the processed quantity of the current processing file.
I	<b>System Status</b>	Displays the current working status of the system: Idle, Running, Paused, or Finished. The working time is displayed on the right.
J	<b>Progress Bar</b>	Displays the current processing progress.

## 2 Introduction

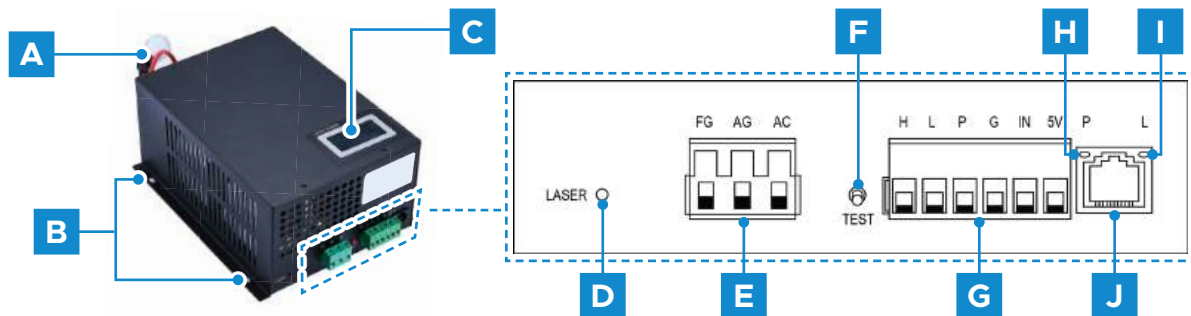
### 2.4.8 Electronics Bay



A	<b>Mainboard</b>	Controls the engraving process, responding to commands from your engraving software or the machine's control panel.
B	<b>X-Axis Driver</b>	Moves the laser head along the X rail.
C	<b>Y-Axis Driver</b>	Moves the X rail along the Y rail.
D	<b>Control Power Supply</b>	Powers the machine's control panel.
E	<b>Laser Power Supply</b>	Transforms standard electricity into the extremely high voltage charge necessary for the laser tube.



## 2.4.9 Laser Power Supply



A	<b>High-Voltage Wire</b>	Connects to the laser tube's anode or positive end, providing high-voltage current to power the laser.
B	<b>Mounting Holes</b>	Allows simple installation and removal.
C	<b>Digital Display</b>	Provides the real-time current value to the laser tube in milliamps.
D	<b>Laser Indicator Light</b>	Illuminates when current is being sent to the laser tube.
E	<b>Main Power Terminal</b>	Holds the power supply's connection to the engraver's grounding (FG) and to the main power supply (AC).
F	<b>Test Button</b>	Tests fire the laser when troubleshooting problems. If the laser fires successfully, the problem will usually be with the control panel or its connections.
G	<b>Connection Terminal</b>	<p>This terminal block ensures that the water sensor, interlocks, and so on.</p> <p>H: Connection for active-high devices</p> <p>L: Connection for active-low devices</p> <p>P: Line to the laser trigger, water, and other systems (such as a door switch)</p> <p>G: Ground wire for the control system, PWM level shifters, potentiometers, etc.</p> <p>IN: Input power for PWM level shifters or potentiometers</p> <p>5V: 5V connection for digital signals</p>
H	<b>Water Indicator Light</b>	Illuminates the water cooling system is operating when connected.
I	<b>Laser Signal Indicator Light</b>	Illuminates when the laser tube is in operation.
J	<b>Ethernet Port</b>	Allows you to connect the laser power supply to an external ammeter while troubleshooting electrical issues. Its indicator lights show its connection to the protection indicator (P) and the active laser (L).

# 3 Installation

## 1 Select a location

3.1 Selecting a Location  
(Page 28)

## 2 Unpack your engraver

3.2 Unpacking Your Engraver  
(Page 29)

## 4 Set up your exhaust system

3.4 Installing the Exhaust System  
(Page 35)

## 3 Set up your water cooling system

3.3 Installing the Water Cooling System  
(Not Included)(Page 30)

## 5 Connect to your power supply

3.5 Connecting to Power Supply  
(Page 36)

## 6 Ready your computer

3.6 Setting Up Your Control Computer  
(Page 37)

## 7 Run first test

3.7 Initial Testing  
(Page 44)



- Use only the hardware, wiring, and power sources that came with or are compatible with this machine. Installing equipment that your machine is not designed to work with can lead to poor performance, shortened service time, increased maintenance costs, property damage, and personal injury.
- 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.
- Users can configure additional accessories (such as an industrial water chiller, fume extractor, or rotary axis) to suit needs. Any auxiliary equipment must be adjusted to the base machine. Queries may be directed to the dealer or manufacturer of such equipment.

## 3.1 Selecting a Location

The location should meet all of the following requirements:

- The location meets all of the requirements mentioned in [§1 Safety Information](#) on Page 1.
- The location should be stable, level, dry, and climate-controlled to ensure an ambient temperature of 40°F–95°F and an ambient humidity under 70%. In particular, the temperature and humidity together should not be close to the dew point.
- 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 the construction of a dedicated ventilation system.
- The location should be away from children; combustible, flammable, explosive, or corrosive materials; and sensitive EMI machines.
- The main power cable 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.
- The location has fire-fighting equipment nearby and the local fire department's phone number clearly displayed.
- It is recommended to use a windowless room or to use blinds and/or curtains to avoid exposure to the potential additional heat of direct sunlight.
- It is highly recommended to have an extra work table nearby to avoid placing objects on or directly adjacent to the machine, which could become a fire or laser hazard.

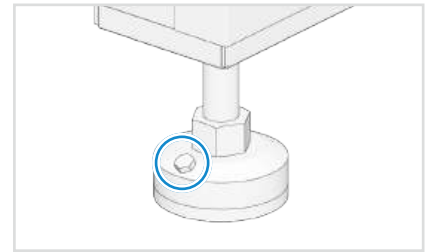
# 3 Installation

## 3.2 Unpacking

Your engraver should have arrived 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 near where you plan to operate the machine permanently. Use at least two people to move and adjust the engraver's position to help keep it level and avoid any sharp or sudden movement.

1. Remove the crate from around your engraver, and remove the surrounding foam insulation.

2. Each foot is attached to the base of the crate with a hex screw. Use a 7.8 mm hex wrench to remove them.



3. Rotate the feet up, unlock the wheels, and roll the machine into place.

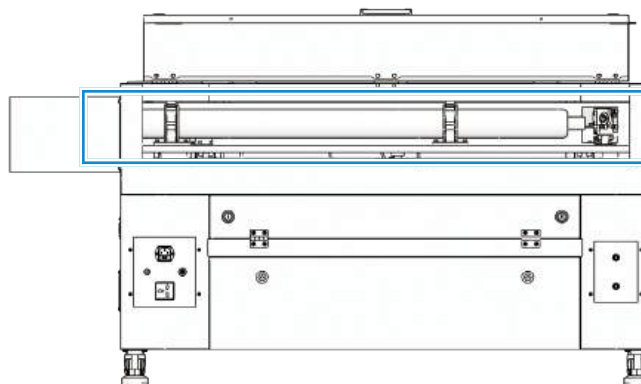
4. Fix it in place by pressing down on the brake pads on the 2 front wheels and rotate the feet down to anchor them. If needed, suitable fasteners can also be used with the 0.2 inch (5 mm) holes to further secure your engraver.

5. Open the cover in the front of the machine and take out the accessories pack placed on the workbed.

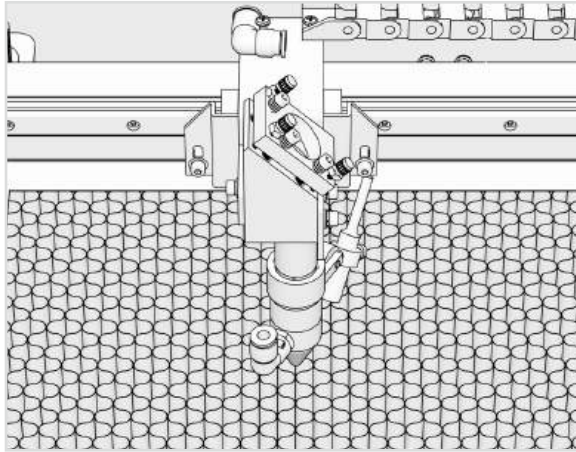
Make sure that you have received all listed accessories in the package list (See [§2.3 Package List](#) on Page 13).

6. **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.



7. Inside the main bay, remove the nylon cable ties from the X axis and the honeycomb workbed.



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.

### 3.3 Installing the Water Cooling System



- The provided water pump is essential to your engraver's performance and longevity. When this laser works without a properly maintained cooling system, its glass tube **WILL** crack from excess heat.
- Always fill the tank with deionized or distilled water or a custom-purpose laser-safe antifreeze. Using tap water will gradually degrade the quality of your engraver and may even cause dangerous mineral buildup within the cooling system. Never use generic antifreeze for the same reason.



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



As an alternative to manually adjusting the water in your tank, you can also use an industrial water chiller to provide your engraver with temperature-controlled water. We recommend the CW-3000 9L chiller (not included). If using it with this engraver, follow its separate manual and plug it into an outlet on a separate fuse from the engraver itself.

## 3 Installation

To connect the water pump to the engraver:

1. Fill a dedicated water tank with distilled water at 15°C–21°C. The tank should always hold at least 2 gallons (7.5 L) of water.

If the temperature drops below 0°C, it is recommended to use laser-safe antifreeze.

2. Turn the protective cover counterclockwise.



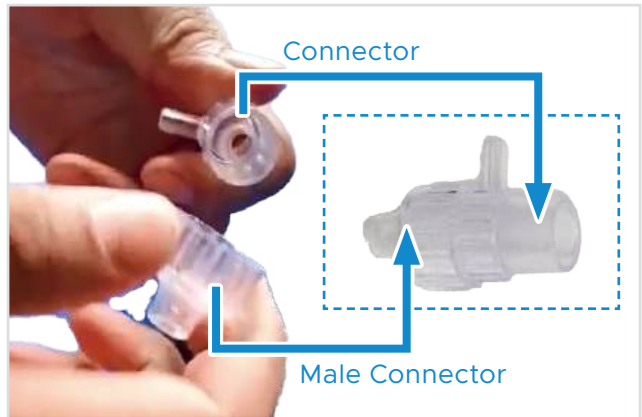
3. Use a flathead screwdriver to pry open the protective cover and remove it.



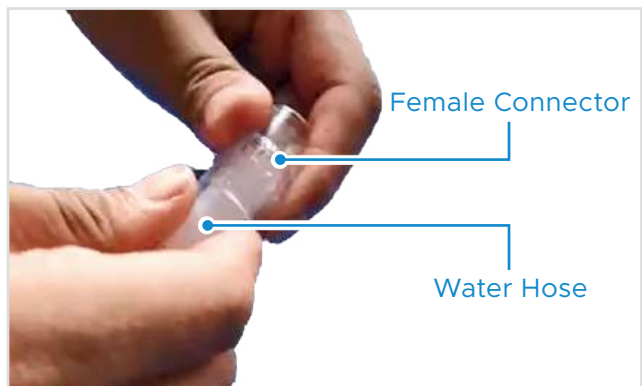
4. Attach the mesh cover to the water pump and turn it clockwise to secure it.



5. Turn and disconnect the female connector and male connector.



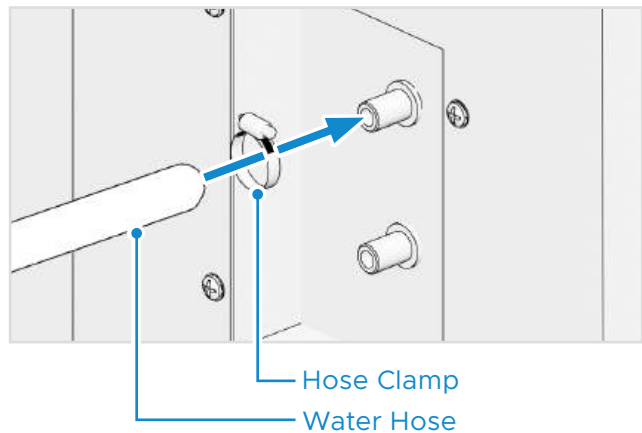
6. Connect the female connector to one end of a water hose.



7. Connect the female connector to the water outlet of water pump.

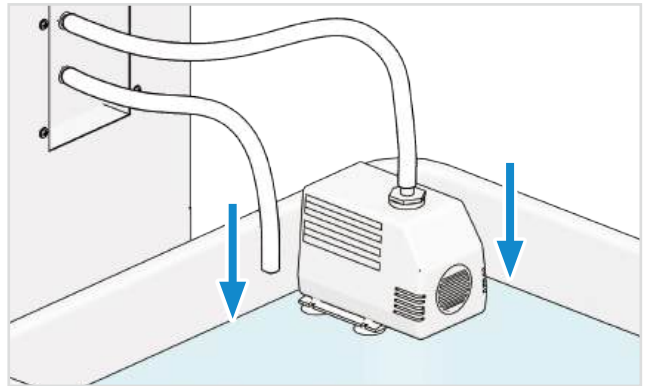


8. Connect the other end of water hose to the water inlet at the back of your engraver and secure it with one hose clamp.



## 3 Installation

9. Completely submerge the pump in the water tank.
10. Connect one end of the other white hose to the water outlet at the back of your engraver and secure it with the other hose clamp.
11. Put the other end into the tank in such a way that the returning water flows into the tank without splashing or other problems.



12. Connect the water pump to its power supply.

For best results, use a power outlet on a separate fuse from the engraver itself. If no such outlet is available, the pump can also be plugged into the dedicated socket located on the back of the engraver.

Once the plug is plugged in, water should begin to run through your machine and back into your tank. When the water cooling system is in operation, pay attention to the following:

- **ALWAYS** obtain visual confirmation that the water flows through the laser tube before starting your laser.
- Larger bubbles will pose a risk of overheating the laser tube. **ENSURE** there are no air bubbles larger than 1 cm. If there are larger bubbles, check the water level in the water tank to fully cover the water pump. You can tilt the engraver on the left side until the bubbles **dissipate**.
- **NEVER** allow the water in the tank to become too hot to cool the laser. Heat damage can occur quickly and severely shorten the life of the laser tube.

Periodically check the water's temperature on the built-in digital display on the laser power supply. For best results, keep it between 60°F–70°F (15°C–21°C). If the water begins to come near 100°F (38°C), replace it with cooler water. Either replace it in stages or turn off the laser during this process: never allow the laser to operate without a constant flow of cooling water. It is also possible to add sealed bottles of frozen water to your tank to keep the water cool but never allow the water to become ice cold, as this could shatter the heated glass CO<sub>2</sub> tube as well.



13. Unplug the water pump after confirmation.

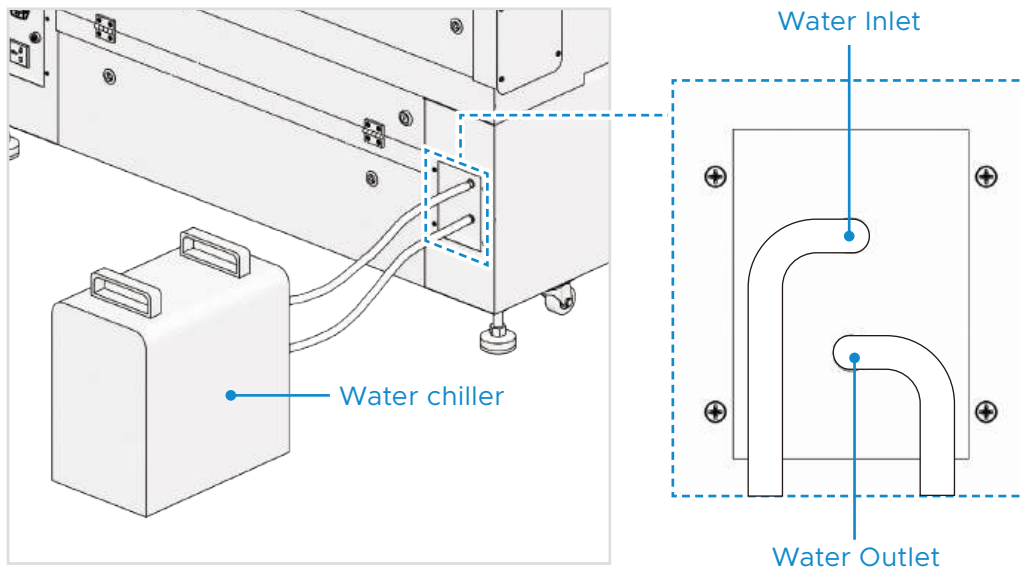
For an engraver with such high power, it is recommended to use an industrial water chiller for better cooling performance, especially when you are using the machine for a long time.

For instructions on installing the water chiller, see the manual of your water cooling system. But keep in mind:

- Connect the water **OUTLET** of your water chiller to the water **INLET** of the engraver.
- Connect the water **INLET** of your water chiller to the water **OUTLET** of the engraver.



You can use the provided water hose clamps to seal the ports.



# 3 Installation

## 3.4 Installing the Exhaust System

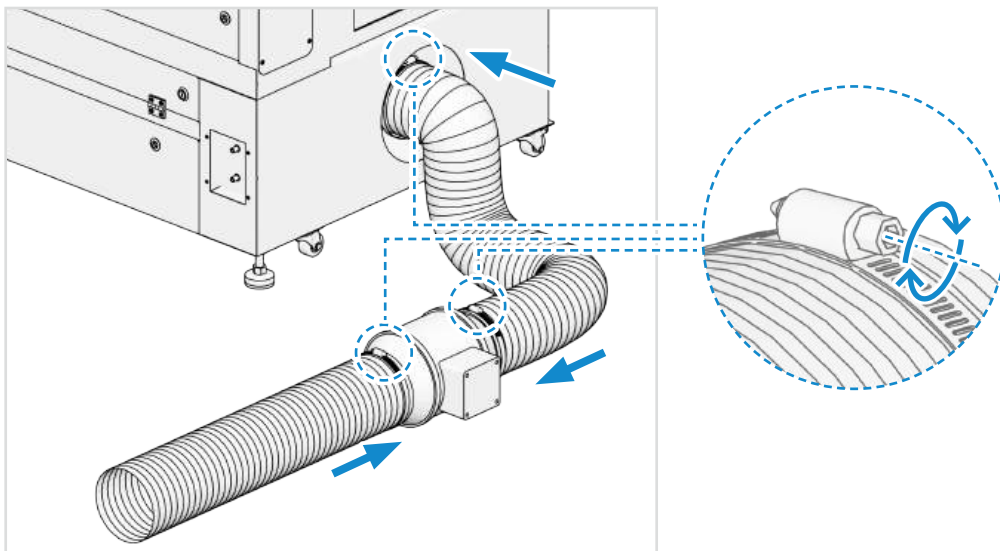


Wear work gloves to avoid cuts.

The provided exhaust pipe extends to a total length of 9.8 ft (3 m). Plan out the route that they will take from your engraver's fan to a dedicated purifier or—if your engraving fumes and debris will not be hazardous and meet local and national air safety standards—to any window or exterior vent. Generally speaking, the straighter you can keep the pipes between your engraver and their outlet, the better your system's ventilation will be and the less quickly dust and debris will build up within the pipes over time.

To install the duct fan:

1. Slide one of the hose clamps onto one end of the exhaust pipe and directly attach the exhaust pipe onto the exhaust vent on the rear of the engraver, fastening it into place with the hose clamp.
2. Fasten the other end onto the exhaust fan's inlet with a second hose clamp.
3. Connect another exhaust pipe to the exhaust fan's outlet with a third hose clamp.
4. Place the other end of the hose out a door, window, and so on, or—if there will be any harmful byproducts produced as you engrave— connect the pipe to a dedicated fume extractor.
5. Seal all seams and connections tightly.

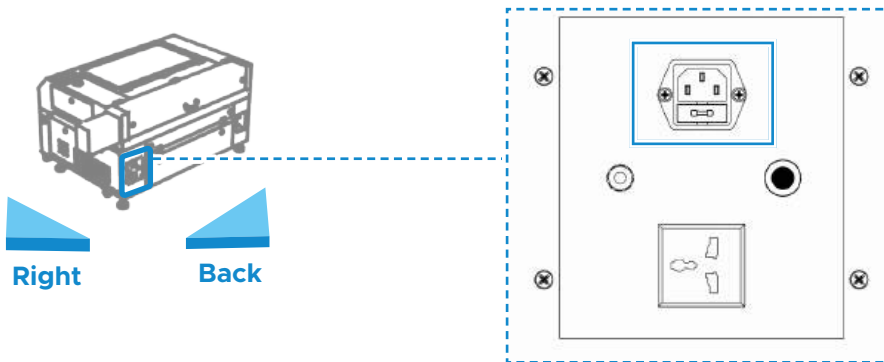


**NEVER** operate the laser if the exhaust system is not removing the fumes and dust produced by your materials out of your work area. Always research materials before use and never operate the laser on any (such as PVC, Teflon, and other halogen-containing substances) that can produce corrosive, hazardous, or even deadly fumes.

## 3.5 Connecting to Power Supply



- Fluctuation along the circuit line should be less than 5%. If this is exceeded, the fuse will blow, which is located in the power socket and accessible from the exterior.
- Do not connect this device to standard extension cords or power strips.
- The powerful laser is extremely high voltage and potentially dangerous, so users must securely ground the engraver to avoid the buildup of static electricity.
- 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.

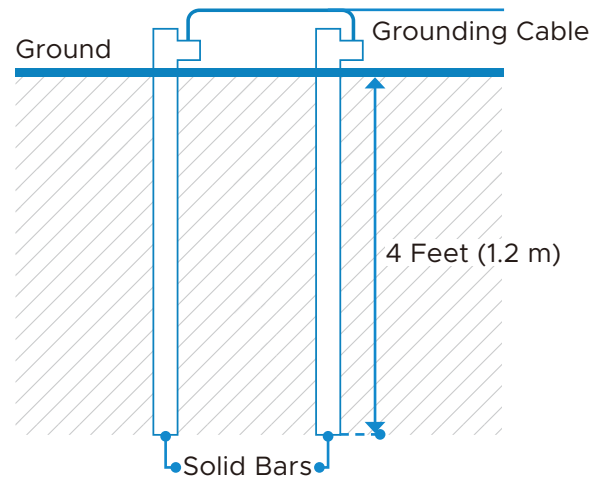
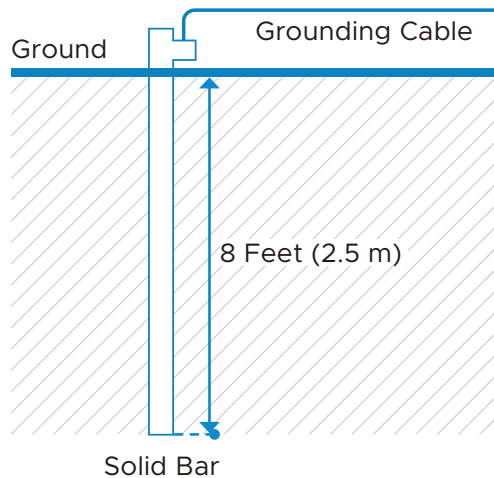


1. Confirm that the labeling beside the power socket at the back of the engraver matches your local power supply and that the power switch is in the ● position before setting up the control system.
2. Connect one end of the power cable to the power socket.
3. Plug the other end of the power cable into a grounded 3-prong outlet or into a surge protector rated over 2000 J that is itself connected to a grounded outlet. Use a dedicated circuit with no other devices on it.

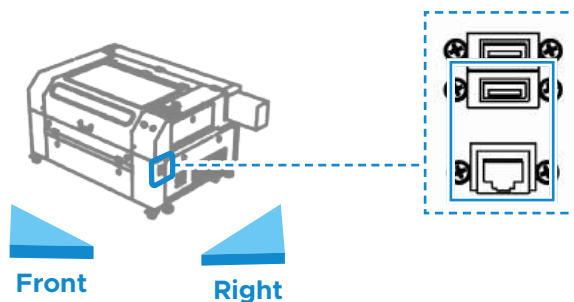
# 3 Installation

If the outlet is not grounded, use the grounding cable and connect it as follows:

- Fasten the near end of the grounding cable to the ground port at the back of the engraver.
- Connect the far end of the cable 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.



## 3.6 Setting Up Your Control Computer



See the software manual for details on the requirements for the control computer. The control computer can be connected in any of the two ways:

- Via the provided USB cable (via the port **USB Cable to PC**).

In this way, the control computer is directly connected to the engraver, so 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.

- Via the provided Ethernet cable (via the port **Ethernet Cable**) using the internet.



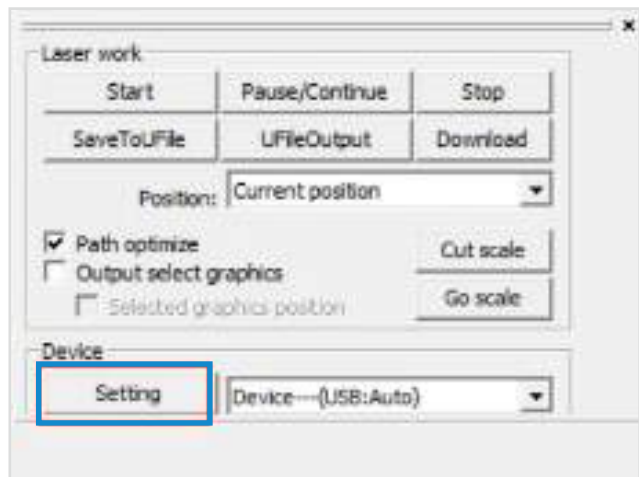
The control computer should not be placed more than 15 feet (4.5 m) away to avoid possible interference with the signal on its line.

A Windows-compatible copy of RDworks V8 is provided on the USB flash drive that came with your engraver. Since Lightburn is also commonly used, this chapter provides instructions to configure these two softwares for the machine. Familiarize yourself with the software's image design features and laser control settings before using it to operate the laser.

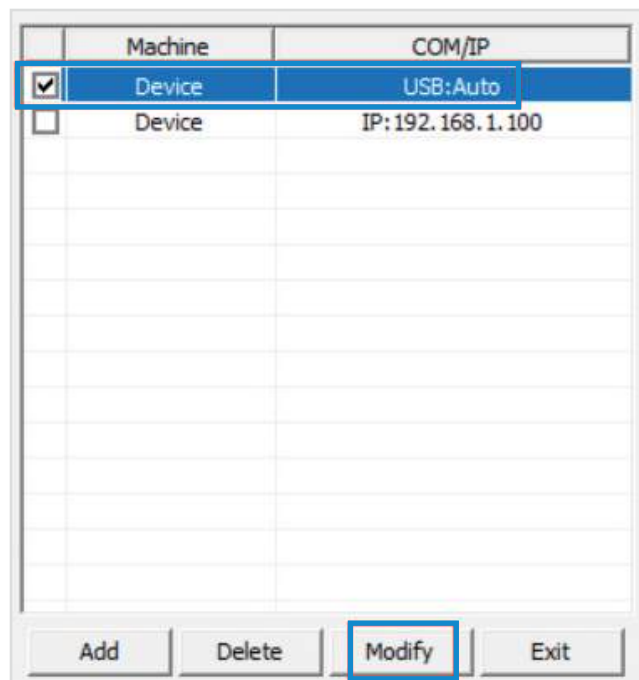
When you first configure your software to work with the laser, the device name to search for will be the mainboard model: **KT332N**. The default origin position will be at the workbed's top right corner. If you change this in your software, be sure to also change the control panel settings to match. See [§5.6.5 Setting Multiple Origins](#) on Page 73 for details.

### 3.6.1 RDWorks V8

1. Initiate RDWorks V8 on your control computer and connect it to the engraver using the provided USB cable.
2. Click “Setting”.



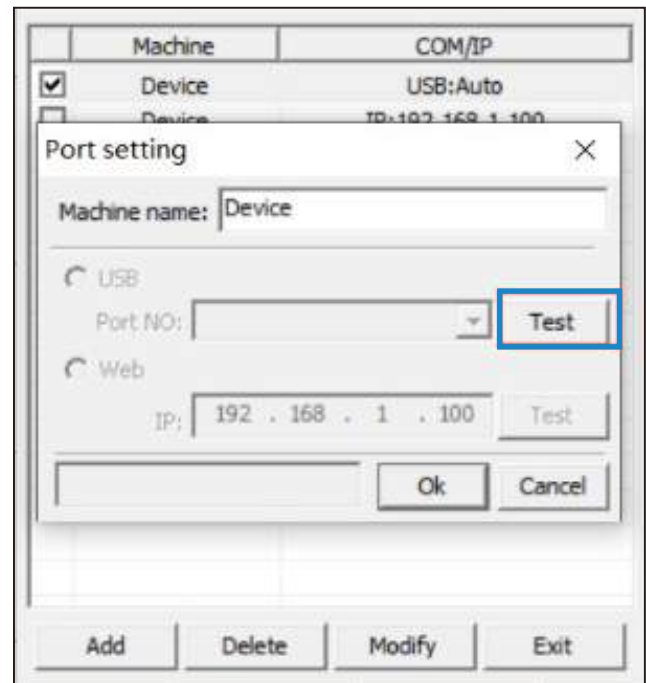
3. Click to tick the box as shown. Click “Modify”.



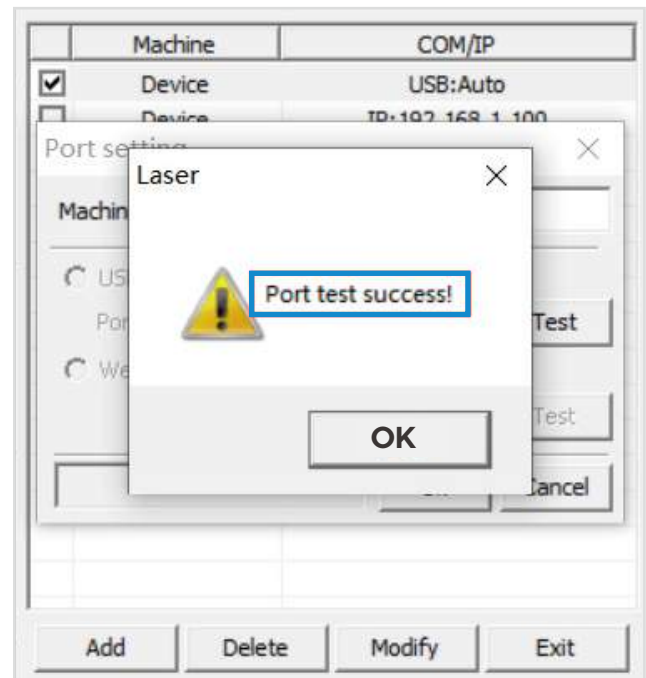
## 3 Installation

- Click “Test” in the dialogue box that shows up as shown.

The connection is successful when the pop-up as shown shows up.

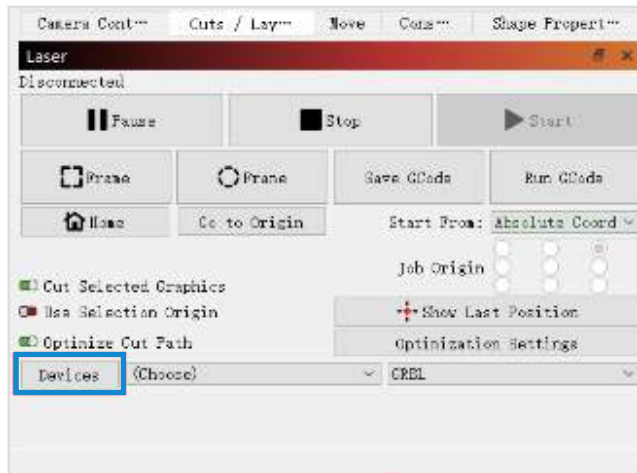


- Click OK to confirm the connection and close the dialogue box.
- Click “Exit” to return to the home interface.

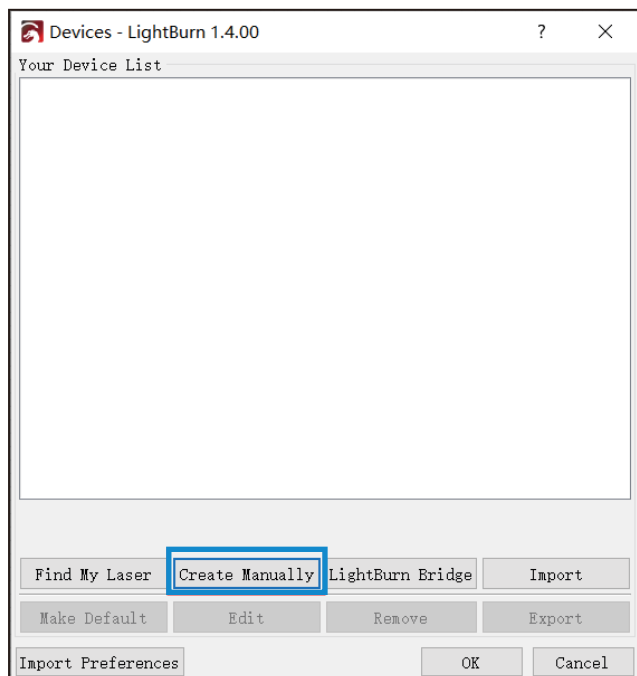


### 3.6.2 Lightburn

1. Initiate Lightburn on your control computer and connect it to your engraver using the provided USB cable.
2. Click “Device” as shown.

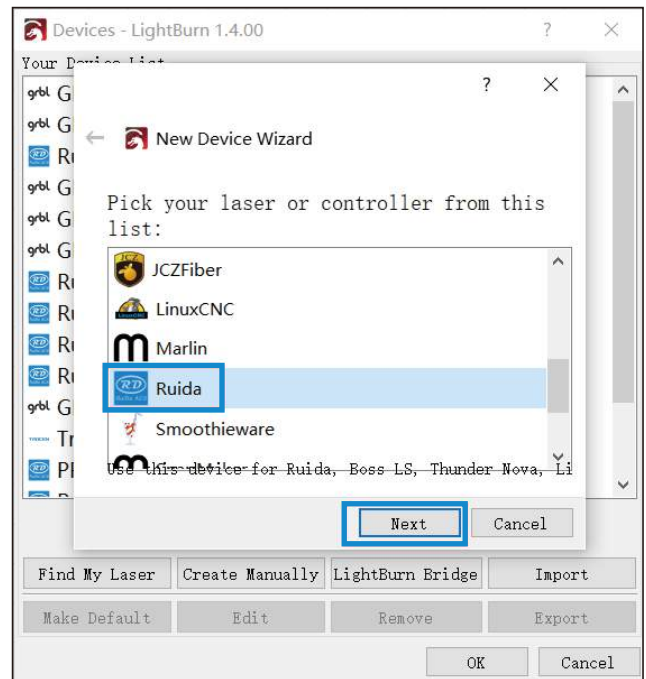


3. Click “Create Manually” in the pop-up that shows up.

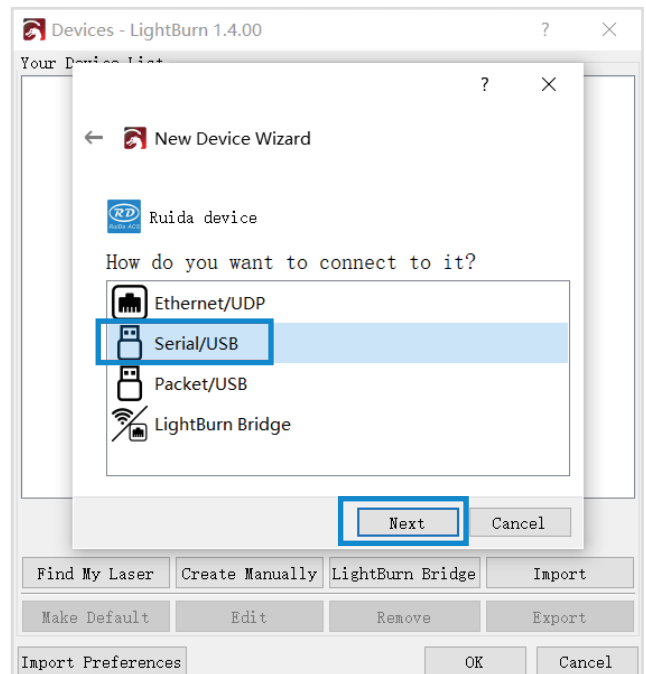


## 3 Installation

4. Choose “Ruida” and click “Next”.

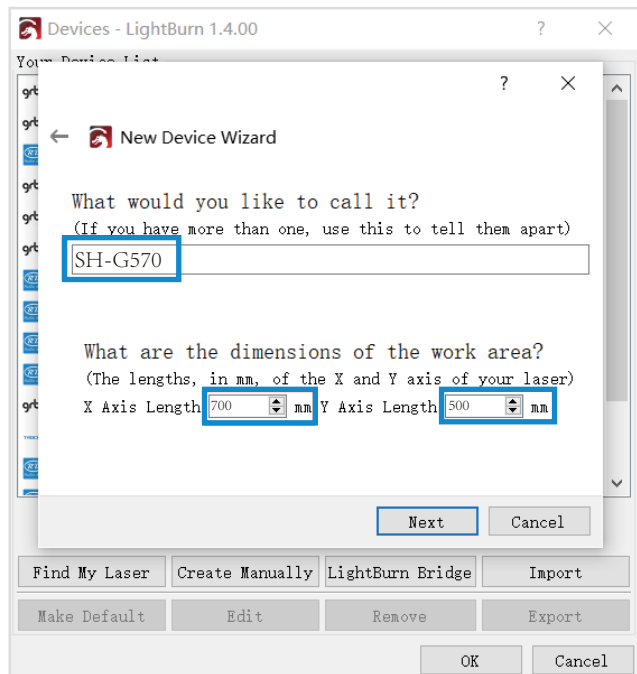


5. Choose Serial/USB and then “Next”.

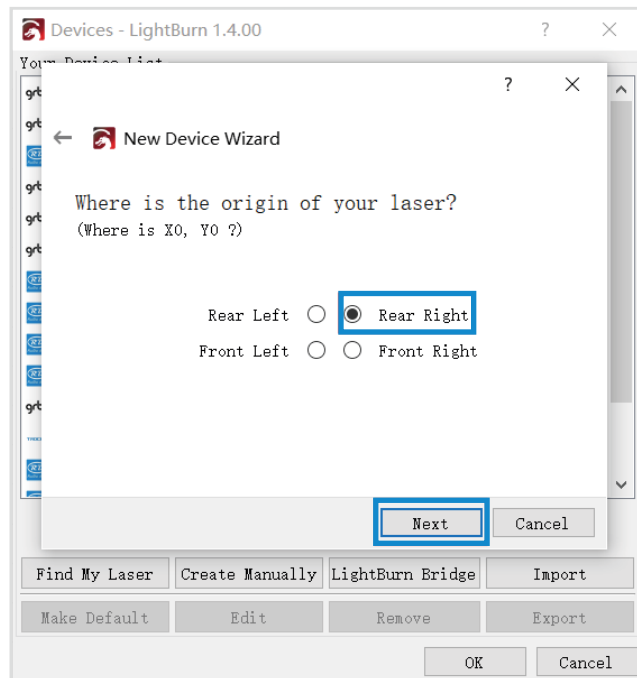




6. Enter the circled engraver name and X and Y axis length. Click “Next”.

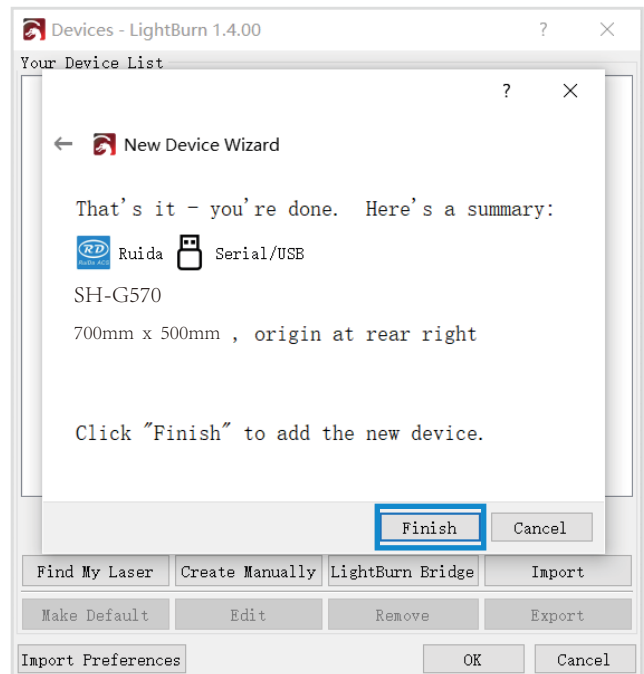


7. Set the origin to “Rear Right” as shown and click “Next”.

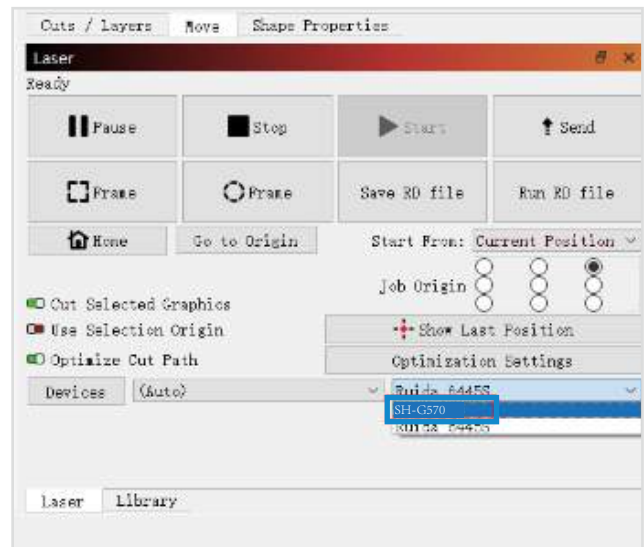


## 3 Installation

8. Confirm your configuration and click “Finish” to close the pop-up.



9. Click the device drop list in the lower right corner and choose “SH-G570”. The engraver is connected when the system shows “Ready”.



## 3.7 Initial Testing



Wear safety glasses during the entire test process!



Always make sure the path is clear between the laser and its target.

Never allow foreign objects between the laser and the material being engraved. Take care not to leave any part of your body in the laser path when it is in operation.

### 3.7.1 Emergency Shutoff

In case of the risk of fire and other hazards during engraving, this engraver includes an easy-to-reach **Emergency Stop** button. Pressing it down stops the laser tube instantly; turning it clockwise unlocks it. When your engraver arrives, its **Emergency Stop** button is initially pressed. It must be unlocked before use.

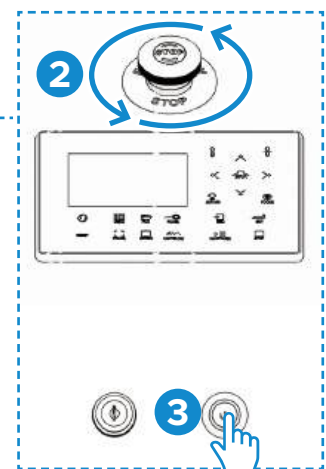
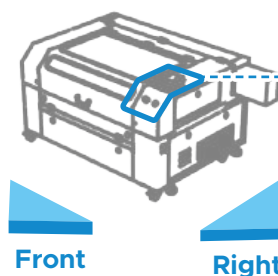
You should test that it works properly before conducting **ANY** other work with your machine.

1. Turn on the water cooling system.

Confirm that the cooling system has been activated.

2. Turn the **Emergency Stop** button clockwise to unlock it.
3. Press the control system power button to turn on the engraver.

Confirm that the air assist and exhaust fan have been activated.



4. Hit the **Emergency Stop** button and observe whether the engraver powers down.

If the **Emergency Stop** is not working and must be replaced before the engraver can be used, turn off the machine and contact customer service.

5. Turn off the engraver after the test is done.

# 3 Installation

## 3.7.2 Cover Shutoff

Because of the risk of blindness, burns, and other injuries from direct exposure to the invisible engraving beam, this device shuts off the laser automatically when any one of its protective interlocks is triggered.



Always make sure the path is clear between the laser and its target.

Never allow foreign objects between the laser and the material being engraved. Take care not to leave any part of your body in the laser path when it is in operation.

You should test that this engraver also shuts off the laser automatically when the protective cover is raised during operation.

You should test that the cover shutoffs activate properly before conducting any other work on your machine.

1. Turn on the water cooling system.

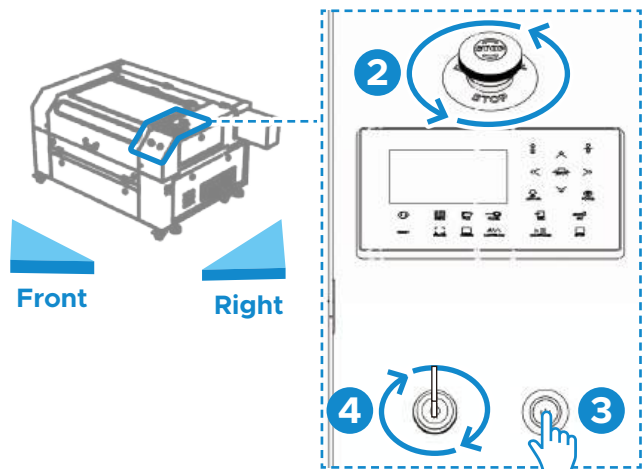
Confirm that the cooling system has been activated.

2. Turn the **Emergency Stop** button clockwise to unlock it.

3. Press the control system power button to turn on the engraver.

Confirm that the air assist and exhaust fan have been activated.

4. Insert the laser key and turn it clockwise to turn on the laser.

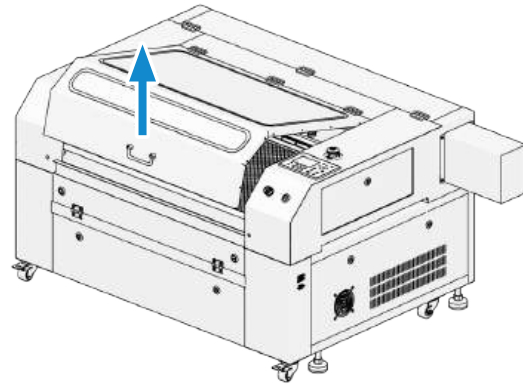


5. Place a piece of laserable scrap material onto the workbed and then close the cover.

6. Press  on the control panel to fire the laser.

7. Taking care not to expose yourself to seeing or being hit by any possible reflected laser light, open the cover as little as possible.

The laser should pause automatically and an error will be displayed on the control panel. If the laser continues to engrave the design while the cover is raised, the automatic shutoffs are not working and must be repaired before the engraver can be used. Turn off the machine and contact our technical support team.



8. Turn off the engraver and press the **Emergency Stop** after the test is done.

### 3.7.3 Water Shutoff

Because of the danger posed by an uncooled laser tube, this engraver also shuts off the laser automatically when its sensors do not detect the correct water flow. You should test that the water shutoff functions correctly.



Always make sure the path is clear between the laser and its target.

Never allow foreign objects between the laser and the material being engraved. Take care not to leave any part of your body in the laser path when it is in operation.

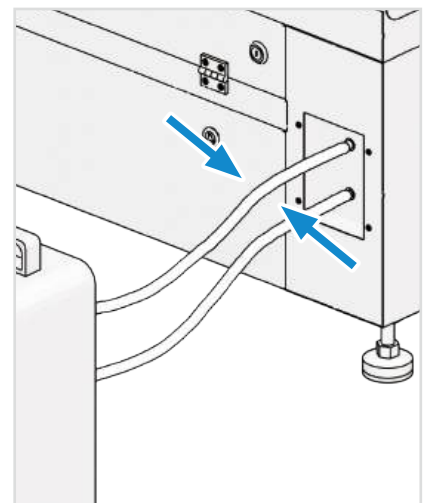
1. Perform the same procedure as before but, crimp or tie the water hoses, or unplug the water pump.

Be careful not to damage the hoses themselves and to only briefly activate the laser.

The laser should stop completely and an error will be displayed on the control panel.

- If the laser continues to fire, the automatic shutoff is not working and must be repaired before the engraver can be used. Turn off the machine and contact our technical support team.
- If the laser stops completely, the automatic shutoff is working correctly. Release the two hoses and run the water system for a minute or two, checking that no damage or leaks have occurred.

2. Turn off the engraver after the test is done.



# 3 Installation

## 3.7.4 Air Assist

Because of the danger posed by sparks during engraving and the risk of damage to the laser nozzle and focus lenses from fumes and debris, the pressurized air begins to blow from the laser head when the engraver starts engraving.

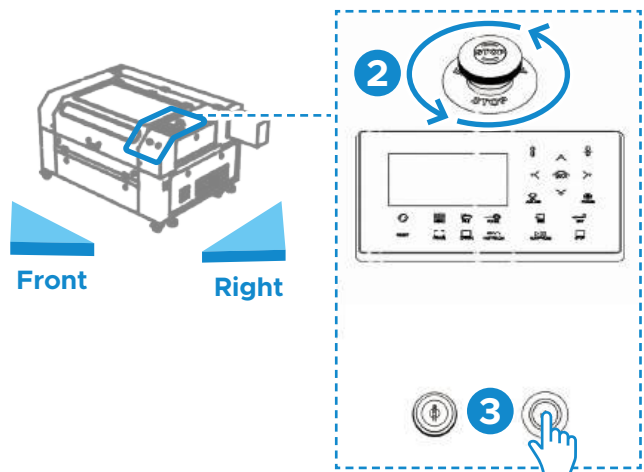
You should test that the pressurized air blows correctly:

1. Make sure that the air assist is in good condition.
  - a. Check that the air assist 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** button) before adjusting anything.
  - b. Check that its air intake filter is in place, clean, and not obstructed by any nearby objects.

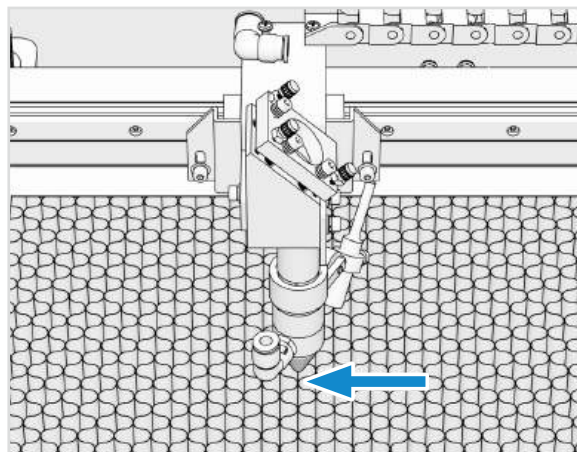
2. Turn the **Emergency Stop** button clockwise to unlock it.
3. Press the control system power button to turn on the engraver.

Confirm that the air assist and exhaust fan have been activated.



4. Open the cover.
5. Confirm that the pressurized air begins to blow from the laser head.

If it does not, turn off the machine and contact customer service.



6. Turn off the engraver and press the **Emergency Stop** button after the test is done.



If any tubing or wiring needs to be adjusted or reconnected, turn off the machine and disconnect it from power before making any such adjustment.

# 4 Operation

## 4.1 Operation Overview

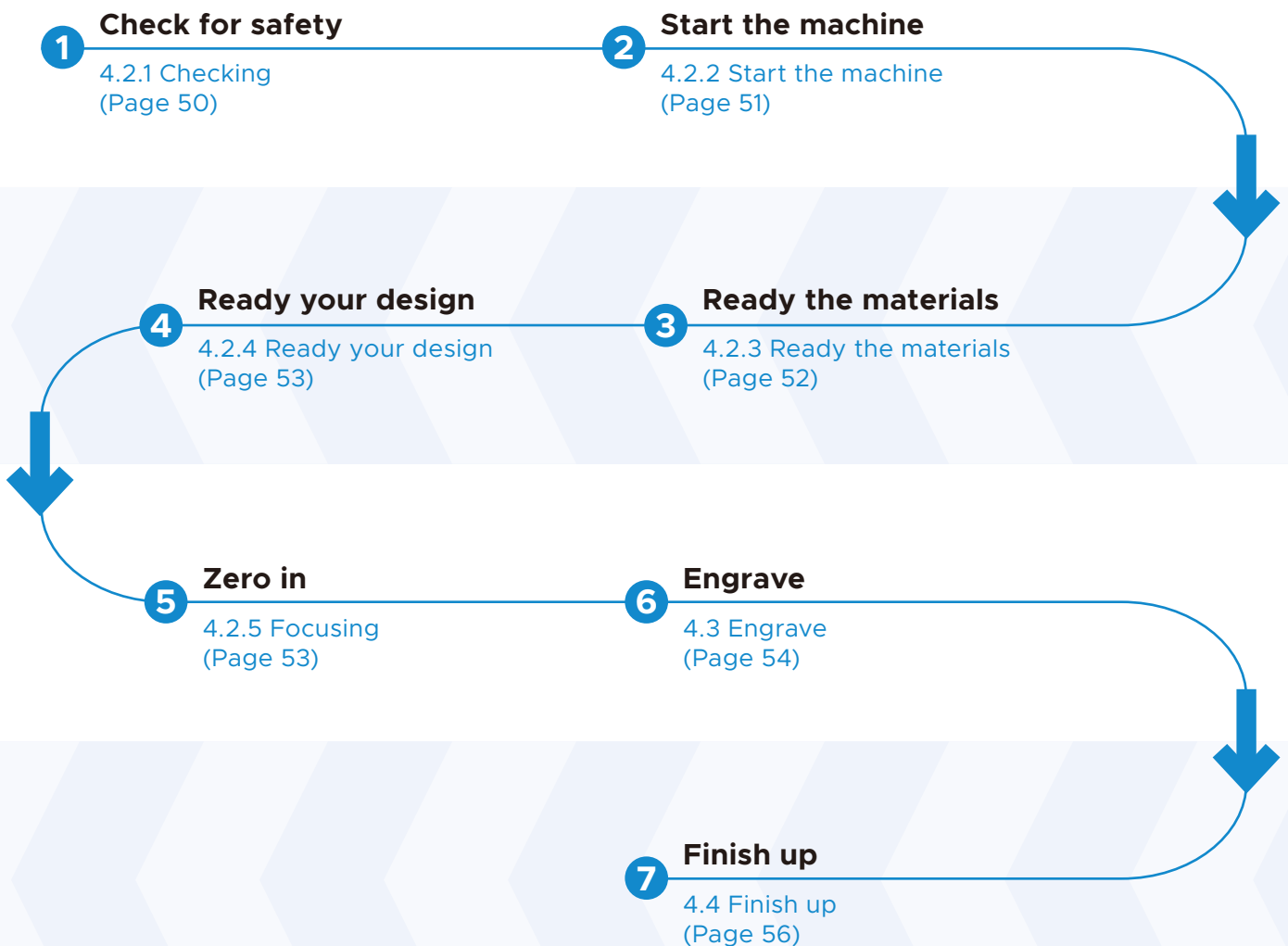


Operate this laser engraver only in accordance with all the instructions provided in this manual. Failure to follow the guidelines detailed here can result in property damage and personal injury.

The engraver is operable either through:

- The built-in control panel
- Your control computer

In typical workflows, designs are created by using graphic files on a control computer, then transferred to the engraver for execution. Here are the main operation steps:





## 4.2 Pre-Operation Preparation

### 4.2.1 Checking

1. Make sure the power supply is ok.
2. Ensure proper ventilation.

Make sure that any back-up ventilation systems are in place and running smoothly.



**NEVER** operate the laser if the fan and pipes are not working to purify or remove 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. Adjust the workbed if necessary.

#### **Honeycomb Bed**

For lightweight materials requiring close support: wood, fabric, leather, thin veneers

#### **Aluminum Knife Bed**

For heavy or rigid materials that are self-supporting and might damage the honeycomb bed and heat-sensitive materials (for example, acrylic, plastic) needing high airflow to avoid surface damage.

The honeycomb bed can be removed to expose the aluminum knife bed and provide a little more space for thicker projects.

The bed can be raised or lowered using the manual adjustment knob to accommodate different thicknesses of various materials.

# 4 Operation

## 4.2.2 Powering on

1. Turn on the water cooling system.

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.

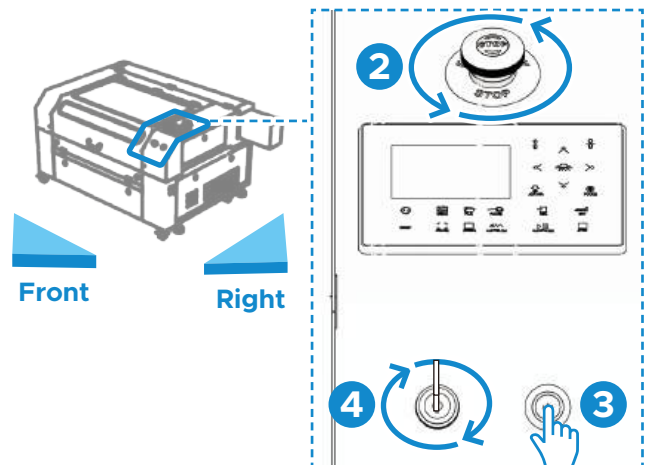
If the laser tube is examined directly, remember to close its access door before continuing. Add more distilled water if the pump is no longer well covered after filling the engraver's water tubing.

2. (Optional) Turn on your additional ventilation system (such as a dedicated purifier).
3. Turn the **Emergency Stop** button clockwise to unlock it.
4. Press the control system power button to turn on the engraver.

Confirm that the air assist and exhaust fan have been activated.

5. Insert the laser key and turn it clockwise to turn on the laser.

The laser head should start to move to its origin automatically.



6. Open the engraver's cover, and confirm the air assist is working well, blowing air through the nozzle.
7. Wait until the engraver is in standby mode and ready to use.

### 4.2.3 Preparing Material

1. Open the engraver's cover.
2. Place a sample piece of your material on the workbed.

The default location of the laser head's zero position is at the top left corner of the workbed. This can be changed by moving either your design or the engraver's origin position using the control panel or your engraving software.

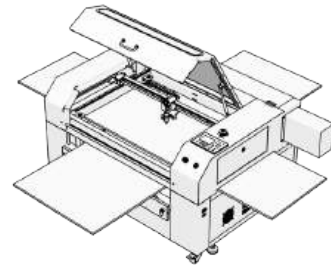
For instructions on material safety, see [§1.8 Material Safety Instructions](#) on Page 8.



**DO NOT** insert anything through the pass-through doors other than the material once 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 the byproducts or wear the necessary PPE to ensure the health of users and passersby.



For heavier pieces of material, be careful to distribute its weight as evenly as possible across reinforced supports. For larger pieces of material, you may open the front and rear pass-through doors.



3. Close the engraver's cover.



Exercise caution with your hands when closing the cover.

# 4 Operation

## 4.2.4 Preparing the Engraving Pattern

1. Create the design.

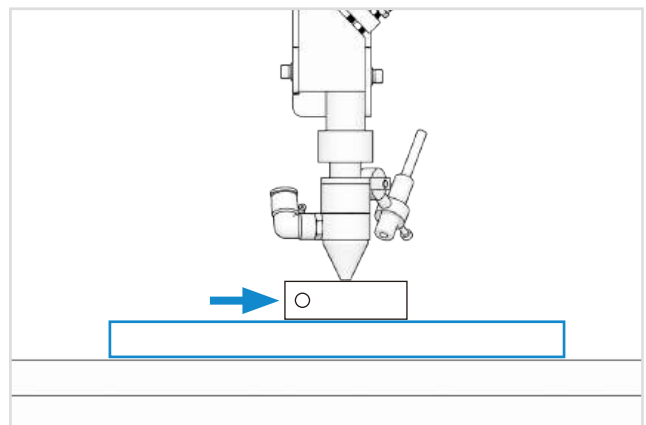
You can do this directly in your engraving software or use any other graphics program, saving or converting the file to a format compatible with the engraver. See the full list of acceptable file types in [§2.2 Technical Specifications](#) on Page 12.

2. 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 around 10% and the laser may not fire at all when set lower than this. It is **NOT** recommended to use the laser at full power. 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.

## 4.2.5 Focusing

1. Open the cover.
2. Use ◀, ▶, ▲ and ▼ to move your laser head about 2.5 inches above the material.
3. Placing the acrylic focus tool on top of the material.
4. Carefully raise the workbed by using the manual adjustment knob until the laser head barely touches the top of the acrylic tool without applying any pressure.






Make sure the engraving distance is correct. Again, **NEVER** attempt to focus the laser either way **WITHOUT** some material on the workbed.



## 4.3 Engraving




- If there is ever an emergency, hit the **Emergency Stop** button **IMMEDIATELY**.
- **DO NOT** stare continuously at the active laser even while wearing laser glasses but watch during use for possible issues like sparks and be prepared to quickly extinguish a fire if necessary.

1. Tap  to define the initial launch position for the laser.  
This action resets the laser head to the designated starting position or origin point, ensuring it aligns with the intended starting location of your design.
2. Tap  to outline the projected area for engraving or cutting on your material.  
The laser traces the boundary, allowing you to ascertain that the laser path is properly aligned with your material setup.
3. Press  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.
4. Press  again to pause work at the current position within the design as needed, especially if you notice you need to adjust the laser's power or speed. Press it again to resume the engraving work.
5. Once the laser has stopped, press  to completely stop work, return to the beginning of the design, and reset the laser head back to its origin.
6. Open the cover and check that the engraved pattern is desired. If not, adjust the parameters as needed. For parameter reference, see [§4.6 Instructions for Specific Materials](#) on Page 58.



Remember to press the reset button after temporarily opening and closing the cover.

7. Remove the sample material and place the actual material for engraving.
8. Press  to engrave your design.

## 4 Operation

During repetitive engraving and cutting,

- Periodically check your temperature gauge to maintain a water temperature below 100°F (38°C). If this temperature is reached, stop working and allow your device to cool before further use.
- Periodically check that the tank is at least 2 gallons (7.5 L) of water. Fill the tank with deionized or distilled water or a custom-purpose laser-safe antifreeze as needed.
- Monitor the temperature and humidity of the environment. Ensure that the temperature of the cooling water does not fall below the dew point of the surrounding air to prevent condensation. For tips to prevent condensation, see [§6.3 Water Cooling System](#) on Page 95.

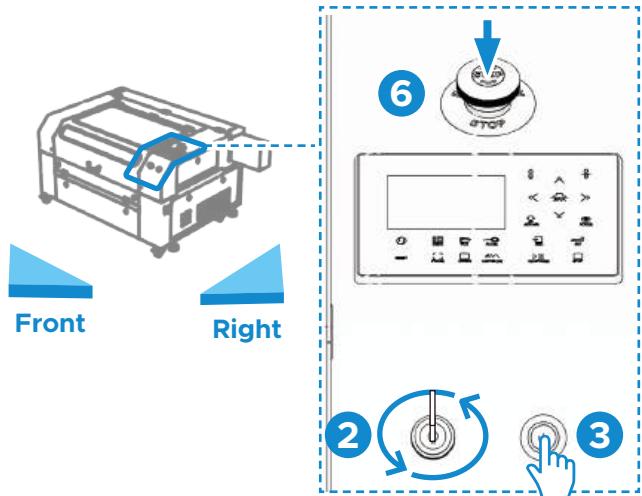


Condensation can lead to water droplets forming on the machine or the floor, which could damage the electronic components of the engraving machine or create a slip hazard over time.

## 4.4 Wrapping-up

Once you have finished engraving, close your software and then turn off your machine in the following order:

1. Close your engraving software, and unplug the USB cable or ethernet cable.
2. Turn the laser key counterclockwise to turn off the laser power.
3. Press the control system power button to turn off the system.
4. Allow time for the ventilation and cooling systems to continue running, cooling the laser and removing any remaining fumes or dust.
5. Turn off the water cooling system.
6. Press the emergency stop button.
7. (Optional) Turn off your additional ventilation system (such as a dedicated purifier).
8. Fully clean the workbed and check if the lens or any mirrors require cleaning. Use the bottom left access panel to remove, empty, clean, and replace the debris tray. Store everything neatly away.
9. For best results, lock and disconnect your laser engraver from its power supply between uses.

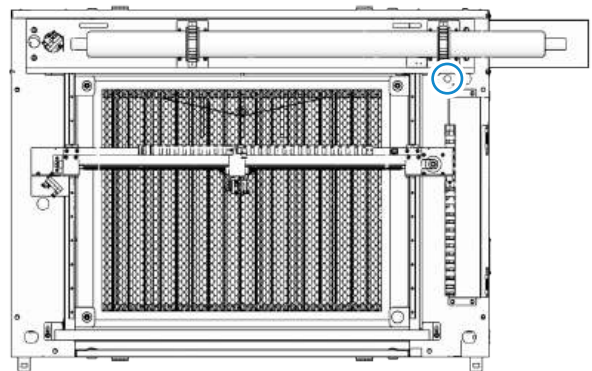


# 4 Operation

## 4.5 Rotary Operation (Optional)

### 4.5.1 Installing a Rotary Attachment

1. If the material is too thick, remove the honeycomb bed, aluminum knife bed and the support bar of the blade.
2. Place your rotary axis in an open area.
3. Put the material and adjust the position using the rotary axis' knobs.
4. Check the height of the workbed is appropriate. If the material is on the workbed, lower the workbed to provide room for the laser head to pass over your axis and material as needed.
5. Connect the rotary axis cord to the rotary port at the back of the main bay.



### 4.5.2 Engraving Procedures with a Rotary Attachment

In typical workflows, designs are created by using graphic files on a control computer, and then transferred to the engraver for execution. Here are the main operation steps:

1. Prepare your engraved material according to the instructions in [§4.2. Pre-Operation Preparation](#) on Page 50.
2. Turn on the switch of your rotary attachment. The rotation of the rotary attachment will be controlled by the engraver's Y axis settings.
3. Follow instructions in [§4.3 Engraving](#) on Page 54 and [§4.4 Wrapping-up](#) on Page 56 for the rest of the engraving process. Remember to set **Distance per Pulse** and other rotation parameters in the software.



## 4.6 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.

### 4.6.1 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.

### 4.6.2 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.

### 4.6.3 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.

# 4 Operation

## 4.6.4 Metal

CO<sub>2</sub> laser engravers should not be used for marking, engraving, or cutting metal. They are best suited for working on coatings applied to a metal base, and care must be taken not to attempt to work on the underlying metal itself. A variety of coatings specialized for CO<sub>2</sub> 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.

## 4.6.5 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.

## 4.6.6 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.

## 4.6.7 Rubber

The various compositions and densities of rubber cause slightly varying engraving depths. 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.

#### 4.6.8 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.

#### 4.6.9 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.

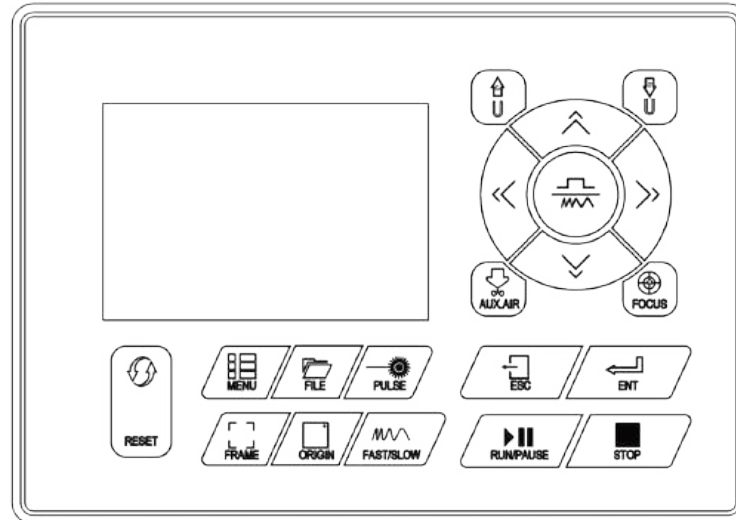
#### 4.6.10 Wood

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 their 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.





# 5 Control Panel Instructions


## 5.1 Overview



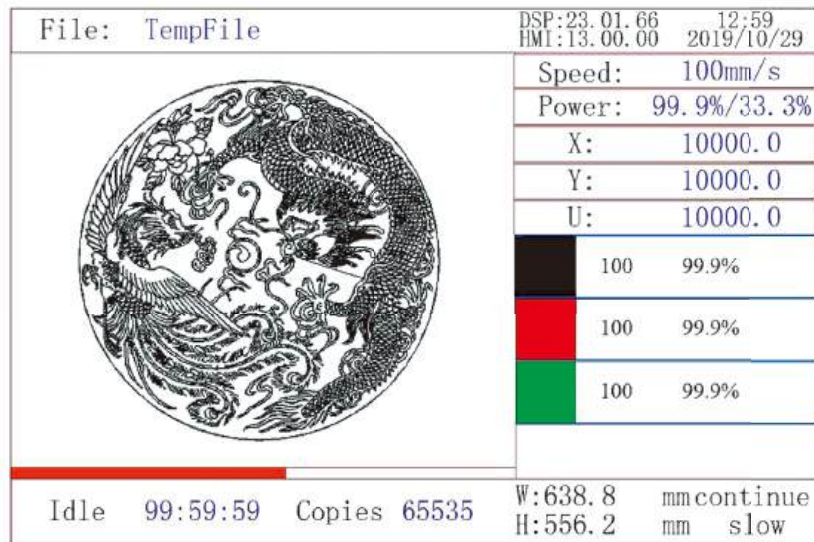
You can control your engraver directly from the built-in control panel, through a direct connection with your computer, or over the internet. For details on operating your engraving software, see its separate manual. The built-in control panel can operate the laser manually or engrave designs loaded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


For manual operation, the arrow keys can be used to move the laser head along the X and Y-axis

guide rails and the  button can be used to fire the laser. The laser head can be set to tab over a set distance each time the arrow buttons are pressed by hitting  and adjusting the parameters under **Manual Set+**. The laser can be set to fire for a fixed period by pressing  and adjusting the parameters under **Laser Set+**. All of the buttons and menus should be labelled in English. If they are not, press  and go to the top button in the right column to change the console's language settings.

To load a design from a FAT16 or FAT32 formatted flash disk or external hard drive, press  and then select **Udisk+** and **Copy to Memory**. Select the design in the File menu and then select **Run**.

Various parameters can be adjusted using the console's menus and submenus, including setting multiple origin points to engrave the design on your material four times in a single session.



When running a design from the control console, this will be the main display. The design should appear in the top left corner and its name and the current speed and power settings on the top right. The position of the laser head relative to the workbed appears as the X (horizontal) and Y (vertical) coordinates. The Z coordinate shows the elevation of the workbed itself although it can only be automatically adjusted if a motorized lift is installed. The U coordinate can be configured to control rotary axes or an automatic feed if either is installed. Below them are the layers with notes about their separate speeds in mm/s and their maximum power as a % of your machine's rated power. The batch count on the lower left keeps track of the number of times the current design has been engraved in a single session. Like the button says, press  to start engraving your loaded pattern and to pause engraving when needed.



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.

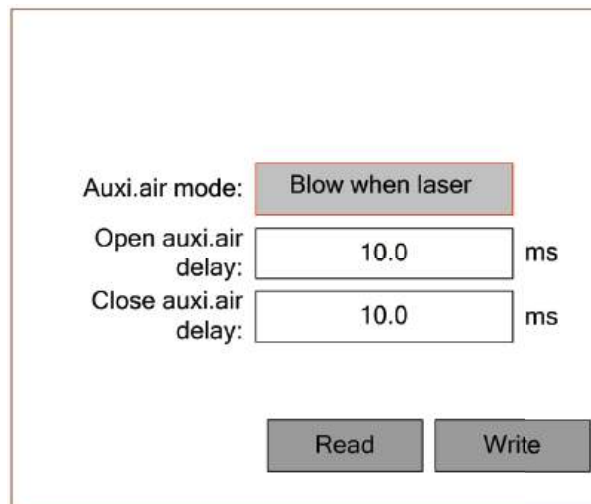
# 5 Control Panel Instructions

## 5.2 Changing Settings

### 5.2.1 Option Boxes

In the main display and various menus, press ▲ and ▼ to move between options and press **ENT** to select an option for adjustment.

### 5.2.2 Changing Parameters



Auxi.air mode: Blow when laser

Open auxi.air delay: 10.0 ms

Close auxi.air delay: 10.0 ms

Read Write

Some options toggle between their settings using ▲ and ▼ . Press **ENT** to exit while saving your changes or **ESC** to exit without saving any changes.



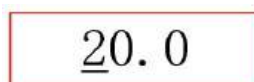
Blow when laser ▲ ▼

Numerical settings must be adjusted digit by digit. An underline cursor shows the currently selected digit.



10.0

Press ▲ and ▼ to adjust the digit up or down.



20.0

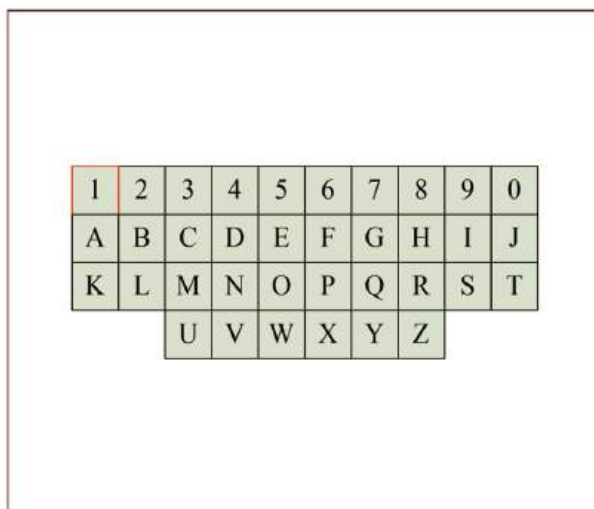
Press ◀ and ▶ to change the numerical position to adjust other numbers.

21.0

To add positions to a number (e.g. to change “900” to “1000”) press ◀ and ▶ to move the underline cursor to a new position and ▲ and ▼ to change it from displaying nothing to displaying a new digit.

To remove positions from a number (e.g. to change “1000” to “900”) use the arrow keys to change the unwanted numerical positions to zero (e.g. “0900”). When you are finished modifying the number, press ENT to exit while saving your changes or ESC to exit without saving any changes.

Alphanumeric settings are adjusted using an on-screen keyboard.



Press ◀ and ▶ to move the cursor to the correct number or letter and **ENT** to select it. When all positions are filled, press **ENT** to exit while saving your changes or **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

## 5.3 Setting the Laser Speed

1. While in the main interface, press **ENT** to modify the items in the **Parameter Display Area**.

Speed	100mm/s
Power:	99.9%/33.3%
X:	10000.0
Y:	10000.0
U:	10000.0

2. The cursor begins on the **Speed** parameter. Press **ENT** to open the following interface:

**Speed** sets the highest speed of the laser head in mm/s. Setting this value too high may cause unsteady engraving or damage your motor drivers and movement system.

3. Press ◀ and ▶ to move the cursor to the correct number or letter and **ENT** to select it. When all positions are filled, press **ENT** to exit while saving your changes or ESC to exit without saving any changes.

Speed:  mm/s

## 5.4 Setting the Laser Power

1. After modifying the items in the **Parameter Display Area**, move the cursor to the **Power** parameter.

Speed:	100mm/s
Power	99.9%/33.3%
X:	10000.0
Y:	10000.0
U:	10000.0

2. Press **ENT** to open the following interface:

**MaxPower** sets the highest intensity of the laser as a percentage of its maximum rated intensity. Constantly setting this value too high will shorten the service life of your laser tube.

**MinPower** sets the lowest intensity of the laser during engraving. Do not set the maximum power below the minimum power or the minimum power above the maximum power.


3. Press ◀ and ▶ to move the cursor to the correct number or letter and **ENT** to select it. When all positions are filled, press **ENT** to exit while saving your changes or ESC to exit without saving any changes.

MaxPower:  %  
MinPower:  %



## 5.5 Adjusting Engraving Layers

1. While in the main interface, press **ENT** and then press ▼ to move the cursor to the **Layer Display Area**.

	100	99.9%
	100	99.9%
	100	99.9%
	100	99.9%

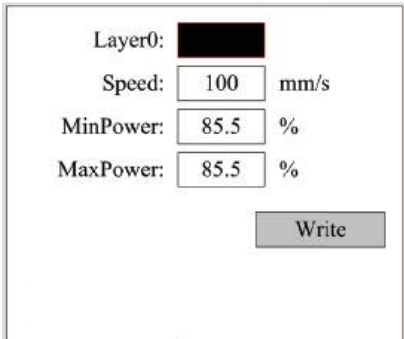
2. Press **ENT** to select this area and use ▲ and ▼ to move between the different layers.
3. Press **ENT** to open the following interface:


**Layer0/1/2/...** shows the name and display color of the selected layer.

**Speed** sets the highest speed of the laser head for this layer.

**MinPower** sets the lowest intensity of the laser for this layer.

**MaxPower** sets the highest intensity of the laser for this layer.



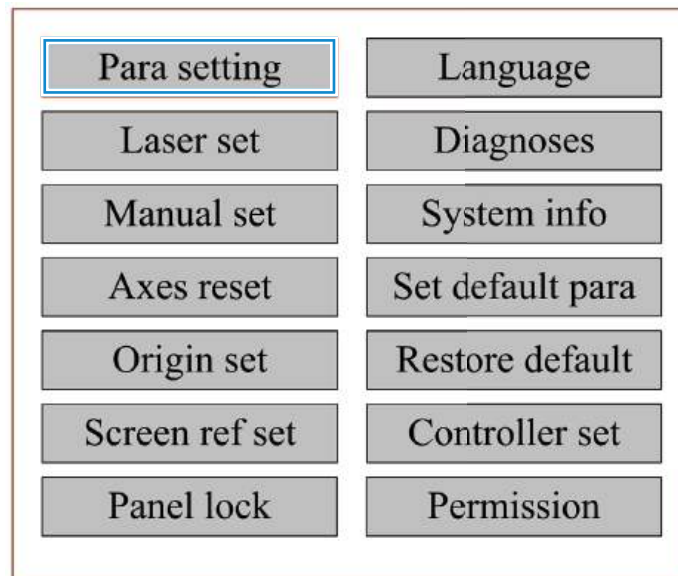
Layer0:	
Speed:	<input type="text" value="100"/> mm/s
MinPower:	<input type="text" value="85.5"/> %
MaxPower:	<input type="text" value="85.5"/> %
<input type="button" value="Write"/>	

4. Press ◀ and ▶ to move the cursor to the correct number or letter and **ENT** to select it. Change settings as needed.
5. Move the cursor to **Write** and press **ENT** to exit, saving any changes to the layer as part of the currently loaded file. Press **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

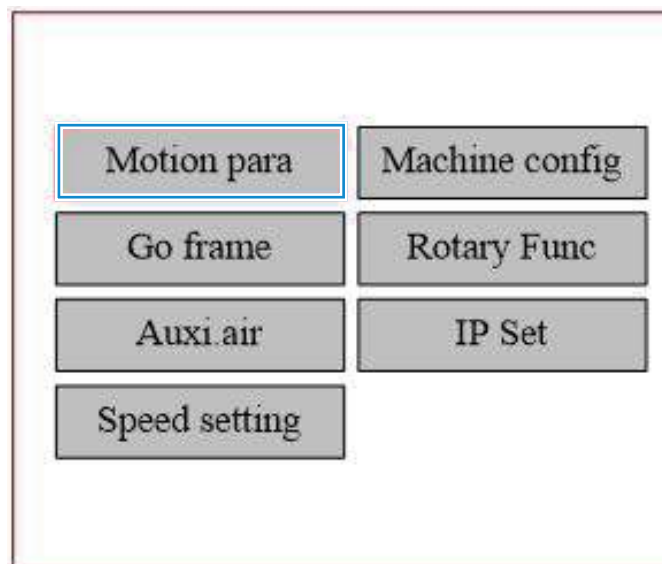
## 5.6 Fine Tuning Movement Parameters (Main Menu)

Press **MENU** to open the control panel's main menu.



### 5.6.1 Setting Parameters

On the main menu interface, select the **Parameter Setting** submenu and press **ENT** to open the following submenu.



## Adjusting Motion Parameters

In the the **Parameter Setting** submenu, select the **Motion Parameter** option and press **ENT** to open the following interface:

**Fast Feed Spd** sets the highest speed of an automatic feed, if installed.

**Cutting Acc** sets the highest acceleration of the laser head during standard cutting.

**Fast Feed Acc** sets the highest acceleration of an automatic feed, if installed.

**Corner Acc** sets the highest acceleration when cutting sharp corners, typically the slowest part of any design.

**Engrave Acc** sets the highest acceleration of the laser head during standard engraving.

**Start Speed** sets the initial speed of the laser head when starting a new design.

**Cut Jerk** sets the behavior of the laser head while changing direction: 0 will bring the laser head to a nearly complete stop while 200 will attempt to change direction at full speed.

Fast feed spd:	<input type="text" value="1000"/>	mm/s
Cutting Acc:	<input type="text" value="100"/>	mm/s <sup>2</sup>
Fast feed Acc:	<input type="text" value="500"/>	mm/s <sup>2</sup>
Corner Acc:	<input type="text" value="100"/>	mm/s <sup>2</sup>
Engrave Acc:	<input type="text" value="100"/>	mm/s <sup>2</sup>
Start speed:	<input type="text" value="50"/>	mm/s
Cut jerk:	<input type="text" value="5"/>	(0-200)%
<div><input type="button" value="Read"/> <input type="button" value="Write"/></div>		

- Move the cursor to **Read** and press **ENT** to load the currently saved parameters.
- Move the cursor to **Write** and press **ENT** to save the currently displayed values.
- Press **ESC** to exit without saving any changes.

For all of these settings, the general trade off is processing speed versus accuracy and smoothness. When max speeds and accelerations are set too low, cutting may take an extremely long time. (See [§5.7.4 Estimating Processing Time](#) on Page 81) When parameters are set too high, especially for cornering, unhelpful shaking and fuzziness may occur. (Note that setting cut jerk too low may also cause shaking or jumps when the laser head comes to a too sudden stop.) For best results and minimal damage to your engraver's motors and gantries, test the best settings for your design by making moderate adjustments each time rather than pushing the settings to their limits.

# 5 Control Panel Instructions

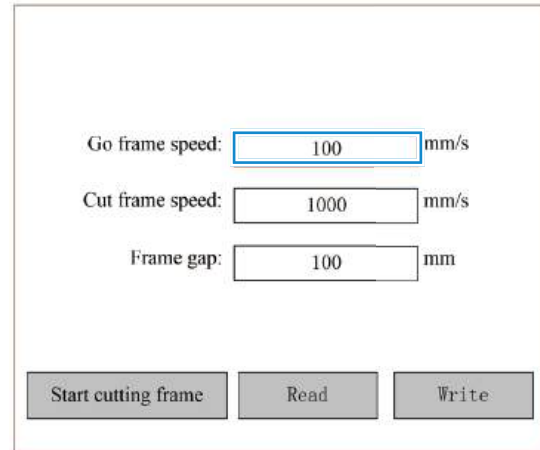
## Adjusting Frame Parameters

In the **Parameter Setting** submenu, move the cursor to **Go Frame** and press **ENT** to open the following interface:

**Go Frame Speed** sets the speed of the laser head while tracing your design's frame.

**Cut Frame Speed** sets the speed of the laser while cutting your design's frame.

**Frame Gap** sets the margin between the outside of your design and its frame.



The screenshot shows a control panel interface for adjusting frame parameters. It contains three input fields: 'Go frame speed' with a value of 100 mm/s, 'Cut frame speed' with a value of 1000 mm/s, and 'Frame gap' with a value of 100 mm. Below these fields are three buttons: 'Start cutting frame', 'Read', and 'Write'.

Move the cursor to **Start Cutting Frame** and press **ENT** to cut a straight border around the current design's X and Y boundaries.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

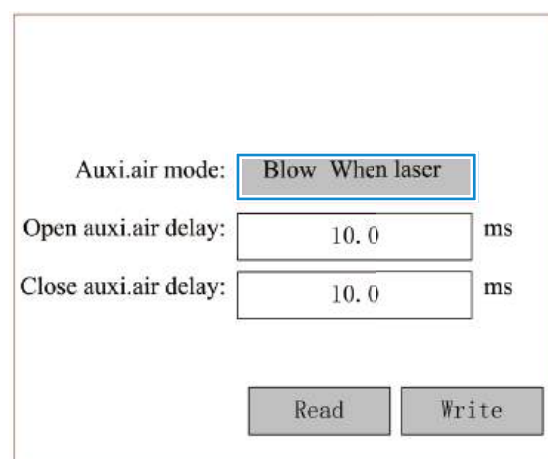
## Adjusting Air Assist Parameters

In the **Parameter Setting** submenu, move the cursor to **Auxi Air** and press **ENT** to open the following interface:

**Auxi Air Mode** sets the conditions when the air assist will supply pressurized air.

**Open Auxi Air Delay** sets the speed at which the air assist activates.

**Close Auxi Air Delay** sets the speed at which the air assist deactivates.



The screenshot shows a control panel interface for adjusting air assist parameters. It contains three input fields: 'Auxi.air mode' with a value of 'Blow When laser', 'Open auxi.air delay' with a value of 10.0 ms, and 'Close auxi.air delay' with a value of 10.0 ms. Below these fields are two buttons: 'Read' and 'Write'.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

### Adjusting Reset Speeds

In the **Parameter Setting** submenu, move the cursor to **Speed Setting** and press **ENT** to open the following interface:

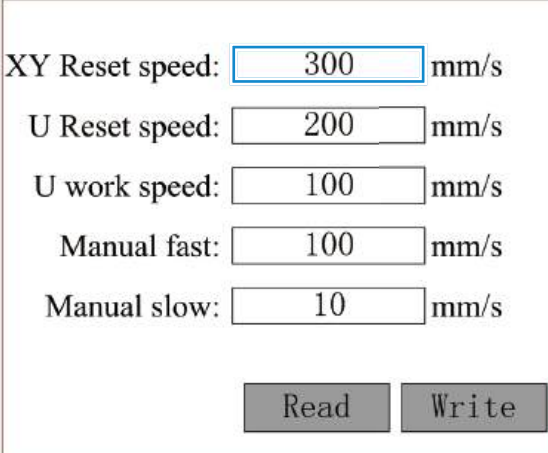
**XY Reset Speed** sets the speed of the laser head during reset.

**U Reset Speed** sets the speed of the U axis during reset.

**U Work Speed** sets the usual speed of the U axis when U ▲ or U ▼ is pressed.

**Manual Fast** sets the speed of the laser head during manual operation when **FAST/SLOW** is also being held down.

**Manual Slow** sets the usual speed of the laser head during manual operation.



XY Reset speed:  mm/s  
U Reset speed:  mm/s  
U work speed:  mm/s  
Manual fast:  mm/s  
Manual slow:  mm/s

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

### Adjusting Misc. Parameters

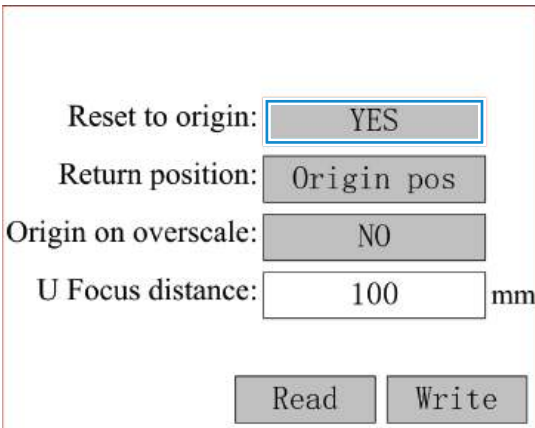
In the **Parameter Setting** submenu, move the cursor to **Machine Config** and press **ENT** to open the following interface:

**Reset to Origin** sets whether the laser head resets after finishing a design.

**Return Position** sets the location the laser head returns to during reset, when that is enabled.

**Origin on Overscale** sets whether the laser head pauses for resetting when told to work beyond the workbed.

**U Focus Distance** sets the height the U axis moves to when **FOCUS** is pressed.



Reset to origin:   
Return position:   
Origin on overscale:   
U Focus distance:  mm

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

## Adjusting Rotary Parameters

In the **Parameter Setting** submenu, move the cursor to **Rotary Func** and press **ENT** to open the following interface:

Enable **Rotary Func** toggles the engraver's use of the Y axis port for rotary commands.

**PPR** sets the pulse per revolution value, when rotary use is enabled. A low value provides low resolution but faster speeds, while a high value slows engraving but creates finer effects.

**Diameter** sets the diameter of the object being rotated.

The screenshot shows a control panel interface for adjusting rotary parameters. It contains three input fields: 'Enable rotary Func' with the value 'YES', 'PPR' with the value '50', and 'Diameter' with the value '10.0' followed by a 'mm' unit label. At the bottom right, there are two buttons labeled 'Read' and 'Write'.

Move the cursor to Read and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

## Setting the Engraver's IP Address

In the **Parameter Setting** submenu, move the cursor to **IP Set** and press **ENT** to open the following interface:

The screenshot shows a control panel interface for setting the IP address. It features a label 'IP address:' followed by four input fields containing the values '192', '168', '1', and '100', separated by dots. Below these fields is a single button labeled 'Write'.

Move the cursor to each field, modify the values as needed, and press **ENT** to confirm your changes.

Move the cursor to **Write** and press **ENT** to save the currently displayed value as your engraver's IP address.

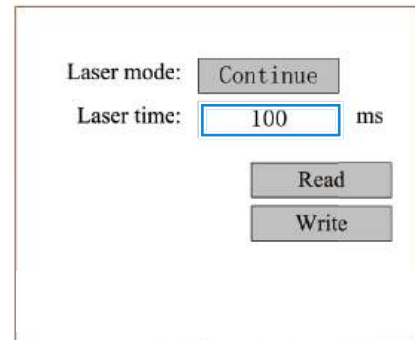
Press **ESC** to exit without saving any changes.

## 5.6.2 Setting the Manual Firing Mode

Press **MENU**, move the cursor to **Laser Set**, and press **ENT** to open the following interface:

**Laser Mode** toggles manual firing of the laser between continuous and timed pulse modes.

**Laser Time** sets the duration of each timed pulse, when that is enabled.



The screenshot shows a control interface for the laser. It has two main settings: 'Laser mode' with a 'Continue' button, and 'Laser time' with a numeric input field containing '100' and the unit 'ms'. Below these are two buttons: 'Read' and 'Write'.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

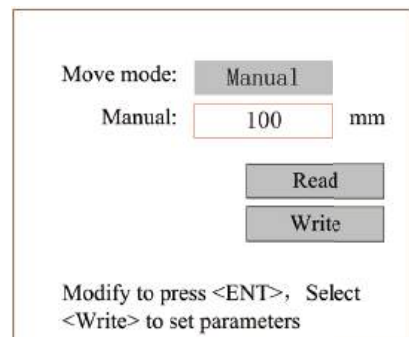
Press **ESC** to exit without saving any changes.

## 5.6.3 Setting the Manual Movement Mode

Press **MENU**, move the cursor to **Manual Set**, and press **ENT** to open the following interface:

**Move Mode** toggles manual movement between continuous and tabbed/jog modes.

**Manual** sets the length of each tabbed movement, when that is enabled.



The screenshot shows a control interface for manual movement. It has two main settings: 'Move mode' with a 'Manual' button, and 'Manual' with a numeric input field containing '100' and the unit 'mm'. Below these are two buttons: 'Read' and 'Write'. At the bottom, there is a text instruction: 'Modify to press <ENT>, Select <Write> to set parameters'.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

## 5.6.4 Resetting the Laser Head Position

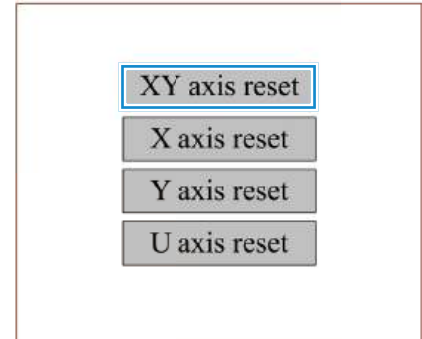
Press **MENU**, move the cursor to **Axes Reset**, and press **ENT** to open the following interface:

**XY Axis Reset** returns the laser head to the origin.

**X Axis Reset** returns the laser head to the X value of the origin at the current Y axis position.

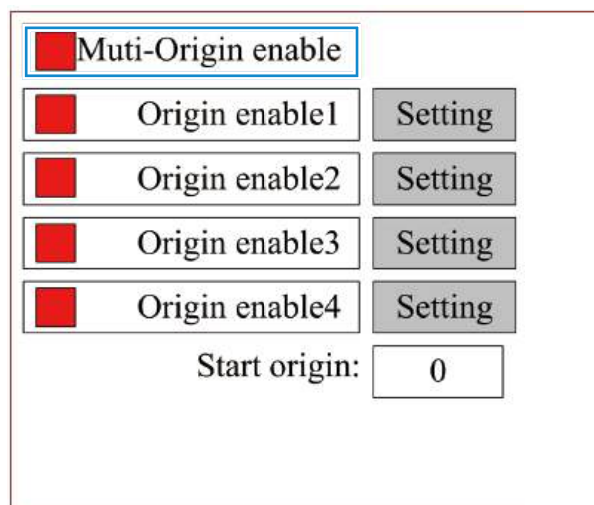
**Y Axis Reset** returns the laser head to the Y value of the origin at the current X axis position.

**U Axis Reset** returns the U axis to its default height.



## 5.6.5 Setting Multiple Origins

Press **MENU**, move the cursor to **Origin Set**, and press **ENT** to open the following interface:



Select **Multi-Origin Enable** and press **ENT** to toggle whether your engraver will use a single origin to engrave a single image during each session or multiple origins to engrave multiple copies during each session. (This will only be activated if your software is also set to use **Anchor Point** positioning during engraving. Designs set to use **Current Position**, **Absolute Coordinates**, or **Machine Zero** will continue to engrave a single copy starting from the selected position.)

When multiple origins are enabled, up to four separate origins can be set. For each origin, move the cursor to **Setting** and press **ENT** to open the following interface:



Origin1:

Former postion:

X: 20.0

Y: 20.0

mm

Current Position:

X: 0.9

Y: 1.2

mm

The currently saved value for this origin will be displayed as its **Former Position**. Press **ESC** to exit the interface and continue to use this saved value. To change it, use the arrow keys to move the laser head to another location and press **ORIGIN** to save it over the previous value.

Any of the four values can be used as the first origin during engraving. Move the cursor to **Start Origin** and press **ENT**. Use **▲** and **▼** to change which origin will be used first during each session. Press **ENT** to save your change or **ESC** to exit without saving any changes. The other origins will always be processed in order: 1 → 2 → 3 → 4 → 1...

### 5.6.6 Setting the Display Position

Press **MENU**, move the cursor to **Screen Ref Set**, and press **ENT** to open the following interface:

Screen origin: Up-left

Up-left

Up-right

Low-left

Low-right

These values set the display of the currently selected design relative to the origin. The current value is displayed next to **Screen Origin**. To change it, move the cursor to any other option and press **ENT**.

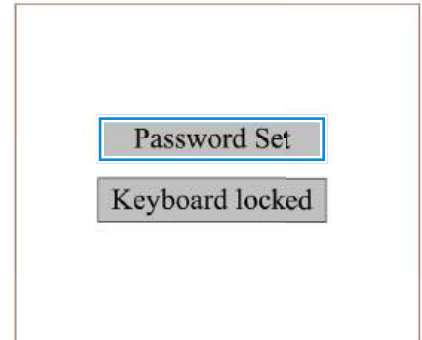
# 5 Control Panel Instructions

## 5.6.7 Locking the Control Panel

Press **MENU**, move the cursor to **Panel Lock**, and press **ENT** to open the following interface:

**Password Set** allows you to set or reset a 6-digit password.

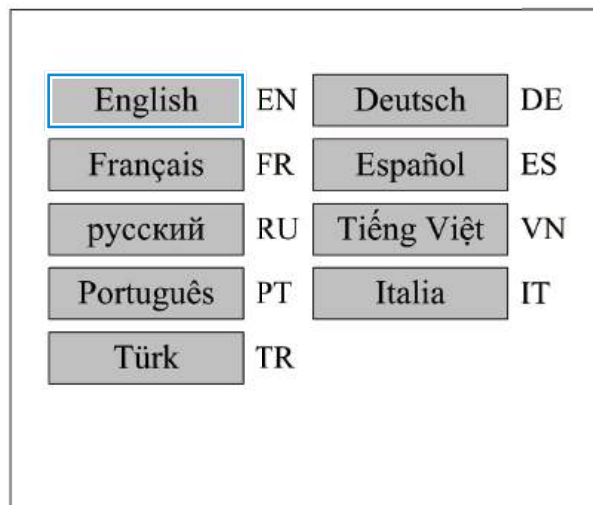
**Keyboard Locked** locks all engraver controls until the saved password is entered.



For maximum safety, it is recommended that you store a password and always activate it when you will be away from your engraver. If any unknown password is already stored on your control panel from factory testing, contact customer service.

## 5.6.8 Changing the Interface Language

Press **MENU**, move the cursor to **Language**, and press **ENT** to open the following interface:



To use the interface in another language, move the cursor to your desired language and press **ENT**. If your control panel arrives in a language other than English from factory testing, use the option on the top left of this interface to reset it to English.

### 5.6.9 Performing I/O Diagnostics

Press **MENU**, move the cursor to **Diagnoses**, and press **ENT** to open the following interface:

INPUT:		
<input type="checkbox"/> LmtX-	<input type="checkbox"/> LmtU+	<input type="checkbox"/> WP
<input type="checkbox"/> LmtY-	<input type="checkbox"/> LmtU-	<input type="checkbox"/> In1
<input type="checkbox"/> Ex-Run	<input type="checkbox"/> Intlock	<input type="checkbox"/> In2
OUTPUT:		
<input checked="" type="checkbox"/> OUT1	<input type="checkbox"/> OUT2	
<input checked="" type="checkbox"/> Status	<input type="checkbox"/> Aux.Air	

The **INPUT** values are read from your machine and may be helpful for troubleshooting or during repairs. The **OUTPUT** values can be used to enable or disable output signals to your indicator light (**Status**), air assist (**Aux Air**), and up to two other devices (**Out1** and **Out2**) as needed.

Move the cursor to the value you wish to toggle and press **ENT** to change its value.

### 5.6.10 Reading System Information

Press **MENU**, move the cursor to **System Info**, and press **ENT** to open the following display:

Total poweron time(h:m:s):	99999:59:59
Total work time(h:m:s):	99999:59:59
Last work time(h:m:s):	99999:59:59
Total laser time(h:m:s):	99999:59:59
Total process times:	9999999
X Total traval(m):	9999999
Y Total traval(m):	9999999

This information may be helpful during troubleshooting or other debugging.

# 5 Control Panel Instructions

## 5.6.11 Resetting Default Parameters

Press **MENU**, move the cursor to **Set Default Para**, and press **ENT** to save all currently stored parameters as the new default parameters.

If a password has been stored (see §5.6.7 Locking the Control Panel on Page 75), you will need to correctly enter the password before this command will be accepted.

## 5.6.12 Restoring Default Parameters

Press **MENU**, move the cursor to **Restore Default**, and press **ENT** to restore all default parameters for your engraver over the current values.

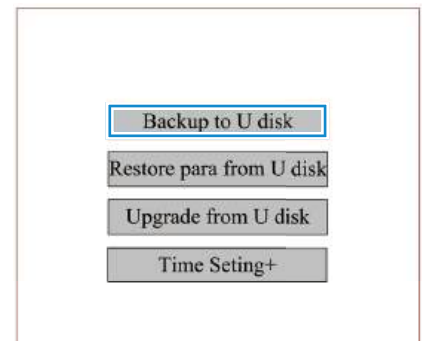
If a password has been stored (see §5.6.7 Locking the Control Panel on Page 75), you will need to correctly enter the password before this command will be accepted.

## 5.6.13 Backing Up Default Parameters

Press **MENU**, move the cursor to **Controller Set**, and press **ENT** to open the following interface:

**Backup to U Disk** saves all current parameters to a currently inserted USB flash drive.

**Restore Para from U Disk** loads all parameters from a currently.



When backing up parameters to a USB flash drive, the file will be saved onto the drive's root directory. When loading parameters from a currently inserted drive, the file will need to be located in the drive's root directory.

### Updating Controller Software

In the same interface, select **Upgrade from U Disk** and press **ENT** to load any update to your control panel's software from a currently inserted USB flash drive. The file will need to be in the root directory of the flash drive.

## Updating System Date & Time

In the same interface, select **Time Setting+** and press **ENT** to open the following interface:



The interface displays date and time settings. The date is shown as 2019 / 1 / 12, and the time is shown as 12 : 1. A 'Write' button is located at the bottom right.

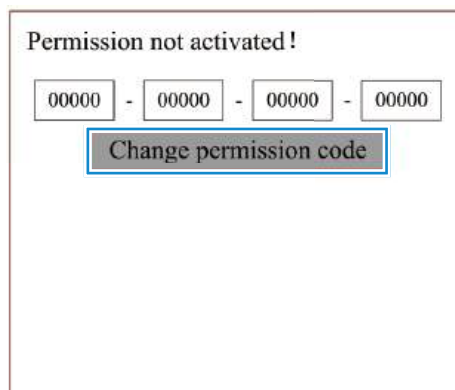
The date follows ISO 8601 order, displaying Year / Month / Day. The time is displayed Hour : Minute.

Move the cursor to each field, modify the values as needed, and press **ENT** to confirm your changes. Move the cursor to **Write** and press **ENT** to save the currently displayed values as your engraver's system date and time.

If a password has been stored (see §5.6.7 Locking the Control Panel on Page 75), you will need to correctly enter the password before this command will be accepted. Press **ESC** to exit without saving any changes.

## 5.6.14 Controller Activation

This control system should arrive ready to use. If your device has not yet been properly authorized for use, contact customer service to get its authorization code. Press **MENU**, move the cursor to **Permission**, and press **ENT** to open the following interface:



The interface displays the message 'Permission not activated!'. Below the message, there are four input fields, each containing '00000', separated by hyphens. A 'Change permission code' button is located below the input fields.

Move the cursor to each field, modify the values as needed, and press **ENT** to confirm your changes.

Move the cursor to **Change Permission Code** and press **ENT** to store your authorization code and fully activate your controller.

Press **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

## 5.7 Setting Files

### 5.7.1 Loading Saved Designs

Press **FILE** to open the control panel's File menu.

File:	Copies:
01:DEF1	65535
02:DEF2	65535
03:DEF3	65535
04:DEF4	65535
05:DEF5	65535
06:DEF6	65535
07:DEF7	65535
08:DEF8	65535

Data Check

File paras

Work time check

Clear copies

Copy to Udisk

Delete

Udisk file

Memery oper

Read file

Any design files saved directly on your engraver will be listed on the left, along with the total number of times each has been engraved.

Move the cursor to **Read File** and press **ENT** to refresh this list, if needed.

Move the cursor to the file you wish to engrave and press **ENT** to select it. You can also use **Data Check** to check each file for any damage before processing. Press **ESC** to exit without selecting a file.

Move the cursor to **U Disk File** and press **ENT** to open the following interface:

File:
01:DEFAUL1 65535
02:DEFAUL2 65535
03:DEFAUL3 65535
04:DEFAUL4 65535
05:DEFAUL5 65535
06:DEFAUL6 65535
07:DEFAUL7 65535
08:DEFAUL8 65535

Read U file

Copy to mem

Delete

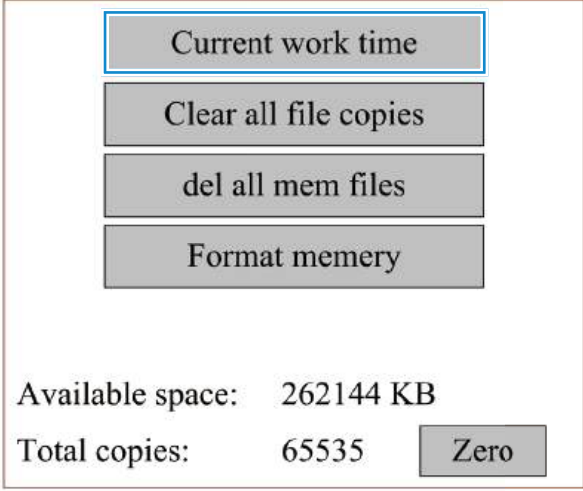
Select **Read U File** and press **ENT** to display all the compatible design files in the root directory of a currently inserted USB flash drive using a FAT16 or FAT32 file system. The system will only display the first 8 alphanumeric characters of a file name. The total number of times each design has been engraved will also be displayed. Move the cursor to the file you wish to engrave and press **ENT** to select it or press **ESC** to exit without other changes.

## 5.7.2 Moving Saved Designs

In the main **File** menu, move the cursor to **Copy to U Disk** and press **ENT** to back up the currently selected file to the root directory of an inserted USB flash drive.

In the **USB File** menu, move the cursor to **Copy to Mem** and press **ENT** to move the currently selected file from your flash drive to the engraver's own memory. Long file names will be truncated to their first 8 alphanumeric characters.

This control system has 256 megabytes (MB) of space for designs, stored parameters, etc. The memory available on your engraver can be checked by going to the main **File** menu, moving the cursor to **Memory Oper**, and pressing **ENT** to open the following interface:



The screenshot displays a control interface with a central column of four buttons: "Current work time" (highlighted with a blue border), "Clear all file copies", "del all mem files", and "Format memery". Below these buttons, the text "Available space: 262144 KB" is shown. Underneath that, "Total copies: 65535" is displayed next to a "Zero" button.

The available memory on your engraver is displayed in kilobytes (kB). To computer the available memory in terms of megabytes, divide the number of kilobytes by 1024.

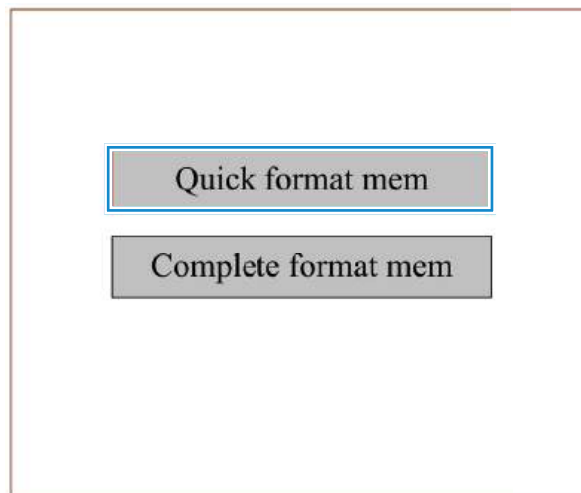
# 5 Control Panel Instructions

## 5.7.3 Deleting Saved Designs

In either **File** menu, move the cursor to **Delete** and press **ENT** to delete the currently selected file from the device.

To clear all saved design files from your engraver's memory, open the **Memory Operations** submenu. Select **Del All Mem Files** and press **ENT** to delete all design files currently saved on your engraver at once.

Move the cursor to **Format Memory** and press **ENT** to open the following interface:

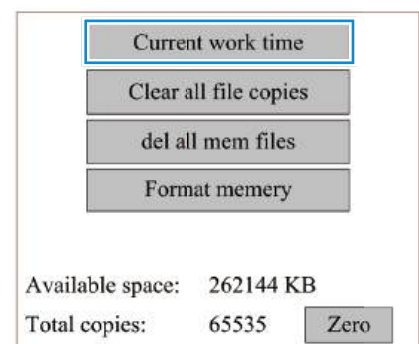


Select either option and press **ENT** to reformat the engraver's memory or **ESC** to exit without deleting all data currently stored on your engraver.

## 5.7.4 Estimating Processing Time

In the **Memory Operations** submenu, move the cursor to **Current Work Time** and press **ENT** to display the estimated time required to complete one engraving session of the currently selected design using the current parameters.

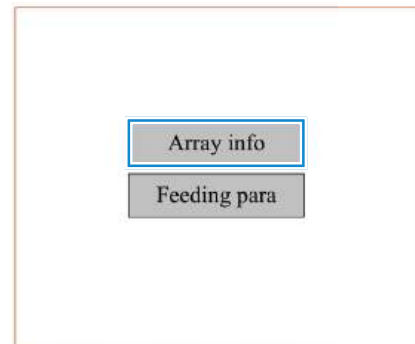
If the estimated time seems excessively long, adjust parameters such as speed and acceleration (see [§5.3 Setting the Laser Speed](#) on Page 65 and [§5.6 Fine Tuning Movement Parameters \(Main Menu\)](#) on Page 67) or reduce the number of copies being made (see [§5.6.5 Setting Multiple Origins](#) on Page 73 and [§5.7.5 Adjusting File Array Parameters](#) on Page 82) during each session.



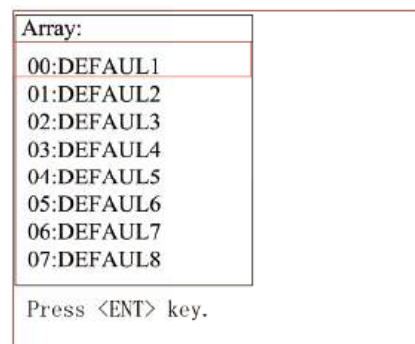


### 5.7.5 Adjusting File Array Parameters

Press **FILE**, move the cursor to **File Paras**, and press **ENT** to open the following submenu:



The cursor begins on the **Array Info** option. Press **ENT** to open the following file list:



Move the cursor to the design file you wish to adjust and press **ENT** to open the following interface:

**Size** displays the size of the design along the X and Y axes.

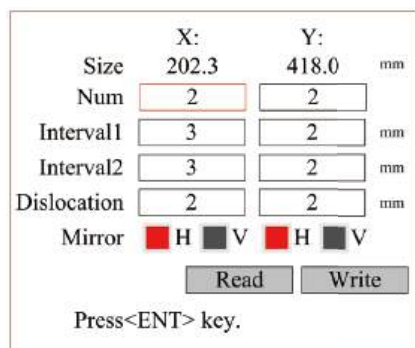
**Num** displays the number of times the design will be copied along each axis.

**Interval1** displays the interval between elements in even-numbered rows.

**Interval2** displays the interval between elements in odd-numbered rows.

**Dislocation** sets the distance each set of copies are shifted along each axis.

**Mirror** allows you to toggle whether the design will be mirrored across one or both axes.

A screenshot of the Array adjustment interface. It has a table-like structure with columns for 'Size', 'X:', 'Y:', and 'mm'. The 'Size' row shows '202.3' for X and '418.0' for Y. The 'Num' row has input boxes with '2' for both X and Y. The 'Interval1' row has input boxes with '3' for X and '2' for Y. The 'Interval2' row has input boxes with '3' for X and '2' for Y. The 'Dislocation' row has input boxes with '2' for both X and Y. Below the table, there are 'Mirror' options for H (Horizontal) and V (Vertical) with red and black squares. At the bottom, there are 'Read' and 'Write' buttons and the text 'Press<ENT> key.'

These settings can be used similar to multiple origins (see [§5.6.5 Setting Multiple Origins](#) on Page 73) to engrave multiple copies of a design during each session. The combined distance of the copies and intervals should not exceed the size of your engraving area.

To mirror each row of copies across the X axis, move the cursor to **H** and press **ENT** to toggle horizontal mirroring.

To mirror each column of copies across the Y axis, move the cursor to **V** and press **ENT** to toggle vertical mirroring.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters. Move the cursor to **Write** and press **ENT** to save the currently displayed values. Press **ESC** to exit without saving any changes.

# 5 Control Panel Instructions

## 5.7.6 Adjusting Automatic Feed Parameters

If an automatic feed is properly installed, this control system can be used to adjust its behavior. In the **File Paras** submenu, move the cursor to **Feeding Para** and press **ENT** to open the following interface:

**Auto Get Feed Length** enables and disables the automatic feed.

**Current Feed Length** displays the distance the feed moves your material each time.

**Feeding Times** sets the number of times the feed will move your material.

**Feeding Length** sets the distance the feed moves your material each time.

The screenshot shows a control panel interface for adjusting automatic feed parameters. It contains four input fields: 'Auto get feed' with a dropdown menu set to 'NO', 'Current feed length' with a numeric value of 100 and the unit 'mm', 'Feeding times' with a numeric value of 5, and 'Feeding length' with a numeric value of 100 and the unit 'mm'. At the bottom of the interface are two buttons labeled 'Read' and 'Write'.

Move the cursor to **Read** and press **ENT** to load the currently saved parameters.

Move the cursor to **Write** and press **ENT** to save the currently displayed values.

Press **ESC** to exit without saving any changes.

To adjust the speed and acceleration of an enabled automatic feed, see [§5.6 Fine Tuning Movement Parameters \(Main Menu\)](#) on Page 67.

## 5.7.7 Displaying Engraving Records

In either **File** menu, the number of times a design file has been run is displayed to the right of the file name.

- To clear this record for a single file stored on your engraver, move the cursor to **Clear Copies** and press **ENT**.
- To clear this record for all files stored on your engraver, go to the **Memory Operations** submenu, move the cursor to **Clear All File Copies**, and press **ENT**.

In the **Memory Operations** submenu, the total number of all copies of all designs is also provided at the bottom of the interface. To clear this record, move the cursor to **Zero** and press **ENT**.

## 5.8 Adjusting Other Parameters

Other user and factory parameters (such as axis signal polarity, emergency stop deceleration, etc.) can be adjusted using the engraving software on your control computer. Improper settings of these values, however, can cause malfunction, property damage, and even serious injury. **DO NOT** modify them except in coordination with customer service and technical support during troubleshooting. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any damage or injury caused by unsupervised adjustment of these parameters.

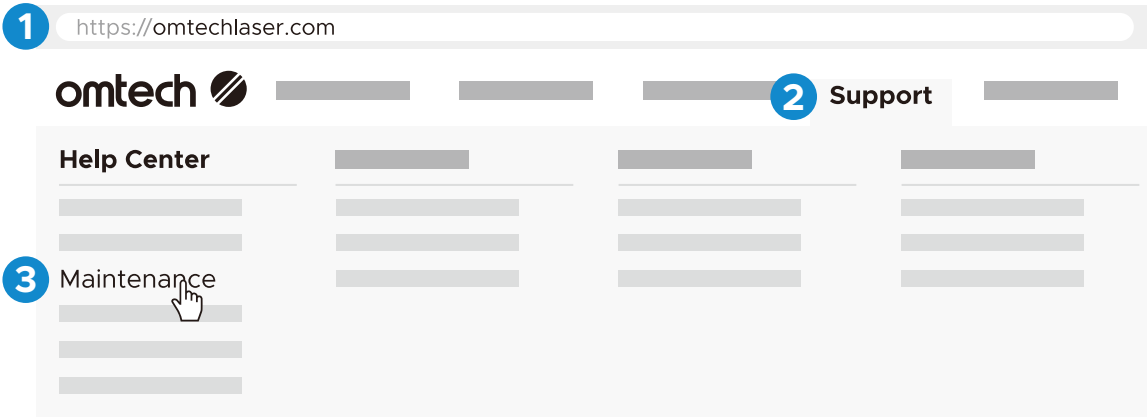
## 6 Maintenance



- Adjustment, maintenance, and repair of the electrical components of this machine 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 machine when it is turned off, disconnected from its power supply, and fully cooled. For maximum safety, wait about 3 minutes after turning the machine off before adjusting the integrated chiller or other electronic parts. This will allow time for the ground connection to clear any residual charge.

To ensure normal use of the laser machine, regular maintenance is essential. Handle with care during maintenance as it contains high-precision components, and follow each part's procedures closely to prevent damage.

For maintenance not listed in this manual, visit the **Maintenance** section on our website [omtechlaser.com](https://omtechlaser.com) where real-time updates are available to assist you.



## 6.1 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 on a daily basis.
- 3rd mirror and the focus lens must be checked every day and cleaned if required.
- The other mirrors, exhaust system, and air assist 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.

# 6 Maintenance

## 6.2 Cleaning

### 6.2.1 Cleaning the Main Bay and Engraver

**Cleaning Frequency:** After each use



- Disconnect the engraver from power before cleaning.
- Completely wipe dry the surfaces after cleaning.
- **NEVER** allow water to come into contact with the electronic elements.



\*Depending on what you've been engraving, you might need to clean the engraver more or less often. However, we suggest cleaning it after each use for the best results.

#### Tools Needed:

- Paper towel
- Mild detergent

#### Viewing Window

Clean 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.

#### Main Bay Interior

Clean thoroughly with paper towels, removing any debris or deposits.

#### Debris Tray

1. Turn off and unplug the engraver.
2. Slide out the tray.
3. Empty loose waste, rinse dust and fine debris off, dry, and replace the tray.

#### Other Surfaces

Dust the other surfaces with a soft cloth or clean them using a mild detergent and then wipe clean before further use.

## 6.2.2 Cleaning the Water System



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

Because distilled water can leach chemicals from your tank and/or hoses and spread these possibly corrosive particles to the laser tube, change your water each week regardless of its level or clarity to maximize your laser's service life.

While changing the water, clean the tank and pump completely to minimize any buildup of residue or chemicals.

1. Turn off the laser engraver and unplug the pump.
2. Open the water tank, remove the pump, and clean both.
3. Disconnect the pump's hose, allowing it to drain, and clean it if needed.
4. Reconnect the hose and replace the pump inside the tank.
5. Add your new water to the tank.
6. Plug the pump in again and allow it to run for 2–3 minutes to restore the water throughout the engraver's cooling system.

Before starting the laser, visually confirm water is running through the laser tube without bubbles and check the water temperature.

## 6.2.3 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. If not clean, your laser will be less efficient and heat buildup on the oil or dust itself can damage the lens.

**Cleaning Frequency:** After each use

**Tools Needed:**

- Lens-cleaning liquid
- Lens tissue or cloth
- The focus lens repair tool

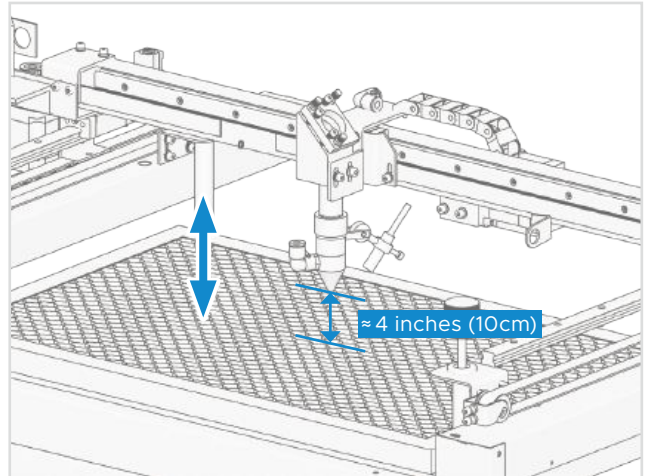


- Disconnect the engraver from power before cleaning.
- Completely wipe dry the surfaces after cleaning.
- **NEVER** allow water to come into contact with the electronic elements.
- Be careful in all of the following steps not to directly touch the lens surface with your hands or any dirty, oily, or abrasive surface. Use lens-safe gloves or cloths only.

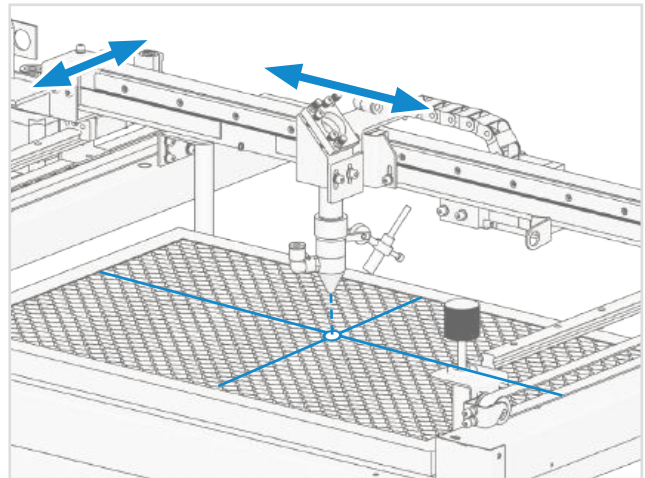
# 6 Maintenance

## Detaching the Focus Lens

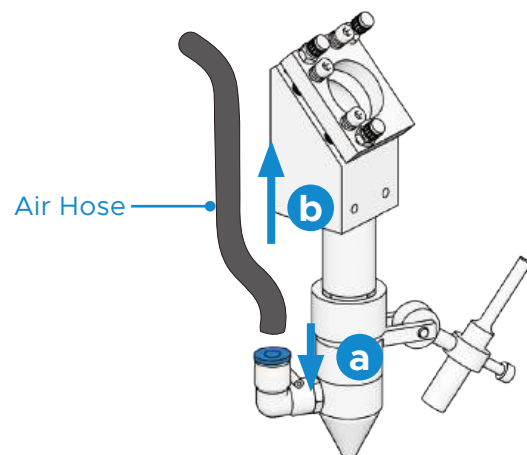
1. Move the engraving table to a distance of approximately 4 inches (10 cm) under the lens holder.



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.

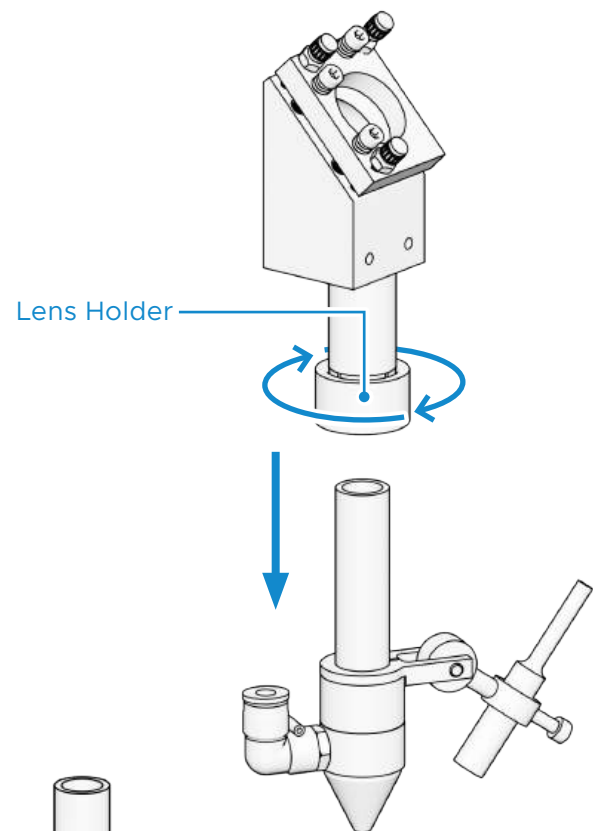


3. Remove the pressurized air hose by pressing down on the sleeve of the air hose connector while pulling the tube upward.

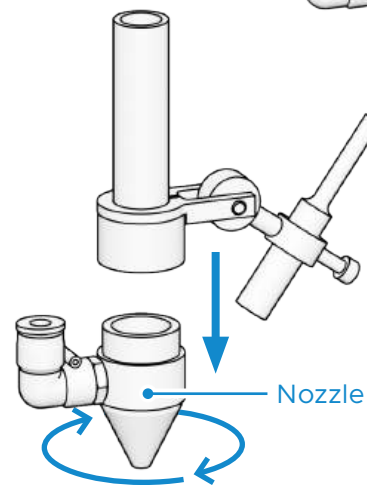




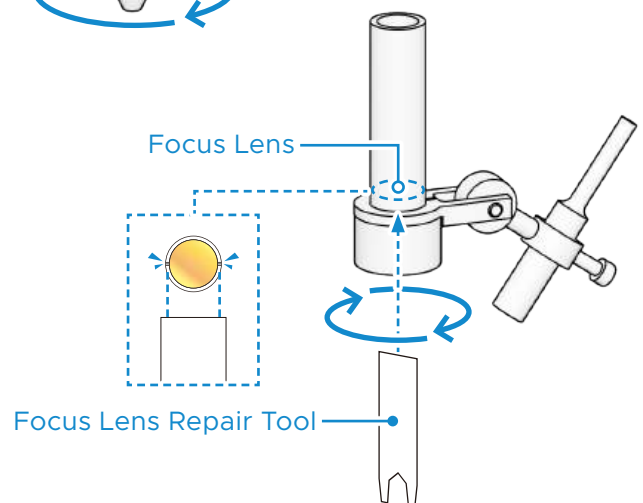
4. Remove the laser guide connections by unscrewing the lens holder counterclockwise.



5. Remove the nozzle by rotating it toward you.



6. Remove the lens from the lens holder by turning the lens holder lock ring counterclockwise with the focus lens repair tool (not included) and letting the lens and its O-ring drop onto the cleaning cloth.



# 6 Maintenance

## Cleaning the Focus Lens and Its O-Ring

1. Examine the lens surface, remove coarse dust as well as possible by blowing air onto the lens surface and, if necessary, clean it with the lens cleaning liquid and lens tissue or cloth as below.
  - a. Put the lens on a clean lens-cleaning tissue.
  - b. Put some lens-cleaning liquid on one side of the lens.
  - c. Leave the liquid to take effect for approximately one minute.
  - d. Gently wipe the liquid away with lens-cleaning tissues soaked with lens-cleaning liquid.
  - e. Dry this side of the lens with dry lens-cleaning tissues/cloth.
2. 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.

3. Examine the O-ring and, if necessary, clean it with a cotton bud and a lens-cleaning tissue or cloth.
4. Examine the O-ring and lens to ensure they are clean. If any dirt remains, repeat the cleaning process until both are thoroughly clean.



Do not touch the surface of the lens after cleaning.

## Reattaching the Focus Lens

1. Carefully insert the lens into the lens holder, ensuring that its rounded convex side is facing upwards.
2. Put the O-ring on top of the lens.
3. Carefully reassemble the lens lock ring, the laser guide connection, and the pressurized air hose in reverse order.

## 6.2.4 Cleaning the Mirrors and Beam Combiner Lens

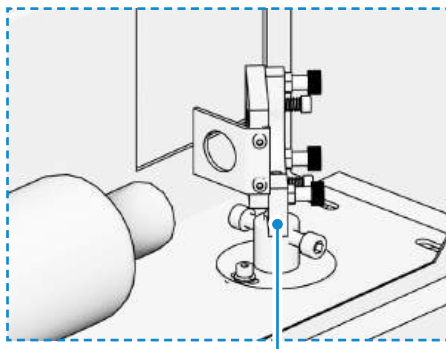
The mirrors should be similarly cleaned if there is any debris or haze on their surface. Otherwise, your laser will be less efficient and could have permanent damage on the mirrors.

**Cleaning Frequency:** Once a week, after each use

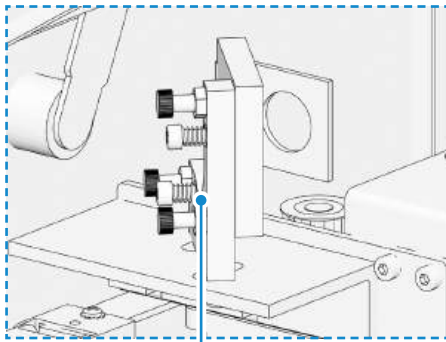
**Tools Needed:**

- Lens-cleaning liquid
- Lens tissue or cloth

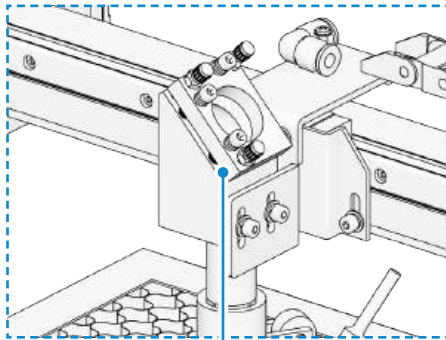
This machine has 3 mirrors and one beam combiner lens used during working, for their locations and cleaning methods, see below:



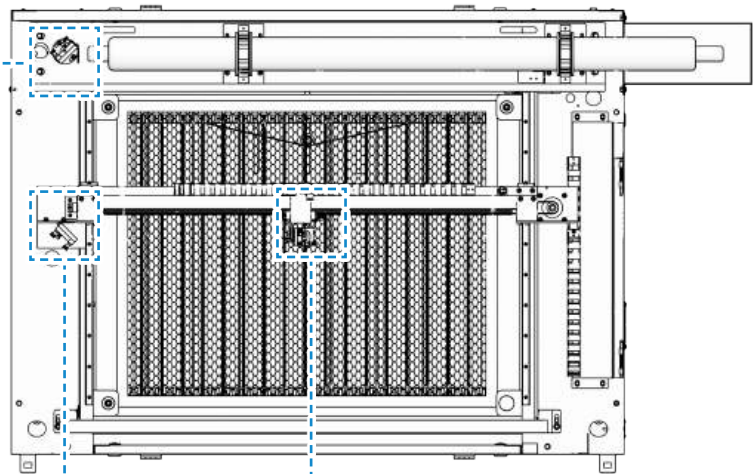
1st Mirror




2nd Mirror



3rd Mirror



## 6 Maintenance

Mirror Name	Mirror Location	Cleaning Method
1st Mirror	In the back left of the machine beyond the far end of the Y axis	<div>  <ul style="list-style-type: none"> <li>• Avoid press hard enough to grind any debris or cause scratching.</li> <li>• 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.</li> <li>• Take care not to touch the surface of any mirror directly.</li> </ul> </div>
Beam Combiner Lens	The end of the laser tube closest to 1st Mirror	
2nd Mirror	On the Y axis at the left end of the X axis	
3rd mirror	On top of the laser head on the X axis	<p>Clean with lens-cleaning tissue or with cotton wetted with lens-cleaning liquid or isopropyl alcohol in gentle circular motions.</p> <p>The 3 positioning mirrors can be cleaned in place or removed for cleaning by turning them counterclockwise.</p> <p>If any mirrors are removed for cleaning, reinstall them by turning them into place clockwise carefully.</p>

## 6.2.5 Cleaning the Exhaust System

Check and clean the exhaust pipes and fans. The rate of dust accumulation on the exhaust fan and pipe will vary depending on the materials processed and the working environment's air quality.

**Cleaning Frequency:** Weekly

**Tools Needed:**

- Dust brush
- Mild cleanser
- Vacuum
- Soft cloth
- Water
- Caulk



- Disconnect the engraver from power before cleaning.
- Allow the fluid used for cleaning to dry completely before reusing.

1. Check the exhaust fan and surrounding pipes for excessive accumulation of dust and debris.
  - a. Use a brush, vacuum, or compressed air to remove large accumulation of dust and debris.
  - b. Use mild cleansers and soft rags or paper towels to fully clean the fan and its blades.
2. Check the seams and joints of the pipes for any damage or leaks. If any found, immediately repair them. Caulk or special-purpose aluminum foil tape generally works best if available; standard duct tape can deteriorate over time, especially near heated components.

# 6 Maintenance

## 6.3 Water Cooling System



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



Always fill the water tank with deionized or distilled water or a custom-purpose laser-safe antifreeze. Using tap water for any purpose but rinsing out cleansers (see [§7.2.2 Cleaning the Cooling System](#) above) will gradually degrade the quality of your engraver and may even cause dangerous mineral buildup within the cooling system. Never use generic antifreeze for the same reason.

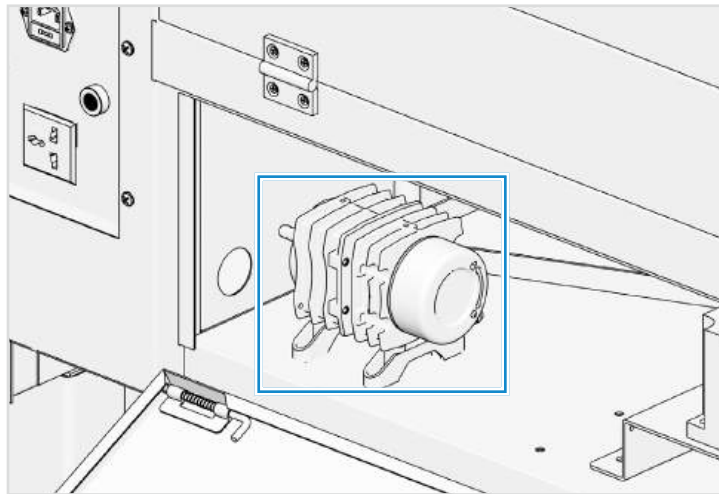
Always make sure the water cooling system is in good conditions by doing the following checks:

- 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 lasersafe coolant to avoid overheating. Check that the tank is at least 2 gallons (7.5 L) of water before and after each use.
- 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
- Ensure that the temperature of the cooling water does not fall below the dew point of the surrounding air to prevent condensation. Here are some tips to prevent condensation:
  - ✧ Use a hygrometer to monitor the temperature and humidity levels in the environment.
  - ✧ If possible, increase the ambient temperature to be lower than the temperature of the cooling water.
  - ✧ Lower the relative humidity of the room, for instance, by using a dehumidifier.
  - ✧ Insulate the cooling water pipes to reduce the likelihood of their surfaces falling below the dew point.
  - ✧ Regularly check the cooling system to ensure it is operating at optimal conditions.

Adjust the above measures appropriately according to your specific environment and equipment requirements.

## 6.4 Air Assist

Your air assist should arrive preinstalled and correctly wired. Simply check that it is correctly configured and connected every month. 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.

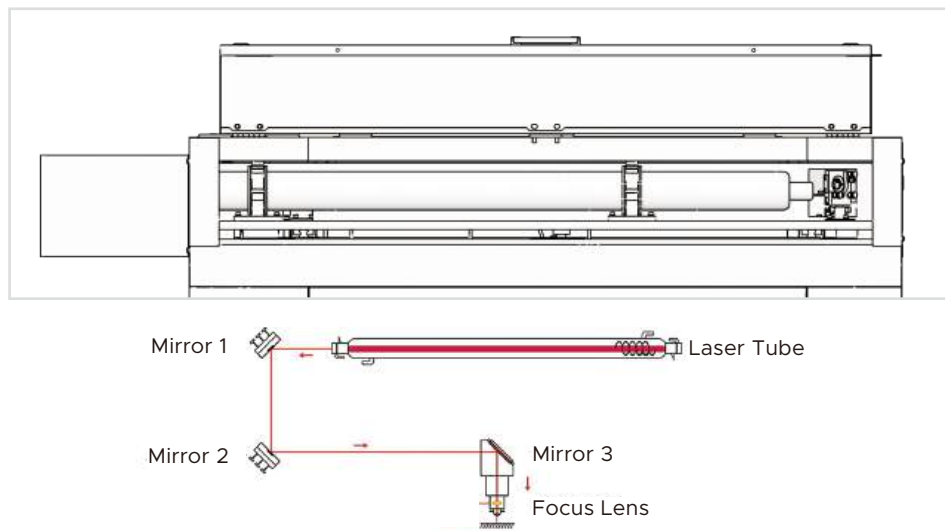


# 6 Maintenance

## 6.5 Laser Path Alignment

Having a perfectly aligned laser path is paramount to your engraver's overall performance. Each of the pro-line series went through a complete beam alignment before shipping. Upon first arrival and about once a week during normal operation, however, it is recommended that the alignment be checked. Refer to the diagram below for the basics of the alignment.

This machine went through a complete beam alignment before shipping. However, when the engraver first arrives and about once a week during normal operation, 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. Refer to the diagram below for the basics of the alignment.



The normal alignment procedures are as below:



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.



1. Place a piece of tape at each stage of the laser path. **DO NOT** place the tape directly onto the mirror.
2. Turn on the machine.
3. Set the Max. Power (not Min.) parameter to 15% or lower. Any higher percentage will cause the laser to ignite the testing tape instead of marking it.
4. Press **Pulse** to manually fire the laser and confirm that the stages remain correctly aligned.

When it is not, use the laser tube's brackets or the setscrews 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.

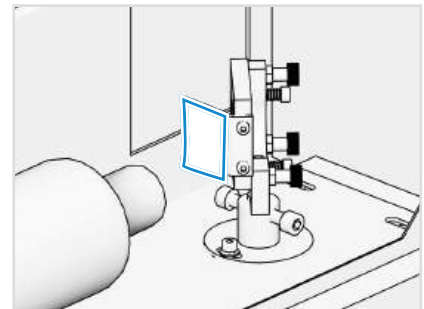
### 6.5.1 Laser Tube Alignment

The laser tube is where the laser beam is generated. Once emitted from the tube, the laser hits 1st Mirror first. Follow the steps below to check the laser hits 1st Mirror right in the center.



- Wear safety goggles during the entire aligning process.
- Avoid attaching the tape directly to any of the mirrors.
- Less than 15% of the maximum power (not Min.) should be sufficient to leave a clear mark without setting the testing tape on fire.
- Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Always close the cover before firing the laser. Do not look directly at the active laser through the cover during this procedure.

1. Cut out a piece of masking tape and place it on the mirror's frame. **DO NOT** place the tape directly onto the mirror.
2. Turn on the machine.
3. Set the Max. Power (not Min.) parameter to 15% or lower.



## 6 Maintenance

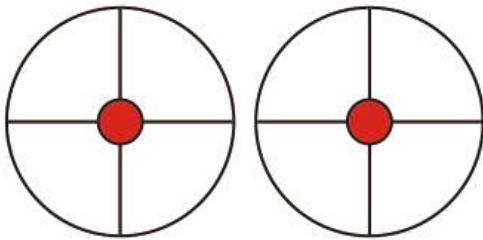
- Press **Pulse** to manually fire the laser and observe if the laser mark is centered on the tape as below. If so, then the laser tube is aligned with 1st Mirror; if not, continue to step 5.



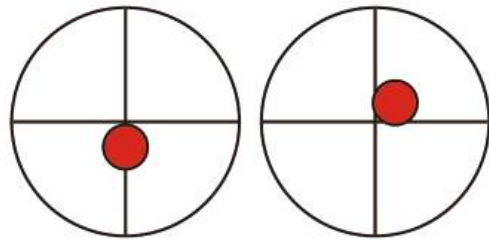
You should be able to see a small mark on the tape. If it is not noticeable, press Pulse again.



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.

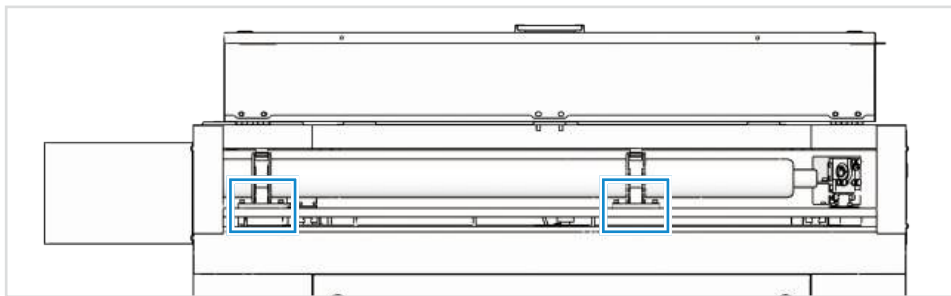


These marks are OK.



These marks require adjustment.

- Cut the power to your laser.
- Loosen the screws on its stand and place a shim under the bracket to raise the laser tube. Be careful not to over-loosen the setscrews and not to overtighten them. Only adjust one stand at a time.



- Repeat steps 1, 2, 4, 5, and 6 until the burnt hole is at the perfect center of the masking tape.
- Retighten the setscrews.

## 6.5.2 1st Mirror Alignment



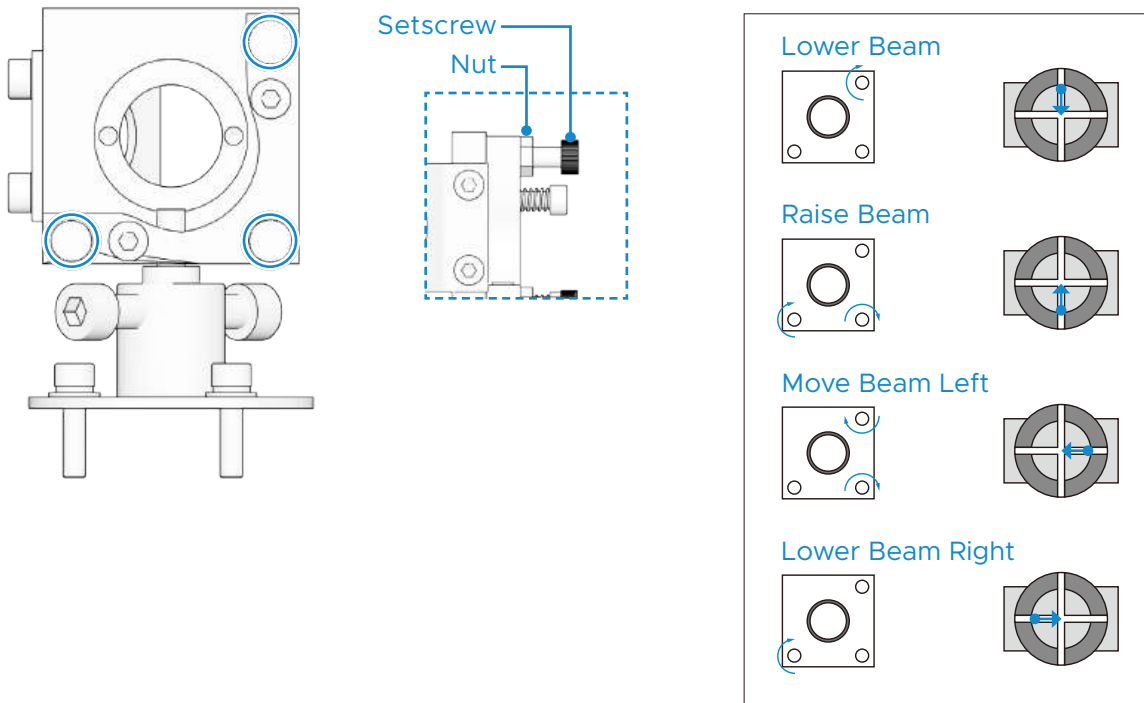
- Wear safety goggles during the entire aligning process.
- Avoid attaching the tape directly to any of the mirrors.
- Less than 15% of the maximum power (not Min.) should be sufficient to leave a clear mark without setting the testing tape on fire.
- Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Always close the cover before firing the laser. Do not look directly at the active laser through the cover during this procedure.

After ensuring the laser is well aligned between the laser tube and 1st Mirror, check the alignment between 1st Mirror and 2nd Mirror.

1. Use the direction arrows on the control panel to send 2nd Mirror to the **BACK** of the bed along the Y axis.
2. Place a piece of masking tape on 2nd Mirror's frame. **DO NOT** place the tape directly onto the mirror.
3. Press **Pulse** to manually fire the laser and observe if the burnt hole is at the center of the masking tape on 2nd Mirror. If so, 1st Mirror and 2nd Mirror are aligned; if not, continue to step 4.

## 6 Maintenance

4. Adjust 1st Mirror's set setscrews accordingly.
  - a. Loosen the nut on the setscrew.
  - b. Slightly turn the setscrew 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  $\frac{1}{4}$  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.

5. Use the direction arrows on the control panel to send 2nd Mirror to the **FRONT** of the bed along the Y axis.
6. Repeat steps 3 and 4 until the beam is well aligned. Replace the tape when necessary.
7. Retighten the nuts on the setscrews.

### 6.5.3 2nd Mirror Alignment



- Wear safety goggles during the entire aligning process.
- Avoid attaching the tape directly to the mirror.
- Less than 15% of the maximum power (not Min.) should be sufficient to leave a clear mark without setting the testing tape on fire.
- Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Always close the cover before firing the laser. Do not look directly at the active laser through the cover during this procedure.

After ensuring the laser is well aligned between 1st Mirror and 2nd Mirror, check the alignment between the 2nd Mirror and 3rd mirror.

1. Use the direction arrows on the control panel to send 3rd mirror to the **LEFT** of the bed along the X axis.
2. Place a piece of tape on 3rd mirror's frame. **DO NOT** place the tape directly onto the mirror.
3. Press **Pulse** to manually fire the laser and observe if the burnt hole is at the center of the tape on 3rd mirror. If so, 2nd Mirror and 3rd mirror are aligned; if not, continue to step 4.
4. Adjust 2nd Mirror's set setscrews accordingly as in [§6.5.2 1st Mirror Alignment](#) on Page 100.
5. Use the direction arrows on the control panel to send 3rd mirror to the **RIGHT** of the bed along the X axis.
6. Repeat steps 3 and 4 until the beam is well aligned. Replace the tape when necessary.
7. Retighten the nuts on the setscrews.

# 6 Maintenance

## 6.5.4 3rd mirror Alignment



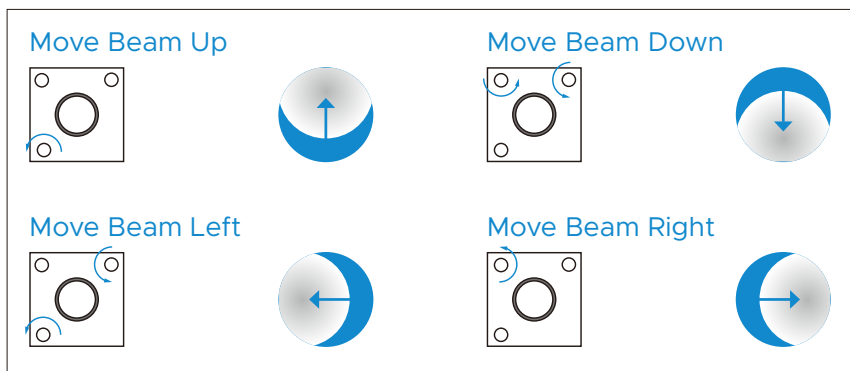
- Wear safety goggles during the entire aligning process.
- Avoid attaching the tape directly to the mirror.
- Less than 15% of the maximum power (not Min.) should be sufficient to leave a clear mark without setting the testing tape on fire.
- Always make sure the path is clear between the laser and its target. Never allow foreign objects between the laser and its target. Always close the cover before firing the laser. Do not look directly at the active laser through the cover during this procedure.

After ensuring the laser is well aligned between 2nd Mirror and 3rd mirror, check the alignment between 3rd mirror and the workbed.

1. Unplug the air assist hose from the laser head.
2. Place a piece of masking 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.
3. Lay the tape right under the laser aperture and on top of the laserable scrap.
4. 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.

If the burnt hole is at the center of the masking tape, 3rd mirror and the workbed are aligned; if not, continue to step 4.

5. Adjust 3rd mirror's setscrews accordingly as in §6.5.2 1st Mirror Alignment on Page 100.



6. Repeat steps 2, 3, and 4 until the hole is at the center of the masking tape.
7. Retighten the nuts on the setscrews.
8. Replug the air assist hose to the laser head.
9. Turn off the machine.

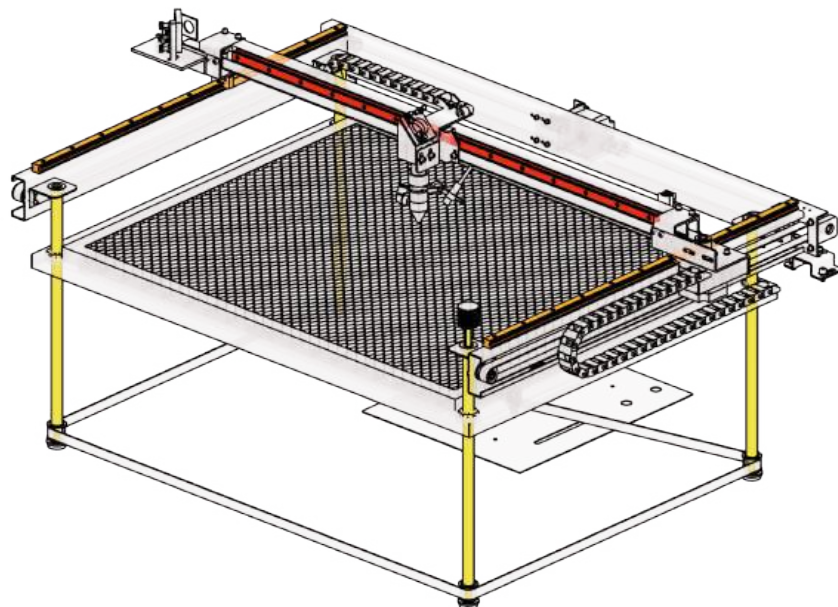
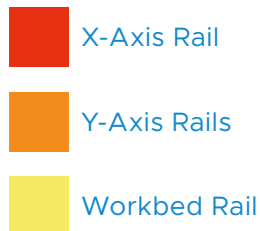
## 6.6 Lubrication

### 6.6.1 Rail

**Lubrication Frequency:** Every two weeks

**Tools Needed:**

- Cotton cloth
  - White lithium grease
1. Disconnect the engraver from power.
  2. Gently move the laser head out of the way.
  3. 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.
  4. Lubricate both the rails and screws with white lithium grease.
  5. Gently move the laser head and X axis to coat the lubricant evenly along both rails.
  6. Raise and lower the workbed to distribute the lubricant evenly along the screws.



# 6 Maintenance

## 6.6.2 Workbed Elevation Bolts

**Lubrication Frequency:** Every two weeks

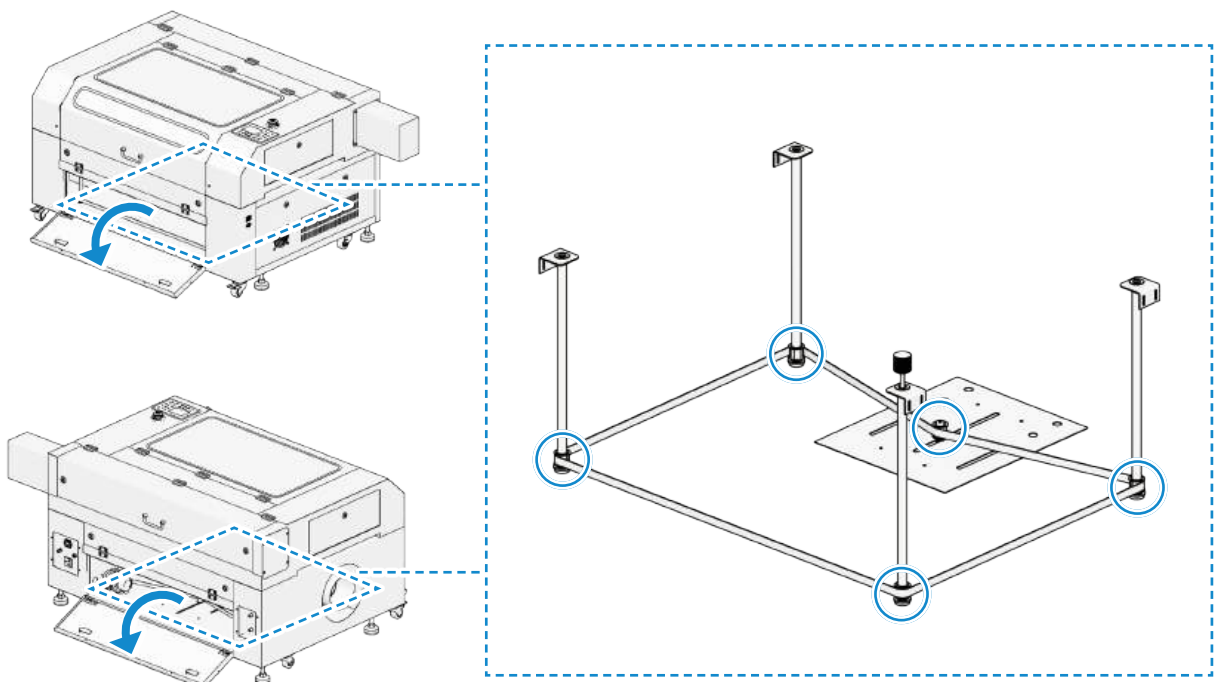
**Tools Needed:**

- Cotton cloth
- White lithium grease



**KEEP YOUR HAND CLEAR OF THE MOVING WORKBED WHILE APPLYING GREASE.**

1. Disconnect the engraver from power.
2. Open the rear access door to access the ball screws.
3. Clean any contaminated grease off the ball screws using a piece of cloth.
4. Apply some new lithium grease at the middle of the ball screws.
5. Move the workbed along its full stroke of motion along the ball screws to distribute the lubricant evenly along the ball screws.





## 6.7 Parts Replacement

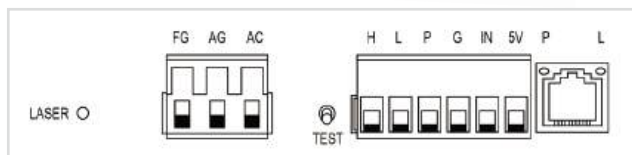


- Be sure only to use identical or compatible replacement parts with this engraver. Contact your vendor or our technicians if you have any questions about fitment. Using incompatible components is highly dangerous and waives all the manufacturer's liability for any damage or injury caused.
- **ALWAYS** completely disconnect the engraver from its power supply before replacing any parts.

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.

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, refer to the following diagram:



**FG:** Ground Wire for the Mains and Case

**AC<sub>1</sub>:** Neutral Wire to the Main Power

**AC<sub>2</sub>:** Live Input from the Main Power

**H:** Connection for Active-High Devices

**L:** Connection for Active-Low Devices (like this machine)

**P:** Line to the Trigger, Water, & Other Systems (like the door switch)

**G:** Ground Wire for the Control System, PWM Level Shifters, Potentiometers, &c.

**IN:** Input Power for PWM Level Shifters or Potentiometers

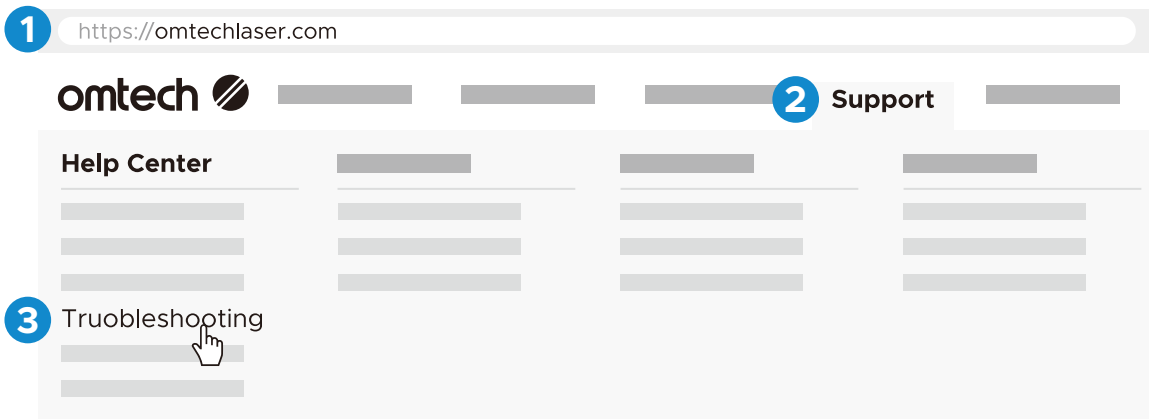
**5V:** 5V Connection for Digital Signals

## 7 Troubleshooting



- Adjustment, maintenance, and repair of the electrical components of this cutter 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 cutter when it is turned off, disconnected from its power supply, and fully cooled. For maximum safety, wait about 3 minutes after turning the machine off before adjusting the integrated chiller or other electronic parts. This will allow time for the ground connection to clear any residual charge.

For common issues and solutions, visit the **Troubleshooting** section on our website [omtechlaser.com](https://omtechlaser.com) where real-time updates are available to assist you.







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