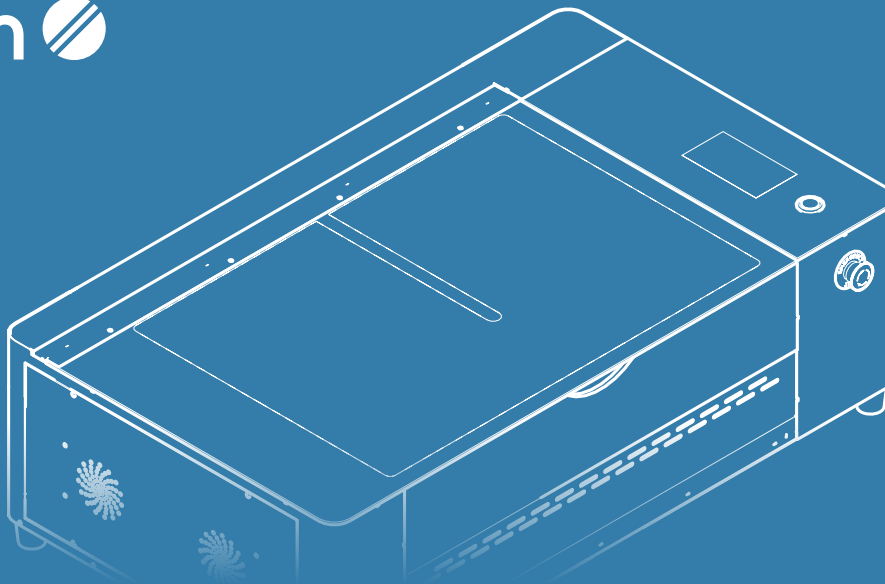




Polar 2

CO₂

Desktop Laser Engraver

User Manual

Read Carefully Before Use
Keep for Future Reference

BEAMING WITH POSSIBILITIES



@omtechlaser



We care about your experience!

If you encounter any issues with your engraver, visit our Help Center or join our official laser group for helpful hints and instructional videos.

Help Center

help.omtech.com



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

If the issue remains unresolved, please contact our **support team**.

To request assistance, simply fill out the form below, take a photo of it (along with any relevant photos or videos if needed), and email it to us. Our service team will respond within **24 hours** to resolve your concerns.

Platform ☐ Amazon ☐ eBay ☐ Walmart ☐ Wayfair ☐ Other: _____ (please specify)

Order Information Order Number: _____

Tracking Number: _____

Recipient Name: _____

Purchase Date: _____

Subject of Inquiry _____

Website:
omtech.com

Technical Support Email:
support@omtech.com

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

Address:
Rygel Advanced Machines, 1940 E Deere
Ave, Ste 100, Santa Ana, CA 92705, USA

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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. 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.

2. 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 shall not be responsible for any violations of laws or regulations resulting from the use of OMTech products.

3. 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.

Regular maintenance should be performed throughout the lifecycle of OMTech products. You are responsible for ensuring the products operate as intended.

Always wear appropriate protective gear.

4. 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 and/or warranties (if any) for any third-party products used.

5. 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.

6. Warranty

Refer to the sales page for warranty information.

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 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.



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



These items address similarly serious concerns about the laser beam.



These items address similarly serious concerns about electrical components.



These items address similarly serious concerns about fire hazards.



These items address pinching and crushing hazards.



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



These items address tips that help.



This product is sold in conformity with applicable EU regulations.



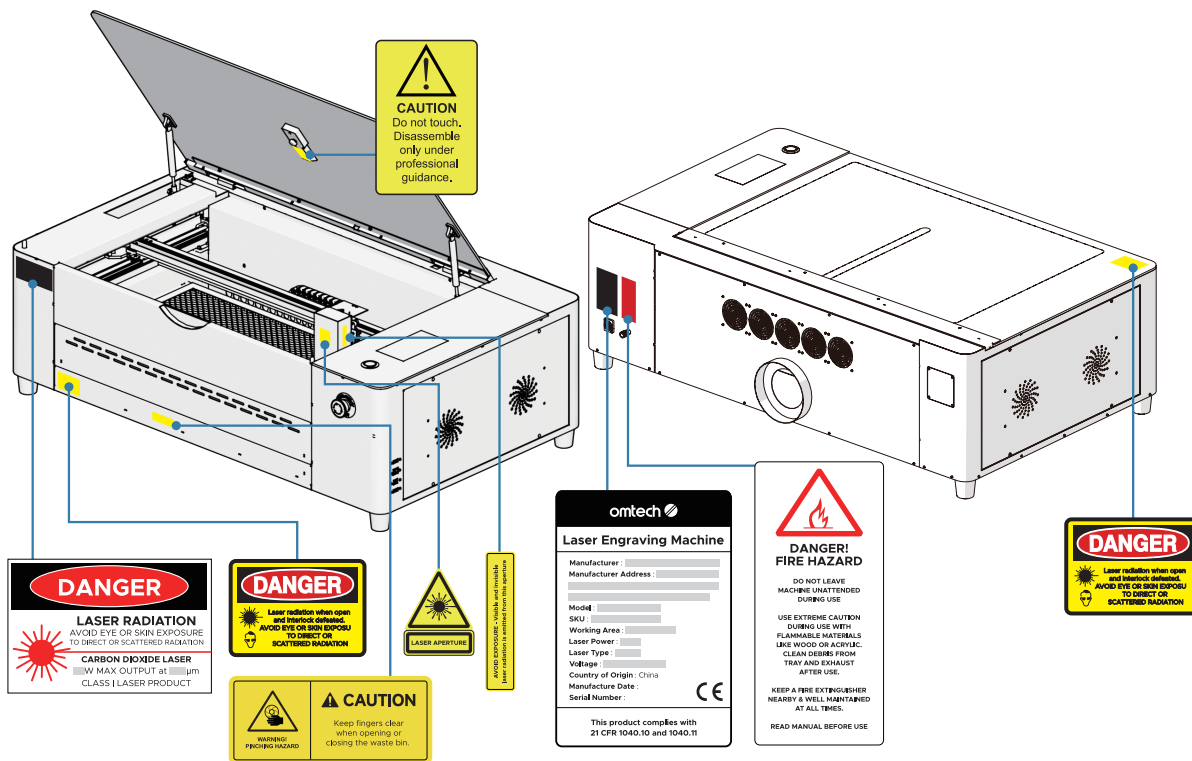
This product contains electrical components that should not be disposed of with regular garbage.

1.3 Safety Instruction Labels

Water-Cooling Model



Air-Cooling Model



Replace these labels if they are missing, illegible, or damaged.

1 Safety Information

1.4 General Safety Instructions



- **ALWAYS** keep a fire extinguisher, water hose, or other flame-retardant system nearby in case of emergencies. Ensure that the phone number of your local fire department is clearly displayed in the vicinity. In the event of a fire, cut the electrical power before attempting to extinguish the flames. Before using an extinguisher, familiarize yourself with its proper range. Avoid using the extinguisher too close to the flame, as the high pressure could cause blowback and worsen the situation.
- **DO NOT** allow minors, untrained personnel, or anyone with a physical or mental impairment that precludes their ability to follow this manual and the software manual to install, operate, maintain, or repair this device.
- This machine can be used by children aged 8 years and older, and by persons with reduced physical, sensory, or mental capabilities, or those lacking experience and knowledge, provided they are supervised or have been instructed on how to use the machine safely and understand the risks involved.
- Children should **NOT** play with the machine.
- Cleaning and user maintenance must **NOT** be carried out by children without supervision.
- Keep the machine and its cord out of the reach of children under 8 years old.



- Use this laser engraving device **ONLY** in accordance with **ALL** applicable local and national laws and regulations.
- Use this device **ONLY** in accordance with this instruction manual and the manual for the engraving software included. **ONLY** allow this device to be installed, operated, maintained, repaired, etc. by others who have also read and understood both manuals. Ensure that this manual and the software manual are included with this device if it is ever given or sold to a third party.
- Any untrained personnel near this device during operation **MUST** be informed about its dangers and **FULLY** instructed on how to avoid injury during use.



- Polar's wireless network is a certified transmitter module in the United States that emits radio signals in compliance with 47 CFR 15 for commercial locations. Still, operators may be required to provide additional equipment in residential areas to avoid interfering with emergency and FCC-licensed broadcasts. Similarly, the Safe Use of Lasers (Z136) standards published by the American National Standards Institute do not have the force of law. Still, some companies or local authorities may require adherence to its provisions to minimize risk and liability. In particular, it may be necessary in commercial settings to formally designate a laser safety officer, to post warning signs in areas with active lasers, and to document that all operators of laser equipment have been adequately trained.
- For the water-cooled model, **DO NOT** operate this engraver with its cooling liquid hotter than 104 °F (40 °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.

1.5 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 according to these instructions, the machine is classified as a Class I laser product. However, the invisible engraving laser, the laser tube, and their electrical connections remain extremely dangerous. Unauthorized adjustments, controls, or procedures not specified in this manual may result in hazardous radiation exposure.

Improper use of the machine can lead to serious property damage and personal injury, including—but not limited to—the following:

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



- **DO NOT** modify or disable this device's safety features or disassemble the laser machine. **ONLY** trained and qualified professionals are authorized to perform repairs may repair it. Modifying, adjusting, or using incompatible equipment may result in dangerous radiation exposure and other serious injuries.
- **NEVER** leave any part of the engraver open during operation, except for the pass-through doors when necessary. Never interfere with the laser beam or place any part of your body in its path during operation. When using the pass-through doors or when there is a risk of exposure to the laser beam, always wear personal protective equipment (PPE), including protective eyewear specifically designed to filter the wavelength of your engraver's laser. The eyewear should have 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 2 laser in its own right.
- **ONLY** use this engraver if its automatic shutoffs are functioning properly. When you first get this engraver and whenever you notice any issues, test the shutoffs (see the complete user manual) before proceeding with any other work. Do not continue use if the shutoffs fail to engage. If this occurs, turn off the device immediately 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 cooling system is not working properly. Always activate the cooling system before turning on the laser tube. Immediately stop use if the cooling system malfunctions.
- For the water-cooled model, **DO NOT** use generic coolant or antifreeze in your cooling water, as they may leave corrosive residues and solidify inside your hoses and piping, causing malfunctions and even explosions. Use custom laser-safe formulations or use and store your engraver in a climate-controlled area.



- **DO NOT** 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 when working with materials listed in the Material Safety section of this manual. The laser settings and engraving process must be properly adjusted for specific materials.
- Ensure the area is kept free of other airborne pollutants, as they also pose a risk of reflection, combustion, etc.



- **ONLY** use this device with a compatible and stable power supply with less than **5%** fluctuation in its voltage.
- **DO NOT** connect other devices to the same circuit, as the laser system will require its full amperage. **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. 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 engraver. 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.
- **NEVER** leave this machine unattended when it is connected to a power supply. If it behaves abnormally, immediately cut off **ALL** power to the machine and contact our customer service or your dedicated repair service. **ALWAYS FULLY** power off the machine (including using the emergency stop switch) after each use.
- If the supply cord is damaged, the machine should be scrapped or have the cord replaced by the manufacturer, its service agent or similarly qualified persons in order to avoid hazards.

1.6 Electrical Safety Instructions

1 Safety Information



- The area around this laser engraving device should be kept dry, well-ventilated, and environmentally controlled to keep the ambient temperature between **40–104 °F (5–40 °C)**. For best results, keep the temperature at **75 °F (25 °C)** or below. The ambient humidity should not exceed **20–85%**.
- For the water-cooled model, **DO NOT** handle your water pump or the water it's submerged in 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 device must be done **ONLY** by trained and qualified 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, **ALWAYS** perform adjustments, maintenance, and repairs of the device when it is turned off, disconnected from its power supply, and fully cooled.



- Users are responsible for ensuring 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 device to process polyvinyl chloride (PVC), Teflon, or other halogen-containing materials under **ANY** circumstances.
- Users are responsible for ensuring that every person present during operation has sufficient PPE to avoid injuries from the emissions and byproducts of the materials being processed. In addition to the protective laser eyewear mentioned above, you may also need goggles, masks or respirators, gloves, and other protective outer clothing. Always wear hand protection when working with metal to avoid cuts and burns.



- Never use this laser engraver under any circumstances if the exhaust system is not functioning properly. **ALWAYS** ensure that the exhaust fans can remove the dust and gas produced by the engraving process in accordance with **ALL** applicable local and national laws and regulations. Immediately stop use if the exhaust fans or vent pipes malfunction. Periodically check the air assist intake filter to ensure it stays free of any dust or debris.
- Exercise special caution when working with conductive materials as the buildup of their dust and ambient particles may damage electrical components, cause short circuits, or produce other effects including reflected laser radiation.
- **DO NOT** use high power settings at very low speeds when engraving highly flammable materials. Instead, use more repetitions of your design at low power settings to achieve a similar effect.

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

CAN be used

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.

This machine **CANNOT** be used with **THE FOLLOWING MATERIALS OR ANY MATERIALS THAT INCLUDES THEM:**

CANNOT 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.

Get OMTech Certified Laser-Grade Materials



Amazon Store



Official Store



1.8 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. Contact your local authorities or dealer for advice.

2 Technical Specifications

Model			Polar 2	Polar 2
Cooling Method			Water Cooling	Air Cooling
Input Power			AC 110–120 V, 60 Hz	AC 110–120 V, 60 Hz
Expected Service Life at <40% / 40–70% / >70% Power			10,000 h / 6,500 h / 1,500 h	30,000 h / 25,000 h / 20,000 h
Laser	Type		CO ₂ Laser	CO ₂ Laser
	Rated Power		70 W	50 W
	Class		Class 4	Class 4
	Wavelength		10.6 μm (10,600 nm)	10.6 μm (10,600 nm)
Laser Tube	Type		Glass Tube	RF Tube
	Size		Ø2.4 × 40.2 in (Ø60 × 1020 mm)	17.1 × 3.6 × 5.7 in (435 × 92.5 × 145 mm)
Mirror	Diameter	1st & 2nd Mirrors	0.98 in (25 mm)	0.98 in (25 mm)
		3rd Mirror	0.79 in (20 mm)	0.79 in (20 mm)
	Thickness		0.12 in (3 mm)	0.12 in (3 mm)
Focus Lens	Diameter		0.71 in (18 mm)	0.71 in (18 mm)
	Thickness		0.08 in (2 mm)	0.08 in (2 mm)
	Focal Length		2 in (50.8 mm)	2 in (50.8 mm)
Processing Area (L × W)			28 × 14.2 in (710 × 360 mm)	28 × 14.2 in (710 × 360 mm)
Max Material Thickness			4.9 in (125 mm)	4.5 in (115 mm)

Max Processing Speed	X-Axis	47.2 ips (1200 mm/s)	78.7 ips (2000 mm/s)
	Y-Axis	19.7 ips (500 mm/s)	19.7 ips (500 mm/s)
Min Letter Size		0.04 × 0.04 in (1 × 1 mm)	0.04 × 0.04 in (1 × 1 mm)
Processing Accuracy		±0.02 mm	±0.02 mm
Integrated Water Pump	Capacity	1.1 gal (4.3 L)	/
	Flow Rate	3.4 gal/min (13 L/min)	/
Integrated Air Assist	Port Diameter	0.24 in (6 mm)	0.24 in (6 mm)
	Air Flow	0.5–0.6 cfm (14–17 L/min)	0.5–0.6 cfm (14–17 L/min)
Integrated Digital Camera	Max Resolution	16 MP	16 MP
	Field of View	28 ×14.2 in (710 × 360 mm)	28 ×14.2 in (710 × 360 mm)
	Accuracy	±0.04 in (±1 mm)	±0.04 in (±1 mm)
Operating Environment	Humidity Range	20–85%	20–85%
	Temperature Range	40–104 °F (5–40 °C)	40–104 °F (5–40 °C)
Compatible Operating Software		LightBurn (Windows, Mac, Linux), RDWorks V8 (Windows)	
Applicable Image Formats		.svg, .dxf, .plt, .ai, .jpg, .bmp, etc.	.svg, .dxf, .plt, .ai, .jpg, .bmp, etc.
Dimensions		46.4 × 27.3 × 14.3 in (117.8 × 69.3 × 36.3 cm)	46.4 × 27.3 × 14.3 in (117.8 × 69.3 × 36.3 cm)
Net Weight		216.1 lb (98 kg)	220.5 lb (100 kg)

3 Package List



Laser Engraver



or

Power Cable



USB Camera Cable



Ethernet Cable



USB Communication
Cable



Duct Fan



Rotary Axis



Exhaust Pipes



Pipe Clamps



USB Drive

For Water Cooling
Models Only



Fuses



Wood Boards



Acrylic Blanks



Cardboards



Hex Wrenches



Double-Sided Tape



Lens Removal Tool

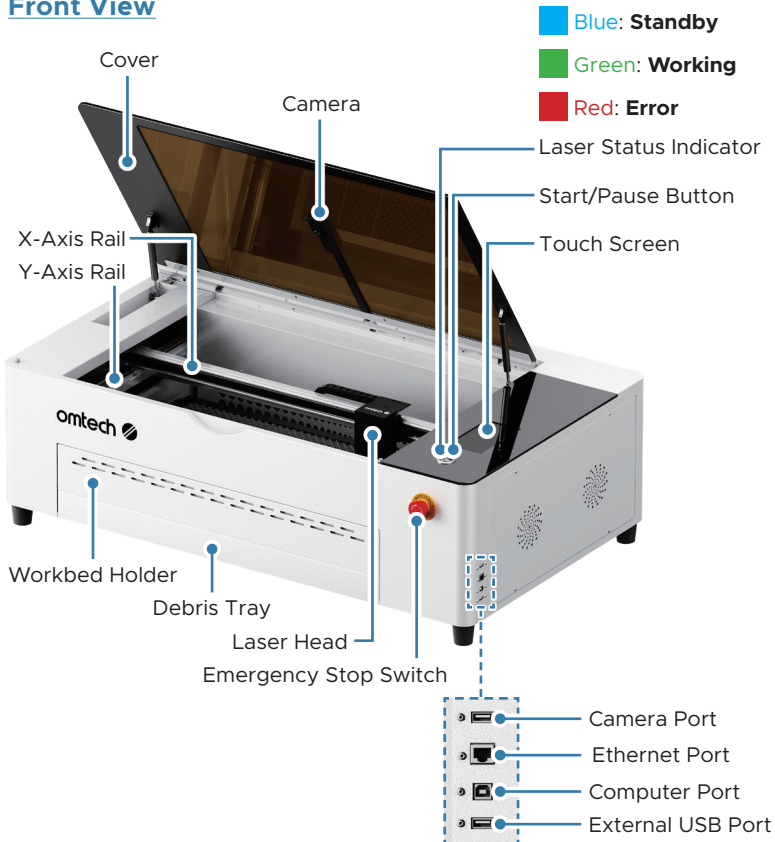


Focusing Rulers

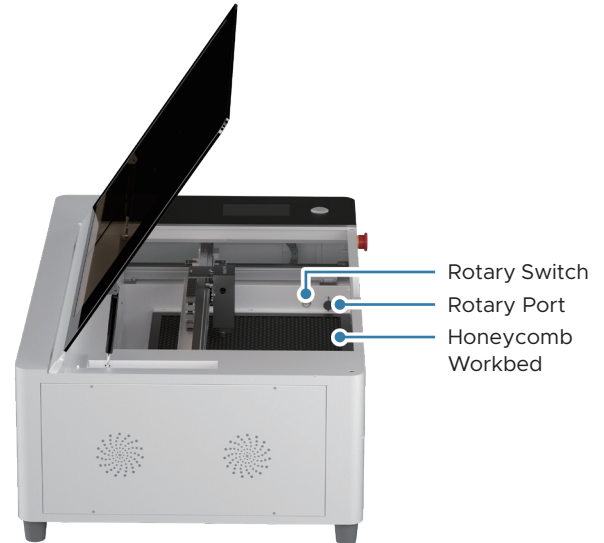
4 Components

4.1 Main Parts

Front View



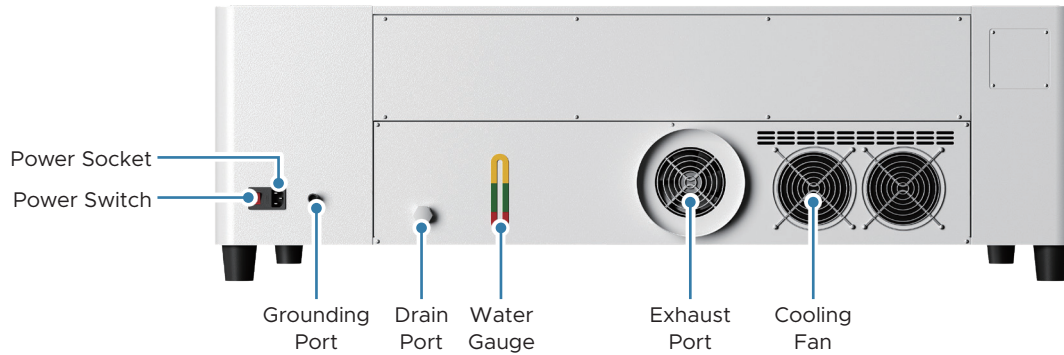
Side View



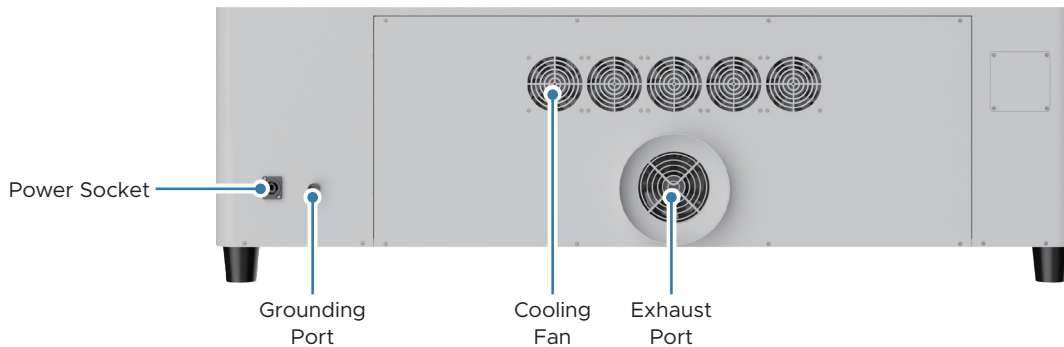
4 Components

Rear View

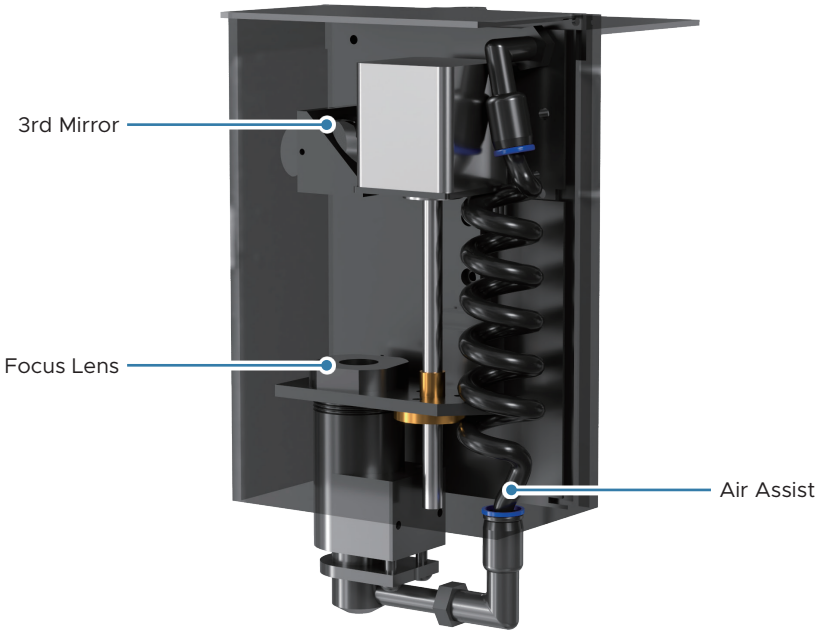
Water-Cooling Model



Air-Cooling Model



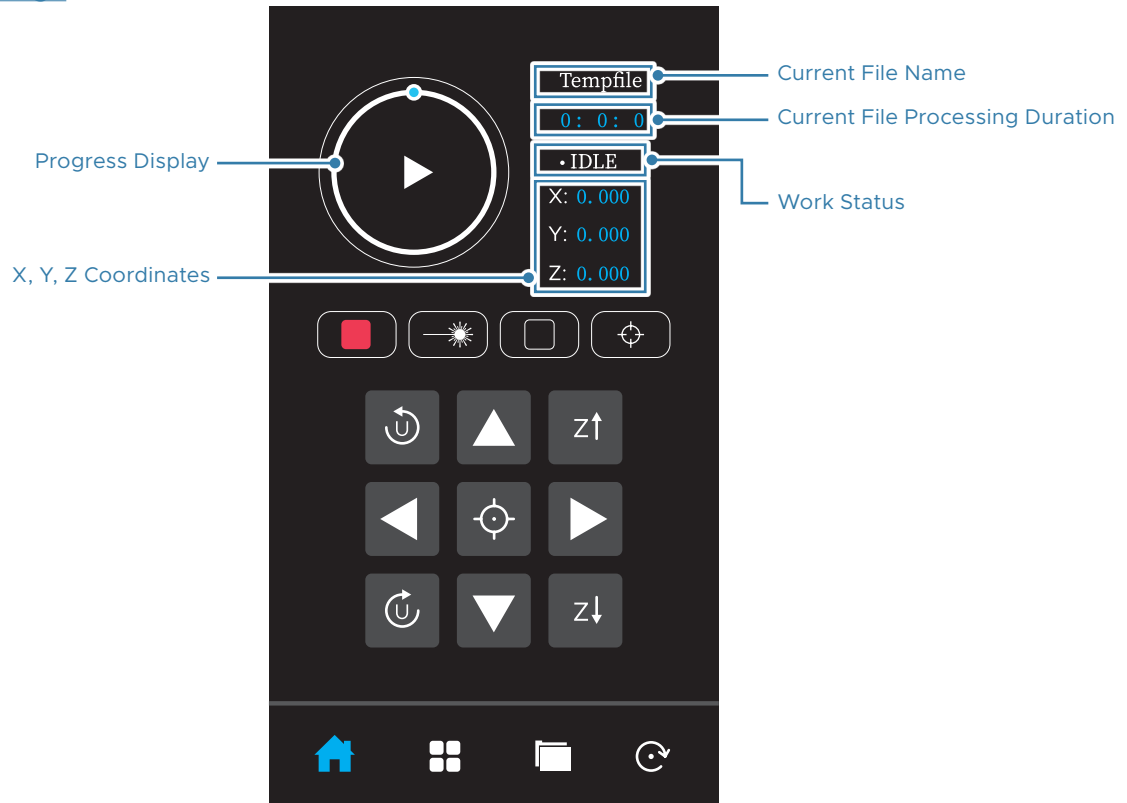
4.2 Laser Head



4 Components

4.3 Touch Screen

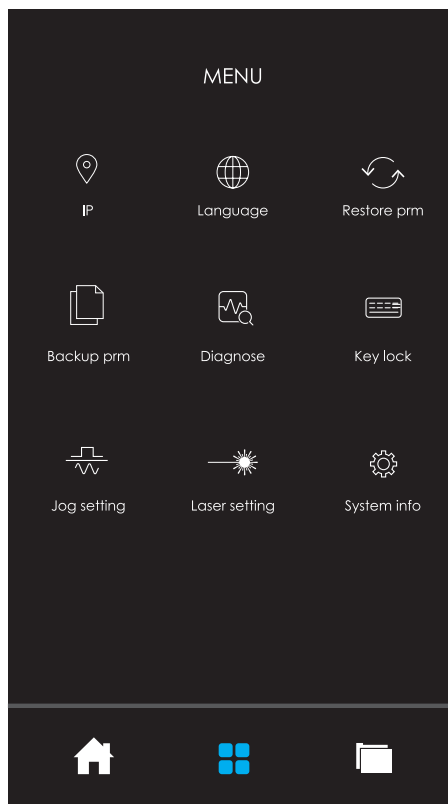
4.3.1 Home Page



Button	Function	Definition
	Start/Pause	Tap to start, pause, or restart work.
	Stop	Tap to stop work.
	Pulse	Tap to fire the laser.
	Frame	Tap to check out boundaries for the current pattern.
	Autofocus	Tap to autofocus the laser.
	No Function	These buttons are reserved for other models and have been disabled.
	Z Axis Coordinate	Tap to move the Z Axis up or down.
	Y Axis Coordinate	Tap to move the Y Axis forward or backward. When using the rotary axis, tap to rotate its rollers forward or backward.
	X Axis Coordinate	Tap to move the X Axis left or right.
	Position	Tap to set a positioning point.
	Home	Tap to enter the home page.
	Menu	Tap to enter the menu page.
	File	Tap to enter the file page.
	Reset	Tap to reset the machine.

4 Components

4.3.2 Menu Page



Button	Function	Definition
	IP	Tap to set the IP. When entering the page, the current IP address of the board will be read. When tapping the dialog box for the IP address, a small keyboard will pop up. Users can modify the host IP address using the keyboard. Once the input is complete, click OK.
	Language	Tap to set the language. When entering the page, the gray box represents the currently used language. Select the desired language to switch to, click OK, and the home page will pop up with the selected language switched.
	Restore PRM	Tap to restore the values of Jog Mode , step length , Pulse Mode , and Laser Time .
	Backup PRM	Tap to backup the values of Jog Mode , step length , Pulse Mode , and Laser Time .
	Diagnose	Tap to display the hardware IO port information of the system. Upon entering the page, the system hardware information is read.
	Key Lock	Locks the home page. In the locked home page, parameters such as Current Processing File Name, Processing Progress, Processing Time, etc., will be displayed normally, but only unlocking operations can be performed. Upon successful unlocking, it will jump to the normal home page. If unlocking fails, it will return to the locked home page.
	Jog setting	Tap to set the Jog mode between Jog and Continuous. - When the Jog mode is set to Jog, each tap of the direction key will move the corresponding axis once, with the distance equal to the step length. - When the Jog mode is set to Continuous, the step length parameter is not effective. Tapping the direction key will move the axis, and releasing the direction key will stop the axis.
	Laser setting	Tap to set the laser mode between Pulse and CW (continuous wave). - When the laser mode is set to Pulse, each tap of the Start key will emit laser once, with the laser duration set by the user as the Laser time value. - When the laser mode is set to Continuous, Tapping the Start key will keep the laser on, and releasing the Start key will turn off the laser.
	System info	Tap to show the system information.

5 Preparation

5.1 Unpacking

1. Remove all the packaging materials, open the cover, and take out all the accessories.
2. Remove any remaining interior packaging. Then carefully slide the laser head back and forth, as well as side to side, to ensure smooth movement.



Ensure all the accessories listed in **§3 Package List** are included.



3. (For Water-Cooling Models Only) Verify that the water level on the gauge is within the green NORMAL range. If not, refill the water tank to a level near the top of the green **NORMAL** range. (See **§8.3 Refilling the Water Tank** on Page 57.)



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.



NEVER adjust the water level within the tank while it and the laser are connected to power.



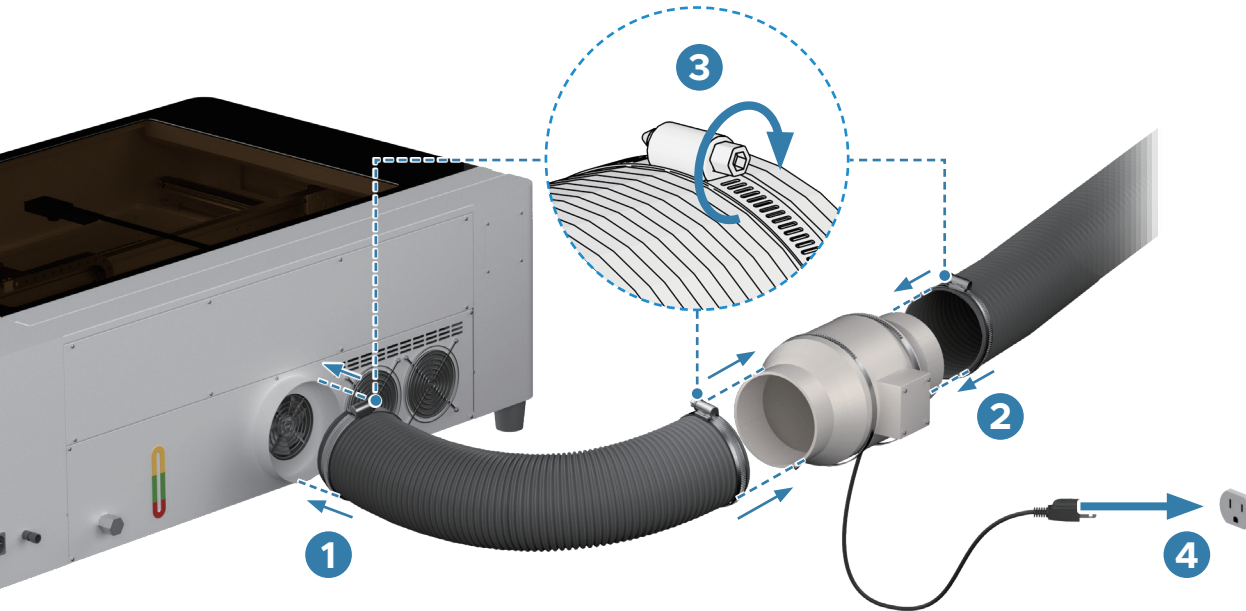
5 Preparation

5.2 Installing the Exhaust System

1. Attach the duct fan to engraver's exhaust port using one exhaust hose and two hose clamps.
2. Attach another exhaust hose to the duct fan using one hose clamp. Then place the other end of the hose out a door or a window.
3. Tighten all the hose clamps to secure the connections.
4. Plug the fan into a grounded outlet.



Use a circuit different from the one the engraver will be on.

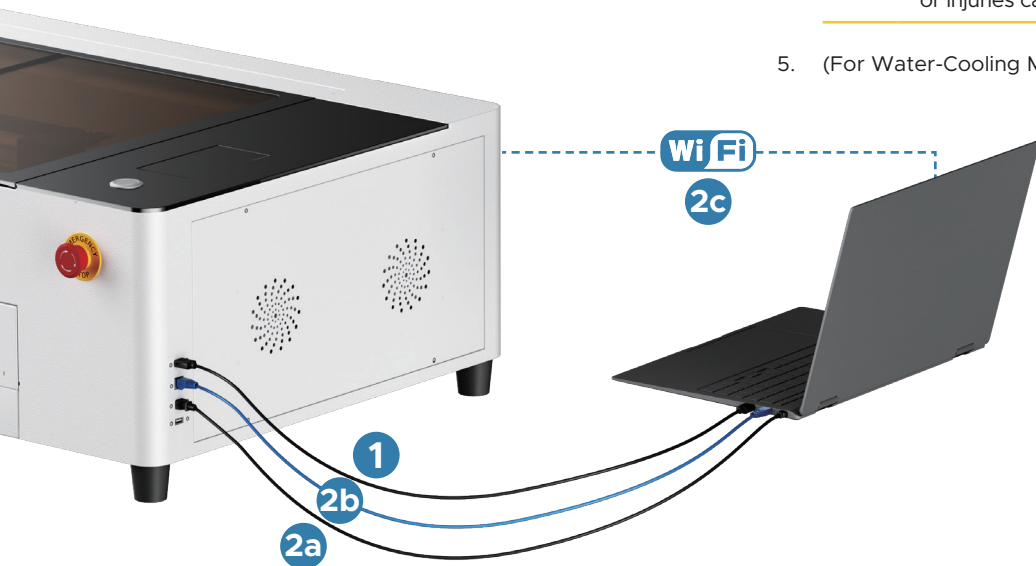


5.3 Setting Up the Control System

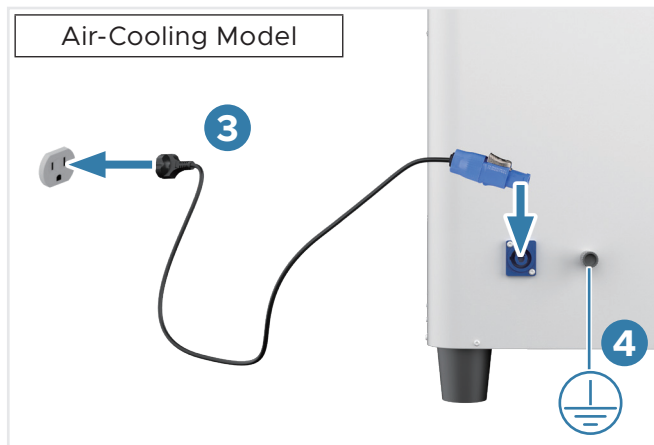
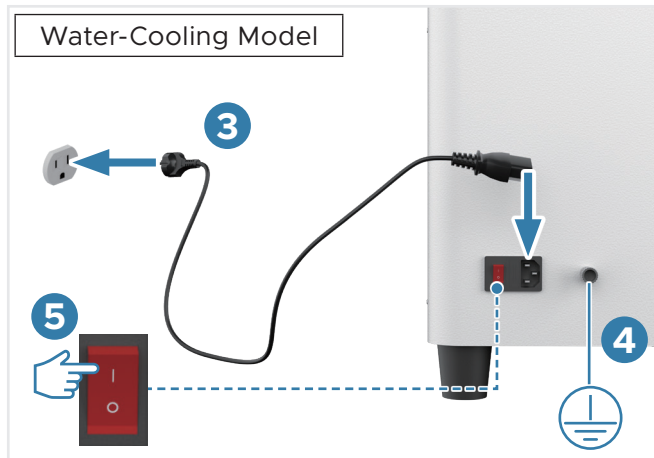
1. Connect the camera to your computer through the USB camera cable.
2. Connect the engraver to your computer by using any of these three ways:
 - a. Connect via the USB communication cable.
 - b. Connect via the Ethernet cable.
 - c. Connect via Wi-Fi. For instructions, see **§5.4 Setting Up Wi-Fi** on Page 23.
3. Plug the engraver into a grounded outlet.
4. If the outlet is not grounded, connect the engraver to your building's grounding system using a grounding wire (not included).
5. (For Water-Cooling Model Only) Flip the power switch to I.



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

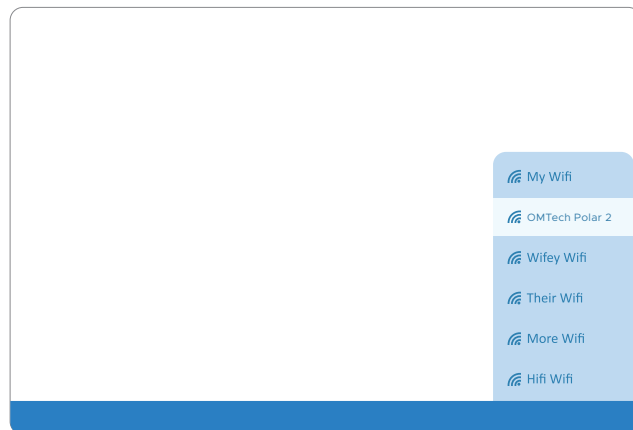


5 Preparation



5.4 Setting Up Wi-Fi

1. Check your local Wi-Fi networks to see if "Polar 2" already exists. If so, log into it using the default password 123456abc.



2. Reconfigure your own device's TCP/IP address.

The default address of the wireless network is 192.168.1.100. You will need to set your computer's network to use a similar but not identical address.

- a. Use 192.168.1 for the first three sections and a unique value for the last section.

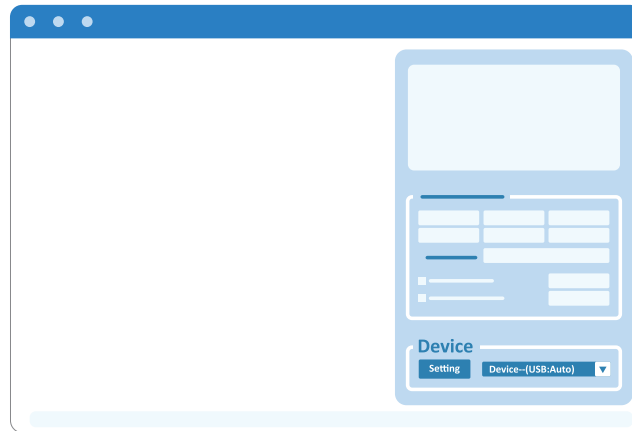
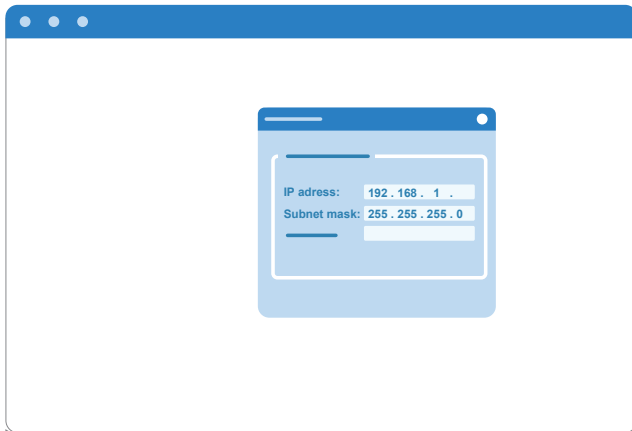
Typically, any value from 2–252 except 47 and 100 should be fine but avoid any values already used by your other networked devices.

- b. Use the subnet mask 255.255.255.0.

3. Enable wireless control in RDWorks by going to **Device** on the lower right side of the main interface.

If it is not visible, remove the other menus above it until it becomes visible.

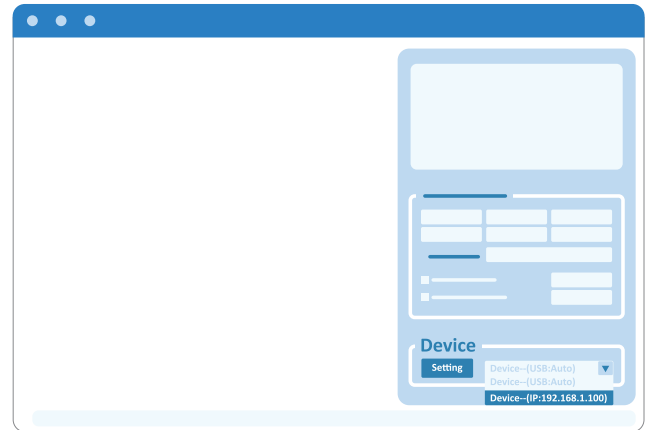
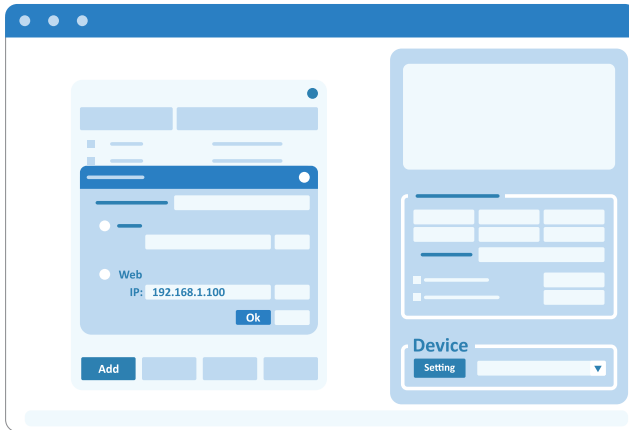
For LightBurn and other software setup, contact Customer Service, visit the OMTech website, or see our YouTube channel.



5 Preparation

4. Add a device.
 - a. Select **Setting** and then **Add**.
 - b. Toggle the selection to **Web**.
 - c. Enter the IP address 192.168.1.100 if it is not automatically generated.
 - d. Select **OK**.
5. Exit to the main interface, confirming and saving your changes.

You can now use the dropdown menu in the **Device** area to switch between using the cable connection (USB: Auto) and the wireless connection (IP:192.168.1.100).



5.5 Setting Up the Software

1. Transfer the copy of Ruida's RDWorks and its instruction manual from the provided USB to your computer.

You can also download the latest version of RDWorksV8 from Ruida's website at www.rdac.com/en or from us at www.omtechlaser.com/pages/software-download.

For LightBurn and other software setup, contact Customer Service, visit the OMTech website, or see our YouTube channel.

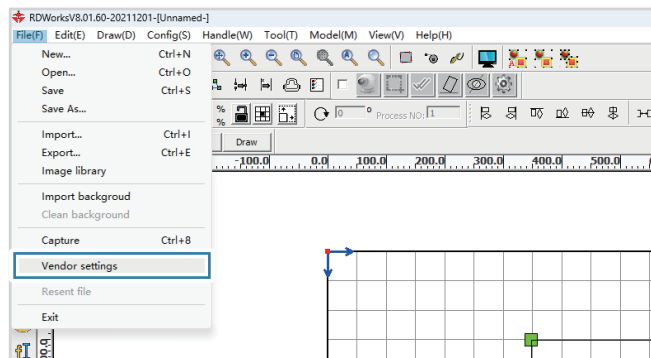


2. Double click the "RDWorksV8Setup8.01.68-20251115.rar", and then "RDWorksV8Setup8.01.68-20251115.exe" to install the software.



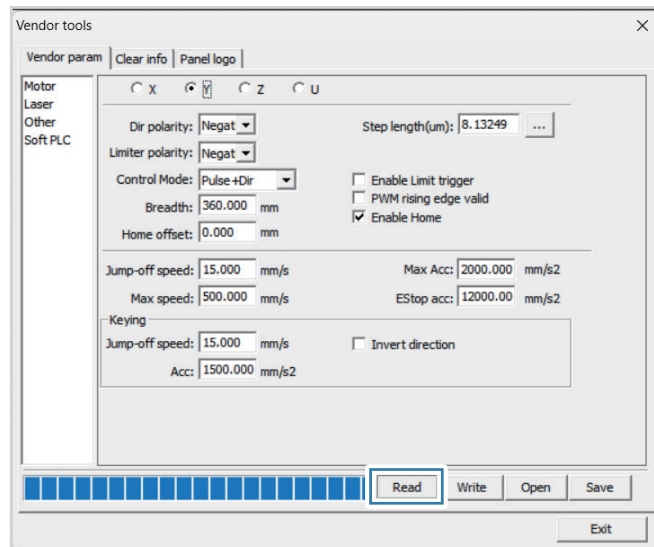
The software version number and release date may differ depending on the engraving machine.

3. Configure the manufacturer parameters.
 - a. Press **ALT+F** ("File") and select **Vendor Settings**. Enter the default password "rd8888".



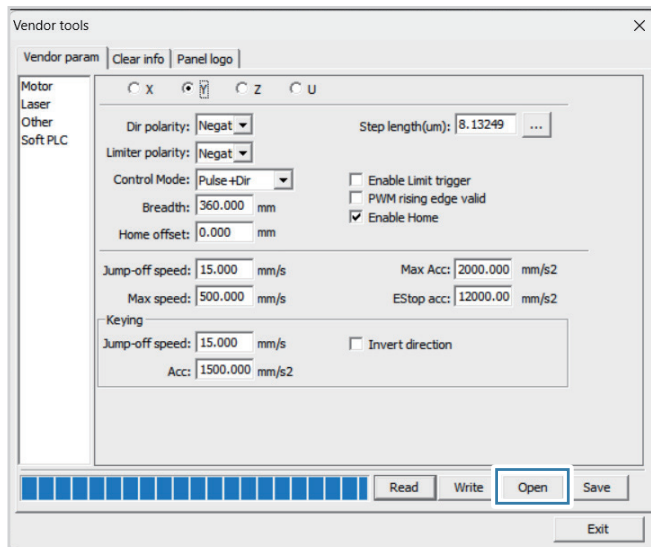
5 Preparation

b. Click **Read**.

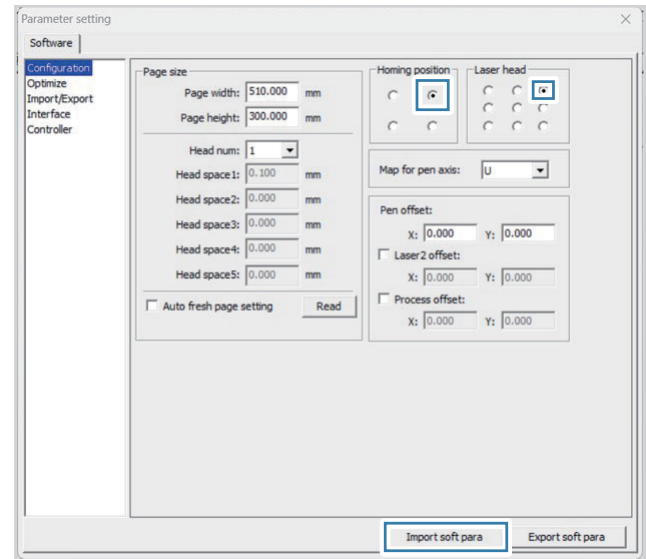
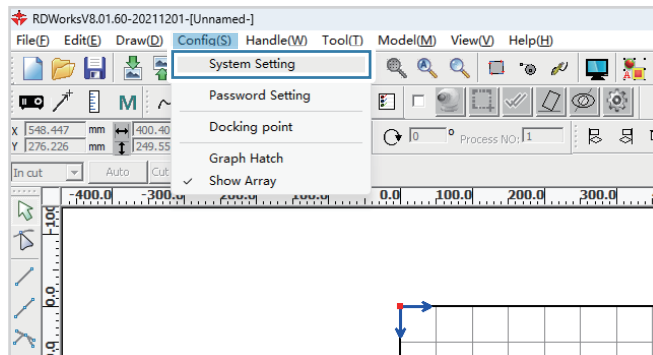


c. Click **Open** and then load the settings file “RDWorksV8 Factory parameters.RDVSet” from the USB.

d. Click **Write** to save the parameters and then click **Exit**.



4. Configure the software parameters.
 - a. Press **ALT+S** ("Config") and select **System Settings**.



- b. Click **Import Soft Para** and load the file "RDWorksV8 software parameters.cfg". Ensure the **Home position** and **Laser head** origin position are the same as that in your design files.



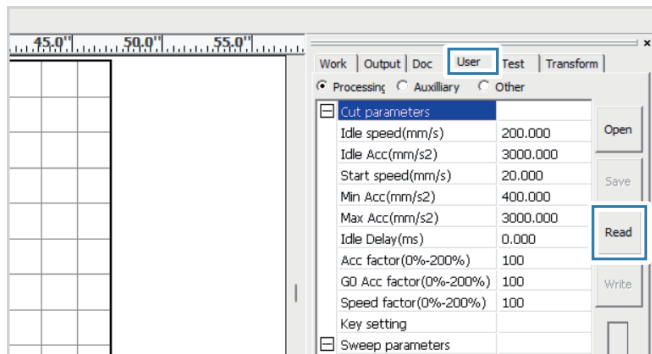
Choosing an origin that differs from the one in your design files can result in mirrored output or direct the laser beam outside the intended area, leading to dangerous reflections.



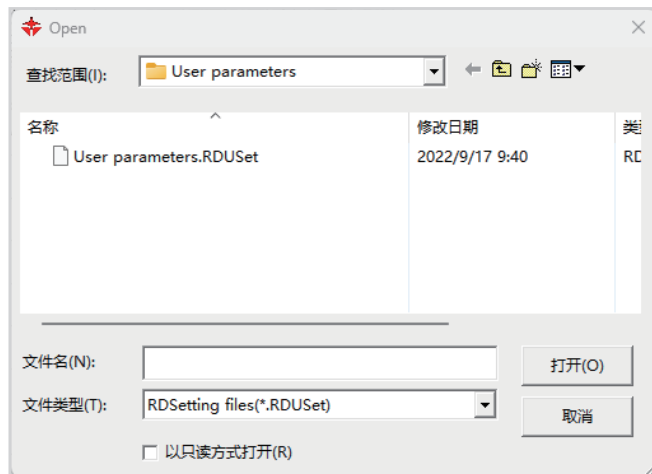
If you restart the software after importing the "RDWorksV8 software parameters.cfg" file, you will need to change the system language from Chinese to your preferred language.

5 Preparation

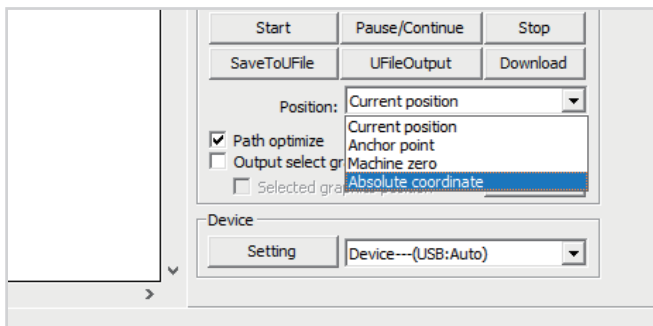
5. Configure the user parameters.
 - a. On the **System Work Platform** on the upper right side of the main interface, change the tab from **Work** to **User**.
 - b. Click **Read**.



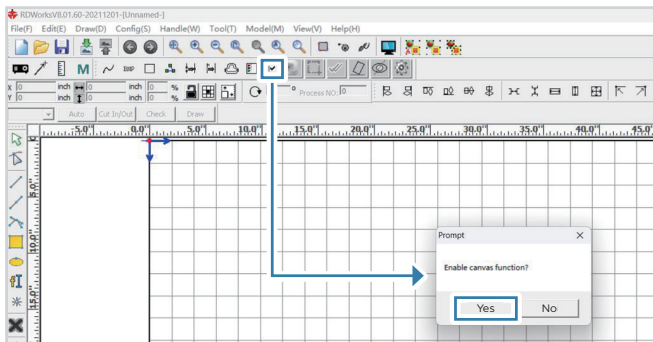
- c. Click **Open** and then load the file "RDWorksV8 User parameters.RDUSet".
- d. Click **Read** to save the parameters.



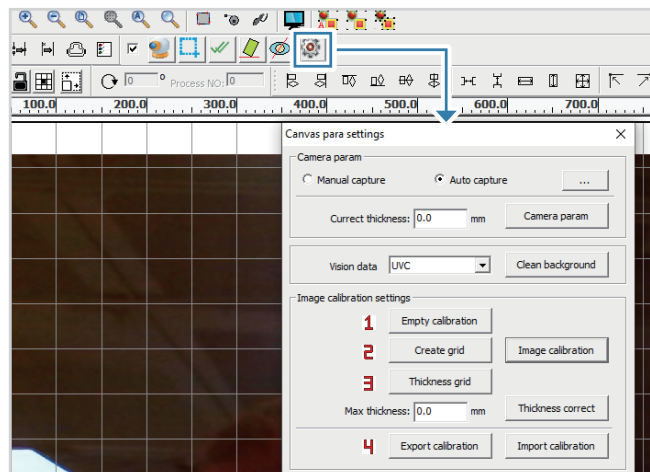
6. Configure the camera.
 - a. On **Laser Work** at the lower right side of the main interface, change the **Position** value from **Current Position** to **Absolute Coordinates**.



- b. On the **Canvas Tools** toolbar, click the unlabeled check box to enable the canvas function and controls.



- c. Click on the gear icon nearby to open the **Canvas Para Settings** submenu.



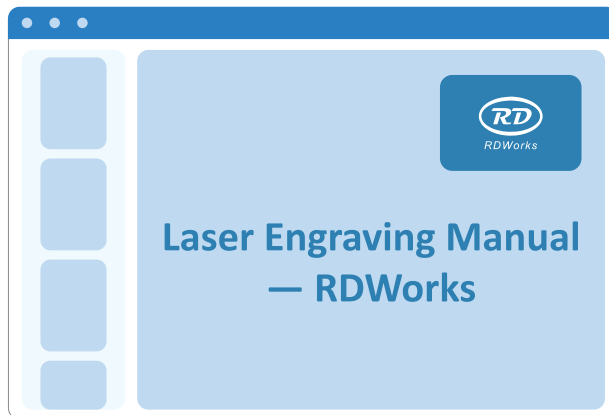
5 Preparation

- d. Click **Import Calibration** and load the file “RDWorksV8 Camera calibration.calx”.
7. Now the software is correctly configured for your engraver. Turn off your engraver if you are not going to use it.

Familiarize yourself with your software’s image design and laser control features before using them to operate the laser.

The screenshot shows the 'Canvas para settings' dialog box with the following sections and controls:

- Camera param**: Radio buttons for 'Manual capture' and 'Auto capture' (selected). A '...' button is next to 'Auto capture'. Below is a 'Current thickness' field set to '0.0 mm' and a 'Camera param' button.
- Vision data**: A dropdown menu set to 'UVC', a 'Clean background' button, and a 'Select camera' button.
- Image calibration settings**: A sequence of numbered steps (1-4) with corresponding buttons:
 - 1: 'Empty calibration'
 - 2: 'Create grid' and 'Image calibration'
 - 3: 'Thickness grid' and 'Thickness correct' (with a 'Max thickness' field set to '0.0 mm')
 - 4: 'Export calibration' and 'Import calibration' (highlighted with a red box)
- Docking background image**: 'Offset' fields for X ('0.000 mm') and Y ('0.000 mm'). A 'Ratio correct' checkbox with X ('1.00000') and Y ('1.00000') fields below it.
- Outer-contour layer**: A color swatch (red) and a dropdown set to '3'.
Inner-contour layer: A color swatch (blue) and a dropdown set to '2'.
Line width: A dropdown set to '1'.



6 Initial Testing



Wear safety glasses during the entire test process.

Always ensure 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.

The laser should pause automatically and the **Start** button should become red.

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 engraver and contact our technical support team.



DO NOT expose yourself to seeing or being hit by any possible reflected laser light.

6.1 Cover Shutoff

Test that the cover shutoffs activate properly before conducting any other work on your engraver.

1. Turn off the engraver.
2. Place a piece of material onto the workbed and close the cover.
3. Turn on the engraver.
Confirm that the cooling system, air assist, and exhaust fans have been activated.
4. Create or load a simple design into RDWorks.
5. Begin engraving by clicking **Start** in the software or pressing the **Start** button on the engraver.
6. Open the cover as little as possible, then check the status of the engraver.

7. Close the cover and press the **Start** button.
The engraver should restart cutting or engraving.
8. Turn off the engraver after the test is done.



6 Initial Testing

6.2 Tray Shutoff

After ensuring that the cover shutoff works, you should also test that the tray shutoff activates.

1. Perform the same procedure as before, but instead of opening the cover, open the debris tray.

The laser should stop completely. If it continues to engrave the design while the debris tray is open, the automatic shutoff is not working and must be repaired before the engraver can be used.



2. Turn off the machine. Contact our technical support team if the tray shutoff is not working.

6.3 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. Perform the same procedure as before.

Confirm that pressurized air begins to blow from the laser head when the engraver starts engraving. If it does not, turn off the machine and contact customer service.

2. Turn off the engraver 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.

7 Operation



Operate this laser engraver only in accordance with all the instructions provided in this manual.

Failure to follow these instructions can result in property damage and personal injury.



Wear safety glasses during the entire test process.

7.1 General Instructions

7.1.1 Placing the Material

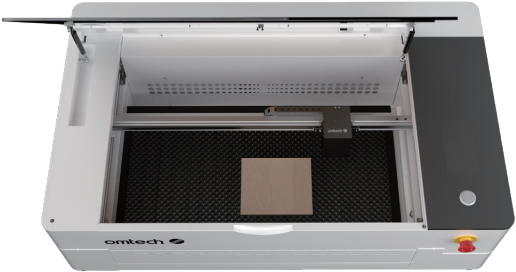
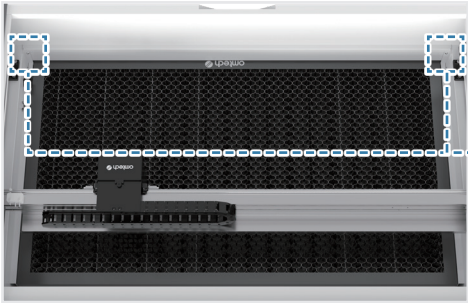
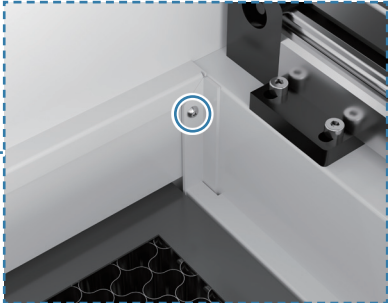
1. Ensure that the engraver is powered off, then open the cover.



7 Operation

2. Confirm the thickness of your material and place a sample piece into the main bay.

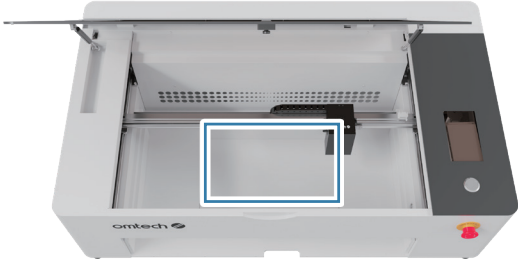
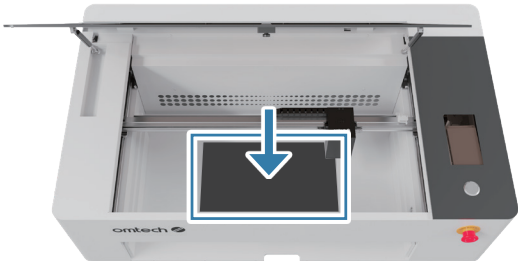
The standard location is in the top left corner of the workbed. This can be changed by moving either your design or the origin position in your software.

Thickness	Instructions
≤ 23 mm	Directly put the material on the honeycomb workbed. 
23–43 mm	1. Unscrew the two bolts that secure the workbed holder.  

Thickness	Instructions
23–43 mm	2. Take out the workbed holder, remove the workbed, then reattach the holder   3. Place the material on the holder. 

7 Operation

Thickness	Instructions		
> 43 mm	Unscrew the two bolts that secure the workbed holder as described above, then remove the workbed and its holder.		
			
	Place the material based on its thickness and the machine type.		
	Machine Type	Material Thickness	Instructions
	Water-Cooling Model	43–85 mm	- Cover the debris tray with a non-reflective plank, preferably an MDF that fits the space. - Place the material onto the plank.
		85–125 mm	Place the material onto the debris tray directly.
	Air-Cooling Model	43–75 mm	- Cover the debris tray with a non-reflective plank, preferably an MDF that fits the space. - Place the material onto the plank.
		85–115 mm	Place the material onto the debris tray directly.

Thickness	Instructions
> 43 mm	1. For thicker materials: - Remove the debris tray. - Unscrew the bolts and remove the base plate.  c. Cover the exposed area of your table with a non-reflective plank, preferably an MDF that fits the space.  Failure to totally cover your table may cause a fire hazard. Using reflective surfaces risks reflecting the laser beam and destroying your engraver. 

7 Operation

Thickness	Instructions
> 43 mm	d. Put the material on the plank. e. Slide the X-axis rail forward to expose the tray interlock switch. f. Move the tray interlock switch into a closed position and hold it there by sliding the nearby metal bracket to the right. Bracket Tray Interlock Switch Never leave the switch in this position after completing your work. Reenable the switch before leaving the work area.

3. Confirm that the rotary switch is flipped down to its standard position and then close the cover.

For round pieces, you will need to use a rotary axis. For instructions, see **§7.2 Rotary Operation** on Page 46.



7.1.2 Turning On the Machine

1. (For Water-Cooling Model Only) Flip the power switch to I.
2. Confirm that the cooling system, air assist, and exhaust fan have been activated.

7.1.3 Loading Your Design

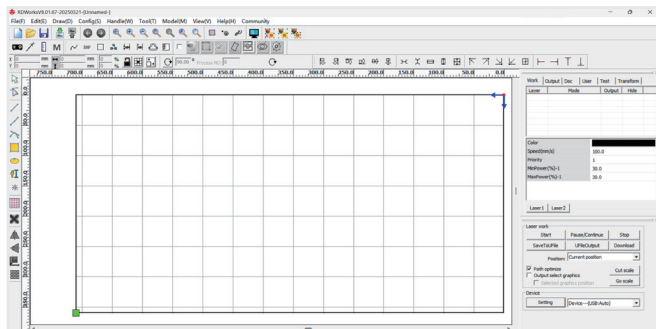
You can load your design in one of the following 3 ways. Select the option that best fits your needs.

7 Operation

Option 1: Via Your Control Computer

1. Create the design that you'd like to engrave and save.

You can do this directly in your engraving software or use any other graphics program.



2. Confirm that your control computer has a connection to the engraver, either directly through the provided cables or Wi-Fi connection or via the internet.

For instructions on connection, see **§5.3 Setting Up the Control System** (Page 22) and **§5.4 Setting Up Wi-Fi** (Page 23).

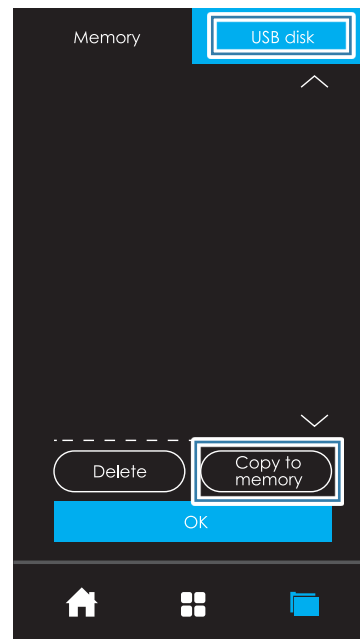
3. Load your saved design into the engraving software.

Option 2: Via a USB Drive

1. Save your design as a .rd file in the root directory of the provided USB drive.

2. Insert the USB drive into the engraver's USB port.
3. On the touch screen, tap **File** → **USB disk**.
4. Choose your design file, tap **Copy to memory**, and then tap **OK** to set it as the current file.

The maximum number of files in the memory is 100.



Option 3: Via the Memory Folder

1. On the touch screen, tap **File** → **Memory**.
2. Choose your design file and tap **OK** to set it as the current file.

7.1.4 Setting Parameters

1. For new materials, start on the low end of likely settings.
If the effect is too weak, rerun the design loop several times or gradually increase the settings.
2. Set the power between 20% and 70%.
Using less than 20% may prevent the laser from firing, while exceeding 70% can shorten its lifespan.
3. To improve the laser's engraving or cutting effect without increasing its raw power, reduce speed or increase the number of loops.



Be cautious—excessive intensity can cause fires or reduce image quality, especially on coated materials.

4. Use 500 DPI as the default resolution.

Lowering resolution can reduce flaming and improve image quality for certain materials, like some plastics.

The screenshot shows a software interface with a top navigation bar containing tabs: Work, Output, Doc, User (selected), Test, and Transform. Below the tabs is a table with columns: Layer, Mode, Output, Hide, and an empty column. The table has several empty rows. Below the table is a section for parameters:

Color	
Speed(mm/s)	100.0
Priority	1
MinPower(%)-1	30.0
MaxPower(%)-1	30.0

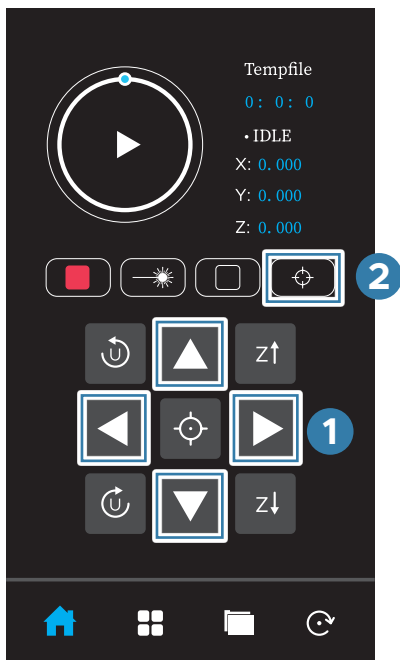
Below the parameters are two buttons: Laser 1 and Laser 2. Below these is a section titled 'Laser work' containing several buttons: Start, Pause/Continue, Stop, SaveToUFile, UFileOutput, and Download. Below the buttons is a dropdown menu for Position, currently set to 'Current position'. Below the dropdown are two checkboxes: 'Path optimize' (checked) and 'Output select graphics' (unchecked). Below 'Output select graphics' is a checkbox for 'Selected graphics position'. To the right of the checkboxes are two buttons: 'Cut scale' and 'Go scale'. Below the 'Laser work' section is a 'Device' section with a 'Setting' button and a dropdown menu for 'Device---(USB:Auto)'.

7 Operation

7.1.5 Autofocusing the Laser

Autofocusing your laser every time you move the material or use a new material.

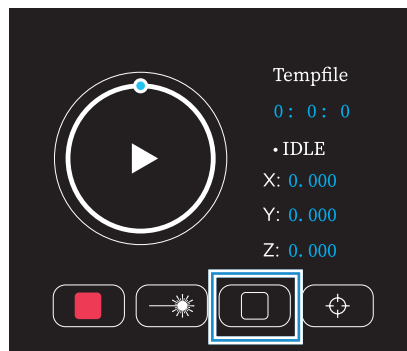
1. Use ▲, ▼, ◀, or ▶ to move the laser head over the sample material.
2. Tap  to auto-adjust to the correct focal height.



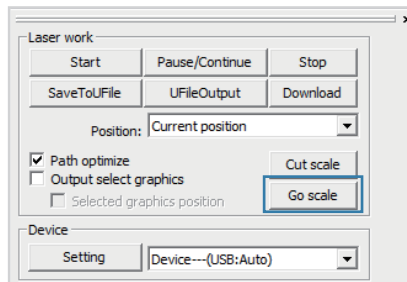
7.1.6 Engraving

You can use either the software or the touch screen to operate engraving.

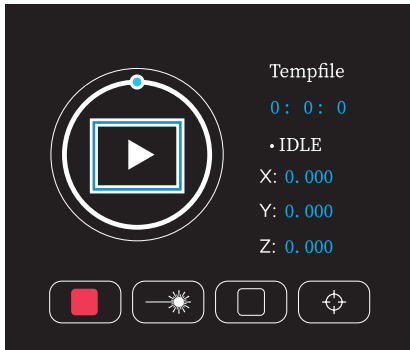
1. Preview the estimated engraving area by tapping  on the touch screen or clicking **Go scale** in the software.



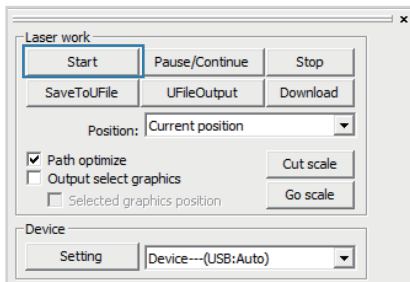
Or



2. Begin engraving your design by tapping ► on the touch screen or clicking **Start** in the software.



Or



3. Watch for possible issues like sparks or fires using the camera view.

If any accident occurs, press the emergency stop switch immediately.



4. Pause and resume work by pressing the **Start/Pause** button if necessary.



7 Operation

5. After the engraving is completed, open the cover and take out your material.



The mainboard can be reset by using the reset key if you encounter any problem.

If an error occurs during the reset process preventing successful reset or if you wish to stop the reset, you can click on the  icon in the center of the screen to halt the reset process.

If your engraver stops during repetitive engraving and cutting, the cooling system may have reached 122°F (50°C) and automatically paused work. Resume work by pressing the engraver's **Start** button only after the system has had time to adequately cool. If possible, use lower power settings while reducing speed or increasing the number of times your design is processed.



7.1.7 Powering Off the Machine

1. Allow the cooling and ventilation systems to continue to run until the air in the main bay is clear and the tube has safely cooled.
2. (For Water-Cooling Model Only) Flip the power switch to **O**.
3. Disconnect the engraver from the power supply.
4. Open the cover and remove any dust or debris buildup from the workbed and the various surfaces within the bay.

7.2 Rotary Operation

The Polar 2 comes with a rotary axis to engrave spherical and cylindrical surfaces.



7.2.1 Installing the Rotary Axis

1. Unscrew the bolts and remove the workbed and its holder.

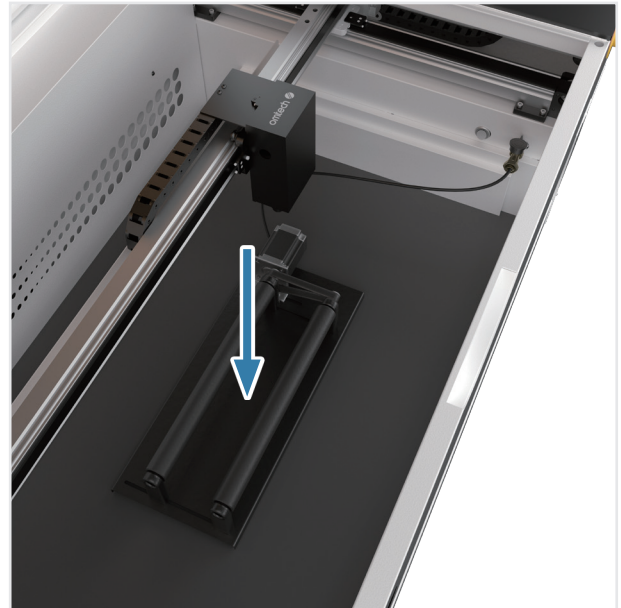


7 Operation

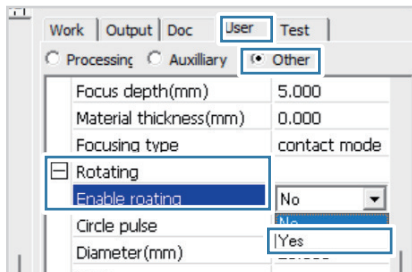
2. Flip the rotary switch to **Rotary**.



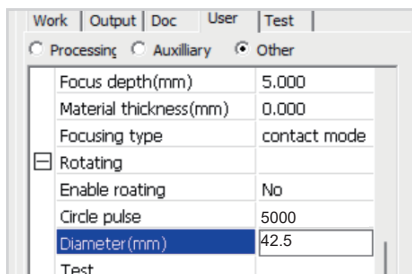
3. Place the rotary axis onto the debris tray, then connect it to the rotary port using its cable.



4. Enable the rotary axis function in the RDWorks V8 software.

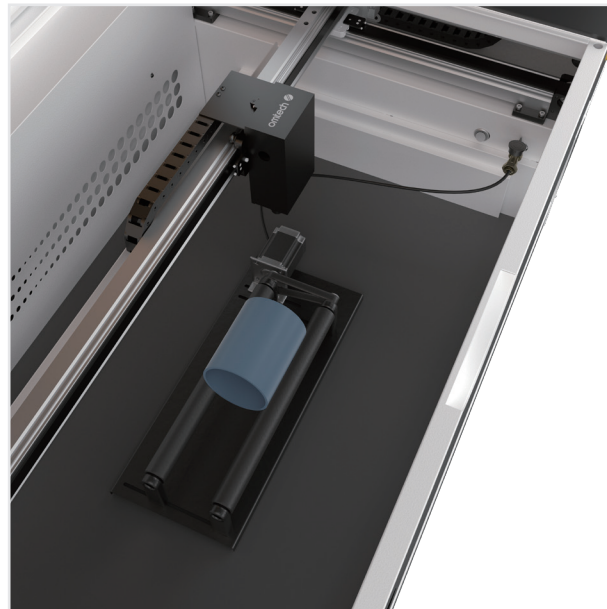


5. Set the **Circle pulse** parameter to **5000** and the **Diameter** parameter to **42.5** in the RDworks V8 software.



7.2.2 Engraving

1. Place your material onto the rotary axis, then close the cover.



2. Repeat instructions from §7.1.2 (Page 40) to §7.1.7 (Page 46).
3. To remove the rotary axis after use, reverse the steps in §7.2.1 (Page 46).

7 Operation

7.3 Instructions for Specific Materials

The following instructions are suggestions to help speed safe work with a range of materials. The user should research the specific safety and engraving requirements of their specific material to avoid the risk of fire, hazardous dust, corrosive and poisonous fumes, and other potential problems.

Once the product is known to be safe or appropriate protective equipment has been set up, it can be helpful to engrave a test matrix of small boxes produced at various speed and power settings to discover the ideal settings for your design. Alternatively, start with low power and fast speed settings and rerun your design as many times as needed, using progressively greater laser intensity.

Material	Settings	Safety Notes
Ceramics	Moderate to high power	• Avoid cracking by using more loops instead of high power and low speed. • Use ventilation systems or PPE for dust.
Glass	High power, low speed	• Avoid cracks by running more loops at lower settings • For fiberglass/carbon fiber, avoid settings that damage structural integrity. • Use PPE for dust. • Wash clothing separately after working with fiberglass.
Leather	Low to moderate power, high speed	Ensure proper ventilation and fire safety measures.
Metal	Not suitable for CO ₂ lasers directly; work on coatings only	• Use specialized coatings for CO₂ engraving. • Parameters vary by coating and metal type. Aluminum coatings require quick, low-power settings; steel coatings need slower, higher-power settings. • Follow coating manufacturer guidelines. Avoid attempting to engrave the underlying metal directly.

Material	Settings	Safety Notes
Paper/ Cardboard	Low to moderate power, high speed	• Test each batch as small parameter differences can cause burning or weak effects. • High fire risk; ensure proper fire safety measures and ventilation.
Plastics	Low power, high speed	• Microporous plastics yield better results. • Avoid excessive power or low speed to prevent melting, poor quality, noxious fumes, or fires. • Use medium to low resolution for engraving. • Ensure proper ventilation and PPE to avoid exposure to fumes.
Rubber	High power, adjust speed for effects	• Microporous rubber requires higher speed. Test settings on samples for best results. Use PPE and/or a ventilation system for dust and fumes.
Stone	Moderate power, moderate to high speed	Ensure proper ventilation and dust control measures.
Textiles	Low power, high speed	Ensure fire safety and proper ventilation.
Wood	Varies by type: Softwoods (low/moderate power, high speed), Hardwoods (high power, low speed)	• Consistent grain/color engraves evenly. Knotted wood and uneven fibers produce poor results. Resinous wood gives high contrast. Manufactured wood varies by glue composition. • Ensure proper ventilation and PPE. • High fire risk; ensure proper fire safety measures.

7 Operation

For the most stable performance and optimal engraving and cutting results, we recommend using OMTech-certified laser-grade materials. OMTech offers a wide range of machine-tested laser materials, ensuring reliable quality and high consistency. These materials include plywood, acrylic, leather, tumblers, keychains, and various other raw materials and blanks. Whether for personal projects or mass production, these materials deliver enhanced stability, a smoother processing experience, and sharper, more detailed laser results.

Scan the QR codes below to purchase official laser materials perfectly compatible with your machine.



Get OMTech Certified Laser-Grade Materials



 Amazon Store



 Official Store

8 Maintenance

8.1 Maintenance Schedule



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 engraver 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 engraver.

Follow the table below when maintaining:

Task	Frequency
(For water-cooling models only) Ensure clean and cool water or laser-safe coolant is provided to the system.	At all times
Confirm the tank is at least two-thirds full.	Before and after use
Clean the workbed and empty the waste bin.	Daily
Inspect and clean lenses (1st and 2nd mirror housing, 3rd mirror, focus lens, camera).	Daily
Inspect and clean the exhaust system.	Weekly
Clean and lubricate guide rails.	At least twice a month
Inspect and clean the air assist.	Monthly
Inspect and clean all other components.	Monthly
(For water-cooling models only) Replace coolant.	Every 3 months
(For water-cooling models only) Perform a full coolant system drain, cleaning, and replacement.	At least once a year

In commercial settings, keep a cleaning and maintenance log in a visible location near the engraver. Have operators date and sign the log as cleaning and maintenance are carried out.

8 Maintenance

8.2 Cleaning



- **ALWAYS** allow any fluid used in any cleaning to dry completely before further use of the engraver.
- **DO NOT** use caustic chemicals or harsh abrasives. Be careful not to allow any electronic component to become wet and let all surfaces dry completely before further use.

8.2.1 Engraver

Viewing Window

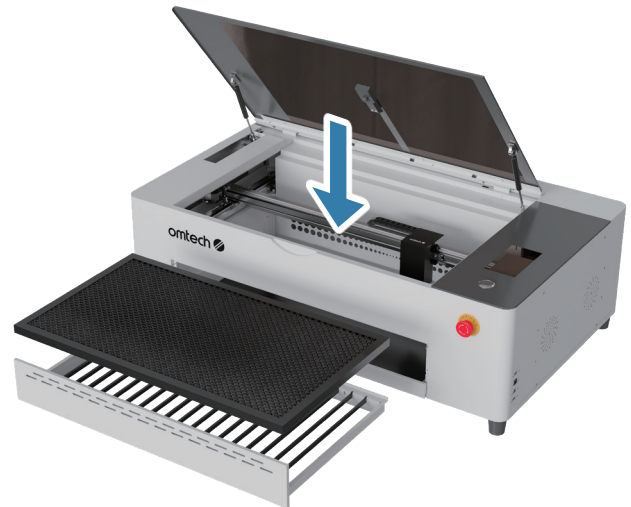
Clean the viewing window with mild cleansers and a lens cotton cloth.

DO NOT use paper towels as they can scratch the acrylic and reduce the cover's ability to protect you from laser radiation.



Interior

Clean the interior of the main bay thoroughly, removing any debris particles or deposits. Paper towels and window cleaner are recommended.



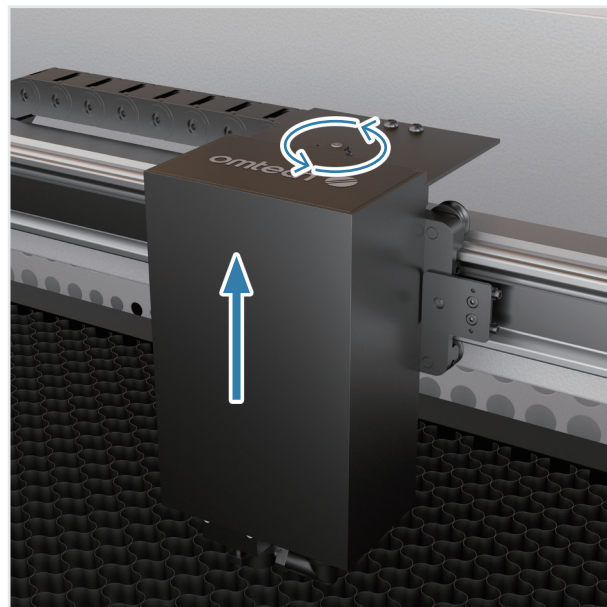
Exterior

Clean the engraver's surfaces with a soft cloth or wipe them using a cloth moderately wetted with mild detergent.



Clean the Third Mirror & Focus Lens

1. Unscrew the bolt, then gently lift the shell upward to remove it.



8.2.2 Camera, Mirrors, and Focus Lens

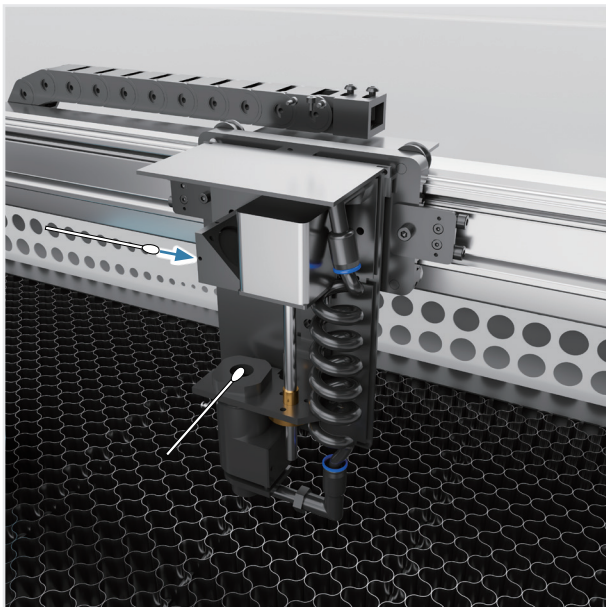


Be careful in all of the following steps not to directly touch the surface of any of these windows, mirrors, or lenses with your finger or any dirty, oily, or abrasive surface. Use lens-safe gloves or cloths only. Avoid pressing hard enough to cause scratches by grinding debris into the lenses.

The 1st and 2nd mirrors should not require adjustment or cleaning. The 3rd mirror and focus lens are held within the laser head's protective shell.

8 Maintenance

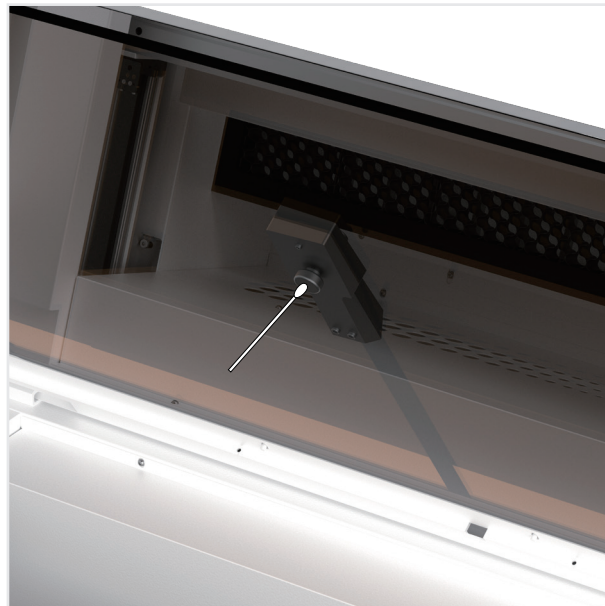
2. Clean the lens of the 3rd mirror and the focus lens.



3. Gently remove any other dust or debris from other components inside the laser head and wipe the shell's holes clean as well.
4. Reinstall the protective shell into place.

Clean the Camera

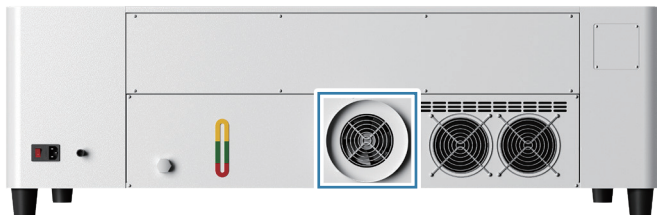
Clean the camera lens in the same way. If any permanent spots or debris appear under the camera's glass lens, it cannot be wiped clean and will require replacing the camera itself. Contact customer service for details.



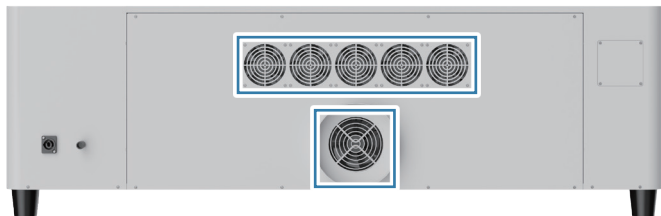
8.2.3 Exhaust System

Check the external fan and surrounding ducts for excessive accumulation of dust and debris. For best results, use a brush, vacuum, or compressed air to remove large accumulations of dust and debris, and use mild cleansers and soft rags or paper towels to fully clean the fan and its blades at least once a month.

Water-Cooling Model



Air-Cooling Model



8.2.4 Cooling System

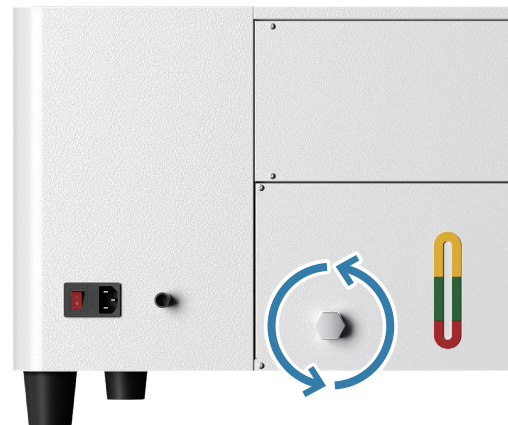
(For Water Cooling Models Only)



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

If the coolant is especially polluted, clean it as follows:

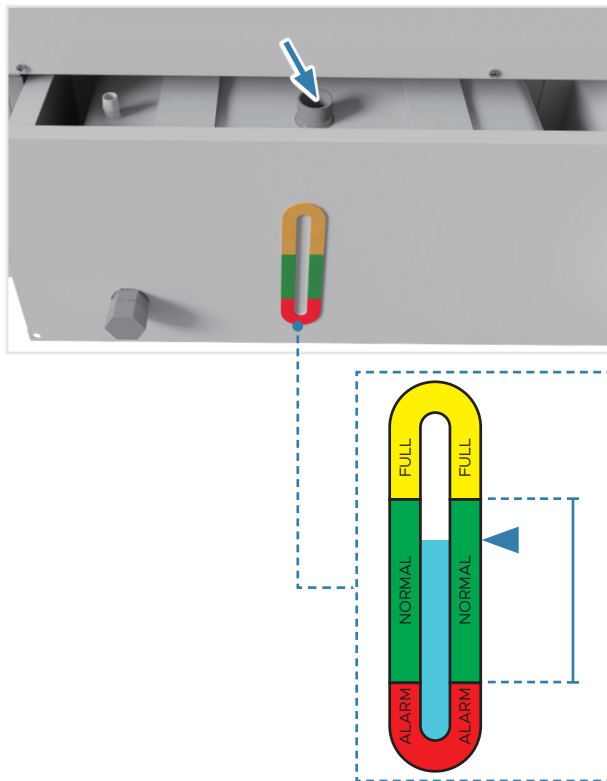
1. Place a container for waste coolant under the drain port.
2. Unscrew the drain port screw to drain the coolant.



3. Reattach the drain port screw.
4. Unscrew the bolts to remove the rear panel, then locate the fill port.

8 Maintenance

5. Refill the water tank with clean coolant to a level near the top of the green **NORMAL** range.



6. Reattach the rear panel.

8.3 Refilling the Water Tank (For Water Cooling Models Only)



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



Always fill the chiller with deionized water, distilled water, or a custom-purpose laser-safe antifreeze. For winter operation, using a laser-safe antifreeze (e.g., OMTEch brand) is recommended. If water is used instead, you must extract all water from the water tank after each use to prevent freezing. Using tap water for any purpose but rinsing out cleansers 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.

In addition to the regular cleaning described above, we recommend adding distilled water or laser-safe coolant to the water tank through the fill port using a wash bottle every three months (see §8.2.4 above).

8.4 Laser Path Alignment

The Polar 2 goes through a complete beam alignment before shipping and its design should keep your mirrors locked into their proper positions at all times. If you wish to test the alignment by using the laser to mark pieces of tape along its path to your material, remember to never place the tape directly on any mirrors or lenses, to never use power levels above 15% to mark the tape, and to never disable the cover's interlock switches during your testing. If you ever find that your mirrors are out of alignment, contact our technical support team to correct the problem.

8.5 Rail Lubrication

For best results, clean and lubricate the engraver's guide rails every two weeks.

1. Turn off the engraver.
2. Gently move the laser head out of the way.
3. Use a dry cotton cloth to thoroughly wipe off all dust and debris from the X and Y axis rails, as well as the Z-axis screw, until they are clean.
4. Lubricate both the rails and screws with white lithium grease.
5. Gently move the laser head and X axis to distribute the lubricant evenly along both rails and raise and lower the bed to distribute the lubricant evenly along the screw.



9 Troubleshooting

The common issues and solutions are listed below. For more detailed information on troubleshooting, visit our Help Center help.omtech.com.

9.1 Connection

9.1.1 The Engraver Can't Find the Device Through Ethernet Cable

Issue	
After powering the device on and connecting it to the computer with an Ethernet cable, the machine's name can't be found in the device list.	
Solution	
Reconnect the Ethernet Cable	Check the Ethernet cable connection and ensure both ends are securely plugged in.
Try a Different Ethernet Cable	This is to rule out that the cable itself is faulty.
Try with Another Computer	The ethernet port on some computers may not work due to configuration or hardware issues. Try with another computer or docking station that supports Ethernet configuration.
Check the Ethernet Cable Adapter inside the Machine	Take off the right plate of the machine and unplug the inner Ethernet extension cable from the control board. Connect your Ethernet cable directly to the control board instead. If it has been connected successfully, it means the extension cable inside the machine is faulty and needs replacement.

9.1.2 The Engraver Can't Find the Device Through Wi-Fi

Issue	
After connecting the machine to the computer via Wi-Fi, the machine's name can't be found in the device list.	
Solution	
Affected by VPN Software	Close any VPN on your computer and restart the software to connect again.
Unstable Wi-Fi Connection	Change to another Wi-Fi network in case the signals aren't strong enough.
Special Characters in Wi-Fi Name and Password	Ensure that your Wi-Fi name and password consist of only alphanumeric characters, and that you enter the correct password.
Unsupported Wi-Fi Frequency Band	Ensure your Wi-Fi is in the 2.4 GHz band, not the 5 GHz band. And try again.
Wi-Fi Is Not Configured	For the first time you connect the engraver to your Wi-Fi, you need to connect it to your computer by USB first and configure the Wi-Fi connection using the software.

9.1.3 The Engraver Can't Find Device Through USB

Issue	
After powering the device on and connecting it to the computer with a USB cable, the machine's name can't be found in the device list.	
Solution	
Check the USB Cable Connection	Verify that the connection is secure. If needed, reconnect the USB cable at both ends.

9 Troubleshooting

Solution	
Malfunctioning USB Cable or Computer USB Port	1. Replace the USB cable, the USB port, and the computer port. 2. Turn on the engraver and open the software. 3. Check if the driver application of the engraver exists in the following ways. For Windows: a. Right-click the start button on your computer. b. Click Device Manager. c. Click Network Adapters and check if the USB Ethernet/RNDIS Gadget exists. For Mac: a. Click System Information. b. Go to Hardware and click USB. c. Check if the RNDIS/Ethernet Gadget exists.
Check VPN	Exit the VPN software and try again.
Check Ping	The firewall may disable ping. 1. Click the right button to run the software in Administrator Mode. 2. Allow the permission "Default Allow Specific Outbound ICMP" in the firewall software.
Check SIP	If the MAC system is under SIP protection, the device may be blocked and can't be connected. Disable SIP according to the MAC manual.
Check the Compatibility of the Cable	The engraver does not support a double-end USB-C cable. Connect the engraver using the original USB-A cable or a USB-C to the USB-A docking station instead.

9.2 Hardware

9.2.1 The Laser Tube Won't Light Up

Issue	
The laser tube won't light up when trying to process after turning on the engraver.	
Solution	
Adjust the Laser Power Setting	As the laser tube ages, more power will be needed for the same level of laser activation as before. Try to process by increasing the power to 80%, and observe if the laser tube will light up.
Check for Cracks in the Tube	1. Disconnect the power supply of the machine and remove the rear upper cover. 2. Inspect the laser tube for any cracks, both inside and outside. If any cracks have been found, replace the tube.
Check the Cable and Connection	1. Disconnect the power supply of the machine and remove the left and right plates. 2. Inspect the cables for any signs of damage, breakage, or detachment. 3. Check both ends of the cable for any looseness in the connection. 4. Reconnect or secure the cable to ensure a proper connection.
Check the Power Supply of the Laser Tube	Have a technician check the power supply of the laser tube or contact customer service for further analysis.
Replace the Laser Tube	If none of the above works, the laser tube may be faulty. Take a video of the problem, film the troubleshooting steps you have taken, and contact our service team for further assistance.

9 Troubleshooting

9.2.2 The Engraver Won't Fire Laser

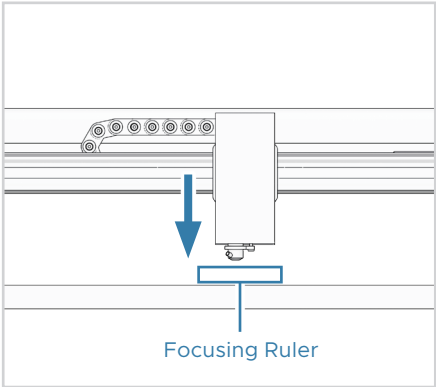
Issue	
The laser tube lights up as usual, but there is no laser coming out from the laser module.	
Solution	
Check the Installation	Have a technician check all the mirrors for any missing, misaligned, or incorrect installation. If needed, contact our customer support team for further assistance.
Adjust the Laser Power Setting	The laser requires a certain amount of power to activate—This is called the minimum activation power. As the laser tube ages, however, more power will be needed for the same level of laser activation as before. You can either increase the processing power directly or adjust the device settings to raise the lowest output power so it can reach the minimum power for laser activation. If the processing power is lower than the lowest output power, the latter will be used as the processing power.
Check the Focal Lens	Check if the focal lens is missing and reinstall it. (See §8.2.2 on Page 54 .)
Clean the Mirrors and Focal Lens	Check for any residue or stains on the surface of the mirrors and focal lens. (See §8.2.2 on Page 54 .)
Recalibrate the Laser Path	Contact customer service to detect if there is any deviation in the optical laser path and calibrate if it is severely deviated.

9.2.3 The Engraver Gets Non-Responsive After Power-on

Issue	
After the engraver is powered on, it doesn't give any response.	
Solution	
Check the Power Cable	Check if the power cable is properly plugged in on both ends.
Replace the Fuse (For Water-Cooling Models Only)	1. Unplug the power cable. 2. Open the fuse box beside the power switch. 3. Replace the fuse if it's blown.
	

9.3 Processing

9.3.1 Laser Head Autofocus Failure

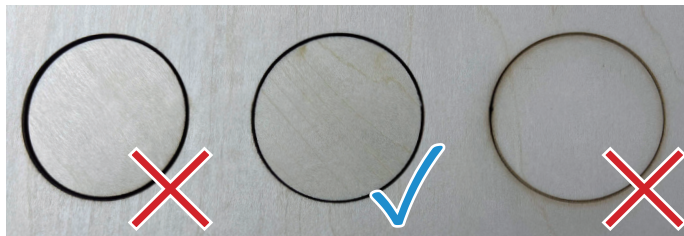
Issue	
When you tap  on the touch screen, the laser head moves downward and collides with the material.	
Solution	
Focus the Laser Manually	1. Move the laser head above the material. 2. Place the provided focusing ruler between the laser head and the material. 3. Tap  to lower the laser head until it lightly touches the focusing ruler.
	

9 Troubleshooting

9.3.2 Not Cutting Through the Material

Issue

The engraver won't fully and effectively cut through the material as expected.



Solution

Check the Processing Parameters

For the materials suggested in this manual, you can choose the recommended parameter values for cutting.

For those not suggested, you can get the ideal parameter values after several tests.

Check the Material Distance/Thickness Value

Check if the material thickness/distance is out of the standard range of the engraver.

Check the Mirrors and the Focal Lens for Stains

For the instructions, see **§8.2.2** on Page **54**.

Check the Power of the Laser Tube

It is common that the power of the CO₂ laser tube degrades over time.

You can try the following methods to improve the performance of the cutting process: increase the power, lower the speed, and increase the processing pass.

If the power drops drastically, have a technician replace the laser tube.

Solution	
Check the Focal Lens Installation	When the focal lens is not installed properly, the laser spot will become larger, decreasing cutting performance. Remove the focal lens and install it again. See §8.2.2 on Page 54.
Use Compatible Material	Some materials are not cuttable with the engraver. For recommended materials, see §1.7 on Page 7.
Calibrate the Laser Path	When the laser path is misaligned, the laser performance may vary significantly in different processing areas. Contact customer service to guide you on calibrating the laser path if the solutions above don't work.

9 Troubleshooting

9.3.3 Poor Engraving Results

Issue

When this issue occurs, you may find the engraving performance is not as expected: the pattern appears blurry, and the engraving outcome is excessively darkening or too shallow to be identified.



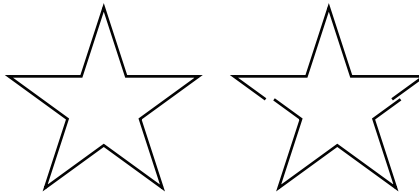
Solution

Check the Processing Parameters	For materials suggested in this manual, you can choose the recommended parameter values for cutting. For those not suggested, you can get the ideal parameter values after several tests.
Check the Material Distance/Thickness Value	Check if the material thickness/distance is out of the standard range of the engraver.
Check the Focal Lens	When the focal lens is not installed properly, the laser spot will become larger, decreasing engraving performance. (See §8.2.2 on Page 54 .)
Check the Material	Some materials can be harder to engrave by laser. To get better results, set a higher processing power or use less dense materials. For recommended settings on materials, see §7.3 on Page 49 .
Calibrate the Laser Path	When the laser path is misaligned, the laser performance may vary significantly in different processing areas. Contact customer service to guide you on calibrating the laser path if the solutions above don't work.

9.3.4 Engraving Image Shifts During Processing

Issue

The engraved image is deviated or won't close up because of the losing steps in processing.



Solution

Lower the Speed of the Engraving Process	If the processing speed is too fast, it may cause step loss. Please try again by lowering the speed.
Adjust the Tightness of the Timing Belts	Contact customer service for instructions on adjusting the tightness of the X-axis and Y-axis timing belts so that the laser module can move smoothly.
Checking the Stability of the Material	If the material is too light, the gas coming out of the air nozzle may nudge the material, causing a deviated image. Use the material clamp or tape to fix the material before processing.
Check the Material Distance/Thickness Value	If the air nozzle hits the material because of the failure of focusing, which leads to the deviation of the image, check if the material thickness or distance is the same as the actual value.

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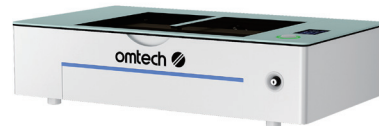
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Manual & Video

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