FM2435-30
Fiber Laser Marking Machine
User Manual

Read Carefully Before Use
Keep for Future Reference

PREFACE

Thank you for choosing our laser equipment.

This fiber laser marking machine is intended for personal and professional use. When used in accordance with these instructions, it comprises a Class 1 laser system but some components remain **extremely** dangerous. Never disable the preinstalled safety devices and always use your laser safely and responsibly.

Read this manual carefully before operation. It covers the details of correct installation, adjustment, maintenance, and—most importantly—safe operation of your new laser. It is intended to be used in conjunction with the manual for its engraving software, as the program not only provides image design but also serves as the main 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.

Both manuals should be included if this device is given or sold to a third party.

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

CONTENTS

1. Introduction

1.1 General Information

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

All personnel involved in the installation, setup, operation, maintenance, and repair of this machine should read and understand this manual, particularly its safety instructions. Substandard performance and longevity, property damage, and personal injury may result from not knowing and following these instructions.

Your fiber laser marker works by emitting a powerful laser beam from its fiber laser source, sending that beam through a fiber optic cable, and using this focused light to etch designs into certain substrates.

This fiber laser marking machine uses a nanoscale fiber laser source. Its single-mode output, good heat dissipation, high efficiency, and compact structure make it ideal for high-precision laser marking. With typical use, this device has an average lifespan around 100,000 working hours. However, constantly running your laser above 80% of its maximum rated power can significantly shorten its service life. It is recommended to use settings from 10–75% 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 also that maintaining cooling ventilation and the exhaust system are both absolutely essential to the safe use of this device. The ambient temperature around the engraver should be kept between 40–95°F (5–35°C). It should not be used when temperatures fall below or rise above those levels. Never operate the engraver without the exhaust system operating properly. It should also always be used in compliance with all applicable laws and regulations for workplace and environmental air quality.

1.2 Symbol Guide

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


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


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


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


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


This product is sold in conformity with applicable EU regulations.


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

1.3 Designated Use

This machine is intended for use engraving signs and other consumer products on applicable substrates. This laser can process a wide variety of metals including steel, aluminum, titanium, brass, copper, tungsten, carbide, and chrome. It can also be used with stone and some hard plastics such as acrylic. (See §§2.5 & 4.3 for further details.) Use of this system for non-designated purposes is not permitted.

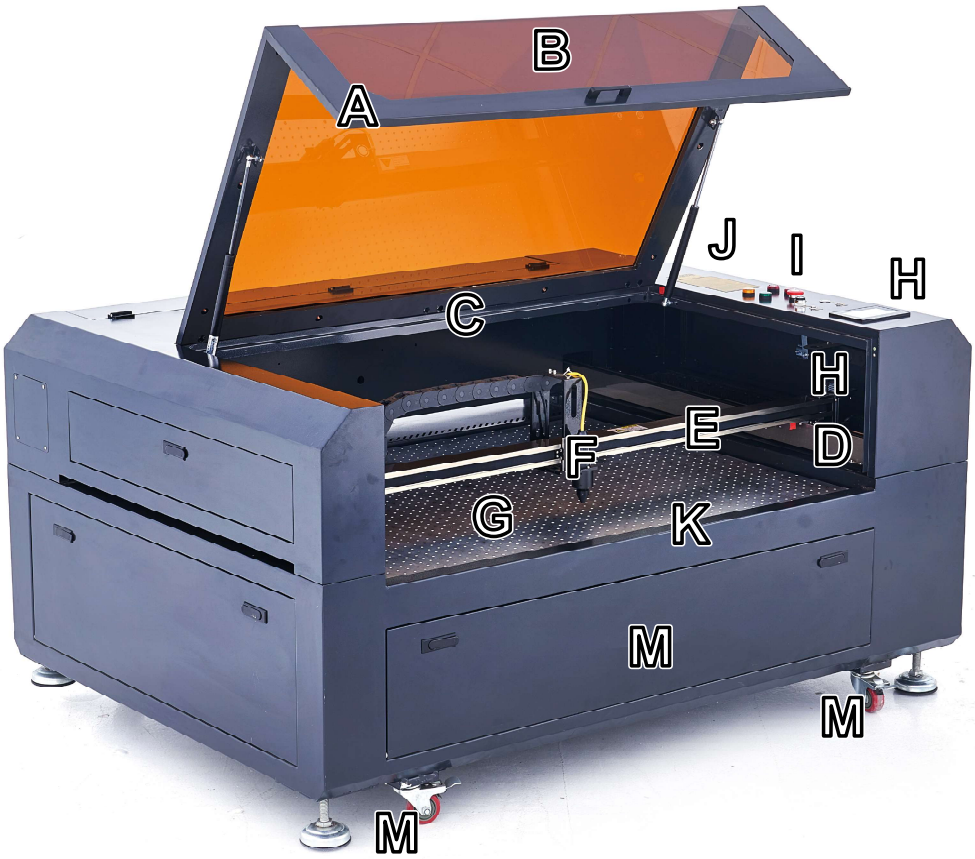
The system must be operated, maintained, and repaired by personnel familiar with the field of use and the dangers of the machine and the material being engraved, including its reflectivity, conductivity, potential for creating harmful or combustible fumes, etc.

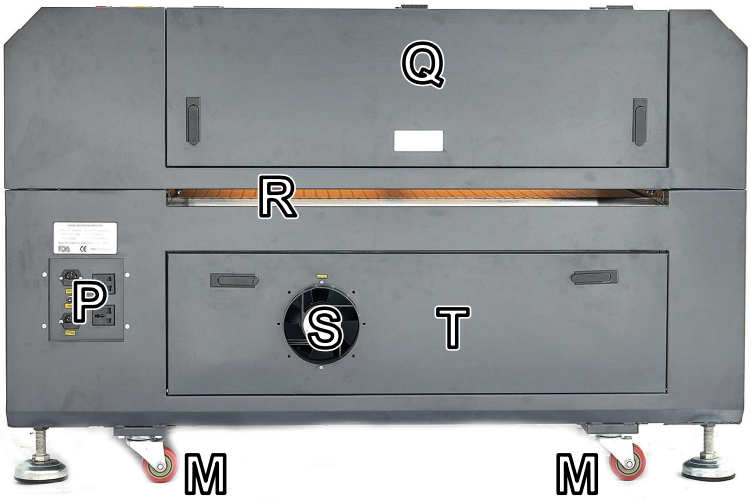
Laser beams are dangerous. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any improper use of this device or for any damage or injury arising from such use. The operator is obliged to use this fiber laser marker only in accordance with its designated use, the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

1.4 Technical Specifications

Model	USB690-30W
Input Power	110V/60Hz
Rated Power	30W
Exp. Service Life	100,000 hours
Laser Wavelength	1064 nm
Laser Frequency	20–100 kHz
Processing Area	23.6×35.4 in. (600×900 mm)
Max. Engraving Speed	47.25 ips (1200 mm/s)
Recommended Max. Speed	19.68 ips (500 mm/s)
Min. Engraving Depth	0.0004 in. (0.01 mm)
Max. Engraving Depth	0.04 in. (1 mm)
Max. Resolution	4500 dpi
Min. Letter Size	0.008×0.008 in. (0.2×0.2 mm)
Focus Lens Diameter	20 mm (0.78 in.)
Required Operating Environment	32–122°F (0–50°C)
Provided Operating Software	RDWorks
Supported Operating Software	CorelDraw, AutoCAD, EngraveLab, Illustrator
Supported Image Formats	.ai, .bmp, .dxf, .gif, .hpgl, .jpeg, .pdf, .plt, .png, .rd, .svg, .tiff, .tga
Graphic Operating Modes	Optimized Raster, Vector, Combined
Certification	FDA, CE
Dimensions	51×37.4×37.8 in. (130×95×96 cm)
Net Weight	440 lb. (200 kg)

1.5 Components





Main Parts

A. Cover—The cover provides access to the main bay for placing and retrieving materials, as well as fixing the laser path alignment and other maintenance. Power to the laser is automatically cut when the cover is opened.

B. Viewing Window—The sepia-tinted acrylic window is shielded to protect you and others from the laser and its reflection, allowing monitoring of the engraving process. However, you should never stare continuously at the laser during operation, even through the window.

C. LED Light—This light illuminates the workbed for a clear view of materials before, during, and after engraving.

D. Y-Axis Rail—The Y-axis rail supports the movement of the X-axis rail up and down the workbed.

E. X-Axis Rail—The X-axis rail supports the movement of the laser head left and right across the workbed.

F. Laser Head—The laser head holds the focus lens, the red dot guidance, and the air assist outlet.

G. Workbed—The workbed can be adjusted in height to fit thinner and thicker materials, as well as fitted with various sizes of positioning bars (sold separately) using M5 bolts.

H. Control Panel—The control panel offers hands-on control of the engraving process, including manual movement of the laser head and firing of the laser.

I. Emergency Stop—This button immediately cuts all power to the laser in the event of an emergency.

J. Warnings—This notice supplements the Safety Information chapter of this manual. Read it carefully before using the machine.

K. Front Pass-Through Door—This door 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.

L. Front Access Door—This door provides access to the waste hopper for easy cleanup after each project.

M. Caster Wheels—These wheels include locks to hold the engraver in place.

N. Top Right Access Door—This door provides access to the wiring for the control panel, buttons, and indicator lights for maintenance and repair when needed.

O. Bottom Right Access Door—This door provides access to the mainboard, laser source, motor driver, and power supplies.

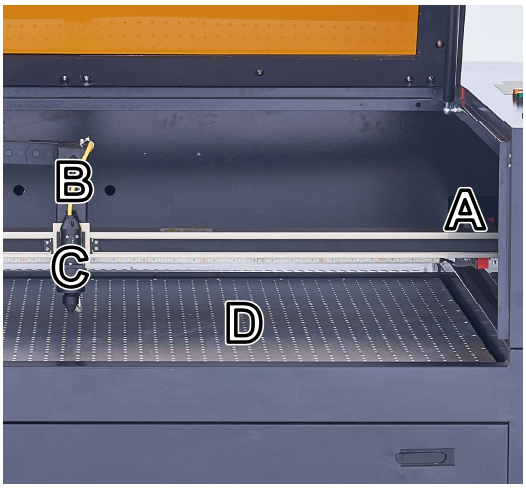
P. Power Sockets—These sockets connect to your main power supply, ground the machine, and provide additional sockets for your air assist and other devices if needed. It is recommended, however, to use a separate plug on a different fuse for all ancillary devices.

Q. Top Rear Access Door— This door opens to the servo motor and the linear guide rail.

R. Rear Pass-Through Door—This door is the rear equivalent of the front pass-through door and requires similar care during use.

S. Exhaust Fan(s)—This fan or these fans (varies by model) pull out gasses and airborne debris from the worktable, sending it through your vent(s) to a window or air purifier.

T. Bottom Rear Access Door—This door opens to the exhaust fan(s) and the air assist motor.



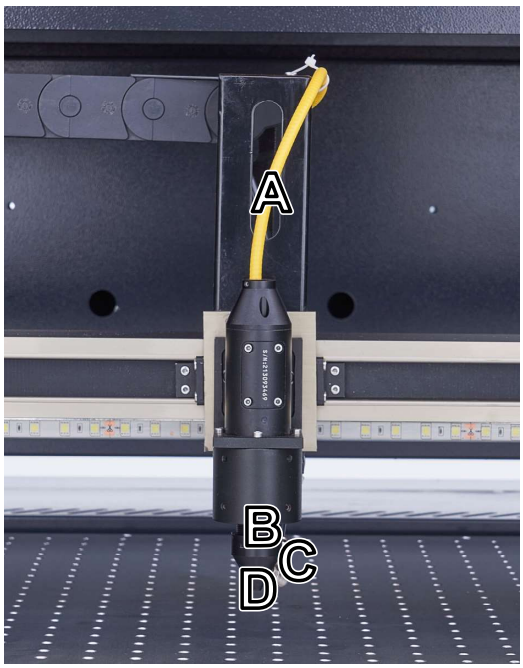
Laser Path

A. Laser Source—This thulium-doped fiber laser source is mounted and immobile. Its connection to the laser power supply is extremely high voltage and extremely dangerous.

B. Optical Laser Line—This fiber optic cable carries the laser beam from its source to the focus lens.

C. Laser Head—This houses the focus lens where the invisible engraving laser emerges from the line, as well as the red dot pointer and air assist.

D. Workbed—The workbed can be adjusted in height to fit thinner and thicker materials, as well as fitted with various sizes of positioning bars (sold separately) using M5 bolts.



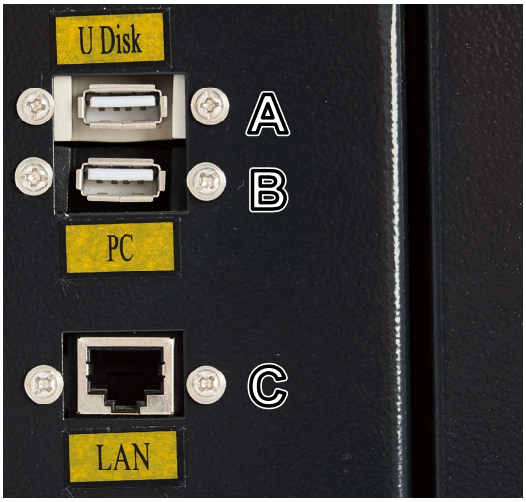
Laser Head

A. Optical Laser Line—This fiber optic cable carries the laser beam from its source to the focus lens.

B. Red Dot Pointer—This device helps you see the exact position of the invisible engraving laser.

C. Air Assist—This device blows pressurized air to kill sparks and blow away gas and debris as you engrave.

D. Focus Lens—This 20mm lens directs and focuses the laser beam to its point of contact with the engraving material. The engraving laser itself is invisible but highly dangerous. Avoid any direct exposure to your skin or eyes.



Connection Inputs

A. USB Port—This port allows you to load and save designs and parameters directly onto the engraver.

B. USB Line Port—This port connects to your control computer and its engraving software using any of its USB ports.

C. Ethernet Port—This port connects to your control computer and its software either directly or via the internet.

Control Panel

A. Open Cover Indicator Light—This light shows the cover of the main bay is open and should be closed before using the laser.

B. Open Cover Alarm—This alarm sounds when the cover of the main bay is open and use of the laser is dangerous for anyone nearby. It should never be disabled.

C. Power Indicator Light—This light shows the laser power supply is active.

D. Laser Indicator Light—This light shows the laser is currently active and the cover should not be opened.

E. Emergency Stop—This button immediately cuts all power to the laser in the event of an emergency.

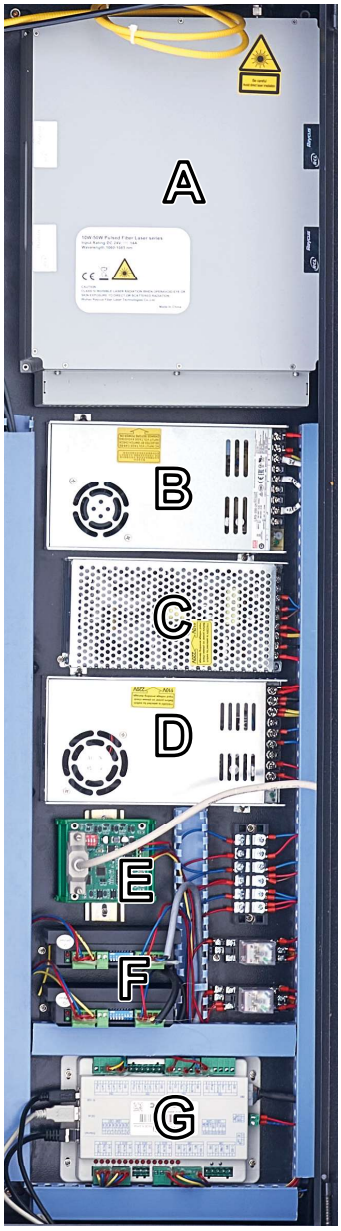
F. Power Lock—This lock helps prevent unauthorized use of your laser. Insert and turn your key to begin startup.

G. Power Button—This button activates the various power supplies in order during startup.

H. Up Button—This button raises the height (Z axis) of the workbed.

I. Down Button—This button decreases the height (Z axis) of the workbed. Remember to refocus the laser using the provided acrylic tool after height adjustment and before engraving.

Bottom Right Access Door



A. Laser Source—This is the thulium-doped fiber laser source. Its connection to the laser power supply is high voltage and extremely dangerous

B. 24V Power Supply—This device transforms standard electricity into the extremely high voltage charge necessary for the fiber laser.

C. 5V Power Supply—This device transforms standard electricity into the voltage charge necessary for the motherboard.

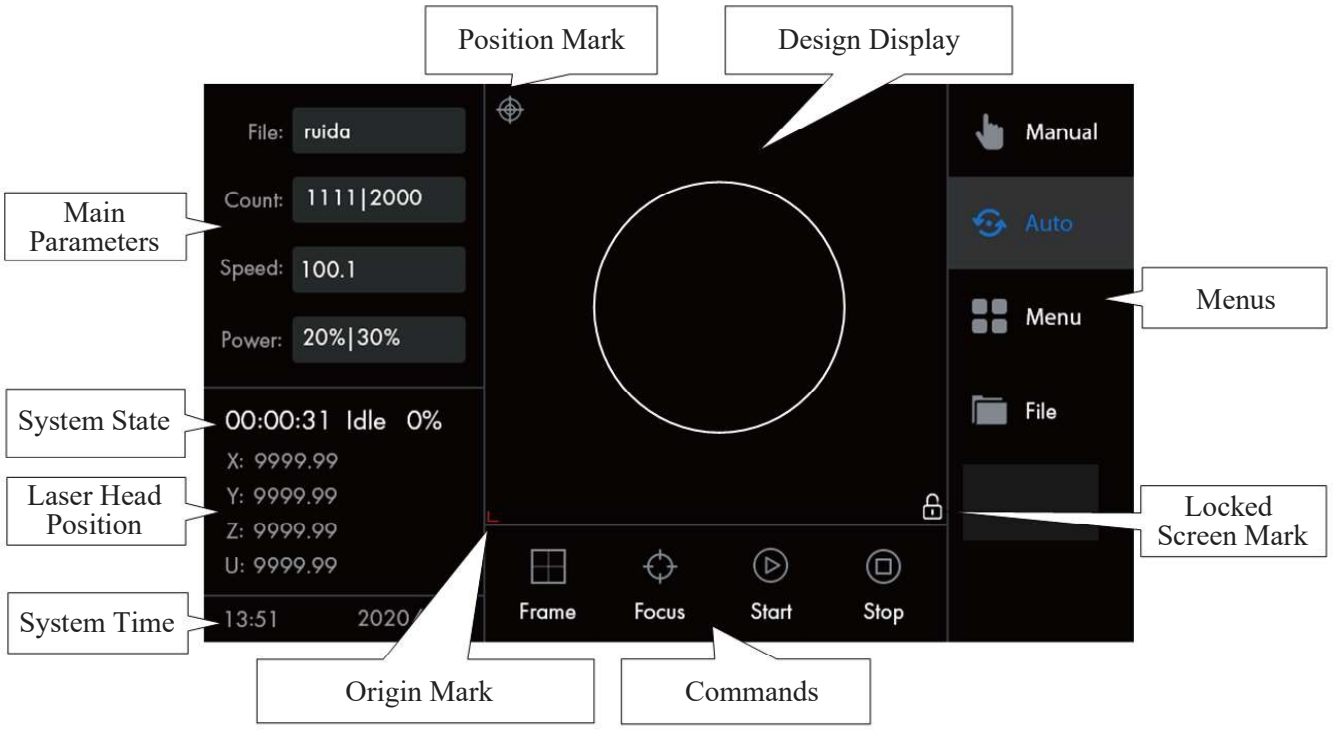
D. 36V Power Supply—This device transforms standard electricity into the voltage charge necessary for the driver.

E. Optical Fiber Converter—This device converts optical signals into electrical signals.

F. Driver—This device moves the laser head along the X & Y axes.

G. Motherboard—This circuit board controls the engraving process, responding to commands from your engraving software or the machine's control panel.

Control Console



File: Displays & modifies the current files.

Count: Displays the number of engravings in the current batch.

Speed: Displays & modifies the laser head's speed in mm/s.

Power: Displays & modifies the current power output of the primary & secondary lasers.

X: Y: Z: U: Displays the current location of the laser head along the X and Y axes, the elevation (Z) of the bed, and rotary position (U).

Manual Activates the interface's manual mode.

Auto Activates the interface's automatic mode.

Menu Accesses the main menu interface.

File Accesses the file menu interface.

00:00:00 Idle Displays the current batch's runtime in hours minutes and seconds and the current idle status.

13:51 2020/9/8 Displays the current system time and date.

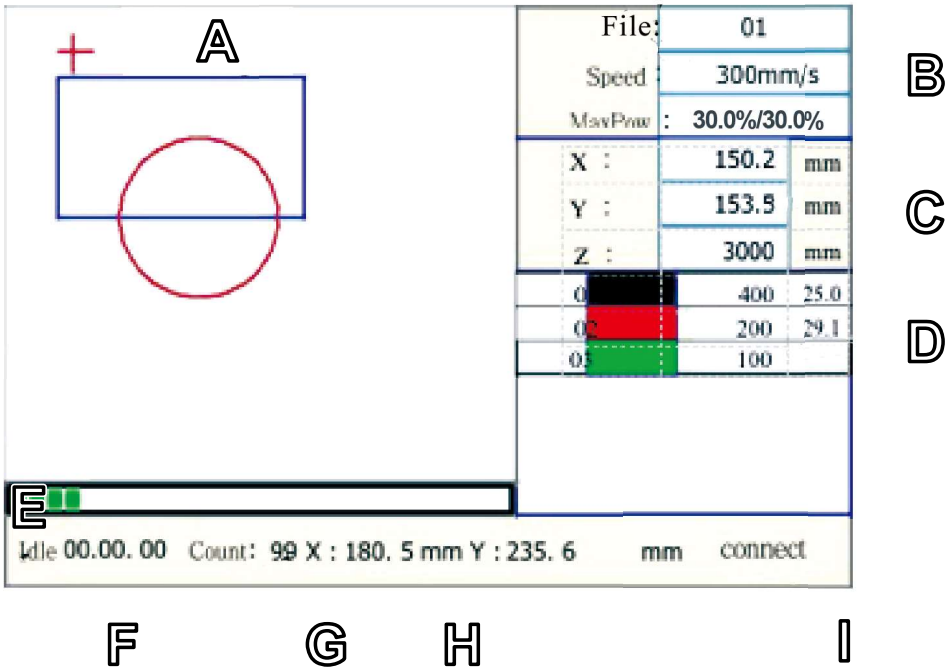
Frame Traces the border of the currently selected design.

Focus If you later install an autofocus device, this button will reset the Z axis to your laser's correct focal distance.

Start Starts engraving the currently selected design.

Stop Stops engraving.

Computer Control Display



A. Design Display—Shows the whole file's track and the running track.

B. Parameters—Displays the running file's file number, speed, max power, etc.

C. Coordinates—Displays the current coordinates of the laser head.

D. Layers—Displays the layer parameters of current or previewed files. Parameters from left to right are layer number, color, speed, and maximum power.

E. Laser Status—Displays the current status of the machine: Idle, Running, Paused, or Finished. The processing time is shown on the right side.

F. Progress Bar—Displays the progress of the current file.

G. Job Number—Shows the count of completed runs of the current file.

H. Design Dimensions—Displays the dimension of the current file.

I. Internet Status—Displays the status of the machine's internet connection.

When the system is idle or the work is finished, all the buttons can be used. Users can process the file, set the parameters, preview their file, etc. When the work is running or paused, some commands on the touchscreen will not work (e.g., **Origin** and **Frame**).

2. Safety Information

2.1 Disclaimer

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

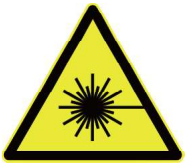
2.2 General Safety Instructions

- Use this laser marking device only in accordance with all applicable local and national laws and regulations.
- Use this device only in accordance with this instruction manual and the manual for the engraving software included with it. Only allow this device to be installed, operated, maintained, repaired, etc. by others who have also read and understood both manuals. Ensure that this manual and the software manual are both included with this device if it is ever given or sold to a third party.
- **DO NOT** operate this device continuously for more than 8 hours. Stop every 7 hours for at least ½ hour.

- **DO NOT** leave this device unattended during operation. Observe the device throughout operation and, if anything seems to be operating strangely, immediately cut off **ALL** power to the machine and contact either our customer service or your dedicated repair service. Similarly, ensure the device is **FULLY** turned off in the correct order after each use.
- **DO NOT** allow minors, untrained personnel, or personnel suffering from physical or mental impairment that would affect their ability to follow this manual and the software manual to install, operate, maintain, or repair this device.
- Any untrained personnel who might be near the device while it is in operation **MUST** be informed that it is dangerous and fully instructed on how to avoid injury during its use.
- Always keep a fire extinguisher, water hose, or other flame retardant system nearby in case of accidents. Ensure that the local fire department's phone number is clearly displayed nearby. In the case of a fire, cut electrical power before dousing the flame. Familiarize yourself with the correct range for your extinguisher before use. Take care not to use your extinguisher too close to the flame, as its high pressure can produce blowback.

2.3 Laser Safety Instructions

When used as instructed, this machine comprises a Class 1 laser system safe for users and bystanders. However the invisible engraving laser, the laser tube, and its electrical connections remain **extremely** dangerous. Used or modified without care, they can cause serious property damage and personal injury including but not limited to the following:



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

As such,

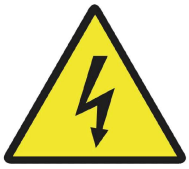
- **DO NOT** modify or disable this device's provided safety features. Do not modify or disassemble the laser and do not use the laser if it has been modified or disassembled by anyone except trained and skilled professionals. Dangerous radiation exposure and other injury may result from the use of adjusted, modified, or otherwise incompatible equipment.
- **NEVER** interfere with the laser beam.
- **DO NOT** place any part of your body under the laser lens during operation. Take measures to protect yourself from potentially reflected laser beams including the use of screens or personal protective equipment.
- **NEVER** attempt to view the laser directly without protective eyewear. Always wear safety goggles or glasses designed to filter the specific wavelength of your engraver's laser with an optical density (OD) of 4+. As even seemingly matte materials can produce harmful reflected beams, care should be taken to keep anyone without protective

eyewear from observing the machine during operation. **EVEN WITH** protective eyewear, do not stare or allow others to stare continuously at the laser beam during operation.

- **DO NOT** leave potentially combustible, flammable, explosive, or corrosive materials nearby where they could be exposed to the direct or reflected laser beam.
- **DO NOT** use or leave sensitive EMI equipment nearby. Ensure the area around the laser is free of strong electromagnetic interference during any use.
- **ONLY** use this machine as described in the Material Safety section of this manual. The laser settings and engraving process must be properly adjusted for specific materials.
- Ensure the area is kept free of airborne pollutants, as these might pose a similar risk of reflection, combustion, etc.
- **NEVER** use this marking machine with the fiber source's housing opened, as the closed laser light path is necessary to prevent laser radiation leakage.

2.4 Electrical Safety Instructions

- **ONLY** use this device with a compatible and stable power supply with less than 5% fluctuation in its voltage.
- **DO NOT** connect other devices to the same fuse, as the laser system will require its full amperage. Do not use with standard extension cords or power strips. Use only surge protectors rated over 2000J.
- **ONLY** turn on the power to this device when it is well grounded, either via a firm connection to a 3-prong outlet or via a dedicated grounding cable firmly connected to the proper slot on the back of the main tower. 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.



- **ONLY** use this device with one hand at a time. The laser is powered by an extremely high voltage connection and placing two hands on the machine at one time during operation has the potential to create a closed circuit with the human body, resulting in electrical shock.
- The area around this laser marking device should be kept dry, well ventilated, and environmentally controlled to keep the ambient temperature between 40–95°F (5–35°C). The ambient humidity should not exceed 70%.
- Adjustment, maintenance, and repair of the electrical components of this device must be done **ONLY** by trained and skilled professionals to avoid fires and other malfunctions, including potential radiation exposure from damage to the laser components. Because specialized techniques are required for testing the electrical components of this marking system, it is recommended such testing only be done by the manufacturer, seller, or repair service.
- Unless otherwise specified, **ONLY** undertake adjustment, maintenance, and repair of the device when it is turned off and disconnected from its power supply.

2.5 Material Safety Instructions

- Users of this fiber marking machine are responsible for confirming that materials to be processed can withstand the heat of the laser and will not produce any emissions or byproducts either harmful to people nearby or in violation of any local or national laws or regulations. In particular, do not use this device to process polyvinyl chloride (PVC), teflon, or other halogen containing materials under any circumstances.
- Users of this fiber laser are responsible for ensuring that every person present during operation has sufficient PPE to avoid any injury from emissions or byproducts of the materials being processed. In addition to the protective laser eyewear discussed above, this may require goggles, masks or respirators, gloves, and other protective outer clothing.
- Users must exercise special caution when working with conductive materials as buildup of their dust and ambient particles may damage electrical components, cause short circuits, or produce other effects including reflected laser radiation.

This machine can be safely used with the following materials:

- Aluminum
- Brass
- Carbide
- Gold
- Silver
- Steel
- Stone, including Granite, Marble, etc.
- Titanium
- Tungsten

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

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

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

- Artificial Leather containing Hexavalent Chromium (Cr[VI]), due to its toxic fumes
- Astatine, due to its toxic fumes
- Beryllium Oxide, due to its toxic fumes
- Bromine, due to its toxic fumes
- Chlorine, including Polyvinyl Butyrale (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
- Paper and Paperboard, due to their high flammability when exposed to the concentrated laser
- Phenolic Resins, including various forms of Epoxy, due to their toxic fumes
- Wood, including MDF, Plywood, Balsa, Birch, Cherry, Oak, Poplar, etc., due to its high flammability

3. Installation

3.1 Installation Overview

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

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

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

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

3.2 Location Selection

Prior to assembling your fiber laser marker, select an appropriate location for its use.

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

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

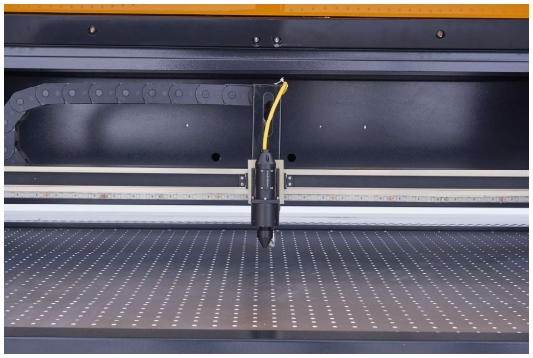
3.3 Unpacking Your Engraver

Your engraving machine arrives in a wooden crate with its accessories (including this manual) packaged inside the lower bay. You should have placed the crate in a spacious flat area for unpacking, ideally where you plan to operate the machine permanently. If you have not already done so, finish removing the crate from around your engraver. Once unpacked, the machine can be rolled into place.

Step 1. Fix it in place by pressing down on the brake pads on the wheels.

Step 2. Retrieve the access and laser keys from the main bay in the front of the machine. Use them to unlock the lower bay and take out the accessories pack. Check that you have received all of the following: a power cord, a ground wire, USB and Ethernet cables, a USB flash drive with engraving software included, exhaust pipe(s) with a hose clamp(s), a set of hex wrenches, an acrylic focusing tool, and this manual.

Step 3. Inside the main bay, remove the nylon cable ties from the X axis.



Step 4. You may keep the packaging in case of future return but, if you dispose of it or any accessories, be sure to do so in compliance with applicable waste disposal regulations.

3.4 Electrical Grounding

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

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

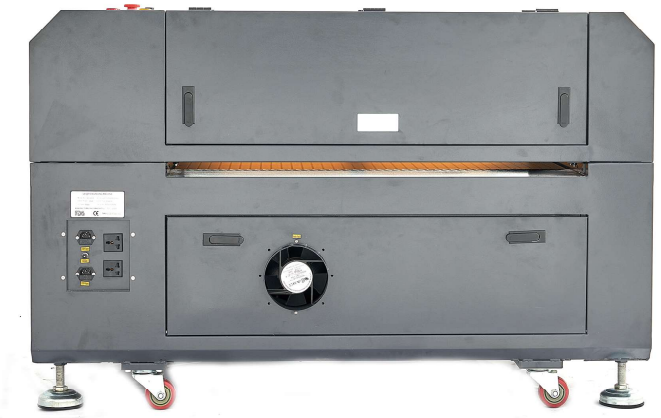
3.5 Exhaust System

The number of rear exhaust fans varies by model. Install the provided exhaust pipe or pipes directly on the fan(s). Each pipe can be expanded to a full length of about 5 feet (1.5 m).

The other end(s) should be connected to a dedicated purifier or (if the fumes are not hazardous and meet local and national air safety standards) placed out a window. **NEVER** operate the laser if the exhaust system is not purifying or removing the fumes produced by the target material. Research materials before use and never operate the laser on any (such as PVC, teflon, and other halogen-containing substances) that can produce corrosive, hazardous, or even deadly fumes.

3.6 Main Power Connection

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



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

3.7 Control Computer

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

3.8 Initial Testing

Emergency Shutoff

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

When your engraver arrives, its e-stop is already pressed and must be pulled up to allow the laser to function. You should test that it works properly before conducting **ANY** other work with your machine. Place a piece of laserable scrap material on the workbed, close the cover, activate **Manual** control (see §4.4), and press **Laser** to fire the laser. Hit the emergency stop button and observe whether the laser stops instantly. If the laser continues to fire, the emergency stop is not working and must be replaced before the engraver can be used. Turn off the machine and contact customer service.

Cover Shutoff (Interlock)

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

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

Air Assist

Your air assist should arrive pre-installed and correctly wired. Simply check in the lower rear bay that it is correctly configured and connected as shown. If any tubing or wiring needs to be reconnected, shut off all power to the machine (including by pressing the emergency stop) before adjusting anything.

3.9 Security

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

4. Operation

4.1 Operation Overview

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

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

4.2 General Operation Instructions

Step 1. Create your design that you'd like to engrave. You can do this directly in your engraving software or use any other graphics program, saving or converting the file to a format compatible with the engraver. See the full list of acceptable file types in the Technical Specifications section above.

Step 2. Turn on your fume extractor or ventilation system, if any. (The engraver's own exhaust fan will turn on with the machine.)

Step 3. Open the engraver's cover and place a sample piece of your material on the workbed. The standard location is in the top left corner of the workbed. This can be changed by moving either your design or the location of the engraver's origin using either the control panel or your engraving software.

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

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

Step 4. Close the engraver's cover and pull up on the emergency stop button. Turn on the engraver by inserting and turning your laser key and pressing the power button above the control panel. To reduce the risk of electric shock, once the laser power supply is on, try to touch the engraver with only one hand at a time. Use the touch-screen to load your chosen design directly from a USB flash disk or through your computer's connection with the engraver.

Step 5. Adjust the workbed if necessary. The bed can be raised or lowered using the control panel or the touchscreen to accommodate different widths of different materials. During adjustment of the workbed or manual focusing (see below), it may be necessary to cut power to the machine to avoid activating the cover alarm. Simply turn the machine off, make your adjustments, and restart.

Step 6. Focus the laser by placing the acrylic focus tool on top of the material and carefully raising the workbed. The laser head should barely touch the top of the acrylic tool without applying any pressure, ensuring the engraving distance is correct. (Never attempt to focus the laser without some material on the workbed.)

Step 7. 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 5%. The laser will not fire at any setting lower than this. It is **NOT** recommended to use the laser at full capacity, especially for extended periods. The recommended maximum power setting is 70%, as prolonged use above that amount will shorten your laser's service life. To increase engraving depth, increase the amount of energy per unit area by increasing the laser's power or the number or loops or by slowing down the speed parameter. Engraving too deep, however, reduces image quality, especially for coated materials.

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

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

Step 8. Press **Start** to engrave your design. Again, do not stare continuously at the laser even through the protective acrylic window. Watch for possible issues like sparks or fires, however, and be prepared to to quickly extinguish a fire if necessary.

Step 9. Once the laser has stopped, examine the quality of your first run and adjust the laser parameters on the control panel or in your software as necessary to create the desired effect.

Step 10. When you have finished engraving, close your engraving software and then turn off your machine in the following order: the power button, any ventilation device, and the emergency power button. Remove your laser key from the control panel.

Step 11. Fully clean the workbed and empty the waste bin.

Step 12. For best results, lock and disconnect your laser engraver from its power supply between uses. Unplug it or turn off its intermediary surge protector.

4.3 Instructions for Specific Materials

When engraving a new material, it can be helpful to engrave a test matrix of small boxes produced with various speed, power, and frequency settings to home in on the exact effect that you are looking for. To speed the process, here are some general guidelines for commonly engraved materials. Again, however, these are only guidelines for your convenience and it is the responsibility of the user to consult material safety data sheets and other sources to ensure the safety of working with various materials and setups. Some of the materials listed will require additional workspace and personal protective equipment in addition to this engraver:

Metals

When engraving metals, generally use high power, a low frequency, and low to medium speed settings. To avoid using your marker at greater than 70% power for extended periods, you can also get similar effects by reducing the power somewhat while also increasing the number of passes or decreasing the engraving speed. Be mindful that some metals will produce conducting, reflective, and/or toxic dust. Softer metals naturally produce more dust during engraving, while harder metals can require higher power settings that also produce more dust. In addition to the risk to the user's skin and eyes, there may be enough dust produced (especially for repetitive industrial applications) that a full ventilation system is required to address the problem. Similarly, operators and others in the work area may need to use breathing PPE such as masks and respirators.

Aluminum: Bare aluminum requires a somewhat higher frequency than other metals and will never produce a strong black mark similar to those created by engraving steel. When darker marking is required, consider employing anodization or producing a deep engraving that can be darkened by using black epoxy or other filler. Anodized aluminum requires a little more speed but a very low frequency.

Powder Coated Metals: Metals with a powder coating usually require a very high frequency and, for best results, at least 3 passes to remove the coating and polish the bare lower layer.

Precious Metals: Gold and similarly soft metals should be engraved with less power but a moderate speed. Silver and other semidurable metals are best engraved at a slightly higher power and slightly slower speed, but still not at the same power and speed as steel or aluminum.

Plastics

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.

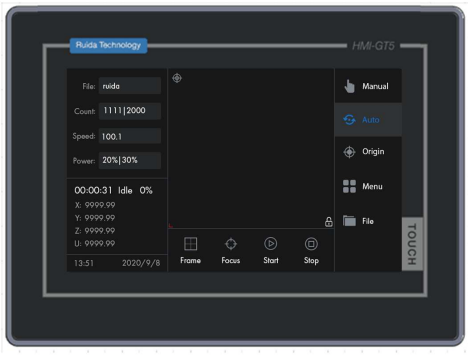
Stone

When engraving various kinds of stone, generally use moderate power and speed at low frequency. As with ceramics and metals, 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.

4.4 Control Console Instructions

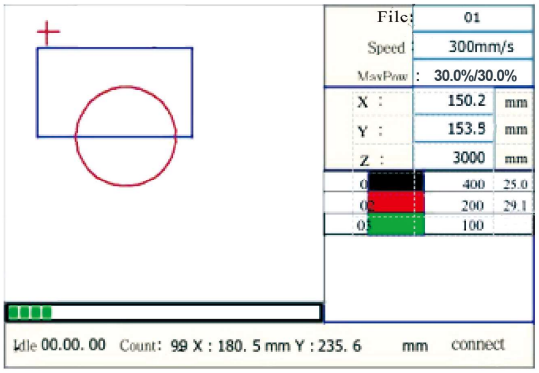
4.4.1 Overview

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, select **Manual** on the main interface. Use the **X±** and **Y±** buttons to move the laser head along the X and Y-axis guide rails and the **Laser** button to fire the laser. The laser head can be set to tab over a set distance each time the **X±** and **Y±** buttons are pressed by changing the **Mode** to “Step” and adjusting the distance using **Step Length**. If you adjust the height of the bed using **Z±**, focus the laser again using **Focus** on the main interface. All of the buttons and menus should be labelled in English. If they are not, press the button with 4 boxes ⊞ on the right side of the main interface. Press the button with a globe 🌍, and then press the top right button next to a British flag 🇬🇧.

To load a design from a FAT16 or FAT32 formatted flash disk or external hard drive, press **File**, then **UDisk**, and click on your file. Press **Select**, then **Auto**, then **Start**. 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.

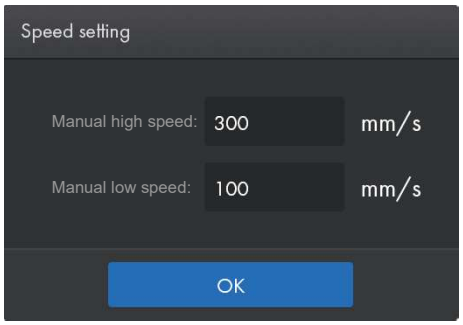


When running a design from your control computer, this will be the main display. The design should appear in the top left corner and its name and the current speed and power settings on the top right. The position of the laser head relative to the workbed appears as the X (horizontal) and Y (vertical) coordinates. The Z coordinate shows the elevation of the workbed itself. 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 buttons say, press **Start** to start engraving your loaded pattern and **Stop** to pause engraving when needed.

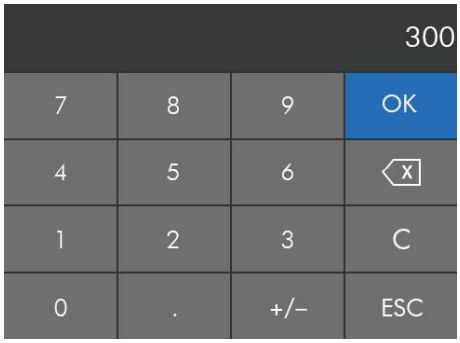
If there is ever an emergency situation such as a fire, do not use the control panel to pause or stop the engraving. Hit the emergency stop button immediately.

4.4.2 Setting the Laser Speed

Press the **Speed** display on the touchscreen's main interface to open the following submenu:



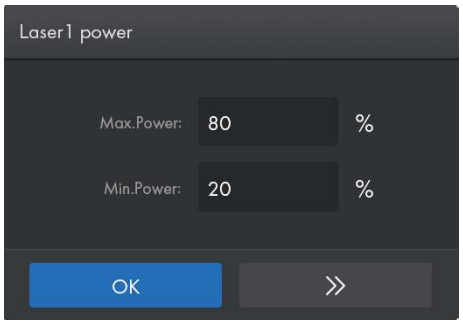
Manual High Speed displays and modifies the maximum speed of the laser head in mm/s, while **Manual Low Speed** sets the minimum speed. To adjust the speed, press the box around the value you want to change and the following submenu will open:



Change the value as needed. Do not use decimals or negative values. Do not set the maximum speed below the minimum speed or the minimum speed above the maximum speed. Press **OK** to save your changes and return to the previous submenu. Press **ESC** to exit without saving any changes. When you are satisfied with your speed settings, press **OK** to return to the main interface.

4.4.3 Setting the Laser Power

Press the **Power** display on the touchscreen's main interface to open the following submenu:



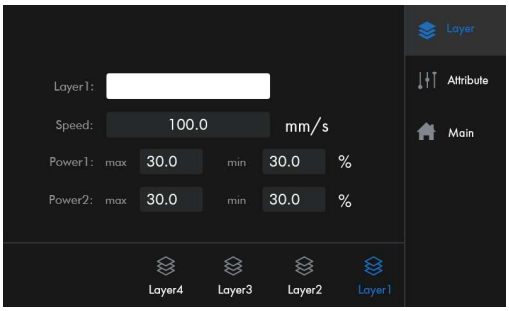
Max Power sets the highest intensity of the main fiber laser as a percentage of its maximum intensity (30W or 50W, depending on your model). Again, intensities above 70% will shorten the service life of your laser source. **Min Power** sets the lowest intensity. Again, intensities below 5% will not activate the laser source.

Change these values in the same fashion as the speed values (see §4.4.2). The control panel is able to support a secondary CO_2 or fiber laser, but its installation is beyond the scope of this manual. (Contact technical support for installation details.) If you have installed a secondary laser, press to modify its power settings.

Press **OK** to save your changes and return to the main interface.

4.4.4 Adjusting Engraving Layers

Press the file display on the touchscreen's main interface to open the following submenu:



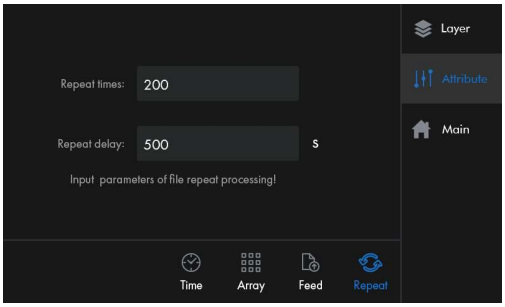
The **Layer** tab to the right allows you to set separate speeds and power levels for various layers of your design. Up to 6 can be displayed at any one time. To scroll through longer lists, use « and ».

Layer1/2/3/…: Displays and modifies the currently selected layer.
Speed: Displays and modifies the maximum speed of the laser head for the currently selected layer
Power1: Displays and modifies the maximum and minimum power settings for the main laser for the currently selected layer.
Power2: Displays and modifies the maximum and minimum power settings for the secondary laser (if any) for the currently selected layer.

The values displayed here will override the default values (see §§4.4.2 & 4.4.3) for the selected layer.

4.4.5 Setting the Number of Repetitions

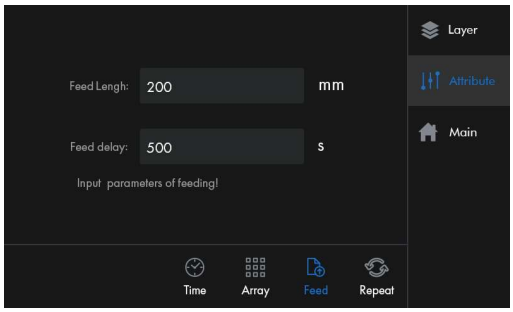
Press the **Attribute** tab on the right and it will automatically open the **Repeat** submenu:



Repeat Times displays and modifies the number of times the laser will trace your design while **Repeat Delay** displays and modifies the pause in seconds between each repetition. Change these values in the same fashion as the speed values (see §4.4.2).

4.4.6 Setting the Engraving Feed

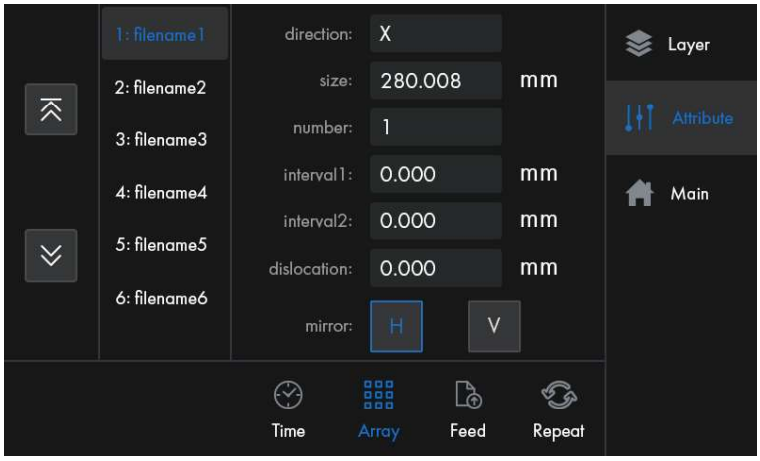
Press the **Feed** tab to open the following submenu:



The control panel is able to support an automatic feeding device. If you have installed such a device, **Feed Length** will display and modify the distance in mm that your material is moved between steps and **Feed Delay** will display and modify the pause in seconds between steps. Change these values in the same fashion as the speed values (see §4.4.2)

4.4.7 Adjusting Engraving Arrays

Press the **Array** tab to open the following submenu:



Various files can be sorted through on the left. Use ⩔ and ⩒ to move up and down the list.

Direction: Displays and modifies the axis being described.
Size: Displays the length in mm of the design along the selected axis.
Number: Displays the number of separate graphical elements in the currently selected file and axis.
Interval1: Displays the interval in mm between elements in odd-numbered rows.
Interval2: Displays the interval in mm between elements in even-numbered rows.
Dislocation: Displays the distance elements are shifted in mm.
Mirror: Allows you to reverse the elements in the even-numbered rows of the selected axis horizontally (**H**), vertically (**V**), or both (**H** & **V** together).

4.4.8 Estimating Engraving Time

Press the **Time** tab to display the estimated runtime for the current file.

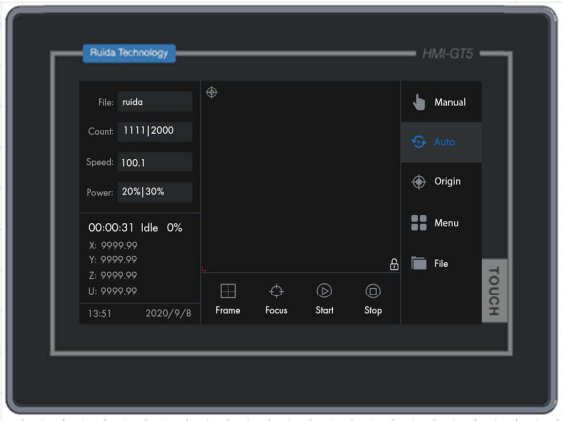
For all of §§4.4.4–8, press the **Main** tab to the right to save your changes and return to the main interface.

4.4.9 Manual Operation

In the main interface, press **Frame** to trace the border of the currently loaded design (see §4.4.13 for further options).

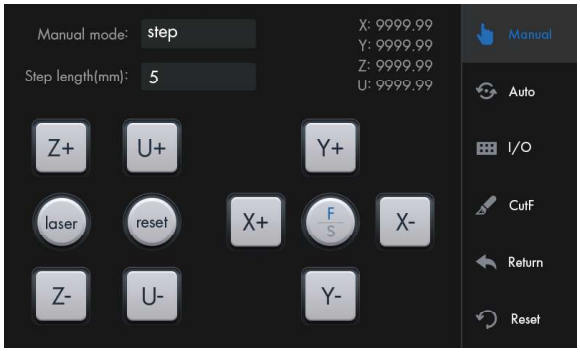
4.4.10 Focusing the Laser

The control panel is able to support an automatic focusing device. If you have installed such a device, press **Focus** in the main interface to automatically adjust the Z axis or laser head position to focus the laser for your material. Do not attempt to focus the laser if no material has been placed on the workbed.



4.4.11 Manual Operation

Press the **Manual** tab on the touchscreen's main interface to open the following submenu:



The current position of the laser head from left to right (X), back to front (Y), and—if a rotary axis is attached—rotationally (U) is displayed at the top right as is the height of the workbed (Z)

Laser: Press this to fire the laser once. Hold it to fire the laser continuously.

X/Y±: These buttons move the laser head along these axes either continuously or in discrete steps. Press the **Manual Mode** field at the top of the menu to toggle between these modes and **Step Length** to change the distance in mm of each movement.

U±: These buttons work in the same way, but turn your attached rotary axis (if any) to position the object to be engraved correctly under a mostly stationary laser head.

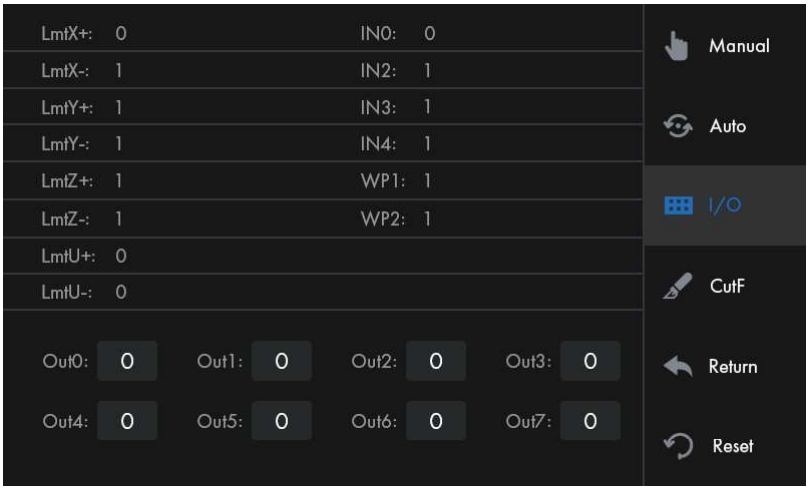
Z±: These buttons raise or lower the workbed for easier adjustment and positioning. They are equivalent to the **Up** and **Down** buttons on the control panel. Remember to refocus the laser after such adjustments before beginning engraving.

F/S: Press to toggle the speed of manual movement between the high (**F**) and low (**S**) settings (see §4.4.2).

Reset: Press to use the current position of the laser head as the current origin or anchor point.

4.4.12 Displaying Input/Output Status

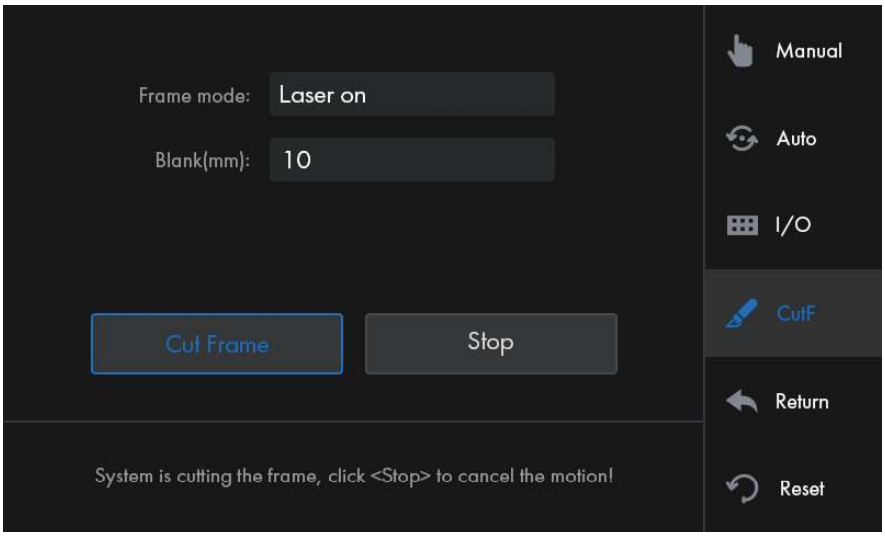
Press the **I/O** tab to open the following submenu:



The values displayed on this screen show whether the axis limit switches **(LmtX/Y/Z/U±)**, device input **(IN0/2/3/4)**, and device outputs **(Out0/1/2/3/4/5/6/7)** are correctly configured for the control panel (1) or inactive (0). **WP1/2** shows the status of the water protection system when the panel is used with a secondary CO_2 laser. The statuses are generally unimportant for users but may be helpful when troubleshooting problems.

4.4.13 Adjusting Border Options

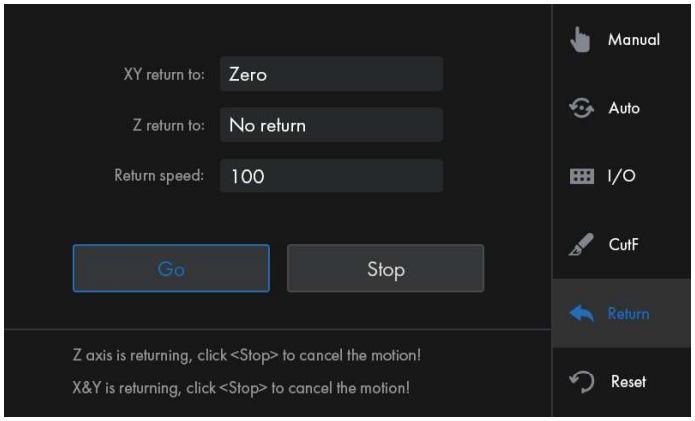
Press the **CutF** tab to open the following submenu:



Cut Frame will run the laser head around the border of the currently loaded design. **Frame Mode** toggles whether the laser will be active (cutting a frame onto your material) or inactive (simply showing you the borders of the current design). It can also be used to burn small dots at the four corners of the current design's frame. **Blank** displays and modifies the margin distance from the design to the frame in mm. Press **Stop** to stop the laser and/or the movement of the laser head while the frame is being shown or cut. The currently selected options will also be used when using **Frame** in the main interface.

4.4.14 Setting Automatic Returns

Press the **Return** tab to open the following submenu:



XY Return: Displays and modifies the position the laser head will return to after engraving a design. Options include the current origin, a selected anchor or position point, or stopping at the last point of the current design.
Z Return: Displays and modifies the elevation the workbed will return to after engraving a design. Its options are similar to those for the X and Y axes.
Return Speed: Displays and modifies the speed of the returning laser head in mm/s.

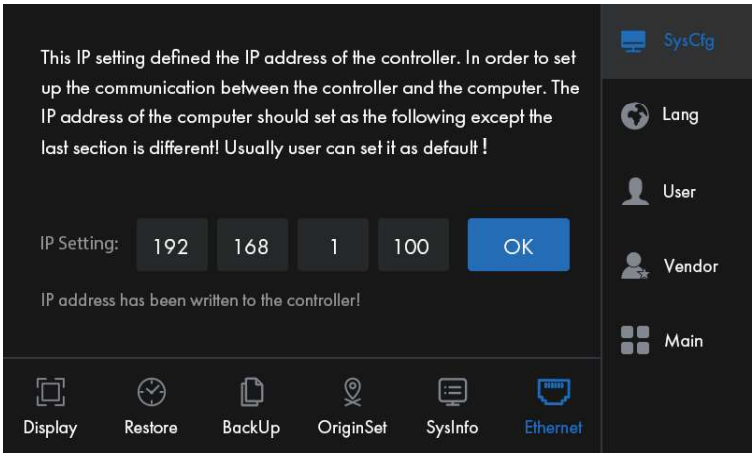
4.4.15 Resetting Manual Adjustments

Press the **Reset** tab to restore all the frame and return parameters to their factory defaults.

For §§4.4.9–13, press the **Auto** tab to the right to save your changes and return to the main interface.

4.4.16 Setting the Engraver IP Address

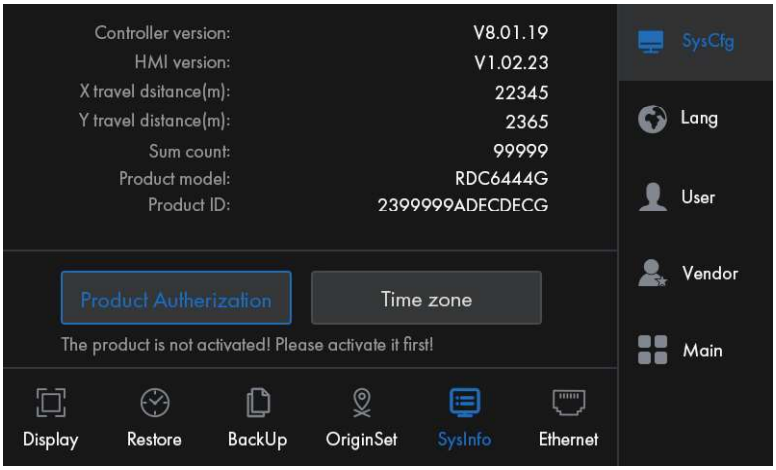
Press the **Menu** tab on the touchscreen's main interface and it will automatically open the **SysCfg** tab's **Ethernet** submenu:



IP Setting displays and modifies the engraver's IP address for access when connected to the internet or a LAN using the engraver's ethernet port.

4.4.17 Displaying System Information

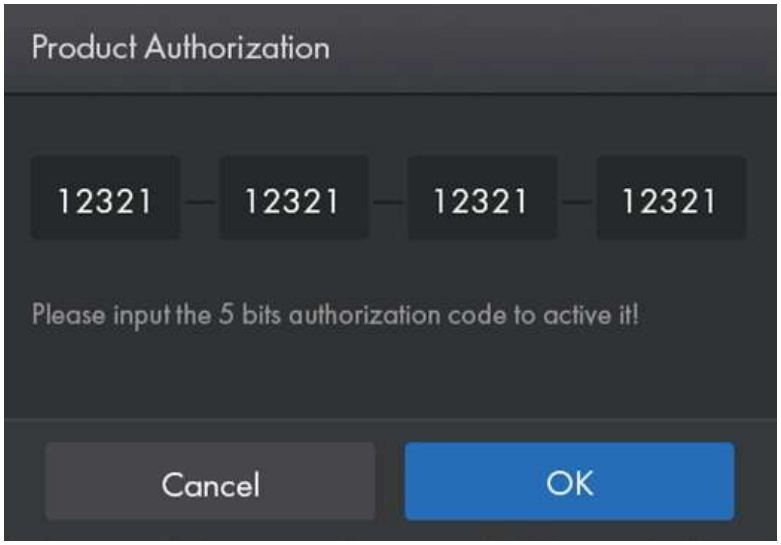
Press the **SysInfo** tab to open the following submenu:



This page displays the controller software version, the touchscreen interface version, and the model and serial number of the controller hardware. It also displays the total number of engravings made with your machine and the total distance the laser head has moved along the X and Y axes in meters.

4.4.18 Registering the Engraver Software

Press **Product Authorization** to open the following submenu:

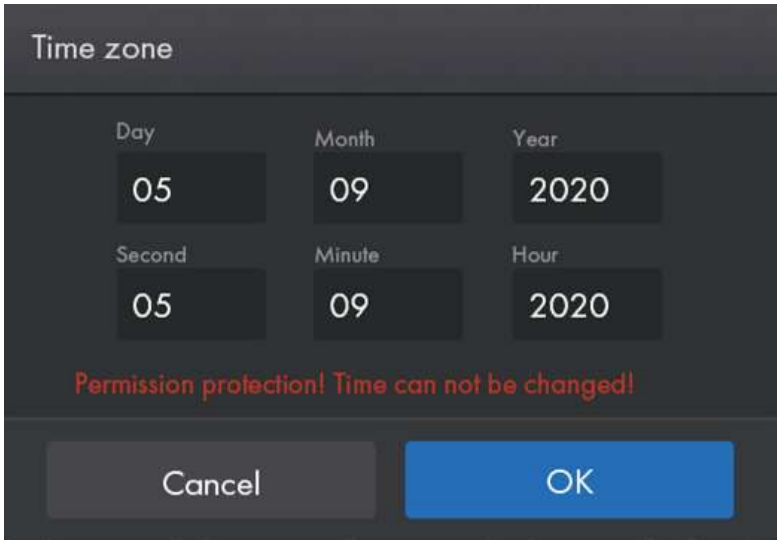


Your control panel and its software should arrive fully authorized and activated. If it is necessary to reauthorize your machine, please contact customer service.

Touch each block of digits to enter the controller software's authorization code and **OK** to confirm or **Cancel** to exit without saving any changes.

4.4.19 Setting System Date and Time

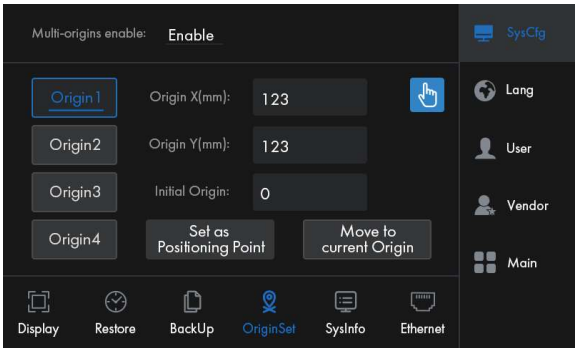
Press **Time Zone** to enter the following submenu:



Touch each block of digits to change the engraver's system date and time. Press **OK** to confirm or **Cancel** to exit without saving any changes. Note that the date and time cannot be adjusted while password protection is active.

4.4.20 Setting Origin Points

Press the **OriginSet** tab to open the following submenu:

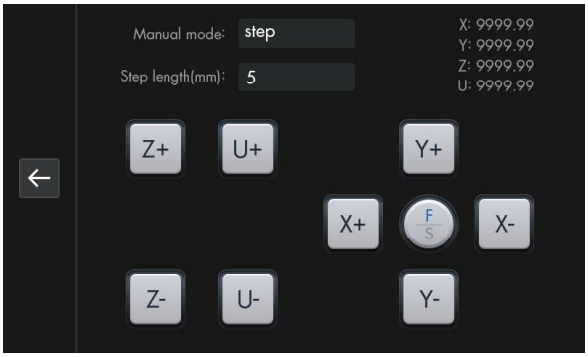


The machine's default setting is to use a single origin to engrave a single copy of your design during each session. Press **Multi-Origins Enable** to engrave up to 4 copies of your design in each session, one from each of 4 different origin points.

When multiple origins are enabled, select **Origin 1/2/3/4** on the left to set the position of each origin. The origins are used in order before returning to the first (1→2→3→4→1→...). If an origin has not been set, it will not be used & fewer copies will be made.

Each origin can be set numercially or manually. To set an origin numerically, select it on the left and use **OriginX** and **OriginY** to set its position from the top left corner of your workbed in mm. Press **Set as Positioning Point** to activate and save this position as a new origin. Press **Move...** to move the laser head to this saved position for checking and adjustment.

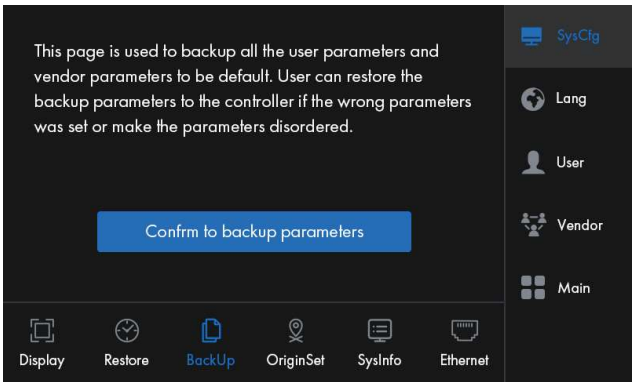
To set an origin manually, select it on the left and then click the hand icon at the top right to open the following submenu:



Use the controls to manually position the laser head, workbed, and/or rotary axis. When you have chosen your location, press ← and **Set as Positioning Point** to save your position as a new origin.

4.4.21 Backing Up Current Parameters

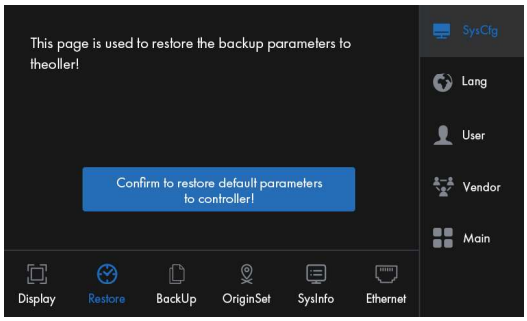
Press the **Backup** tab to open the following submenu.



Press **Confirm** to save all current parameters for future use or select a different tab to exit without saving. The default password for saving and resetting your parameters is "RD8888".

4.4.22 Restoring Saved Parameters

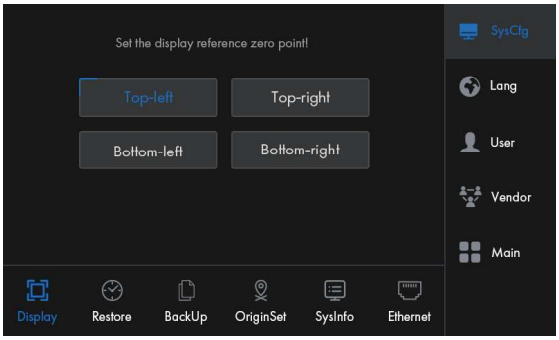
Press the **Restore** tab to open the following submenu:



Press **Confirm** to reset all current parameters to the last saved version. If **Backup** has not been used, these will be the factory default settings. Select a different tab to exit without resetting your current parameters.

4.4.23 Setting the Display Position

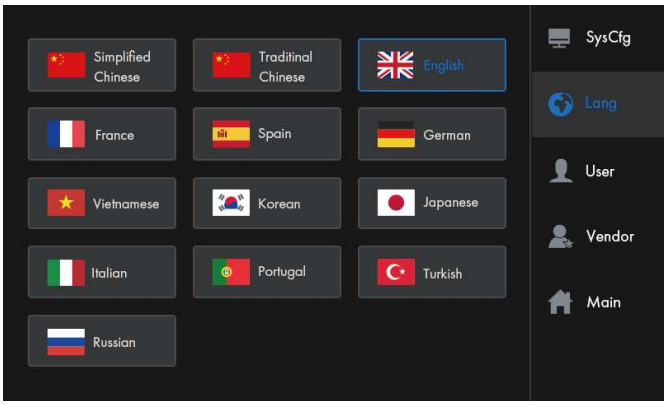
Press the **Display** tab to open the following submenu:



These buttons change the way in which your design will be shown on the touchscreen's main display. The default position places the engraving origin at the top left corner of the design. Other selections will mirror the design over the X or Y axis or over both. Make sure the display choice here matches that in your software when working from your computer.

4.4.24 Setting the Interface Language

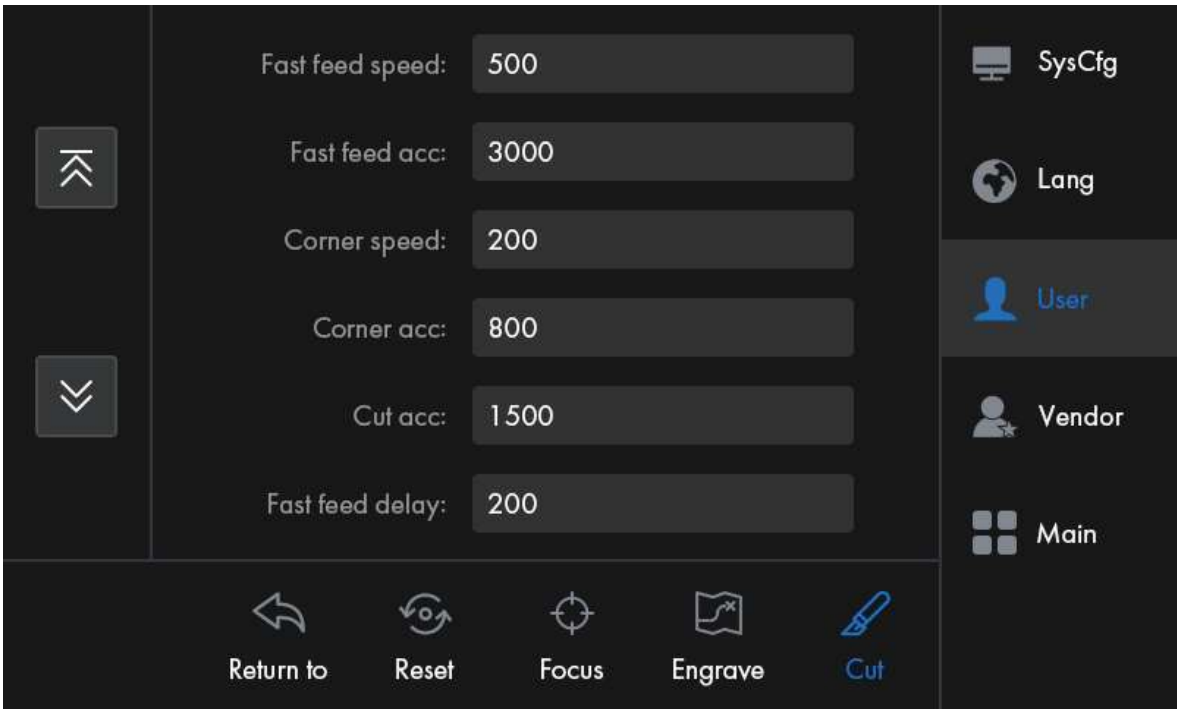
Press the **Lang** tab on the right to open the following submenu:



Select the interface language you would like to use or select a different tab to exit without changing your current language. If the interface is not already in English, press the top right option to correct this.

4.4.25 Fine Tuning Cutting Parameters

Press the **User** tab on the right and it will automatically open the **Cut** submenu:



The various parameters can be sorted through on the left. Use ⩔ and ⩒ to move up and down the list.

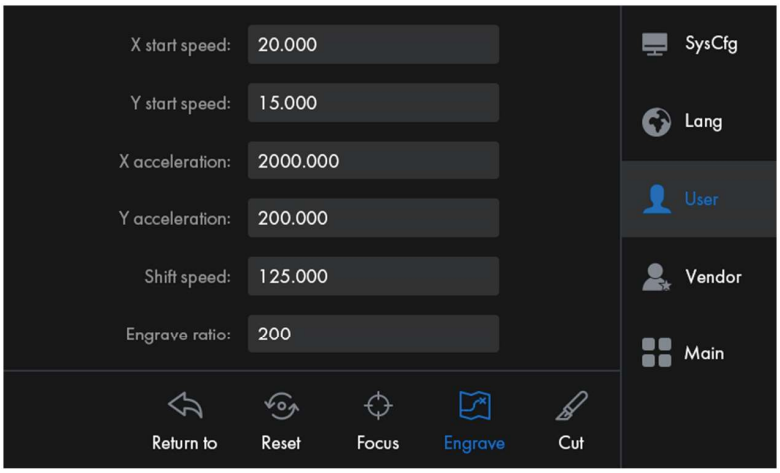
Idle Speed: Displays and modifies the max speed of the laser head when the laser is off in mm/s.
Idle Acc: Displays and modifies the max acceleration of the laser head when the laser is off in mm/s².
Fast Feed Speed: Displays and modifies the max speed of your automatic feeding device, if any, in mm/s.
Fast Feed Acc: Displays and modifies the max acceleration of the automatic feeding device, if any, in mm/s².
Corner Speed: Displays and modifies the max speed of the laser while cutting sharp corners, the slowest part of any design, in mm/s.
Corner Acc: Displays and modifies the max acceleration of the laser while cutting sharp corners in mm/s. This should be lower than **Cut Acc**.
Cut Acc: Displays and modifies the max acceleration of the laser during standard cutting in mm/s².
Fast Feed Delay: Displays and modifies the delay of the automatic feeding device, if any, between engravings in seconds.
Acc Mode: Toggles between sharp (T) and gradual (S) acceleration during cutting.
Idle Delay: Displays and modifies the delay of the laser in seconds when leaving idle status.

These parameters override other settings elsewhere in the control panel when cutting designs. For example, if the maximum cutting speed is set as 300 mm/s here and 500 mm/s under the **Speed** submenu, the laser will only cut at a maximum of 300 mm/s. However, the **Speed** and other submenus can set the laser speed lower than the maximum here without trouble.

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. (The estimated runtime for your design under current settings can be checked using the **Time** tab. See §4.4.8.) When parameters are set too high, especially for cornering, unhelpful shaking and fuzziness may occur. If this happens, lower your settings and try again.

4.4.26 Fine Tuning Engraving Parameters

Press the **Engrave** tab to open the following submenu:

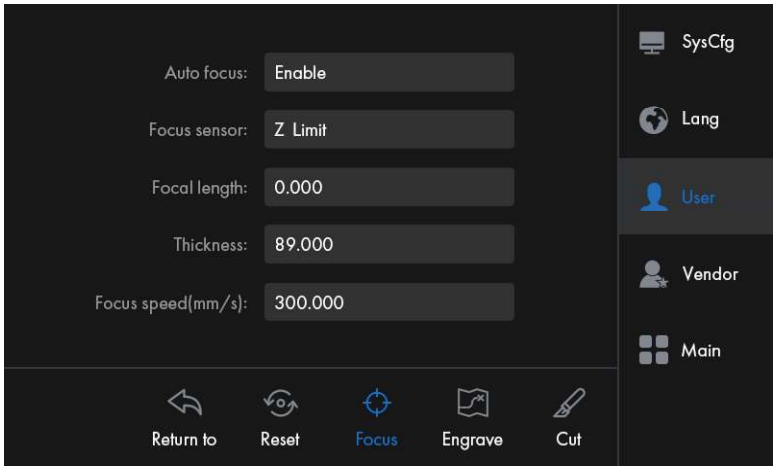


X Start Speed: Displays and modifies the starting speed of the laser along the X axis in mm/s.
Y Start Speed: Displays and modifies the starting speed of the laser along the Y axis in mm/s.
X Acceleration: Displays and modifies the max acceleration of the laser along the X axis in mm/s².
Y Acceleration: Displays and modifies the max acceleration of the laser along the Y axis in mm/s².
Shift Speed: Displays and modifies the max speed of the laser between lines of engraving in mm/s.
Engrave Ratio: Displays and modifies the laser spot size as a % of its usual size.

As with the cutting parameters, the general trade off is processing speed versus accuracy and smoothness. When accelerations and shift speed are set too low, engraving may take an extremely long time. When parameters are set too high, unhelpful shaking and fuzziness may occur. If this happens, lower your settings and try again.

4.4.27 Adjusting the Automatic Focus

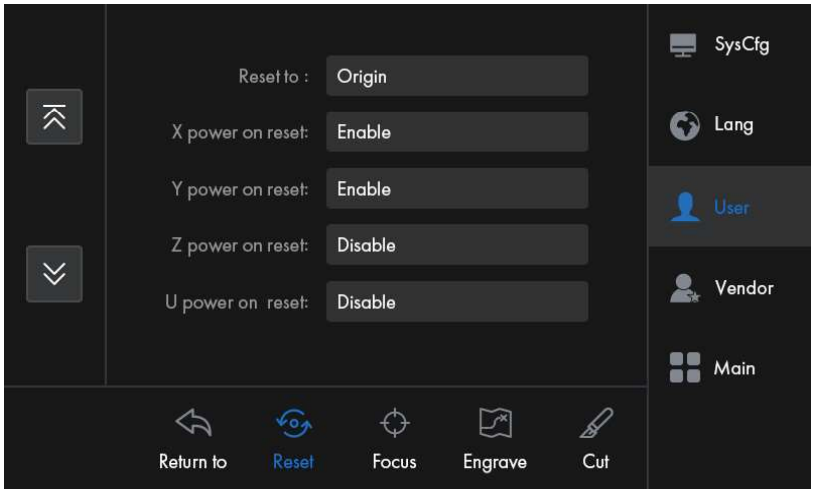
Press the **Focus** tab to open the following submenu:



Use **Autofocus** to activate an autofocusing device, if installed. The focus sensor, focal length, workbed thickness, and focusing speed can all be adjusted here. For more details, consult your device's separate manual and/or customer service.

4.4.28 Adjusting the Automatic Reset

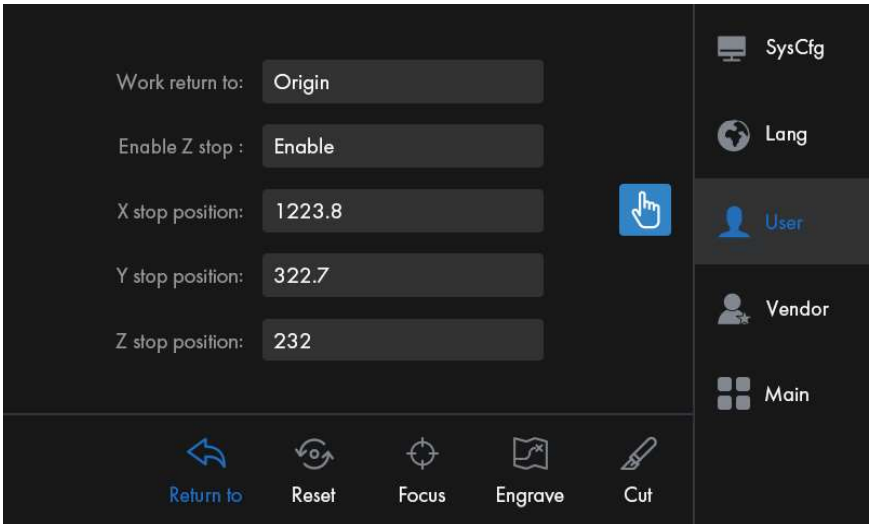
Press the **Reset** tab to open the following submenu:



Use these settings to control adjustments the machine will make upon restarting.

4.4.29 Adjusting the Automatic Return

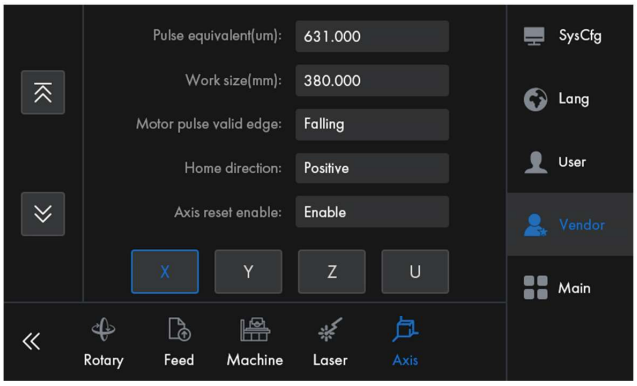
Press the **Return** tab to open the following submenu:



Use these settings to control the position the laser head returns to after each design is completed. It can be set numerically or manually using the hand icon to the right.

4.4.30 Changing Factory Hardware Parameters

Press the **Vendor** tab to open the following submenu:

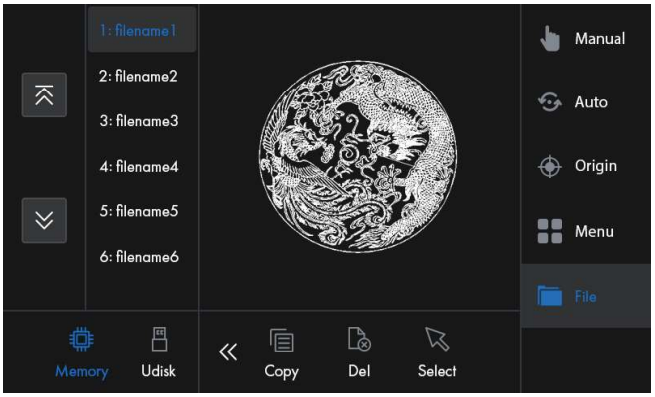


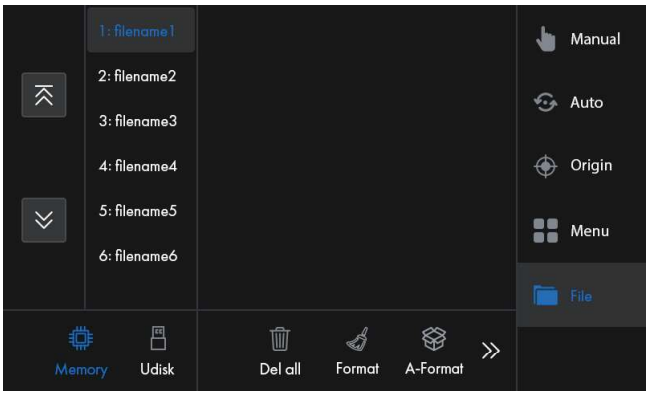
These submenus adjust very detailed aspects of your engraver's hardware. Improper settings in these menus can cause malfunction, property damage, and even serious injury. **DO NOT** modify them except in coordination with customer service and technical support during troubleshooting. The manufacturer and/or seller bear(s) no responsibility and assume(s) no liability for any damage or injury caused by unsupervised adjustment of these parameters.

For all of §§4.4.16–30, press **Main** to save your changes and exit to the main interface.

4.4.31 Loading Designs

Press the **File** tab on the touchscreen's main interface to open the following submenu:





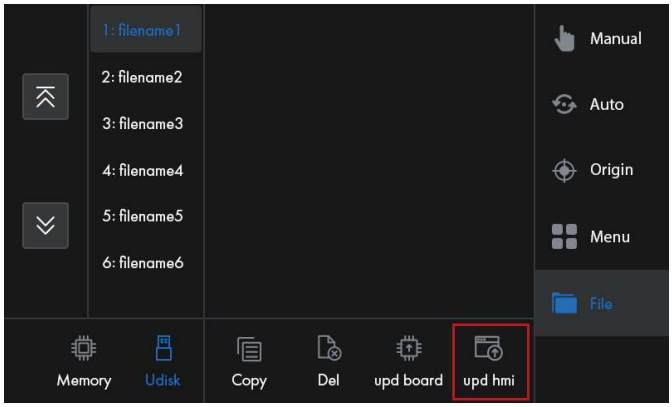
Various files can be sorted through on the left. Use ⩔ and ⩒ to move up and down the list. The files saved onto the engraver (**Memory**) will be shown automatically. Press **UDisk** to access files in the root directory of inserted FAT16 and FAT32 (Windows) formatted USB flash drives. Note that only the first 8 characters of the name will be displayed. File names using characters other than letters and numbers may not display correctly and may be inaccessible to the software.

Only 3 of the following commands are shown at one time. Use ≪ and ≫ to scroll through them.

Copy: Copies the selected file onto the other device
Delete: Deletes the selected file from the selected device
Select: Opens the currently selected file, replacing the previously open one
Del All: Deletes all files from the selected device
Format: Deletes all files from the selected device
A-Format: Deletes all files from the selected device

4.4.32 Updating the System Software

When **UDisk** is selected, the following additional commands are available:

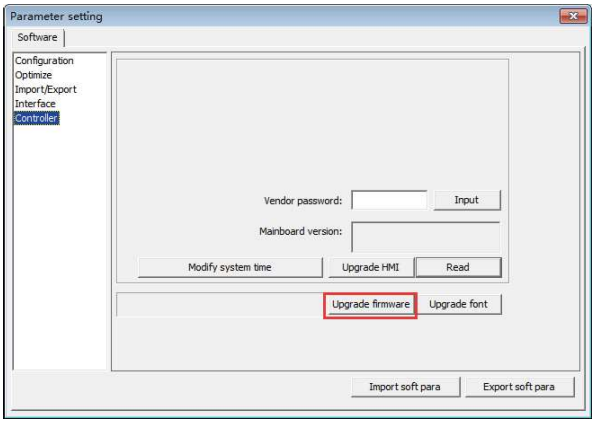


UPD Board: Upgrades the controller software from the inserted flash drive
UPD HMI: Upgrades the touchscreen's software from the inserted flash drive's root directory

The updates must be in the flash drive's root directory and should be the only .hmt or .upd file in that directory.

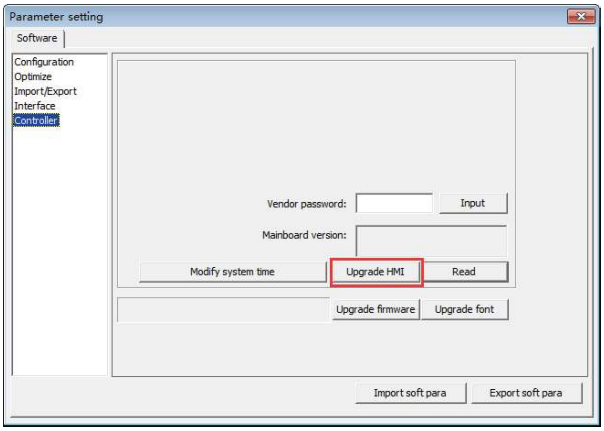
Software updates can also be loaded from the control computer using the provided copy of RDWorks. Connect the computer and engraver and go to

Settings > System > Mainboard > Controller > Upgrade Firmware



or

Settings > System > Mainboard > Controller > Upgrade HMI

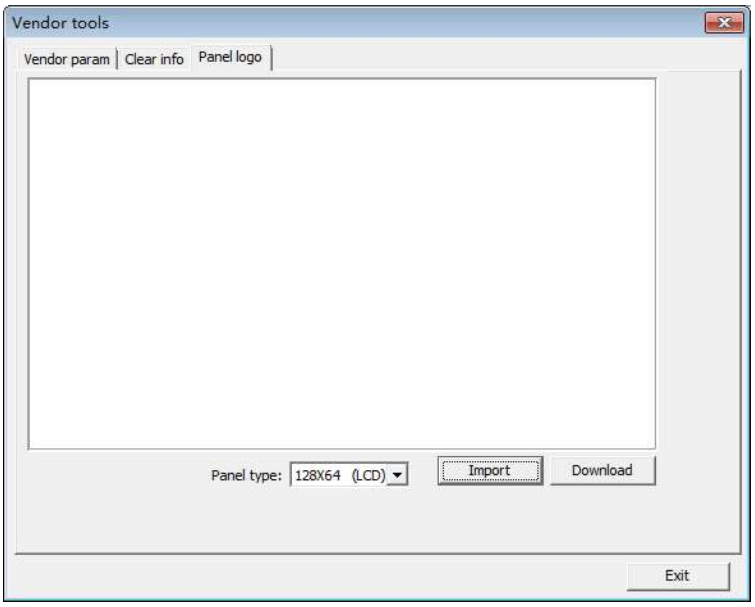


Select the correct file on your computer and the update will load on your engraver automatically.

4.4.33 Changing the Boot Screen

Changing the startup screen on your engraver can only be done through RDWorks. Connect the control computer and engraver and go to

File > Vendor > Panel Screen > Import



Select the correct file on your computer, set the **Panel Type** to 800×480 TFT, and click **Download**. The update will load on your engraver automatically.

5. Maintenance

5.1 Maintenance Overview

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

- The working table must be cleaned and the waste bin emptied on a daily basis.
- The focus lens must be checked every day and cleaned if required.
- The exhaust system must be checked every week and cleaned if required.
- The wiring should be checked every week for loose connections, especially the wiring for the laser tube power supply.
- The guide rails should be lubricated at least twice a month.
- The air assist must be checked every month and cleaned if required.
- The whole laser machine must be checked every month and cleaned where required.

5.2 Cleaning

5.2.1 Cleaning the Main Bay and Engraver

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

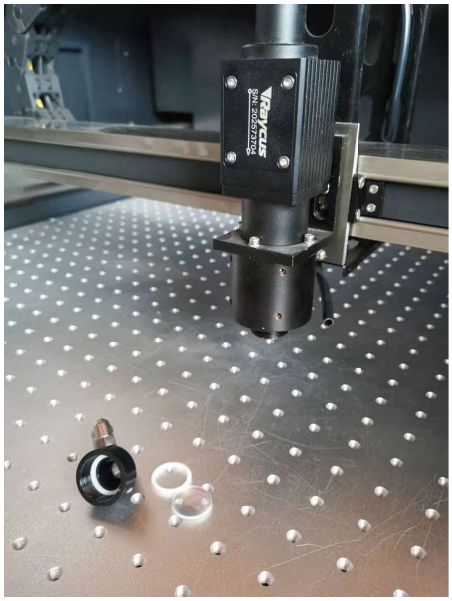
Clean the viewing window with mild cleansers and a lens or cotton cloth. **DO NOT** use paper towels as they can scratch the acrylic and reduce the cover's ability to protect you from laser radiation. Clean the interior of the main bay thoroughly, removing any debris particles or deposits. Paper towels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

5.2.2 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 daily and clean it if there is any debris or haze on its surface. Your laser will be less efficient and heat buildup on the oil or dust itself can damage the lens.

1. Move the engraving table to a distance approximately 4″ (10 cm) under the lens holder.
2. Move the laser head into the center of the workbed and put a cloth under the lens holder so that the lens will not be damaged if it accidentally falls from its holder.
3. Unscrew the lens holder, rotating to the left.

4. Remove the pressurized air hose and laser guide connections.
5. Once positioned over your clean lens-cleaning tissue, remove the lens from the lens holder by carefully turning the lens holder and letting the lens and its O-ring drop onto the cleaning cloth.

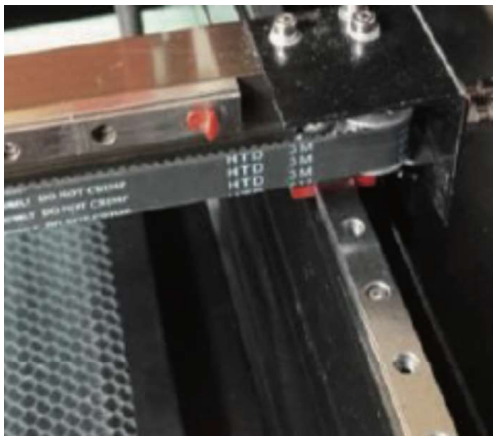


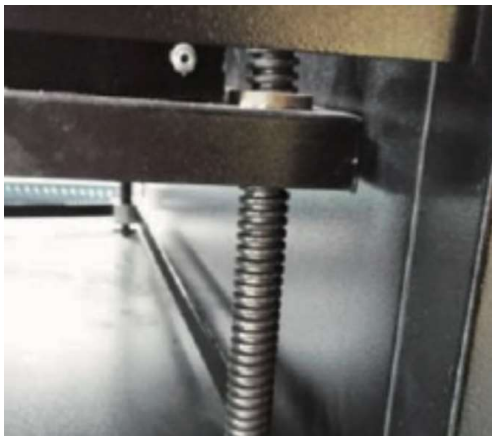
6. Examine the O-ring and, if necessary, clean it with a cotton bud and a lens-cleaning tissue or cloth.
7. Remove coarse dust as well as possible by blowing air onto the lens surface.
8. Check the surface and if necessary clean the lens with the lens cleaning liquid and lens tissue or cloth.
9. Hold the lens assembly by its edge with a lens-cleaning tissue and use a drop of lens-cleaning liquid. While holding the lens at an angle, flush both surfaces to wash away grime.
10. Put the lens on a clean lens-cleaning tissue and put some lens-cleaning liquid on one side of the lens. Leave the liquid to take effect for approximately one minute and then gently wipe it away with lens-cleaning tissues soaked with lens-cleaning liquid. Dry this side of the lens with dry lens-cleaning tissues/cloth.
11. Repeat the same cleaning process on the other side of the lens.

    ⚠ **NEVER** use a cleaning tissue twice. Dust accumulated in the cleaning tissue could scratch the lens surface.
12. Examine the lens. If it is still dirty, repeat the cleaning process above until the lens is clean. Do not touch the surface of the lens after cleaning.
13. Carefully insert the lens into the lens holder, ensuring that its rounded convex side is facing upwards. Put the O-ring on top of the lens.
14. Carefully reassemble the lens and laser head attachments in reverse order.

5.3 Lubrication

It is recommended that you add white lithium grease to the X and Y axis guide rails and screws at least every two weeks.





5.4 Parts Installation and Replacement

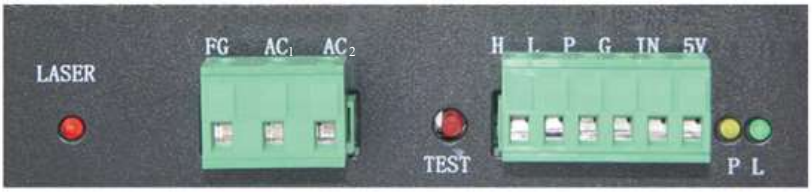
The engraver should not be modified or disassembled by anyone except trained and skilled professionals, but some consumable parts may require replacement after prolonged use. Be sure only to use identical or compatible replacement parts with this engraver. Contact your vendor or our technicians if you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

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

Rotary axes can be easily installed by moving the laser head to the middle of the bed and then attaching the rotary device's 4-pin ;lug in place of the Y-axis connection. For the wiring diagrams necessary to install an autofocus device, autofeed bed, or secondary laser, contact customer service or technical support.

Take special care when replacing the laser source 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_1: Neutral Wire to the Main Power
AC_2: Live Input from the Main Power
H: Connection for Active-High Devices (like this machine)
L: Connection for Active-Low Devices
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



5.5 Troubleshooting Common Problems

5.5.1 Alarms

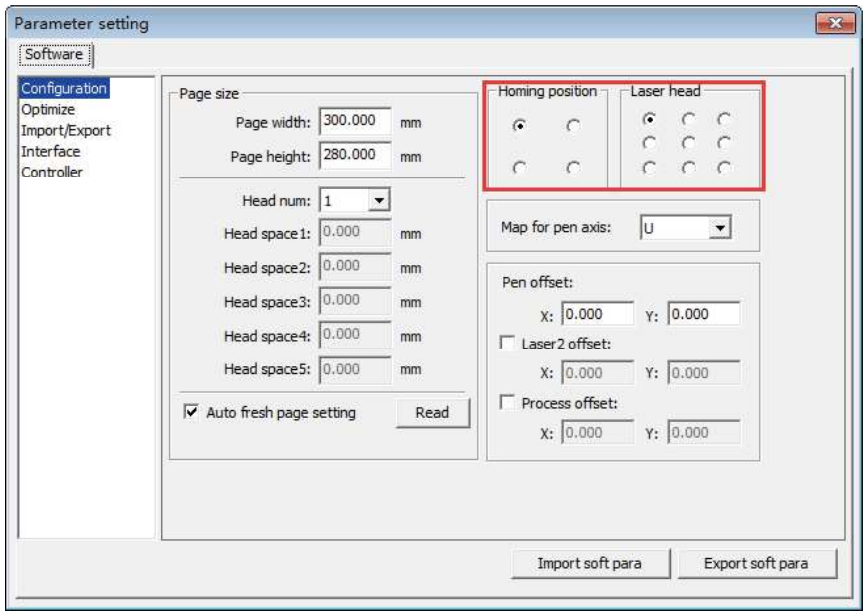
Your engraver is configured to detect faults in real time, stopping work and helping to bring them to your attention before damage or injury is caused.

Alarm Type	Typical Solutions
Cover Protection	Close the cover.
	Cut power to the laser until all adjustments in the main bay have been made.
	Check the cover sensor and its wiring. Repair or replace any damaged or worn parts.
Overbreadth	Adjust your design or its position to fit within the size limits of your engraver.
	Divide your design into a series of pieces and cut or engrave them in turn.
Insufficient Buffer	Adjust the acceleration of the laser head along both axes.
	Adjust your design placement to use the center of the engraving area.

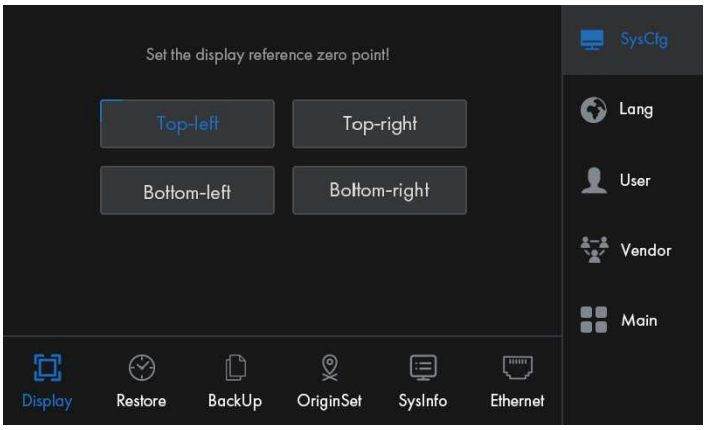
When used with a secondary CO_2 tube, the control panel may also display a Water Protection alarm. This usually indicates that cutting and engraving should stop until the water used to cool the tube reaches a safe temperature, but may also indicate a failure in the water temperature sensor or its wiring.

5.5.2 Correcting Display Alignment

If your design on the engraver's touchscreen does not match the display on the control computer, the problem is usually misalignment. In your copy of RDWorks, go to **Parameter Setting** and then **Configuration**. Examine the placement of the **Homing Position** and **Laser Head** as shown:



On your touchscreen, select the **Menu** tab on the right and then the **Display** tab at the bottom. It should open the following submenu:



Adjust whichever setting is misaligned to bring the two displays back into agreement.

5.6 Disposal Instructions

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

Contact Us

Thank you for choosing our laser equipment for your home or shop! For a .pdf copy of the latest version of this manual, use the appropriate app on your smartphone or other device to scan the QR code to the right.

Come join the OMTech community at our official laser group on Facebook or visit the company forums at **omtechlaser.com**! If you encounter any problem regarding your engraver, do not hesitate to contact customer service with your order number at **help@cs-supportpro.com** or **techsupport@omtechlaser.com**. Our teams will respond within 24 hours to make things right. You can also reach us Monday to Friday at (949) 539-0458 between 8 am and 4:30 pm PST.

Thank you and we hope you will choose us again for all your laser needs!