



EDGE 30/50

FIBER LASER MARKING MACHINE USER MANUAL



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Section 1: Introduction

1.1 Brief Introduction

Thank you for choosing an SA Laser EDGE fiber galvo system. This manual is intended to guide you through the safe operation, setup, and maintenance of your fiber laser galvo system. This manual is hardware machine focused and does not cover the Lightburn topics from our 5-day class training, which can be found in our SPARK training manual that comes with the purchase of a laser. It is still recommended that you print or save this document for future reference. Please be sure to read this manual in its entirety prior to operating the machine, as it will ensure a better understanding on how the machine works.

Fiber laser galvo systems use a solid-state pulsed fiber laser source paired with high-speed galvanometer scanning mirrors. This allows the laser beam to be directed with exceptional speed and accuracy, producing fine detail, consistent results, and repeatable performance across a wide range of materials. Compared to traditional gantry-based systems, galvo technology enables faster processing speeds, higher throughput, and reduced mechanical wear.

SA Laser was founded with a focus on bringing industrial-grade laser technology to manufacturers, educators, and makers in a practical and serviceable form. With roots in technical support, SA Laser designs and integrates laser systems that balance performance, reliability, and ease of use. Each machine is assembled, tested, and supported with real-world applications in mind.

1.2 Warranty

This machine comes with a standard 2 Year Warranty that covers parts and labor within the two years from freight delivery / pickup day. For any major warranty claims, the buyer is responsible for shipping or transporting the machine to SA Laser. The machine will be shipped back to buyer at no cost after warranty work has been completed. If warranty claim is not substantial, spare parts can be shipped out from SA Laser to buyer at no cost to the buyer.

1.3 Application

Since the EDGE is a fiber laser, this allows for repeatable results on metal and select non-metal materials, like most polymers and some ceramics, with some common applications listed below.

- **Metal Engraving and Marking**
Permanent marking on carbon / mild steel, stainless steel, aluminum / anodized aluminum, brass, copper, titanium, nickel alloys and coated metals for text, logos, serial numbers, and graphics.
- **Part Identification and Traceability**
Engraving of serial numbers, QR codes via Lightburn, barcodes, and data matrix codes for inventory tracking, compliance, and quality control.
- **Tool and Equipment Marking**
Durable marking on metal or polymer tools, fixtures, tags, and nameplates requiring long-term legibility.
- **Industrial Branding and Labeling**
High-contrast logos and identification marks without the use of inks, chemicals, or consumables.
- **Surface Processing**
Annealing, oxide layer removal, surface texturing, and color marking on stainless steel, depending on material type and laser parameters.
- **Educational and Training Use**
Instructional applications in technical schools, universities, and training laboratories for teaching laser operation, materials processing, and digital manufacturing workflows.

The fiber laser is not intended to cut or engrave organic materials such as wood, leather (except real cowhide), rubber, acrylics, polycarbonate, or other plastics that would be better suited for CO₂ lasers. The laser also is not intended to engrave reflective materials without prior surface preparation or testing. Operation of the laser without the appropriate laser rated eyewear, covered later in the manual, is also not intended.

Section 2: Safety

2.1 Safety Classification

The SA Laser EDGE fiber laser is a class IV laser product as defined by international standard IEC 60825-1.

The SA Laser EDGE fiber laser 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. Being a class IV laser, avoid eye and skin contact to direct or scattered exposure to laser radiation, which can cause harm to the human body.

During normal operation of the laser, the *output* of the embedded fiber laser is not contained, therefore requiring the use of personal protective equipment (PPE), which comes included. The protective housing features side panels that require a tool for removal; these are strictly reserved for manufacturer service only, as routine maintenance does not require panel access. Furthermore, the internal design ensures that no laser radiation is exposed when these panels are open, as the beam path remains fully contained.

The integrated diode (red dot) laser's beam path is located within the laser head, preventing any hazardous levels of radiation from escaping. The visible output of this laser is still accessible to the operator and therefore potentially hazardous to the eyes with any direct contact.

The American National Standards Institute (ANSI) safe use of lasers Z136.1-2000 is the standard reference for laser safety use for operators. The standards are developed by the ANSI Accredited Standards Committee (ASC) Z136, a collaboration of the leading experts in the field, and are the authoritative standard in the United States for safe laser operation and practices. Although the standards are not "law," compliance with the standard is often mandated by federal entities. It is the operators responsibility to ensure the installation and operation of the SA Laser EDGE system is performed in accordance with all applicable laws.

2.2 Safety precautions

Operators must read and follow the operating requirements and specifications listed in this manual to not cause harm to the machinery, themselves, or others. Highly recommended practices include keeping an ABC fire extinguisher nearby, in the event any fire is started from the engraving process. Ample forced or natural ventilation will carry away toxic or harmful fumes and particulates from the work area, during normal operation of engraving. Allowing only qualified operators in the area will keep the machine performing.

The SA Laser EDGE series laser does not require much amperage to run, so a dedicated circuit is not needed. Be mindful of the existing load on whichever circuit the machine is plugged into, to prevent a possible electric hazard or fire.

Prior to operating the machine, ensure all covers and doors are properly secured in place to avoid any potential radiation. Normal operating conditions do not require anything to be open, other than the lens cap off. The operator must be

observant and not distracted while the machine is running. Ensure machine is completely off before leaving unattended. To preserve the life of the machine, keep it operating in a dry environment between the temperatures of 40 - 90 degrees Fahrenheit.

2.3 Fire & Hazardous Materials

FIREWARNING:

This machine uses focused intense heat to ablate and etch material. The machine should never be left unsupervised while it is in use. Leaving the machine unattended while in use can result in a fire and substantial damage to the machine or building it is in. Any damage caused by fire that is not due to defects in workmanship or the machine itself will NOT be covered by SA Laser, LLC 2 year warranty.

HAZARDOUS MATERIALS: Any materials that are considered hazardous to the health of the machine, operator or individuals surrounding the machine while in use are NOT recommended to etch or engrave. These materials can produce toxic fumes or cause the machine to not function properly from residues and need replacement parts.

PVC Compounds – Fumes produced by cutting / engraving **Vinyl** – Fumes produced by cutting / engraving vinyl that Polyvinyl Chlorine (PVC) can cause irritation to the eyes, skin, and respiratory tract. This material should NEVER be used with this machine. Chlorine can cause irritation to the eyes, skin and the respiratory tract. This material should NEVER be used with this machine.

For safety, research a materials safety data sheet (SDS) before using on this machine. Safety data sheets give information on whether materials are safe or not to be exposed to the high heat during engraving / cutting. Any material containing chloring is not safe to you, your laser, or the individuals around you. If you are unsure about the safety of a material, reach out to us and we will help identify the safety of it.

2.4 Laser Safety & Recommended Policies

Each laser has a “Laser Emission Indicator” light on the front of the control box. Ensure the light is off and the laser is not in use before grabbing or placing a part into the work bed. Ensure laser rated safety glasses for 1064nm are worn while operating the machine, especially when reflective materials are being engraved / cut to prevent any indirect exposure to the laser.

The following safety measures must be strictly enforced and followed by the respective laser safety officer on location to ensure the safety of the machine and operator. SA Laser, LLC shall not be held responsible for any damages or injuries resulting from the improper use of the laser machine.

NEVER:

- Operate the laser machine, unless properly trained.
- Operate the laser near flammable or explosive materials.
- Dismantle the laser machine unless instructed to by an SA Laser Technician.
- Set anything on top of the laser arm or box while the laser is in use
- Use unsafe materials such as PVC and Vinyl that emit noxious gasses.
- Leave the machine unattended while in use

ALWAYS:

- Wear properly rated 1064nm protective glasses when operating.
- Maintain a clean environment for proper unclogged laser cooling.

2.4.1 Laser Safety Protective Glasses

Appropriate laser protective eyewear must be always worn by personnel operating and near the machine while in use. Properly rated laser glasses reduce the specific invisible 1064 nm infrared wavelength of the laser beam. For fiber lasers, the protective eyewear must be rated for the wavelength 1064 nm considering the operating range of the laser is 1000 nm – 1100 nm. The minimum optical density (OD) required is OD 6+; OD 7+ or higher. Even with laser rated safety glasses on, never stare at the laser path while in use for long durations. The protective glasses are meant to shield from accidental, brief, or indirect exposures and not for intentional direct viewing.

2.4.2 Remote Interlock Connector

Because this machine is an open-beam galvo system, the operator is responsible for establishing a laser-controlled area to use the remote interlock correctly. In accordance with IEC 60825-1 and FDA Laser Notice 56, the remote interlock connector is designed to prevent laser emission when the safety circuit is broken. For an open-beam system like the SA Laser EDGE, the remote interlock connector must be wired to the entry door(s) of the room or to a physical safety barrier. Upon usage of the laser, if the door or physical safety barrier is tripped, the laser will cease to fire and must be resumed via the software by hitting “start” or “resume”.



Operating this class IV laser without a functional remote interlock connected to a room or barrier safety system is a violation of federal safety standards and poses a significant risk of permanent eye injury or fire.

The laser comes with a “bypass plug” out of the box intended for testing and to provide a starting point for the operator only. The jumper must be replaced by a permanent room interlock for standard operation.

2.5 Important Safety Labels

The following safety labels can be found around the machine. It is important to pay attention and understand the warnings around your machine to ensure a safe operation.

SA Laser	
7210 Eckhert Rd, San Antonio, TX 78238	
Model: XXXXX	Serial Number: SAXXXXXX-XX
Class IV Laser product	Ytterbium-doped Fiber
Maximum Output Power: 50W	Wavelength: 1064 μm
Required Power: AC 110V ± 10% 60 HZ	Pulse Duration: 150ns
MFG Code: SA-W	Manufactured: Month Year
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	

Certification / Identification

The “Certification” and “Identification” label can be found on the back right side of the machine

Laser Aperture

The “Avoid Exposure” warning label can be found inside the working area on the laser head, as well as the back plate in the working area from mirror 1 to 2.





Warning Logotype

The “DANGER: Visible & Invisible Radiation” warning can be found on the top, right hand side of the machine. Staring at the laser beam can cause damage to the eyes. Touching the laser beam can cause serious injuries.

Emission Indicator

Located on the front of the control box, the “Laser Emission Indicator” turns on when the laser is firing.



Safety Goggle Warning

This label can be found on the front surface of the laser. Wearing laser protection glasses is required during operation for the operator and those nearby.

Non-Interlocked Protective Housing

The “Danger” labels for non-interlocked panels are located on each side of the machine. This machine produces laser radiation, so all panles must be closed when the laser is operating.



Emergency Stop

Located on the front of the control box, next to the laser emission indicator. When pressed, the laser source will immediately shut off with the machine systems to follow.

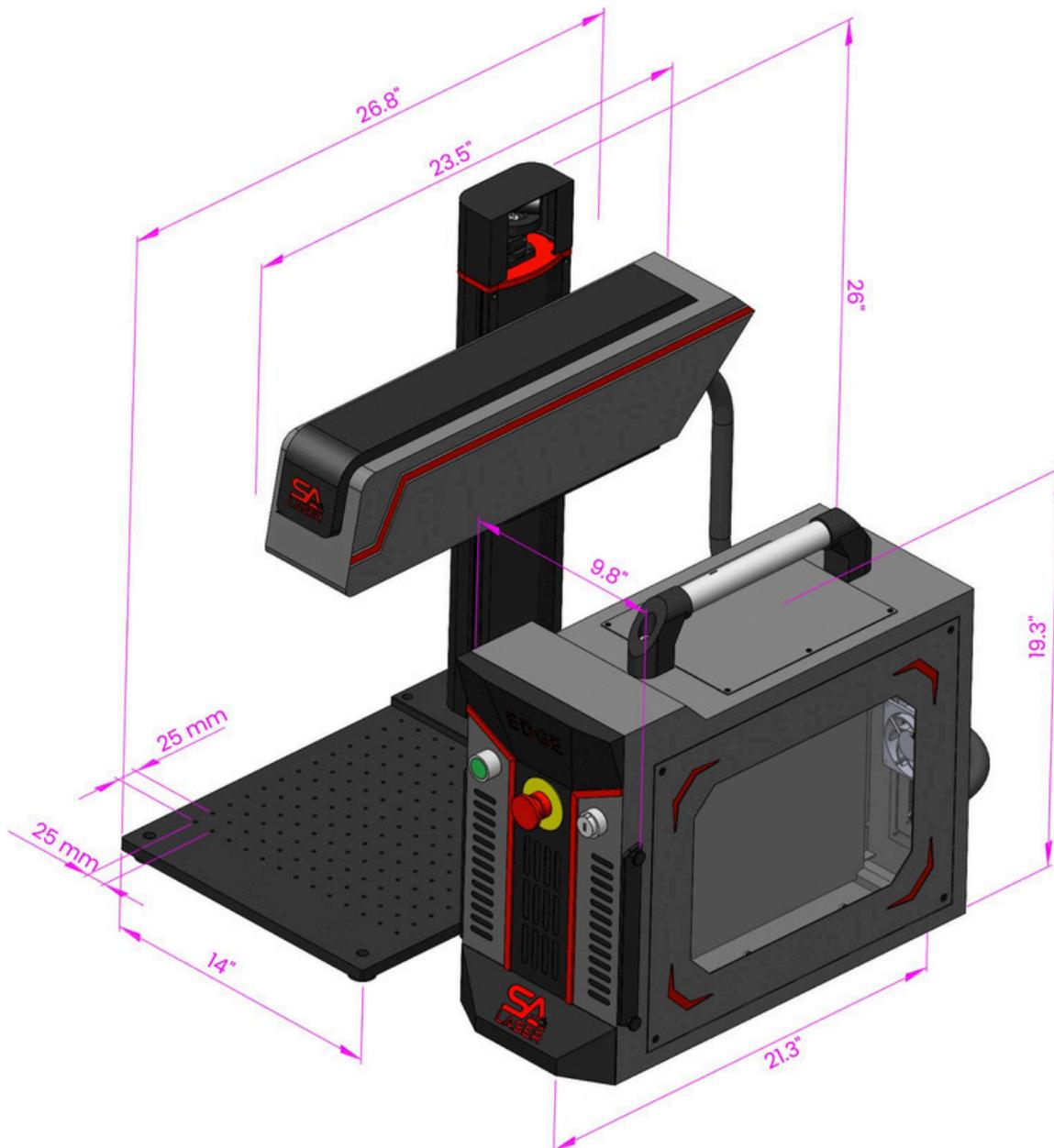
Section 3: Getting Started

3.1 Unpacking & Setup

Your new laser will come standard with a small crate that contains the laser & accessories surrounded by foam. If the laser was picked up during training without a crate, it is recommended that the laser stays in an upright position with the protective foam layer around it until the laser reaches its destination.

To open the crate the machine comes with, simply rotate the turn latch until all tension is released from the lid and unbuckle. It is recommended to then remove the foam layer from around the laser and lift the machine up and out onto a nearby table with a second person on either side. Carefully cut back on the shrink wrap layer holding the laser together. Next, fold over the Z-tower handle cover and rotate the tower adjustment handle clockwise to lift the laser head up and off the accessory and control box. With the laser on a workstation, begin by removing the two boxes stacked on the side. One box will be the accessories and the other being the rotary, that come standard with all machines. Carefully cut any zip ties holding the black looming together and with help, lift the control box into the desired workstation position with both hands holding the transport bar located on top. Next, grab the base of the laser and underside of the laser head near the tower and lift with help into desired workstation position.

The fiber EDGE dimensions are shown below as a reference for the space needed to setup the machine. Note that the tower and control box do not need to be next to each other as shown. The black cable looming that connects the two components can be used to its full length to achieve a setup with the tower and control box spaced out.



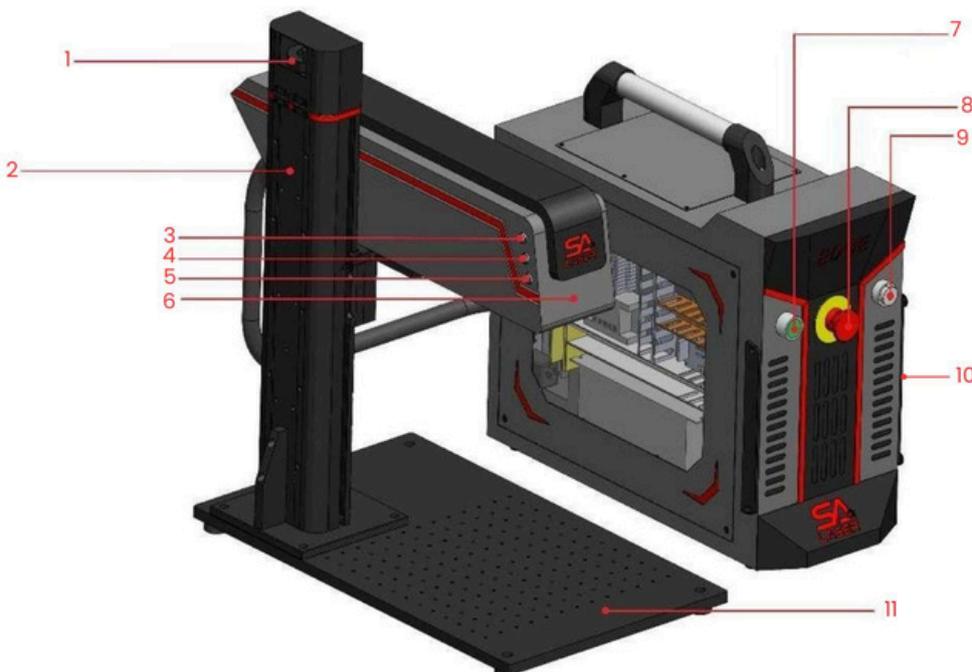
As stated before, the laser will come with two boxes and a metric ruler used for calibration and testing. Below is an itemized list of items that comes with your SA Laser EDGE laser machine:

Rotary Accessory Box:

- Rotary
- Additional chuck teeth for inverted work holding
- Chuck key

Main Accessory Box:

- Power Cable
- Empty (Installed) 220mm lens
- Additional 112mm lens
- Laser safety glasses
- Pack of anodized aluminum business cards
- Footswitch
- Set of Allen keys
- Alcohol wipes
- USB type B to A cable
- Spare machine fuses
- Pack of M5 fixturing screws
- Aluminum guide / fixture rails
- Flathead and Cross screwdriver
- Reinforced zip up accessory bag
- Keys
- USB drive with native EZCAD software & calibration testing
- Calibration & test piece

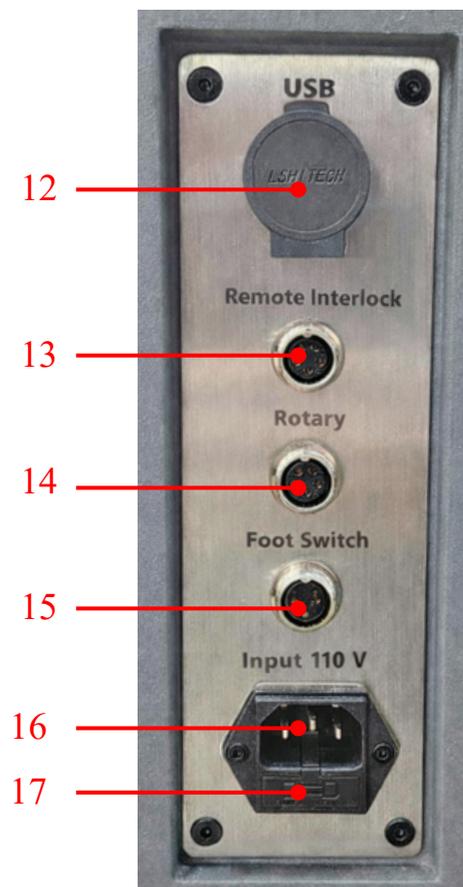


EDGE Machine Components

1. Z Axis adjustment handle
2. Laser Tower
3. LED Work light Toggle Button
4. 220mm Lens Optimal Focus Red Dot
5. 112mm Lens Optimal Focus Red Dot
6. Galvo Cover
7. Laser Emission Indicator
8. Emergency Stop
9. Key Switch
10. Air Filter
11. M5 Threaded Baseplate

EDGE Machine Back Ports

- 12. USB Type B Port for computer
- 13. Remote Interlock Port
- 14. Rotary Accessory Port
- 15. Foot Switch Accessory Port
- 16. Power Cable Port
- 17. Power Fuse Box



3.2 Powering on the EDGE Laser

To power on your EDGE Laser, follow the steps below.

1. Locate the power cable from the accessory box and plug it into the back of the control box and the other end into a standard 110V wall outlet.
2. Locate the set of keys from the accessory bag in the accessory box. Place it the key switch on the front of the control box and rotate clockwise 90 degrees until the confirming click.
3. Grab the emergency stop and rotate clockwise until it pops outwards, signifying that it is no longer engaged.
4. Observe the fans and lights on the machine kick on, and remove the lens cap.
5. Plug the included USB cable into the “USB” port on the control box and the computer that will run the laser.

To power down your laser, toggle the key switch first, then push in the emergency stop, then place the lens cap back on.

3.3 Finding Optimal Focus

The EDGE Laser comes with three ways to help you find optimal focus before you begin engraving. The first way is covered and assisted with during our 5-day training class to find optimal focus, then measure it with a “Focus Stick” for the 220mm & 112mm Lens. A focus stick is a cut out piece of acrylic that is marked or cut to a specific height from the top of a material to the bottom of the laser lens. It is important to note that the focus sticks sent with new lasers are longer than needed, as all lenses differ slightly. Ensure that your optimal focus has been found first, then mark or cut before using. By having a fixed visual in the form of a stick, finding optimal focus with new materials is as simple as placing the stick on the desired engraving spot, then adjusting the laser head up or down to reach the desired height. Many variables exist with this method however, like holding the stick at an angle or compressing it downward, giving a false optimal focus height.

The second option to find optimal focus is locating the two stickers with measurements found on the left side of the galvo cover. The top and bigger number is the measurement for the 220mm lens and the bottom, smaller number is the measurement for the 112mm lens. These values are tested in house and printed for the specific lenses that come with the laser. Any other lenses would not share the same numbers. Using the included ruler to measure from the top of your desired material to engrave, to the bottom of the painted white line, like shown to the right, is how focus is found. For example, the top 220mm lens number on this machine reads out to “428mm”. With the 220mm lens installed and object placed below, the laser head is moved up or down until the 428mm mark on the ruler lines up with the bottom of the white line, shown with a dotted red line. Optimal focus has been found.



The third, built in, option to find optimal focus is pressing the 220 or 112 mm lens optimal focus buttons on the left side of the galvo head. Depending on whichever lens is installed by the operator of the laser, press the button matching the current lens. An additional external red dot will illuminate, with

both lens options shown to the left. Simply

lower or raise the laser head until the additional red is on top of the original red dot and disappeared in the center of the work field. During transportation, these external focusing red dots may shift slightly. If they need to be adjusted, carefully locate the external



red dot under the galvo cover near the lens, like shown to the right. With a 2mm Allen key, loosen a screw, then tighten a corresponding screw until the red dot is moved to a more desired position.

3.4 Swapping Lenses

The 220mm lens comes installed on the EDGE Laser, but if the operator desires a more focused laser beam that provides more energy output to engrave faster, then the 112mm lens is best suited at the cost of a smaller work area. To change out the installed 220mm lens, first place the lens cap over the bottom of the lens to provide protection while changing it out. Next, firmly grab the 220 lens and rotate it counterclockwise to loosen it from the galvo head.



Make sure the lens AND spacer are both removed before attempting to place the 112mm lens back in. The picture to the left shows the lens and spacer fully removed. The picture to the right shows the spacer still attached to the galvo head. If the spacer remains in the galvo head, firmly grip it and rotate counterclockwise to loosen it from the galvo head. Once the spacer is removed, then the 112mm lens may be threaded in.

When switching to the 112mm lens, there is no spacer for it, only for the 220mm lens. With a different lens installed, be sure to change to the correct laser profile within SA Lasers included laser bundle file for Lightburn. Ensure the spacer goes back onto the 220mm lens before placed back or damage to the galvo mirror may occur.

3.5 Using the footswitch

The included footswitch allows for custom commands that execute once the footswitch is pressed. To set it up, simply plug the foot switch into the “Foot Switch” connector in the back of the laser control box. Align the cut part of the connector toward the top and securely screw the retaining nut on. To customize the command it executes, go into Lightburn > Device Settings > Ports and Laser Settings > and find a command most desirable. Click the drop down and select “15” and then hit okay. In this example, to the right, the footswitch is commanding the “Start Marking” function. This now means, the laser will start marking once the footswitch is toggled (Only if the Lightburn setting of “Always frame before marking” is not on, otherwise, click the footswitch again).



3.6 Laser Parameters

Power	30W / 50W	Working area	112mm ² / 220mm ²
Wavelength	1064nm	Z Axis	500mm
Frequency	30-100KHZ	Max Power Consumption	500W
Pulse Width (Fixed)	120-200ns	Operating Temperature	0-45°C
Single Pulse Energy	1-1.25mj	Max Marking Speed	7000mm/s
Frequency	30-60KHZ	Minimum Line Width	0.015mm
Beam Quality	<1.5	Minimum Character	0.2mm
Software	Ezcad2 / Lightburn	Repeated Precision	±0.003mm
Output Power Tenability	10-100	Lifespan of Fiber Laser Module	100,000 hours

3.7 Lightburn Software

Current versions of LightBurn run on the following operating systems:

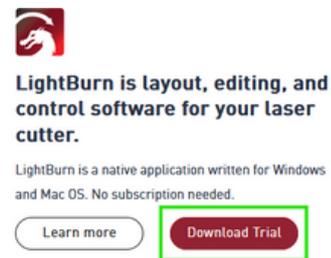
- 64-bit Windows 10 (build 1809) or later
- macOS 12 or later

To install LightBurn, go to their website:

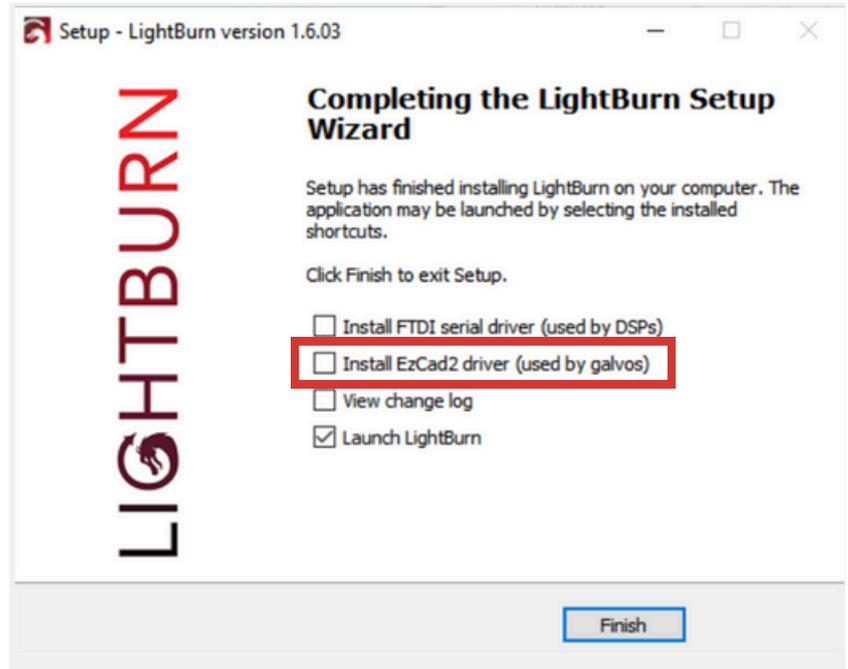
<https://lightburnsoftware.com/>.

Click the **Download Trial** button.

Click on **DOWNLOAD LIGHTBURN FOR WINDOWS 64-BIT**. The numbers will change based on version.



When you've completed the download, you should see the file in your "Downloads" folder or a manually selected folder. Double-click the file to start the installation wizard. Follow the prompts in the wizard. Click **YES** or **ALLOW** to anything asking for permission. Be sure to select the **Install EzCad2 driver (used by galvos)** driver option. This allows LightBurn to communicate with your laser.

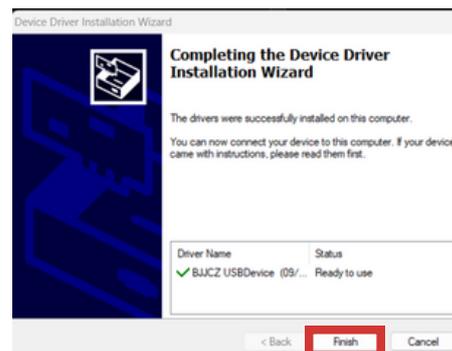
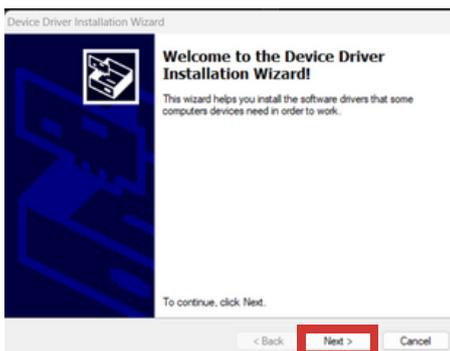


If the EzCad2 drivers are not installed for any reason during the installation process, you can still install them afterwards.

Navigate to **C:\Program Files\LightBurn\EzCad2Driver**.

Name	Date modified	Type	Size
dpinst-x64	12/16/2024 7:35 AM	Application	1,023 KB
ezcad2	9/3/2025 7:10 PM	Setup Information	2 KB
winusbinstallation	9/3/2025 7:10 PM	Security Catalog	9 KB

Double-click **dpinst-x64** to install the drivers.

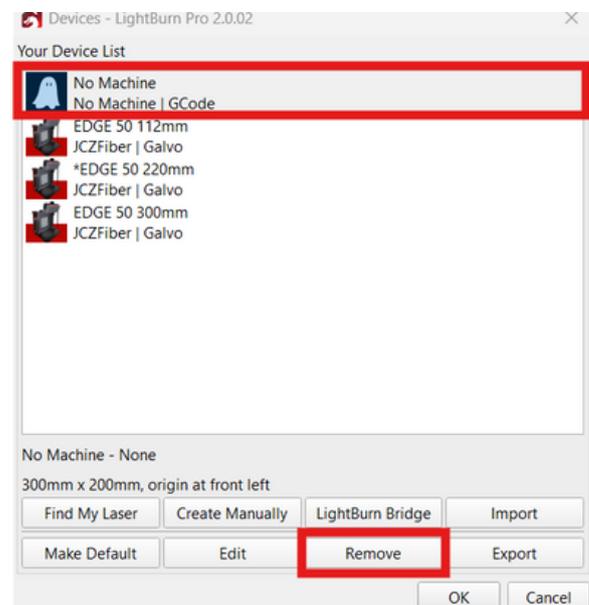
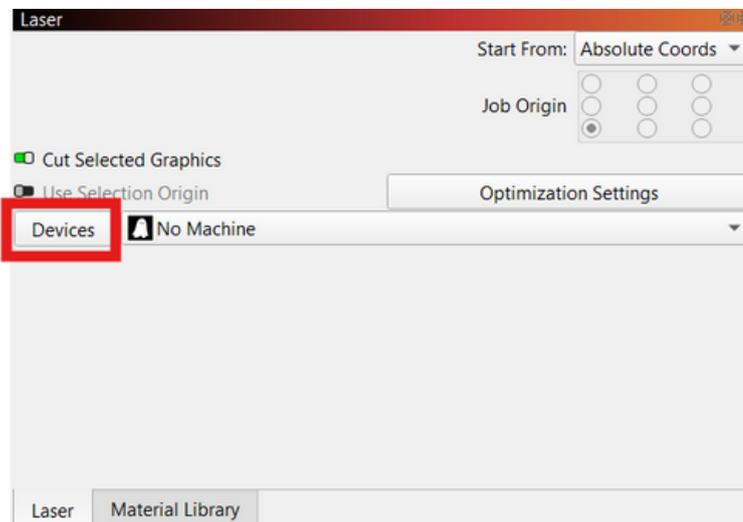
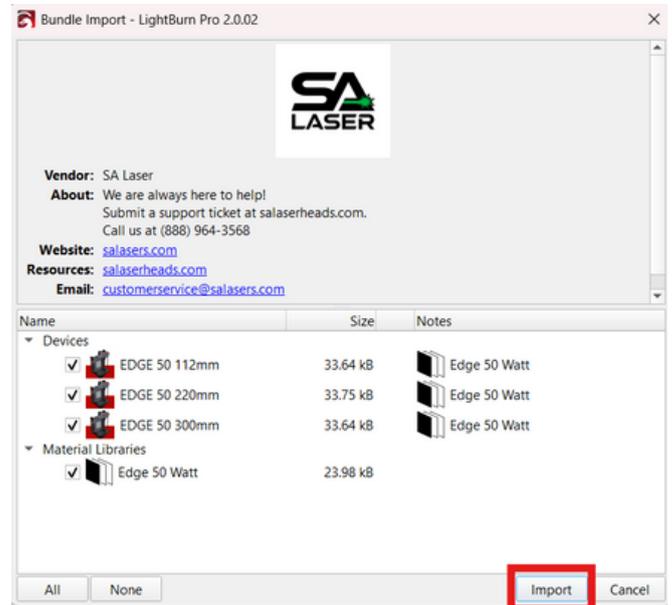


After training, we will have emailed you a LightBurn license key with an EDGE 30 or 50 watt Bundle file. Download that file and remember where you downloaded it to.

If it's your first time opening LightBurn, the Devices window will automatically pop up asking for you to create a profile. Click **Cancel**, and then click **I don't have a device yet Create a dummy machine**. There is no need to do this if you already have a profile.

Click **File>Bundles>Import Bundle** then find and double-click the bundle file you downloaded from your email. This window (to the right -->) will appear. Clicking **Import** will bring in any item that is checked. Your EDGE laser comes with the 112mm and 220mm and the 300mm is purchased separately.

You can remove the dummy "No Machine" profile by clicking **Devices** in the Laser tab. In the Devices window, click the "No Machine" profile, then click **Remove**, then click **OK**.



Create a 2"x2" square in LightBurn and hit "P" to center the square in the work space. In the Cuts/Layers window, set the settings to the following:

- Speed - 5 in/sec or 120 mm/sec**
- Power - 100%**
- Frequency - 20 kHz**

NOTE: Laser reaction color may vary depending on material. Alternatively, look for a weaker vs. a stronger reaction in terms of reaction brightness and sound.

Place a piece of steel or aluminum on the work bed. Click the **Frame** button and align your piece of steel so that the red laser square is completely on your piece of metal. Click the **Start** button and watch the laser to turn from YELLOW to a solid BLUE/WHITE as you lower head. Take a note of the height using the ruler on the laser tower.

Continue to run the head down until the laser changes back to YELLOW, then raise it back up until you a solid BLUE/WHITE reaction. Take a mental note of the height using the ruler on the laser tower. Your optimal focus is now found by splitting the difference of the two heights, move the galvo to this position.

Place one end of your focus stick on the piece of steel and place the other on the side of the lens casing. Mark your focus stick where it is level with the bottom of the lens. The distance from the bottom of the focus stick to your mark is your optimal focus distance. You may trim the focus stick to the bottom of your lens.

Weak reaction: yellowish and low reaction sound.



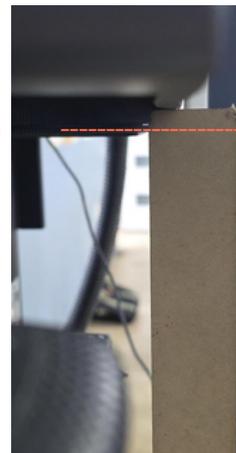
Strong reaction: white/blue and noticeable sizzling sound.



Split the difference between the two measurements (values may differ from picture).



Mark / trim here



Section 4: Maintenance & Service

4.1 Basic maintenance



Fiber laser machines require very little maintenance but be sure to check the following list below to prevent any potential mishaps or machine failure.

- Remove the two thumb screws on the right side of the control box, then push back and pull outward to remove the air filter, shown to the left. Do this monthly to clean out (air blast) the filter to ensure proper and clean air flow to the electrical components.

- Clean the lens with isopropyl alcohol and microfiber cloth at discretion weekly.
- Wipe down the work weekly area to ensure abrasives don't end up on or inside the machine.

4.2 Basic Troubleshooting

Problem	Suggestion
Laser is very weak	Clean lens and doublecheck true optimal focus has been set
Laser is not connecting to computer	Change to a new USB cable and port on computer and then double check Lightburn drivers are properly installed. Make sure only one tab of Lightburn is open.
Laser red dot does not align with laser marking	Find your SPARK training manual to review "Red Dot Calibration"
I updated my computer and lost all of my settings and library	Give us a call or email and we can supply the vendor bundle once more and schedule a time to go over 9 point calibration
Red dot is not showing	Make sure the lens cap is off the lens

CAUTION: This device contains no user-serviceable parts within the protective housing. Removal of side panels is strictly reserved for Authorized Service Personnel. Routine maintenance (such as cleaning external optics) does not require panel access. Unauthorized removal of these panels may void the warranty and expose the individual to Electrical Shock Hazards (110V). Always disconnect the main power cord before attempting to access internal components.

Remote Service Assistance: In specific troubleshooting scenarios, the manufacturer may provide direct technical supervision to an operator for internal inspection. In these events, the operator is acting as Temporary Service Personnel under the manufacturer's guidance. You must strictly follow all verbal and written instructions, ensuring the system is completely de-energized before tool-assisted panel removal.

Internal Radiation Safety: The internal design ensures that the laser beam path remains fully contained within a secondary enclosure or fiber optic conduit. Removal of the exterior side panels for electronic servicing **does not permit human access** to laser radiation. Under no circumstances should the internal laser fiber couplings or the beam delivery system be disassembled, as this will result in immediate exposure to **Class 4 Laser Radiation**.

