



Laser Engraver

Fusion User Manual



This image is for reference purposes only;
the actual product may vary.
F03-0304-0AA1 Version: A



Please scan the QR code
for more information.

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01 Safety Instructions

Safety First

This guide applies to laser cutting devices certified under Class 1 Laser Safety (IEC 60825-1), the highest level of built-in safety protection.

1. General Safety Operating Requirements

Pre-use Inspection:

Before operating the device, carefully read and familiarize yourself with all safety precautions and operating procedures. Inspect the device for any damage or irregularities before each use. If any issue is found, stop using the device immediately and do not resume until it has been repaired.

Work Environment Requirements:

The work area must be kept clean and free of flammable or explosive materials. Place the device on a flat, stable surface to prevent accidents caused by movement or tipping.

Device Protection:

Do not disassemble or modify the device without authorization, especially the laser or operating systems. The device must remain in its original factory configuration to maintain compliance with Class 1 laser safety standards.

Supervised Operation:

The device must be monitored at all times during operation. Never leave it unattended while running, to avoid potential accidents.

2. Laser Safety

Laser Safety Mechanism:

This device complies with IEC 60825-1 Class 1 laser safety standards. The laser module is fully enclosed. A safety interlock system ensures that laser emission stops automatically when the lid is opened, preventing user exposure to laser radiation.

Protective Measures:

Additional laser safety goggles are not required during operation, as the device is structurally designed to prevent direct laser exposure in the working environment.

Material Restrictions:

Do not use this device to process materials containing PVC, vinyl, or any chlorine-based substances. These materials release toxic gases during cutting, which pose health risks and can damage the machine.

Avoiding Laser Reflection:

Avoid using highly reflective materials. If reflective materials must be used, ensure the surface is blackened or treated beforehand to reduce the risk of harmful reflections.

3. Fire Safety

Fire Prevention in the Work Area:

Keep flammable materials and volatile solvents (such as alcohol or gasoline) away from the device. Ensure the workspace is well-ventilated and a fire extinguisher is readily accessible near the device.

Fire Risks During Cutting:

Although laser cutting typically does not cause combustion, certain materials (e.g., acrylic) are flammable at high temperatures. Always monitor the cutting process and be prepared to extinguish any flames immediately.

Device Cleaning:

Regularly clean residual materials and debris inside the cutting chamber. Accumulated scraps can become a fire hazard if not properly removed.

Power Connection:

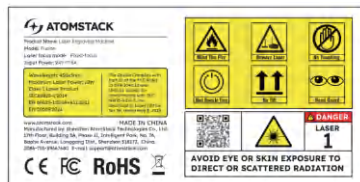
Use only the power adapter provided with the device. Ensure the power outlet is properly grounded. Do not remove any device panels or touch electronic components while the unit is powered on, to avoid the risk of electric shock.

Power Switch:

The device is powered on and off using the switch located on the side of the machine.

Press “-” to turn the device on, press “0” to turn the device off.

5. Labels:



6.Disclaimer and Warnings

01 Disclaimer:

Not a toy, and unsuitable for children under 15. Please do not allow children to touch the laser module. Exercise caution in children's presence.

02 Warning:

The device contains a laser module; scan the QR code for the full manual and the latest instructions and warnings.

Before using the product, please be sure to read this document carefully to understand your rights, responsibilities, and safety instructions.

The user agrees to take responsibility for their actions and any consequences that may arise.

The user agrees to use the product only for legal purposes and agrees to comply with all terms and conditions of this document and any related policies and guidelines that Shenzhen AtomStack Technologies Co., Ltd. may establish.

03 Legal Responsibilities:

You understand and agree that, unless you provide the original engraving or cutting files, parameters settings in the engraving software, operating system information, videos of the engraving or cutting process, and the steps taken before the malfunction or failure occurred, Shenzhen AtomStack Technologies Co., Ltd. may not be able to provide the cause of damage or accidents or offer after-sales service.

Shenzhen AtomStack Technologies Co., Ltd. is not responsible for any losses caused by the user's failure to follow the instructions in this manual.

The user is prohibited from disassembling the machine without guidance from company technicians.

04 Miscellaneous

- Statement of Rights: Shenzhen AtomStack Technologies Co., Ltd. reserves the right of final interpretation of this document, in compliance with applicable laws.
- Right to Update: Shenzhen AtomStack Technologies Co., Ltd. reserves the right to update terms without prior notice.

FCC statement:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Warning: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

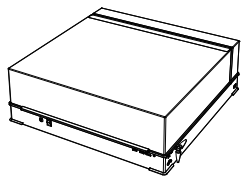
- 1.Reorient or relocate the receiving antenna.
- 2.Increase the separation between the equipment and receiver.
- 3.Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- 4.Consult the dealer or an experienced radio/TV technician for help.

FCC radiation exposure statement:

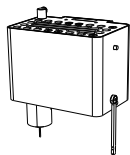
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Adhering to these instructions helps ensure safe and effective use of the equipment.

02 Packing List



Machine



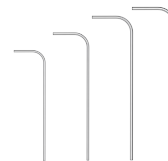
Laser head



Exhaust duct hose



Hose clamp



H1.5/H2 /H2.5/H3
inner hexagonal L-shaped wrench



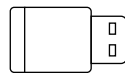
Air hose



Phillips screwdriver



USB key



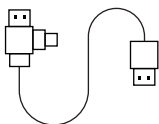
USB drive



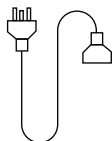
Cable holder



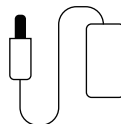
Wire clamp



One-to-two
computer cable



Power cable



Power adapter



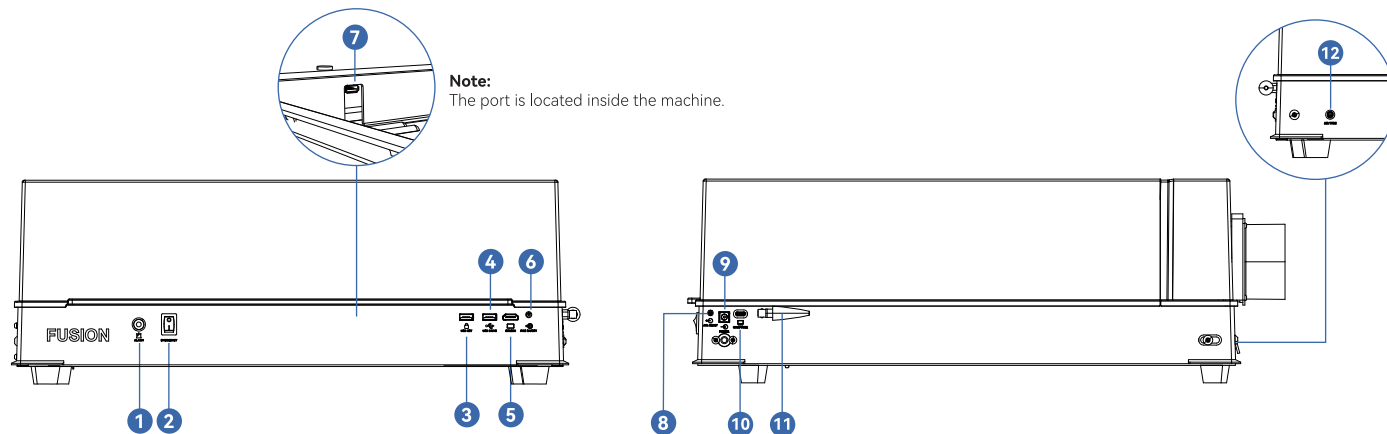
Dust-free cloth



Fusion User Manual

03

Getting to Know Fusion

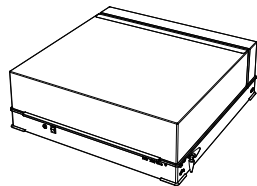


1	Alarm indicator: The machine will trigger an alarm if it tilts or detects flames.
2	Power switch: power on/off (Emergency Power Cut to Stop the Machine)
3	USB key port: Insert the USB key to enable the main unit.
4	USB: Insert USB drive to update the firmware/Offline operation
5	Control display port: Connects to the control display for offline operation
6	Active Fire Extinguisher Port: Power Supply for the Water Pump of the Active Fire Suppression Air Pump

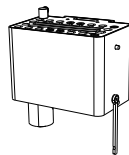
7	Accessory port: Used for connecting chucks, rollers, conveyor feeders, etc.
8	Air Assist: Power supply interface of the active fire extinguishing air pump
9	Power: Power supply interface of Fusion
10	Computer: Used for connecting to a computer
11	Wi-Fi Receiver: Used for device network connection
12	Air pump hose port: Connects the air assist hose

04 Installation

1. Get the machine and laser.

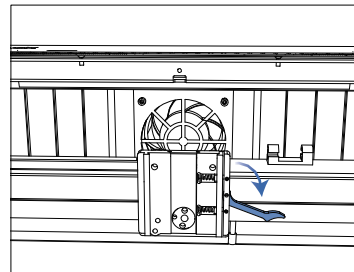


Machine

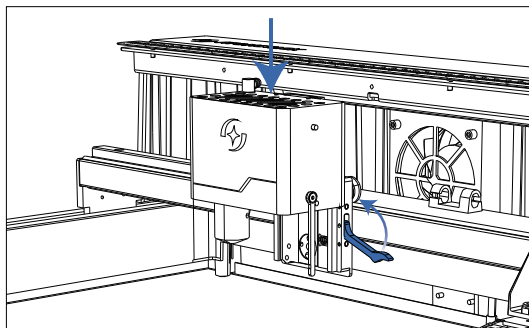


Laser head

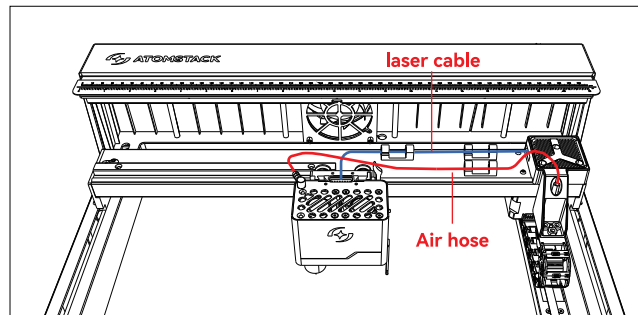
2. Open the latch.



3. Mount the laser and secure the latch.



4. Insert the laser cable and Air hose.

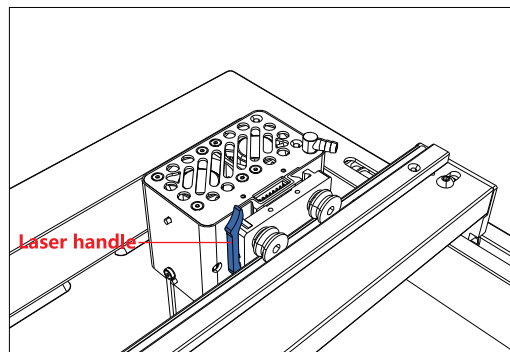
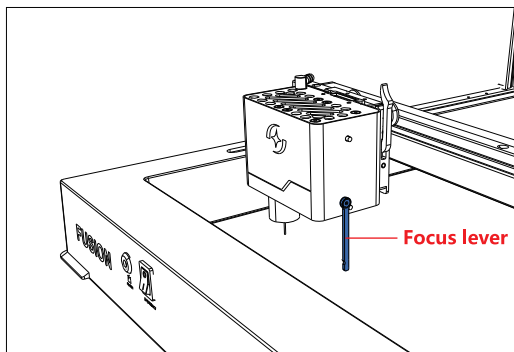


05

Function Overview

1. Laser Focusing

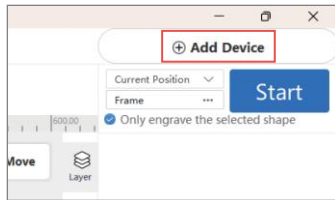
- 1.1 Pull down the laser handle to allow vertical movement of the laser head.
- 1.2 Unfold the laser focusing rod until it is perpendicular to the worktable.
- 1.3 Move the laser head up or down until the focusing rod just touches the top surface of the engraving object, then lock the laser handle in place.
- 1.4 Fold the laser focusing rod upward.



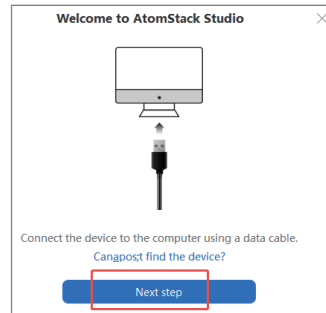
2. Software connection

- 2.1 Insert the USB cable to computer, power on engraver;
- 2.2 Connect to control software "AtomStack Studio";

"Add Device"



"Next step"



"Select Fusion"

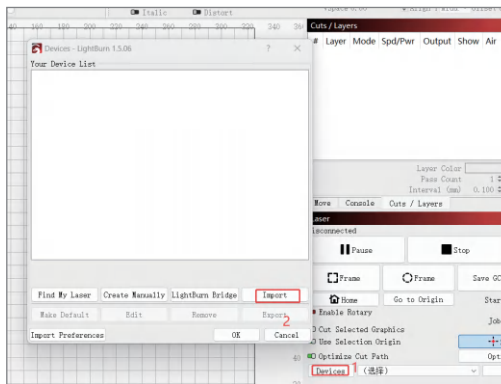


2. Software connection

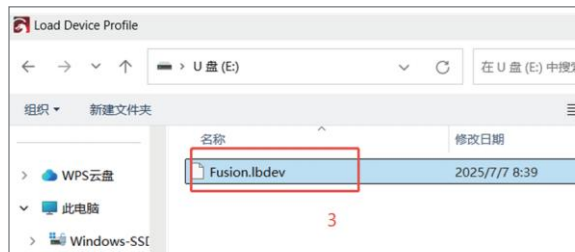
2.3 Connect to control software“LightBurn”;

a.“Devices” → “Import” → “Select the configuration file from the USB drive”;

“Devices” → “Import”



“Select the configuration file from the USB drive”

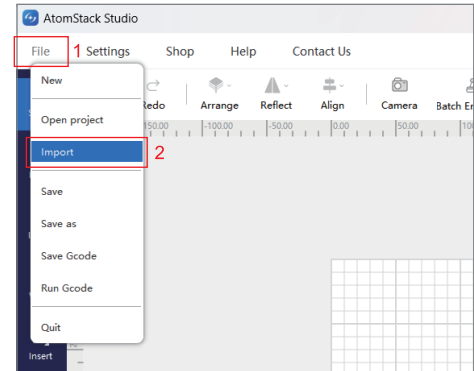


b. Select "Serial Port" and then "Fusion" in sequence. When the console reports "OK" and the machine beeps once, the connection is successful.

c. If the connection fails, check whether the baud rate is correct. Go to Device Settings → "Baud Rate", make sure 460800 is selected, then click "OK" to confirm.

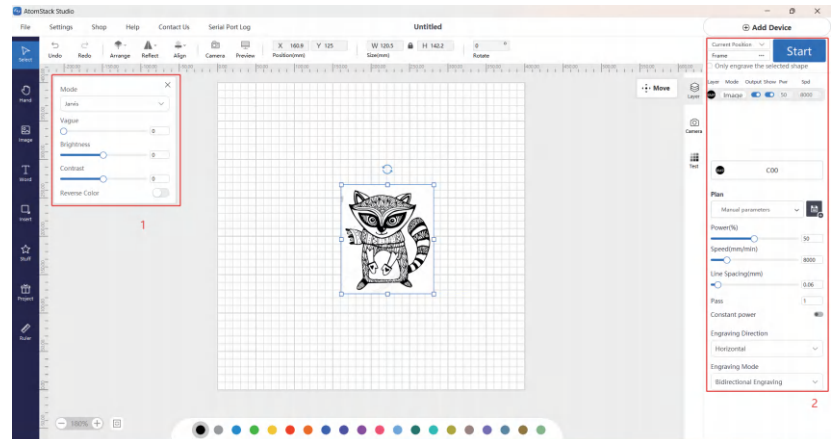
3. Laser Engraving

(A) Open the AtomStack Studio software, go to the "File" menu, and select "Import" to load the engraving file.



(B) Left-click on the image (as shown below) to open the Mode settings page, and select Jarvis mode (leave other parameters at default values).

- a. Start From: Current Position
- b. Power (%): Set to 60
- c. Speed (mm/min): Set to 8000
- d. Line Spacing (mm): Set to 0.06
- e. Engraving Direction: Select Horizontal
- f. Engraving Mode: Select Bidirectional Engraving
- g. Move the laser head above the engraving object to perform focusing.
- h. After focusing is complete, click Frame to confirm the engraving position.
- i. Click Start to begin engraving.



4. Enclosure Opening Detection

4.1 Precautions:

4.1.1 The enclosure-opening detection function requires the limit switches to operate properly. If any limit switch malfunctions, the detection function will be disabled.

4.1.2 The machine must be placed on a level and stable surface.

4.1.3 Engraving cannot be started while the lid is open. To resume engraving, the lid must be closed first.

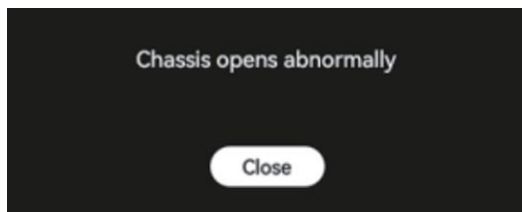
4.2 How to Use the Enclosure-Opening Detection Function

4.2.1 When the enclosure lid is opened, the machine will pause operation. Once the lid is closed, the machine will resume working.

4.2.2 When the lid is opened, a buzzer will sound, and a prompt will appear in the PC software as shown below.

```
Target buffer size found
[MSG:Mode=STA:SSID=ATOMSTACK:Status=Connected:IP=192.168
.2.80:MAC=48-27-E2-1B-63-A0]
[MSG:Mode=AP:SSID=Engraver_41059:IP=192.168.4.1:StationN
um=0:MAC=4A-27-E2-1B-63-A0]
ok
[MSG:Check door]
[MSG:PreviousPage:1
]
[MSG:Check door]
[MSG:PreviousPage:1
]
```

4.2.3 If using the touchscreen/display for control, a message will appear on the screen as shown below.



5. Tilt Detection

5.1 Operating Instructions:

5.1.1 After this function is enabled, if the machine tilts at an angle between 15° and 20° relative to the horizontal plane, the function will be triggered:

- The machine will automatically stop working,
- A buzzer will sound,
- An alarm message will appear on the PC software,
- If a control screen is present, the message “The machine is tilted” will be displayed.

5.2 There are two ways to clear the alarm:

5.2.1 Without control screen: The alarm will automatically clear once the machine returns to a level position.

5.2.2 With control screen: Tap “Close” on the screen to dismiss the alarm.

The machine is tilted,
please place the machine horizontally before use

Close

6. Flame Detection & Active Fire Extinguisher

(Active fire extinguisher is sold separately)

6.1 Precautions:

6.1.1 When used outdoors, direct sunlight may cause false triggers of the flame detection function. Indoor use is recommended.

6.1.2 You can enable or disable the flame detection function via the control screen, the AtomStack APP, or AtomStack Studio.

6.1.3 When cutting MDF (medium-density fiberboard), be sure to disable the flame detection function to avoid false alarms.

6.2 Operating Instructions:

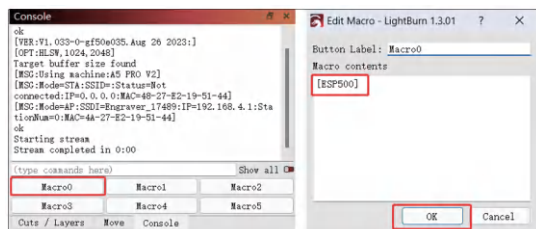
6.2.1 Once the function is enabled, if a flame is detected during operation:

- The buzzer will sound,
- The automatic fire suppression system will activate immediately,
- Water will be sprayed for 5 seconds within a 30×30 mm area around the flame detection location,
- The air pump will continue to blow air for approximately 1 minute,
- The control screen will display: “Flame detected, please restart the machine after eliminating danger”.

(Note: the control screen must be purchased separately)

Flame detected,
please restart the machine after eliminating danger

6.2.2 After shutting down and restarting the machine, it will return to normal operation.



7. Power-off Resume Engraving

7.1 Precautions:

7.1.1 The power-off resume function is disabled by default at the factory. If you have not purchased the control screen, you need to enable or disable this function through the AtomStack APP or AtomStack Studio.

7.1.2 When the power-off resume function is enabled, the motors will be locked.

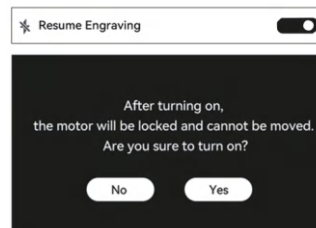
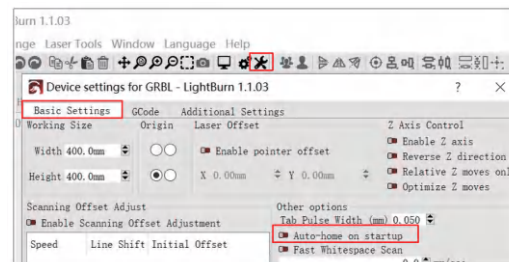
7.1.3 Ensure that neither the engraving machine nor the workpiece has shifted, otherwise positional deviation may occur.

7.1.4 During the file parsing process when resuming engraving, do not plug or unplug the HDMI cable; otherwise, you will need to restart the machine to complete the recovery.

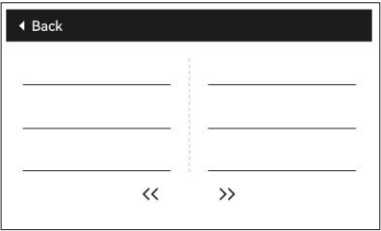
7.1.5 Make sure to disable "auto-home on startup", as it may interfere with the proper functioning of the power-off resume feature.

7.2 How to Use the Control Screen to Resume Engraving After Power-Off (control screen sold separately)

7.2.1 Enable the function from the menu. The laser head will automatically return to the machine's origin and display a message indicating that the motors are locked.



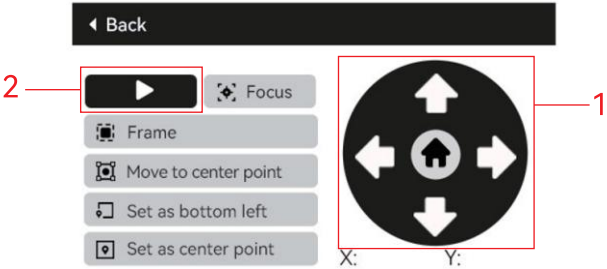
7.2.2 Select the engraving file.



7.2.5 If a power outage occurs during engraving, when power is restored, the screen will display "Unfinished engraving task detected". Tap "Confirm", and the machine will parse the coordinates and resume engraving from the point where it was interrupted.

7.2.3 Use the control screen to manually move the laser head to the desired engraving position (see Figure 1 below).

7.2.4 Tap "Start". After the file is parsed, the machine will automatically begin engraving (see Figure 2 below).



06

Machine Maintenance

1. Shaft cleaning

Recommended frequency: once every 500 hours.

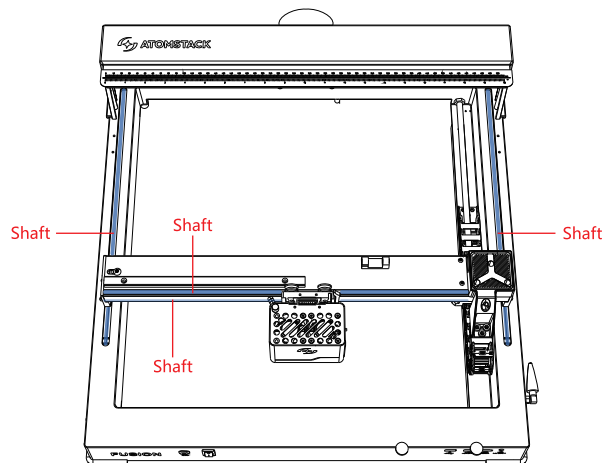
Maintenance Method:

After cleaning with an alcohol wipe, apply lubricant to the optical shafts. Move the pulley back and forth to evenly distribute the grease.

Lubricant specifications:

It is recommended to use white grease of grade 2 or 3.

- For low-temperature environments (below 15 °C), use grade 2.
- For environments above 15 °C, use grade 3.



2. Laser cleaning

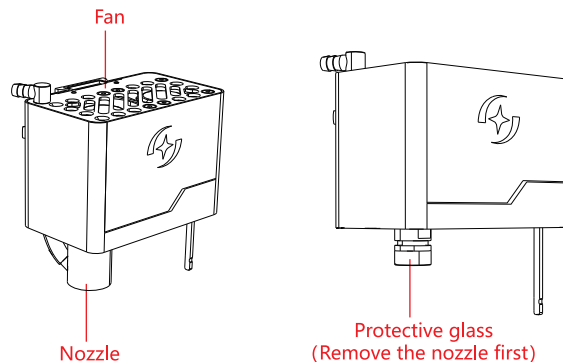
Recommended frequency: once a week.

Maintenance Method:

Wipe the fan, nozzle, and protective lens on the laser head.

Cleaning tools:

Lint-free cloth, anhydrous ethanol, Phillips screwdriver.



3. Honeycomb table and base plate cleaning

Recommended frequency: Once per week.

Cleaning method: Wipe the honeycomb panel and base plate.

Cleaning tools: Lint-free cloth, anhydrous ethanol.

07

Software Resources

7.1 PC Software: Atomstack Studio (PC) and LightBurn

7.1.1 Atomstack Studio (PC) : Atomstack Studio (PC) is a control software developed by ATOMSTACK specifically for our products, offering a better user experience.

Advantages: Free, Timely updates, Simple operation, Pre-set material plan database.



7.1.2 Lightburn: LightBurn is a paid software designed specifically for layout, editing, and control of laser cutting machines.

Advantages: Powerful features, Comprehensive control commands, Good versatility, Available for trial.



7.2 Mobile phone app: Atomstack (App) is ATOMSTACK's self-developed mobile control software, specific for the ATOMSTACK Fusion.

Advantages: Easy connection, Simple operation, Offline control, Pre-set material database, Real-time water temperature monitoring, Resume engraving after power failure.



7.3 Software download:

For software download address and instructions, please refer to: <https://atomstack.com/pages/atomstack-studio-software>

1.After turning on the power switch, the machine does not respond at all?

Check if the USB key is inserted

2.Does the machine support LaserGRBL software?

Due to the baud rate of 460800, it is not compatible.

3. Fails to reset

1. Check whether the X and Y axis limit switches are faulty.
2. Check whether the X and Y axes can move normally.

4. How to clear the error in Atomstack Studio

Errors	Solutions
HardLimit = 1	Check whether the X-axis and Y-axis limit switches have been triggered
AbortCycle = 3	Engraving manually stopped, no action required
HomingFailPulloff = 8	Check the X/Y axis motor and limit switch for proper operation.
HomingFailApproach = 9	Check the X/Y axis motor and limit switch for proper operation.
MachineTiltAlarm = 11	The alarm will automatically clear once the machine returns to a level position.Or tap "Close" on the control screen to dismiss the alarm.
FlameDetected = 12	Flame detected, restart the machine
DoorOpen = 13	Lid opening detected, close the lid or check the limit switches for proper operation
SafeLock = 14	Check if USB key is inserted or any faults



Contact Us

Customer service:

For detailed warranty policy, please visit our official website: www.atomstack.com

For technical support and service, please email: support@atomstack.com

Manufacturer:

Shenzhen AtomStack Technologies co., Ltd.

Zip code: 518172

Address:

17th Floor, Building 3A, Phase II, Intelligent Park, No. 76, Baohe Avenue,
Baolong Street, Longgang District, Shenzhen, Guangdong, China.

Scan QR code:

Scan with QR code reader/barcode scanner or any app with scanner

