CLOUDRAY
INDUSTRIAL SOLUTIONS

BM1
User Manual

Please read this instruction manual carefully before use
Please use the laser engraving machine correctly and safely

Thank you for choosing Cloudray laser engraving machine

Please read the user manual carefully before use and keep it in a safe place for further reference.

English

C02-241008

FCC WARNING

Warning

To assure continued compliance, any changes or modifications not expressly approved by the party.Responsible for compliance could void the user's authority to operate this equipment.

FCC Statement

This equipment 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.

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:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

FCC Radiation Exposure Statement:

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

English

SAFETY INSTRUCTIONS

Thank you for purchasing the Cloudray laser engraving machine. In order to better use and maintain this equipment, please read this manual carefully and follow the steps in the manual.

Important Statement!

All losses caused by improper use or failure to follow the steps in the manual shall be borne by the individual. The final right of interpretation of the manual belongs to our company, which also reserves the right to modify all information, data, technical details, etc. in this manual.

Safety Precautions

★Before operating the equipment, users must carefully read the manual and strictly follow the operating procedures.

★Laser processing may be risky, and users should carefully consider whether the object being processed is suitable for laser operation.

★The processing object and emissions should comply with local laws and regulations.

★The laser radiation may cause the following situations:

① Ignition of surrounding flammable materials;

② During laser processing, other radiation and toxic and harmful gases may be generated due to different processing objects;

③ Direct exposure to laser radiation can cause human harm. Firefighting equipment must be equipped in the use site. It is prohibited to stack flammable and explosive items around the workbench and equipment. At the same time, it must be well ventilated.

★The environment where the equipment is located should be dry, free of pollution, vibration, strong electricity, strong magnetism and other interference and influence. The working environment temperature is 5~30℃, and the working environment humidity is 30-65% rh (no condensation)

★Equipment operating voltage: AC100-240V.

★The engraving machine and other related equipment must be safely grounded before they can be turned on and operated.

★When the equipment is turned on, it is necessary to be on duty throughout the process. All power supplies must be cut off before leaving to prevent abnormal conditions. If any abnormal conditions occur, please turn off the power immediately!

★It is strictly forbidden to place any irrelevant total reflection or diffuse reflection objects in the equipment to prevent the laser from reflecting on the human body or flammable items.

★The equipment should be kept away from electrical equipment that is sensitive to electromagnetic interference, which may cause electromagnetic interference to it.

★There is high voltage or other potential dangers inside the laser equipment, and non-professionals are strictly prohibited from disassembling it.

English

SAFETY INSTRUCTIONS

Notice!

1. After the laser is turned on, it is strictly forbidden to aim at people, animals and flammable objects to avoid skin burns and fire.

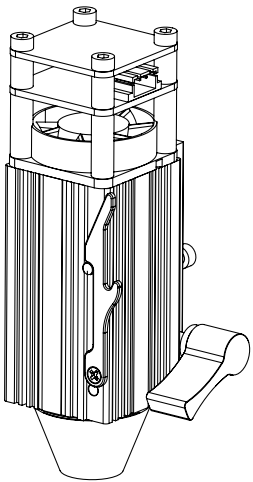
2. The brightness of the laser is harmful to the eyes. Please do not look directly at the laser.

3. Keep your hands away from the machine when it is working to avoid injury

4. Turn off the power of the machine when it is not in use to avoid misoperation by a third party

Maintenance and Care

The laser module is a consumable. It is recommended to turn off the machine power for 10 minutes after 4 hours of engraving and 1 hour of cutting.



English

CONTENTS

English

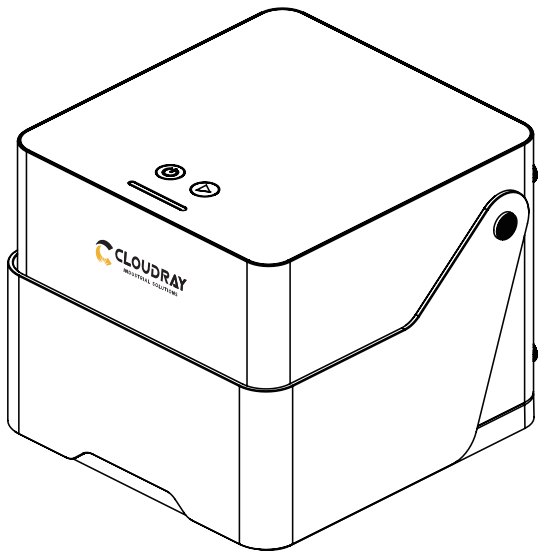
English

01 PRODUCT PARAMETERS

Product model	CEM05B
Main material	ABS+high strength metal
Laser wavelength	455nm
Engraving speed	5000mm/min
Laser life	＞10000h（27℃ ambient temperature）
Focus mode	Knob focus
Engraving area	80×80mm
Engraving accuracy	±0.01mm
Engraving height	＜40mm
Cutting material	3W laser power can cut 1-2mm plywood 5W laser power can cut 3-5mm plywood,5-7mm pine board
Total power	<48W
Input voltage	DC12V 4A
Engravable materials	Paper, wood, plastic, leather, cloth, cardboard, stone, stainless steel, coated metal, and most other non-transparent materials
Data transmission	USB to serial port wired transmission, WiFi wireless transmission
Cooling method	Air cooling
Supported system	CutLabX software platform (windowsOS, macOS, Android, iOS) GRBL software platform (windowsOS, macOS)
Supported format	CutLabX software platform -> Image formats: JPEG/BMP/JPG/GIF/PLT/PNG/CUTLABX -> Vector formats: DXF/PLT/HPGL GRBL software platform -> NC/BMP/JPG/PNG/DXF and other formats

English

02 PRODUCTS AND ACCESSORIES



Standard accessories


User Manual


Power supply


Type-C data cable


Brush


Marker pen


Planks

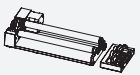

Kraft paper

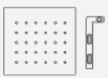

Black cardboard


Card reader

Optional accessories


Air Purifier

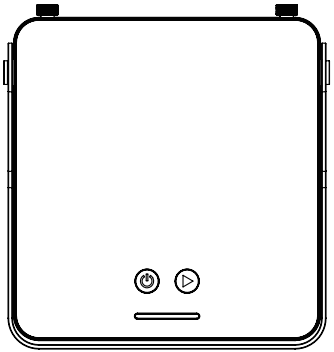

Rotating axis module


Engraving positioning module

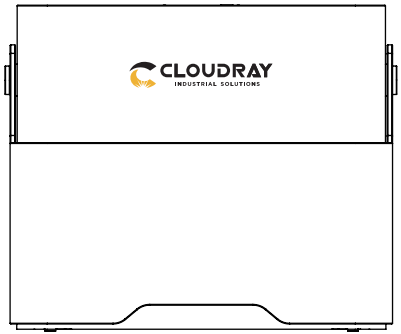
English

03 PRODUCT STRUCTURE AND ASSEMBLY

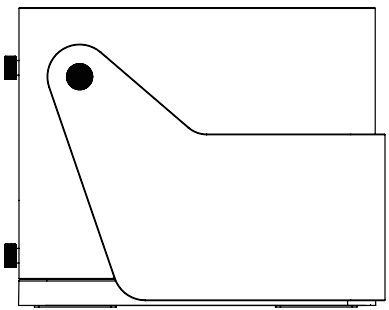
Top view



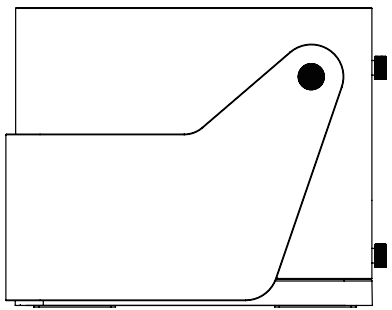
Front view



Left View



Right View

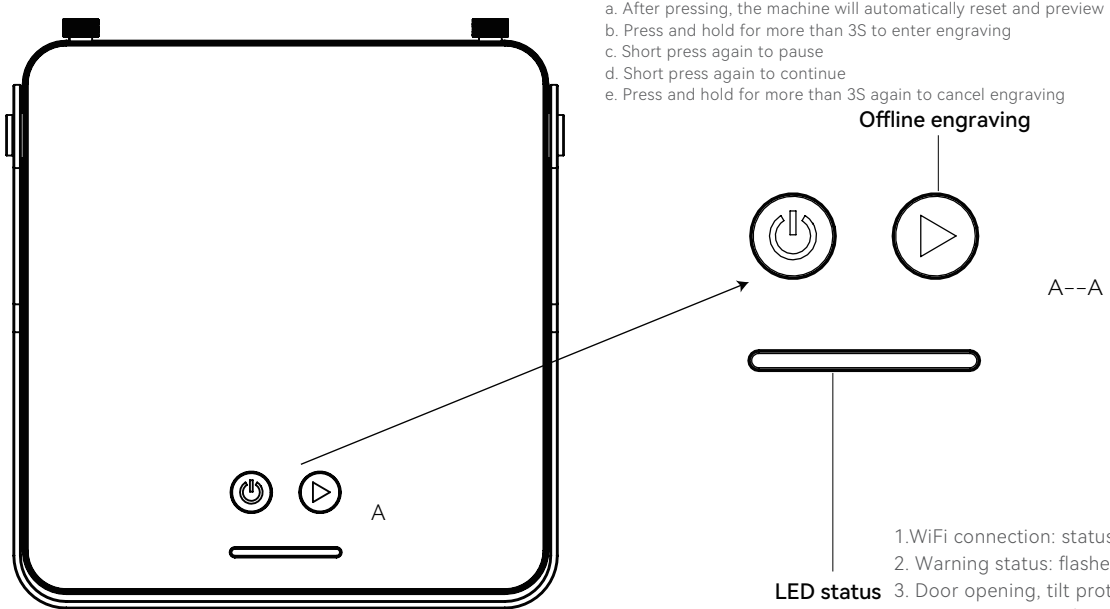


English

03 PRODUCT STRUCTURE AND ASSEMBLY

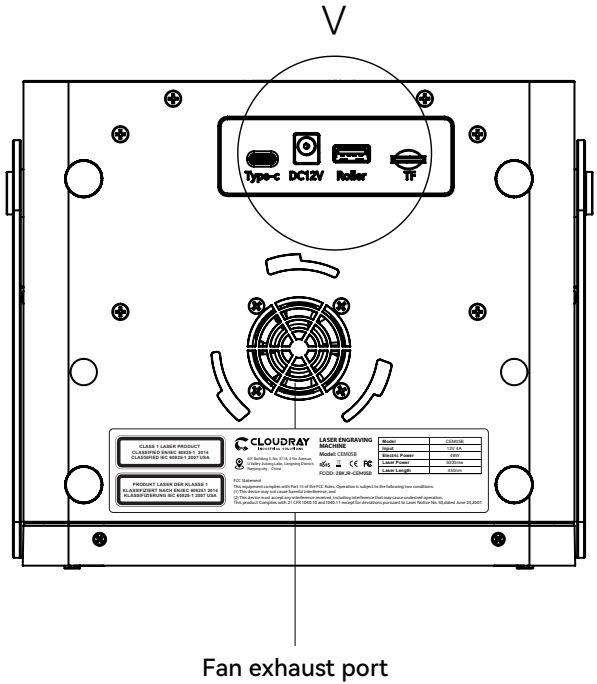
【 Function description 】

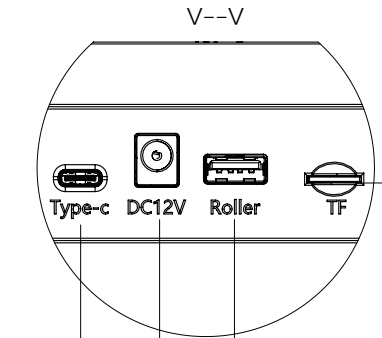
1. Generate engraving or cutting files (gcode) through CutLabX or LightBurn software and save them to the root directory of the TF card. The saved name is: 001.nc
2. Insert the TF card into the machine before turning on the machine, then use the matching power adapter and power cord to connect to the controller panel, and finally turn on the power switch on the stone side of the control panel.
3. Press the "Offline Engraving" button:
a. After pressing, the machine will automatically reset and preview
b. Press and hold for more than 3S to enter engraving
c. Short press again to pause
d. Short press again to continue
e. Press and hold for more than 3S again to cancel engraving



1.WiFi connection: status flashes, on 0.2S, off 0.2S
2. Warning status: flashes, on 0.5S, off 0.2S
3. Door opening, tilt protection flashes, on 0.5S, off 0.5S
4. Engraving status: breathing flashes
5. Standby mode: light is always on

【 Function description 】





TF card socket
For storing engraving content
(A TF card needs to be inserted
when using a mobile phone)

Roller port
For connecting to the roller module

DC power socket
For connecting to a 12V power supply

Type-C port
For connecting to a computer

03 PRODUCT STRUCTURE AND ASSEMBLY

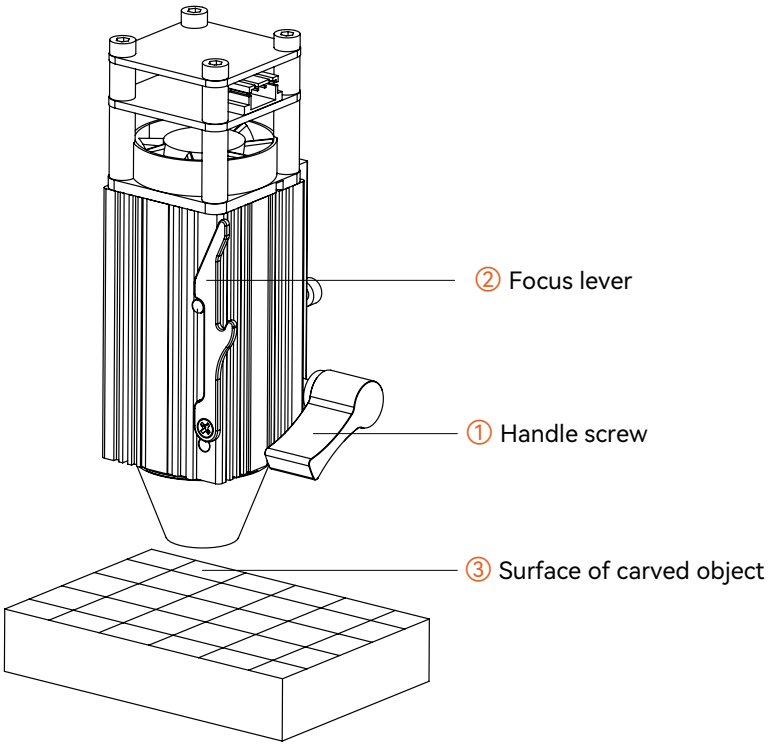
【Focus laser focusing method】

1. Turn the hand screw ① counterclockwise to allow the laser to move up and down.

2. Open the focus lever ② downward and align it with the surface of the object to be carved ③.

3. Turn the handle screw ① clockwise to tighten the laser.

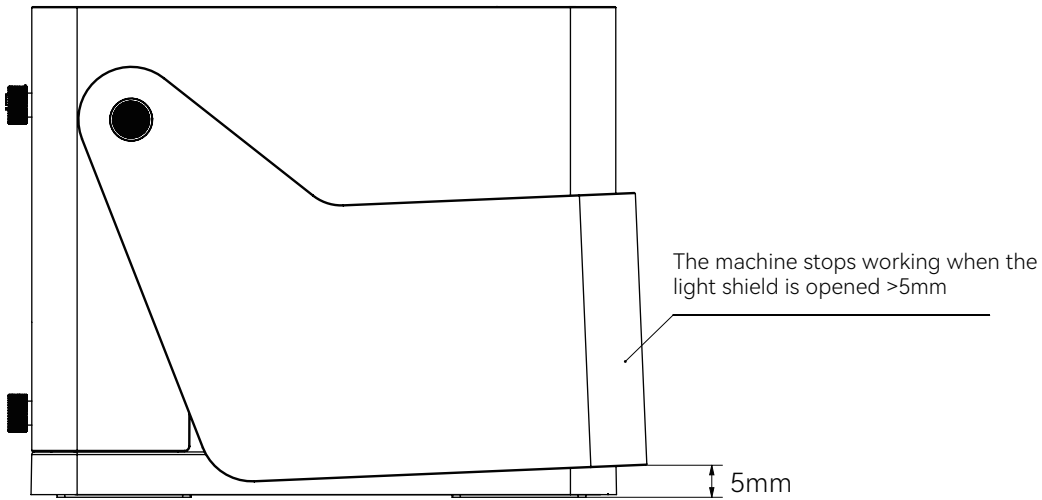
4. Manually turn the focus lever ② counter-clockwise 90° to retract.



English

English

【Function Description - Stop when Cover Opened】

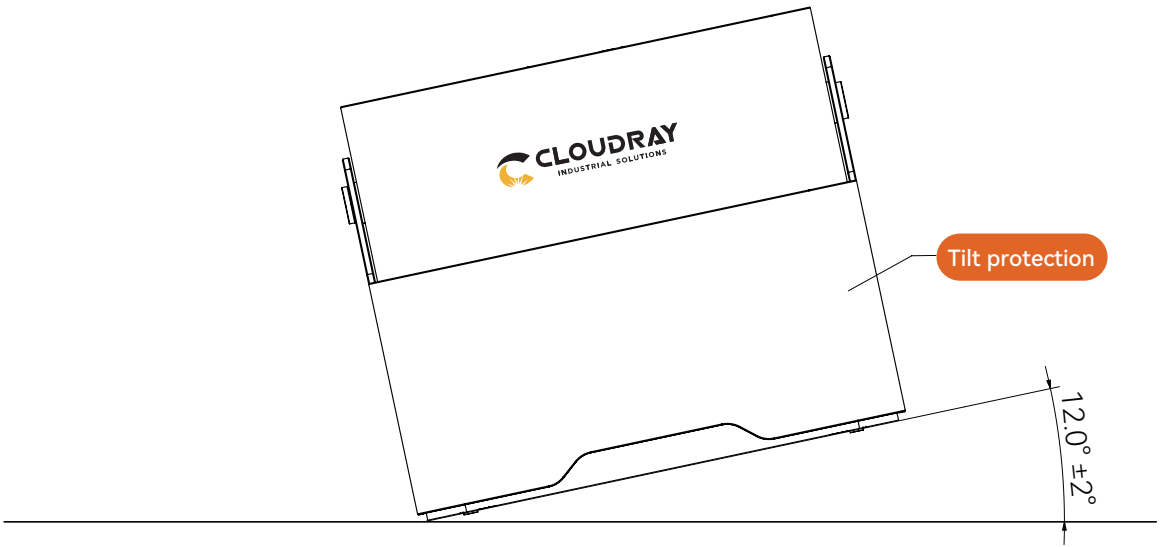


English

【Function Description】

If the inclination of the host machine to the horizontal plane is greater than 12° ±2° and lasts for more than 1s, the machine will stop running immediately and the laser module will stop laser output.

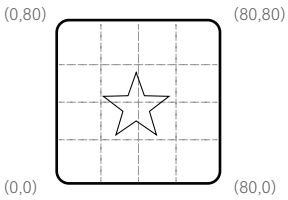
After entering the protection state, the machine must be restarted to restore normal function.



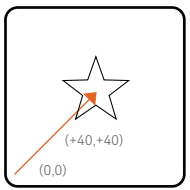
03 PRODUCT STRUCTURE AND ASSEMBLY

English

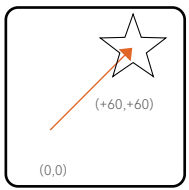
【 LightBurn Run 】



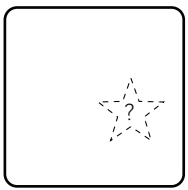
For example, let's say we want to engrave a star, which is located at the center of the LightBurn workspace as shown on the computer screen, at (40,40).
The following figure shows the machine in each of the three startup modes
Problems can occur when manually moving the laser module in the absolute coordinate system or the user origin. This is because the machine does not know that it has been moved.
It cannot know its true position unless the origin position is reestablished or homed.
Consider the following sequence of operations when working in absolute coordinates:
1. The machine's origin is (0,0)
2. The user physically drags the laser to a position near (80,80), and the machine still thinks it is at (0,0);
3. The user runs the star program. The machine starts moving up and to the right to reach the "center" and hits the upper right corner.



A) Absolute Coordinates:
The machine will move to the center,
The finished star will be at (40,40)



B) User Origin:
Suppose the user origin is set at (20,20),
Then the finished star will be at (60,60)



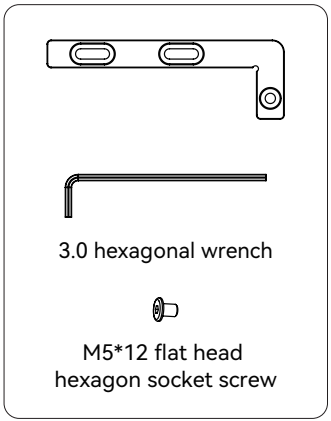
C) Current Position:
The star will appear wherever the laser module is located at the moment the program is started.

Important

If the machine crashes, be sure to pull the laser back to the center slightly before homing.
There are two limit switches on the machine, one each for X and Y. If the limit switch on one of them is pressed, the machine will not move that axis when homing.

03 PRODUCT STRUCTURE AND ASSEMBLY

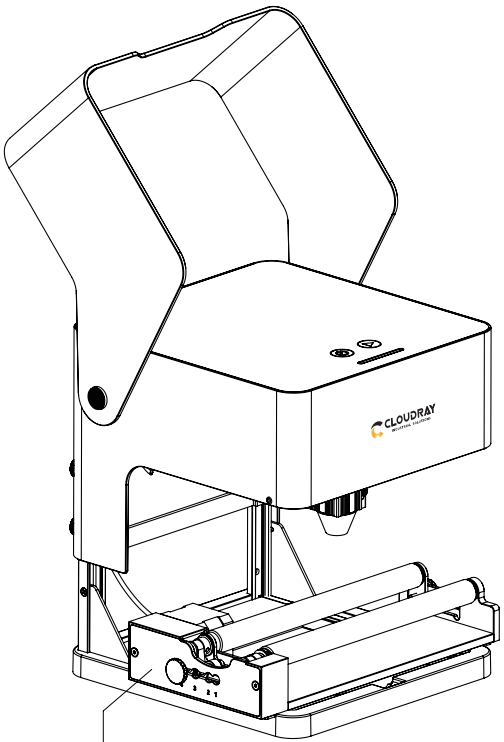
Optional: Positioning module



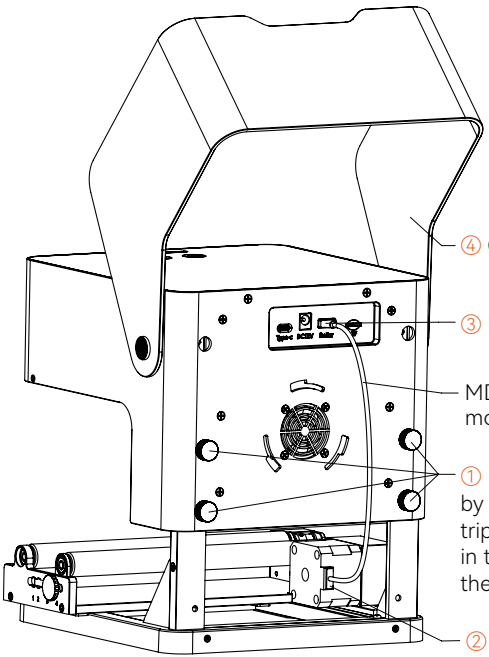
03 PRODUCT STRUCTURE AND ASSEMBLY

Optional: MD19 rotary module

*Tip: When you use the rotary module, you need to open the protective cover to work, please contact customer service.
When you open the cover to use, the machine has become a Class IV laser device. Please pay attention to laser radiation safety when using it.



MD19 dual parallel axis rotary module placement



④ Open the light shield upward

③ Plug in the connection cable

MD19 dual parallel axis rotary module connection cable

① Unscrew these 4 screws by hand, extend the movable tripod downward as shown in the figure, and then install the hand screws to tighten.

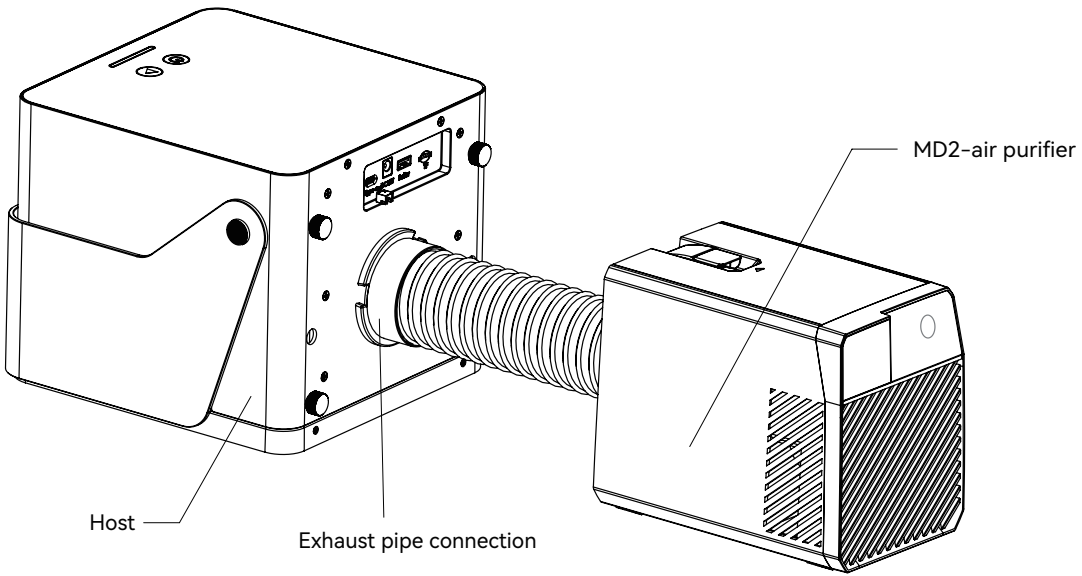
② Plug in the connection cable

English

Connect the telescopic exhaust pipe to the air purifier:

a. Connect the telescopic exhaust pipe to the machine connection and the MD2 air purifier connection.

b. Power on the air purifier and adjust the appropriate air volume for use



English

1. Driver installation path:

Double-click the U disk folder/windows/driver/driver.exe/Click to install/Driver installation is successful

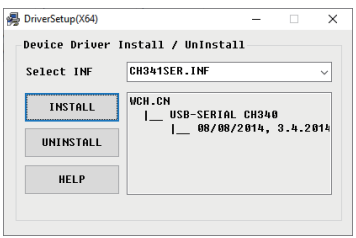
① TF card

② 01_Windows

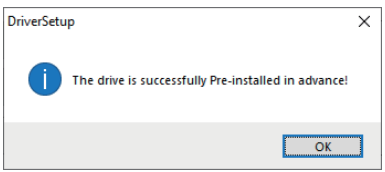
③ driver

④ driver.exe

⑤ Click to install



⑥ Confirm to complete the installation



*Driver software acquisition method: Download from the designated website www.dkjxz.com

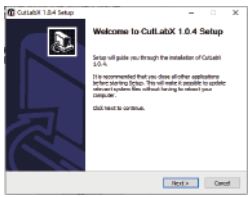
English

2. Software installation path:

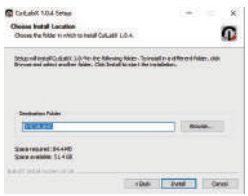
Double-click U disk data file/windows/software/ CutLabX/Wait for the progress bar to complete the installation

① TF card ② 01_Windows

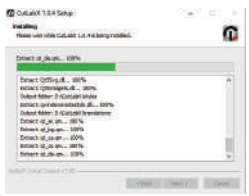
③ software ④ CutLabX



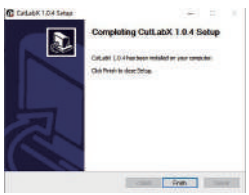
⑤ Double-click CutLabX installation



⑥ Select the installation location and click "OK"



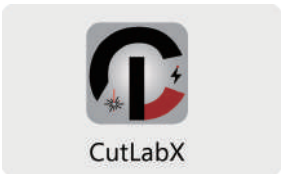
⑦ Wait for the progress bar to complete



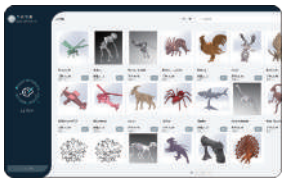
⑧ Installation completed

3. Online operation:

Use a data cable to connect the machine to the computer
Double-click the software icon-enter the creation interface-select the appropriate port
Click "Connect" when it becomes "Connected" to indicate a successful connection.



① Double-click the software icon



② Enter the homepage and click Start Creating

③ Select the appropriate port to connect

④ Connect successfully

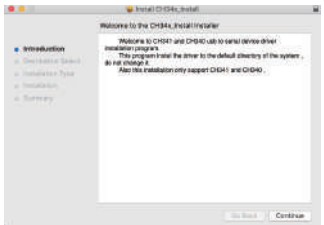
Tip: After clicking CutLabX, if anti-virus software pops up or the computer housekeeper warns of risks, the CutLabX file is the Win system installation package. If it is wrongly judged as a suspicious file, please select Allow all program operations, and the software installation will be successfully completed.

1. Driver installation path:

Driver installation path: Double-click U disk/02_MAC/driver/CH34x_Install_V1.4.pkg/Installation introduction/Installation type/Installation/Installation completed

TF card

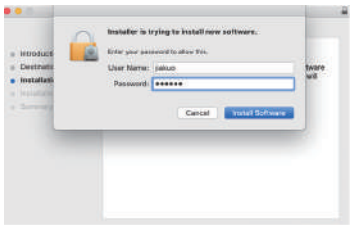
①



④ Click Continue

02_MAC

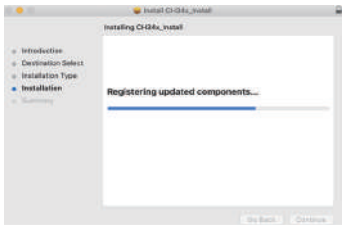
②



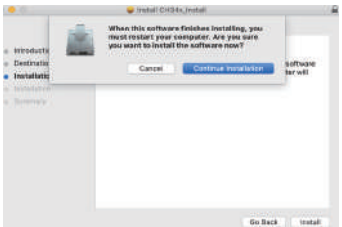
⑤ Enter the computer password

driver

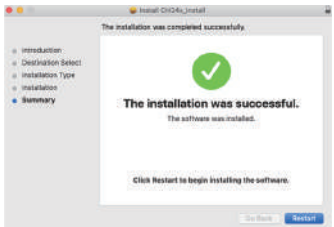
③



⑥ Click Continue installation



⑦ Continue installation

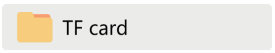


⑧ Complete installation

English

2. Software installation path:

Double-click the USB disk/02_MAC/software/Cut-LabX/software icon right/Complete the installation

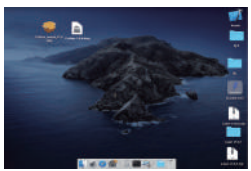


①

②

③

④



⑤ Double-click the software icon

⑥ Drag the icon to the right of the Applications folder

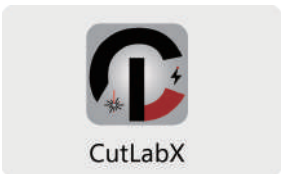
⑦ Complete the installation

3. Online operation:

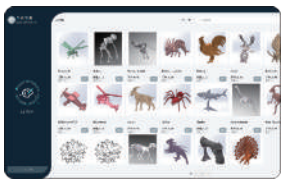
Use a data cable to connect the machine to the computer

Double-click the software icon-click the connection device icon-select the appropriate port

Click "Connect" when it becomes "Connected" to indicate a successful connection.



① Double-click the software icon



② Enter the homepage and click Start Creating

③ Select the appropriate port to connect

④ Connect successfully

Tip: When the machine is connected to MAC, you must select a name that begins with: W.ch.....

05 MOBILE SOFTWARE DOWNLOAD AND INSTALLATION

English

01

Method 1:

App download web: https://www.cutlabx.com

02

Method 2:

Scan the QR code to download

Web Download

Note:

1. For Android system, open the browser and scan the QR code to download.
2. After successful installation, the corresponding permissions must be granted.

06 MOBILE PHONE CONNECTION

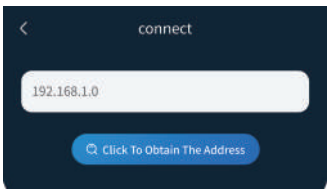
1. Steps to connect the mobile phone to the machine: Default WiFi

*Note: After the mobile phone is successfully connected to the machine, the mobile phone will have no network.

01 Turn on the machine and turn it on

02 Turn on the mobile phone's WLAN and find the WIFI signal
The name is BM1, and the password is 12345678

03 After the WIFI connection is successful, open the CutLabX APP,
Click the link mark in the upper right corner,
Enter 192.168.0.1 as the IP address,
and click "Connect" to complete the connection.



(Tip: When using WiFi mode, the machine and the mobile phone must be in the same WiFi network)

06 MOBILE PHONE CONNECTION

2. Steps to connect the phone to the machine: Home network

01

Turn on the device and turn it on

02

Connect the machine with a USB cable

03

Open the CutLabX software and enter the creation interface. The machine will automatically connect after recognition

04

The machine will automatically connect after recognition
(If it does not connect automatically, try a different COM)

05

Click the "WiFi Settings" button. Click to enter the WIFI name, home network password, and restart the machine

06

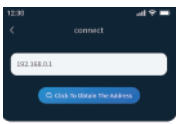
Turn on the WIFI on your phone, find the home network WiFi name, and enter your password

07

After the WIFI connection is successful, open the CutLabX APP and click the link mark in the upper right corner

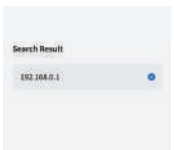
08

"Click to get the address"



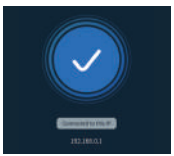
09

Click your IP address to get it, and click "Connect"



10

The connected IP is displayed, indicating that the connection is successful



(Tip: To use the WiFi mode, the machine and the phone must be in the same WiFi network)

English

English

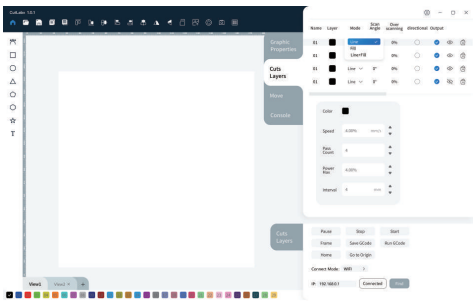
3. Steps to connect the computer to the machine via USB

*Note: Install the driver according to your computer system (see driver installation instructions).

01 Turn on the machine and turn it on

02 Connect the BM1 machine with a USB cable

03 Open CutLabX software and enter the creation page



04 Automatically identify the machine and connect

(If it does not connect automatically, you may need to try another COM)

(Tip: When the machine is connected to a MAC, you must select the name that begins with: W.ch.....)

English

FAQ-Machine-related issues

Questions	Solutions
What type of laser source does the machine use?	It is a semiconductor laser
What happens if the machine loses power during operation?	When the power is cut off during an engraving task, the laser head will remain in place. When the power is turned on again, the machine will initialize and will not continue the original task.
Why can't the pattern be engraved at all (or the engraving is very shallow)?	The imported picture should be clear and the color should not be too light; before engraving, please make sure the focus is correct and the power, speed and time settings are appropriate.
What if the pattern is not engraved completely (or the depth is inconsistent)?	Please make sure that the engraving object is flat, the machine is level, and it has been adjusted normally according to the operating instructions.

FAQ-Machine related issues

Questions	Solutions
How to focus the BM1 laser engraving machine?	Place the material on the stage, lower the left knob to focus, and lock it after focusing. For example, engrave and cut a 2mm thick basswood board.
Will the working platform be damaged during laser engraving?	During the engraving or cutting process, the laser may penetrate the object and leave marks on the work surface. Be sure to place an object that the laser cannot penetrate under the engraving object, such as: stainless steel plate, aluminum alloy plate, etc.
Why can't I start engraving when pressing the button on the host during offline engraving?	Make sure there is an engraving file in the root directory of the TF card and the TF card is inserted. Note: a. The machine reads the engraving file with the latest modification date in the root directory of the TF card by default. It is recommended to delete other irrelevant files in the root directory. b. This file can be generated by LaserGRBL, LightBurn, and CutLabX software, and the compatible format is NC. If GC is generated by default, please manually modify the file suffix to NC.
Why does the machine not respond after turning on?	a. Check whether the power plug on the machine end is fully plugged in. b. Check the electrical status of the power socket. c. Check whether the power switch and light shield on the machine are closed.

English

FAQ-Machine related issues

Questions	Solutions
Why can't the machine connect to the computer after it is turned on?	a. Reinstall the driver, the driver shows that it has been installed, indicating that the driver is normal. When the driver display is pre-installed, you need to check whether it is the original wiring or not connected to the machine. Please use another port on the computer. b. Is the port selection correct? Some computers will have 2 ports when connected. Please ignore com1 and select another com port. (The port number of the MAC must start with Wchusbserial to work properly) c. Close other software that occupies the com port. d. When the protective cover is opened, the machine cannot be connected, and the protective cover needs to be closed. When connecting with Lasergrbl, it cannot be connected when CutLabX is opened. You need to close Lasergrbl to use it normally. *Note: In Lightburn, the machine can store multiple machine information, please select the appropriate configuration information according to the model.
Why can't the mobile phone be used after the machine is turned on?	a. Please use the mobile phone according to the manual. b. If the connection is abnormal due to incompatibility of the newly released mobile phone or system upgrade, please provide a screenshot of the mobile phone configuration and contact our customer service to get technical support as soon as possible.

English

FAQ-Engraving/Cutting Related Questions

Questions	Solutions
What non-transparent materials can the BM1 laser engraver engrave or cut?	Engraving: cardboard, wood, bamboo, rubber, leather, cloth, acrylic, plastic, etc.; Cutting: cardboard, wood, bamboo, cloth, leather, cloth, acrylic (transparent acrylic cannot be cut), plastic, etc.
Can it be engraved on curved materials?	Yes, but the curvature of the material and the area of the engraved image should not be too large, otherwise there will be slight deformation.
Can it be engraved on reflective/transparent materials such as ceramics/glass?	Yes, but before engraving, anti-reflective materials (such as laser colored paper, black marker) need to be applied to the surface of the material to ensure the engraving effect and prevent reflected light from damaging the laser module.
Why do materials of the same material but different colors have very different processing effects using the same G-code file?	Materials of different colors have different optical properties and absorb and reflect laser energy differently. When engraving materials of the same material but different colors, it is recommended to set different powers and speeds in the software.

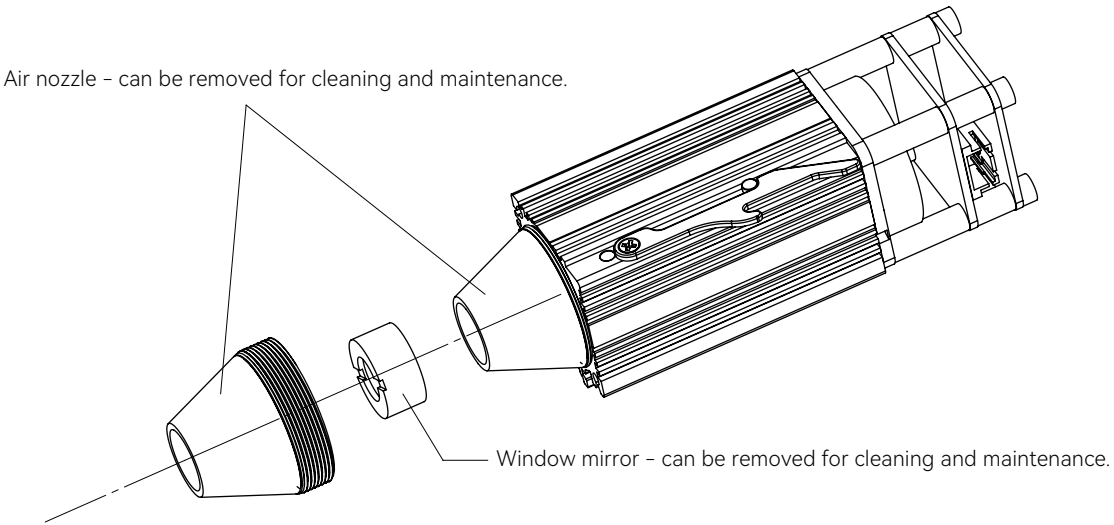
English

FAQ-Engraving/Cutting Related Questions

Questions	Solutions
There is a lot of smoke on the cut material, how to deal with it?	Please reduce the laser power and increase the speed appropriately.
Why can't the material be cut?	1. Make sure the machine and the engraving material are parallel to the work surface; 2. Make sure the laser module protective lens is clean; 3. Make sure the focus mode is correct; 4. Confirm the material thickness again and set it according to the recommended parameters in the random data; 5. Gradually increase the number of cuts, or appropriately reduce the cutting speed.

FAQ-Software related questions

Questions	Solutions
What software does the BM1 laser engraver support?	LaserGRBL (free) - Real-time LightBurn (paid) - Real-time/offline 30-day trial CutLabX (free) - Real-time/offline/mobile During real-time engraving, be careful not to let the computer freeze or enter standby mode (do not lock the screen) to avoid affecting the engraving.
Where can I download these software?	LaserGRBL (https://lasergrbl.com/download/) LightBurn (https://lightburnsoftware.com/pages/trial-version-try-before-you-buy) CutLabX (www.cutlabx.com)
What image formats does the software support?	LaserGRBL (bmp/png/jpg/gif/svg) LightBurn (bmp/png/jpg/jpeg/gif/tif/tiff/tga/ai/pdf/sc/dxf/hpgl/plt/rd/svg) CutLabX (AI, PDF, SVG, DXF, PLT, PNG, JPG, GIF, BMP)
Where can I get tutorials for the software?	LaserGRBL (https://lasergrbl.com/usage/) LightBurn (https://lightburnsoftware.github.io/NewDocs/) CutLabX (www.cutlabx.com)



* You can regularly perform the following operations to keep the BM1 in good working condition and reduce wear
* Clean the laser module lens: Over time, particles and dust will accumulate on the outer lens of the laser module, causing the laser module lens to generate heat and reduce power output.
* If you find that you have difficulty cutting materials that you have no problems cutting before, it is likely that the lens is deposited with dirt and dust
* Remove the laser from the machine, remove the air nozzle, and use a cotton swab or dust-free cloth with a little alcohol to gently wipe the lens.

CLOUDRAY

INDUSTRIAL SOLUTIONS

LASER ENGRAVING MACHINE