AURORA Series
Unified User's Manual

For AURORA 20,30 and 50

Thunder Laser

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Dongguan City, Guangdong Province, China

Introduction

This manual has been designated as the thunder laser systems, fiber laser machine installation and user guide; The manual is divided into seven chapters, Including general information instructions, safety instructions, the key components of every laser cutting systems and the installation steps, operation instructions, software instructions and maintenance instructions from THUNDERLASER Company.

First, it should be emphasized that the installation of each system must meet the requirements, and make it consistent with the installation requirements of THUNDERLASER. If not, the machine will not working properly, poor performance, life shortened, maintenance costs increased and even machine damage .

The note is for getting a specific requirement of system installation, and we hope every customer try to understand these notes before installation and usage, thus you can correctly install and use. If you meet any installation problems, you can contact our technical staff and customer service staff.

Content

Chapter1. General

1.1 General Information

Please read this documentation carefully before installation and operation.

Injury, death, loss of property, fire, electric shock, malfunction, reduced performance & machine life, and critical failures can result from not reading, understanding, and following the Operation Manual!

Operation of the system is permitted only with equipment and spare parts supplied or listed in the spare parts and consumables lists. The use of 3rd Party components may void the warranty.

Auxiliary equipment must be adjusted to the base machine (contact us for further info).

The following symbols are used throughout the Operation Manual:

Caution: Warnings to keep in mind when operating the laser.

High Voltage: Care must be taken to prevent injury and/or death.

Laser Radiation: Pay attention to the dangers of the laser beam.

Fire Hazard: High potential for fire. NEVER RUN UNATTENDED!

Tips: Helpful notes or info that simplify the use or understanding.

1.2 Designated

The THUNDER LASER AURORA SERIES is intended exclusively for laser marking using the supplied marking software.

Materials such as metal, anodized aluminum, and several plastics can be processed on the laser. The following points should also be observed as part of the intended use:

1.The engraving process must only be performed with a perfectly adjusted machine.

2. Only mark approved materials using suitable parameters.

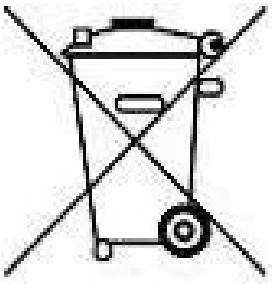
3. Use of the system in other areas is against the designated use. The manufacturer does not admit liability for damage to personal and/or equipment resulting from such use.

4. The system must only be operated, maintained and repaired, by personnel that are familiar with the designated field of use and the dangers of the machine!

5. Non-observance of the instructions for operation, maintenance and repair described in this Operation Manual excludes any liability of the manufacturer if a defect occurs.

6. Caution when processing conductive materials (carbon fibers), Conductive dust or particles in the ambient air might damage electrical components and lead to short circuits. Bear in mind that those defects are not warranted.

1.3 Disposal remarks



Do not dispose the machine with domestic waste!

Electronic devices have to be disposed according to the regional directives on electronic and electric waste disposal. In case of further questions, please ask your supplier. He might take care of proper disposal.

1.4 Technical Data/Device Specification

Mechanics

Fiber system	Aurora 20,30&50		
Field Lens	F-110(Standard)	F-150(Optional)	F-200(Optional)
Max marking area	110*110mm	150*150mm	200*200mm
Focus Diameter	35um	50um	50um
Max work Height	195mm	165mm	35mm
Focus length	171mm	240mm	310mm
Max marking speed	2000mm/s		
Writing speed	516cps		
Position speed	11000mm/s		
Z-axis	Motorized Z-axis		
Table	Alumina table		
Table Size	360×265mm		
Net weight	Aurora20 73kgs/161lbs	Aurora30 74kgs/163lbs	Aurora50 76kgs/168lbs
Housing Dimensions(W*D*H)	703mm×430mm×812mm		

Laser Equipment

Fiber system	Aurora 20,30&50		
Laser Type	Pulsed Fiber Laser		
Standard Laser Power	20W ,30W, 50W (depend on model)		
Wavelength	1060-1085nm		
Frequency	20W 20-60kHz	30W 30-60kHz	50W 50-100kHz
Pulse width	110ns		
Cooling	Air cooled		

Control System

Fiber system	Aurora 20,30&50
Computer	Microsoft Windows XP, VISTA, Win7, Win10
Interfaces	USB
Marking software	EzCad2
Correction software	CorFile2
Laser power	Adjustable from 1 - 100%

Electricity, Power, Breaker

	20WATT	30WATT	50WATT
Electricity Requirement	115 or 230Volt AC, 50 or 60Hz,Single phase		
Power consumption	170W	240W	340W
Recommended circuit breaker	10A, 110V&220V	10A, 110V&220V	10A, 110V&220V

Ambient Conditions

Ambient temperature — Operating temperature 0℃-40℃

Humidity — Relative humidity max 80%

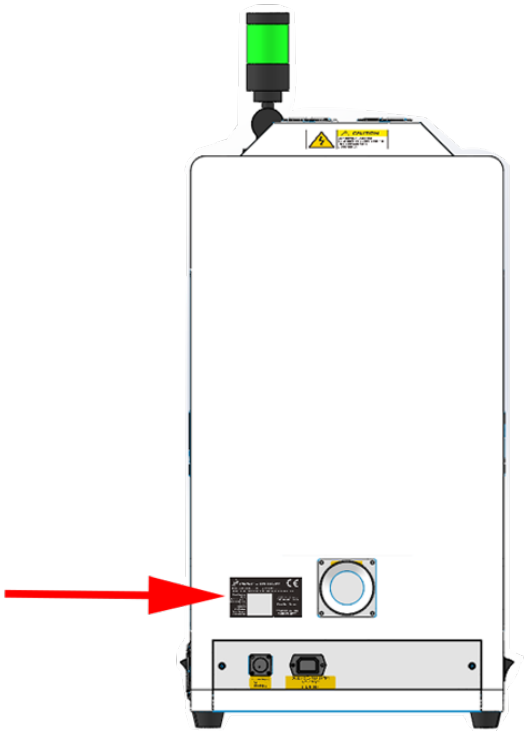
Laser Safety

Laser class — Class2

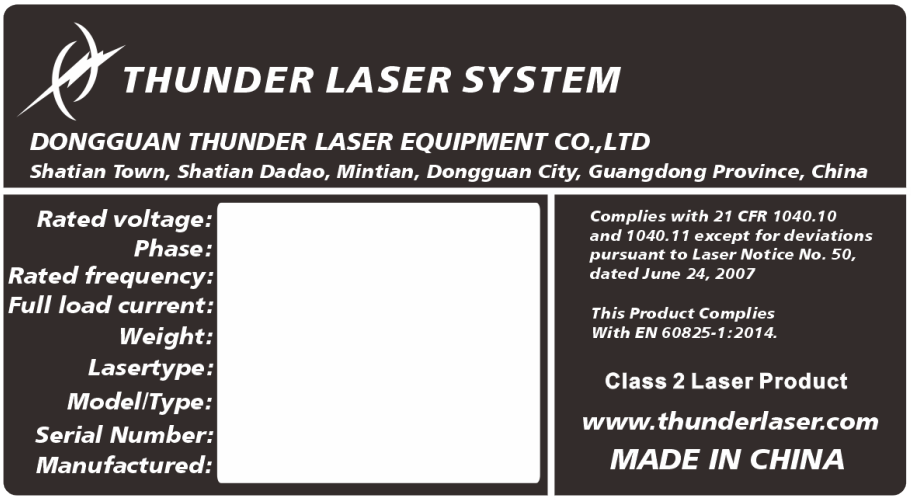
Compliant FDA approved

1.5 Manufacturer's Label

The Manufacturer's Label is located on the backside of the machine (see picture below)



It is recommended to record all of the data so that you always have this handy. You will need to supply your Serial Number to our Support Team on occasion.



Chapter2 Safety

2.1 General Safety Information

All personnel involved in installation, set-up, operation maintenance and repair of the machine, must have read and understood the Operation Manual and in particular the "Safety" section. The user is recommended to generate company-internal instructions considering the professional qualifications of the personnel employed in each case, and the receipt of the instruction/Operation Manual or the participation at introduction/training should be acknowledged in writing in each case.

Safety-conscious of Working

The machine must only be operated by trained and authorized personnel.

The scopes of competence for the different activities in the scope of operating the machine must be clearly defined and observed, so that under the aspect of safety no unclear questions of competence occur. This applies in particular to activities on the electric equipment, which must only be performed by special experts.

For all activities concerning installation, set-up, start-up, operation, modifications of conditions and methods of operation, maintenance, inspection and repair, the switch-off procedures that may be provided in the Operation Manual must be observed.

Safety Information for the User and/or Operating Personnel

1. No working methods are permitted that affect the safety of the machine.
2. The operator must also ensure that no unauthorized persons work with the machine (e.g. by activating equipment without authorization).
3. It is the duty of the operator, to check the machine before start of work for externally visible damage and defects, and to immediately report changes that appear (including behavior during operation) that affect the safety.
4. The user must provide that the machine is only operated in perfect condition.
5. The user must guarantee the cleanness and accessibility at and around the machine by corresponding instructions and controls.
6. No safety components may be removed or disabled (again we emphasize the imminent dangers, for example severe burns, loss of eyesight, etc.). If the removal of safety components is required during repair and service, the replacement of the safety components must be performed immediately after completion of the service and repair activities.
7. Preparation, retooling, change of work piece, maintenance and repair activities **must only performed with equipment switched off** and by trained personnel.

8. **Any attempt to perform unauthorized modifications and changes to the machine can VOID THE WARRANTY.** This does not apply to preventative & general maintenance, adjustment and alignment, etc that follow Thunder Laser's best practices.

2.2 Laser Safety Information

1. To assess the potential dangers laser systems pose, they are classified into 2 safety classes, Thunder Laser Aurora series is a device of class 2. This is guaranteed by the protective housing and the safety installations.
Please note that improper and warranty operation of the device can override the status of Safety class 2 and can cause the emission of harmful radiation.
2. Without safety precautions, the following risks exist with exposure to laser radiation:
Eyes: Burns to the cornea
Skin: Burns
Clothing: Danger of fire
3. Never try to modify or disassemble the laser and do not try to start up a system that had been modified or disassembled!
4. Dangerous radiation exposure can result from the use of operation or adjustment equipment other than that described here, and if different operational methods are performed.

2.3 Safety Precautions when Operating the Device

Your Thunder Laser AURORA SERIES has an integrated safety system which immediately stops the job when the protection cover (Lid) is opened. An incomplete job will occur if the cover is opened during operation.

Please remember the following safety precautions when working with this device:

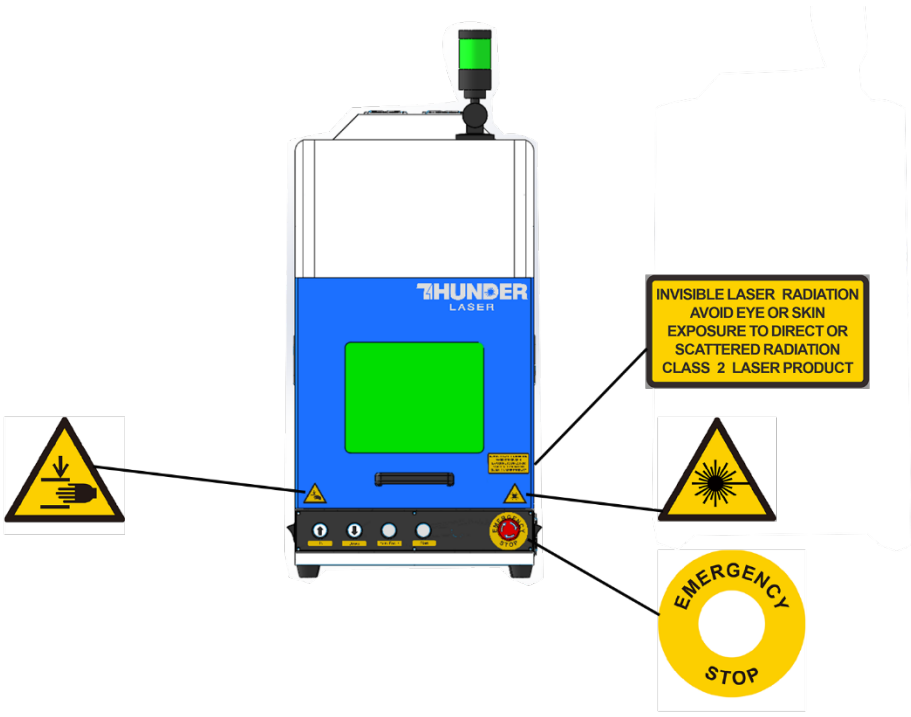
1. CO2 Fire extinguishers should be placed near laser. Always keep a properly maintained and inspected fire extinguisher on hand.
2. Do not store any flammable materials in the inside of the device. Particularly leftovers of produced materials have to be removed to prevent fire hazard.
3. Please maintain free airflow around this system at all times. Do not cover the machine while in operation.
4. Stay with the laser. Do not leave the laser unattended when it is working.

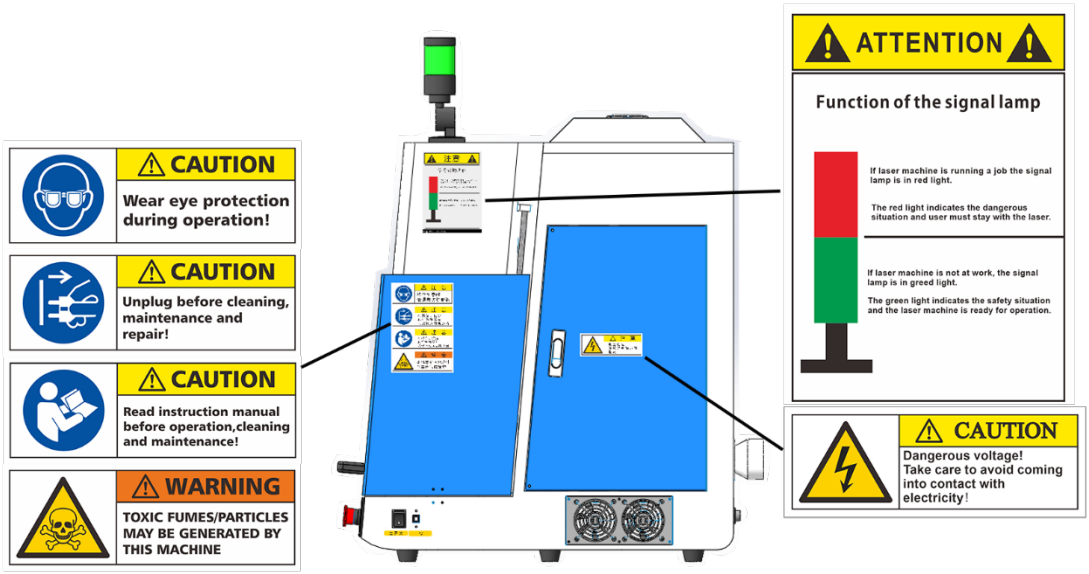
1. These lasers emit invisible radiation; safety glasses should be worn when maintaining these machines for your protection.
2. Adjustment of the beam path must be performed only by specially trained personnel. An improper setting can lead to uncontrolled emission of the laser radiation.

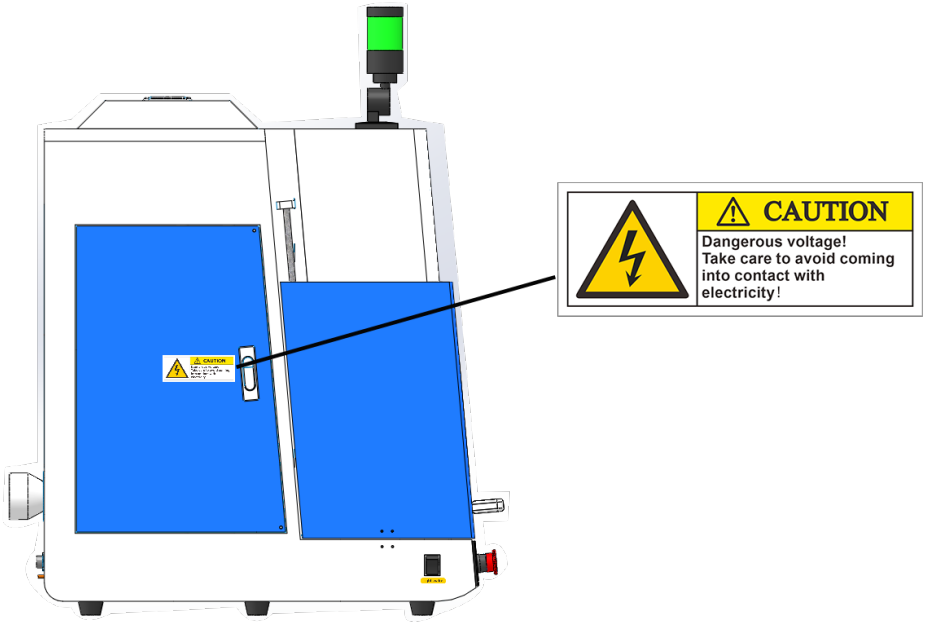
1. Do not disable limit switches or safety features as this can invalidate warranties and cause damage to you and the machine.
2. Before processing materials the user must verify whether harmful materials can be generated and whether the filter equipment of the exhaust system is suitable for the harmful materials. We emphasize that it is the responsibility of the user, to consider the national and regional threshold values for dust, fogs and gases when selecting the filters and the exhaust system. (The values for the maximum workplace concentration must not be exceeded.)
3. PVC (polyvinyl chloride) must under no circumstances be processed with the laser.

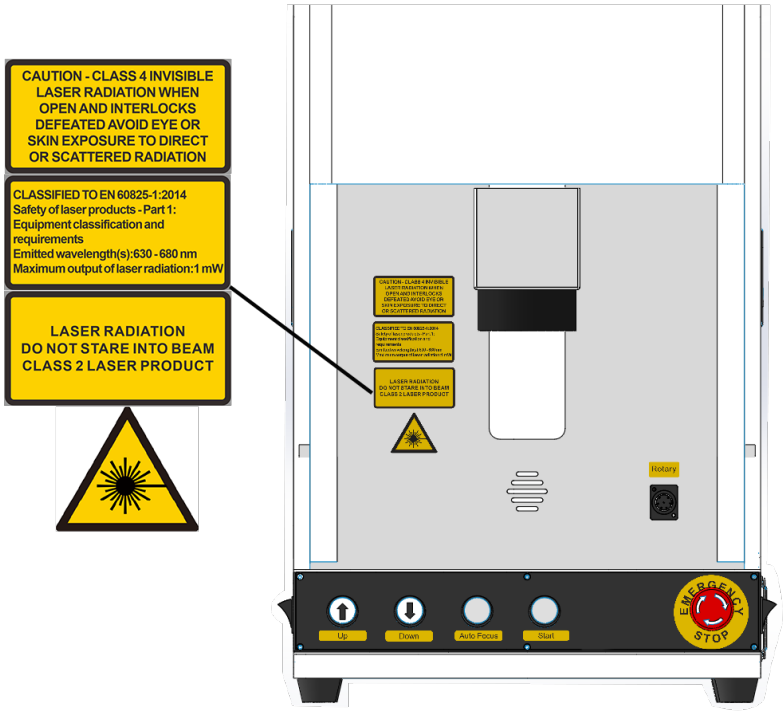
2.4 Warning and Information Labels

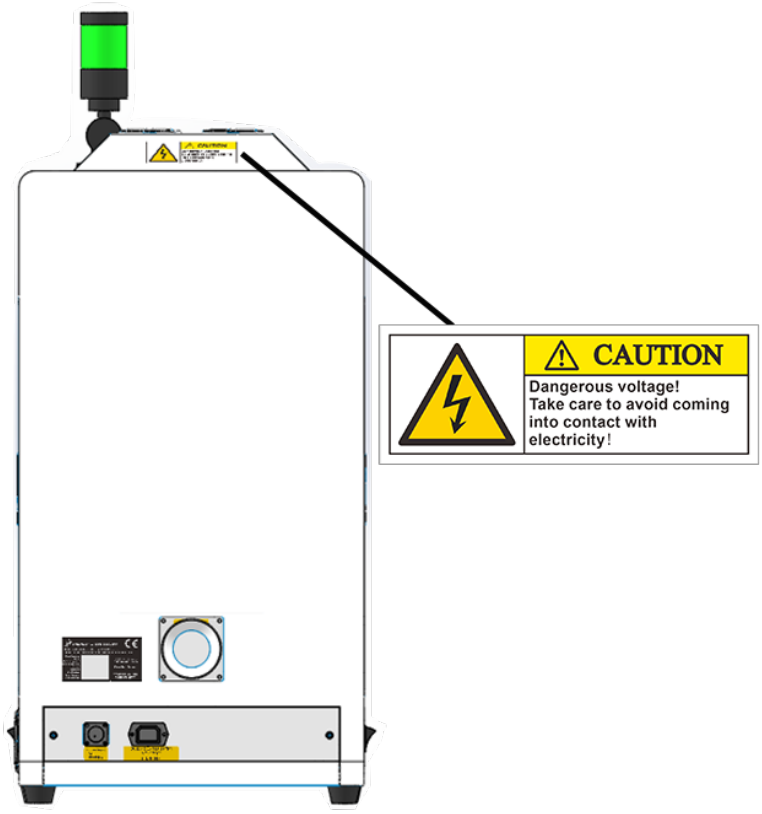
The warning and information labels in various locations if the machine should always be read carefully and understood. If labels are lost or damaged, they must be replaced immediately.




CAUTION
Wear eye protection during operation!
CAUTION
Unplug before cleaning, maintenance and repair!
CAUTION
Read instruction manual before operation,cleaning and maintenance!
WARNING
TOXIC FUMES/PARTICLES MAY BE GENERATED BY THIS MACHINE
ATTENTION
Function of the signal lamp
If laser machine is running a job the signal lamp is in red light.
The red light indicates the dangerous situation and user must stay with the laser.
If laser machine is not at work, the signal lamp is in greed light.
The green light indicates the safety situation and the laser machine is ready for operation.
CAUTION
Dangerous voltage!
Take care to avoid coming into contact with electricity!


CAUTION
Dangerous voltage!
Take care to avoid coming into contact with electricity!


CAUTION - CLASS 4 INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION
CLASSIFIED TO EN 60825-1:2014
Safety of laser products - Part 1: Equipment classification and requirements
Emitted wavelength(s):630 - 680 nm
Maximum output of laser radiation:1 mW
LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
Rotary
Up
Down
Auto Focus
Start
EMERGENCY STOP


CAUTION
Dangerous voltage!
Take care to avoid coming into contact with electricity!

Chapter3. Process of Installing

3.1 Unpacking

You receive your THUNDER LASER AURORA SERIES packed in a wooden box which contains the laser machine and additional accessories. The following steps give you an overview of the unpacking and assembly of the laser. Please follow these steps carefully.

Keep the packing box. You will require it in case of a return.

Dispose all waste according to the applicable waste disposal law.

1. Put the wooden box on a flat and spacious room for unpacking.
2. Remove the machine box; carefully remove the protective foam, wraps, films, etc.
3. Please keep the warranty certificate as well as the model and serial number of the machine. If you need tech support we may ask you for this information.
4. Then start to install the machine, carefully following the instructions in this manual.

3.2 Location

Before you install the fiber laser system, you should select an appropriate location. Follow the guidelines shown below:

1. Avoid locations where the system is exposed to high temperatures, dust and high humidity. (The humidity must not exceed 70% and the temperature must not be close to the dew point.)
2. Avoid locations, where the system is exposed to mechanical shocks.

1. Circuit Breaker protection: Do not connect other devices on the same circuit as the laser system. It requires a dedicated circuit.
2. DO NOT open any of the machine's access panels while the unit is plugged in. Opening a panel may expose the operator to severe electric shock, invisible laser radiation, mechanical pinch points, burns, blindness, and other hazards. ALWAYS POWER OFF AND UNPLUG!
3. DO NOT make or break any electrical connections to the system while the unit is turned on.

1. Avoid locations with poor air circulation; select a location close to ventilation (if available).Select a location, whose room temperature is between 15 °C and 25°C (59° – 77° F).
2. This is fundamental to maintain consistent and reliable operation of a fiber laser and the machine itself. Avoid higher ambient temperatures and strong exposure of the engraver to the sun. Use blinds, if required.
3. Mechanical shock and vibration of the laser will have detrimental effects on the performance and life expectancy of the machine. It will manifest (over a period of time) with a noticeable decrease in performance and increased maintenance required, possibly even damage. Setting your Thunder Fiber Laser up in s suitable temperature controlled, dust free, moisture free, level, stable surface (a level concrete floor) with the recommended extraction is critical to the ongoing performance of the machine. It is also a warranty condition.

3.3 Connections

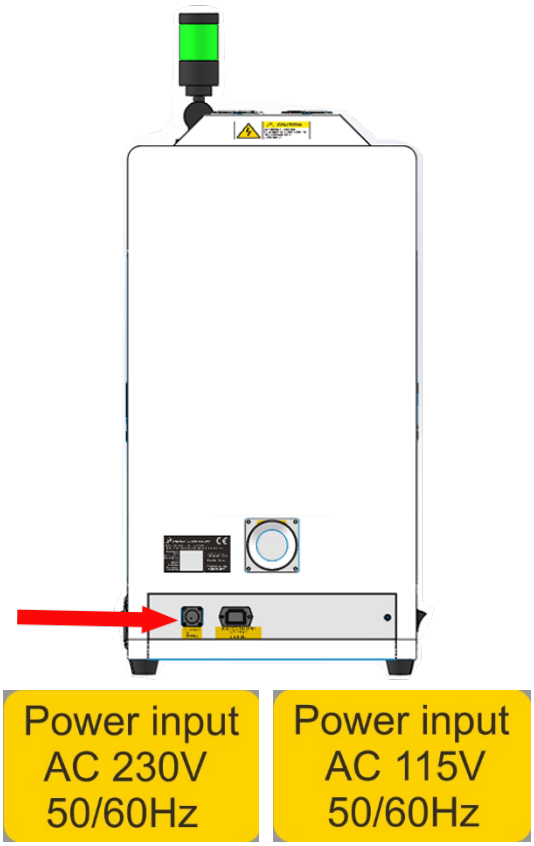
Perform the connections exactly in the order described; otherwise electrostatic charging can damage your computer and/or the electronics of the laser system.

3.3.1 Connecting the Mains

Connect one end of the mains cable with the connection socket at the rear side of the laser device (see Figure below) and the other end with a protected power outlet.

Mains voltage and operating voltage must correspond (AC 230V 50/60 Hz or AC 115V 50/60 Hz) – see information label beside the connection socket.

Under no circumstances should you switch on the device if the voltages do not correspond.



3.3.2 Connecting the Computer

Connecting the Computer and the machine by using the USB cable. Like below:

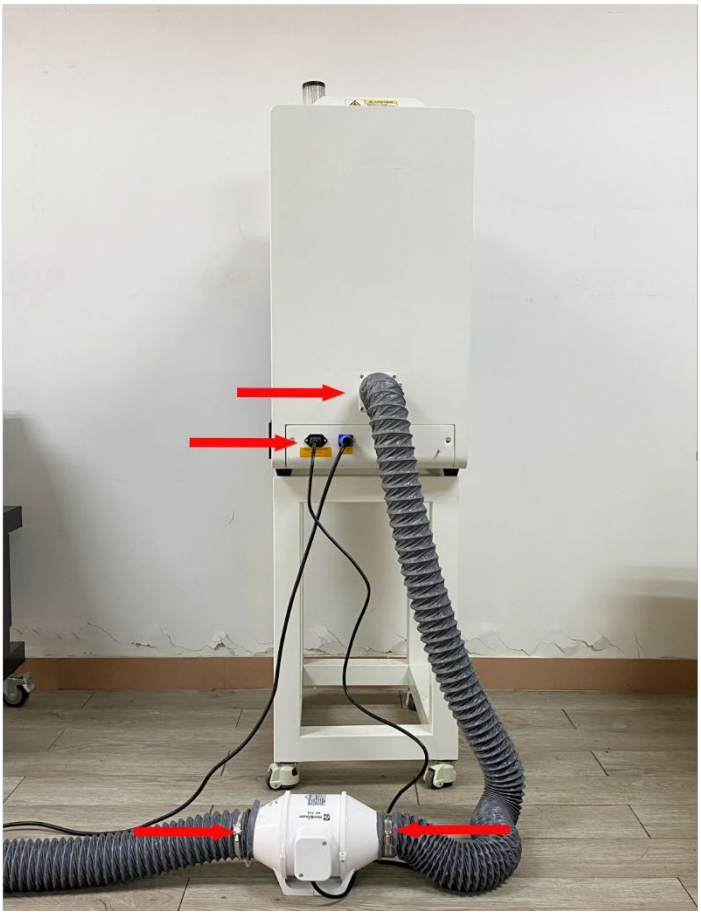
The USB cable is placed inside the toolbox.

3.3.3 Connecting the exhaust system

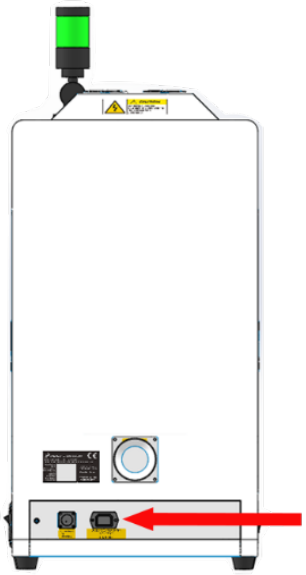
How to set up the exhaust system?

Insert one side of the gray exhaust pipe into the fan inlet and the other side into the fuselage behind the exhaust tank. Insert one side of the gray exhaust pipe into the fan outlet and put the other side of the pipe outside where you work (If the machine is far from the outside of the room that the gas manufactured by the machine cannot be discharged; then you might need a dust/fume filter, it can keep the air quality of your working environment well).

Please refer to the following pictures about how to install the exhaust pipe:



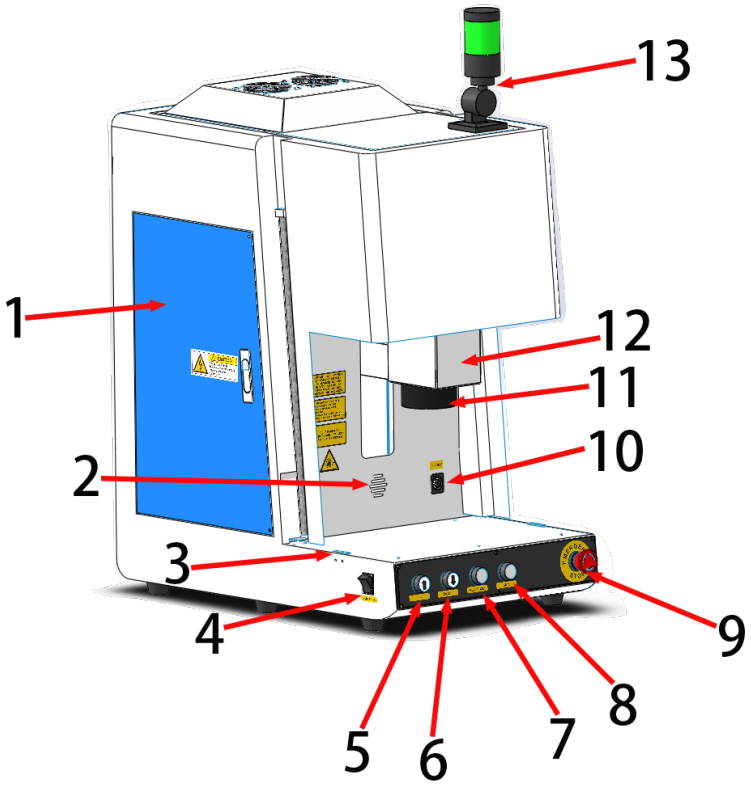
The input voltage must correspond (AC 230V 50/60 Hz or AC 115V 50/60 Hz) – see information label beside the connection socket.



Output: Exhaust fan
AC 115V
50/60Hz

Output: Exhaust fan
AC 230V
50/60Hz

Chapter4. Machine view



1. Left side door
On fiber laser, there are installed Z motor and Driver, Z limit switches.
Please open this door for checking these parts, but must pay attention to the electric current.

2. Exhaust hole
This is for exhaust the fume.

3. Flap protection sensor
This is where Open flat protection exist. Laser will stop working once the cover is opened during working.

4. Light switch
Turn on the LED lamp inside the fiber laser.

5. Up button
You can raise the field lens up.

6. Down button
You can lower the field lens.

7. Auto focus button
The fiber laser will adjust the focus length automatically.

8. Start button
Start to marking job.

9. Emergency stop button
Once there's an accident happen during working, please turn off this switch immediately. It will be cut off the laser power and motion power immediately.

10. Rotary connector
To connect rotary device

11. Field lens
You can replace the Field lens by rotate it.

12. Galvanometer
Composed of two parts: optical scanning device and servo control.

13. Indicates light
If fiber laser machine is running a job, the signal lamp is in red light.
If laser machine is not at work, the signal lamp is in green light.

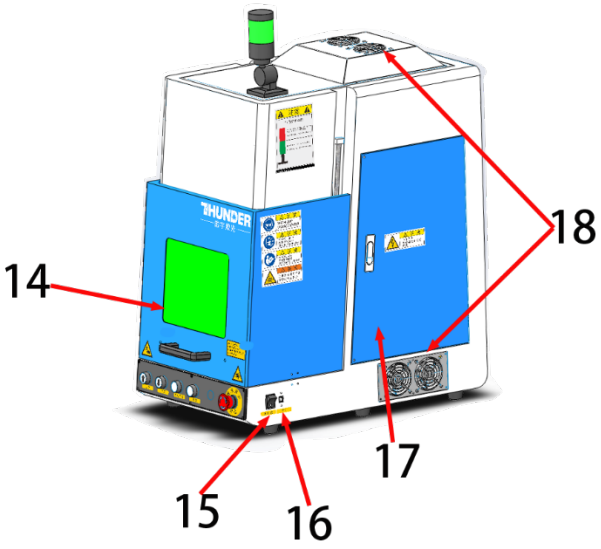
14. Front door
Open the door to put the material.

15. Main switch
The laser machine will be start while you turn it on.

16. PC connection port(USB)
This USB is for connecting computer.

17. Right side door
On fiber laser machine, the laser inside the right door.

18. Cooling fan
To cooling the fiber laser machine and laser.



19. Manufacture's label

It's show you the laser information like serial number or manufacturing date etc.

20. Main power socket

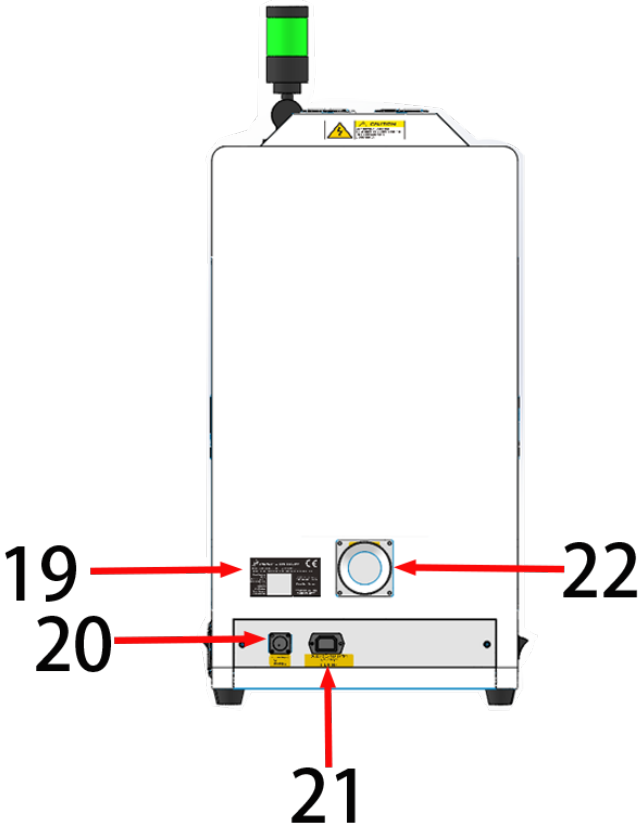
To connect the main power.

21. Exhaust fan socket

To connect the main power of exhaust fan.

22. Exhaust hose

This is for installing the exhaust device.



Chapter5. EzCad2Brief Introduction

5.1 Software Installation

The EzCad2 software run on a PC with 900 MHz CPU and 256 MB RAM at least. In general, we recommend the fastest PC available. EzCad2 was developed in Microsoft Windows XP and will run in Windows XP, WIN7, WIN10and VISTA.

The installation of EzCad2 is very easy. Users simply need to copy EzCad2 folder that is in the Install FOLDER to hard disk, and then double click the Ezcad2.exe under the EzCad2's directory to run the software.

If user run the software without connect the fiber laser, a caution will appear and the software will work at demo state. In demo state, we can evaluate the software but we cannot save files and cannot control laser device.

The Software, Drive and Correction file are in the U-disk that came with the fiber machine.

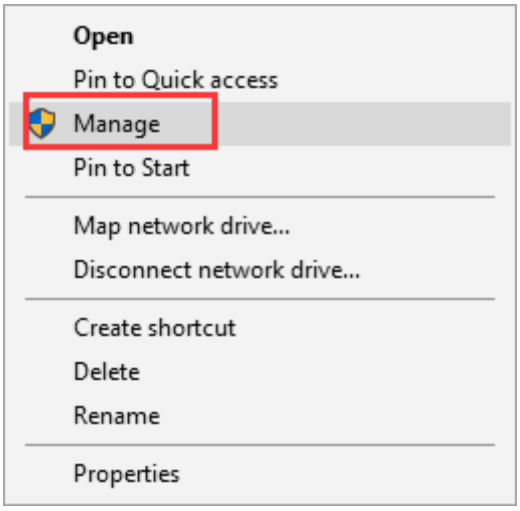
5.1.1 Driver Installation

Turn on the fiber laser

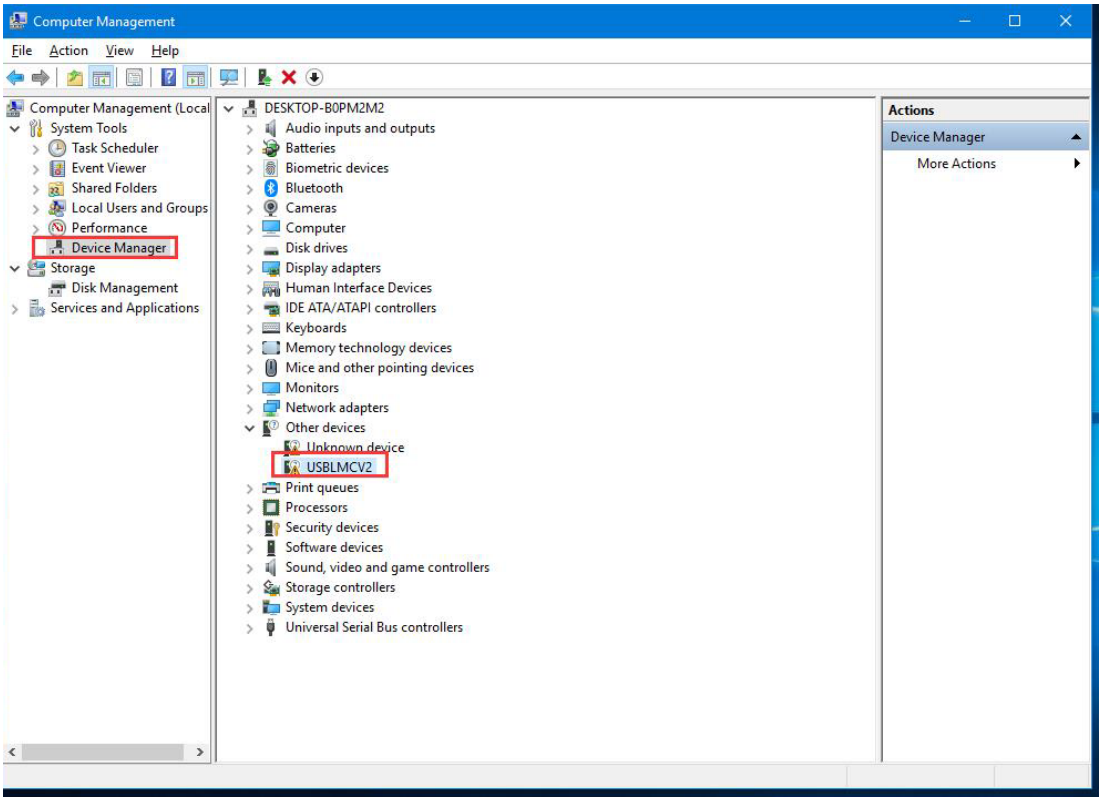
Connect your fiber laser and PC via USB cable.

Before go to next step, please save the Driver file in the U- disk to your computer, and remember where it is.

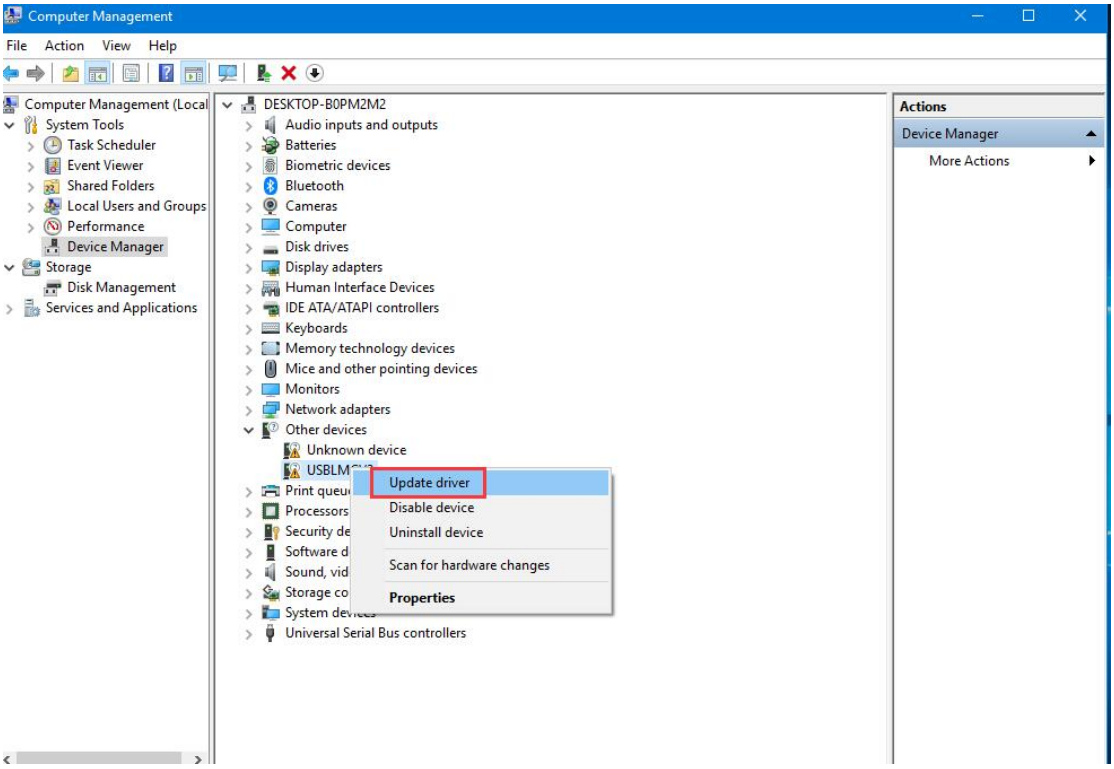
1. Go Manage>>Device manager>>Other devices>>USBLMCV2>>right click, Update driver>>Browse my computer for driver software>>Browse, and find the CV4 folder you saved from the U-disk that came with the fiber laser>>Select the CV4 driver>>Next>>Install, then the driver is installed successfully. See below pictures.


Open
Pin to Quick access
Manage
Pin to Start
Map network drive...
Disconnect network drive...
Create shortcut
Delete
Rename
Properties

Pic1


Computer Management
File Action View Help
Computer Management (Local
System Tools
Task Scheduler
Event Viewer
Shared Folders
Local Users and Groups
Performance
Device Manager
Storage
Disk Management
Services and Applications
DESKTOP-B0PM2M2
Audio inputs and outputs
Batteries
Biometric devices
Bluetooth
Cameras
Computer
Disk drives
Display adapters
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Memory technology devices
Mice and other pointing devices
Monitors
Network adapters
Other devices
Unknown device
USBLMCV2
Print queues
Processors
Security devices
Software devices
Sound, video and game controllers
Storage controllers
System devices
Universal Serial Bus controllers
Actions
Device Manager
More Actions

Pic2


Computer Management
File Action View Help
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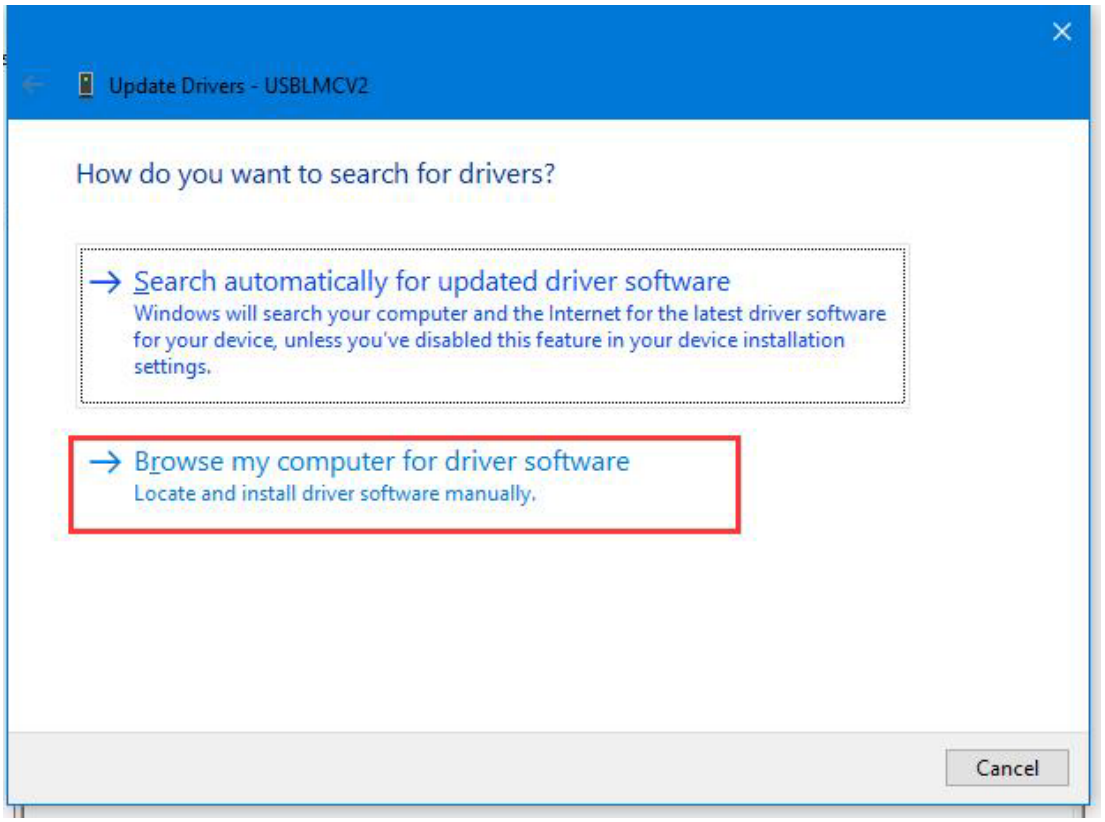
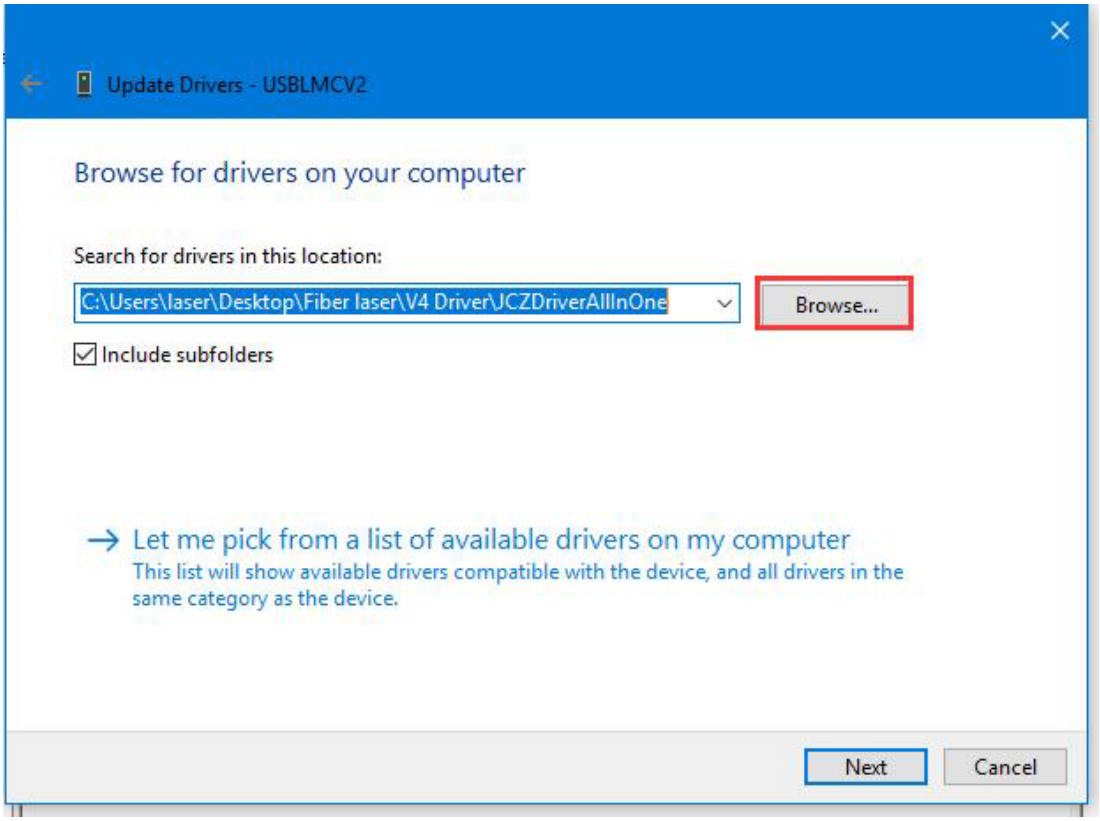
Event Viewer
Shared Folders
Local Users and Groups
Performance
Device Manager
Storage
Disk Management
Services and Applications
DESKTOP-B0PM2M2
Audio inputs and outputs
Batteries
Biometric devices
Bluetooth
Cameras
Computer
Disk drives
Display adapters
Human Interface Devices
IDE ATA/ATAPI controllers
Keyboards
Memory technology devices
Mice and other pointing devices
Monitors
Network adapters
Other devices
Unknown device
Print queue
Processors
Security de
Software d
Sound, vid
Storage co
System dev
Universal Serial Bus controllers
Update driver
Disable device
Uninstall device
Scan for hardware changes
Properties
Actions
Device Manager
More Actions

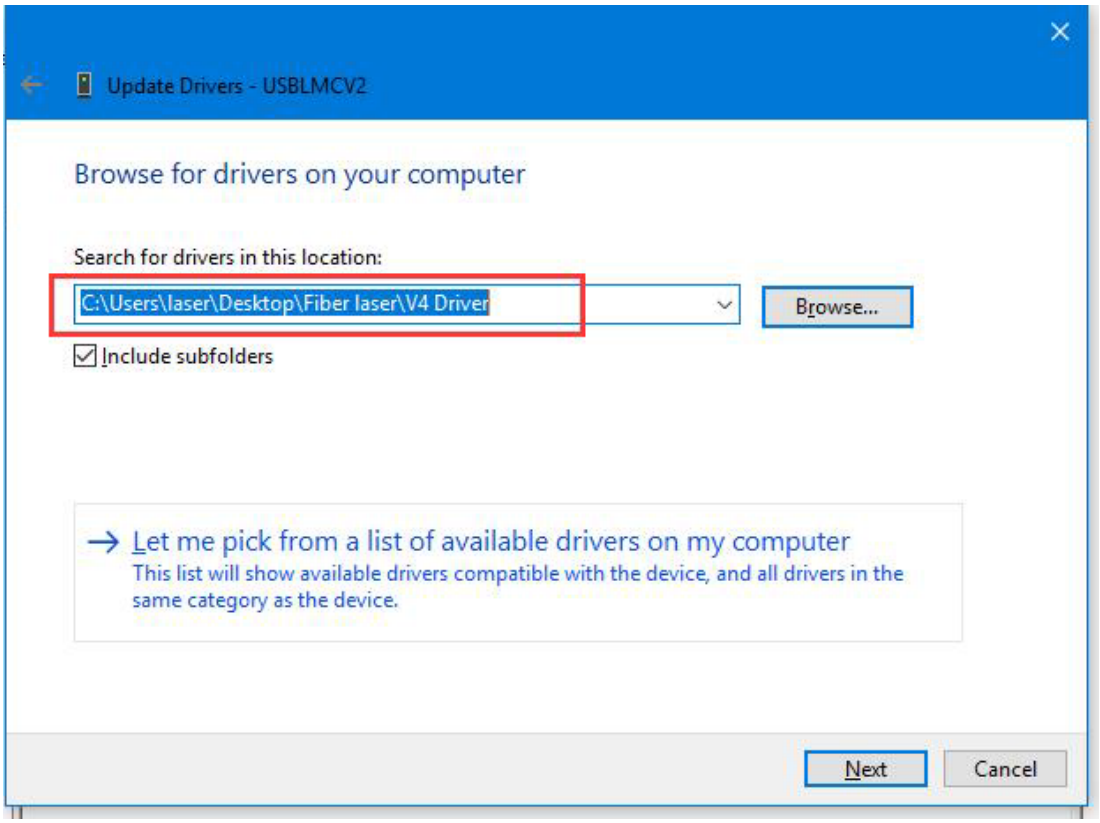
Pic3


Update Drivers - USBLMCV2
How do you want to search for drivers?
Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.
Browse my computer for driver software
Locate and install driver software manually.
Cancel

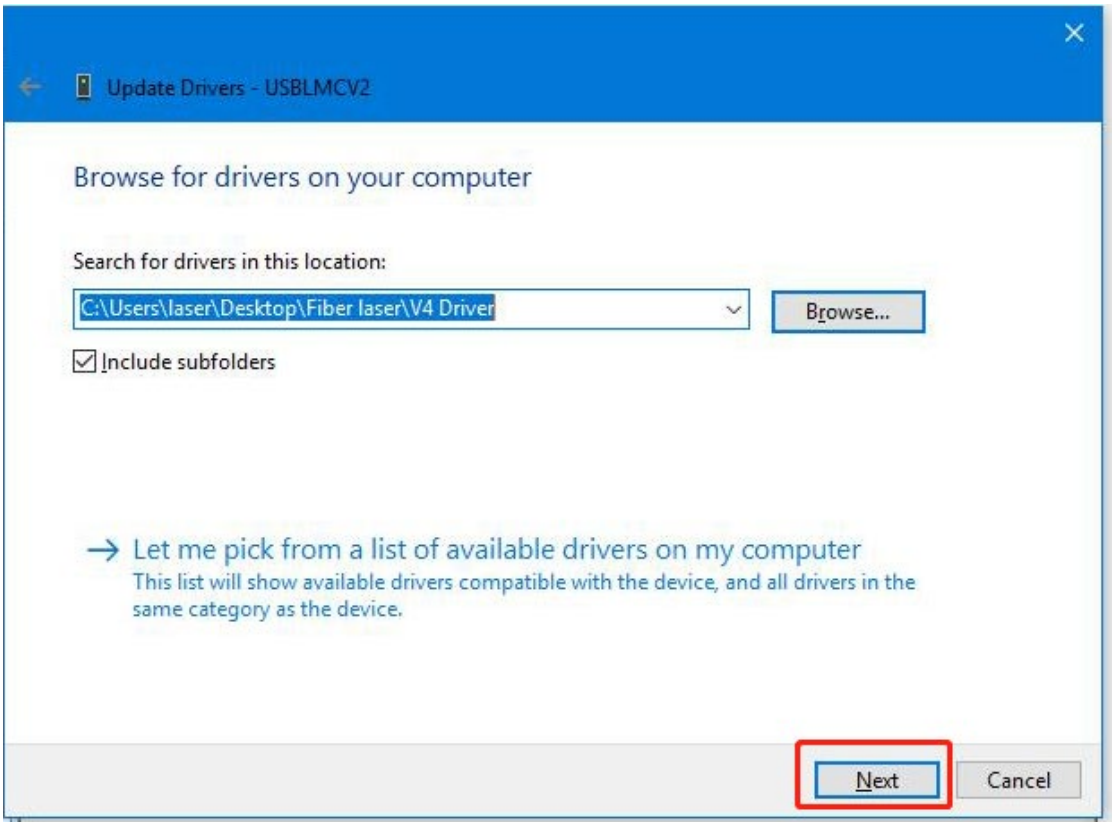
Pic4


Update Drivers - USBLMCV2
Browse for drivers on your computer
Search for drivers in this location:
C:\Users\laser\Desktop\Fiber laser\V4 Driver\JCZDriverAllInOne
Browse...
Include subfolders
Let me pick from a list of available drivers on my computer
This list will show available drivers compatible with the device, and all drivers in the same category as the device.
Next
Cancel

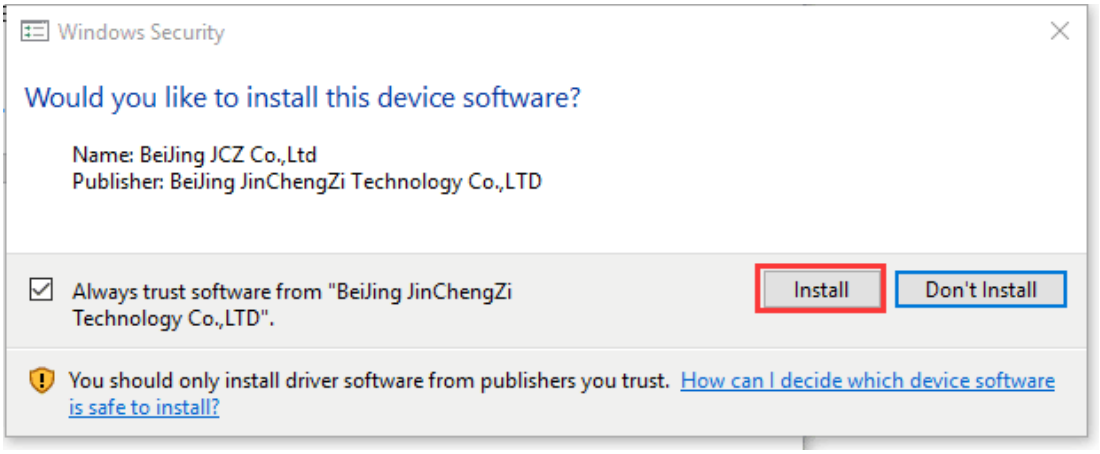
Pic5


Update Drivers - USBLMCV2
Browse for drivers on your computer
Search for drivers in this location:
C:\Users\laser\Desktop\Fiber laser\V4 Driver
Browse...
Include subfolders
Let me pick from a list of available drivers on my computer
This list will show available drivers compatible with the device, and all drivers in the same category as the device.
Next
Cancel

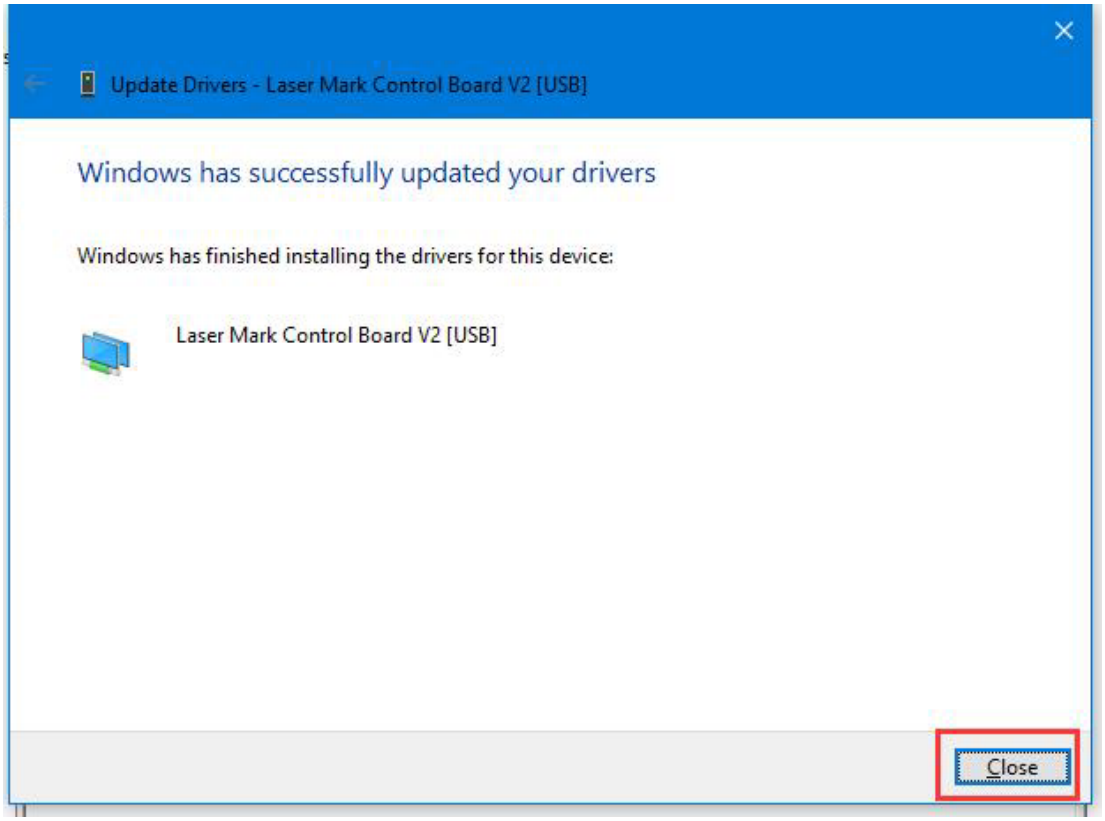
Pic6


Update Drivers - USBLMCV2
Browse for drivers on your computer
Search for drivers in this location:
C:\Users\laser\Desktop\Fiber laser\V4 Driver
Browse...
Include subfolders
Let me pick from a list of available drivers on my computer
This list will show available drivers compatible with the device, and all drivers in the same category as the device.
Next
Cancel

Pic7


Windows Security
Would you like to install this device software?
Name: BeiJing JCZ Co.,Ltd
Publisher: BeiJing JinChengZi Technology Co.,LTD
Always trust software from "BeiJing JinChengZi Technology Co.,LTD".
Install
Don't Install
You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

Pic8



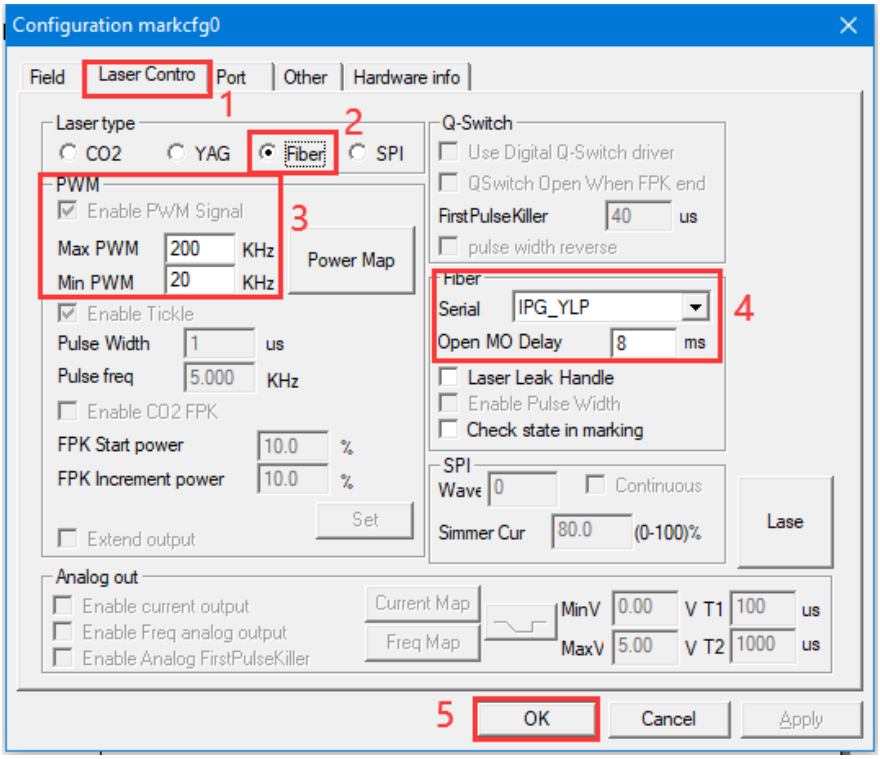
Pic9

5.1.2 Software setting

1. General setting

Open the software, then press “F3” and select items according to below picture（take Aurora 20W as an example）.

Laser type: Fiber
PWM:
Max PWM: 60KHz, Min PWM: 20 KHz.
Fiber serial: IPG_YLP
Open Mo Delay: 8ms.

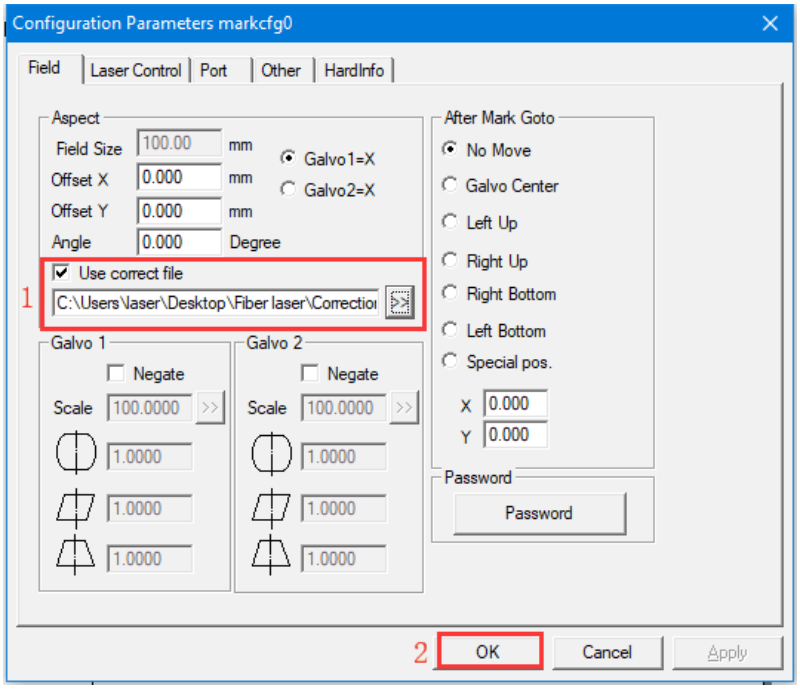


For 20W, the range of Frequency is 20-60kHz.
For 30W, the range of Frequency is 30-60kHz.
For 50W, the range of Frequency is 50-100kHz.

2. How to import the correction file.

1. Before leaving the factory, we have done a correction test for each machine and import the correction file to fiber software, so the customer does not need to do correction again.
2. Different field lenses have different correction files and cannot be used universally.
3. If the field lens selected by the random device is purchased from us, we will prepare the calibration file and put it in the U disk.

Open the software>>Press “F3” button>>Field>>find the correction file(the name is 110×110.cor) in the USB disk that came with the machine.

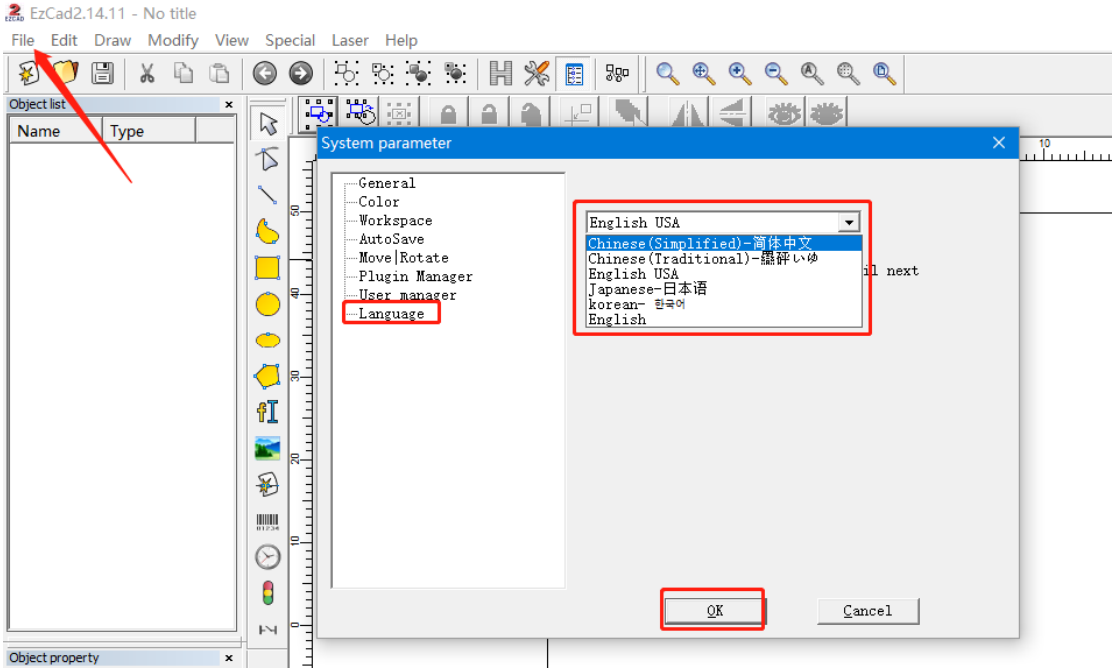


5.1.3 How to change the language of software if needed

Open the software, go File>>System Parameter>>Language, then change the language according to your need.

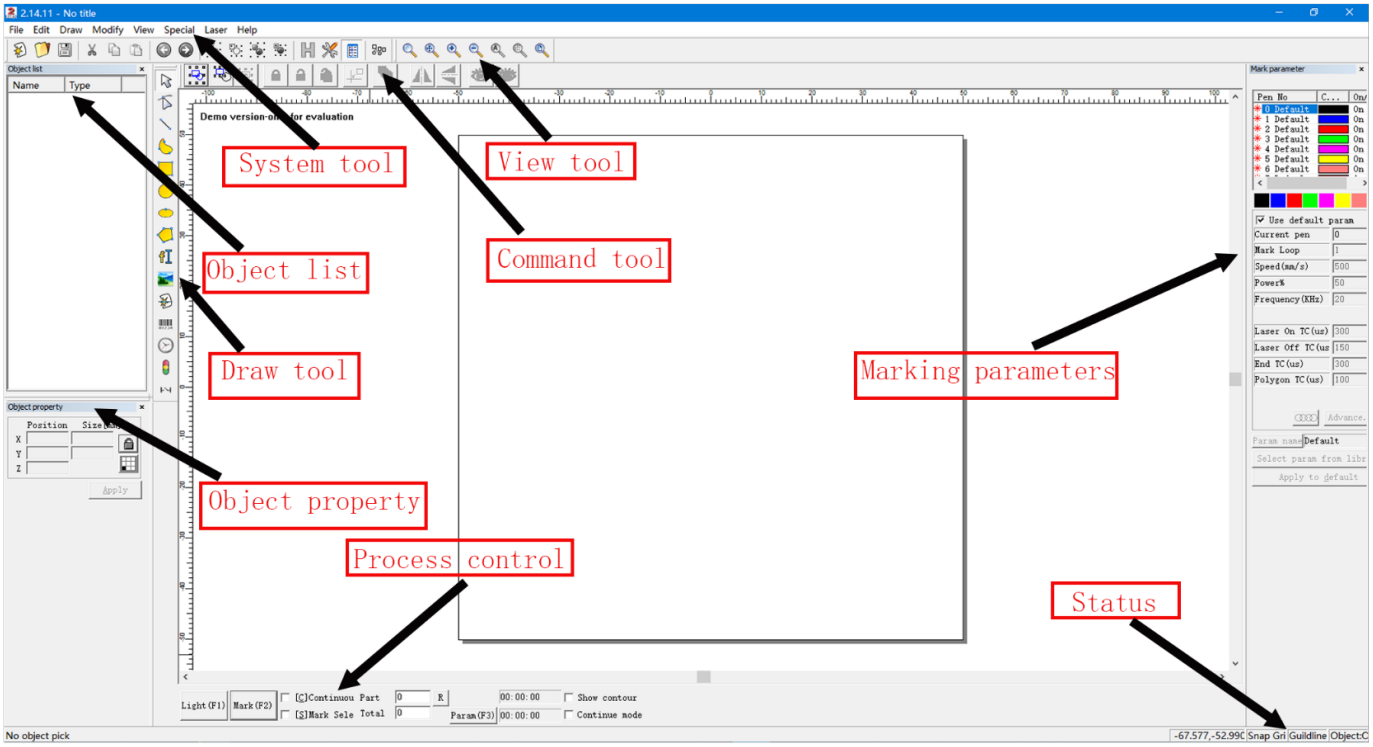
Note: 1. this software only supports 4 languages, English, Chinese, Japanese and Korean.

2. you need to restart the software after you changing language.



5.2 View menu

- **Main interface view**

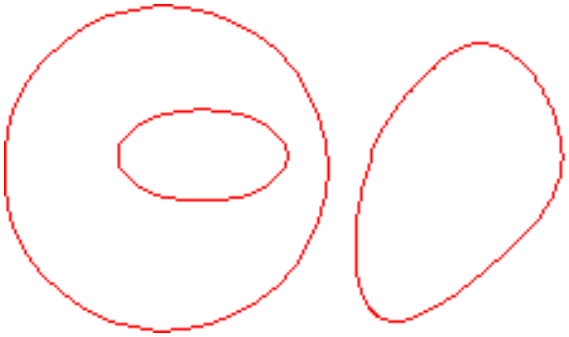


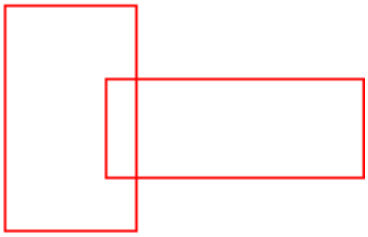
- **Main function introduction**

1. Hatch function

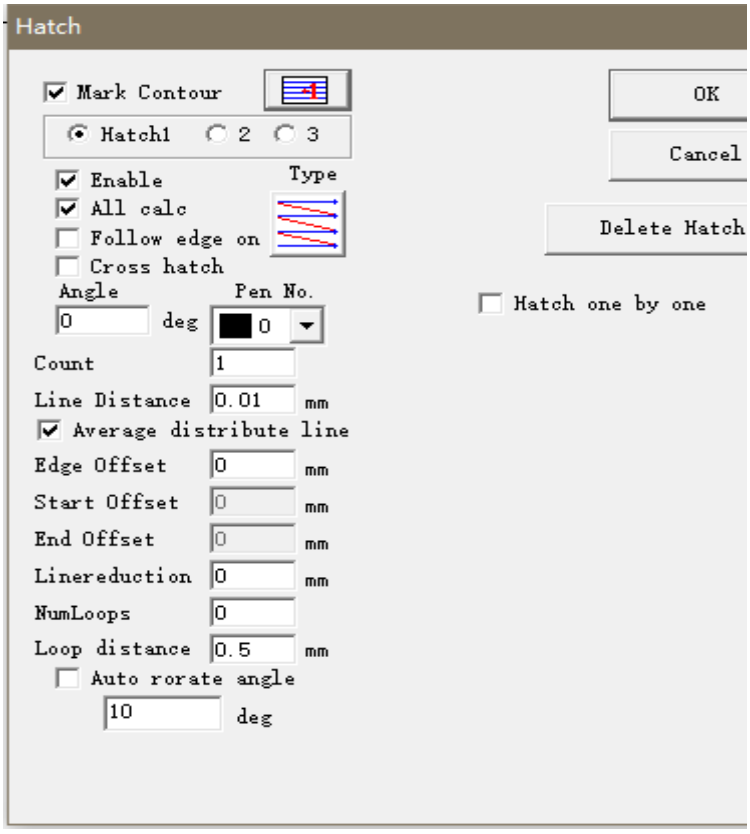
The  —Hatch is used to force EzCad2 to calculate the hatch fills for the current objects. The object to be filled must be closed curve, and if you choose many objects to fill, these figures can be objects nested mutually. Any two objects may not have intersect ant parts

(Objects on the left can be filled; The two rectangles on the right may get unexpected result for they intersect each other.)





 The icon of Hatch in Toolbar is and when selected a hatch dialog box will appear.



Mark Contour: whether to show and mark the current object's contour or not  means when click _Mark Contour', mark hatch line first then mark contour  means when click _Mark Contour', mark contour first then mark hatch line

Hatch 1 / Hatch 2 / Hatch 3: Users may have three independent hatch parameters to hatch the same object at the same time. Each set of hatch parameters can be appointed a Pen No. which stands for a set of marking parameters.

Enable: whether to permit the validity of the current hatch parameter.

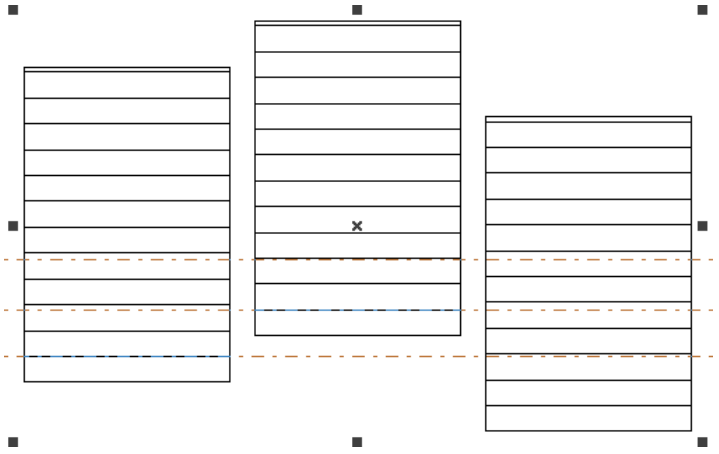
All Calc: Calculate all the selected objects as a whole. This is an optimizing option. In some cases the speed of marking may highly be raised. It will take long time to calculate large, complex objects. When not selected, the objects will be calculated separately.

For example: draw three rectangles, line distance is 1mm, angle is 0.

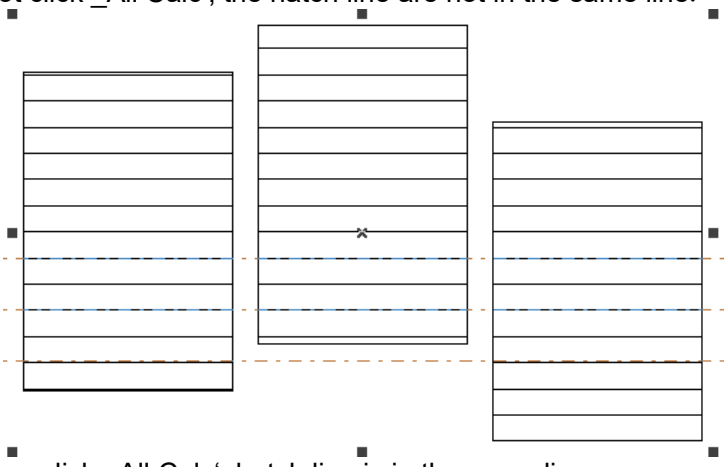
Do not click _All Calc', system will mark as the order in object list, mark hatch line in the first rectangle then mark hatch line in the second rectangle, and so on.

Click _All Calc', mark all the hatch line at one time, mark all the hatch that on the same line.

Marking result as follow:



do not click _All Calc', the hatch line are not in the same line.

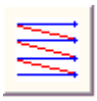


click _All Calc', hatch line is in the same line

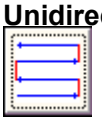
Follow edge on: Marking the edge of image.

Cross hatch: Change different angle every time when finished once hatch.

Type of Hatch: (Figure Types of hatch)



Unidirectional hatch: The hatch lines will be marked from left to right.

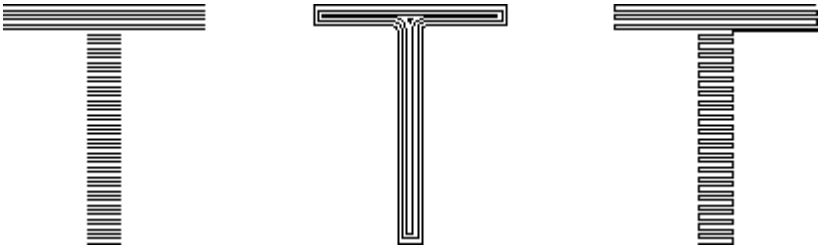


Bidirectional hatch: The hatch lines will be marked from left to right first, and then from right to left.

Ring-like hatch: fills objects from the outside to the inside like a ring.

Optimization two-way hatch: similar with bidirectional hatch, but the end of each end connects.

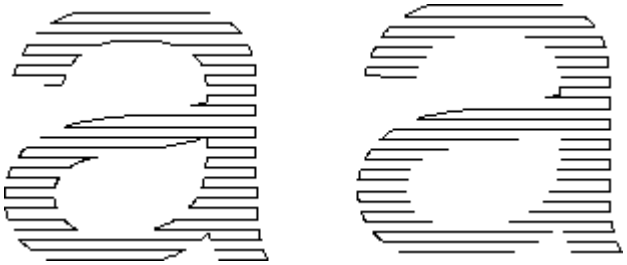
Click the button will switch between the Unidirectional, bidirectional, and ring-like hatch.



Types of hatch

(The left object is being filled by Unidirectional Hatch or Bidirectional Hatch, the middle object by Ring-like hatch, and the right one is Optimization two-way Hatch)

Optimization Gong type hatch: similar with Gong, will jump in null place.



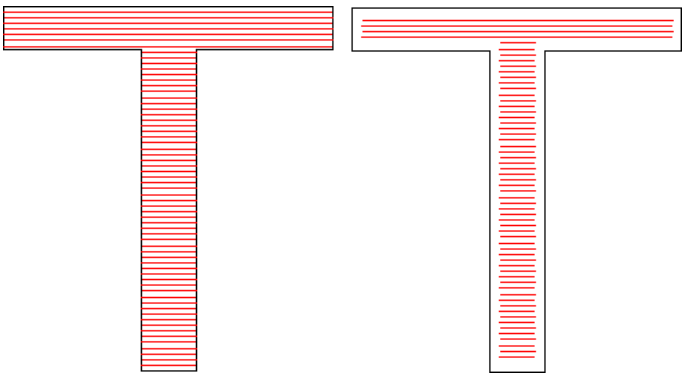
Gong type hatch Optimization Gong type hath

Above 5 types all can be changed by click the button  , choose it according to different application.

Delete Hatch: delete hatching

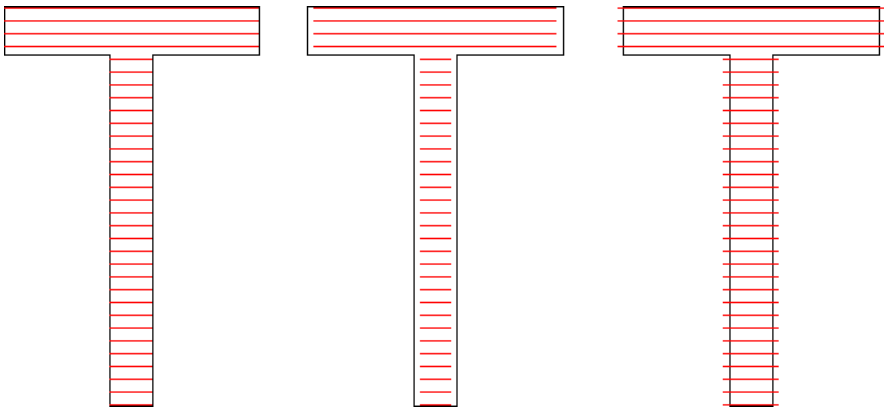
Line Space: the space between two hatch lines

Edge offset: the distance between hatch lines and the object's outline(below figure).



Board Distance

Linereduction: The hatch lines both sides reduction(below figure).

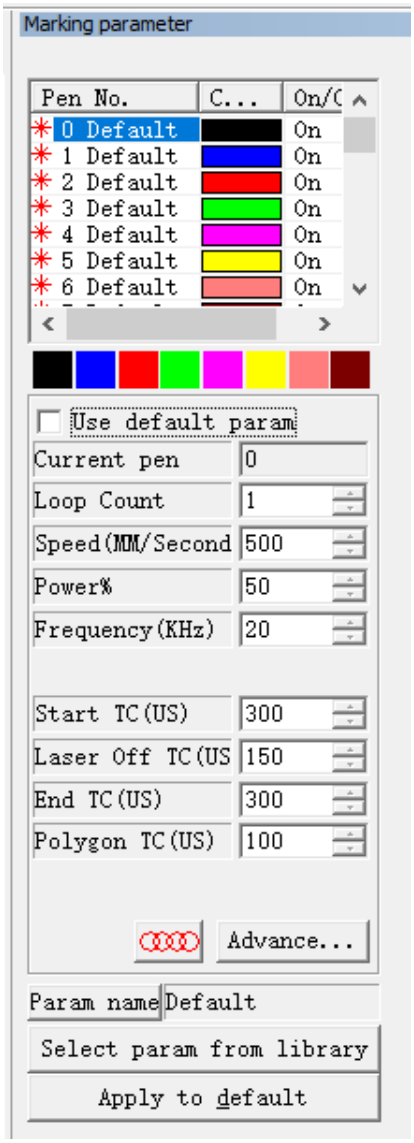


Linereduction

The left figure is the object when the Linereduction is 0,the middle figure is the object when the Linereduction is 0.5, and the right figure is the object when the Linereduction is -0.5

2. Marking parameter

At the right side of the main interface, this parameter shows some setting about Marking project, you can change parameter and project's color, e.g. Speed, Current Frequency, power, etc.



In EzCad2, every document file has 256 pens, 0 to 255 numbered, and they are located in the top of the Marking Properties Table. Each pen is corresponding to a group of marking parameter and the parameter base's name is after the color.

 : This item indicates that objects with selected pen's number will be marked. Users may customize the color by double-clicking the color sticker.

 : This item indicates that the current object has not been marked with a pen's number, and it will not be marked.

Color: the current pen's color.

Use default param: If you select it, it means the file will marking with default parameters.

Loop count: loop times to mark an object.

Speed: the current marking speed(the adjustment range is 0-2000mm/s)

Power: the current power.(the adjustment range is 1-100%)

Frequency: the laser machine's frequency in the marking parameter.(for 20&30W, the adjustment range is 30-60kHz, for 50W, the adjustment range is 50-100kHz.

Start TC: When the scan head has to execute a mark command, the scanner mirrors first have to be accelerated up to the defined marking speed. In the beginning of the movement, the laser focus moves very slowly which may result to burn-in effect at the start point. To avoid this, We insert a delay (Start TC) at the beginning of each mark command. When the laser eventually turns on, the mirrors have already reached a certain velocity. However, if this value is too large, the first part of the vector will be cut off. Also negative value is supported.

Laser Off TC: The delay time of the laser shutting down after marking finished. Proper time can wipe off the burn-in effect at the end. This value cannot be negative.

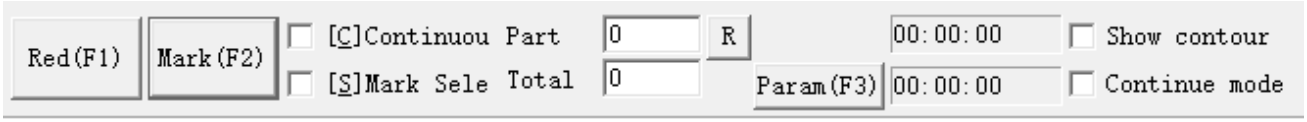
End TC: The End TC parameter is used to control how long the software will wait at the end of a series of vectors. The wait is required because the software is always "ahead" of the hardware and must wait for the hardware to catch up. This delay applies to the end of all vectors in which the laser is to be turned off after execution.

Polygon TC: the Polygon TC parameter is used to control how long the software will wait at vector connection points. The wait is required due to the lag time between the software/DAC position and the actual hardware/mirror position. This timer applies to all vectors whose endpoint is also the start point of the next vector (polygon connection points). In other words, this timer applies to end of all vectors in a series of connected vectors, except for the last one (the end of last one is controlled by the **End TC** parameter). The three connected points in a square or the intermediate connection points in a polyline circle are examples of points the **Polygon TC** parameter can effect. The starting point of the square is controlled by **Start TC** parameter. The last corner of the square is controlled with the **End TC** timer.

More details please view the software manuals. You can download it from our website.
https://www.thunderlaser.com/laser-download

3. Mark Control Bar

The Mark-Control Bar is located at the bottom of the main interface window, as Figure Mark-Control Bar shows.



Mark-Control Bar

Red: This item is used to mark the frame of the object without laser output so that users are convenient to orient the workpiece. This function is available in those laser machines which have guide light.

Key –F1‖ is the shortcut key of this function for guide light show.

Mark: Start marking

Key –F2‖ is the shortcut key of this function.

Continuous: mark the objects recently until user stop the mark.

Mark Selected: only those selected objects would be marked.

Part: the total counts that the mark command has been executed.

Total: The total counts that the mark command should be executed. The value would decrease 1 automatically after the mark command has been executed each time. It is unavailable under the mode of Continuous Marking. When in marking process, if the amount number is more than 1, the marking operation will not stop until the marking number is 0.

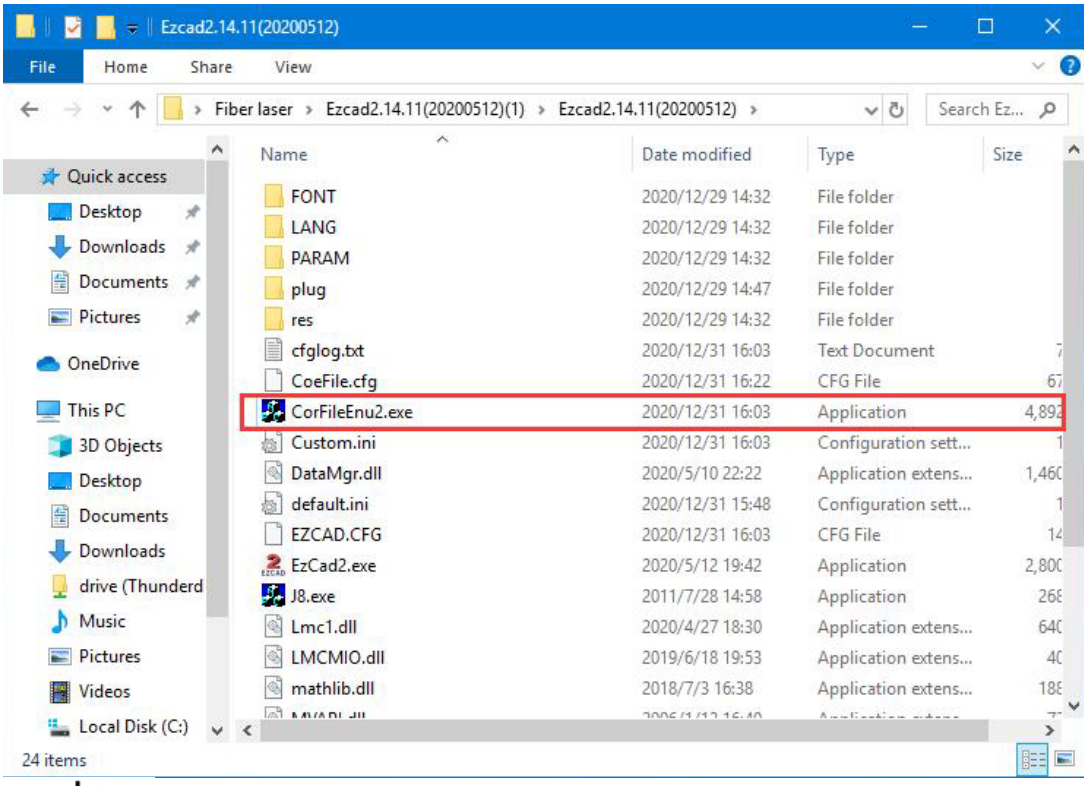
Parameter: machine parameter.

Key –F3‖ is the shortcut key of this function.

5.3 Correction procedure

How to correction by yourself if needed.

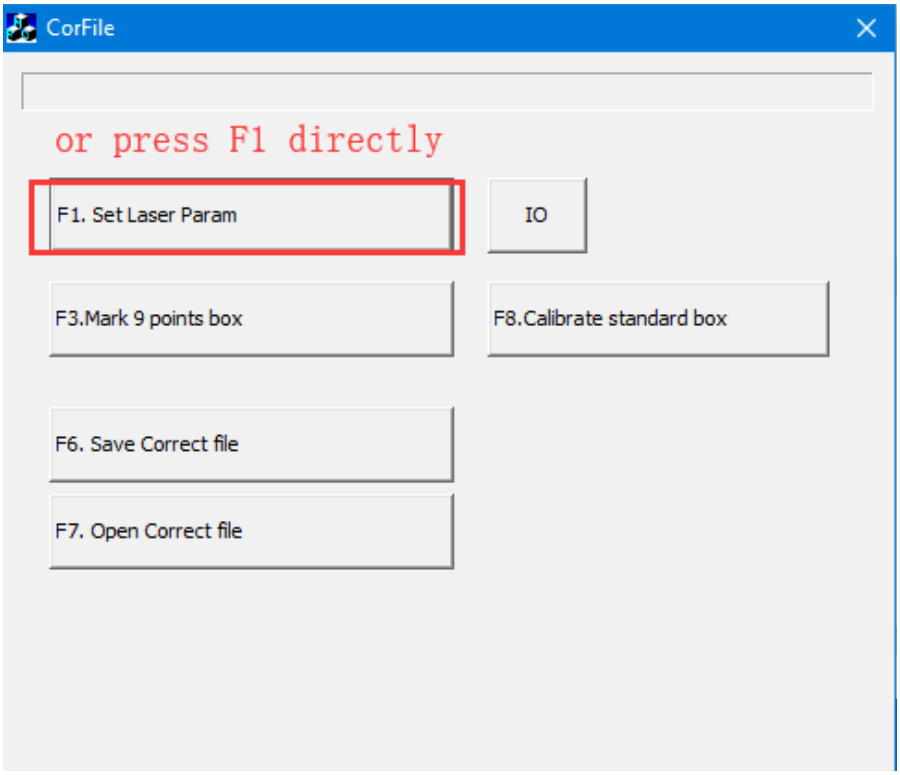
(1) Connect the fiber laser and computer, and find the correction software CorFileEnu2.exe. Users simply need to copy EzCad2 folder that is in the Install FOLDER to hard disk, and then double click the Ezcad2.exe under the EzCad2's directory to run the software.



1.The correction software is in the software folder.

2. The paper used for calibration is special, it is recommended to buy some as a spare when purchasing the machine

(2) Open the correction software "CorFileEnu2.exe". And select "F1.Set Laser Para" or press "F1" button of your keyboard.

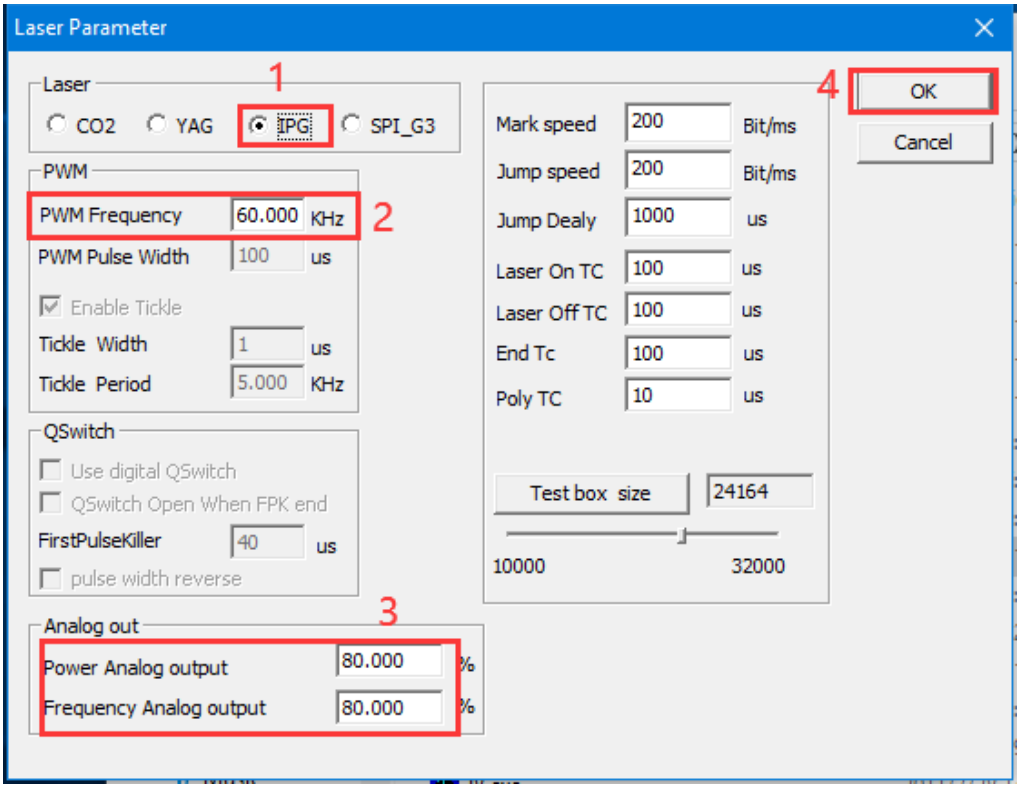


(3) Set the Laser and PWM according to below picture.

Laser: IPG

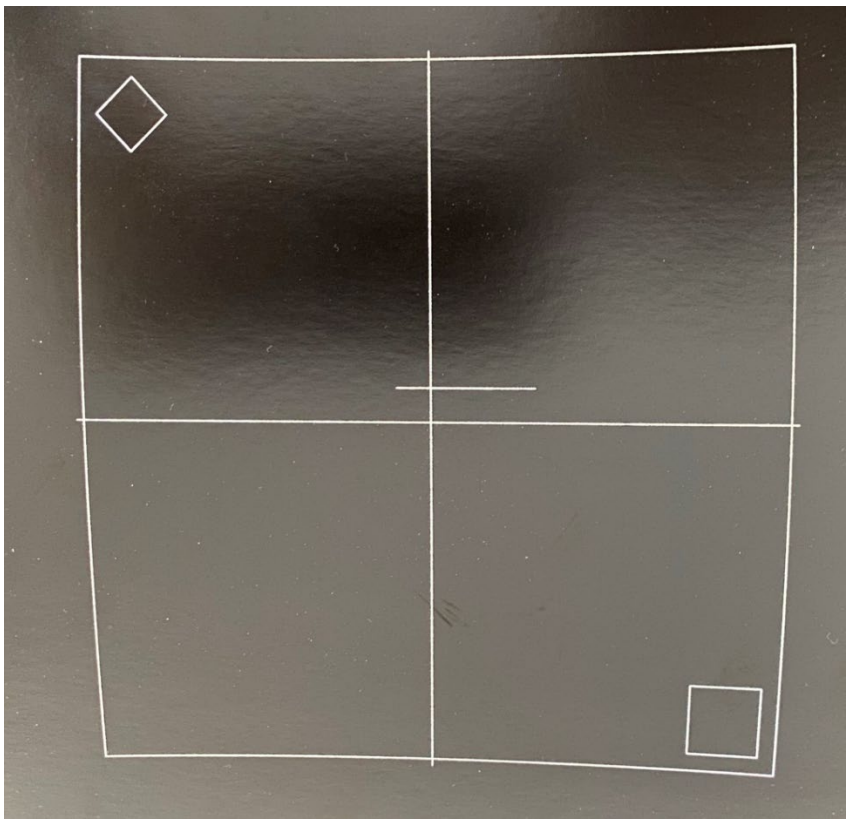
PWM Frequency:60KHz

Power Analog output and Frequency Analog output: 80%. You can adjust it according to your needed.

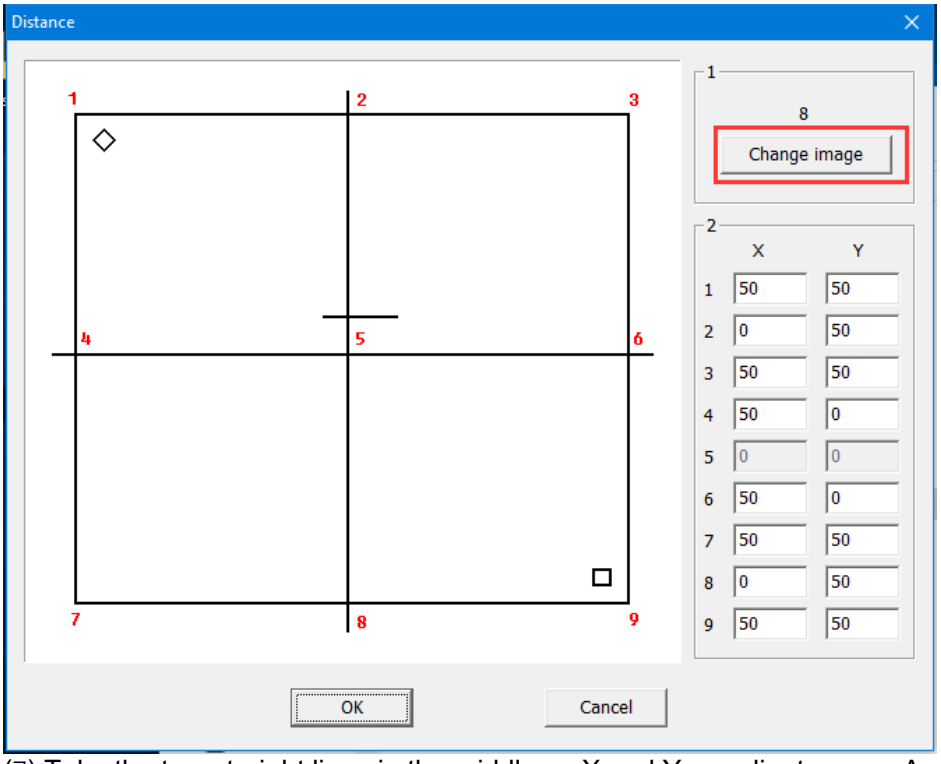


(4) Put a piece of black paper jam/Coated printing paper on the work area, please make sure it's flat.

(5) Select ”F3.Mark 9 points box” or press”F3” button of your keyboard. Then you can see the marking result.

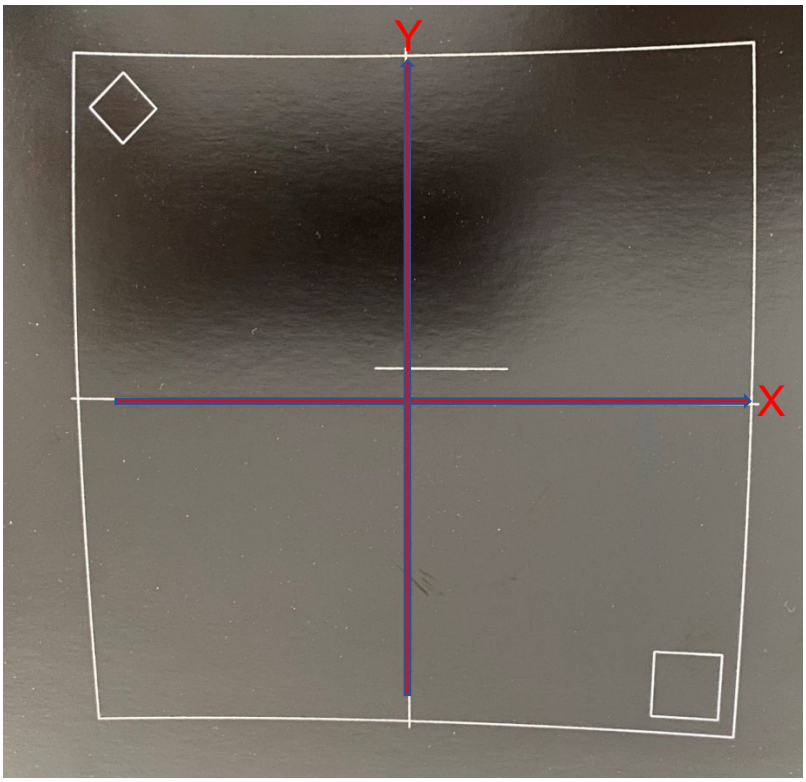


(6) If the image that marked is different from the software, please press “Change image” to choose the same image.



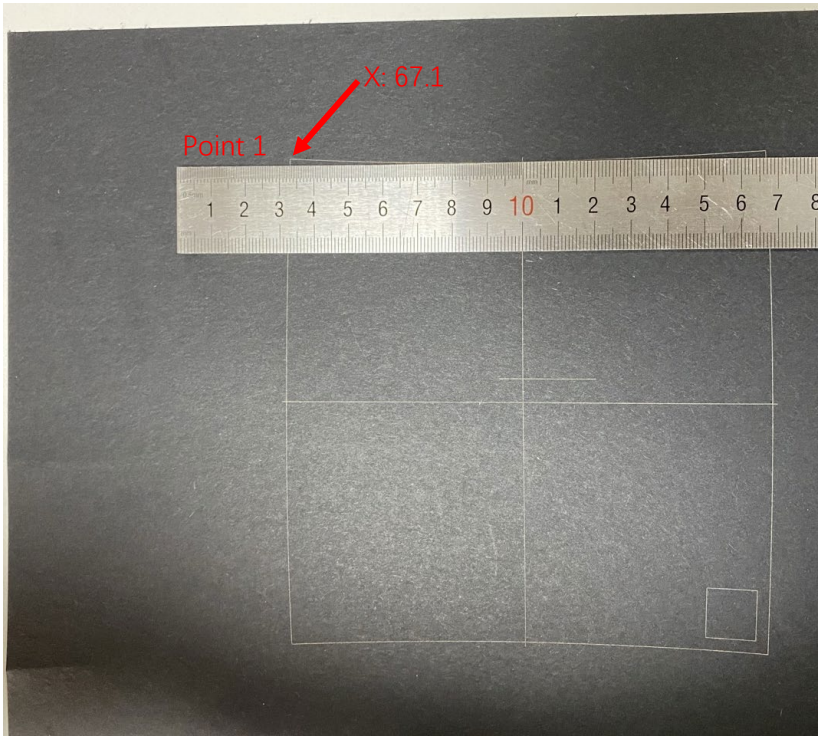
(7) Take the two straight lines in the middle as X and Y coordinate axes. And measure the coordinates of

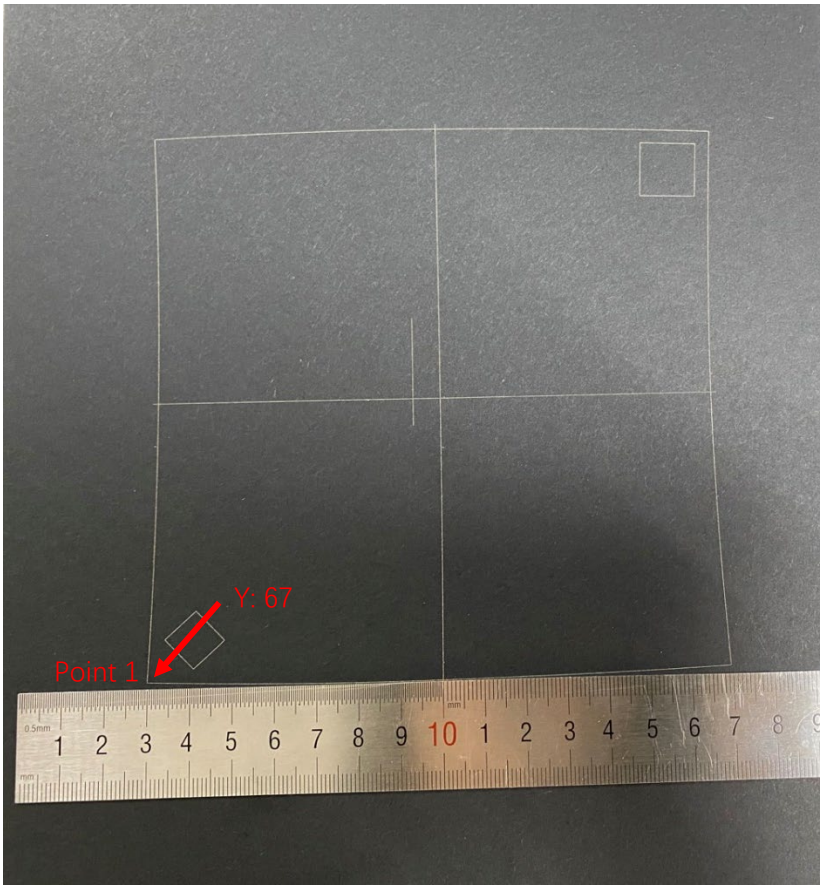
point 1,2,3,4,6,7,8,9. Centered on point 5(0,0). Use a ruler to measure the coordinates of each point on the black photo paper, and take the absolute value (accurate to the decimal point)



For example:

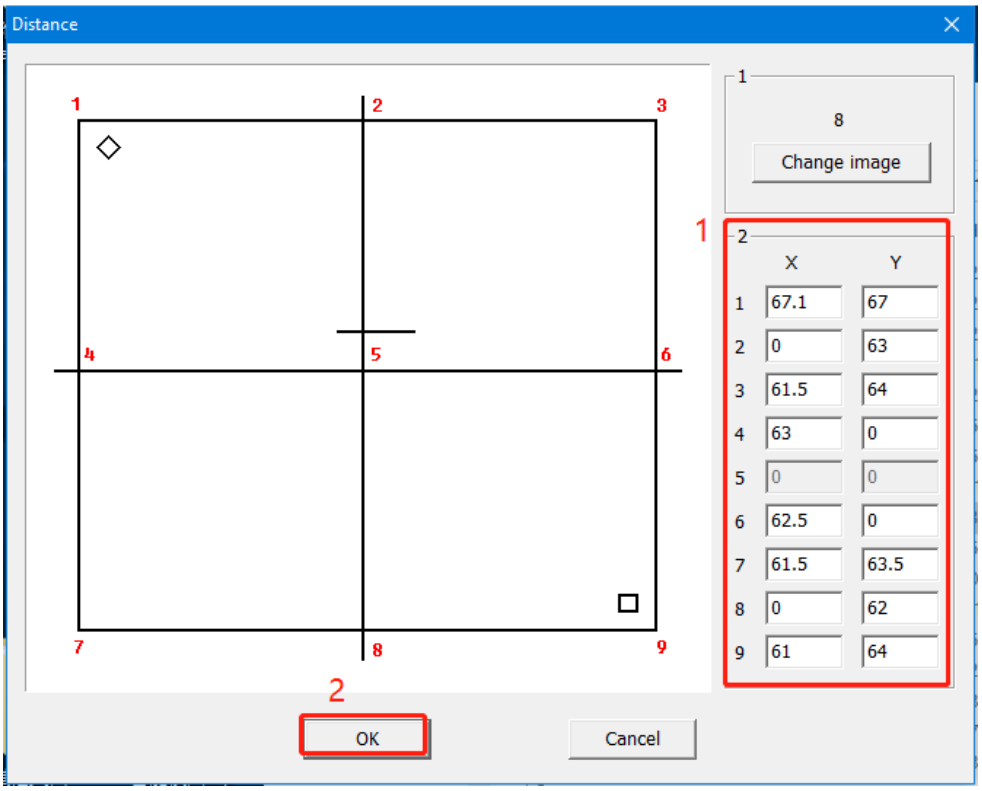
The coordinate of point 1 is(67.1,67). Measure other points in the same way.



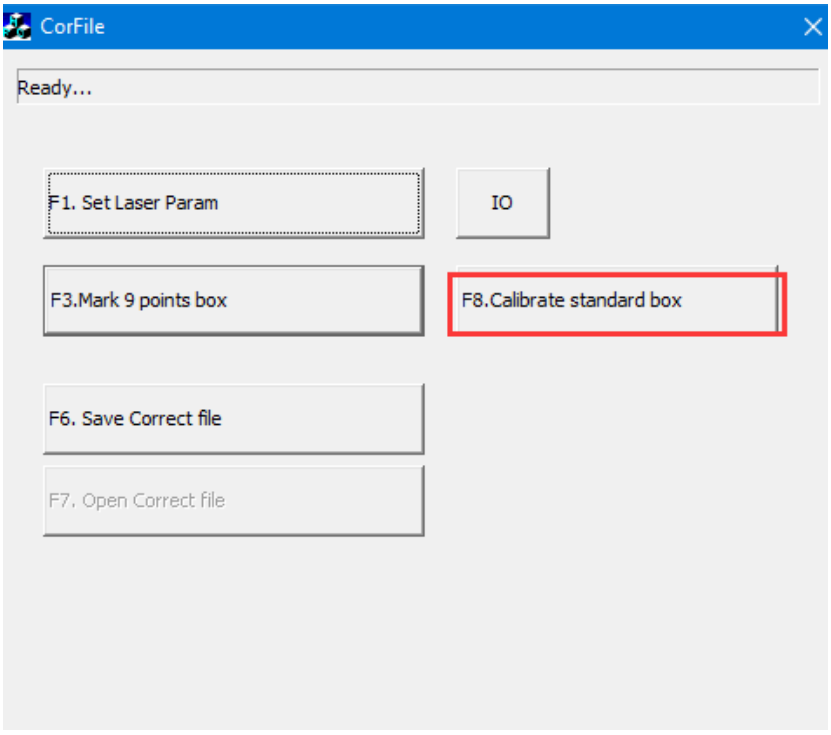


Note: In order to avoid excessive Y-axis coordinate error during measurement, please rotate the photo paper and measure the Y-axis coordinate of point 1 in the horizontal direction.

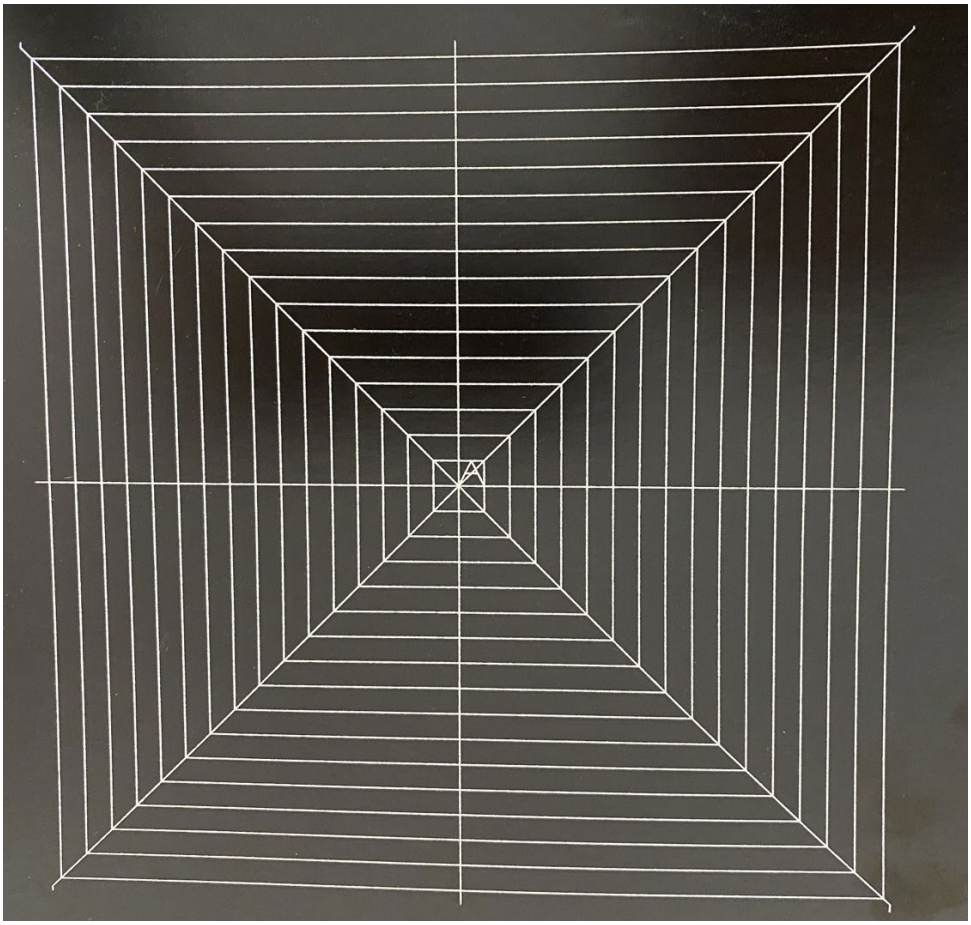
(8) Fill in the corresponding coordinate column of the dialog box. After finishing, click "OK" to return to the previous interface. And put a new black paper jam/Coated printing paper on the work area. Then input them in software and press “OK”.



(9) Then press F8. Calibrate standard box, and the fiber laser will mark.



After each marking, the following dialog box will appear.



① You can see here is a “A” inside these squares (the direction of top of A is point 1 2 3).

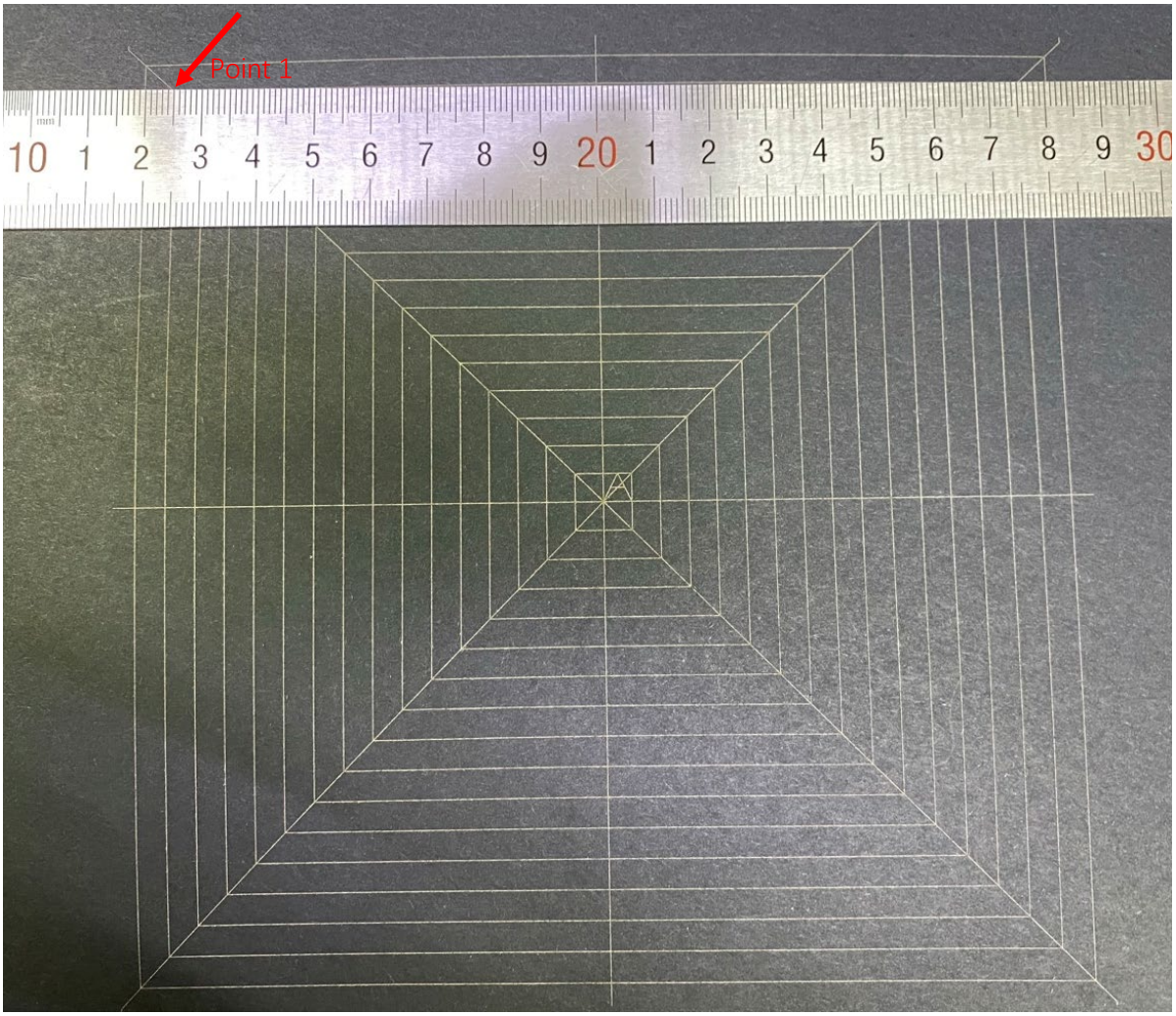
② And the distance between every square is about 5mm（tolerance range is 0.03mm）.If the size and distance all are correct, no need to re-correction.

③ Measure the actual size of the second square outside, and record it.

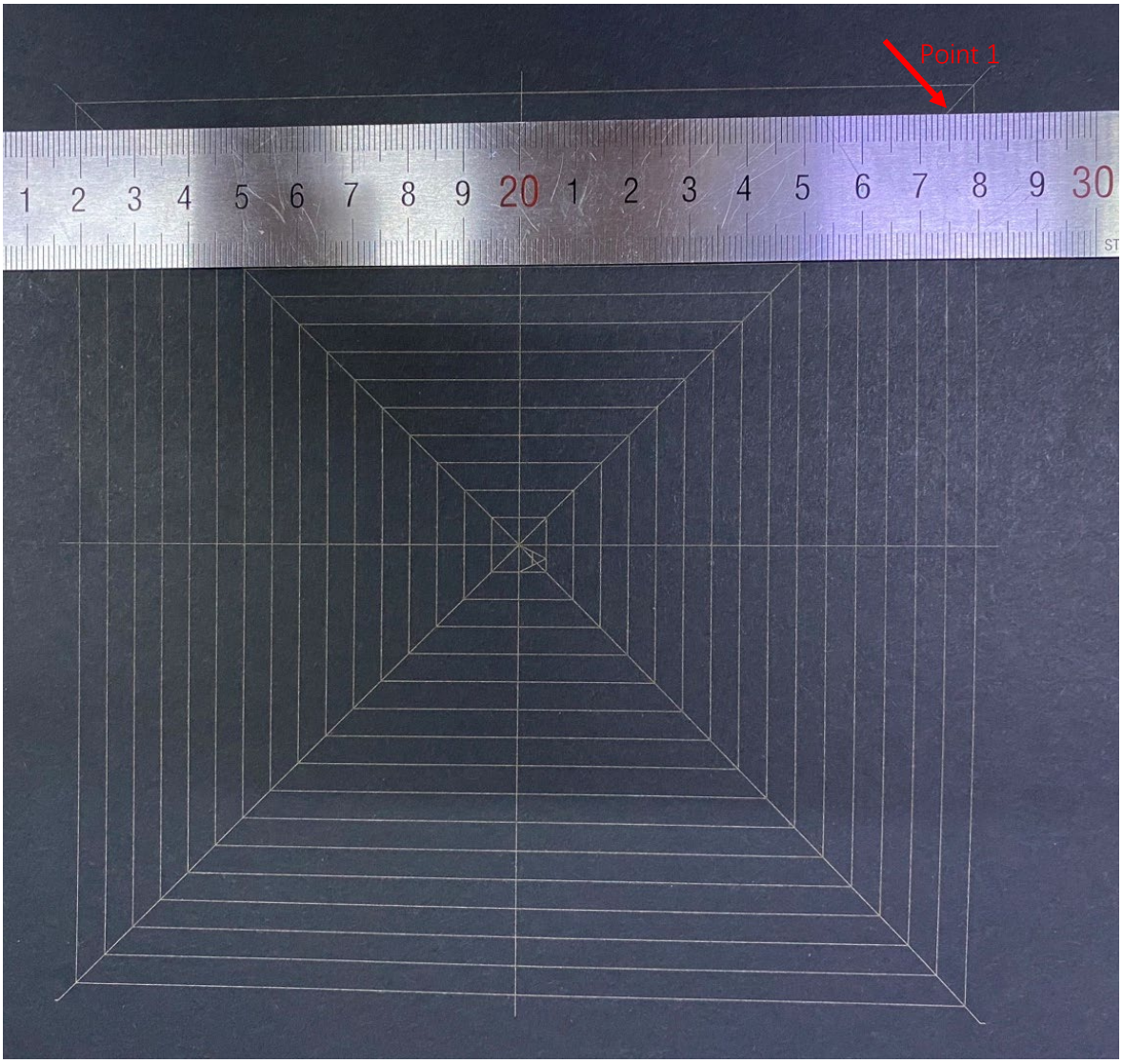
F-110, measure the third square outside(from outside to inside), the size should be 110*110mm.

F-150, measure the second square outside(from outside to inside), the size should be 150*150mm.

F-200, measure the fourth square outside(form outside to inside), the size should be 200*200mm



Pic1



Pic2

The distance on both sides of the square should be 75mm.

For this case, the distance of the X axis of Point 1 is 75.05mm, it means the X coordinate value of Point 1 needs to be increased.

For this case, the distance of the Y axis of Point 1 is 74.5mm, it means the Y coordinate value of Point 1 needs to be reduced.

Now we can modify the coordinates of Point 1, the coordinate of Point 1 is (67.1, 67),

We can reset the coordinate of Point 1 as (67.3, 66).

Note:

If the distance of X or Y axis of some point is 75mm, it means the X or Y axis of this point no need to adjust.

The larger the error value, the larger the value you need to increase on the original basis.

The smaller the error value, the smaller the original value needs to be increased.

For example:

If the distance of Y axis of Point 1 is 77mm, it means the Y coordinate of Point 1, you can set it to 68.

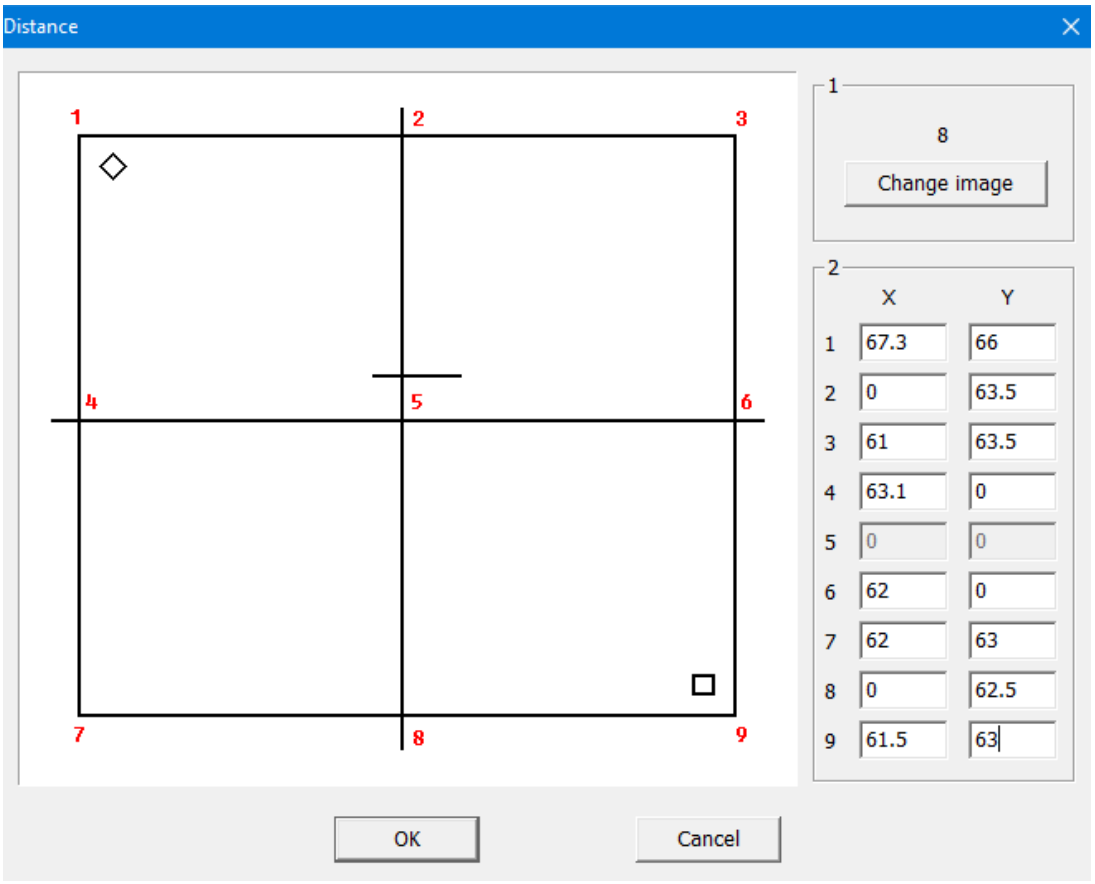
If the distance of Y axis of Point 1 is 73mm, you can try to set the Y coordinate of Point 1 to 66.

④ Measure the nine points of this square, and record all distance of them (including Y and X axes).

⑤ After that, then please put a black paper on the work table, then press F3.

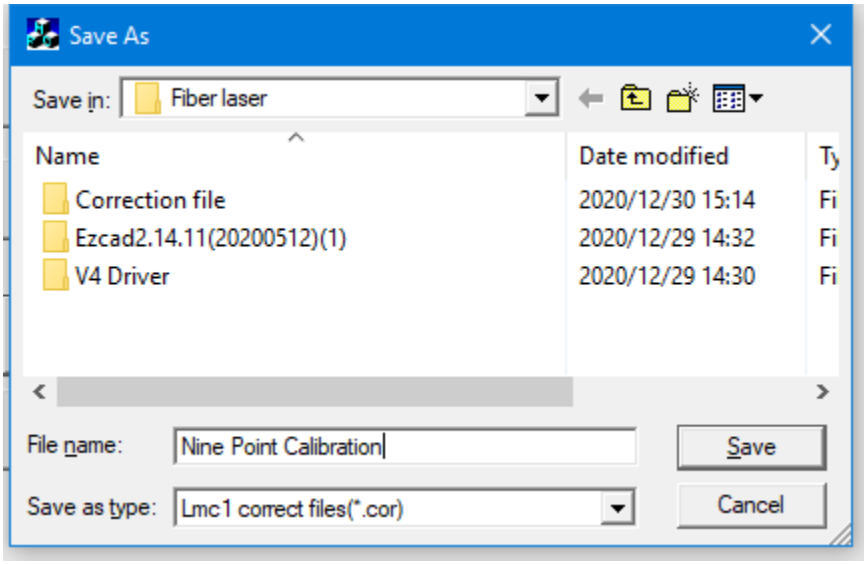
Note: the fiber laser will mark the image again, no need to measure the image again.

⑥ Then modify the coordinates according to the distance that you recorded in above steps.



⑦ Then press “OK” and press F8, the fiber laser will mark the Calibrate standard box again. And repeat the steps ③to⑦. If the size of square and distance between the squares are correct, you can go next step.

(10) After the size is corrected successful, you need to save the correction file. Press “F6 Save correct file”. The following dialog box appears, please specify a file for the file name, otherwise it will be unsuccessful to save, such as "Nine Point Calibration". Be sure to remember the file directory location.



（11） Then open the EzCad2 software and input the correction file you saved.

Note: How to import the correct file, please refer to **Chapter 5.1.2, part 2.**

5.4 Different Field Lens-How to set&adjust the focus length of Auto-focus

Aurora series marking machines can be equipped with 3 field lenses (F-110, F-150, F-200), and the focal lengths of different field lenses are different. After changing the field lens, the user needs to adjust the focus of autofocus again.

How to set the focus length of Auto-focus:

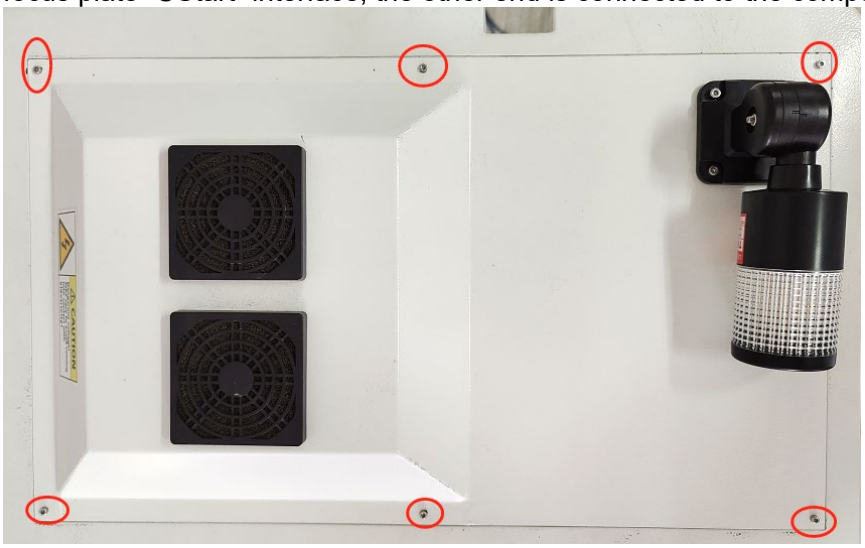
(1) First time use the auto-focusing system, connect the wire of the control board, then connect to the computer.

How to connect the USB cable of Auto-focus board:

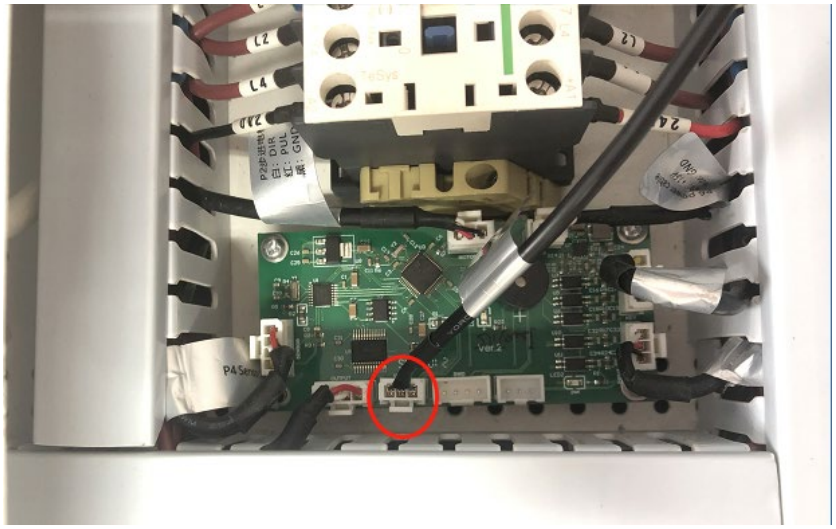
Find the USB cable of Auto-focus board that came with the Fiber machine.

Loosen the 6 fixing screws of the top cover of the fixed marking machine (please keep the screws), move

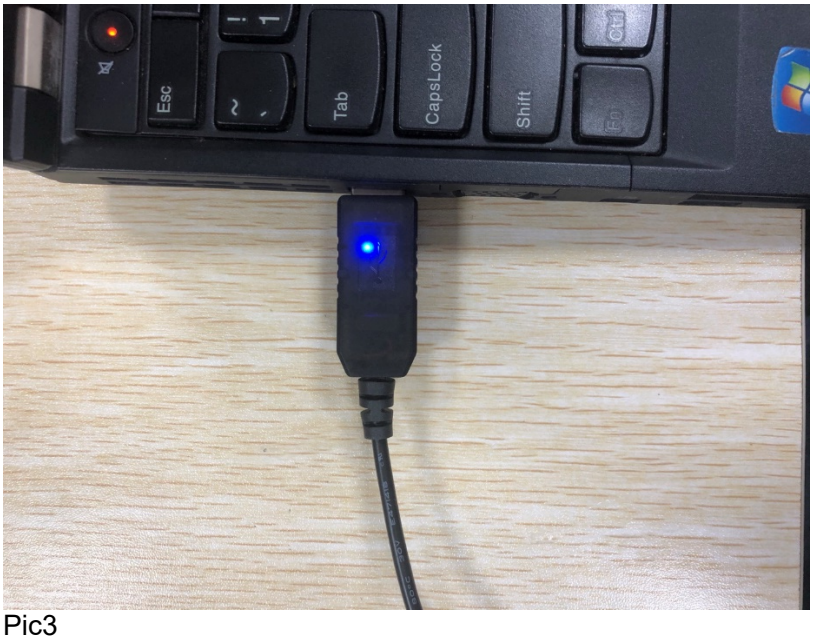
the top cover to the right, move it to see the auto focus plate, and connect the USB cable to the auto focus plate “UStart” interface, the other end is connected to the computer end.



Pic1



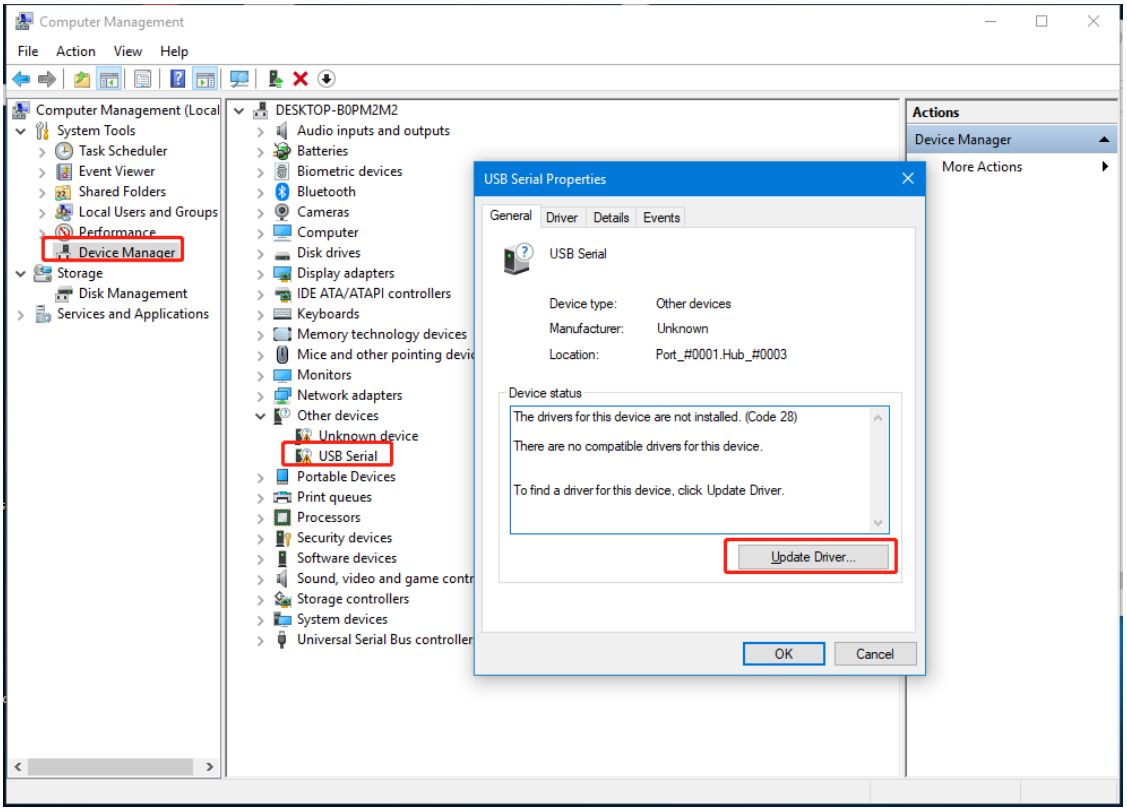
Pic2



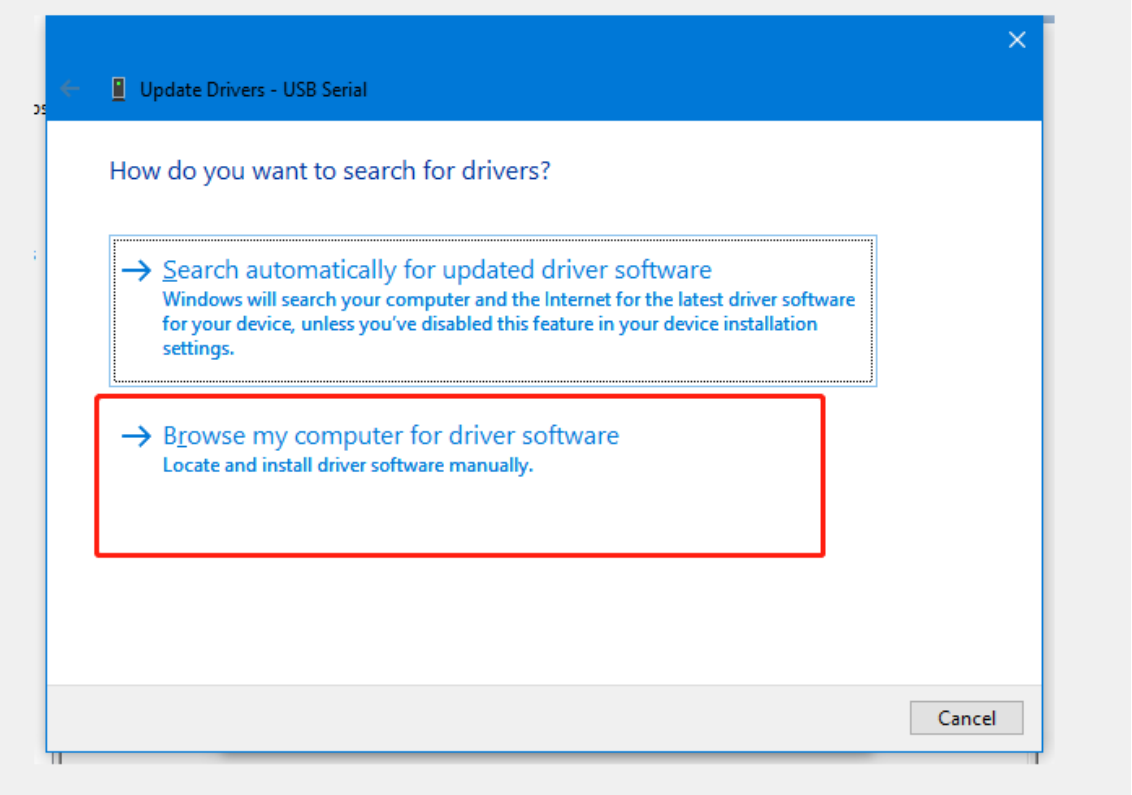
Pic3

(2) Install USB driver: Right click “computer>>Management>>device manager>>Other devices>>USB Serial>>Update Driver>>Browse my computer to driver software>>Find the Driver folder that came with the machine CD340G-USB-Drive>>Next>>Install successfully.
Find the corresponding COM of the USB, and remember it.

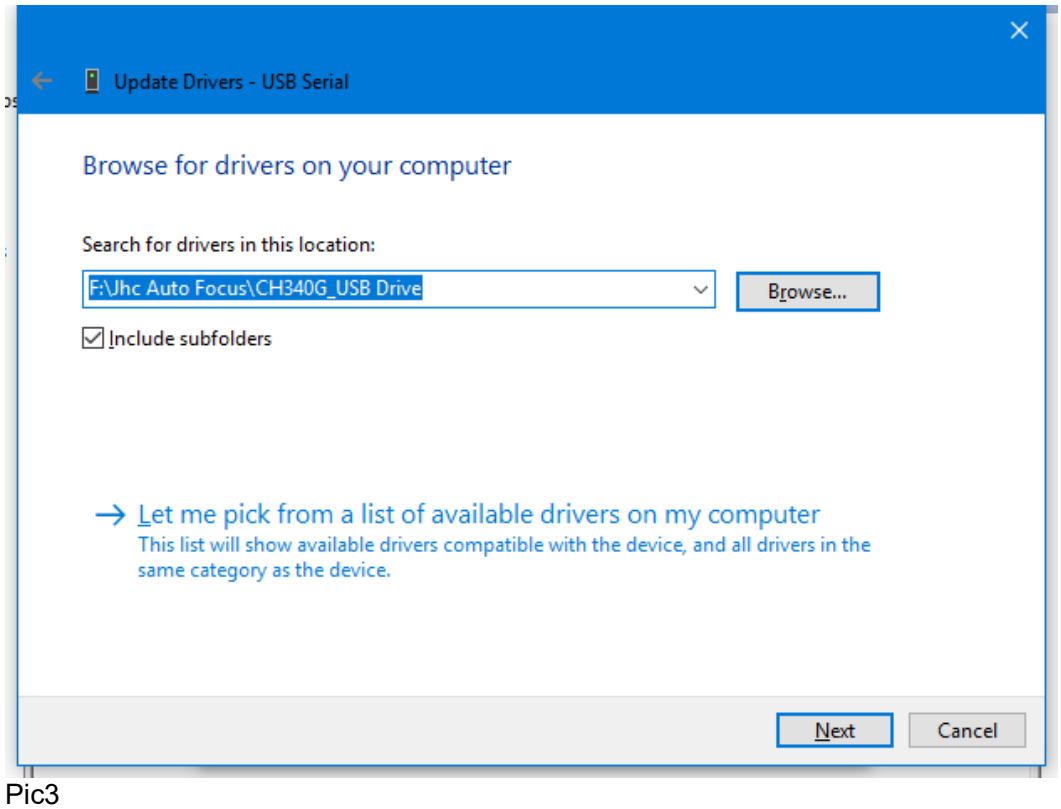
The auto-focus software driver folder in the U-disk that came with the Fiber machine.



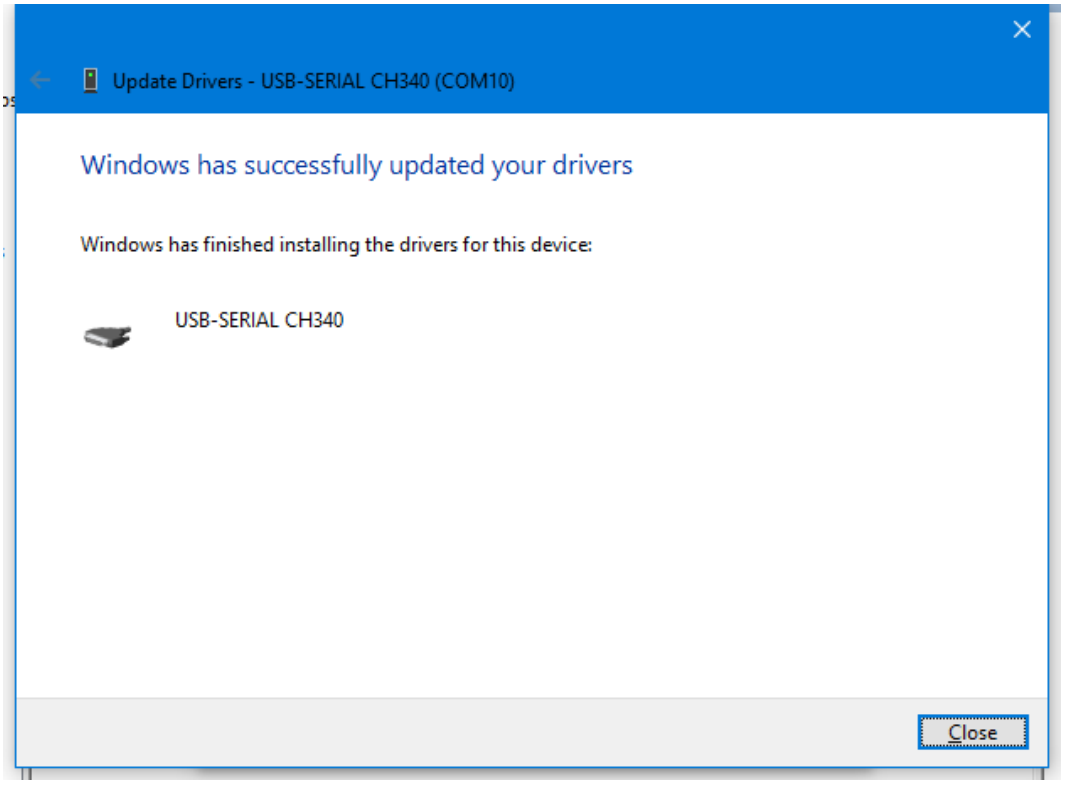
Pic1


Update Drivers - USB Serial
How do you want to search for drivers?
Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.
Browse my computer for driver software
Locate and install driver software manually.
Cancel

Pic2


Update Drivers - USB Serial
Browse for drivers on your computer
Search for drivers in this location:
F:\Jhc Auto Focus\CH340G_USB Drive
Browse...
Include subfolders
Let me pick from a list of available drivers on my computer
This list will show available drivers compatible with the device, and all drivers in the same category as the device.
Next
Cancel

Pic3

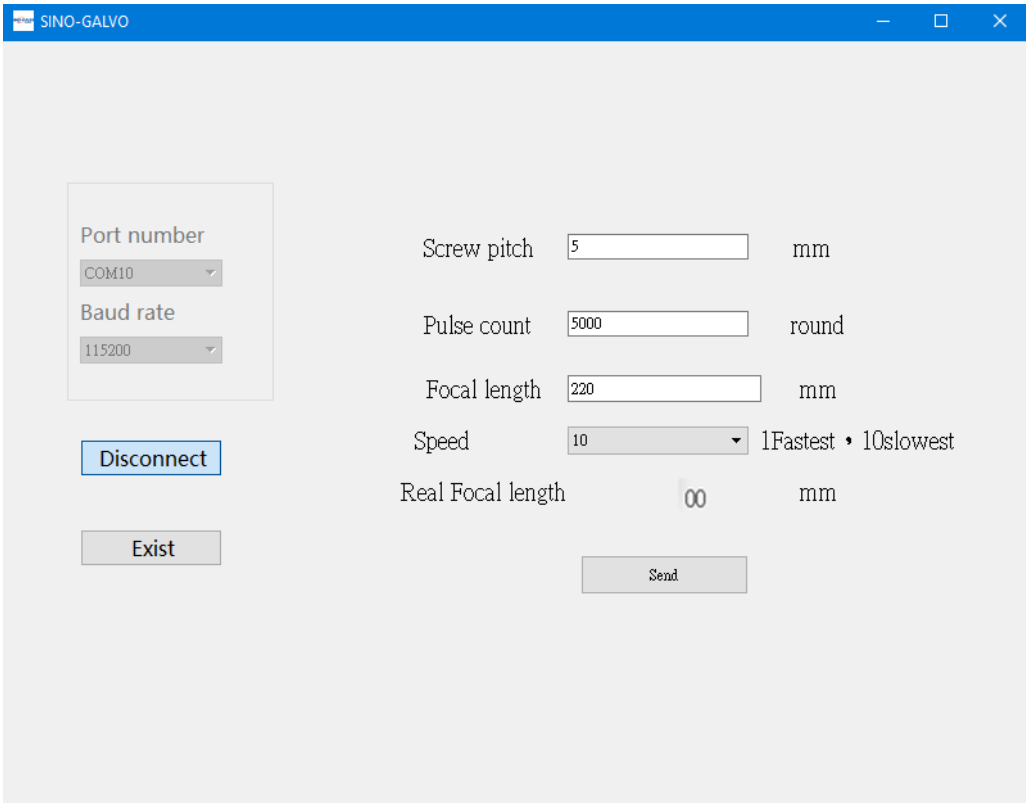


Pic4

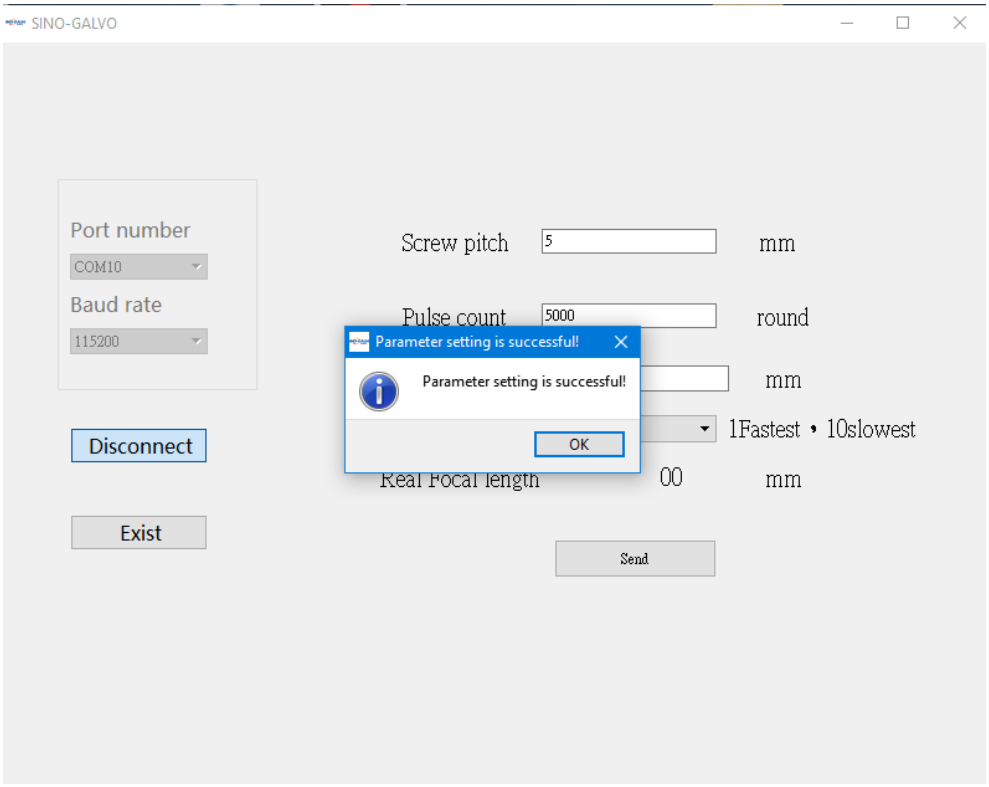
（3） Choose correct COM port and click connect, then set the screw pitch as 5, Pulse count as 5000. Speed as 1(divided into 10 gears, 1 fastest, 10 slowest, 1-10 decreasing speed), then click Send, successfully set window will be showed. And enter the focal length according to the recommended form.

Focal Length for different lens(for reference only)

	F-110	F-150	F-200
20 WATT	P:30%, S:100mm/s	P:50%, S:100mm/s	P:70%, S:100mm/s
Focus length range	213.5—215mm	263—265.5mm	399—401mm
30 WATT	P:20%, S:100mm/s	P:30%, S:100mm/s	P:50%, S:100mm/s
Focus length range	211.5—213mm	261—263mm	393.5—396.5mm
50 WATT	P:25%, S:100mm/s	P:30%, S:100mm/s	P:50%, S:100mm/s
Focus length range	213—214.5mm	264—265.5mm	399-401.5mm
PS: P means power, S means speed.			



Pic1



Pic2

How to adjust the focus length:

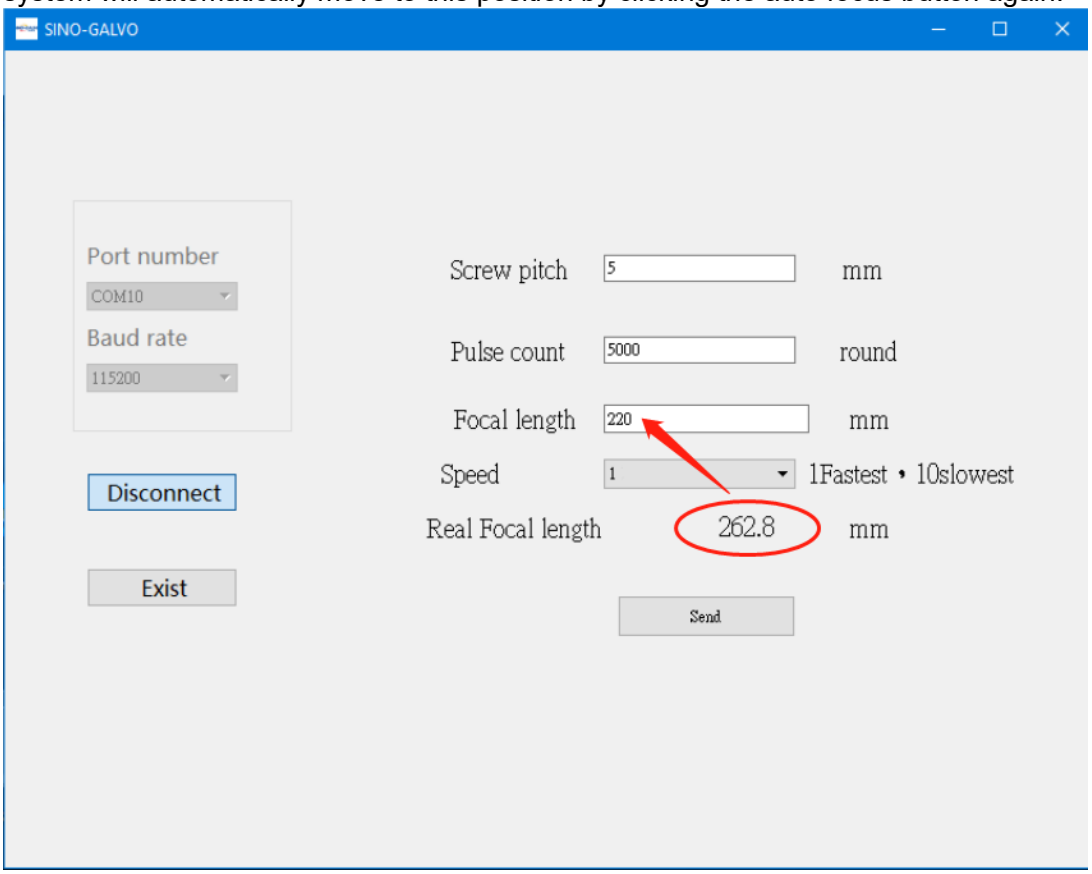
(1) Install the USB driver first, and set the Screw pitch, Pulse count and Speed according to the steps in **How to set the focus length**.

(2) Open the marking software, place a piece of metal material on the work platform, draw a 10*10mm

square in the software, set the marking parameters, it is recommended to set the speed at 100mm/s and the power at 30%. Low-speed marking makes it easier to observe changes in focal length. Click on the red light, align the material, and click on the mark. During the marking process, press the up or down button of the marking machine to observe the beam. When the beam is brightest, it is the best focus. At the same time, it can be observed that the actual focal length column in the auto-focus adjustment software is constantly changing, and the actual focal length when the beam is at its brightest is recorded. How to use the Fiber laser, you can refer to **Chapter 6.**
And below form is for reference. You can enter them in auto-focus software or adjust based on them.

	F-110	F-150	F-200
20 WATT	P:30%, S:100mm/s	P:50%, S:100mm/s	P:70%, S:100mm/s
Focus length range	213.5—215mm	263—265.5mm	399—401mm
30 WATT	P:20%, S:100mm/s	P:30%, S:100mm/s	P:50%, S:100mm/s
Focus length range	211.5—213mm	261—263mm	393.5—396.5mm
50 WATT	P:25%, S:100mm/s	P:30%, S:100mm/s	P:50%, S:100mm/s
Focus length range	213—214.5mm	264—265.5mm	399-401.5mm
PS: P means power, S means speed.			

（5）Enter the recorded real focal length value into the set focal length input box, click "send" again, the software will return to the successful setting, the parameters will be stored by the software, and the system will automatically move to this position by clicking the auto focus button again.



Chapter 6 The First Time Running the Fiber Laser

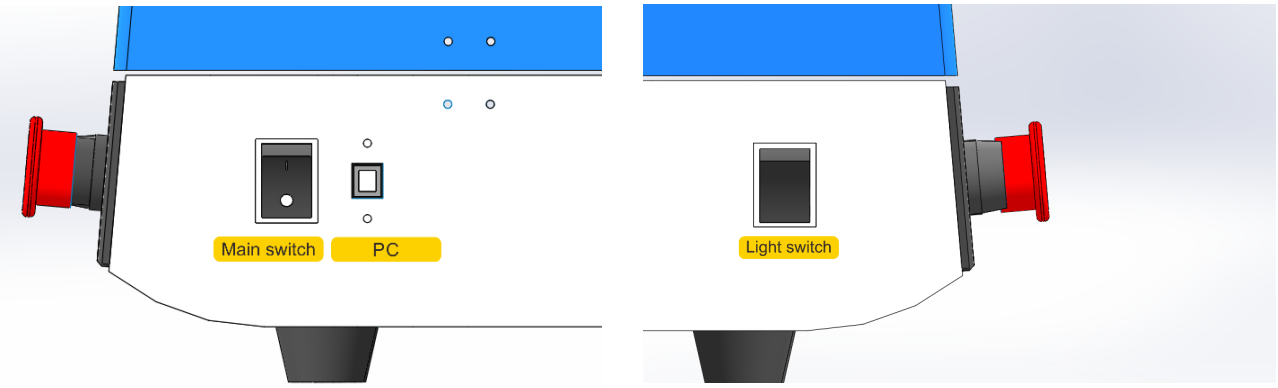
To be safe, never ever run the laser system unattended.

According to international standard，“O”means close；“I”means open for the rocker switch below.

Yours first marking test(take Aurora 20W, Field Lens F-110 as example)

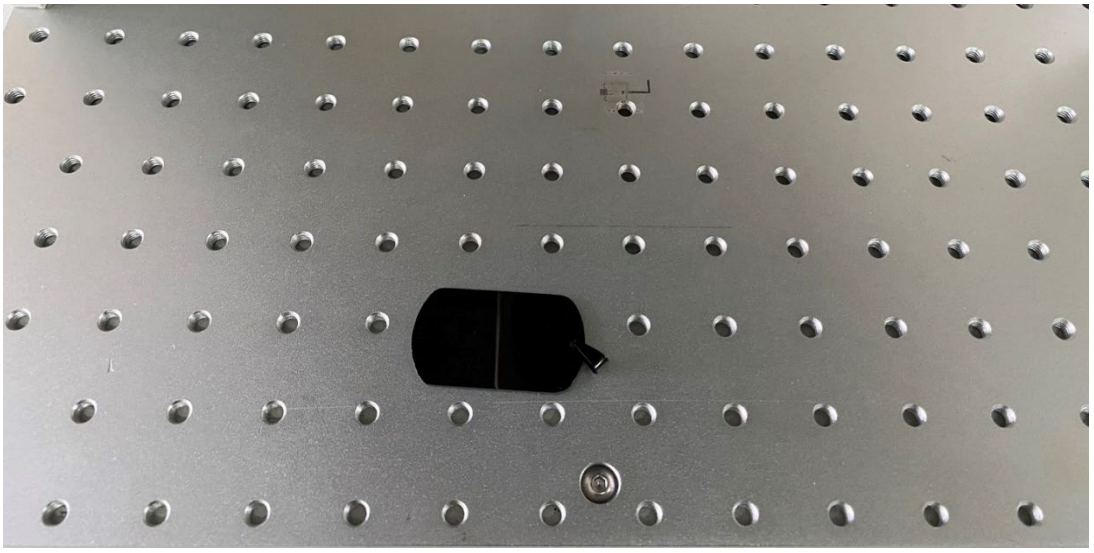
The following steps describe how to successfully engrave a first pattern. Please follow the individual steps:

1. First confirm the exhaust fan, computer and all mains are connected.
2. Turn on the “Main” switch and “Light” switch.



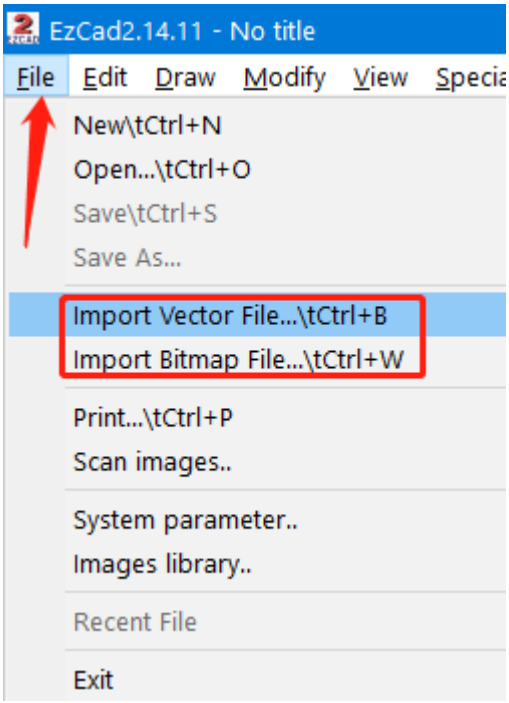
Main switch on the right side of the Fiber laser, Light switch one the left side of the fiber laser.

3.Place the material on the work table(the marking area of F-110 is 110*110mm, F-150 is 150*150).



4. Open the software EzCad2, then install driver and import the Correction file according to **Chapter 5.1.1.**

5. Import your file to EzCad2



This software supports these file types.

Vector Files

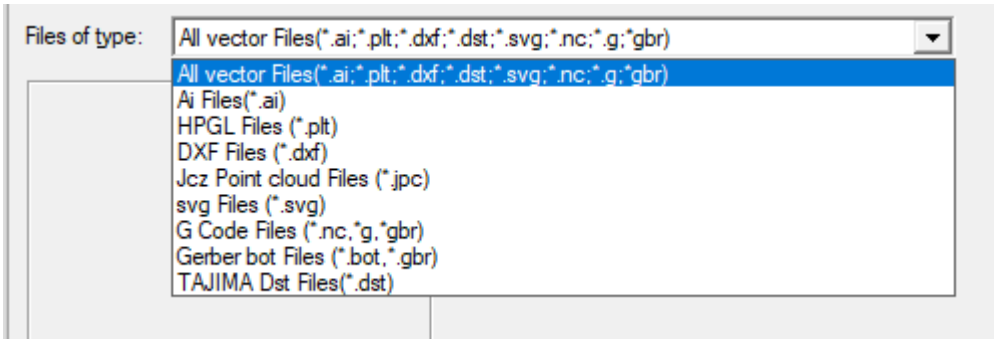
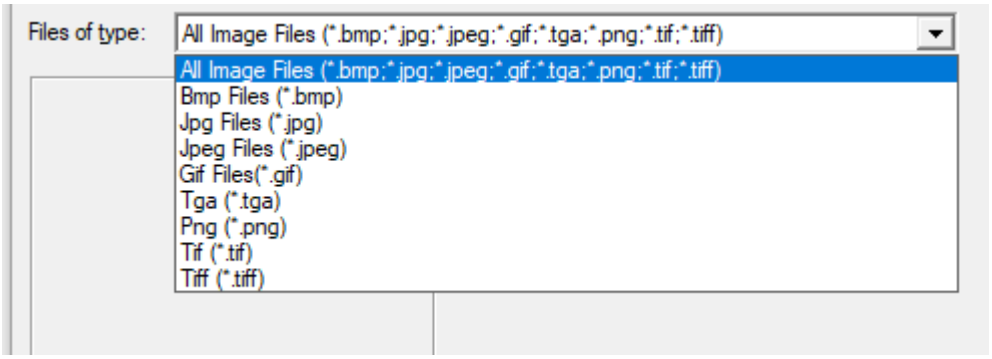
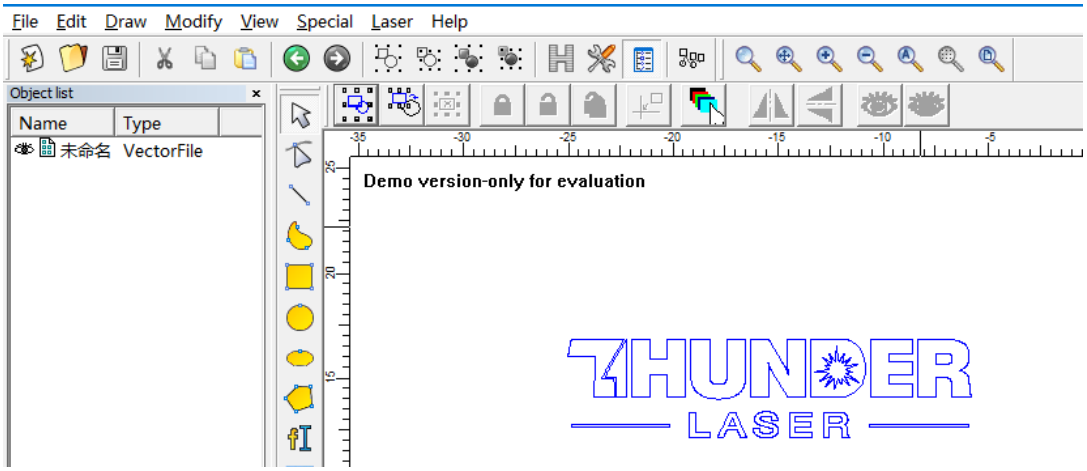
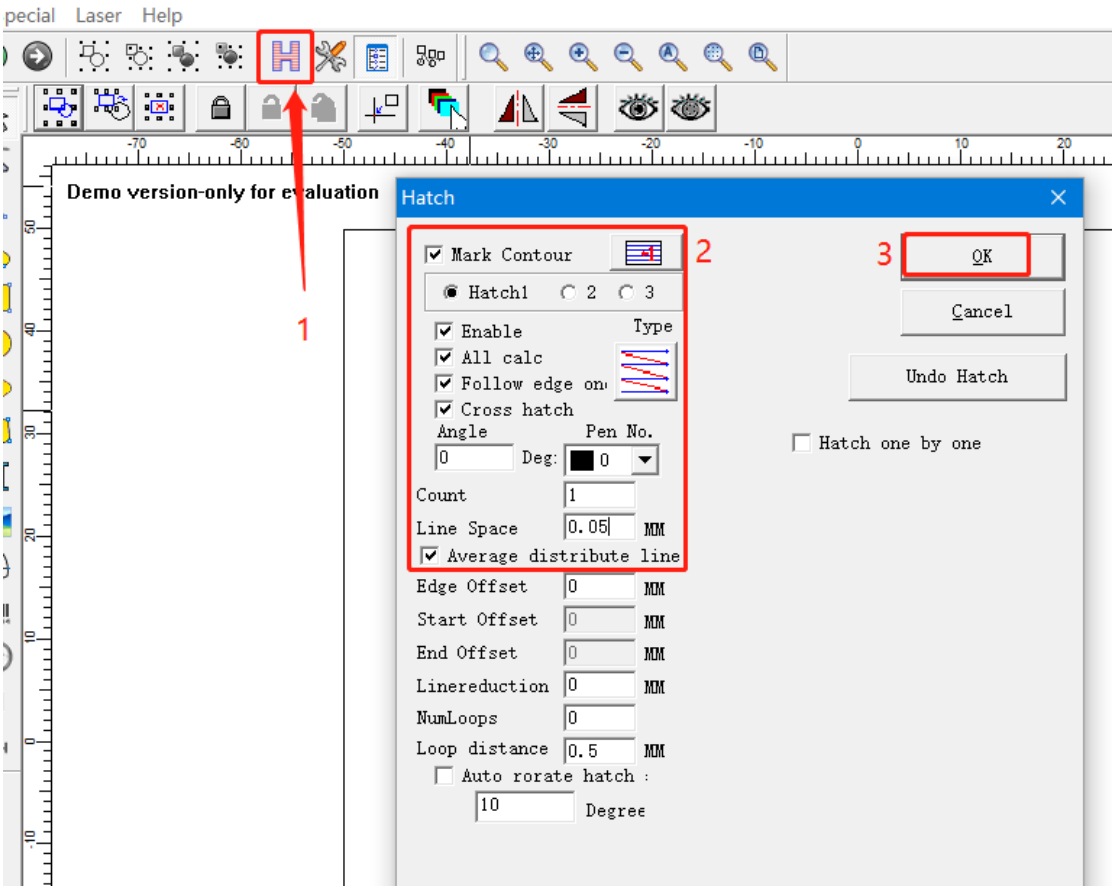


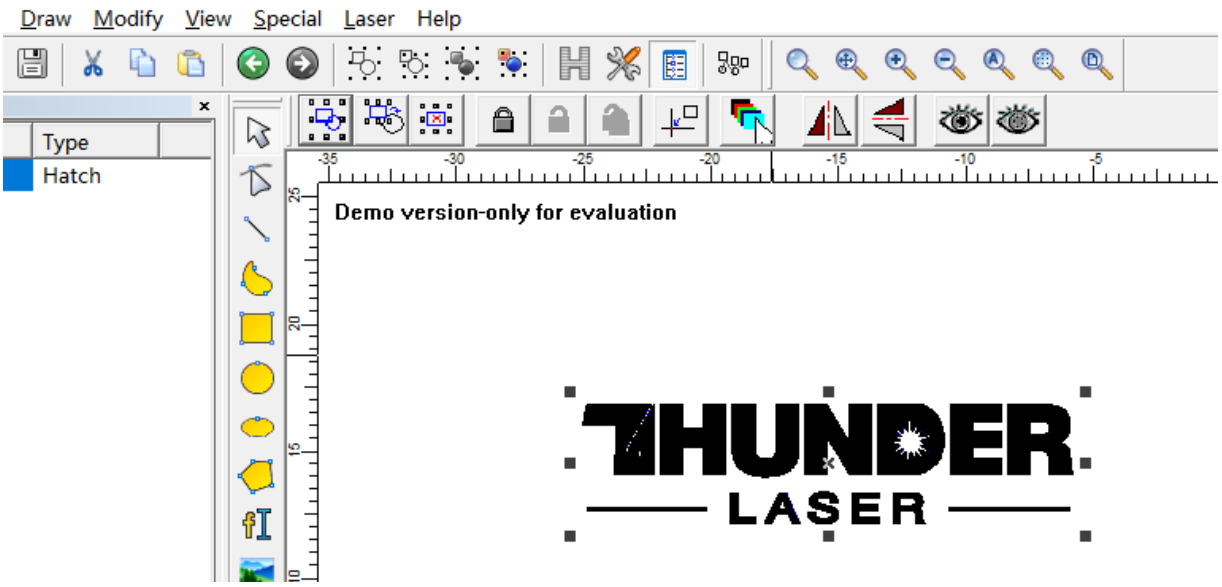
Image Files





6. Press Hatch function, choose Hatch1(or you can choose the other according to your need), Set the Line space as 0.05mm(we recommend using the range of 0.01-0.1mm), then press “OK”.

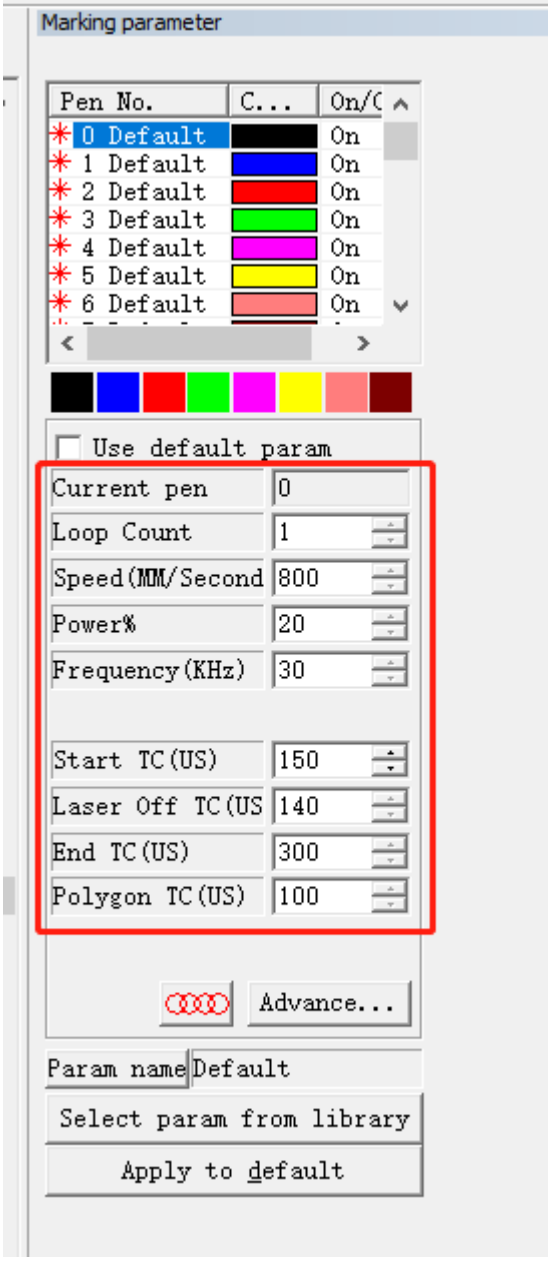




7. Set the marking parameters for your file. Adjust parameters as needed(you need to unselect “use the default para” for change the parameters).
Set the Loop Count to 1, Speed to 800mm/s, Power to 15%, and Frequency to 30KHz.
Start TC(US) to 150, Laser Off TC(US) to140, End TC(US) to 300, Polygon TC(US) to 100.
Other settings no need to change.

For 20W, the range of Frequency is 20-60kHz.

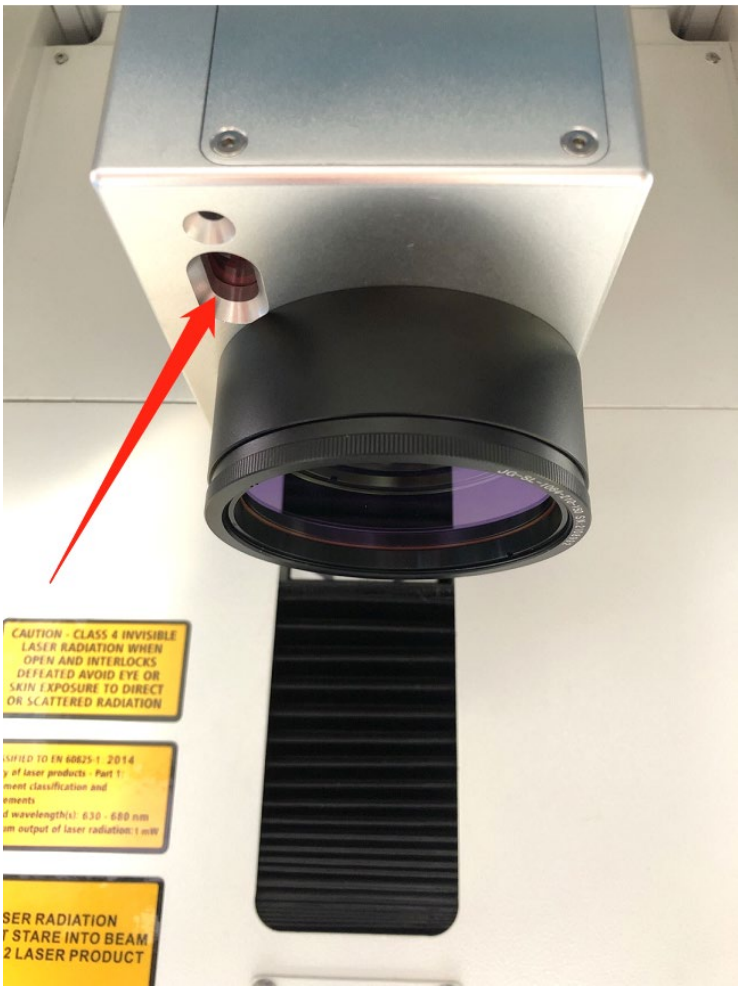
For 30W, the range of Frequency is 30-60kHz.
For 50W, the range of Frequency is 50-100kHz.



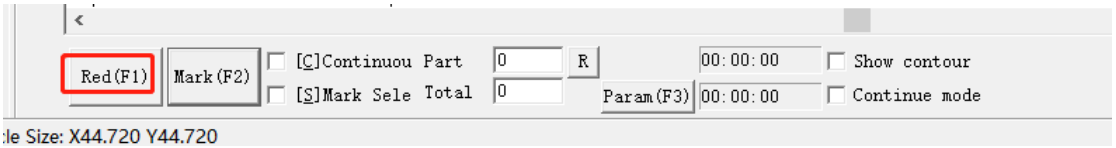
8. You can see a red dot on the work area, it comes from the auto focus sensor. So please put your material under the red dot, then press “Auto focus” button. The Galvanometer will adjust the focus distance automatically. And wait 2-3 seconds, after hearing a beep(from the indicates light), that means the focus distance adjustment is complete.

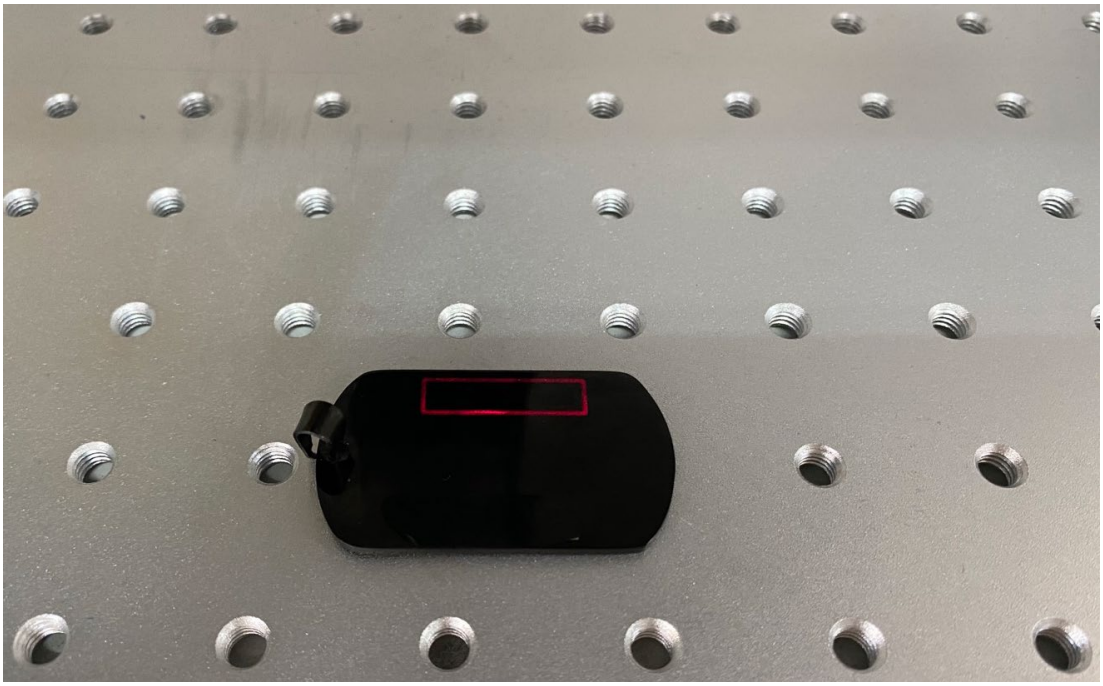

CAUTION - CLASS 4 INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED AVOID EYE OR SKIN EXPOSURE TO DIRECT OR SCATTERED RADIATION
CLASSIFIED TO EN 60825-1: 2014
Safety of laser products - Part 1: Equipment classification and requirements
Emitted wavelength(s): 630 - 680 nm
Maximum output of laser radiation: 1 mW
LASER RADIATION
DO NOT STARE INTO BEAM
CLASS 2 LASER PRODUCT
Rotary
Up
Down
Auto Focus
Start

If the beep continues after you pressing the auto focus button, please view below info. Here is a ranging sensor inside the field lens, the range we set is 200mm-600mm(the distance between the ranging sensor and object), if the distance is lower than 200mm or higher than 600mm, the buzzer inside the sensor will beeps. You need to UP/DOWN the field lens manually, after you adjust to correct range, stop to press UP/DOWN button, then the beep will stop. Then you can use the auto focus again. Below picture is the ranging sensor.



9. Press Key F1 or Red(F1) in software, then fiber will virtual marking out the size of your file. Adjust the position of your material according to the red area. See below pictures.





10.Close the door and press Key F2 or Mark(F2) in software. Or press start button to mark.

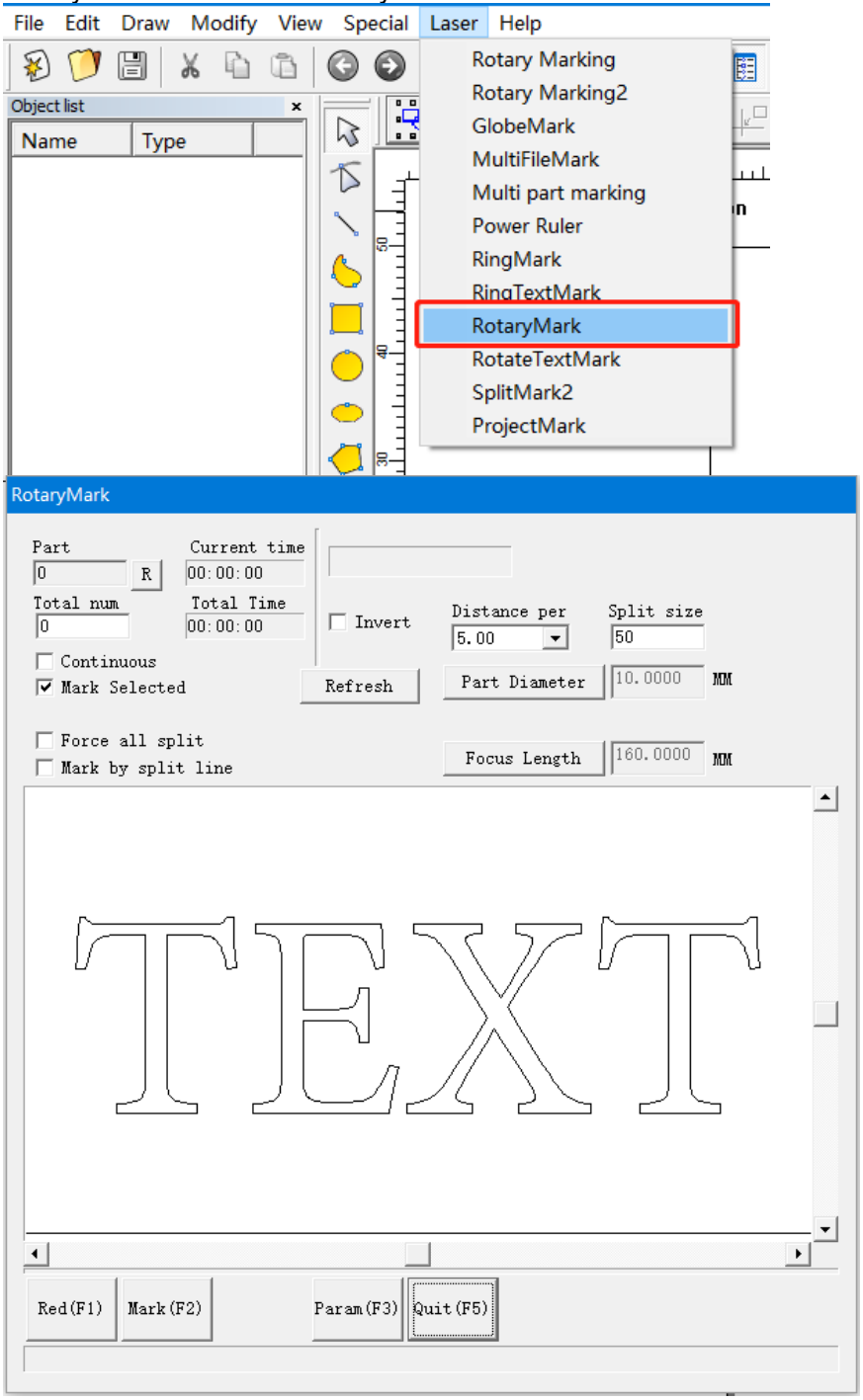
1. The controller can record the last file, if you want to run a file twice or more, you can press "Start" button of the fiber machine directly.
2. You can start to marking with "Start" button also.

11.The fiber laser will mark your image.

Chapter 7 How to use the chuck rotary axis attachment

7.1 Rotary Mark Introduction

RotaryMark is in the Laser of system tool bar:



Part: The part count that has been marked. Press the button R on the rightwards will reset the part count.

Total num: The total count needs to mark. When the parts have been marked reach the **Total num**, software will stop it automatically.

Part diameter: click it, and fill in part diameter.

Focus length: click it and fill in focus length of F-θlens.

1. Focus length of F-110=163mm, F-150=210mm.
2. The two parameters effect marking result directly.

Processing models

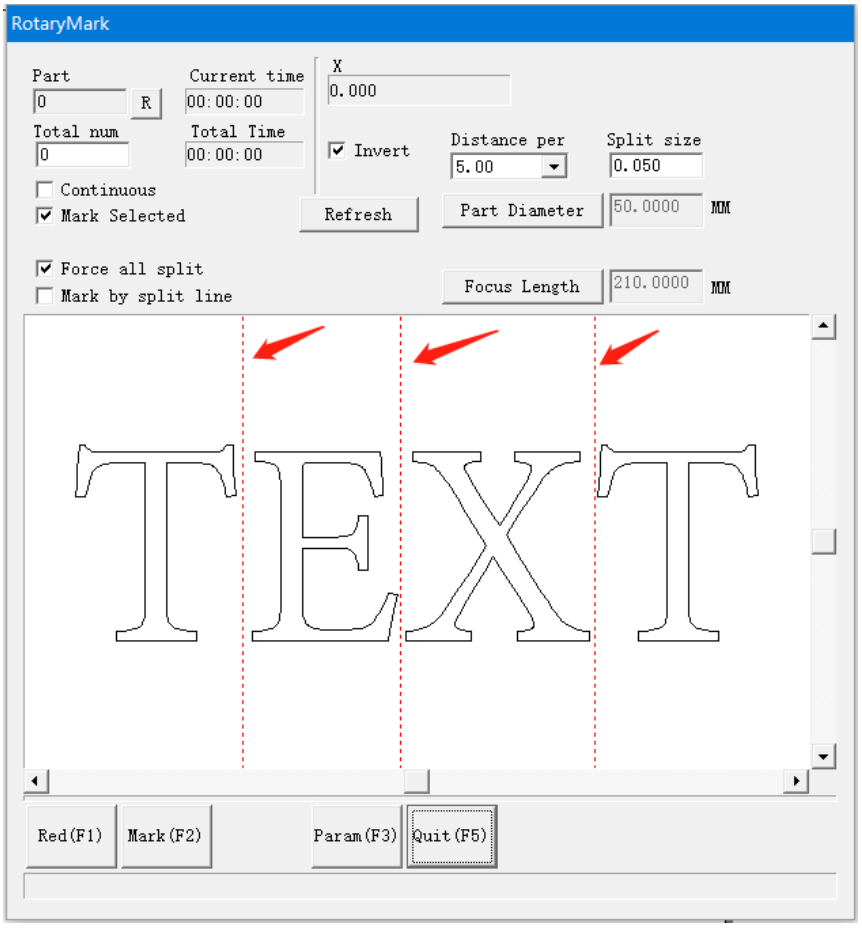
① Continuous: continuous to marking the current file.

② Mark selected: control marking size through configuring split size, don't click _mark by split line at the same time, or the software will split as mark by split line.

Split models:

① Force all split: split the file according split size you set.

② Mark by split line: click it, software will mark as _mark by split line, click left keyboard twice to draw split line, click right keyboard near the split line to cancel the split line. The direction of the split line is the same with rotary axis.



Do not select Force all split and Mark by split line at the same time.

Axis step: The move distance each time when the key Ctrl and arrow key.

Left/Right/Up/Down was pressed together.

Press key PageUp/PageDown to increase/decrease the distance.

Press Ctrl+Left to move left and Ctrl+Right to move right for expansion axis X.

Press Ctrl+Up to move up and Ctrl+Down to move down for expansion axis Y or axis Z.

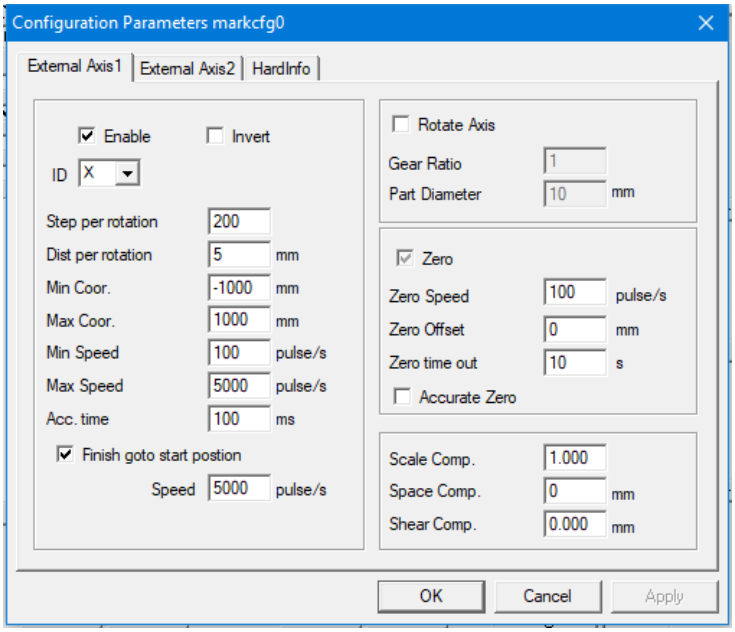
Split Size: the distance between the lines.

Continues: Repeatedly mark the figure until stop it manually.

Mark Selected: Only those figures selected will be marked.

Invert: keep it on. If not select it, the image will be upside down.

Click **parameter**, this dialog window will pop-up



The definition of each parameter:

Enable: Enable current expansion axis.

ID: The current expansion axis will be used as axis X/Y/Z.

ID is X, the figure will be split in direction X to mark.

ID is Y, the figure will be split in direction Y to mark.

ID is Z, the expansion axis will move to the appointed position to mark.

Please choose X axis as default settings.

Pulses per round: The pulse numbers each round that the expansion axis rotating. We can calculate it through following formula.

Min speed: the minimum rotary speed of expansion axis.

Max speed: the maximum rotary speed of expansion axis.

Goto start position after finished: The expansion axis will go back to the initial position after finishing marker.

Speed: The speeded of the axis are going back to the initial position after finishing marker.

Rotation axis: Select it, it's indicates that current expansion axis is rotation axis. Moving manner is rotation; otherwise, it indicates flat content processing or Z axis locating process.

Gear ratio: Electric motor connecting axis, the reducing ratio is one. If there is reducing setup, the reducing ratio is reducing setup ratio. For our rotary, the gear ratio is 1.

Part diameter: The workpiece needs to mark currently. If expansion axis is rotation axis, part diameter, an important parameter to count move distance, must fill in accurately.

Zero: Whether to enable the rotary to reset.

By default, the software does not enable return to origin (the gray mark is not enabled). Under any circumstances, the zero point function must not be selected.

7.2 The first time using the chuck rotary axis attachment

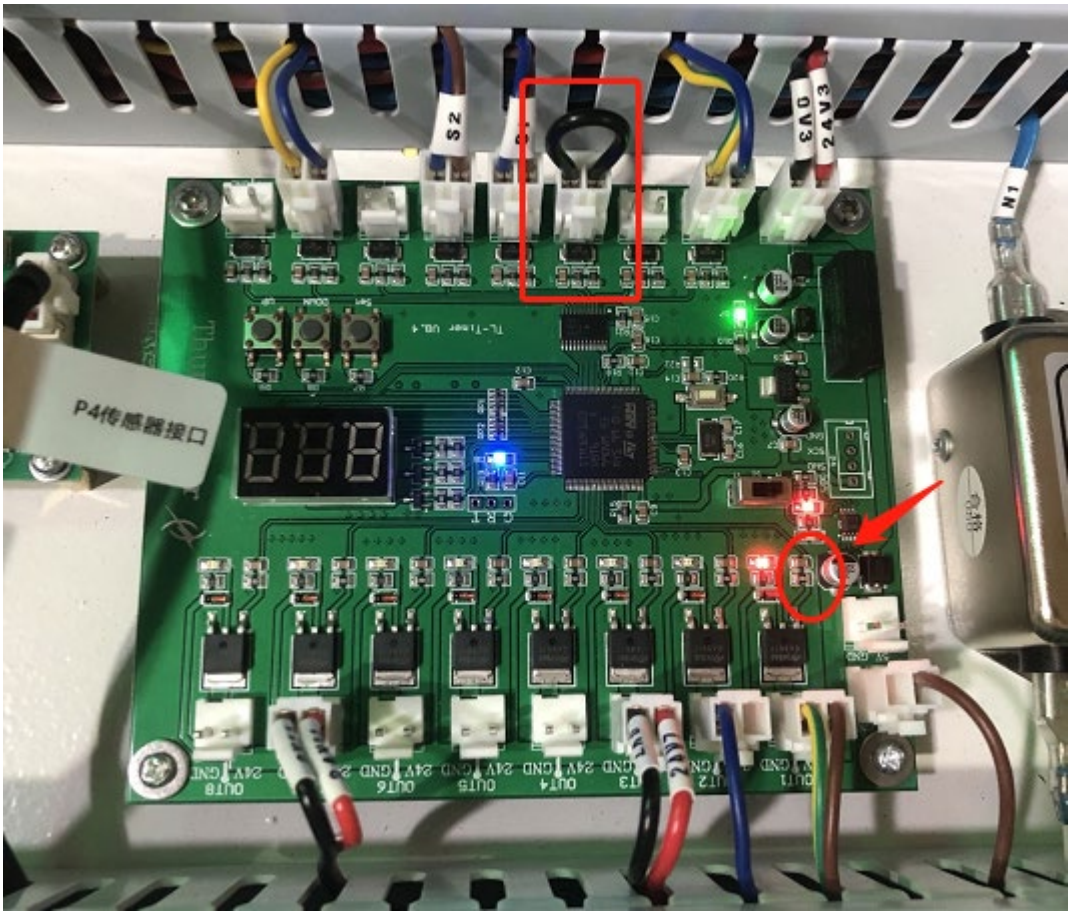
The chuck rotary axis attachment is the optional item.

Specification		
W×D×H	10.04"×6.69"×4.33"/255mm×170mm×110mm	
Galvo Scanner	F-110	F-150
Max working length	2.95"/75mm	3.94"/100mm
Max working diameter	3.94"/100mm	

1. Due to the limitation of the maximum working height, F-200 cannot use rotary axis attachment.
2. The front door cover cannot be closed when the rotary is used, and the cover opening protection needs to be manually shielded.

How to shield flap protection:

Remove the 6 screws that fix the top cover, move the top cover to the left, move the top cover to the position where you can see the TL-Timer card, find the In3 interface, unplug the terminal at the In3 position, and see the red indicator light (red circle position) after it goes out , And then plug the terminal back in. At this time, the door cover is successfully shielded. After shutting down and restarting, the door cover protection will take effect automatically.

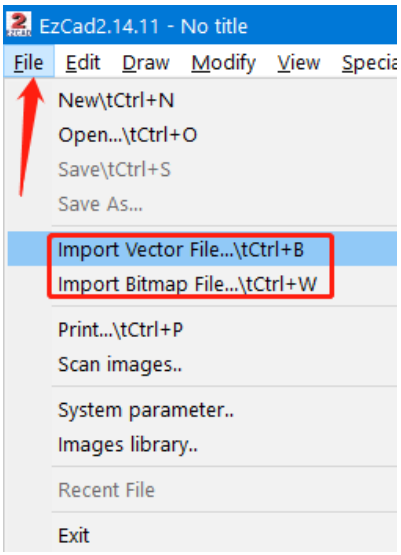


Please remember to install the top cover back and fix it with screws.

To install and set-up the rotary axis attachment proceeds as described as follows(**take Aurora 20W, Field Lens F-110 as example)**:

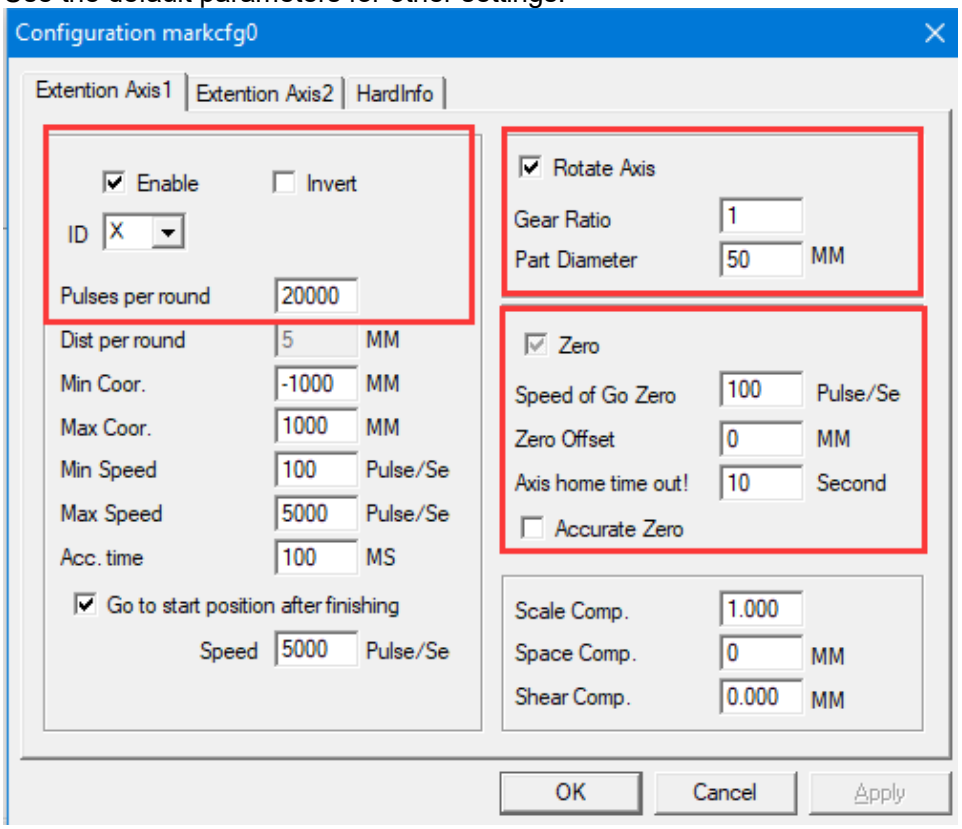
1. Turn on the fiber laser, move the field lens to high position.
2. Move the field lens to the higher position then switch off the fiber and open the lid.
3. Put the rotary axis attachment onto the working table and align the rotary attachment with the Y-axis are parallel, with the jaw chuck closest to where the rotary attachment plugs in.
4. Connect the rotary axis attachment via the control cable with the connector of the motion system. The connector is located inside the right front of the working area. Connected it to this interface and fixed, and then you have finished the device connection. Like below:

5. Before you mount the object into the rotary axis attachment, measure the diameter of the object at the position to be engraved with a sliding caliper or a similar tool. Write down this value. For example:50mm.
6. Adjust and fix the slider to make the work piece fitting into the rotary axis attachment.
7. Set the focus automatically, carefully and safely. You can see a red dot on the work area, it comes from the auto focus sensor. So please put your material under the red dot, then press “Auto focus” button. The Galvanometer will adjust the focus distance automatically. And wait 2-3 seconds, after hearing a beep(from the indicates light), that means the focus distance adjustment is complete.
8. Generate a graphic with the help of the graphics software. The graphics size must be adjusted until less than the dimensions of the work piece.
9. Import your file to EzCad2.

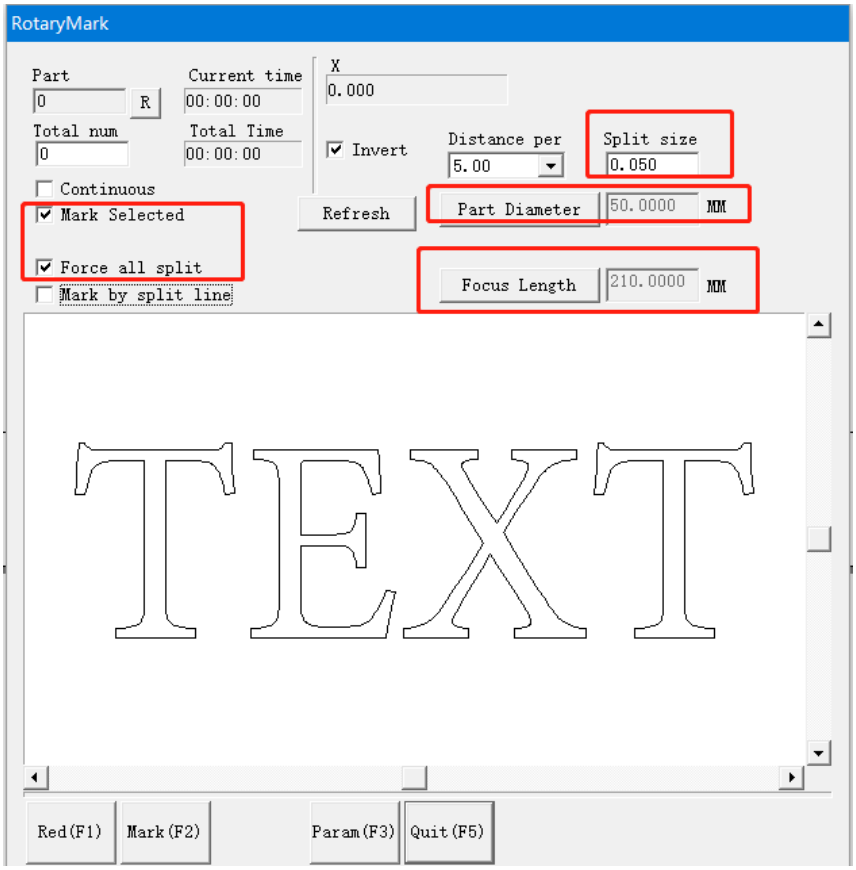


10. Find laser>>RotaryMark>>Parameter(F3), then fill the parameters and press OK.
Parameter settings:
Click Enable, Invert
ID choose X
Step per rotation:20000
Gear Ratio:1
Part Diameter:50mm
Zero: Keep the default setting (grey mark), under any circumstances, do not check.
Accurate Zero: do not selected

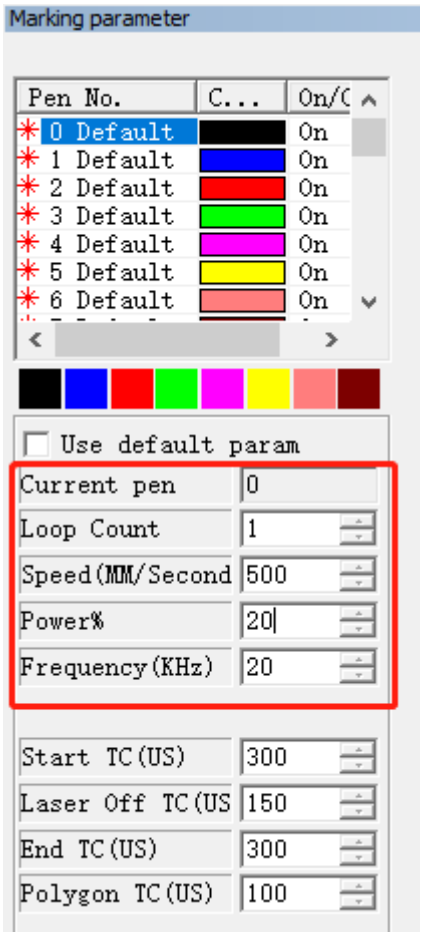
Use the default parameters for other settings.



11. Set the rotary parameters(choose Mark Selected and Force all split, split size:0.05, Part Diameter:50mm, Focus Length:210mm)



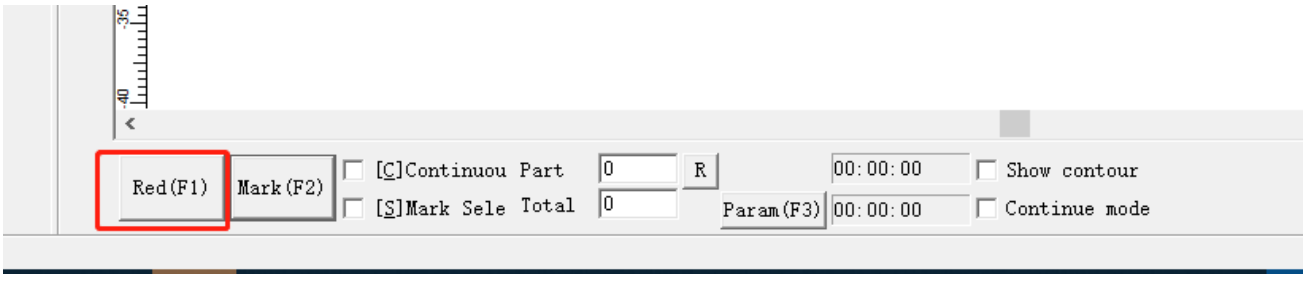
12. Set the marking parameters(Loop Count:1, Speed 500mm/s, Power 20%, Frequency:20KHz).

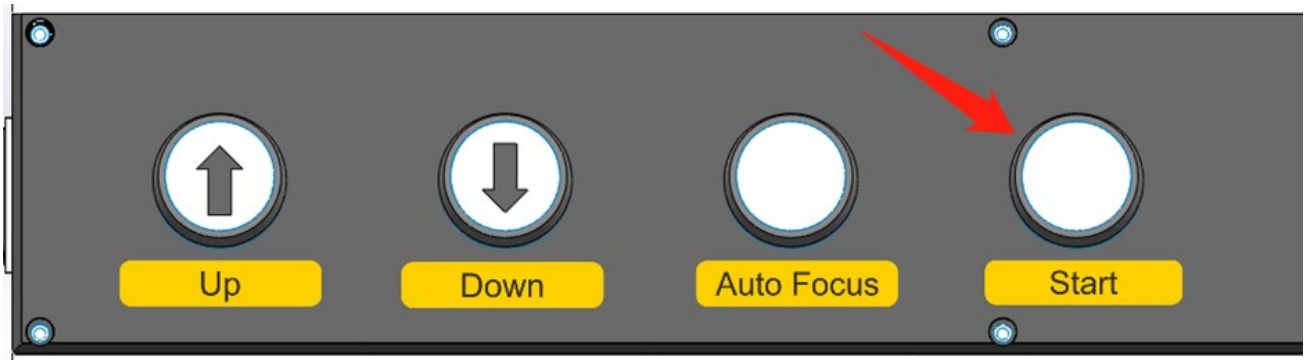


13. Press Red(F1), you can see a red vertical line(the red light comes from the fiber laser) on your material, machine will mark from the vertical line to the right side, if need, you can move the rotary manually.

Press Ctrl + left key on the keyboard, the rotary will rotate to the left.

Press Ctrl + Right keys on the keyboard, the rotary will rotate to the right.





14. Press Mark(F2), the fiber laser will mark your image.

Chapter8 Maintenance

8.1 General Maintenance

Caution-**Before any maintenance work takes place, ensure that the power supply has been switched off and the system is powered off.**

All maintenance work must be carried out according to the safety regulations.

In order to ensure the maximum availability and lifetime of the system, we recommend you regularly check the ventilation and keep the surrounding area clean.

8.2 Cleaning the Field lens

This system is fitted with high quality optical components, which under normal operating conditions are maintenance free for their lifetime. However, it may be necessary to clean output lenses, e.g. the scanner flat field lens (f-theta objective) if it becomes covered in dust or fumes.

1. Never touch the optical components with your fingers! Oily or dirty hands may damage the lens surfaces.
2. Do not use any tools or hard objects to clean the surfaces. Scratches cannot be repaired.
3. To remove larger pieces of dirt, only use a lens cleaning cloth with high proof (min. 98 %) alcohol.
4. Do not dip the cleaning cloth in the cleaning solution. This contaminates the solution and makes it unusable. Place drops of the solution on the cloth!

5. Distribute the cleaning fluid carefully using small circular motions. Start at the center of the lens and move outwards to the edge. Keep moving the cloth until the entire surface is clean.
6. Do not wipe the lens with a dry cloth. Do not touch the reverse side of the cloth.
7. Do not exert any pressure on the lens.
8. Clean once half a year (depending on usage).

The End.