

Laser machine instruction

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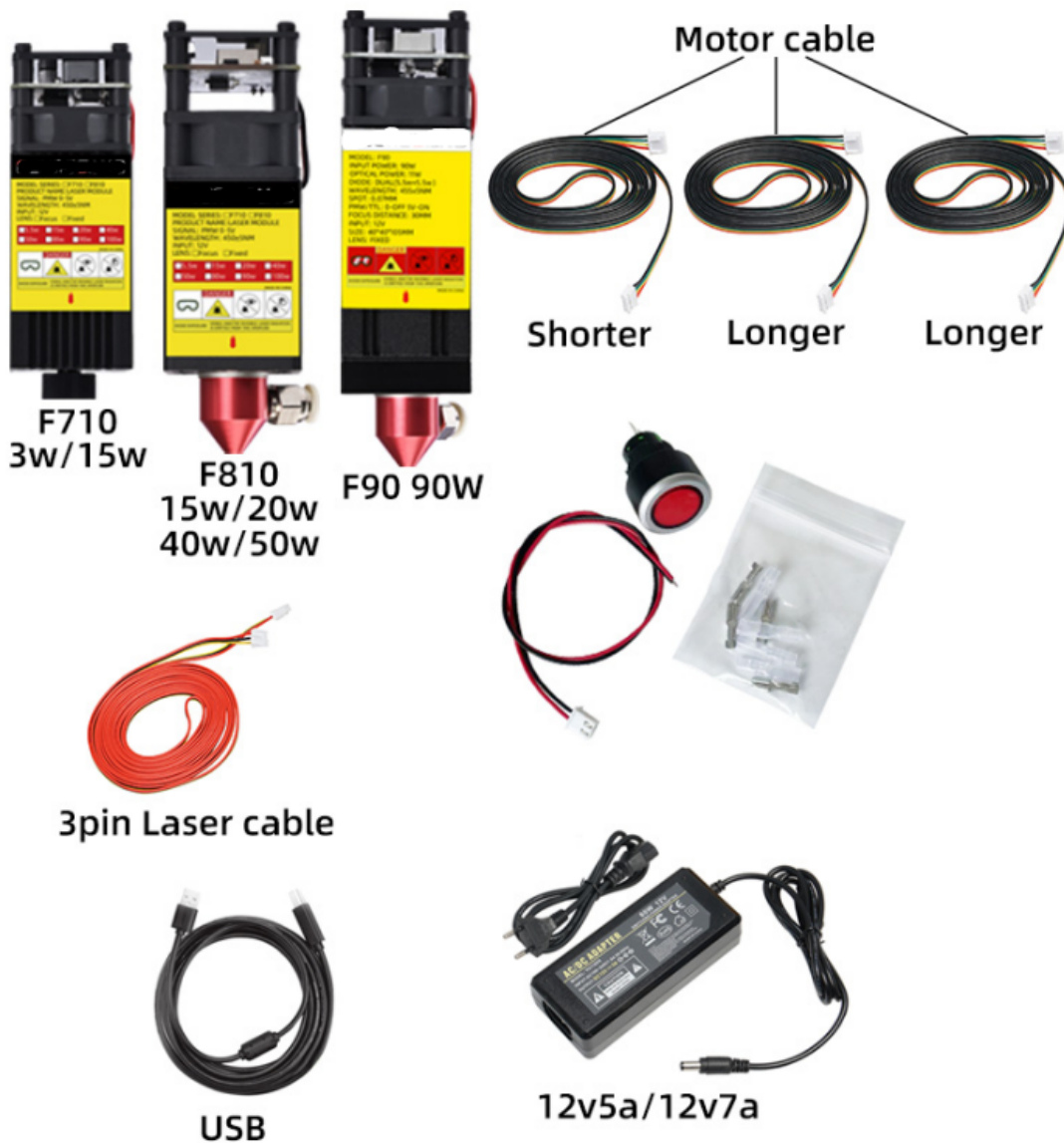
1. Wiring and put cables in chains.

Before wiring pls put all of cables in the chains first.

1) Prepare these parts before for wiring

Wiring video

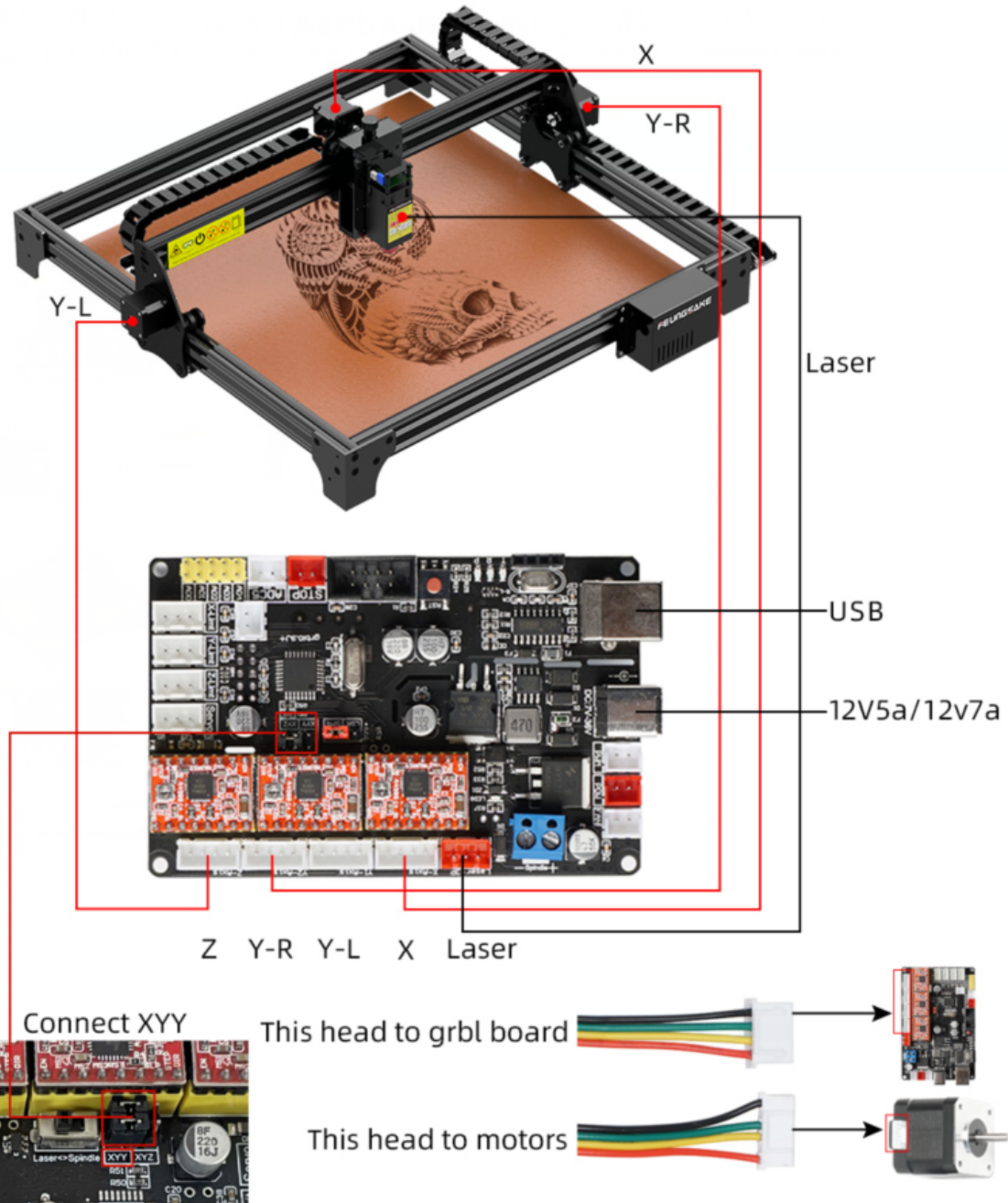
https://drive.google.com/file/d/1Pac_A4pohi45HIWg20qMgoYM76E3EsVH/view?usp=share_link



Wiring method 1

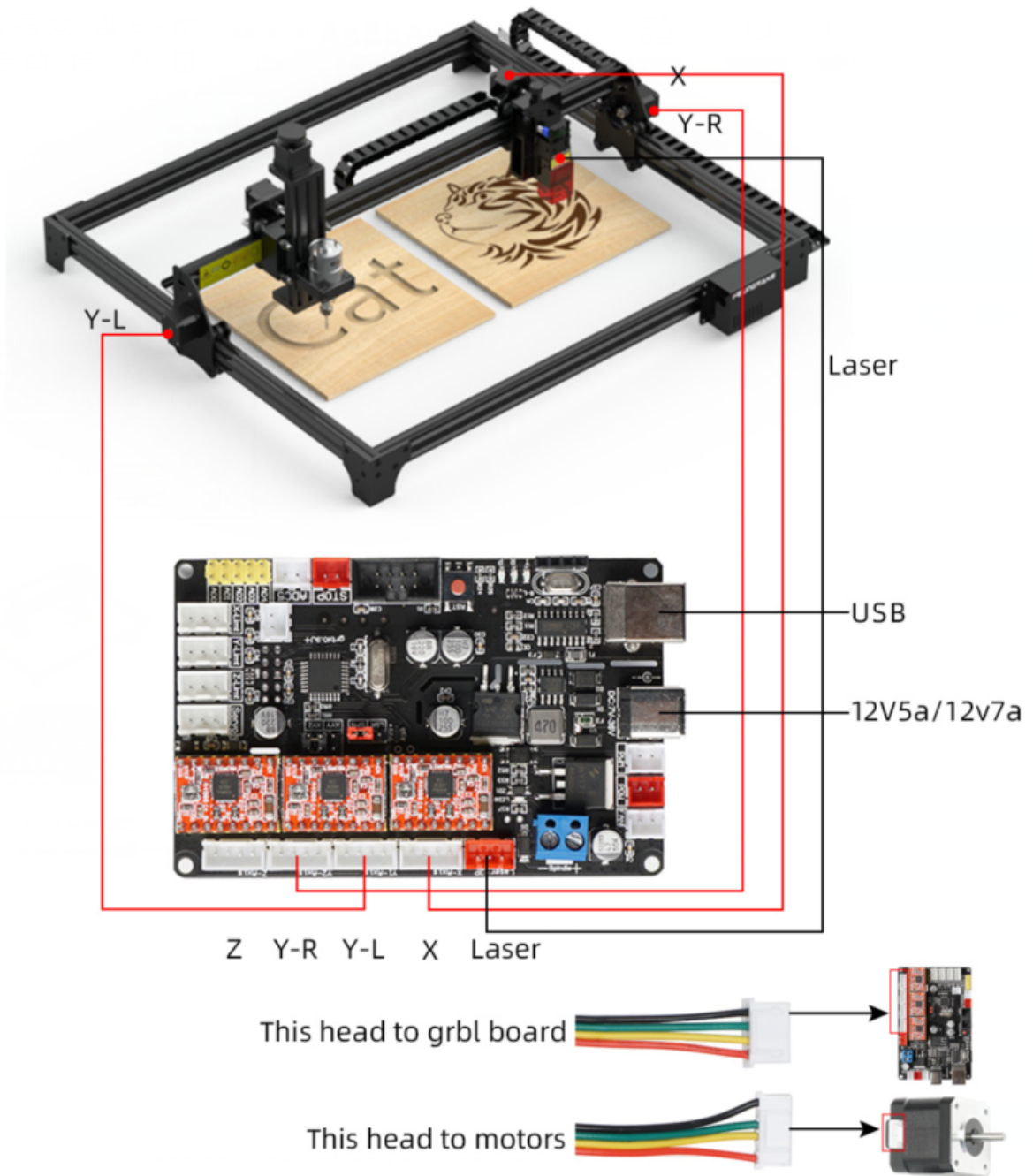
Wiring picture below is for machine model 1015 1515 1520 2024 and no Z kit order.

This picture to display how all the cables to go, pls read details after this picture.
 NOTE: Y-L motor better connect to Z port, this method can be control both Y axis by two chip separate, it stronger current for the bigger area machine. But if you want connect to Y-L it also will work noprobem. But i suggest connect to Z port.
 Remember connector should jump to XYY in middle of the board.

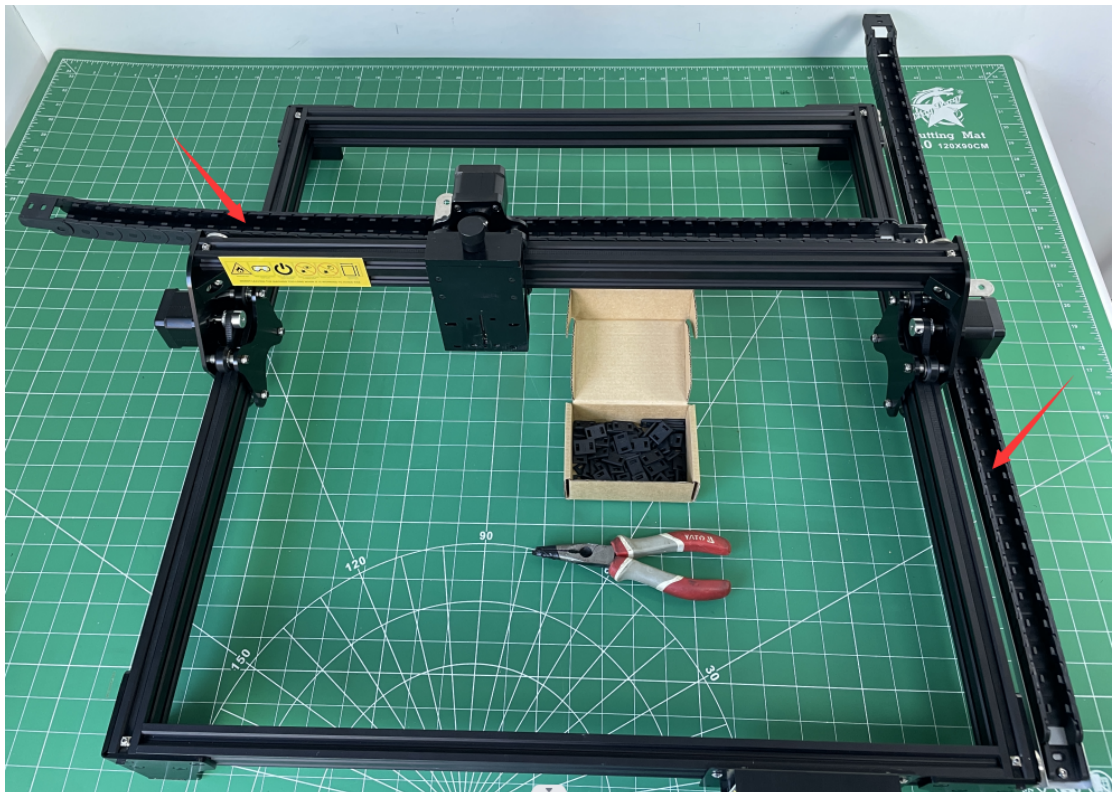
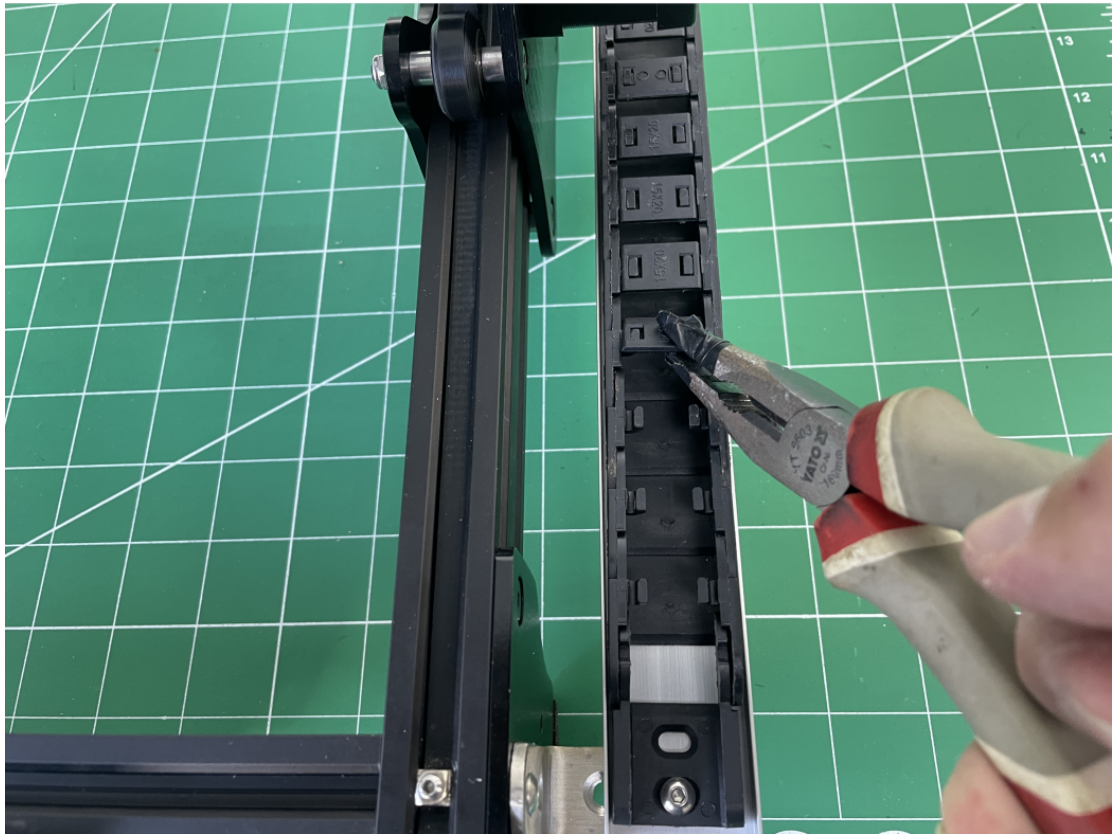


Wiring method 2

Wiring picture below is for machine model 4040 6550 4286 5112 1010 and with Z kit order.



- 2) put cables in chains
1. Open all of the chain cover.



2. Find three of this parts put in the chain of X axis, pls note the head must be same like the picture.

1pc motor cable (the longer)

1pc laser cable

1pc air pipe



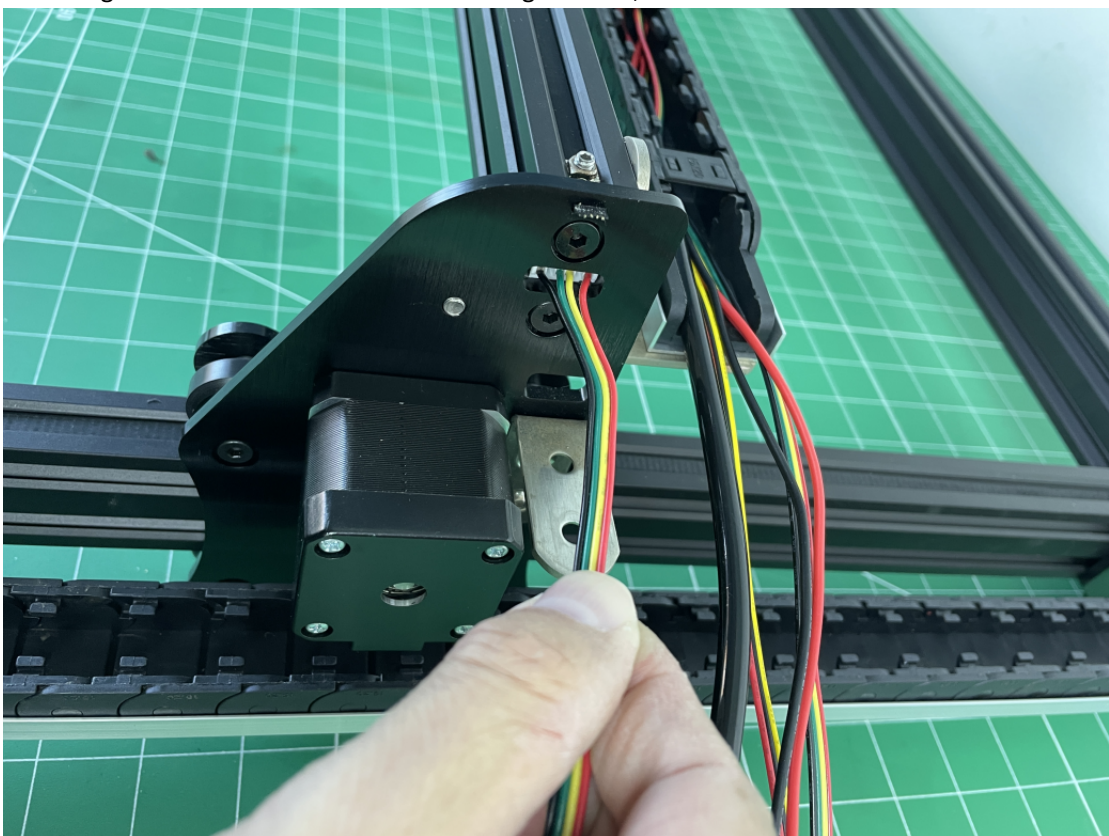
After put cables in the x axis chain like picture below.



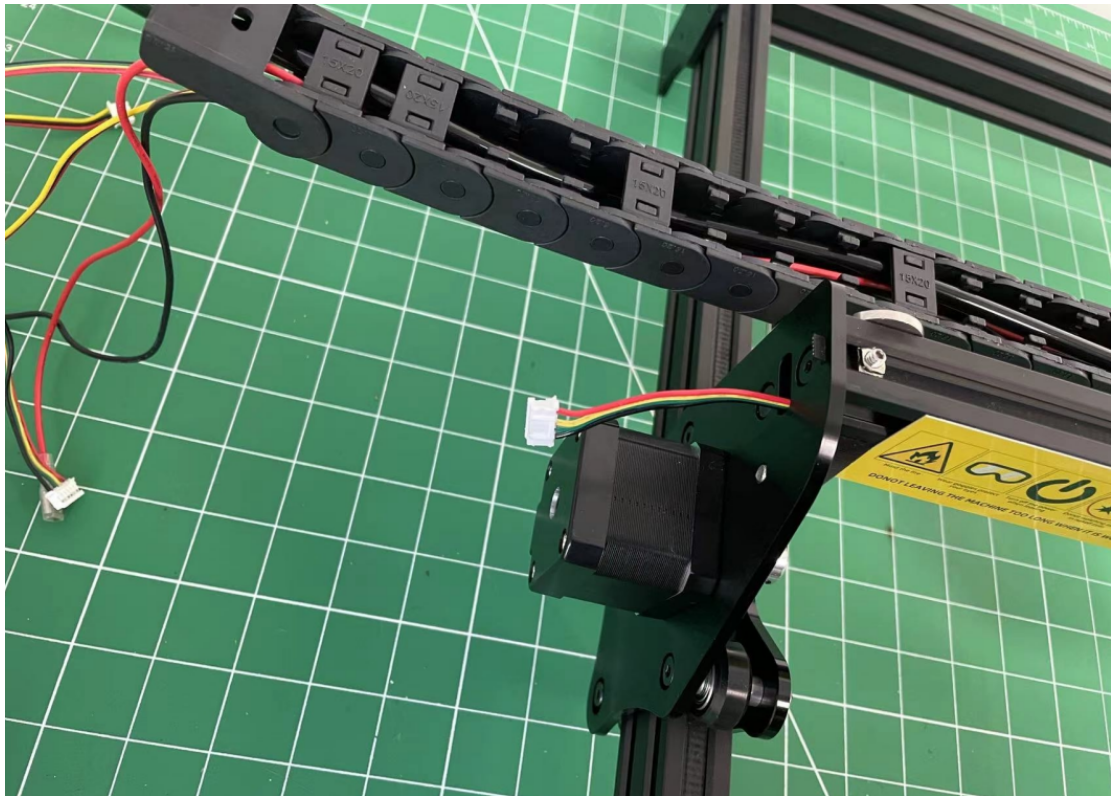
3. take another longer motor cable, take the wider head.



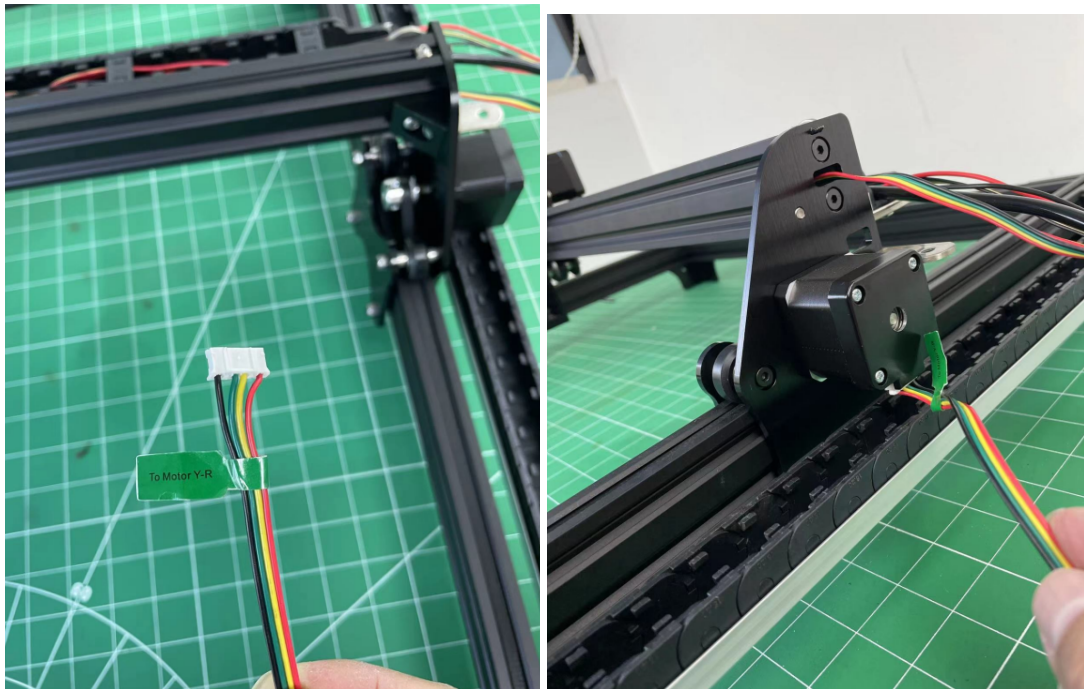
Go through the x axis aluminum hole from Y right to left, this cable is for Y left motor.



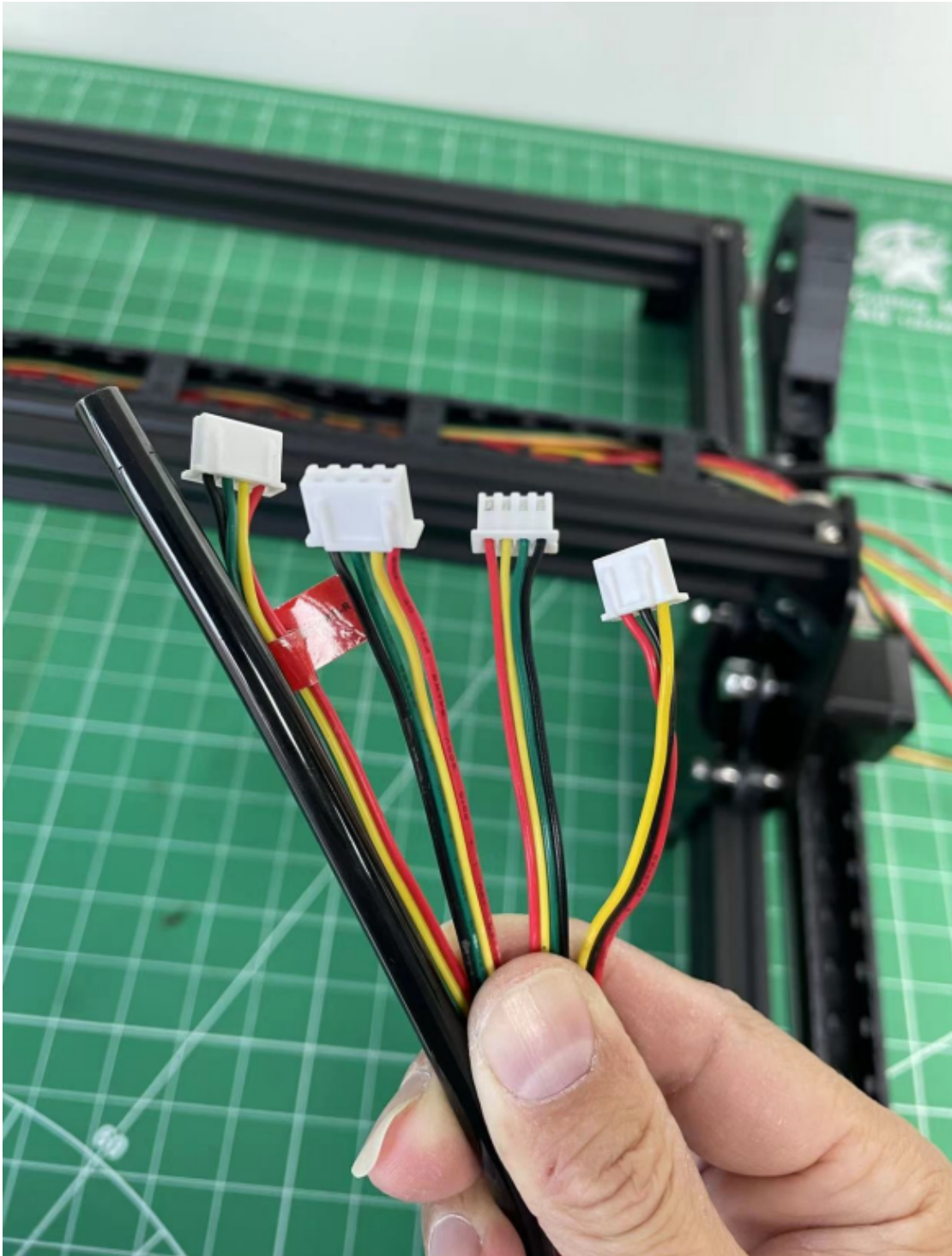
After through it look like the picture below, you can connect it to Y-left motor.



4. take the shorter motor cable, connect to Y-right.



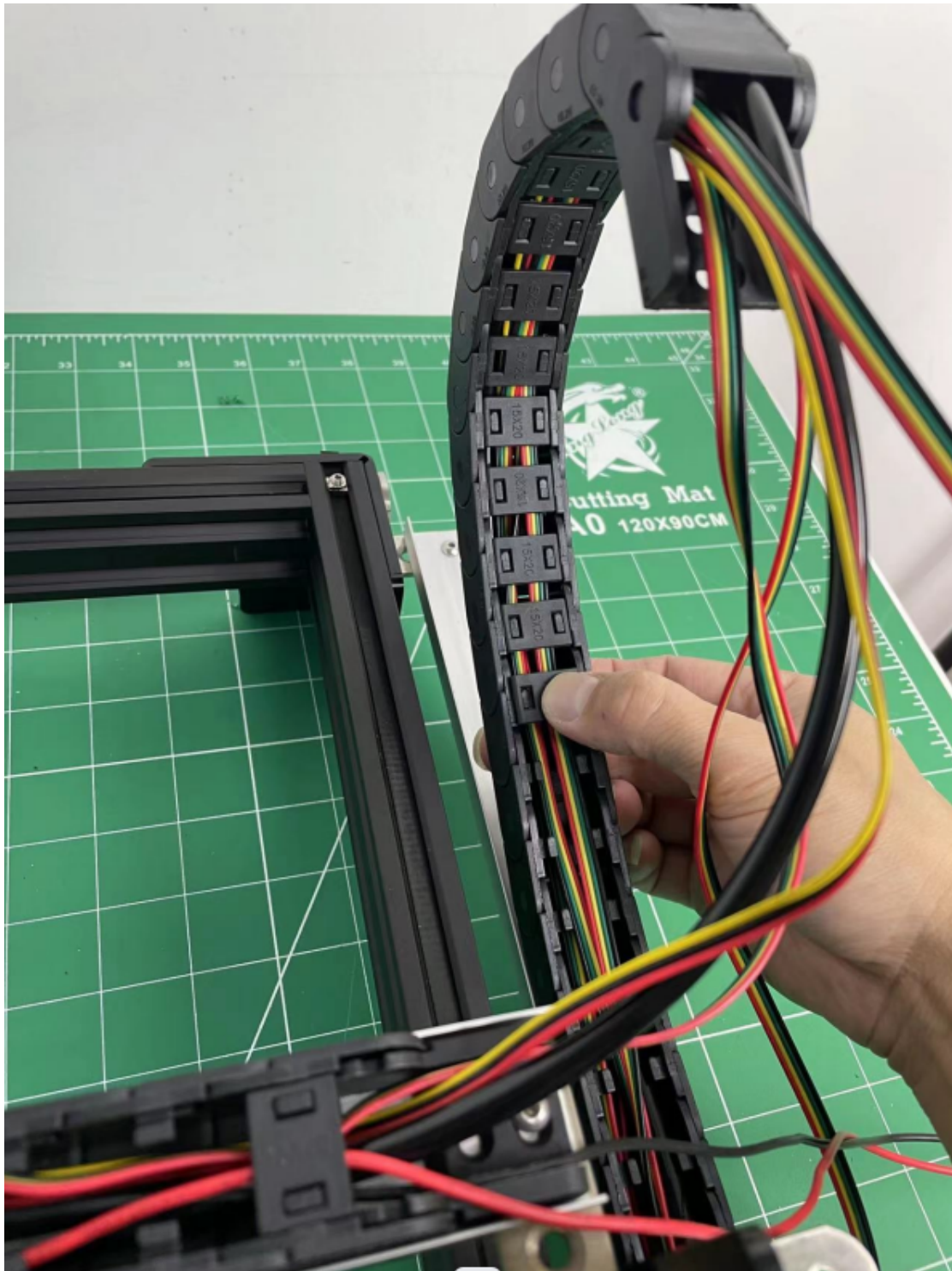
5. take another head of all cables and air pipe (this head toward to board), through from Y axis chain.



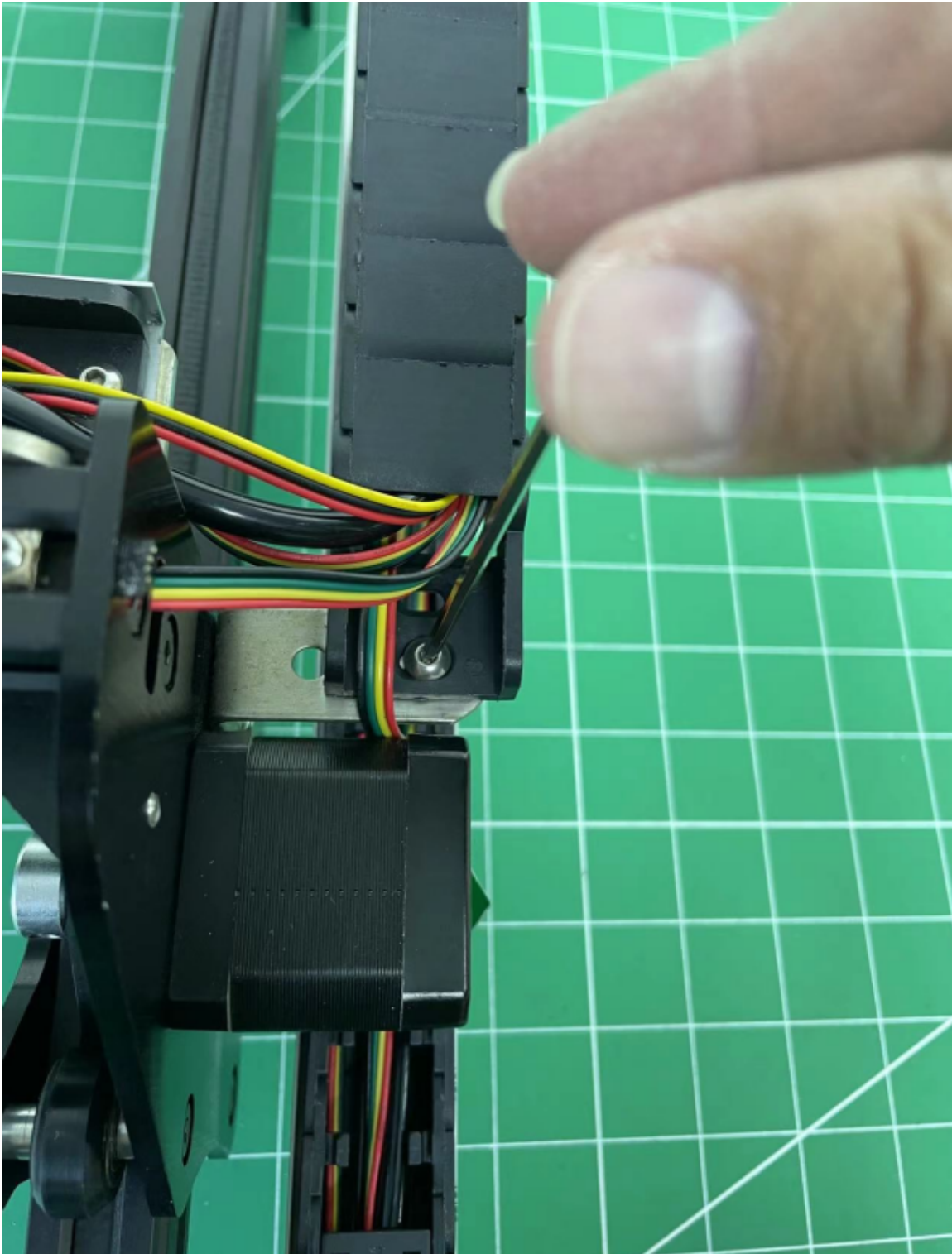
Through cable into Y chain from this direction, pls note.



After through Y chain, you can put the cover back on the chain.



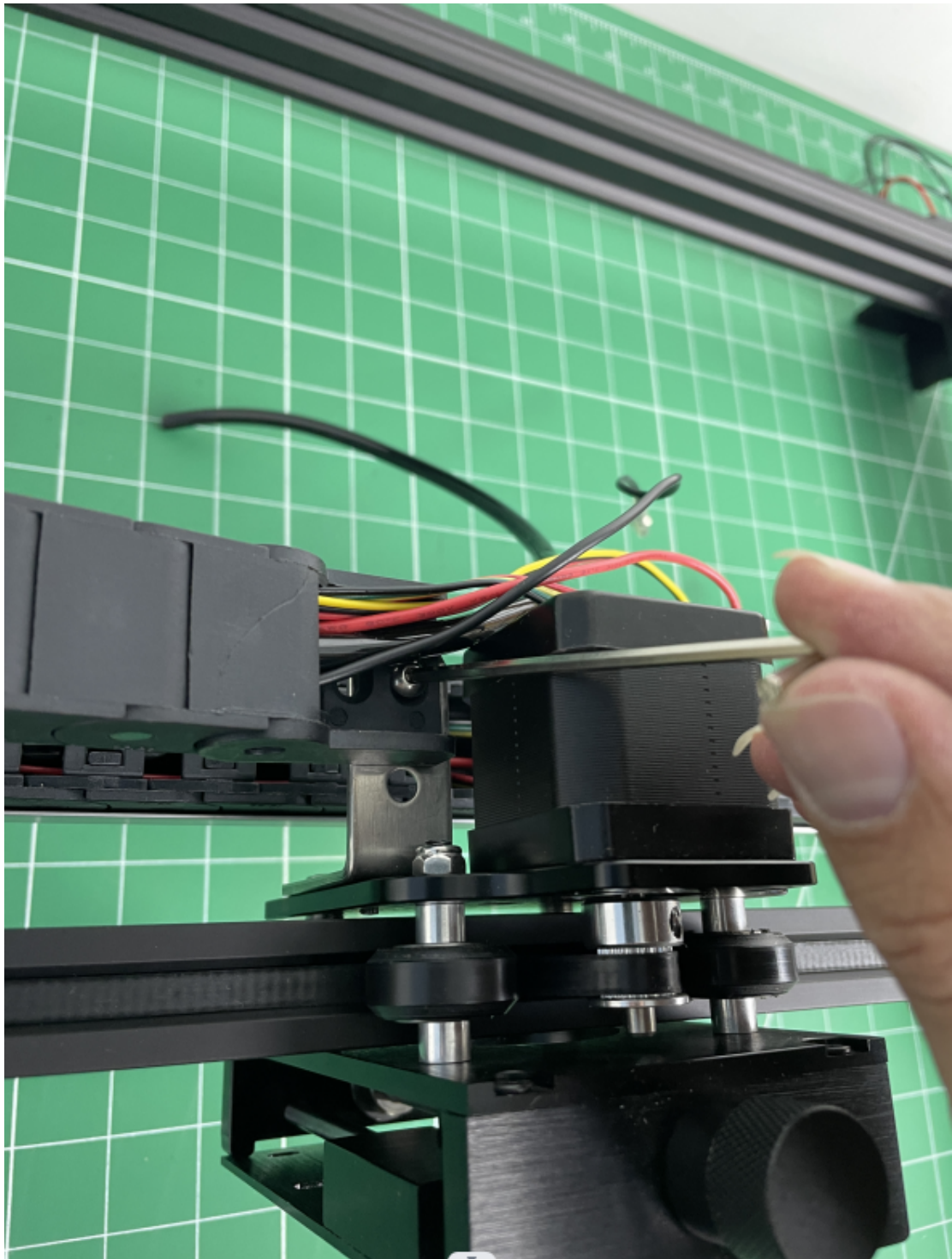
Fix the Y chain on L bracket with M4 screw.



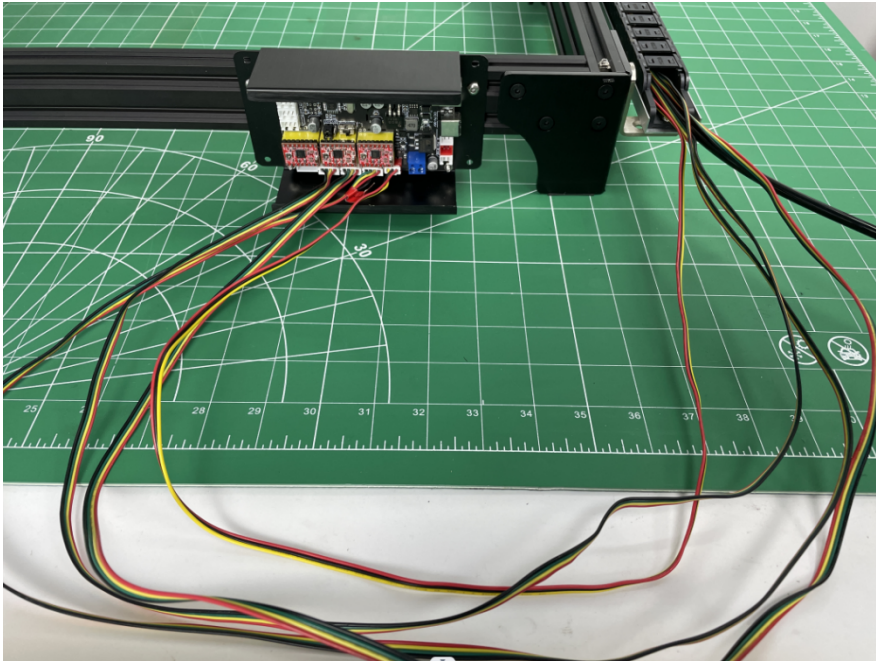
After that you can put all of cables in the Y chain and fix a few covers to hold the cable keep it not getting out. Like picture below



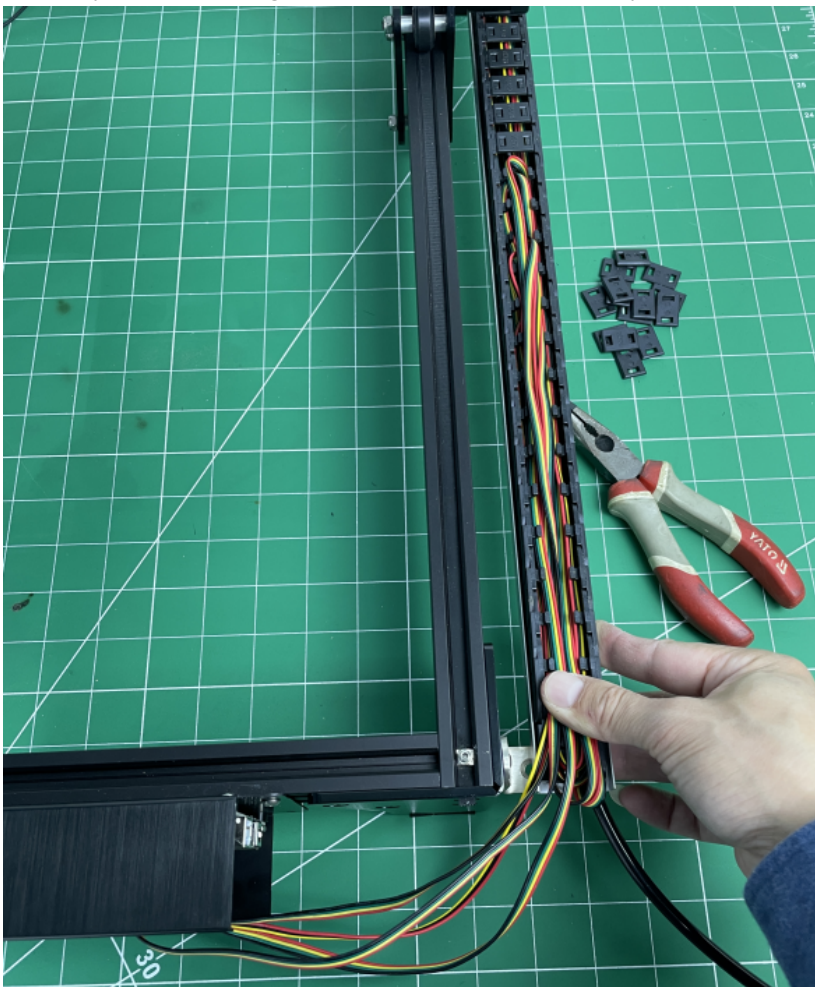
6. Fix the X chain on L bracket.



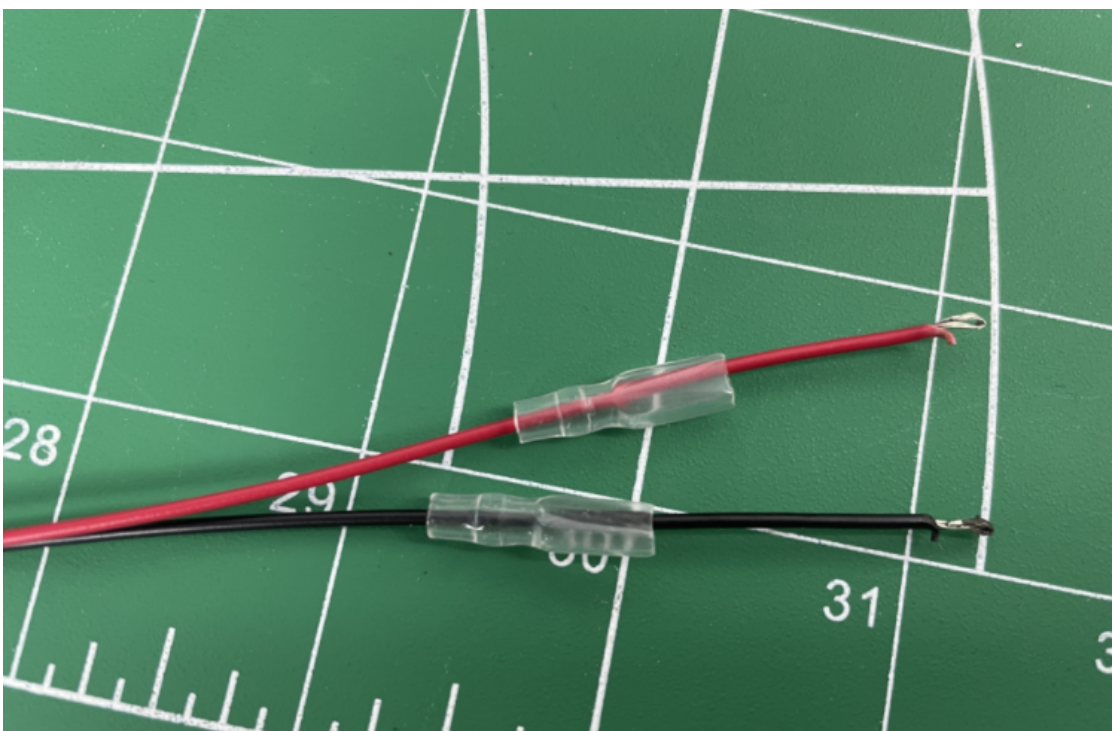
7. Connect cable on board, just refer wiring picture or video.

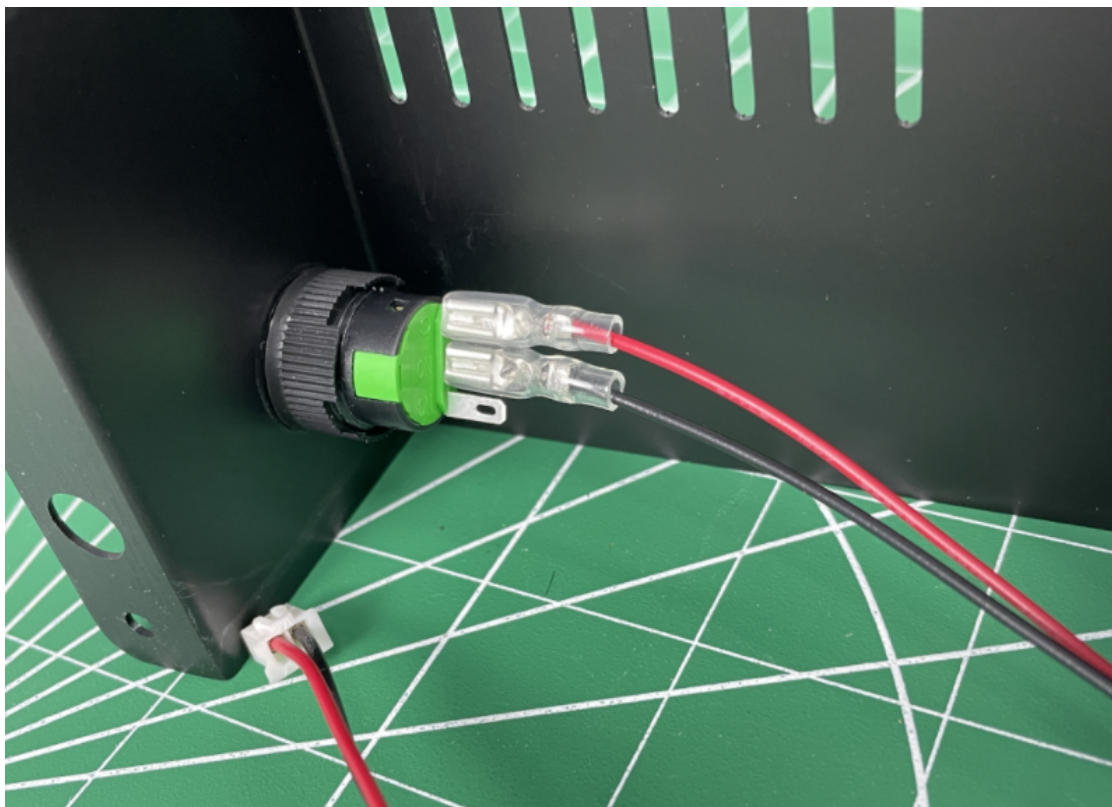


You can put the overlong cable in the chain refer to the picture below.

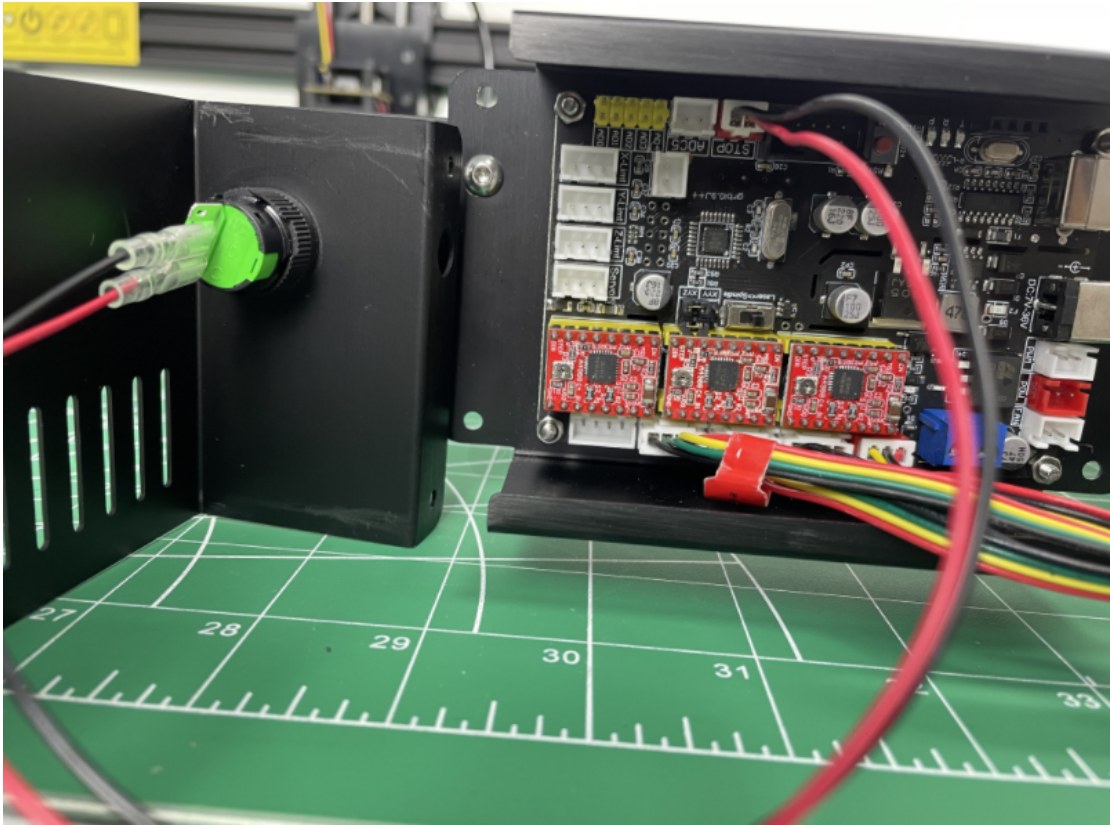


8.connect the emergency stop switch, just prepare the parts and connect it step by step refer the below pictures.





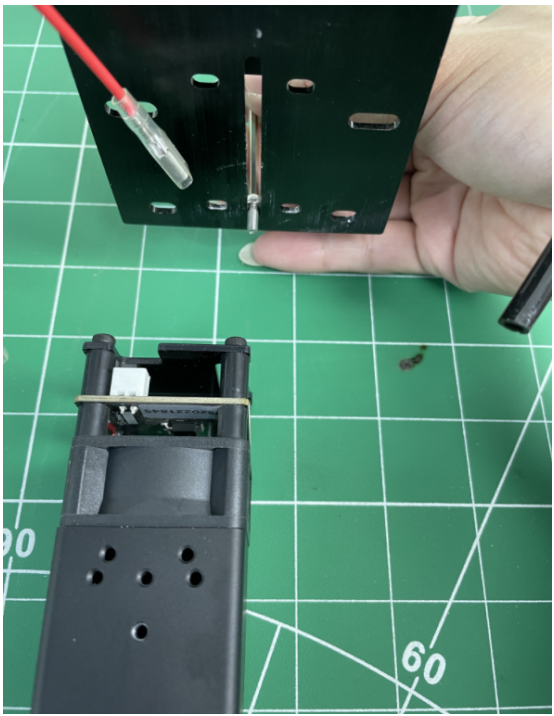
On board just connect to the port "STOP"

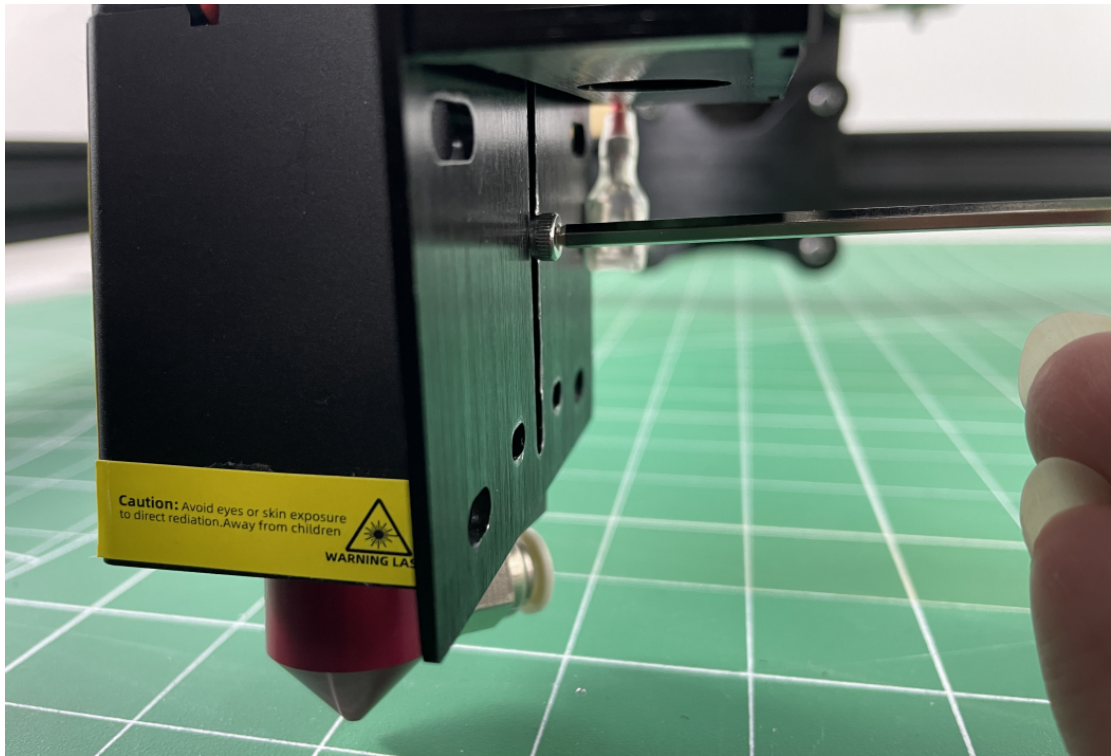


9.mount the cover then connect usb cable and power adapter.

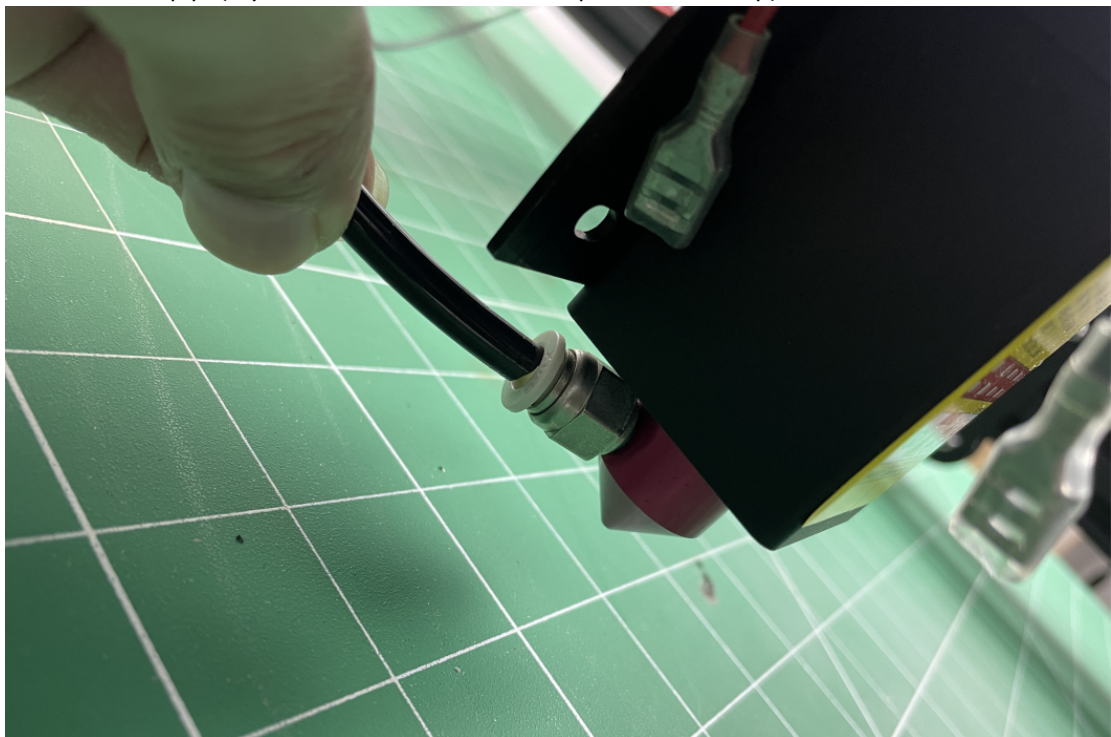


10.fix the laser module, fix with 1pc m3*8 screw, or you can fix with 2 screws noproblem.





11. connect air pipe (if your laser have no air nozzle pls miss this step)

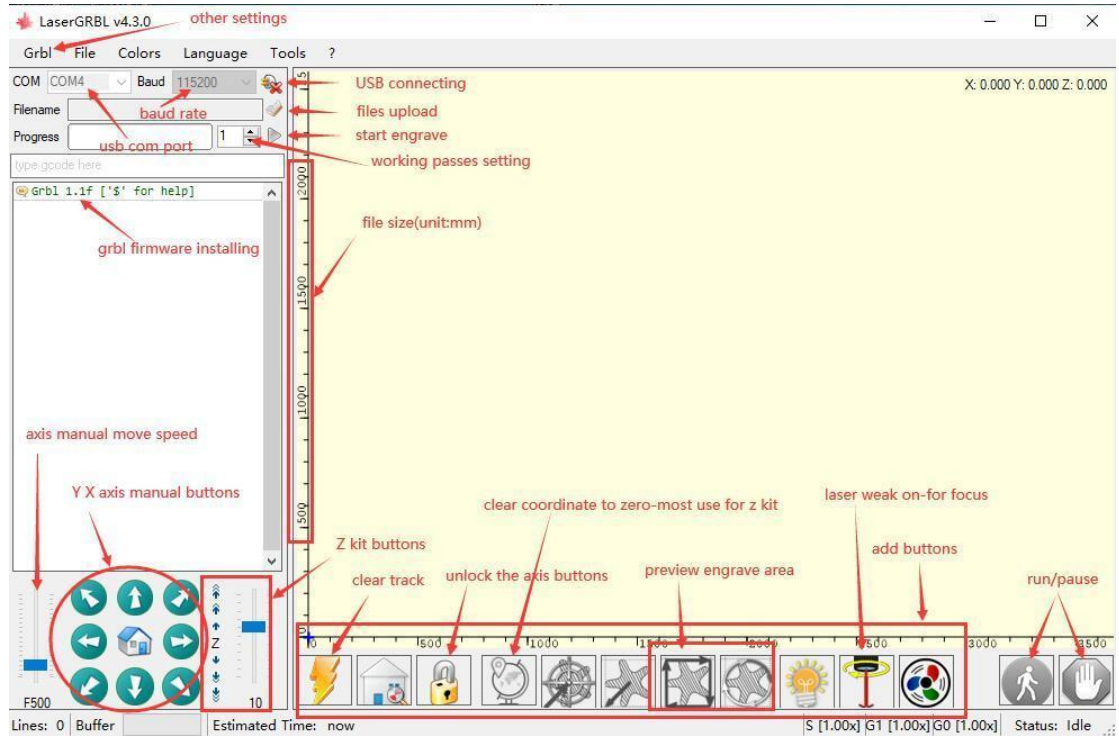


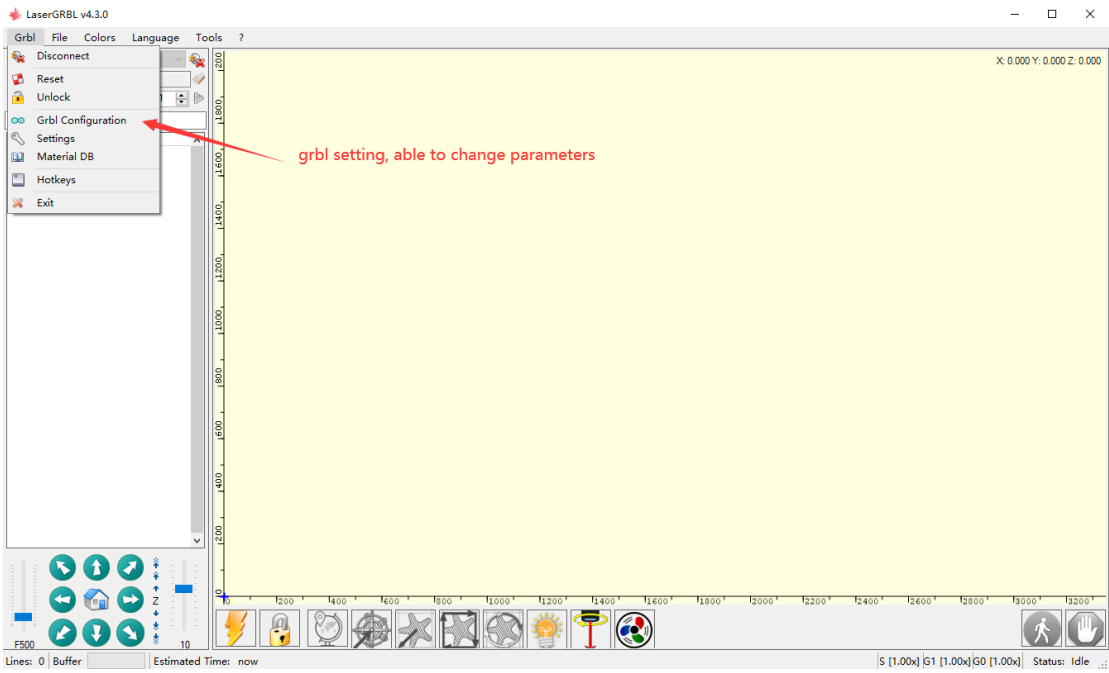
2. run laser on Lasergrbl software.

Step1).download all the files which we send you, download them on your PC from Google driver.



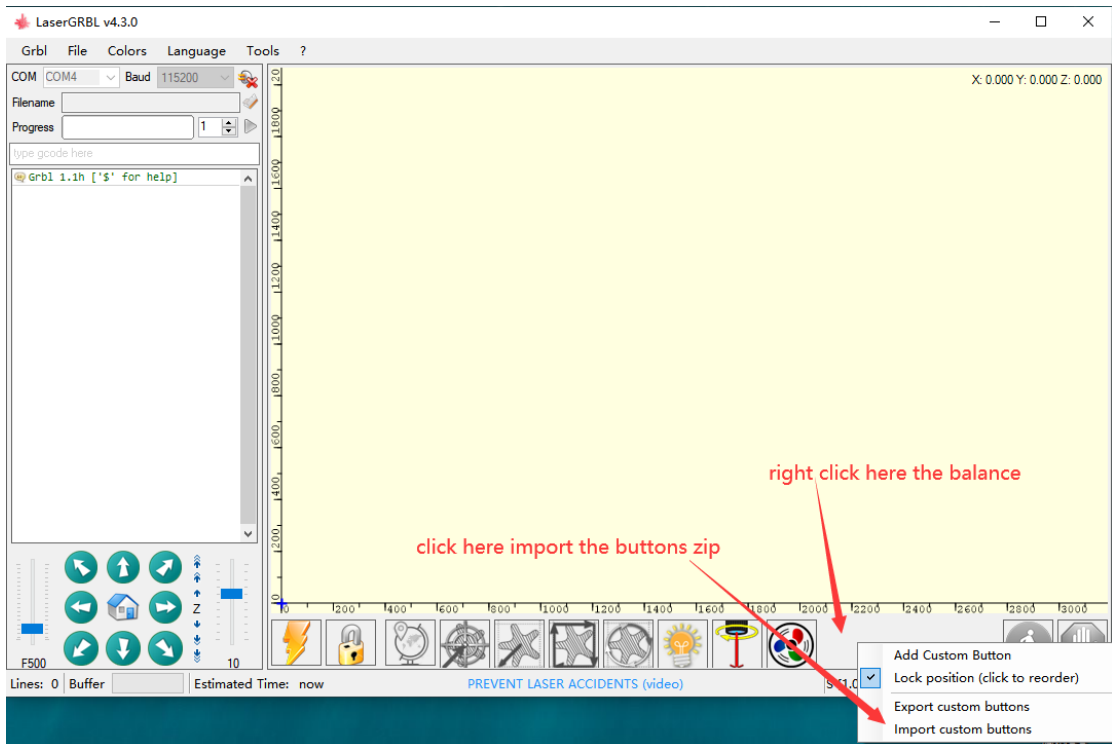
Step2). read Software interface each buttons description.

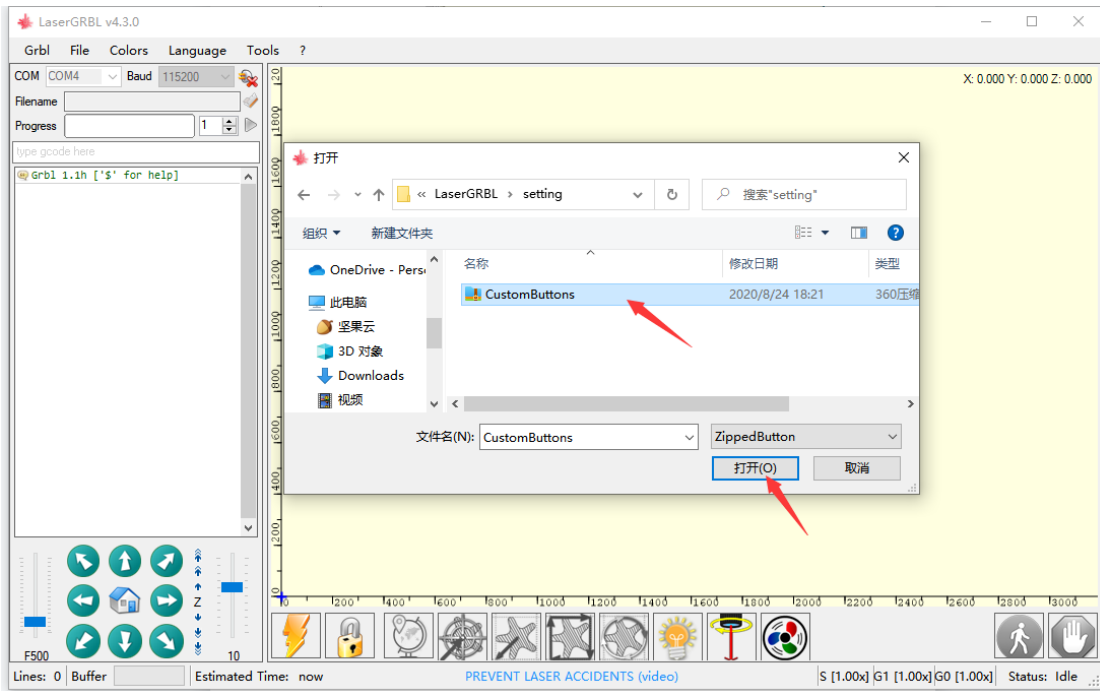




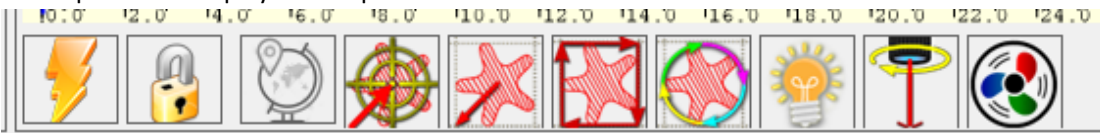
Step3).Add buttons on lasergrbl

Right click on balance, choose"import button" upload zip the file.the zip file is in document pls check it.



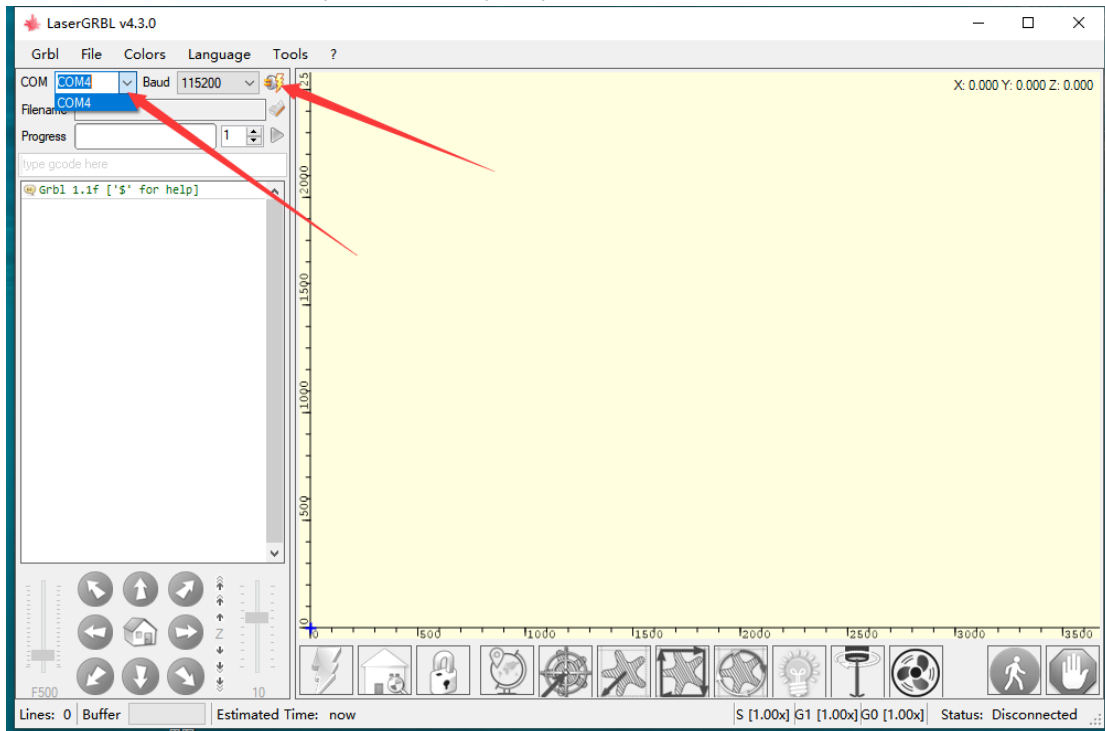


After upload will display these operation buttons.



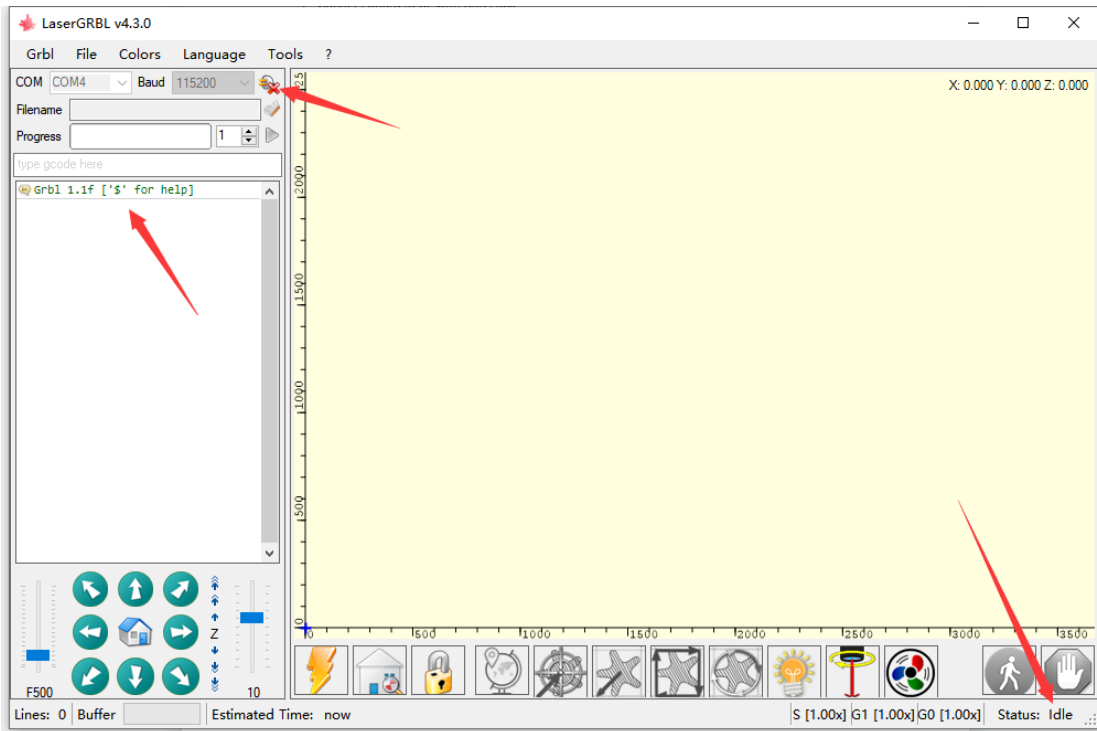
Step4). be sure usb cable is connecting and click this connecting button.

Pls choose the correct COM port which fit your pc, our driver is CH340, baud rate is 115200.



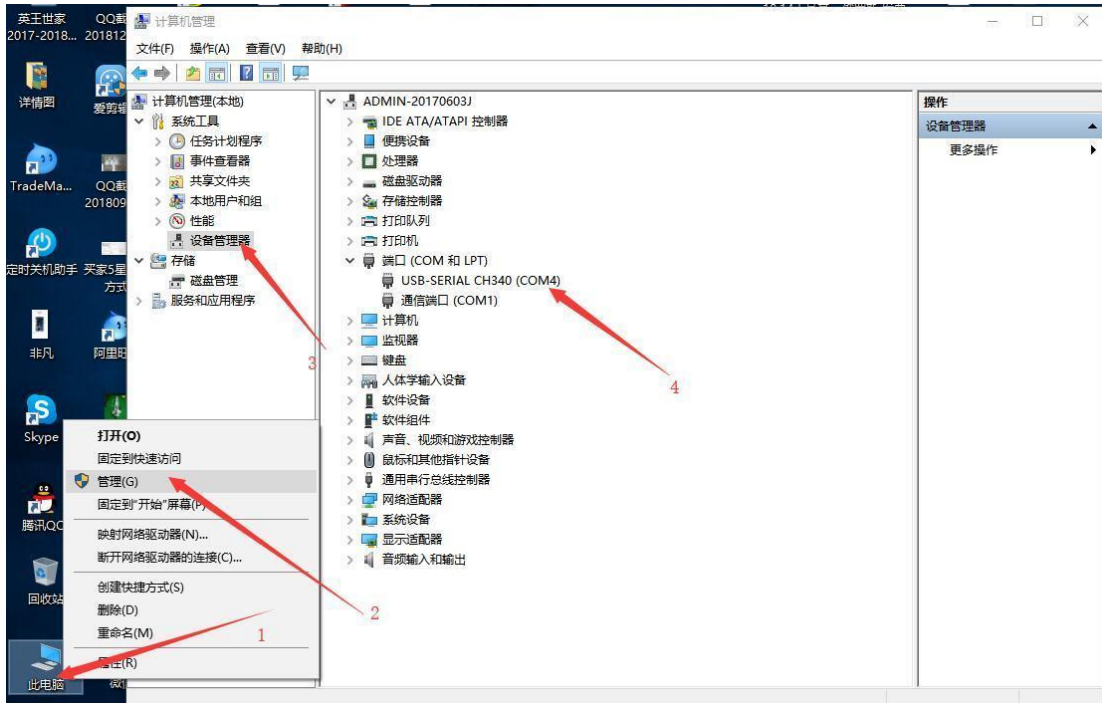
Connected

If your software status like this, mean connecting successful, our board default installing grbl 1.1.

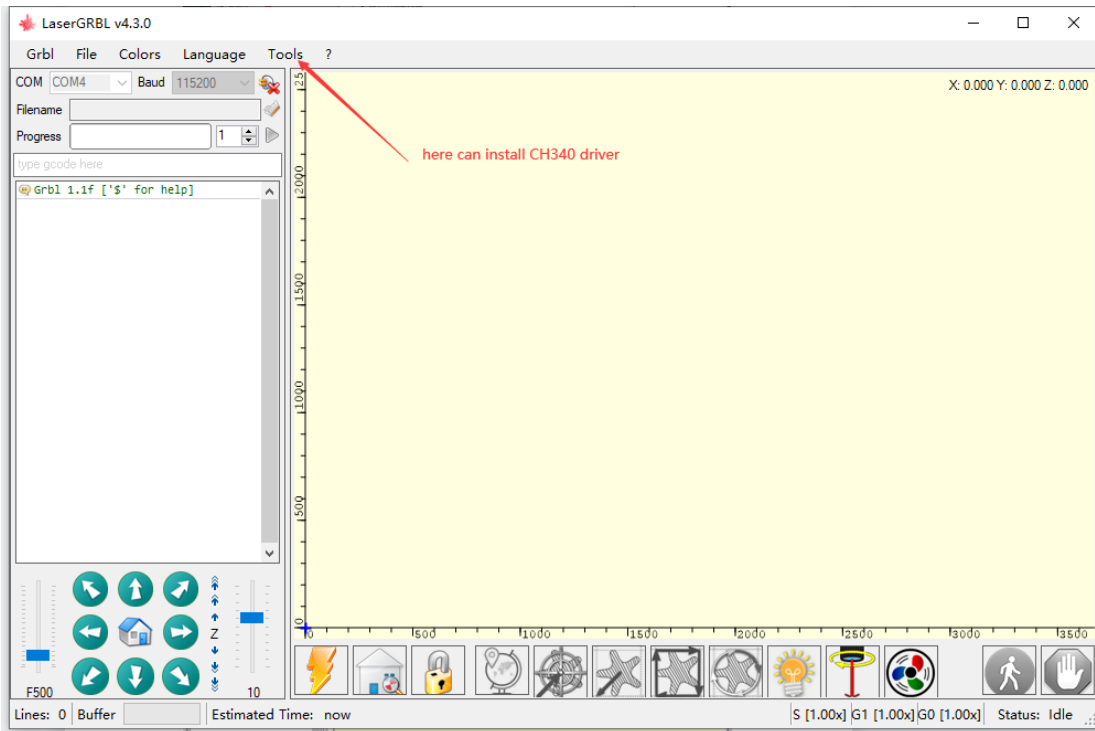


NOTE:

If you canot connect the software, pls check if you have install our Driver on your pc, the is driver name "CH340" you can check it in your PC refer the picture, pls remember what is your COM port, it maybe COM4/COM3/COM6/COM12, every PC are different.



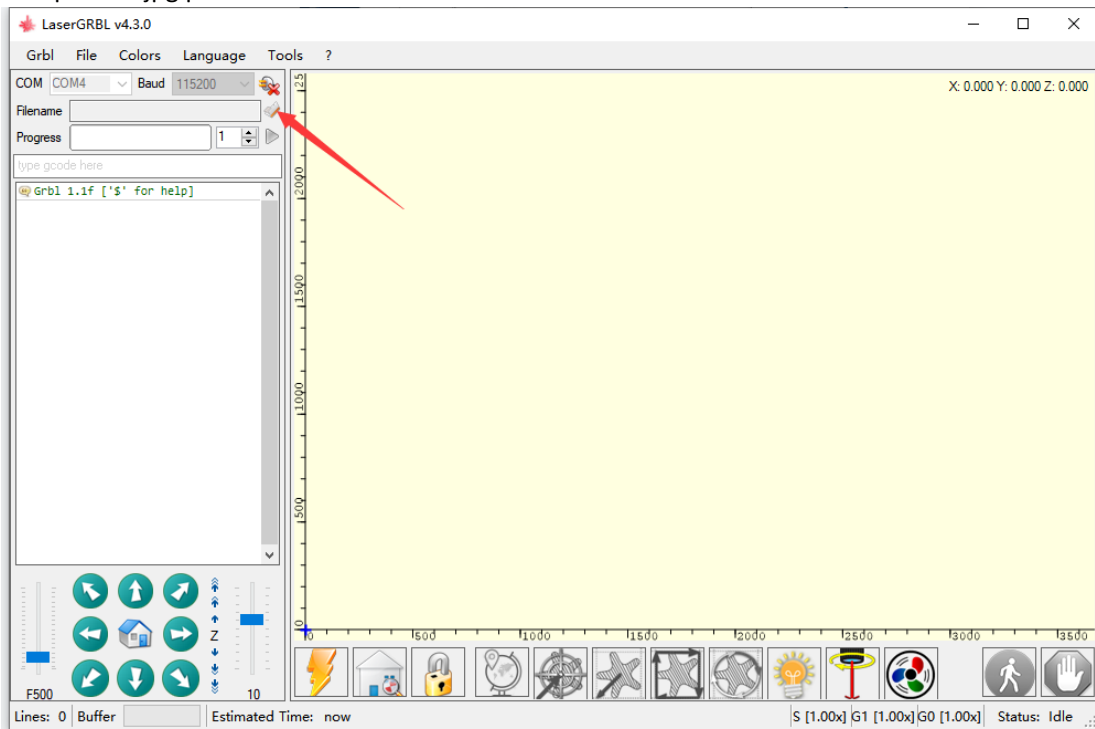
If you didnot install the driver pls try install at here for the CH340 driver.



Step5). **how to marking.**

This lasergrbl software just accept format: JPG, JPEG, BMP, Gcode, SVG, let try to use jpg file make first engraving, pls use high resolution pictures for marking then the result will more clear.

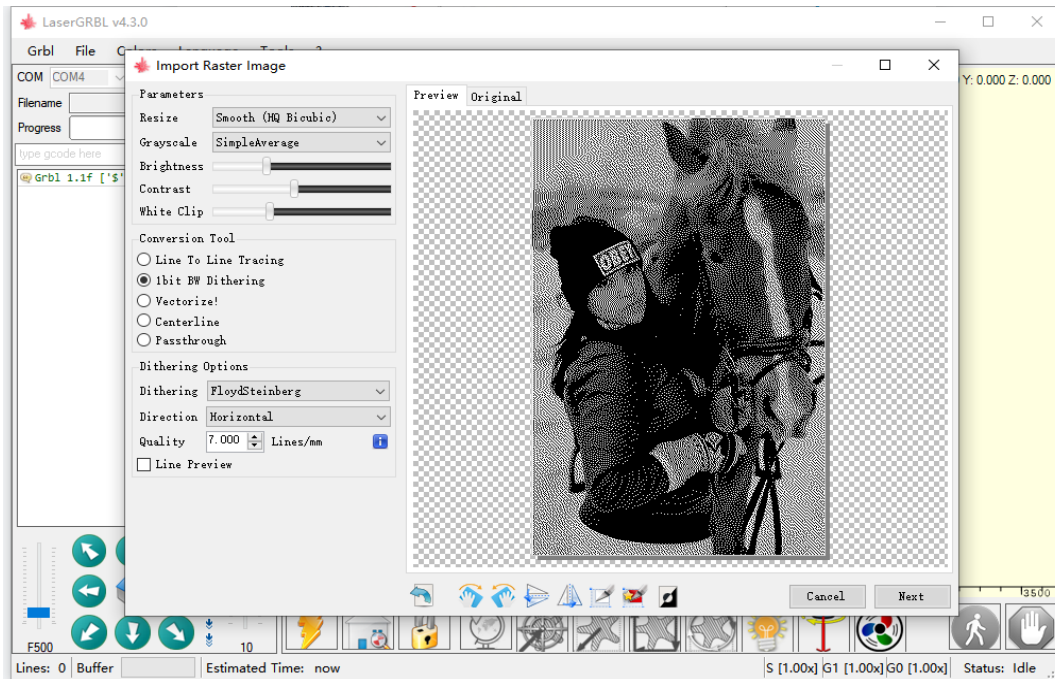
5.1.upload a jpg picture



5.2.choose setting

When you upload JPG picture it will display like this, you able to change setting, this is our suggest setting for marking on wood or leather,

click NEXT

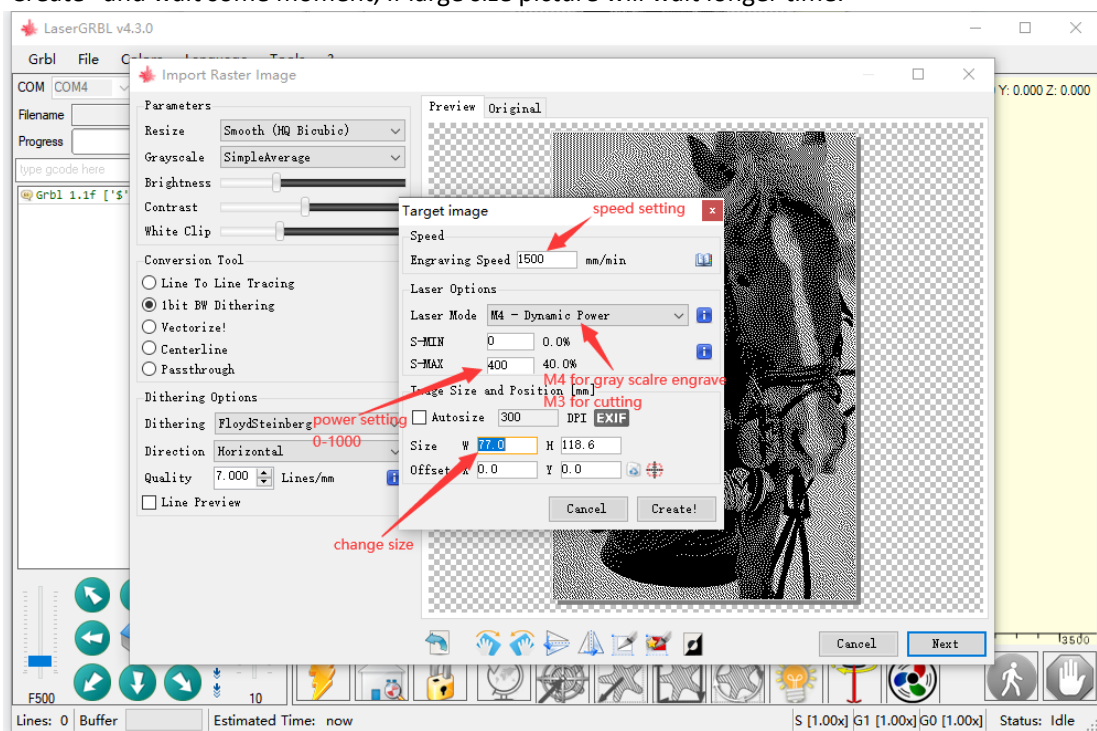


5.3. change setting

For marking: you can set faster speed and power lower;

Speed from 1000-5000, max less 5000 is ok, but we normally set about 2000-3500, but if you use bigger power laser which over 50w you can set faster. Laser mode choose M4 better for marking, M3 is for cutting.

S-MAX this is set power, you can set about 300-500%, 1000 is full, we normally set 380-400. for marking. you also able to change engraving size here, the unit is mm. after all setting just click "Create" and wait some moment, if large size picture will wait longer time.



NOTE: when marking picture you should set faster speed and lower power, speed between 1000-3500mm/s even more, power about 280-450%, if you increase speed you maybe should increase power meanwhile, if not, if not, when set speed too fast the power is too low it canot

chase the speed will missing marking for some position, pls note.

If you want cutting, just set slowly speed and high power, this is depend on how thicker wood.

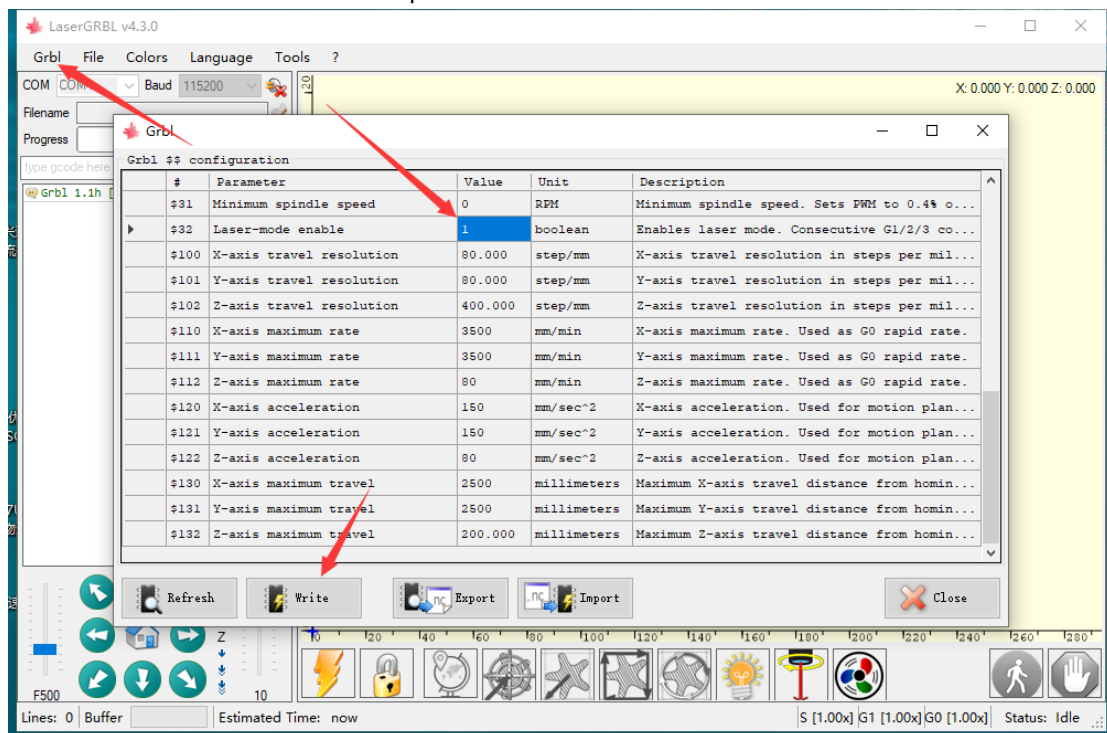
PS:

M4 button for gray scale marking,

M3 is for cutting,

But if you have no M4 button on your software pls go into grbl setting change \$32=1 write it then M4 will display. We will tell you how to add M4 following.

5.4.How add M4 button? Refer this picture.



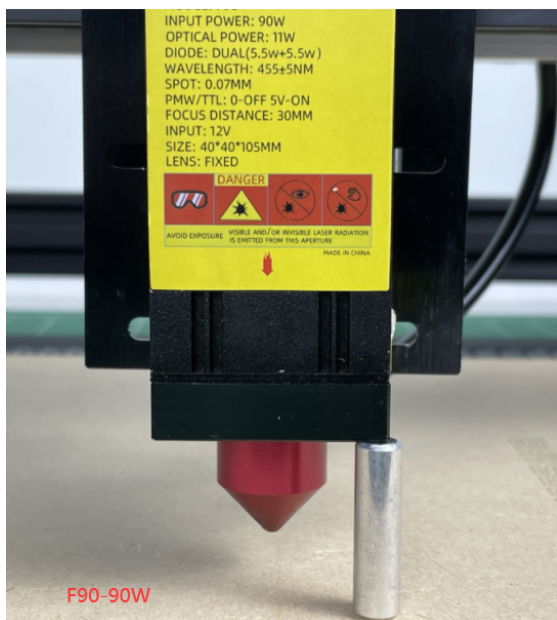
5.5.Laser Focus for Fixed lens.

*fixed lens laser mean the laser lens canot turning it keep suitable distance make the best focus, refer this method below.

Fixed lens laser will come with a metal bar which 27mm(F810series 15w 20w 40w 50w) and 30mm(F90 90w),different series laser are different focus distance.

Step1. Move the laser head to the materials engraving area,put focus bar under the shield,

Step2. adjust x axis down, take the bar away that mean done focus.



Tips1. the best focus distance maybe at ± 0.2 mm, every laser are a little different, so if your laser best distacne is 27mm but it canot clear marking on materials you try 26.8 or 27.2 or other similar maybe is his best distance.

Tips2. when you going to cutting on thicker wood which over 10mm, you can try keep focus distance longer 2-3mm than standard distance, for example your laser standard focus distance is 27mm you will cut on 10mm wood, you can adjust distance 29-30mm maybe it can cut off faster.

Tips3. when use bigger power laser for cutting wood we suggest you use air assist because it can make the wood surface much clean not burnt, but if cutting acrylic/fabric/rubber/cartboard/EVA foam/and marking you will not need air assist, it will worese result is use air assist for this work.

Tips4. how to confirm if your focus good or not? You can try set lower power marking on wood if the marking streak small which look less 0.1mm it mean focs accurat.

5.6.Laser Focus for Focus lens.

***focus lend laser mean the laser lens can turning left or right to focus the laser point till accurate, refer this method below.**

Focus laser normally can work distance from 20-45mm, but normally at 30mm the laser point will

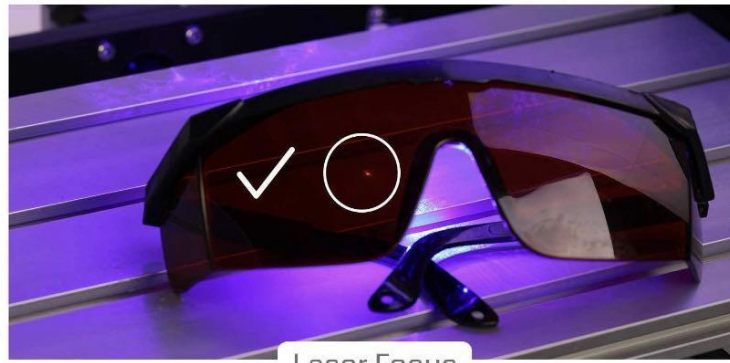
easier make accurate dot.

Step1. move the laser head to the materials engraving area.

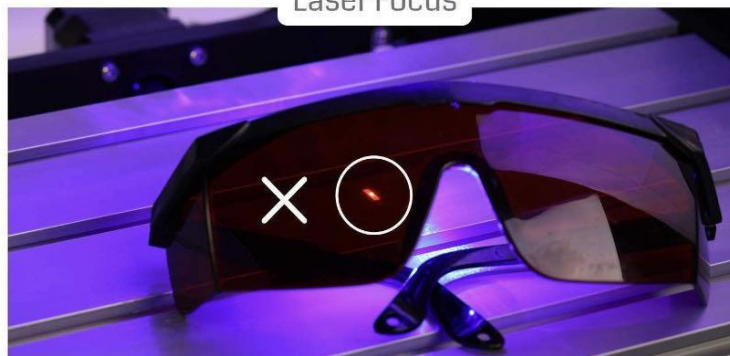
Step2. put a focus paper under the lens, if you have no focus paper you can take other thin metal sheet which better less 0.1mm thickness.

Step3. open weak power on software(note: if the laser with weak power button on circuit board just use that button instead of software).

Step4. wear goggles watch the laser point meanwhile turning lens till it look accurate like result as below picture.



Laser Focus

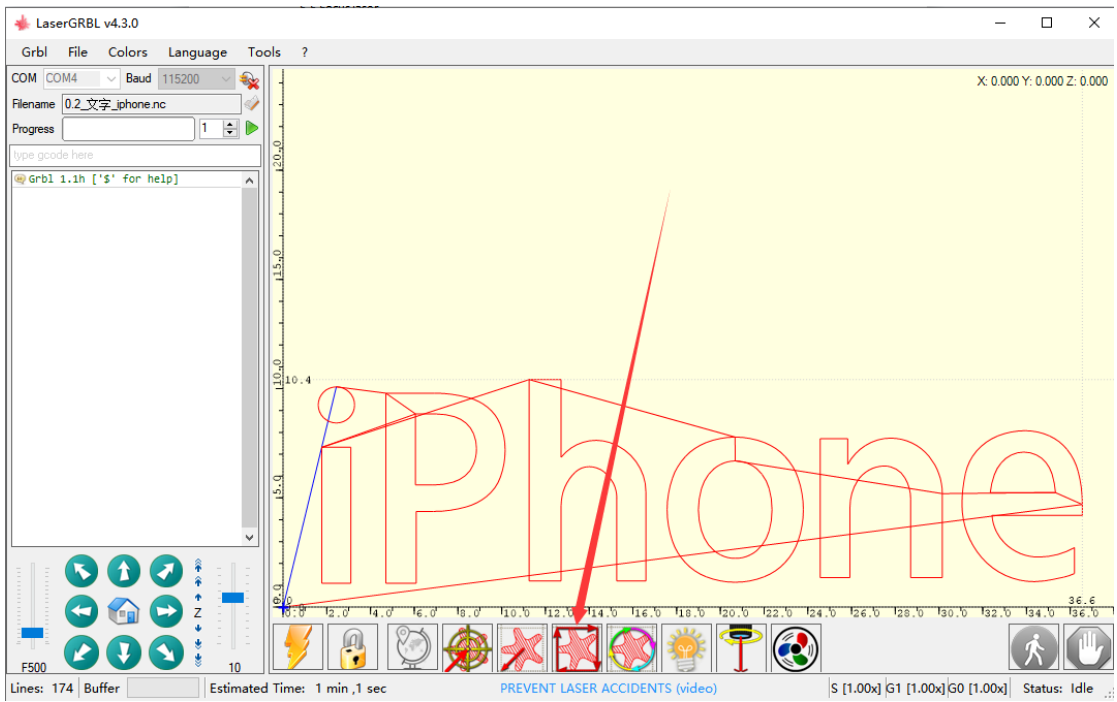


Video assist

https://drive.google.com/file/d/1xB-jSfWZjGAdvVmXYMeQ0IZkb1E3IYg/view?usp=share_link

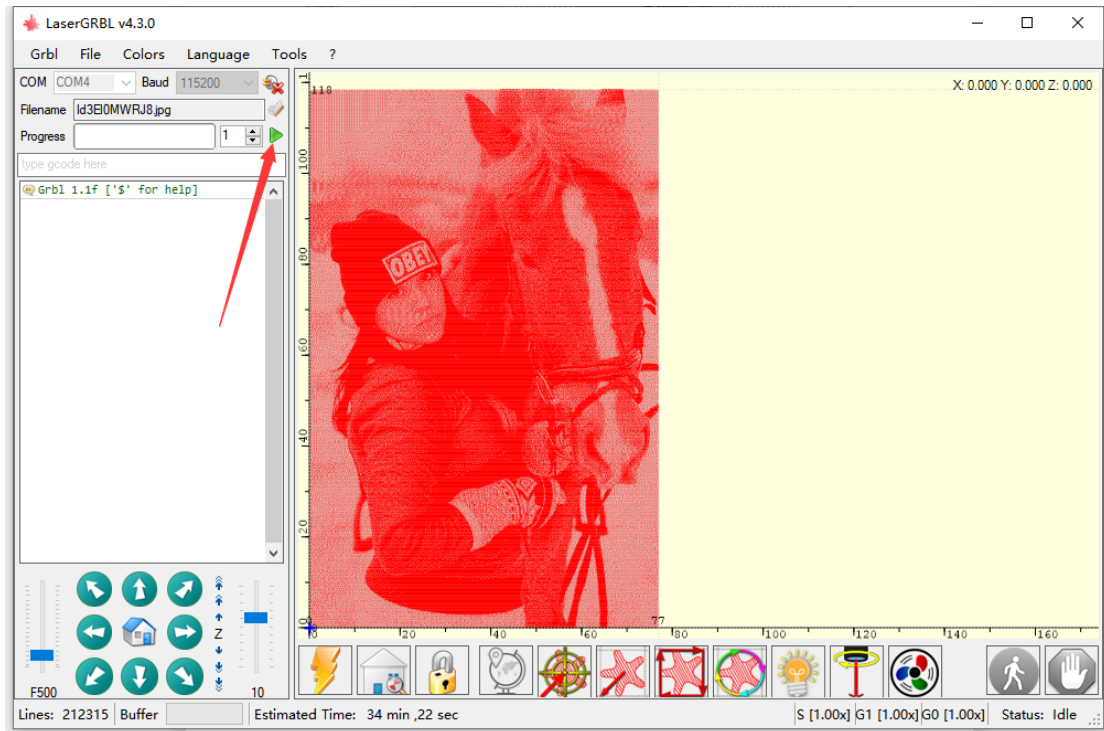
5.7.previewer the engraving area

Before engrave, you can click this frame button for previewer the engraving area, be sure laser moving area is in the materials.



5.8. Start engrave

Click start button to make your first engraving, you can read the estimated finish time below on software.





NOTE: nice engraved result is depend on the engraving surface, if wood material is worse and roughly and engraving result will be worse, different color different result like both picture above. So if your wood is not good surface or if you need other special engraving result i suggest paint colors on it for example white color or black or both, the engraved result will look much better, Just like the two pictures below, it was engraved by other customer.



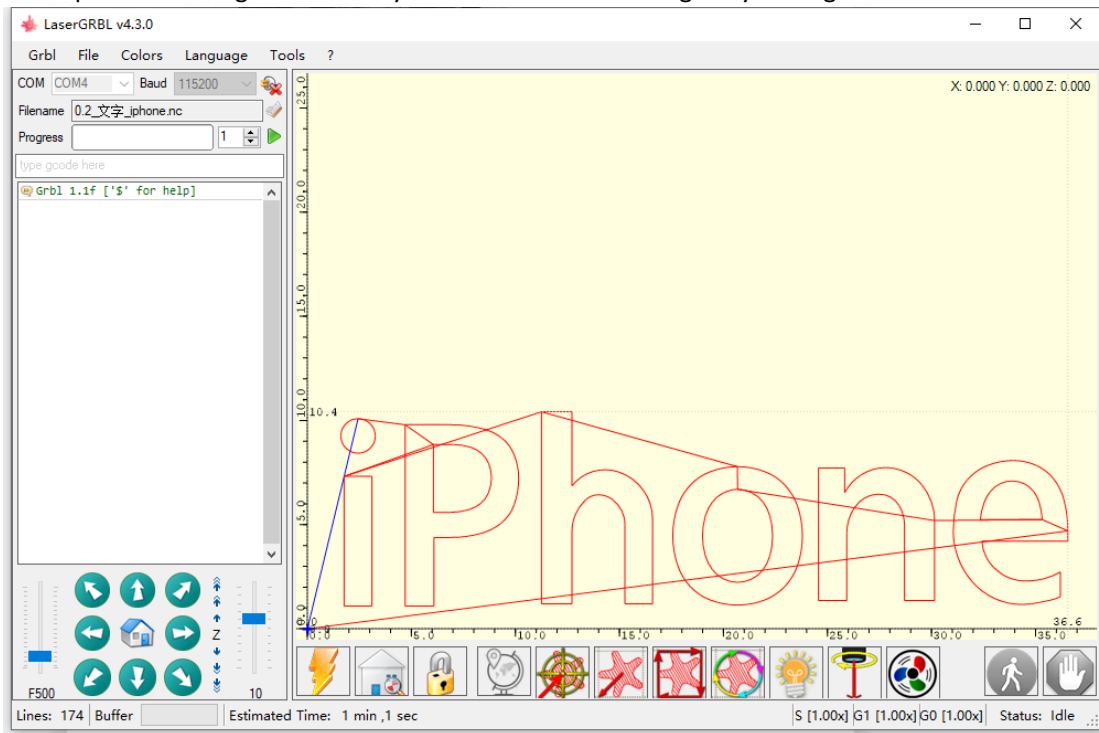
Tips. For painting color what materials advise? You can try nail polish/painting/oil paint/other. More engraving result need customers test by self, because this machine can engrave on many things included some materials we never try, but customers can try it. Or you can you search on Youtube there are so many other people share engraving method.

Video assist

https://drive.google.com/file/d/1SxtfE80aM-JhK4C4SYzhuYIK21hp-ll/view?usp=share_link

Step6). **How to cutting**

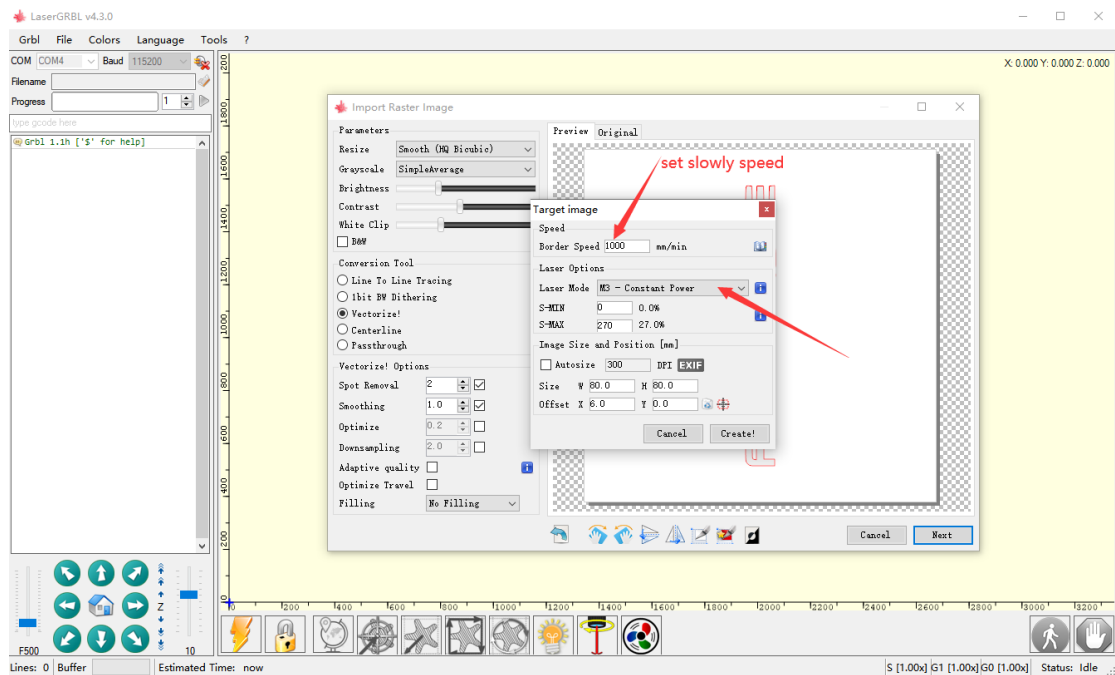
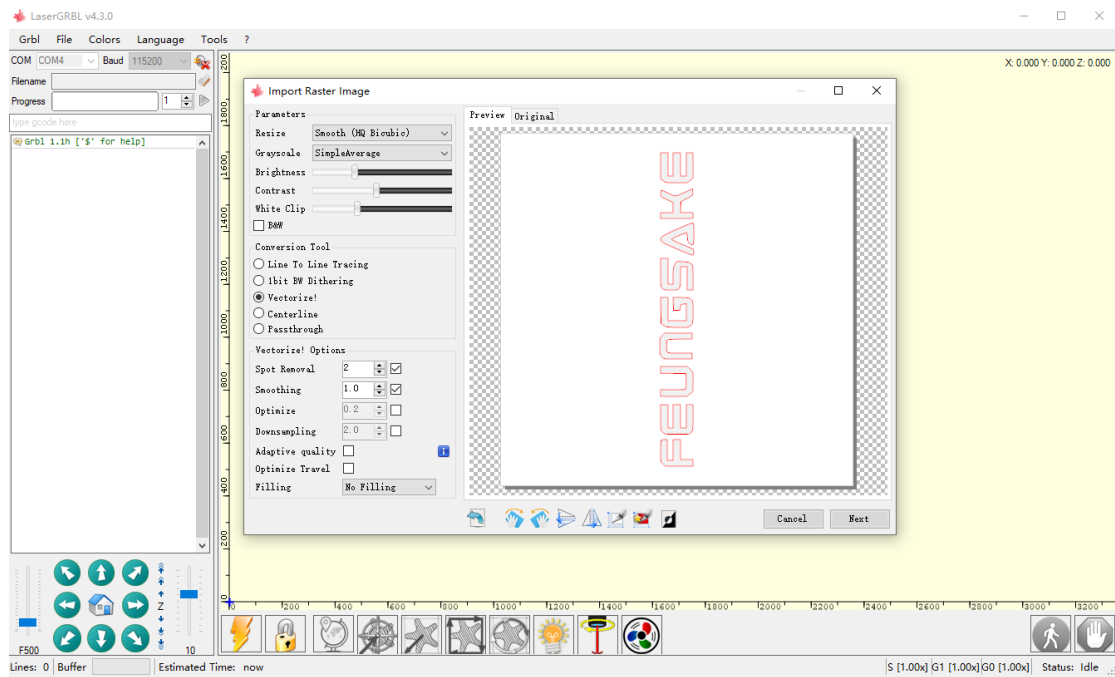
Method1. For cutting work you will upload vector file or streak file not picture, we suggest use SVG, Gcode format and you better done set the parameter when drawing on other program, after upload on lasergbl software you will not need to change any setting.



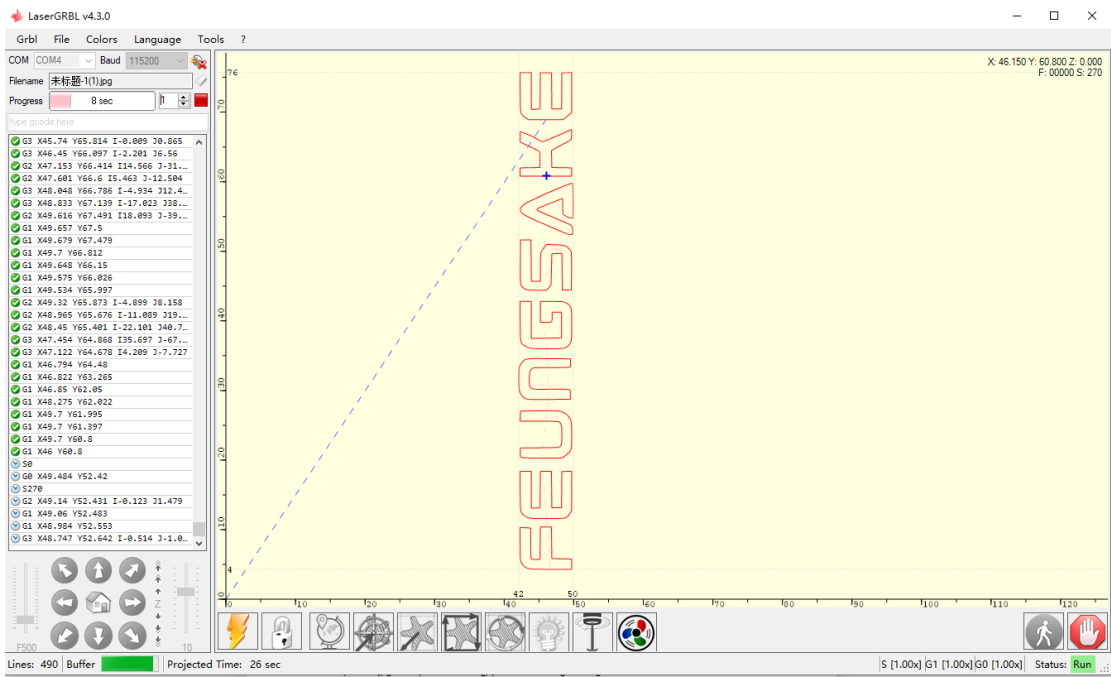
Method2. If you upload jpg format for cutting pls suggest draw the jpg file like picture below, only the letters but no other background.



Choose No Filling



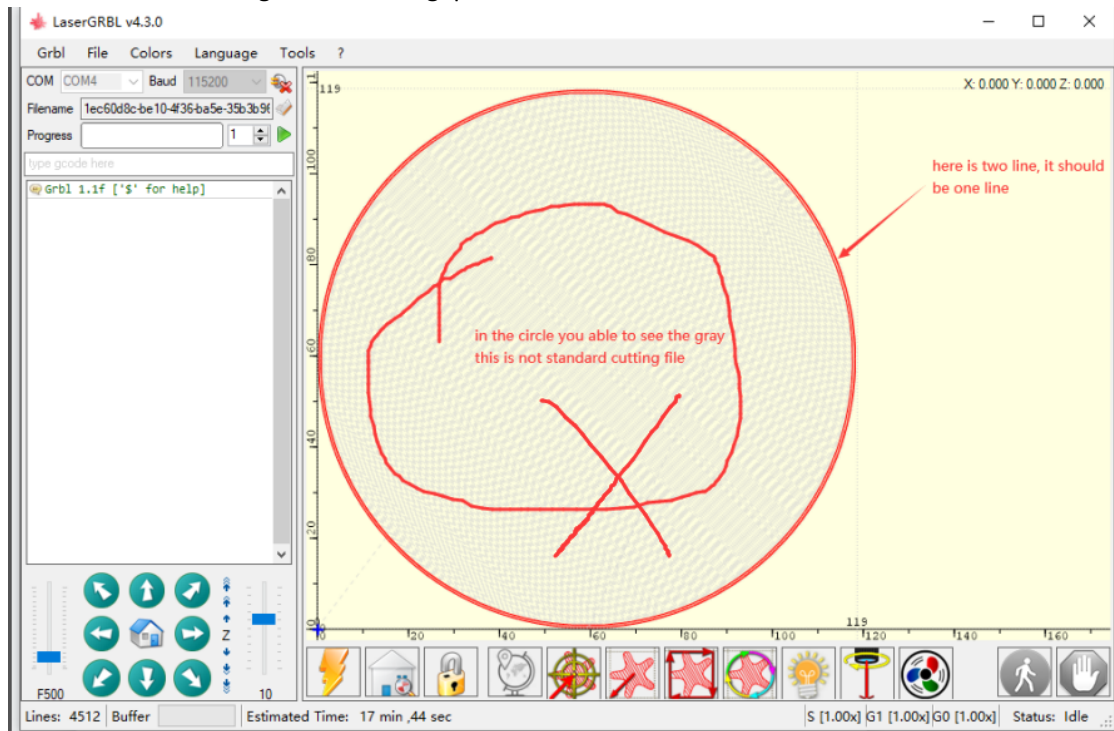
NOTE: when you set full power for cutting, pls let laser rest 5-10mins after 45mins worked,because laser diode will tire when continue work with full power, it will decrease power, all of laser have this problem. But if you set lower power for engraving it can work over 12hours no problem without rest.



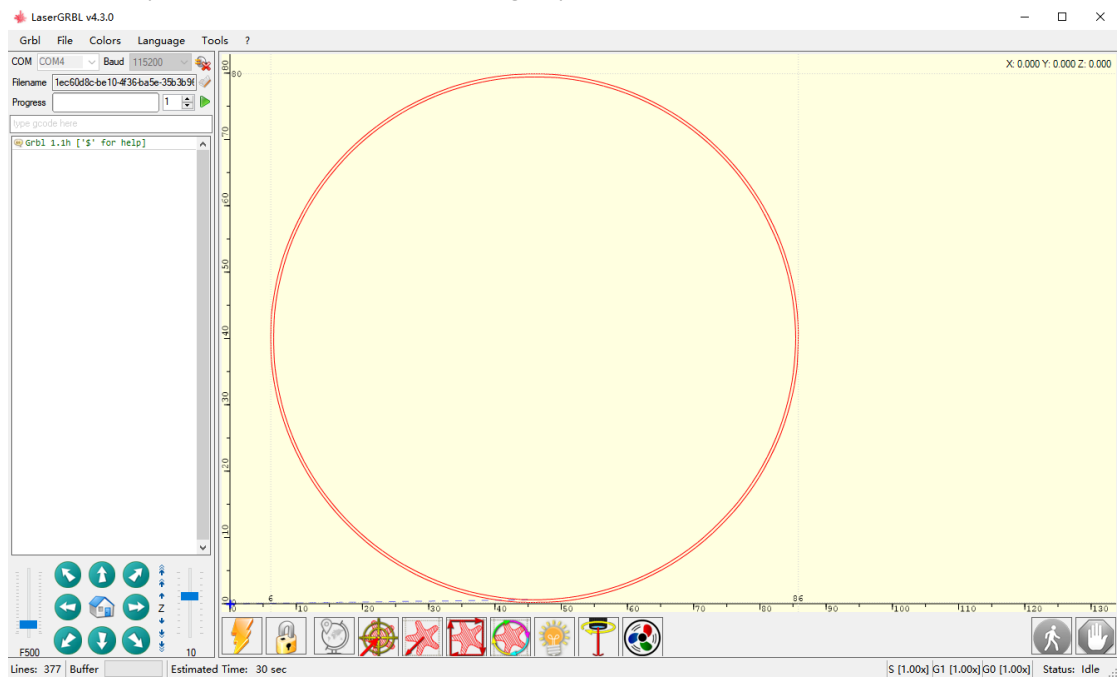
Video assist

https://drive.google.com/file/d/1rfjiiYqyVifclnObPOBZis18IPR3aNRuF/view?usp=share_link

NOTE: the file upload result like picture below is not standard, the laser will engraving middle area, so this file is not good for cutting, pls note, it must be vector file.



Just like this picture below, this file for cutting noprobem.



3.Other details.

- 1) . grbl board default setting for Laser.

Grbl

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Grbl \$\$ configuration

#	Parameter	Value	Unit	Description
\$0	Step pulse time	10	microseconds	Sets time length per step. Minimum 3usec.
\$1	Step idle delay	25	milliseconds	Sets a short hold delay when stopping to ...
\$2	Step pulse invert	0	mask	Inverts the step signal. Set axis bit to ...
\$3	Step direction invert	0	mask	Inverts the direction signal. Set axis bi...
\$4	Invert step enable pin	0	boolean	Inverts the stepper driver enable pin sig...
\$5	Invert limit pins	0	boolean	Inverts the all of the limit input pins.
\$6	Invert probe pin	1	boolean	Inverts the probe input pin signal.
\$10	Status report options	1	mask	Alters data included in status reports.
\$11	Junction deviation	1.000	millimeters	Sets how fast Grbl travels through consec...
\$12	Arc tolerance	0.002	millimeters	Sets the G2 and G3 arc tracing accuracy b...
\$13	Report in inches	0	boolean	Enables inch units when returning any pos...
\$20	Soft limits enable	0	boolean	Enables soft limits checks within machine...
\$21	Hard limits enable	1	boolean	Enables hard limits. Immediately halts mo...
\$22	Homing cycle enable	1	boolean	Enables homing cycle. Requires limit swit...
\$23	Homing direction invert	7	mask	Homing searches for a switch in the posit...

Refresh Write Export Import Close

Grbl

— □ ×

Grbl \$\$ configuration

#	Parameter	Value	Unit	Description
\$23	Homing direction invert	7	mask	Homing searches for a switch in the posit...
\$24	Homing locate feed rate	25.000	mm/min	Feed rate to slowly engage limit switch t...
\$25	Homing search seek rate	500.000	mm/min	Seek rate to quickly find the limit switc...
\$26	Homing switch debounce delay	250	milliseconds	Sets a short delay between phases of homi...
\$27	Homing switch pull-off distance	2.000	millimeters	Retract distance after triggering switch ...
\$30	Maximum spindle speed	1000	RPM	Maximum spindle speed. Sets PWM to 100% d...
\$31	Minimum spindle speed	0	RPM	Minimum spindle speed. Sets PWM to 0.4% o...
\$32	Laser-mode enable	1	boolean	Enables laser mode. Consecutive G1/2/3 co...
\$100	X-axis travel resolution	80.000	step/mm	X-axis travel resolution in steps per mil...
\$101	Y-axis travel resolution	80.000	step/mm	Y-axis travel resolution in steps per mil...
\$102	Z-axis travel resolution	400.000	step/mm	Z-axis travel resolution in steps per mil...
\$110	X-axis maximum rate	3500.000	mm/min	X-axis maximum rate. Used as G0 rapid rate.
\$111	Y-axis maximum rate	3500.000	mm/min	Y-axis maximum rate. Used as G0 rapid rate.
\$112	Z-axis maximum rate	80.000	mm/min	Z-axis maximum rate. Used as G0 rapid rate.
\$120	X-axis acceleration	150.000	mm/sec ²	X-axis acceleration. Used for motion plan...

Refresh Write Export Import Close

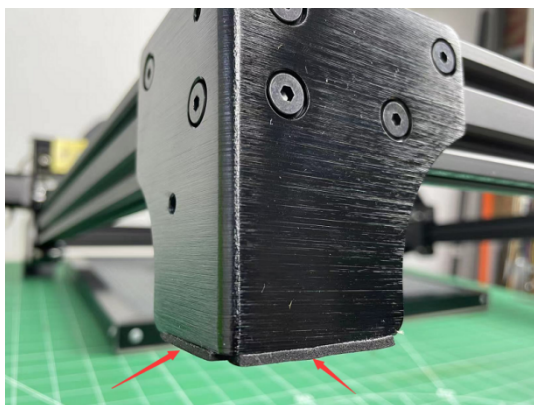
Grbl configuration window showing a list of parameters:

#	Parameter	Value	Unit	Description
\$31	Minimum spindle speed	0	RPM	Minimum spindle speed. Sets FWM to 0.4% o...
\$32	Laser-mode enable	1	boolean	Enables laser mode. Consecutive G1/2/3 co...
\$100	X-axis travel resolution	80.000	step/mm	X-axis travel resolution in steps per mil...
\$101	Y-axis travel resolution	80.000	step/mm	Y-axis travel resolution in steps per mil...
\$102	Z-axis travel resolution	400.000	step/mm	Z-axis travel resolution in steps per mil...
\$110	X-axis maximum rate	3500.000	mm/min	X-axis maximum rate. Used as G0 rapid rate.
\$111	Y-axis maximum rate	3500.000	mm/min	Y-axis maximum rate. Used as G0 rapid rate.
\$112	Z-axis maximum rate	80.000	mm/min	Z-axis maximum rate. Used as G0 rapid rate.
\$120	X-axis acceleration	150.000	mm/sec ²	X-axis acceleration. Used for motion plan...
\$121	Y-axis acceleration	150.000	mm/sec ²	Y-axis acceleration. Used for motion plan...
\$122	Z-axis acceleration	80.000	mm/sec ²	Z-axis acceleration. Used for motion plan...
\$130	X-axis maximum travel	2500.000	millimeters	Maximum X-axis travel distance from homin...
\$131	Y-axis maximum travel	2500.000	millimeters	Maximum Y-axis travel distance from homin...
\$132	Z-axis maximum travel	200.000	millimeters	Maximum Z-axis travel distance from homin...

Buttons: Refresh, Write, Export, Import, Close

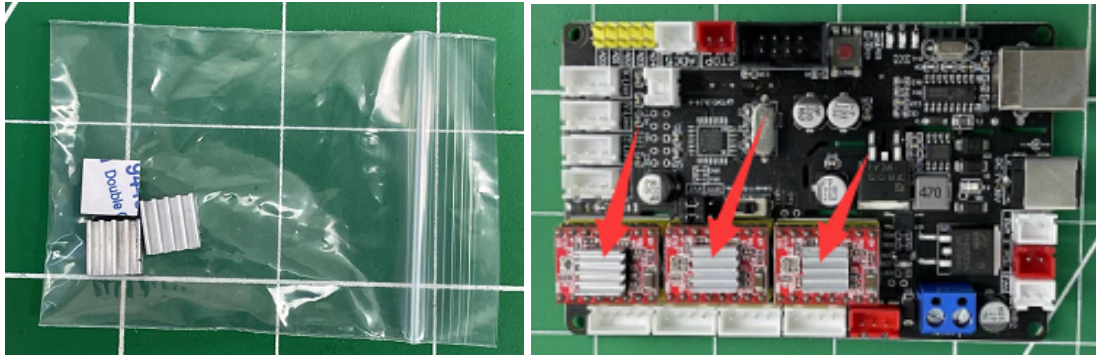
2) . how to use the EVA foam?

It use for stick under the feet for keep machine more stable, like picture below.



3). how to use the cooling fin?

It use for stick on the motor chip for cooling, but pls donot make the board circuit short when you stick this on chip, because so many other electronic part near the IC chip and the cooling fin is make of metal.

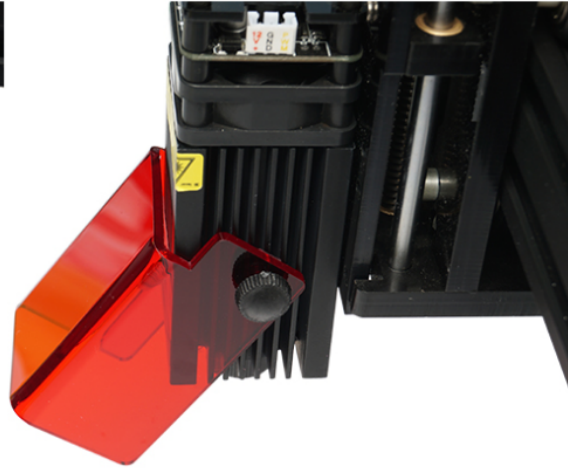
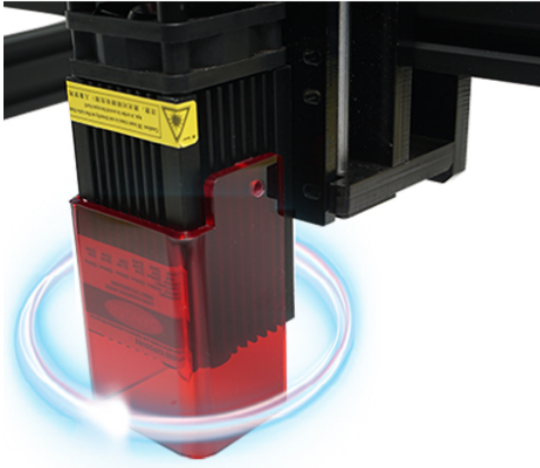


4). how to stick the yellow lable?
Just stick it on X axis aluminum left side.

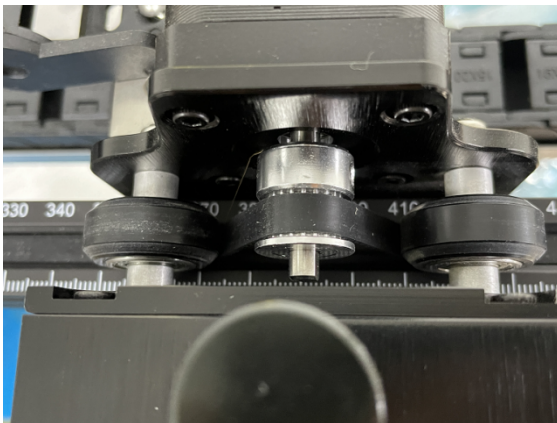
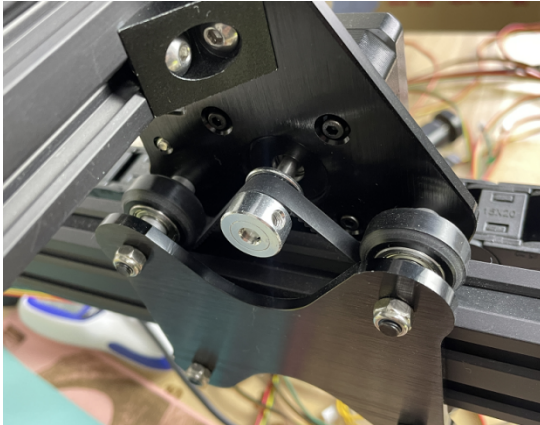


5).how to mount the laser eyes protect cover?





6.)how to fix the belt on axis?

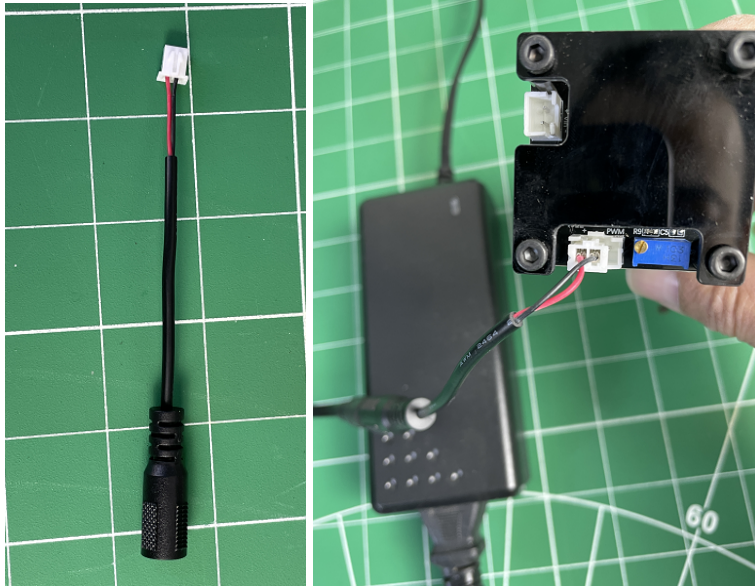




7). how to use the DC spara cable?

The DC cable just for test laser only, machine work not need this cable.

Test method: connect the DC cable to laser 12v + - port normally laser will be working continue with full power, this status is correct, if not means the laser is damaged, this method is very fast and accurate test laser fine or damage.



8). laser marking and engraving parameter.

NOTE: the parameter just test on small area which 20*20mm circle, if you do the same work on larger size it will not cut such depth, because laser will tire after longer time working with full power. So the parameter only for reference.

F810 40W 50W		The data is for reference only and subject to your actual test		
Material	Marking	etching	Cutting	
Plywood	√	√	√	≤5mm
MDF wood	√	√	√	≤5mm
Balsa wood	√	√	√	
Birch wood	√	√	√	≤5mm
Pine wood	√	√	√	≤10mm
Acrylic(black Color)	√	√	√	≤5mm
Acrylic(Transparent)	√	√	x	
Corrugated cardboard	√	√	√	≤8mm
Kraft paper	√	√	√	
Paper board	√	√	√	
A4 paper(with color)	√	x	√	
A4 paper(white)	x	x	√	
Bamboo	√	√	√	
Stamp rubber	√	√	x	
Non woven	√	x	√	
Canvas	√	x	√	≤1mm
Fabric polyester	√	x	√	
Synthetics Fabric	√	x	√	≤1mm
Jeans	√	√	√	≤1mm
Synthetics leather	√	√	√	≤2mm
Plastic	√	√	√	≤2mm
PPR	√	√	x	
EPE foam	x	x	x	
EVA foam	√	√	√	≤8mm
Bakelite	√	√	x	
Glass	√	√	x	
Cobblestone	√	√	x	
Brushed Ceramic	√	√	x	
Printed Metal	√	x	x	
Anodized Aluminum	√	x	x	
Stainless Steel	√	√	x	
Mirror Stainless Steel	√	x	x	
Stainless steel sheet	√	x	x	≤0.05mm
Red wine glass	x	√	x	
Stainless steel vacuum cup	√	x	x	
Slate stone	√	√	x	
Gold	x	x	x	
Silver	x	x	x	
Iron	x	x	x	

NOTE: Regarding cutting, the above data is based on a small area of 20*20mm test about the maximum cutting thickness, just the approximate thickness, Subject to your own actual testing, but when you cut in a large area, the power will decrease a little meanwhile the cutting thickness will decrease, this is a normal phenomenon of lasers, for reference only.

F810-50W Cutting parameters

Tested Software	Materials	Thickness	Speed	Power	Pass
Lightburn	Pine	8mm	150mm/min	100%	4
		10mm	100mm/min	100%	6
	Plywood	5mm	130mm/min	100%	4
		Acrylic	5mm	130mm/min	100%
	Birch wood	2.5mm	250mm/min	100%	1
		5mm	100mm/min	100%	6
MDF	3mm	150mm/min	100%	1	

NOTE: the tested date were tested on size about 20*20mm, Subject to your own actual testing, but when you cut in a large area, the power will decrease a little meanwhile the cutting thickness will decrease, this is a normal phenomenon of lasers, for reference only.

F90 90W		The data is for reference only and subject to your actual test		
Material	Marking	etching	Cutting	
Plywood	√	√	√	≤10mm
MDF wood	√	√	√	≤9mm
Balsa wood	√	√	√	
Birch wood	√	√	√	≤15mm
Pine wood	√	√	√	≤20mm
Acrylic(black Color)	√	√	√	≤20mm
Acrylic(Transparent)	√	√	×	
Corrugated cardboard	√	√	√	≤10mm
Kraft paper	√	√	√	
Paper board	√	√	√	
A4 paper(with color)	√	×	√	
A4 paper(white)	×	×	√	
Bamboo	√	√	√	
Stamp rubber	√	√	√	≤2mm
Non woven	√	×	√	
Canvas	√	×	√	≤1mm
Fabric polyester	√	×	√	
Synthetics Fabric	√	×	√	≤1mm
Jeans	√	√	√	≤1mm
Synthetics leather	√	√	√	≤2mm
Plastic	√	√	√	≤2mm
PPR	√	√	√	≤2mm
EPE foam	×	×	×	
EVA foam	√	√	√	≤15mm
Bakelite	√	√	×	
Glass	√	√	×	
Cobblestone	√	√	×	
Brushed Ceramic	√	√	×	
Printed Metal	√	×	×	
Anodized Aluminum	√	×	×	
Stainless Steel	√	√	×	
Mirror Stainless Steel	√	×	×	
Stainless steel sheet	√	√	√	≤0.05mm
Red wine glass	×	√	×	
Stainless steel vacuum cup	√	×	×	
Slate stone	√	√	×	
Gold	×	×	×	
Silver	×	×	×	
Iron	×	×	×	

NOTE: Regarding cutting, the above data is based on a small area of 20*20mm test about the maximum cutting thickness, just the approximate thickness, Subject to your own actual testing, but when you cut in a large area, the power will decrease a little meanwhile the cutting thickness will decrease, this is a normal phenomenon of lasers, for reference only.

F90-90W Cutting parameters

Tested Software	Materials	Thickness	Speed	Power	Pass
Lightburn	Pine	10mm	150mm/min	100%	4
		20mm	100mm/min	100%	6
	Plywood	5mm	180mm/min	100%	1
		10mm	100mm/min	100%	4
	Acrylic	5mm	180mm/min	100%	1
		10mm	100mm/min	100%	6
	Birch wood	20mm	100mm/min	100%	18
		10mm	80mm/min	100%	1
	MDF	5mm	200mm/min	100%	3
		9mm	200mm/min	100%	16

NOTE: the tested date were tested on size about 20*20mm, Subject to your own actual testing, but when you cut in a large area, the power will decrease a little meanwhile the cutting thickness will decrease, this is a normal phenomenon of lasers, for reference only.

4.FQA

1. How engraving on glass, on transparent materials?

Should put a layer of black color on glass first, laser engrave on the black color, after engraved just remote the color is ok. The laser cannot engrave on transparent directly.



2. How marking on stainless steel?

Adjust laser to the best focus distance, if you use F810 series 50w you keep 27mm from laser burron to steel surface, set full power 100%, lower speed less 500mm/mins, it can be easier mark on steel surface. But F710 series cannot mark on metal.



3. Can the laser marking on all of metal?

No, the laser just mark on stainless steel, if 90w and 160w will mark on aluminium oxide surface.

4. Can the laser cut metal?

No, this laser is not for cutting metal but wood, fabric, bamboo, leather these soft materials, but the bigger power laser like 90w and 160w it can cut 0.05mm steel sheet, but we not suggest use this laser for cut steel sheet, the result is not very nice.

5. Can the laser engrave on high reflective materials just like mirror?

It is better donot often engrave on high reflective, this will easy damage the laser diode, if you really mark on it pls donot keep the laser straight toward to the materials but fix a little bend face to it.

6. how to cut thicker wood? Any good idea?

If you use bigger power which over 90w for cutting thicker wood, you can try to keep the best distance to the wood middle position, for example, the wood is 10mm thickness, use 90w laser best focus distance to wood surface is 30mm, you can adjust distance 26mm to surface is ok, means your focus target is close to middle of the wood not surface.

7. Can laser head and z kit mounting on a machine together?

Yes, but leave longer belt before you mounting it, because both head will need longer belt, but two head cannot working at the same time, it have to work separate, when you run laser should push the z kit to corner.

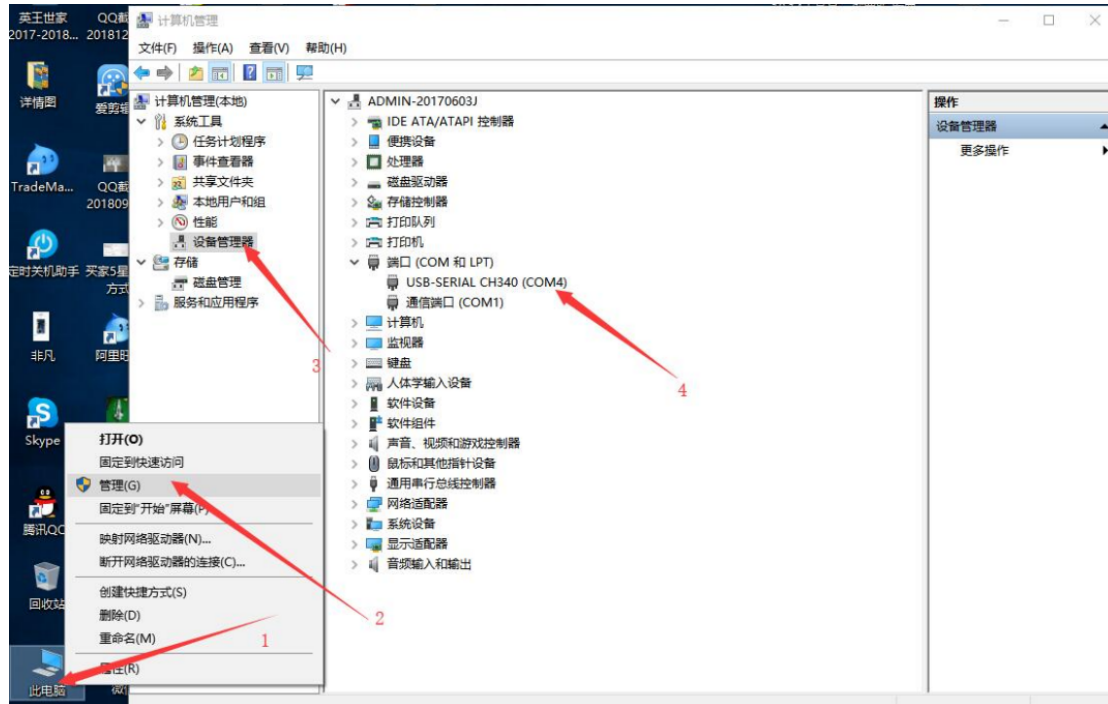
8. Laser and z kit and rotatory can work at one software?

Yes, normally on lasergrbl, but z kit only for with gcode file, laser can work with jpg, bmp, svg,

pdf, dxf. Rotatory is same like laser, it just replace the Y axis of machine, when usse rotatory should disconnect machine both Y axis cable, just connect right side Y cable to rotatory is ok and remember change Y grbl setting step to 64. machine should set 80.

9. I canot connect USB to my PC?

Pls check if your pc has install our driver the name is CH340, pls check on your pc, if no have pls try install it, you can open lasergrbl software at right corner you able click to install CH340.



10. Can i update my grbl board?

Yes, pls download the Xloader 1.1 frimware on your pc and read the video first you will know how to update it.

1.1grbl firmware-Xloader

<https://drive.google.com/drive/folders/1f-UcNV05SBTXVolrS9tZAFzSSWlCk3bk?usp=sharing>

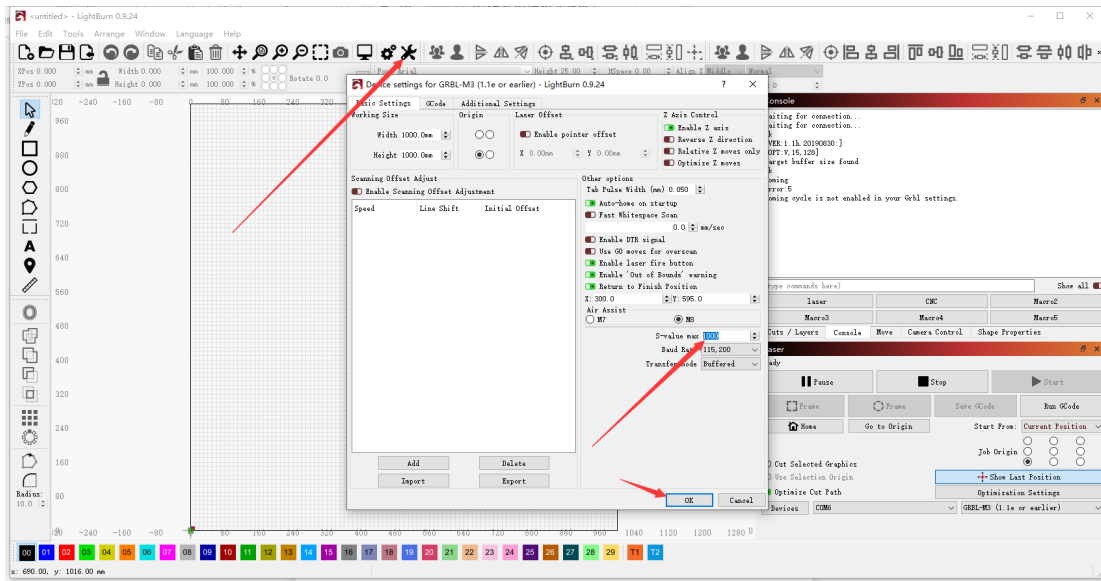
Operation video

https://drive.google.com/file/d/1434FkoBWOT_20YWNvo2HfDLCTIGdERpt/view?usp=share_link

11. How long worked after should i give laser rest?

When you set full power for cutting About after 45mins should pause the laser let it rest 5-10mins, this can keep longer life span and laser will bigger power again after rest.

12. Pls check you should set button "S-value Max" to 1000 on lightburn, if you set lower at here the laser power will come smaller power output.



MORE FAQ WILL UPDATE IN FUTURE.
THANKS