BF330-C Series
2D Galvanometer laser welding head

Electrical and Software User Manual

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Thank you for choosing our company product!

This manual provides a detailed introduction of the use of the BF330-C series 2D Galvanometer laser welding head, including installation, operation, maintenance instructions, etc.If you want to know more, please contact our company.

Please read this manual in details before using BF330-C series products, which will help you to use it better.

Due to the continuous update of product features, your product received may differ in some ways from the statement in this manual. We apologize!

catalogue

preface

Thank you for choosing our BF330-C series products! In order to ensure that you can use it correctly, please carefully read the BF330-C series product manual before use, this manual is mainly for the BF330-C series 2D galvanometer welding head basic installation, factory setting, operation and maintenance services, due to the different product configuration, some products do not have the functions listed in the manual, please focus on the actual products;

Due to the continuous upgrading and improvement of products, some functions of this book may be slightly different from the actual product, please refer to the actual product;

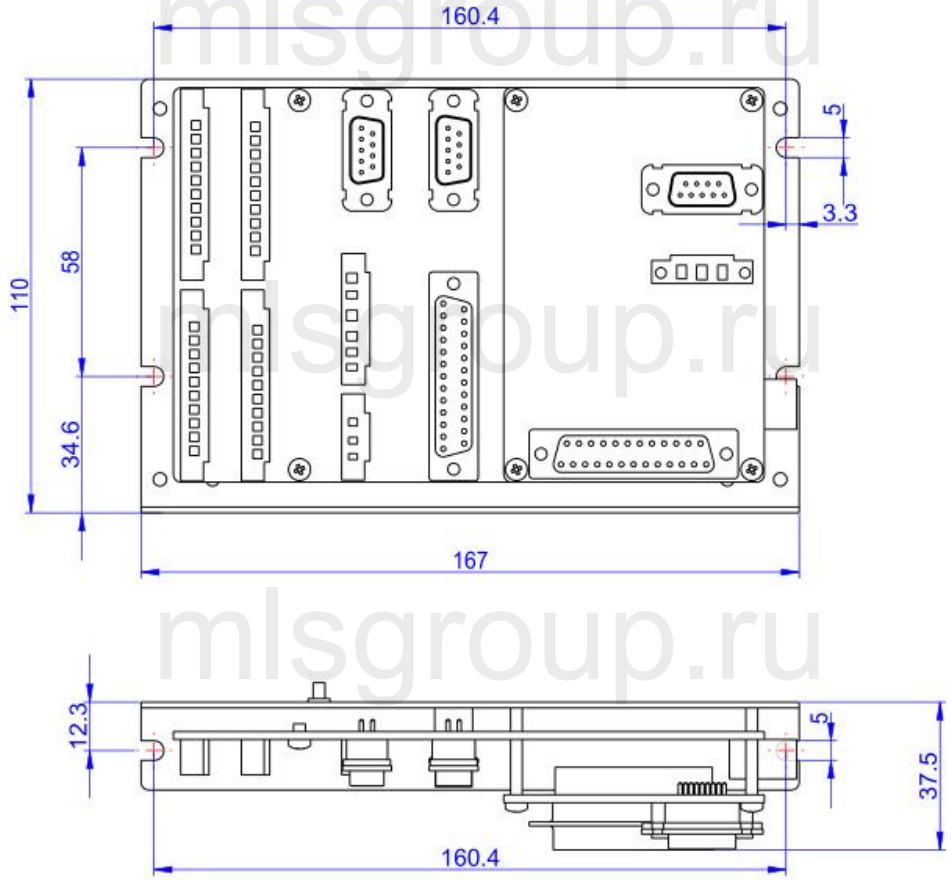
For the safety of operators and mechanical equipment, please be sure to install and operate the equipment by professional laser engineers, if there are any problems in the use process, please contact our after-sales service center, we will arrange professional engineer to serve!

PDU Control system

1 Overview

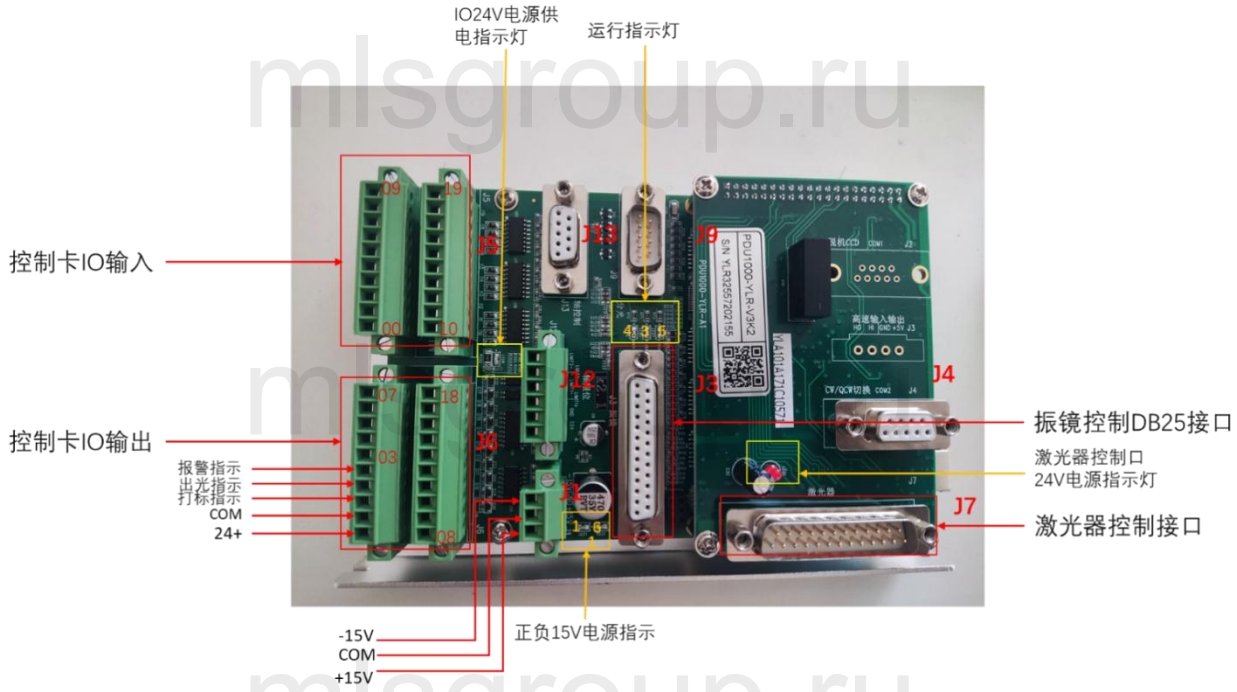
The PDU1000-V3K2 series marking control card is specially developed for laser welding and marking control card, which is connected to the computer through the USB port.

2 Installation size



3 LED indicator instructions Note

After the control card is powered on, check the LED1 and LED6 lights immediately. If there is any abnormality, power off immediately and check the wiring.



Number	explain
LED1	Negative power supply indicator
LED6	Positive power supply indicator
LED3	Card idle indicator
LED4	Under working
LED5	Error indicator light

4 interface specification

4.1 Power interface (J1,3PIN terminal)

The galvanometer voltage range is 8V~18V, power rate> 5W.

The the J3 port is void:

Pin number	Name on card	direction	Power supply	Power rate
1	+15V	input	8V~18V	>5W
2	GND	input	GND	
3	-15V		void	

The J3 port is connected:

Pin number	Name on card	direction	Power supply	power	Power supply cable
1	+15V	input	+15V	+ 5W	≥ 0.75 mm^2
2	GND	input	GND	+ 5W	≥ 0.75 mm^2
3	-15V	input	-15V	+ 5W	≥ 0.75 mm^2

4.2 Galvanometer control interface (J3, DB25 Female type)

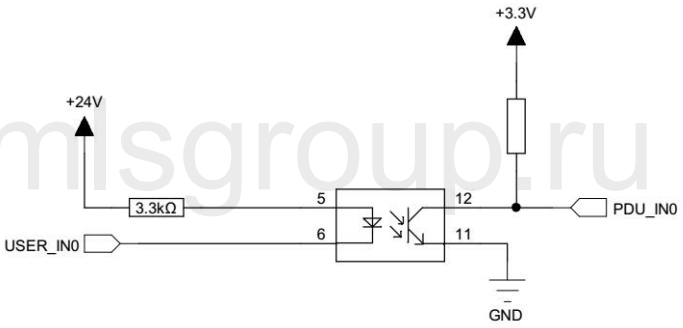
The galvanometer's signal is a differential cable; if the signal cable length is more than 3m, the length of signal cable should be less than 20m; if galvanometer's power supply is supplied from J3, the power supply cable diameter should be more than 0.75 mm^2

pin	name	explain	direction		pin	name	explain	direction
1	Clk-	clock signal -	output		14	Clk+	clock signal +	output
2	Sync-	synch-	output		15	Sync+	synch +	output
3	X_data -	X signal-	output		16	X_data +	X signal +	output
4	Y_data -	Y signal-	output		17	Y_data +	Y signal +	output
5	X_fb -（A-）	X Feedback- (multiplexing, A-)	import		18	X_fb+（A+）	X feedback + (multiplexing, flight A +)	import
6	Y_fb-（B-）	Y Feedback- (multiplexing, B-)	import		19	Y_fb+ (B+)	Y feedback + (multiplexing, B +)	import
9/10/22	+15V	power supply + 15V	Output, connecte pin 1 and J1		11/23/24	GND	GND, power supply reference point	Output, connect pin 2 and J1

12/13/25	-15V	power supply -15V	Output, connecte pin 3 and J1		7/8/20/21	NC	Remaining	

4. 3 User Input signal (J5)

The general input I / O interface circuit is as follows.



To ensure that the normal low level current must be greater than 2.5mA, VCC-VinL> 8V, If the supply voltage is 24V, VinL should be less than 15V.

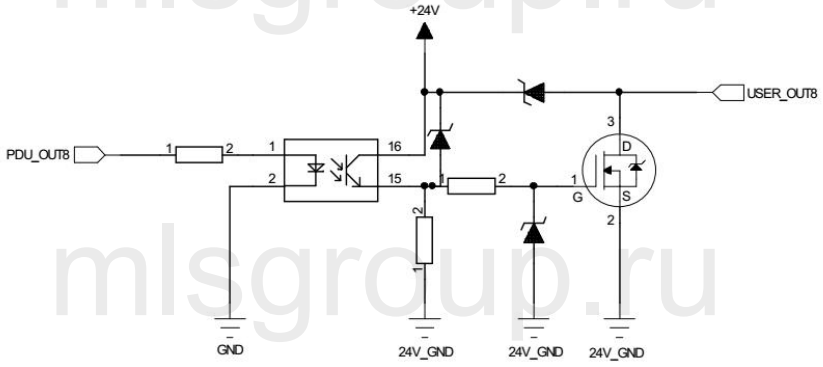
At high level, the leakage current must be less than 0.25mA, that is, VCC-VinH<0.8V. If the power supply voltage is 24V, VinH should be greater than 23.2V.

pin	name	explain		pin	name	explain
IN_A				IN_B		
1	I0	Foot (default)		11	I10	general IO statement I/O
2	I1	general IO statement I/O		12	I11	general IO statement I/O
3	I2	general IO statement I/O		13	I12	general IO statement I/O

4	I3	general IO statement I/O		14	I13	general IO statement I/O
5	I4	general IO statement I/O		15	I14	general IO statement I/O
6	I5	Common input I / O (for object detection input in flight)		16	I15	general IO statement I/O
7	I6	general IO statement I/O		17	I16	general IO statement I/O
8	I7	general IO statement I/O		18	I17	general IO statement I/O
9	I8	general IO statement I/O		19	I18	Pause signal
10	I9	general IO statement I/O		20	I19	break alarm

4.4 User Output IO (J6)

O0~O7 is 500mA current output port, the circuit is as follows:



Pin No	Signal name	maximum output current	explain		Pin No	Signal name	Output current	explain
J6_A					J6_B			
1	I24V	Input, user I / O power supply	The power supply current shall be greater than the sum of I / O input and output current		11	O8	6mA	
2	ICOM	User I / O power supply grounding			12	O9	6mA	
3	O0	500mA	marking indication, special IO		13	O10	6mA	
4	O1	500mA	Light-out indication, dedicated IO		14	O11	6mA	
5	O2	500mA	Alarm indication, dedicated IO		15	O12	6mA	
6	O3	500mA			16	O13	6mA	
7	O4	500mA			17	O14	6mA	
8	O5	500mA			18	O15	6mA	
9	O6	500mA			19	O16	6mA	
10	07	500mA			20	017	6mA	

5 Laser source module (small panel)

5.1 PDU1000-YLR-V3K2 Laser source Interface

J4, DB9 female head, serial port, used for switching YLR laser source CW, and QCW mode .The interface is defined as follows:

Pin No	Interface definition	explain		Pin No	Interface definition	explain
2	TXD	Data send		3	RXD	Data receive
5	GND	grounding		1/4/6/7/8/9	NC	

J7, D B25 male head to control laser output and power, partial interfaces defined as follows.

pin	name	type	explain	pin	type	name	explain
1/4/14	AGND		Analog ground, analog signal grounding	16	output	AN0	The 0~10V analog signal +, which is used to control the laser energy
5	Red_laser	output	Laser red light control pin	10	output	enable	Laser enabling signal
				23		DGND	9 / 10 / 17 Reference grounding
12	Modulation -	output	The laser triggers the negative signal	24	output	Modulation +	Laser trigger signal at the forward input

			term input end				end
6	OUT4		Energy light road application, non-energy light do not receive	21		IN1	Energy spectrorespon se signal, non-energy light is not connected
13	+24V_laser	imp ort	Input, laser control circuit + 24V power supply	25		Laser_gnd	13 Laser control circuit + 24V power supply reference ground

5.2 Wiring mode with the IPG YLR series laser

pin	name	explain		pin	name	explain
1/4/14	AGND	Analog ground, analog signal reference grounding, connected to the IPG YLR series laser 14 pin		16	AN0	0~10V output analog signal for control of laser energy, IPG YLR series laser 12 pin
5	Red_la ser	Laser red light control pin, connected to the IPG YLR series laser with 17 pin				

9	reset	Laser reset signal, connected to the IPG YLR series laser 21 pin	10	enable	Laser enabling signal, connected to the IPG YLR series laser 18 pin
17	error	Laser alarm signal, connect to IPG YLR series laser 19 pin	23	DGND	9 / 10 / 17 Reference grounding, 20 pin of IPG YLR series laser
12	Modulation-	Laser trigger signal negative term input end, connected to IPG YLR series laser 16 pin	24	Modulation+	Laser trigger signal forward input terminal, connected to the IPG YLR series laser 15 pin
6	OUT4	Energy light way application, non-energy light do not receive	21	IN1	Energy spectroresponse signal, non-energy light is not connected
13	+24V_laser	Input, laser control circuit + 24V power supply	25	Laser_gnd	Laser control circuit power supply reference ground

5.3 Wiring mode with the YLS-K laser

Control card pin number	Control card signal definition	Laser pin number	Laser signal definition	remarks
24	Modulation+	XPIF A：1	Modulation enables	The Laser triggers the frequency signal
12	Modulation-	XPIF A：2	Modulation enables you to return	
16	AN0	XPIF B:1	Analog control input	energy management
1	AGND	XPIF B:2	Signal sharing	
22	Laser ready	XP1：21	Laser ready	Laser-ready feedback signal
10	Laser ON	XP1：16	LASER ON	Laser drive
7	Start the laser	XP1：1	Laser request	Laser request
9	reset	XP1：4	reset	
5	Red light	XP1：5	Red light	
23	grounding	XP1：9	grounding	
		XP1：6	Connect 24V	Analog external control
		XP1：8-14	Connect to the 24V grounding	external control
13	24V power supply	XP1：42	+ 24Vdc power supply voltage	Customer offers + 24Vdc power supply
25	Laser_gnd	XP1：41	+ 24V Reference grounding	Return from the + 24Vdc power supply.
		XPIF A：7	short circuit	

		XPIF A：8		
		XPIF A：9	short circuit	
		XPIF A：10		

5.4 Connection to the Rayko RFL-C1500S / 2000S laser

Control card pin number	Control card signal definition	Laser pipe pin number	Laser signal definition	remarks
17	ERROR	24（DB25）	Laser state signal	
16	Analog output	22（DB25）	analogue input	Laser energy control
14	Analog output reference analogue	25（DB25）	analogue input grounding	
10	enable	6(DB25)	light enable	
24	Modulation+	core	modulating signal +	Laser light out control signal
12	Modulation-	external shield	modulating signal-	
13	24V power supply	7（DB25）	24V input	External AD mode
		20（DB25）	24V input	The Pin 8 and Pin24 for power supply
25	24V Reference ground	9（DB25）	24V Reference ground	set
		6（DB9）	Interlock	Short enable laser light
		7（DB9）	Interlock	

5.5 Connection to the GW Laser P Series lasers

Control card pin number	Control card signal definition	Laser pin number	Laser signal definition	remarks
16	Analog output	1（DB15）	PIN	Laser energy output control signal
14	Analog quantity output reference grounding	9（DB15）	GNDA	
10	enable signal	13（DB15）	IN_L0	Laser enabling
5	Laser red light	6（DB15）	IN_RG	External control red light
24	Modulation +	14（DB15）	IN_PULSE	modulating signal
12	Modulation -	7（D B15）	7,5,6,12,13,14,15 Pin with reference grounding	
23	enable grounding	7（D B15）	7,5,6,12,13,14,15 Pin with reference grounding	
13	24V power supply	15（DB15）	24V	
25	The 24V power supply grounding	8（DB15）	7,5,6,12,13,14,15 Pin with reference grounding	
		5（DB15）	E-stop signal	Short connection
		12（DB15）	water	
		15（DB15）	+24V	

Install and debug galvanometer's software

6 Software version and installation

	drive	patch
USB	V3	V1,V2,V3
USB	V6	V6
PCIe	V6	V6

Note: When installing the software, select the corresponding driver and patches against the table above table, and V3K2 card uses V3 driver and V1/V2/V3 patch.

dongle	software
Standard galvanometer	without visual software
Standard vision	with visual software

Note: dongle should be used accordingly with the software.

1) Open the installation program, select the language "English", and click "OK";

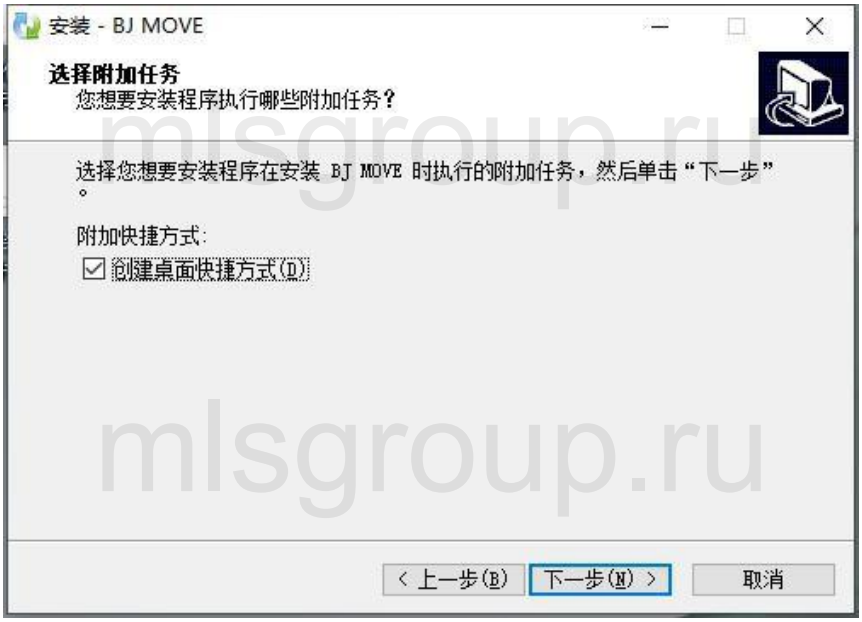
2) Click Next;

3) Enter the installation password in the window: JK0803 (letter caps);

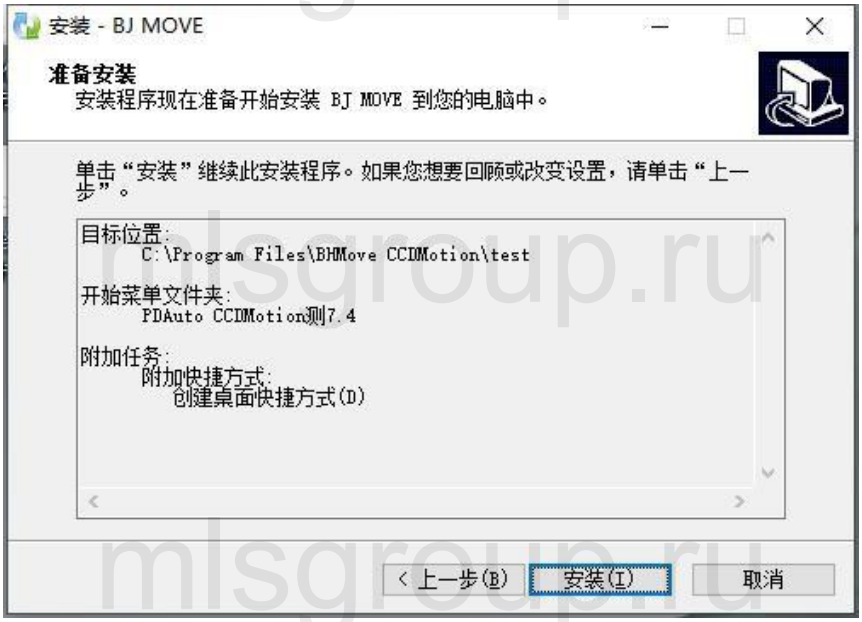
4) Select the installation path and click Next;

5) Create the Start menu, take the default path, and click Next;

6) Create a desktop solution, check to create a desktop shortcut, click Next;

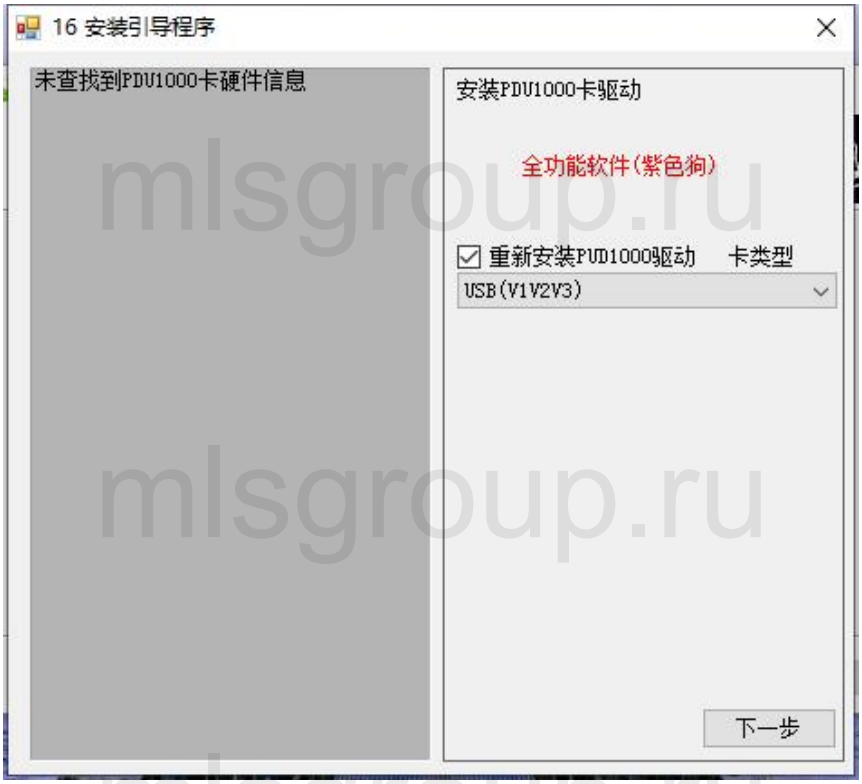


7) Click on Install to start the installation;

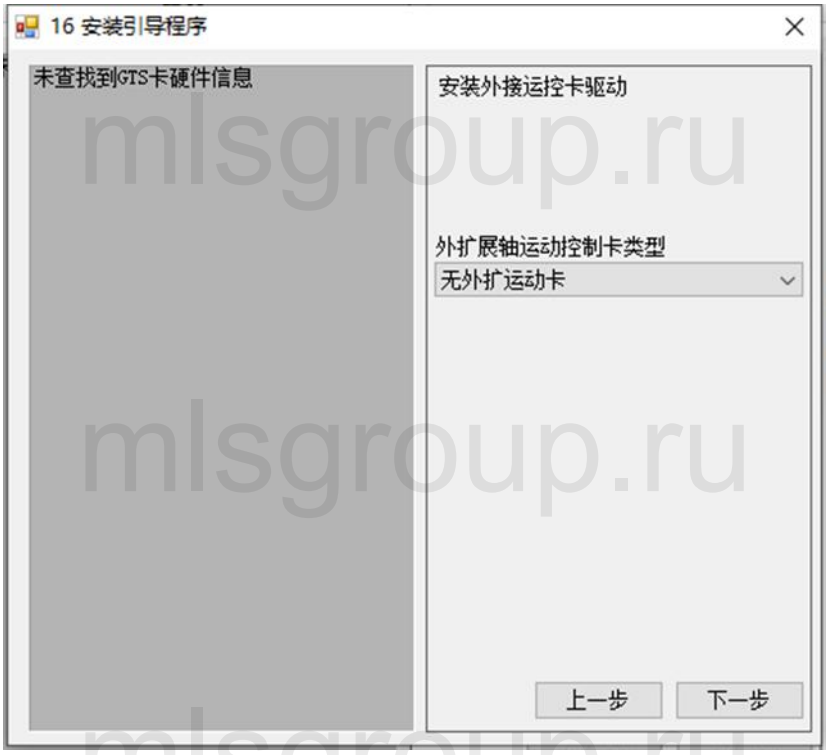


8) install NET.window, if the system is built-in directly click off, if the system does not have, click to continue;

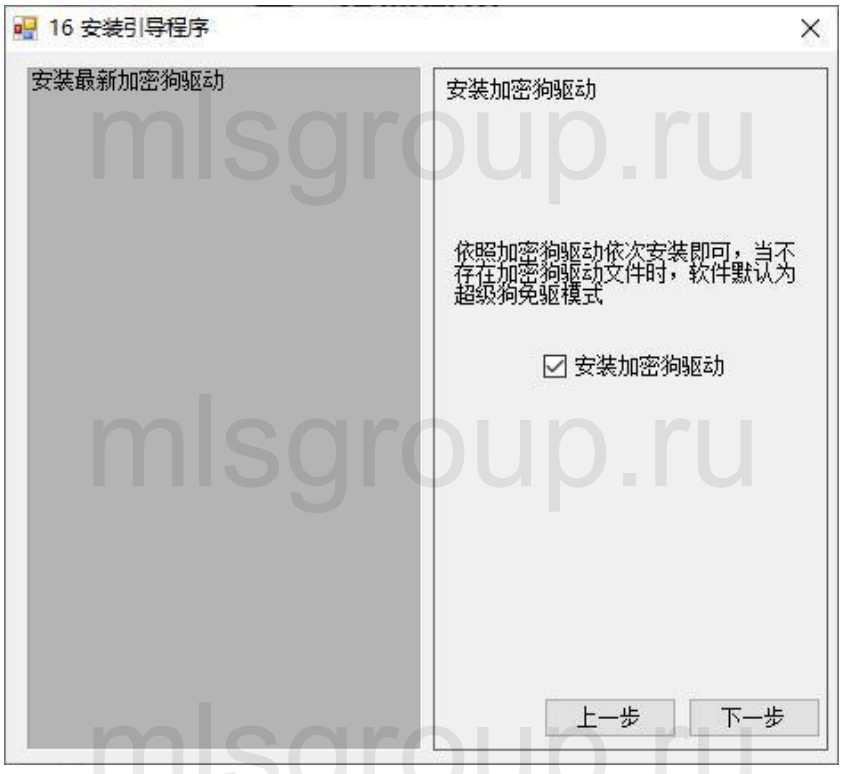
9) Install the driver, PDU1000-YLR-V3K2 card to select the driver version, click Next;



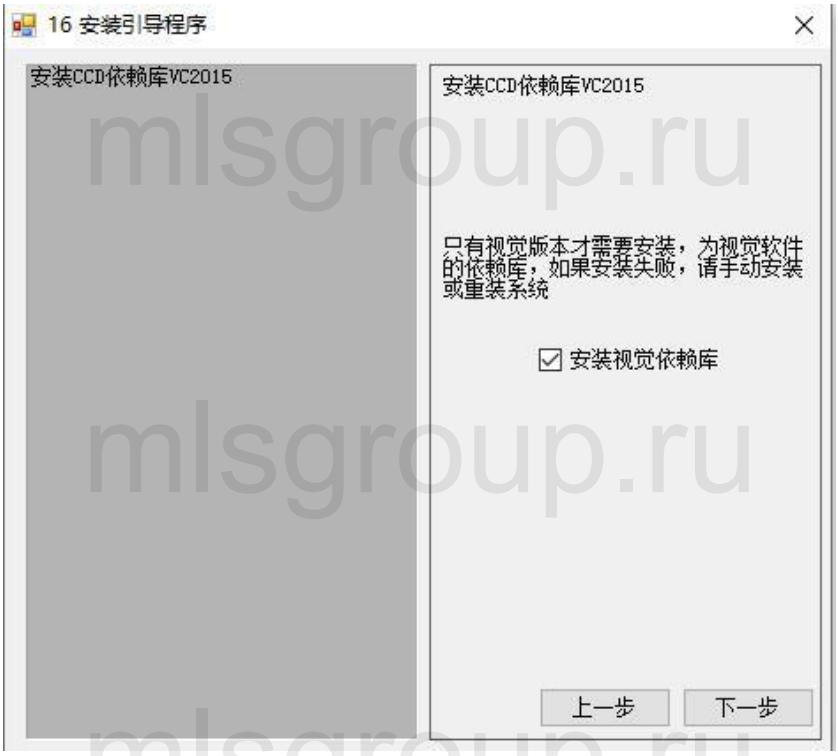
10) Install motion control drive, click Next according to different card choices;



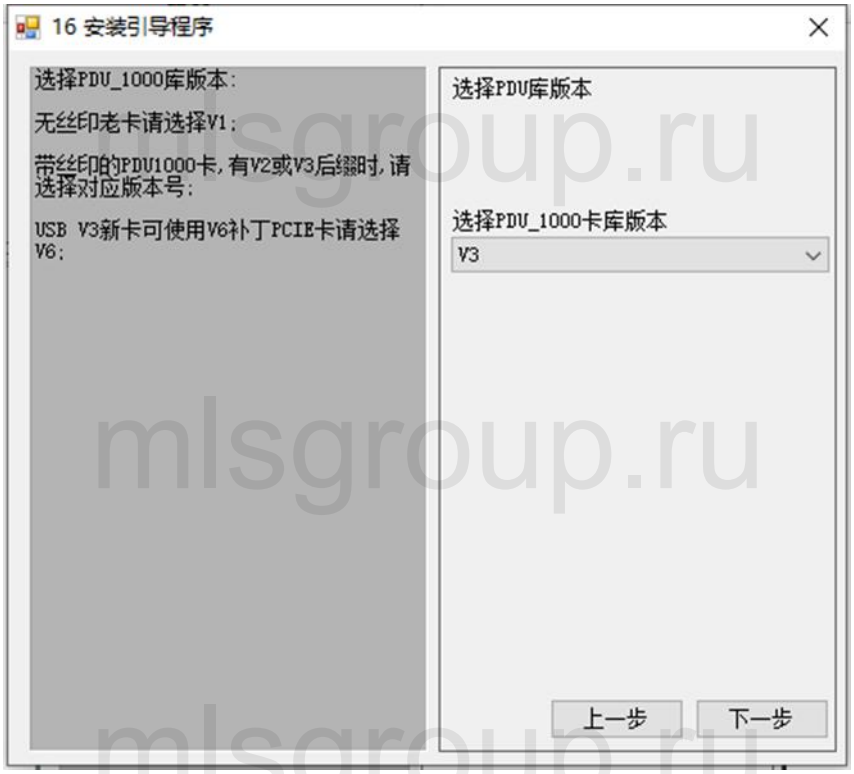
11) Install the dongle driver, click Next;



12) Install the visual dependency library, click next, and then install (without vision do not install);



13) Install the galvanometer control card library and click Next



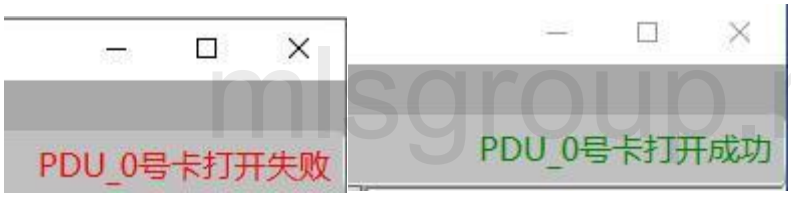
Click complete.

7 Problem shooting

7.1 error code

error code	Solution
H0007	There is no encrypted dongle
H0033	The dongle driver is not installed
H0031	The encryption dongle model is wrong
H0041	The software is infected, antivirus after reinstall the software once, replace the ini folder
H0042	Install the new dongle driver

7.2 If the card fails to open, there will be red letters in the upper right corner of the software.



The PDU series laser control card failed to open	
Check that the hardware connection	Check the hardware connection
Check that the PDU series laser control card driver is properly installed	Reinstall the driver, find the CCDVER test 7.4 \ Drivers \ PengDin path in the root directory of the marking software, and then select the driver corresponding to the USB or PCIe.

Is the software PDU_1000 library version number patch selected correctly	Re-select the card library version, find the CCDVER test 7.4 \ Drivers \ PDU card library path under the root directory of the marking software, and then select the corresponding driver of V3 or V6, select all the files in the folder, copy them to the marking software root directory, and replace the original file.

8 Set the laser

8.1 Commissioning laser

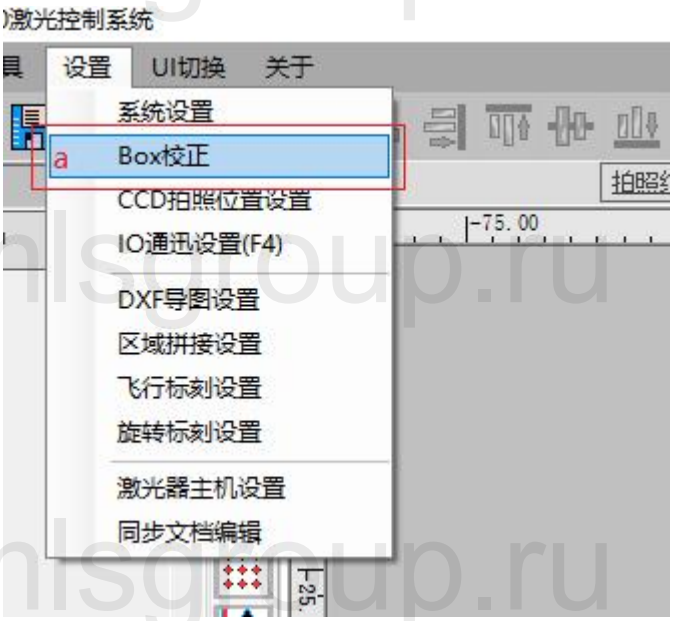
1. Connect the control card, laser and galvanometer;
2. Open the software, the green word "PDU card opened successfully" appears in the upper right corner, indicating the success of the software connection card;

3. Create a new project;

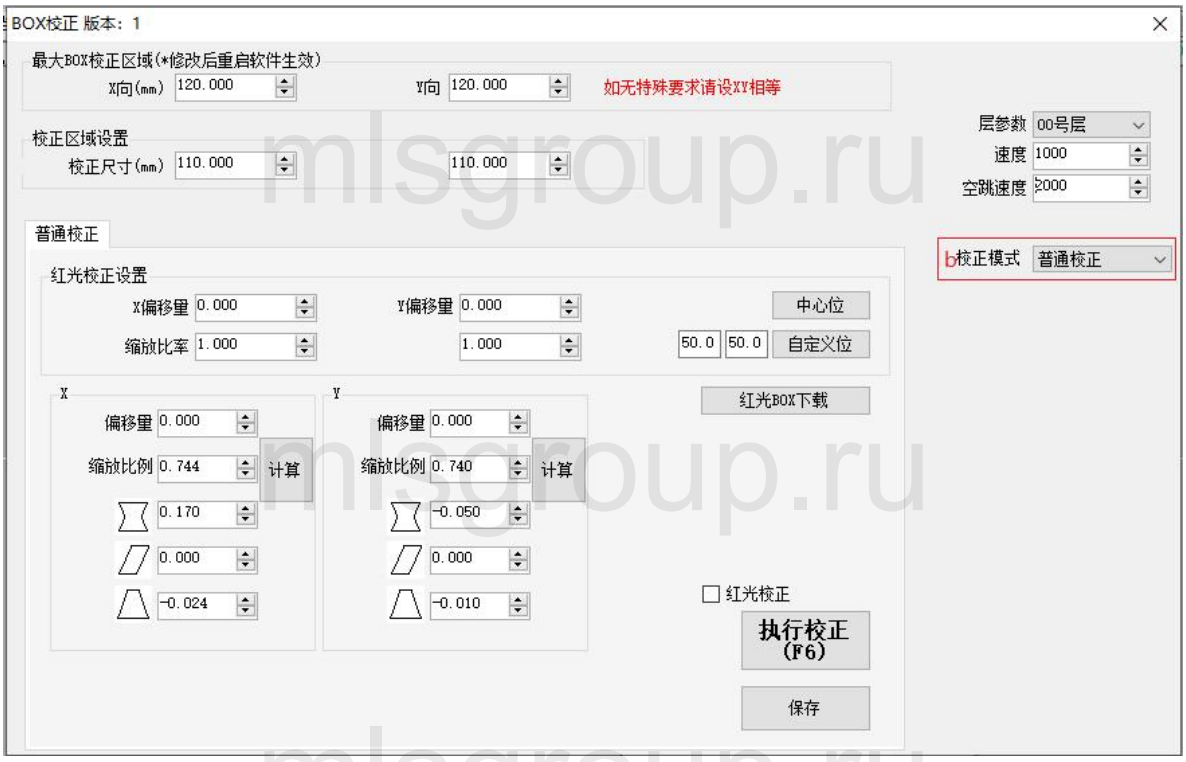
1. Draw a point, the point emits light, adjust the galvanometer height, and find the focus of the laser according to the marked laser intensity.

8.2 BOX correction: Manual correction

a. Select the "BOX Correction";



b. Select Normal Correction ";



c. Set the "correct size", the "correct size" value is the actual demand marking size or galvanometer amplitude;

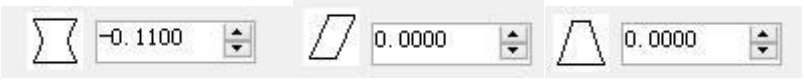
d. Set the "Maximum BOX correction Area", suggest that the "Maximum BOX corrected Area" value is slightly larger than the "Test rectangle Size" value, and the red light correction scale ratio is changed to 1;

e. Check the open laser;

f. Click confirmation, laser print;

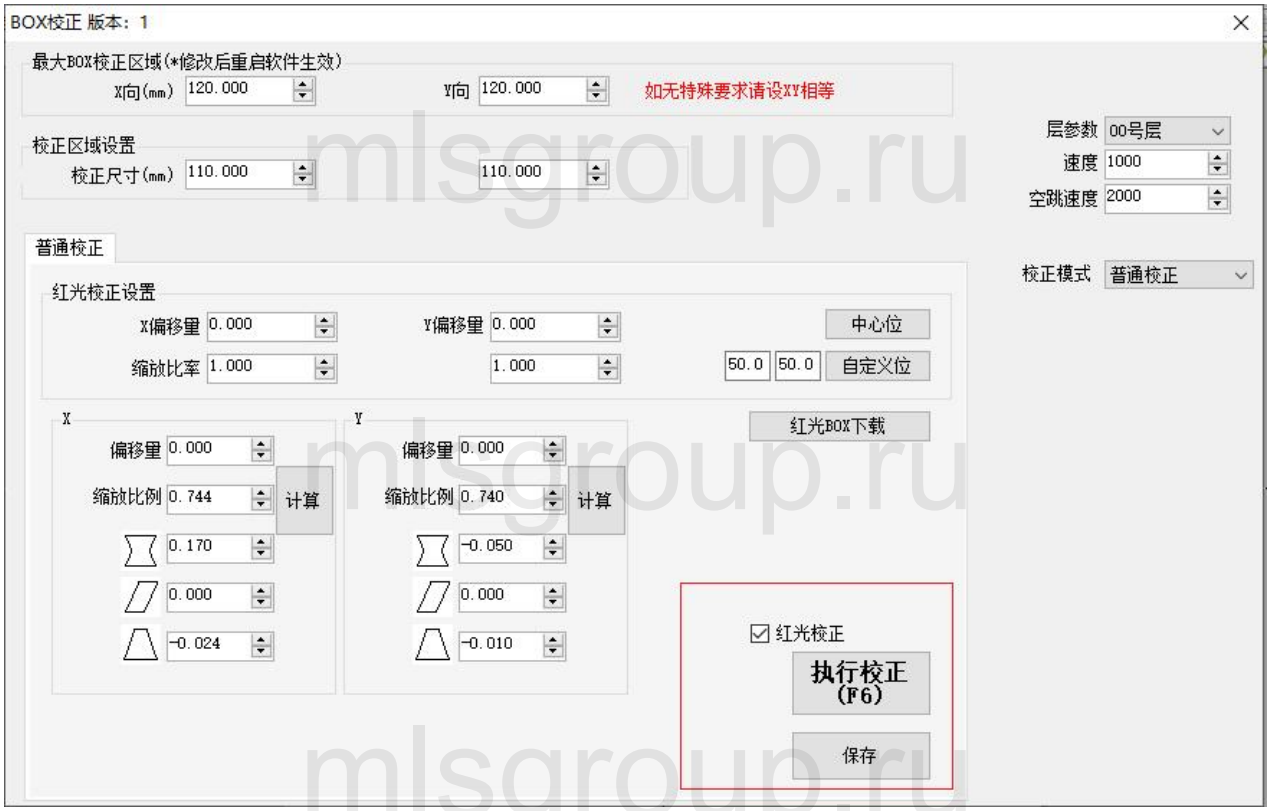
g. Use the ruler to measure whether the length of the X and Y axes is equal to the "test rectangle size" set in c. If the measured length is not equal, find the galvanometer corresponding to the X (Y) axis, click the calculation button, fill in the measured length in the pop-up window, and click "Calculation".Click on the "Laser test" to repeat the test until the measured length is equal to the set "test rectangle size" length;

h. Click "OK" at f, laser print, ① if the printed rectangular line is a curve, find the galvanometer corresponding to the X (Y) axis, adjust the value in the vibrator; ② if the printed rectangle is a parallelogram, find the galvanometer corresponding to the X (Y) axis, adjust the value in the mirror; ③ if the printed rectangle is trapezoidal, adjust the value in the mirror; adjust repeatedly, until the required rectangle printed out;



i. Click "OK" at f to see whether the printed coordinates of X and Y axis meet the requirements. It can be adjusted by setting the corresponding relationship between the vibrator and X (Y). If the direction of X (Y) axis is reverse, check "reverse";

j. The default mirror center point is (0,0), the position of the mirror center point can be changed according to the actual requirements, but the offset should be not too large, do not change the "central offset" without special requirements; "rotation angle" is to adjust the angle of the galvanometer coordinate system, can be changed according to the direction of the target, do not change without special requirements.



k. Check "Open red light" and click "Execution Correction";

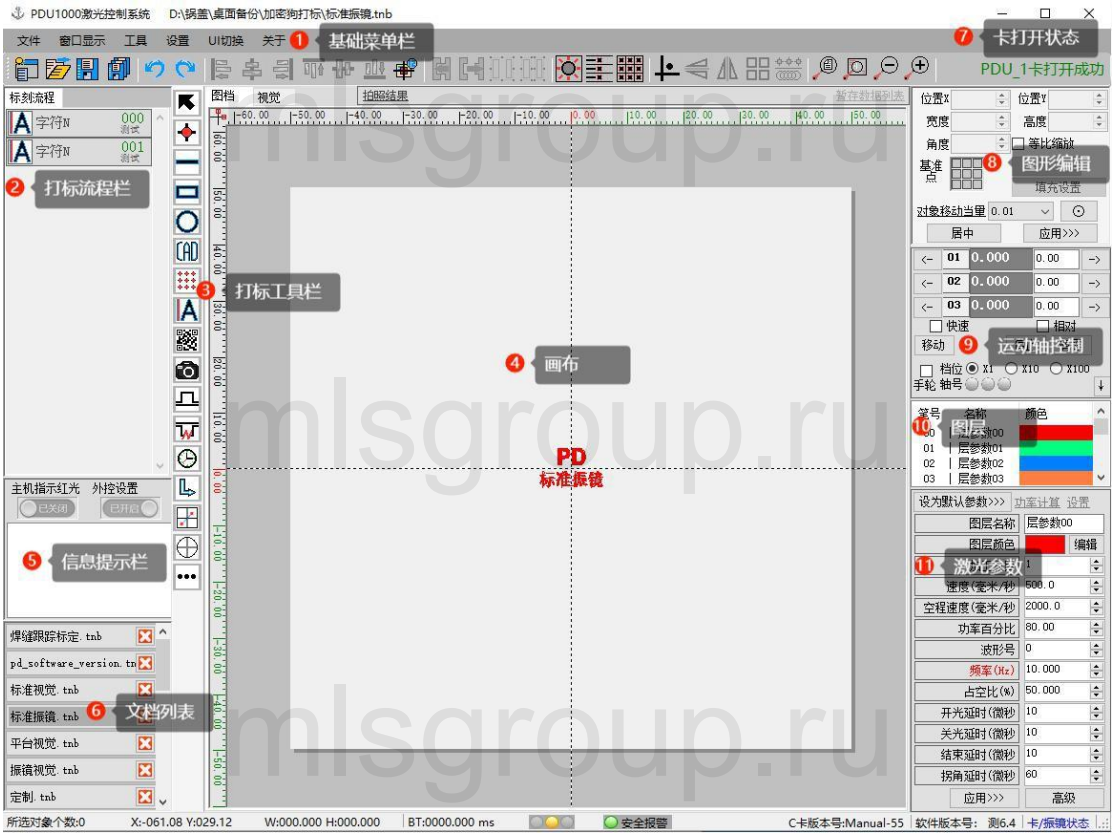
l. Observe whether the red light track coincides with the rectangle printed by the laser. If not, set "zoom ratio (X, Y)" and adjust the red light track; click "Red light test". If the spot does not coincide with the origin of the laser print, set " central offset (X, Y) and adjust the position of the spot.

9 Software interface and tools

9.1 Interface layout

1. The basic menu is the software system level setting, including vision, camera, laser, BOX correction, platform sports card, IO and other setting functions;
2. Bidding process bar: edit the parameters of marking tools and sort the process;
3. Tool bar: including graphics, bitmap, CAD, CCD and other tools;
4. Canvas: Display graphics;
5. Information prompt bar: display the marking information and CC D information;
6. Text, file, column, table;

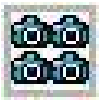
7. Galvanometer card connection state;
8. Drawing editing: edit the size, location, and fill of process objects;
9. Control the axis movement;
10. Process object layer;
11. Laser parameters: debug the laser marking process.



9.2 Icons

Icons	tool	direction for use
	single-point	
	straight line	
	polygon	The default is a rectangle, and click the icon to select another multilateral drawing 

	Circle (arc)	The default is circular, and click the icon to use other arc drawing tools 
	lattice	
	character	Edit character text to enable text variables: serial number, date, time, serial port communication, network communication, etc
	two-dimension code	
	CAD	Import finished CAD drawings and can currently import files in dxf, plt format.
	bitmap	You can import.Pictures in bmp format.
	delayed	Bid marking delay tool.
	flatbed press	Set up the platform movement position (X, Y).
	Mark drop	
	SCR script	Edit the script
	Height measurement / bar code	
	time variable	
	Mark the rectangular ROI	

	Flight Settings	
	Call the subdocument	
	Coaxial CCD painting	
	Array photo	
	Laser follow	
	move	Shortcut F6
	teach	

9.3 Layer and parameter

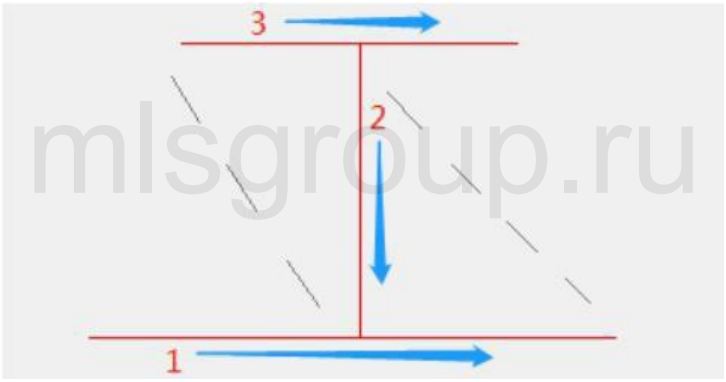
Note: Each layer corresponds to a set of laser parameters, and we can also change the name and the color of the layer in the parameters.Click the name of the layer, and the parameter bar will display the layer name, layer color and the parameter data corresponding to the current layer. The parameter data includes the number of processing, processing speed, power, etc. After changing the parameters, click Apply to save the parameters to the current layer.

9.4 laser technology

Why need the time delay?

Because the galvanometer system is composed of drive plate, motor and lens, there is a delay in the motion signal transmission between these components, and the lens has mechanical inertia, so there is an uncertain delay between the "marking card control lens" and the "lens real motion".Due to the existence of these uncertain delay, debugging laser process needs to set 5 kinds of delay, light delay, light off delay, jump delay, marking delay, turning delay.

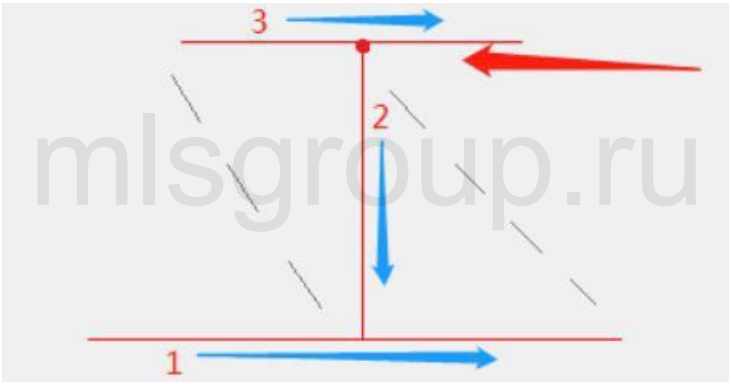
Unified process debugging graphics: in the practice of marking, the marking drawing is generally not directional, when the marking effect is not ideal, it is not convenient to diagnose which process parameters are unreasonable.Therefore, we can draw a directional graph dedicated to adjust the process parameters.Line 1. Line 3 is a reference, mainly studying the welding effect of line 2. This group of lines can be roughly drawn and finalized according to the accuracy of the process requirements through the position and size parameters.



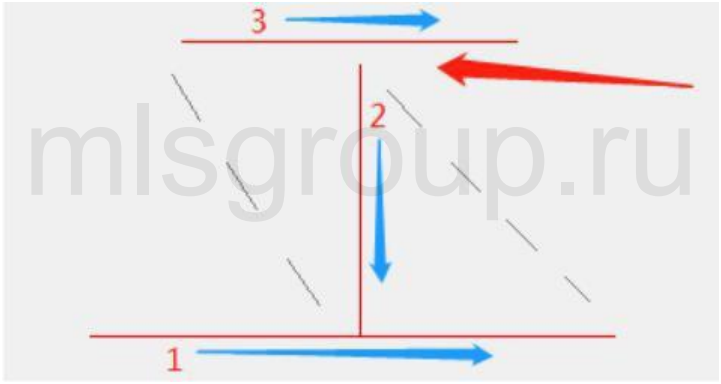
Light-on delay, abbreviation: LOnD

The light on delay occurs in the open light, when the galvanometer empty jump to the specified position, but the laser is not light at the same time but the delay LOnD, this value can be set to a negative value, when set to a negative value, means that when the galvanometer reaches the specified position, the light LOnD and then start the Mark movement.

When the LOnD is set for hours, you can see that the burst point occurs at the open light (because the lens movement speed is low and the LOnD is too low, the laser will gather at the beginning and cause the burst point).



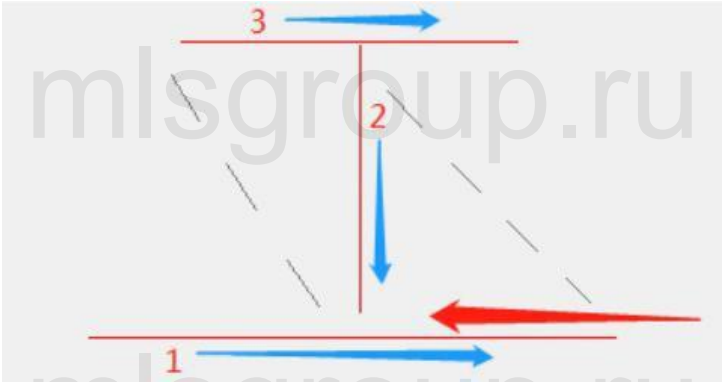
When the LOnD is too large, you can see that some of the light is less burned (this is because the lens begins to move and the LOnD is too large, after a long time, the laser is far from the start point, resulting in some less welded).



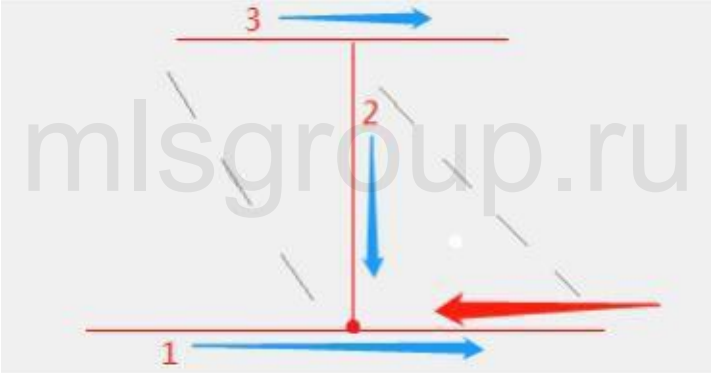
Light-off delay, abbreviation: LOffD

The light-off delay occurs when the light is turned off. When the galvanometer is welded to the specified position, the laser is not turned off at the same time, but the delay LOffD can be set to a negative value, which means that the light has been turned off before the galvanometer reaches the LOffD before the specified position, that is, the light is turned off in advance.

When LOffD is set for hours, you can see that the light is less engraved (this reason is that due to the time difference between the instruction and the motion, that is, the instruction is already in place but the actual is not in place, and the LOffD is too small, the laser is less welded at the end).



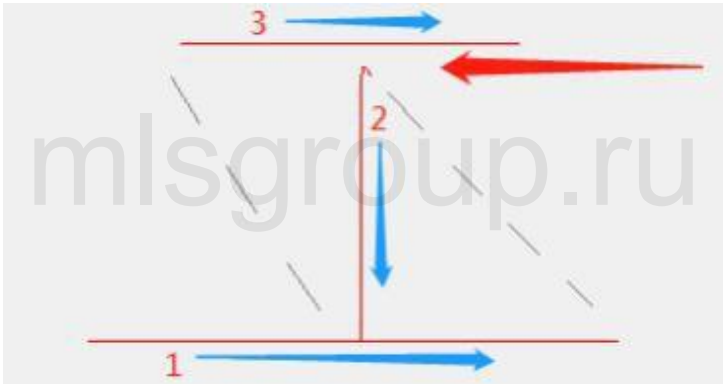
When the LOffD is too large, you can see the burst point generated at the light off (this reason is because the lens is in place at the end and the LOffD is too large, and the light is not turned off, resulting in the laser burst point at the end)



Jump delay, abbreviation: JumpD

JumpD occurs after the galvanometer jump, when the galvanometer jump to the designated position, the time of JumpD, and other movements start.

When JumpD is set for hours, you can see the instability of the next movement after Jump (the reason for this situation is that the galvanometer motor is not stable when the Jump movement ends, and the JumpD is too small, and the galvanometer is still in the unstable state during the next period of movement).



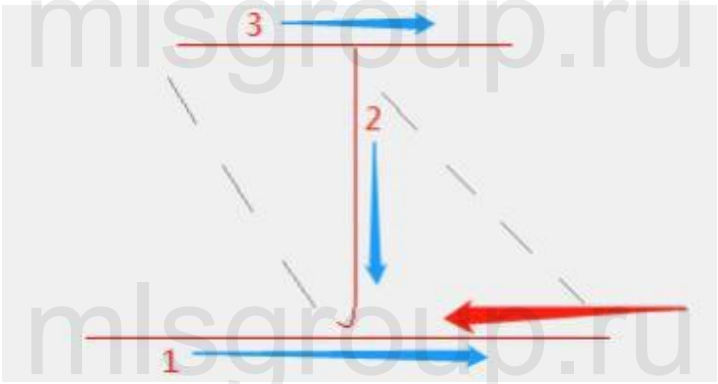
When setting the JumpD is too large, there is no instability, but it will affect the efficiency.The setting of JumpD is generally related to the jump speed and the weight of the lens. Generally, if the larger the jump speed, the larger the lens weight, the larger JumpD needs.

Mark delay, abbreviation: MarkD

Time the MarkD after the optical welding, then start the jump instruction.

Set MarkD too small, you can see before the end of the welding position directly start the Jump movement, lead to light corner (the reason is the theoretical position and actual position, theoretically

movement is in place, but the actual is not in place, and MarkD is too small, then the next Jump movement has started, leading to this phenomenon).

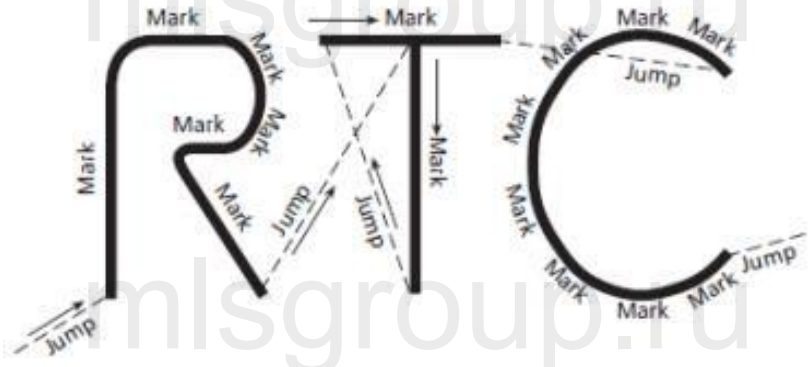


When setting the MarkD is too large, there is no instability, but it will affect the efficiency.

Corner delay, abbreviation: PolyD

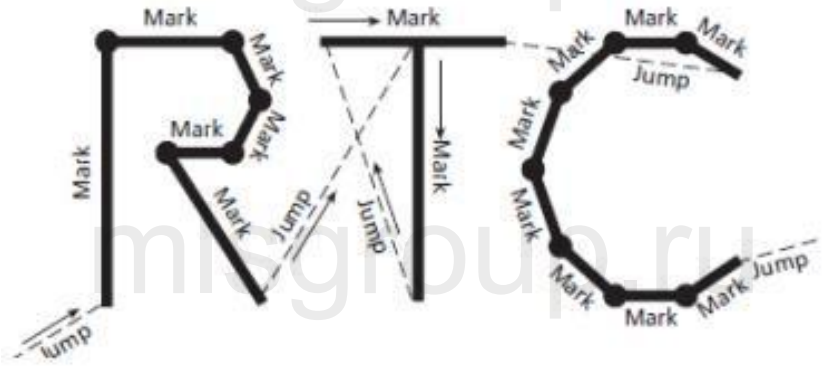
PolyD occurs at the corner of two straight lines, that is, wait for the PolyD after the last line moves, and the galvanometer moves the next line, during which the laser keeps shining.

Set PolyD over hours, you can see in the corner between two continuous Mark movement, and the actual demand graphics (this reason is that the previous Mark, vibration mirror motor is not in place, and PolyD is too small, then the next Mark, vibration mirror can only from the shortcut path, leading to this phenomenon).



When PolyD is too large, you can see a burst point at the corner between two continuous Mark

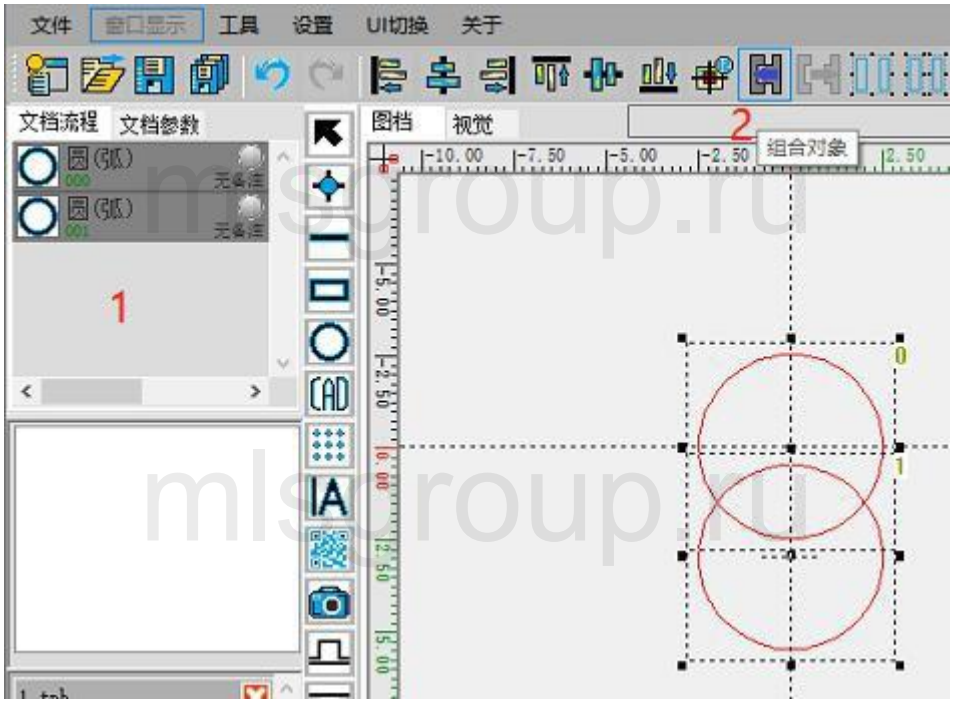
movements (this reason is that the previous Mark ends, the lens motor is in place, and the PolyD is too large. At this time, the next Mark has not been yet started, but the laser is still shining, resulting in the burst point).



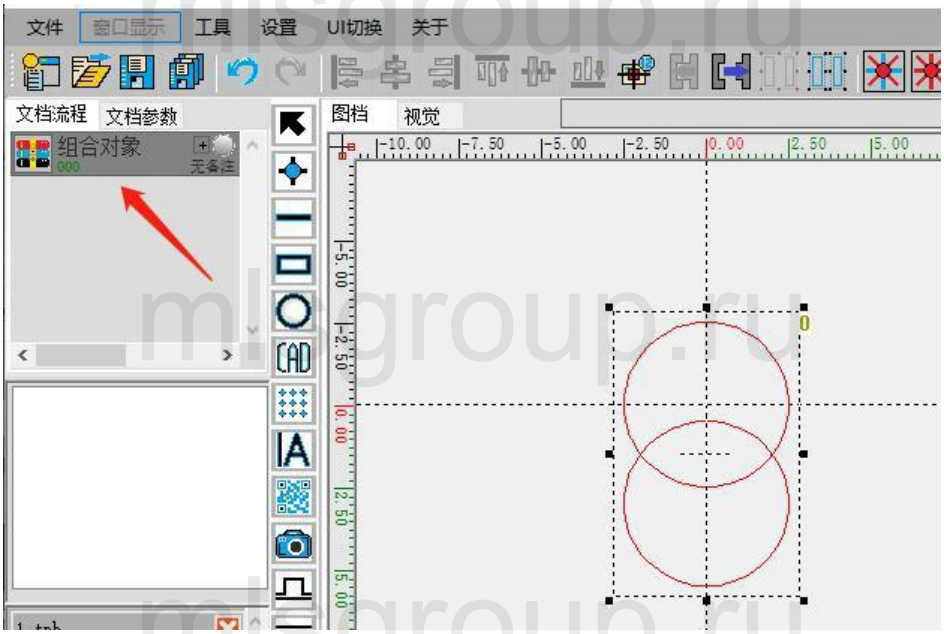
9.5 software tool

Combination tools

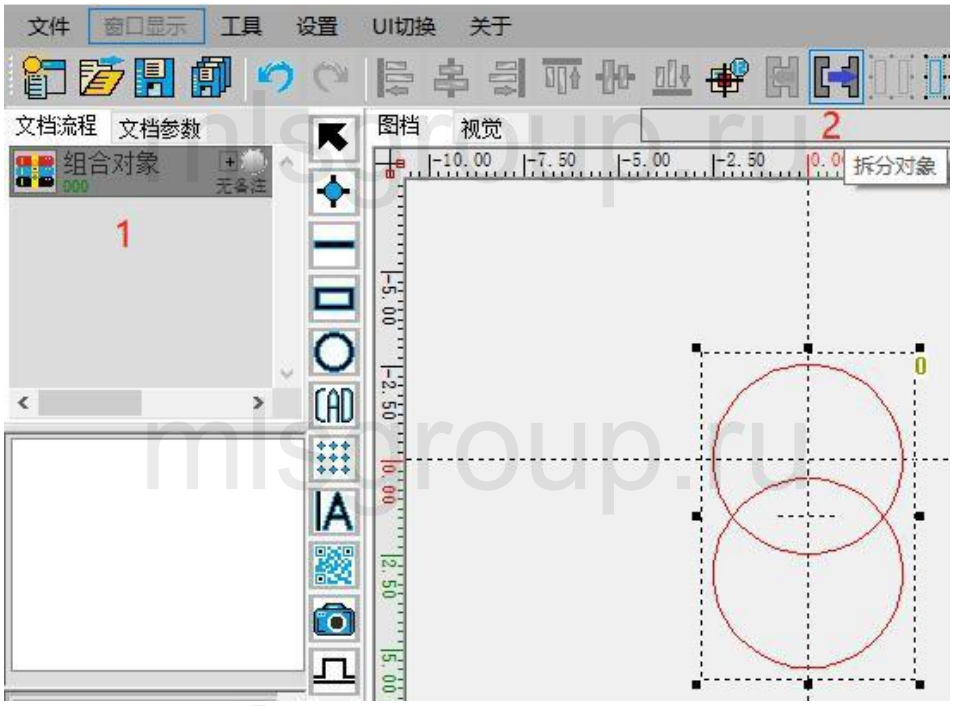
2. Press CTRL, select two circles, and then click the combined object button;



3. Two circle objects, turned into a combination object;

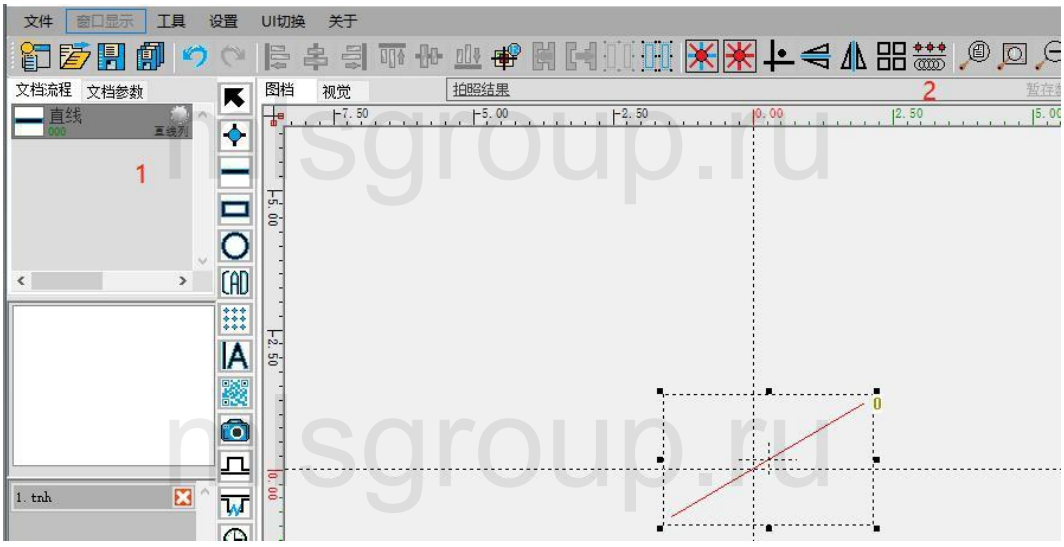


4. Select the combined object, and then click the split object, you can split the combined object;

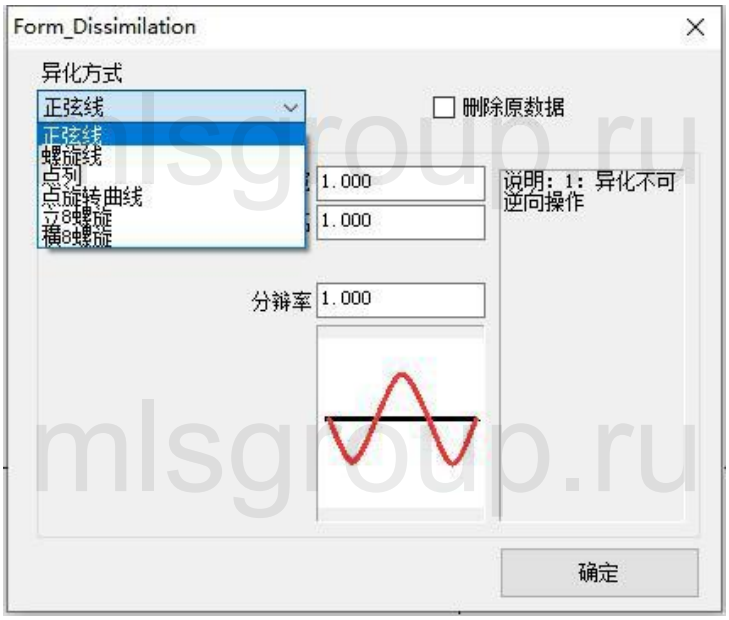


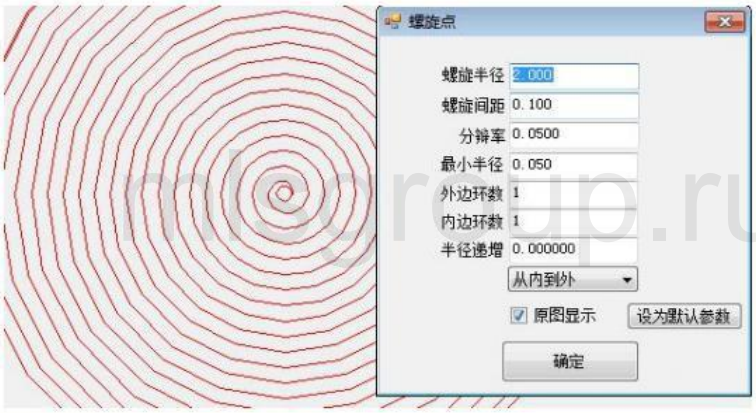
Curve alienation

1. Select a straight line object, and then click on the curve dissimilation tool;



2. Select the corresponding alienation tool in the curve alienation pop-up window, and then set the parameters;



	图例	说明
1		选择加工图形对象，点击异化工具
2		如图所示异化参数螺旋点，点击异化的工具，并选择显示原图。
3	参数 / 描述 **螺旋半径** 螺旋点的大小 **螺旋间距** 线条间距 **分辨率** 圆滑程度 **最小半径** 最里面的圆的半径大小 **外边环数** 外环轨迹焊接次数 **内边环数** 内环轨迹焊接次数 **半径递增** 螺旋圈数递增时半径递增的值 **方向问题** 焊接时从外向内，还是从内向外	参数一栏（当你修改参数时，图形会有不同的变化）