The Hand-held Color Display Laser Engraving&Cutting Control System Operation Manual

Content

Content	1
Chapter 1 Gernaral Information	**1**
1.1 Summary	1
1.2 Notes and Warning	1
1.3 Work Environment	2
1.4 Power Supply and Grounding	2
1.4-1 Power Requirements	2
1.4-2 Grounding Requirements	2
1.5 Accessory List	3
Chapter 2 Wiring Installation Instruction	**4**
2.1 Installation Dimension	4
2.2 Wiring Instruction	6
2.2-1 Interface Broad	6
2.2-2 Wiring Diagram	7
2.3 Interface Broad Signal Instruction	8
2.3-1 Power Signal	9
2.3-2 Data Line Port	9
2.3-3 U disk Cable	10
2.3-4 PC Connection Line	10
2.3-5 Output Interface	10
2.3-6 Laser Power Interface	10
2.3-7 Input Interface	12
2.3-8 Input Signal Diagram	14
Chapter 3 The Panel Instruction	**15**
3.1 The Operation Panel and Buttons Function Introduction	15
3.1-1 The Operation Pane	15
3.1-2 Buttons Function Introduction	15
3.2 The Main Interface Introduction	17
3.2-1 Power Interface	17
3.2-2 Standby Interface	17
3.2-3 Speed Setting Interface	18
3.2-4 Light Intensity Setting Interface	19
3.2-5 Range Preview Interface	19
3.2-6 Single Axis Movement Interface	20
3.2-7 File Selcetion Interface	20
3.2-8 U Disk File Interface	21

3.2-9 Main Menu Interface 22
3.3 File Setting 22
Chapter 4 The Complex Settings 24
4.1 The Laser Setting 24
4.2 The Equipment Setting 25
4.3 The Axis Setting 31
4.4 The Origin Point Setting 32
4.5 The User's Setting 32
Chapter 5 The System Information 33
5.1 The Password Setting 33
Chapter 6 The System Testing 34
Chapter 7 the Frequently Asked Question Help 33
7.1 Power-on Reset Question 33
7.2 The Laser Light Question 34
7.3 The PC Connection Question 34
7.4 The Reading and Writing of U disk Question 35

Chapter 1 General Information

1.1 Summary

- Firstly, many thank you for using our Laser Engraving Control System!
- Our Laser Engraving Control System can be used various dispensing devices, and meet your different processing requirements.
- The advanced DSP control technology, the faster system, and the friendly robot operation interface, which effectively improve the productivity; the speed of the control system is adjusted by smooth curve, run more smoothly, reduce noise, and extend device's work life.

1.2 Notes and Warning

- Before using, please read our manual carefully, ensure to operate our system correctly.
- Please keep the manual well, and it's convenient for your future references.
- Because of different configuration, some devices have not some of the functions listed in the manual, the details subject to appropriate operation functions.
- Prohibit the non-professionals to maintenance and debug the electrical system, if not, this will reduce device's safety performance, and expand failure, even cause accident and property loss.
- Please do not piles up debris on the control box, and in the course of using, regularly remove the dust of the control box surface and filters, to keep good ventilation.
- Prohibit touching any motion parts or opening the control equipments when the machine is working, or it maybe bring about the accident and machine can't work.
- Prohibit using the electrical equipment in the damp, dust, corrosive gas, flammable gas area, or it maybe cause the electrical shock or fire!
- When users have to open the cover of the control box, must cut off the power after 5minutes and under the professionals' guidance, only can be allowed to touch the components in the electrical control box!

1.3 Work Environment

- Ventilation, sanitation, and less dust;
- Storage temperature: 0-50°;
- Work temperature: 5-40°;
- Work relative humidity: 30%-90%（no condensation）

1.4 Power Supply and Grounding

1.4.1 Power supply requirements:

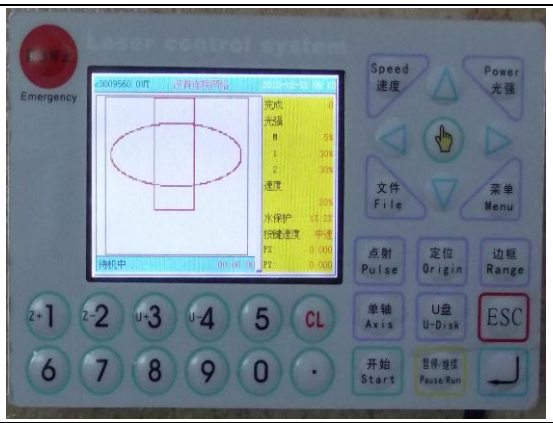
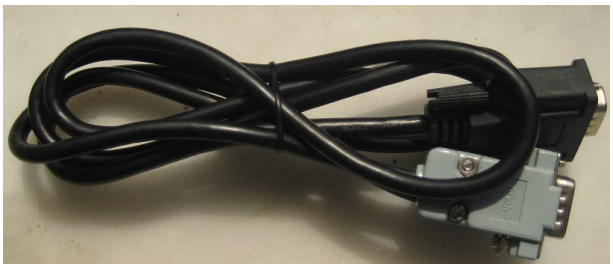
- DC 24V
- According to different machine configurations, power consumption is between 0.1-0.2KW.

1.4.2 Grounding requirements:

- In order to prevent electrical equipment due to leakage, over-voltage, insulation etc causes of the electrical shock or fire, please make the electrical control reliable grounding.
- Grounding resistance is less than 100 ohms; the length of wire cable is within the 20meters, the cross-sectional area of the wire cable is larger than 1.0Mm.

1.1 Accessory List

The Laser Engraving Control System-TL403C1A contained the accessories as below:

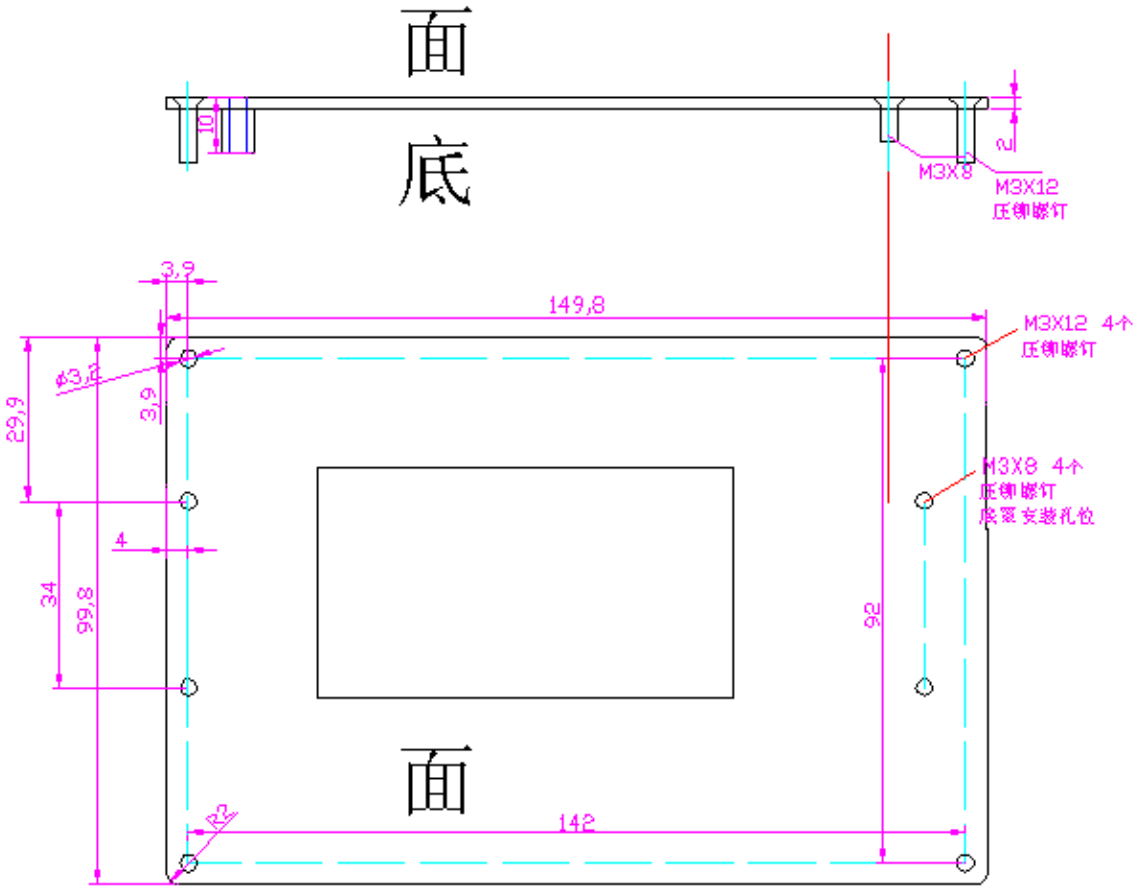
Name	Qty	Introduction	Photo
Operation Head	1	Show the buttons	
Controller	1	Interface Broad The Motion Control Card	
USB Connection Line	1	Directly communicate with Interface Broad and PC	
Power Line	1	Connect the Power	

Chapter 2 Wiring Installation Instruction

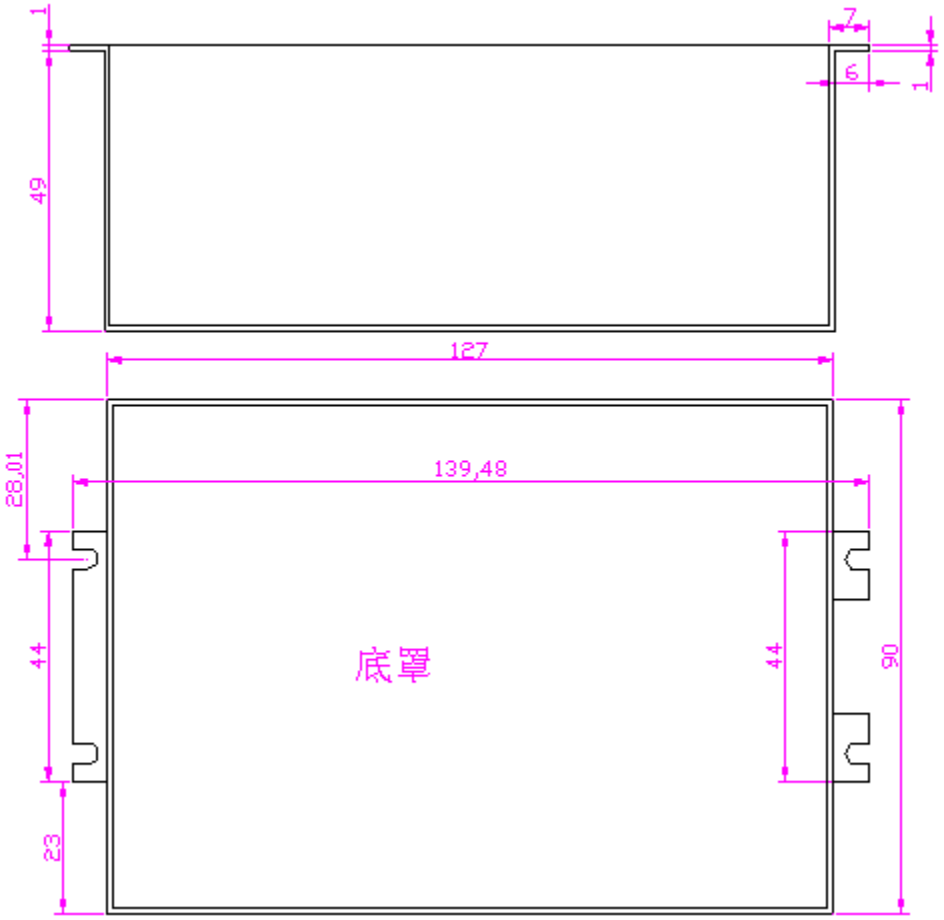
2.1 Installation Dimension

The installation dimension of operation head (the unit is MM):

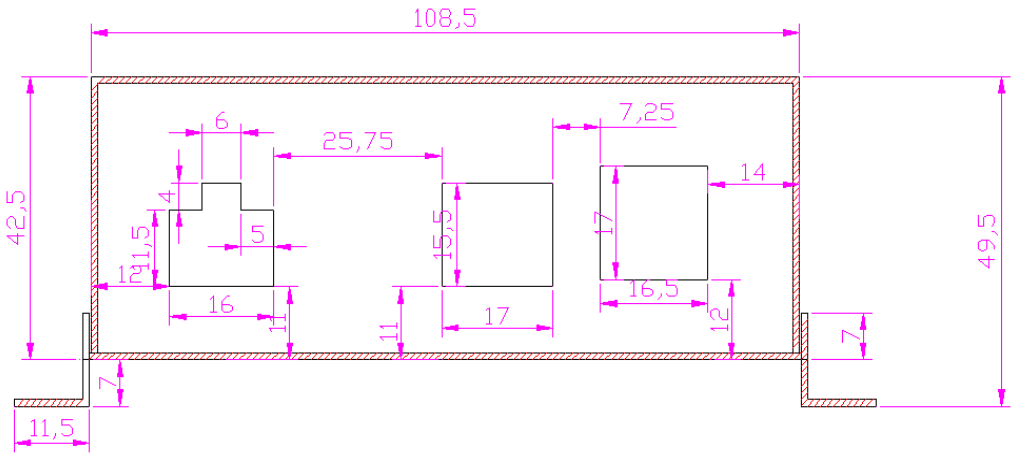
Face:

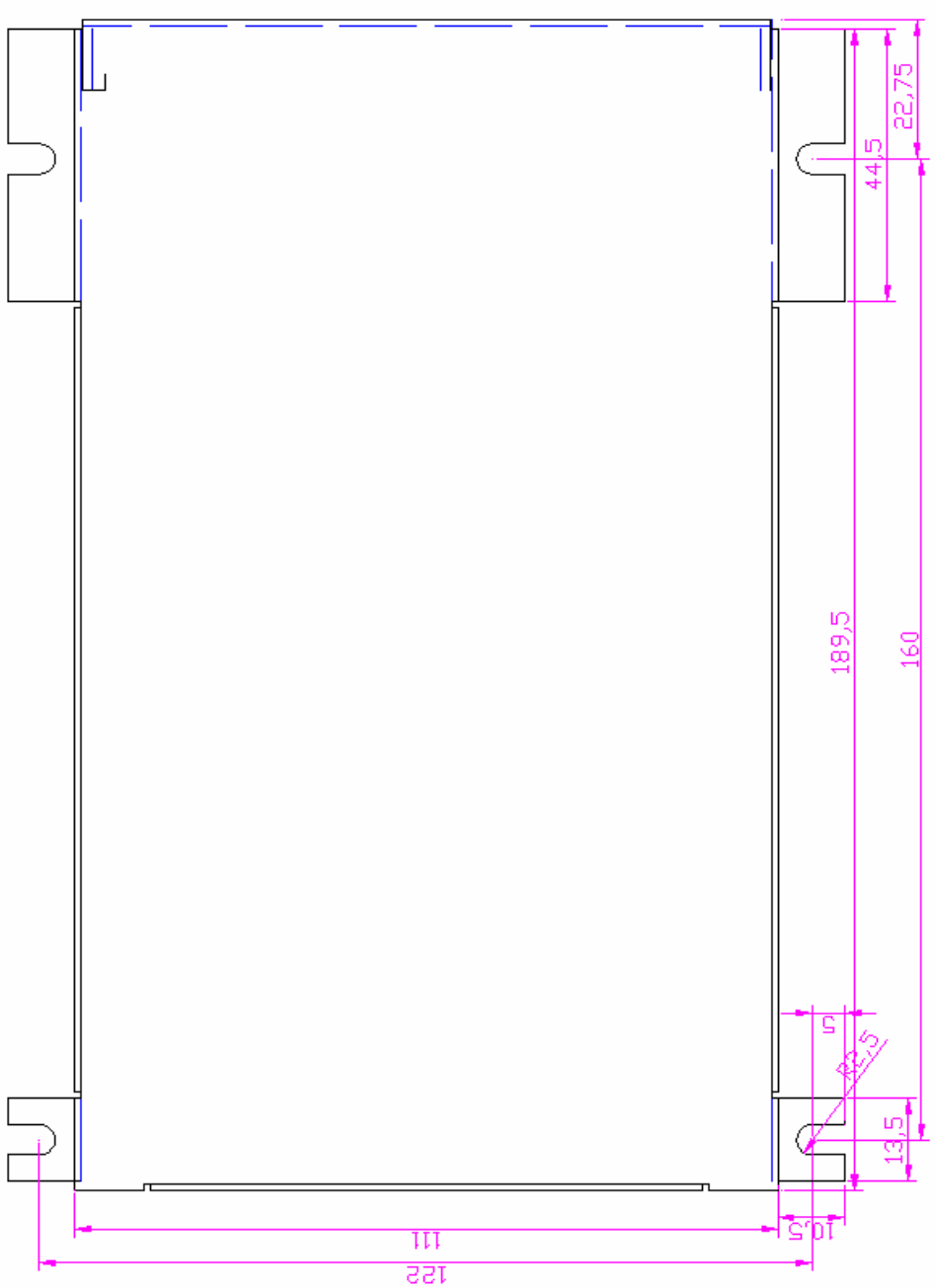


Bottom:



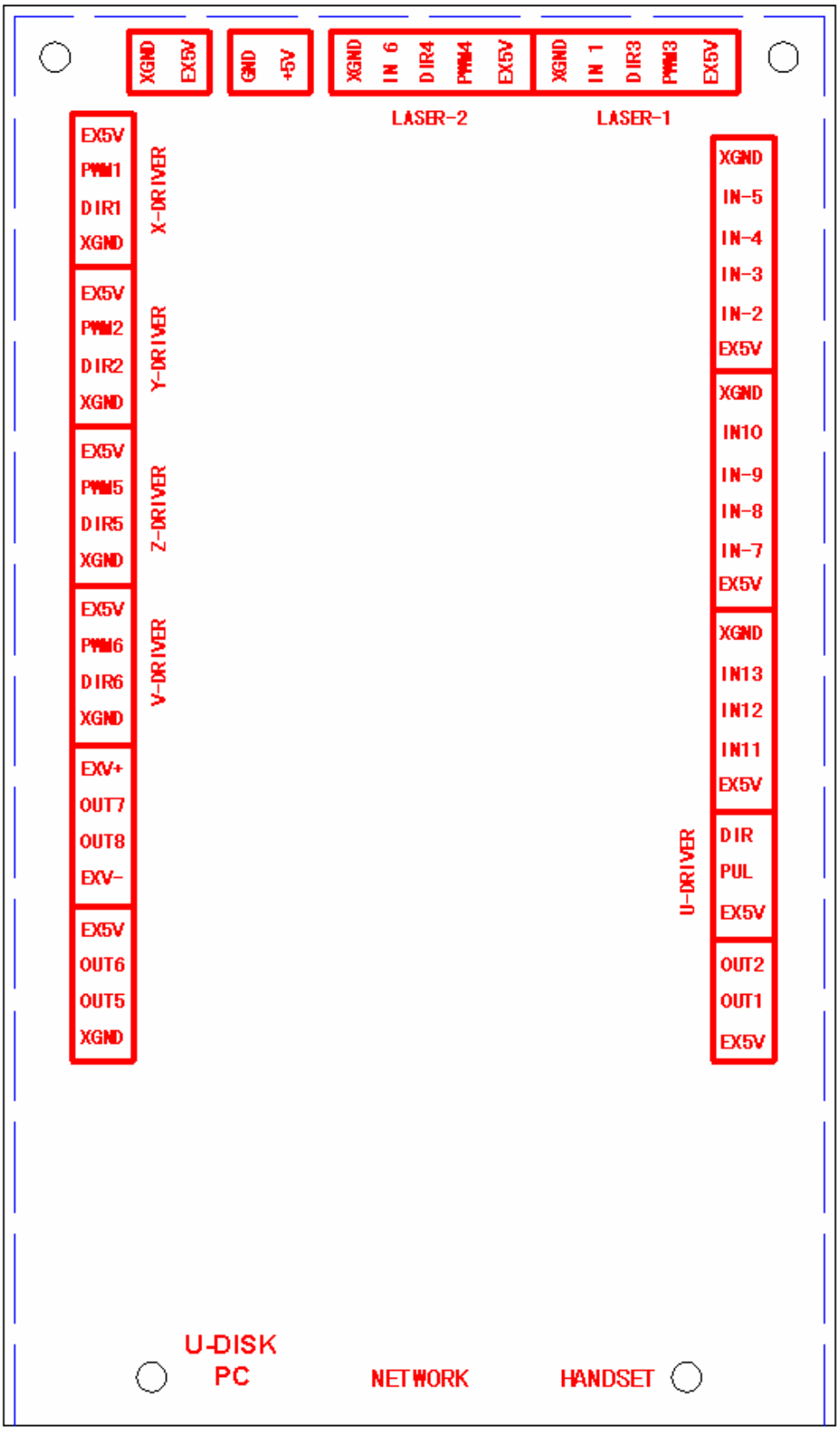
The installation dimension of interface broad (the unit is MM):




22,75
44,5
189,5
160
5
R2,5
13,5
5
10,5
111
122

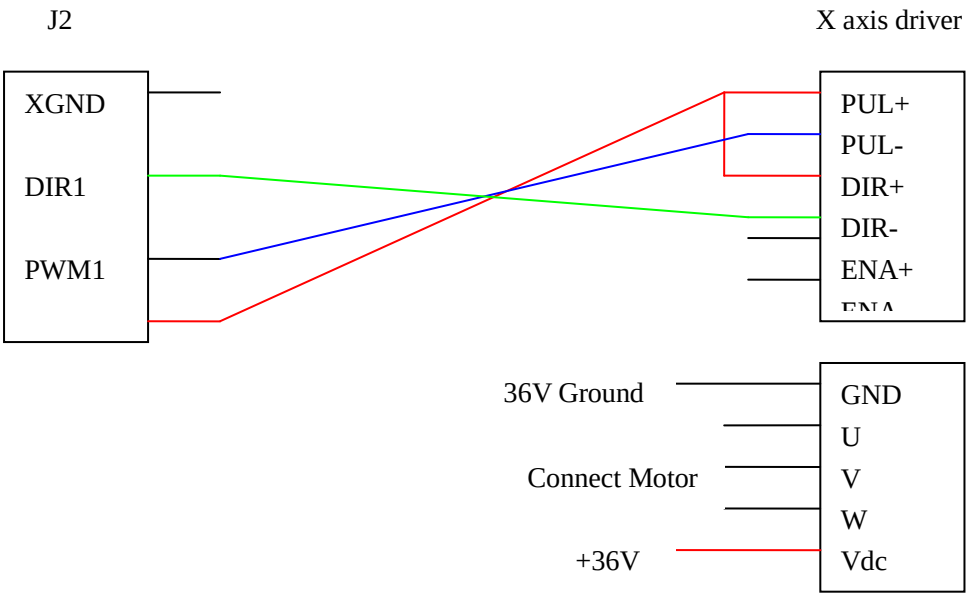
2.2 Wiring Instruction

2.2.1 Interface Broad



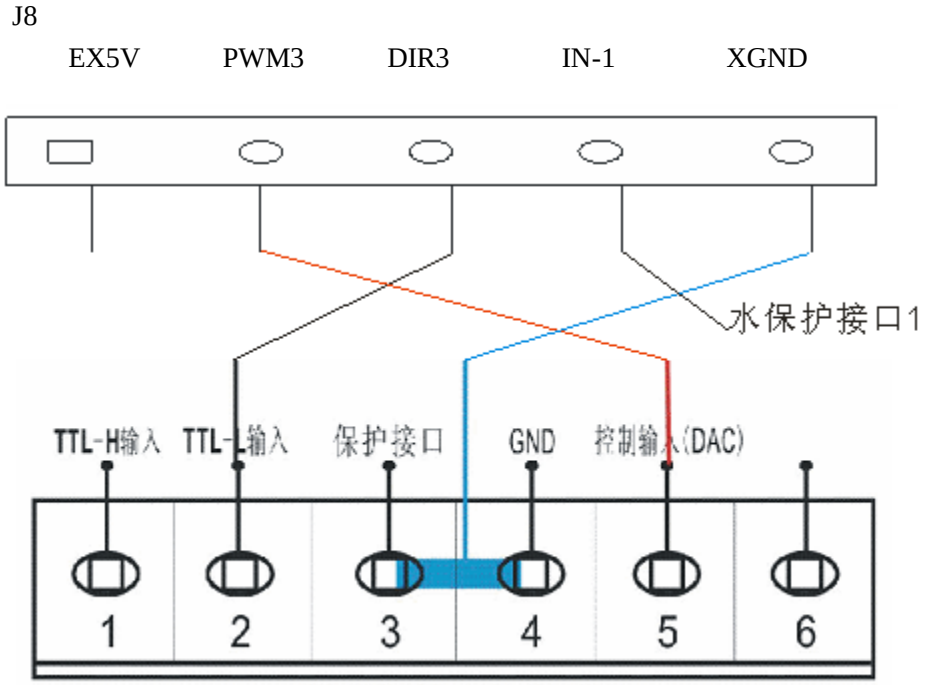
2.2.2 Wiring Diagram

- Axis Wiring Diagram



Y, Z axis is similar

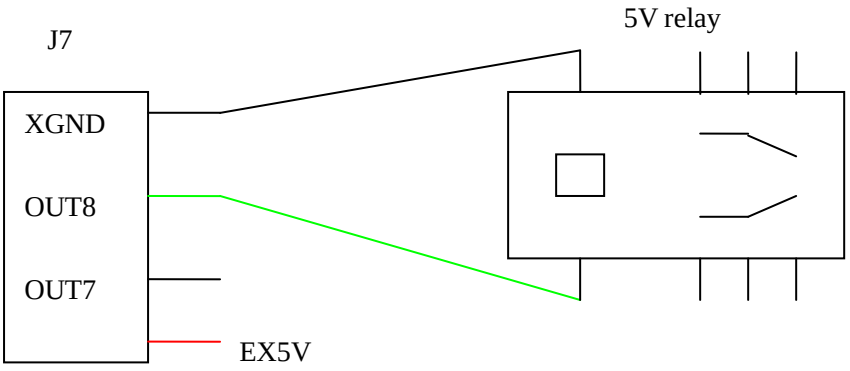
- Laser Power Wiring Diagram



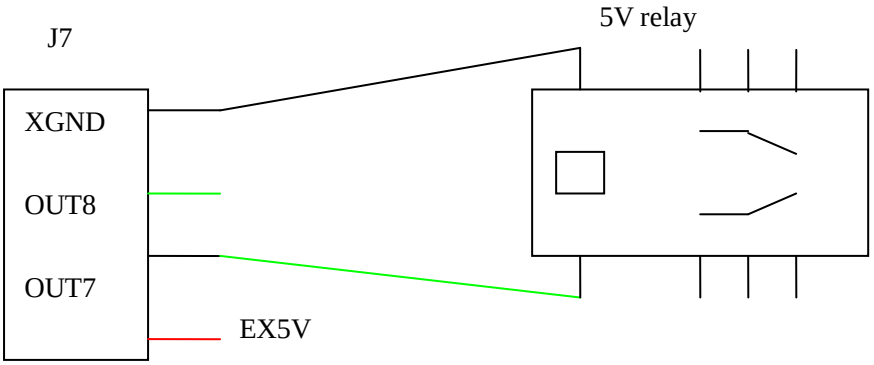
The Laser Power 1

The laser power 2 is similar.

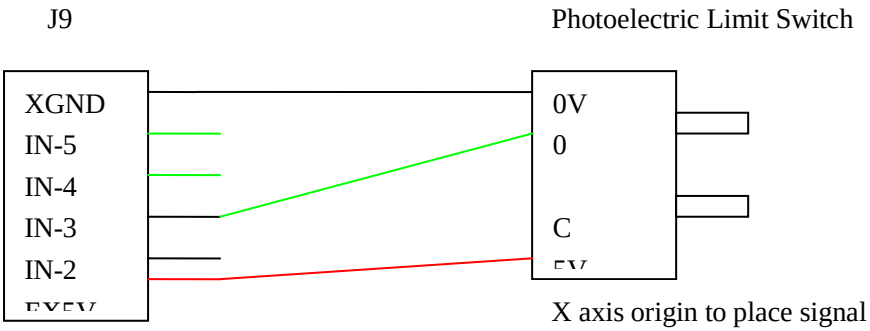
- Inflatable Signal Wiring Diagram



- Lifting Signal Wiring Diagram



- Limit Signal Wiring Diagram



The other limits are similar.

2.3 Interface Broad Signal Instruction

2.3.1 Power Signal

- The system is dual 5V power supply.
- The system internal 5V power interface J16 (switching power interface):

Pin	Definition
1	+5V internal 5V power source positive（input）
2	GND internal 5V power source grounding (input)

- The system external power interface J14 (switching power interface):

Pin	Definition
1	EX 5V external 5V power source positive（output）
2	XGND external 5V power source grounding（output）

2.3.2 U-disk Port

Label U disk, can directly insert the U disk to read and write.

2.3.3 PC Connection Port

Label PC connection port, can connect PC to read and write with USB.

2.3.4 Network Port

Label Network, can connect PC to read and write by network.

2.3.5 Output Interface

The driver interface

- X axis interface J2

Pin	Definition
1	EX5V external 5V power source positive（output）PUL+、DIR+
2	PWM1 step pulse（output）PUL-
3	DR1 direction signal（output）DIR-
4	X GND external 5V power source grounding（output）

- Y axis interface J3

Pin	Definition
1	EX5V external 5V power source positive（output）PUL+、DIR+
2	PWM2 step pulse（output）PUL-
3	DR2 direction signal（output）DIR-
4	X GND external 5V power source grounding（output）

- Z axis interface J13

Pin	Definition
1	EX5V external 5V power source positive（output）PUL+、DIR+
2	PWM5 step pulse（output）PUL-
3	DIR5 direction signal（output）DIR-
4	X GND external 5V power source grounding（output）

- U axis interface J5

Pin	Definition
1	EX5V external 5V power source positive（output）PUL+、DIR+
2	PWM6 step pulse（output）PUL-
3	DIR6 direction signal（output）DIR-
4	X GND external 5V power source grounding（output）

- U axis interface J4

Pin	Definition
1	EX5V external 5V power source positive（output）PUL+、DIR+
2	OUT3 step pulse（output）PUL -
3	OUT4 direction signal（output）DIR--

The general output interface

- The ordinary IO output interface J17

Pin	Definition
1	EX5V external 5V power source positive（output）
2	OUT1
3	OUT2

- The ordinary IO output interface J6 (expansion port)

Pin	Definition
1	EX5V external 5V power source positive（output）
2	OUT5 automatic following signal (metal cutting)
3	OUT6 the rising signal (metal cutting)
4	X GND external 5V power source grounding（output）

The relay control signal interface J7

Pin	Definition
1	EXV connect the pin 1 of J6
2	OUT7 in the brush mode, lifting signal, relay output signal pin 1
3	OUT8 inflatable signal, relay output signal pin 1
4	X GND connect relay output signal pin 2

The input voltage of relay has many kinds, such as 5V, 12V, 24V, but the 5V is the best.

2.3.6 Laser Power Interface

- The interface of laser power 1 - J8

Pin	Definition
1	EX 5V external 5V power source positive (output)
2	PWM3 be used to control the laser When the laser is RF laser, used to control the power intensity and light of the laser. When the laser is domestic glass tube, used to control the electric current.
3	DIR3 laser enable control (DIR3 jumper to H, the signal is high and effective, to L, the signal is low and effective.） When the laser is RF laser, used to control the enable function of laser. When the laser is domestic glass tube, used to control laser On/Off
4	IN—1 laser status, the corresponding instruction is LED D1 When the laser is RF laser, used to the state input of laser. When the laser is domestic glass tube, used to the state input of water conservation (active low)
5	XGND external 5V power source grounding（output）

- The interface of laser power 2 – J11

Pin	Definition
1	EX 5V external 5V power source positive (output)
2	PWM4 be used to control the laser When the laser is RF laser, used to control the power intensity and light of the laser. When the laser is domestic glass tube, used to control the electric current.
3	DIR4 laser enable control (DIR3 jumper to H, the signal is high and effective, to L, the signal is low and effective.） When the laser is RF laser, used to control the enable function of laser. When the laser is domestic glass tube, used to control laser On/Off
4	IN—6 laser status, the corresponding instruction is LED D6 When the laser is RF laser, used to the state input of laser. When the laser is domestic glass tube, used to the state input of water conservation (active low)
5	XGND external 5V power source grounding（output）

2.3.7 Input Interface

The limit interface

- X, Y axis limit interface J9

Pin	Definition
1	EX 5V external 5V power source positive (output)
2	IN—2 X up limit, axis movement to the max coordinate limit sensor input, corresponding to D2
3	IN—3 X down limit, axis movement to the minimum coordinate（0）limit sensor input, corresponding to D3
4	IN—4 Y up limit, axis movement to the max coordinate limit sensor input,

	corresponding to D4
5	IN—5 Y down limit, axis movement to the minimum coordinate（0）limit sensor input, corresponding to D5
6	XGND external 5V power source grounding（output）

- Z, U axis limit interface J12

Pin	Definition
1	EX 5V external 5V power source positive (output)
2	IN—7 Z down limit, axis movement to the minimum coordinate（0）limit sensor input, corresponding to D2
3	IN—8 U down limit, axis movement to the minimum coordinate（0）limit sensor input, corresponding to D3
4	IN—9 opening protection signal input, corresponding to D4
5	IN—10 foot switch signal input, corresponding to D5
6	XGND external 5V power source grounding（output）

The general input interface

- Input interface J10

Pin	Definition
1	EX 5V external 5V power source positive (output)）
2	IN—11 signal input, corresponding to D11
3	IN—12 signal input, corresponding to D12
4	IN—13 signal input, corresponding to D13
5	XGND external 5V power source grounding（output）
6	XGND external 5V power source grounding（output）

Input interface J13

Pin	Definition
1	EX 5V external 5V power source positive (output)）
2	IN—14 signal input, corresponding to D14
3	IN—15 signal input, corresponding to D15
4	IN—16 signal input, corresponding to D16
5	XGND external 5V power source grounding（output）
6	XGND external 5V power source grounding（output）

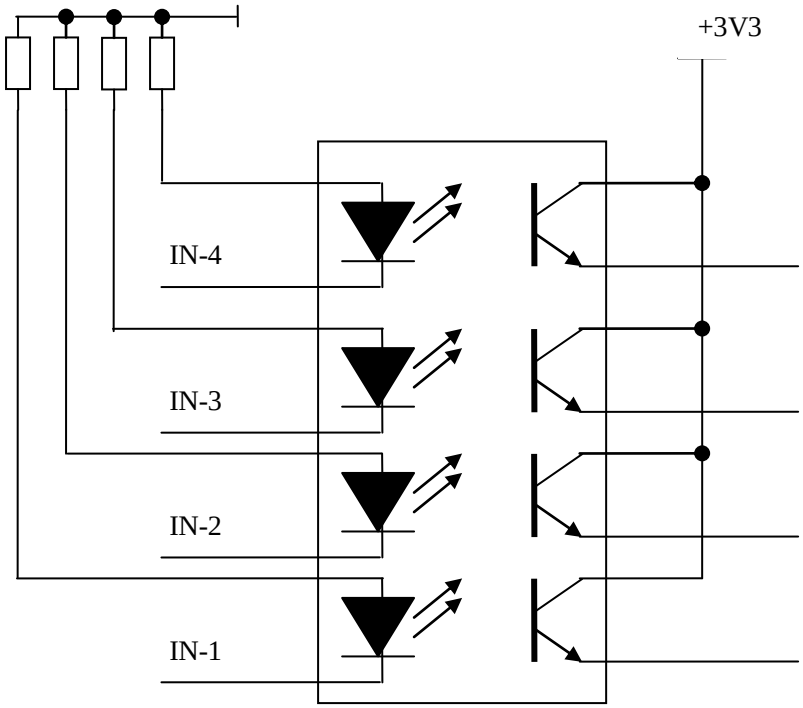
- When using the single laser control, the water protection signal of another laser must be shorted with XGND, otherwise, the machine doesn’t work.

The connection ways of switch input signal:

- When using approaching switch, the corresponding parameters of upper PC must be set as “Negative” by NPN; the corresponding parameters of upper PC must be set as “Positive” by PNP.
- When using straight or magnetic induction switch, the corresponding parameters of upper PC

must be set as “Negative” while receiving signal + XGND；the corresponding parameters of upper PC must be set as “Positive” while receiving signal + EX5V.

2.3.8 Input Signal Diagram

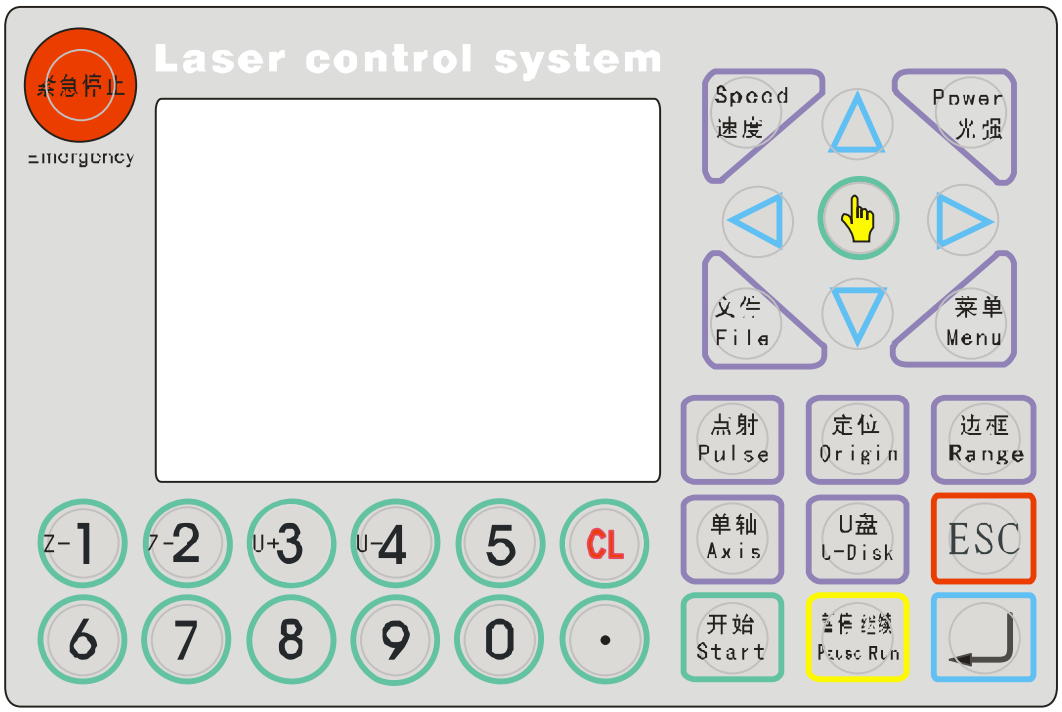


Input Signal

Chapter 3 The Panel Instruction

3.1 The Operation Panel and Buttons Function Introduction

3.1.1 The Operation Panel



3.1.2 Buttons Function Introduction

- 1、 

"Emergency Stop" key: no matter what state the machine, click the key, it'll be into reset state, then return the origin point.

2、 

"Speed" Key：set the speed.

3、 

"Power Light Intensity" Key：can be into the Light Intensity Setting Interface. 4、

"Menu" Key：press the key into the main menu interface.

5、 

"File" Key：into the memory file selection interface.

6、 

"U Disk" Key：into the U disk file selection interface.

7、 

“Range(frame)”Key：the range preview interface.

8、 

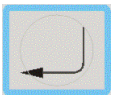
“Pulse”Key：use to test, touch a time, light a time, used to test the optical path.

9、 

“Origin”Key：can set the start point that the machine run. The “Origin” can be freely chosen on the Machine setting parameters. If choose the “Mechanical Origin”, after the machine reset, it’ll return the origin, the coordinate is “0, 0”. If choose the “Regression Point”, after resetting, it’ll return the current coordinate that machine operated last time.

10、 

“Single Axis”key：into the single axis movement interface.

11、 
“Confirm”Key.

12、 

“ESC”Key.

13、 

“Start”Key.

14、 

“Pause/Run”Key：press the key to pause at the working state, again press, it’ll go to running. On the Pause state, after moving the X or Y axis, touch a time, it’ll be automatically return the origin to continue working. On the Stop state, press the key, the laser head will automatically return the regression point.

15、 

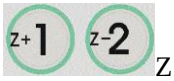
Number Keys, change the data the selected area, also can directly press the key to choose the current menu.

16、 

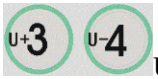
Decimal Key.

17、 

Delete key.

18、 

Z axis moving key, in the Processing and Event into interface to move the Z axis.

19、 

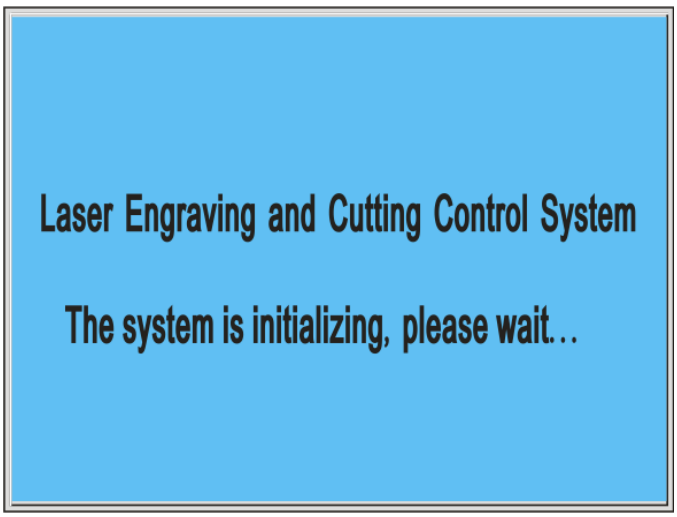
U axis moving key, in the Processing and Event into interface to move the U axis

20、  Direction key，used to move the X, Y axis, in the other interfaces, used to move the curse to choose menu.

21、  Choose key，change the axis speed in the standby interface, in the other interface, used to change the parameters besides the numbers.

3.2 The Main Interface Introduction

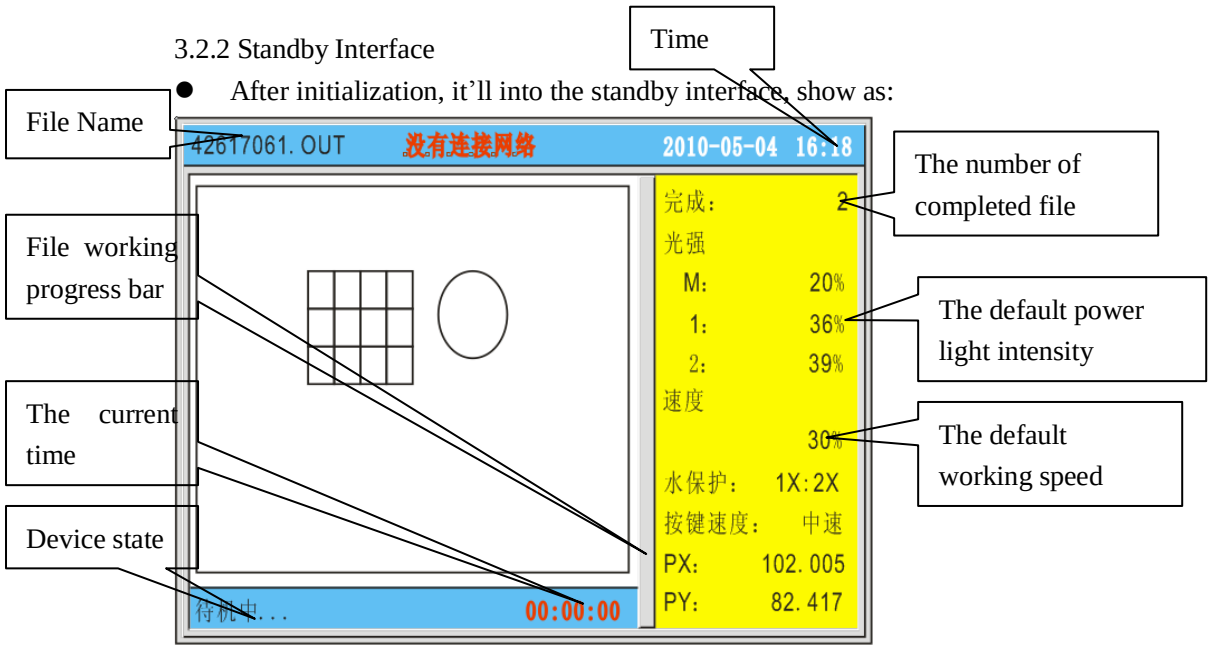
3.2.1 Power Interface



The system is initializing, please wait…

3.2.2 Standby Interface

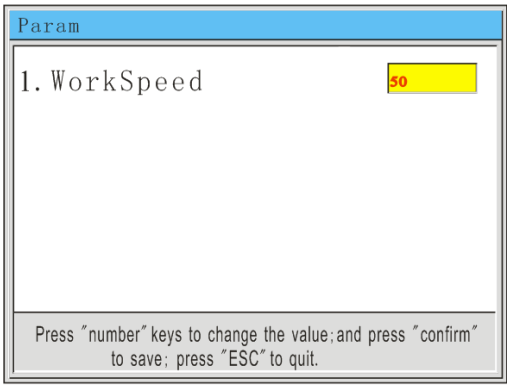
- After initialization, it'll into the standby interface, show as:



- If connect the network, it'll show the IP address196.168.0.100.
- In the figure, the water protection is 1X: 2X, 1X means water protection 1 not connected, 2X means water protection 2 not connected. If connect, it'll show 1V:2V.
- The Key Speed, manually move axis speed, can press the "Select" key to change the speed, there are "fast", "middle", "slow".
- PX、PY is the coordinate in the current place.
- The current time is that file can be completed

3.2.3 Speed Setting Interface

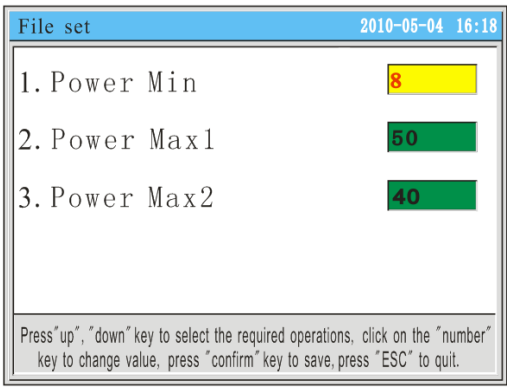
After initialization, press the "Speed" key, show as:



This shows the speed setting is effective when the speed of working file set as defaulted. The speed value is the percentage of the axis' limit speed.

3.2.4 Power Light Intensity Interface

After initialization, press the "Power Light Intensity" key, show as:



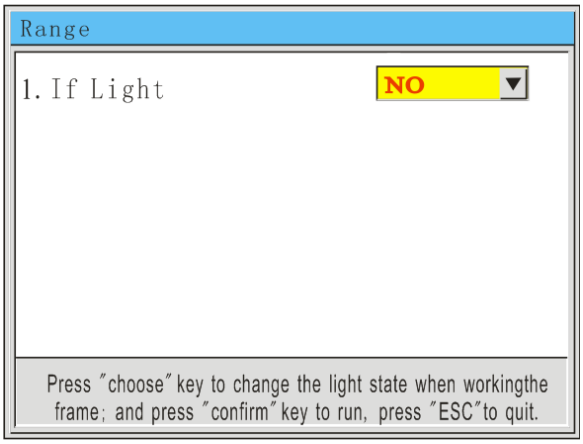
This shows the light intensity is defaulted, and there are 3 cases:

1. at the time of Pulse, it's used to the max light intensity here;
2. Moving axis and range working with light, also used to the max light intensity here.
3. The selected file's light intensity is effective when defaulted.

M is the min light intensity, 1 is LASER-1 set the percentage of max defaulted light intensity; 2 is LASER-2 set the percentage of max defaulted light intensity

3.2.5Range Preview Interface

After initialization, press “Range” key, show as:



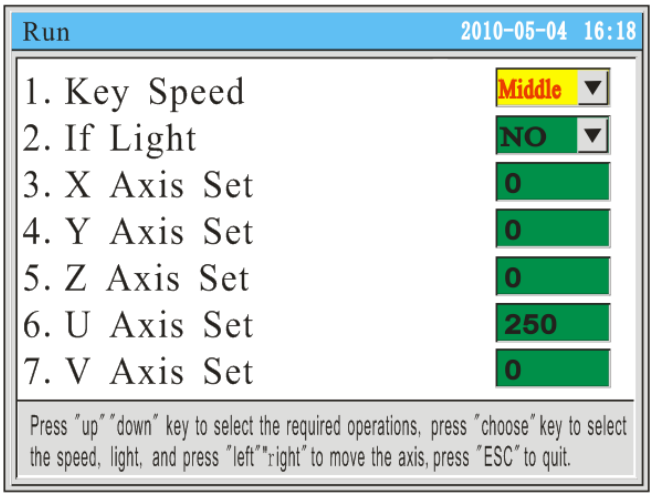
There are two previews:

1. preview with the light
2. preview without the light

Press “Select” key to choose, “Yes” is for the first preview, “No” is for the second preview.

3.2.6 Single Axis Movement Interface

After initialization, press “Single axis” key, show as:

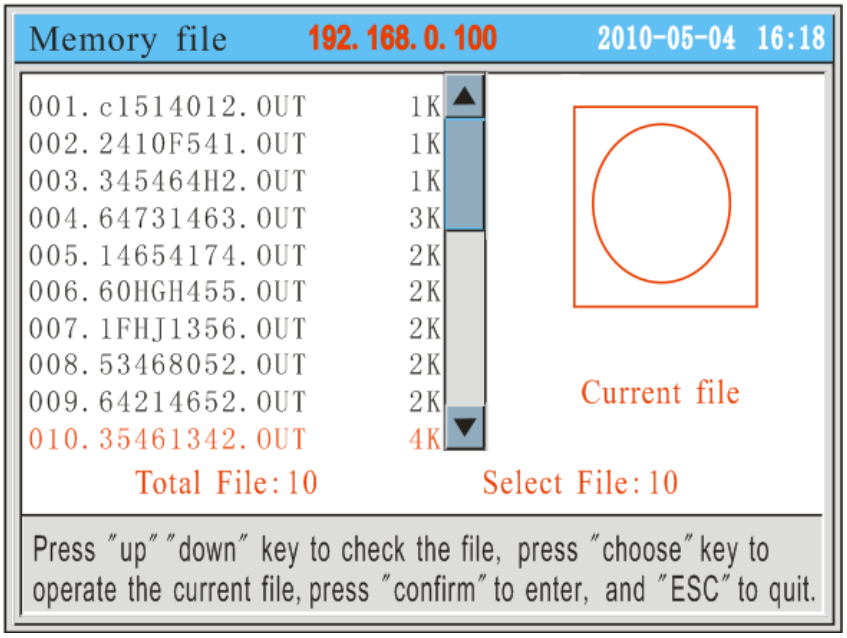


Press the “Direction” key to choose the needed operation:

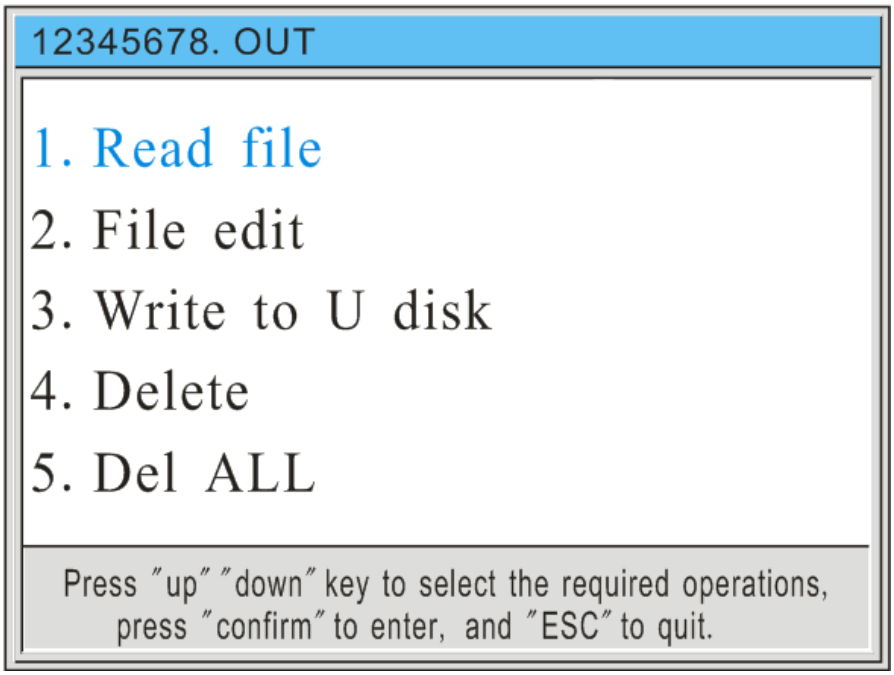
1. Key Speed: fast, middle, slow.
2. Light: Yes or No?
3. X axis: press “right, left” key to move X axis, when stop, it’ll show the current coordinate. The other axis operation is similar. When the U axis stopped, it’ll show the middle value of max route.

3.3.7File Selection Interface

Can press “menu” key into the main menu, and select the memory file. Also can directly press “File” to enter, show as:



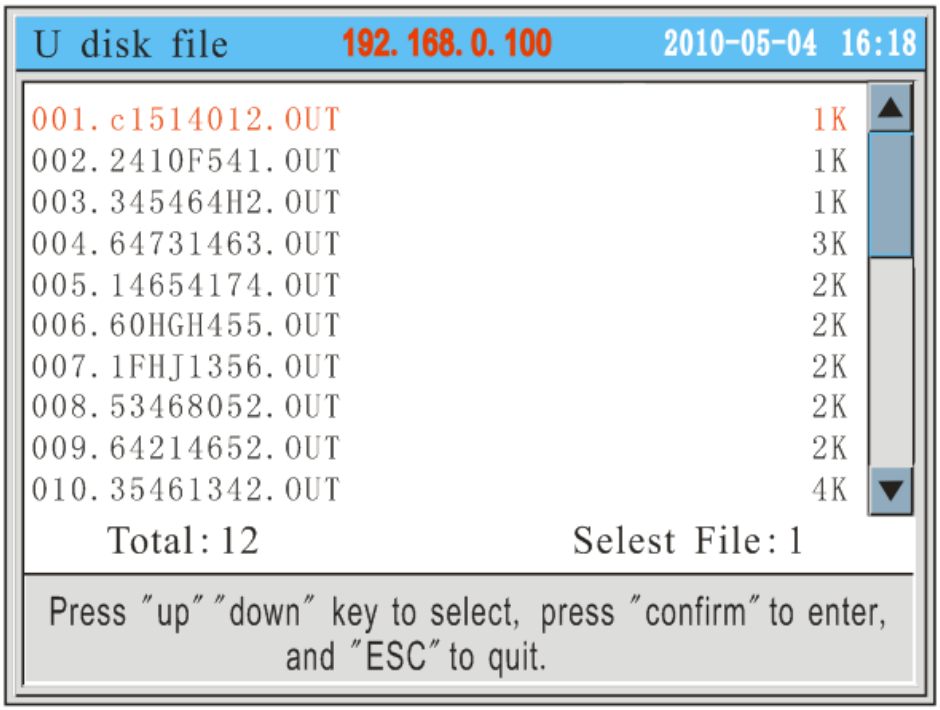
Press “Down, Up” to choose the file, and press “Select” key to point the current file, then click “confirm” key or “ESC” to quit, show as:



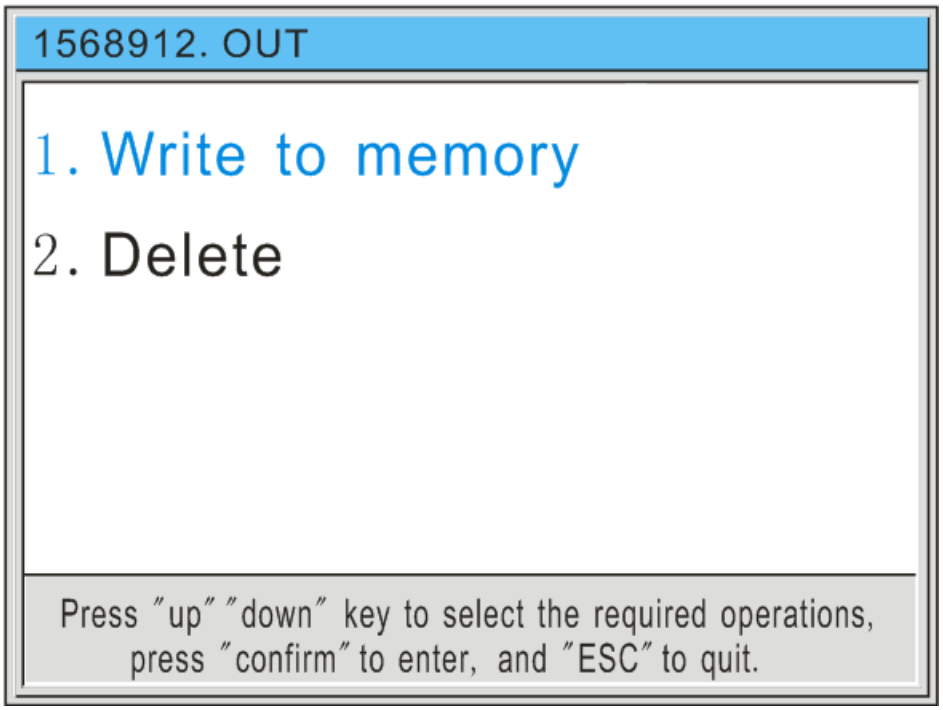
1. reading file, it’s the work file
2. edit the file, can change the file’s parameters
3. write into U disk, copy the file into U disk
4. delete, delete the current file
5. Delete all; means delete all the memory file.

3.2.8 U disk File Interface

Can press “menu” key into the main menu, and select the U disk file. Also can directly press “U disk” to enter, show as:



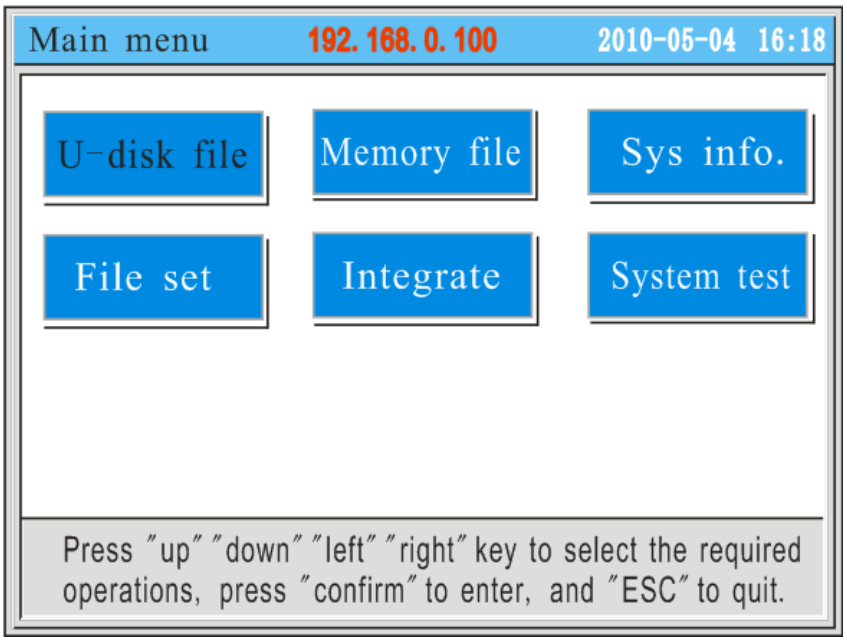
Press “Down, Up” to choose the file, and press “Select” key to point the current file, then click “confirm” key or “ESC” to quit, show as:



1. write into memory
2. delete

3.2.9 The Main Menu Setting

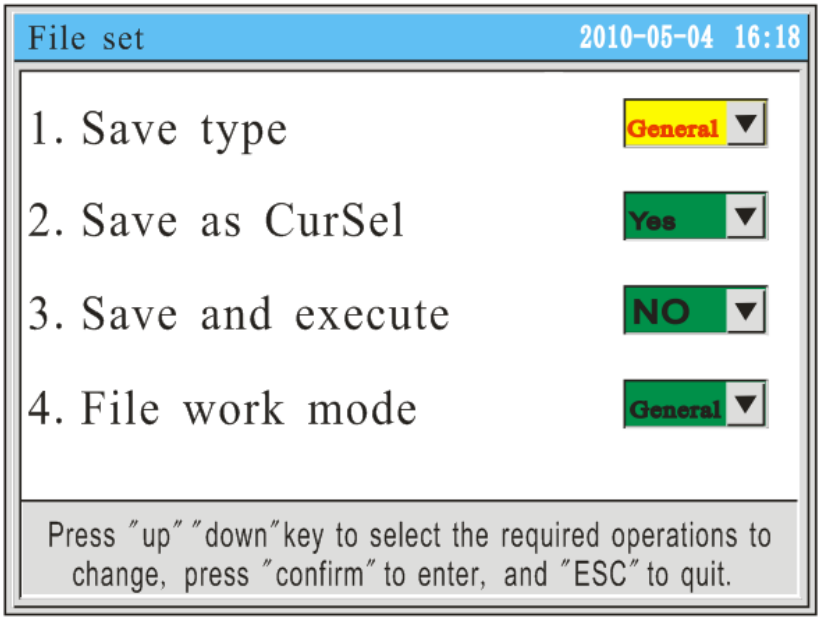
Press “Menu” into the main menu, show as:



Press the “Direction” key to choose the needed setting, “confirm” to operate, and “ESC” to quit.

3.3 File Setting

After starting, press “menu” into the main menu, choose the “File Setting”, then “confirm”, show as:

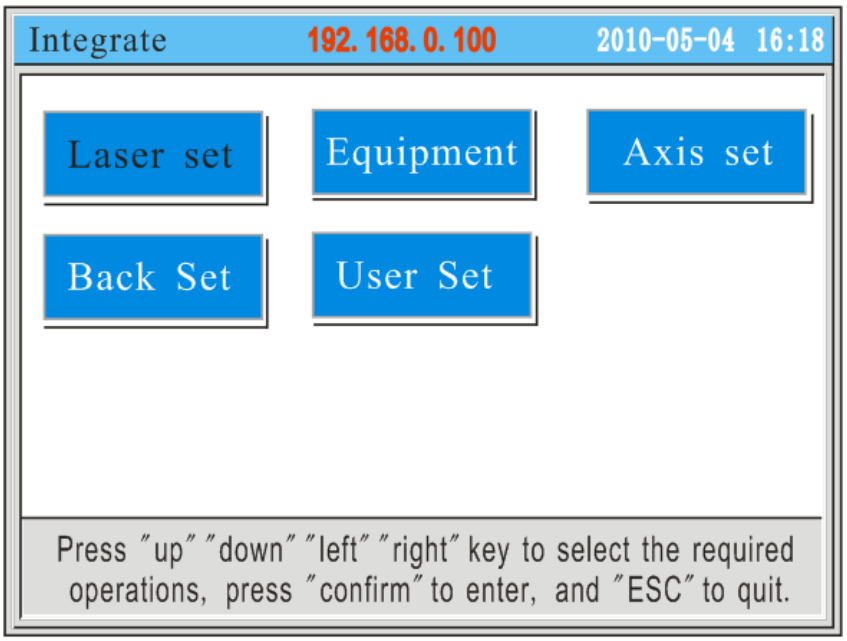


Press “Up, Down” to choose the required operation, click “Select” key to change setting, press “Confirm” to save the setting, click “ESC” to quit.

1. Storage type: general storage and temporary storage.
2. Save as CurSel
3. Save and execute
4. File work mold

Chapter 4 The Complex Settings

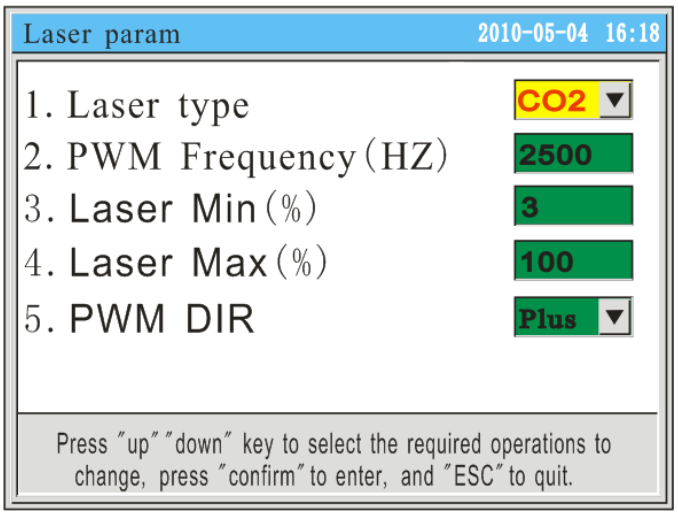
After finishing the start, press "Menu" key into the main menu interface, choose "Complex Setting", then click on the "confirm" to enter, show as:



Press the "Up, Down, Right, Left" to select the needed operation, click "confirm" to enter, click "ESC" to quit.

4.1 The Laser Set

In the Complex Setting interface, choose "The Laser Setting" to enter, show as:

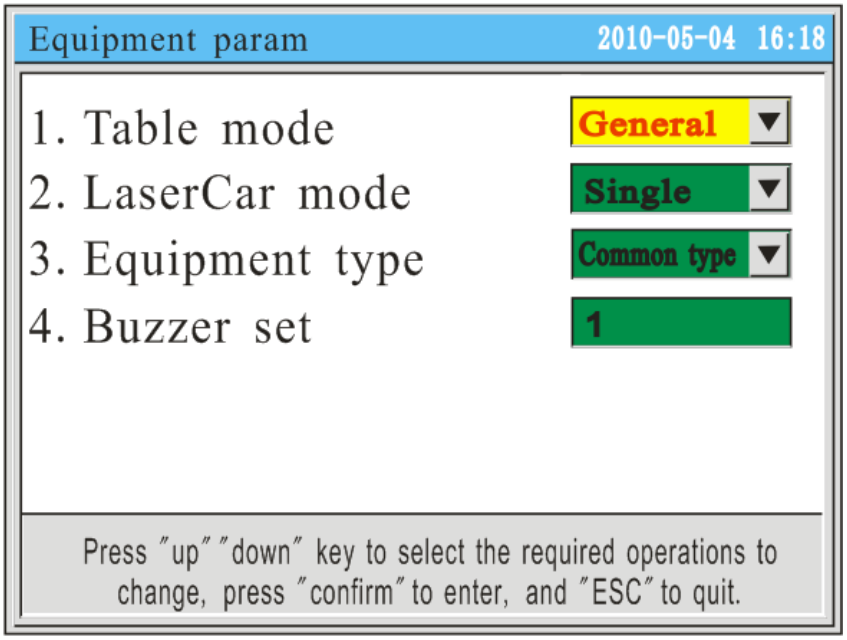


Press the "Up, Down" key to select the needed operation. Click on the "Choose" key to change setting, "Number" keys to set the value.

1. Laser type: the common laser (CO2 glass tube), the coherent laser, and the RF laser.
2. The frequency of PWM: press the "Number" keys to change the PWM.
3. The laser min/max: the setting range: 0≦the min duty ratio ≦the max duty ratio ≦100.
4. PWM DIR: presses "choose" to change the PWM DIR.

4.2 The Equipment Setting

In the Complex Setting, choose “the Device Setting” to enter, show as:

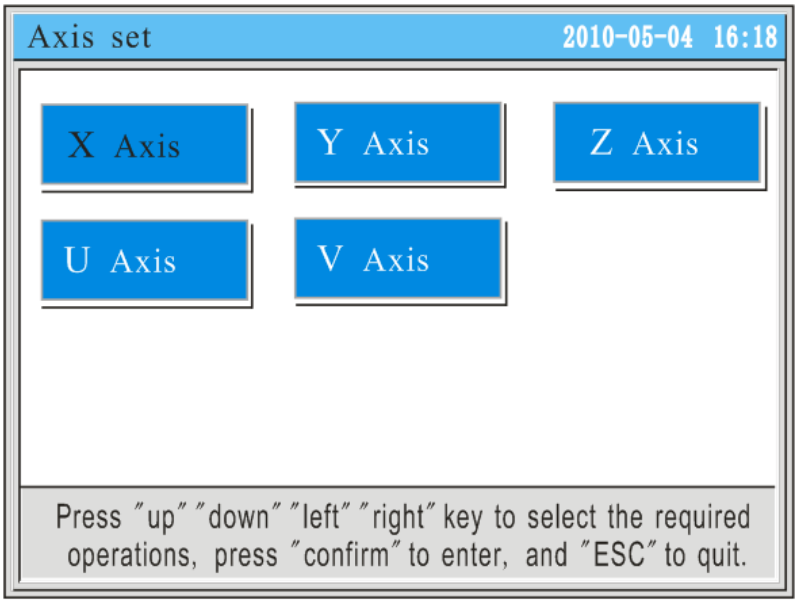


Press the “Up, Down” key to select the needed operation. Click on the “Choose” key to change setting, “Number” keys to set the value.

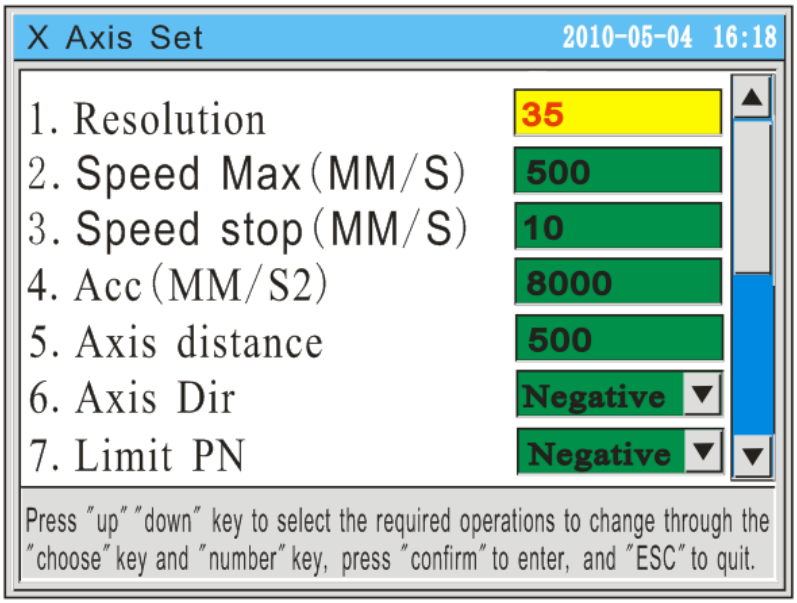
1. Table model: after choosing dural table model, and set the distance of dural table model, the distance subjects to the two upper left corner of table model. The machine on dural table has two tables: to go back and forth by Z axis, keep a table on the working position; and another one turn in there on the both sides of machine.
2. After choosing dural table model, set the min distance, which are the origin points between the two tables. The machine on the dural table has two X axis, through the two X axis’ movement, flexibly deal with array patterns’ laser cutting working. When it’s even column, the two head will work at the same time; when it’s odd column, one head on the last column work.
3. The equipment type: the common device, the metal cutting device, and the wheel device.
   A) When choose the metal cutting device, need to set falling delay, rise delay, and long distance.
      Falling delay, it’s the delay time when AF in the preparation of light before.
      Rise delay, it’s the delay time when AF rising.
      Long distance, above two graphics, it’s the distance that the previous graphic’s end point to the following graphic’s start point.
   B) When choose the wheel device, need to set the parameters: Reference Diameter and Reference Resolution.
4. Buzzer set: press “Number” keys to set the times.

4.3 The Axis Setting

In the Complex Setting interface, choose “The Axis Setting” to enter, show as:



Press the “Up, Down” key to select the needed operation, for example, the X axis setting:

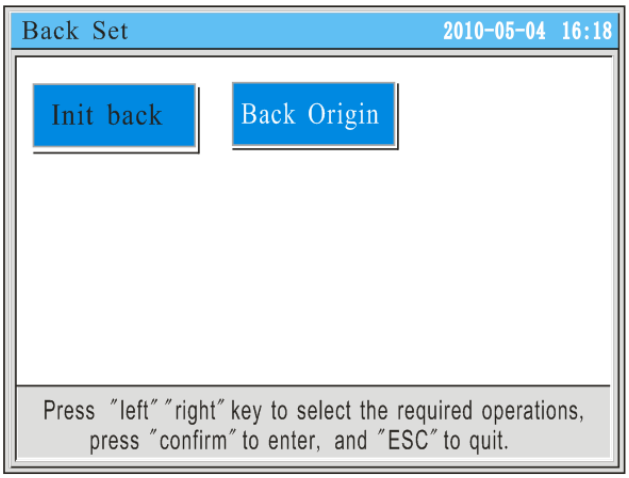


Press the “Up, Down” key to select the needed operation. Click on the “Choose” key to change setting, “Number” keys to set the value.

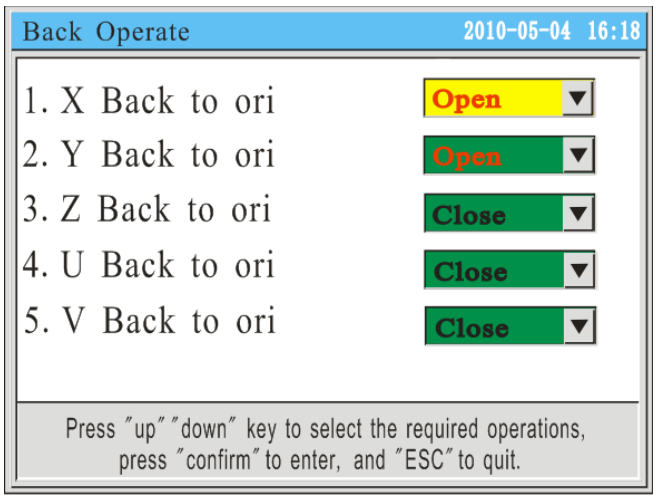
1. Resolution: the resolution = the length that the laser head moving when the motor rotate a cycle×1000/the pulses that the controller needed when the motor rotate a cycle.
2. The speed setting: the limit speed is the fastest speed that the axis can reach. The stop speed is the speed that the axis starts and stops. The acceleration is the max speed when running.
3. The max. Route: it’s the max distance that the axis moving.
4. Axis distance.
5. Axis DIR
6. Limit PN.

4.4 The Origin Point Setting

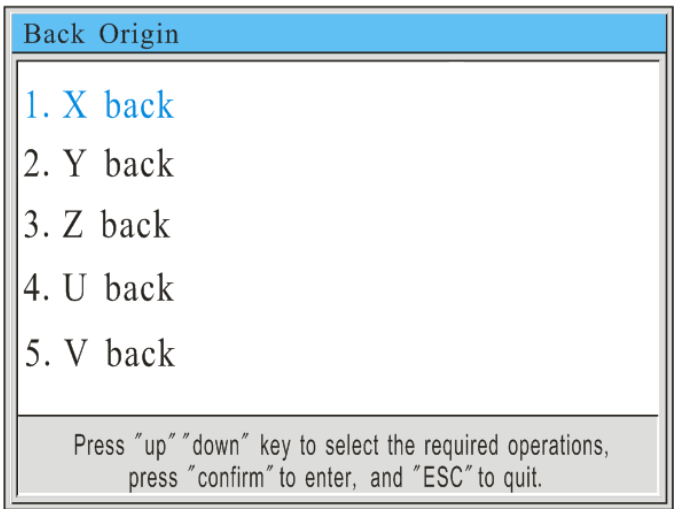
In the Complex Setting interface, choose “the Origin Point Setting” to enter, show as:



Press the “Right, Left” key to select the needed operation, for example, back to the origin after power.



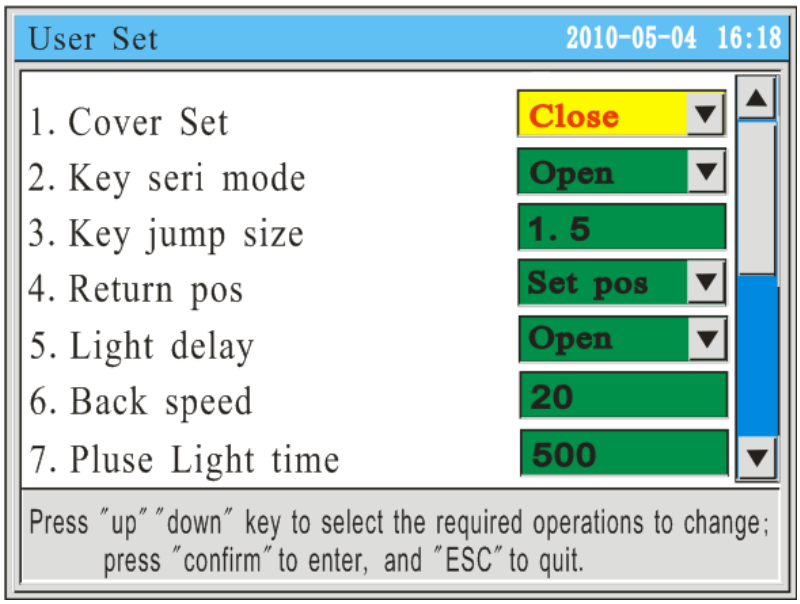
Press the “Up, Down” key to select the needed operation. Click on the “Choose” to change setting.



Press the “Up, Down” key to select the needed operation.

4.5 The User' Setting

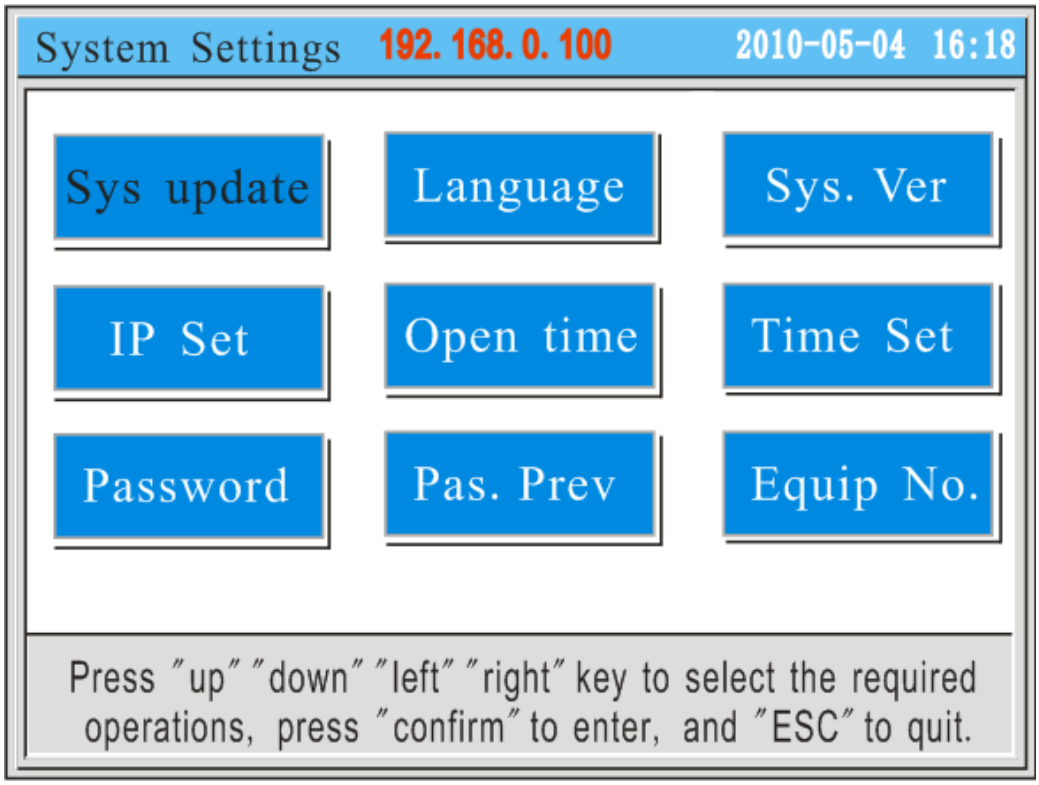
In the Complex Setting interface, choose "the User' Setting" to enter, show as:



Press the "Up, Down" key to select the needed operation. Click on the "Choose" to change setting.

Chapter 5 The System Information

After the starting, press "Menu" key into the main menu interface, choose "the System Information" to enter, show as:

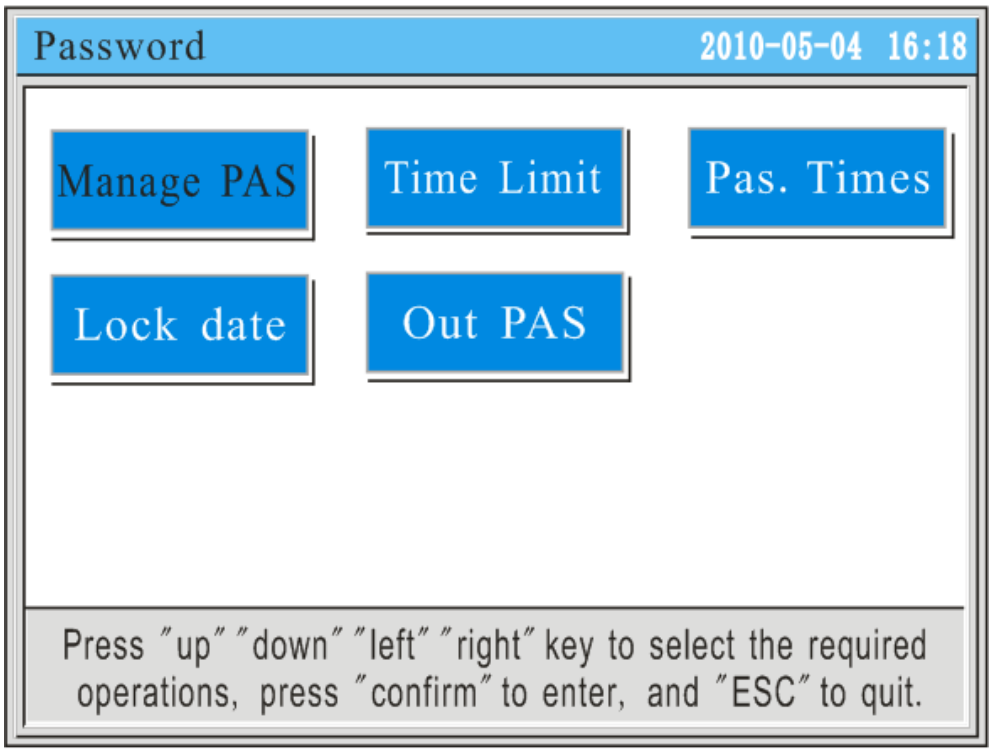


Press the “Up, Down, Left, Right” key to select the needed operation.

1. The system update, please copy all the files to U disk before updating.
2. Language.
3. The system version, show the current DSP version No.
4. The IP setting, press the "number" keys to set.
5. The booted time.
6. The time set, set the time, need to input the management password before. The origin management password is 00000000.
7. The password setting.
8. The password preview.
9. The equipment No.

5.1 The Password Setting

Choose "the Password Setting" to enter, show as:

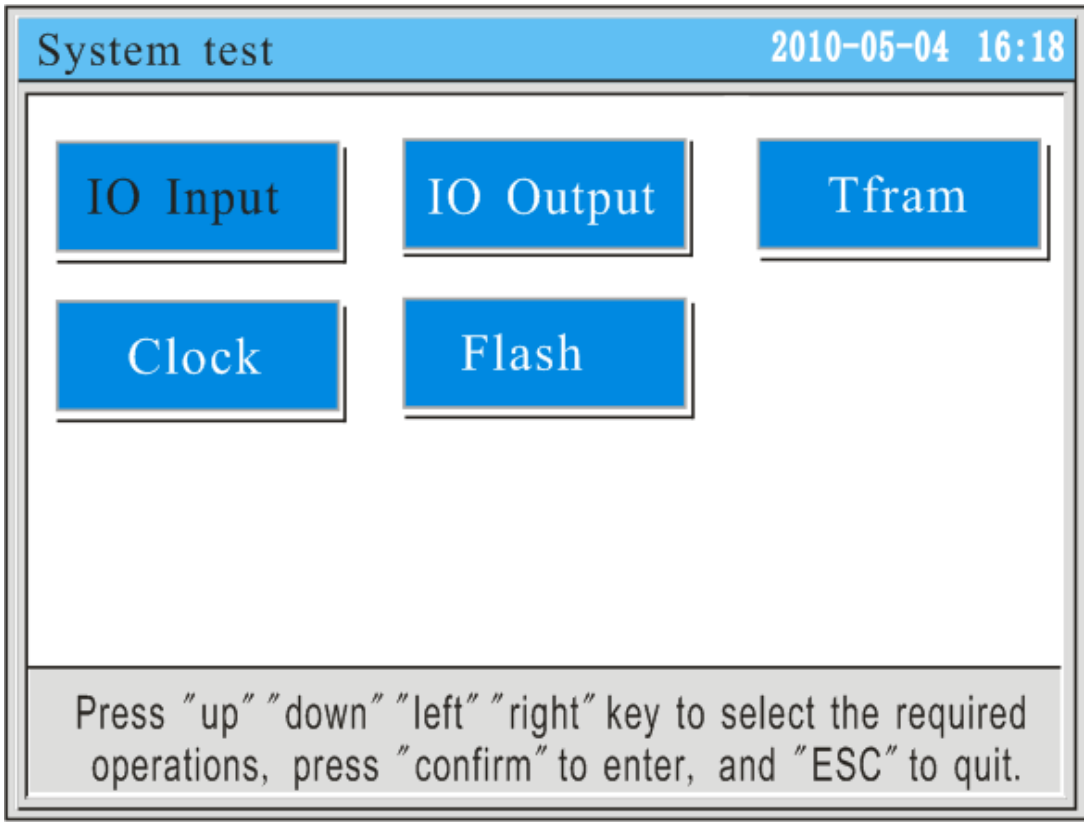


Press the “Up, Down, Left, Right” key to select the needed operation.

1. The management password.
2. The time limit, when it starts, the staging password is working.
3. The password times, set the password phases, a phase a month.
4. Lock the date, the phase password is from the lock the date, the range is 1-28.
5. Out the password.

Chapter 6 The System Testing

After the starting, press "Menu" key into the main menu interface, choose "the System Testing" to enter, show as:



Press the "Up, Down, Left, Right" key to select the needed operation.

1. IO input testing, corresponding to the IO input low power, it'll display from Green to Red.
2. IO output testing, connect the IO test board, can see all the output signals corresponding LED turn off.
3. Ferroelectric, Timer, Flash, after finishing the testing, it will show the result.

Chapter 7 the Frequently Asked Question Help

7.1 Power-on Reset Question

Q: the system does not reset, buttons no response, and LCD no display.

A: the system reset error, the solution is:

First, click the "Emergency Stop" on the panel, and check the button normal.

Second, check the external 5V and internal 5V are within the normal.

Q: opening, the X, Y axis not move, the LCD display the main interface, can manual move the axis.

A: the power back to origin error. Into the "Power back to Origin" interface, set the X, Y axis as Opening.

Q: opening, the X, Y axis returns the origin, the LCD still shows "system initialization".

A: the power back to origin error. Into the "Power back to Origin" interface, set the Z, U axis as Close.

Q: opening, X, Y slow-move a short distance, not reach to the limit point, and complete the reset.

A: the Limit Polarity error. Into the "Limit Polarity" interface, change the X, Y polarity.

Q: opening X, Y move to the opposite direction of limit switch,

A: the direction polarity error. Into the "Direction Polarity" interface, change the X, Y polarity.

Q: button moving, X, Y moving direction is opposite to the button moving.

A: the button polarity error. Into the "Button Polarity" interface, change the X, Y polarity.

Q: after the completion of reset, X, Y fast automatically moving.

A: the regression point setting error. Into the "Regression Point Setting" interface, set the regression point as mechanism origin point.

Q: the setting of power back to origin is close, after power, X, Y still automatically moving.

A: the regression point setting error. Into the "Regression Point Setting" interface, set the regression point as mechanism origin point.

7.2 The Laser Light Question

Q: Long light after power on.

A: view the enable signal of laser power is wiring, and see the jumpers of interface broad DIR3 and DIR4, check whether they e keep the consistency.

Q: When the light power intensity is big, the idemitsu is small; when the light power intensity is small, the idemitsu is big.

A: the PWM polarity setting error, into the button polarity setting interface, changes the PWM polarity.

Q: PWM frequency is correct, light power intensity can be changed by line within 10% - 60%.
A: check the laser power supply model, it's 5.5 voltage, not 3.3V.

Q: Water protection invalid.
A: check the laser type, there are 3 types: 0 is CO_2 glass tube; 8 is coherent glass tube; 16 is RF tube. If the laser type is correct, please check the water protection directly shorted.

7.3 The PC Connection Question

The Questions:

- Reading the parameters, can't open the port.
- Can't read the parameters.
- Transfer the file invalid.

The Solutions:

- Check whether the USB line is connected correctly, and the USB port is connected the PC.
- Check the USB driver is installed correctly.
- Check the USB port numbers on the device management, if it's more than 9, please change it within 3 – 9.
- The software output port need to be same with COM port.
- Insert a new and good port on the computer.
- Close the equipment power supply 3 minutes, than open again.
- Restart the computer, to ground the equipment and the computer.
- Replace a computer.

7.4 The Reading and Writing of U disk Question

Q: click the U disk file, show as "U disk is empty or error".
A: U disk error. Check the U disk port is correct. Replace a U disk.

Q: click the U disk file, show as "U disk reading…please wait", the indicator is off.
A: replace the U disk cable.