7824k Motion Control System Operating Instructions

Laser engraving cutting motion controller series

Contact US

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Preface

Thanks for choosing the TROCEN motion controller

In order to return customers, we will help you complete the production of equipment with first-class quality motion controllers, perfect after-sales service and efficient technical support.。

USE

By reading this operation instructions, users can understand the basic operation of the 7824K/7846K control card.

User target audience

This note is intended for engineers who have some understanding of mechanical automation such as laser equipment.

Main content

The basic operation and use of the 7824k/7846k panel are introduced in detail。

Related documents

《LASERCAD Instructions for use》

1. Product Description

1.1 Introduction

AWC7824k Motion controller is a laser cutting motion control system developed by Shenzhen Trocen Automation Technology Co., Ltd. AWC7824k

motion controller adopts the operation mode of button + touch integration on the basis of the original function of AWC7824, which adapts to different production and processing and debugging sites. The system is used by the upper computer software and the lower computer motion controller, which can greatly improve production efficiency and reduce production costs. The computer computer software of this system.

LASERCAD software, has the following characteristics:

- The interface is friendly, powerful, and the operation is intuitive and convenient
- Support professional drawing software such as CorelDraw and Auto CAD
- Support AI, PLT, DXF, SVG, PDF, NC, DST, DSB, UD6 and other format files
- Simple drawing functions
- With automatic nesting and path optimization functions

The lower computer motion controller of this system has the following characteristics：

- High-speed DSP main control chip, faster computing speed, more advanced motion algorithm, better effect
- 4.3Inch TFT LCD touch screen, the operation interface is more intuitive and the operation is more simple
- All optocouplers isolate external electromagnetic interference, and the system works more stable and reliable
- Support network, USB, U disk and other fast reading and writing files
- Support multi-head collaboration to multiply efficiency

1.2 Explanation of terms and abbreviations

Table 1-2-1 Explanation of terms and abbreviations

Terminology/Abbreviation	Explain
PC software	LASERCAD software is a special supporting software for TROCEN laser motion controller.
TFT touch screen LCD panel Cntrol Panel Panel (motherboard)	Refers to the 4.3-inch TFT color LCD touch control panel. The panel is used for specific display and control operations and is an important part of the system.
Base Board (Wiring board)	The backplane is a control board that integrates signal input and output control and motor drive connections.
Firmware system	The visible physical objects of the system include: panels, wiring blocks, wires, etc.

1.3 Open box

After receiving the product, please confirm whether the product and accessories are complete, if there is any defect, please contact Shenzhen Trocen Automation Co., Ltd. after-sales customer service.

Table 1-3-1 Product list

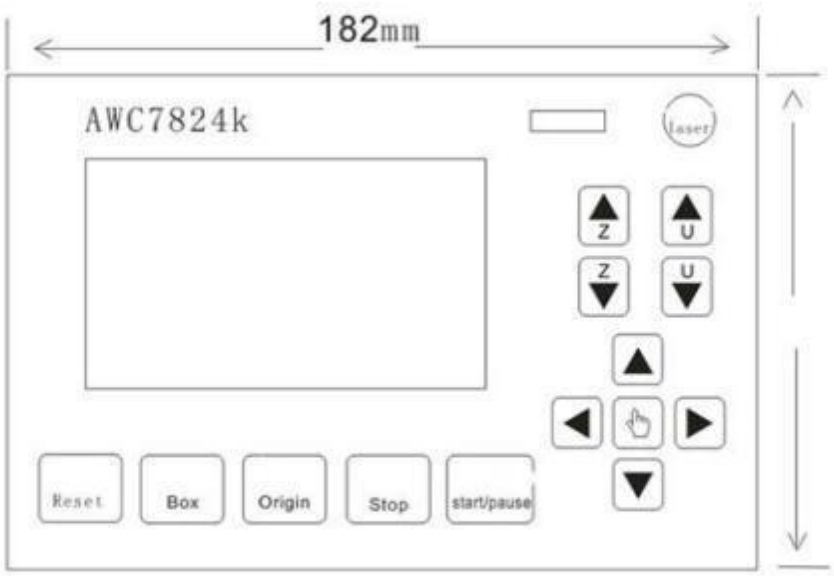
Name	Exterior	Illustrate

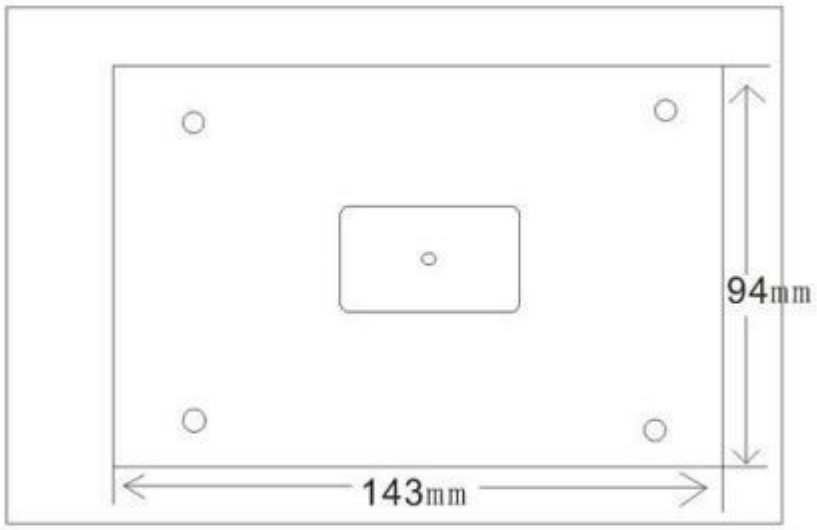
Panel board		AWC7824k Main board
Base board		AWC 7824k Base board（wiring board）
USB Cable (3m)		Connect the panel and computer via USB.
Net cable (5m)		Connect the panel and computer via network
CN cable （1.6m)		Two CN cables are included with the box to connect the CN1 and CN2 ports of the panel and the base board
USB Extension cable (0.5m)		USB Extension cable
Net extension cable(0.5m)		Net extension cable

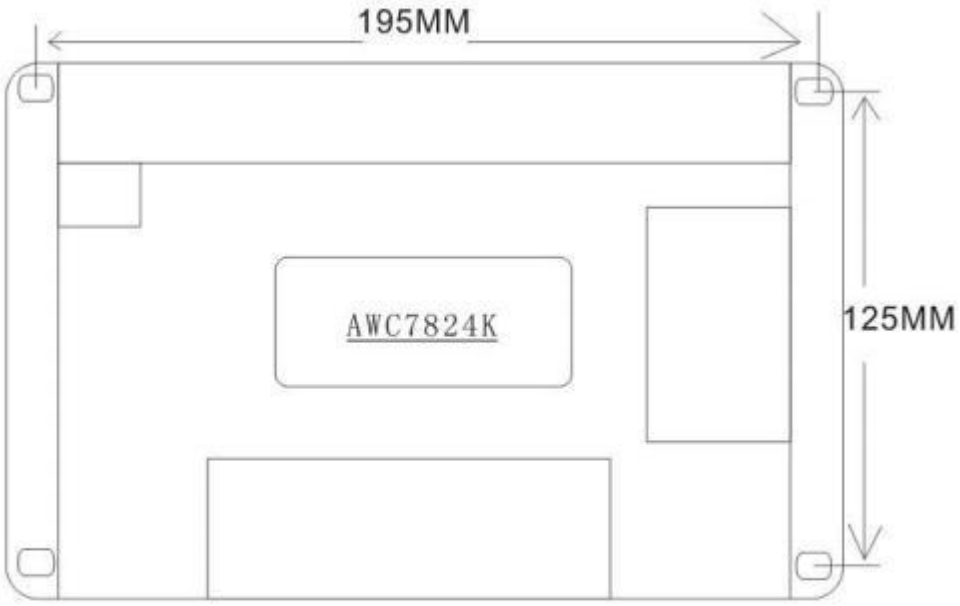
1.4 Physical Dimension

The system panel is designed with a display, soft buttons, and a USB stick jack.

Fig. 1-4-1 Panel base plate mounting dimension drawing




94mm
143mm


195MM
AWC7824K
125MM

1.5 Baseboard introduction

The base board serves as the connection between the panel and other parts of the machine. include:

- Connect the motor driver
- Detection of motion axis limit signals
- Detection of input signals
- IO control signal and corresponding power output

1.5.2.1 Base board power port

the baseboard power port is used to power the basebard and panel, and must pay attention to the positive and negative poles when connecting, and cannot be reversed.

Table 1-5-1 Backplane power port description

Pin	Name	Description
1	+24V	Positive power supply
2	GND	Negative pole of power supply

1.5.2.2 The panel is connected to the base board

The panel and the base board are connected through 2 serial port lines, and the corresponding ports can be connected.

Table 1-5-2 Description of the ports that connect the faceplate to the base board

Port name	Description
CN1	Connect the baseboard to the CN1 port of the panel with a CN cable.
CN2	Connect the baseboard to the CN2 port of the panel with a CN cable.

1.5.2.3 Signal input port

The backplane provides multiple sets of input signal terminals for the acquisition of input signals.

Table 1-5-3 Description of the backplane signal input terminals

Port group	PIN	Name	Description
Input	1	IN1	Open the cover protection signal, the function needs to be turned on the panel to be effective.
	2	IN2	Foot switch, this function needs to be turned on on the panel to be effective.
	3	IN3	Feeding switch
	4	IN4	Feeding switch
	5	IN5	reserved

	6	IN6	reserved
	7	GND	power ground
Output	1	OUT1	Working blowing (output signal throughout the working process)
	2	OUT2	Light blowing (output signal when light is out, no output when empty)
	3	OUT3	A brush signal or a tricolor red light indicates that the machine has stopped working or alarmed
	4	OUT4	The feeding signal (output signal when feeding) or a three-color green light indicates that the machine is cutting
	5	OUT5	Y&U Synchronous feeding signals (often used as pressing signals) or tri-color yellow lights indicate pause or wait conditions
	6	OUT6	Layer blowing
	7	OUT7	Job completion signal (output 1.5s pulse signal)
	8	OUT8	Dispensing/drawing tip signals
Limit	1	X-	X Axis origin limit, X-axis movement to the minimum coordinates, limit sensor input signal.
	2	Y-	Y Axis origin limit, Y axis movement to the minimum coordinates, limit sensor input signal.
	3	X+	X Axis hard limit, X-axis movement to the maximum coordinates, limit sensor input signal.
	4	Y+	Y Axis hard limit, Y axis movement to the maximum coordinates, limit sensor input signal.
	5	GND	power ground
	6	Z-	ZAxis origin limit, Z axis movement to the minimum coordinates, limit sensor input signal.
	7	U-	U Axis origin limit, U-axis movement to the minimum coordinates,

			limit sensor input signal.
	8	Z+	ZAxis hard limit, Z axis movement to the maximum coordinates, limit sensor input signal.
	9	U+	U Shaft hard limit, U-axis movement to the maximum coordinates, limit sensor input signal.

Laser signal	1	GND	power ground
	2	TTL	Light-controlled switching signal (high and low level selectable)
	3	PWM	Laser power signal
	4	WP	water protection signal
	5	5V	5v DC output

Remark：All input ports: voltage 24V or 0V, need to open the function in the panel, high and low levels are optional. Manufacturer recommended shaft origin, hardware limit switch selection: it is recommended to choose NPN type, normally open All input ports can be tested by interview in the test interface

1.5.2.4 Signal output

Output voltage：24v，The output is active at high levels. Each output port must be connected to a relay with a rated DC voltage of 24V or more to be used, and cannot be directly connected to the load.

1.5.2.5 Base board motor driver control port

The backplane provides up to 4 road motor drive connections, and the user can choose between stepper or servo drives as required. The servo drive has higher control accuracy than the step drive, and the user can choose the appropriate drive method according to the usage scenario, cutting precision requirements and cost factors.

Table 1-5-5 Backplane signal shaft terminal description

Shaft signal terminals	Description
DIR	Direction, connect the driver DIR-
PUL	Pulse, connected to driver PUL-
5V	Connect the drivers DIR+ and PUL+

Axis	Instructions for use
XY	Plane XY axis
Z	The cross-shifting model is split head 2, which can also be used for platform lifting and auto focusing
U	Feeding axis

2. LASERCADSoftware installation and use

LASERCAD is a typesetting and nesting software running on Windows platform. For specific installation and usage methods, please refer to the

"LASERCAD Software Operating Instructions".

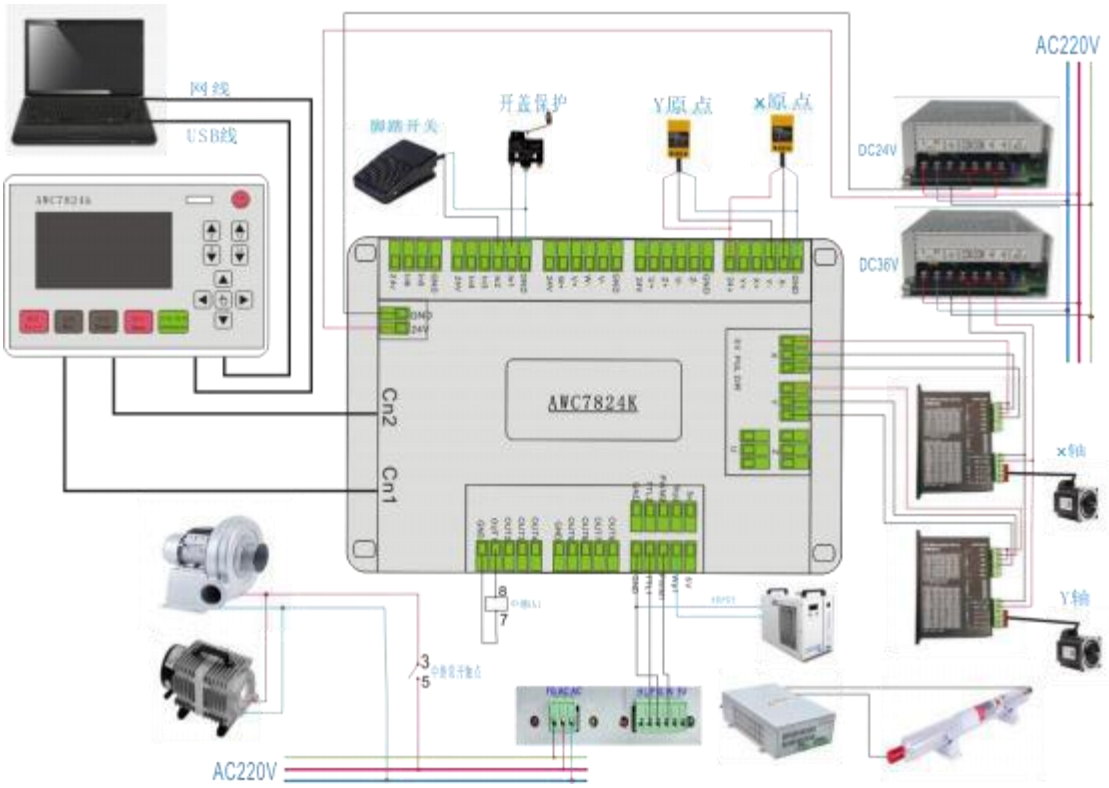
3. Initial installation of equipment

This chapter mainly covers the initial hardware installation of the product and the basic parameter settings of the control card. For detailed settings and descriptions of other parameters, please refer to the subsequent chapters of this article.

3.1 Hardware connection

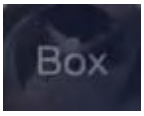
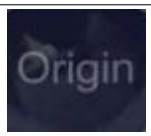
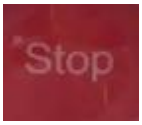
Please connect the hardware as shown below.

Figure 3-1-1 Overall wiring diagram display



3.2 Introduction to interface functions

3.2.1 Key Function

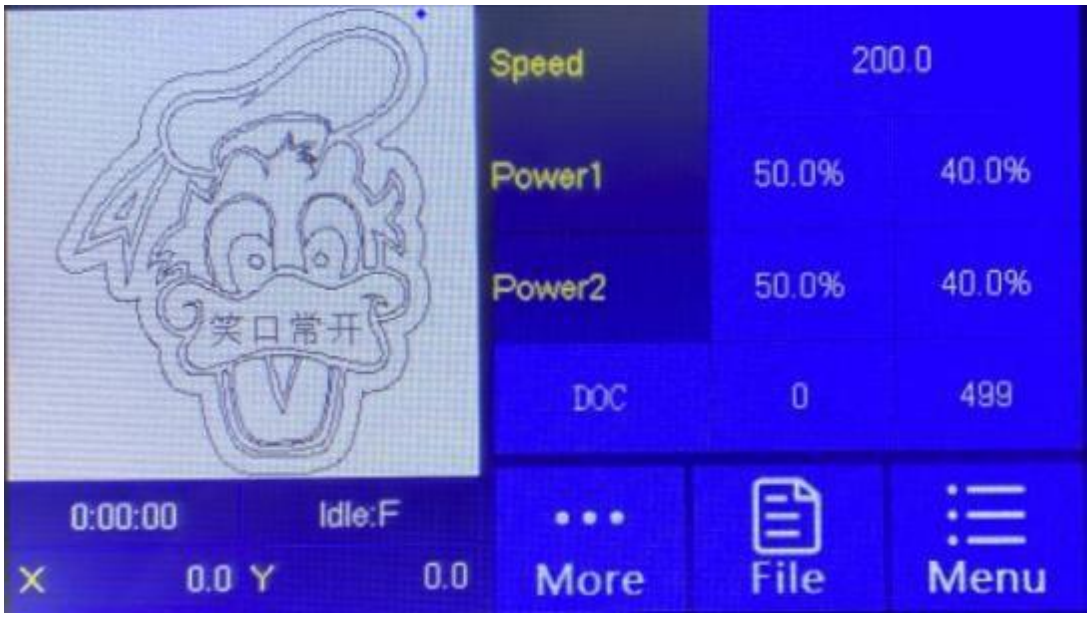
	Regardless of the state of the system, pressing this button will return the machine to standby and restart operation.
	Test the machining graphic size and machining position preview.
	Set the laser head start point position (this function requires the working positioning mode to be set to key positioning).
	Stop working and go back to the origin.
	Start/pause the machine and keep it in its current state.
	The laser tube emits light once when the button is pressed, which is used for testing. The burst power is the maximum power displayed in standby.
	Used to move the XY axis

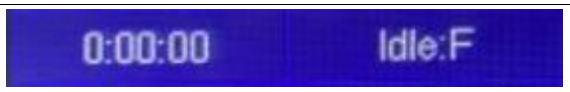
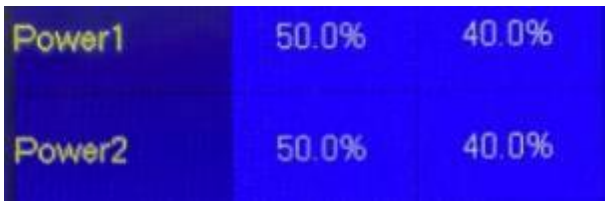
	
	The keys control the speed of fast and slow switching.
	Z-axis direction key (z-axis is often used for split head 2)
	Z axis direction key
	Feed axis direction key
	Feed axis direction key

3.2.2 Precautions for using U disk port

- Copy the working file: After the software sets the cutting parameters, click "Load" to save as an offline file. Copy the file to a USB stick. Plug it into the panel and read it. (UD5 format)
- Upgrade the firmware, extract the upgrade file, pull it to the U disk, click the upgrade file on the U disk file, find the corresponding file, and click Automatic Upgrade. (ug5 format)
- File not read: The file cannot be stored in the folder, it must exist in the root directory.
- Can't read the U disk: The U disk is set to FAT32 format / The U disk cannot be the system boot disk.
- If the file name exceeds 4 Chinese or 8 letters, an error will occur when copying the file to the USB flash drive.

3.2.3 Introduction to the function of the touch screen interface



	Display tracks and preview machining graphs
	Machining time display and status display
	Coordinate display
	When standby, it is the speed of key movement, and the processing speed is displayed when working
	Max/min power; In standby, this maximum power is the point emission power; Display processing power during operation; Press pause during operation to modify the current power.

3.2.4 Go to the "More" page

1.Input test

On this page, you can see the status of all input ports, which is commonly used to test input switching signals.

2 Output test

On this page, the output can be manually opened/closed for manual testing of the output signal.

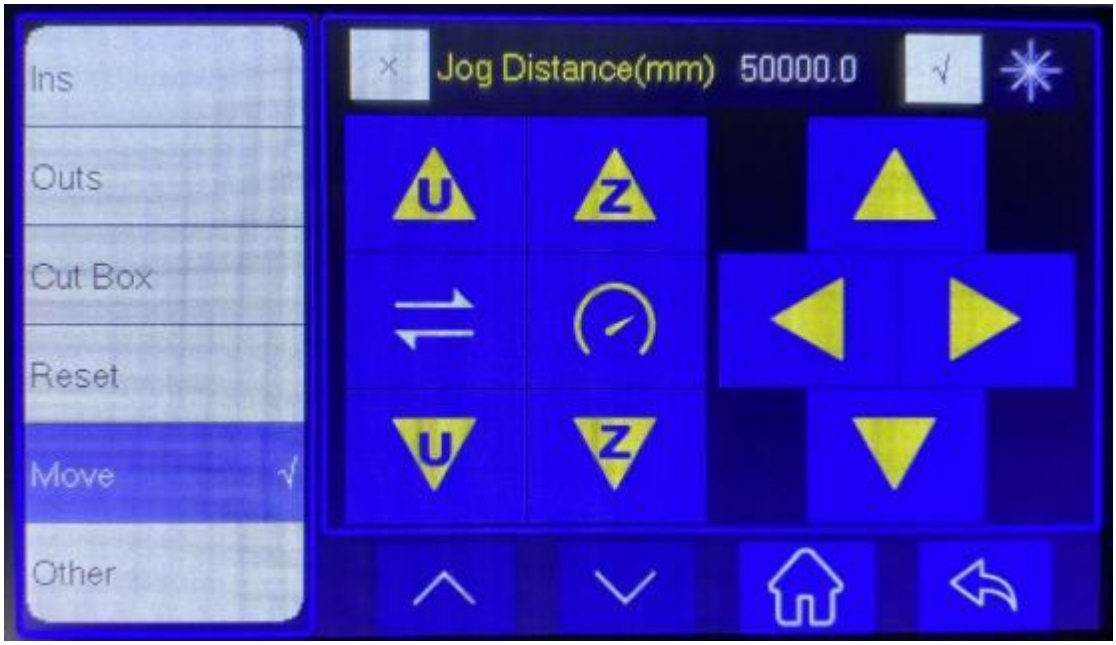
3 Cut box

Can be used to cut the border of the currently processed file.

4 Reset

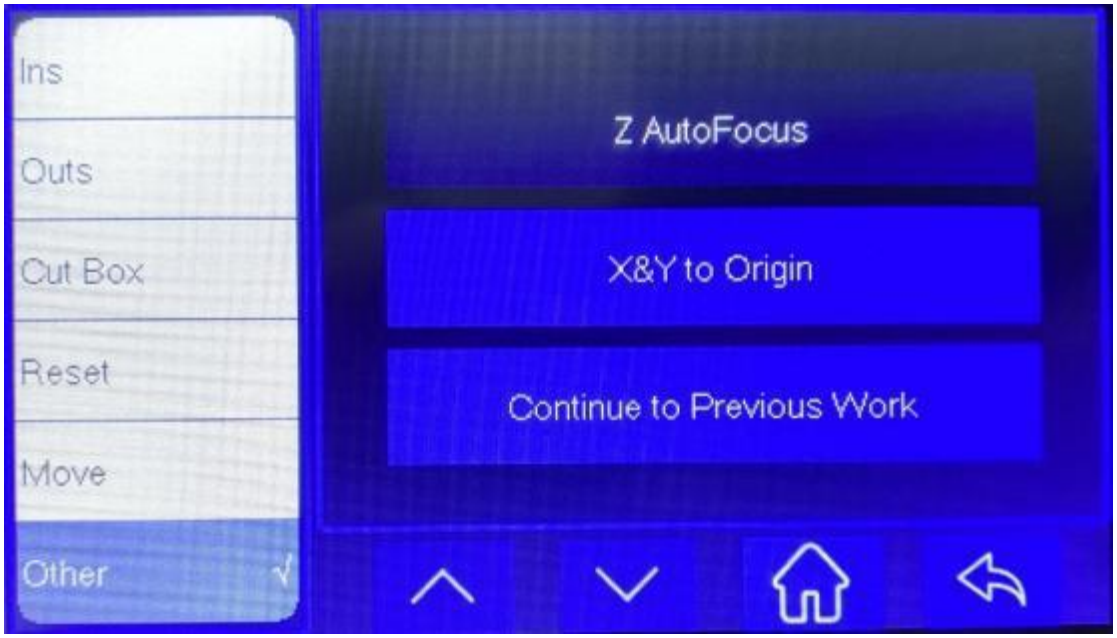
For single-axis reset testing

5 Move page



When the jog distance is √, the axis moves according to the jogging distance; When the constant light sign is √, the light is moved.

6 Other page



Return to the origin and re-cut (press stop before shutting down).

7 File function key

4. Menu function

4.1 U disk function

Used to copy offline files and upgrade panel firmware. See 3.2.2 for precautions.

4.2 Origin Manage

Store some origin coordinates, often used for quick switching of precise positions;

You can directly store the current position point and manually enter the coordinates, click "Move the laser head to this position" when using, and then press the "Locate" button to complete the operation.

4.3 Motion parameters setting

Space speed	When the laser tube does not emit light, the moving speed of the laser head .mm/s
Cut jerk	The change in cutting acceleration, which increases or decreases in tens of thousands.mm/s3
Space jerk	The change in acceleration when no light is emitted, increasing or decreasing in tens of thousands.mm/s3
Min acc	Acceleration when cornering.mm/s2
Engrave acc	The amount of change in instantaneous acceleration is only useful for engraving.
Start Speed	The initial speed of the laser head from standstill to the start of motion.mm/s

Arc speed Factor	The parameter change value of the whole system, similar to the gear, the smoothness of the bending is obvious, and the value is 0.5~5. The smaller the number, the slower the turn

4.4 Network Setting

1. You can set the IP address of the current main board.

2.IP There are three locations that need to be set:

A. Panel network settings

B. Local network connection IP4 address

C. Select the network mode in the upper right corner of the software, and the IP and panel correspond to each other.

3. Example setup：

Panel IP settings	192.168.8.8
PC IP4 IP settings	192.168.8.10
Software settings	192.168.8.8

4.5 Language

Currently the system supports 12 languages: Chinese Simplified, Chinese Traditional, English, Portuguese, Turkish, Russian, French, Korean, Arabic, Spanish, Vietnamese, Danish.

4.6 System version

1. Product model: AWC7824k.
2. Product ID: 16 digits and letters.
3. System version: Version information is usually recorded by date.
4. User authorization: Enter the authorization code to authorize the use time or unlock it.

4.7 Common parameters settings

4.7.1 Work mode

Go origin after reset	Turn the feature on or off; If this function is enabled, the laser head will stop at the anchor point after reset, and the laser head will stop at the zero point when it is turned off
Origin mode	Key origin：After pressing the key to move the laser head to the desired position, press the positioning button on the panel. Soft origin：The origin position when the user draws with Laser CAD. Machine zero as origin：The machine zero point is set as the origin point. Cutting position： Set the current position of the laser head as the origin point.
Go back position	The position of the laser head stop after the completion of the work, the anchor point/machine zero point/current point.
Count mode	Work Complete Count +1, Full Page Count/Light Count/Array Single Count.
Feeding mode	Full-page feeding/array multi-line feeding/array single-line feeding.
Feeding delay mode	Post-feed delay/pre-feed delay
Auto Origin	When the bounds are exceeded, the system automatically cuts within the format according to the pattern.

4.7.2 Common parameters

Auto focus distance	MM, The distance between the laser head and the tabletop.
Key move speed	The speed at which the axis moves while the panel is operating.
Run box speed	Run box，Empty preview graphics position, size when speeding.
Cut box speed	Speed when cutting box
Blow open delay(s)	The time from the laser light to the start of blowing.
Blow close delay(s)	The time between when the laser stops emitting light and when the blowing stops.

4.7.3 Axis speed parameters

Z work speed	Separately head work speed
U work speed	Feeding speed
XY home speed	Machine reset speed
Z home speed	Separately head reset speed
U home speed	Feeding axis reset speed

4.7.4 Rotate engraving&cutting

Rotary	Enable/Disable
Rotary axis	Can choose X/Y/U。
Type	Four-wheel/clamped
Pulse count per rotate	The number of pulses required to rotate the shaft in one revolution
Current diameter(mm)	The diameter of the processed file.

Number of cycles = number of motor pulses * (number of large wheel gears / number of gears of motor gears)

After on/off, the system needs to be reset to take effect

5. Manufacturer parameters

5.1 Enter the manufacturer parameter password

5.2 Axis parameters

1. During initial debugging after power-on, you need to enter the axis parameters and debug the parameters of each axis.

2. 7824k axis number: X, Y, Z, U.

Distance per pulse （um）	The controller sends a pulse to the distance traveled by the motor.
Valid pulse edge	The rms value for driver level changes, which generally defaults to the falling edge.
Datum direction	When the machine is reset, the direction in which the shaft movement returns to zero.
Key direction	The direction in which the axis moves when the key is moved.
Limit switch valid level	The limit switch gives the control level of the system, and the low level is often selected.

Range（mm）	Working surface of the machine, soft limit.
Start speed（ mm/s）	starting speed; This is where the limit is played.
Max acc（ mm/s2）	The maximum acceleration value during acceleration of the motion axis, which here plays a limiting role.
Max speed	Maximum ultimate speed of the motion axis. This is where the limit is played.
Zero offset(mm)	The system defaults to 3mm, offset distance after reset, staggered sensor.

3. Pulse equivalent calculation steps

Touch“ 

” Go to the Calculate Impulse Equivalent page：

Step 1: Click "Set as starting point" to record the measurement starting point.

Touch“  ”go into move page.

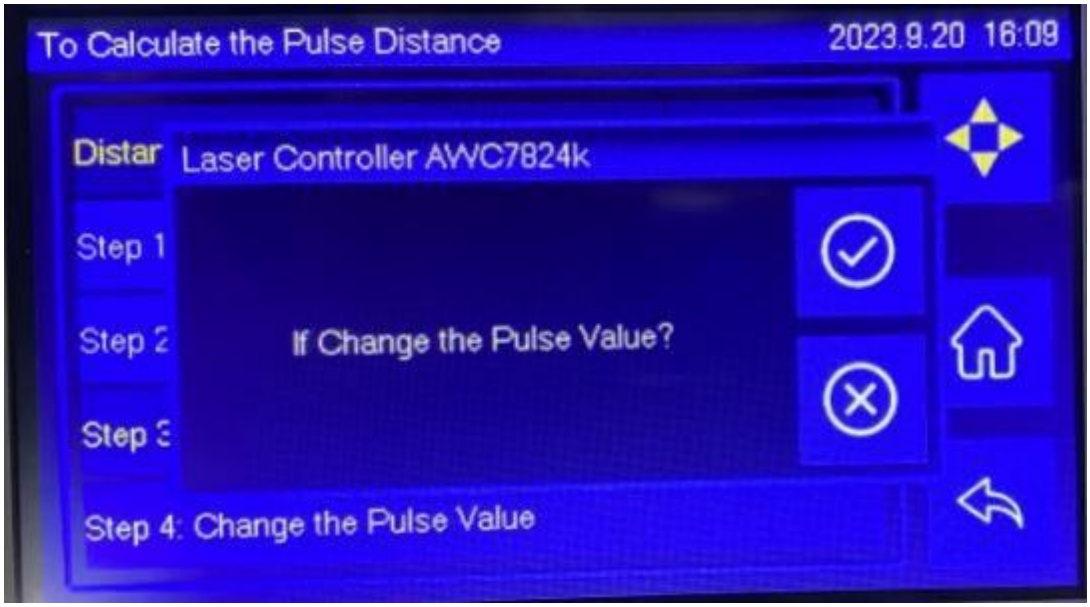
Press the point button to mark the starting point. Move the measuring axis, move the laser head 200mm (or any distance), move the point shot, make the end mark, and close the mobile page。

Step 2: Click Set as the end point, at which time the distance value

automatically calculated by the system will appear;

Step 3: Measure the distance of the actual point shot and fill in the input box

Step 4: Click to modify the pulse equivalent, and press " √" to make sure.



5.3 Laser paramethers

Laser mode	Optional CO2 glass tube, RF tube
TTL Valid level	control level of the laser tube; When the high level is active, TTL is connected to the power supply TH, and when the low level is active, TTL is connected to TL.
PWM frequency（HZ）	Set the pulse frequency of the control signal used by the laser, the higher the frequency, the faster the operation. Generally, CO2 is 20000, and RF tube is 5000.
Max power（%）	The ultimate power of the laser tube plays a limiting role here. Generally set to 98% to prevent excessive power from damaging the machine.
RF min power（%）	Prevent small light leakage of RF tubes in standby state; Generally, it is set between 6%~10%.
Laser 1 water protect	Water protection switch, when this function is turned on, the water tank needs to be turned on normally, and the water protection signal should be normally turned on to connect to the WP and GND terminals of the motherboard. When the water signal is broken, the panel prompts "Water protection failure!", and the machine stops working.
Laser 2 water protect	

5.4 IO parameters

Foot switch(IN2)	Control the machine operation by switching, click once to start, and click again to stop.
Open protection(IN1)	Protection signal, when the signal is turned on, the machine stops working, prompts to open the cover protection.
Feed switch(IN3， IN40	Manual feeding switch to control the U-axis.
IO input valid level	It is possible to set low (normally open) / high (normally closed) active.

5.5 Auto reset settings

XY auto reset	Generally, it is the open state, and the process of power-on reset is actually the process of zero point; Not resetting the machine coordinate position may not match the actual situation.
Z auto reset	When the multi-head inter-shift is turned on, the Z-axis is automatically reset; The order is XYZ.
U auto reset	

5.6 Hard limit settings

X+, Y+, Z+, and U+ correspond to the limit signals of each axis, that is, the maximum coordinate point. When the hardware is connected to the line, the function needs to be enabled on this page.

5.7 Multi head settings

1，Head count：number of head

2，Two head type：Common single belt; The cross-moving motor is a separate structure with a double belt.

3，ZX head space(mm)：the space of the head

4，Debugging steps for multi-head mutual transfer models:

（1）Debug the pulse equivalent of the split head; In order to ensure the accuracy of the splitting head, the measured distance should be as close as possible to the maximum stroke when measuring.

（2）Enter the manufacturer parameter multi-head cross-shift setting and fill in the number of cross-shifted axes;

（3）After reset, press the point shot, measure the point distance and fill in the distance into the axis spacing;

（4）Verify, open the software, the virtual array lays the square, looks at the actual spacing after cutting, and fine-tunes the parameters according to the effect。

5.8 Dispensing function

This function is suitable for shoe material line drawing and garment dispensing industry; The signal output port is OUT8; When using this signal port, an external signal amplification board is connected.

Dispensing function	On/Off; When the signal is turned on, the brush layer signal is a dispense signal.
On time（ ms）	Valve opening time.
Distance（mm）	Valve closing distance.
Z down distance（ mm）	Working origin position of the z-axis when working.
Z up distance（ mm）	The distance lifted up the z-axis when the empty travel is moved.
Worked to close OUT1	ellipsis

5.9 Function config

Z axis for autofocus	Enable/Disable
U axis for feeding	Enable/Disable
Feed while go origin	After the work is completed, the U-axis works simultaneously when the laser head returns to the positioning point.
Y axis work for roller	Enable/Disable, for use on tape cutting machines.
YU axis for feeding	The Y-axis and U-axis work simultaneously when feeding, and are used to output fixed materials from the cylinder on the beam during feeding. The Y-axis pulse equivalent must be greater than the U-axis pulse equivalent.
YU axis feeding direction	YU Synchronous feeding direction.
YZ double driver control	When turned on, it is a dual output signal and a double limit mode. When the dual drive is turned on, both Y- and Z- must detect the signal, and the Y-axis is considered reset and has a correction function.
Y axis double limit	Double limit, Y+ is limit 1, Y- is limit 2, and limit 2 is the origin. Split speed section to reduce reset time.
System automatic delay(s)	System initialization delay.
Close system sound	Enable/Disable
Tricolor light	When the tricolor light is turned on, ou3 red ; out4 green;

	out5 yellow; Red means the machine is stopping or alarming, green means the machine is cutting, yellow means paused or waiting conditions and other defined functions of OUT3, OUT4, OUT5 will disappear