Platform Automatic Laser Welding Machine

DLW SERIES

USER MANUAL



LUOYANG XINCHENG PRECISION MACHINERY CO., LTD.

Notice

Before using this product, please ensure that the following items are in compliance with the product safety operation requirements. Otherwise, it is forbidden to turn on the system and perform cleaning operations.

	It is prohibited to use this product in places with flammable and explosive materials.
	When cleaning highly reflective materials (copper, aluminum, etc.), it is forbidden to have people stand around to avoid damage caused by reflected light.
	It is forbidden to aim the cleaning head at the human body to avoid injury.
	Make sure that the equipment is reliably grounded.
	Clean combustible items carefully and equip with fire-fighting equipment.
	This product is a Class IV radiation laser. Goggles must be worn.
	Protective gas pressure≥0.15MPa
	The minimum bending radius of the integrated cable should be more than 200mm.

Content

Notice....1

I Application 3

II Product Description 3

1.Main Technical Parameters....3

2.Equipment Structure Diagram....4

III Installation & Instruction....4

IV Installation steps....5

V Software Operating Instructions....5

1.Introduction to System....5

2.Machine Makers Setting....10

3.Introduction to Teaching Programs....18

4.Axial Operation....36

5.Process Tuning....42

6.Processing Simulation....46

7.Status Monitoring....47

8.Other Application Features....51

9.Diagnosis....53

10.Safeguard....53

11.Parameters....55

12.System Management....56

13.About....57

VI Care and maintenance....57

VII Transportation and storage....58

VIII After-sales service....58

I Application

The product has a high degree of automation and a simple welding process. It can weld carbon steel, stainless steel, aluminum, zinc thin-walled materials, precision parts and other spot welding, butt welding, stack welding, rotary welding and other welding. It has the advantages of high welding precision, small weld seam and smooth and beautiful. Widely used in electronic components, sensors, medical equipment, precision machinery industry and other fields.

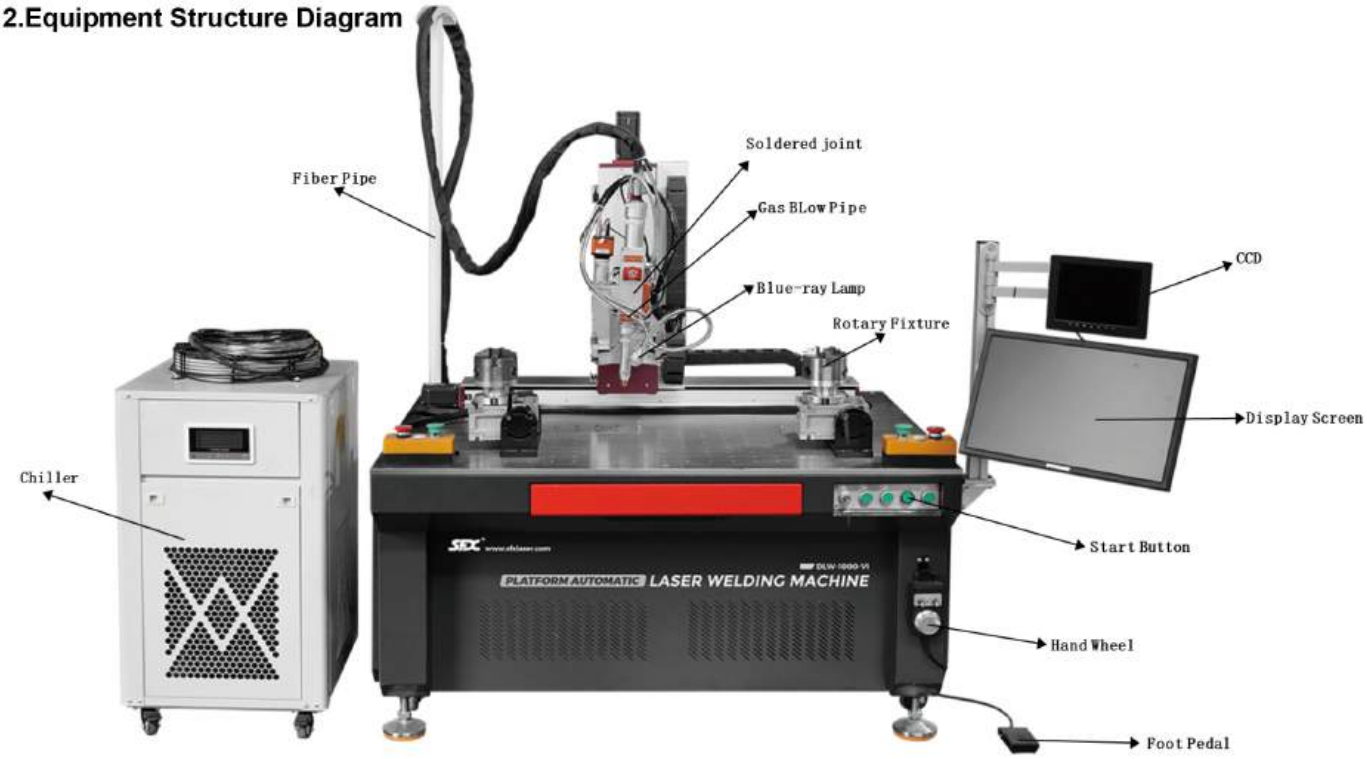
II Product Description

I. Main technical parameters

Model	DLW-1000	DLW-1500	DLW-2000
Laser Power	1000W	1500W	2000W
Laser Wavelength	1080±10nm		
Working Mode	Continuous / Modulated		
Max. Modulation Frequency	20KHz		
Track(X *Y *Z)	800*300*300mm(Customized)		
Stainless Steel Depth of Melt	2.6mm ≈ 510kg	3.59mm	4. 57mm
Carbon Steel	2.06mm	2. 77mm	3. 59mm
Aluminum	2mm	3mm	4mm
Spot Dimension	O—5mm		
Aiming and Positioning System	CCD Surveillance System		
Input Voltage	AC220±10%		
Power Consumption	7 KW	9 KW	11 KW
Cooling Method	Water cooling (Medium: Distilled, Deionized or Purified Water)		
Water Tank capacity	16L （Need to add water 14-15)		
Dimensions of Machine	1350*1000*1850mm	1350*1000*1850mm	1350*1000*1850mm
Package	1500*1400*2000mm		
N.W	≈510kg		
G.W	≈589kg		

Note:X indicates the number of axes,which is optional according to demand.

2.Equipment Structure Diagram



III. Installation and Instructions

Item	Requirements
Environmental Temperature	0°C~35 °C
Environmental Humidity	40%—80%
Electricity Configuration	Reference II (1) Technical parameters
Cooling Medium	Deionized water, Evaporated Water, Purified Water
Grid Line	Compliance with the National Standard for Machine Rooms

1.Please refer to the technical parameter table for using voltage. If not, please equip transformer.

2.Pay attention to avoid the workpiece during operation to avoid personal or equipment injury.

3.Please check the water level of the chiller before starting the machine to ensure that the cooling water is in the standard zone position.

4.Ensure good ventilation and surrounded by cooling space ≥ 60cm, to avoid bad heat dissipation affect performance.

5.Check the protective lenses before use, dirty need to be cleaned in time (use dust-free cotton swabs or wipes Jiao anhydrous alcohol or Isopropyl alcohol from the center to the edge of the counterclockwise direction of scrubbing), cleaning attention to lens protection, avoid scratches.

6.Cold environment, please ensure that the cooling medium does not freeze.Use laser antifreeze for temperatures below 2 °C to avoid abnormalities in the cooling system.

7.If the chiller temperature falls below 22 °C, the laser will be in low-temperature alarm and will need to be warmed up. When the temperature reaches 22 °C, the chiller should be turned off and on again to eliminate the alarm.

IV. Installation steps

1. Connect one end of the power cord to the unit's power connector and the other end to the AC power supply.
2. Connect the water pipe between the main chassis and the chiller, and connect the chiller power line to the main chassis.
3. Fill the chiller with cooling medium (deionized water, distilled water or pure water) to the yellow-green junction of the liquid level display (air-cooled machines can skip this step) .
4. Access to the protective gas, adjust the air pressure ≥ 0.15MPa .
5. Sequentially press the machine's main power supply, turn on the emergency stop button, open the system control switch, open the laser power switch (some models do not have this switch can be skipped), wait for the system to start.

V. Software Operation Instructions

1. Introduction to the System

Using platform laser welding equipment with this software operations manual, which explains in detail the functions of the buttons and how to use them on the software screen, the user can quickly and easily control the welding equipment to complete the process.

For ease of reading, the descriptions of the components are uniformly formatted as follows:

(1)All clickable buttons on the software are denoted by "boldface and quotation marks," e.g. "Start Button."

(2)Input box are uniformly indicated by <boldface and angle brackets>, e.g. <Input Value>.

(3)CW laser sources are introduced throughout the manual. Since the laser parameters must be set on the YAG laser source, the YAG screen will be different in some cases, see 1.2.1 YAG Screen Introduction.

1.1Software Functions

Functions are listed according to catalog order:

(1)Multi-axis control and operation of welding machines

(2)User operation right management

(3)Multi-workstation settings

(4)Instructional welding coordinates function

(5)Teaching function for spot welding

(6)Input and Output teaching function

(7)Continuous inching, incremental inching, return to the origin, MPG, automatic five motion modes

(8)Laser on/off time - power setting

(9)Laser speed modulation settings

(10)Laser emission protection design, manual emission and red-light alignment

(11)Laser power, frequency and duty cycle settings

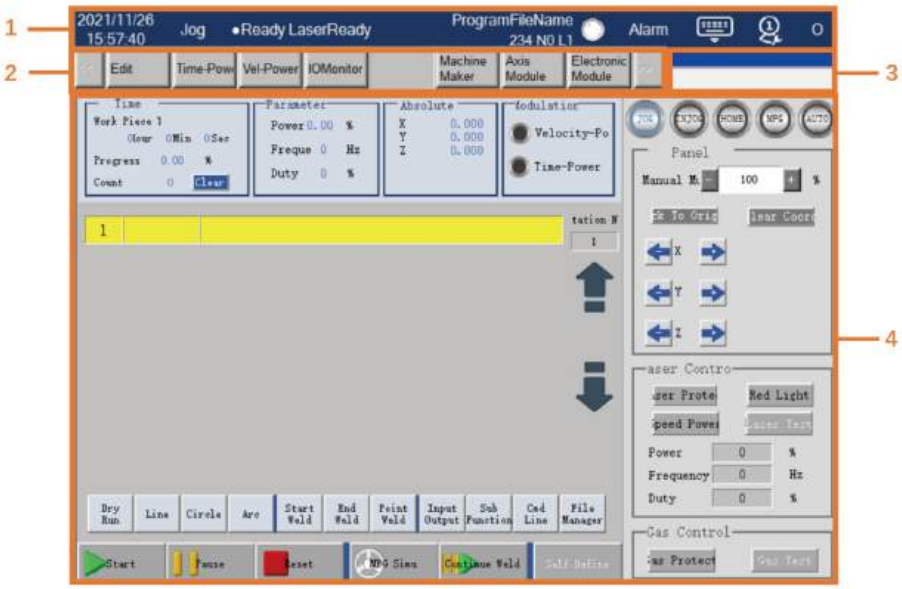
(12)Air pressure correction, blowing control function

(13)MPG simulation trial run, broken point welding function

(14)I,O point monitoring function

(15)Rotary axis mode

1.2 About the Screen



1



(1)Status bar: displays messages from left to right: date and time, control mode, controller status, laser status, file in process, alarms, operation panel and user rights Return to Home page.

(*This status bar is included as part of the background frame and is visible on any page.)

(*The "Alarms" button on the right is touchable. When pressed, it redirects you to the alert page, and when pressed again, it redirects you to the previous page.)

(*The  on the right is a touchable button. When you press the button on any screen, the screen will go back to the first page of the welding software. Fenubar will cut back to the first layer of Fenubar on the first page).

2



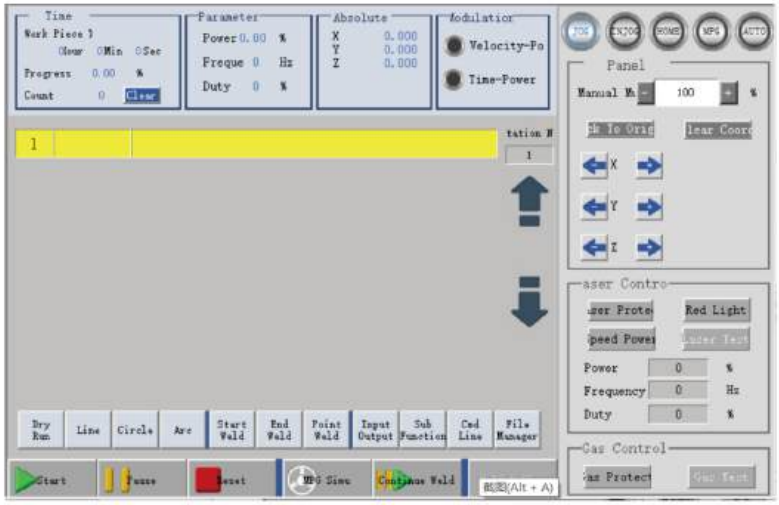
(2)Fenubar function keys: they are part of the background and visible on any page, their content varies from page to page.

3



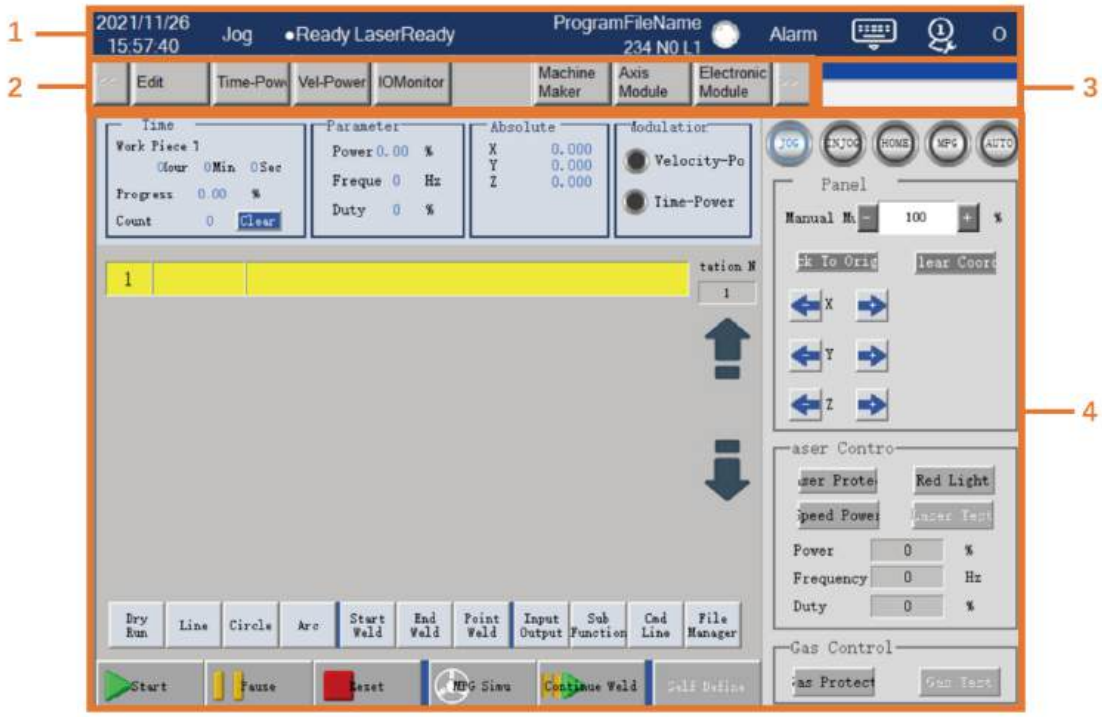
(3)Input box: the blue one is the input box can enter by the user, the white one at the bottom will prompt an input range.

4

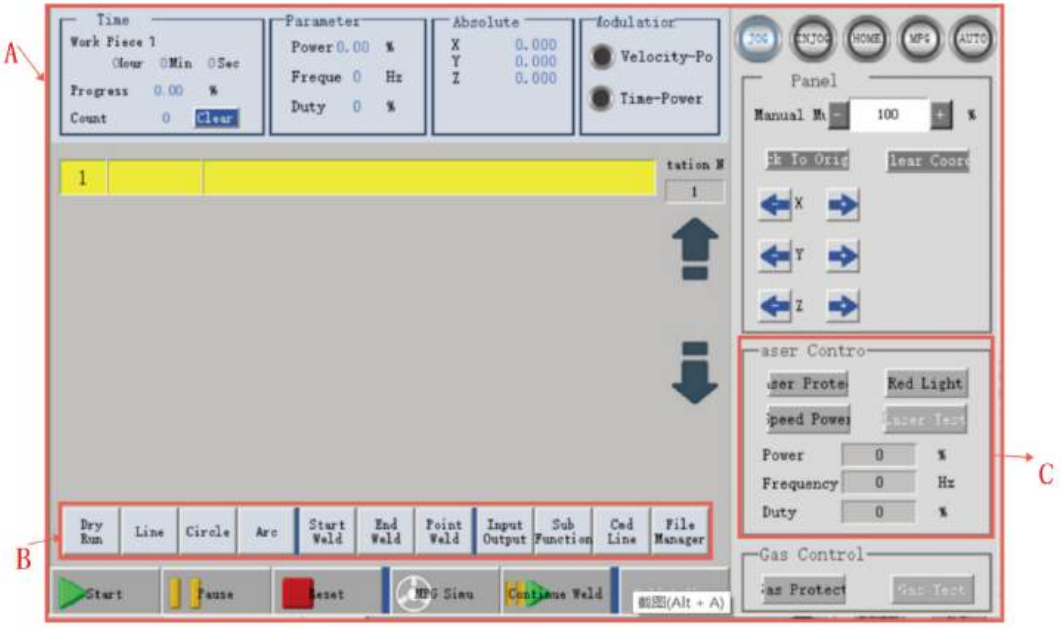


(4)Function screen: When different function keys are pressed, a corresponding screen function will be displayed. The detailed description of the screen and operation is given in the following sections.

1.2.1 About the YAG Screen



1. Status bar: same as 1.2.
2. Fenubar function keys: same as chapter 1.2
3. Input field: same as chapter 1.2
4. Function screen:



a. Status monitoring:

(1)Processing Parameters: No display of power, frequency, duty cycle, new laser mode, you can directly select the layer, convenient for demonstration and light out test.

(2)Other: the content of the modulation status is not displayed, modified to other.

b. Welding Teaching Instructions: No time and power are displayed in the pop-up window; new laser mode is added in Spot Welding. c. Laser Control: No power, frequency, duty cycle are displayed.

c. Laser control: power, frequency, duty cycle, speed power are not displayed.

1.3 User Rights

For different users, the welding software provides four types of operating rights, and users can modify the rights using the avatar in the upper right corner of the status bar.

Classification of Rights.:

1.Operator 

3.User 

2.Machine makers 

4.Administrator 

The open functions of each level of authority are as follows:

Classification	Functionality	Operator	User	Machine	Administrator
Password		None	666	520	5566
Workstation procedures (F1, F2)	• Start, Pause, Reset	√	√	√	√
	• MPG simulation, continued welding at breakpoint		√	√	√
	• Workpiece counting and reset(Note 1)		√	√	√
	• Software panel • Motion mode • Axis control • Back to home after processing • Endpoints Control		√	√	√
	• Laser protection • Speed modulation • Gas protection • Rotary axis mode	√	√	√	√
	• Red light • Laser testing • Power • Frequency • Duty cycle • Gas control interface		√	√	√
	• Teaching process • Programming • Command editing • Current workstation		√	√	√
Laser modulation(F3)	• Time power modulation • Velocity modulation		√	√	√

Classification	Functionality	Operator	User	Machine	Administrator
Workstation reservation setting(F4)	• Activate reservation function • Cancel reservation • Cancel all reservations	√	√	√	√
Multi-point calibration(F5)	• Multi-point correction settings	√	√	√	√
	• Reference point settings		√	√	√
Status monitoring(F6)	• Input and output monitoring		√	√	√
	• Laser monitoring			√	√
Machine setting(F7)	• Axial settings • Workstation settings • Homing settings • Welding parameters			√	√
Controller setting(F8)	• Axial modules • Machine coordinates • Programming • Process monitoring • Electronic control module • Maintenance • Parameter settings • Diagnosis • System management (Note 2) • Software installation • Data backup • Data recovery • Import/export • Image file installation • Driver hardware			√	√
Alerts	• Existing alerts • Historical alerts • Storage alerts	√	√	√	√

(Note 1: The password for workpiece counting and reset is the same as the user password.)

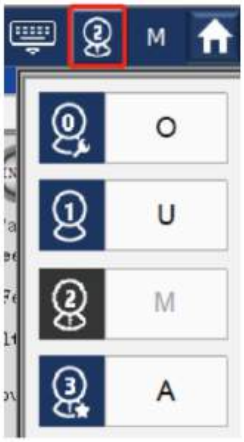
(Note 2: The controller password 520 is still required for input to access the system administration settings.)

Method of modifying rights:

1.Click on the "Rights" button on the status bar (the avatar in the red box as shown).



2.The right selection window pops up and you may select which right you want to switch to.



3.Click on it and a password window will appear (Operator authority does not require a password).

4.After entering a correct password, you can switch rights.



2. Machine Makers Setting

2.1Axial Setting

Fenubar entry path: Home screen →Next page(F10) →Machine makers setting (F1) → Axial setting (F1)

Function screen:



The function screen for axial setting is divided into home position setting (left) and stroke limit setting (right).

The Axial Setting page only shows the enabled axes (Pr21~Pr40), the machine zero point setting field can display up to 8 axes per page, and the stroke limit setting field can display up to 4 axes of information per page.

If the number of axes enabled exceeds the number of axes that can be displayed on one page, press "Previous Page"/ "Next Page" to toggle the display of axial information and setting functions.

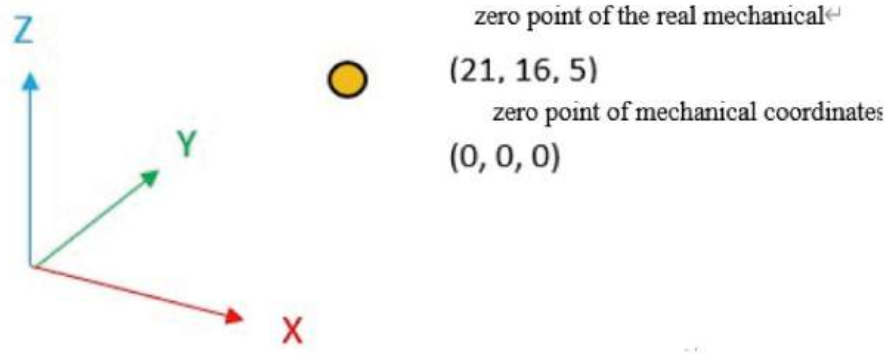
2.1.1 Machine Zero Point Setting

Functionality:

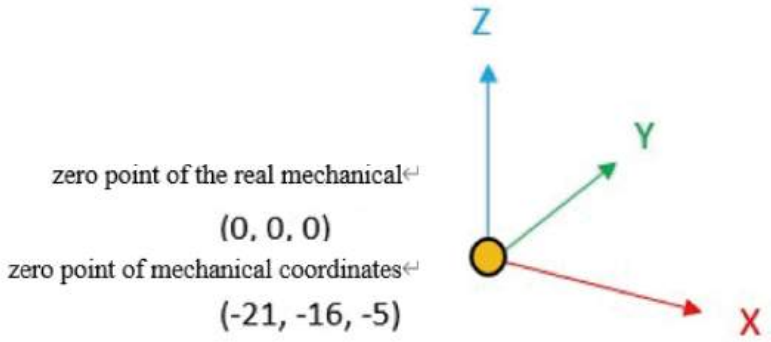
When the software is operated for the first time, the starting value of the zero point of the mechanical coordinates in the software is zero, but in fact, the position of the machine may not be at the designed machine zero point. To calibrate the origin of the mechanical coordinates in the software to be consistent with the designed zero point of the machine, refer to the following correction procedure:

Correction process: (citing the three axes as an example)

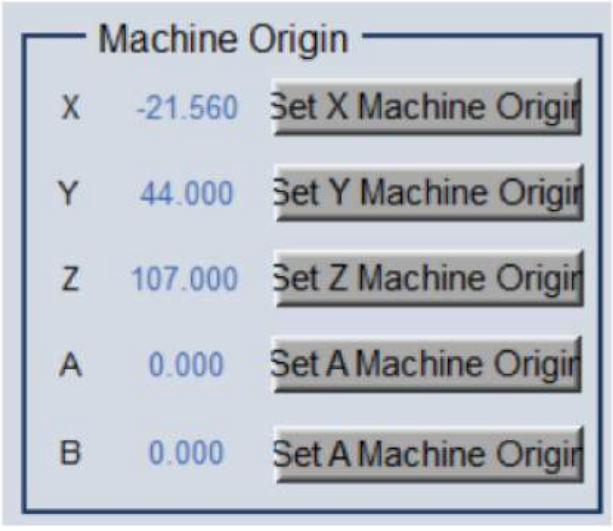
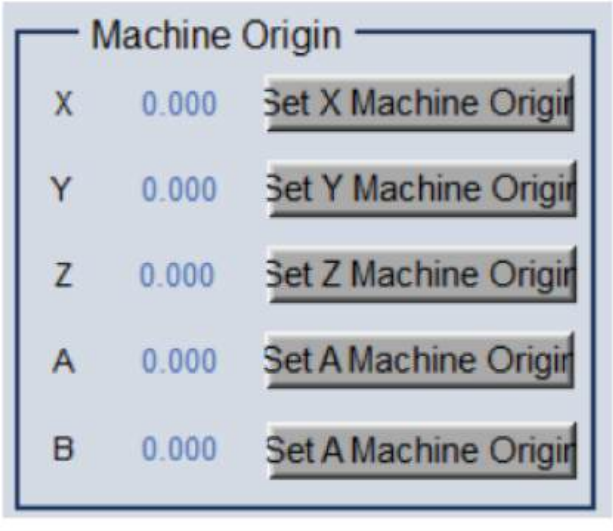
1.When the software is turned on, the zero point of mechanical coordinates of the software is different from the zero point of the real mechanical coordinates.



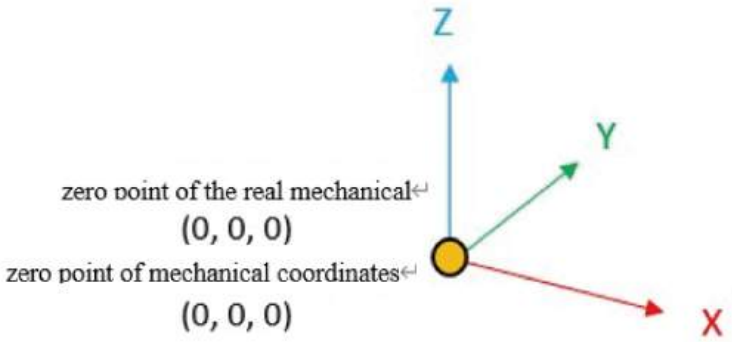
2. Control of the axes to move the machine to the zero point of the true mechanical coordinates.



3. Click the "Machine Zero Point Setting" button for each axis on the machine zero point setting screen.

Before clicking	After clicking
	

4. The zero point of each axis has been set. The schematic is shown in X, Y, and Z axes only, but the axes can be calibrated depending on the machine design and electronic control scheme.



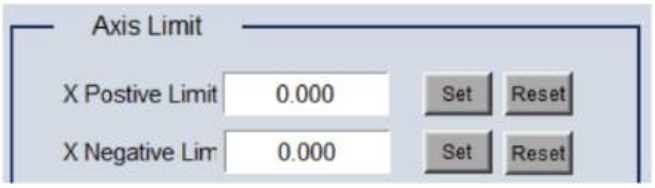
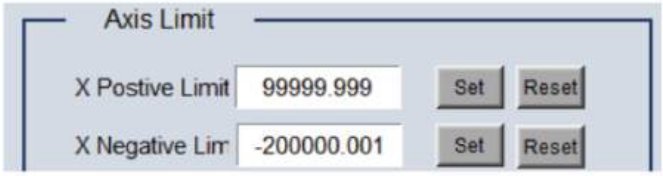
2.1.2 Stroke Limit Setting

Functionality:

When using the software for the first time, the starting limit position of each axis is zero and the limit position must be set manually by referring to the following procedure:

Calibration process: (Take single axis as an example)

1.First, click the "Reset" button of each axis, after reset, the positive and negative limits are 99999.999~99999.999mm respectively, to make sure that the alarm of "Exceeding Travel Limit" will not be jumped during the moving process.

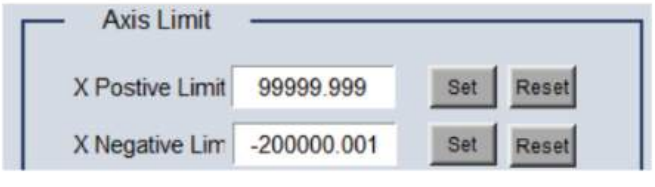
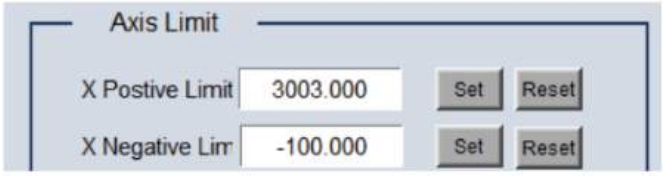
First-time use	After reset
	

2.After moving to the limit position, press the "Set" button to complete correction.



Move the X-axis to the positive limit position (300), press "Set" on the X-axis positive limit, and then "300.000" is displayed in the text box, indicating that the positive limit has been set.

Move the X-axis to the negative limit position (-10), press "Set" on the X-axis negative limit, and then "-10.000" is displayed in the text box, indicating that the negative limit has been set.

First-time use	After reset
	

2.3 Workstation Setting

Fenubar entry path: Home screen → Next page (F10)→Machine makers settings (F1) → Workstation settings (F2)

Function screen:

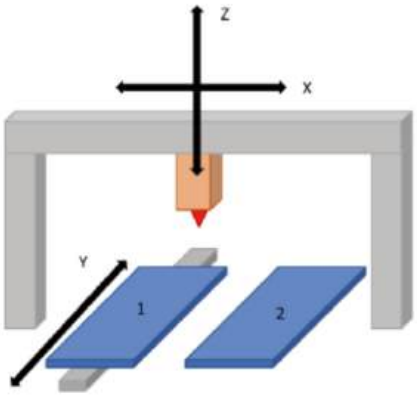


Functionality:

The system can be configured with multiple axes and multiple workstations. The number of workstations and axes for supporting depends on the software version and the chosen scheme, and the maximum number of workstations for supporting is double workstations, with a single workstation supporting up to five axes.

The following is a demonstration of a three-axis dual workstation:

Assuming that a platform welding machine supports two workstations, and the soldered joint is X, Z movable dual-axis, workstation 1 is a movable Y-axis platform, workstation 2 is a fixed platform, the number of workstation axes are set as follows:





(* Note: You must click "Save" after you have selected the workstation setting to complete the setting.)

2.4 Back to Home Setting

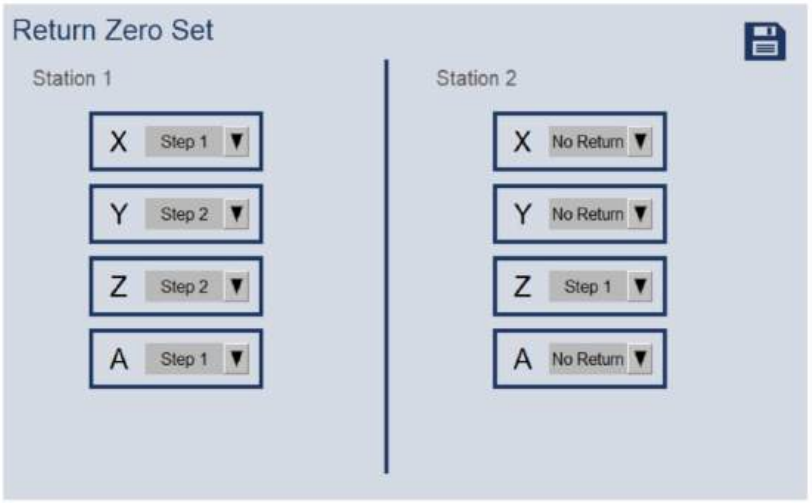
Fenubar entry path: Home screen → Machine makers setting (F7) →Back to Home setting (F3)

Function screen:



Functionality:

The system can set the order in which each workstation performs the return to the home position. In the drop-down menu, you can set the order of returning to the home position for the axes in steps 1~5 or not; if position 1 wants to return to the home position, then return to the X and A axes first, then move back to the Y axis and the Z axis, before returning to the home position. If position 2 wishes to return to the home position only on the Z-axis and not on any other axes, the back to home position is set as follows:



(* Note: You must click "Save"  after you have selected the workstation setting to complete the setting.)

2.5 Welding Parameter Setting

Fenubar entry path: Main screen → Machine makers settings (F7) → Welding parameters (F4)

Functionality:

This interface allows quick setting of welding parameters during the adjustment phase of the machine.

2.5.a Axial Parameter Setting

Fenubar entry path: Main screen → Machine makers settings (F7) → Welding parameters (F4) → Axial parameters (F1)

Function screen:

Index	Item	Value
5	*I/O type	9
9	*Servo type(103:M3;110:ECAT,120:RTEX)	103
10	*Servo alarm contact type(0:A;1:B;2:Disable)	0
15	the I/O board digital filter method	3
17	*Control precision,BLU(1:10;2:1;3:0.1 micro)	2
21	*Port no. for X axis	1
22	*Port no. for Y axis	2
23	*Port no. for Z axis	3
24	*Port no. for 4th axis	4
41	X axis motor polarity	0
42	Y axis motor polarity	0
43	Z axis motor polarity	0
44	4th axis motor polarity	0
61	X axis encoder resolution(En:p/rev;Sc:p/mm)	1000
62	Y axis encoder resolution(En:p/rev;Rl:p/mm)	1000
63	Z axis encoder resolution(En:p/rev;Rl:p/mm)	1000

Functionality:

Before the axial debugging of the welding machine in the Syntec electric control scheme, the basic parameters of each axis should be set. The following table shows only used axial parameters.

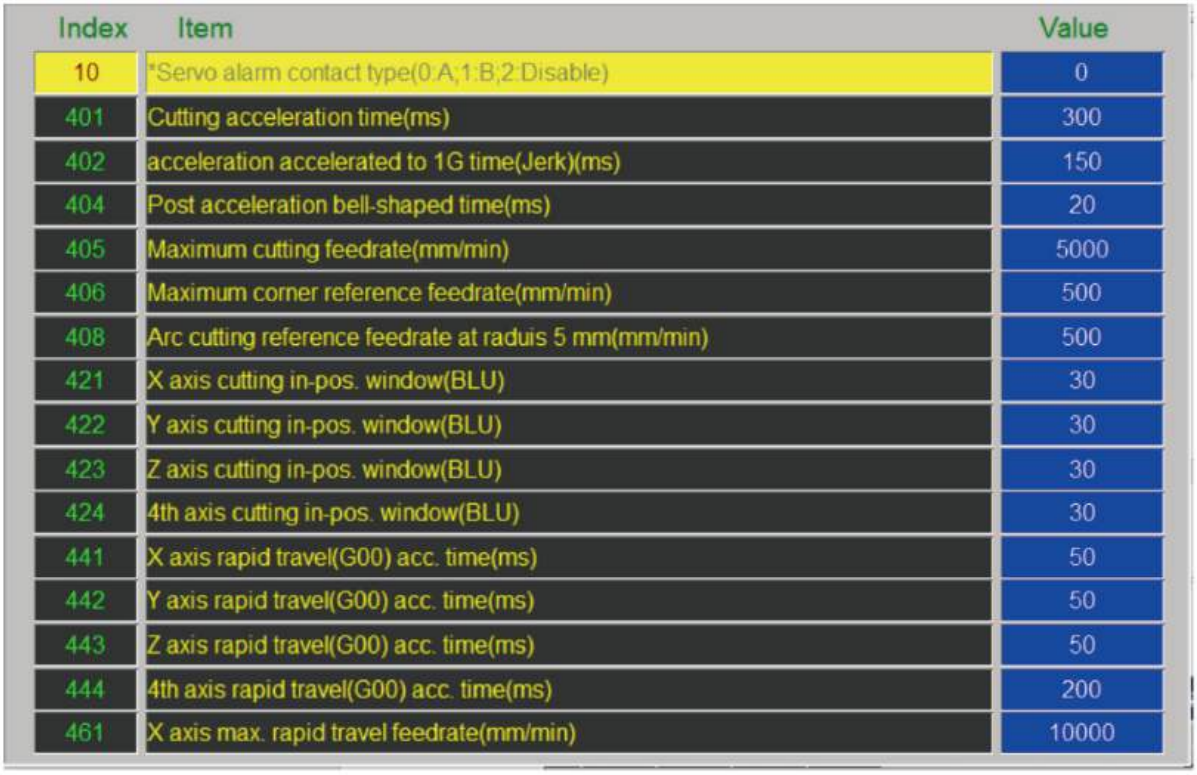
Parameter description:

Parameter No.	Description	Set Value	Remark
Pr9	*Axial plate morphology	On-site settings	Takes effect after restart
Pr41~Pr44	Direction of motion of each axis	On-site settings	
Pr61~Pr64	Resolution of motion sensor for each axis (Encoder: Pulse/rev; optical ruler: Pulse/mm)	On-site settings	Z3 motor (24bit) setting: 4194304
H2 motor (17bit) setting: 32768			
Pr121-Pr128	Screw on each axis/number of teeth on motor side	On-site settings	
Pr161-Pr164	Screw on each axis PITCH(BLU)	On-site settings	
Pr3821	* First set of axes couple active axis numbers	On-site settings	Takes effect after restart
Pr3822	* First set of axes couple following axis numbers	On-site settings	Takes effect after restart
Pr3823	* First set of axes couples active axis components	On-site settings	Takes effect after restart
Pr3824	* First set of axes couple following axis components	On-site settings	Takes effect after restart
Pr3825	*First set of axis-coupled morphologies (0: no; 1: machine, 2: pair-wise; 3: set; 4: main-wise; 5: one-to-many; 6: feedback)	On-site settings	Takes effect after restart
Pr3826	First set of axes coupling time (ms)	On-site settings	
Pr3826	First set of axes coupling/separation time (ms)	On-site settings	

2.5.b Motion Parameter Setting

Fenubar entry path: Main screen → Machine makers settings (F7) → Welding parameters (F4) → Axial parameters (F2)

Function screen:



Index	Item	Value
10	*Servo alarm contact type(0:A;1:B;2:Disable)	0
401	Cutting acceleration time(ms)	300
402	acceleration accelerated to 1G time(Jerk)(ms)	150
404	Post acceleration bell-shaped time(ms)	20
405	Maximum cutting feedrate(mm/min)	5000
406	Maximum corner reference feedrate(mm/min)	500
408	Arc cutting reference feedrate at raduis 5 mm(mm/min)	500
421	X axis cutting in-pos. window(BLU)	30
422	Y axis cutting in-pos. window(BLU)	30
423	Z axis cutting in-pos. window(BLU)	30
424	4th axis cutting in-pos. window(BLU)	30
441	X axis rapid travel(G00) acc. time(ms)	50
442	Y axis rapid travel(G00) acc. time(ms)	50
443	Z axis rapid travel(G00) acc. time(ms)	50
444	4th axis rapid travel(G00) acc. time(ms)	200
461	X axis max. rapid travel feedrate(mm/min)	10000

Functionality:

The parameters on this page allow you to adjust the smoothness of the automatic/manual axial motion to optimize the performance of the machine. The following table shows the common motion parameters.

Parameter description:

Parameter No.	Description	Set Value	Remark
Pr401	Acceleration/deceleration time during cutting	On-site settings	
Pr402	Time required for acceleration to 1G (Jerk, unit: ms)	On-site settings	
Pr404	Post-acceleration/deceleration cutting bell-shaped acceleration/deceleration time (ms)	On-site settings	
Pr405	Maximum cutting speed (mm / min)	On-site settings	
Pr461~Pr464	Maximum speed of rapid movement on each axis (mm / min)	On-site settings	
Pr521~Pr524	JOG speed on each axis (mm/min)	On-site settings	

2.5.c Home/Limit Parameter Setting

Fenubar entry path: Main screen → Machine makers settings (F7) → Welding parameters (F4) → Home/limit parameters (F3)

Functionality:

When a non-absolute motor starts up and returns to the home position, it is necessary to set the back to home position parameter for each axis and the limit switch parameter to find the home position. The following parameters for home and limits all needs to be set.

Parameter No.	Description	Set Value	Remark
Pr841~Pr844	Second-stage low velocity (mm/min) at the home searching on each axis	On-site settings	
Pr861~Pr864	The direction of home searching on each axis is negative	On-site settings	
Pr881~Pr884	The offset of home searching on each axis (BLU)	On-site settings	
Pr3409	Enable emergency stop button (R89). 0: not enabled, 1: enabled	On-site settings	
Pr3411	Phase switch use mode (R91). 0: Not applicable, 1: Hard limit, 2: Home, 3: Hard limit and home	On-site settings	
Pr3412	Limit switch type.0: Normally open, 1: Normally closed	On-site settings	

2.5.d Other Parameter Setting

Fenubar entry path: Main screen → Machine makers settings (F7) → Welding parameters (F4) → Other parameters (F4)

Functionality:

This field provides common application parameter settings and reserved expansion parameter settings, and users can expand the application as needed.

Parameter description:

Parameter No.	Description	Set Value	Remark
Pr3209	Language-0:ENG;1:CHT;2:LOCAL;119:CHT	119	
Pr3251	*Touch screen (0:None:1:PM USB;2:EETI;3:PM9k C1;4:PM9k C2;5:TK C1;9:Mouse)	On-site settings	Takes effect after restart
Pr3401	Maximum laser output voltage (R81)	On-site settings	10V=10000
Pr3402	Velocity power curve modulation mode (R82). 0:Freq;1:Duty;2:DA	2	*Currently only DA modulation is available
Pr3403	Laser type (R83).0:Raycus,1:Maxphotonics,10:YAG	On-site settings	
Pr3404	Hardware modules (84). 0:ADDA, 1:LWM/SLSR	0	*If standard software is installed using SLSR, the relationship with the Input and output in the PLC needs to be modified

Parameter No.	Description	Set Value	Remark
Pr3405	Number of additional workstations (R85)	0~1	Increases the number of workstations and supports up to two workstations.
Pr3406	*Barometric correction curve order (R86). 1:1st order, 2:2nd order, 3:3rd order	On-site settings	Changes take effect after restart
Pr3407	MLC Buffer (R86)	Extended use	
Pr3408	Pre-venting time (ms) (R88)	On-site settings	
Pr3410	*Maximum DA output voltage on the controller (R90). 0:10V, 1:5V.	On-site settings	Changes take effect after restart
Pr3413	Coordinate system setting (R93). 0: floating, 1: edge-finding result, 2: workstation 1, 3: workstation 2, 4: workstation 3, 5: workstation 4	On-site settings	
Pr3414	MLC Buffer (R94)	Extended use	
Pr3415	MLC Buffer (R95)	Extended use	

3.Introduction to Teaching Programs

Fenubar entry path: Home →Workstation1(F1)/Workstation(F2)

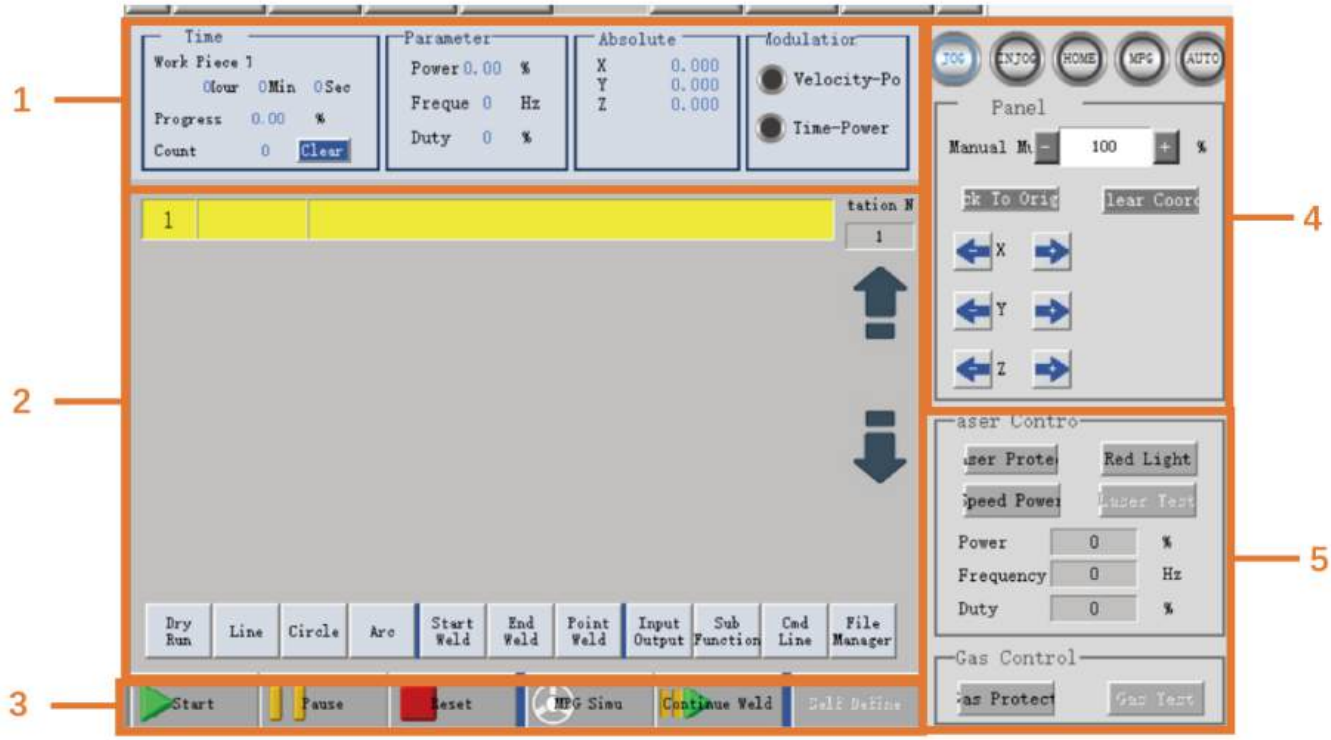
Teaching mode is an important function of this software, the user through the control axis, moving to the destination coordinate point, one by one to record the coordinates of the weld point, the system will generate its own welding processing path, to achieve the function of teaching processing.

(*Note: In the case of front/rear station connection, shared folders need to be enabled to use Teach-In Mode for processing program editing.)

3.1. Introduction to Teaching Programs

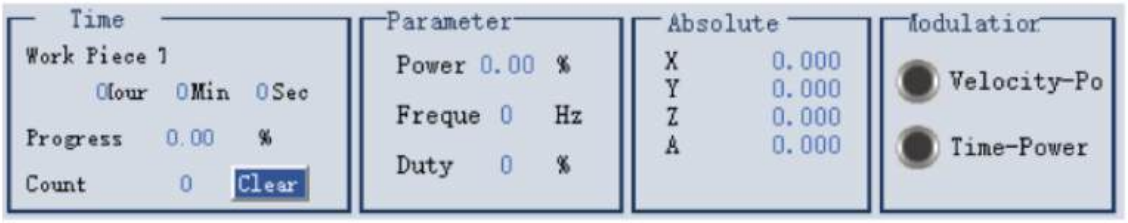
The most important function of teaching mode is writing a teaching program. This section first introduces the functions of each module on the screen, and then demonstrates the operation process. Details of the instructions and modifications are described in subsequent chapters.

3.1.1 Screen Style



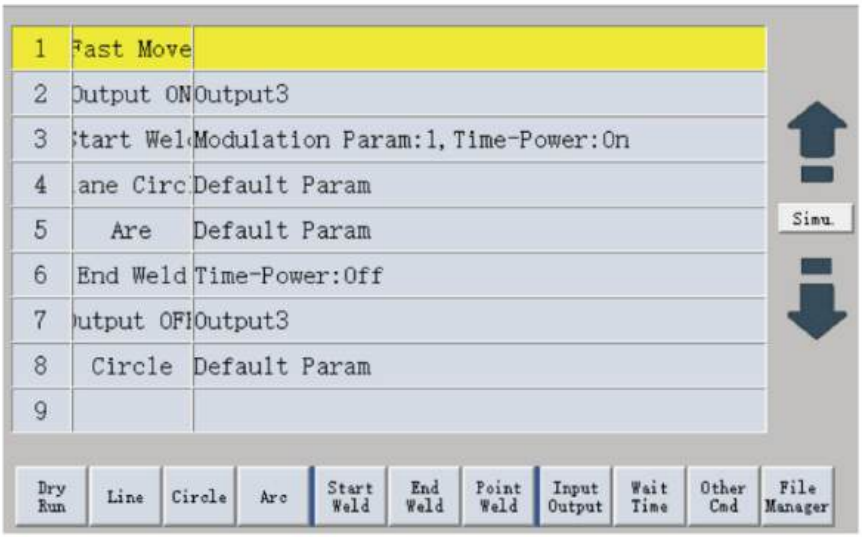
The screen is divided into five modules, namely (1) status display, (2) main program, (3) start command, (4) axial operation, and (5) laser gas control:

(1)Status display module



From left to right are machining time, machining parameters, absolute coordinates, and modulation status, which can display the current machine status. Aside from the "Reset" button, which can reset the number of workpieces processed, all other information in this module is only for display and not for modification.More detailed information can be found in 7 Status Monitoring.

(2)Main program module



The main module of the program contains the workstation selection, the program home page, program instructions, and the previous page and next page buttons.

Select the correct workstation before programming and processing. The program home page displays 9 lines of programs at a time. If more than 9 lines, the program codes of other pages will be displayed on the previous / next page on the right.

Each program line can carry a program instruction, and the instruction list is at the bottom of the screen. For detailed description of each instruction, please refer to Section 3.3 Teaching Program Instructions .(first page, press next page, press next page)

(3) Initiate command module: Please refer to 3.6 Execution of Machining Processes for detailed description of the instructions used to control the processing action.



(4) Axial operation module: For axial motion control, please refer to 4 Axial Operation for details.



(5)Laser gas control module: Please refer to 5.3 Laser Control Parameters and 5.4 Gas Control for details regarding the modules for laser and gas control.



3.1.3 Operating Procedures

To quickly become familiar with and operate the teaching mode, refer to the following procedure, which lists the

complete basic operations:

(1)Confirm work workstations

The background color of the current screen can be used to confirm which program is in which workstation, and the workstation program can be switched by Fenubar.

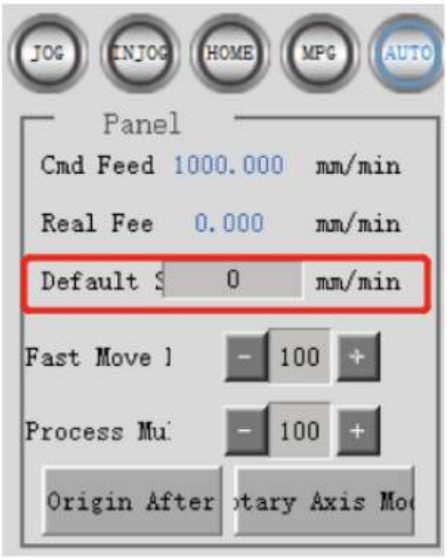
(2)Start writing programs

Click the teaching program field to start editing the program line by line. The instruction contains functions such as adding, modifying, copying and deleting, etc. The details are described in the next section, 3.2 Teaching Program Writing.



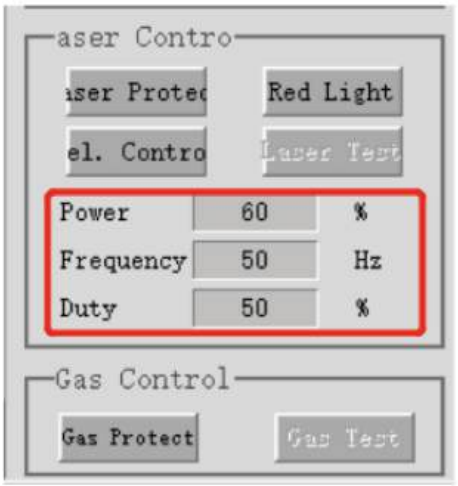
(3)Set preset speed

After the program is written, it is necessary to set an appropriate <Preset Speed>, otherwise the system will not start processing smoothly.



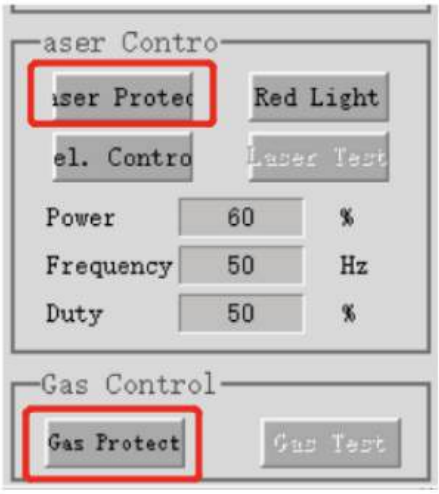
(4)Set laser parameters

Then set the laser parameters <Power>, <Frequency>, <Duty Cycle> during machining, and the parameter values will vary according to different materials and different processes. Advanced laser parameters are described in detail in 5 Process Tuning.



(5)Turn on the protection device

Click "Laser Protection" and "Venting Protection" to activate the laser and venting devices, otherwise the welding process will not proceed smoothly.



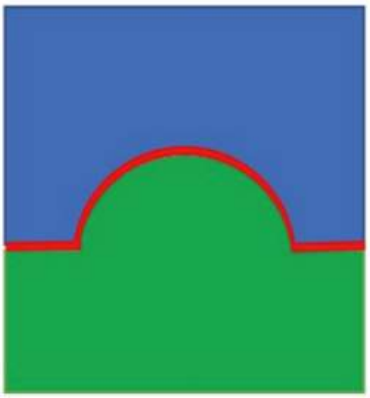
(6)Start the program:Finally, click the "Start" button to start the written program.



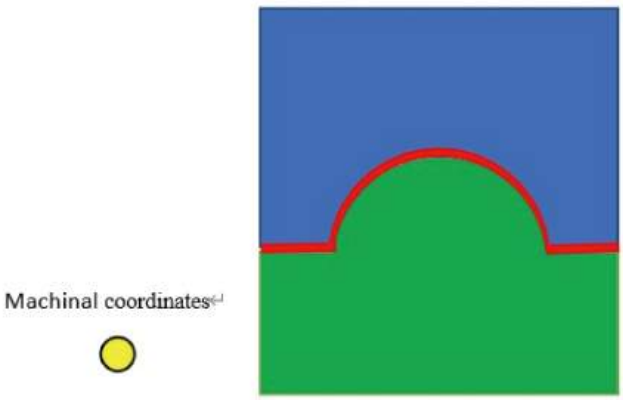
3.2 Teaching Program Writing

The coordinates to be welded by the machine are given in a teaching manner and the program can be written according to the following procedure.

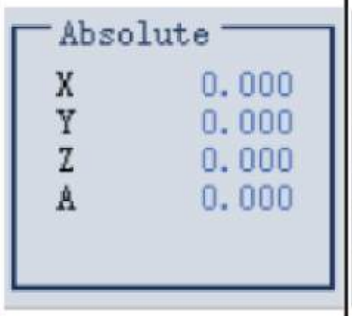
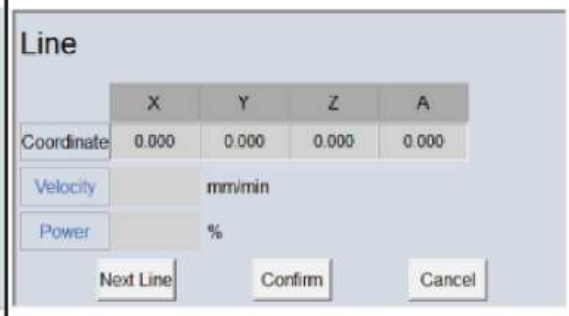
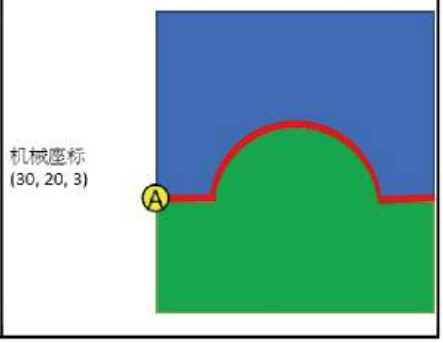
The following diagram illustrates the need to weld the top half (blue) to the bottom half (green) of the workpiece, with the desired weld being the red path:



(1)Move to starting point



At first the mechanical coordinates may be elsewhere. The first step is to move quickly to the starting point of welding. First control the axial direction to the welding starting point (A), click on the first line of the program, click "Fast Move," and then click "Confirm."

Coordinates	Program	Diagram
		

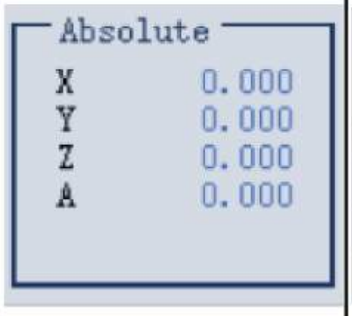
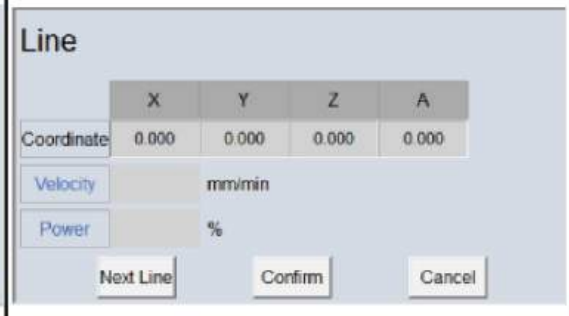
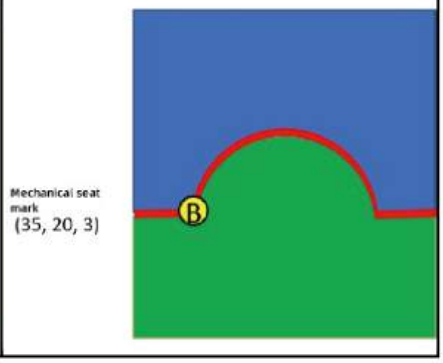
(2)Weld straight to the next point

To start welding, you need to click "Start Welding," input <Modulation Parameter No.> enable the "Time Power" function, enter the <Advance Blowing> time, input the <Laser on Delay> time, and click "Confirm."



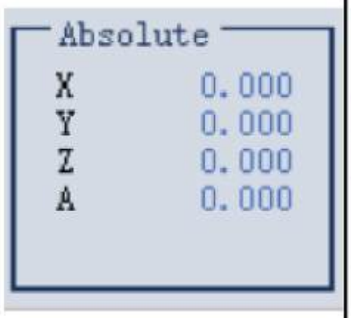
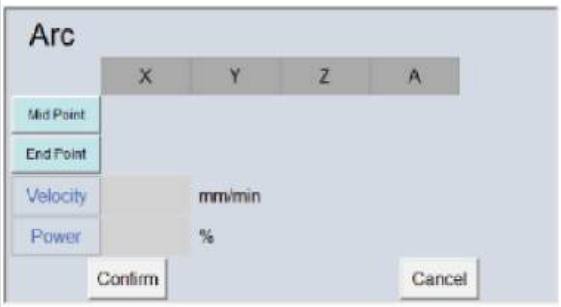
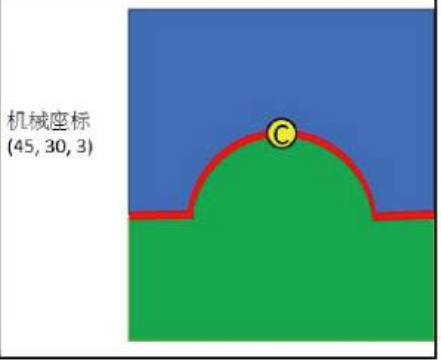
The next step is to move straight to a fixed point (B), first control the axis to a fixed point (B), click on the next blank program line, press "Straight Line," then press "Confirm."

(*Note: If < speed > , < frequency > , < duty cycle > and < power > are blank, the system will automatically bring in the default parameters, and the modification of the default parameters will be introduced in the chapters of 5.3 Laser Control Parameters and 5.5 Processing Speed.

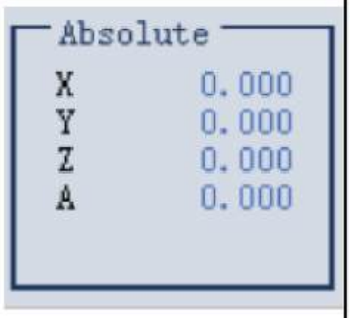
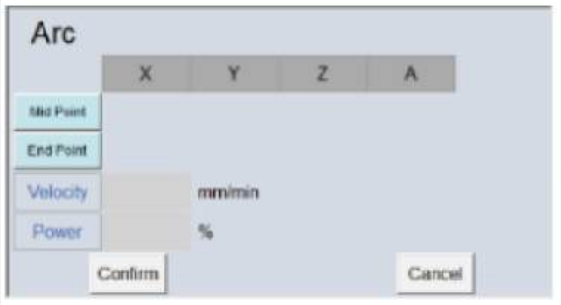
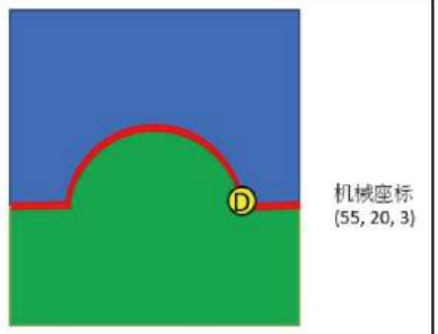
Coordinates	Program	Diagram
		

(3)Arc welding

The next weld is a semi-circular arc; first move the axis to one of the points (C) of the arc, click on "Arc" on the next blank program line and click on "Midpoint."

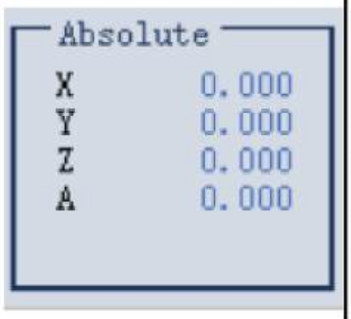
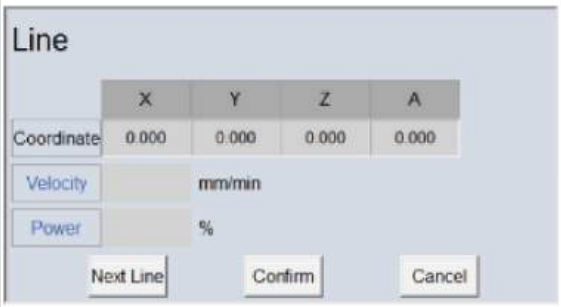
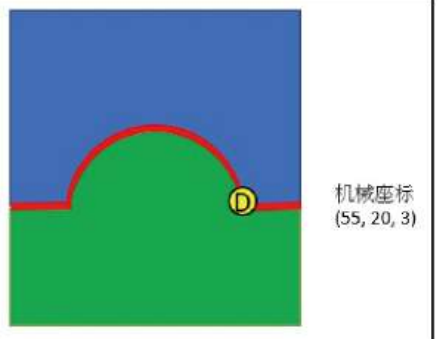
Coordinates	Program	Diagram
		

Then move to the end point (D) of the arc, click "End Point," and then click "Confirm."

Coordinates	Program	Diagram
		

(4)Last straight-line welding

The last step is to make a straight line to the welding end point (E), and then move the axis to a fixed point (E) and press "Straight Line" on the blank program line and then "Confirm".

Coordinates	Program	Diagram
		

(5)Finish welding

At the end of welding, press "Finish Welding" in the blank of the last line of the program. Input the time of "Extended Blowing" and "Laser off Delay" as required, and decide whether to turn on the "Time Power" function.



3.3 Teaching Program Instructions

Functionality: The machine is operated by teaching to achieve ideal welding action, while the actual operation requires various instructions to finish a complete machining program.

Entry path: Home screen → Workstation 1 program (F1) → lower field

Enabling conditions: the command line can only be seen in the four modes of inching, INCJOG, HOME and MPG, and the command line will be hidden in the automatic mode.

In this chapter, the teaching instructions are divided into four categories: A. axial action, B. welding action, C. peripheral control, D. auxiliary instruction. The functions are classified in order and explained.

3.3.1 Axial Motion

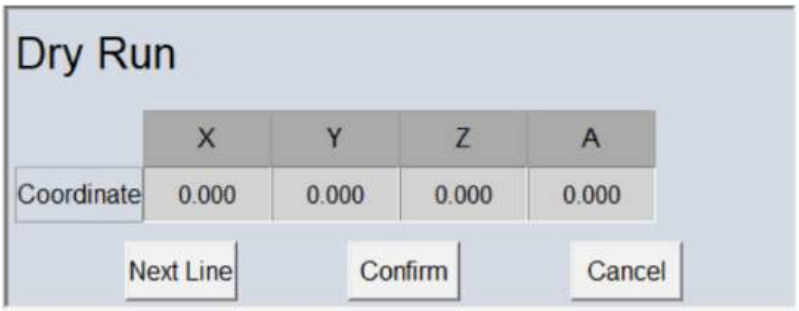
Functionality: The instructions in this section relate to the movement of the basic axial path of the machine to achieve the function of teaching the welding point.

Coordinate definition: the command of axial action will need coordinate position. The coordinates here are all the axial positions of the current machine and will be updated with the axial movement.

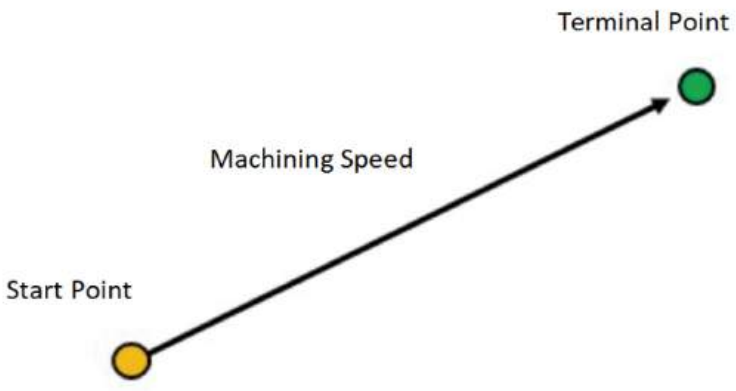
Common setting: the command usually does not need to specially define the Velocity and power, and the system will automatically set it as the default parameters. If it is necessary to modify the Velocity and power of the command in a single section individually, input <Velocity> and <Power> in the single section.

The commands for axial motion consist of four items: (1) dry run, (2) straight line, (3) arc, and (4) full circle.

(1)Dry run 



Command function: move to the specified position (current coordinates) with machining speed.



Parameter definition:

Fast-moving multiplying: The fast-moving speed of the fast move command can be adjusted in the fast-moving multiplying power of 4.5 Auto Mode.

Operating Instructions

1.Click on the "Dry run" button to enter the Dry run teaching page.

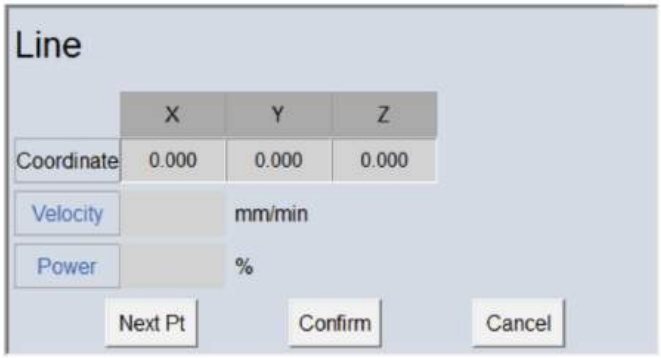
2.Move the axis to the target position.

3.If you want to teach the next line of the Dry run, click the "Next Line" button. (The current point will be taught and the next line of Dry run teaching will commence)

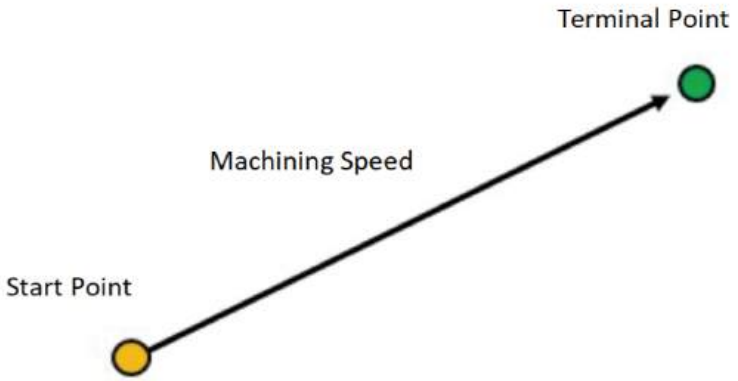
4.If the next line does not teach the Dry run step, then click "Confirm" to complete this teaching.

5.Click "Cancel" to cancel the teaching.

(2)Straight Line 



Command function: move to the specified position (current coordinates) with machining speed.



Parameter definitions:

1. <Velocity>: You can input the processing Velocity in mm/min here, the entered Velocity only affects this single section, without affecting the Velocity of other programs; if you do not enter it, the default is the preset Velocity, as described in Section 5.5 Processing Velocity.

2.<Power>: You can input the laser power in % here; the input power only affects this single section, without affecting the power of other programs; if no input, the default is the power in laser control, which is introduced in 5.3 Laser Control Parameters.

3.<Frequency>: you can enter the laser frequency here, the unit is Hz, the input frequency will only affect the single section, does not affect the frequency of other programs; if not entered, the default is the frequency of the laser control, in the 5.3 Laser Control Parameters to be introduced.

4.<Duty Cycle>: you can enter the laser duty cycle here, the unit is %, input our duty cycle will only affect the single section, does not affect the duty cycle of other programs; if not entered, the default is the duty cycle of the laser control, in 5.3 Laser Control Parameters for introduction.

Operating instructions:

(1)Click on the "Straight Line" button to enter the Straight Line teaching page.

(2)Move the axis to the target position, you can selectively set the movement <Velocity>, the machining <Power>,<Frequency>,<Duty Cycle>.

(3)If you want to teach the next line of the straight line, click the "Next Line" button. (The current point will be taught and the next line of straight line teaching will commence)

(4)If the next line does not teach the straight-line step, after inputting the output power, click "Confirm" to complete the teaching.

(5)Click "Cancel" to cancel the teaching.

(3) Full-circle Circle

The full-circle axial maneuver is divided into flat circles and three-dimensional circles. In the case of planar welding, the planar circle can be selected to teach a two-dimensional full circle machining path. In the case of profile welding, a 3D circle can be selected to teach a 3D full circle machining path.

(4-1)flat circles



Command function:Quickly moves to the starting point and completes the circle on the plane selected by the user at the machining speed.

Parameter definitions:

a.<Power>: You can input the laser power in % here; the input power only affects this single section, without affecting the power of other programs; if no input, the default is the power in laser control, which is introduced in 5.3 Laser Control Parameters.

b.<Frequency>: you can enter the laser frequency here, the unit is Hz, the input frequency will only affect the single section, does not affect the frequency of other programs; if not entered, the default is the frequency of the laser control, in the 5.3 Laser Control Parameters to do the introduction.

c.<Duty Cycle>: You can enter the laser duty cycle here, the unit is %, the input duty cycle will only affect the single section, does not affect the duty cycle of other programs; if you do not enter it, it defaults to the duty cycle of the laser control, which is introduced in the 5.3 Laser Control Parameters.

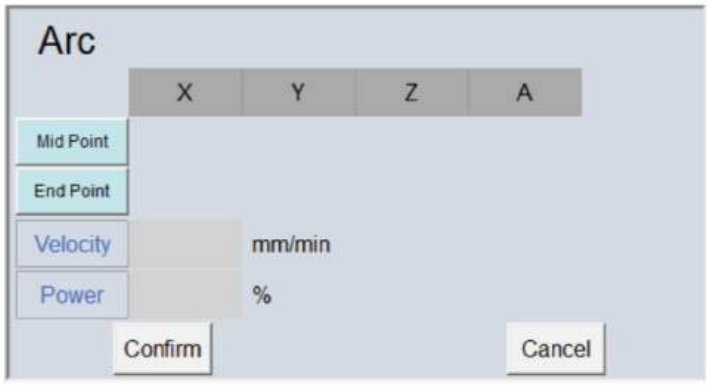
d.<Velocity>: You can input the processing Velocity in mm/min here, the entered Velocity only affects this single section without affecting the Velocity of other programs; if you do not enter it, the default is the preset Velocity, which is described in Section 5.5 Processing Velocity.

e.<Overcutting Degrees>: if 30° is filled in, 390° is actually processed, and more than 30° is processed beyond the starting point.

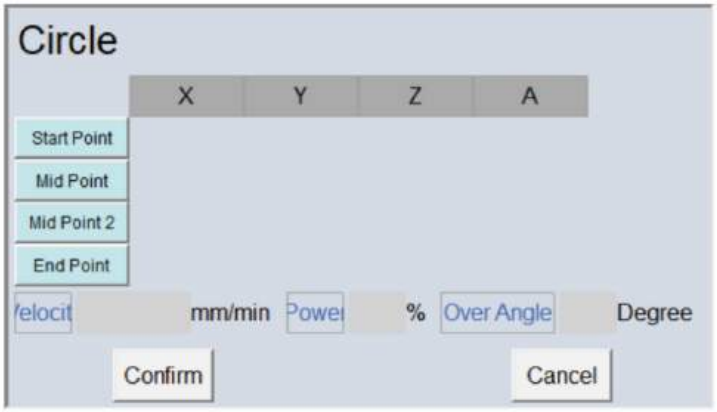
Operation instructions:

a.After clicking the "Full Circle" button, then press the "Plane" button to enter the Circle Demonstration page.

b.Click ▼ to open the lower menu to select the plane where the full circle is located.
c.After moving the starting position of the axial full circle, press the "Start Point".
d.Find the center point on the circle to be welded, move it to the position and then press "Center Point".
e.Find the end point on the circle to be welded, move it into position, and then press "End Point". (The end point does not need to coincide with the start point, just make sure it is on the weld circle.)
f.After completing all the points on the full circle, you can set the "Overcutting Degree".
(4-2)3D circle



Command function: Rapidly moves to the starting point and completes the circle in three-dimensional space at a machining speed of 1,000 kilometers.
Parameter definitions:
a.<Power>: You can input the laser power in % here; the input power only affects this single section, without affecting the power of other programs; if no input, the default is the power in laser control, which is introduced in 5.3 Laser Control Parameters.
b.<Frequency>: you can enter the laser frequency here, the unit is Hz, the input frequency will only affect the single section, does not affect the frequency of other programs; if not entered, the default is the frequency of the laser control, in the 5.3 Laser Control Parameters to do the introduction.
c.<Duty Cycle>: You can enter the laser duty cycle here, the unit is %, the input duty cycle will only affect the single section, does not affect the duty cycle of other programs; if you do not enter it, it defaults to the duty cycle of the laser control, which is introduced in the 5.3 Laser Control Parameters.
d.<Velocity>: You can input the processing Velocity in mm/min here, the entered Velocity only affects this single section without affecting the Velocity of other programs; if you do not enter it, the default is the preset Velocity, which is described in Section 5.5 Processing Velocity.
e.<Overcutting Degrees>: if 30° is filled in, 390° is actually processed, and more than 30° is processed beyond the starting point.
Operation instructions:
a.After clicking the "Full Circle" button, then press the "3D Cricle" button to enter the Circle Demonstration page.
b.Click to open the lower menu to select the plane where the full circle is located.
c.After moving the starting position of the axial full circle, press the "Start Point".
d.Find the center point on the circle to be welded, move it to the position and then press "Center Point".
e.Find the end point on the circle to be welded, move it into position, and then press "End Point". (The end point does not need to coincide with the start point, just make sure it is on the weld circle.)
f.After completing all the points on the full circle, you can set the "Overcutting Degree".
(4) Circular Arc 



Command function: move quickly to the starting point and finish the circle with machining speed.

Parameter definitions:

1.<Velocity>: You can input the processing Velocity in mm/min here, the entered Velocity only affects this single section without affecting the Velocity of other programs; if you do not enter it, the default is the preset Velocity, which is described in Section 5.5 Working Speed.

2.<Power>: You can input the laser power in % here; the input power only affects this single section, without affecting the power of other programs; if no input, the default is the power in laser control, which is introduced in 5.3 Laser Control Parameters.

3.<Frequency>: you can enter the laser frequency here, the unit is Hz, the input frequency will only affect the single section, does not affect the frequency of other programs; if not entered, the default is the frequency of the laser control, in the 5.3 Laser Control Parameters to be introduced.

4.<Duty Cycle>: You can enter the laser duty cycle here, the unit is %, the input duty cycle will only affect the single section, does not affect the duty cycle of other programs; if you do not enter it, it defaults to the duty cycle of the laser control, which is introduced in the 5.3 Laser Control Parameters.

Operating instructions:

1.Click on the "Circle" button to go to the Circle teaching page.

2.Move to a point in the middle of the arc, and click the "Middle Point" icon.

3.Move to the last point of the arc, click "End Point" to show the instruction, and then click "Confirm" when finished.

3.2.2 Welding Action

Functionality: The commands in this section control welding-related actions.

Definition of blowing: The welding process requires blowing to assist in improving the quality of the weld, and depending on the equipment, the software provides the setting of the blowing time.

Power setting: the most important thing for welding is the control of the laser. The power parameter has more detailed teaching in 5 Process Tuning. What can be modified in this command is the function of turning on or off time power, and which <Parameter No.> to use for the time power.

Operating Restrictions: Since this command involves a laser switch, it is necessary to press the "Laser Protection" and "Venting Protection" before the subsequent welding and venting actions can operate normally.

The instructions for welding include (1) start weld, (2) endweld, and (3) spot welding:

(1)Start weld 



Command function: The program runs to this point and from this line onwards, it will turn on the light and weld and execute the subsequent welding path.

Parameter definitions:

a.<Modulation Parameter No.>: One can enter the numbers from 1 to 10, each modulation parameter number corresponding to the time power setting and Velocity power graph. See 5.1 Laser Time Power and 5.2 Laser Velocity Power for details.

b.<Advance Blowing>: before moving to the welding start coordinates, blow in advance for a period of time, and reach a fixed point before emitting light, to ensure the welding quality of the workpiece, in milliseconds.

c.<Laser on Delay>: After moving to the welding start coordinates, maintain the light at a fixed position for a period of time to ensure the welding quality of the workpiece, in milliseconds.

d.<Time Power>: when pressed, the button appears yellow to enable the laser on time power curve function, when pressed again, it appears gray to turn off the time power curve function.

Operating instructions:

a.Click the "Start of Welding" button at the bottom of the screen.

b.Enter the <Parameter No.> of the light-on time power curve to be invoked and select whether to enable "Time Power."

c.Enter the desired time for "Advance Blowing" and "Laser on Delay" and click "CONFIRM."

(2)Endweld 



Command function: The program runs to this point and will turn off the laser from this line onwards.

Parameter definitions:

a.<Extended Blowing>:When moving to the welding end point, issue a light off command. At this time, the gas blowing is extended for a period of time before closing the blowing. Make sure to close the light first, then turn off the gas blow, and then proceed to the next line when the gas blow is finished, in milliseconds.

b.<Laser off Delay>: When moving to a welding end point, maintain at a fixed point and continue to emit light for a period of time before issuing the receiving command to ensure the welding quality of the workpiece, in milliseconds.

c.<Time Power>: when pressed, the button appears yellow to enable the laser off time power curve function,

when pressed again, it appears gray to turn off the time power curve function.

Operating instructions:

a.Click the "End of Welding" button at the bottom of the screen.

b.Select whether to enable the "Time Power" curve.

c.Fill in the time required for "Extended Blowing" and "Laser off Delay" and click "Confirm."

(3) Spot Welding 



Command function: Wait for a certain time after moving in a straight line to the specified position, then turn on the light at the target point, the on time can be set for single-point welding.

Parameter definitions:

a.Current coordinates: i.e. the current position of the machine.

b.<Velocity>: The Velocity from the previous position to a fixed point, in mm/min. The Velocity entered only affects this single section, not the Velocity of other programs; if no Velocity is input, it defaults to the preset Velocity, which is described in section 5.5 Processing Velocity.

c.<Power>: One can input the laser power here, in Hz; the input power only affects this single section, without affecting the power of other programs; if no input, the default is the power in laser control, which is introduced in 5.3 Laser Control Parameters.

d.<Frequency>: You can enter the laser frequency here, the unit is Hz, the input frequency will only affect the single section, does not affect the frequency of other programs; if you do not enter it, it will be defaulted to the frequency of the laser control, in the 5.3 Laser Control Parameters for the introduction.

e.<Duty Cycle>: You can enter the laser duty cycle here, the unit is %, the input duty cycle will only affect the single section, does not affect the duty cycle of other programs; if not entered, the default is the duty cycle of the laser control, in the 5.3 Laser Control Parameters for introduction.

f.<Waiting Time>: How long does one have to wait for the light to emit after arriving at a fixed position, in ms.

g.<Duration>: How long the laser continues to emit light at this point, in ms.

h.<Modulation Parameter No.>: One can enter the numbers from 1 to 10, each modulation parameter number corresponding to the time power setting and Velocity power graph. See 5.1 Laser Time Power and 5.2 Laser Velocity Power for details.

i.<Time Power>: When pressed, the button appears yellow to enable the laser on time power curve function, when pressed again, it appears gray to turn off the time power curve function.

j.<Blow ahead>: After moving to the spot welding coordinates, blow ahead for a certain period of time, and then light out to ensure the quality of the weld and to remove dust, in ms.

k.<Delayed blowing>: After the command of light harvesting is issued, the gas extends the time of blowing for a longer period of time before turning off the blowing to ensure that the light is harvested before turning off the blowing, and then the next program is executed after the completion of the blowing, the unit is ms.

Operating instructions:

a.Click on the "Spot Welding" button to enter the spot-welding teaching page.

b.Move the axis to the target position.

c.Fill in <Waiting Time>, <Duration>, <Modulation Parameter Number>, <Blow ahead>,<Delayed blowing>,whether to enable <Time Power>, and light output <Power>, <Velocity> <Frequency>,<Duty Cycle>as required, and then click "CONFIRM."

d.If the next line is also a spot weld, click the "Next Line" button. (The current point will be taught, while the next line of spot welding teaching will begin.)

e.If the next line no longer teaches the spot welding steps, click "CONFIRM" to complete the spot welding instruction.

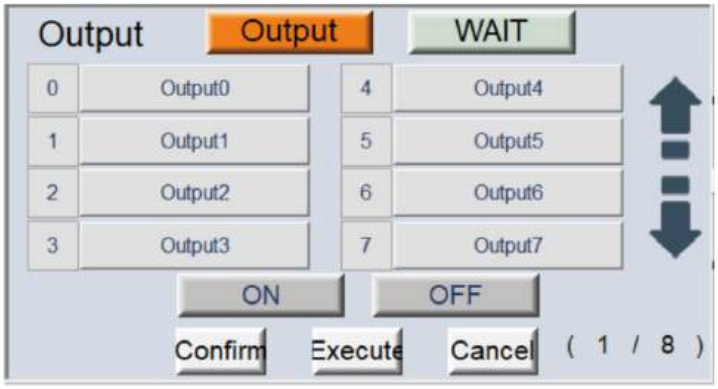
f.Click "Cancel" to cancel the spot welding instruction.

3.3.3 Peripheral Control

Functionality: Provides the function of controlling the peripheral external devices (such as clamping, cylinder, blowing, workstation switching, position signal, foot switch signal), and reaches the automatic control of peripheral devices through I and O contacts.

IO point definition: I and O represent the input and output respectively, which need to be matched with the actual wiring points, and currently 96 points each for I and O are supported.

(1) Input/output 



Command function: You can select the point of the output for teaching, or wait for the input signal before executing the subsequent action.

Parameter definitions:

a."Output": Pressing "Output" bottom, the other bottoms below will switch to the output point position button and display 8 positions on one page.

b."Wait": Pressing "Wait" bottom, the other bottoms below will switch to the input point position button and display 8 positions on one page.

c."Output 0-95": After pressing one of the output points, the button will appear yellow, indicating that the output point has been selected.

d."Input 0-95": After pressing one of the input points, the button will appear yellow, indicating that the input point has been selected.

e."On" / "Off": Selecting the points I and O, if it is O, the program will perform on or off O point when it runs to this line. If it is I, it will wait for the signal of I to be turned on or off before executing the next line of program.

f."Confirm": Click Confirm to complete the input/output teaching.

g."Execute": Press Execute to test if the point number and function are working properly.

h."Cancel": Cancels this input/output teaching.

i."Previous Page"/"Next Page": Each page displays 8 points, and other I and O points are displayed on the previous page and next page.

Operating instructions:

a.Click the "Input/output" button to enter the teaching page.

b.Select point I or O for teaching, click "Wait" for point I and "Output" for point O.

c.Select the point number to be controlled, and use "Previous Page" and "Next Page" to change pages if it is more than 7.

d.Select "On" or "Off" according to the program requirements.

e.Press "Execute" first to test if the function is as expected.

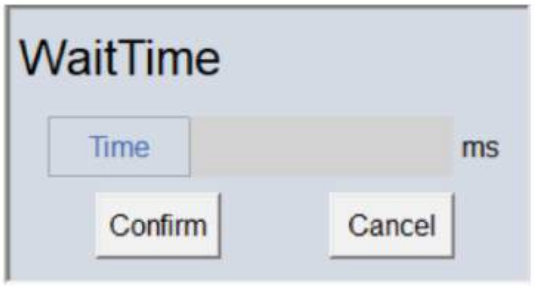
f.After testing and finding the function and number normal, press "Confirm" to complete the teaching.

g.If you click "Cancel", the welding instruction will be cancelled.

3.3.4 Auxiliary Instructions

The software provides some auxiliary commands to achieve the needs of multiple customization.

(1)WaitTime 



Command function: You can insert a timed waiting step in the program, the machine will pause for a while and then resume the motion.

Parameter definitions:

<Waiting Time>: Enter the time, in ms, at which you want to pause the motion.

Operating instructions:

Click "Timed Waiting," enter <Waiting Time>, and click "Confirm".

(2)Subprogram 



Command function: You can insert other subprograms in the middle of the program, enter the subprogram to start executing, and after finishing the subprogram, return to the main program to continue executing.

Parameter definition:

<Program Name>: Enter the file name of the subprogram.

Operating instructions:

a.Click "Other Commands."

b.Click "Subprogram," enter "Program Name" and click "Confirm."

(3) Command list 



Command function: The command list input box supports NC commands as well as special MACRO commands.

Parameter definition:

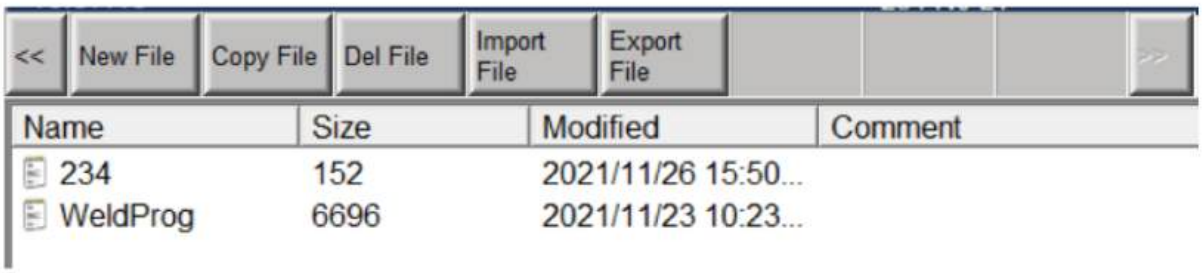
<Content>: Enter the NC or MACRO command.

Operating instructions:

a.Click "Other Commands."

b.Click "Command List," enter "Content" and click "Confirm."

(4)File 



Command function: Processing file management.

Parameter definitions:

a." New File": creates a new empty file.

b."Copy File": makes a copy of a selected file.

c."Delete File": deletes a selected file.

1."Select": Checks off the file (blue background) that the cursor is pointing to.

2."Select All":Bursts all the files on the list to be checked.

3."Unselect": unchecks all items that have been checked.

4."Delete Files": Deletes the checked files.

5."Delete All Files": Delete all files in the list.

Note: Deleting files does not allow you to delete files currently in use by the program.

d."Import File": imports files in an external device to the program.

e. "Export File": exports files in the program to an external device.

Operating instructions:

a.Click on "File Management" to enter the file operations page.

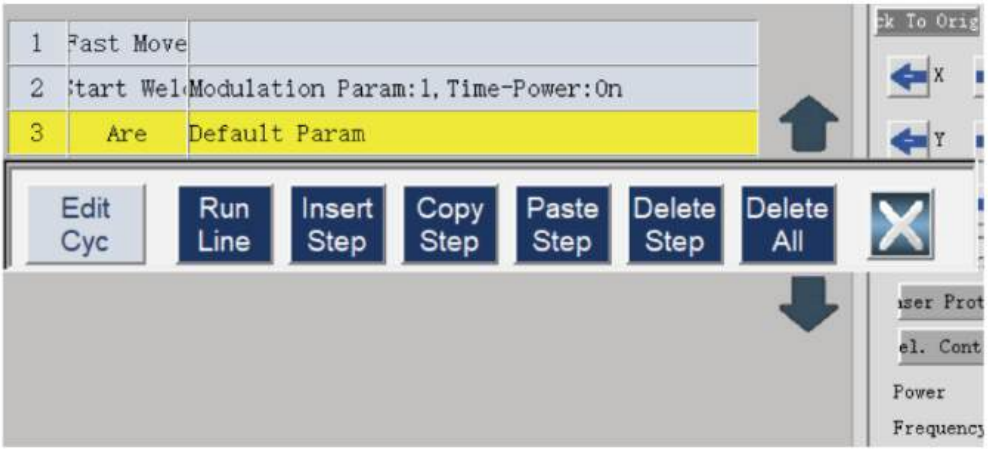
b.You can select "Open File," "Copy File," "Delete File" and "Import/Export File."

c.Double-click the file name, or click on it and press Enter to load the file.

Note: Dual-station application does not allow teaching files with the same file name to exist in the two workstations. When you clink "New file," "Copy File" or "Import File," the system will check if the file name already exists in the other workstations, and the operation with the same file name is not allowed.

3.4 Modifications to Teaching Programs

Function screen:



Functionality:

If you want to modify a program you have already written, right-click on the line or hold down the left mouse button to display the modification-related functions, which are described below in order.

(1)Edit Command 

Functionality: You can edit all the contents of the current line number.

Operating instructions:

a.Click on the program line to be modified.

b.Right-click and then click "Edit Command" to edit the command.

c.Modify what needs to be corrected, including coordinates, Velocity, commands, points, etc.

d.Click "CONFIRM" when you are finished editing.

(2)Single-step Execution 

Functionality: Users can execute the contents of the current line.

Operating instructions:

Right-click, then click "Single-step Execution" and click "Confirm."

(3) Insert 

Functionality: Can insert a blank line in front of the selected line to make it easier to add actions.

Operating instructions:

Right-click and then click "Insert."

(4) Copy 

Functionality: Copies the contents of the current line number.

Operating instructions:

a.Click on the line number to be copied.

b.Right-click and click the "Copy" button.

(3)Paste 

Functionality: Paste the contents of the previously copied line number into the current line number.

Operating instructions:

a.Click on the line where you want to paste it.

b.Right click and then click "Paste."

(4)Delete 

Functionality: Deletes the contents of the current program line.

Operating instructions:

a.Click on the program line to be deleted.

b.Right click and then click "Delete."

(5)Delete All 

Functionality: Deletes all programs in the open file.

Operating instructions:

a.Go to "File" and select the files you want to delete completely.

b.Right click and then click "Delete All."

3.5 Executing the machining program

Function screen:



Function: After the program has been written, it is necessary to click the button to start the processing, and this part of the function is in the startup instruction module.

Functionality Description:

I . "Start": the motion mode will be switched to "Auto", the controller status will be changed to "Processing", and the programmed demonstration program will be executed.

2 . Pause": the controller status changes to "Pause", temporarily stops the machining program, and press start again to continue the machining program.

3. "Reset": Equivalent to the function of the Reset key, stops all ongoing activities, the controller status returns to "Ready", and the machining program resets back to the first line and waits to be started again.

4 . "Wheel Simulation": can be pressed at any time to simulate the machining path using the wheel device. For details, please refer to Section 6.1 "Wheel Simulation".

5 . "Continuous Welding": If you press "Emergency Stop" or "Reset" during processing, the machine stops immediately and returns to the ready state, then press "Continuous Welding" to start from the stopped section and continue the processing program.

6. "Customize": Provide users with customized functions.

4. Axial Operation

Fenubar Entry Path: Main screen→Station 1 Program (FI)→Station 2 Program (F2)→Upper right column.

Function introduction:

Users can choose different motion modes, and then through the software panel buttons, control the movement of each axis, moving to the desired coordinate point. The following five modes are introduced in order: inching, incremental inching, return to home position, handwheel, and automatic.

4.1 JOG Mode

Function screen:



Functionality:

In the JOG (continuous JOG) mode, the buttons on the screen and the multiplier adjustment can be used to quickly move each axis.

Component description:

a.Manual multiplication -- 、 - 、 + 、 ++ :Adjusting the speed of movement of the inching action has different specifications for operation in percentage mode (Pr3207=1) and segment mode (Pr3207=2).

	--	-	+	++	Note
Pr3207= 1	The value in the display column is reduced by 10.	The value in the display column is reduced by 2.	Add 2 to the value in the display column.	Add 10 to the value in the display column	The limit of processing multiplier is 0% to 200%.
Pr3207=2	not display	The value in the display column is reduced by 10.	Add 10 to the value in the display column.	not display	The limit of processing multiplier is 10% to 200%.

b.Manual magnification display column: Display the value of the magnification of the movement. Under Pr3207=1, you can input the value of the dynamic multiplier from the keyboard, and the dynamic multiplier input range is 0%~200%.

c."Back to Home": Press to move the unit to the home position set by the program.

d."Coordinate Reset": press to reset the position of each axis in the absolute coordinates, and use the current position as a new program origin.

e."RTCP": This function button is displayed only when the Pr3001 parameter is not set to 0. When pressed, the RTCP function is turned on/off instantly.

f.Each axial direction "←" and "→": Pressing "→" moves the axis to positive direction, pressing "←" moves the axis to negative direction, holding down the button moves the axis continuously, releasing the button stops the movement.

Mode of operation:

a.Click JOG mode in the teaching mode, the button before clicking is in black, 

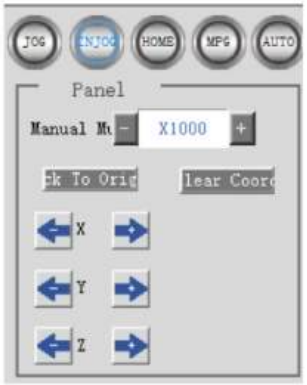
b.and will turn blue  after successfully switching to JOG mode.

c.Click on - and + of the manual multiplication to adjust the Velocity of movement. (It is recommended that you lower the multiplier for first-time use to avoid accidents caused by high-speed movement.)

d.Click on ← and → in each axis to control the movement of different axes.

4.2 INCJOG Mode

Function screen:



Functionality:

In INCJOG mode, the distance of INCJOG can be set through the input box <INJOG Distance> in the panel, so that the laser point position can move the required distance accurately in manual mode.

Component description:

1.<INJOG Distance>: Enter the distance you want to move (mm) or the angle of rotation (degree), ranging from 0.001-100 mm or degree.

2. "Back to Home": Press to move the unit to the home position set by the program.

3."Coordinate Reset": press to reset the position of each axis in the absolute coordinates, and use the current position as a new program origin.

4."RTCP": This function button is displayed only when the Pr3001 parameter is not set to 0. When pressed, the RTCP function is turned on/off instantly.

5.Each axial direction "←" and "→": Pressing "→" moves the axis to positive direction, pressing "←" moves the axis to negative direction, pressing and holding only moves a fixed distance, releasing and clicking again can trigger the next move command.

Mode of operation:

1.Click INCJOG mode in the teaching mode, the button before clicking is in black , and will turn blue  after successfully switching to INCJOG mode.

2. Click "Control Endpoint" in the software panel to enable/disable the RTCP function. Before clicking the button, the button will be black on gray background, and after successfully opening the button, the button will become white on blue background.

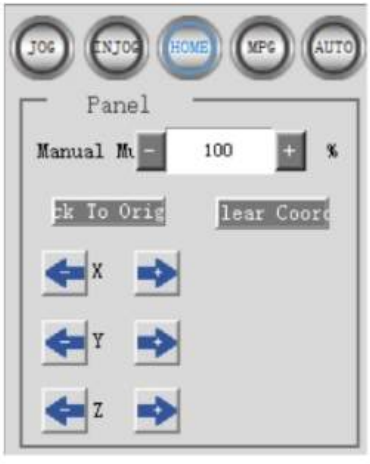
(*Note: This function needs to open the tip of the knife point control function (RTCP) rights, there is about the movement of RTCP instructions can refer to 3.2 manual RTCP function)

3.Enter the <Amount of Movement> field to adjust the desired movement distance (mm) or rotation angle (degree), ranging from 0.001-100 mm or degree.

4.Click  and  in each axial direction, and the laser point position will move in the desired direction with equal distance or angle according to the input value.

4.3 Home Search Mode

Function screen



Functionality:

Move a single axis until the controller receives the home dog signal, and then move the second segment until the motor index signal is triggered. The system will automatically move according to the offset, and return the mechanical coordinates to zero, which is also called home searching.

Component description:

a.Manual multiplication 、、、 :Adjusting the speed of movement of the inching action has different specifications for operation in percentage mode (Pr3207=1) and segment mode (Pr3207=2).

	--	-	+	++	Note
Pr3207= 1	The value in the display column is reduced by 10.	The value in the display column is reduced by 2.	Add 2 to the value in the display column.	Add 10 to the value in the display column	The limit of processing multiplier is 0% to 200%.
Pr3207=2	not display	The value in the display column is reduced by 10.	Add 10 to the value in the display column.	not display	The limit of processing multiplier is 10% to 200%.

b.Manual magnification display column: Display the value of the magnification of the movement. Under Pr3207=1, you can input the value of the dynamic multiplier from the keyboard, and the dynamic multiplier input range is 0%~200%.

c."Home": Press to move the machine to the home position set by the program.

d."Coordinate Reset": press to reset the position of each axis in the absolute coordinates, and use the current position as a new program origin.

e.When you press the "Home searching" button, the axes will move in the direction of Pr861~Pr865, and keep moving until the motor index signal is triggered or press the "Reset" button.

f."One Click Home searching": when pressed, all axes start home searching.

Modes of operation:

There are two ways to operate it: seek home for each axis separately or use one click to find home.

Find the origin of each axis separately.

a.Click home searching mode in the teaching mode, the button before clicking is in black 

, and will turn blue 

after successfully switching to back to home mode.

b.Click on -- 、 - 、 + 、 ++ of the manual multiplier to adjust the Velocity of the movement.

4.4 MPG Mode

Function screen:



Functionality:

Uses an external MPG device to turn the rotary table and move each axis to a specified position.

Component description:

a."Back to Home": Press to move the unit to the home position set by the program.

b."Coordinate Reset": press to reset the position of each axis in the absolute coordinates, and use the current position as a new program origin.

c."Control Endpoint": This function button is displayed when the Pr3001 parameter setting is not zero. When pressed, the RTCP function is instantly turned on/off.

d.MPG Axis Direction and MPG Magnification: Set on the physical wheel unit.



Operation mode:

1. Connect the solid wheel to the MPG hole on the FC controller.
2. Go to the parameter setting page and modify the Pr202l parameters.

Parameter Number	Description	Model	MPG Setting	Remarks
Pr2021	Axis card port number or register number corresponding to the MPG.	FC-A	5(corresponding to HHB Pin7~10)	Please note that the Port number in the table on the left represents the MPG1 port on the hardware, and it is still necessary to refer to the number of Pr9 axes to determine if this port is functional.
		FC-B	20(corresponding to HHB Pin7~10)	
		7C/8B/8C/8C-5/8E/10B/10C/10C-5/10E	20(corresponding to HHB Pin7~10)	
		12B / 1SB / 1SC / 1SC-5 / 1SE / 80MI	20	
		8A/10A/12A/15A	5	
		11R	9	
		21R/81R	20	

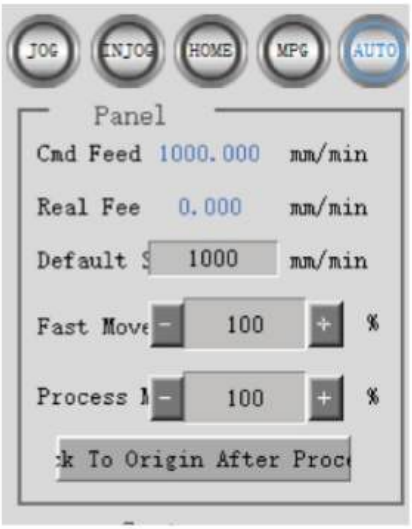
3. Select "MPG" mode, the button before clicking is black, and after switching to handwheel mode, the button becomes blue.
4. In the software panel, click "Control Endpoint" to turn on/off the RTCP function, the button is black on gray background before clicking, and the button turns into white on blue background after successfully turning on the function.

(*Note: This function needs to open the knife tip point control function (RTCP) authority, there is about the dynamic RTCP description can refer to 3.2 in the dynamic RTCP function)

5. Turn the Axial knob to the specified axial direction.
6. Turn the magnification knob to the specified magnification.
7. Turn the wheel to move the axis.

4.5 Automatic Mode

Function screen:



Functionality: In automatic mode, one can set the machining Velocity and adjust the multiplier. Only in automatic mode can one initiate the machining program.

Component description:

1.<Preset Velocity>: A preset processing Velocity in mm/min can be entered in this field.

2.Rapid traverse magnification -- 、 - 、 + 、 ++ usts the speed of rapid traverse of the machine, in percentage mode (Pr3207= 1) and segment mode (Pr3207=2) under the operating specifications are different.

	--	-	+	++	Note
Pr3207= 1	The value in the display column is reduced by 10.	The value in the display column is reduced by 2.	Add 2 to the value in the display column.	Add 10 to the value in the display column	The limit of the fast shift multiplier is 0% to 100%.
Pr3207=2	not display	The value in the display column is reduced by 25.	Add 25 to the value in the display column.	not display	There are three manual multipliers: 25%, 50%, and 100%.

3.Quick Shift Multiplier Display: Display the value of Quick Shift Multiplier. Under Pr3207=1, you can input the value of the quick shift multiplier from the keyboard, and the input range of the quick shift multiplier is 0%~100%.

4.Machining multiplier -- 、 - 、 + 、 ++ : Adjust the speed of the machine when machining, in the percentage mode (Pr3207 = 1) and the number of segments mode (Pr3207 = 2) under the operating rules are different.

5.Machining multiplier display column: displays the machining multiplier value. Under Pr3207=1, you can input the machining multiplier value from the keyboard, and the machining multiplier input range is 0%~200%..

For a written description of each function of the processing mode setting, refer to "8 Other Application Functions" for details.

Mode of operation:

a.Click automatic mode in the teaching mode, the button before clicking is in black AUTO, and will turn blue AUTO after successfully switching to automatic mode.

b.Enter <Preset Velocity>.

c.Click on -- 、 - 、 + 、 ++ to adjust the fast movement multiplier and processing multiplier

d.Click "Return Home after Machining" or "Rotary Axis Mode" button depending on the machining requirements.

e.Finish setting the automatic mode parameters before starting processing.

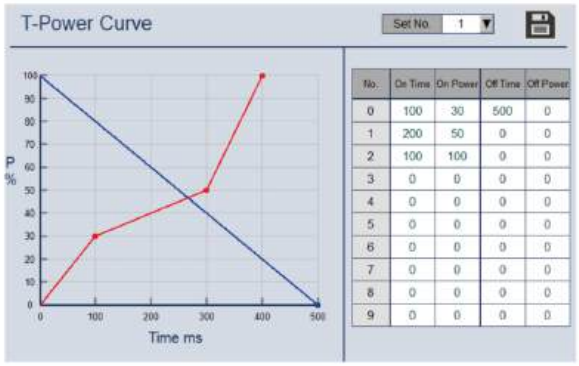
5.Process Tuning

This section describes the various parameters associated with the laser welding process and how they can be adapted to achieve better processing results.

5.1 Laser Time Power

Fenubar entry path: Home screen → Laser modulation setting (F3) → Time power setting (F1)

Function screen:



Functionality:

Here set the laser on (red), off (blue) power and time relationship, also known as the slow rise and fall power, to avoid the dramatic changes in the energy of light on, light off, resulting in over-welding.

Component description:

a.<Number>: One can enter the number of the modulation parameter, ranging from 1 to 10.

b.Time Power Curve: A time setting table for previewing the input.

c.<Time Setting Table>: Enter the time for turning on and off the light and the corresponding power in the table, with the time unit being ms, for incremental design.

d.<Distance Setting Table>: Input the distance between light-opening and light-receiving and the corresponding power in the table, and the time unit is mm, which is an incremental design.

e.Time and power curve: preview the input time setting table.

f.Distance Power Curve: Preview the distance setting table.

Mode of operation:

a.Click on the "Time Power" function button to enter the time power curve screen.

b.Enter the modulation parameter <Number> to be modified.

c.In the table below, enter the light on time, the corresponding light on power (0% to 100%), the light off time, and the corresponding light off power (100% to 0%), in order, such as 0-50 ms, 20% from 0 on the main screen, 50 ms-100 ms, 40% from 20% on the screen and so on, as shown above.

d.When finishing the input, confirm the preview above is correct and press to complete the setting.

e.To enable the time power curve, one needs to click on the "Time Power" button in the program command for "Start of Welding" and "End of Welding," or if not needed, turn it off here.



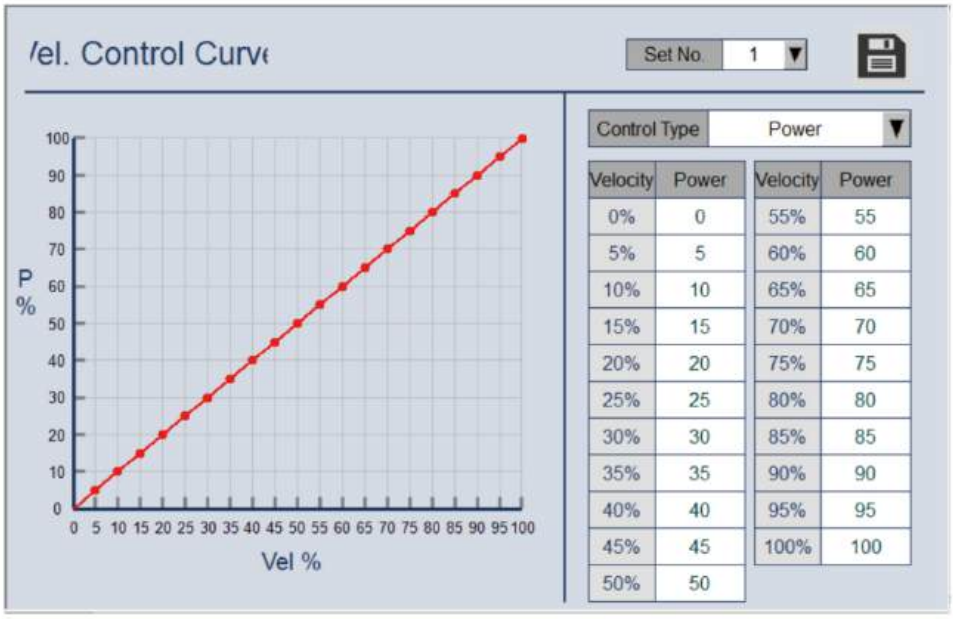


(*Note: The power percentage here will be superimposed on the 5.3 laser-controlled power percentage. For example: 5.3 Laser Control Parameters is entered as 80% and the time power is set as shown in the diagram above. 100 ms after light on, the process laser power is 80 * 40% = 32%, 500 ms after light on is 80 * 100% = 80%.)

5.2 Laser Velocity Modulation

Fenubar entry path: Home screen → Laser modulation setting (F3) → Velocity modulation setting (F2)

Function screen:



Functionality:

Set here the laser power/frequency/duty cycle relationship with speed as it changes to adjust the power/ frequency/duty cycle in real time to avoid the concentration of energy in non-equivalent speed situations that can lead to over-welding.

Component description:

a.<Number>: One can enter the number of the modulation parameter, ranging from 1 to 10.

b.<Modulation Type>: One can select the type of modulation, with options available for "Power," "Frequency" and "Duty Cycle."

c.<Modulated Quantity Setting Table>: Enter the laser settings corresponding to the speed percentage in the table.

Example: When the speed is 25% and the power is set at 25%, the speed changes to 25% of the target speed and the actual output power changes to 25% of the target power when the speed power curve is turned on during actual machining

d.Velocity curve: A modulated quantity setting table with a preview of the input.

Mode of operation:

a.Click the "Speed Modulation" function button to enter the speed power curve.

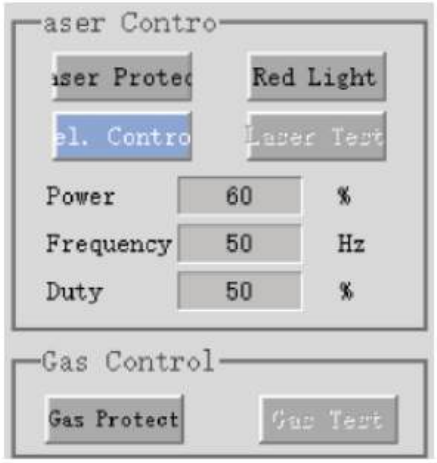
b.Enter the modulation parameter <Number> to be modified.

c.Select the type of modulation you want to use <Modulation Type>.

d.Enter the output modulated quantity for each velocity percentage in order in the table below.

e.When finishing the input, confirm the preview above is correct and press to complete the setting.

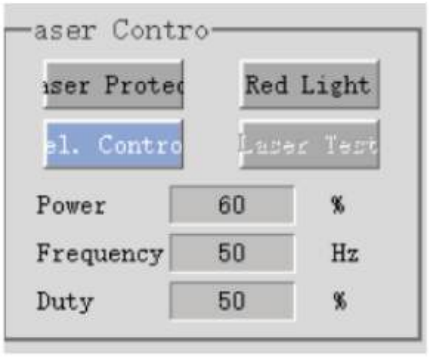
f.To enable the speed modulation function, you need to click on "Speed Modulation" in the laser control panel. When the button lights up, the speed modulation function is turned on.

Turn on speed modulation	Turn off speed modulation
	

5.3 Laser Control Panel

Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) → lower right corner of the screen.

Function screen:



Functionality: This panel allows you to control the laser and set the laser process parameters.

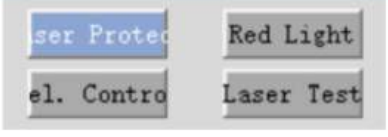
Component description:

1."Laser Protection":If the laser protection button lights up, The machine will be able to output lasers for processing If it is not lit, the laser can't output to avoid danger caused by accidental touch

2."Red Light": You can turn on the red light of the laser to facilitate teaching.

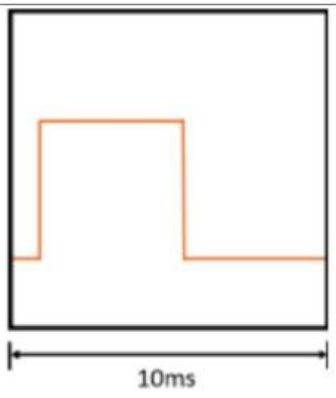
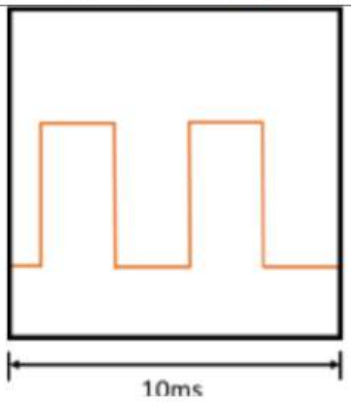
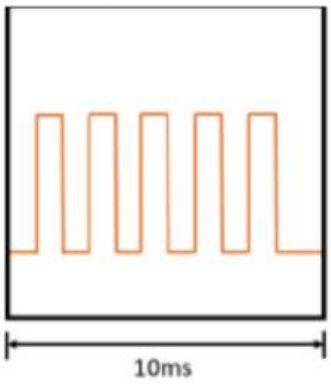
3."Speed Modulation": Enables the speed modulation function.

4."Laser Test": You can only click on the "Laser Test" button when the "Laser Protection" button is enabled. The laser will output when the mouse is pressed, mainly used for spot welding or testing the laser.

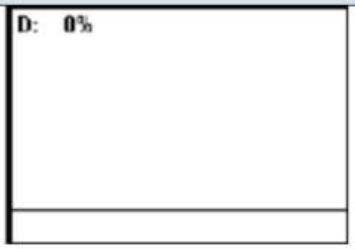
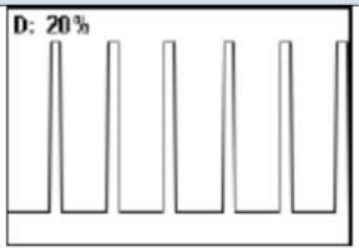
One cannot click **"Laser Test"** when **"Laser Protection"** is not enabled.	Click on **"Laser Test"** only after **"Laser Protection"** is enabled.	Keep pressing **"Laser Test"** and the button will be shown in white on a blue background.
		

5.<Power>: Set the laser's output power in % of the maximum power.

6.<Frequency>: Set the frequency of the pulsed laser in Hz (1/sec).

Frequency	100Hz	200Hz	500Hz
Duty cycle	50%		
Description	Pulsed laser 1 time in 10 ms 1 / 0.01 = 100 Hz	Pulsed laser 2 times in 10 milliseconds. 2 / 0.01 = 200 Hz	Pulsed laser 5 times in 10 milliseconds. 5 / 0.01 = 500 Hz
Diagram			

7.<Duty Cycle>: Set the duty cycle of the pulsed laser.

Duty cycle	0%	20%	100%
Diagram			

5.4 Gas Control Panel

Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) → lower right corner of the screen.

Function screen:



Functionality: The panel is used to control gas.

Component description:

a."Gas Protection": If the "Gas Protection" button is lit, The machine will be able to output gas for processing

b."Gas Test": When the "Gas Protection" is on, click the "Gas Test" button. When the button is lit, it output gas. Click the button again and the gas output will stop.

5.5 Processing speed

Fenubar Entry Path: Main Screen 1 Station →Program (FI) / Station 2 Program (F2) → Axial Operation Software Panel → Auto Mode

Function screen:



Functionality: The speed is set on the software panel in automatic mode, which affects the processing quality directly.

Component description:

a.Feed rate: displays the target speed that the controller sends to the machine.

b.Actual feed rate: shows the actual processing speed of the machine.

c.<Default Feed rate>: The default processing speed, in mm/min.

d.Fast stroke move multiplier: Adjust the speed of rapid movement of the machine, with a total of 3 stages: 25%, 50% and 100%; press "-" and "+" to switch.

e.Feed rate multiplier: Adjust the speed of the machine during processing, with the default value being 100%, press "-" to decrease the value in the white box by 10, press "+" to increase the value in the white box by 10, the limit of processing multiplication being 10%~200%.

6.Processing Simulation

If the programming is complete and you want to simulate it first to see if the path is as expected, you can use the processing simulation function.

6.1 MPG Simulation

Functionality: Use manual pulse generator for a step-by-step simulation of the machining programs, which can operate the process in either forward or reverse direction.

Operating instructions:

a.Refer to the setting of 4.4 MPG Mode to connect the controller to the manual pulse generator MPG

b.Click on "MPG Simulation" and the button will appear in blue as shown below.



c.Turn the manual pulse generator MPG to begin a simulation of the machining program.

d.To cancel the simulation, simply press the "MPG Simulation" button again and the button will be grayed out.

6.2 Pause

Functionality:

If you need to pause the machining process, press the "Pause" button.

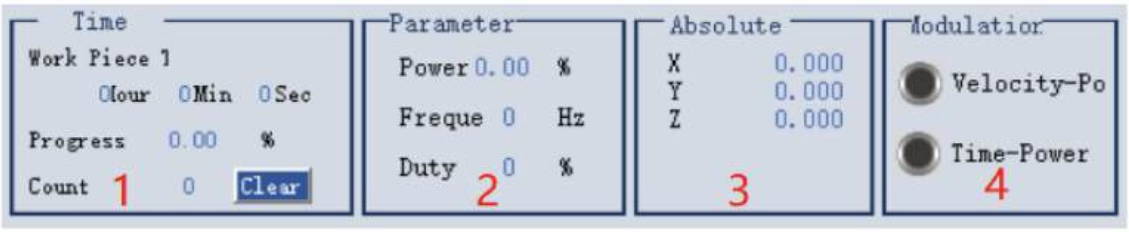
6.3 Continuous Welding at Breakpoint

Functionality:

If you press the emergency stop or Reset during machining, the machine will stop immediately. After the ready state is restored, press "Continuous Welding at Breakpoint" to continue the processing program from the breakpoint.

7. Status Monitoring

Fenubar entry path: Home screen → Workstation 1 program (F1)/Workstation 2 program (F2) → top of the function screen.



7.1 Processing Time

Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) →1st frame at the top of the screen.

Function screen:



Functionality:

a.Single workpiece time: After pressing Start Processing, the system will start timing until the end of the processing, and display the elapsed time.

b.Processing progress: the processing progress is 0% at the beginning of the first line of the program and 100% at the end of the program, and the percentage of processing progress can be used to know the percentage of the program that has been implemented.

c.Cycle times: Display the cycle times of demand set by user, please refer to"8.5 Cycle Processing "for the setting method.

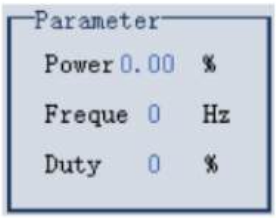
d.Current number of cycles: Display the current number of cycles.

e.Processing Monitor: Press Processing Monitor, the contents of the original [Processing Time] column will be switched to the contents of the [Processing Monitor] column.

7.2 Processing Parameters

Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) → 2nd frame at the top of the screen.

Function screen:



Functionality:

a.Power: displays the current output power of the laser.

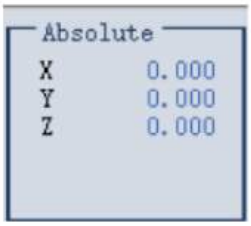
b.Frequency: displays the current output frequency of the laser.

c.Duty cycle: displays the current output duty cycle of the laser.

7.3 Absolute Coordinates

Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) → 3rd frame at the top of the screen.

Function screen:



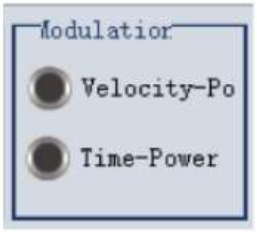
Functionality:

Absolute coordinates: instantly display the current program coordinates on each axis of the machine.

7.4 Modulation State

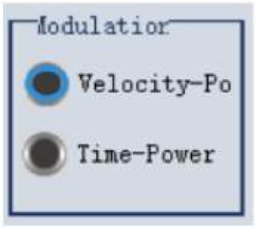
Fenubar entry path: Main screen → Workstation 1 program (F1)/Workstation 2 program (F2) → 4th frame at the top of the screen.

Function screen:



Functionality:

a.Speed-power: Where the speed-power function is enabled, and the power is modulated according to the velocity during the machining process, the speed-power lamp in this modulated state will light blue.

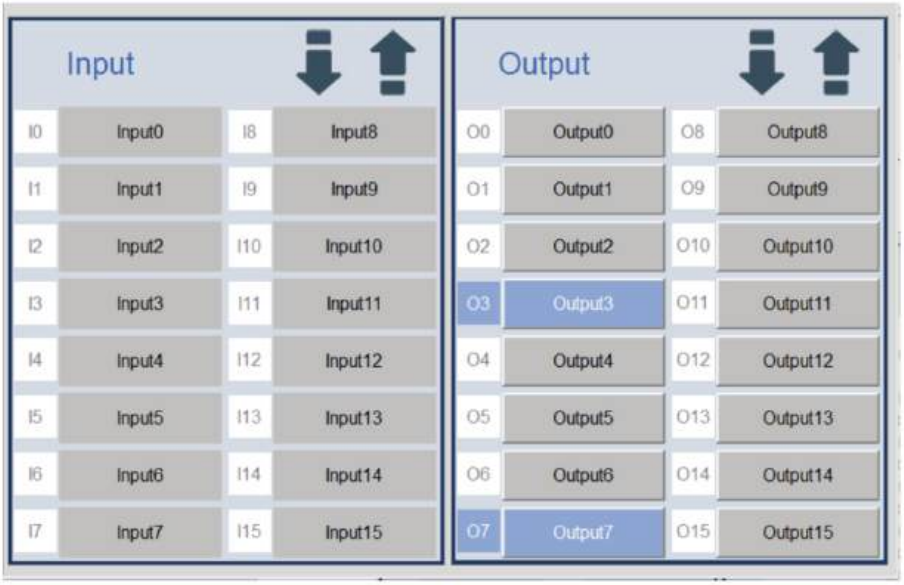


b.Time-power: Where the time-power function is enabled, and the laser power is ramp up or ramp down during the machining process, the time-power lamp in this modulated state will light blue.

7.5 IO Monitoring

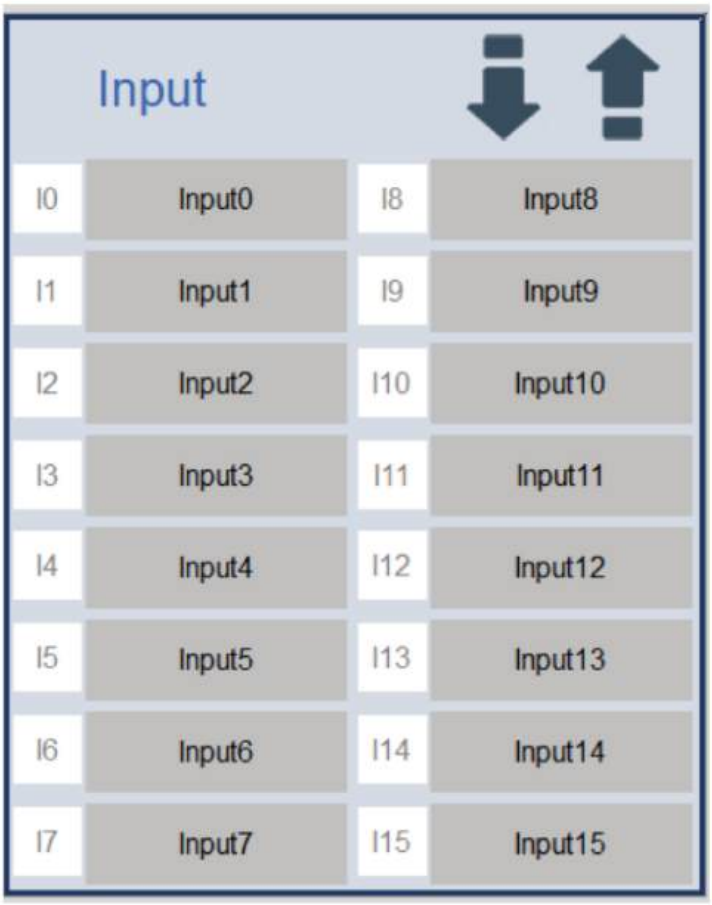
Fenubar entry path: Home screen → Status monitoring (F6) →IO monitoring (F1)

Function screen:



Functionality:

a.Input monitoring: 96 input signals can be monitored, when any input signal is received, the label will appear blue, as shown below:



b.Output monitoring: 96 output signals can be opened manually. After pressing any output signal button, a confirmation window will pop up to confirm whether to output this signal or not. After clicking "Confirm," the color of the button will change to white on blue background, and after pressing Inpute2 button again, a confirmation window for closing will pop up.

c.This page can be toggled by pressing "Previous Page"/"Next Page," supporting up to 96 I points and 96 O points.

7.6 Laser Monitoring

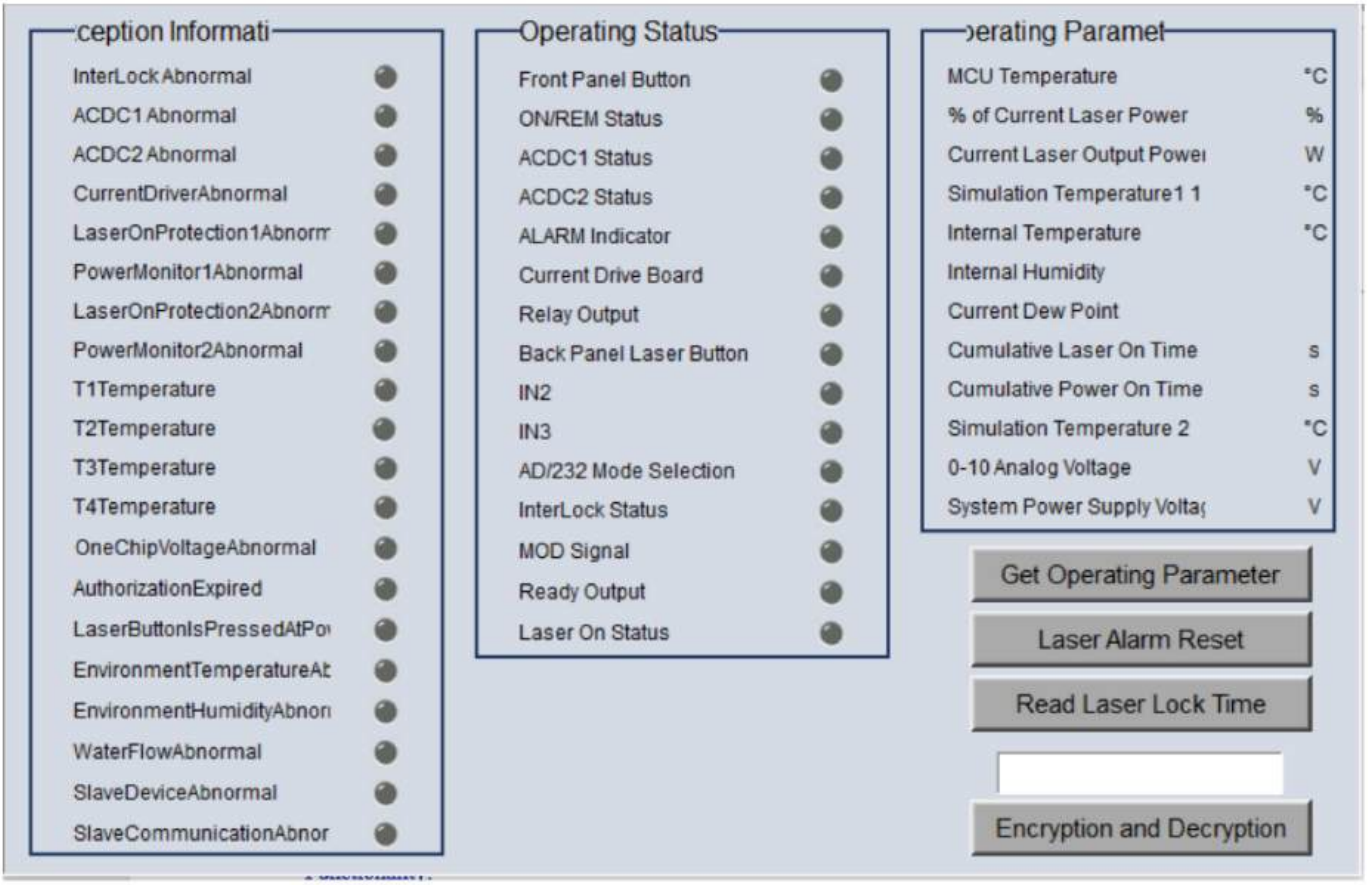
Functionality: provides a complete status display of the laser, allowing maintenance personnel to troubleshoot in the event of a laser alarm.

Fenubar entry path: Home screen → Status monitoring (F5) → Laser monitoring (F2)

Enable condition: The laser monitoring function only supports Raycus, Maxphotonics,GW,JPT,IPG lasers (Pr3403 = 0、1、21、22、3、5、51、6). Only when Pr3403 is 0、1、21、22、3、5、51 or 6 can the laser monitoring page be accessed from the "Laser Monitoring" entry point.

7.6.1 Raycus Laser

Function screen:



Functionality:

a.Click "Get Laser Operating Parameters" to update and retrieve the laser operating parameters.

b.Press "Laser Anomaly Reset" to reset the laser's alarm.

c.Press "Read Laser Lock Time" to read the current lock time of the laser and the number of failed decryption attempts, and display it at the bottom of the screen.

d.Press "Laser Encryption & Decryption" to read the value in the input box of "Laser Encryption & Decryption" and perform the encryption and decryption on the laser.

e.In the laser anomaly information , the red light on on the right indicates that the laser is experiencing this abnormality.

f.In the running status bar of the laser, the green light on on the right indicates that this function is being performed.

g.The bottom of the screen shows the current lock time, the number of failed decryption attempts and the communication status.

7.6.2 Maxphotonics Laser

Function screen:

Functionality:

1.Click "Get Laser Operating Parameters" to update the operating parameters, mainly power, frequency and duty cycle.

2.Click "Read Encryption Expiry Information" to read the laser expiry information and display it at the bottom of the screen.

3.Press "Agent Decryption," read the password in the input box of "Agent Decryption," and perform the agent decryption on the laser.

4.In the laser anomaly information bar, the red light on  on the right indicates that the laser is experiencing this abnormality.

5.In the running status bar of the laser, the green light on  on the right indicates that this function is being performed.

6.The bottom of the screen shows the current decryption expiration status and communication status.

8.Other Application Features

This section contains other applications of the software that do not affect machining quality, but can assist in machine operation to boost machining efficiency.

8.1 Return Home after Machining

Fenubar entry path: Home screen → workstation 1 program (F1)/Station 2 program (F2) → Axial operation software panel → Auto mode

Function screen:



Functionality: After executing the last line of the machining program, each axis of the machine automatically returns to home position.

Operating instructions:

a.Please refer to 2.4 Back to Home Setting to set the back to home action.

b.The button "Return Home after Machining" before pressed is black on a gray background, and white on a blue background after pressed.

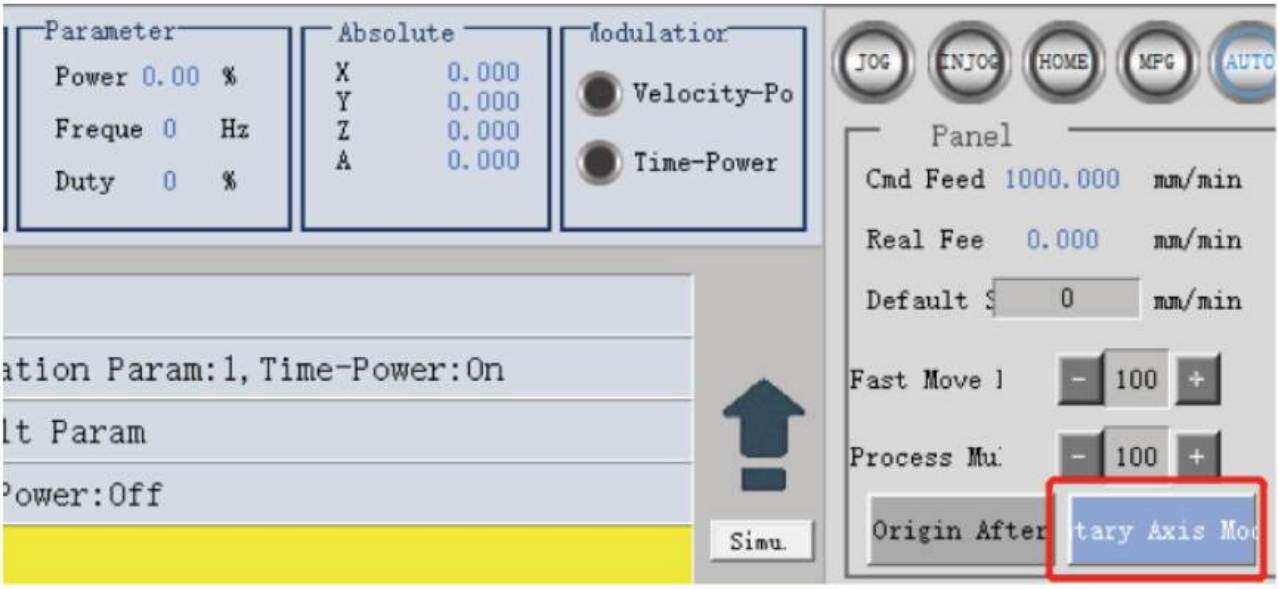
c.Start the processing programs.

d.After finishing processing, the axes return to the home position in order according to back to home setting.

8.2 Rotary Axis Mode

Fenubar entry path: Home screen → workstation 1 program (F1)/Station 2 program (F2) → Axial operation software panel → Auto mode

Function screen:



Functionality:

After starting machining, the current position of the rotary axis serves as a starting point, which means there is no need to reverse back to the starting point of the previous machining, thus improving machining efficiency.

Operating instructions:

a.Confirm the axis you want to set into rotary axis mode, which axis type parameter is setting right (Pr221~240 set to 1~5).

b.The button "Rotary Axis Mode" before pressed is black on a gray background, and white on a blue background after pressed.

c.Press the "Start" button.

d.The current position of the rotary axis serves as a program origin and a processing starting point, with the values on the absolute coordinates reset, as shown in the figure.

(Note: If axial home searching parameters Pr961~980 are set to 4 or 5 or 6, this function is invalid, refer to Pr961~Pr980 axial home searching methods.)

8.3 Next Point Editing

Functionality:

If the shape of the workpiece to be welded is complex and a large number of teaching points are needed to fit the weld path, the next point editing function can be used to provide the efficiency way to editing points.

Operating instructions:

a.Refer to 3.4 Teaching Program Modification, right-click the content of program to edit the processing parameters. The point coordinates of this content of program can be adjusted when editing the dry fast move, straight line, circle, arc and spot welding action.

b.Move the machine to the correct position and press the "Import Current Coordinates" button to import the current coordinates into this content of program; or select the coordinates directly to enter a value to adjust the point position.

c.After point coordinates adjustment, press "Previous Point" / "Next Point" button, the adjusted points will be stored automatically, and the machine will automatically move to the previous / next position according to the button pressed, then the user can proceed with editing for the next point.

d.Repeat steps 2 to 3 to complete the editing of a large number of points, then you can begin processing.

Note: If you want to move the machine to the currently displayed point coordinates when editing the point coordinates, you can click the "Point Arrival" button.

9.Diagnosis

9.1 PLC Status

Fenubar port path: main screen → next page (F10) → controller settings (F2) → electronic control module (F2) → Diagnostic function (F3) → PLC status (F1) You can view PLC related status, including PLC I, O, S, C, A bit data, PLC register, PLC counter, PLC timer, and ladder diagram.

9.2 System Data

Fenubar port path: main screen → next page (F10) → controller settings (F2) → electronic control module (F2) → Diagnostic function (F3) →System data (F2)

You can view system data. This screen also provides a function to skip to the page with a specified system data number.

9.3 Shared Variables

Fenubar port path: main screen → next page (F10) → controller settings (F2) → electronic control module (F2) → Diagnostic function (F3) → Shared variables(F3)

You can check the status of shared variables. This screen also provides a function to skip to the page with a specified number of shared variables and to clear the field.

9.4 Program Variables

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module(F2) → Diagnostic function(F3) → Program variables(F4).

You can view the program variables. This screen also provides a function to skip to the page with a specified program variable number.

9.5 Operation Logs

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module (F2) → Diagnostic function (F3) → Operation log (F5). You can view the operation log. This screen provides the following functions:

- Search date and time
- Search alert
- Search for I-Bit
- Export operation logs

9.6 SRI Status

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module (F2) → Diagnostic function (F3) → Next page (F10) → SRI status (F1).

You can view the SRI status and the status of each port number.

10. Safeguard

10.1 Alarm Display

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module (F2) → Maintenance (F1) → Alarm display (F1)

To prevent incorrect operation that could endanger the safety of people and machines, a number of protections are set in the system or PLC. When these protective conditions are triggered, the system will issue a warning or alarm to alert the user. This section describes how to access alarms and how to troubleshoot them when they occur. Alerts are basically divided into existing alerts and historical alerts:

10.1.1 Existing Alerts

a.Current alert status of the system.

b.When an alarm occurs, the controller will pop up an alarm window showing the current alarm content.

c.Click ESC to exit the window.

d.If the alarm has not been cleared, click Reset to bring up the alarm window again.

e.Switch to the "Maintenance" page and the existing alert will be displayed automatically.

10.1.2 Historical Alerts

Alarms that have occurred in the system can be viewed on this page for possible causes of the problem.

Switch to the "Maintenance" page, click "Alert Display," and then click "Historical Alerts" to display the historic alerts.

The smaller the serial number of the alarm, the more recently the alarm has occurred.

10.1.3 Alarm Export

When an alarm occurs in the system, it may be necessary to contact the machine maker for maintenance. At this point, the alarm export function can be used to export the alarm conditions that have occurred to an external storage device for transmission to the machine maker so that the machine maker can identify the possible causes of the problem before arriving at the scene.

Operating steps:

a.Insert an external storage device into the controller, or set up a corresponding network folder.

b.Switch to the "Alert Display" screen.

c.To export an existing alarm, click "Existing Alerts" to display an existing alarm.

d.To export a historical alarm, click "Historical Alerts" to display a historical alarm.

e.Click "Save Alerts."

f.On the pop-up external storage device selection window, select the target folder for saving. Click "OK" to export the alarms. A message will show up when the export is complete, click OK to confirm.

g.File name.

h.Existing alert: Actalm.txt.

i.Historical alert:Histalm.txt.

10.2 Network Setting

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Maintenance (F1) → Network setting (F2)

Parameter Description:

IP address acquisition method

• Select "Specify IP Address Directly" when using jumpers.

• Select "Specify IP Address via DHCP" and skip the "IP Location" and "Subnet Mask" settings when using a network line.

IP Address

• Enter an IP address available in the domain.

Subnet Mask

• Enter the subnet mask in the IP address.

• Must be consistent with PC settings

Personal PC Name

• Enter the name of the PC you want to link to

• Must be consistent with PC settings

Shared Directory Name

• Enter the name of the folder shared on the PC (Must be consistent with PC settings)

User Name

• If a folder shared by a network drive is not protected by a user IP and password, you do not need to make any settings, otherwise set a corresponding user IP and password.

User Password

• If a folder shared by a network drive is not protected by a user IP and password, you do not need to make any

settings, otherwise set a corresponding user IP and password.

10.3 Quick Diagnosis

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module (F2) → Maintenance (F1) → Quick diagnosis (F3).

10.4 Extended Parameter Bits

Fenubar entry path: Home screen → next page (F10) → controller settings (F2) → Electronic control module (F2) → Maintenance (F1) → Extended parameter bits(F4)

The new-generation controller provides a total of 20 sets of R81~R100 registers for machine makers, each register featuring 16Bits setting function. Machine makers can use these 20 sets of registers to provide users with control flags for specific PLC control functions.

Operating instructions:

a.Use touch to select and change parameter addresses.

b.Use [Page Up] [Page Down] to toggle between previous and next pages.

c.Only [0] or [1] can be input.

d.Notes can be made for each bit.

11.Parameters

11.1 Parameter Summary Table

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) → Parameter summary table (F1)

Displays a parameter summary table.

11.2 Application Parameters

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) → Application parameters (F2)

Displays an application parameter summary table.

11.3 Mechanism Parameters

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) → Mechanism parameters (F3)

Displays a mechanism parameter summary table.

11.4 Mechanism Compensating Parameters

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) →Mechanism compensating parameters (F4)

Displays a mechanism compensating parameter summary table.

11.5 Skip to Parameter Number

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) →Skip to parameter number (F5).

You can enter the parameter number you want to view to skip to the page.

11.6 SRI Parameter Settings

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) →next page (F10) → SRI parameter setting (F3)

1.Click settings

2.Click editing devices

3.Click the I/O comparison table

4.Perform settings

5.Exit this page and click on Save parameter settings.

6.Restart

The following is an example of an FC-IO module:

1.Locate the input field for the FC-Input and output module of the SRI. The name SRI-1-1-1 represents the sequence on the hardware connected through the SRI.

2.Set the starting point of Input and output's first workstation to 0, 16 for the 2nd workstation, 32 for the 3rd workstation, and so on.... (The default is -1, which means that it is not enabled.)

3.Because I/O needs to use 16 bits respectively, after setting 0, IO0~15 are all set to the corresponding IO board.

PS. If there is an analog module ex. ADDA installed, please switch from Fenubar to analog mode and set the R value for this module.

11.7 I/O Comparison Table

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) →next page (F10) → I/O comparison table (F4)

Displays the I/O comparison table setting page.

11.8 Serial parameters

Fenubar entry path: Home screen →next page (F10) → controller settings (F2) → Electronic control module (F2) → Parameter setting (F2) →next page (F10) → Serial PLC axis parameters (F2)

Displays general serial axis and serial PLC axis setup options.

12.System Management

12.1 Software Installation

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Software installation (F1)

Update software version:

• For foreground installation, choose between a handheld kit or a controller kit.

• One can install a foreground/background kit in the foreground and then turn power off and on again.

12.2 Data Backup

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Data backup (F2))

Restores the backup system data.

12.3 Data Recovery

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Data recovery (F3)

Restores the backup system data.

12.4 Import/Export

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Import/export (F4)

• F1 system data management: can import/export system data such as parameter files, PLCs, etc.

• F2 Macro management: imports/exports Macro

12.5 Image File Installation

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Image file installation (F5)

Upgrades system image files.

12.6 Driver Hardware Management

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) → Driver hardware management (F8)

Manages the driver hardware.

12.7 ESI Import Function

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → System management (F4) →next page (F10) →ESI import (F5)

Imports ESI files

12.8 Notes for System Management

For software installation, system data import, system recovery and image file installation, the system can only select one for execution at a time. If you want to run the second one, you need to restart and finish upgrading the system.

One can finish upgrading a foreground/background kit in the foreground at one go and then turn power off and on again.

13.About

13.1 About

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) →Maintenance(F1)→Next Page(F10)→System Information(F5)→System Information(F1)

Provides controller version information.

13.2 System Rights

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → Maintenance (F1) → Next page (F10) → System information (F5) → System rights (F7)

On this page, you can view system-related rights, including "Controller Serial Number Setting,""System Expiration Date Setting," "Function Option Setting," and "Controller Setting Recovery."

13.3 Machine Makers Information

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → Maintenance (F1) → Next page (F10) → System information (F5) → Machine makers information (F5)

Displays information about machine makers.

13.4 On-call Repair Service

Fenubar entry path: Home screen →next page (F10) → controller settings (F2)→ Electronic control module (F2) → Maintenance (F1) → Next page (F10) → System information (F5) → On-call repair service (F6)

This page provides the QR code for users to call the repair service

VI. Care and maintenance

Tip: To avoid personal injury and human damage, equipment maintenance must be performed by a professional.

1.Welding head

1.1 Daily inspection: check the protective lenses, dirty and timely use dust-free cotton swabs or wiping stick dipped in anhydrous alcohol or isopropyl alcohol to clean; coating damage or bad spots, please replace them in a timely manner to avoid causing other optical lenses to burn.

1.2 Regular inspection: when using or stop using for a period of time (one week is recommended), check the laser module before turning on the machine to ensure that the optical components are free from dust pollution, mold and other abnormalities.

1.3. Observe the spot: the operator can use black photo paper to check the laser output spot, once found uneven or skewed spot, should be promptly repaired.

2. Chiller

2.1. Clean the condenser and dust net dust regularly.

2.2. When transported or not used for a long time, the coolant should be drained.

2.3. When the temperature is lower than 2℃ , please use the special laser antifreeze, and check it before use to make sure that the chiller works normally, to avoid the coolant solidifying and causing damage to the laser output head, welding head and chiller.

2.4. The coolant must be replaced in the following cases

2.4.1. Replace the filter cartridge.

2.4.2. After 3 months of use.

2.4.3. Re-use after a long period of non-use (3 months recommended).

3.Maintenance of the whole machine

3.1.Regular cleaning equipment: equipment use will accumulate dust and debris, these substances will affect the laser output power and efficiency of the equipment, but also accelerate the wear and tear of the equipment. Regular cleaning of the equipment is required.

3.2. Regular calibration of equipment: laser welding machine is a high-precision equipment, need to be calibrated regularly to ensure its working accuracy and stability. Calibration includes calibrating the position and angle of the equipment, laser power, zero error, etc., can be calibrated by the instrument.

VII. Transportation and storage

1. Before moving the equipment, please remove the power cord and drain the coolant inside the system, do not move or transport with liquid.

2. When transporting or handling, please do not bump up and down or tilt excessively (not more than 45 °), to avoid bumping, bumping and flipping.

3. When it is not used for a long time, please pay attention to the worktable to prevent dust and rust.

4. When storing, drain the water in the water tank through the sewage outlet, and at the same time, loosen the drain screw plug under the water pump to drain the residual water in the water pump, and place it in a cool and ventilated place.

VIII. After-sales service

1.One year warranty for the whole machine of this product and two years warranty for the laser:

1.1. Since the date of purchase of this product, our company free warranty within one year. If you need to return to the factory for repair, the user only needs to bear the two-way transportation costs.

1.2. This product is free maintenance for life, the user only needs to bear the cost of spare parts and two-way transportation costs.

Note: The date of purchase is subject to the invoice date or order receipt date.

2. The following coverage is not warranted:

2.1. Damage caused by improper use such as violent bumping and bending.

2.2. Damage caused by man-made reasons.

2.3. Laser accessories and consumables are not warranted (optical parts such as collimating mirrors, vibrating mirrors, field mirrors, comprehensive cables, etc. are not covered by warranty).

3. After-sales service process:

3.1. Customers call the after-sales +1 (240) 560-8967 phone number, professional staff to answer and diagnose the problem.

3.2. If you need to return to the factory for repair, arrange the customer to send it back.

3.3. Receive the returned machine, repair it and resend it.

3.4. Visit customers to improve service quality and provide better protection for customers.

※ The relevant technical parameters listed in this manual are for reference only. The relevant product information is subject to change without prio r notice. All technical parameters and agreements are subject to the terms of the sales contract.

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