



YAG Pulse Laser Power Supply For Welding System <Operation Manual>

Please read this manual carefully before installing and operating this product.



Shenzhen Anzhong Power Co.,Ltd

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Chapter I Preface

Thanks for using the YAG pulse laser power supply for cutting system of Shenzhen Anzhong Power. Before using the product, please read the guide carefully and put the manual in a safe place for future reference. This manual applies to all products of this series.

The beam of special properties (wavelength 1 μ m, 10.6 μ m etc.) generated by exciting a specific substance is what we call laser light, while the device that turns electric energy into the optical energy of the foregoing wavelength is laser generator; Devices provide power to the lasers to make it work, called laser power supply.

Shenzhen Anzhong Power Co., Ltd is a high-tech company who specializing in researching, manufacturing and sales for laser power supply and the laser machine key parts. The company has a great range of laser products, such as YAG solid laser cutting /welding power supply ,the CO2 laser power supply, High-power & High-precision semiconductor laser power supply, High-power RF laser power supply ,light source drive ,DC power supply ,machine tool operation power supply, UV power supply with UV curing, focusing controller, etc.

The company has leading talents and talents echelon who worked in the field of laser power industry, and rich experience in R&D and production. For the investment in R&D, we have a number of independent intellectual property rights and core technology, and the Annual R & D COST is more than 10% of sales volume. To ensure that the company has a number of innovative products on the market, Anzhong continues to invest personnel and funds, and these innovations meet demand of the market, at the same time, it also establishes the leading position in the laser power supply industry.

Customers' demands are the power generator for our continuous exploration and development. Customers' problems are the golden key for our continuous studies and innovation. The brand comes from quality, credibility is our life. Facing the future, Anzhong power will continue to provide a variety of solutions for customers, improve the technology level of laser application industry, and strive to become the first brand of laser power supply industry.

Anzhong Power, with the professional attitude, provides professional products for you professionals.

Cautions before use

- . Make sure the product is what you bought after unpacking it.
- . Please read this manual before using the product!
- . Please follow the safety preventions, warnings, cautions and safety signs before using the product!

Verify the product is damaged or not during the transport.

Please contact us or our sale agent for any inconformity or damage to the product. Email: anzhongpower@163.com (see details about unpacking and installation described herein).

Special statement

The hardware and software are subject to subsequent changes in connection with customized models or technical update without notice.

Safety caution

To keep the operator safe and avoid danger to the laser system or environment, please follow all the safety cautions, warnings and signs specified below and in subsequent sections herein whenever you start any of our series products.

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Please contact our after service immediately for any question about the product.

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Chapter II Introduction and Features

2.1 Application

This product is the rational distribution of the laser welding equipment, which is the optical power under the 600w, the conversion mode is current or energy. It is not only weld the same materials together like Ti, Ni, Sn, Zn, Cu, Al, Cr, Nb, Au, Ag, alloy, steel, the KOVAR alloy etc. but also weld the different metal materials like Cu-Ni, Ni-Ti, Cu-Ti, Ti-Mo, Brass-Cu, low carbon steel-Cu etc.

Application industries: Mobile, Electronic components, Clock glasses, Jewelry accessories, Hardware products, Precision instrument, Medical appliances, Auto parts, Power battery, and Craft gifts etc.

2.2 Product description

Series of AZ-HJ YAG Pulse laser welding power supply is the product of independent R&D by our company, which is high-precision constant-current power supply controlled by DSP, have the function of laser energy negative feedback and current feedback. It is a standard power supply for Nd: YAG pulse laser. Advanced technology, in the same industry is also a leading level.

Working with the energy mode and current mode. The max. single pulse energy can be up to 100J, instability rate is less than $\pm 2\%$. The laser machine could realized the penetration depth of ordinary Stainless Steel plate is 3mm, for the Copper Sheet is 2mm, for the Pure Aluminum plate is 2mm to match our power supply. For the materials such as Ti, Ni, Sn, Zn, Cu, Al, Cr, Nb, Au, Ag, alloy, steel, the KOVAR alloy and others, we provide the processing solution.

The interface is friendly, parameters and state can be display. Users can set kinds of laser waveform and parameters by touch screen. The alarm functions are the water temperature, water flow, water level, over current under/over voltage and phase loss etc. It can almost meet all requirements of laser welding fields. It is the best power for the multi-function laser welding machine. According to the different in the welding applications, the Output Power of power supply is different. And also can customized according to customer demand for processing. For the power class, respectively, for the single lamp, 3kw (optical power 150w), 9kw (optical power 150w), double lamp=12kw (optical power 300w), double lamp=18kw (optical power 600w).

2.3 Main Features:

Laser energy with a real-time feedback, the deviation range is less than $\pm 2\%$, the precision control for single point energy, making the laser welding process standardization.

Initiative pulses output can be exactly controlled by the thermal stability period of resonant cavity and wide fluctuation of laser energy.



With the Slow Decrease & Increase and the first impulse control functions for the welding closed graph.

Compensates laser energy degradation. The system will prompt to change the lamp or other maintain items if it over the range of the compensation. (option)

The working way, waveform and parameter can be dynamic switched by external control mode. All of the parameters can be set in Chinese-English interface.

Working state can be output remotely (fault, normal, standby), also use in the remote monitoring.

With multi-purpose external protect port to handle the signal of the water temperature, water pressure, flow capacity, conductivity, fiber temperature, etc.

Multiple external control board like serial, I/O, analog control, etc.), make the automatic system integrate easier.

The automatic laser gate control function depends on timing or laser power, they are all accurate and with a high-speed. (option)

Chapter III Technical Parameters

Model	AZ-HJ-150	AZ-HJ-300	AZ-HJ-600
Pumping Lamp Model&Quantity	1pcs.	2pcs.	2pcs.
Max. single pulse energy	60J	100J	120J
Average laser output power	150W	300W	600W
Laser output peak-power	5kW	10kW	12kW
Rated output power	8kW	14kW	18kW
Input voltage/frequency range	TN-C,380V±10%, 50Hz-60Hz		
Charging Box Dimension	530mm*430mm* 200mm	Discharging Box Dimension	530mm*430mm*200mm
Power box number	1charging box,1discharging box 1 discharging box	1 charging box,2 discharging box	
Net weight	(charging box) 26.5 kg / (discharging box) 28.5 kg		
Laser working way	Pulse	Display control Way	LCD Color touch screen
Pulse width range	0.1~15.0ms	Laser frequency range	1Hz~100Hz
Pulse current output range	25A-350A (current working way)	Preburning time	About 1 minute
Continuous working time	More than 24 Hours	Spot welding count	1~9999
Alarm record	For the last 6 group alarm information record	Cooling way	Forced air cooling
Laser energy stability	The deviation range of laser pulse energy is less than ±2%In energy mode		
Memory capacity	There are 32 groups laser process parameters, up to 20 waveforms cab be set in each group		
	Each inflection point width: 0-15.0 ms (there are 24 inflection points can be set)		
	Laser output peak-power percentage: 0-100.0% (there are 24 inflection points can be set)		
	Setting waveform:In the energy working mode,display the actually energy waveform , current working mode no display.		
Woking Environment	In the environmental temperature below45 ℃drying conditions used, air dust <0.01 g/m3, ask no condensation.		

Chapter IV Principle Introduction

The circuit of the power supply has main components as following:

The main circuit includes: charging circuit, stored energy circuit, chopped-wave output and preburning & triggering circuit.

Control Circuit includes: electrical control circuit, computer control circuit and protective circuit.

✧ **Boost/Rectifying Circuit**

Boost/Rectifying Circuit is boosted through three-phase boost system, which consist of boost inductor and IGBT switch. The voltage is expected to rise from 380VAC to 750VDC, and will provide the charging circuit with power.

✧ **Chopped-wave Output**

The IGBT module will stop working when the electric energy of stored energy circuit is fully charged. After that, IGBT module and storage capacitor will discharge, the charging circuit start working. The power supply will continue this working mode.

✧ **HV Start Circuit**

It's consist of step-up Transformers, HV bridge rectifier, electric filter, current limiting resistor, current relay, HV pulse transformer and HV triggering circuit.

Since the pulse xenon lamp has entered a state of normal glow discharge when preburning, it will assume the negative-resistance characteristic. The preburn circuit must be assumed a high current state to ensure of the normal operation of xenon lamp glow discharge after the end of arc discharge. So the current limiting resistor of preburn circuit is bigger. The trigger mode of the power supply is internal trigger. The preburning circuit will trigger automatically, when the storage capacitor is fully charged, the HV pulse transformer can produce 15000-20000V HV to the xenon lamp, as soon as preburning succeed, the triggering circuit will cut off by itself.

✧ **Control Circuit**

There are two primary components that make up a control circuit: operating circuit and computer controlled circuit. The operating circuit with the interlock protection function, which is by button, contactor and electric relay to achieve the make-break-operation of pump, preburn circuit, main power and the control power. The whole computer controlled circuit is assembled on a circuit board.

Chapter V Wire Connecting

5.1 The Safety Cautions for Circuit Connection

Please read the cautions carefully before connecting the circuit and follow them strictly.

- Environment: Please use the power at ambient temperature is not to be more than 45 degrees, humidity is less than 85%, and the ambient temperature should not fluctuate widely. It is prohibited to use of this power in the following environments,
 - Dust, oil environment
 - Vibratory environment
 - Corrosive environment
 - High-frequency noise environment
 - Humid environment
 - Ambient air contains high concentrations of carbon, nitrogen and sulfur oxides (CO₂, NO_x or SO_x) .
- Don't place screws or coins inside the power supply, which could cause a short circuit and damage the machine.
- Press the buttons with uniform force instead of touching them with screwdriver specially sharp-pointed things in case the screen is damaged. (Fingers or a special stylus are permitted)
- Don't press or operate the buttons and switches continuously. Repeated switching could shorten the service life of the machine
- The power supply of machine is 380V. There is HV in chassis. Don't touch inside of machine when power on and off within 15 minutes.
- Don't dismount or install or, refit welding machine, which may cause an electric shock or fire. Prohibit any operation other than specified in the manual behavior
- Don't damage the power wire and kinds of connecting wires. Don't tread, stretch or twist the power wire and any connecting wires, which may cause a short circuit or fire. If there is any place in need of repair, please contact our company. If the machine appears abnormal condition, please shut off and stop using it immediately.
- If the machine appeared charred, screechy, overheating or smoking and other accidents, please shut off the power immediately in case causing an electric shock or fire. In case of the above, please contact us immediately.
- According to the safety regulation and to keep the operator safe and avoid damaging the equipment, safety earth is necessary as the power supply with the metal enclosure.
- All of the pins of plug should plug in correctly. There are different numbers on the plug and socket, find the same number and insert them corresponding please. Otherwise, the power supply will be damaged.


- Make sure that the cathode/anode wires are correctly connected!
- Don't connect the three-phase voltage, until all of the connector wires have been connected correct.
- The charge wires of charging Box and discharging box should be minimum 10mm² in diameter each. In strictly accordance with the standard of our company supplies wires.
- The wires from the power supply to the xenon lamps should be minimum 10mm² in diameter each. In strictly accordance with the standard of our company supplies wires.
- The wire connector of power supply input-output should be securely pressed to avoid loose connection that may cause sparking or heating in the conductor.
- Avoid binding the charge wire and discharge wire together with the lamp wire in case of serious heating in the conductor.
- Avoid binding the signal wire together with the input-output wire in case of interference.
- Don't starting the power supply, until the water chiller or water cooling system work properly.
- A high-voltage pulse output when staring the xenon lamp, so the operator should stay away form the cable of xenon lamp electrode.
- The power voltage of the product is 380V three-phase AC, high-voltage is with several parts of the power boxes. Don't touch the charged metal parts of the connectors inside and outside of the machine when it is on "Power On" mode or within 30 minutes after the power is off.
- It was forbidden to open the power box by the non-professionals for safety.
- Check the insulation of instrument for measure is good, e.g. multimeter and oscilloscope etc.
- Ensure the gear position in the Voltage Grade in voltage measurement and the range of the meters and instruments larger than the testing point voltage.
- Ensure good ventilation and sufficient radiation space are provided when installing the power to keep the air duct well ventilated.

Chapter VI LCD Touch Screen Introduction

6.1 Startup Introduction

After turning on the device, the touch-screen will enter self-checking interface, which is usually contains the following,

- Memory
- Battery voltage
- Safety switch (E-stop, case, xenon lamp exchange cover)
- Flow
- Shutter
- EEPROM module
- Time module
- Energy detector
- Please turn on the key switch when you see the words "please unlock". (Users set the key switch by yourself), please see the following picture:



Welcome to use
Laser welding machine Control System

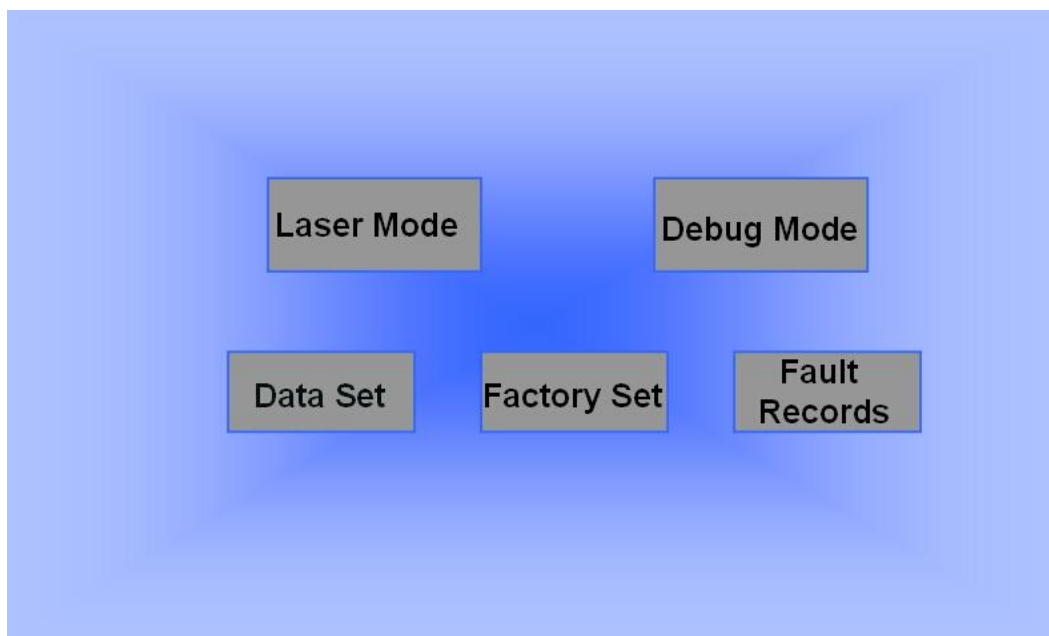
Model : AZ-HJ1-50W

Version : V 2 . 0

System startup, please wait ...

6.2 Main Menu

After turning on the key switch, self-checking is activated. After 3-5 seconds for self-checking, the screen will directly display the "Menu" interface. If the self-checking fails, the screen will display the corresponding error message. Users can adjust equipment according to the messages, then start up again, please see the following picture:



Menu Instruction:

- ✧ **Laser Mode:** Setting the welding parameters and waveform.
- ✧ **Debug Mode:** Setting the laser or the crystal. (Rarely used).
- ✧ **Data Set(Process Set):** Temperature, laser output delayed, display in English & Chinese, external mode switch.
- ✧ **Factory Set:** Chose the model, the trial date, the real time.
- ✧ **Fault Records:** Recording faults of system.

6.3 "Laser Mode(Weld Mode)"Introduction

Setting the welding parameters and waveform.You can enter the control system, parameters and weld seam set interface.

Laser Mode

<p>Product Num:</p> <p>Control mode:</p> <p>Mode:</p> <p>Hit Num:</p> <p>Peak :</p> <p>Proport : %</p> <p>Set Energ: J</p> <p>OutEnerg : J</p> <p>Outpower: W</p> <p>Outvoltage : V</p> <p>Pulse width: ms</p>	<p>Hit Total:</p> <p>Feedback :</p> <p>Max Energy : J</p> <p>Frequency: Hz</p>	<p>QuaTotal :</p> <p>Weld state :</p> <p>Mini Energy: J</p> <p>Water T: ℃</p>
--	---	--

Operation

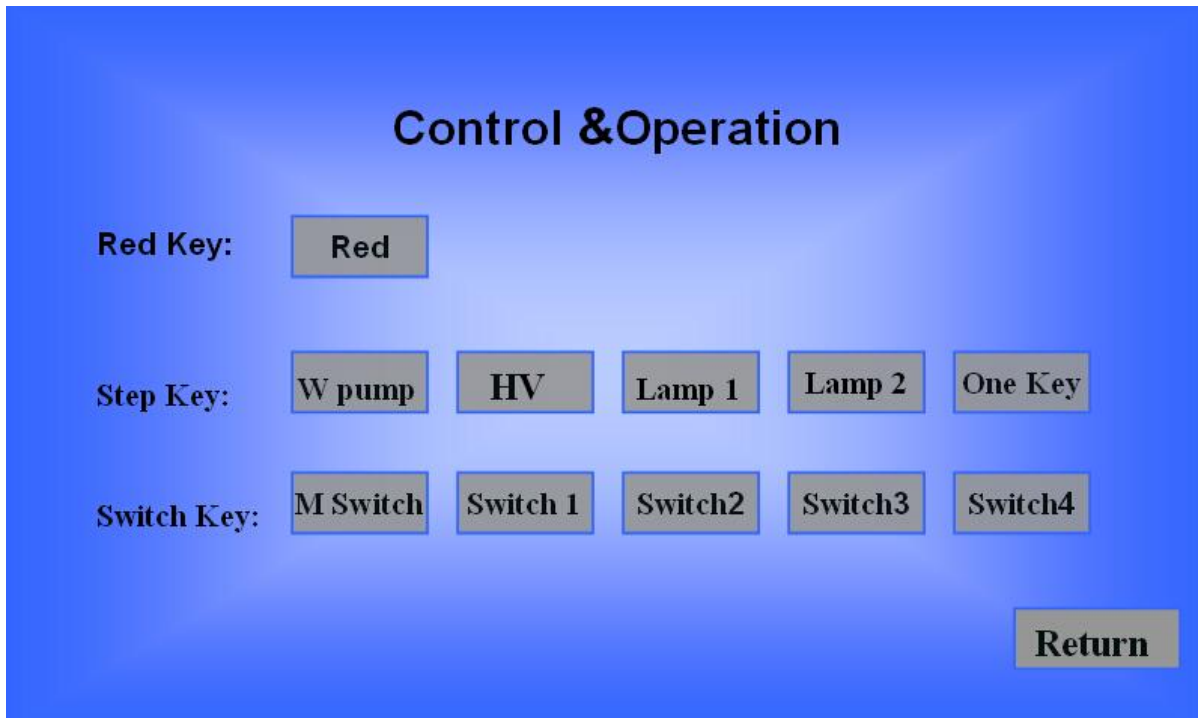
processSet

Weld Set

RETURN

6.3.1 "Operation"Introduction

Red light, Step key, One-Key Operate and 光闸 control.



6.3.2 "Process Set"Introduction

Feedback Mode: Energy feedback and current feedback.

Conmode(Control Mode): Internal control and external control can be chose.

Set Energy: In the energy mode, according to the setting parameters to calculate the setting energy; It will display "0", under the current mode.

Peak input:

In the current mode, enter the maximum units for 50w as 250A, the minimum is 20A.

In the energy mode, enter the maximum units for 50w as 7.5kw, the minimum is 0.5kw.

Proportion: Input proportion is 0-100%;

Frequency: Laser output frequency is 1-100Hz;

Hit Num: Laser output times. When the num is "0", press the laser key, the laser will output all the time. When the num is 1-60000, the laser will stop at the num of your set.

Max Energy & Min Energy: It is the limit of the energy output. When the energy over the limited, you will see the prompt.

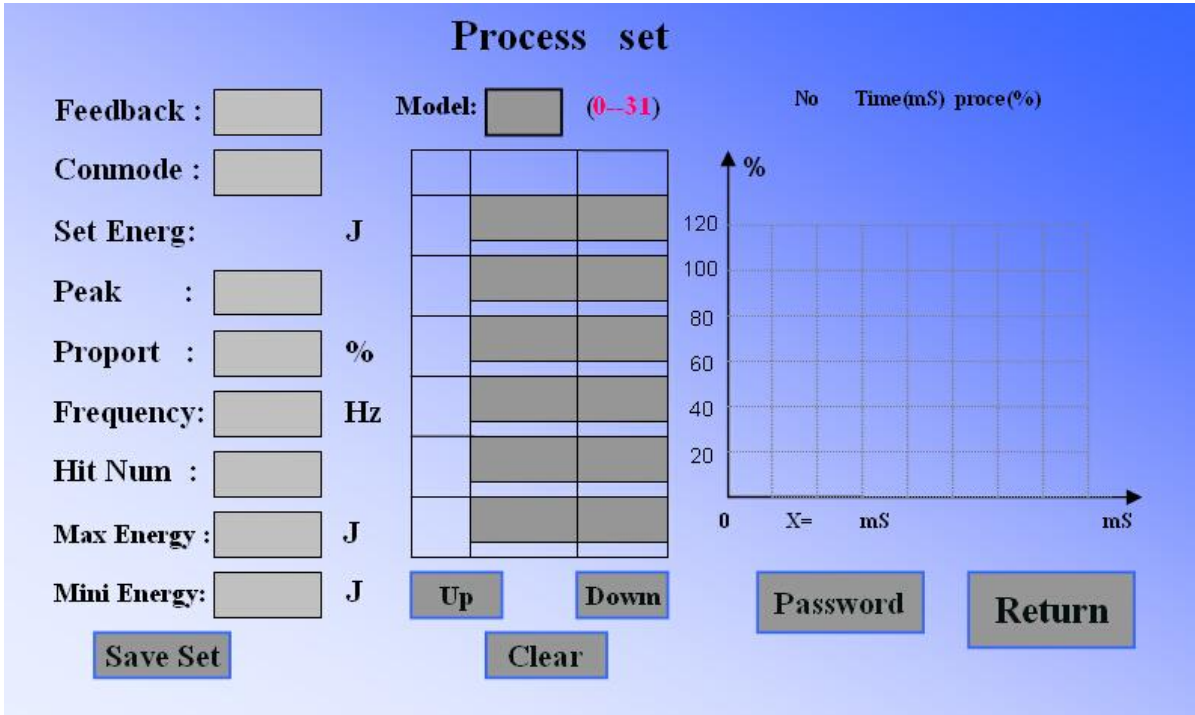
Schedule Mode: 0-31 modes for setting and to corresponding different peak and input percent, power, laser output frequency and times, Max & Min energy and waveform.

Waveform Setting: 24 waveforms can be set. You can press the Page Up/Down to viewing/clearing the waveform. Remember press "Save set" to save the waveform what you set, and you can check it

after save it.

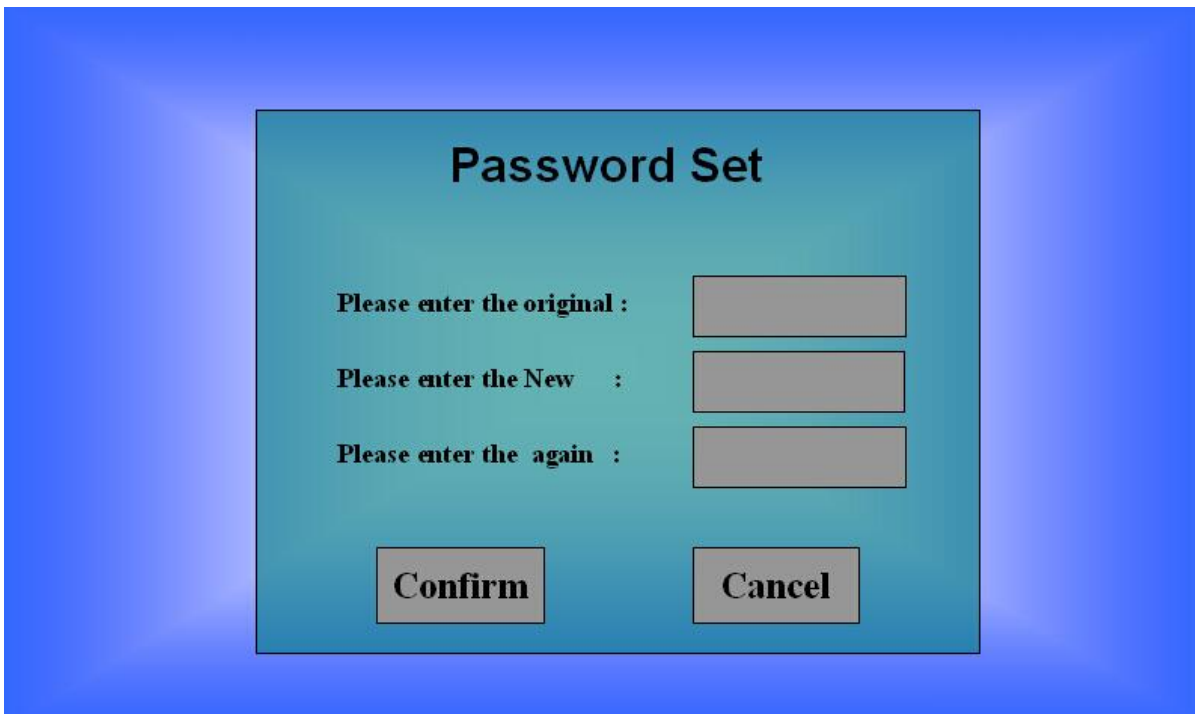
Password Setting: Change or close the password of this page. (Details in 6.3.2.1)

Save Setting: After save the parameters, the waveform will update.



6.3.2.1 Password Set

Setting the password of the "Process Set" page or cancel it. Password is any combination of numbers between 1-999999. When the new password is "0", you can enter the "Process Set" page without any password.



6.3.3 "Weld Set" Introduction

If you want to modify the Ramp Up/Down parameters, please enter this page.

【1】 Rise Num: Ramp up points.

【2】 First Ratio: The first point proportion of the peak input percent.

【3】 Rise Ratio: Proportion of progressively increased between the ramp up points.

【4】 Down Num: Ramp down points.

【5】 Last Ratio: The last point proportion of the peak input percent.

【6】 Down Ratio: Proportion of progressively decreased between the ramp up points.

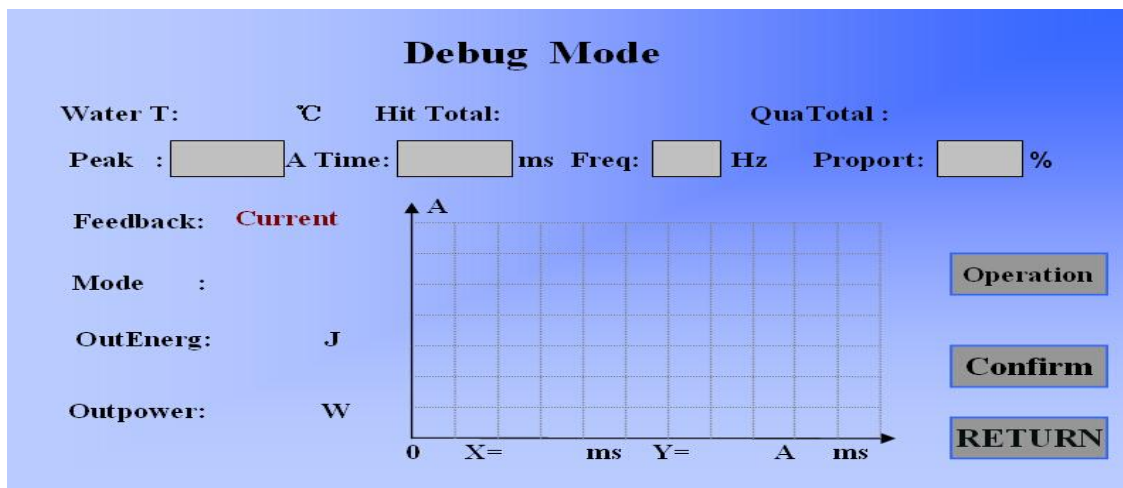
【7】 Num Switch: Turn ON the "Num switch" before welding. System will record all of the points after print a complete image, and display in the "Total Num". Please turn OFF the "Num Switch" when you finish the welding. And then turn ON the "Weld Switch" to input the Ramp up/down parameters. Press "Save", system parameters will be automatically updated to that you setted. (For the switch, "Yellow" is ON, "Gray" is OFF)

Weld Set

Rise Num :	<input type="text"/>	Down Num:	<input type="text"/>
First Ratio:	<input type="text"/>	Last Ratio :	<input type="text"/>
Rise Ratio :	<input type="text"/>	Down Ratio:	<input type="text"/>
Weld Switch :	<input type="checkbox"/>	Total Num:	
Num Switch:	<input type="checkbox"/>	Clear :	<input type="checkbox"/>

6.4 "Debug Mode" Introduction

Only for current mode. The current range for setting is 20A-250A; The Pulse width time range for setting is 0.1-15ms.



6.5 "Date Set" Introduction

- 【1】 High limT:Upper Temperature Limit 0-99°C
 - 【2】 Low limT:Lower Temperature Limit0-99°C
 - 【3】 Cotrolled Temperature: 0-99°C
 - 【4】 Delay:0-999ms
 - 【5】 Input String:It is the 15 digit serial numbers for factory.This number is for your customer to setting or extending the service date.
 - 【6】 High limNum:Laser ouput range:0-999999999 times.
 - 【7】 Low limNum:Quality products limit:0-999999999 times.
 - 【8】 EN/中:Handover in English & Chinese;
 - 【9】 Tem Key:Temperature switch.(Unused)
 - 【10】 Exte Mode:External mode.In this mode,if you want to use the working mode 0-31,please turn it ON ;If you opearte it with the LCD,please turn if OFF.
 - 【11】 Lamp 1 Key/Lamp 2Key:To chose the lamp1 or 2 on and off.Must be turned on before you 8、
- Clear Num: Clear the total output numbers of laser and the quality products.

Data Set

High limT: °C EN/中 :

Low limT: °C Tem Key :

Contr T : °C Exte Mode :

Delay : ms Lamp1Key:

Input String: Lamp2Key:

High limNum:

Low limNum:

6.5.1 "Date Set>Passord" Introduction

Setting the password of "the process parameters setting interface "or "restore the factory settings". The Process setting password range is 1-999999, passwords can be up to 6 digits. Others Items passoword range is 1-99999999, passwords can be up to 8 digits.

Process set Password

Please enter the New :

Please enter the again :

Data Set Password

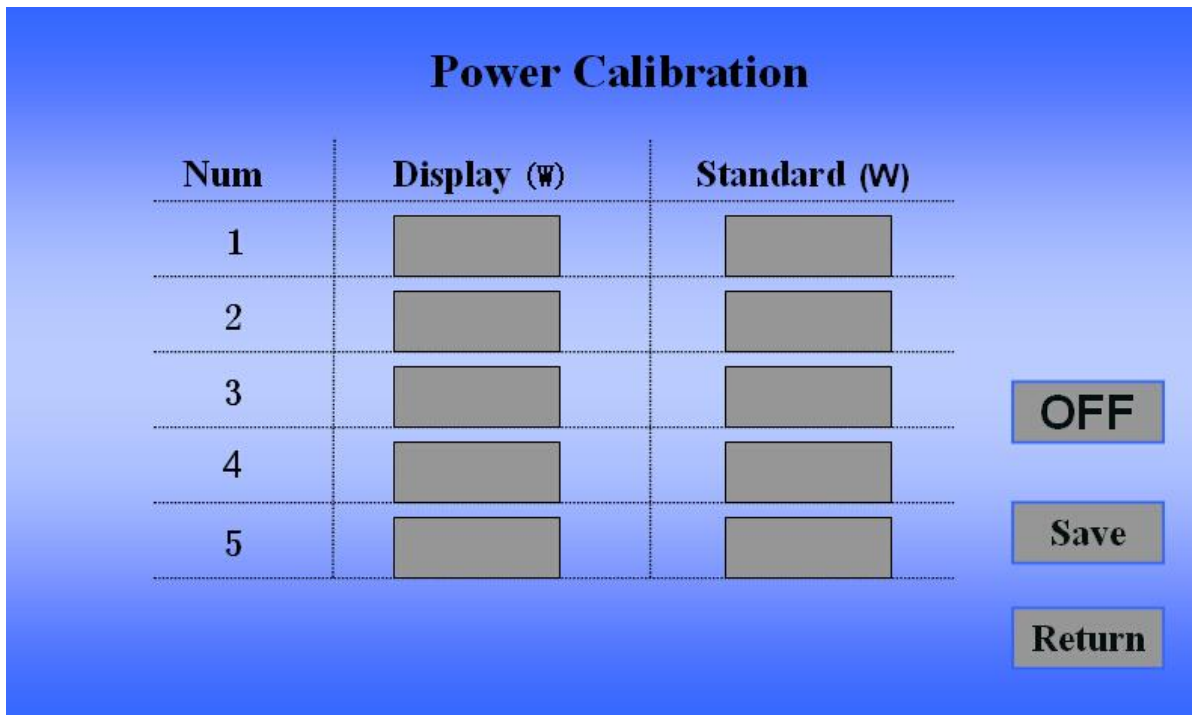
Please enter the original :

Please enter the New :

Please enter the again :

6.5.2 "Power Calibration" Introduction

It's used to calibrate the average laser power of the machine. Please change OFF to ON before use this function. When the display power is different from the actual value, you can input the power at "Standard list" what you test and press "Save", after that system will calibrate the average laser power to the actual one.



6.6 "Factory Set" Introduction

The interface is only available to equipment manufacturer. End users can not use it .

- 【1】 Hardware and software version number.
- 【2】 Product Number range is 0-99999999, set by manufacturer.
- 【3】 Model: Click to select to use 50W, 200W, 300W, 600W.
- 【4】 Peak power limit : In energy mode , peak limit to make a maximum of 12KW.
- 【5】 Trial Date Set : When you select this button , enter the trial date , the date to be set within ten days away , each boot will prompt customers the use date will full. Expires the next day , the system will stop output the laser.
- 【6】 Set Date & Time : When you select this button, enter the corresponding time and date , press "Confirm".
- 【7】 Clear Err : Click to clear the fault record.
- 【8】 Password : Entering process settings , parameter settings and factory set three interface password changes.

Factory Set

SoftVersion : AZHJ-V2.0 **Hard Version:** AZHJ-V2.0

Product Number:

Model : W **Max Power:** KW

Trial Date Set : 年 月 日

Date/time Set:

年 月 日 时 分 秒

6. 6. 1 "Facotry Set>Password" Introduction

The Process setting password range is 1-999999,passwords can be up to 6 digits.

Others Items passoword range is 1-99999999,passwords can be up to 8 digits.

<h4 style="text-align: center;">Process set Password</h4> <p>Please enter the New : <input type="text"/> <input type="button" value="Confirm"/></p> <p>Please enter the again : <input type="text"/> <input type="button" value="Initialize"/></p>	<h4 style="text-align: center;">Factory Set Password</h4> <p>Please enter the original : <input type="text"/></p> <p>Please enter the New : <input type="text"/></p> <p>Please enter the again : <input type="text"/></p>
<h4 style="text-align: center;">Data Set Password</h4> <p>Please enter the New : <input type="text"/> <input type="button" value="Confirm"/></p> <p>Please enter the again : <input type="text"/> <input type="button" value="Initialize"/></p>	<p><input type="button" value="Confirm"/> <input type="button" value="Initialize"/></p> <p style="margin-top: 20px;"><input type="button" value="Return"/></p>

6.7 "Fault Records" Introduction

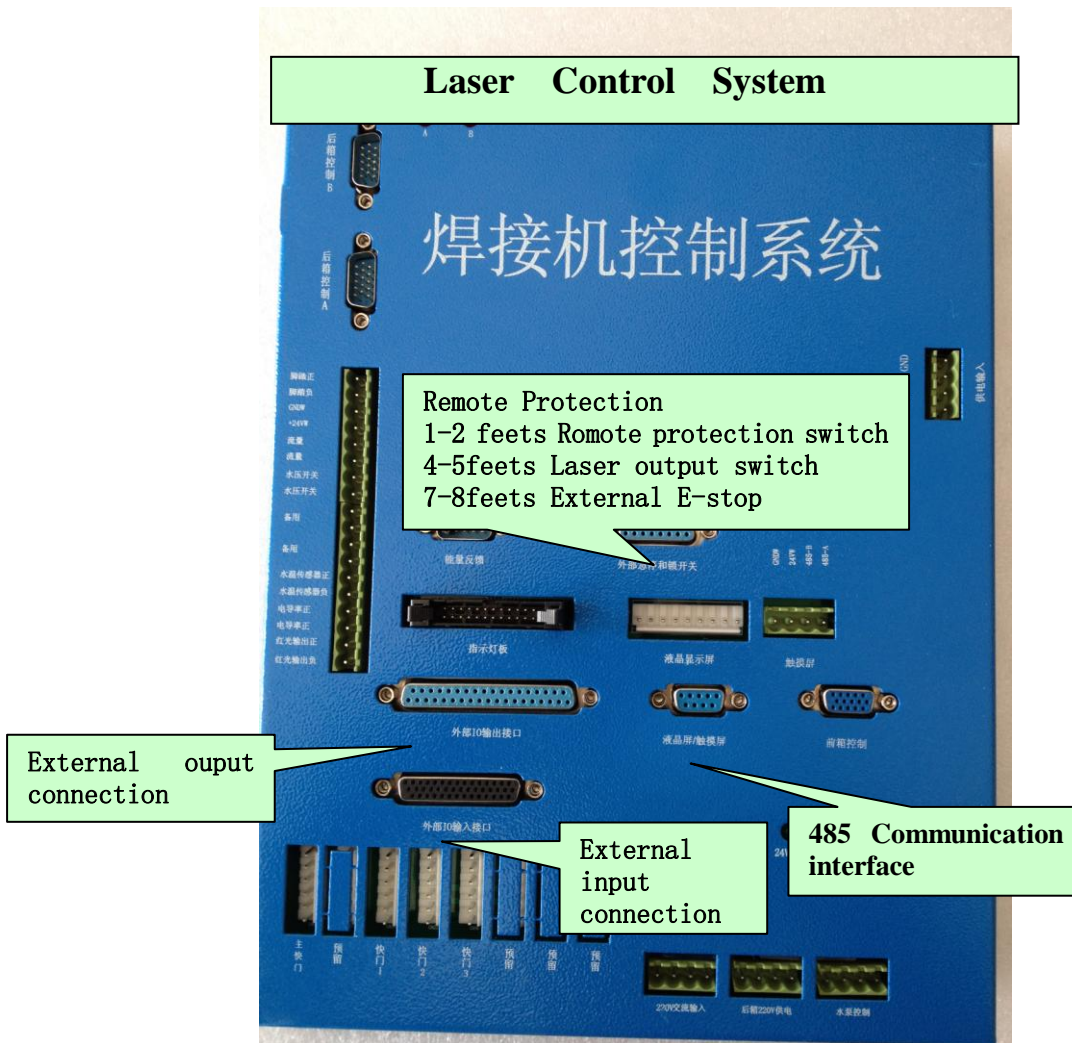
The system can record the last date 30 Group fault records.

Fault Records						
Num	Data				record	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	
	.	.	.	:	:	

Up
Down
Return

Chapter VII Input/Ooutput Interface

7.1 Diagrammatic drawing of I/O board



7.2 I/O Board introduction

7.2.1 485 communication interface

It can be connected with an external touch screen.

7.2.2 Protection for remote control

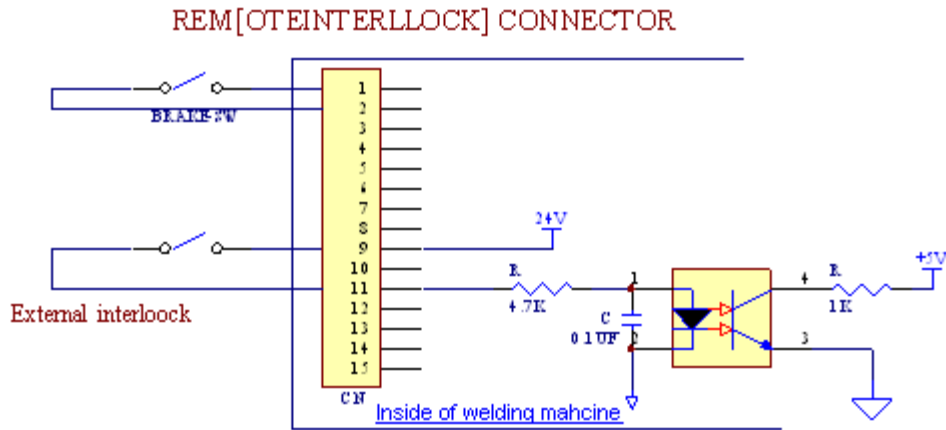
- (1) The remote controlled lock

CAUTION

The specific setting of the remote controlled lock guarantees the laser welding machine working safely and effectively. If the lock has not connect, the unit will stop working at once.

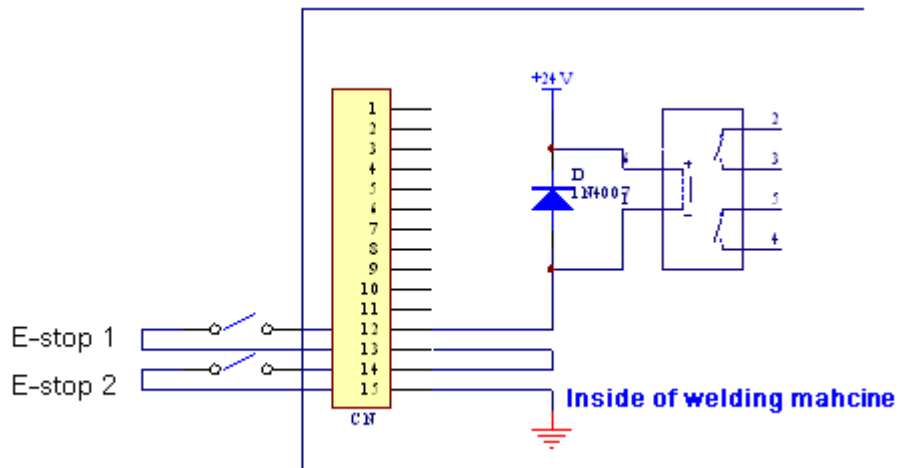
Users can connect the interlock to the critical parts such as safety door and linkage device etc. Series mode is available if necessary.

The connector is short-circuited before delivery. Please see the following picture,



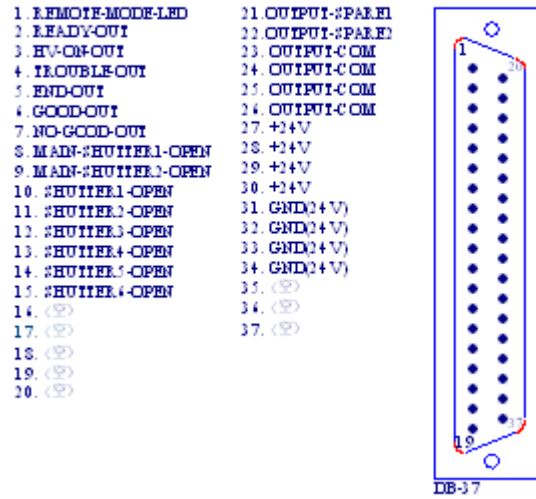
(2) External emergency stop

The E-stop switch has the same function with E-stop switch on the control box. It is short-circuited before delivery, showing as follow:



7.2.3 External output interface(D-SUB 37-Pin plug),please see the following picture:

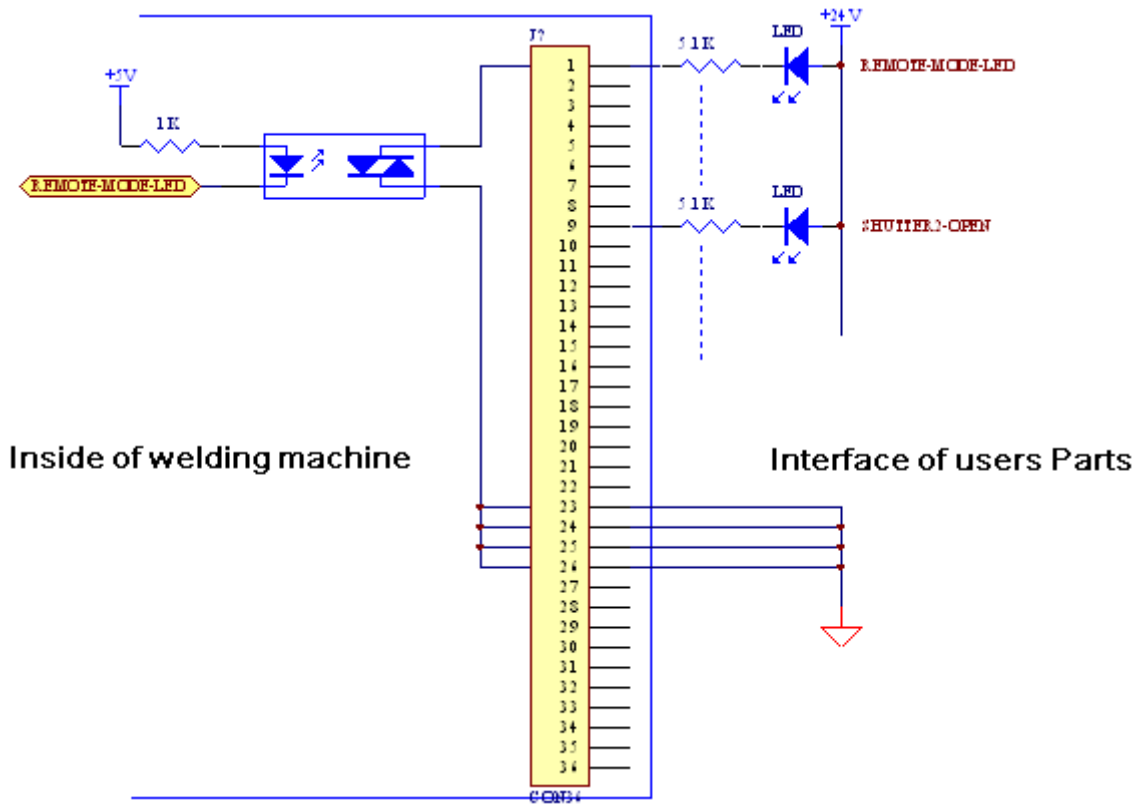
External control output interface



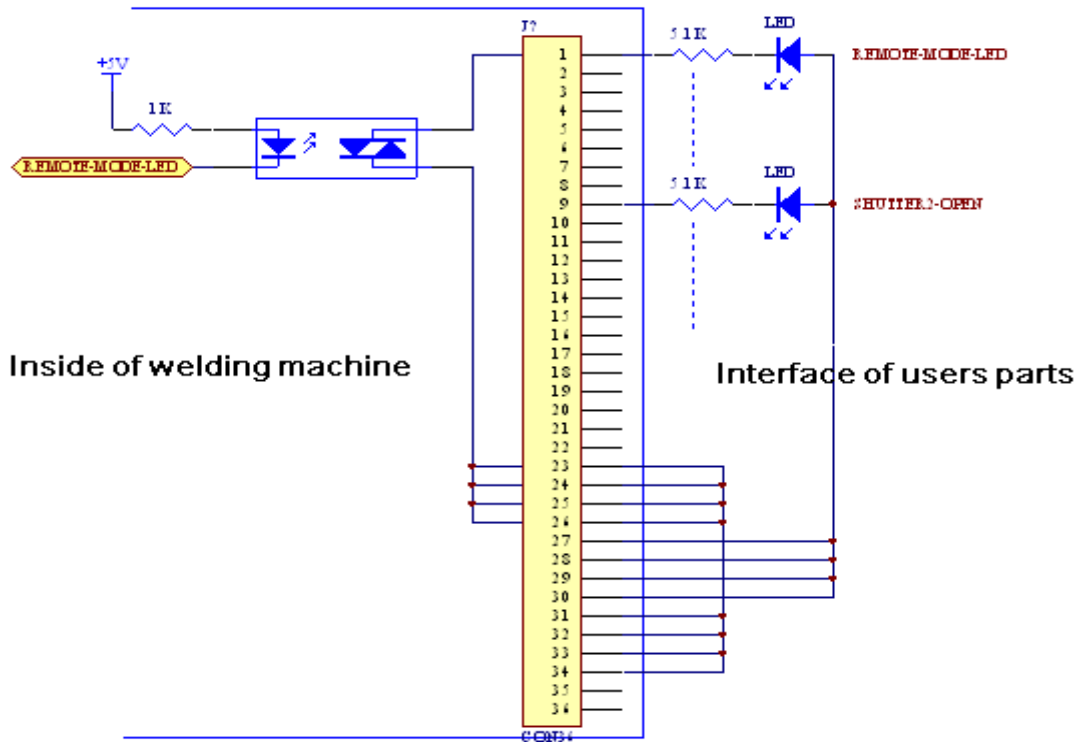
(1) The unit output signal connect legend

There are 2 ways: one is power source supplied by users, the other is power source supplied by welding machine.

a. Users supply the power source



b. Welding machine supply power source



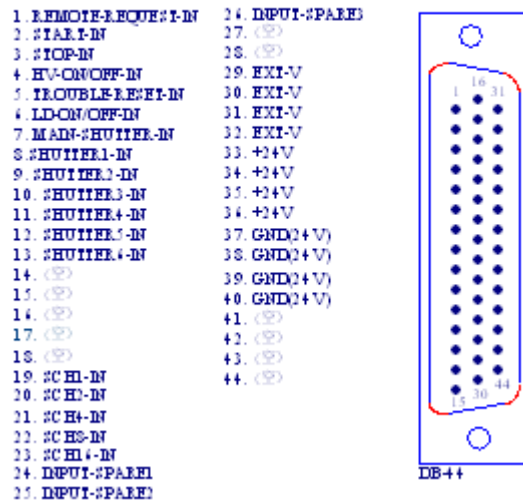
(2)The unit output introduction (DB-37 Plug)

Connector No.	Description
1	REMOTER-MODE-LED: The unit is controlled by external signal
2	READ-OUT: The unit is ready for laser out
3	HV-ON: The HV is ON
4	TROUBLE-OUT: The unit is on a failure
5	END-OUT: The laser output is finished
6	GOOD-OUT: The laser energy is in the setting range
7	NO-GOOD-OUT: Output laser energy is out of the setting range
8	MAIN-SHUTTER1-OPEN
9	MAIN-SHUTTER2-OPEN
10	SHUTTER1-OUT
11	SHUTTER2-OUT
12	SHUTTER3-OUT
13	SHUTTER4-OUT
14	SHUTTER5-OUT
15	SHUTTER6-OUT
16-22	None
23-26	GND-Outside

27-30	Internal power supply of welding machine (+24V)
31-34	GND-Inside
35-37	None

7.2.4 External input interface(EXT. I/O (1) D-SUB 44-Pin plug),please see the following picture:

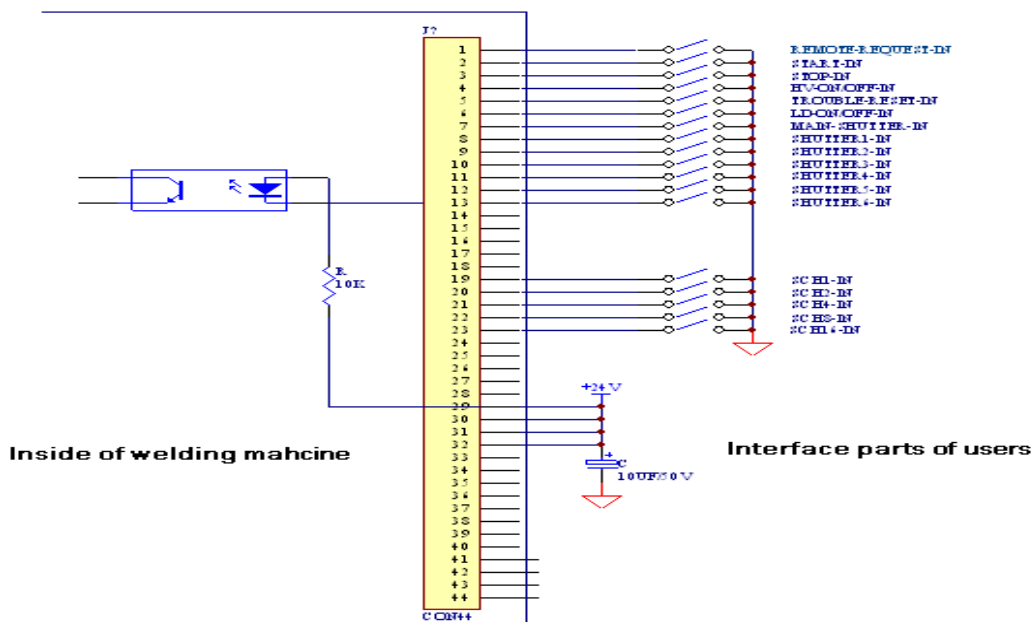
External control input interface



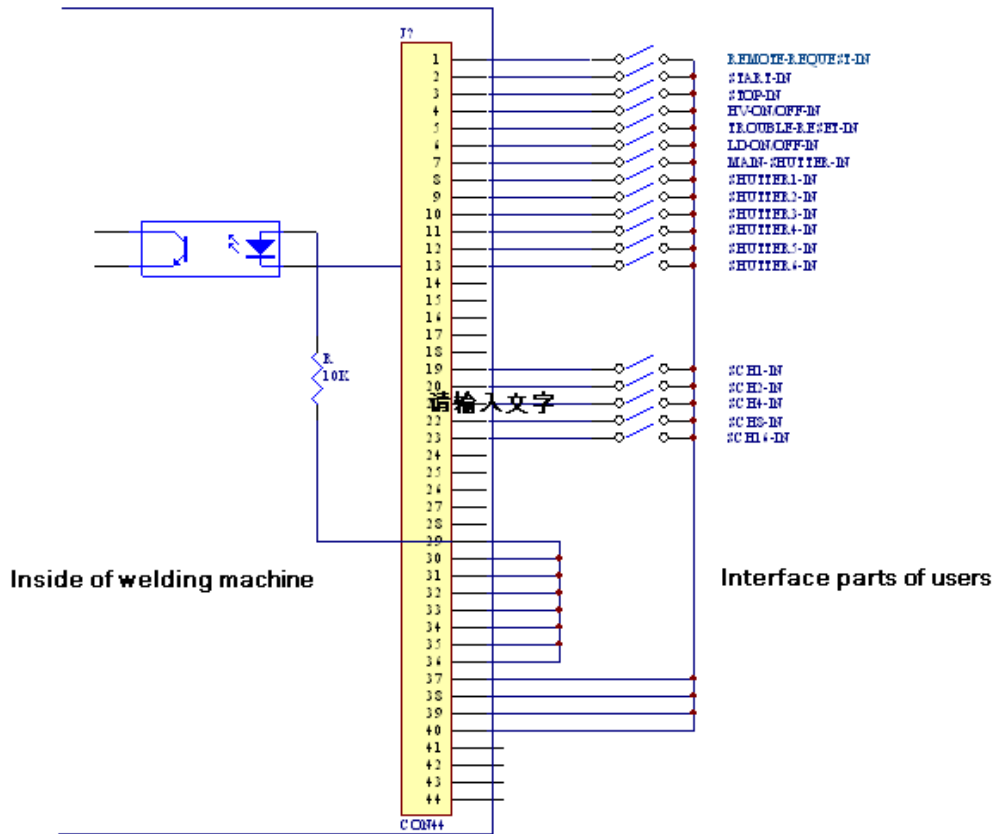
(1)Control machine by external signal

There are 2 ways: one is power source supplied by users,the other is power source supplied by welding machine.

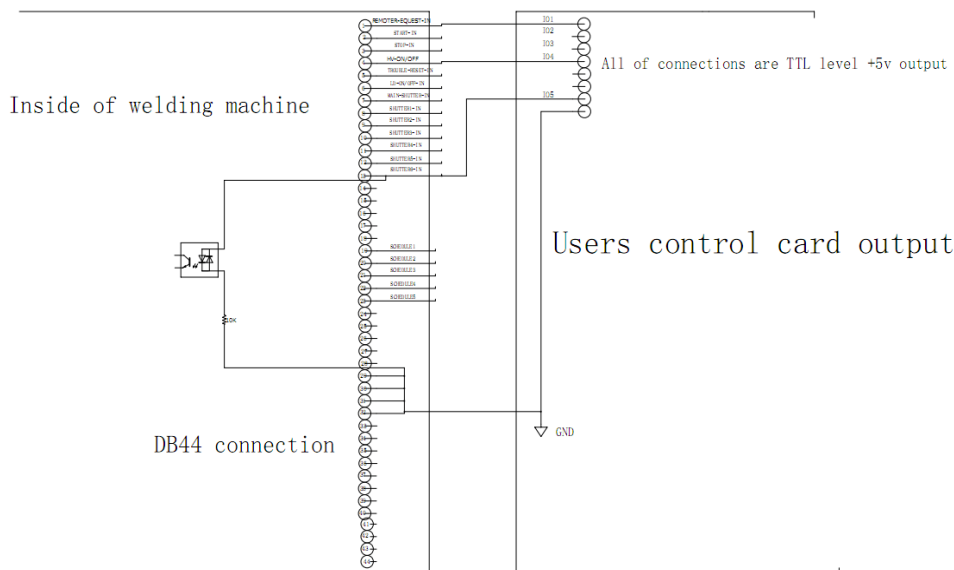
a.Users supply the power source



b. Welding machine supply power source



c. Diagram for users control card output at +5V TTL control (Control card input valid at TTL high level)



(2) Signal indication for external signal control the unit (DB-44 Plug)

Port No.	Description	
1	REMOTER-EQUEST-IN:When switch in on,the unit is out of control by MBOX,and will accept the control of the external signal.	
2	START-IN:External control laser output.For oscillating mirror sopt welding,pulse signal input.	
3	STOP-IN:External control laser stop	
4	HV-ON/OFF:External control HV ON/OFF	
5	TROUBLE RESET-IN:External control system to reset an error	
6	LD ON/OFF-IN:Indicating switch of external control red light	
7	MAIN-SHUTTER-IN:External control main shutter switch	
8	SHUTTER1-IN:External control main shutter 1 switch	
9	SHUTTER2-IN:External control main shutter 2 switch	
10	SHUTTER3-IN:External control main shutter 3 switch	
11	SHUTTER4-IN:External control main shutter 4 switch	
12	External control continuous laser output/stop signal	
13	Retention	
14-18	None	
19	SCHEDULE 1	Take the number respectively from every port as 1,2,4,8,16.Total operating mode is the sum of the above states. E.g. Working Mode20=21port+23port (See the details in the codes sheet as below)
20	SCHEDULE 2	
21	SCHEDULE 4	
22	SCHEDULE 8	
23	SCHEDULE 16	
24	Reserved	
25	Reserved	
26	Reserved	
27-28	None	
29-32	External power supply (+24V)	
33-36	Internal power supply of welding	
37-40	GND-Inside	
41-44	None	

(3)Codes sheet:

Input [SCH. #]	SCH 1	SCH 2	SCH 4	SCH 8	SCH 16
0					
1	•				
2		•			
3	•	•			
4			•		
5	•		•		
6		•	•		
7	•	•	•		
8				•	
9	•			•	
10		•		•	
11	•	•		•	
12			•	•	
13	•		•	•	
14		•	•	•	
15	•	•	•	•	
16					•
17	•				•
18		•			•
19	•	•			•
20			•		•
21	•		•		•
22		•	•		•
23	•	•	•		•
24				•	•
25	•			•	•
26		•		•	•
27	•	•		•	•
28			•	•	•
29	•		•	•	•
30		•	•	•	•
31	•	•	•	•	•

“•” :Input port connect with circuit common ground

Blank: Input port don't connect with circuit common ground

Chapter VIII Protection Functions Description

8.1 Over-voltage and under-voltage protection

When voltage of power grid is more than rated voltage overvoltage and under-voltage protection is on ,then,power supply is be protected.

It will display "voltage for bus is too low".Laser-out signal is off, the front box is turned off automatically.When the voltage of power grid return to normal,power supply should be started again,then to work.

8.2 Over current protection

(1)Over current protection of front box IGBT

When the peak current is bigger than rated current of IGBT of front box,start the over current protection to protect the power supply.Display <front box IGBT over current>Laser-out signal is off, the front box is turned off automatically.

Turn off the power key switch for cutting of the electricity ,Next check main circuit. If the IGBT is not broken,change the main board or display board.This maintenance work must be authorized or qualified service personnel assigned to the operation by the manufacturer.

(2)Over current protection of front box IGBT

When the peak current of back box A or B over the rated current of IGBT,enter the overcurrent protection,then the power supply will be protected.

Screen displaying"IGBT of back boa A or B overcurrent"Laser output signal off ,front bax HV off at the moment.

Turn off the key switch of power supply for cutting of the electricity . Next check main circuit. If the IGBT is not broken,change the main board or display board.This maintenance work must be authorized or qualified service personnel assigned to the operation by the manufacturer.

8.3 Output over-voltage protection

When output voltage over 680V,over-voltage protection is on and power supply is be protected.Screen will display "busbar is overvoltage".Laser output signal off ,front box HV off at the moment.

Turn off the key switch for cutting of the electricity ,Next check output voltage of supply

8.4 Overheat protection

When surface temperature of power unit radiator is over 75°C,overheat protection is on ,power supply being protected.Screen displaying"overheat".Laser output signal off ,front box HV off at the moment

When the temperature down to the proper value,turn on the power then begin work again.

8.5 External control protection

When chiller is off,power supply can not be turned on.

When cooling system alarms(water temperature alarming and flow alarming),external control protection is on and power supply is protected.When screen displaying tips like"water pressure failure" or "excessive water Laser output signal off ,front box HV off at the moment.

When cooling system return to normal,turn on power supply to work again.

Chapter IX Fault indication

No.	Description	HV	Alarm	Reasons and Solutions
1	Shutter is off	OFF	ON	When you trigger the laser, please open the shutter.
2	Communication failure	–	ON	Communication between main control panel and single chip is failure. Please check if the auxiliary power supply is normal. If it is normal, please connect to our after-sales staff.
3	Energy is too large	–	ON	Please check if the setting value of energy upper limit is lower than monitoring value. If the monitoring value is fault please connect us for freely.
4	Energy is too small	–	ON	Please check if the setting value of energy lower limit is higher than monitoring value. If the monitoring value is fault please connect us for freely.
5	Water temperature is too high	OFF	ON	Water temperature of internal recycle is too high. Check if the cooling system of chiller is normal. Waiting for the temperature return to normal, turn on the power supply to work again.
6	Water temperature is too low	OFF	ON	Water temperature of internal recycle is too low. Check if the cooling system of chiller is normal. Waiting for the temperature return to normal, turn on the power supply to work again.
7	HV is off	–	ON	HV of front box is off. Turn on the HV
8	Battery under voltage	–	ON	Change a battery
9	Back box failure	OFF	ON	Back box of supply is abnormal. Please connect our after-sales staff.
10	Undervoltage of busbar	OFF	ON	It can not be fully charged for a long time or the voltage is too low. Check if the network voltage is low or if the power wire is broken.
11	Overvoltage of busbar	OFF	ON	Supply voltage is too high after rectification. Check if the network voltage is high.
12	Preburn 1 failure	OFF	ON	Turn off and check if the connection of laser lamp is correct.
13	Preburn 2 failure	OFF	ON	Turn off and check if the connection of laser lamp is correct.
14	Flow failure	OFF	ON	Flow of cooling water is not enough. The water tube is clogged in oscillator or filter. Clean or change the filter and tube.

15	Top cover open	OFF	ON	Top cover or two-sides covers are open or the screws are loosen. Cover the lids and lock the screws.
16	Temperature abnormal of energy model	OFF	ON	Temperature of energy feedback model is not up to the steady temperature when laser out(the steady temperature is 26-28°)。 Click the "confirm" button at bottom right corner of the touch screen. Restart and click HV,then wait for about 10 minutes.
17	Main shutter failure	OFF	ON	Please check if there are some sundries around shutter. If not please connect to us
18	Shutter 1 failure	OFF	ON	Please check if there are some sundries around shutter. If not please connect to us
19	Shutter 2 failure	OFF	ON	Check if there are some sundries around shutter. If not please connect to us
20	Clock module failure	-	ON	Battery power of 5v is low or system date is fault. Change battery of 5V.
21	EEPROM module failure	-	ON	Battery power of 5v is low. Change battery of 5V.
22	Peripheral 5V failure	-	ON	Auxiliary power supply module of 5V is abnormal. Check voltage of auxiliary power supply. If the voltage is abnormal,change auxiliary power supply.
23	Peripheral 24V failure	-	ON	Auxiliary power supply module of 24V is abnormal. Check voltage of auxiliary power supply. If the voltage is abnormal,change auxiliary power supply.
24	Relay board supply failure	-	ON	Auxiliary power supply module of 5V and ±15V is abnormal. Check voltage of auxiliary power supply. If the voltage is abnormal,change auxiliary power supply.
25	Shutter supply failure	-	ON	Auxiliary power supply module of 24V is abnormal. Check voltage of auxiliary power supply. If the voltage is abnormal,change auxiliary power supply.
26	Pump failure	-	ON	Power supply for pump is abnormal. Check if the power supply for pump is 220V. If abnormal,please connect to us.
27	Main power too large	-	ON	The actual output power of power supply is large than default laser power. Please decrease the pulse width,frequency and peak power.
28	E-stop	OFF	ON	Turn off the external e-stop signal [EXT. I/O]. or reset the e-stop buttons on Mbox and panel.
29	Current of IGBT of front box too large	OFF	ON	The charging current of front box is too large. It is larger than the maximum rated current of IGBT. Please restart power supply. If it appears repeatedly,the rectifier diode may be broken,then connect to us

				please.
30	Current of IGBT of back box A too large	OFF	ON	The charging current of back box A is too large. It is larger than the maximum rated current of IGBT. Please restart power supply. If it appears repeatedly,the rectifier diode may be broken,then connect to us please.
31	Current of IGBT of back box B too large	OFF	ON	The charging current of back box B is too large. It is larger than the maximum rated current of IGBT. Please restart power supply. If it appears repeatedly,the rectifier diode may be broken,then connect to us please.
32	The total number of firing more than the upper limit	-	ON	Enter the interface of "process set",click "clear"button.
33	Sampling energy is too small	-	ON	Please check the optical path,or ensure the life of the xenon life.
34	The charging box power tooo big	-	ON	The power of the unit is too high,please contact us.
35	The trial date will be expired.	-	ON	please contact the manufacturer
36	The trial date expired	-	ON	please contact the manufacturer
37	Three phase voltage is too low or phase missing	-	ON	Please ensure the connection
38	Temperature of the charging box is too high	OFF	ON	The internal temperature is too high , please keep the device for heat dissipation
39	Enter the wrong password	-	ON	Please enter the correct password

Chapter X Everyday Maintenance

1.The power supply uses three-phase-five-wire system, the Null Line and Earth Wire should be reliable connected to make sure electrical safety.

2.The power supply by the fans cooled, cross ventilation, air convection design. Leaving enough space around the power supply, so that heat dissipation quickly.

3.Should be maintained around the power supply clean and dry.

4.In the environmental temperature below 35 °C, dry conditions, air dust <0.01 g/m³, no condensation.

5.Regular cleaning the dust of power supply ,the air cover of the cabinet, the fan cover of power supply, well-ventilated.

6.The Air Switch, AC Contactor, Fans and all kinds of terminal blocks are the critical electronic components that affect the power supply service time. Please clean the dust of them half a year.

7.Service time of Xenon lamp is short. When the xenon lamp power and laser power drop obviously, replace the xenon lamp as soon as possible please. Don't increase the Output Power of power supply unlimited to improve the Laser Output Power, it can cause the further damage of power supply and YAG Laser Rod.

8.change the main board battery

The service life of the battery is about 2 years. Please change it before run out.change method:

- ✧ Turn off the power supply
- ✧ Wait for 5 minutes,then open the front case plates of cabinet
- ✧ Dismount the battery from CPU board.
- ✧ Replace the new battery, and don't install wrong.

Conclusion

The laser power supply plays a vitally important role in the operation of the laser equipment. With the constant development of laser technology, the new power supply are born at the right moment. Our company produced power supply, not only meet market requirement, but also develop new, professional, stable products according to the customer request. Our team has always been adhering to the "Actively open up, Bold Innovation."

Please read the cautions carefully and follow them strictly. Don't exceed the parameters are limited. Please contact us immediately for any failure in your unskillful operation instead of trying to handle it by yourself in case of any negative result. Sincerely welcome you to give valuable comments and suggestions to us, if this manual not comprehensive. We will actively improve every job, to do its utmost to meet our customer demand! The request of the customer, will be a direction that we work hard. Thanks again for the selection of our products. Company staff sincerely look forward to working with you for your cooperation again!

Best regards for you!

Shenzhen Anzhong Power Co., Ltd
Your Easy life, we keep running for!