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# Intelligent Ultrasonic Welder

## User's Manual



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### **Safety requirements and warnings:**

This section explains the meaning of the various "Danger, Warning, Caution" symbols and signs in the manual and provides

General safety precautions for connecting systems.

The following three symbols will appear frequently in this manual, please pay special attention to them:



**Danger** This mark indicates that if you ignore this mark and perform incorrect operations, it will definitely lead to serious property damage, serious



**Warning** This mark indicates that if you ignore this mark and operate incorrectly, it may cause varying degrees of property damage, personal injury,



**Caution** This sign means: If you ignore this sign and perform incorrect operations, although it will not cause any injury, it may cause additional work

Even if it is a "Caution" mark, it may also lead to serious consequences depending on the situation. The above contents are important, please be sure to  
Must comply with the implementation

### **The following precautions should be taken when touching the ultrasonic generator and the welding machine frame:**

- ◇ Before installing any electrical connections, make sure the power is turned off;
- ◇ Non-professional technicians of our company are strictly prohibited from opening the ultrasonic generator for testing, maintenance and repair;
- ◇ Please use a power socket with a grounding terminal to prevent electric shock accidents, and ensure that the rack is effectively grounded;
- ◇ The ultrasonic generator will generate high voltage, so do not operate it with the upper cover open;
- ◇ Do not put your hands under the welding head. The downward pressure and ultrasonic vibration may cause injury accidents.
- ◇ When using the welding head, do not put your fingers between the welding head and the mold.

## 1. Ultrasonic welding system introduction

### 1.1 Welding system

**EW-6030** series uses a high-performance anti-interference microprocessor to achieve electronic control. All parameters of welding control are managed by a microcomputer. The intelligent frequency control system eliminates the inconvenience of manual frequency adjustment, automatically detects sonic overload, tracks the best resonance point in real time, keeps the vibration group temperature at the lowest point, and the temperature of the welding head rises with the frequency change. The machine automatically adjusts and runs more stably. The welding system consists of a **EW-6030** ultrasonic generator and a transducer/amplifier/welding head assembly.

#### 1.1.1 How it works

The materials are welded by high-frequency vibration acting on the workpieces. The vibration generates high temperature on the welding contact surface through the friction between the workpiece surface and the molecules. When the temperature rises to the point where the material can be melted, material flow will occur between the workpieces. When the vibration stops, the workpiece solidifies under the action of pressure, forming a weld. During the welding process, no current passes through the welded parts, so no welding arc is generated in the electric welding mode. Since ultrasonic welding does not have problems such as heat conduction and resistivity, it is undoubtedly an ideal metal welding system for non-ferrous metal materials, especially for thin and thin materials such as aluminum, nickel, copper, and silver. Single-point, multi-point, square, strip, single-layer, multi-layer, and composite welding has an ideal effect.

#### 1.1.2 Ultrasonic generator

The ultrasonic generator consists of an ultrasonic generator module, a system controller and a user interface. The main function of the ultrasonic generator module is to convert **50Hz/60 Hz** industrial frequency AC power into **20 kHz** electrical energy. The main function of the system controller is to control the welding system.

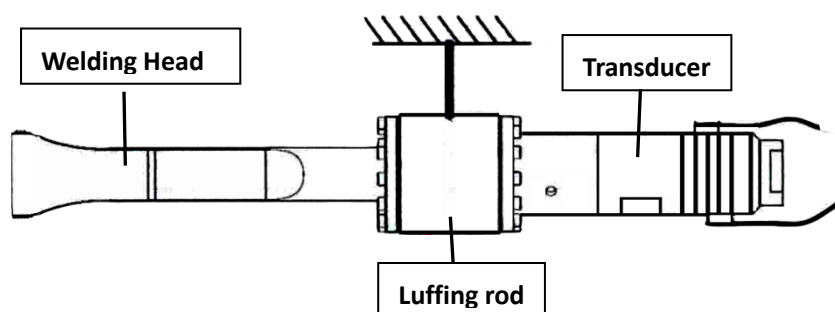
The ultrasonic power module includes an ultrasonic power amplifier unit and a control unit with a "system protection monitoring" function, and can automatically

cut off the ultrasonic energy when a malfunction occurs in the welding machine, thereby providing extremely high safety and reliability for the generator and even the entire welding equipment.

### 1.1.3 Acoustic system (vibration system)

It is composed of a transducer, a horn and a welding mold (welding tool head), and is an energy receiving device for generating ultrasonic signals. The acoustic system includes a transducer, a horn and upper and lower molds. The acceptable surface temperature is between  $10^{\circ}$  and  $50^{\circ}$ . When it exceeds  $50^{\circ}$  C, please cool it or stop using it. The connection surface between the horn and the mold must be clean, flat and tight, otherwise the ultrasonic energy will be lost, affecting the welding effect. If the surface is scratched or uneven, it cannot be used. If the joints are not installed tightly, please tighten them before use.

picture 1.1 *Acoustic system diagram*



#### ◆ Transducer

Ultrasonic electrical energy is transmitted to the transducer through the ultrasonic generator, so that the high-frequency electrical energy oscillation is converted into elastic mechanical vibration of the same frequency. The core of the transducer is piezoelectric ceramics, which are designed with special high-power piezoelectric ceramics. It has the characteristics of high power factor and low impedance. When the transducer is connected to the AC power supply,

the piezoelectric ceramics expand and contract alternately, converting more than 90% of the electrical energy into mechanical energy.

### ◆ Luffing rod

The horn is part of the ultrasonic assembly and is used to amplify the amplitude, match the impedance, transmit and amplify the elastic mechanical power of the transducer. It is similar to a mechanical transformer and can increase or decrease the vibration amplitude. The horn is usually made of aluminum or titanium, installed with the transducer and the welding head, and reduces energy loss at the node of axial operation.

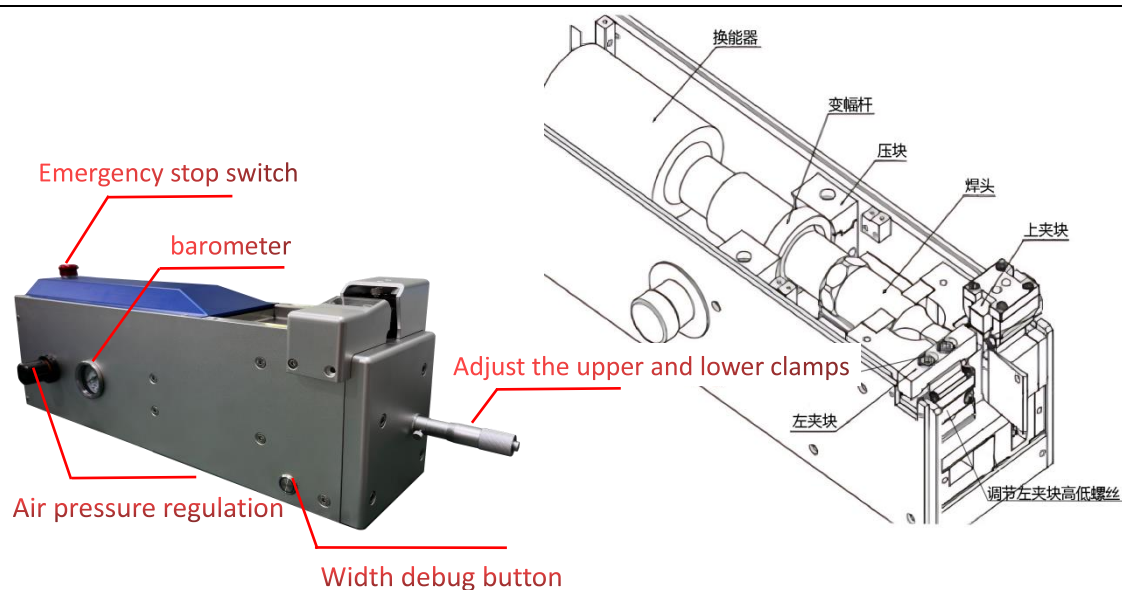
### ◆ Welding head

The welding head is selected or designed according to different welding applications. Each welding head is modulated to half wave frequency, and the welding head applies pressure and vibration evenly to the workpiece to be welded. The welding head is installed on the horn as part of the ultrasonic assembly to transmit the ultrasonic vibration from the transducer to the workpiece.

## 1.1.4 Welding machine body

The welding machine body is mainly composed of three parts: the fixing device, the pneumatic device and the control device. The fixing device is mainly used to fix the ultrasonic vibration system; the pneumatic device is used to provide the pressure required for welding; and the adjustment device is composed of left and right modules.

**picture 1.2** *Schematic diagram of the frame (machine head) (for reference only)*



surface 1.1 Structural description of the rack

Serial number	name	Function and explanation
1	Transducer, horn, welding head	Constituent a whole vibration system.
2	Briquetting	Used to fix the vibration system to the frame.
3	Upper clamp	Perform a downward pressing motion while welding.
4	Left clamp	When welding, it is used to control the width; the two fixing screws on the left clamp are used to set the width to zero.
5	Adjust the left and right screws of the left clamp	Adjust the width of the weldment.
6	Adjust the height screw of the left clamp	Adjust the height of the left and right clamps.
7	Adjust the upper clamp	Adjust the thickness of the weldment.

8	Emergency stop switch	Emergency stop.
9	Width debug button	The left clamp moves to the limit position.
10	barometer	Indicates the pressure value of the gas source.
	Air pressure regulation	Adjust the pressure value of the cylinder

### 1.1.5 Pneumatic system

- The pneumatic system consists of a solenoid valve , a cylinder , a pressure gauge, two throttle valves, a pressure regulating valve and a filter.
- The solenoid valve and the cylinder cooperate to complete the movement of the left/right clamp ;
- The throttle valve is used for the rising/falling speed of the welding head;
- The pressure gauge displays the current air pressure;
- The pressure regulating valve adjusts the gas source pressure of the current system;
- The filter filters the incoming air source to prevent water, oil and other debris in the air source from entering the solenoid valve, cylinder and other components, thereby causing damage to the upper and lower pneumatic motion systems.

### 1.1.6 Input/output interface for ultrasonic generator and welding frame

- an input/output interface on the rear of the ultrasonic generator :
- Transducer interface: two-hole aviation socket with positioning notch;
- Operation control signal interface: including solenoid valve control, alarm, emergency stop, completion signal, etc. ;
- Machine start signal: The foot switch signal triggers a welding process;
- Operation control signal interface: operation instructions, debugging pneumatic system to complete corresponding work;
- Transducer energy input / output connector: connects the ultrasonic generator and transducer (corresponding to the transducer interface).



#### **warn**

Before cleaning, the power supply must be disconnected to avoid electric shock and short circuit. Do not allow water or other liquids to enter the machine. If liquid enters the machine, please turn off the power immediately and stop using it.

When the equipment is in operation, do not put your hands under the mold to avoid being pinched or caught.

### Notice

The moisture in the compressed air can cause the electrical switching valve and other air circuit components in the machine to fail, so the compressed air must pass through an oil-water separator (filter) before entering the controller.

## 1.2 Main parameters

### 1.2.1 Electrical performance parameters

**surface 1.2** *Ultrasonic generator electrical parameters (for reference only)*

model	Rated voltage	Maximum Power	Ultrasonic frequency	Welding time
EW-603020	AC220V 50Hz	2000 W	20KHz	<1s
EW-603030		3000 W		
EW-603032		3200 W		
EW-603040		4000 W		
EW-603042		4200 W		

**Note** : For other models, please see the appendix at the end of this article .

### warn

The net weight of the welding rack is greater than 15 kg . Please ask others for help or use lifting equipment when transporting or moving!

The workbench used to place the equipment must be stable and able to withstand a gravity of no less than 50Kg (usually at least 20% of the safety load factor should be increased based on the weight of the machine) , with a height of about 600 ~800mm, and must not be placed in a humid or high-pressure place .

## 1.3 Controller and display screen

### 1.3.1 Ultrasonic generator front panel function introduction

**picture 1.3** *Ultrasonic generator front panel diagram*

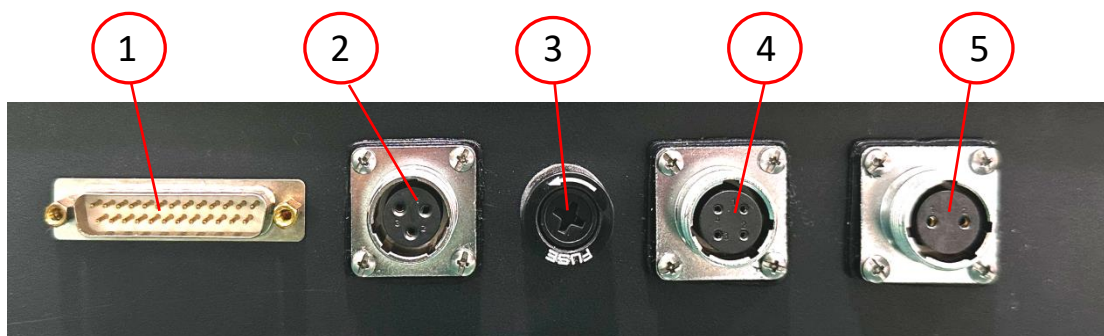


surface 1.3 Ultrasonic generator front panel display

Serial number	name	Function
1	Power switch/indicator light	This indicator lights up when the ultrasonic generator is connected to main power and the power switch is in the "On" position.
2	Screen Indicators	This screen lights up when 24 V is applied to the ultrasonic generator.

### 1.3.2 Ultrasonic generator rear panel function introduction

picture 1.4 Schematic diagram of the rear panel of the ultrasonic generator



surface 1.4 Ultrasonic generator rear panel interface

Serial number	name	Function
1	Output Interface	Provides the required solenoid valve output signal for the

		machine head. (Connect the machine head)
2	Power input interface	Removable connector plug for connecting input power.
3	Fuse holder	Prevent overload and short circuit to protect circuit safety.
4	Input Interface	Input signal required for automation or control. (Connect foot switch)
5	Transducer interface	Connect the handpiece transducer cable to provide ultrasonic energy to the transducer.

## 2. and debugging of welding rack

### 2.1 Installation Requirements

#### 2.1.1 Space requirements

The welding rack must be installed on a horizontal surface so that the rack is in a vertical state before use. It cannot be installed at an angle!

The rack is usually manually operated and operated by a foot switch , so it is usually installed on a workbench with sufficient support and appropriate height to facilitate the operator to operate the equipment in a sitting or standing position.

#### 2.1.2 Air source requirements

The compressed air provided by the user for the welding rack must be clean, dry and free of lubricants, and the air pressure source pressure is 6 ~ 8kg/cm. In order to prevent the entry of moist and unclean compressed air and damage to the metal welding machine, although an air filter has been installed on the welding rack, the air supplied by the user is required to be pre-treated by drying.

### 2.2 System installation steps

### 2.2.1 Electrical system wiring

- Place the welding machine on the workbench and the generator box near the machine body where the operator can easily observe and adjust it.
- Connection of power cord – The ultrasonic signal generator requires the user to provide a single-phase input with a ground terminal and a voltage of **220VAC / 50Hz**. Confirm that the power socket matches the power plug that comes with the machine, and then insert the power plug on the machine into the socket.



**warn**

Before inserting the power plug, make sure that the power voltage is single -phase **AC220V** and that the

The power switch is off !

Transducer connection – Insert the transducer cable aviation circular connector into the two-hole transducer plug on the rear side of the ultrasonic signal generator. The transducer cable connection is completed. Please pay attention to the positioning notch during installation !



**warn**

transducer cable connector is equipped with a threaded locking sleeve. After inserting it into the corresponding plug, be sure to screw the threaded locking sleeve to the bottom, otherwise electrical connection failure may occur and affect the welding effect. This connector does not support hot plugging!

the generator / rack control cable – Insert the rack control cable male connector (DB25) into the DB25 male plug on the rear side of the ultrasonic signal generator according to the plug , and tighten the screw. The connection of the generator / rack control cable is completed.

## 2.3 Adjustment of parameters on welding rack

### 2.3.1 Adjustment of air source pressure

The pressure regulating valve can be used to adjust the current air pressure of the system. Lift the locking ring upwards and rotate the knob left and right to adjust the air pressure. Turning it

clockwise increases the pressure and turning it counterclockwise decreases the pressure. After adjusting to the desired pressure, press the locking ring.

### 2.3.2 Welding machine thickness and width adjustment

The thickness of the weldment can be adjusted by adjusting the upper and lower clamps, and the width of the weldment can be adjusted by adjusting the left and right clamps.

### 2.3.3 Debugging of weldment width position

The width of the weldment can be adjusted using the adjustment button on the left side of the machine head.

## 2.4 Adjustment after replacing welding head and other components

Every time the welding head or worn components of the welding machine are replaced, it may be difficult to ensure that there is no relative displacement between the welding head and the components or modules due to the size or installation method of the components, which may easily cause two problems:

- **The gap between the fixture and the welding head is too small, or even collides.**

The energy of ultrasonic wave is very large when it is triggered. If the gap is too small or even collides, it can directly damage the texture of the fixture and the welding head, affecting the welding effect. If it happens too many times, it may even damage the welding head. Please pay attention.

- **The gap between the fixture and the welding head is too large**

The welding process may cause the welding line to run away or the welding tip may be too large, which will affect the welding effect.

The following will introduce how to adjust and replace the welding head and wear parts:



warn

**It is strictly forbidden to trigger ultrasonic waves** during the adjustment of the welding machine to prevent damage to the welding head and fixture. It is strictly forbidden to trigger ultrasonic waves for a long time after the adjustment is completed. Generally, the triggering of ultrasonic waves should not exceed **5** seconds.

Every time you adjust the machine, you must check the pressing height of the upper clamp to prevent it from hitting the welding head.

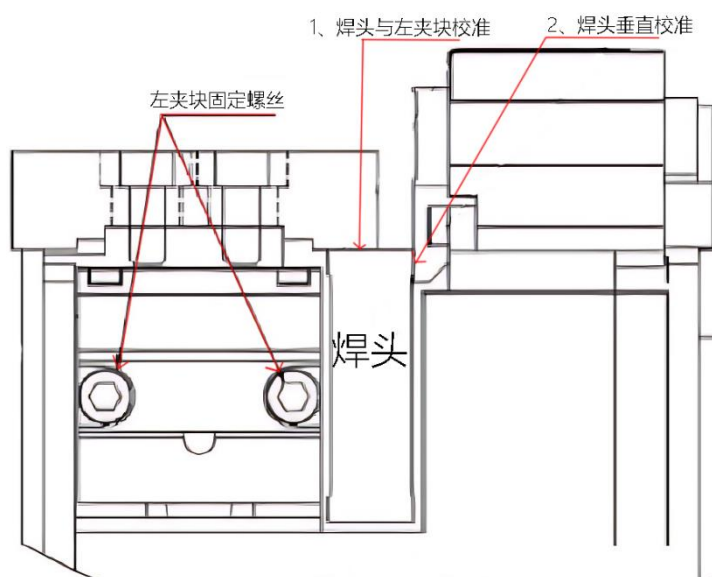
### 2.4.1 Replace welding head adjustment

surface 2.1 Steps to replace welding head

Adjustment steps	Operation content
1	Disassemble the upper plate and front plate of the wire harness machine , as shown in Figure ( 1.2 ).
2	Loosen the left module fixing screws and lift the left module a little to facilitate the removal of the vibration system.
3	Release the pressure block and take out the vibration system.
4	Replace the welding head and put it back in place.
5	Calibrate the welding head.
6	Replace the clamp and secure the vibration system.

### 2.4.2 Welding head calibration method

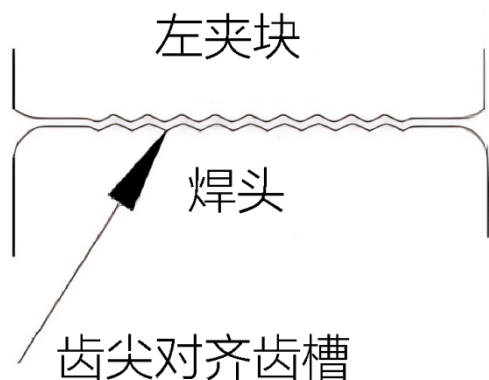
picture 2.1 Welding head calibration chart



From the above figure (Figure 2.1), we can see that the calibration of the welding head is divided into two aspects:

- **Alignment of welding head and left clamp**

picture 2.2 Calibration diagram of left clamp of welding head

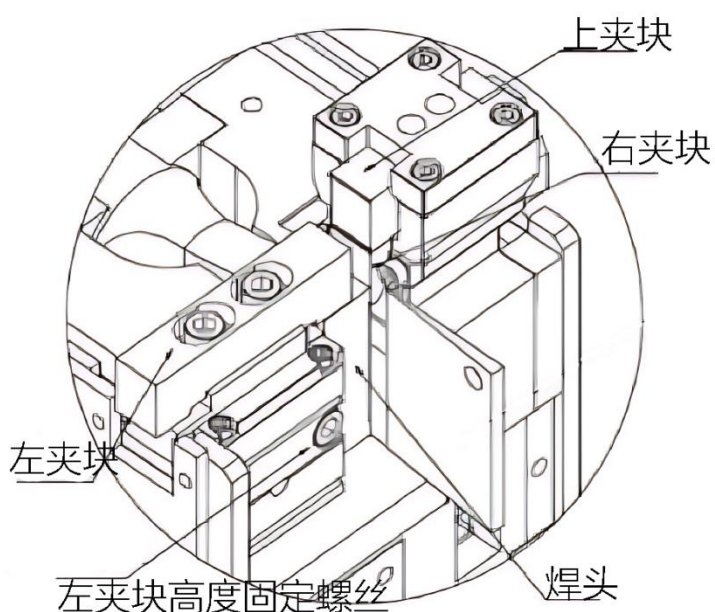


surface 2.2 Steps for aligning the welding head and the left clamp

step	
1	Remove the right module .
2	Secure the left module tightly to prevent it from shifting.
3	Visually check that the tooth tip is aligned with the tooth groove .
4	The alignment of the welding head and the left clamp is completed .
5	The wave crest of the welding head pattern is aligned with the trough of the left clamp .


● **Welding head vertical calibration**

picture 2.2 Welding head vertical calibration diagram



**surface 2.3** *Welding head vertical calibration steps*

step	
1	Remove the right module .
2	Use the adjustment piece that comes with the machine to insert it into the gap between the welding head and the right module , and make it close to the bottom surface and the right module .
3	Calibrate the angle of the welding head and observe the light leakage of the welding head . ( Based on the small planes on both sides of the welding head . )
4	If there is no light leakage , the calibration is complete .

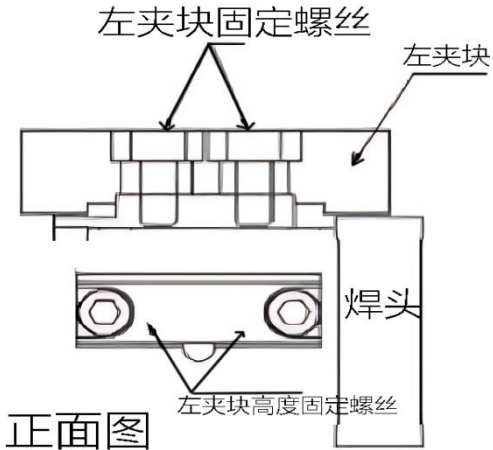
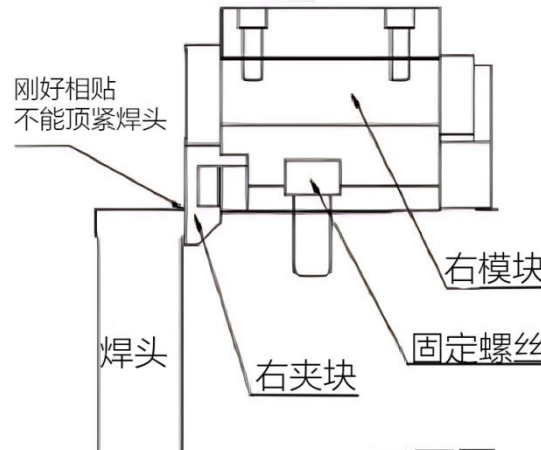
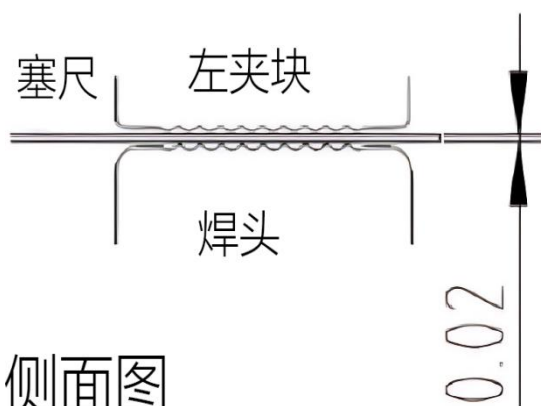
 **Warning:** When calibrating the welding head , both calibration aspects should be carried out at the same time and checked after completion . After calibration , the vibration system must be fixed to prevent the vibration system from loosening when vibrating . Collision with the fixture .

2.4.3 Adjustment of the gap between left and right modules

Each time the welding head or worn parts of the welding machine are replaced , the gap between the left and right modules must be readjusted . The adjustment method is as follows:

**surface 2.4** *Steps to adjust the gap between left and right modules*

<b>Adjust the gap between the left clamp and the welding head</b>	<b>the right clamp and the welding head</b>
---	---

	
	
<p>Adjustment Instructions:</p> <ul style="list-style-type: none"> <li>● Tighten the left clamp fixing screw during calibration.</li> <li>● Loosen the left module fixing screw, and the left clamp can move up and down</li> <li>● Please use a 0.02mm feeler gauge to adjust the gap.</li> <li>● After calibration, tighten the left module fixing screw.</li> </ul> <p>Press the "left and right" icon to check whether the left module is tight and whether it moves smoothly.</p>	<p>Adjustment Instructions:</p> <ul style="list-style-type: none"> <li>● Loosen the fixing screws shown in the above figure.</li> <li>● The right clamp should just touch the welding head , and try not to have any forceful effect on each other to avoid damaging the welding head or the clamp.</li> <li>● Tighten the fixing screws.</li> </ul> <p>Press the "up and down" icon to check whether the right module is tight and whether it moves smoothly.</p>
<p>Note: Before adjustment , the left clamp fixing screw must be tightened.</p>	<p>Note: A 0.01mm feeler gauge can be used for adjustment, which is safer.</p>

### 2.4.4 Replacement of welding surface

In order to maximize the use of the welding head , please replace the welding surface every 50,000 times . Repeat this cycle . If the welding surface is severely worn , please replace the welding tool head in time . When replacing the welding surface , please check the wear of the left and right clamps and the upper clamp . If the wear is severe , resulting in unsatisfactory welding results or too large a batch after welding , or even line deviation , please replace the welding tool in time.

## 3. Welding machine operation

### 3.1 Welding mode

The welding machine has two major modes: mold adjustment mode and automatic mode (time mode, energy mode, external control mode) .

According to the requirements of the metal material welding application purpose, the welding modes of the welding system can be divided into three types:

Time mode, energy mode, external control mode.

#### 3.1.1 Mold adjustment mode

It is used to check whether the welding head you installed is aligned with the mold and to adjust the relative position initially. The operation steps are as follows:

- Confirm that the system is in standby mode (pressure, power supply, etc. are normal ), click " **Welding Mode** " on the screen to enter the welding mode page and select " **Mold Adjustment Mode** ". The arrow will point to the selected mode, and step on the foot pedal to lower the welding head and keep it in contact with the mold .
- If you want the welding head to return to the starting position and enter the " automatic state ", repeat the above operation, select "automatic mode" and click " **welding head rise** ".

#### 3.1.2 Automatic mode

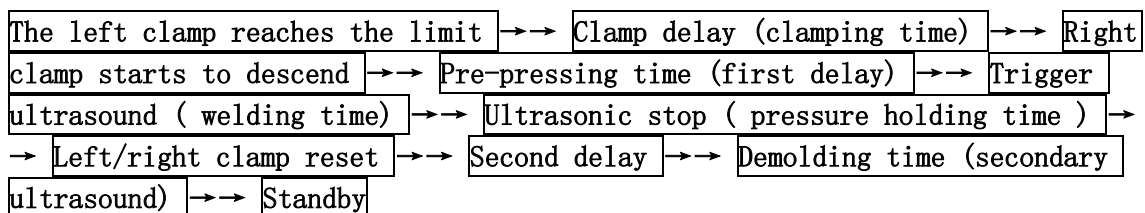
- **External control mode**

The ultrasonic generator operates under external control, and the on and off of the ultrasonic wave is controlled by an external signal. It is usually used for integration with other equipment or remote control.

➤ **Time Mode**

The ultrasonic generator runs according to the preset time parameters. This mode is the most commonly used. When all welding parameters have been adjusted to the best through trial welding and satisfactory welding results have been obtained, you only need to step on the foot switch in the standby state (pressure, power supply, etc. are normal) to enter the welding program.

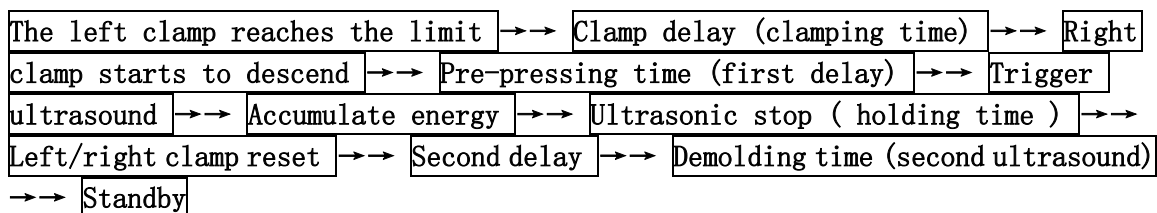
the welding procedure is as follows



➤ **Energy Mode**

The ultrasonic generator controls the output of ultrasonic waves according to the energy setting value, which can achieve precise energy control and is often used in applications for processing or treating materials.

The timing of the welding procedure is as follows



## 4. Ultrasonic Generator Operation

### 4.1 System interface

The operating system interface consists of the main interface, welding mode, advanced settings, welding data and other pages. You can adjust the required control mode or time, energy and other controls through the options on the "Welding Mode" page, or you can view the historical welding data through the "Record Query" in the "Welding Mode".

#### 4.1.1 System main interface

## Maintenance and Failure Analysis

Wait until the progress bar at the bottom of the touch screen is loaded and enter the system operation page ( as shown in the figure below ).

picture 4.1 Ultrasonic generator system schematic



surface 4.1 Ultrasonic generator system function

Serial number	name	Function
1	English	English switching / consistent with the diagonal Chinese switching.
2	Resonant frequency	is the actual frequency of the transducer.
3	Output Power	is the actual output power.
4	Welding mode	Jump to welding mode setting page.
5	Advanced Settings	After entering the correct password, you will be redirected to the advanced settings page.

6	System Reset	System reset (reset alarm)
7	Sonic test	It is used to check the power consumption and working frequency of the welding head in the no-load state, and can also test whether the resonance frequency of the welding head and the generator is normal.
8	Amplitude adjustment	Click the value to enter an amplitude value from 1 to 100, or click to add or subtract (+/- 5) .
9	Device Status	Display device status in real time.

4.1.2 System welding mode

picture 4.2 Schematic diagram of ultrasonic generator welding mode



surface 4.2 Ultrasonic generator welding mode

Serial	name	Function
--------	------	----------

## Maintenance and Failure Analysis

number		
1	Welding mode switching	The options are time mode, energy mode and external control mode.
2	Clamping time	Clamping time.
3	First delay	Welding head pre-pressing time.
4	Welding time	The time that ultrasonic energy is emitted.
5	Holding time	The holding time after welding.
6	Secondary delay	Cooling and curing time.
7	Shake-off time	Second ultrasonic demoulding time.
8	Fixture/welding head control	User controlled raising and lowering of the fixture/weld head.
9	Debug mode switch	Can be switched to mold adjustment mode and automatic mode (arrow direction).
10	Job Count	Record the number of welding times, click to clear to 0.
11	Record query	Welding record query, including frequency, power, energy, time and other data.

### 4.1.3 System Advanced Settings

picture 4.3 *Schematic diagram of advanced settings of ultrasonic generator*

1

2

4

5



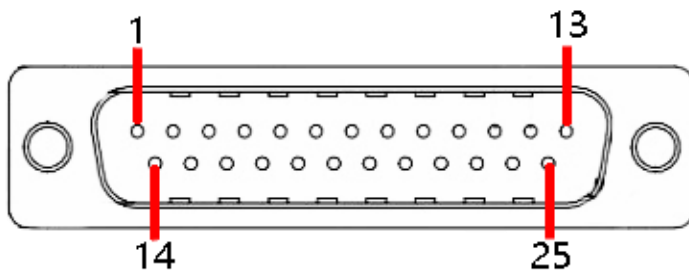
surface 4.3 Ultrasonic Generator Advanced Settings

Serial number	name	Function
1	Maximum frequency(KHz)	The maximum frequency value of the frequency tracking can be adjusted according to actual conditions to make the oscillator frequency within the range.
2	Maximum protection (W)	The maximum power value can be set. If the welding process exceeds this value, the system will display output overload.
3	Mold protection (W)	The maximum mold protection value can be set. If this value is exceeded during the power-on sweep phase, the system will display a mold abnormality.
4	Startup speed	Generally no modification is required; if modification is required, please contact the manufacturer.
5	Internal gear	The factory default setting is 50. If you need to increase the welding power, you can increase this value. The maximum

## Maintenance and Failure Analysis

		value is 100
6	Power on sweep	Closed: Manual frequency sweep is required when the device is turned on. Opened: Automatic frequency sweep is performed when the device is turned on.
7	Emergency stop invalid	It can be added according to customer needs.

### 4.1.4 DB25 port terminal definition



Pin	name	Function
1	Clamp cylinder control	Clamp cylinder solenoid valve control port.
2	/	
3	GND	Internal GND.
4	/	
5	24 VDC positive	Internal +24V.
6	/	
7	Welding head cylinder control	Welding head gas solenoid valve cylinder control port.
8	/	

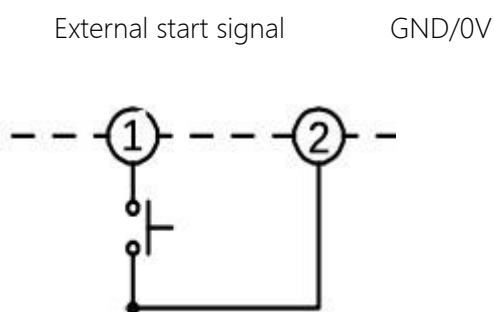
## 4.2 Welding Operation

### 4.2.1 Using the Input Interface

**surface 4.4** *Ultrasonic Generator Test Program (User Input/Output)*

step	measure
1	as shown in Figure 4.4 , or use a similar device.
2	The ultrasonic generator is switched on, the front panel screen lights up and the ready signal activates.
3	Send an external start signal and keep it <b>for 15-20ms</b> . When the external start signal exists, the ultrasonic start output is activated.
4	When the ultrasound start output is activated, the presence of external signals will not be recognized by the system.

**picture 4.4** Test connection diagram (Figure 1.4-5 interface)



### 4.2.2 Common problems and solutions in welding operations

**surface 4.5** *Solutions to common problems in welding operations*

question	Countermeasures
Welding is not firm	1. Increase the air pressure; 2. Reduce the distance between the bottom mold and the welding head; 3. Increase the

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	ultrasonic time; <b>4.</b> Increase the welding head descent speed.
Welding surface damage (Excessive welding)	<b>1.</b> Reduce the air pressure; <b>2.</b> Increase the distance between the bottom mold and the welding head; <b>3.</b> Reduce the ultrasonic time; <b>4.</b> Slow down the descent speed of the welding head.
Generator overload (abnormal)	<b>1.</b> Reduce the air pressure; <b>2.</b> Increase the distance between the bottom mold and the welding head; <b>3.</b> Increase the pre-pressing time; <b>4.</b> Increase the time between two ultrasonic triggering (that is, the interval between two automatic welding cycles is too short and should be lengthened).
There is a cold solder joint	<b>1.</b> The bottom mold pattern is worn; <b>2.</b> The welded parts are contaminated; <b>3.</b> The welding parameters are improperly set (welding time, frame up and down speed); <b>4.</b> The welding capacity of the equipment itself is exceeded; <b>5.</b> The welding head pattern does not match the welded parts; <b>6.</b> The air pressure is improperly set/the air pressure fluctuates; <b>7.</b> The power selection is too low.

## 5. Maintenance and Failure Analysis

### 5.1 Welding machine care and maintenance

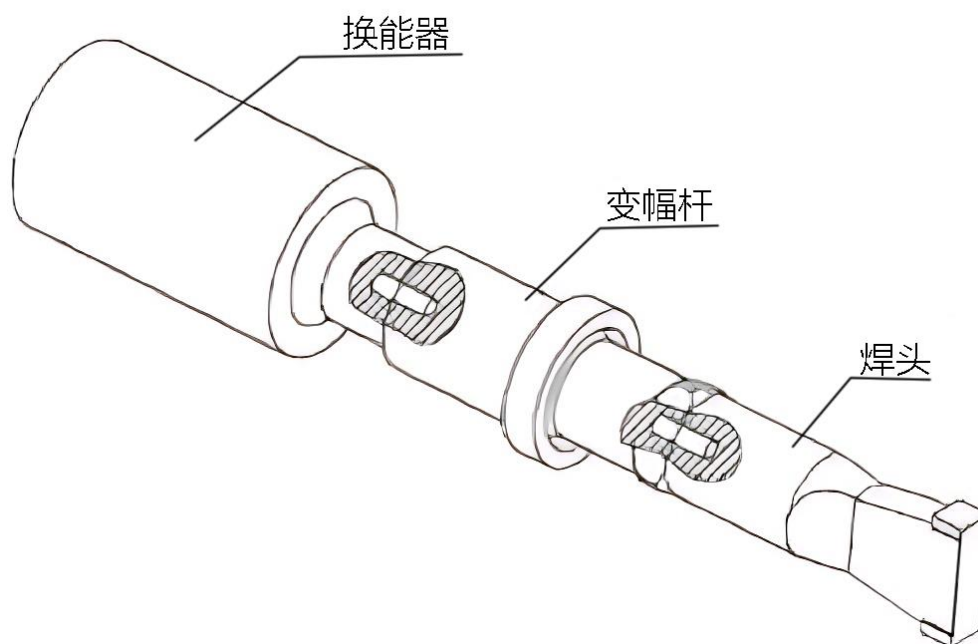
- ✓ The welding head and workpiece should always be kept clean.
- ✓ Check cable connectors regularly for loose connections.

- ✓ The machine should be cleaned regularly, but liquids should not be used for cleaning. Do not put heavy pressure or place fluids on the vibration box.
- ✓ Keep the air in the workplace flowing smoothly and the surrounding temperature should not be too high (below 40° C).
- ✓ The lifting grooves, screws, etc. should be greased regularly and kept clean.
- ✓ When moving the machine, the oscillator box should be separated from the machine body (disconnect the cable socket) and be careful when moving it to avoid impact.
- ✓ When not in use for a long time, please wipe the appearance of the machine, apply oil for maintenance, cover it with a cover, and place it in a dry and ventilated place.
- ✓ should be opened every month and the dust inside the case should be removed with a clean, moisture-free air gun to maintain good heat dissipation and ventilation of the parts.

**In order to achieve the best working condition and maintain the performance of the machine, and ensure the normal operation of the vibration system, the vibration system must be manually inspected.**

- ✓ All parts of the frame must be tightened securely , and the welding head must not touch the workpiece or fixture .
- ✓ Turn on the power, the power indicator light will light up , and the ultrasonic generator will automatically search for frequency.
- ✓ Generally , the sound of ultrasound is relatively stable and soft . If there is a strange sound , please replace the welding head or check for looseness.
- ✓ There is no abnormal sound and normal operation can be performed.

For the entire ultrasonic metal welding machine , the welding head is a consumable part with a limited service life . The service life of the welding head is affected by various factors , among which the main factors are the hardness difference between the welding head ( hardened tool steel) and the workpiece (such as non-ferrous metal) and the welding time. Long-term welding will cause wear and tear of the surface texture or even breakage . When there is a problem with the welding head , the welding head must be replaced . Here we mainly explain how to disassemble and assemble the welding head.



**Things to note when replacing:**

1. Carefully observe whether the connecting bolts are intact to avoid damaging the screw buds of the vibration system due to vibration . Replace them when necessary to avoid losing more than you gain .
2. be kept clean without dust or objects . Add butter during installation to make the ultrasonic wave transmit better.

**Remember!**

3. After tightening the welding head , loosen the bolts half a turn to prevent the welding head from being stuck on the bolts and then put them on the diode . When installing the secondary rod and transducer, the bolts must be tightened on the secondary rod first , and then the transducer is installed.

**Please note that the order cannot be reversed !**

4. After the replacement is completed , please do not install it on the machine immediately . Connect the cables and place the vibration system directly on the table to test whether the ultrasonic wave is abnormal.
  - a. If there is a strange noise , please reinstall the vibration system.

- b. intermittently for two or three minutes . Each time the ultrasound is triggered, it should not be too long . Check the heating condition. If the heating is abnormal, please reinstall it (the connection surface may be messy) .

If you have any questions, please contact our after-sales service department.

## 5.2 Failure Analysis

① The ultrasonic system consists of three core parts , namely the welding head , transducer and generator . When the ultrasonic system is abnormal , first determine whether there is a problem with the welding head . After replacing a new welding head , observe whether the status of the ultrasonic system returns to normal . If so, it indicates that there is a problem with the welding head . If not, please see the next step;

② If the problem is not with the welding head, you can connect another good ultrasonic generator (if there are two devices) to the vibration rod of the problematic ultrasonic metal welder , and then observe whether the machine is normal. If it is normal , it indicates that there is a problem with the ultrasonic generator . If it is not normal, it indicates that there is a problem with the transducer. When there is a problem with the ultrasonic generator or transducer, please contact the manufacturer for repair in time.

### 5.2.1 Common electrical faults

#### **surface 5.1** *Troubleshooting of common electrical faults*

<b>Fault</b>	<b>troubleshooting</b>
The power indicator light is off	1. The power cord is damaged. 2. The fuse is damaged. 3. The power switch is damaged.
The power indicator is	1. The screen connection cable is not firm; 2. The 24V

## Maintenance and Failure Analysis

normal, but the screen is off	power supply system is faulty.
Screen clicks are unresponsive	1. The screen connection cable is not firm; 2. The main control board is damaged.

### 5.2.2 Welding machine signal generator alarm

#### **surface 5.2** *Elimination of welding rib signal generator alarm*

<b>Device Status</b>	<b>troubleshooting</b>
Equipment is normal	The device is operating normally.
Measurement frequency	Displayed during frequency sweep.
Vibrator not connected	The transducer is not connected, or the transducer RF cable is broken.
Sweep failed	1. The oscillator is not within the default frequency range. 2. If it is within the range, the oscillator may be damaged.
Impedance Abnormality	The transducer impedance is special and must be adjusted separately.
Output overload	1. The output power is greater than the protection power, adjust the power protection value; 2. If it is abnormal, please check whether the mold is damaged.
Frequency protection	Generally, the welding tool frequency deviation is too large; 1. The transducer is damaged; 2. If 1 is excluded, re-matching is required.

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Power protection	The IGBT power tube may be damaged. If this happens again, you need to contact the dealer.
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Appendix: Specifications of ultrasonic metal welding machines (specially customized or non-standard products are not included). (For reference only)

model	frequency	Maximum electrical power	Air pressure	Rated voltage	Welding time	Net Weight
JHN - 2020	20KHz	500~2000W	2 ~ 7 Kg	AC220V 50Hz	<1s	75~80 Kg
JHN - 2030	20KHz	1000~3000W	6~8Kg			75~85Kg
EW-603042	20KHz	1500~4200W	6~8Kg			75~85Kg
EW-603050	20KHz	2000~5000W	6~8Kg			75~105Kg
EW-603056	20KHz	2000~6000W	6~8Kg			75~105Kg
EW-603080	20KHz	2000~8000W	6~8Kg			75~115Kg
JHN-2510	25KHz	500~1000W	1~5Kg			70~80Kg
JHN-2520	25KHz	500~2000W	2~7Kg			75~80Kg
JHN-3508	35KHz	750W	1~5Kg			45~50Kg
JHN-3512	35KHz	1200W	1~5Kg			45~50Kg
JHN-4008	40KHz	800W	1~5Kg			45~50Kg
EW-603030-2G	20KHz	1500~3000W*2	6~8Kg			125Kg
EW-603042-2G	20KHz	1500~4200W*2	6~8Kg			125Kg
EW-603060-2G	20KHz	1500~6000W*2	6 ~ 8 Kg			125 Kg
JHN - 2060-4G	20KHz	1500~6000W*4	6 ~ 8 Kg			185 Kg
JHN - 2080-4G	20KHz	1500~8000W*4	6 ~ 8 Kg			205 Kg

**Appendix:** Combinations of metal materials that can be ultrasonically welded (for reference only, ● indicates phase melting)

	Al	Thermy	Cu	Ge	Or	Faith	Mg	Mo	Nose	Cb	Pd	Pt	Yes	Ag	Poop	Sn	To	W	HER	Zr	Pb
铝	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	
beryllium	●	●				●											●				
copper			●		●	●	●	●	●			●		●	●		●				●
germanium					●							●									
gold				●	●				●			●	●	●		●	●	●			●
iron					●			●	●			●		●	●		●	●	●	●	●
magnesium						●								●			●	●			
molybdenum								●	●			●				●		●	●		●
nickel									●	●		●		●	●		●	●			
cadmium										●						●					
palladium											●			●							
platinum												●	●					●			



Single layer nickel/copper + single layer copper foil	0.25mm and below	0.01 ~ 0.5S	2-6 Kg	700W ~ 4200W
Aluminum to Nickel/Copper/Nick el-plated Copper	0.6mm and below	0.01 ~ 0.5S	2-6 Kg	700W ~ 4200W
Copper foil within <b>20 layers</b>	0.4mm and below	0.01 ~ 0.5S	2-6 Kg	2000W or above
Aluminum foil within <b>30 layers</b>	0.8mm and below	0.01 ~ 0.5S	2-6 Kg	2000W or above
Copper foil within <b>50 layers</b>	0.85mm and below	0.02 ~ 0.5S	2-6 Kg	3000W or above
Aluminum foil within <b>60 layers</b>	1.6mm and below	0.02 ~ 0.5S	2-6 Kg	3000W or above
Copper and aluminum foil within <b>80 layers</b>	1.5mm and below	0.02 ~ 0.5S	2-7 Kg	4200W or above
Copper and aluminum foil within <b>100 layers</b>	2.0mm and below	0.02 ~ 0.5S	2-8 Kg	5000W or above
Copper and aluminum foil within <b>120 layers</b>	3.0mm and below	0.02 ~ 0.5S	2-8 Kg	6000W
Copper and	3.8mm and below	0.02 ~ 0.8S	2-8 Kg	8000W

aluminum foil within <b>160 layers</b>				
<b>50+</b> layers of copper foil + copper block + <b>50+</b> layers of copper foil	<b>0.6+10+0.6</b> mm or less	<b>0.02 ~ 0.8S</b>	<b>2-6 Kg</b>	<b>(3000W ~ 6000W)*2</b>
<b>80+</b> layers of copper foil + copper block + <b>80+</b> layers of copper foil	<b>0.85+10+0.85mm</b> or less	<b>0.02 ~ 0.8S</b>	<b>2-8 Kg</b>	<b>(5000W ~ 6000W)*2</b>
<b>100+</b> layers of copper foil + copper block + <b>100+</b> layers of copper foil	<b>1.0+10+1.0mm</b> or less	<b>0.02 ~ 0.8S</b>	<b>2-8 Kg</b>	<b>(6000W)*2</b>
<b>120+</b> layers of copper foil + copper block + <b>120+</b> layers of copper foil	<b>1.2+10+1.2mm</b> or less	<b>0.02 ~ 0.8S</b>	<b>2-8 Kg</b>	<b>(8000W)*2</b>

based on 0.009 or 0.01 mm ; the thickness of aluminum foil is based on 0.02 mm .