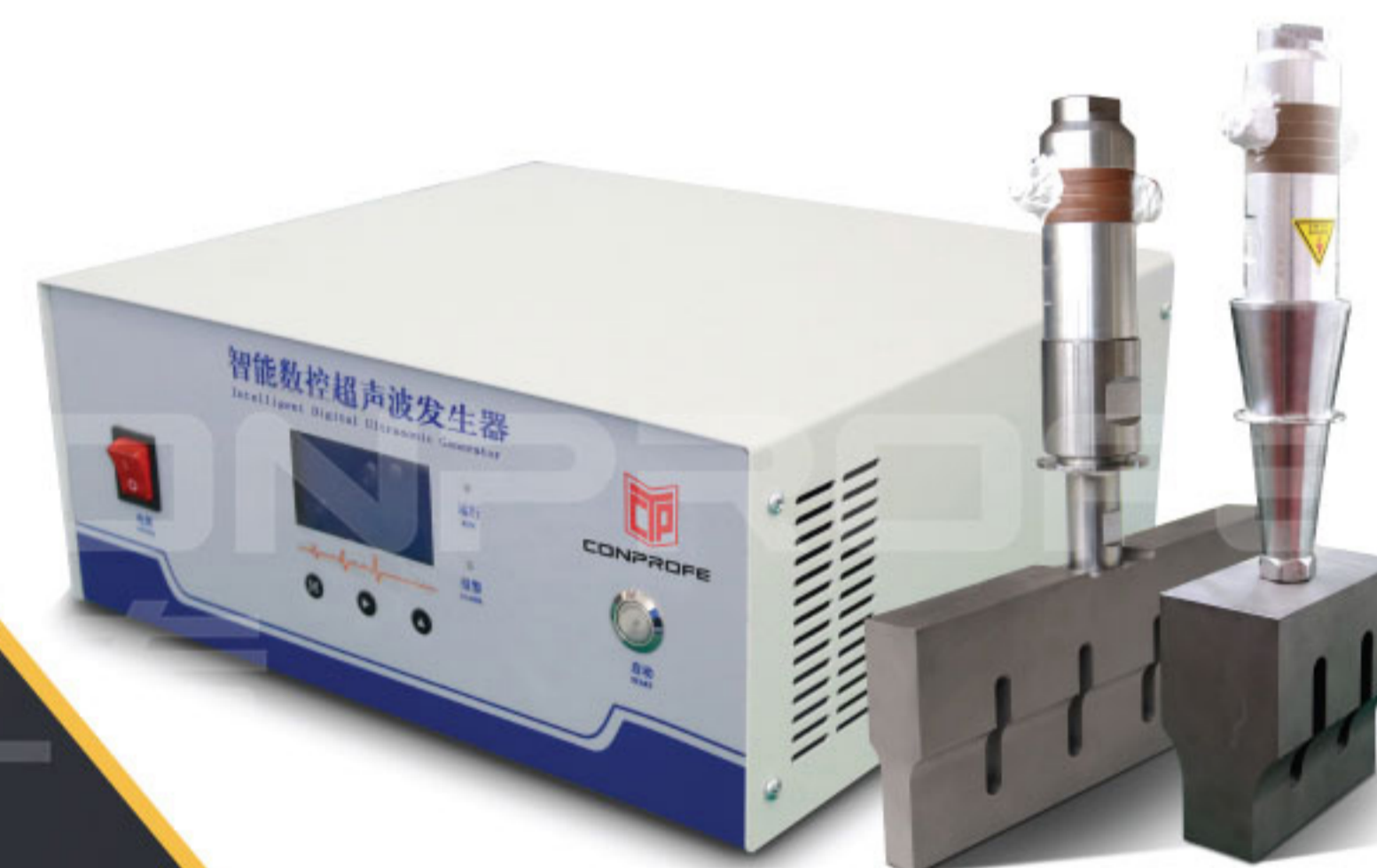


User Manual

Intelligent Digital Ultrasonic Welding
System (Exclusive for KN95 Mask)



Official Website



Official WeChat

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1. Preface

1.1 Preface/Overview

Thank you for choosing our intelligent digital ultrasonic welding system.

Please read the manual carefully before use.

Please keep these instructions safe for future reference.

For more information, please visit Conprofe Technology Group Co., Ltd.'s official website at www.conprofetech.com.

1.2 Preface/Important safety precautions

- ⚠ Check whether the cable is damaged before installation!
- ⚠ Check the aviation socket for damage before installation!
- ⚠ Make sure to connect the ground line before installation!
- ⚠ Do not disassemble the intelligent digital ultrasonic generator's power supply without authorization in order to avoid the internal high voltage causing hazards.

2. Product introduction

2.1 Working principle

The intelligent digital ultrasonic generator can convert low-frequency alternating current into high-frequency alternating current, and then convert electric energy into mechanical energy of high frequency vibration via the transducer. The welding head can generate tens of thousands of high-frequency vibrations per second when applied to the contact surface of thermoplastics. Through the upper weldment, the high-frequency vibrations transmit the ultrasonic energy to the welding zone, where the upper and lower weldments will generate locally high temperature through mutual friction. After the ultrasonic action, the pressure lasts for a few seconds, making the weldments solidify and set, and form strong molecular chains to achieve welding.

2.2 Product advantages

The intelligent digital ultrasonic welding system has three major features: intelligence, environmental protection and high efficiency. The system can search and track frequency automatically with no need of manual regulation. And, its ultrasonic amplitude is adjustable between 10% and 99%, so it can match different product types intelligently. Additionally, the system needs no help of solvents, adhesives, or other aids, thus being capable of realize environment-friendly, pollution-free and safe production. Last but not the least, the system can replace manual welding, improve efficiency and reduce cost.

2.3 Applications

The intelligent digital ultrasonic welding system is mainly used in the fields of masks, medical protective clothing, diapers, non-woven bags, non-woven clothing stitching, trademark slitting and nylon band cutting, etc.

2.4 Technical parameters

Model	15K intelligent digital ultrasonic welding system	20K intelligent digital ultrasonic welding system
Frequency(KHz)	15	20
Output power (W)	2600	2600
Input voltage (V)	220±10%	220±10%
Output frequency (KHz)	13~17	18~22
Overall dimensions (mm)	335(L) ×305(W) ×143(H)	335(L) ×305(W) ×143(H)
Weight (Kg)	9	9



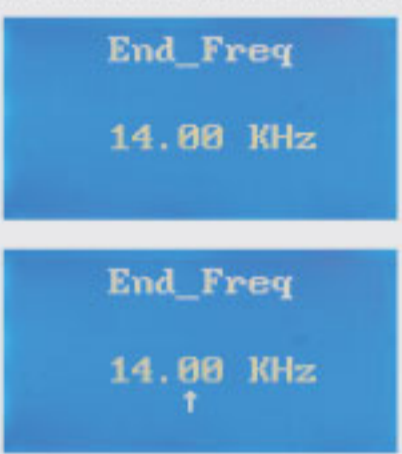


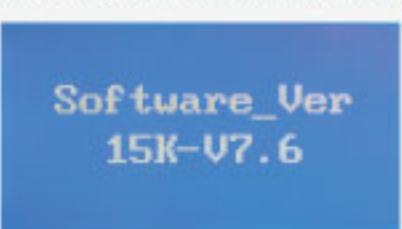
3. Function of intelligent digital ultrasonic generator

3.1 Display screen interfaces and keys



Note: **M** Setting **▶** Select **▲** Add

The Standby & Setting LCD Screen has 5 interfaces displaying information as follows (taking 15K model as an example).

Interface	Description
Standby 	In standby mode, you can switch over between the 5 interfaces by pressing the key "▶"
Interface 1 	<ol style="list-style-type: none"> Interface 1: Home screen power range: 10- 99%; default: 50%. Long press the setting key "M" for 1 second, and enter the power setting state. Press the key "▶" to set the state and the cursor "↑" moves circularly, enabling you to set the values of the tens place (adjustable range: 1-9) and the ones place (adjustable range: 0- 9); Press the key "▲" to set the state and the value adds by "1" for each press, up to "9" and then to "0"; then, press "M" for 1 second to return to the home screen after setting.
Interface 2 	<ol style="list-style-type: none"> Interface 2: Ending frequency range: 13.00-17.00KHZ; Default: 14.00 KHz. Long press the setting key "M" for 1 second, and enter the frequency setting state. Then, press the key "▶" to set the state and the cursor "↑" moves circularly, enabling you to set the values of the tens place (adjustable range: 1-4), the ones place (adjustable range: 0- 9) and the tenths place (adjustable range: 0-9); Press the key "▲" to set the state and the value adds by "1" for each press, up to "9" and then to "0"; long press of the key can increase the frequency value by 1 rapidly; then, press "M" for 1 second to return to the home screen after setting.
Interface 3 	<ol style="list-style-type: none"> Interface 3: Starting frequency range: 13.00-17.00KHZ; Default: 15.00 KHz. Long press the setting key "M" for 1 second, and enter the frequency setting state. Then, press the key "▶" to set the state and the cursor "↑" moves circularly, enabling you to set the values of the tens place (adjustable range: 1-4), the ones place (adjustable range: 0- 9) and the tenths place (adjustable range: 0-9); Press the key "▲" to set the state and the value adds by "1" for each press, up to "9" and then to "0"; long press of the key can increase the frequency value by 1 rapidly; then, press "M" for 1 second to return to the home screen after setting.
Interface 4 	<ol style="list-style-type: none"> Interface 4: Long press the key "M" for 1 second to enter the mode setting state. Press the key "▲" to set the mode: ON: Continuous; OFF: Discontinuous. Long press the key "M" for 1 second to return to the home screen.
Interface 5 	<ol style="list-style-type: none"> Interface 5: Software version information Note: The default ending frequency and starting frequency are 14.00KHZ and 15.00KHZ respectively, generally needing no adjustment.

3.2 Indicator light description



- The power indicator light is red, and is always on when the power switch is on.
- The running indicator light is green. When it flickers, it means the equipment is searching frequency automatically; when it is normally on, the equipment is running with ultrasonic output; and when it goes off, the equipment is not running.
- The alarm indicator light is red. It will light up when the ultrasonic welding system is in fault.

3.3 Connection terminal description



- Note:
- 1 Passive switching signal instead of live signal can be connected to this port.
 - 2 The transmission line is connected to the transducer
 - 3 The power cord is connected to AC220V and ground wire
 - 4 Expansion port (shielded)



- The intelligent digital ultrasonic generator connects to the transducer with a special cable with aviation plug.
- The intelligent digital ultrasonic generator's power supply port connects to an external power supply socket with a special 220V power supply line with 10A fuse.
※Note that external power supply needs to be fully grounded to prevent leakage.



- The intelligent digital ultrasonic generator's external control port (1) is connected to the external control line, while the lead of the external control line is connected to the normally open port (relay output) of the control equipment's remote switch.

3.4 Operating process

- Connect the transducer with a GX30-4 aviation plug;
- Connect the remote switch with a GX16-2 aviation plug;
- Connect the power cord;
- Turn on the power switch on the front panel of the intelligent digital ultrasonic generator.
- Select the mode according to the location of use: ON: Continuous; OFF: Discontinuous.
Note: ON (Continuous): used in the process of knurling; OFF (Discontinuous): used in the process of welding ear loops or N95's folded edges
- Disconnect the remote control switch during operation or failure to stop the intelligent digital ultrasonic generator working.

4. Precautions for component installation

4.1 Precautions for transducer installation

(1) Apply "industrial vaseline" to the welding head end face and the horn end face. (As shown in Figure 1).

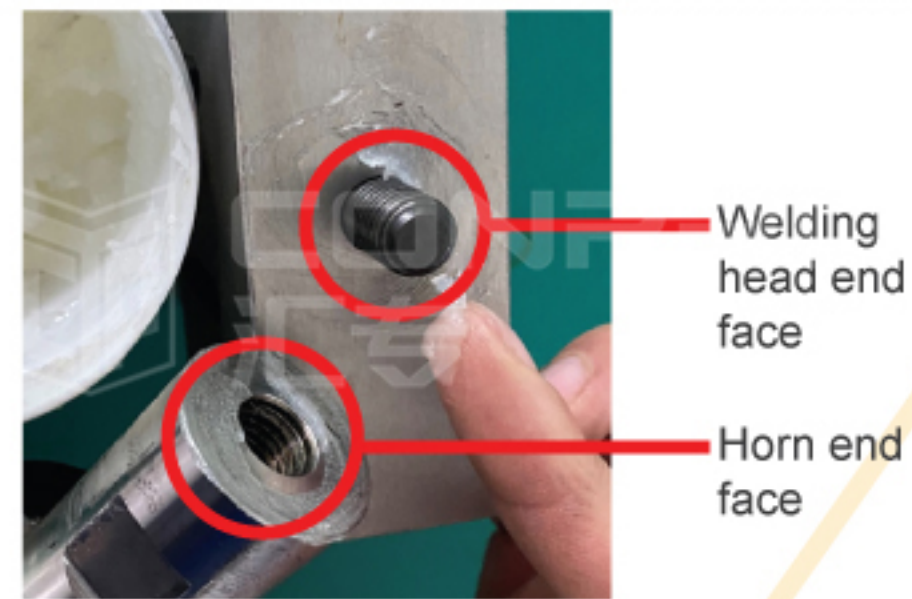


Figure 1

(2) Install the upper circular gasket on the horn. (As shown in Figure 2).



Figure 2

(3) Install the circular flange on the horn. (As shown in Figure 3).

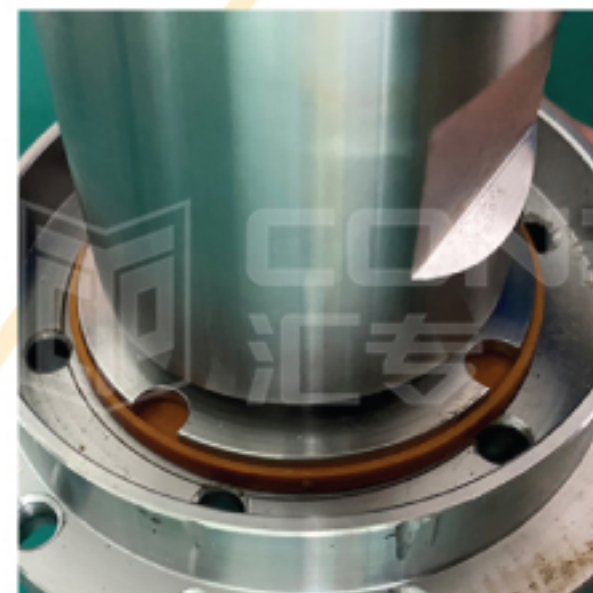


Figure 3

(4) Tighten the transducer to the three-jaw chuck after connecting it to the welding head (the connecting screw rod shall be mounted in the welding head first) (As shown in Figure 4).

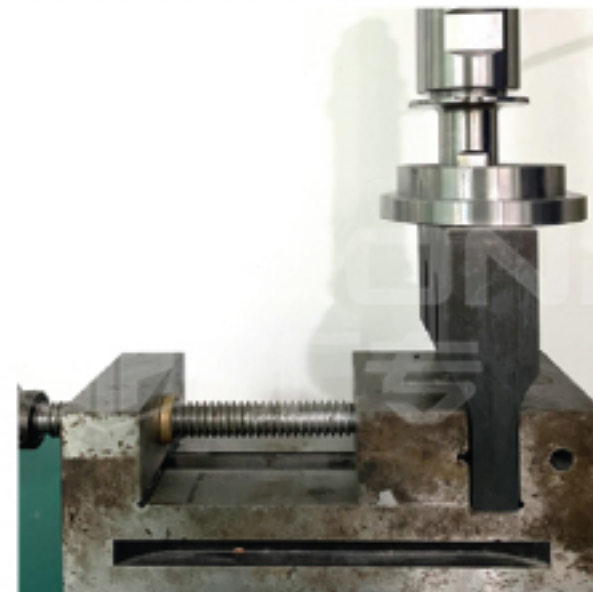


Figure 4

(5) Hold the flange with one hand, put two semi-circular gaskets into the groove in the horn and adjust the position. (As shown in Figure 5 and Figure 6).



Figure 5

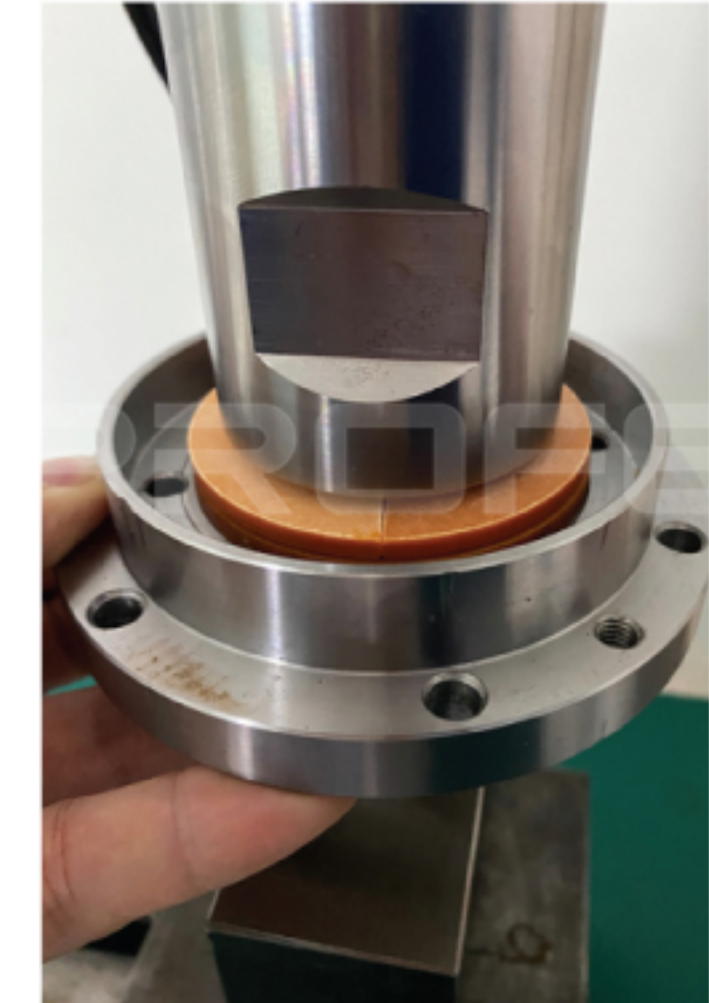


Figure 6

(6) Put the semi-circular steel press block in the flange and adjust the position. (As shown in Figure 7 and Figure 8).

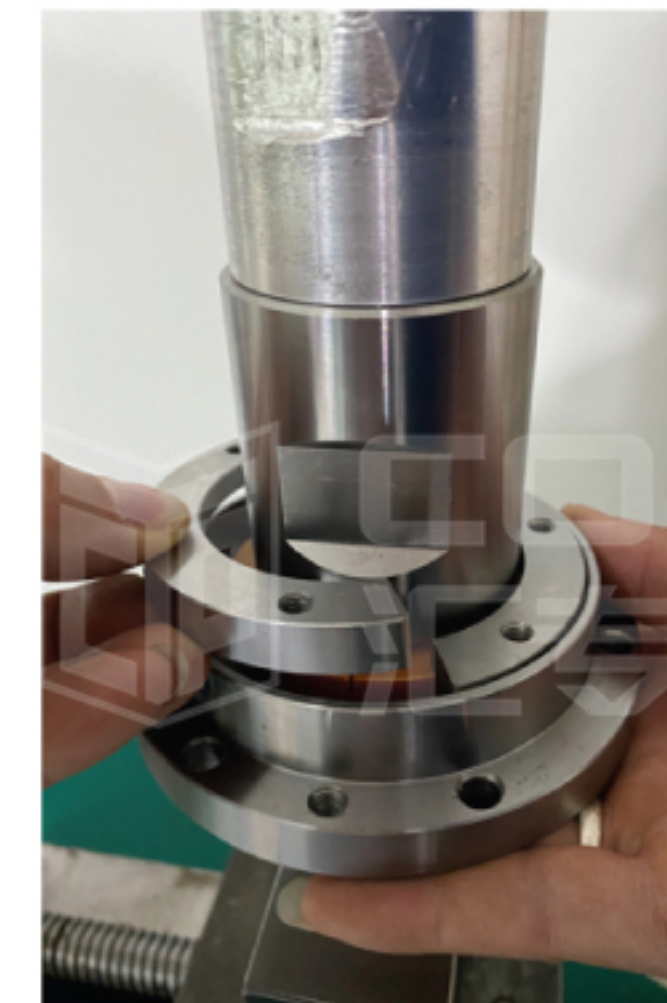


Figure 7

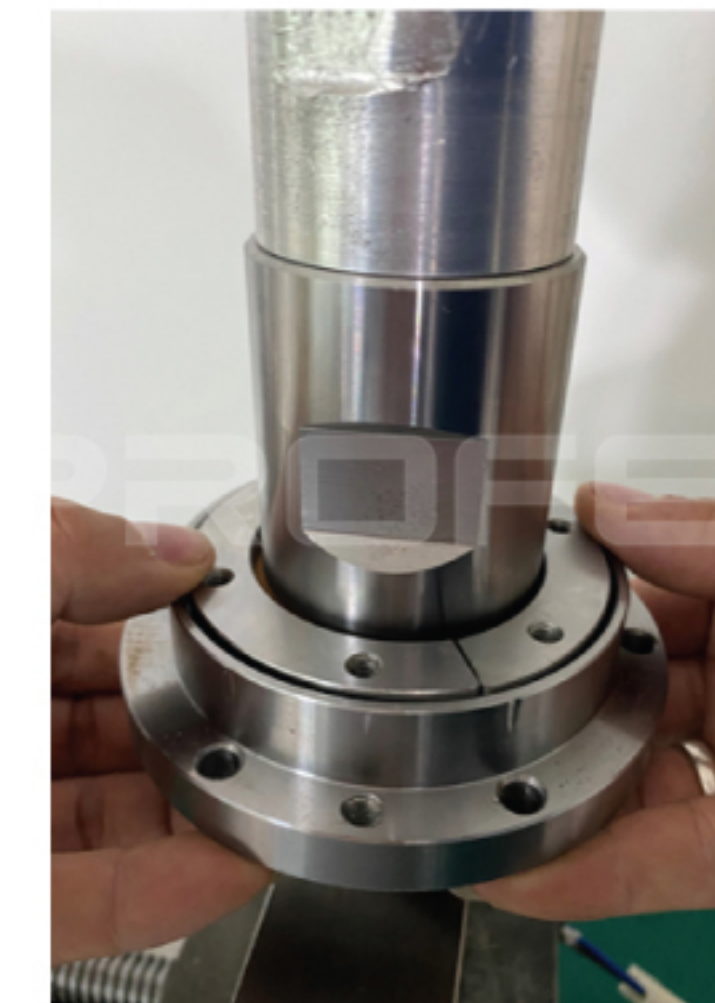


Figure 8

(7) Tighten up the screws in proper order from the bottom up and then pre-lock the screws first, but don't lock them too tight. (As shown in Figure 9).

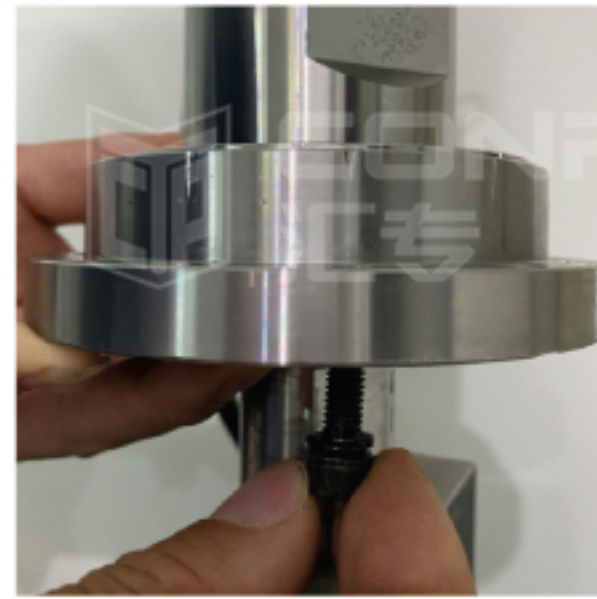


Figure 9

(8) Connect the transducer to the welding head and then tighten it up with a force of 175NM. (As shown in Figure 10).



Figure 10

(9) Tighten the screws up after assembling the transducer with the mechanical connecting plate. (As shown in Figure 11).

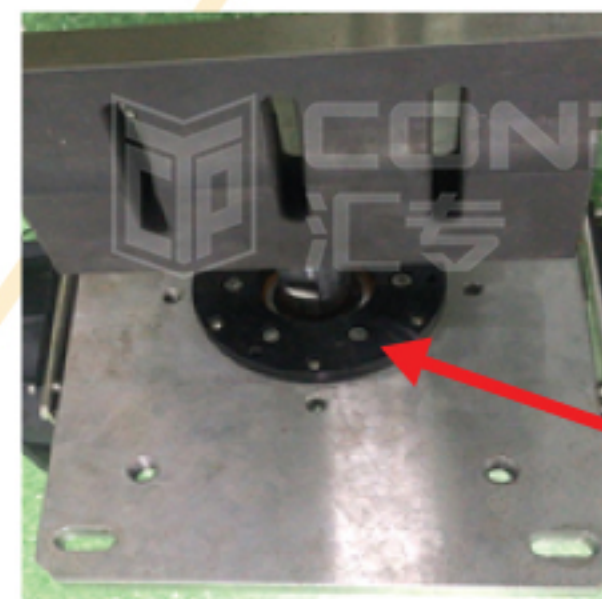


Figure 11

(10) Adjust the welding head and the connecting plate to ensure that both faces are completely parallel to each other. (As shown by the two red lines in Figure 12).

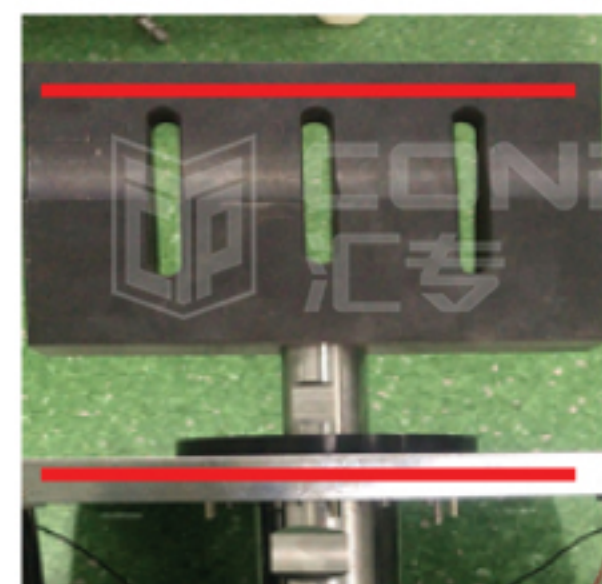


Figure 12

(11) Ensure that the upper and lower gaskets and the transducer are concentric. Keep the rest parts of the transducer out of contact with the flange except the edge. (As shown in Figure 13).

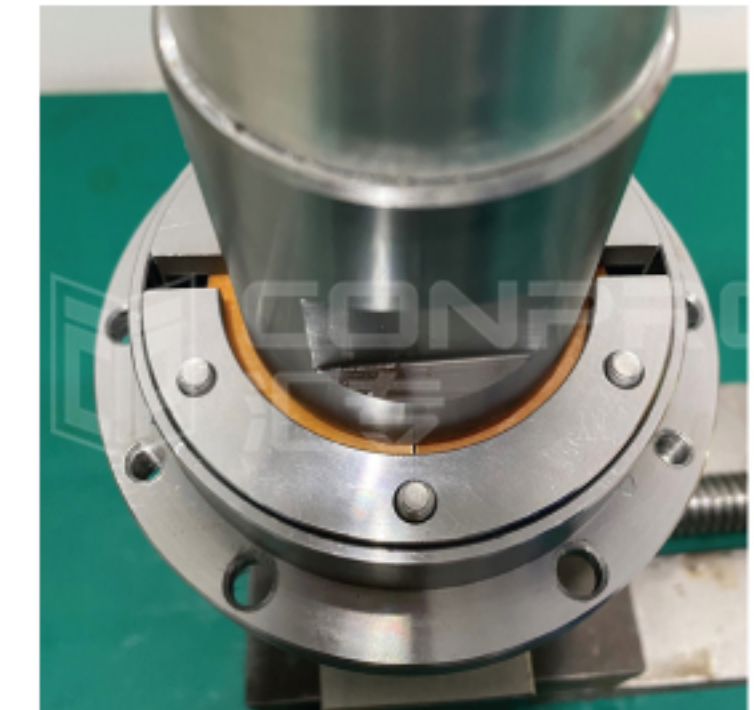


Figure 13

(12) Finally, tighten up the flange screws to complete assembly. Screwing sequence: pre-lock the screws diagonally first (then pre-lock them tight diagonally (not locked tight)), and finally lock them tight diagonally. (As shown in Figure 14).



Figure 14

※ Distinguishing the transducer's negative and positive poles (as shown in Figure 15).
 Positive pole: the pole not in contact with the tail wire.
 Negative pole: the pole in contact with the tail wire.

⚠ Precautions: DO NOT touch the piezoelectric ceramic in the transducer when the equipment is started or maintained, as the piezoelectric ceramic is with high voltage and will cause electric injury or corona to the operator.

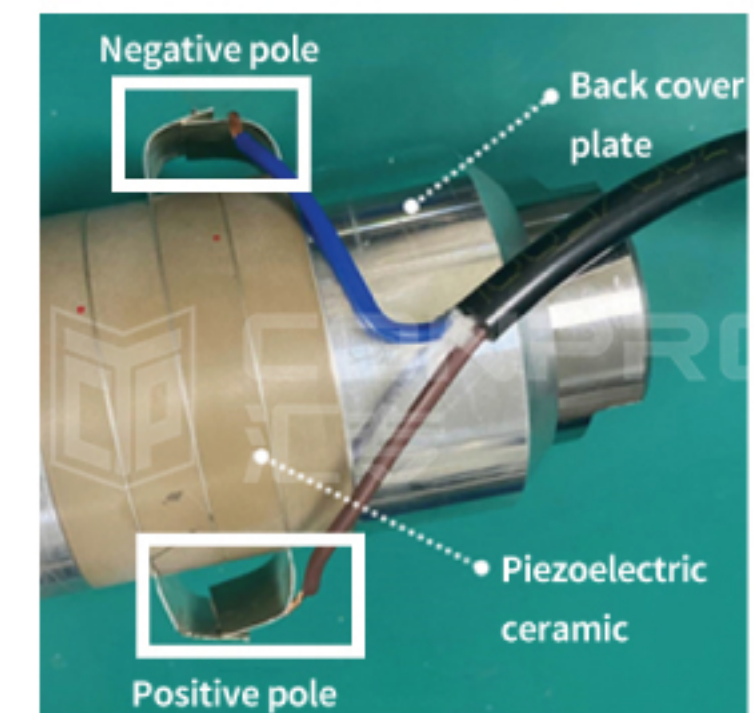


Figure 15

4.2 Precautions for flange installation

- (1) Screwing sequence: Pre-lock a group of screws diagonally first, then pre-lock other screws tight in sequence diagonally (not locked tight), and finally lock them tight diagonally.
- ⚠ Attention: (1) Pay attention to avoid diagonal warping after locking the first screw tight; (2) Apply uniform force on the gasket to prevent it from breaking.
- (2) Ensure that the flange, the gasket and the transducer are concentric. Keep the rest parts of the transducer out of contact with the flange except the edge.

4.3 Precautions for welding head installation

- (1) Clean up the stud, the threaded hole and the mating face to ensure no dirt on the surface; then, apply a small amount ($\leq 1g$) of grease or industrial vaseline to the mating face.
 - ⚠ Attention: DO NOT apply the grease or industrial vaseline to the stud or in the threaded hole.
- (2) Adjust the torque wrench to 175 N.m to lock the welding head tight.
- (3) Adjust the welding head and the side of the connecting plate to ensure that the two faces are parallel (as shown in Figure 12).

5. Commissioning Instructions

5.1 Commissioning guide on intelligent digital ultrasonic welding system

5.1.1 Ultrasonic welding implementation conditions

- (1) The pressure of the contact surface between the knurling mold and the welding head must be above 0.5mPa.
- (2) The transducer must have strong vibrations when in no-load conditions.
- (3) During welding, the knurling mold and the welding head must be fitted effectively, and the welding gap should fall within 0.02-0.05mm.
- (4) A complete set of intelligent digital ultrasonic system includes: intelligent digital ultrasonic generator, transducer, flange and welding head, as shown in the figure below:

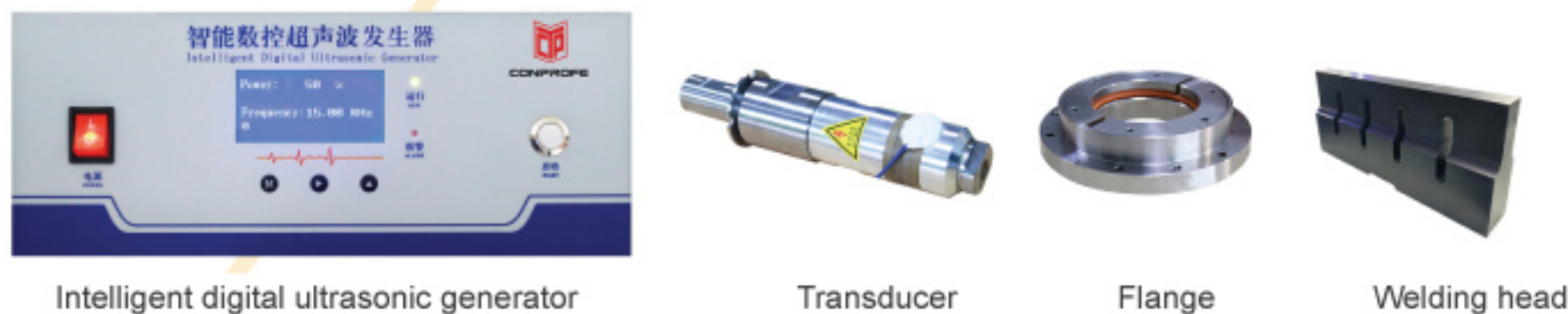


Figure 16

5.1.2 Insufficient welding strength leads to false welding or welding failure

Troubleshooting: (1) Check whether an alarm is given, whether the air pressure meets the requirement, and whether the air pressure fluctuation is too large.

● Alarm (Figure 17)



Figure 17

- Welding process of ear loop: Check whether the air pressure of the ear loop welding machine meets the requirement (above 0.5mPa). Take care if the air pressure value does not meet the requirement (as shown in Figure 18). Note that the air pressure may be lower than 0.5mPa when the air pressure fluctuates too large.



Figure 18

Troubleshooting: (2) Use a hexagon wrench or a metal tool to test the vibration degree of the welding head, and determine the vibration.

- If the vibration is strong, then determine whether the welding height of the welding head's contact surface is appropriate, and whether the welding head is closely fitted without any gap. The knurling welding part is as shown in Figure 19, while the ear loop welding part is as shown in Figure 20 and Figure 21. V-shaped folded edge welding part in Figure 22.

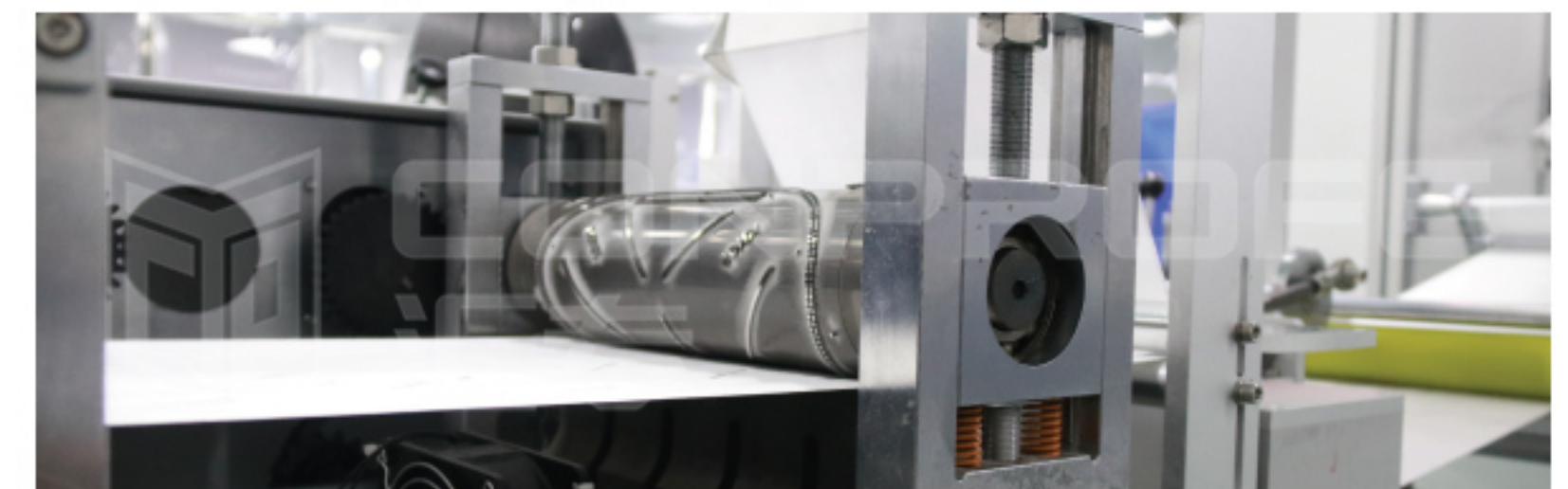


Figure 19



Figure 20

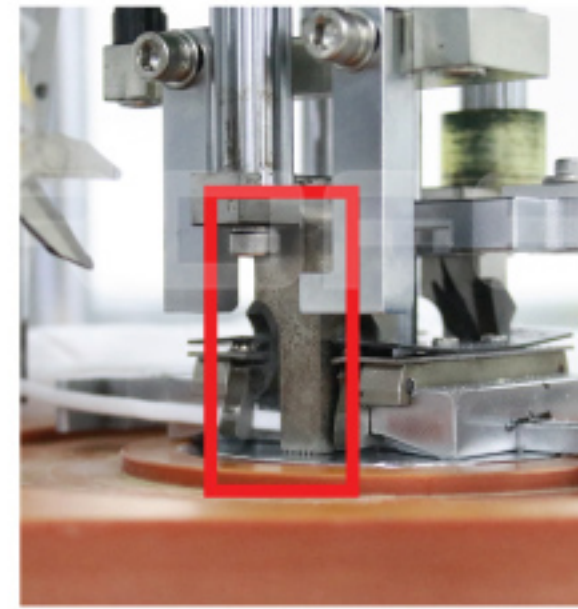


Figure 21

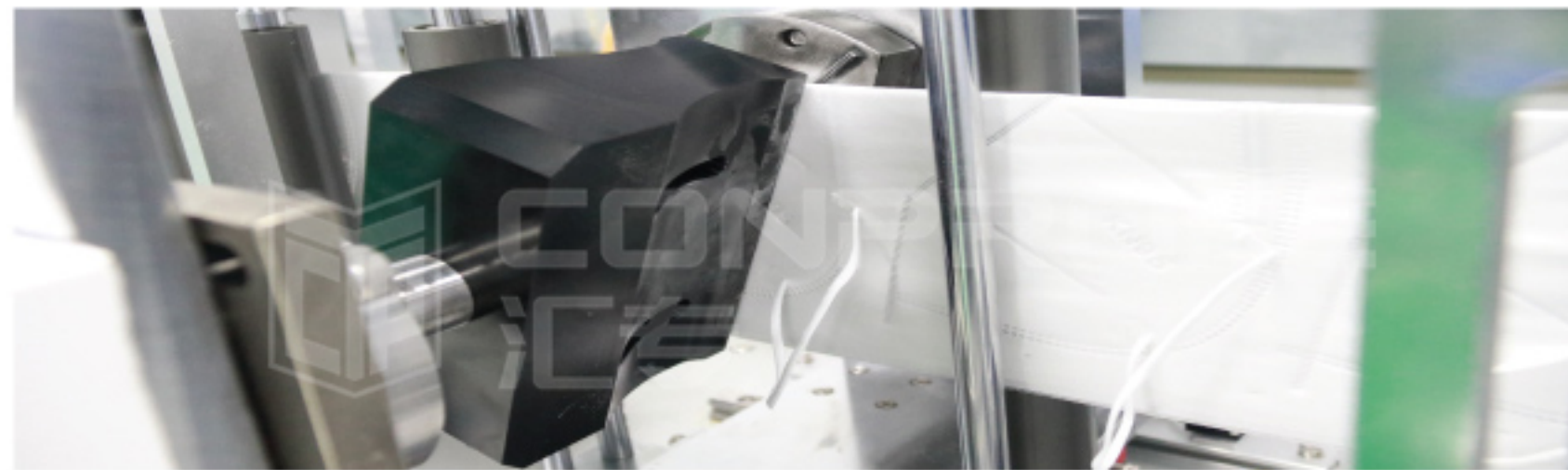


Figure 22

Troubleshooting: (3) Check the welding head

Check the welding head for looseness and check its location for offset (as shown in Figure 23).



Figure 23

5.1.3 Too strong welding strength results in weld penetration, damage and ear loop adhesion.

- Check whether the air pressure is above 0.5mPa.
- Check the welding height. Appropriate measures that can reduce the welding height and the welding strength can be adopted.
- Check whether the ear loop welding cylinder goes down too fast. Measures that can reduce the speed appropriately may be adopted.

5.2 Steps and precautions for commissioning of flat face mask making machine production line.

※ The PLC control program of the mask making machine is to: start the ultrasonic generator first before pressing down the cylinder to prevent the transducer's back panel cover from getting loose due to instantaneous excessive shock.

5.2.1 Commissioning steps and precautions for flat face mask welding

- (1) Check whether the transducer and the welding head are locked tight (torque: 175N.m);
- (2) Check whether the shockproof gasket between the transducer and the flange is properly installed;
- (3) Check whether the transducer and the flange are locked tightly;
- (4) Check whether the roller is concentric with the roller shaft;
- (5) Check whether the roller is parallel to the welding head;
- (6) Make sure that the center of the roller is not at the edge of the welding head, otherwise the mask cannot be welded at all.
- (7) Lift the roller, put the fabrics well into place and drop down the roller for false pressing; adjust the pressure at both ends of the roller after the ultrasonic generator startup until good welding effects can be achieved.

5.2.2 Commissioning steps and precautions for ear loop welding

- (1) Check whether the transducer and the welding head are locked tight (torque: 175N.m);
- (2) Check whether the shockproof gasket between the transducer and the flange is properly installed;
- (3) Check whether the transducer and the flange are locked tightly;
- (4) Check whether the welding head is locked tight (by pressing down the welding head);
- (5) Debug the nut at C and determine the transducer's height (as shown in Figure 28);
- (6) Debug the gap between the welding rod and the welding head as 0.02- 0.05mm;
- (7) Make sure there is no interference between the ear loop clamping jaw and the welding head;
- (8) Check the length and position of the ear loop for accuracy;
- (9) Make sure the chain of the control system is in place and turn on the ultrasonic generator.



Figure 24

6. Troubleshooting

S/N	Common malfunctions	Causes	Reference solutions
1	The system can't search frequency: There is no ultrasonic output when the equipment is running, and still no ultrasonic output after re-startup (the running indicator light flickers at startup and finally turns red; the buzzer keeps ringing and the screen displays "1").	The transducer is damaged, the intelligent digital ultrasonic generator is in fault, or connections between the power supply and the transducer are abnormal.	Cut off the power supply and check whether the connections between the intelligent digital ultrasonic generator and the transducer are normal; conduct frequency search test with a normal intelligent digital ultrasonic generator; replace the transducer.
2	Low operating frequency: after continuous operation for a period of time, welding failure and low operating frequency is found with the intelligent digital ultrasonic generator.	Severe heating of the transducer results in large frequency offset, and then out-of-frequency phenomenon (the frequency has a large deviation from that in normal case) or the welding head is damaged (frequency below 19500Hz).	Improve heat dissipation environment or replace the welding head.
3	The equipment fails in welding after it is stopped and restarted.	After the ultrasonic welding system works for a long period of time, the temperature of the transducer and the welding head rises up, and the frequency of the transducer will offset. After the equipment is stopped, the temperature of the transducer drops down, the frequency of the transducer will offset in reverse. After re-energizing, the frequency searched is not the optimal frequency, thus resulting in poor welding effects.	After re-energizing, search the frequency for a number of times, and keep the equipment running for another two minutes around after searching similar frequency values several times. If the welding effects are still not good, select the OFF mode to search the frequency corresponding to the transducer before running the equipment again.
4	Abnormal noise during the production.	The mechanical construction gets loose or the operating pressure is not stable (ear loops and folded edges)	Cut off the power supply and check whether the mechanical connections are loose. Check whether the air pressure fluctuates greatly.
5	Weld failure	Long-time operation under the condition that the equipment stops while the ultrasonic system keeps running causes damage to the transducer or the optimum work frequency to offset, thus resulting in poor welding effects;The mechanical construction gets loose; The air pressure is insufficient or instable.	Start and stop the ultrasonic system synchronously with the equipment; Check whether the mechanical construction and the air pressure are stable.
6	Welding head becomes charged.	The transducer's positive and negative poles are connected inversely;The ground connection is poor;The transmission line is abnormal.	Make wiring and ground connections according to standards; Replace the transmission line.
7	Power alarm	Frequency search: (Display 1) Overcurrent:(Display 2) Overvoltage:(Display 3) Over temperature:(Display 4)	Frequency search: Adjust frequency search range. Overcurrent: Check the output backend for abnormality. Overvoltage: Check the output backend for abnormality. Over temperature: Improve the heat dissipation system of the transducer.
8	During edge knurling and slitting, welding effects becomes poorer as the speed increases.	The automatic frequency search mode of the intelligent digital ultrasonic generator cannot catch up with the mask making machine's operation speed.	Change the control mode to manual mode and enter the appropriate frequency value.
9	Ear loops cannot be welded.	The mechanical construction gets loose, the transducer swings during welding, or the clearance between the cylinder and the welding head increases or their positions shift; The air pressure or the cylinder's pressure is insufficient, resulting in weld failure.	Check all mechanical connections for looseness; maintain stable and adequate pressure.
10	Short service life of welding head.	The welding head is easy to wear, and have poor heat dissipation during operation. Severe and continuous heating of the welding head will greatly reduce its service life.	Replace it with a wear-resistant welding head; improve the heat dissipation conditions.
11	The intelligent digital ultrasonic generator's frequency keeps constant.	The intelligent digital ultrasonic generator is in fault: It becomes unable to search frequency and keeps a constant frequency after jumping to the last working frequency; it is in the OFF working mode, where the frequency will be maintained the same.	Check the operating mode of the intelligent digital ultrasonic generator; cut off the power supply and check the transducer, the intelligent digital ultrasonic generator and the connections between the two for any abnormalities; use a normal intelligent digital ultrasonic generator for frequency search test to determine whether the intelligent digital ultrasonic generator is in fault.
12	After working continuously at high intensity, weld failure phenomena occur during the knurling and slitting.	The transducer is overheated resulting in frequency offset, and the operating frequency is not optimal; the mechanical construction parts get loose; the slitting and discharging speed is too fast and the welding time is too short.	Improve the heat dissipation system of the transducer and reduce the frequency offset; Check the mechanical connection parts for looseness; Reduce the discharging speed to extend the welding time.