ULTRASONIC WELDING GENERATOR

20KHZ2000W

用户手册

User Manual

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*About the user manual version

New models are being improved almost every day. We will continue to update the equipment hardware and software to meet the wide range of ultrasonic generators needs. Newly added functions or modified functions will be explained by rewriting the existing version of the user manual. After rewriting the manual, without notice.

thank you very much for choosing our products. The generator is our newly developed product with high performance and high stability, which can directly replace almost all ultrasonic generators at home and abroad, providing high repeatability.

1. Foreword and Overview

1.1 Safety requirements and warnings

This section explains the meaning of the various "safety caution" symbols and signs on the manual, and provides general safety precautions for ultrasonic generator systems.

The following two signs will appear frequently in the manual, please pay special attention:

Note

"Attention" is used to indicate possible dangers and give special tips on some key information for correct use and parts that are easily overlooked. Users should have a certain understanding of it.

Warning

The "Warning" logo is used to warn of possible dangers and possible damage to the equipment. Failure to comply will result in personal injury or equipment damage to varying degrees.

Notice

Ultrasonic generators must be used strictly in the prescribed manner.

The following precautions should be taken when using an ultrasonic generator:

- The user manual introduces you to use the ultrasonic generator properly, please strictly follow it.
- It is important to use a power socket with a ground terminal to prevent electric shock.

- Before carrying out maintenance and inspection of the ultrasonic generator, the power supply should be cut off. Without the prior permission of the company, it is not allowed to disassemble and adjust by itself. Otherwise, all guarantees will automatically lapse.
- Ultrasonic generators can generate high voltages of tens of thousands of volts in certain locations under special circumstances. Do not open the case without permission.
- The emergency stop switch of the welding machine should be checked regularly to ensure that the emergency stop switch is always effective
- Relevant technical data of ultrasonic equipment must be strictly observed. In particular, the rated parameters of the power supply and the operating environment of the system should be configured in full accordance with the relevant regulations.
- This equipment can only be adjusted by personnel who have read and understood this operating manual, and only by personnel with appropriate training!

Before installing or adjusting the product, you should read this manual carefully in order to better use our products. Failure to follow these instructions may result in damage to the transducer / horn or mold.

2.Basic Information Introduction

With an available bandwidth of 3KHz (such as 20K range 18.5KHz ~ 21.5KHz), it can directly drive all the transducers on the market that meet the frequency of this model without modifying the matching capacitor.

2.1 Intelligent Fan Control:

- When the temperature is low, the fan starts following the sound wave output. If there is no sound wave output within 30 seconds, the fan stops to prevent the inhalation of excessive dust and improve the reliability of the device.
- When the high temperature exceeds 45° C, the fan will continue to work to cool down.
- When the temperature exceeds 80° C, the device will provide over-temperature protection and prompt on the screen.

2.2 Power limitation:

In order to be able to work continuously around 2000W, the actual power protection threshold of the generator is 2400W. Our universal ultrasonic generator is particularly suitable for long wave applications such as cutting and non-woven welding. The built-in circuit provides a purer sine wave driven transducer than most generators on the market, making the heat generation smaller and more efficient higher. Reduce heat dissipation requirements and extend life.

2.3 Working Mode:

Automatic Mode: long wave mode, suitable for cleaning / cutting / non-woven welding, etc.

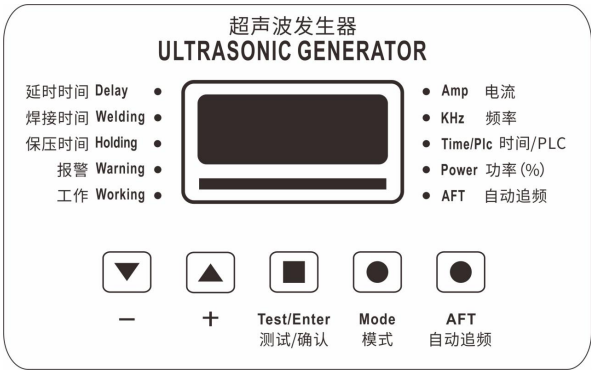
Welding Machine Mode: Delay time;

Welding time;

Holding time (curing time);

2.4 Voltage / Generator Size

- Voltage: 198-242VAC (50 / 60Hz),
- Size: 384mm * 240mm * 110mm
- Weight: 7KG
- Color: light gray



2.5 Main Features

- **Automatic frequency tracking**: The system automatically tracks the resonance frequency of the welding head. Compensation for detuning caused by heat and other reasons.

- **Digital frequency control**: The operating frequency is digitally controlled by the microcontroller.

- **Digital amplitude setting**: This feature allows users to set accurate amplitudes according to application requirements, which provides a larger range and repeatability of settings than analog systems.

The amplitude can be adjusted in a large range: 20% ~ 100% continuously adjustable, which is different from the shortcomings of traditional generators that are difficult to work with low amplitude.

- **High-speed microcontroller:** The operating frequency of the internal microcontroller is up to 168MHz, which can accurately and timely control the working conditions.

- **0.5 millisecond control and sampling interval:** 2000 times of sampling and control for the welding process per second.

- **LED and key operation interface are stable and reliable.**

- **Slant start:** Ultrasonic energy supply and welding head start at the most suitable ascent speed to reduce the electromechanical pressure of the system.

- **Vibration after welding:** The user can start the ultrasonic wave after the welding and pressure holding process is finished, and the workpiece sticking to the welding head will be shaken off.

- **Welding quality monitoring:** user-definable process alarm, when it is outside the range of user-defined defective products, the system will generate an alarm to remind the user.

- **Diagnosis at startup:** During the startup process, the main components of the system are tested.

- **Timing frequency search:** When starting the system, the system performs frequency search every one minute to update the resonance frequency of the welding head. This is especially effective for a welding process that can affect the temperature of the welding head. Changes in the temperature of the welding head will cause the resonance frequency to drift.

All kinds of protection are complete:

- including over power consumption of the whole machine,
- Inverter tube overcurrent,
- Inverter drive undervoltage,

- Load overvoltage,
- Load overcurrent,
- Load overpower,
- The load impedance is abnormal,
- The load frequency is out of range,
- Over temperature,
- Overcurrent of external devices (such as solenoid valve),
- The control circuit voltage is out of range,

Most of the functions can be used only by updating the program. We provide an offline burner with a limit on the number of flashes. Users can update the program by themselves.

Warning

Since it is a general-purpose ultrasonic generator, internal adjustments are made at the factory for different applications to meet application requirements, and you should not use it for other purposes. If the generator is factory set for welding applications for cutting applications, it may cause damage to the die due to excessive driving.

3. Environmental Requirements

Try to use the device in an environment that meets the following conditions, which will benefit the life of the generator:

Envirnmental factor	Scope of application
Operating / use temperature	From 0° C to +55° C
Storage / transport temperature	From －25° C to +70° C
Relative humidity	From 30% to 90%, no condensation

Warning

In order to ensure that the ultrasonic generator has good ventilation conditions, it is necessary to take care not to cover the ventilation opening of the generator. It is strictly forbidden to use this equipment in the bad environment with corrosive gas around. The inhaled air will flow through the internal circuit module, and use in the presence of corrosive gases will greatly reduce the service life of the device.

4.Packing list

Name	Quantity	Name	Quantity
Ultrasonic generator box	1	manual	1
1.5m power cable	1	DB9 connector set	1
2 core aviation plug	1		

When receiving the equipment unpacking

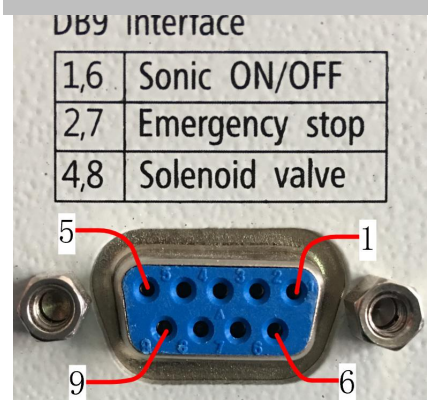
- Check the packing list for missing items
- Check the appearance to confirm whether it has obvious damage
- Whether the power-on test equipment works normally
- The user manual may be given by sending a PDF file

Warning

Ultrasonic generators have sophisticated components and structures and are sensitive to static electricity. If they are dropped or bumped during transportation or transportation, the circuit of the generator may be damaged.

5.Interface Definition

5.1 DB9 interface



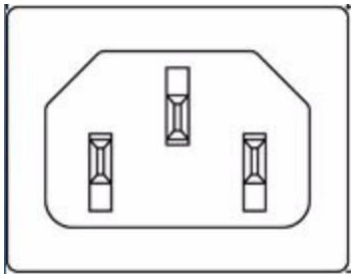
We will send DB9 connection set together with ultrasonic generator, which is very easy to use.

1,6	input	24V voltage, turn on is to start, the typical application is to connect a normally open micro switch or self-locking switch.
2,7	input	24V voltage, when connected, it is an emergency stop. The typical application is to connect a normally open micro switch or a self-locking switch.
4,8	output	24V output voltage, connected to the solenoid valve to control the movement of the cylinder lifting welding head。
Among them: 6, 7, 8, 9 are the same ground, so 6/7/8 can share a line.		

5.2 Ultrasonic Output Aviation Plug

1	+, Connect to the positive end of the transducer
2	-, Connect to the negative terminal of the transducer and connect to the ground wire and the chassis

5.3 Power Input Interface



Notice

The power plug must be inserted into a socket with a ground terminal. The adaptable power range of the ultrasonic signal generator is 220VAC ± 10% @ 50 / 60Hz. By adjusting the internal settings of the generator, it can also adapt to the power supply range of 110VAC ± 10% @ 50 / 60Hz.

Using 110V directly without adjustment can almost only be used for cutting and atomization.

The minimum diameter of the power connection cable is 1.5mm2.

Fuse: 250V, 15A

Internal Adjustable Options:

Power selection, the transformer provides three output gears.

- L : generally used for cutting knives and other applications. The amplitude is relatively weak and the loading capacity is poor.
- M :used for most applications.
- H: used for occasions requiring high power output, such as metal welding.

You should not adjust the position without permission from our company.

Notice

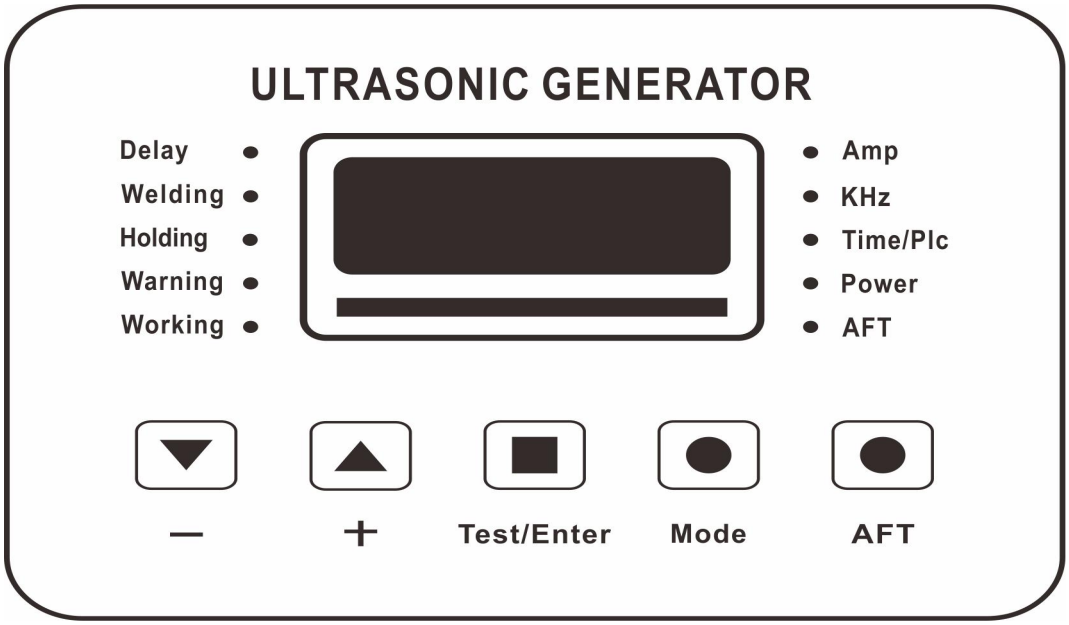
When designing and manufacturing generators, we have fully considered various safety aspects. Modifications or certain changes to the system may affect the safety of the device during operation. Therefore, when modifying or modifying the equipment, keep the following in mind:

- Before modifying the ultrasonic welding system using components provided by other manufacturers, you must contact our company to determine whether these components are suitable for modifying the machine.

- If the customer makes such modifications or changes to the ultrasonic generator without the permission of the company, all the manufacturer's guarantees will automatically become invalid.

6.Display Interface and Parameter Introduction

6.1 Set Interface :



6.2 Button Function:

- **+ : Value/Setting +**
- **- : Value/Setting -**

- **Test/Enter**: Sonic test and input confirmation key combination.

  - when long press Test/Enter button for more than 0.8 seconds, it is sonic test function, used for no-load test horn.

  - When Test/Enter key is pressed in short tome, it is setting state entered or the data is confirmed after setting.

- **Mode**: Mode button is used to select the display Mode of the digital display screen.

  - Under the normal display Mode, such as the original display state of Amp,
  - Press once to enter the display state of KHz.
  - Press again to enter the Time/Plc display state; Press again to enter the Power

- Display state; Press again, return to Amp display state, and so on, loop display.

- **AFT**: the one-button frequency tracking function, short press, the ultrasonic generator will automatically track the resonant frequency of the horn or transducer (oscillator).

6.3 Indicator Function Function:

- **Amp:** when the Amp light is on, display current, which is X.X ampere.

  If the horn（mode） is too small, press the sound wave test/ enter key, the current displayed may be 0.1a, which is a normal phenomenon.

- **KHz:** when the KHz lamp is on, display frequency, XX.XX KHz, which is the working frequency of the horn (mold).

- **Time/Plc:** when the Time/Plc light is on, the digital display shows the current working mode of the ultrasonic generator.

  If the PLC is displayed, the working mode of the ultrasonic generator is the automatic mode, and the wave time of the ultrasonic generator is only controlled by the external PLC.

  If the display is x.xx, and the Delay light is on, the working mode of ultrasonic generator is plastic welding machine mode, the working time of ultrasonic generator is the time set for the internal time.

- **Power:** when the Power light is on, the digital display displays the amplitude percentage value, which can be set from 20% to 100%.

- **AFT:** when the AFT button is pressed, the ultrasonic generator will go into tracking frequency mode, AFT light will be off after finished the tracking frequency.

- **Delay:** when the Delay and Time/Plc lights are on at the same Time, the digital display displays the Delay wave Time in the plastic welding machine mode.

- **Welding:** when Welding and Time/Plc lights are on at the same Time, the digital display shows the welding time in Welding mode.

- **Holding :** when Holding and Time/Plc lights are on at the same Time, the pressure Holding Time in is displayed.

- **Warning:** when Warning light is on, displays the alarm code, such as E-01, E-02, etc.

- **Working:** when the Working light is on, the original state of the digital display screen will not change. It only represents that the current ultrasonic generator is emitting waves.

Lamp bar: set amplitude of ultrasonic generator from 20%-80%, and lights 1-8 lamps respectively.

6.4 Automatic Mode (continuous operation mode):

Long press the Test/Enter button, turn on the power switch. Enter the automatic mode (PLC).
The control mode of ultrasonic generator can be switched by pressing the +/- button.

When display PLC, the ultrasonic generator can operate in automatic mode.

When displays x.xx and Delay light is on at the same time, the ultrasonic generator can work in plastic welding mode.

After selecting a good working mode, wait more than 2 seconds, turn off the power switch, after the machine is discharged, restart the normal use.(you can also turn off power swith, long press the Test/Enter button to accelerate the discharge of the machine.)

Warning

When the automatic mode is selected: digital current Working status, Working light will be on, showing the running status, indicating that the sound wave is in the output state.
If the cutting tool is used, avoid touching the tool tip.

Warning

Continuous working (welding time over 5S), it should be ensured to work under low power. It is recommended to work under 1/3 power of the model (such as 2000W model, continuous working should not exceed 666W as far as possible).

In order to prolong the life of the horn(mold), pls intall the fan beside of ultrasonic transducer.

6.5 Ultrasonic Welding Machine Mode (Parameter Setting)

1. Press Mode button to switch the display Mode to Time/Plc Mode. The indicator lights of Delay and Time/Plc are on.

2. Press the Test/Enter button to Enter Delay time setting mode. The digital display and Delay indicator light will be flashing. At this time, you can press the +/- button to adjust the delay time parameters.

3. Press Mode button again to enter Welding time setting Mode.The digital display and Welding indicator lights will flashing, +/- button to adjust the Welding parameters.

4. Press the Mode button again to enter the Holding time setting Mode. Digital display and Holding indicator light will shine, then you can press the +/- button to adjust the welding parameters.

5. After various parameters are adjusted, press Test/Enter button to confirm, and the parameter setting mode will exit. At the same time, the digital display will not shine.

6.6 Ultrasonic Amplitude Adjustment:

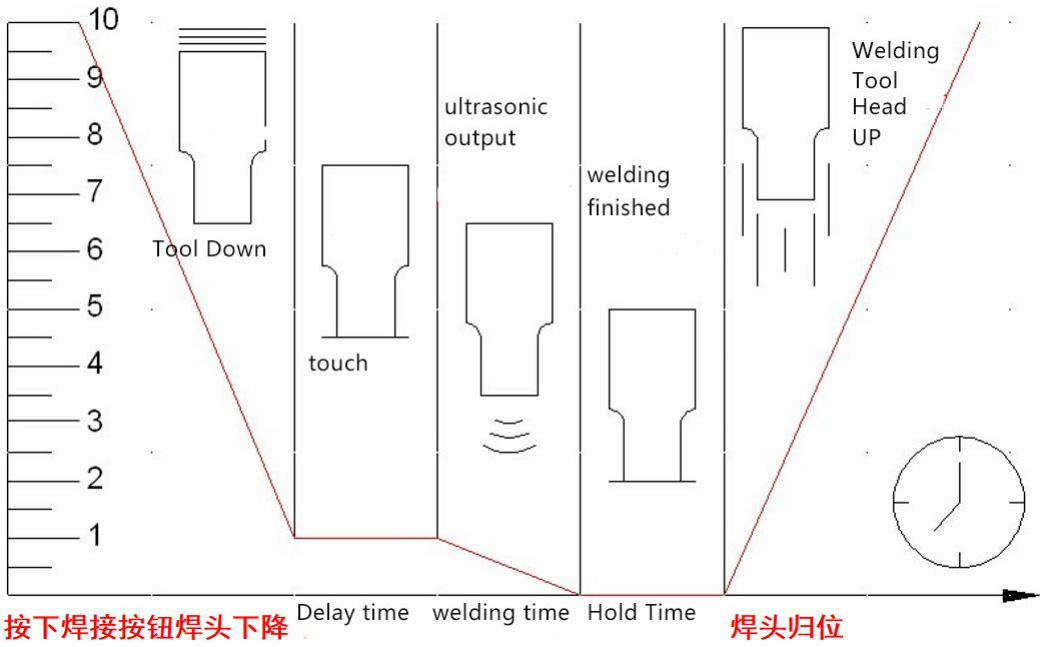
1. If you want to adjust the output amplitude of the ultrasonic, press Mode button to select the display Mode of the digital display screen as POWER, and the POWER lamp is on.
2. Press Test/Enter button to Enter the mode of amplitude and percentage setting, and the digital display will shine.
3. Press the +/- button to set the output amplitude of 20%-100%.
4. After setting the parameters, press Test/Enter to confirm, and the system will exit the setting mode.

Ultrasonic test: ultrasonic test amplitudes are limited to a maximum of 40% of the total amplitude, even if your Settings exceed 40%, to exceed 40% of the output, you must use an external boot.The purpose of this is to protect the mold to a certain extent, and to prevent the mold from driving directly with large amplitude under the condition of abnormal mold (such as not locked) and causing irreversible damage.

Attention:

Any time the emergency stop switch is pressed, the welding head can immediately rise, the ultrasonic stop and end the welding process, and return to the standby state.

6.6 Function of each parameter in the setting item:



Delay time: the time from pressing the welding button to pressing the welding part.That is, the time of phase 1 to phase 2 in the figure, which will be related to the cylinder travel and falling speed. If I do not know how much to set, set a relatively large value, and then reduce it according to the circumstances, such as 0.8s is good.Can be set up 0 ~ 9.99 s

Pressure holding time (also known as curing time/cooling time) : after the ultrasonic wave is stopped in stage 4, in order to make the welding parts tightly bonded and wait for cooling, sometimes the welding head needs to hold the product for a period of time to make the welding parts tightly bonded and cooled, this is the curing time. Correspond to phase 4 in the figure.Curing time is not required. In order to minimize welding time and improve efficiency, this parameter can be set to minimum 0.5s in most cases.The specific value depends on the actual welding effect.Can be set up 0 ~ 9.99 s

7. Commonly Setting Process for Welding

Select welding machine mode to start

1. Start the machine and wait for the completion of the detection frequency of the system to obtain the operating frequency.

2. Set the amplitude to 60%, test according to the sound wave, check whether the current is within 1A, whether the power is within 500W, and listen to whether the sound is dominated by crisp model frequency . If not, you should check whether the mold (horn) or transducer is abnormal, whether the mold (horn) is not tightened, cracking, etc.

3. Click "parameter setting "-- >" time mode "-- >" setting", time mode is the most common mode, all generators provide this mode, easy to use.

4. Set the delay time: 0.5s, which depends on the time from the welding head to the welding part, and adjust accordingly.

5. Set the welding time: 0.5s, which depends on the welding material/welding area and amplitude, etc., set a reasonable value first, and then adjust it according to the result.

6. Set the holding time: 0.5s, n which depends on the solidification time and welding melting degree of the welding material. suggested use the large value first and reduce to the satisfactory value as appropriate to speed up the process.

7. The energy upper/lower limit, the power upper/lower limit and the secondary wave time shall be kept at 0, that is, this function shall not be used, and the power and energy displayed on the interface after welding shall be filled in according to the power and energy shown after welding when it can be welded correctly, so as to increase the quality monitoring function.

8. Press the "exit" button to return to the main screen.

9. Test welding, continuously adjust above amplitude/delay time/welding time/curing time as well as the air pressure value of the frame and the position of the mold according to the welding situation until satisfactory results are obtained.

10. Steps can be omitted: according to the results shown after several times of welding, average the energy value obtained for many times, and switch to the energy welding mode.The energy welding can compensate for the difference of welding consistency caused by the fluctuation of voltage/air pressure or unsatisfactory rubber parts.

11.If a complete fusion of welding parts is required, the peak power welding mode can be used. After the welding parts melt and become soft, the absorbed power will become larger. According to this principle, a peak power value is set to achieve better fusion consistency.

8. Warning Message & Reasons

8.1 Error: lock frequency out of DAC coarse range:

Trigger the protection, indicating that the frequency has lost the lock, and the correct working frequency has not been found when the frequency of the microcontroller is adjusted to its own capacity limit.

When this error occurs, try:

- whether load is connected to the mold in the frequency search process, because the equipment searches for resonance frequency with very low amplitude. If the load is connected (such as the search frequency in water), the driving capacity is not enough to push the load to get the correct feedback, so please do not load the search frequency. reset a relatively high frequency and manually search frequency.
- check the welding head for cracking, unlocking, sliding-wire and adhesion.
- check whether the connection line between the generator and the load is not connected, falling off or broken.
- check whether the contact surface between the welding head and the luffing device is smooth and the surface is flat.

Replace a normal welding head test, confirm that the equipment is working properly, and check whether the resonance frequency of welding head is within the allowable frequency range of the equipment, such as the 20k model is between 18.5k and 21.5k.

8.2 Error: Lock phase out of the DAC fine tuning range:

Trigger the protection, indicating that the resonant frequency cannot be found or the frequency lock has been lost in the real-time frequency adjustment of the system.

When this error occurs, try:

- Reduce the load, such as reducing the mold size, pressure in the plastic welding machine mode, etc.
- Increase the amplitude and use higher voltage to push.
- Replace the luffing rod with the following 1:2 ratio, which is recommended by us. The traditional 1:3 ratio is more suitable for the traditional self-excited ultrasonic wave than the luffing rod.
- Research the resonant frequency and set the frequency to work at the resonant frequency + 0.06khz.
- Check other possible causes, such as abnormal wiring, mold, transducer, voltage, etc.

8.3 Error: A power consumption:

During the working process, the system will detect the real-time power in real time and protect the equipment from damage when the power exceeds the rated power of the equipment.

When this error occurs, try:

- Research frequency, and check whether the frequency searched is out of range under the acoustic wave test, the specific value can be found in this paper.
- Excessive load, such as heavy load (such as water load) on a large mold, exceeds its own safe power output range to provide protection.
- If the mold or generator is abnormal, such as the mold is cracked but not completely damaged, the resonance characteristics will become worse, the power consumption will increase but the actual amplitude will be small.
- Large amplitude means large driving voltage, and some loads require a sharp increase in output power. Beyond the range, appropriately reduce the amplitude.
- If it is confirmed that this parameter must be used due to excessive load or amplitude, please consider using other more powerful models of our company.

8.4 Error: Excess Temperature:

In the working process, the system will continue to monitor the temperature of the inverter part of the generator power to ensure that when the temperature is too high, it can timely prevent further temperature rise and damage the equipment.Temperature generation and heat dissipation have been fully considered in the design and the protection will not occur under normal circumstances.

When this prompt occurs, try:

- Improve the use environment, increase the heat dissipation space or provide external heat dissipation.
- Check whether the vent is blocked and the fan is damaged.
- Wait a few minutes until the temperature drops, then restart the machine and continue working.

8.5 Error: IGBT Overcurrent Protection :

This protection indicates that for some reason, the power consumption of the whole machine is very large, which has exceeded 2 times of the rated power in a short time. It should be handled with special care.

When this prompt occurs, try:

- Check whether the frequency is correct. In the case of no load, set the tracking frequency to a relatively high value, such as 20.4k for 20k model, and conduct frequency search.
- Check whether the mold has been damaged, remove the mold or replace a mold that is confirmed to be good, and check again.
- Check whether the load is short-circuited or not. Check whether the load connection wires and plugs are short-circuited or have insufficient voltage resistance, which leads to short-circuit overcurrent protection.
- Other problems that lead to severe over power consumption.....

8.6 Error: Load Overcurrent Protection :

The system detects that the load current exceeds the protection current value set internally.

When the prompt occurs, you can try in sequence:

- Detect whether the load is too large and reduce the load.
- If the overcurrent is caused by too large load, the amplitude can be appropriately increased, and the same power can be output by increasing the drive voltage to reduce the drive current, but doing so will more easily lead to the overpower warning and have a greater impact on the life of the mold.
- If there is no acoustic output, check whether there is a short circuit in the load line.

- Increase the intermediate frequency by 0.1khz and retry.

8.7 Error: Load over-voltage:

The system detected that the load voltage exceeded the protection voltage set internally.

When the prompt occurs, you can try in sequence:

- Reduce the amplitude to reduce the driving voltage.
- Check whether the load is not received.
- Check whether the municipal electricity exceeds the standard seriously.
- Contact us.

Error Code Table：

Item	Error Code	Error Messager
1	E-01	The display board and the MCU master control board cannot communicate
2	E-02	Over current alarm
3	E-03	Load overvoltage alarm
4	E-04	Power tube overheating alarm
5	E-05	Load error alarm
6	E-06	Frequency error alarm

If you still cannot find the reason after testing, please contact us to solve it.

9. About after-sales

The equipment is guaranteed for one year. Please contact us if the equipment fails to work properly due to any quality problems within one year (appearance is not covered by the warranty).We will solve for you and resume production as soon as possible.

9.1 Warranty terms shall not apply to:

- Any product that is misused, not used according to instructions, neglected (including insufficient maintenance), accidentally installed, adjusted or adjusted by users;
- Any product that is exposed to adverse conditions, repairs incorrectly, or repairs using methods or materials other than our own;
- Use accessories other than our company (range changer, transducer, or defective welding etc.);
- Equipment damage caused by irresistible factors (natural disasters, etc.).

9.2 Warranty terms include:

- Any quality problems that lead to abnormal production within the warranty period will be guaranteed without any charge.
- For parts that are replaced within the warranty period, the warranty period of the new parts shall be the remaining period for replacing the old parts.
- For parts that have been replaced after the warranty period, there will be a 3-month warranty.

Users have any warranty questions can contact the salesperson who sell the equipment.