Ultrasonic Processor User Manual

Contents

1 Safety Requirements

1.1 Common signs in the manual

Please pay special attention to the following signs and instructions:

The "high pressure" mark includes dangerous situations, such as user neglect, may cause serious injury accidents, cause irreversible damage to the equipment, and even threaten life.

The "Warning" signs include dangerous situations that may cause moderate injury to the human body or the device if the user ignores them.

The "Caution" sign includes some common problems noted by the external wiring of the device, such as user neglect, which may cause the device to fail to work properly.

1.2 Common Marks on Product

SWP series ultrasonic generator in each external port and above are affixed with some safety signs to remind the user that there is a high voltage dangerous voltage inside the equipment, the user needs to be careful.

Warning: The following precautions should be taken before the installation or maintenance of the equipment:

1) Ensure that the power supply is off before electrical connection.

2) A power supply with a ground terminal must be used to supply the equipment to prevent the risk of electric shock.

3) The heat dissipation fan must have a certain space for heat dissipation. Otherwise, the service life of the device will be affected.

4) Turn off the main power supply and wait more than one minute for the internal large electrolytic capacitor to discharge fully before disassembling the device for viewing or maintenance.

5) Do not perform ultrasonic operations when the high voltage RF cable of the transducer is disconnected or there is no transducer. Otherwise, the service life of the device will be affected, and personal threats may occur in serious cases.

If there is abnormal sound in the process of ultrasonic use, the user needs to power off to check:

1) Whether the high-voltage RF cable is loose.

2) Whether the mold and transducer are locked.

3) Whether there are cracks in the mold.

In the process of ultrasonic use, due to the mold design or special use conditions produce audible vibration of the human ear, in such cases, please use personnel to do a good job of protection, otherwise long-term use is harmful to the human body.

In the process of ultrasonic welding plastic type materials, if there will be certain harmful gases, please use the personnel to do a good job of ventilation and protection of their own.

1.3 Equipment Usage

The equipment is a small power ultrasonic generator, rated power is 2000W, widely used in ultrasonic cell crushing, small spot welding, experimental water treatment and so on.

1.4 Equipment Working Environment

In order to use SWP series ultrasonic power supply safely, please strictly follow the instructions in sections 3.1 of this manual to operate the equipment.

2 Equipment Introduction

SWP series ultrasonic generator through the frequency generation - power amplifier to load the high-frequency AC signal to both ends of the transducer, through mechanical vibration can achieve the desired effect. Users can choose different types according to the needs of assembly into their own needs.

SWP series ultrasonic generator has the following characteristics:

1) **Power-on scanning can be switched on and off --** whether the device can be scanned after startup can be set by the user.
2) **Power supply voltage adaptation --** the input voltage range of the equipment is 220V AC.
3) **Time adjustment - The** device has built-in time counting, the user can set the time length according to the need, the accuracy of 100ms.
4) **System protection --** through software and hardware to achieve the purpose of protecting the ultrasonic system.
   i. Voltage protection
   ii. Current protection
   iii. Frequency protection
5) **Alarm reset -- the frequency of the** device will automatically reset to the set frequency after the alarm occurs, and the device will enter different states according to the scanning mode after the user presses the start key.

3 System Features

3.1 Ultrasonic system

The ultrasonic system consists of SWP series ultrasonic generator and transducer, which can carry out ultrasonic atomization, spot welding and a series of actions, and can be freely designed into timing or pure manual mode according to the application.

3.2 Ultrasonic generator

SWP series ultrasonic generator is composed of frequency control module, amplitude control module, drive module, protection circuit, man-machine interface, power supply and resonant circuit. The man-machine operation is completed by the touch screen, the operation is simple and clear.

SWP series ultrasonic generator has the following characteristics:

1) Automatic frequency modulation: This feature is the basic feature of the ultrasonic system, and the accuracy of the frequency is directly related to the normal use of the equipment

2) Digital amplitude setting: the amplitude is 1%~100% adjustable, and the digital adjustment ensures the uniformity of each start

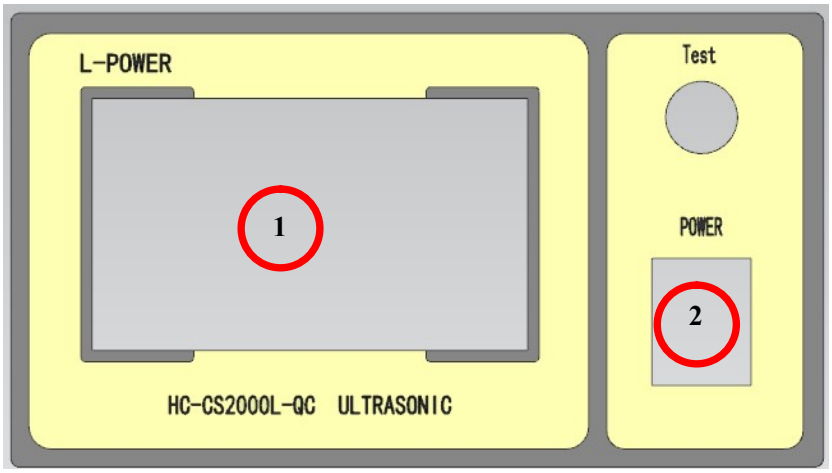
3) Soft start: In order to make the ultrasonic system work perfectly, the user needs to choose the appropriate soft start time according to the characteristics of the mold to reduce the impact of the generator acting on the transducer. For molds that are difficult to start, the starting speed of the mold can be adjusted

4) Automatic frequency search: Frequency search is to search the frequency of the device according to the low amplitude (about 10%), so that the device has a good starting frequency when it is working normally

5) Time adjustable: The 2000L series ultrasonic generator has a built-in time count (accuracy of 100ms), and the user can set this parameter according to his needs to ensure the uniformity of each time

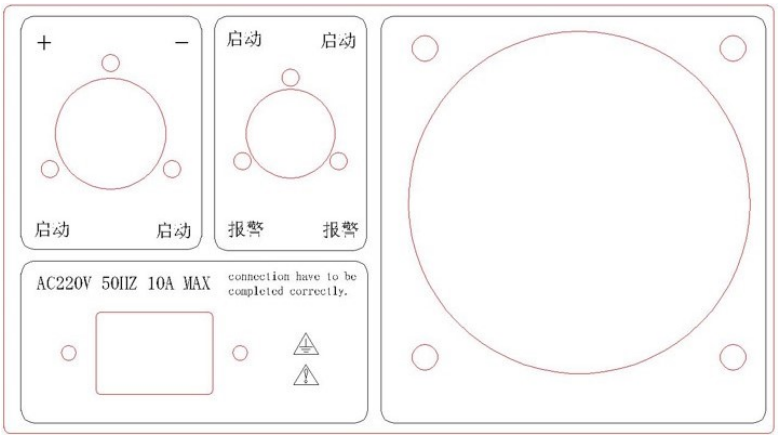
6) The timing mode can be selected, and the timing or manual mode can be selected according to the ultrasonic time parameters

3.3 Introduction to HMI



No.	Name	Description
1	Touch Screen	The entire system can be controlled via a touch screen
2	Power Switch	Power input

3.4 Schematic diagram of the interface



No.	Name	Description
1	Power interface	Power input for AC 110V/220V
2	Fan	Cooling for machine
3	Startup and alarm interface	External start control terminal and alarm output terminal (relay signal)
4	Start with transducer output or transducer output only 高压	Transducer output line and external start control terminal (relay signal)

WARNING The transducer line is strictly prohibited to be reversed!

CAUTION The starting signal is the relay signal input, and other voltage signals must not be introduced, otherwise the device will not work normally

3.5 Introduction of Transducer

Customers can match parameters according to their own transducers, or contact our company to select transducers according to suitable applications.

Cooling requirements:

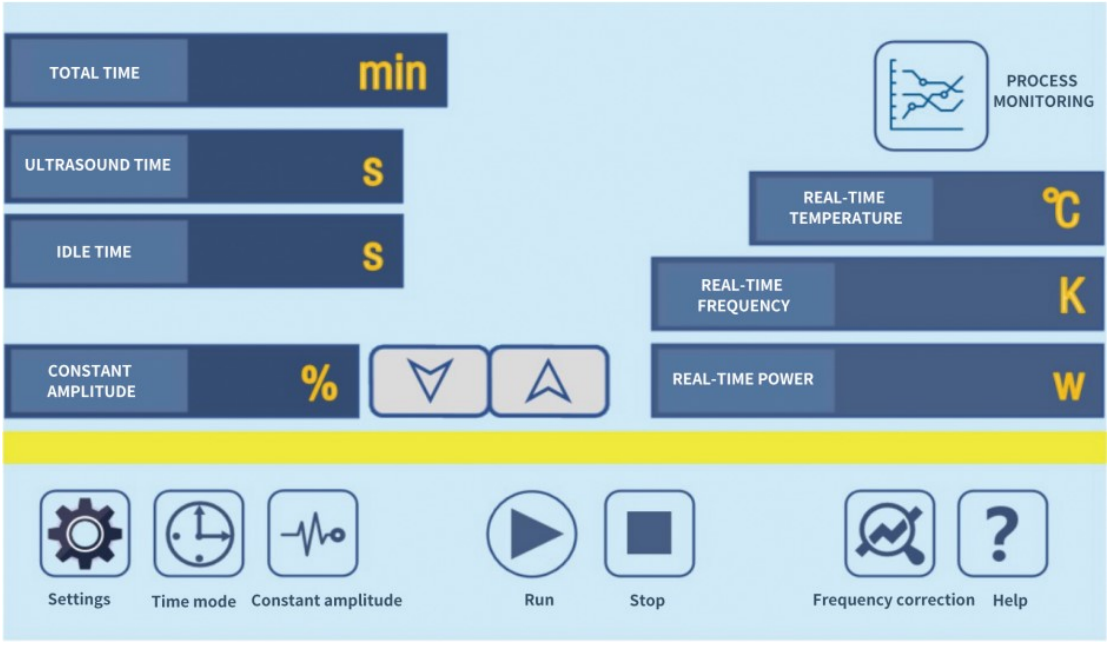
If the ultrasonic system needs to work for a long time, it is recommended to use ventilation air cooling to cool the transducer; otherwise it will affect the normal work of the equipment and reduce the service life of the transducer.

WARNING Ventilation must be clean and dry compressed air, otherwise it will cause short circuit ignition between the electrode plates of the transducer, destroy the transducer and may cause electric shock accidents.

4 Operation instructions

The data will be automatically loaded after the startup after loading is complete and no fault will automatically enter the user interface.

4.1 User Interface



1) **Total time:** The parameter set for this parameter is the ultrasonic cycle time, the adjustment range is 0~999.9, the unit is minute
2) **Ultrasonic time**: The parameter set by this parameter is the ultrasonic issuing time, the adjustment range is 0~999.9, the unit is second
3) **Idle time**: The parameter set by this parameter is the ultrasonic pause time, the adjustment range is 0~999.9, the unit is second
4) **Constant amplitude**: The parameter set by this parameter is the amplitude percentage, and the adjustment range is 1~100, the larger the parameter, the stronger the output amplitude of the device
5) **Device Address**: Displays the address of the current device, and clicks to enter the address and baud rate adjustment interface
6) **Real-time temperature**: Display the current temperature in real time (Read only)
7) **Real-time frequency**: Real-time display of the current frequency (read only)
8) **Real-time power**: Real-time display of current power (read only)

9) **Run**: After clicking Run, the device starts to run and the icon will change to pause; If the working time is 0, it will run all the time; if it is not 0, it will automatically pause after the countdown ends

10) **Pause:** The ultrasonic work is paused but the countdown is retained

11) **Stop: Stop ultrasound work cut countdown reset**

12) **Frequency correction: Calibrate the frequency**

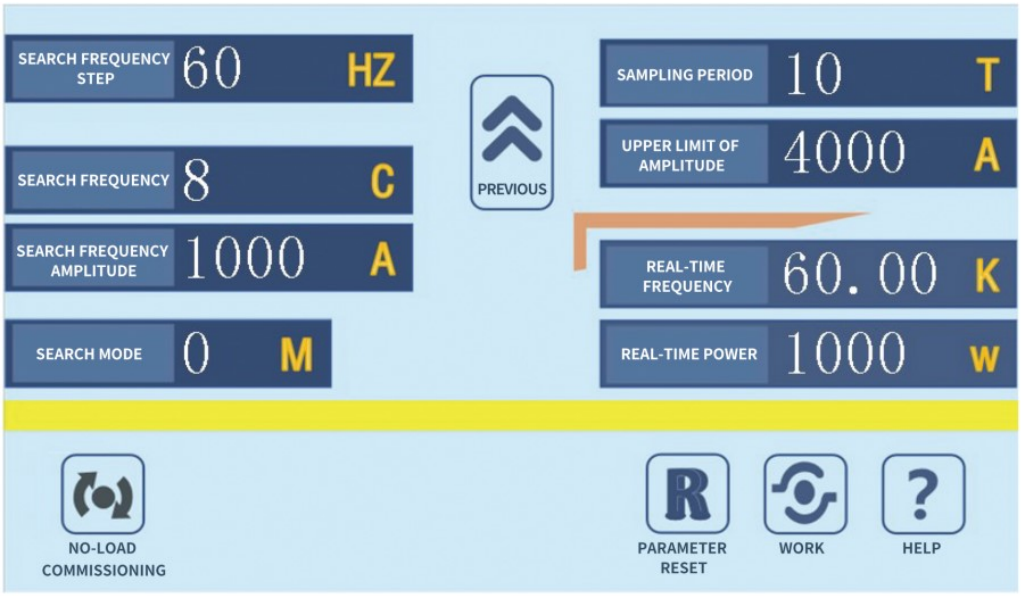
4.2 Password interface

Click Settings to enter the password entry interface

1) Click the password display box, enter the password 1234, and click confirm to enter the system parameters interface

4.3 System Parameters interface

The parameters changed after entering the system parameter adjustment state will take effect directly.



1) Initial frequency: This parameter is the initial frequency of equipment operation, and the user can set this parameter according to the frequency of transducer + mold, and the error shall not exceed ±100HZ. Setting Range(10.00~600.00)
2) Soft start time: the parameter set by this parameter is the soft start time, the larger the parameter, the longer the time for the equipment to set the amplitude from zero amplitude, when the equipment mold is too large or the mold is rough, the user can increase the parameter, so that the mold has no excessive impact. Setting Range(1~1000)
3) Power Threshold: This parameter is set as the minimum power ratio of the device. Only participate in the detection of no-load protection protection, please set the appropriate parameters. Setting range (1~500)
4) Alarm Temperature: This parameter is set to the warning temperature of the device. Alarm when the device exceeds this temperature. Setting Range(10~100)
5) Upper frequency limit: This parameter is the highest running frequency of the device, when the operating frequency of the device is higher than the set value, the device will enter the protection state and stop all actions. Setting Range(10.00~600.00)
6) Lower frequency limit: This parameter is the lowest operating frequency of the equipment, when the operating frequency of the equipment is lower than the set value, the equipment will enter the protection state and stop all actions. Setting Range(10.00~600.00)
7) Real-time frequency: Real-time display of the current frequency (read-only)
8) Implementation power: Real-time display of current power (read-only)
9) No-load commissioning: Frequency search Shiyan is carried out without load test specimens.
10) Parameter Reset: Reset all parameters to factory parameters. (irreversible)

4.4 Work Parameters interface

1) Frequency search step: The parameter set by this parameter is the forced scanning coefficient, this parameter changes with the change of the frequency width of the transducer, when the frequency width is too narrow, the user should reduce this parameter accordingly, the larger the parameter, the shorter the single scan time. Setting Range(1~200)
2) Frequency search times: The parameter set by this parameter is the number of forced scans, this parameter changes with the change of the frequency width of the transducer, when the bandwidth is too narrow, the user should increase this parameter accordingly, the larger the parameter, the longer the scanning process. Setting Range(2~150)
3) Frequency search amplitude: The parameter set by this parameter is the amplitude during scanning, the user should carefully adjust this parameter, the amplitude is too large during scanning, which can easily cause the transducer to ignite, and there is a danger of burning. When scanning, the amplitude is too small, and it is easy to fail to sweep. The user should adjust this parameter from small to large and select the appropriate sweep amplitude. Set the range (500~3500).
4) Search Mode:
   a) The lock frequency is the correct frequency of the search frequency, and the search frequency is not entered.
   b) Enter the search mode.
   c) The lock frequency is the starting frequency, and does not enter the frequency search.
   d) Lock the frequency to set the frequency, and enter the sound wave detection mode.
5) Sampling period: for the parameter acquisition and detection of monitoring parameters, the sampling period is 10 waveforms for 1T, if the ultrasonic frequency is 100K, The sampling time is 1000 ms/100.000 KHZ * 10 ×

sampling period = 0.1 × sampling period ms.

6) Amplitude upper limit: set the upper limit for the amplitude on the software, adjust the range (500~3500), the output voltage value of the amplitude control of the electric box is 0~4000, the upper amplitude limit * constant amplitude % + 500 = the amplitude output of the electric box

4.5 Factory reset

The parameters changed after entering the factory parameter adjustment state will not take effect directly, and will only be stored for factory reset

The parameters in the factory parameters are the same as the system parameters, please refer to the system parameters interface for details

1) Number of alarms: The number of alarms recorded.
2) Working Hours: Record the hours of work
3) Record clearing: Reset the number of alarms and working hours to zero

4.6 Communication protocol description

Modbus communication protocol (Modbus_RTU, 8/N/1, Slaver), only supports Modbus_RTU slaves, and the length of all parameters is 2 bytes.

A. 01H function code: read coil status (address range 0x0000 - 0x0005)
   0x0000: Alarm reset (self-clearing)
   0x0001: No-load debugging (self-cleaning)
   0x0002: Frequency sweep (self-cleaning)
   0x0003: The sound wave is started and paused
   0x0004: Sound wave stop (self-clearing)
   0x0005: Factory reset (self-cleaning)
B. 02H function code: read the input status (address range 0x0000 - 0x0000)
   0x0000: Working status
C. 03H function code: read hold register (address range 0x0000 - 0x0019)

0x0000: Initial frequency
0x0001: Soft start time
0x0002: The upper limit of power
0x0003: frequency cap
0x0004: the lower limit of the frequency
0x0005: Search frequency step
0x0006: the number of frequency searches
0x0007: Search frequency amplitude
0x0008: Search mode
0x0009: Sampling interval
0x000A: Early warning temperature
0x000B: The upper amplitude limit
0x0018: Welding amplitude
0x0019: Welding time

D. 04H function code: read input register (address range 0x0000 - 0x0009)
0x0000: Real-time power
0x0001: Real-time frequency
0x0002: Transducer temperature
0x0003: Fault code (see 4 fault description and solution for details)
0x0004: State Machine Code (1)
0x0005: The software version number
0x0006: The frequency after no-load search
0x0007: the number of samples
0x0008: Device temperature
0x0009: The total time remaining
0x000A: Whether the remote parameter status is reserved
0x000B: Total length of working time (16 bits high)
0x000C: Total working time length (16 bits lower)
0x000D: the number of alarms

E. 05H function code: force (write) a single coil (support 0fH function code)
Address range 0x0000 – 0x0003.
For details of the address of each coil, please refer to the 01H function code.

F. 06H function code: force (write) a single hold register (support 10H function code)
Address range 0x0000 – 0x0019

For details of the address of each parameter, see the 03H function code

5 Fault Instructions And Solutions

G. Fault code: 1
Fault description: No load warning, check whether the transducer wire is disconnected, check whether the "power threshold" parameter is too large.

H. Fault code: 2
Fault description: The ultrasonic frequency during operation exceeds the upper

limit of frequency, please check whether the transducer mold is damaged.

I.Fault code: 3

Fault description: The ultrasonic frequency during operation is lower than the lower frequency limit, please check whether the transducer mold is damaged, and check whether the temperature of the transducer mold is too high, resulting in too much frequency offset.

J. Fault code: 4

Fault description: Operation failure, check whether the transducer mold is damaged, whether there is a hard load in the process of use.

K. Fault code: 5

Fault description: Memory chip damage, please shut down 30 seconds after restart if not solved then press the alarm reset.

L. Fault code: 6

Fault description: The load temperature is too high, please cool down.

M. Fault code: 7

Description: The temperature of the device is too high, please cool it down.

The corresponding solution of the above fault fails to eliminate the fault, which may be the fault that the machine cannot recover from itself, please contact us, do not disassemble the machine without technical support.