WIN-WIN COOPERATION · CHINA.KAER-WELDER

USER MANUAL

(Version 1.0)

High-end Type Ultrasonic Welding Machine

1. General Information

JS series high-accuracy ultrasonic welder is mainly used for secondary joining of thermoplastics. Compared with other traditional processes (such as gluing, electric heat-joining, or screw tightening), it has remarkable advantages like high productivity, sound welding quality, environmental protection and energy saving, among others.

2. Structural characteristics and Working principle

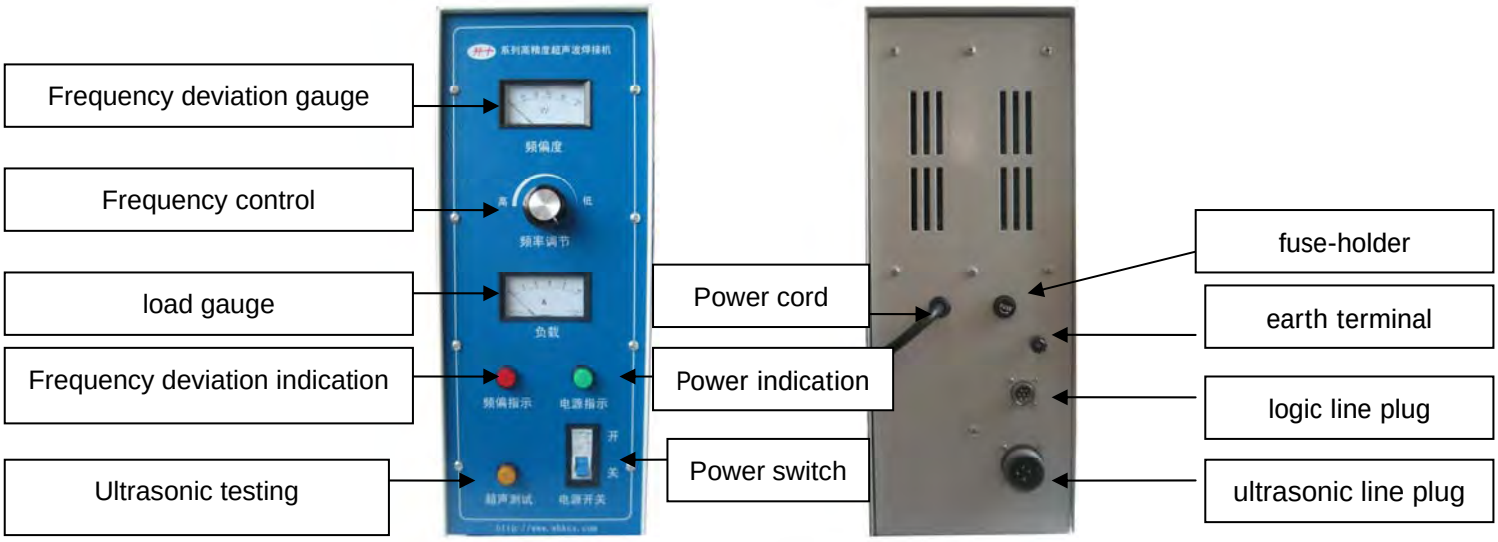
JS series high-accuracy ultrasonic welder converts the electric energy into ultrasonic energy through the ultrasonic transducer (i.e. high-frequency mechanical vibration energy with the frequency exceeding the threshold of human's auditory sense). Conducted to the plastic work piece through the welding head, such ultrasonic energy melts down the joint face of the plastic work piece after rubbing the joint face violently with ultrasonic frequency at the speed of tens of thousands of times per second and with certain amplitude. The transient pressure maintained at the work piece after stopping vibration makes two pieces of weldment solidify together in the form of molecular interlinkage. Generally, the welding time is less than 1 second, but the weld strength compares favorably with that of a weldment itself.

By adopting electronic program control, JS series high-accuracy ultrasonic welder has such features as high automation, built-in full automatic protective circuit, easy and safe operation, stable and reliable running, etc.

JS series high-accuracy ultrasonic welder is applicable for butt welding of thermoplastics. With its welding head replaceable according to the customers' requirements, the welder can also be used for processing such as rivet welding, spot welding, embedding, cutting, etc.

External view and all parts introduction, as follows:


pressure detection
LCD
operating keyboard
Fall speed regulating
Rising speed regulating
air pressure governor
Acoustic welding head
positioning tooling
Double-start button
jerk button



Main Technical Parameters

1. Operating voltage: monophase AC220V±%5
2. Apparent power of transducer:
   □1500W □2000W □2600W □4200W
3. Ultrasonic frequency: □15KHz □20KHz
4. Power supply noise: no more than 100Vp_p
5. Momentary interruption permission: less than 10ms
6. Working temperature: 0～50℃
7. Equipment Storage Temperature: -10～60℃
8. Environment humidity: 20～70% (no condensation)
9. No source of vibration environment.
10. Dust-free, non-corrosive gases environment

3. Equipment Installation

- The equipment should be installed on the solid table board, with a space of 150mm in the rear.
- Since the welder has relatively higher requirements for power supply, unstable voltage will exert direct influence on the welding effect, or in an even more serious case, result in shortening service life of power generator or burning it! Areas with unstable voltage require a voltage

stabilizer with fluctuation of output voltage below 2% and the output power double the nominal power of the welder.

- There should be no fire source around, and well-ventilated, and the installation should be smooth.
- Before operating the welder, make sure to connect the ground wire properly, with ground resistance less than 0.5ohm.

Never operate the welder without proper grounding!

- Before switching on, please make sure that proper power supply and air supply are used, the cable wires have been connected correctly, the limit of welding head has been well set, and the hands and other parts are at safe operation position

4. Application Notice

1) User shall not alter welding head at option, or it may change frequency parameters of transducer system, which will result in damages to transducer system and ultrasonic power generating system.
2) Never leave both hands under the welding head when the machine is in operation or is testing ultrasonic sound, to guarantee operating safety for operators!
3) No direct contact is allowed between the welding head and the machine base or other metal fixtures during operation or test, to ensure safe operation of the equipment;
4) No start-up or operation of this equipment is allowed before reliable connection to earth!
5) Start-up or operation is prohibited where high temperature and high dust environment exist!
6) Stable operational power supply is required while operation beyond the rated voltage is prohibited!
7) Earplugs are recommended for a long-term operator to avoid injury by noise pollution;
8) Proper ventilation facilities should be made available when processing noxious plastic parts or those with peculiar smell,
9) Stop and check the machine immediately in case any abnormal

noise occurs or transducer system heats to over 50℃ during operation. Only after returning to normal can the production be continued; If temperature of transducer system is still on the high side, continuous operation shall only be allowed after cooling it down. In special situation, forced heat-elimination measures should be taken.

10) If fuse of the machine is blown, a fuse with regulated nominal value should be adopted. If fuse is blown for several times, the machine should be stopped immediately for inspection. Only after an error (errors) is located and proper repairing is conducted can it be put into application;

11) Ensure a clean air supply. When air filter is half full of water, immediate discharging should be made.

12) Lubricate mechanical movable parts at regular intervals; remove dust from electric cabinet regularly after a long time operation; if equipment is not used, proper dust cover should be chosen to cover them;

13) If heat emission fan gets blocked from running, stop immediately for inspection. Continuous use will not be allowed until normal condition is resumed;

14) Special staffs shall be designed for debugging and maintaining the equipment;

15) Please feel free to contact us should any error occurs. No continuous use or optional alteration is allowed. Press the operational button with both hands for operation. Foot operated switch is not available for this machine. Any consequences resulting from self-modification or self-setting shall not be our responsibility.

5. Equipment Operating Instructions

1) Ultrasonic generator instrument

- Load gauge: used for the actual load current direction of generator, also used as output power instructions. When the load sheet indicates a large number, the generator automatically cuts off the power output, and frequency deviation indicator lights.
- Frequency deviation gauge: the deviation of natural frequency of

transducer and woking frequency of generator. When frequency deviation gauge indicates a large number, the generator automatically cuts off the power output, and frequency deviation indicator lights.

- Frequency adjustment knob: used to adjust the frequency of generator.
- Ultrasonic testing button: jog the button for testing whether ultrasound and generator are normal. Commonly used for equipment debugging.
- Deviation indicator: when the deviation of natural frequency of transducer and working frequency of generator is too large or the load current exceed the maximum limit current, the generator automatically cuts off the power output, and indicator lights.
- Power switch: the main power control.
- Earth terminal: earth resistance should be less than 0.5 ohms.
- Signal output: 4-pin airline outlet.
- Logic signal Input: 7-pin airline outlet.

2) Ultrasonic generator ajustment

Confirm that the logic signal line and ultrasonic wire are connected normally. Turn on the power, jog "ultrasonic testing", if the deviation indicator light, please adjust "frequency control" knob and jog "ultrasonic testing" button until the deviation indicator does not light. At this time, continue to fine-tune "frequency control" button until the deviation gauge pointers indicate the minimum, if continue to increase or reduce the "frequency control" button, the deviation gauge pointers will indicate a large number again.

Attention:

1.When regulating, jog the "ultrasonic testing"″ button, do not continue to press.

2.Ultrasonic generator is well ajusted when: deviation gauge points the minimum (usually within three cells), in no-load (no pressure) state, the load gauge points within two cells. If the load gauge points a large number, please contact the manufacturer.

3.The less in the potential difference between natural frequency of transducer and working frequency of generator, the better.

3) LCD display normal working information

- Operating mode

The operating modes of this control system are shown as follows in Figure 1. Turned on the power normally, press [OK] button to enter the following screen.

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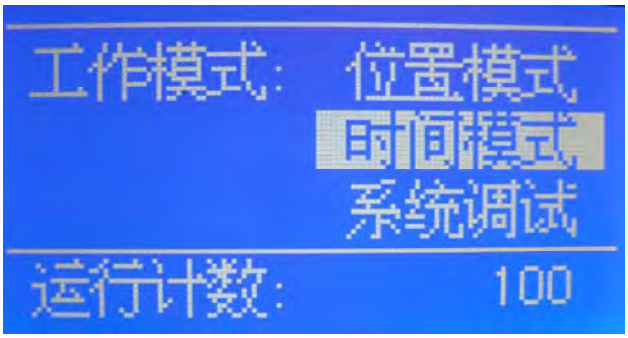


Operating modes:position mode

Time mode

system debug

Run Count:100

Figure 1 The main interface

As shown, the control system has three kinds of operating modes.When powered, the system default is the last working mode, the default mode of operation highlights, such as the time mode above.

Working mode selection method:
After power-on, press the [∧] or [∨], select one of the three operating modes, the highlighted one is the selected mode.

- Position model working process

This model is the application mode of other types, so omitted.

- Time mode working process

  When choosing time mode, just as shown in figure 1 that time mode in operating model highlights. In the reset of [STOP] button, press the [Start] button, into the working process of time model, as follows:

  Start→ release weld head→delay time to the [can be set] →release ultrasound→ release time to [can be set] →cooling→pressure holding time to [can be set] →run count value plus 1→weld head ascend→time interval to [can be set] →'tick' signals the end

Attention: In working process, if press [STOP], ultrasonic output will be cut off, and weld head auto ascend to the pointed time, 'tick' indicate, but run count does not count.

- System debug mode working process

When choosing system debug mode, just as shown in figure 1 that system debug mode highlights.

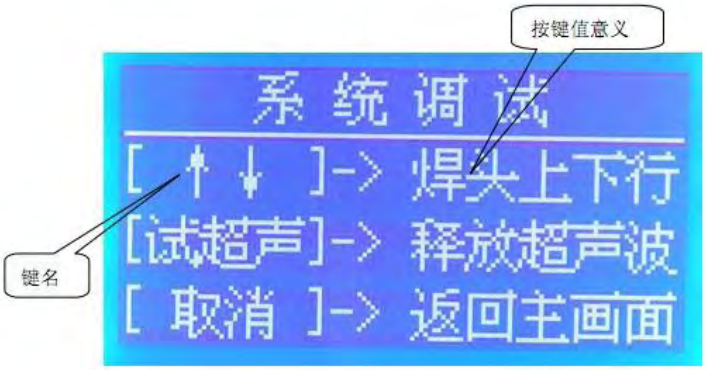
Working process is shown as follows:

In system debug mode, press [OK] to enter the Figure 2 screen.

Press[∧], welding head ascends, action self-locking.

Press[∨], welding head descends, action self-locking.

Press [Test], release ultrasound, action is not self-locking.



System debugk

Welding head ascend &descend

Ultrasonic testing-ultrasonic releasing

Cancel-return to

Figure **2** system debug screen

Press [Return], debug end, return to the main screen. Welding head ascend to pointed place, buzzer sounds. Or show no operation in 120S, automatically return to the main screen.

- Parameter setting

Parameter setting mainly means various time parameters, as following in Figure 3.

Meanings of parameters set :

- Delay time: refers to in time mode, the time from welding head start descend to the release of ultrasund.
- Welding time: refers to the time of releasing ultrasound.
- Pressure holding time: refers to the time of welding workpiece-cooling after releasing ultrasound.
- Interval time: refers to the interval of permitting next welding after cooling.

Delay time 2.01s
Welding time 1.70s
Pressure holding time 0.92s
Interval time 1.00s

Figure 3 parameter setting screen

Achieving method is as follows:

In time mode or position mode, press [OK] to enter the parameter setting screen shown in Figure 3. The default screen shows delay time parameters. Delay time font highlights.

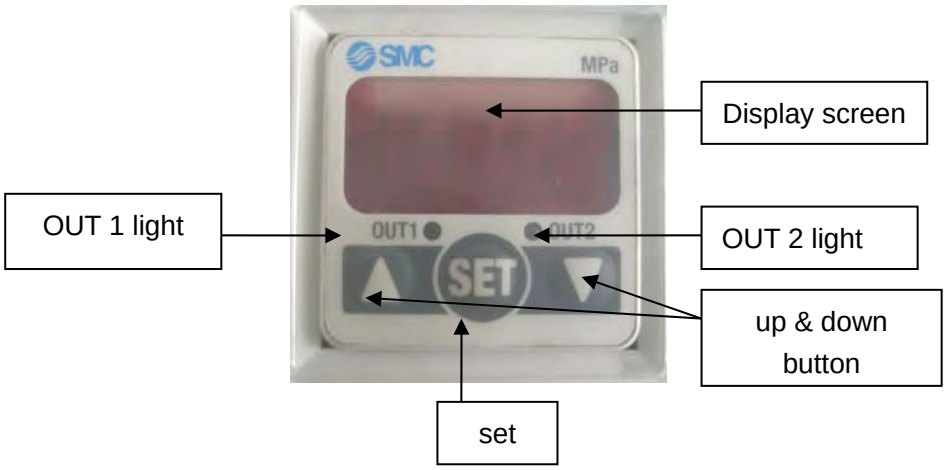
By choosing [∧] or [∨] to select delay time, welding time or pressure holding time.
- Press [OK] to enter the parameter values to be set.
- Click [∧] or [∨] to add or subtract the selected parameter value. Parameter value range : 0-19.99S.
- Uninterruptable press[∧] or [∨]to add or subtract parameter value by interval of 0.1s.
- Uninterruptable click [∧] and [∨]to add or subtract parameter value by interval of 0.01s.

- Click [OK] to return to parameter setting screen.
- Click [Back] to return to the main screen.

Notice: Others

1.The system enter non-work screen, if there is no continuous operation, then it will automatically return to working screen after 120s.
2.Wiring attention, best to separate the input and output wiring bundle.
3. Automatically memorize the last working model after each power-on.
4.Run count reset: In the working screen, press [Return], this count clears.

1. Pressure Sensor Setting



Press [set], in the display screen will switch to display P-1, P-2, P-3, P-4. In them, P-1, P-2 is pressure detection range value of out 1. P-3, P-4 is pressure detection

range value of out 2. This machine uses only one output (output 1), so only setting P-1 the lowest pressure detection range value, and setting P-2 the highest pressure detection range value. Press [set] , switch to P-1, press up and down button to change set value. Change P-2 in the same way.

● Speed Control Valve

Increase in speed regulation of and decrease speed adjustment is used to adjust the cylinder lifting speed, the actual work needed to be adjusted depending on the speed.

6. Troubleshooting for Frequently Asked Questions and Equipment Maintenance

1. When turning on power switch, power indicator doesn't light and fan doesn't run, and no response is seen to operation, then possible causes are as follows:

a. No electricity for power source, please check to confirm;

b. Bad contact between power line and outlet, please make due repairing;

c. If fuse of equipment power supply is blown, please change fuse with regulated nominal value.

2. If non-logic action is found, please make inspection as suggested below. Contact our service staff if it still can't be solved.

a. Check if connection of logic cable conductor is normal;

b. If two operational buttons are well connected;

c. If air supply is normal;

d. If emergency stop is reset and any error exists;

3. In the event of unstable logic control, check and handle it as follows. If not successful, please contact our service department in case of failure.

a. Caused by the interference due to too close distance between the logic wire and the power output wire.

b. The logic wire or logic board is in contact with the ground wire, or too close to the ground wire.

c. The connecting plug-in units of the logic wire are in bad contact.

d. Power supply is impure, with interference factors.

e. Supply voltage fluctuates greatly.

4. Unstable welding quality.

a. Nonuniform shape, dimensions or material quality of the weldment;

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improper design of fusion face; improper selection of welder power and amplitude of welding head.

b. Unstable supply voltage; unstable air pressure of air supply.

c. Occurrence of frequency deviation protection or overload protection during welding.

d. Unstable outputting of ultrasonic.

e. Because the power output of this welder is adjusted automatically according to the load, improper adjustment of the limit screw or the moving stroke of the welding head exceeding allowable stroke of the welder may result in the reduction of power output.

5. Occurrence of frequency deviation protection during welding.

a. Improper adjustment of frequency. Raise the frequency slightly, to surmount the influence of frequency rising on the transducer system under the action of pressure. Ensure stable degree of frequency deviation with slight changes during welding.

b. Parameters of the components of transducer system are matchless, which is generally caused by too high natural frequency of the acoustic welding head.

c. Serious heating up of the transducer system.

d. Too high welding pressure.

6. Unstable output of ultrasonic, and indication of high load but very faint sense of ultrasonic vibration are mainly caused by the automatic tracking system falling out of synchronism, with the following causes:

a. The working frequency deviates seriously, which causes the failure of frequency tracking.

b. The transducer system is damaged seriously, or the parameters deviate seriously.

c. Over high load while starting ultrasonic causes the failure of starting. At this moment, shorten the delay time to bring the triggering mode under the mode of advance triggering, or reduce the pressure to lower the starting load.

7. The following cases may be caused by the faults of the transducer system, especially the acoustic welding head.

a. High no-load current and unstable ultrasonic.

b. Particularly serious heating up of the welding head, and squealing of the welding head while testing ultrasonic.

c. Constant frequency deviation protection or overload protection; invalid

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frequency adjusting.

7. Special Statement

a) This manual is presented based on JS series high-accuracy ultrasonic welder. Part of its framework may not comply with the model you choose. Therefore, this manual is only for your reference, with your concrete model subject to the real machine.

b) Weihai Kaer Ultrasonic Engineering Co., Ltd reserves the right for interpretation and revision for this manual. This manual is subject to change without notice.