

超声波点焊机

Ultrasonic Spot welding machine

T10 系列

SERIES

电控使用说明书

Control box Operation Manual

1. 性能简介

超声波电控一体机是一体式设计的全功能电控+超声波系统。

- ✓ 集成双电机控制系统
- ✓ 集成气缸控制、风扇控制
- ✓ 脚踏控制电机调速、超声波发波、气缸升降。
- ✓ 超声波发生器具有软启动功能，可防止设备瞬间启动电流过大。
- ✓ 扎实的硬件设计，每个参数都经过严格的计算、仿真。
- ✓ 具有完善的保护功能：过热保护、过流保护和过压保护。确保设备稳定，安全的工作。
- ✓ 数码管显示频率、功率、相位、挡位、追踪频率、温度等工作参数。清晰直观。
- ✓ 按键设置挡位、相位、启动频率等参数。操作方便安全。
- ✓ 提供串口接口功能，方便与 PC 通讯。

1. FEATURES

Ultrasonic electric control integrated machine is an integrated design of full - function electric control + ultrasonic system.

- ✓ Integrated cylinder control and fan control
- ✓ Integrated cylinder control and fan control
- ✓ Pedal control motor speed, ultrasonic wave, cylinder lift.
- ✓ With a soft-start function, it can prevent the inrush current when the power is turned on.
- ✓ It has perfect protection function: overheat protection, overcurrent protection and overvoltage protection.Ensure stable and safe operation of equipment.
- ✓ Digital tube display frequency, power, phase, gear, tracking frequency, temperature and other operating parameters.Clear and intuitive.
- ✓ Button to set the parameters such as gear, phase, start frequency, etc.Easy to operate and safe.
- ✓ Provides a serial port interface, convenient to communicate with PC.



2. 主要技术参数 MAIN PARAMETERS

外形尺寸	长 220mm×宽 205mm×高 65mm
主机净重	2.05Kg
缝合速度	0-40m/min
电磁阀电压	110V/220V
输出频率	19-21KHz
输出功率	0-2600W
工作电压	AC220/50Hz
工作电流	0-5A
环境温度	-40 ~ 85°C











Dimensions:	L220mm×W205mm×H65mm
Net Weight	2.05Kg
Speed	0-40m/min
Voltage	110V/220V
Frequency	19-21KHz
Power	0-2600W
Voltage	AC220/50Hz
Current	0-5A
Operation Temperature	-40 ~ 85°C

3. 前面板功能说明 FRONT PANEL FUNCTION DESCRIPTION

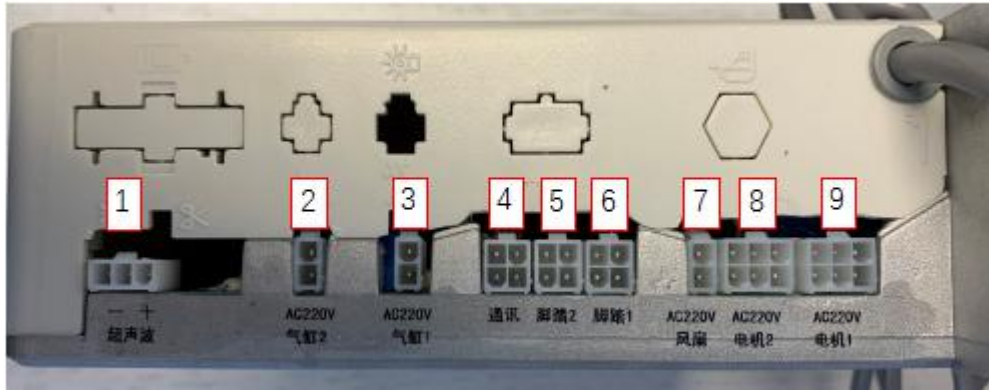


3.1 电源开关（船型开关）：位于前面板侧面用于开启、关闭设备的总电源，拨到 1 为开，拨到 0 为关。Power switch (ship-type switch) : The total power on and off the equipment is located at the side of the front panel. Dial 1 to turn on and 0 to turn off.

3.2 前面板按键说明 Front panel key description:

- 1、 空按键；（预留备用） Empty keys(Reserve)
- 2、 按一次数码管光标上的数据值加 1。Press the data value on the digital tube cursor to add 1.
- 3、 按一次数码管光标上的数据值减 1。Press the data value on the digital tube cursor once to reduce 1.
- 4、 数码管光标左移 Move the digital cursor to the left.
- 5、 数码管光标右移 Move the digital cursor to the right.
- 6、 确认按键（修改数码管值后，按此按键生效） Button confirm(After modifying the digital tube value, press this button to confirm)
- 7、 空按键；（预留备用） Empty keys(Reserve)
- 8、 切换参数显示和设置参数按键 Switch parameter display and set parameter keys.
- 9、 切换数码管显示页面（向上翻页） Switch to digital tube display page (page up)
- 10、 切换数码管显示页面（向下翻页） Switch to digital tube display page (scroll down)

4. 后面板接口说 REAR PANEL INTERFACE DESCRIPTION




- 1、超声波输出接口
 - 2、气缸电磁阀接口 1 (AC220V,预留备用)
 - 3、气缸电磁阀接口 2 (AC220V)
 - 4、通信接口 (预留备用)
 - 5、脚踏板接口 2 (数字接口, 电焊机脚踏板接口)
 - 6、脚踏板接口 1 (模拟接口, 压花机脚踏板接口)
 - 7、风扇接口 (AC220V)
 - 8、电机接口 1 (花轮电机驱动接口)
 - 9、电机接口 2 (换能器电机接口)
1. Ultrasonic output interface
 2. Cylinder solenoid valve Interface 1 (AC220V, reserved for reserve)
 3. Cylinder solenoid valve Interface 2 (AC220V)
 4. Communication interface (reserved for reserve)
 5. Pedal interface 2 (digital interface, welding machine pedal interface)
 6. Pedal interface 1 (analog interface, pedal interface of embossing machine)
 7. Fan interface (AC220V)
 8. Motor Interface 1 (Flower-wheel motor drive interface)
 9. Motor Interface 2 (Transducer motor interface)

5. 数码管显示屏操作说明 OPERATION INSTRUCTIONS OF DIGITAL TUBE

DISPLAY SCREEN

数码管显示屏可以显示超声波运行的各项参数，并可以设置各项参数。

数码管显示屏共分为两个模式：显示模式页面和设置模式页面。


显示模式页面和设置模式页面切换方式：按  键，可来回切换，无需密码；

显示模式页面：主要用来显示电控及超声波工作的各项参数。为防止工人误操作，显示模式页面参数不可以修改，只能用于显示。

设置模式页面：主要用来设置电控及超声波工作的各项参数。

Digital tube display screen can display the parameters of ultrasonic operation, and can set the parameters.

The digital tube display screen is divided into two modes: display mode page and setting mode page.

Display mode page and setting mode page switch mode: press button , can switch back and forth, no password.

Display mode page: mainly used to display the parameters of electronic control and ultrasonic work. In order to prevent workers from misoperation, display mode page parameters can not be modified, only used for display.

Setting mode page: it is mainly used to set the parameters of electric control and ultrasonic work.

1、显示模式页面共有 16 页，参数如下表：The display mode page consists of 16 pages, with the parameters shown in the table below

显示模式 Display		参数 Parameter
第 0 页	频率 frequency	19.xxxk Hz
第 1 页	追踪 tracking	1000-1500
第 2 页	振幅 amplitude	13
第 3 页	电压输出相位 Voltage output phase	150
第 4 页	算法 algorithm	0
第 5 页	连续模式/断续模式 Continuous mode/intermittent mode	1(连续模式)Continuous mode
第 6 页	功率 power	150W
第 7 页	电感温度 Inductance temperature	
第 8 页	故障码 Fault code	16 (就绪) 17 (运行中) 16 (ready) 17 (running)

第 9 页	机箱温度 Case temperature	
第 A 页	电机 1 转速 Motor 1 speed	2000
第 B 页	电机 1 使能 Motor 1 enablement	1
第 C 页	电机 1 速比 Motor 1 speed ratio	12
第 D 页	电机 2 转速 Motor 2 speed	2000
第 E 页	电机 2 使能 Motor 2 enablement	1
第 F 页	电机 2 速比 Motor 2 speed ratio	12

2、设置模式页面共有 20 页，参数如下表：There are 20 pages in the setting mode page. The parameters are shown in the following table

设置模式 Setting mode		参数 (设置完每项按 OK 生效) Parameters (after setting each item, press OK to confirm)	
		电焊机 Welder machine	压花机 embossing machine
第 0 页	振幅 Amplitude	20	13
第 1 页	相位 phase	150	150
第 2 页	追踪最小值 Trace minimum	800	800
第 3 页	追踪最大值 Track maximum	1600	1500
第 4 页	追踪速率 Tracking speed	1	3
第 5 页	关闭时间 Closing time	0	
第 6 页	电机 1 方向 Motor 1 direction	0	
第 7 页	电机 1 极对数 Motor 1 pole log	12	
第 8 页	电机 1 速比 Motor 1 speed ratio	6	
第 9 页	电机 2 方向 Motor 2 direction	1	
第 A 页	电机 2 极对数 Motor 2 pole log	12	
第 B 页	电机 2 速比 Motor 2 speed ratio	6	
第 C 页	调速模式的速度 The speed of the speed regulating mode	2000	
第 D 页	定速模式的速度 The speed of the constant speed mode	2000	
第 E 页	测试模式的速度 The speed of the Test mode	2000	
第 F 页	模式选择 Mode selection	0 (测试) /1 (调速) /2 (定速) 0 (test) /1 (speed) /2 (constant speed)	
第 10 页	电机开启延时 Motor opening delay	100	50
第 11 页	电机关闭延时 Motor shutdown delay	300	200
第 12 页	保存设置 Save Settings	输入 8888 后，按 OK 键生效 After entering 8888, press OK to confirm	
第 13 页	恢复出厂设置 factory data reset		

1.1 页面功能介绍 Page function Introduction



第 0 页(频率): 用于显示超声波工作的频率, 19950HZ, 代表 19.95KHz。

第 1 页(追踪): 显示超声波的追踪特性。

第 2 页(振幅): 用于显示超声波电源的振幅。

第 3 页(相位): 用于显示超声波频率跟踪的效果。

第 5 页(超声波模式): 超声波工作模式: 0 表示电焊模式, 1 表示压花模式。

第 6 页(功率): 用于显示超声波电源的输入功率, 一般压花机功率在 150-200W 之间, 封边机瞬间功率在 300-500W, 其他机型根据实际需要设定。

第 7 页(电感温度): 显示超声波电源的电感温度, 电感是超声波电源的重要功率器件, 工作时温度较高, 100°C 以下都是正常工作范围。

Page 0 (frequency) : Frequency used to display ultrasonic working, 19950HZ, representing 19.95khz.

Page 1 (tracking) : Shows the tracking characteristics of ultrasound.

Page 2 (amplitude) : Used to display the amplitude of the ultrasonic power supply.

Page 3 (phase) : Used to display the effect of ultrasonic frequency tracking.

Page 5 (Ultrasonic mode) : Ultrasonic working mode: 0 means welding mode, 1 means embossing mode.

Page 6 (Power) : It is used to display the input power of the ultrasonic power. The power of the general embossing machine is between 150-200W, and the instantaneous power of the edge sealing machine is between 300-500W. Other models are set according to actual needs.

Page 7 (inductance temperature) : The inductance temperature of the ultrasonic power supply is displayed. The inductance is an important power component of the ultrasonic power supply. The operating temperature is relatively high, and the normal operating range is below 100°C.

第 8 页(故障码): 显示超声波工作状态: 16 表示发波就绪, 17 表示正在工作; 其他为故障; 故障代码如下表。 Page 8 (fault code) : Display the working status of ultrasonic wave: 16 means the wave is ready, 17 means it is working; Others are faults; The fault code is shown in the table below.

输出短路 Output short circuit	0x01
输出过载 Output overload	0x02
输出开路 Output open circuit	0x03
输出过压 Output overvoltage	0x04
输入欠压 The input voltage	0x05
输入过压 Input overvoltage	0x06
温度过高 The temperature is too high	0x07
输出过流 Output flow	0x08
	0x09
初始化 Initialize	0x0A
硬件故障 Hardware failure	0x0B
硬件故障 Hardware failure	0x0B
未授权 Unauthorized	0x0C
就绪 Ready	0x10
工作中 Running	0x11
未检测到超声波 No ultrasound was detected	0x12

第 9 页(机箱温度): 显示超声波电源的机箱温度。

第 A 页和第 D 页(电机转速): 用于显示压花机工作的速度, 参数值/100 为实际速度, 单位为“米/分钟”。表示压花机 1 分钟能够缝合的米数。

Page 9 (cabinet temperature) : Display the cabinet temperature of the ultrasonic power supply.

Page A and Page D (Motor speed) : It is used to display the working speed of the embossing machine. The parameter value /100 is the actual speed, and the unit is "meters/min".Represents the number of meters that the embossing machine can sew in 1 minute.

5.2 电机控制模式设置

电机控制模式有三种模式: 定速模式、调速模式、测试模式;

电机控制模式速度参数, 是设定电机的转速, 即压花机每分钟缝合的米数。

参数修改在设置模式页面中修改, 修改参数后, 需要按“OK”键, 并将设置模式第 12 页 (保存设置) 改为 8888, 再按“OK”键, 然后关机重新开启即可。

5.2 Motor control mode setting

There are three motor control modes: constant speed mode, speed regulation mode and test mode.

Motor control mode speed parameter, is to set the motor speed, that is, the number of meters stitched per minute by the embossing machine.

Modify parameters In the setting mode page. After modifying parameters, press "OK" key, change the setting mode page 12 (save Settings) to 8888, press "OK" key, then shutdown and restart.

5.2.1 定速模式

定速模式为固定转速，踏板控制启停，启动后进入设定转速。

定速模式下，气缸放下，电机启动后超声波持续发波。

5.2.2 调速模式

调速模式为踏板控制转速，根据踏板的深度，控制电机的转速，自由控制缝合速度。调速模式下的转速设定值为最高转速，实际电机转速根据踏板深度由零到最高转速线性变化。

调速模式下，气缸放下，电机启动后超声波持续发波。

5.2.3 测试模式

测试模式用于电机同步调试，测试模式下，气缸默认抬起，超声波不发波。

5.2.1 Constant speed mode

The constant speed mode is fixed speed. The pedal controls the start and stop. After starting, it enters the set speed.

In constant speed mode, the cylinder is put down and the ultrasonic wave continues to send after the motor is started.

5.2.2 Speed regulation mode


Speed control mode is pedal control speed, according to the depth of pedal, control motor speed, free control suture speed. The set value of speed in the speed regulation mode is the maximum speed, and the actual motor speed changes linearly from zero to the maximum speed according to the pedal depth.

In the speed regulation mode, the cylinder is put down and the ultrasonic wave continues to send after the motor is started.

5.2.3 Test mode

The test mode is used for synchronous motor debugging. In the test mode, the cylinder is lifted by default without ultrasonic waves.

5.3 超声设置 Ultrasonic set

超声设置页面主要用于超声波的调试。一般出厂后，超声波电源与换能器都已经匹配完成，无需调试。当更换不同品牌或厂家的换能器时，可能需要在此界面调试（开启电源按  键就切换到此页面操作此页面时）。操作人员需要具备一定的调试能力。

第 0 页(振幅): 用于设置超声波电源的振幅，设定范围为 5%-48%，振幅设定越高，输出功率越大。一般建议在 30%以下，输入功率小于 900W。

第 1 页(相位): 用于显示超声波频率跟踪的效果。出厂设置为 150，一般实际运行在 100-200 之间表示频率跟踪正常，相位值超过 150 ± 100 ，说明频率跟踪失败，未工作在最佳工作点。

第 2 页(追踪最小值): 此页为追踪下限。追踪表示超声波跟踪的系统控制值, 追踪上下限设定是调试超声波换能器匹配的重要参数。

第 3 页(追踪最大值): 此页为追踪上限。

第 4 页(追踪速率): 设定超声波追踪的速度, 设定范围 1-10, 设定值越大, 追踪速率越快, 频率响应越快, 能够适应高速的刀具花纹的变化, 同时, 可能会增加换能器的发热。


第 6 页到第 E 页: 电机参数设置, 用于设置电机转速、电机控制模式模式等。

第 F 页(模式选择): 超声波三种模式选择: 0 表示测试模式、1 表示调速模式、2 表示定速模式。

第 10 页、第 11 页(电机开启/关闭延时): 电机启动/关闭延时时间, 单位 ms。

第 12 页(保存设置): 设置参数后保存。

第 13 页(恢复出厂设置): 只恢复超声出厂设置, 不恢复电机参数。

Ultrasonic setting page is mainly used for ultrasonic debugging. Generally, after factory delivery, ultrasonic power supply and transducer have been matched, no debugging is needed. When changing transducers from different brands or manufacturers, you may need to debug in this interface (switch  to this page to operate this page when opening the power button). Operators need to have a certain debugging ability.

Page 0 (amplitude) : It is used to set the amplitude of the ultrasonic power. The setting range is 5%-48%. The higher the amplitude is set, the higher the output power will be. General recommendation is less than 30%, input power less than 900W.

Page 1 (phase) : Used to display the effect of ultrasonic frequency tracking. The factory setting is 150. Generally, the actual operation is between 100 and 200, indicating that the frequency tracking is normal. The phase value exceeds 150 ± 100 , indicating that the frequency tracking fails and the work is not at the optimal working point.

Page 2 (trace minimum) : This page is the trace minimum. Tracing represents the system control value of ultrasonic tracking. Setting the upper and lower limits of tracing is an important parameter for debugging ultrasonic transducer matching.

Page 3 (tracking maximum) : This page is the tracking maximum.

Page 4 (tracking rate) : Set the ultrasonic tracking speed with a range of 1-10. The higher the setting value, the faster the tracking rate and the faster the frequency response. It can adapt to the change of high-speed tool pattern, and at the same time, it may increase the heat of transducer.

Page 6 to Page E: Motor parameter setting, used to set the motor speed, motor control mode, etc.

Page F (mode selection) : Ultrasonic three mode selection: 0 means test mode, 1 means speed regulation mode, 2 means constant speed mode.

Page 10, Page 11 (motor start/close delay) : Motor start/close delay time, unit MS.

Page 12 (save Settings) : Save after setting parameters.

Page 13 (restore factory Settings) : only restore ultrasonic factory Settings, not motor parameters.

6. 调试笔记

6.1 匹配

本电源采用振子自动匹配算法，一般20KHz附近的振子上电即可正常工作，无需扫频，无需调试，一般只需在工艺页面设定合适的焊接工艺。

6.2 工艺

- ✓ 压花机，采用连续发波模式，振幅设定13%左右，关闭延时0.2秒，工作时主页显示输入功率150-200W。
- ✓ 打片机，采用连续发波模式，振幅设定20%左右，关闭延时0.2秒，工作时主页显示输入功率300-500W。
- ✓ 封边机，采用间歇发波模式(断续发波模式)，振幅设定25%左右，准备时间0.5秒，焊接时间0.5秒，冷却时间0.3秒，工作瞬间主页显示输入功率400-700W。

6.3 相位

出厂设定值 150，请勿修改。正常工作时，如果相位在设定值 ± 20 之间波动，说明锁频成功。如果相位超出设定值 ± 100 的范围，说明锁频不成功，需要检查追踪值是否处于上限或下限。

6.4 追踪

设置页面可设置追踪值的上限和下限。20KHz下限为800，上限为1600。一般不需要修改。超声波在工作时，档位越高或负载越大，追踪值会越小。档位越低或者负载越轻时，追踪值会越大。

在重载情况下，如果追踪值达到下限，且相位恒定偏离设定值时，可以通过减小追踪下限值使相位重新锁定至设定值。反之，在轻载情况下，如果追踪值达到上限，且相位恒定偏离设定值，可以通过增大追踪上限值。

6.5 常见问题

6.5.1 焊接效果差，焊不透

检查工艺设定，适当增加焊接振幅，或者焊接时间。

6.5.2 振子发热

在焊接效果良好的情况下适当降低振幅和焊接时间，可以有效减少振子发热。

6.5.3 频率无法锁定

如果追踪频率大于 22KHz，可以尝试增大追踪上限；反之，如果超声波追踪频率小于 18KHz，可以尝试减小追踪上限。

6. TROUBLE SHOOTING

6.1 match

This power supply adopts the vibrator automatic matching algorithm. Generally, the vibrator near 20KHz can be powered on and work normally. There is no need to scan frequency or debug.

6.2 process

√ Embossing machine, using continuous wave mode, amplitude set around 13%, closing delay 0.2 seconds, working homepage shows input power 150-200W.

√ Punching machine adopts continuous wave sending mode, the amplitude is set at about 20%, the shutdown delay is 0.2 seconds, and the main page shows the input power of 300-500W when working.

√ Edge sealing machine adopts intermittent wave mode (intermittent wave mode), the amplitude is set at about 25%, the preparation time is 0.5 seconds, the welding time is 0.5 seconds, the cooling time is 0.3 seconds, the main page of working moment shows the input power is 400-700W.

6.3 phase

Factory set value 150, do not modify. During normal operation, if the phase fluctuates between the set value ± 20 , the frequency lock is successful. If the phase exceeds the range of ± 100 set value, the frequency locking is unsuccessful, and it is necessary to check whether the tracking value is at the upper or lower limit.

6.4 track

Settings Pages can set the upper and lower limits of trace values. The lower limit of 20KHz is 800 and the upper limit is 1600. Generally no modification is required. The higher the gear or the larger the load, the smaller the tracking value will be. The lower the gear or the lighter the load, the greater the trace value.

Under heavy loading, if the trace value reaches the lower limit and the phase is constant away from the set value, the phase can be re-locked to the set value by reducing the trace lower limit. On the contrary, in the case of light load, if the tracking value reaches the upper limit and the phase is constant and deviates from the set value, the tracking upper limit can be increased.

6.5 Frequently asked Questions

6.5.1 Poor welding effect and impenetrability

Check process Settings to increase welding amplitude or welding time appropriately.

6.5.2 Vibrator heating

In the case of good welding effect, the vibration heat can be effectively reduced by appropriately reducing the amplitude and welding time.

6.5.3 Frequency cannot be locked

If the tracking frequency is greater than 22KHz, try to increase the tracking upper limit. Conversely, if the ultrasonic tracking frequency is less than 18KHz, an attempt can be made to reduce the tracking upper limit.