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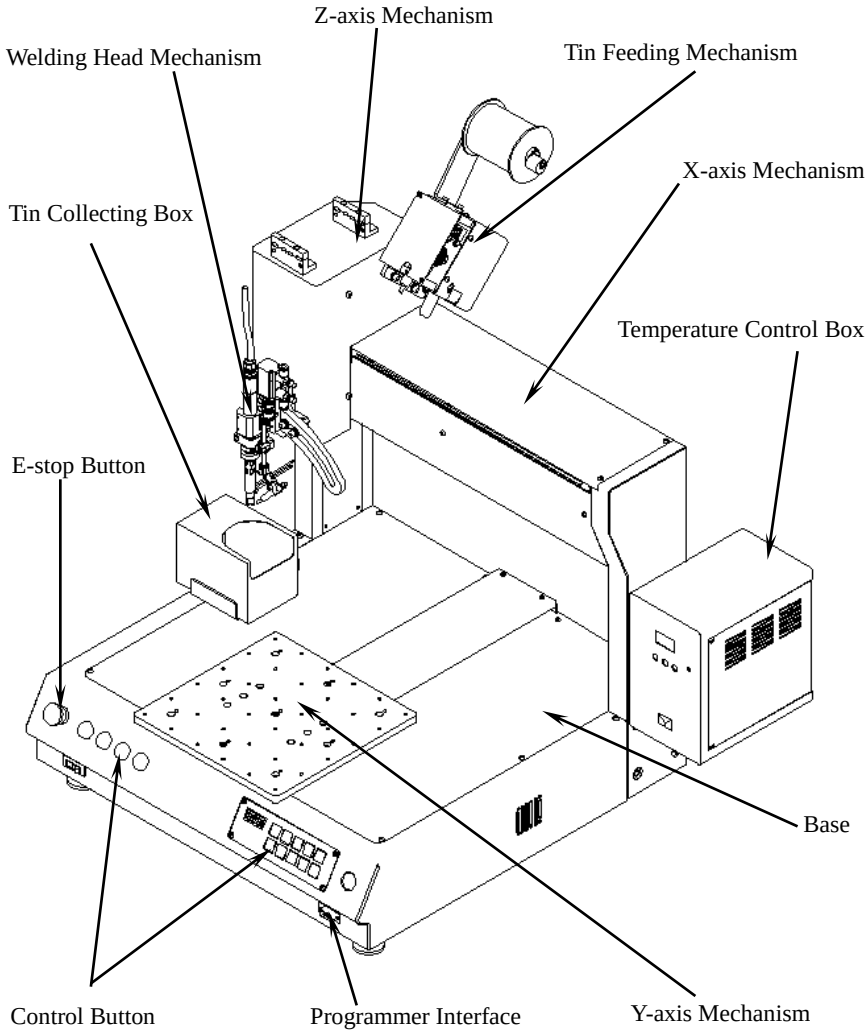
Precautions

Please read the following safety precautions to prevent this product or any other products connected with it from being damaged. In order to avoid possible dangers, this product can be only used in the specified range.

- **Use proper power cord:** Only use the dedicated power cord provided with this product. Before use, check the power cord to confirm there is no damage or electric leakage.
- **Product grounding:** This product is grounded through the power cord. Use the power socket with reliable grounding wire.
- **Do not pull out or insert the serial port connected with the computer and the programmer when the machine is powered on.**
- **Please keep the product surface clean and dry, and do not operate it in an environment which is humid or has corrosive gas.**
- **Do not put articles on the machine.**
- **Please turn off the power supply after use.**
- **The size of components to be welded shall meet the movement index of this product.**
- **Do not use the serial port line of the handheld programmer to connect PC; otherwise PC may be damaged.**
- **Do not disassemble the machine without authorization to avoid the risk of electrical shock.**

1. Product Overview

DH-300/400 full automatic soldering robot is a high-quality three-freedom soldering and welding device developed for welding various workpieces. As shown in the figure below, with left/right column type mechanical structure, the soldering robot is suitable for welding the products at the operating point. This product has the characteristics of very high positioning accuracy, high rigidity and low center of gravity, and has good movement performance and extremely low noise. During movement, the machine is stable and is convenient to download the motion parameters. AUTOCAD data file can be directly read as the operating data, or the handheld programmer can be used for teaching programming through RS-232 serial port. Users can develop a variety of tools as required to be fixed on the carrying plate to meet different requirements of users. DH-300/400 automatic soldering robot reduces the welding quality instability caused by manual operation, realizes the automatic operation of soldering and welding, and ensures the product welding quality.


Z-axis Mechanism
Welding Head Mechanism
Tin Feeding Mechanism
X-axis Mechanism
Tin Collecting Box
Temperature Control Box
E-stop Button
Base
Control Button
Programmer Interface
Y-axis Mechanism

1.1 Product Functions and Characteristics

1. X, Y and Z axes can make two-dimensional and three-dimensional motion;
2. This product is capable of welding at the operating point and drag soldering;
3. Three-dimensional displacement is controlled by the precision stepping motor, so that positioning accuracy and repeated positioning accuracy are high;
4. With CAD Graphics recognition, teaching is simplified and track is more accurate;
5. This product has compact sealing structure, reasonable layout and higher cost performance;
6. This product is more convenient to operate and use with the handheld programmer, and the track storage number is up to 120;
7. Welding time and track running speed can be adjusted by programming;
8. With three-axis fine tuning operation, teaching point coordinates are more accurate;
9. According to the principles of ergonomics, the worktable height is optimized to be 135mm, so as to more meet the operation process of workers and reduce the workers' feeling of fatigue;
10. According to users' requirements, specially designed soldering iron clamps of adjustable height and angle etc. can be equipped;
11. Different tin feeding systems can be equipped according to soldering tin diameters;
12. Soldering bit temperature, tin feeding speed, tin feeding volume and tin return volume can be adjusted;
13. The tin feeding wheel and the tin breaking wheel in the tin feeder can be interchanged.
14. This product has the function of alarm display.

1.2 Technical Parameters

DH-300/400 Full Automatic Soldering Robot:

1. Range of motion:

Axis	DH-300	DH-400
X axis (mm)	335	435
Y axis (mm)	300	400
Z axis (mm)	100	100

2. Maximum operating speed:
   X axis: 800mm/s
   Y axis: 800mm/s
   Z axis: 400mm/s
3. Wire feeding accuracy: ±0.2mm
4. Range of tin wire: φ0.3~φ1.5mm
5. Repeated accuracy: ±0.02mm
6. Temperature accuracy: ±2º
7. Maximum load:
   Worktable: 8Kg (Operating speed < 80mm/s)
   Z axis: 2.5Kg (Operating speed < 80mm/s)
8. Overall dimensions: 620mm×600mm×700mm (L, W, H)
9. Weight: 61Kg
10. Task storage number: 120

Parameter Requirements of Welding System

1. Temperature range of soldering bit: 200.0-480.0ºC
2. Tin feeding speed: 0-50mm/s
3. Tin return volume: 0.1-5.0mm
4. Tin blowing time: 0.0-9.9s
5. Manual tin feeding function
6. Manual tin return function
7. Manual tin blowing function
8. Applicable tin wire diameter: 0.3mm, 0.4mm, 0.5mm, 0.6mm, 0.8mm, 1.0mm, 1.2mm, 1.5mm
9. Soldering bit: High-frequency vortex soldering bit
10. Welding status ready function

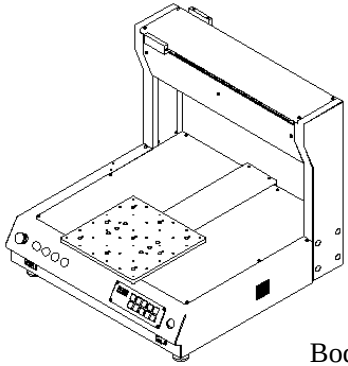
1.3 Operating Environment

1. Application range of supply voltage: 220V AC, fluctuation range +10%~-15%, frequency 50±1 Hz
2. Ambient temperature: 0 ~ 40ºC
3. Relative humidity: 20% ~ 90% (no condensation)
4. Pressure requirement of air source: 0.3MPa ~ 0.6MPa

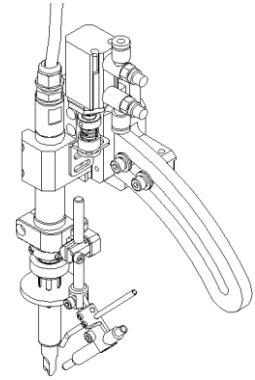
2. Equipment Installation and Commissioning

2.1 Unpacking

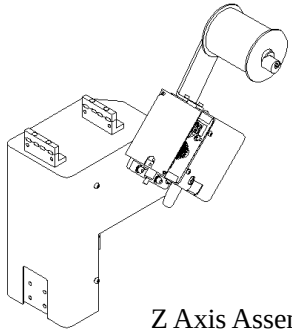
Please confirm whether there are the following items after unpacking.



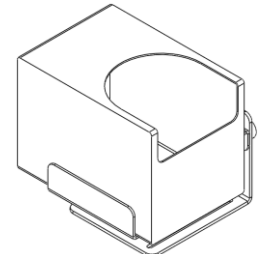
Body



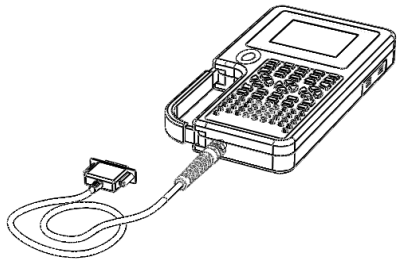
Soldering Bit Assembly



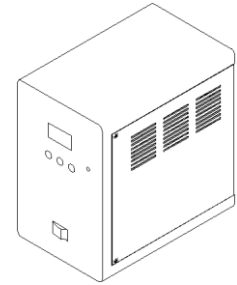
Z Axis Assembly



Tin Blowing Box



Programmer

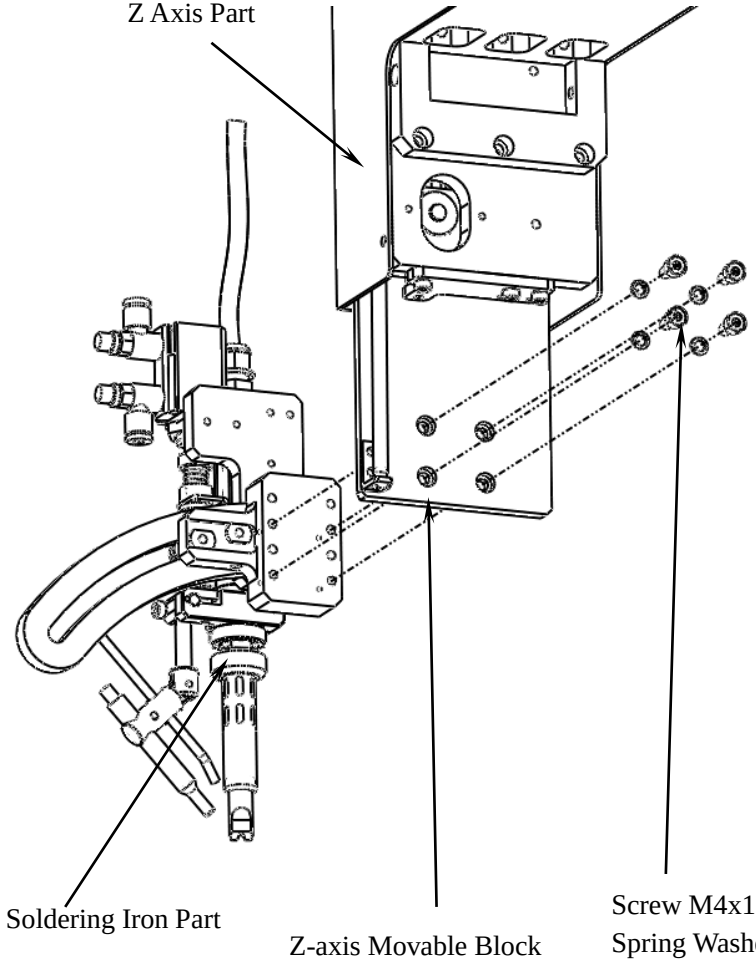


Temperature Control Box

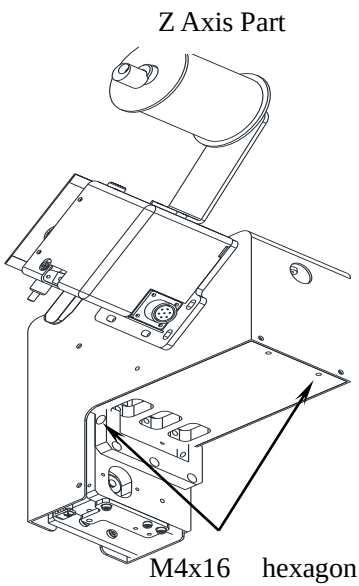
2.2 Assembling

2.2.1 Installation of Soldering Bit Assembly

The soldering bit assembly of the three-axis welding machine is installed on the Z-direction movable block of Z axis.



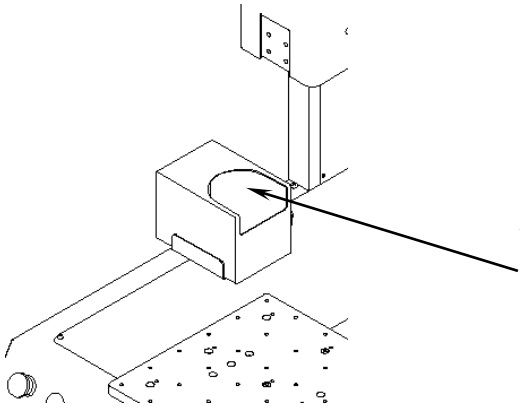
2.2.2 Installation of Z Axis



M4x16 hexagon socket screw and spring washer

Connecting screw holes on both sides

2.2.3 Installation of Tin Collecting Box

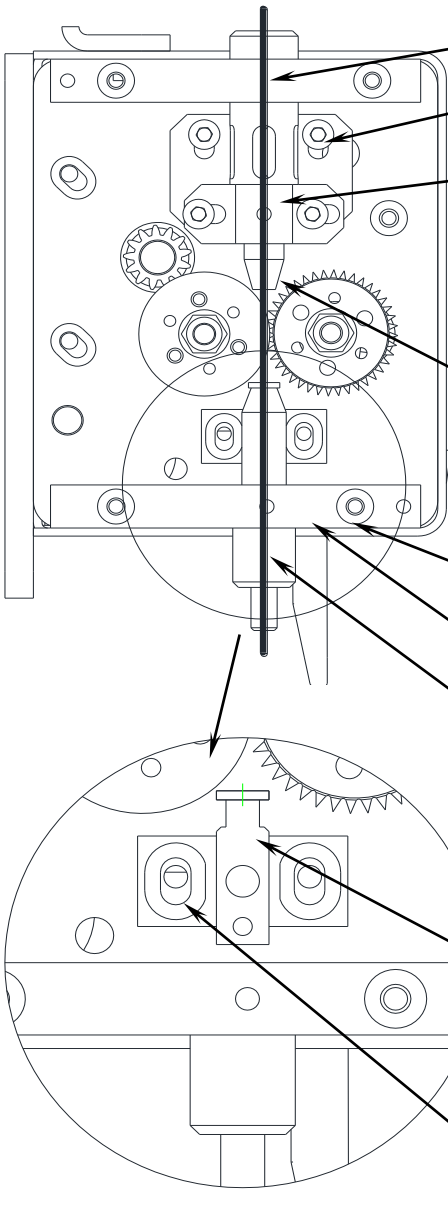


Approximate position of tin collecting box after assembling; this position is adjustable

There are two screw holes on the upper plane of Y-axis outer cover; fix the tin collecting box on the two screw holes of Y-axis outer cover with two M3X8 hexagon socket screws and washers with corresponding specification.

2.2.4 Installation of Tin Guiding Pipe

Select the corresponding tin feeding hose according to the required diameter series of tin wire.



Thick black line indicates the passing path of tin wire

Adjusting Base

Wire Feeding Guide Sleeve Seat

The wire inlet of tin guiding pipe shall be close to the tin feeding wheel as far as possible here so as to help to reduce the wire blocking phenomenon.

Note: To feed the tin, the wire feeding guide sleeve seat shall be adjusted to the rightmost side, and the adjusting base shall be adjusted to the downmost side. To break the tin, the wire feeding guide sleeve seat shall be adjusted to the leftmost side, and the adjusting base shall be adjusted to the uppermost side.

Fixed Seat of Tin Guiding Pipe

Note: This is where the shoulder and the bottom of the fixed seat of tin guiding pipe shall fit together as far as possible.

Tin Guiding Pipe

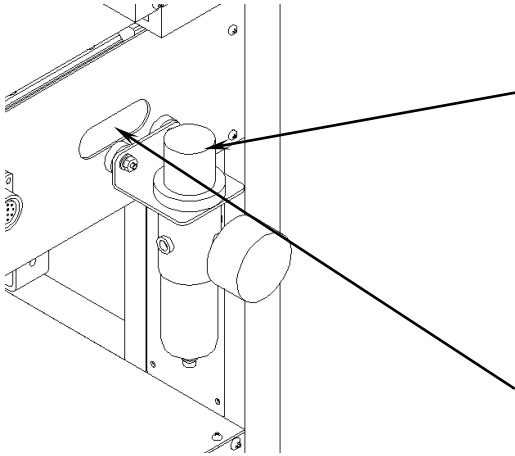
Tin Blocking Detecting Piece

The tin blocking detecting piece shall be close to the tin feeding wheel as far as possible, and the vertical position can be adjusted through the adjusting seat of adjusting piece.

Special Note: The tin blocking copper detecting ring shall not be in contact with the tin feeding wheel and other metals so as to avoid failure due to forming a loop with the tin feeder.

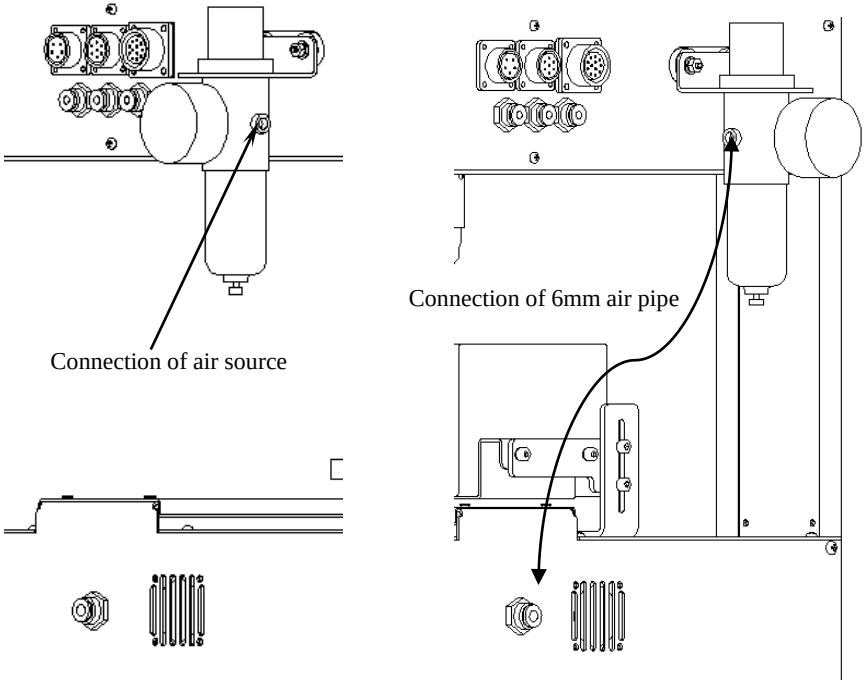
Adjusting Seat of Adjusting Piece

2.2.5 Installation of Oil-water Separator



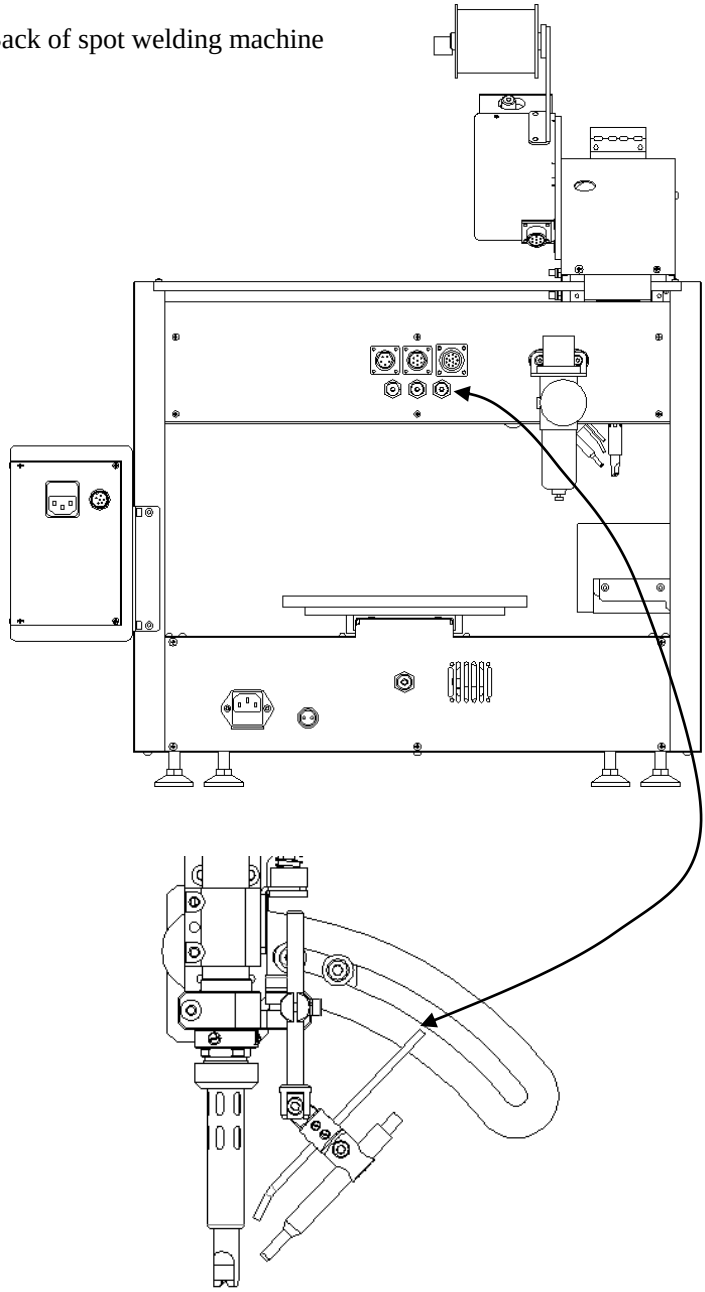
2.2.6 Connection of Air Pipe

(1) Connection of air pipe for oil-water separator

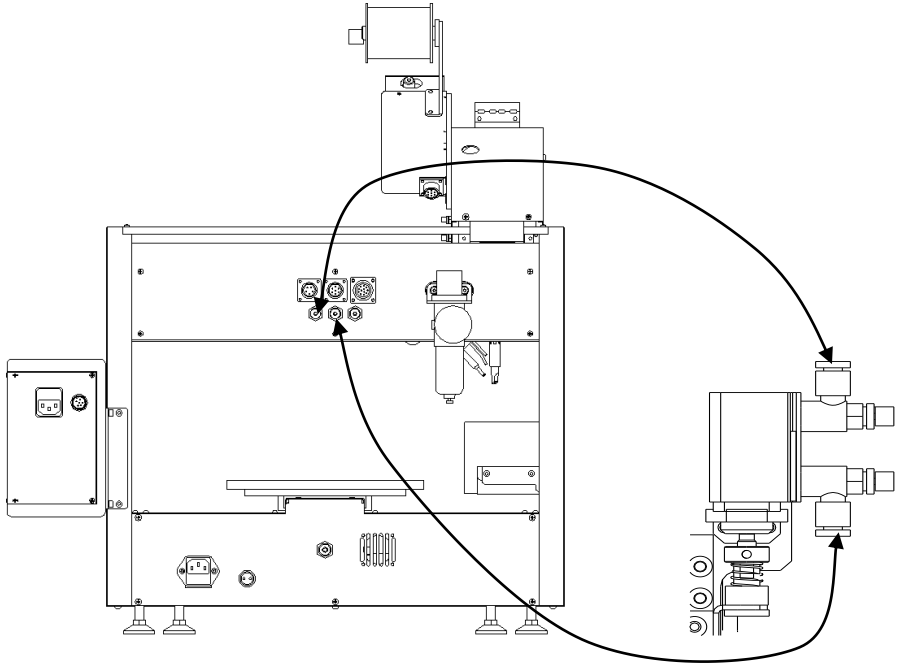


(2) Connection of air pipe for tin blowing

Back of spot welding machine

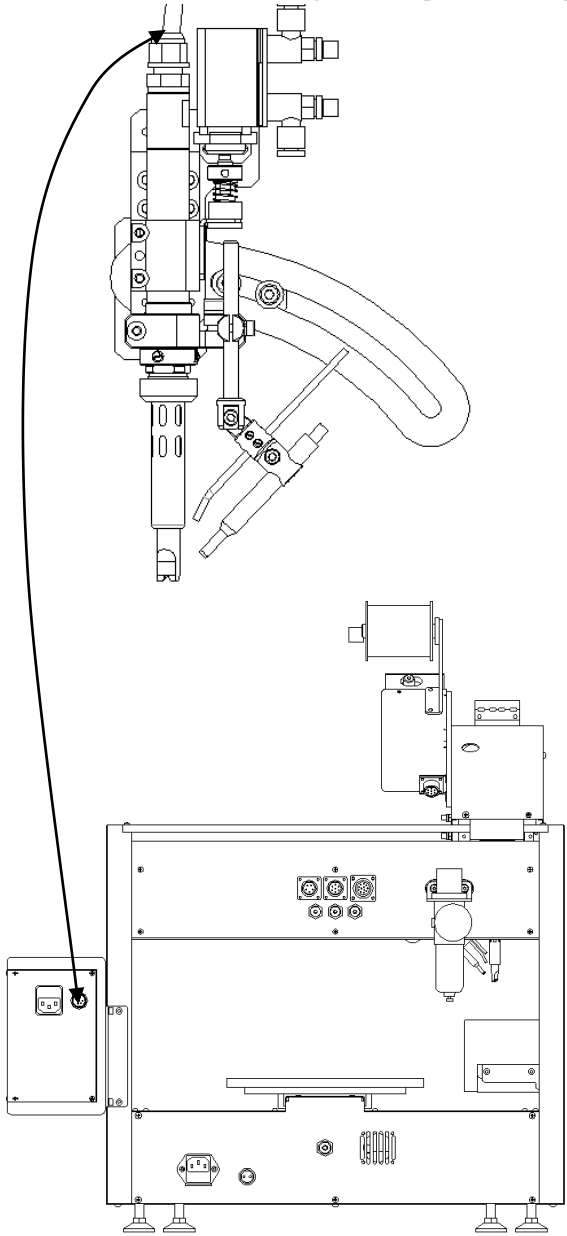


(3) Connection of air pipe for cylinder

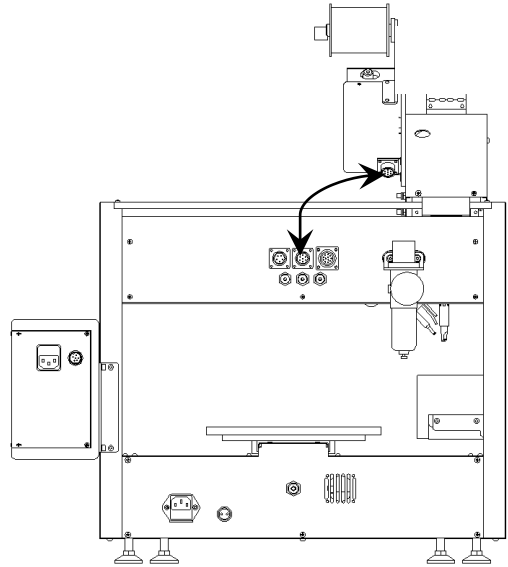


2.2.7 Connection of Electric Wire

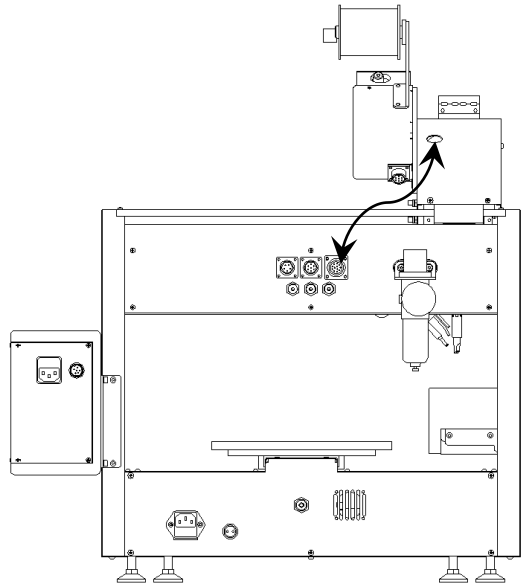
(1) Connection of electric wire for welding head (6-pin aviation plug)



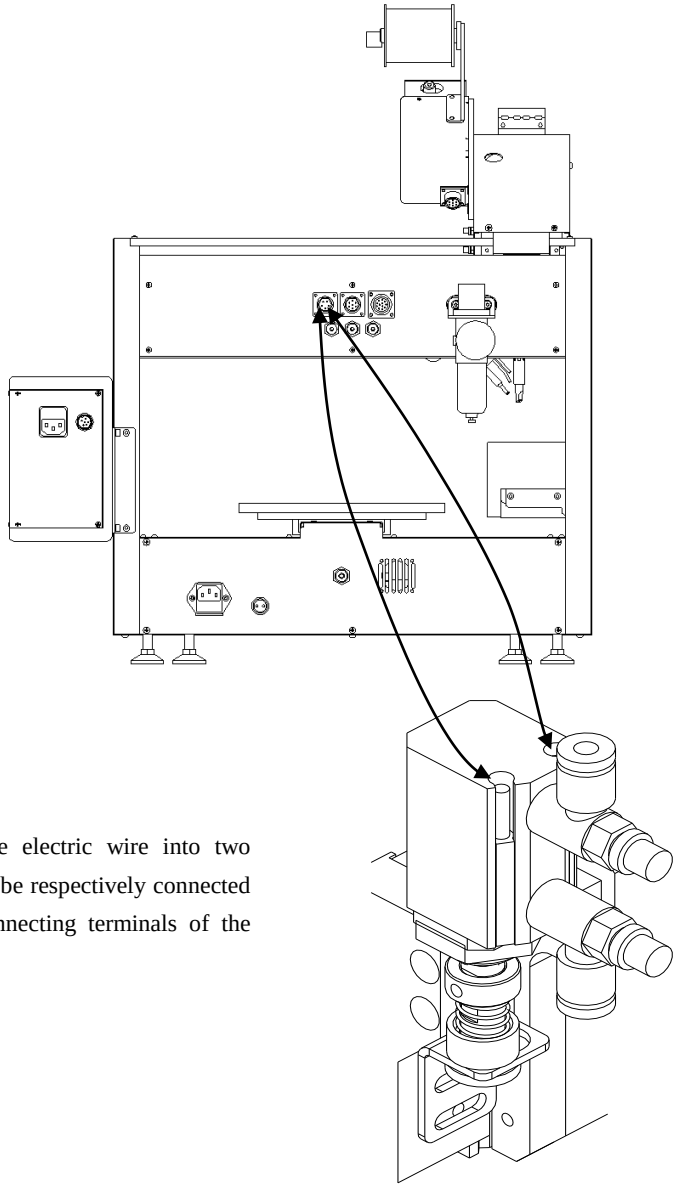
(2) Connection of electric wire for wire feeding (7-pin aviation plug)



(3) Connection of electric wire for Z axis (12-pin aviation plug)

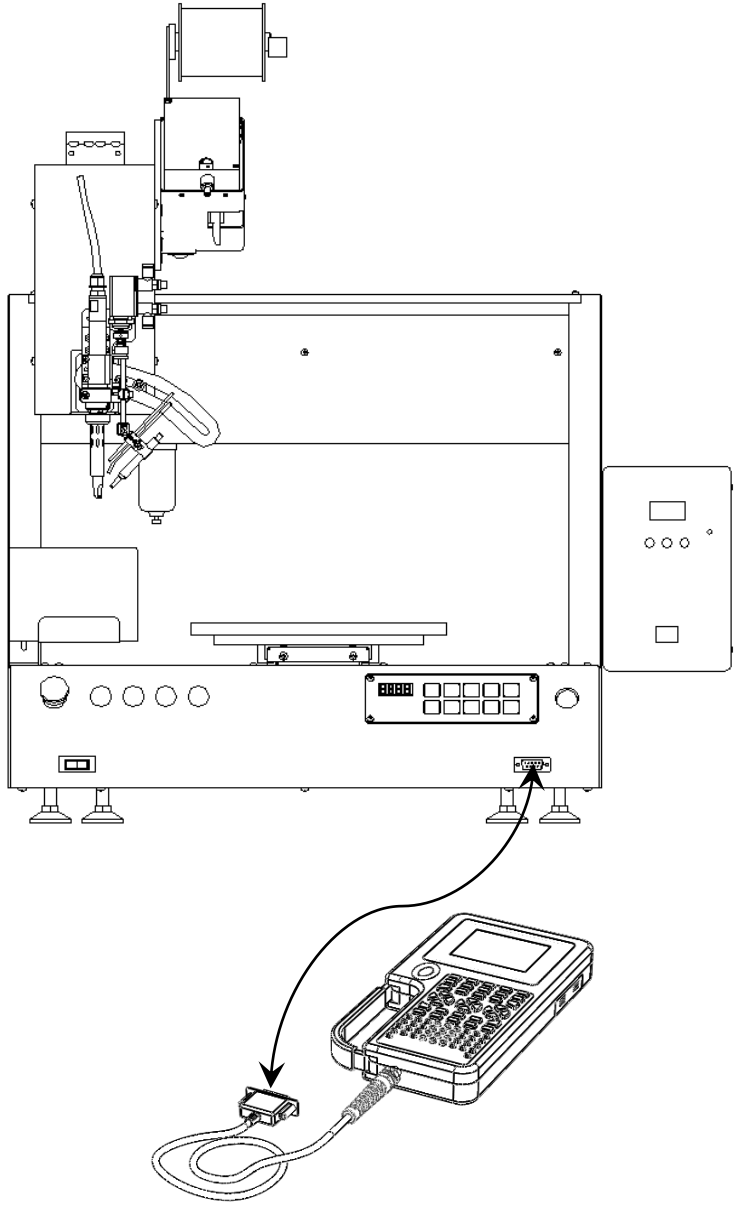


(4) Connection of electric wire for miniature cylinder (5-pin aviation plug)

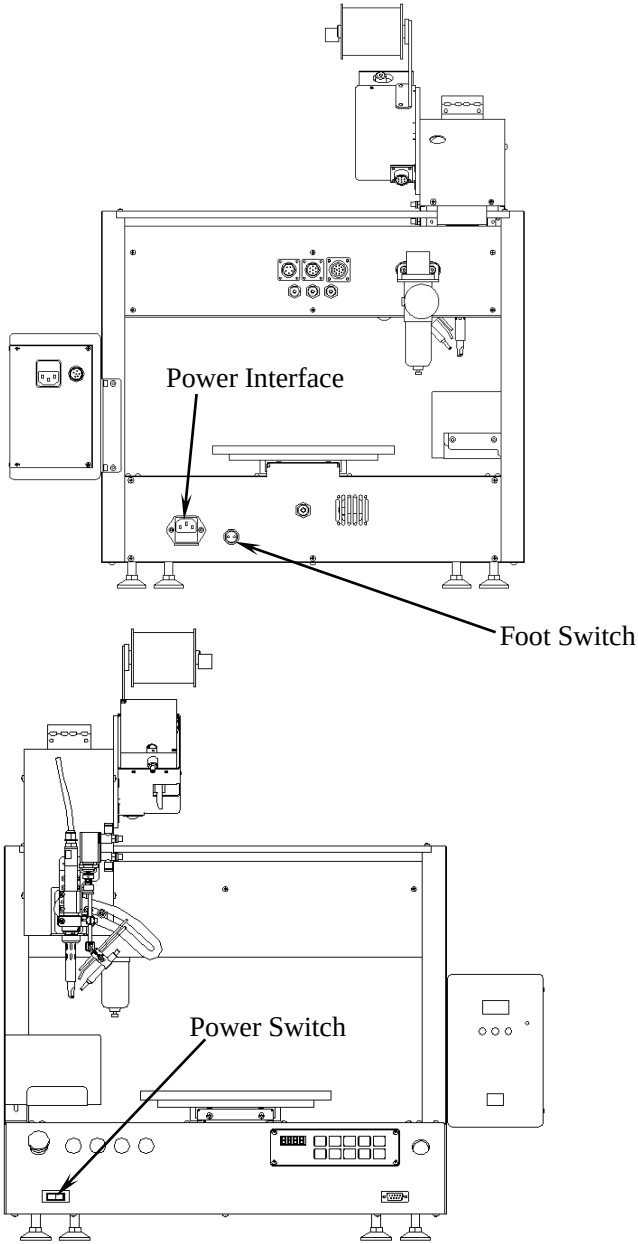


Divide the electric wire into two strands to be respectively connected to the connecting terminals of the cylinder.

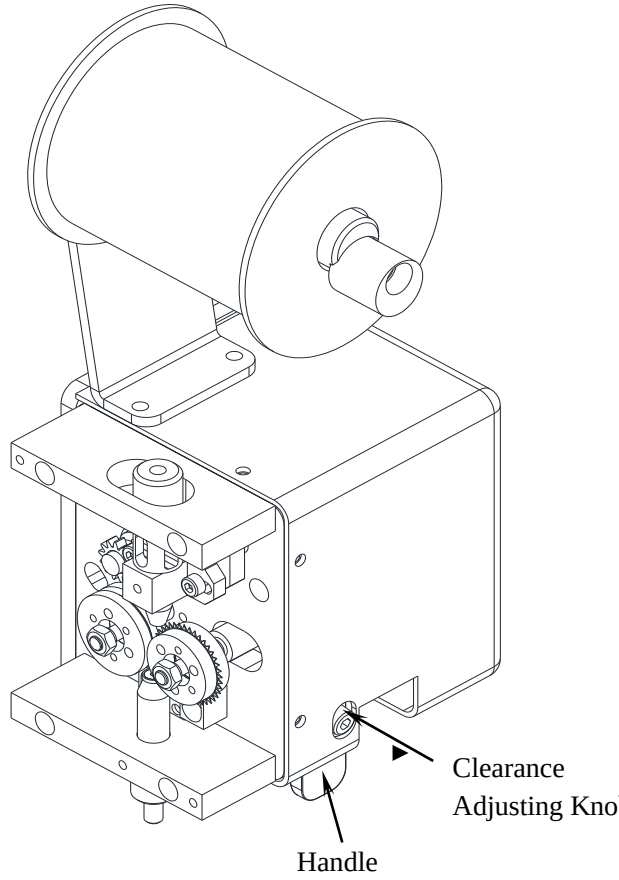
(5) Connection of programmer interface



(6) Power supply connection and switch



2.3 Installation and Adjustment of Tin Wire



When installing the tin wire, select the tin wire with required diameter series. Thread the tin wire through the guide sleeve opening at the top of the tin feeder, lift the handle to let the tin wire pass through the clearance of friction wheel and reach the interior of the wire leading opening at the bottom, and then close the handle to carry out the tin feeding operation, and observe the clearance of friction wheel. Adjust the clearance with M4 hexagon socket screw driver.

2.3.1 Clearance Adjustment Methods

(1) Clearance adjustment methods in case of tin feeding:

① When the tin wire of 0.3mm is used, rotate the adjusting screw counterclockwise until the clearance of tin feeding wheel is minimum. When you feel the adjusting screw is very loose and the force is not required during rotation, the minimum clearance is reached. At this time, rotate the adjusting screw clockwise. When you feel the required force is increased, rotate the adjusting screw by 1/2 turn to 2/3 turn.

② When the tin wire of 0.4mm is used, the adjustment method is the same as that of the tin wire of 0.3mm.

③ When the tin wire of 0.5mm, 0.6mm, 0.8mm, 1.0mm or 1.2mm is used, it is only necessary to adjust the clearance of tin feeding wheel to the minimum clearance.

④ When the tin wire of 1.4mm or 1.5mm is used, the adjustment method is the same as that of the tin wire of 0.3mm.

(2) Clearance adjustment methods in case of tin breaking:

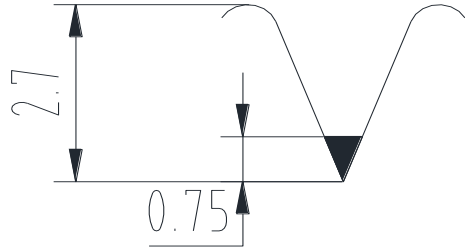
① When the tin wire of 0.6mm, 0.8mm, 1.0mm or 1.2mm is used, it is only necessary to adjust the clearance of tin feeding wheel to the minimum clearance.

② When the tin wire of 1.4mm or 1.5mm is used, the adjustment method is the same as that of the tin wire of 0.3mm.

2.3.2 Service Life of Tin Breaking Blade

1. Force bearing mode of blade

The maximum penetrating depth of the blade is 0.75mm (The maximum diameter of tin wire is 1.5mm), and the whole depth of the blade is 2.7mm. As shown in the figure below, the main force bearing part is the tooth tip, which is a part easy to wear on the blade and is a main factor influencing the service life.



2. Material analysis of blade

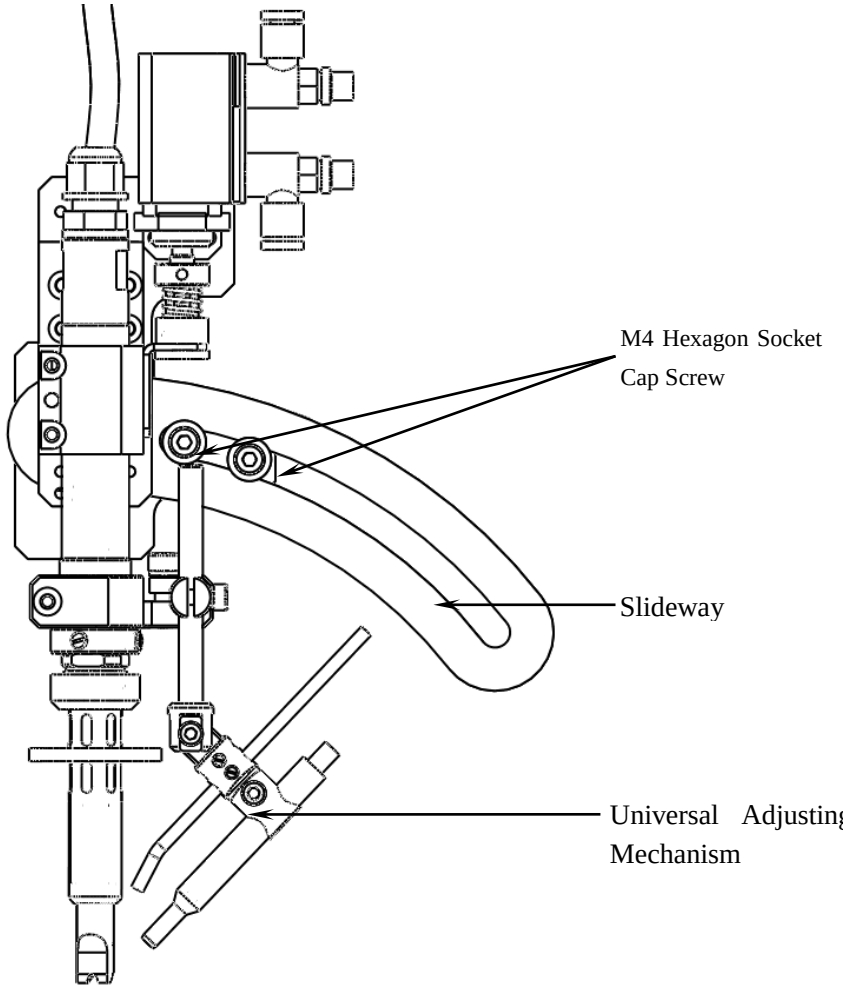
The hardness of the material W6Mo5Cr4V2 for the tin breaking blade is 58-62 HRC after heat treatment, and the hardness and the wear resistance are very high, so the abrasion is very small between the blade and the tin wire.

3. Service life of blade

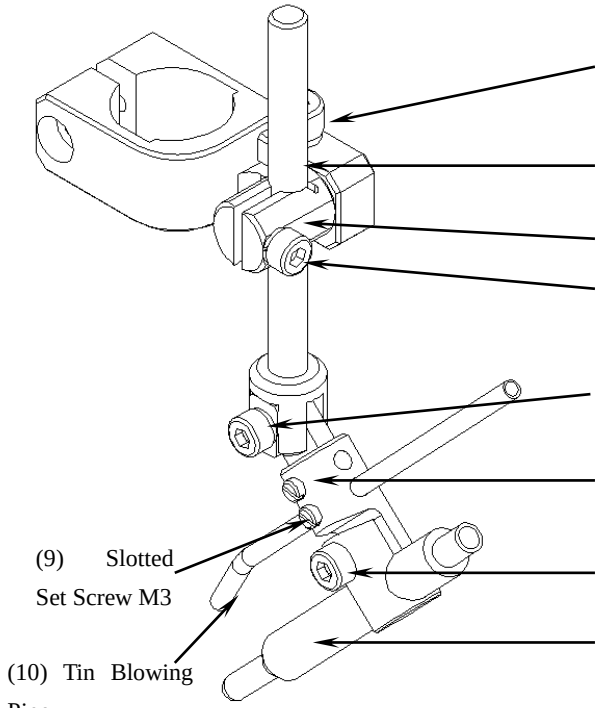
It is predicted that the service life of the blade is about 1 year according to the material properties of the blade and the force bearing condition of the tooth tip. The failure mode of the blade is mainly manifested that when the holes on the tin wire are different in size, it indicates the blade has been abraded seriously. At this time, it is suggested that the customer should replace the blade.

2.4 Adjustment of Soldering Bit Mechanism

The adjusting mechanism of this part is used for precisely feeding the tin wire to the tin soldering point of soldering bit and adjusting the soldering pencil rod anticlockwise in the front view direction as shown in the following figure. When two M4 hexagon socket cap screws are loosened, the soldering pencil rod can be deflected approximately around the tip of welding head in the arc-shaped slideway so as to adjust the angle.



The universal adjusting mechanism can be used for adjusting the wire outlet of tin guiding pipe to align with the soldering surface tip of soldering bit.



1. Loosen (1) to rotate (3) to the desired angle and then lock (1);
2. Loosen (4) to vertically slide (2) to the desired height and then lock (4);
3. Loosen (5) to rotate (6) to the desired angle and then lock (5);
4. Loosen (7) to slide and rotate (8) in the hole and adjust the wire outlet to the distance required by the tip of soldering bit, and then lock (7). **It is suggested that the distance control should not be less than 8mm.**
5. Loosen (9) to slide and rotate (10) in the hole and adjust the air outlet of tin blowing pipe to align with the tip of soldering bit so as to blow away the residual molten tin.
6. Loosen (11) to slide and rotate (12) in the hole. (12) is optional, and is not configured in the standard configuration.

2.5 Equipment Commissioning

Check the E-stop switch and the equipment wiring, and turn on the power switches of the motion control system and welding system of the spot welding machine when the E-stop switch is screwed out and the wiring is correct. After the motion control system of the spot welding machine is powered on, LED nixie tube starts flashing. Four "-" are displayed on the nixie tube after it stops flashing, which indicates that the program initialization is completed. Press the Reset button to reset the machine. After the reset is completed, the task number (default: 0) is displayed on the nixie tube. In this state, communication can be made with PC or the handheld programmer, and tasks can be downloaded onto the slave computer after graphic teaching through PC or the handheld programmer. After task downloading is completed, perform graphic simulation through the "Simulation" function of PC or the handheld programmer, and observe whether the operating track of the spot welding machine is correct. In simulation state, the motion system will operate, but the tin feeding system will not operate, so actual welding will not be carried out.

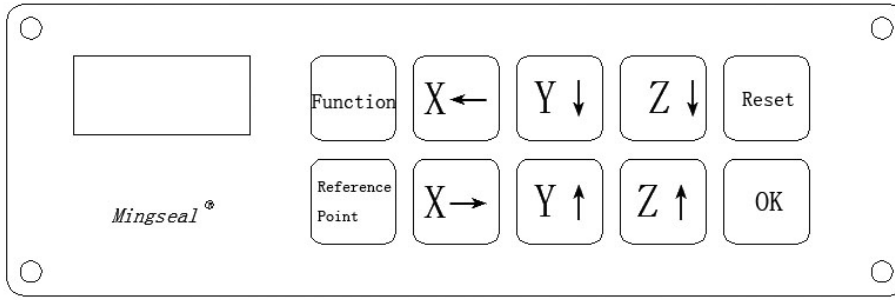
Notes: (1) The welding function is shielded by the spot welding machine during commissioning of the full automatic soldering robot.

(2) Do not use the serial port line of the handheld programmer to connect PC; otherwise PC may be damaged.

3. Basic Operation

3.1 Motion Control System

3.1.1 Description of Control Panel



There are ten metal buttons and one control button on the control panel:

1. The metal button marked with “Function” is the function control button. For corresponding operation process, see 3.1.6 in Basic Operation;
2. The metal button marked with “Reference Point” is the reference point adjustment control button. For corresponding operation process, see 3.1.5 in Basic Operation;
3. The metal buttons marked with “X←”, “X→”, “Y↑”, “Y↓”, “Z↑” and “Z↓” are used to set the function number and parameters in the function control, modify the current reference point values of X, Y and Z axes in the reference point adjustment, and select the task number in the task selection control. See 3.1.3 and 3.1.5 in Basic Operation for details.
4. The metal button marked with “OK” is used to confirm and save corresponding function information.
5. The button marked with “Reset” is used to realize reset control. See 3.1.2 in Basic Operation for details.
6. The button marked with “Run” is used to realize running control. See 3.1.4 in Basic Operation for details.

3.1.2 Reset and Pause Function

Task Reset

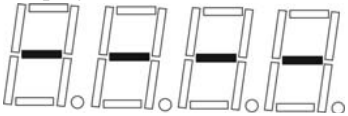
This function enables the system to return to absolute zero to realize the return-to-zero action of the system.

After startup, the system must execute this function; otherwise the system cannot normally operate.

If the position deviation occurs during welding, the E-stop switch can be immediately pressed.

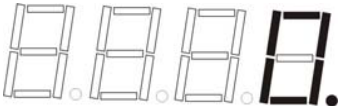
- Power Switch (system startup)

Display status of nixie tube:



Program initialization is completed → Press the Reset button

- Reset



Machine reset is completed

Task Pause

During the task running process, press "Reset" button once to pause the running task at any time. After the task is paused, the task number displayed on the nixie tube starts flashing. To continue to run this task, please press "Run" button. To reset the machine, continue to press "Reset" button.

Note: When pressing "Reset" button once, if the current spot welding is not completed, the system will enter into pause state after this spot welding is completed.

Button operation process in emergency:

Press the E-stop switch (machine stops)
- Turn off the power switch
- Turn on the power switch
- Screw out the E-stop switch
- Reset

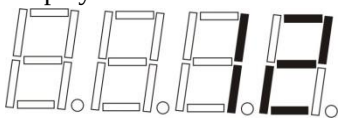
3.1.3 Task Selection Function

This function realizes the selection of stored tasks. The equipment can store 120 tasks. The task selection and confirmation can be realized through the metal buttons.

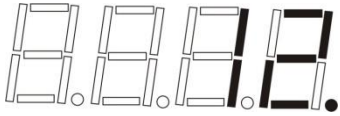
Task selection operation process:

- X→ (The task number is increased by 1 for each press), X← (The task number is decreased by 1 for each press)
- Y↑ (The task number is increased by 10 for each press), Y↓ (The task number is decreased by 10 for each press)
- OK
- Wait till the decimal point is displayed on LED

Display status of nixie tube:



Task selection is completed after OK button is pressed



Task selection is completed

3.1.4 Running

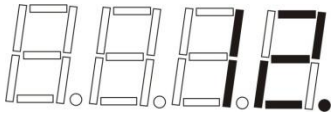
This function realizes the welding startup of the confirmed tasks.

Operation process:

After task selection is completed, directly press “Run” button.

Display status of nixie tube:

The welding spots are counted in real time during task execution, and it indicates that 300 operating points have been welded.



Task execution is completed, and the task number is displayed again.

If the automatic delay operation function is set in the function setting, when pressing “Run” once, the equipment will execute the automatic

delay operation according to the set time. The initial setting is no this function.

3.1.5 Reference Point Adjustment

This function realizes the reference point adjustment of the existing tasks. If the reference point of the workpiece to be welded needs adjustment, it can be realized through this function. The adjusted reference point is simultaneously shifted according to the adjusted value together with the starting point of the task.

This function can be executed only when there are tasks. The adjustment range of reference point is ±99.9mm. If the adjustment range of reference point is exceeded, limit error will be prompted. The solution is to adjust the reference point again.

Operation process:

Task selection

- Reference point (The reference point is raised by a certain height from the starting point according to the set value)
- Press "Cylinder ↓", and then use X→, X←, Y↑, Y↓, Z↑ and Z↓ to adjust X-axis positive direction, X-axis negative direction, Y-axis positive direction, Y-axis negative direction, Z-axis positive direction and Z-axis negative direction respectively, meanwhile the current adjustment value of reference point is displayed on LED in mm, and the adjustment unit can be set according to Function 3; if any direction button is pressed continuously, there will be the function of continuous adjustment.

Display status of nixie tube:

Adjustment status of reference point

Adjustment of reference point is completed

- OK (Adjustment of reference point is valid and saved)

➡ Run (After adjustment of reference point is completed, press "Reset" button to exit, and then press "Run" button to run the task)

To cancel the reference point adjustment operation during reference point setting:

➡ Reset (Cancel the current reference point adjustment operation and return to the current task)

3.1.6 Other Functions

Other functions are expanded in the "Function" button to realize the function setting of existing tasks, such as acceleration, whether zero correction is performed after welding is finished each time. Enter the function setting menu with the "Function" button, and select the function option with "X←" and "X→" buttons.

1. Zero correction setting:

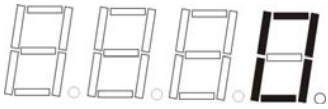
Operation process: Function ➡ X→: Select the function No. 1

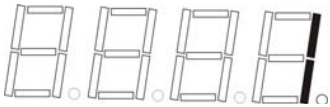
➡ OK: Set zero correction after end of running each time

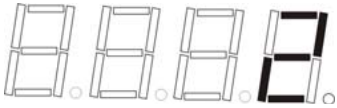
➡ X← and X→: Adjust the parameter: 0 - return to zero point after end of running; 1 - stop at the starting point after end of running; 2 - stop at the ending point after end of running, and Y axis moves back the distance (in mm) set in function 9 (When the last point in the task is tin blowing point, this tin blowing point is the ending point)

Display status of nixie tube:

 Display the function item number

 Zero point positioning correction

 Cancel positioning correction

 Y-axis positioning correction

Zero positioning correction: The welding head returns to zero point (reset point) after end of running each time.

Cancel positioning correction: The welding head returns to the position of reference point after end of running each time.

Y-axis positioning correction: The welding head stops at the last welding position after end of running each time, and Y axis moves Y-axis positioning distance (Function 9 can be used to set Y-axis positioning distance) towards the direction of zero point.

- OK

To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

2. Acceleration time setting:

Operation process: Function
- X→: Select the function No. 2
- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter (5-500) (in ms)

Display status of nixie tube:

 Display the function item number

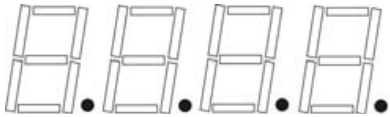
Press “OK” to enter the setting of the parameter value corresponding to the function number.

Initial status

Status after adjustment

- OK (If the nixie tube displays four points, it indicates that the data is being processed. After the data is saved, the function item number is displayed.)

Display status of nixie tube:



To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

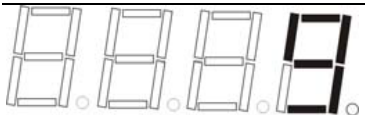
3. Adjustment unit setting of reference point:

Operation process: Function

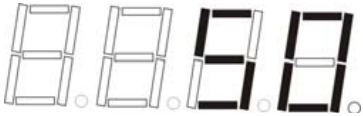
- X→: Select the function No. 3
- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter (1-50), wherein 1 is the minimum adjustment unit of reference point (shifting speed is slowest), 50 is the maximum adjustment unit of reference point (shifting speed is fastest). The larger the value is, the higher the adjustment speed of reference point is.

Display status of nixie tube:

Display the function item number



Before adjustment



After adjustment

➡ OK

To execute the reset operation during function setting operation:

➡ Reset (Cancel the current operation and return)

4. Adjustment height setting of reference point: (i.e. the height from the reference point to the starting point so as to prevent the welding head from being damaged when the reference point is adjusted)

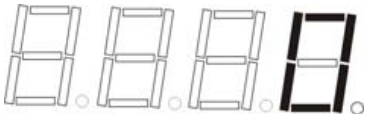
Operation process: Function ➡ X→: Select the function No. 4

➡ OK (Enter)

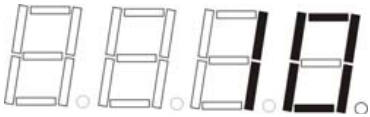
➡ X← and X→: Adjust the parameter (1-10), wherein 0 represents that the reference point coincides with the starting point, and 10 represents that the vertical height from the reference point to the starting point is 10 mm.

Display status of nixie tube:

Display the function item number



Before adjustment



After adjustment

➡ OK

To execute the reset operation during function setting operation:

➡ Reset (Cancel the current operation and return)

5. XY-axis idling speed setting:

Operation process: Function ➡ X→: Select the function No. 5

➡ OK (Enter)

➡ X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter (1-800); 1 represents the minimum speed in mm/s, and 800 represents the maximum speed in mm/s. Wherein, the increment of X button is 1mm/s, the increment of Y button is 10mm/s, and the increment of Z button is 100mm/s.

Display status of nixie tube:

Display the function item number

Before adjustment

After adjustment

➡ OK

To execute the reset operation during function setting operation:

➡ Reset (Cancel the current operation and return)

6. Z-axis idling speed setting:

Operation process: Function ➡ X→: Select the function No. 6

- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter (1-400); 1 represents the minimum speed in mm/s, and 400 represents the maximum speed in mm/s. Wherein, the increment of X button is 1mm/s, the increment of Y button is 10mm/s, and the increment of Z button is 100mm/s.

Display status of nixie tube:

Display the function item number

Before adjustment

After adjustment

- OK

To execute the reset operation during function setting operation:

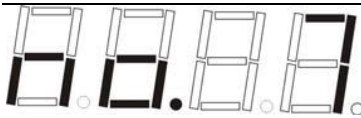
- Reset (Cancel the current operation and return)

7. Task restoration:

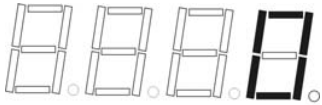
The task restoration function is mainly used to restore the task to the initial status if any error occurs when the reference point is adjusted.

Operation process: Function
- X→: Select the function No. 7
- OK (Enter)
- X← and X→: Adjust the parameter

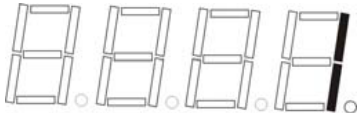
Display status of nixie tube:



Display the function item number



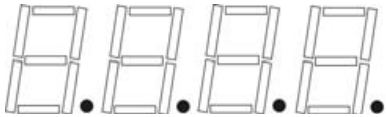
No task restoration



Task restoration

- OK (If the nixie tube displays four points, it indicates that the data is being processed. After the data is saved, the function item number is displayed.)

Display status of nixie tube:



To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

8. Setting of automatic delay operation (i.e. when pressing "Run" or "Pedal" once, the equipment will execute the automatic delay operation according to the set time)

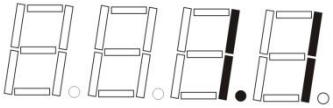
Operation process: Function

- X→: Select the function No. 8
- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter; X← and X→ represent plus or minus 0.1, Y↑ and Y↓ represent plus or minus 1, Z↑ and Z↓ represent plus or minus 10, and the value range is 0-500.0s. If the value is set to 0, there is no automatic delay operation function, and other values are delay time parameters.

Display status of nixie tube:

Display the function item number

Before adjustment



After adjustment

OK

To execute the reset operation during function setting operation:

Reset (Cancel the current operation and return)

If the automatic delay operation function is set in the function setting, to let the equipment not be in the state of continuous automatic delay operation, it is necessary to press "Reset" button during the track operation process of the equipment. Then the equipment exits the automatic operation status to execute the reset action. After reset, the setting of function number, etc. can be carried out again.

9. Y-axis positioning correction distance: (i.e. Y-axis positioning distance after each axis returns to the reference point when the task running is finished)

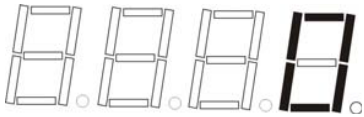
Operation process: Function

- X→: Select the function No. 9
- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter; X← and X→ represent plus or minus 1, Y↑ and Y↓ represent plus or minus 10, Z↑ and Z↓ represent plus or minus 100, the maximum value of the parameter is the maximum

distance from Y axis of current task reference point to 0 point of Y axis, and the minimum value is 0 (in mm).

Display status of nixie tube:

Display the function item number



Before adjustment

After adjustment

Note: To use this function, the parameter of the function No. 1 is set to 2.

- OK

To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

10. This function is reserved.

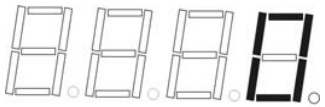
11. Deletion of current task:

Operation process: Function

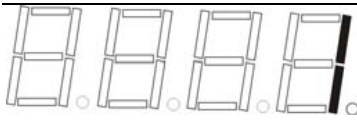
- X→: Select the function No. 11
- OK (Enter)
- X← and X→: Adjust the parameter

Display status of nixie tube:

Display the function item number



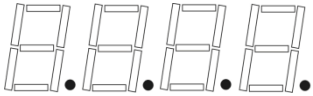
No task deletion



Task deletion

- OK (If the nixie tube displays four points, it indicates that the data is being processed. After the data is saved, the function item number is displayed.)

Display status of nixie tube:



To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

12. Setting of automatic deceleration: (This function is reserved at present)

Operation process: Function

- X→: Select the function No. 12
- OK (Enter)
- X←, X→, Y↑, Y↓, Z↑, Z↓: Adjust the parameter

Display status of nixie tube:

Display the function item number

Before adjustment

After adjustment

- OK

To execute the reset operation during function setting operation:

- Reset (Cancel the current operation and return)

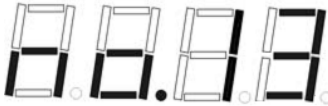
13. Counting function of welding spots corresponding to task:

Operation process: Function → X→: Select the function No. 13

→ OK (Enter)

→ X← and X→: Count clearing

Display status of nixie tube:



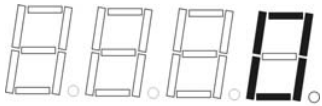
Display the function item number

After pressing OK

This indicates the number of welding spots welded in this task is 300. If the following is displayed after pressing OK:

One decimal point is displayed, indicating that the counting of welding spots has undergone a cycle. At this time, the number of welding spots is 9999+300=10299.

Press X← or X→ to clear the count.



→ OK

To execute the reset operation during function setting operation:

→ Reset (Cancel the current operation and return)

14. Tin-blocking position function:

Operation process: function

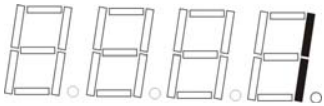
→ X→ select function No. 14

→ OK (enter)

→ X←、X→select parameters 0, 1

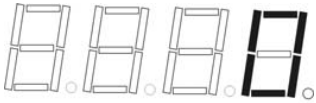
Display status of nixie tube:

Function No. display



Initial state

When tin-blocking warning emerges during the task running, press “reset”, and then “run” button, the system will move from the tin-blocking point to next operation point



When tin-blocking warning emerges during the task running, press “reset”, and then “run” button, the system will move to the first operation point

- OK

Function parameters setting, to do reset operation:

- reset (cancel the operation and machine reset)

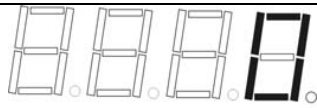
15. IO output control function:

Operation process: function

- X→ select function No.15
- OK (Enter)
- X←、X→select parameters 0-9000

Display status of nixie tube:

Function item No. display

 Initial status

Extended IO mouth OUT3, no output signal

 After adjustment,

Set 1-9, the program will finish, and IO mouth OUT3 will output a rated impulse of 100 times, and the time unit is ms

Set 10-9000, and after each soldering point (drag soldering section), the IO mouth OUT3 will output a rated-time impulse, and time unit is ms

➡ OK

Functions parameters setting, to do reset operation:

➡ reset (cancel the operation and machine reset)

16. **Pin exit mode setting:**

operation process:

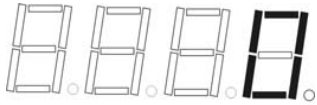
function ➡ X→ selection function No. 16

➡ OK (enter)

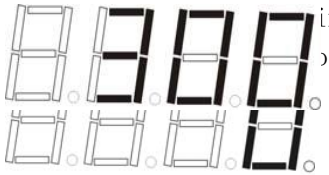
➡ X←、X→ select parameters 0-300

Display status of nixie tube:

 Function No. display

 Initial status

When slant distance in parameters setting, iron tip move slantly

 ing point, after soldering, the iron tip
exit soldering process.

 After adjustment,

Set 1-300, when pin soldering, the iron tip exit the soldering from the pin vertically to pin top, and stay a short time; the time is 10 times of the rated time, and unit is ms.

- OK

Function parameters setting, to do reset operation:

- reset (cancel the operation and machine reset)

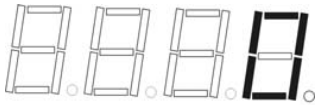
17. Soldering points-counting warning parameters

Operation process: function

- X→selection No. 17
- OK (Enter)
- X←、X→、Y↑、Y↓、Z↑、Z↓
- Parameters setting

Display status of nixie tube:

 Function item No. display

 Initial status

 after adjustment,

Set 0-9000, it stands for the soldering points warning No.; the No. will be indicated when soldering process, and after

soldering points exceed the warning No., the system will give warning, and indicate “E.400”

➡ OK

Functions parameters setting, to do reset operation

➡ reset (cancel and machine reset)

18. Slant angle setting:

operation process: function

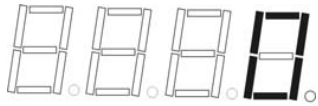
➡ X→select item No. 18

➡ OK(Enter)

➡ X←、X→、Y↑、Y↓、Z↑、Z↓ parameters setting

Display status of nixie tube:

Function No. display



Initial status

After adjustment,

Set 0-360, to set the slant angle; this setting only for soldering platform of 3 axis.

➡ OK

Functions parameters setting, to do reset operation:

➡ reset (cancel and machine rest)

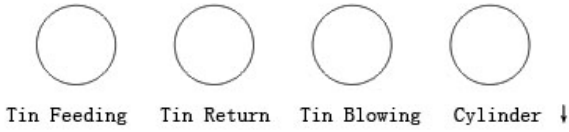
3.1.7 Menu Structure Table

Startup->
Reset->
|--Task selection |---X→
| |---X←
| |---Y↑
| |---Y↓
| |--- OK <-
| |--- Task selection <-
|-- Function |-X→-|---1 Zero correction----------|---OK<-
|---2 Load mode (acceleration)--------|---OK<-
|---3 Adjustment unit setting of reference point ----------|---OK<-
|---4 Adjustment height setting of reference point----------|---OK<-
|---5 XY-axis idling speed ----------|---OK<-
|---6 Z-axis idling speed ----------|---OK<-
|---7 Task restoration ----------|---OK<-
|---8 Setting of automatic delay operation ----------|---OK<-
|---9 Y-axis positioning correction distance ----------|---OK<-
|---11 Deletion of current task --------|---OK<-
|---12 Setting of automatic deceleration ----------|---OK<-
|---13 Counting function of welding spots corresponding to task----------|---OK<-
|-Function 1 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|--- 0-2 ----|-OK<-
|-Function 2 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 5-500 --|-OK<-
|-Function 3 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 1-50 ----|-OK<-
|-Function 4 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|--- 0-10 ---|-OK<-
|-Function 5 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 1-800 ---|-OK<-
|-Function 6 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 1-400 ---|-OK<-
|-Function 7 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|---- 0-1 ----|-OK<-
|-Function 8 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 0-500.0 -|-OK<-
|-Function 9 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|---- 0-x ----|-OK<-
|-Function 11 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|--- 0-1 ----|-OK<-
|-Function 12 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|-- 5-600 ---|-OK<-
|-Function 13 parameter X→, X←, Y↑, Y↓, Z↑, Z↓-|----- 0 ----|-OK<-

|--Reset |
|--Pedal |
|--Run |
|--Reset |

Note: The serial port communication is valid only in the task selection menu, namely, it will be normal if being connected with the host computer.

3.2 Description of Soldering Process Panel



There are 4 inching buttons on the spot welding process control panel (as shown in the above figure), and these buttons are marked with “Tin Feeding”, “Tin Return”, “Tin Blowing” and “Cylinder↓” respectively.

1. “Tin Feeding” button: Long press “Tin Feeding” button to carry out manual tin feeding.
2. “Tin Return” button: Long press “Tin Return” button to carry out manual tin return.
3. “Tin Blowing” button: After the machine is reset, long press “Tin Blowing” button to carry out manual tin blowing, and release the button to stop tin blowing.
4. “Cylinder↓” button: In the cylinder mode, inch “Cylinder↓” button to lift or drop the welding head cylinder.

3.3 Temperature Control System

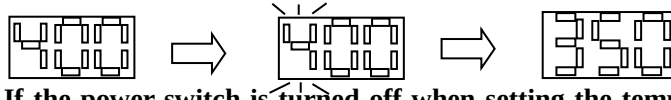
3.3.1 General Temperature Setting

Note: Confirm that the soldering station is in the temperature adjustable state (enter the correct password or the password is the original password 000). When setting the temperature, the heating element is powered off. If pressing “SET” key for less than 1s, the current set temperature will be displayed for 2s, and then the soldering bit temperature will be displayed.

Example: Change 400ºC to 350ºC

Press and hold “SET” key for 1s at least, and then the leftmost digit place (hundreds place) will flash (as shown in the figure below), indicating that the temperature control system is in the temperature setting mode, and the hundreds place can be set; press “▲” or “▼” to adjust. Press “SET” key again, and then the middle digit place (tens place) starts flashing, indicating that the

tens place can be set. Press “SET” key again, and then the right digit place (ones place) starts flashing, indicating that the ones place can be set. When the temperature is set to the desired temperature, press “SET” key to input the set temperature into the internal memory. Then the current temperature is displayed to start the control of the heater.



Note: If the power switch is turned off when setting the temperature, the set value will not be stored in the memory. If the set temperature value is out of settable range, the display window will return to the hundreds place flashing. If this situation occurs, please input the correct temperature value again.

3.3.2 Prompt Temperature Setting

During operation, if you want to rapidly set the temperature under the condition that the heating element is not powered off, please select this method.

Do not press “SET”, but directly press “▲” or “▼” key to set the temperature to rise or fall by 1ºC, and the window displays the set temperature. After releasing “▲” or “▼” key, the display window delays to display the set temperature for about 2s. If pressing “▲” or “▼” key again within the delay time of 2s, the set temperature will rise or fall by 1ºC again. If pressing and holding “▲” or “▼” key for at least 1s, the temperature will rapidly rise or fall. Do not release “▲” or “▼” key until the desired temperature is reached.

3.3.3 Parameter Setting

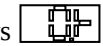
The temperature control system uses the following parameters which are adjustable.

Password setting

The original password for the memory of the temperature control system is “000”. In this state, the soldering iron temperature setting is allowed. To limit the temperature adjustment, the password must be changed.

Method for password change	1. Turn off the power switch, simultaneously press “▲”, “▼” and “SET”, and then turn on the power

	switch.
	2. Press and hold "▲" and "▼" keys till [---] is displayed.
	3. When the window displays [---] , the temperature control system enters the parameter setting mode.
Enter the old password	4. Press "SET" key, and then the window displays the leftmost hundreds digit of [---] is flashing, indicating that the temperature control system has entered the password setting mode. The hundreds digit can be adjusted. Use "▲" or "▼" key to change the displayed value. The method for setting the password value is the same as that of "General Temperature Setting". After selecting the three digits of the password, press "SET" key.
The entered password is wrong	5. If the temperature control system enters the normal operation state after the window displays the current set value for two seconds, it indicates that the entered password is wrong, and the temperature setting cannot be performed.
The entered password is right	6. If the window displays [8.8.8] , it indicates that the entered password is right. After it is displayed for 4 seconds, the temperature control system enters the normal operation state, and the temperature setting is allowed.
Enter a new password	7. When the window displays [8.8.8] , press "SET" key, and the window displays [---] , indicating that the soldering station enters the new password entry state. Enter a new password. See "General Temperature Setting".
Enter the new	8. When three digits are selected, press "SET" key, and the window displays [---] again. Now it is

password again	necessary to enter the new password again. 9. If the new passwords entered twice are the same, press "SET" key, and then the password change is successful. The new password will be stored in the memory. 10. If the new passwords entered twice are different, press "SET" key, and then the window displays  . It is necessary to enter the new password (see the above steps 8-9). The password change is not successful until the passwords entered twice are the same.
Setting of working mode	When the window displays  , simultaneously press "▲" and "▼" keys, and then the working mode number is displayed, indicating that the temperature control system enters the working mode setting. Press "▲" or "▼" key to change the displayed value. After determining the working mode, press "SET" key, and then the selected working mode is stored in the memory. For the meaning of displayed number, see the "Working Mode Table".

Working Mode Table

Working Mode	Temperature Adjustable Range	Remark
0	200ºC-420ºC	With sleep and automatic shutdown
1	200ºC-420ºC	With sleep and automatic shutdown
2	200ºC-420ºC	With sleep and automatic shutdown
3	50ºC-600ºC	With sleep and automatic shutdown
4	50ºC-420ºC	With sleep and automatic shutdown
5	50ºC-420ºC	With sleep and automatic shutdown
6	200ºC-480ºC	With sleep and automatic shutdown
7	200ºC-480ºC	With sleep and automatic shutdown
0.	200ºC-420ºC	Without sleep and automatic shutdown
1.	200ºC-420ºC	Without sleep and automatic shutdown
2.	200ºC-420ºC	Without sleep and automatic shutdown
3.	50ºC-600ºC	Without sleep and automatic shutdown
4.	50ºC-420ºC	Without sleep and automatic shutdown
5.	50ºC-420ºC	Without sleep and automatic shutdown
6.	200ºC-480ºC	Without sleep and automatic shutdown

7.	200ºC-480ºC	Without sleep and automatic shutdown

Note: In sleep and automatic shutdown mode, if the machine does not run within 20 minutes, the power supply of the welding head will be reduced, and [- - -] will be displayed. In this state, the machine can sleep slightly. When the temperature control system of the machine enters the sleep state, the temperature of the welding head will drop to 200ºC (if the set operating temperature is higher than or equal to 200ºC) or 50ºC (if the set operating temperature is lower than 200ºC), and this temperature will be kept until the temperature control system recovers operating. If the temperature control system does not be waked up after entering the sleep state for 40 minutes, the power supply of the welding head will be automatically cut off, and the window will have no display.

The factory settings of the temperature control box is "6.", namely without sleep and automatic shutdown mode.

Two wake-up methods of sleep:

1. Turn off the power switch of the temperature control box, and then turn on the power switch again;
2. Press any key on the temperature control box.

3.3.4 Calibration of Soldering Iron Temperature

After the heating element or the soldering bit is replaced, the soldering iron temperature shall be calibrated again. The calibration method is as follows:

1. Set a temperature value of the temperature control system.
2. When the temperature is stable, measure the welding tip temperature with the soldering iron temperature tester, and record the reading value.
3. Press and hold "SET" key, simultaneously press "▲" and "▼" keys, and then the temperature control system will enter the temperature calibration mode.

4. At this time, the hundreds place of LED displayed temperature is flashing. Press "▲" or "▼" key to select the value. Press "SET" key to select the digit place. Enter the reading value of the temperature tester; the value entry method is the same as that of "General Temperature Setting". After the value is entered, press "SET" key. Then the calibration of soldering iron temperature is finished.

5. If there is any temperature deviation, calibration will be performed repeatedly.

Note: It is suggested to use FG-100 white light temperature measuring instrument to measure the welding tip temperature. If there is password lock, the temperature cannot be calibrated. It is necessary to enter the correct password to calibrate the temperature.

3.3.5 Usage Precautions of Soldering Bit

1. Soldering shall be performed at low temperature as far as possible (370-380°C). When lead-free soldering is performed, the welding tip temperature shall not exceed 400°C. Experimental results show that when the welding tip temperature exceeds 400°C, the service life of the welding tip is greatly reduced. Taking the automatic welding testing of K-shaped tip (knife-shaped tip) as an example, when the welding tip temperature is increased by 30°C, the depletion rate is increased by about one time. Because high temperature increases the erosion and dissolution speed of the tin wire and the iron plating layer on one hand, and influences the diffusivity and wettability of the molten tin on the other hand, the iron plating layer of the welding tip and the tin form a compound to further oxidize the welding tip.

2. When lead-free soldering is performed, the temperature setting is very important. Because of the difference on the size of welding portion, the power and performance of soldering station, and class and line type of soldering tin, the soldering temperature will be adjusted, and soldering shall be performed at low temperature as far as possible. If the soldering temperature exceeds 450°C, the oxidation rate is more than two times that

at 380°C.

3. Clean the soldering iron with the cleaning sponge. The cleaning sponge shall be kept clean. Please do not add more water or be too dry. If more water is added in the cleaning sponge, the oxidation rate of the welding tip will be increased. If the cleaning sponge is too dry, the tin coating and the chromium coating on the welding tip surface will be destroyed.

4. When the welding tip is not in use, the soldering iron shall not be in the high temperature state for a long time. If the welding tip is in the high temperature state, the soldering flux on the welding tip will be converted into an oxide to weaken greatly the heat conduction function of the welding tip and accelerate the oxidation.

5. When the welding tip is out of service, new tin layer shall be added after cleaning to prevent it from being oxidized.

3.3.6 Maintenance of Soldering Bit

Inspection and cleaning method of soldering bit

1. Set the temperature to 250°C.

2. After the temperature is stable, clean the soldering bit with the cleaning sponge, and inspect the status of soldering iron.

3. If the tin coating of soldering bit contains the black oxide, new tin layer can be plated, and then clean the soldering bit with the cleaning sponge. Repeatedly clean in this way until the oxide is removed thoroughly, and then plate new tin layer.

Note: Never get rid of the oxide on the soldering bit with the file.

Recovery method of non-wetting soldering bit

1. Remove the soldering bit from the soldering pencil rod of the machine after the soldering bit is cooled.

2. Get rid of dirt and oxides on the tin plating surface of the soldering bit with 80# polyurethane abrasive foam or 100# emery paper.

3. Install the soldering bit in the soldering pencil rod, wrap new exposed plating surface of the soldering bit with the tin wire (above φ0.8mm) containing rosin, and turn on the power supply of the temperature control system.

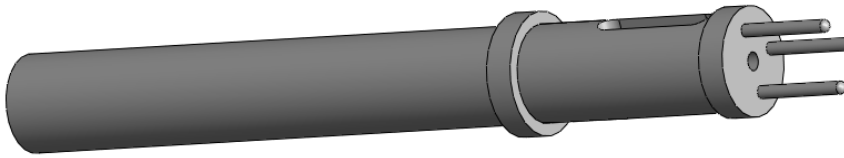
Proper routine maintenance will effectively prevent the soldering bit from non-wetting.

Service life extension of soldering bit

1. The soldering bit shall be wetted with the fresh soldering tin after use each time, so as to prevent the soldering bit from being oxidized, thus prolonging its service life.
2. The soldering bit shall be used at lower temperature as far as possible when it is capable of working. Low temperature can reduce the oxidization of the soldering bit and helps to weld the components.
3. Flux with less activated rosin shall be used because high-content activated rosin will speed up the corrosion of the soldering bit plating.
4. When the soldering bit is not used for welding, the power supply shall be turned off as far as possible to prolong its service life.
5. When the soldering bit is used to weld the workpieces, the greater pressure shall not be exerted because greater pressure is not equal to rapid heat transfer. To improve the heat transfer, soldering tin melting must be used so that a soldering tin bridge for heat transfer is formed between the soldering bit and the welding spot.

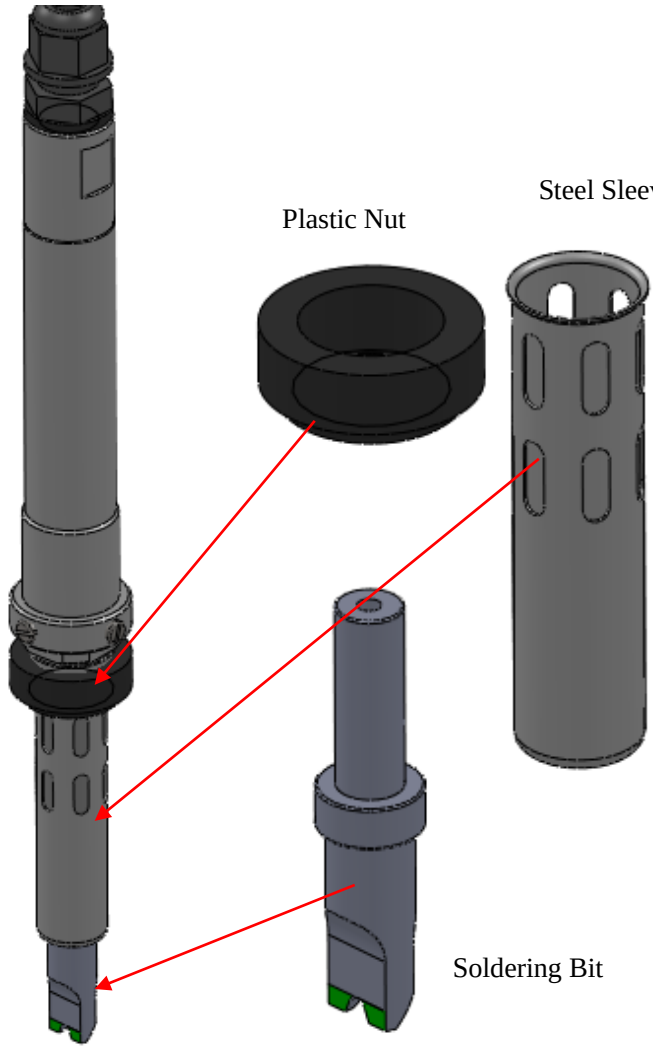
Instructions for replacement of heating core

The structure diagram of heating core is as shown in the following figure.



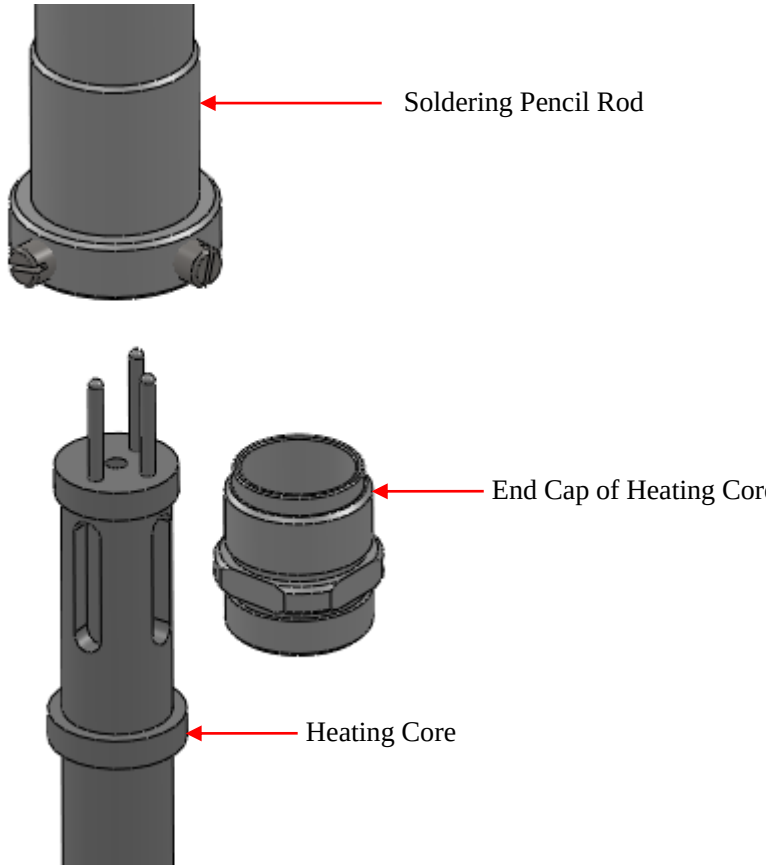
There are three pins at the end part of heating core, with a hole in the middle. The heating core is very convenient to replace when being damaged. Don't worry about wrong insertion (See the real object for details).

For specific replacement of heating core, firstly remove the plastic nut, steel sleeve and soldering bit as shown in the figure below.



Next, loosen two M4 set screws on the soldering pencil rod, and then screw off

the end cap of heating core to pull out the heating core. See the following figure.



Note: Only loosen M4 screws not to be disengaged with the soldering pencil rod, because M4 screws are used to compress the end cap of heating core and prevent it from being loosened.

Note: In normal use condition, the service life of heating core is 3 months, and the service life of soldering bit is 20,000 points.

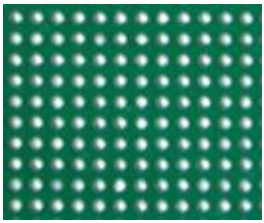
3.3.7 Error Marks of Temperature Control System

When the temperature control system fails, various error marks will be displayed. Specific error marks are as follows:

 Sensor fault	The sensor or any part of sensor circuit is out of order. At this time, the power supply of welding head is cut off.
 Heating element fault	The heating core is damaged.
Flashing temperature display	When the soldering bit temperature is over 80°C lower than the set temperature, the temperature display will flash. Attention shall be paid by the user.

3.4 Welding Example

During programming, pay attention to the setting of relevant welding parameters. Take welding with pad specification of 1mm (as shown in the following figure) as an example for instruction.



To achieve the effect as shown in the above figure for welding the pad, please pay attention to the following:

1. The selected soldering bit shall meet the size of the object to be welded; for example, the tip size of the selected soldering bit used for the above pad shall be 1.0mm.
2. The diameter of the selected tin wire shall be half the tip size of soldering bit; for example, the diameter of the selected tin wire used for welding the above pad shall be 0.5mm.
3. Welding parameters: ① Soldering iron temperature: The temperature can

be 320-360°C when the lead-free tin wire is used for welding. If the pad is too large, the temperature can be properly increased. For example, the temperature can be 320°C for the above pad; ② Preheating time: Select it according to the pad size. For example, 20ms or 0ms can be set for the above pad. If the pad is too large, the preheating time can be increased; ③ Tin stop time: Select it according to the pad size. For example, 100ms can be set for the above pad. If the pad is too large, the tin stop time can be increased; ④ Primary tin feeding volume and primary tin feeding speed: Select them according to the pad size. If the pad is too small, it is possible not to set them. For example, it is possible not to set them for the above pad; ⑤ Secondary tin feeding volume and secondary tin feeding speed: Select the tin feeding volume according to the welding process, and the tin feeding speed can be set to 14-20mm/s; ⑥ Primary tin return volume and primary tin return speed: Select them according to the welding process. The tin return volume is generally set to 0.5-0.8mm, and the tin return speed can be set to 50mm/s at maximum; ⑦ Secondary tin return volume and secondary tin return speed: Select them according to the welding process. The tin return volume is generally set to 0.6-1.2mm, and the tin return speed can be set to 50mm/s at maximum.

Note: The above parameters are only used for reference, and relevant parameters can be modified according to actual welding requirements.

4. Hardware Operation Error Prompts and System Diagnosis Codes

Hardware Operation Error Prompts and System Diagnosis Codes of Spot Welding Motion Control System

No.	Error and Warning Codes	Meaning	Error or Warning Causes	Measures
1	E.001	X-axis over-travel	1. The E-stop switch is active. 2. The photoelectric switch is damaged. 3. The motor is damaged.	1. Screw out the E-stop switch. 2. Reset. 3. Check whether the programmed task is correct. If not correct, please contact the after-sales service department.
2	E.002	Y-axis over-travel	1. The E-stop switch is active. 2. The photoelectric switch is damaged. 3. The motor is damaged.	1. Screw out the E-stop switch. 2. Reset. 3. Check whether the programmed task is correct. If not correct, please contact the after-sales service department.
3	E.003	Z-axis over-travel	1. The E-stop switch is active. 2. The photoelectric switch is damaged. 3. The motor is damaged.	1. Screw out the E-stop switch. 2. Reset. 3. Check whether the programmed task is correct. If not correct, please contact the

				after-sales service department.
4	E.005	X-axis and Y-axis over-travel	1. The E-stop switch is active. 2. The photoelectric switch is damaged. 3. The motor is damaged.	1. Screw out the E-stop switch. 2. Reset. 3. Check whether the programmed task is correct. If not correct, please contact the after-sales service department.
5	E.100	In emergency stop	1. The device is in emergency stop, and it is necessary to perform the movement operation.	1. Screw out the E-stop switch. 2. Perform the reset operation.
6	E.200	Task not loaded	1. The task is not loaded, and it is necessary to perform the operation related to the task.	1. Perform the reset operation. 2. Load the task (select the task), and then execute the running or reference point operation.
7	E.202	Welding system abnormal	1. Tin is broken or blocked, and it is necessary to perform the movement operation.	1. Check whether tin is broken or blocked.
8	E.204	Task download failed	1. The task download is failed, and the programmer downloads the task related operations.	1. Please download the task with the programmer again.
9	E.205	Track over-travel (current coordinates over-travel)	1. The task is wrong, and the track is over-travel (the current coordinates are over-travel)	1. Perform the reset operation. 2. Program the task again to download because the downloaded task is wrong.

10	E.300	System not reset	1. The system is not reset.	1. Perform the reset operation.
11	E.302	Welding system abnormal	1. The photoelectric detection of the cylinder is wrong, and it is necessary to perform the movement operation.	1. Check whether the air source is connected or the photoelectric detection position of the cylinder is correct.
12	E.402	Welding system not ready	1. When the task starts to run, manual tin feeding, return and blowing operations or vertical action of the cylinder are being performed.	1. When pressing “Run” or “Pedal” to run the task, do not perform manual tin feeding, return and blowing operations or vertical action of the cylinder.
13	E.502	Communication between welding system and motion system failed	1. The communication chip is damaged or the communication wiring is wrong.	1. Press “OK” key again to select the task to check whether it is correct. If not correct, please contact the after-sales service department.

5. Simple Problems and Solutions

Phenomenon 1: LED nixie tube does not light after being powered on.

Please firstly check whether the operating environment meets the technical requirements. If so, please check whether the fuse is damaged. If damaged, please replace it with a new one of the same model.

Phenomenon 2: LED nixie tube displays messy codes during operation.

This phenomenon is caused by electrostatic interference. In this case, it does not influence the normal use of the machine. Such phenomenon can be solved by resetting the machine.

Phenomenon 3: After the machine is powered on, Z axis is locked, and X axis and Y axis are in the state of no torque.

Please check whether the E-stop switch is screwed out.

Phenomenon 4: The movement is abnormal, and the speed is too slow or too fast.

Such case may be caused by improper operation when downloading the task. For solutions, see the adjustment of track movement parameters in Chapter 3.

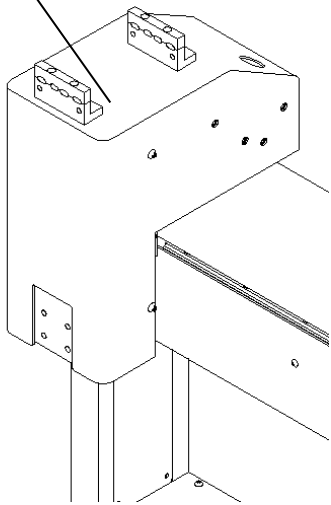
Phenomenon 5: The tin feeding mechanism does not feed tin downwards.

Please check whether the tin wire is broken or blocked.

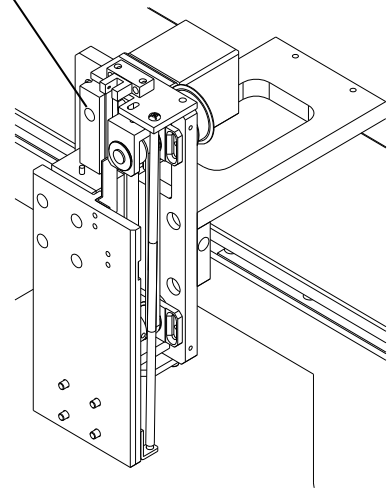
6. Maintenance

1. Please keep the product surface clean and dry, and do not operate it in an environment which is humid or has corrosive gas. If there is any dirt on the product surface, please clean it in time.
2. It is necessary to turn off the power supply after use each time.
3. It is necessary to grease the linear guides in the X-axis, Y-axis and Z-axis parallel moving mechanism every two months.
   Methods:
   1) Z axis: Remove the Z-axis enclosure, wipe clean the surface of the linear guide, and then evenly apply the lubricating oil on the surface of the linear guide to slide up and down for several times. Meanwhile, it is possible to add the lubricating oil to the sliding block through its oil hole;
   2) X axis: Remove the X-axis middle baffle plate, wipe clean the surface of the linear guide, and then evenly apply the lubricating oil on the surface of the linear guide to slide left and right for several times. Meanwhile, it is possible to add the lubricating oil to the sliding block through its oil hole;
   3) Y axis: Remove the middle baffle plate and the double-layer carrying plate on Y axis, wipe clean the surface of the linear guide, and then evenly apply the lubricating oil on the surface of the linear guide to slide back and forth for several times. Meanwhile, it is possible to add the lubricating oil to the sliding block through its oil hole.

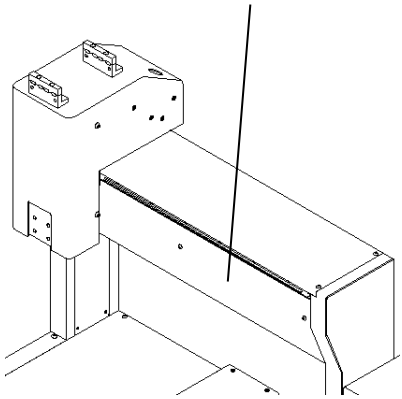
Z-axis Enclosure



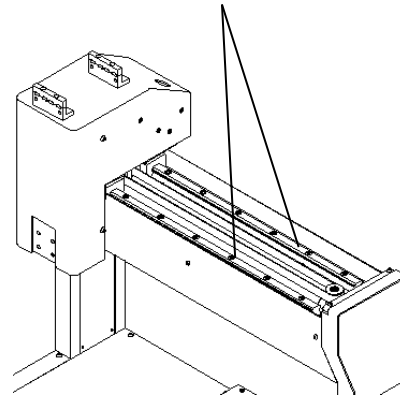
Z-axis Linear Guide

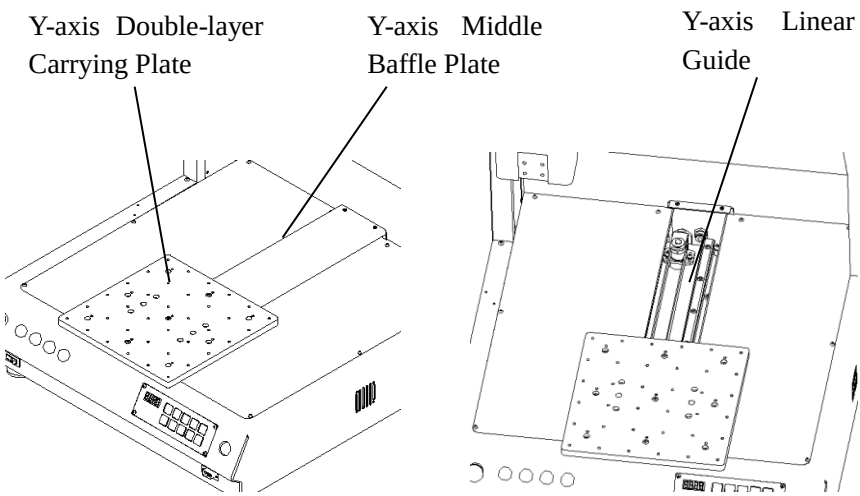


X-axis Middle Baffle Plate

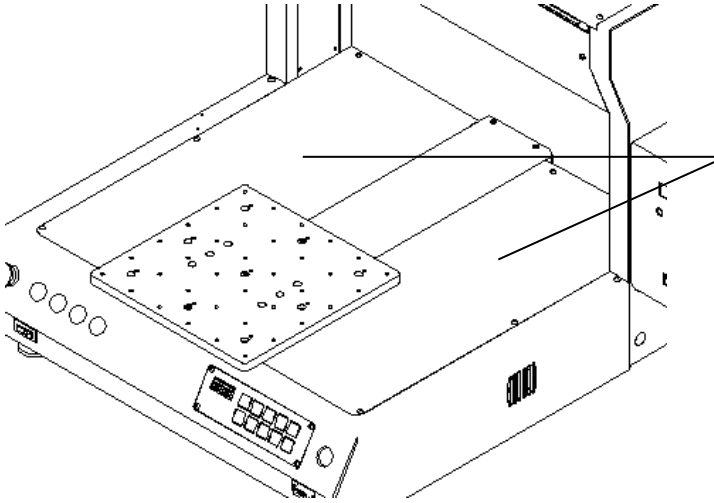


X-axis Linear Guide

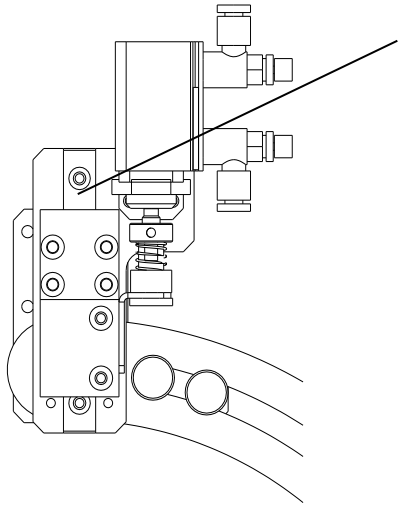




4. After the machine operates for a period of time, if X-axis, Y-axis and Z-axis parallel moving mechanism has the step losing phenomenon during operation, the pre-tightening force of the synchronous belt may be decreased. It is necessary to inform our after-sales service staff to maintain the machine on site.
5. It is necessary to open the bottom box cover to remove the dust for the internal circuit boards and other components of the machine every three months to prevent the electric control components from being damaged.
   Methods: Remove screws used for fixing the bottom box cover, open the cover, and blow the dust on the circuit boards away with clean compressed air.



6. It is necessary to grease the linear guide in the movement mechanism of soldering bit every two months;
   Methods: The linear guide can be seen from the side. Blow away the dust on the surface of linear guide by high-speed airstream, and fill the lubricating oil as far as possible after dust removal.



7. Frequently clean the tin collecting box.

   Methods:

   1. Firstly ensure that the consumption of steel wire balls in the tin collecting box is not excessive, and the volume of steel wire balls placed does not exceed one third of the whole tin collecting box.
   2. If the molten tin blown down overspreads the surface of the steel wire ball in use, the steel wire ball shall be overturned to the unused side or replaced.
   3. Clean the tin balls in the tin collecting box every day.

   The above requirements are to prevent the molten tin from splattering during tin blowing.