ET9383E-BB1
ET9483E-BB1

3-Axis Desktop Soldering Robot

Instruction Manual

Thank you very much for purchasing this Robot.

This operation manual describes the features and operation of the robot. The detailed description about the teaching and processing may refer to the operation manual of the “Teach Pendant”.

Before using, read the manual thoroughly for proper use of the robot. Store the manual in a safe easily accessible place for future reference.

CONTENT

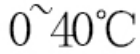
Ⅰ.Safety Instruction 5
1.1 Safety symbol 5
1.2 Unpacking and inspection 7
Ⅱ.Summary 9
2.2 Technical data 10
2.3 Part description 11
2.4 Dimension 12
Ⅲ.Connection 13
3.1 Connection 13
3.2 I/O Socket Instruction 13
3.2.1 Circuit Instruction of I/O Socket 13
3.2.2 4-pin Socket instruction 14
3.2.3 5-pin Socket instruction 14
3.2.4 7-pin Socket Instruction 15
3.3 Instruction about DB37 socket 15
3.3.1 Pins Instruction of DB37 15
3.3.2 Circuit Instruction of DB37 16
3.4 Instruction about DB9 socket 17
3.4.1 Pins Instruction of DB9 17
3.5 Instruction of Input & Output 18
3.5.1 IO Function Definition 18
4.5.2 IO Function Instruction 21
Ⅳ. Commissioning 24
4.1 Debug steps 24
4.1.1 Security check before operation 24
4.1.2 Operation of First Time 24
4.1.3 Debugging steps (take a point for example) 25
4.2 Interrupt and continue 28
Ⅴ. Operation panel 30
5.1 Introduction 30
5.2 Main menu (with teach pendant) 31
5.3 Main menu (disconnect teach pendant line) 31

5.3.1 Loop menu 32
5.3.2 S-point menu 33
5.3.3 Temperature calibration menu 33
Ⅵ. Troubleshooting and maintenance 34
6.1 Troubleshooting 34
6.2 Daily check and maintenance 36
6.2.1 Cooling fan maintenance 38
6.2.2 Maintenance of emergency stop button 39
6.2.3 Maintenance of robot movement mechanism 39
6.2.4 Oil-water separator maintenance 40
6.2.5 Linear guide maintenance 40
6.2.6 Maintenance of ball screw 41
6.2.7 Daily maintenance of heating controller 41
6.2.8 Soldering tip 42
6.2.9 Prolong the lifetime of soldering tip 42

Ⅰ.Safety Instruction

1.1 Safety symbol

Serious warning	
	➢ The product poses a risk of electric shock. ➢ Only authorized person can change settings. ➢ Push the red emergency switch for power off in an emergency situation. ➢ Forbid working while the power wire was damaged. ➢ If the device remains unused for a long time, please pull the power cord out of power socket. ➢ During maintenance and inspection of the robot, attention power status and pull out the power plug of the controller. ➢ Install a Frame Ground to prevent electric shock. ➢ There is a dangerous voltage inside the device! Only be authorized by the experienced and be an expert can repair the equipment, or contact the agents, manufactures, when the system fails to repair.
	➢ Risk for injury. ➢ Do not extend your body to machine when it works well or powers on. ➢ Do not wet and disassemble the machine when used. Also do not pull power cord. ➢ Please keep the machine and table clean, which will help reduce accidents.
	➢ Unprofessional person can not change arbitrarily. When performing maintenance, please turn off the power supply and air pressure. ➢ This product is non-explosion-proof and is strictly prohibited for potential explosive environment.
	➢ Make sure that the heating controller parts are securely fastened to the machine before using it. ➢ Flammable and explosive objects or gas solvents are strictly prohibited in the working area.

Warning	
	➢ Do not move the movements by hands to avoid damaging the robot. ➢ Do not touch the moving parts in your work, or you may damage the machine or accident. ➢ During the operation of the machine, please do not put your hand into the device, which may cause the user to get injured or cause substantial damage to the object involved. ➢ During the suspension of the machine, please check the condition carefully for manual operation, otherwise it may cause the user to get injured or cause substantial damage to the object involved.
	➢ Avoid falling the fittings or having an accident, please take the device and fittings by help. ➢ Mind head, attention about the sheet metal. ➢ Carry to an applicable place, install the device on a flat floor.
	➢ The product must be used or stored in an applicable environment. ➢ Working ambient temperature is 0~40℃, relative humidity is 20%~90%.
	➢ The equipment is heavy and huge, do not pile up. ➢ Do not pile up items in the scope of the machine ➢ Before moving and carrying, make sure the movements is fixed (for example the X-axis may be fixed by sheet metal or lines for safety). ➢ Unfold the packaging, before using the robot, make sure the movements' fixture (for example the X-axis may be fixed by sheet metal or lines for safety) is torn down.
	➢ Regularly inspect and maintain will increase durability and performance. ➢ Must operate the robot by standard procedure. ➢ Before starting a repetitive operation, make sure that there is no obstacle in the robot's working area.

<table>
<tr><td> 
</td><td>➢ Please use robot within the standard requirements (such as voltage, air pressure, power frequency) as stated in the specification.
➢ Make sure the air source is clean and dry.
➢ Suggest the air pressure is less than 0.7Mpa.</td></tr>
<tr><td colspan="2">Attention</td></tr>
<tr><td>  </td><td>➢ Do not throw the packaging and foamed plastic.
➢ If the robot should come back to the manufacture or agency, it must be folded by initial package.
➢ The robot must be placed vertically.
➢ The robot can be packet after fold by foamed plastic.
➢ The robot can not get wet in transit or stored procedures.</td></tr>
</table>

1.2 Unpacking and inspection

Wooden case packing：

① Put wooden case packing on the floor vertically, tear up the fixed film.

② Take the screw out of the wooden case by drill and unfold the wooden case.

③ Take and carry the device by two or more people, put firmly on appropriate station.

④ Unfold the packaging, before using the robot, make sure the movements' fixture (for example the X-axis may be fixed by sheet metal or lines for safety) is taken down.

⑤ All fittings are in the table as follow.

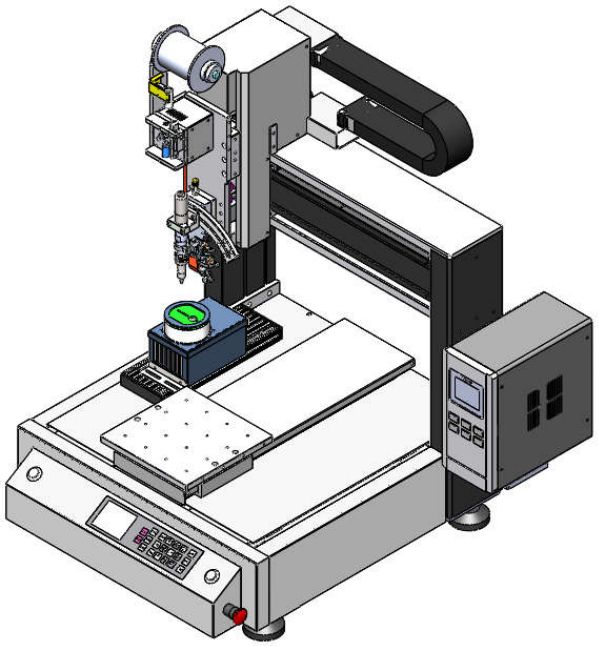
NO.	Part Name	Model	Quantity	Figure
1	Heating controller	378FA	1	
2	Teach pendant	QUICK 9011D	1	
3	Teach pendant cord	DB9	1	

4	Power cord		1	
5	Manual	Manual instructions	2	
6	Tin slag box	9026EP	1	
7	Key box	8031A/8031HA	1	

Check the machine carefully, if you have any problem, please contact manufacturer immediately!

II .Summary

The robot is high-precision automatic soldering equipment with three shafting. The system provides users with convenient programming instruction, larger storage space, fast processing speed, rich parameter setting and effective flow control, which can improve production capacity. According to actual production requirement, on the premise of meet the motion performance index, the optimization design was carried out on the product structure, to meet the requirements of flexible.



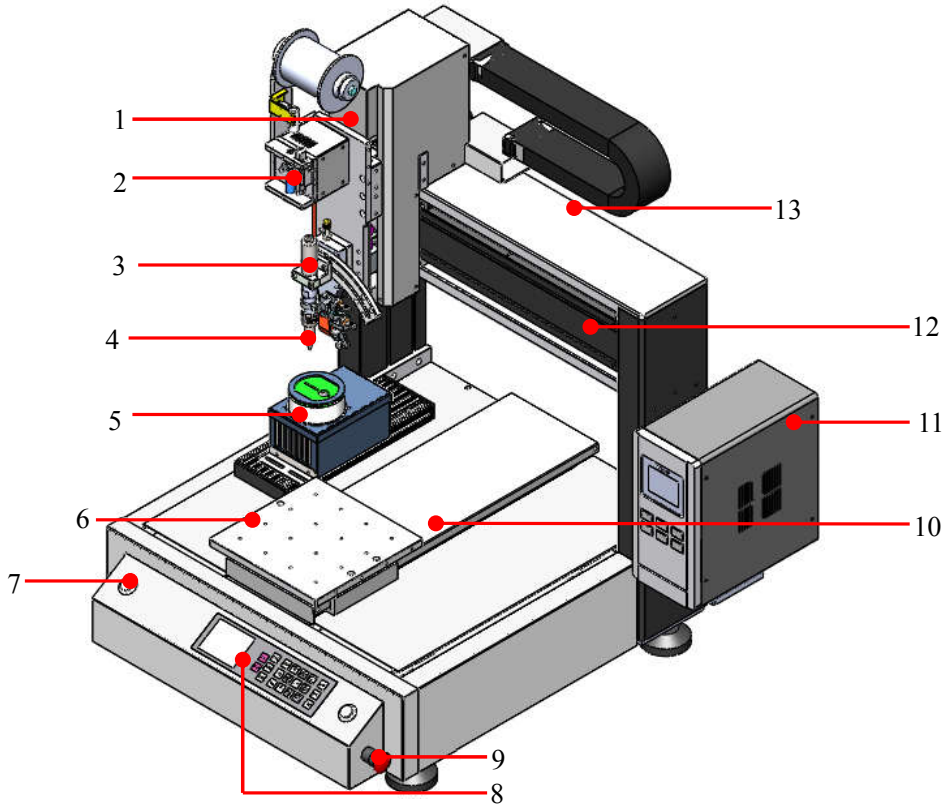
- Comprehensive 3-dimensional drawings support, such as 3-dimensional linear interpolation, capabilities of teaching 3D graphics and user-defined 3D array and so on.
- Group function: This function allows users copy, delete, modify, array, and pan multi-points.
- Excellent teach pendant. Supporting advanced function, such as array, group edit, sub-procedure, condition-call procedure etc.
- Unique merge function: Easy resolution to process complex multi-layers irregular array and non-array graphics.
- Capable to control the length of feeding solder wire at single point, and to edit the parameters of any multi-points at one time.
- Smooth functions of changing speed and hi-speed trajectory on the moving. User-definable speed parameters.
- Multiple processing modes, such as single-step operation, overall processing, and automatic loop processing.
- Smooth movement speed ensures product reliability
- Manual debugging, control the whole production process
- High power heating controller, high heat capacity tip, guarantee welding quality and stability

2.2 Technical data

Model		ET9383E-BB1	ET9483E-BB1
Input power		★100V-240VAC 50/60HZ	★100V-240VAC 50/60HZ
Power consumption		200	200
Number of controllable axis		3 Axis	3 Axis
Axis movement range	X axis (mm)	300	400
	Y axis (mm)	300	400
	Z axis (mm)	100	100
	R axis (°)	--	--
Operation speed	X (mm/s)	0.1～800	0.1～800
	Y (mm/s)	0.1～800	0.1～800
	Z (mm/s)	0.1～300	0.1～300
	R (° /s)	--	--
Repeatable accuracy	X/Y/Z axis(mm)	±0.01	
	R axis/ (°)	--	
Resolution ratio	X/Y/Z axis(mm)	0.01	
	R axis/(°)	--	
Z&R Axis Payload Weight(Kg)		5	
Y Axis Payload Weight (Kg)		8	
Noise		＜70dB（measure in the distance of 1m）	
Working ambient	Temperature	0～40℃	
	Relative humidity	20％～90％, no condensation	
Temperature stability		±3°	
Weight（Kg）		45	55

★NOTE: Ensure that your power supply data agrees with the information on the nameplate of the machine!

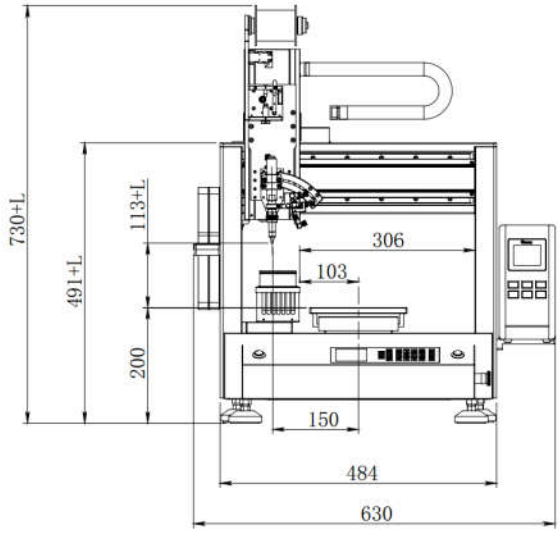
2.3 Part description



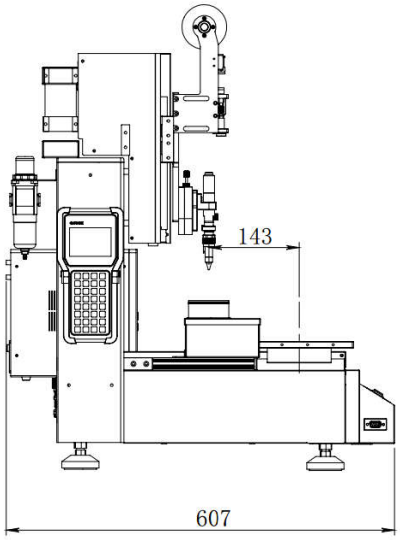
Item	Part Name	Item	Part Name
1	Z Axis stepper motor + lead screw	7	Start/Pause operation button
2	Wire feeder device	8	Operation panel
3	Soldering iron	9	Emergency stop operation button
4	Soldering tip	10	Y Axis hybrid servo motor + synchronous belt
5	Tin slag box	11	Heating controller
6	Fixture baseplate	12	X Axis stepper motor + synchronous belt

2.4 Dimension

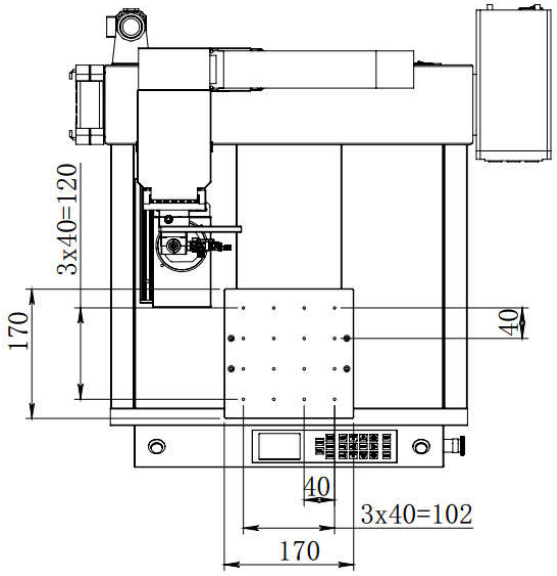
Front view



Left view



Top view



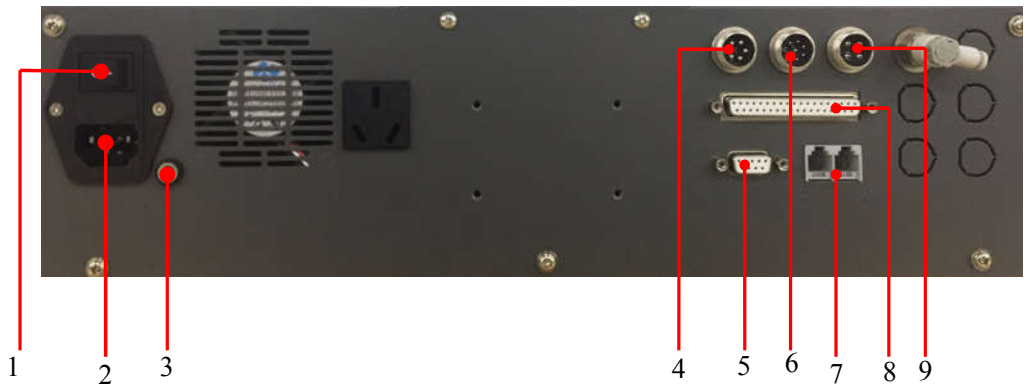
Unit：mm

Note：

Distance symbol	Dimension
L	0
L1	50
L2	100
L3	150

Ⅲ .Connection

3.1 Connection



1. Power switch: it's a power connecting or disconnecting device.

2. Power inlet module: connect 110V/220V AC line cord to power inlet module.

3. ESD socket

4. 5-pin socket: connect to heating controller, refer to 3.2.3 5-pin Socket instruction.

5. DB9port: spare port, refer to 3.4 Instruction about DB9 socket.

6. 7-pin socket: connect to heating controller, refer to 3.2.4 7-pin Socket Instruction.

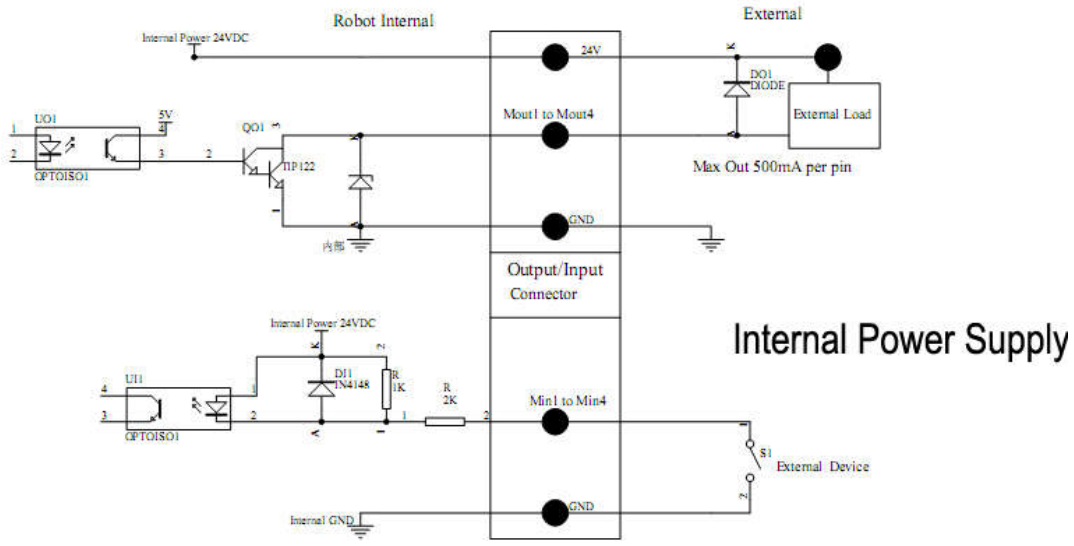
7. RJ121 port: connect to heating controller, it follows RS485 Standard Protocol.

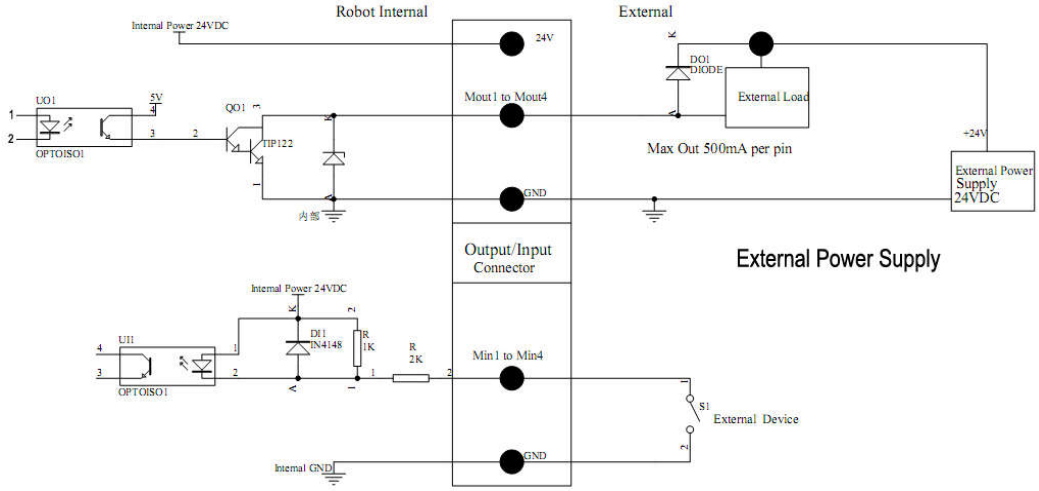
8. DB37port: spare port, refer to 3.3 Instruction about DB37 socket.

9. 4-pin socket: connect to key box, refer to 3.2.2 4-pin Socket instruction.

3.2 I/O Socket Instruction

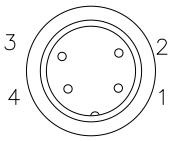
3.2.1 Circuit Instruction of I/O Socket





3.2.2 4-pin Socket instruction

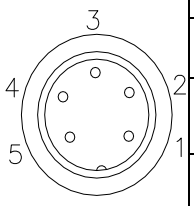
The following list describes the pins function of the 4-pin socket, it is connected to key box.

4-pin socket	Pin	Pin name	Description	Function
	1	Min4	Main input 4 signal	It's used to connect to "START/STOP" operation button.
	2	GND	Power supply "-"	
	3	Min1	Main inputting 1 signal	It's used to connect to "ORG" operation button.
	4	Min2	Emergency stop	It's used to connect to emergency stop operation button.

NOTE: * If the customers need special function, the input and output signal can be set again.

3.2.3 5-pin Socket instruction

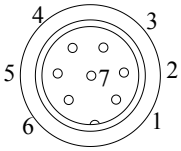
The following list describes the pins function of the five-pin socket, it is connected to heating controller.

5-pin socket	Pin NO.	Pin name	Description	Function
	1	24V	"+" power supply	
	2	0V	"-"power supply	
	3	Min 3	Main input 3 signal	It's used to connect safety signal.
	4	Ein13	External input 13 signal	It's used to alarm when solder wire is lacking.
	5	Ein14	External input 14 signal	It's used to control temperature alarm.

NOTE: * If the customers need special function, the input and output signal can be set again.

3.2.4 7-pin Socket Instruction

The following list describes the pins function of the seven-pin socket, it's connected to heating controller.

7-pin socket	Pin NO.	Pin name	Description	Function
	1	24V	"+" power supply	
	2	GND	"-"power supply	
	3	Mout1	Main output 1 signal, the current is less than 0.5A	It is used to feeding signal.
	4	Mout4	Main output 4 signal, the current is less than 0.5A	It is used to cylinder movement signal.
	5	Ein12	Block material	It is used to connect to block material sensor.
	6	Mout2	Main output 2 signal, the current is less than 0.5A	It is used to output working status signal.
	7	Mout5	Main output 5 signal, the current is less than 0.5A	In effective only in pulse signal.

NOTE: * If the customers need special function, the input and output signal can be set again.

3.3 Instruction about DB37 socket

NOTE: ***DB37 socket is an optional fitting. It must be ordered if you need it to do information input or output.***

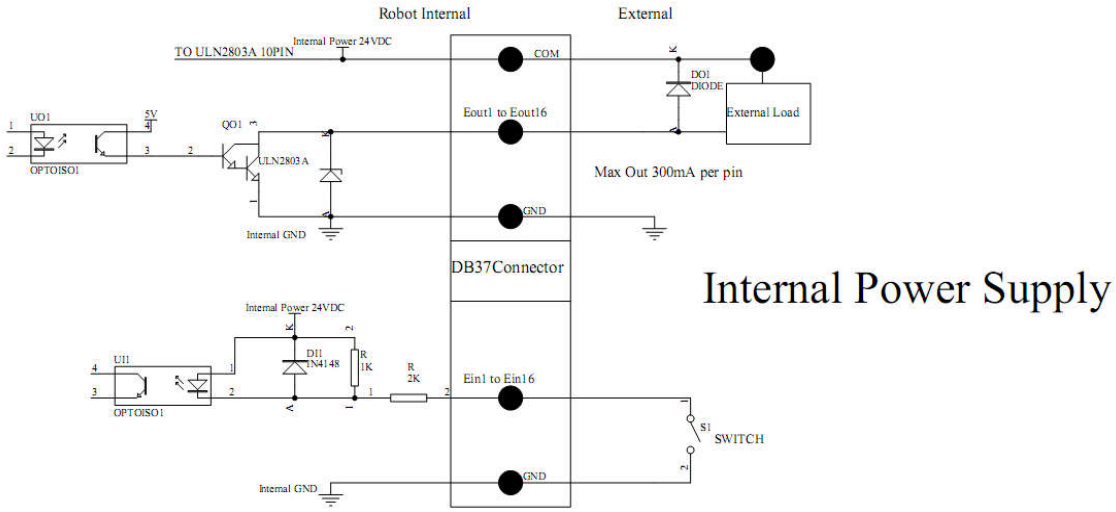
3.3.1 Pins Instruction of DB37

(socket of DB37)

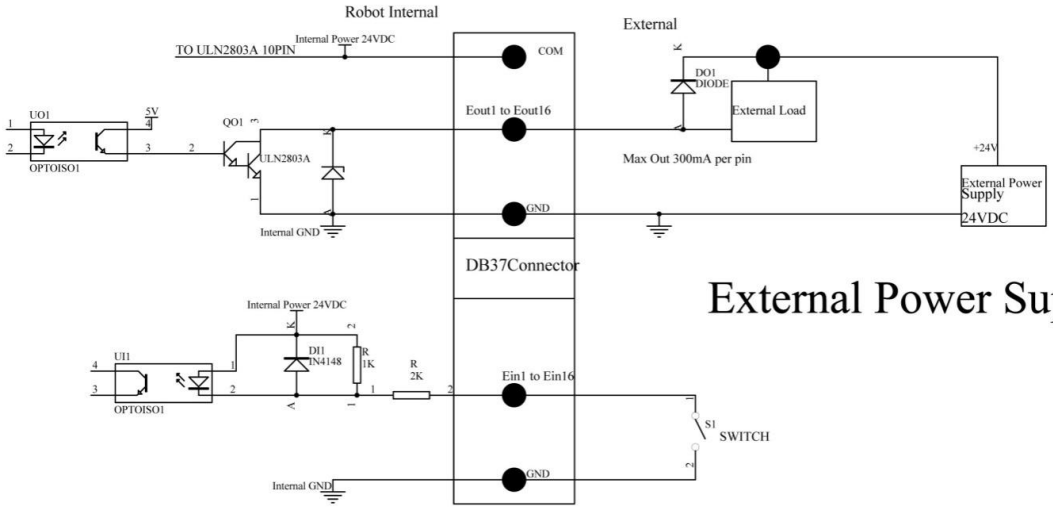
NO.	Pins port	Corresponding I/O interface of DB37	NO.	Pins port	Corresponding I/O interface of DB37
1	GND	P01	20	GND	P20
2	Eout8	P02	21	Ein8	P21
3	Eout7	P03	22	Ein7	P22
4	Eout6	P04	23	Ein6	P23
5	Eout5	P05	24	Ein5	P24
6	Eout4	P06	25	Ein4	P25
7	Eout3	P07	26	Ein3	P26

8	Eout2	P08	27	Ein2	P27
9	Eout1	P09	28	Ein1	P28
10	COM	P10	29	GND	P29
11	GND	P11	30	Ein16	P30
12	Eout16	P12	31	Ein15	P31
13	Eout15	P13	32	Ein14	P32
14	Eout14	P14	33	Ein13	P33
15	Eout13	P15	34	Ein12	P34
16	Eout12	P16	35	Ein11	P35
17	Eout11	P17	36	Ein10	P36
18	Eout10	P18	37	Ein9	P37
19	Eout9	P19			

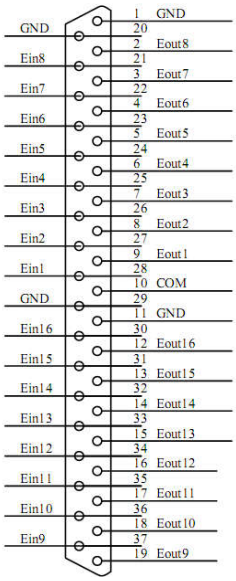
3.3.2 Circuit Instruction of DB37



Internal Power Supply



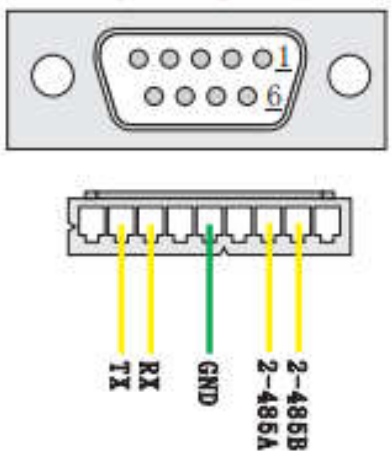
External Power Supply



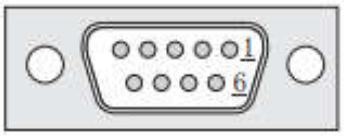
Plug of DB37 (pin type)

Connection of DB37 plug

3.4 Instruction about DB9 socket



3.4.1 Pins Instruction of DB9



Item	Pins	Function	Item	Pins	Function
1	9P-1	No connection	6	9P-6	No connection
2	9P-2	TX(Transmitter signal)	7	9P-7	2-485A
3	9P-3	RX(Receiver signal)	8	9P-8	2-485B
4	9P-4	No connection	9	9P-9	No connection
5	9P-5	GND(Power supply “0V”)			

3.5 Instruction of Input & Output

- The following input interfaces and output interfaces are corresponding to the signal pins which are defined as “Min, Mout, Ein, Eout” at the above socket. Also, it is corresponding to the interface at the “IO Test” displaying window.
- After setting, it can test the function of IO interface at the “IO Test” displaying window.
- The interfaces in following table can be set at the “Input Config” or “Output Config” of “System Config 2” of teaching pendant. It can define the special function for the following input & output interfaces which are corresponding to the above sockets.
- Main board port define list:

Board	Port	Function
Expansion input port	Ein12	Wire block alarm signal
	Ein13	Wire lock alarm signal
	Ein14	Temperature abnormal alarm signal
	Ein16	Right Start/Pause button signal
Main input port	Min1	Reset button signal
	Min2	Emergency stop button signal
	Min4	Left start/pause button signal
Main output port	Mout1	Wire feeder device motor pulse
	Mout2	7P-6
	Mout3	Blow (trigger blow file signal)
	Mout4	7P-4
	Mout5	Wire feeder device motor direction

3.5.1 IO Function Definition

1. In the “Input Config 2” displaying window, it can set the input interface:

Port	Optional Function
Min1	--, Shortcut1, Origin BTN, Safe flag-1, Safe flag-2
Min2	--, Shortcut 2, Stop BTN, Safe flag-1, Safe flag-2
Min3	--, Shortcut 3, Start BTN, Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS
Min4	--, Shortcut 4, Foot BTN, Safe flag-1, Safe flag-2

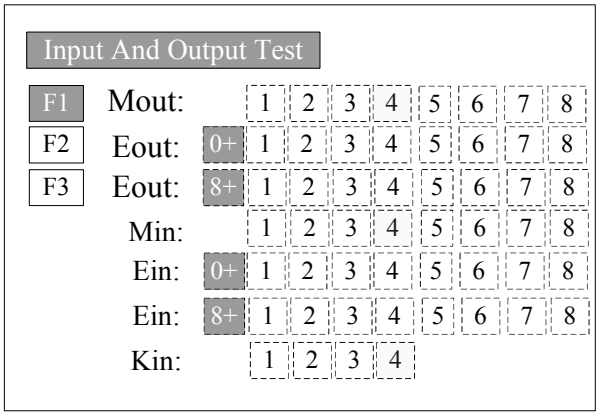
Min5	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag.
Min6	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag.
Min7	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, pressure flag.
Min8	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, pressure flag.
Ein1~Ein8	--, Shortcut 5-259
Ein1	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 5.
Ein2	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，safe flag-1, safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, pressure flag，shortcut 6
Ein3	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 7
Ein4	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 8
Ein5	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, pressure flag，shortcut 9
Ein6	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 10
Ein7	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 11
Ein8	--, Origin BTN, Stop BTN，Start BTN , Foot BTN，Safe flag-1, Safe flag-2, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag，Shortcut 12
Ein09	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Adj X-Limit, Shortcut 260, Upper CS, Nether CS, Pressure flag

Ein10	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Adj X-Limit, Shortcut 261, Upper CS, Nether CS, Pressure flag
Ein11	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Adj X-Limit, Shortcut 262, Upper CS, Nether CS, Pressure flag
Ein12	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Shortcut 263, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag
Ein13	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Shortcut 264, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag
Ein14	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Shortcut 265, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag
Ein15	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Shortcut 266, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag
Ein16	--, Origin BTN, Stop BTN, Start BTN, Foot BTN, Safe flag-1, Safe flag-2, Shortcut 267, Lack fault, Block fault, Temp fault, Temp\Feed fault, Upper CS, Nether CS, Pressure flag
Kin1	--、Upper CS, Nether CS
Kin2	--、Upper CS, Nether CS
Kin3	--、Upper CS, Nether CS
Kin4	--、Upper CS, Nether CS

2. In the “Output Config 2” display window, the output interface can be set:

Port	Optional Function
Mout1~Mout4	--, Nozzle 1, Nozzle 2, Nozzle 3, Nozzle 4, Working Flag, Work End Flag, Cylinder, Clean Output
Eout09~Eout16	--, Ready Flag, Alarm Flag, Working Flag, Work End Flag, Cylinder, Clean Output, Pause flag, Left light flag, Right light flag

3. In the teaching pendant, “Eout09~Eout16” are corresponding to the “Eout8+ (0~8)” at the “IO Test” and “Output (point)” displaying window.



Namely, “Eout8+ 1” is the output interface “Eou09”. “Eout8+ 2” is the output interface “Eou10”. “Eout8+ 3” is the output interface “Eou11”, etc.

4.5.2 IO Function Instruction

Input signal function	Function Instruction
--	N/A.
Origin BTN	Input the reset signal into the unit by corresponding signal pin, and the unit will run the reset (ORG) operation.
Stop BTN	Input the stop signal into the unit by corresponding signal pin, and the unit stops the current operation.
Start BTN	Input the start signal into the unit by corresponding signal pin, and the unit starts to work or pauses the current work.
Foot BTN	Input the foot switch signal into the unit by corresponding signal pin and the unit runs the foot switch operation and the function is similar with the “Start BTN”.
Safe flag-1	Input the signal “breakover ground” into the unit by corresponding signal pin and the unit comes into the testing state (cannot move and can only be programmed).
Safe flag-2	Input the signal “break over ground” into the unit by corresponding signal pin and the unit comes into the testing state (cannot move and can only be programmed).
Lack fault	Input the signal “lack fault” into the unit by corresponding signal pin and the unit comes into the process, such as stop working, alarming etc..
Block fault	Input the signal “block fault” into the unit by corresponding signal pin and the unit comes into the process, such as stop working, alarming etc..

Temp fault	Input the signal “temp fault” into the unit by corresponding signal pin and the unit comes into the process, such as stop working, alarming etc..
Temp/Feed fault	Input the signal “temp/feed fault” into the unit by corresponding signal pin and the unit comes into the process, such as stop working, alarming etc..
Upper CS	Input the signal “cylinder up sensor (in retraction state)” into the unit by corresponding signal pin and the unit judges the position of cylinder whether in retraction state.
Nether CS	Input the signal “cylinder down sensor (in reaching state)” into the unit by corresponding signal pin and the unit judges the position of cylinder whether in reaching state.
Adj X-Limit Adj Y-Limit Adj Z-Limit	It is effective only for the soldering robot and only when connecting with “9036 tip calibration device”. “Adj X-Limit” is corresponding to the “Ein09”. Input the signal by “Ein09” to calibrate the X-axis of tip. “Adj Y-Limit” is corresponding to the “Ein10”. Input the signal by “Ein10” to calibrate the Y-axis of tip. “Adj Z-Limit” is corresponding to the “Ein11”. Input the signal by “Ein11” to calibrate the Z-axis of tip. (Note: only calibrating X/Y/Z at the same time, it can calibrate the tip’s position.)
Shortcut	It is corresponding to the shortcut of processing file. The shortcut can be set in the “File Name” display window of teaching pendant. It can be used do find the required processing files quickly.
Shortcut1	Min1
Shortcut 2	Min2
Shortcut 3	Min3
Shortcut 4	Min4
Shortcut 5~259	It is corresponding to the “Ein1~Ein8”. Namely, the high & low electrical level of “Ein1~Ein8” can form 255 (1~255) kinds signal. The shortcut (5~259) is the sum of the electrical level digit add 4.
Pressure flag	The condition of air pressure.

Output signal function	**Function Instruction**
--	Not have function.
Nozzle 1	Once the nozzle 1 comes to run the program, the output is in conducting state, or else not.
Nozzle 2	Once the nozzle 2 comes to run the program, the output is in conducting state, or else not.

Nozzle 3	Once the nozzle 3 comes to run the program, the output is in conducting state, or else not.
Nozzle 4	Once the nozzle 4 comes to run the program, the output is in conducting state, or else not.
Ready flag	When the unit comes into the normal ready state, the output is in conducting state, namely, once receiving the “START” signal, it comes to run. And it closes the output after running.
Alarm flag	When set the mode as alarming, once it detects the abnormal state, the output is in conducting state, or else not.
Working flag	When the unit comes into the working state, the output is in conducting state, or else not.
Work End flag	After t finishing the process, the output is keeping in conducting state 200ms, or else not.
Cylinder	Once the unit comes to run the cylinder process, the output is in conducting state, control cylinder motion, or else not.
Clean output	Once the unit comes to run the clean process, the output is in conducting state, do the clean (blowing or revolving brush), or else not.
Pause flag	The condition of pause BTN
Left light flag	The condition of left light on key box
Right light flag	The condition of right light on key box

Note:

- The function settings of input & output cannot be accessed by the operator. It can only be operated by the manufacturer.
- Will not give advanced information if some functions are changed.

Ⅳ. Commissioning

4.1 Debug steps

4.1.1 Security check before operation

 Inspect the line and do NOT power on if line was damaged or wet. Please invite the professional when the device needs maintenance.

 Caution: High voltage, prevent electric shock.

User must inspect current and pneumatic station after installment or before first time using.

1. Inspect if the power supply is standard requirements or not.
2. Inspect if the device is grounding standard or not.
3. Make sure there is no person or obstacle in the robots working area.
4. Inspect if the moving parts was fixed.
5. Inspect if the emergency stop switch was pushed or not.
6. Inspect if the power switch was OFF or not.
7. Attach and detach the moving parts to make sure it is smooth.
8. Inspect if the socket and pipe is well-connected, make sure there is no leak.

4.1.2 Operation of First Time

If using the unit for the first time, user should test the basic functionalities at first.

Step1: Install and Test

Before using, user should properly install and connect the system.

At first, user should test the basic functionalities of the system with the 'Test' function of the teaching pendant.

Test including: Is there any problem with the axes movements towards positive or negative direction?

Step2: Parameters Setting

Properly set the global parameters and other parameters using in the processing.

Remark: Failure to properly set the parameters will cause difficulties in using the system.

Step3: Teaching Program

Program a graphic with teaching pendant. Refer to the instruction manual of the teaching pendant.

Step4: Origin Calibration & Set the Parameters of the Teaching Pendant

1. Origin calibration: User should adjust the start point when a teaching file is created for the first time.
2. Set file parameters.

Step5: Download & Process

1. Download: please refer to instruction manual of the teaching pendant "Teaching File Download".
2. Process: please refer to instruction manual of the teaching pendant "File Processing".

4.1.3 Debugging steps (take a point for example)

 Do NOT touch or put your hands on the moving parts when the device is working!

1. Connect all the sockets, power cord and the main air input pipe.

2. Turn the pressure regulating valve for appropriate air pressure.

3. Turn off the heater controller and the solder feeder.

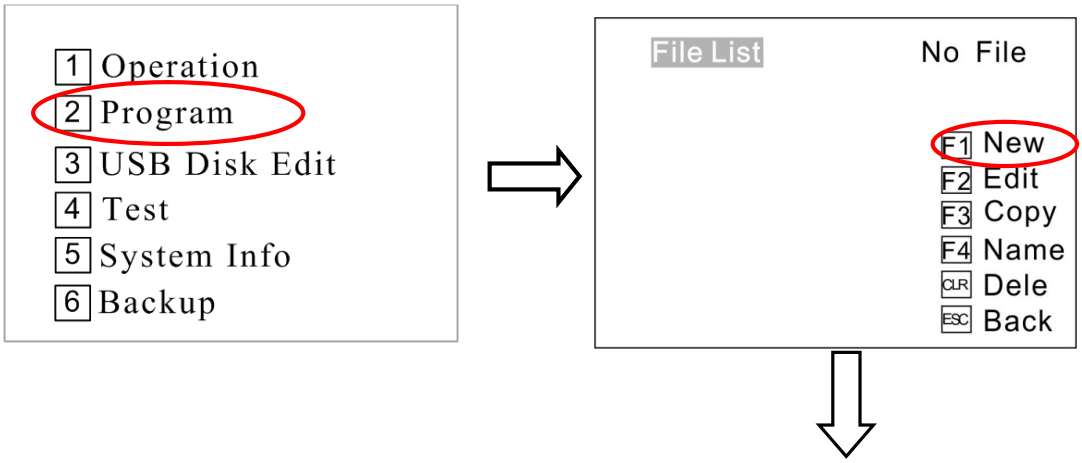
4. Entering File Edit interface, insert a POINT and moving the tips to the place you need soldering by teach pendant. Details are as follow:

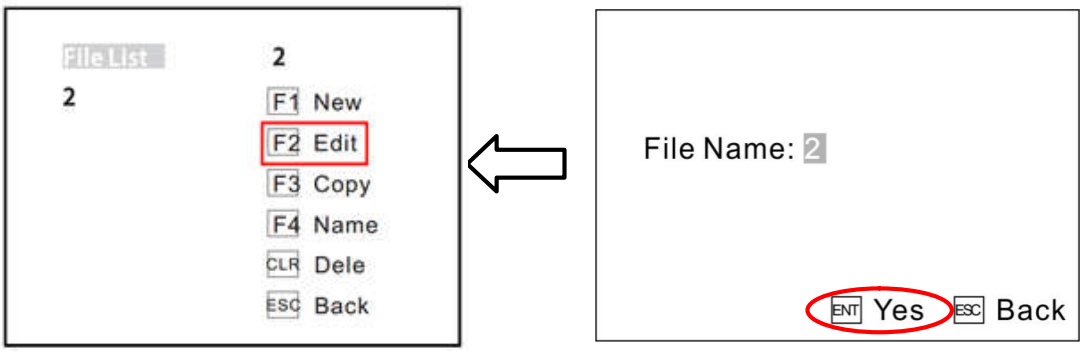
1) Press 2 to enter File List menu.

2) Press F1 to create a new file.

3) Press F2 to edit the new file,

4) Press ENT to save it, see follow picture.





5) Press F2 to enter Name 2 menu.

6) Press F2 File Edit to enter "Y axis select " menu. Change to "left" or "right" by SHIFT button.

7) Press +/- to enter Insert menu and press 1 to enter Point menu.

1 The speed (machine steps) can be adjusted by changing it.

2 All axis can be moved manually by clicking "X-", "X+" or "Y-", "Y+" or "Z-", "Z+".

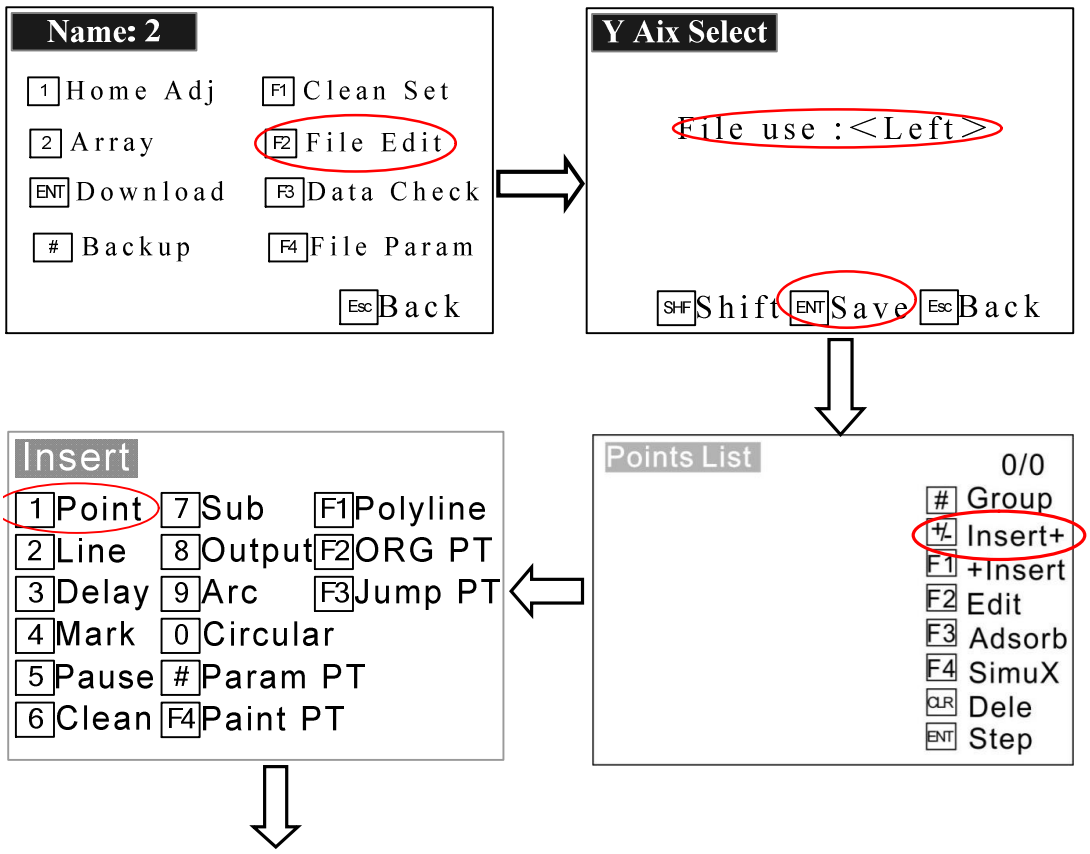
8) Press F4 to enter Point parameter menu.

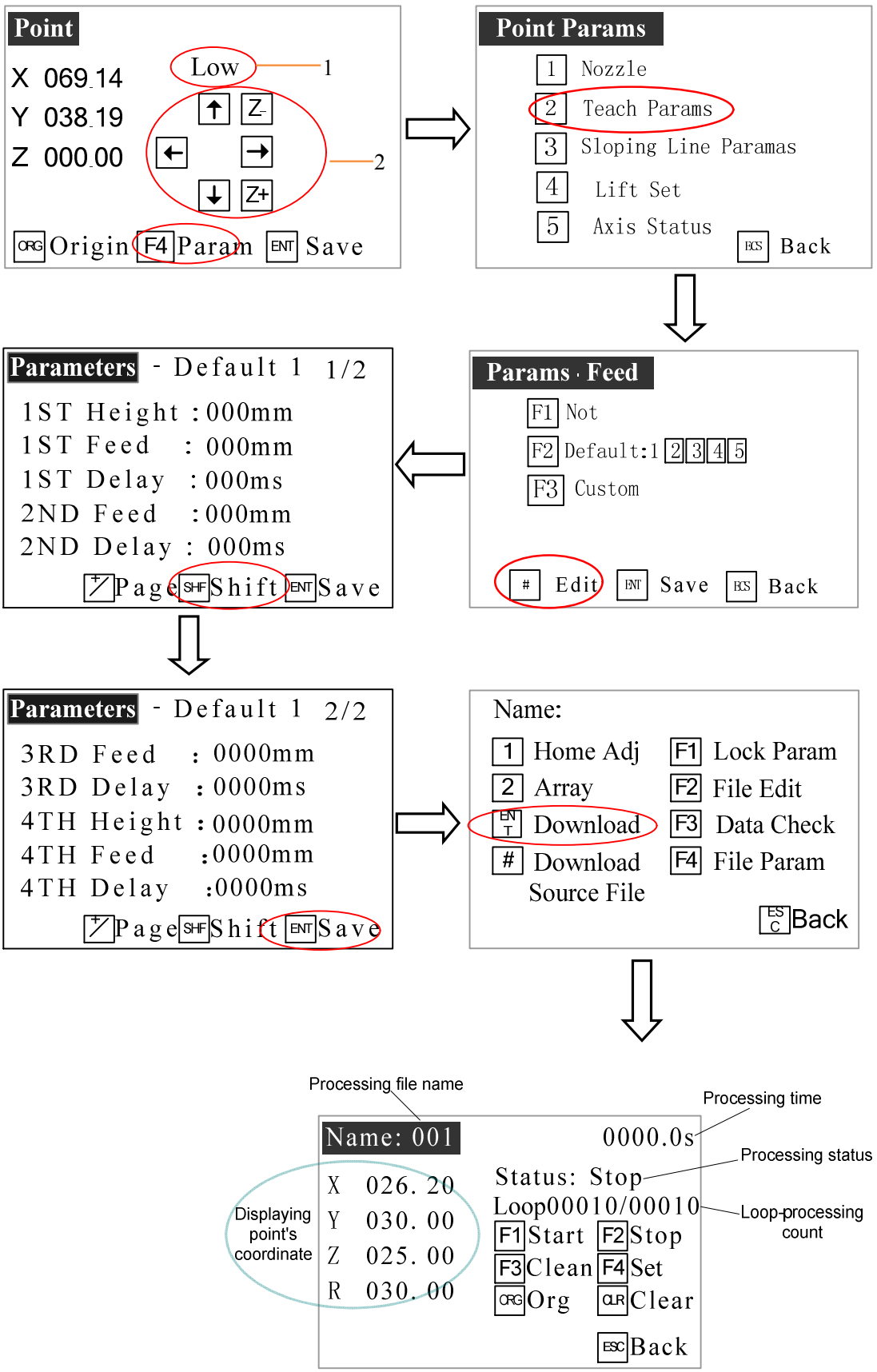
9) Press 2 to set teach parameters

10) Press # to enter parameter menu and press ENT to save it.

11) Press ESC to back "Name 2" menu and you can press ENT to download the file 2.

12) Press F1 to start work.




Point
X 069.14
Y 038.19
Z 000.00
Low
1
2
Z-
Z+
ORG Origin
F4 Param
ENT Save
Point Params
1 Nozzle
2 Teach Params
3 Sloping Line Paramas
4 Lift Set
5 Axis Status
BCS Back
Params · Feed
F1 Not
F2 Default:1 2 3 4 5
F3 Custom
Edit
ENT Save
BCS Back
Parameters - Default 1 1/2
1ST Height :000mm
1ST Feed : 000mm
1ST Delay :000ms
2ND Feed :000mm
2ND Delay : 000ms
+/- Page SHF Shift ENT Save
Parameters - Default 1 2/2
3RD Feed : 0000mm
3RD Delay :0000ms
4TH Height :0000mm
4TH Feed :0000mm
4TH Delay :0000ms
+/- Page SHF Shift ENT Save
Name:
1 Home Adj
2 Array
ENT Download
Download Source File
F1 Lock Param
F2 File Edit
F3 Data Check
F4 File Param
ESC Back
Processing file name
Processing time
Name: 001
0000.0s
Processing status
Status: Stop
Loop00010/00010
Loop-processing count
Displaying point's coordinate
X 026.20
Y 030.00
Z 025.00
R 030.00
F1 Start
F2 Stop
F3 Clean
F4 Set
ORG Org
CLR Clear
ESC Back

4.2 Interrupt and continue

1. **Function**: For an interrupted processing file, it can continue to work at the next point of the interrupted point after troubleshooting.

2. **The manner of continue the interrupted work**: after troubleshooting, press the "START" button and keep more than 2s not loosen, the robot will continue to work from the interrupted point. If press and hold the "START" button for 2s, the robot will start the work from the start-point of the processing file.

As the different interrupt type, it can classify the interrupted point as the following table:

Interrupted condition

No.	Interrupted condition	Mark	Action of Stop after be Interrupted
1	Press STOP BTN	A/B/C/D	Stop immediately
2	Press EMERGENCY BTN	A/B/C/D	Stop immediately
3	Press ORG BTN	A/B/C/D	Stop immediately
4	Press PAUSE BTN	A/B/C/D	Stop immediately
5	Lack soldering alarm*	A/B/C/D	Stop immediately
6	Block soldering alarm*	A/B/C/D	Stop immediately
7	Temperature alarm*	A/B/C/D	Stop immediately

⚠ Caution：

- If it was interrupted by emergency stop, you can continue after dismiss the emergency stop and reset
- The above "interrupt type" is effective in the processing mode, and at the teaching mode and debugging mode, the "interrupt type" with "*" is ineffective.

4. A/B/C/D is interrupted mark, these mean:

Interrupted stop method

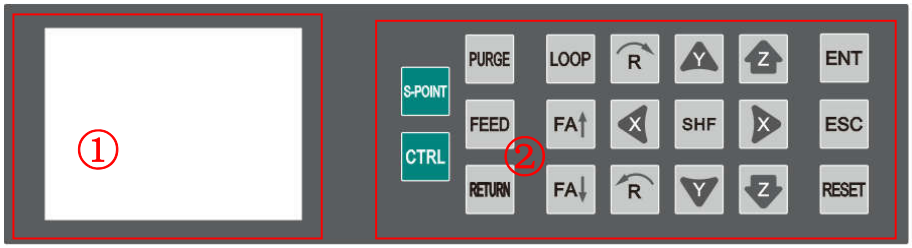
Interrupt mark	Interrupted station	Continue station
A	From Start feeding to soldering finish	Jump interruption soldering, go

		straight to next point.
B	Moving between two soldering point.	Go straight to next soldering point.
C	Pause	Go to next soldering point.
D	Holding up distance after soldering	Go to next soldering point.

⚠ ***Caution: If power outages during the operation, it cannot continue the interrupted work after troubleshooting.***

V . Operation panel

5.1 Introduction

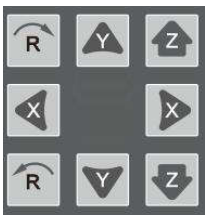


① Display area

Display temperature\communication\version information.

② Operation button

Operation button functions list:

Operation Button	Functional Description
	1. Direction Button 2. Manual control shift (X,Y,Z,R Axis) movement
	1.Cylinder switch 2. “FA ↑ ” cylinder ON button, “FA ↓ ” cylinder OFF button
	1. Soldering tip purge button 2. The button will active when the purge file downloads.
	1. Speed change button 2. Total three speed: Low, Mid, Hig.
	Confirm button
	Reset button
	In the off-line status, press this button to enter into Loop menu.

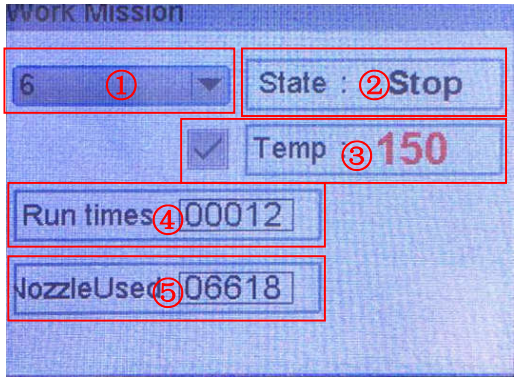
Operation Button	Functional Description
	Start point button
	Back button
	Feeding wire button
	Return wire button
	Heating controller switch (Built-in heating controller is effective)

5.2 Main menu (with teach pendant)

- Connect the power cord to the power supply.
- Connect teach pendant line from operation panel.
- Display version and communication information, see follow picture:

5.3 Main menu (disconnect teach pendant line)

Disconnect teach pendant line from operation panel and it will automatic enter into Work Mission menu, see following picture:



① The current work process file name.

Press  button to change the file.

② State.

Show machine current state.

③ Temperature

Show tip current temperature.

Press  button to display the temperature information.

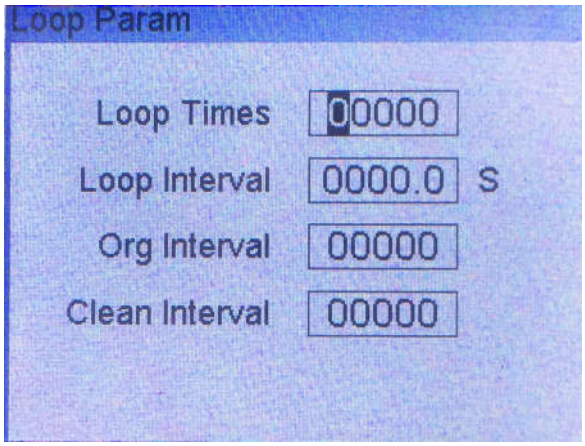
④ Run times

Display machine operation totalizer.

⑤ Nozzle Used

Display tip operation totalizer, press **reset** button to clear value.

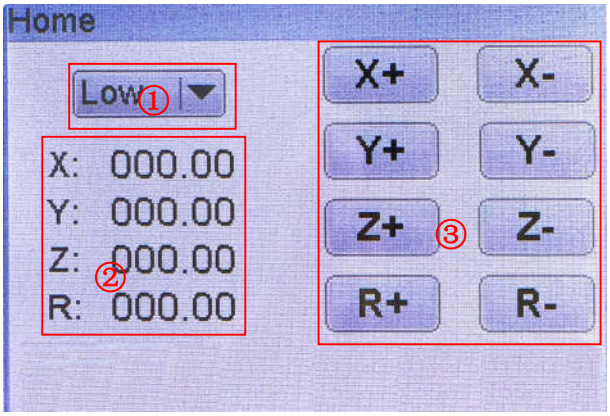
5.3.1 Loop menu



Press  button to enter into Loop menu.

Press  button to change the digital; press  button to change the number.

5.3.2 S-point menu



Press 

button to enter into Home calibration menu.

① Speed smbol

Press the SHIF button to select Low/High/Middle speed.

② Display area

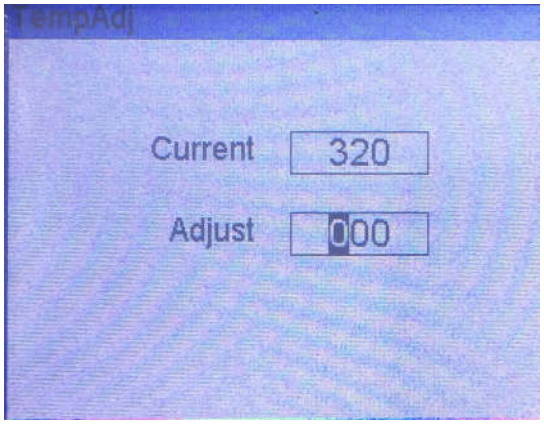
Display the current position of the soldering tip.

③ Jog mode

All axis can be moved manually by clicking 

.

5.3.3 Temperature calibration menu



Press SHIF button for 3s to enter into the temperature calibration menu.

Press 

button to change the digital; press 

button to change the number.

Ⅵ.Troubleshooting and maintenance

6.1 Troubleshooting

NO.	Trouble shooting	Reason	Measure
1	The unit can't reset.	Please check if the emergency BTN was pressed or not.	Dismiss the emergency BTN and press the ORG BTN.
2	The Z axis unit movement wasn't accurate.	Out of the weight or the speed.	If the unit's accurate decreased, reduce the speed and it will be remission. Adjust the verticality or parallelism of the track, tighten the screws of the tracks.
3	The motor was abnormal.	The board or the motor was bad.	If it was still bad after changed the signal wires of motor, the board doesn't have matter .change the wires of drivers, if the bad one works after changed the wires, it proves the motor was bad, if the normal one doesn't work, it proves the driver is bad.
4	The fuse has burned.	If the replacement of the fuse is still malfunctioning, it could be that the motherboard is broken.	Replace it.
5	The motor is vibrating at the origin when reset.	The photoelectric switch is bad or the drive plate has a problem.	Replacing the photoelectric remains the problem, it will be driven problem.
6	X-axis only turns to one direction motion.	Driver board of X-axis is broken.	Replace it
7	The unit is always alarming.	If overcome the trouble it was still alarming, maybe the emergency BTN was bad or the alarm flag wasn't feedback.	Press the emergency BTN and check if power will be cut or not. If the power wasn't cut, the emergency BTN is bad.

NO.	Trouble shooting	Reason	Measure
8	The high temperature of the motor, no power input.	The chain guide wheel falls off or breaks.	Change guide wheel.
9	Drive shaft of motor fracture.	Because of the long time force operation, the drive shaft and the base screw loose, creating a gap, resulting in wear and tear.	Remove the drive shaft and weld and tighten the loose screws.
10	The motor position is tilted and the running chain is abnormal.	The motor bracket is not fixed with the limit bolt.	Adjust the motor position and fix it.
11	Cylinder problem.	Cylinder regulating valve damages.	Replace the cylinder.
12	Sports parts are jammed.	The screw of the proximity sensor loosens, leading to a deviation near the sensor position.	Calibration of proximity sensors.
13	The accuracy of the machine declined.	1. Loose guide rail 2.X-axis and Y-axis out of the vertical.	1. Readjust the straightness, perpendicularity and levelness of the guide rail. 2. Adjust the bolts of the crossbar and machine link.
14	There is something strange in the lead screw.	1. The bearings are damaged. 2. short of lubricating oil.	1. Clean or change the bearings. 2. Add the lubricating oil.
15	The lead screw is shaking while moving.	1. The lead screw was bent. 2. The lead screw was not concentricity with the motor.	1. Change the lead screw. 2. Adjust the place of the lead screw.
16	The pressure watch is beating at work, and the pressure value is set to swing	The sealing surface of the valve is attached to water or oxides.	Remove the valve and clean the moisture and oxides.

NO.	Trouble shooting	Reason	Measure
	back and forth.		
17	The belts slipped.	1. The belts loosen. 2. There is some lubricating oil on the belts.	1. Adjust the motor's place for tightening the belt. 2. Clean the lubricating oil.
18	The sliding block movement is retarded, the guide way is febrile, and wear phenomenon.	The gap between guide rail and slider is too small.	1. Adjust the clearance between guide rail and slide block. 2. When the puncture is worn, it needs to remove the guide rail and slide, and repair the puncture site.

6.2 Daily check and maintenance

Safety instructions:

Risk of electric shock

Be sure to open the cabinet door after the power off

Cut off the power supply for 5 minutes and replace the servo unit (including the rectifier) and control the power unit. During this time, please do not touch the terminal!

Risk of electric shock and injury

After the repair, please do not forget the tool in the electric control cabinet, make sure the door of the electric control cabinet is closed.

The total power supply control cabinet and the relevant control box should be labeled "no power supply", so as to prevent non-related personnel from closing the switch

Daily check of soldering robot:

1) Check if there's flammable or explosive item close to the soldering robot.

2) Check if the working voltage is correct.

3) Clean the soldering tip. Check if the tip is corroded or worn out. If so, please replace it.

4) Check if the tube of wire feeder is in good condition. Check if the tube is blocked.

5) Check if airflow is normal, if the air tube is smooth.

6) Check if zero position of each axis is correct.

7) Test the movement and communication performance of soldering robot.

8) Check if the emergency button can be pushed and unscrewed normally.

9) Clean the working environment of soldering robot.

10) Check if the external screws of the soldering robot are screwed well.

11) Write down equipment condition in each shift.

12) Run a testing program after each shift.

Examination period of robot projects:

Inspecting with power off						
Items	Position	Daily	Monthly	3 months	6 months	12 months
Check whether screws and structure is fastened.	Screws in the covers.	√	√	√	√	√
	Screws in the robot.	√	√	√	√	√
	locking bolt of robot	√	√	√	√	√
	Screws in the axles.					√
	Motor and reducer screws.					√
Check whether socket is fastened.	Socket on the surface of robot.	√	√	√	√	√
	Socket in the robot		√	√	√	√
Check whether robot is abrasion. Clean dust on the equipment.	Robot appearance	√	√	√	√	√
	External cables		√	√	√	√
Check whether it is curving or position skewing. Please repair or send to repair station if necessary.	The axis position of the robot	√	√	√	√	√

The condition of the grease	Please refer to the "maintenance of ball screw" and "linear guide rail".				√	√

Inspecting with power on						
Items	Position	Daily	Monthly	3 months	6 months	12 months
Inspecting the working area.	Every axle					√
Shake tenderly and check whether lines are break.	External cable				√	√
Press and check whether axles shaking while MOTOR ON status.	Every axle.					√
Inspecting Human-computer interface. Including keys, buttons, lights, emergency stop buttons function.	Operation panel, emergency stop button, tower light.	√	√	√	√	√
Check whether motion and vibration is normal.	Entire	√	√	√	√	√

6.2.1 Cooling fan maintenance

Cooling fan rotation is abnormal, the temperature in the control cabinet will rise, the electric control cabinet will malfunction, all should check cooling fan

Control the fan in the cabinet and the back fan to turn when the power is connected, so check whether the fan is rotating, and the air volume of the outlet and the suction vents are checked to confirm whether the rotation is normal.

6.2.2 Maintenance of emergency stop button

The emergency stop button is a safety device, and it must be pressed in hazardous situations. When pressed, the emergency stop button locks in and therefore remains active. The current operating program is stopped immediately, all movements are stopped; fault and error message appears; the machine cannot be restarted as the button locks in when pressed and thus remains active. After resolving the error, the emergency stop button must be pulled out as acknowledgement.

6.2.3 Maintenance of robot movement mechanism

Robot is a precision equipment, need time and maintenance, keep good lubrication condition, must strengthen the maintenance and maintenance, at any time, timing, clean up dirt, oil, ensure the robot to work under a good condition, this can avoid some faults occur frequently, reduce downtime, and can guarantee or to extend the service life of machine.

（一）Daily Maintenance

1. Clean the solder and glue after working.
2. Must change or clean the tips frequently.
3. Don’t touch the track for avoiding rust.
4. Check if the parts are normal before work.

（二）Regular Maintenance

You should maintain the machine about three months, if you always use it. The details are as follow:

Take off the cover of X-axis, clean the screw and track, check the screw if loose or not, spread lubricant on the screw and track, move the X-axis for spread more lubricant. Then take on the cover.

Take off the cover of Y-axis, clean the screw and track, check the screw if loose or not, spread lubricant on the screw and track, move the Y-axis for spread more lubricant. Check the screw of light sensor. Then take on the cover.

Take off the cover of Z-axis, clean the screw and track, check the screw if loose or not, spread lubricant on the screw and track, move the Z-axis for spread more lubricant. Check the screw of light sensor. Then take on the cover.

Belt: check if the belt is loosened. Adjust the belt if it loosened: firstly, disassemble the fixed screw. Secondly, pull the motor back. Then press the belt 10N stress at the mid of the belt, bend 10~15mm. Finally it is fixed.

Check the straightness, perpendicularity and operating accuracy of the guide regularly every quarter. If abnormal, it should be adjusted in time

Replace the worn component.

The maintenance of the electrical part is mainly to check the connection of the conductor. Check whether the pins of each plug are crooked, whether the wires are broken and the welding falls off

Clean the internal dust of the electric control cabinet carefully and check whether the connection is loose, whether the appearance of the components appears abnormal, and whether the switch and button are normal

After the inspection, check the signal and then measure the motion characteristics. After an error-free time, you can set up a file to run for ten minutes without losing your step (which requires all directions to go to the limit), then complete the regular maintenance. For users who use less frequently, regular maintenance time can be half a year, maintenance content is the same.

6.2.4 Oil-water separator maintenance

1. When installing, it is forbidden to drop or make it suffer a strong shock to avoid damage.
2. Make sure to use the screws to secure a secure fixture on the welding robot before it can be used.
3. The recommended use of air pressure is less than 0.7Mpa.
4. Regularly remove water from oil and water separator, remove regularly and wash with tube brush.

6.2.5 Linear guide maintenance

1. Lubricate the linear track every 100km walking. Even if you don't use it very often, you need to add it regularly.
2. Do not lubricate too much grease.
3. Inject the grease into the block. Do not straightly smear the grease on the surface of block.

4. Avoid sliding block into foreign body to affect life.

How to inject the grease:

1. Stop the unit. Inject into the nozzle 0.7cc grease.
2. Allow the slider to move back and forth, allowing the inner steel to roll completely.

Repeat ①&②, inspect whether grease adhere to the end of track.

6.2.6 Maintenance of ball screw

1. Inject grease with grease gun by many times. Roll the screw spindle half-turn after injecting one time (Inject 0.7cc each time). Notice: Do not inject rated grease, otherwise it will not be lubricated completely.
2. Finished lubricating rated grease, Push the block for a round trip to spread grease.
3. Daily maintenance of the wire feeder unit
4. The tube of solder wire feeder would be blocked by the rosin after a long period of using. Check and clean it (with alcohol) regularly.
5. Do not over bend or rotate the tube in case of wire jam.
6. Check if the diameter of the tube assembly is same as which of the wire feeder.
7. Turn the pressure adjustment screw clockwise if the wire cannot be fed smoothly. Turn it anti-clockwise if the wire was pressed too much.
8. Do not tighten the press adjustment screw too much to protect the press spring.

6.2.7 Daily maintenance of heating controller

1. Turn off the heating controller when not in use. Pull out the power cable if not use it for a long time.
2. Reliable grounding is essential for the soldering robot. Do not use the power cable without ground.
3. Replace the fuse of the heating controller if it is broken: Turn off the heating controller, pull out the power cable, remove the fuse cover, take out the defective fuse and put a new one.

6.2.8 Soldering tip

1. High temperature would affect/decrease the lifetime of soldering tip. Set the temperature as per application but as low as possible.
2. The oxide and carbide produced by residual flux will damage the soldering tip, like soldering deviation and slow heat conduction etc. Clean the soldering tip regularly (every week for long time continuous using).
3. Under high temperature, the solder in tip will produce oxide, which will damage its heat conduction. Turn off the heating controller when not use.

6.2.9 Prolong the lifetime of soldering tip

1. Coat the soldering tip with solder to prevent oxide.
2. Set the temperature as per application but as low as possible.
3. Choose the right type of soldering tip.
4. The plating would be broken if the tip is bent. Do not use the soldering tip as a detecting tool.
5. Activated rosin will corrode the tip plating. Choose the solder wire with less activated rosin.
6. Do not press the soldering tip. Much pressure is not helpful for heat conduction. Melt the solder wire to create a solder bridge between tip and point, to speed up heat transfer.

QUICK INTELLIGENT EQUIPMENT CO., LTD.
ADD: NO.11, FengXiang Road, Wujin High-Tech Industrial Development Zone, Jiangsu, China
TEL: 86-519-86225678
FAX: 86-519-86558599
POSTCODE: 213167
WEBSITE: www.quick-global.com