

# User Manual

## -Control System of Desktop Solder Robot Machine



(Portable Box Version) V7.3

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# 1. Product Introduction

## 1.1 Product Overview

S-C5331R intelligent tin soldering machine control system is designed and manufactured by the professional digital control team of the company for tin soldering machine industry; it is featured as low cost, high condensation and high degree of integration. The perfect tin soldering processes are collocated to meet different processing demands; the product is widely applied in the multi-axis automatic tin soldering machine field.

## 1.2 Functional Introduction

1. 320\*240 HD colored screen and Chinese operation interface are collocated to bring convenience to learning and usage.
2. Perfect tin soldering processes are collocated and spot welding and drag welding processes are prepared; the tin supply speed is automatically adjusted according to the working speed.
3. The oblique angle gun access function is collocated; it is able to set up the gun access angle at disposal.
4. The tin shaking function (horizontal, vertical) is collocated to upgrade the welding quality.
5. Perfect cleaning functions include regular cleaning function or designated position cleaning function; upon cleaning, the tin compensation volume is set up.
6. It supports the counterpoint function of MARK point and aims to revise the error caused by the angle and position deviation of work piece.
7. It enjoys the skip selection function and is able to select numerous interrupted commands at one time.
8. It enjoys the command displacement function and is able to move the edited function to the target position.
9. It enjoys such functions as regional array copy, translational calculation, batch edition, single step, automatic and circulation operation, I/O input and output.
10. It enjoys such functions as automatic execution, automatic reset, production volume setup and processing time counter and thus meets different application demands.
11. The action parameter is edited and downloaded to the controller by serial port for off-line and separate operation; the action parameter can be also saved in the portable box to bring convenience to usage; graph copy and save functions are collocated between the equipment.
12. The portable box is able to save several hundred processing files; each file can support 8,000 commands—They are adopted in the normal usage.
13. The hardware is collocated with four-gun tunnel control function, four-way general output function, eight-way input function and twelve-way high-speed pulse output function.
14. Each action command has separate tin delivery time, tin return time, lifting height and flexible batch revision functions; they are able to swiftly upgrade the edition efficiency.

## 1.3 Functional Features

### 1.3.1 Hardware features of controller

Number of motor axis: 5 axis (XYZRB)

Pulse frequency: 200K

Quantity of I/O port: Exclusive eight-way input (XYZR original point, start/pause, pause, reset/emergency shutdown buttons); exclusive four-way rubber gun output (four rubber gun switches, direct driving solenoid valve, driving current: 2A); four-way general I/O output, four-way general I/O input; twelve-way high-speed “NPN integrated electrode open circuit” 5-24VDC output; rated current: 0.5A.

Input category of I/O: Optocoupler isolated input.

Save capacity: 16M

Interface model: DB44 interface

Working voltage: 24V DC

Working temperature: -10-60°C

Storage temperature: -40°C-70°C

Working humidity: 40%-80%

Save humidity: 0%-95%

### 1.3.2 Hardware features of portable box

Interface model: USB interface and serial port are collocated; USB interface is connected with the computer—This function is temporarily reserved. The serial port is connected with the portable box.

Save model: Flash chip.

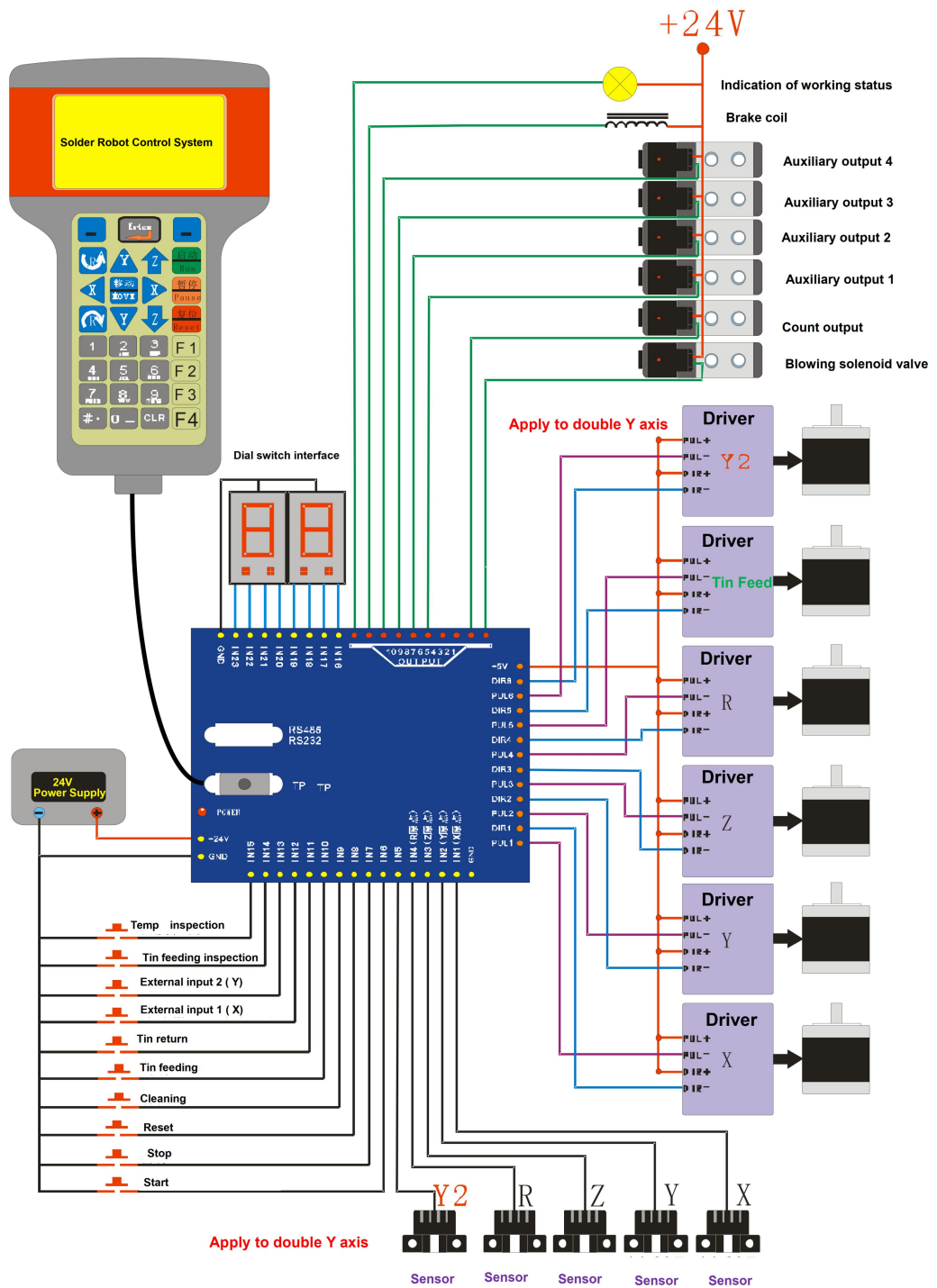
Display screen: 320\*240, 3.2'' colored LCD.

## 1.4 List of Products

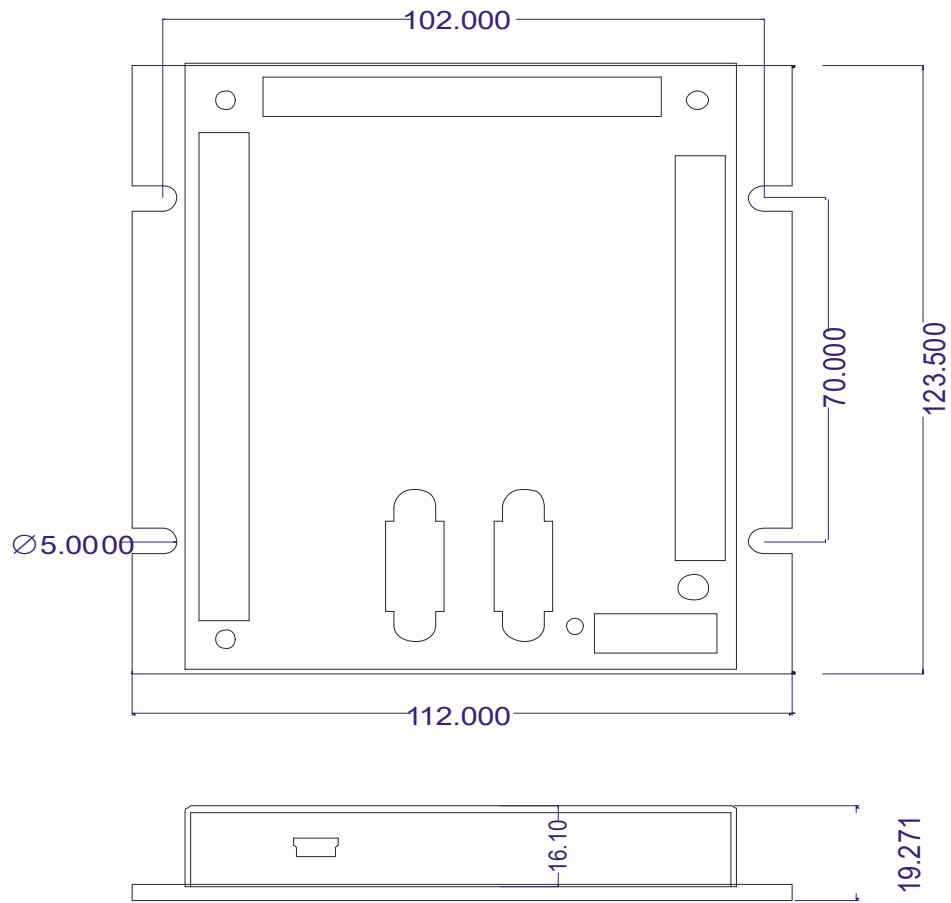
Name of fittings	Category	Qty'	Introduction
Portable box	Necessary	1	Operation instruction box
Controller	Necessary	1	Operation controller
Data line	Necessary	1	Connection line
Lengthened line	Necessary	1	Lengthened line of controller serial port

# 2. Wiring Diagram

## 2.1 Wire Schematic Diagram of Control System

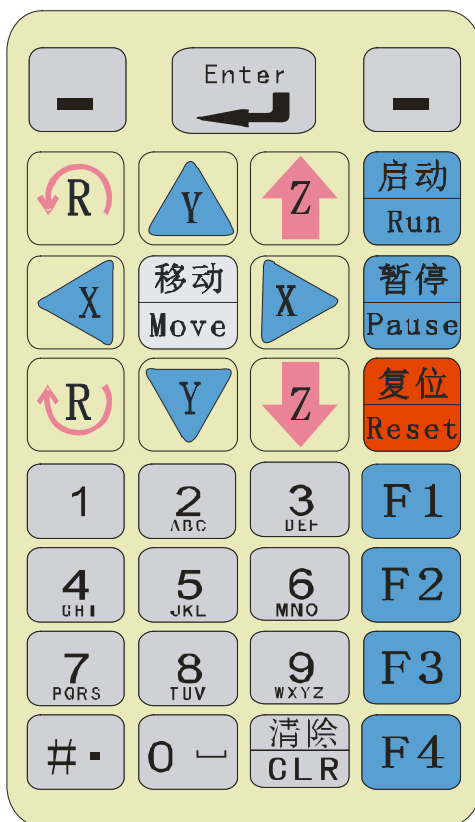


## 2.2 Installation Dimension

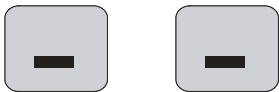

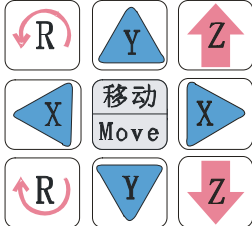











### 3. Specification of Keys

#### 3.1 Key Diagram of Portable Box



#### 3.2 Key Specification of Portable Box

Graph of keys	Name	Functions
	Function key	Different screens display different operation keys.
	Confirmation key	It aims to revise and save data and parameters.
	Direction key	XYZR direction key controls the forward, backward, upward and downward and rotational operation of four axis. <MOVE> locating key: It aims to manually find the point and detect needle of the equipment.

	Figure and letter key	It aims to input the letter, figure and point; press “#” to transfer the input method.
	Start/download key	It aims to download action command in the controller and start the equipment.
	Pause key	It aims to pause the operation of machine.
	Reset key	It aims to reset equipment to the original point.
	Multi-functional key	Different screens have different functions.
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	Multi-functional key	Different screens have different functions.
	Delete key	It aims to delete revised error parameters and values; delete files and commands; clear production volume into 0.

**Warning**

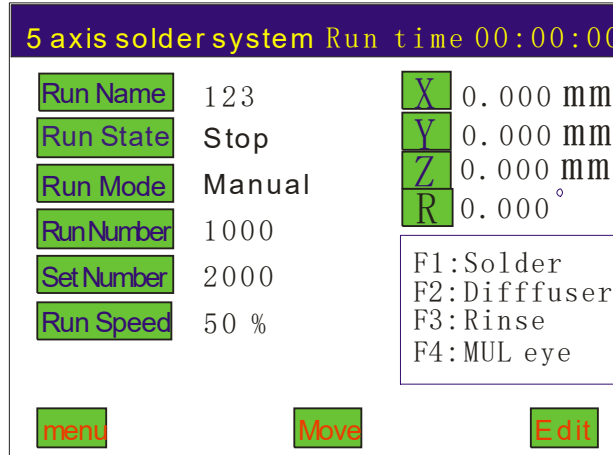
**when operating the handheld box, you must insert and extract the serial port connecting wire under the circumstance of power failure, in order to avoid its burning controllers and handheld box.**



# 4. Operation Specification of Portable Box

## 4.1 Introduction to Start Screen

Upon electrification, the portable box automatically skips to the start screen—existing working screen as below:



Processing file: Name of processing file.

Working status: Existing working status of the machine, including operation, pause and shutdown.

Working model: Operation model of the machine, including manual operation model and automatic circulation model.

Processing quantity: Fulfilled production volume of the machine. If the processing quantity = set production volume, the machine has fulfilled the processing quantity and is shut down.

Set production volume: Preset production volume of the machine.

**Working speed: Operation speed of the equipment: gumming trace speed. It refers to the speed percent in the edition of command within a scope of 0—100%; under this screen, the operator presses the direction key “Y” to increase or reduce the working speed percent; presses “Z” key to increase or reduce the working speed percent at a unit of 10. However, it is forbidden to make a real-time revision to the working speed; upon revision of the speed, the second operation becomes valid.**

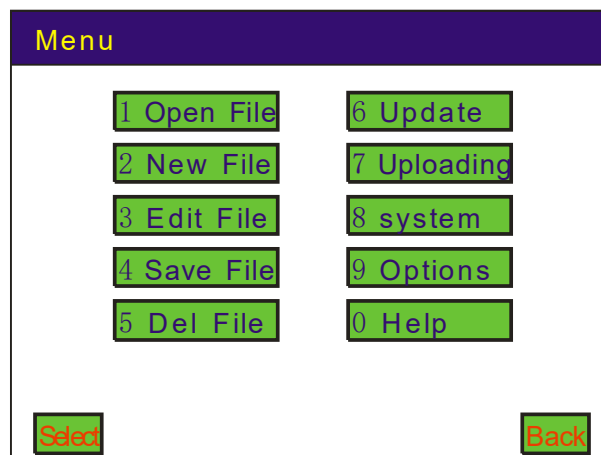
X: Existing coordinate of X-axis.

Y: Existing coordinate of Y-axis.

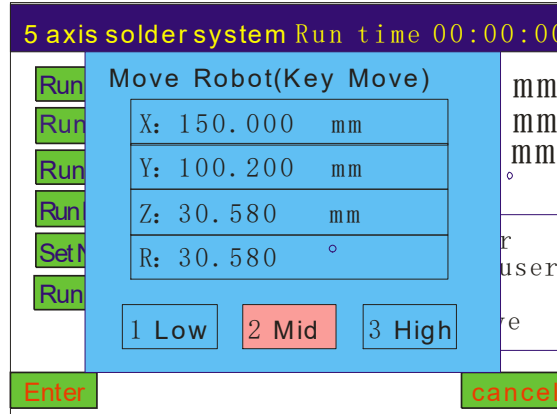
Z: Existing coordinate of Z-axis.

F1~F4: Swift operation.

Press “menu” and enter into the “main menu” screen. Please refer to Article 4.2 in detail.

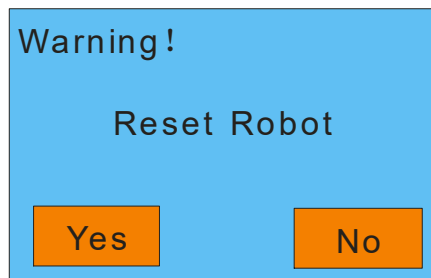


Press “move” and directly move the equipment as below:

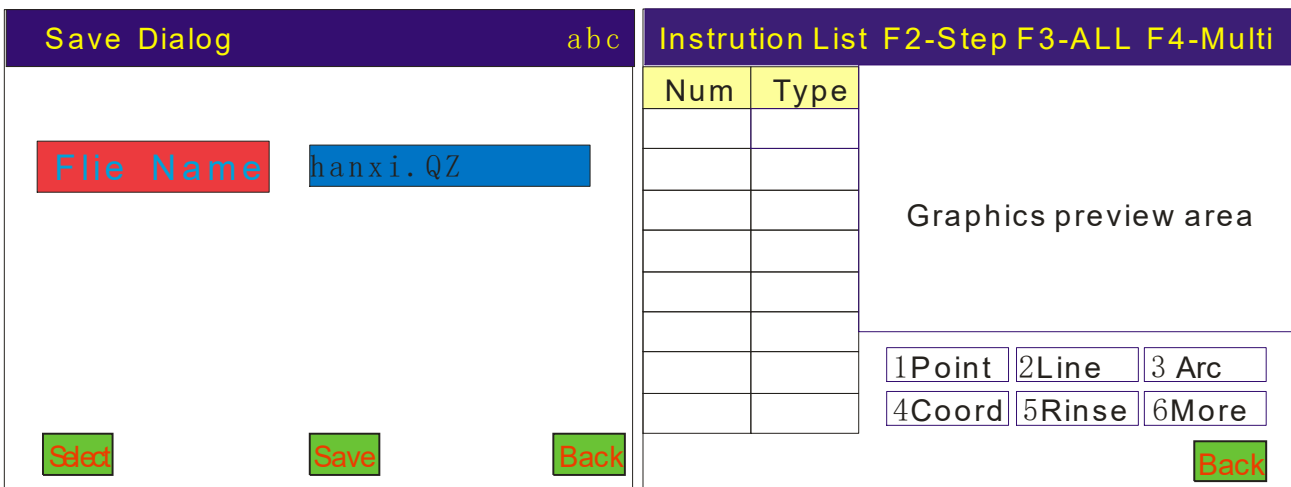


Press “edit” and enter into the dialog box of command instruction (remark: 1. In case of no file in the portable box, press “edit” and create a file—The operation methods are same as file creating; 2. In case of certain files in the portable box, press “edit” and enter into the dialog box of command list and search for and edit the command).

1. In case of no file in the controller, press “edit” to create a file; the system automatically prompts the following dialog box:

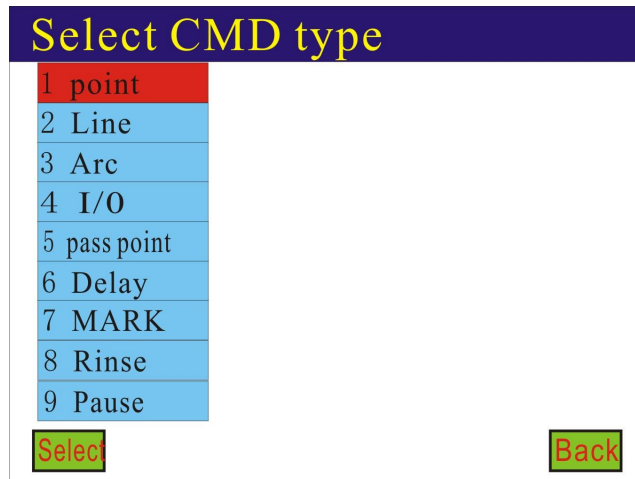


“Left functional key” means Yes and “right functional key” means No; upon selection, the system automatically springs out the dialog box of file saving; input the file name and press “save” and enter into the edition dialog box of command instruction (“#” key refers to transfer key of figures and letters); automatically save instructed command in this screen into the input file as below:

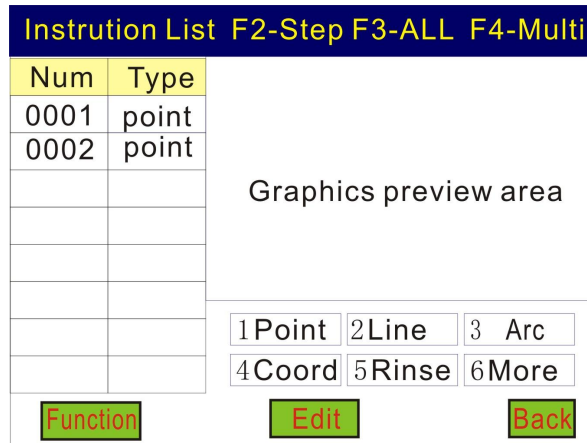


In the dialog box of command list, press figure key 1—5 and edit corresponding graph elements in the figure; press figure key 6 and select more graphs.

Please refer to the following figure in detail:



2. In case of certain files in the controller, press “edit” and enter into the dialog box of command list and revise and edit the parameter as below:




Press left key “X” and skip to the first command of the list; press right key “X” and skip to the last command of the list.

Press upper key “Y” key and move the existing command upward; press lower key “Y” and move the existing command downward; in case of multiple selection, press “Y” key and select the command direction.

Press upper key “Z” and turn to the previous page of command list; press lower key “Z” and turn to the next page of command list.

Press upper key “R” and magnify the graphic file; press lower key “R” and zoom the graphic file.

Press “” key and remove command selected in the list.

Press “MOVE” key and directly edit and revise the selected command coordinate (refuse to automatically locate the selected command coordinate).

Press “#” key and detect needle of selected point; execute offset to all the commands of edited file.

In this screen:

“F1” key refers to skip selection function and can select interrupted commands (intermittent commands) for edition of parameters.

Methods: Select one target command and press F1; SN and position of the command change color—It means successful selection. Select the second target command and press F1; skip and select all the target commands for edition of parameters. Press F1 (single item) or F4 (total items) to cancel the skip selection.

Press “F3” and select all the commands (total selection).

Press “F4” and select a certain section command (multiple selection); prompt by cursor.

Then press “operation” key and copy the selected command, copy the array, execute off, revise in batch and automatic filleting.

1. Copy command: Copy selected command.
2. Copy of array: Array copy selected command.
3. Operation of offset: Offset selected action command and offset coordinate according to the designated value.
4. Batch revision: Make a batch revision of a certain parameter and thus upgrade the edition efficiency.
5. Batch revision of category: Make batch revision to the same command category under one file.
6. Insertion command: Insert command before the selected command.

If the cursor selects only one command in this screen, press “edit parameter” and enter into the following dialog box and thus revise the parameters of existing command; upon change of any or several parameters, “save” key is sprung automatically; upon saving, parameter revision becomes successful as below:

Instrution List F2-Step F3-ALL F4-Multi					
Num	Type	1Length	3. 0mm	1 Speed	10. 0
0001	Point	2Length	2. 0mm	2 Speed	10. 0
0002	Point	3Length	3. 0mm	3 Speed	10. 0
0003	Point	1 Time	0. 5s	Wsliding	NOP
0004	Point	2 Time	0. 5s	X : 21. 000	
0005	Point	3 Time	0. 5s	Y : 50. 000	
		D Height	10. 0mm	Z : 60. 000	
		U Height	10. 0mm	R : 60. 000	
					Back

Instrution List F2-Step F3-ALL F4-Multi					
Num	Type	1Length	5. 0mm	1 Speed	10. 0
0001	Point	2Length	2. 0mm	2 Speed	10. 0
0002	Point	3Length	3. 0mm	3 Speed	10. 0
0003	Point	1 Time	0. 5s	Wsliding	NOP
0004	Point	2 Time	0. 5s	X : 21. 000	
0005	Point	3 Time	0. 5s	Y : 50. 000	
		D Height	10. 0mm	Z : 60. 000	
		U Height	10. 0mm	R : 60. 000	
					Save      Back

Pre-heat and deliver tin: Pre-deliver tin to the iron tip.

2nd section tin delivery: Tin delivery volume of 2<sup>nd</sup> section (in the drag welding, 2<sup>nd</sup> section tin delivery is adopted; in the spot welding, 2<sup>nd</sup> section is set into 0)

3rd section tine delivery: Tin delivery volume of 3<sup>rd</sup> section (generally, it refers to the tin volume in the drag welding of speed section; in the spot welding, it refers to the tin volume)

Pre-heat time: Delayed time of iron tip upon contact with the welded point.

2nd section time delay: Waiting time in the existing position upon 2<sup>nd</sup> section tin delivery.

3rd section time delay: Waiting time in the existing position upon 3<sup>rd</sup> section tin delivery.

Gun access height: Working distance between welding gun (oblique access) and welding point

Lifting height: Lifting height of welding gun upon welding process

Pre-heat speed: Pre-heat tin delivery speed

2nd section speed: Tin delivery speed of 2<sup>nd</sup> section

3rd section speed: Tin delivery speed of 3<sup>rd</sup> section

Tin shaking process: There are two choices: horizontal shaking; vertical shaking.

If the cursor selects two and above two commands (multiple selection or total selection), “edit parameter” changes into the “batch revision”; make swift batch revision to numerous commands as below:

Instruction List F2-Step F3-ALL F4-Multi		select the object	
Num	Type	1 Length	3 Speed
0001	point	2 Length	D Height
0002	point	3 Length	U Height
		1 Time	X
		2 Time	Y
		3 Time	Z
		1 Speed	R
		2 Speed	Wsliding

Graphics preview area

1 Point 2 Line 3 Arc  
4 Coord 5 Rinse 6 More

Function ALLEdit Back Select Back

## 4.2 Functional Introduction to Main Menu

Press menu key and enter into the “main menu” screen as below:

Menu	
1 Open File	6 Update
2 New File	7 Uploading
3 Edit File	8 system
4 Save File	9 Options
5 Del File	0 Help

Select Back

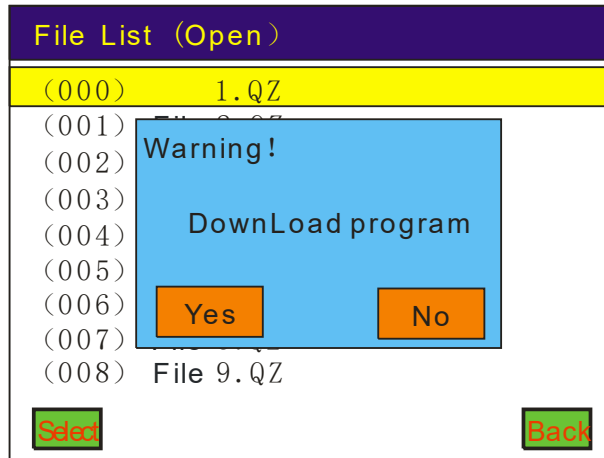
### 4.2.1 “Open file” menu

Open existing action files in SD card; press “select or confirm” key and open the existing file list as below:

File List (Open)	
(000)	File 1.QZ
(001)	File 2.QZ
(002)	File 3.QZ
(003)	File 4.QZ
(004)	File 5.QZ
(005)	File 6.QZ
(006)	File 7.QZ
(007)	File 8.QZ
(008)	File 9.QZ

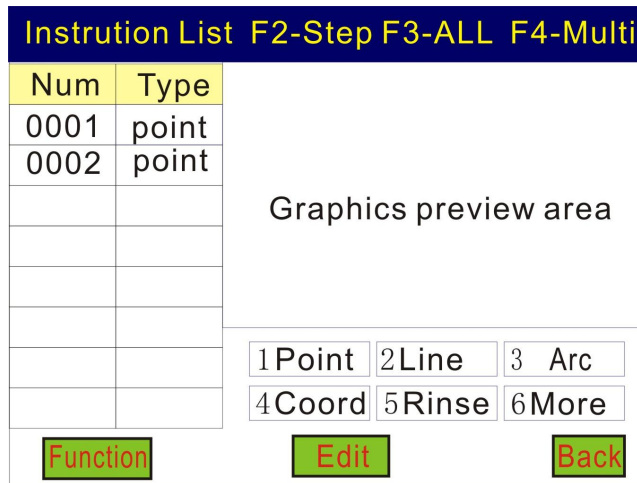
Select Back

In selecting “open file”, prompt procedure download or not; “download” means download of file command to the controller as below:



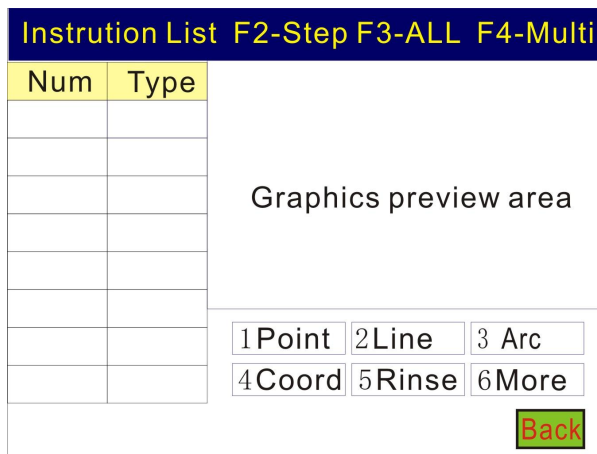
Select “yes”; upon download, directly skip to the start screen;

Select “no” and skip to the dialog box of command list and display all the commands of the file as below:



#### 4.2.2 “Create file” menu

Create an action file; press “confirm” key and prompt “whether reset equipment”; select reset and prompt a dialog box to save the file; input the file name and enter into the dialog box of command edition as below:



In this screen, add needed graph command; press figure key 1—5 and edit corresponding graph elements in the figure; press figure key 6 and select more graphs; please refer to Article 4.1 in detail.

#### 4.2.3 “Edit file” menu

Edit the open file in the controller as shown in Article 4.1. Please refer to the figure below:

**Instruction List F2-Step F3-ALL F4-Multi**

Num	Type
0001	point
0002	point

Graphics preview area

1 Point 2 Line 3 Arc  
4 Coord 5 Rinse 6 More

**Function Edit Back**

**4.2.4 “Save as” menu**

Save open file as another file; input the file name, press “confirm” key and successfully save the file; edit the file name into figures and English letters; press “#” key and transfer the input method as below:

**Save Dialog** abc

File Name hanxi.QZ

**Select Save Back**

**4.2.5 “Delete file” menu**

Delete existing file name; press “select” or “confirm” key and delete the file name as below: select the file name and press “select” or “confirm” key.

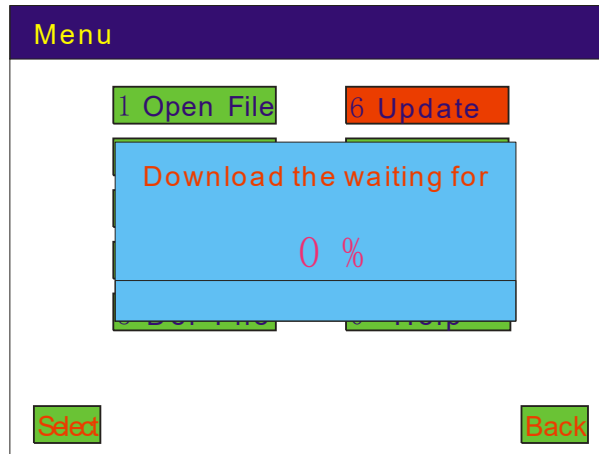
**File List (Delete )**

(000) File 1.QZ  
(001) File 2.QZ  
(002) File 3.QZ  
(003) File 4.QZ  
(004) File 5.QZ  
(005) File 6.QZ  
(006) File 7.QZ  
(007) File 8.QZ  
(008) File 9.QZ

**Select Back**

**4.2.6 “Download data” menu**

Download file to the equipment controller as below:

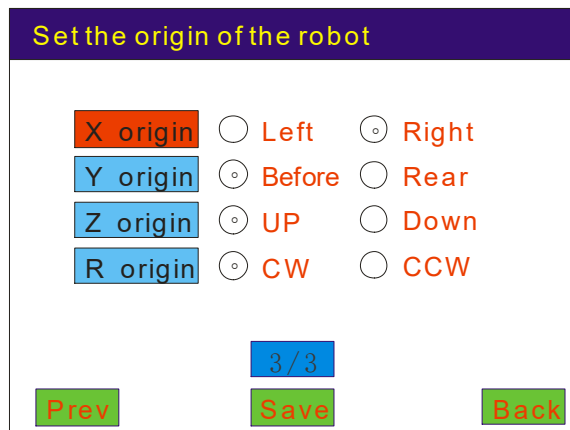
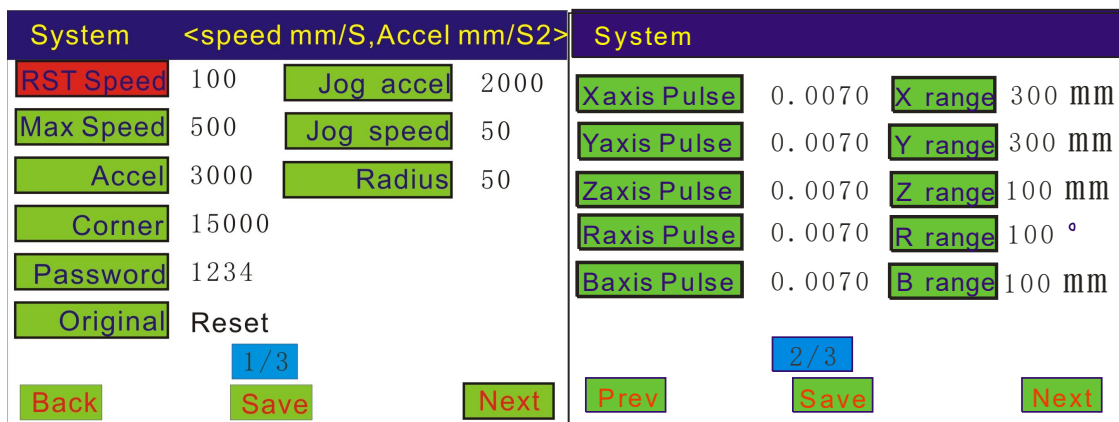


#### 4.2.7 “Upload data” menu

Read file from equipment controller to the portable box.

#### 4.2.8 “System” menu

The equipment parameters include: reset speed, maximum speed, acceleration, turning angle acceleration, user’s password, start reset, manual acceleration, manual speed, idle travel smoothness, X-axis pulse equivalent, Y-axis pulse equivalent, Z-axis pulse equivalent, R-axis pulse equivalent, B-axis pulse equivalent, X-axis stroke, Y-axis stroke, Z-axis stroke, R-axis stroke, B-axis stroke and equipment original point direction. Please refer to Article 4.11 in detail.



#### 4.2.9 “Option” menu



Adjustment model of machine

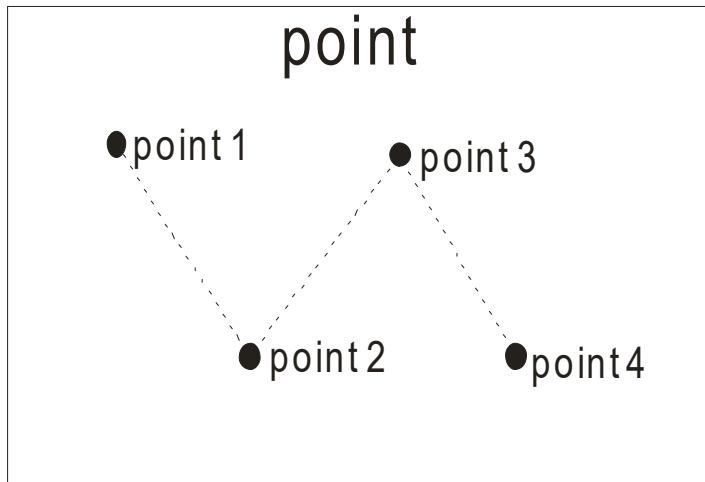
It includes: execution method, reset method, setup of production volume, default parameter, shutdown position, cleaning function and idle travel speed; please refer to Article 4.12—4.19 in detail.

4.2.10 “Assist” menu

It refers to the version and model of controller; it aims to inspect I/O port status of controller and resume the setup of default parameters.

**4.3 Operation of New Functions**

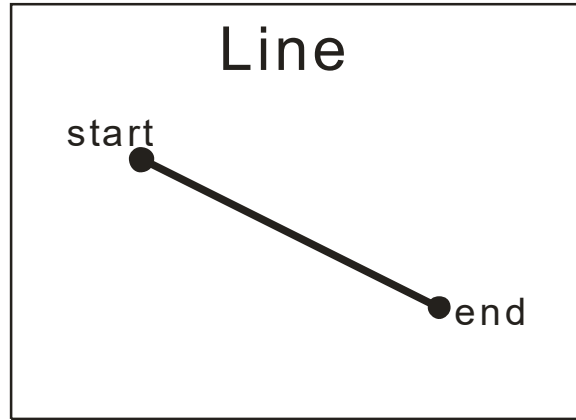
4.3.1 Example: Add “point”



Press figure key 1 and directly instruct the point coordinate; move the point coordinate by direction key: “left X key” → move X axis to the left; “right X key” → move X axis to the right; “upper Y key” → move Y axis upward; “lower Y key” → move Y axis downward; “upper Z key” → move Z axis upward; “lower Z key” → move X axis downward. “R key” → move the angle of R axis. Press “confirm” key and add command successfully. Exit the instruction screen and directly press “return” key as below:

Instrution List F2-Step F3-ALL F4-Multi		Instrution List F2-Step F3-ALL F4-Multi	
Num		Num	Type
	<b>Point (Key Move)</b>	0001	point
	X: 150.000 mm	0002	point
	Y: 100.200 mm		
	Z: 30.580 mm		Graphics preview area
	R: 30.580 °		
	1 Low 2 Mid 3 High		
<b>Enter</b>	<b>Cancel</b>	<b>Function</b>	<b>Edit</b> <b>Back</b>

4.3.2 Example: Add “straight line”



Press figure key 2, first edit the starting point coordinate of straight line and press confirm key; then edit terminal coordinate of straight line and press confirm key—That is the end of command edition of straight line. Edition methods are same as the “point” coordinate.

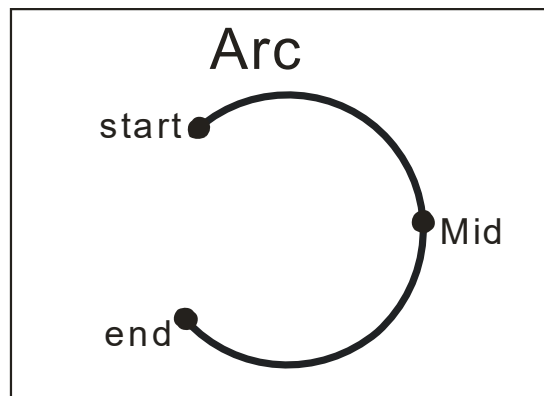
Instruction List F2-Step F3-ALL F4-Multi

Num	Start (Key Move)
	X: 150.000 mm
	Y: 100.200 mm
	Z: 30.580 mm
	R: 30.580 °
	<input type="button" value="1 Low"/> <input style="background-color: #ffcccc;" type="button" value="2 Mid"/> <input type="button" value="3 High"/>
<input style="background-color: #90ee90;" type="button" value="Enter"/>	<input style="background-color: #90ee90;" type="button" value="Cancel"/>

Instruction List F2-Step F3-ALL F4-Multi

Num	End (Key Move)
	X: 100.000 mm
	Y: 200.200 mm
	Z: 30.580 mm
	R: 30.580 °
	<input type="button" value="1 Low"/> <input style="background-color: #ffcccc;" type="button" value="2 Mid"/> <input type="button" value="3 High"/>
<input style="background-color: #90ee90;" type="button" value="Enter"/>	<input style="background-color: #90ee90;" type="button" value="Cancel"/>

### 4.3.3 Example: Add “arc”



Press figure key 3 and enter into the arc command edition screen; first edit the starting point coordinate of arc, then middle point coordinate and ultimately terminal coordinate. The edition methods are same as the “point” edition methods.

### 4.3.4 Input/output

“Wait for input”: When designated port changes into low potential, the procedure executes continuously.

“I/O start”: When the output command is executed, start designated I/O port (low potential output).

“I/O shutdown”: When the output command is executed, shut down designated I/O port (high potential output).

#### 4.3.5 Example: Add “route point”

Route point: All the axis execute until the designated point.

#### 4.3.6 Example: Add “time delay”

“Time delay” refers to added time delay function between commands.

#### 4.3.7 Example: Add “MARK”

“MARK” point refers to the marking point and aims to locate marking point in the tools. The function includes: locating of single MARK point; locating of double MARK point.

##### ① Locating of single MARK point:

The locating point must be 1<sup>st</sup> command of the command list. Press figure key 6 in the dialog box of command list and add more MARK points.

Edit the point coordinate for locating; download the procedure and refuse to execute the operation. Press “MOVE” key under the “start screen” status; the welding gun automatically points to 1<sup>st</sup> command (in the marking point).

##### ② Locating of double MARK point:

Add two MARK points in the command list; select two obvious marking points remote from tools as MARK points; they will automatically display in 1<sup>st</sup> and 2<sup>nd</sup> positions of the command list (before or after edition of command, add two MARK points); press “6 more” in the dialog box of command list and add MARK point.

Edit the coordinate of two points for locating; download the procedure and refuse to execute the operation. Press “MOVE” key under the “start screen” status; the welding gun automatically points to 1<sup>st</sup> MARK point and spring out “whether descend Z axis”; select according to the actual demand; upon locating coordinate, press confirm key and welding gun automatically points to 2<sup>nd</sup> MARK point. The operation methods are same as 1<sup>st</sup> MARK point.

**The locating function of double MARK point can revise the error caused by angle and position deviation of work piece.**


#### 4.3.8 Example: Add “cleaning”

Edit cleaning point in the command; clean up when procedure executes until the cleaning command.

#### 4.3.9 Example: Add “pause”

It refers to pause function between commands; upon pause, press stat key and re-execute.

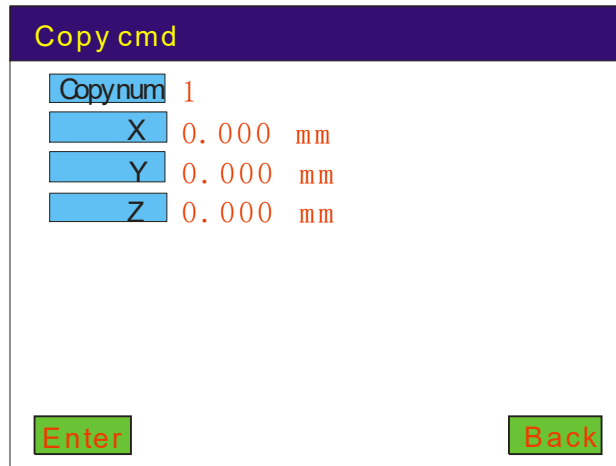
## 4.4 Operation of Deletion Command

In the dialog box of “command list”, direct press “” key in the keyboard and delete selected existing command; press F4 and delete numerous commands at the same time.

## 4.5 Operation of Copy Command

“Copy command” aims to copy selected command: Generally, it is adopted in the array copy. Press Y key and select single command; **press F3 and select all the commands; press F4 and select numerous commands.**

Select the command, press “operate” and enter into the dialog box of “copy command” as below:

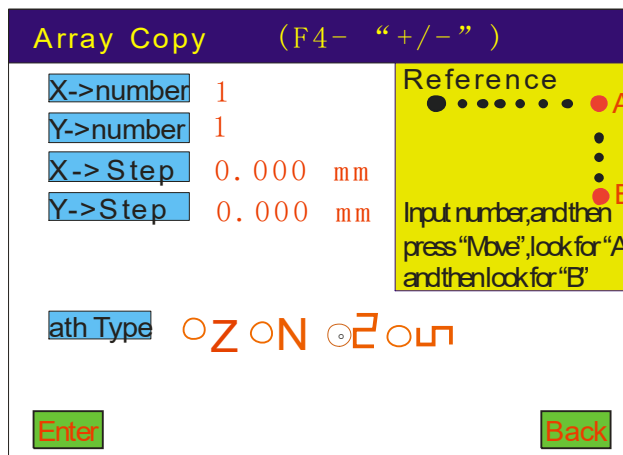


Method I: Input copy quantity; if distance between copied command coordinates is clearly known, directly input coordinate distance of “X”“Y”“Z” (distance between coordinates); press “confirm” key and complete the copy.

Method II: Input copy quantity; if distance between copied command coordinates is not clearly known, do not input coordinate distance of “X”“Y”“Z”; then press “locating” key; press direction key and move equipment to the starting point of last copied graph; press “confirm” key and system calculates the distribution interval according to the interval and copy quantity.

### 4.6 Operation of Array Copy (Copy of Three-dimensional Array)

Press direction key Y and select single command; press F3 to select all the commands and F4 to select numerous commands. Upon selecting the command, press “operate” and enter into the dialog box of “array copy” as below.



Method I: Input the quantity of array copy in X direction and Y direction; then press “MOVE” key and move to the last point of X direction (point A in the figure) and press “confirm”; then move to the last point of Y direction (point B in the figure) and press “confirm”; automatically calculate the distance. First input the copy quantity. Route method: selection of operation trace.

Method II: Input the quantity of array copy in X direction and Y direction; then input the distance of array copy in X direction and Y direction; select the route method; ultimately, press “confirm” key and complete the array copy.

## 4.7 Operation of Offset

“Operation of offset” aims to offset the selected action command and offset the coordinate according to the designated value.

Press Y key and select single command; **press F3 and select all the commands and press F4 and select numerous commands**. Upon selecting the offset command, press “operate” and enter into the dialog box of “operation of offset” as below:

Offset	CMD	(F4-“+/-”)
X		0.000 mm
Y		0.000 mm
Z		0.000 mm
R		0.000 °

Enter Back

Method I: Input specific offset data and press “confirm” key and complete the offset.

Method II: If it is not clear about specific offset data, press “locating” key and move offset data. Press “locating” key; press direction key and move equipment to the offset coordinate; then press “confirm” key and complete the offset.

## 4.8 Batch Revision

“Batch revision” aims to make a batch revision to a certain parameter and thus upgrade the edition efficiency.

The operation methods are as follows: **press F3 and select all the commands and press F4 and select numerous commands**. Press “batch revision” key and enter into the following dialog box:

select the object	
1 Length	3 Speed
2 Length	D Height
3 Length	U Height
1 Time	X
2 Time	Y
3 Time	Z
1 Speed	R
2 Speed	Wsliding

Select Back

Select the parameters and revise one by one; upon revision, press “confirm” key and complete revision.

## 4.9 Batch Revision of Category

“Batch revision of category” aims to make a batch revision to the same command category in one file, such as all the “points” in one file.

The operation methods are as follows: In the dialog box of command list, if the cursor points to the specific

category, press “operate”, enter into the “batch revision of category” and revise all the commands of same category in the file; in the batch revision of all the “single points”, the cursor points to any single point, enter into a certain parameter of “batch revision of category” and revise the parameters of all the “single points” in the file.

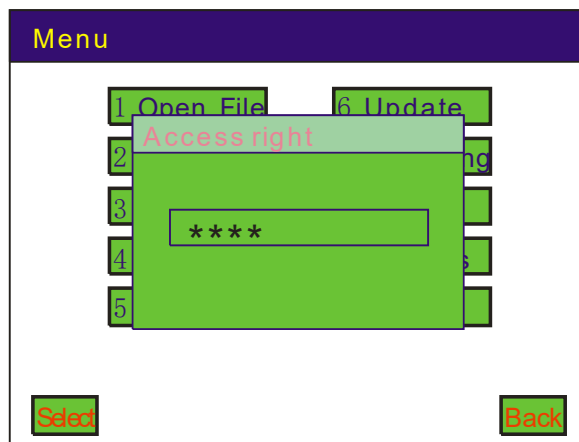
### 4.10 Insertion Command

“Insertion command” aims to insert to the previous line of selected command according to the same methods as adding command.

### 4.11 System

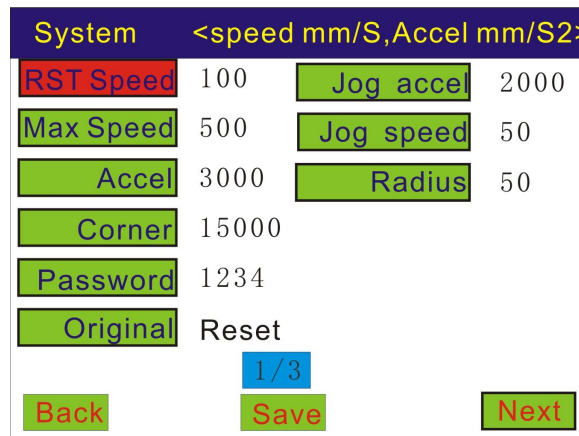
“Equipment parameter” aims to set up the pulse equivalent parameters of equipment axis, such as stroke scope, return speed to original point and acceleration.

Press “system” key and spring out password dialog box. The password is 1234 as below:



#### 4.11.1 Equipment parameters

Input password and enter into the dialog box of equipment parameters as below:



“Reset speed”: It refers to the equipment reset speed. It is input by the figure key within a scope of 10—100; it is in the unit of mm/s.

“Maximum speed”: It refers to the maximum limited operation speed of equipment. It is input by the figure key: it is 500 in general; it is in the unit of mm/s.

“Acceleration”: It refers to the equipment acceleration. It is input by the figure key: it is about 2000 in general; it is in the unit of mm/s2.

“Turning angle acceleration”: It refers to the turning angle acceleration of equipment. It is input by the figure key

within a scope of 1—5 times of set acceleration; it is in the unit of mm/s<sup>2</sup>.

“User password”: It refers to the system password. The figure key is valid; the password is successfully set up by saving.

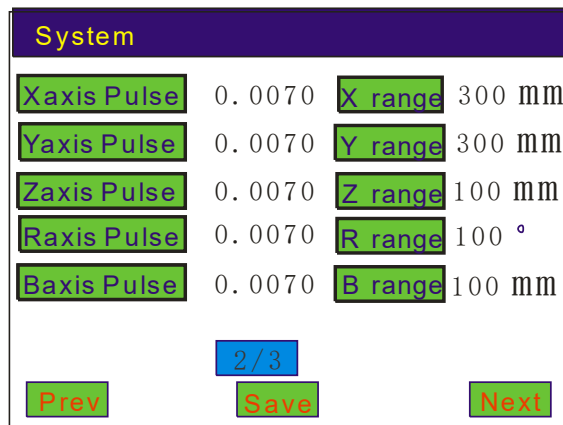
“Start reset”: It refers to the axis tunnel of equipment reset. It is selected by the direction key X.

“Manual acceleration”: It refers to the manual movement acceleration of equipment; it is in the unit of mm/s<sup>2</sup>. Generally, the setup scope is between 500—3000.

“Manual speed”: It refers to the manual movement speed of equipment; it is in the unit of mm/s. Generally, the setup scope is between 10—100.

“Idle travel smoothness”: It refers to the arc transitional radius in the idle travel; it is in the unit of mm. Generally, the setup scope is between 0—50.

#### 4.11.2 Pulse equivalent and stroke



“Stroke”: It refers to the actual operation stroke of equipment in the unit of mm; R-axis stroke is in the unit of degree.

“Pulse equivalent”: It refers to the pulse movement distance in the unit of mm.

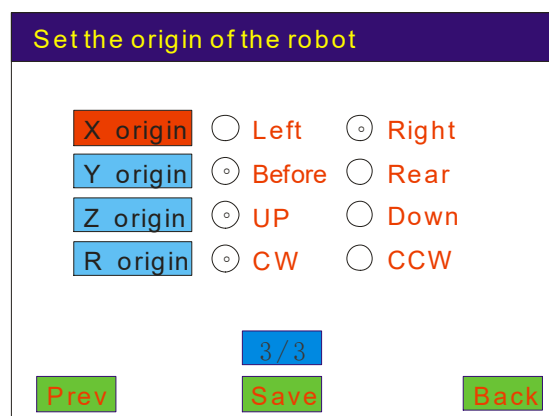
Please refer to the software calculator of pulse equivalent for the pulse equivalent of X, Y and Z axis.

Pulse equivalent of R axis =  $360^\circ \div$  number of pulse in the driver.

Pulse equivalent of B axis = Circumference of tin delivery wheel  $\div$  number of pulse in the driver.

#### 4.11.3 Setup of original point direction of equipment

“Setup of original point direction of equipment”: It aims to set up the original point according to the machine original point and thus maintain the direction key of portable key compatible with the movement direction of machine and bring convenience to the operation instruction as below:



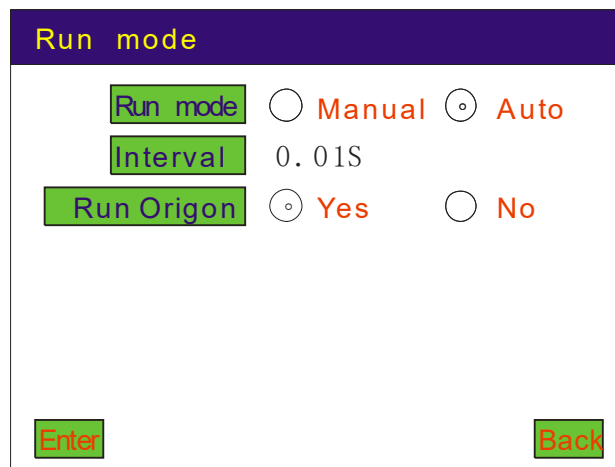
## 4.12 Operation of Execution Methods

“Execution method” aims to set up the automatic model or manual model. The automatic model aims to automatically execute after the designated delay time upon execution of all the action commands; the manual model aims to shut down upon execution of all the commands—In order to re-start, press the start button for the second time.

“Execution method” is located in the “option” dialog box as below: Select “manual model” and “automatic model” at disposal. Upon setting the “automatic model”, start manually for the first time. Notice: In the change of execution method, reset the equipment first. It is forbidden to change the execution method in the normal operation.

“Interval” refers to the designated delay time. It is valid in the “automatic model”.

“Repeated gun exit” refers to execution before execution of first command and upon exit of welding gun to the original point of Z axis.



The screenshot shows a dialog box titled "Run mode". It contains the following elements:

- A green button labeled "Run mode".
- Two radio buttons: "Manual" (unselected) and "Auto" (selected).
- A green button labeled "Interval" followed by the text "0.01S".
- A green button labeled "Run Origon" followed by two radio buttons: "Yes" (selected) and "No" (unselected).
- At the bottom, there are two green buttons: "Enter" on the left and "Back" on the right.

## 4.13 Operation of Reset Methods

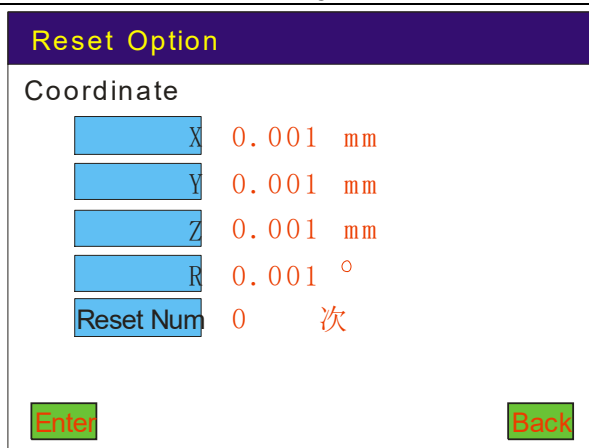
“Reset method” aims to set up the automatic reset model of equipment upon execution of all the commands, assure absolute zero point position of the coordinate and prevent staggering of equipment due to lose of step.

“Reset method” is located in the “option” dialog box. First input the reset coordinate value (similar coordinate value to the coordinate of original point): between 1—2mm in general; then input the reset speed. Reset frequency refers to equipment operation frequency before reset (if reset frequency is 0, the equipment will not reset automatically); press “confirm” key and set up the reset model.

This action aims to adopt high reset speed to operate until the reset coordinate upon equipment operation; then return to the original point of equipment.

**Notice: Reset the equipment before change of reset model. It is forbidden to change the reset model in the normal operation.**

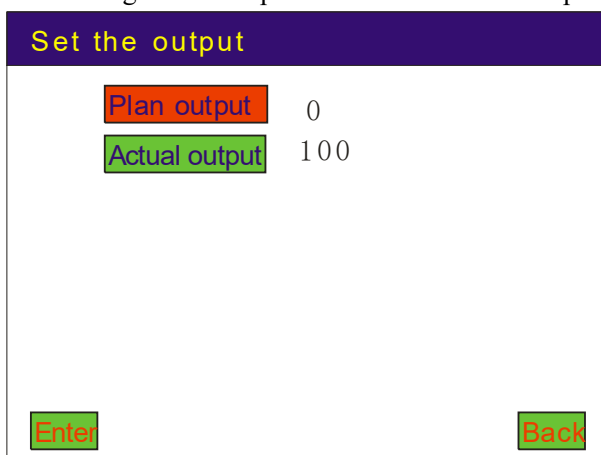




### 4.14 Setup of Production Volume

“Setup of production volume” aims to set up the operation frequency (production volume); shut down if expected production volume is reached; prompt completion of production volume. If the expected production volume is set into 0, no frequency is limited and it is not shut down due to production volume problem.

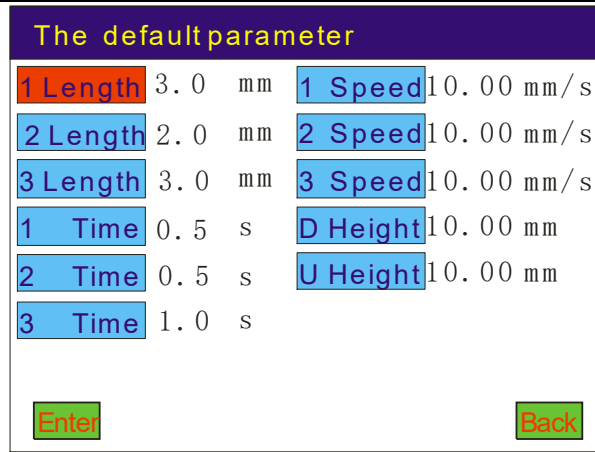
In case of equipment shutdown due to completion of production volume, the production volume is directly cleared to remove the production volume counter inside the equipment. Otherwise, the figure is accumulated continuously; the counter will not be cleared even though different product commands are adopted.



### 4.15 Default Parameters

“Default parameter” aims to set up the default parameters of some action commands; in the “add” and “insert” of action, we only confirm the coordinate data; other parameters come from the default parameters.

Set up “default parameter” in the “option” dialog box as below:



Pre-heat and deliver tin: Pre-deliver tin to the iron tip.

2nd section tin delivery: Tin delivery volume of 2<sup>nd</sup> section (in the drag welding, 2<sup>nd</sup> section tin delivery is adopted; in the spot welding, 2<sup>nd</sup> section is set into 0)

3rd section tin delivery: Tin delivery volume of 3<sup>rd</sup> section (generally, it refers to the tin volume in the drag welding of speed section; in the spot welding, it refers to the tin volume)

Pre-heat time: Delayed time of iron tip upon contact with the welded point.

2nd section time delay: Waiting time in the existing position upon 2<sup>nd</sup> section tin delivery.

3rd section time delay: Waiting time in the existing position upon 3<sup>rd</sup> section tin delivery.

Pre-heat speed: Pre-heat tin delivery speed

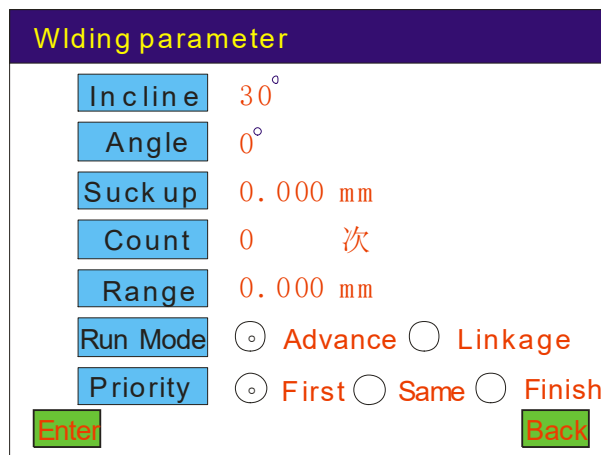
2nd section speed: Tin delivery speed of 2<sup>nd</sup> section

3rd section speed: Tin delivery speed of 3<sup>rd</sup> section

Gun access height: Working distance between welding gun (oblique access) and welding point

Lifting height: Lifting height of welding gun upon welding process

### 4.16 Welding Process



“Inclination angle of welding gun”: It refers to the inclination angle of welding gun; it determines the gun access angle.

“Initial angle”: It refers to the initial angle of welding gun.

“Tin return length”: It refers to the shrinkage length of tin gun upon welding.

“Tin shaking frequency”: It refers to the shaking frequency of welding gun.

“Tin shaking amplitude”: It refers to the shaking margin of welding gun in the unit of mm.

“Pre-heat and deliver tin”: “Non-linkage” refers to the tin volume pre-loaded in the iron tip before gun access; then locating in the welding point.

“Linkage” refers to tin supply in the locating in the welding point.

“Action of R axis”: It refers to the axis rotation sequence.

In-advanced: It refers to the priority action of rotational axis; then locating of XY.

Linkage: It refers to the synchronized linkage and locating of rotational axis and XY axis.

Backward: It refers to the action of rotational axis upon locating of XY.

### 4.17 Shutdown Position

It aims to set up the shutdown position upon equipment operation.

Stop location	
Stop Type	0
X	0.000 mm
Y	0.000 mm
Z	0.000 mm
R	0.000 °

Hint

0-end if file

1-Original

2-any point

Enter
Back

### 4.18 Cleaning Functions

It aims to clean the iron tip.

Rinse Tools	
Number	0 次
Make up	0.0 mm
Length	5.000 mm
Time	0.500 S
X	0.000 mm
Y	0.000 mm
Z	0.000 mm
R	0.000 °

Enter
Back

“Number”: It refers to the automatic cleaning upon spot welding for N times (if it is 0, no cleaning is made).

“Cleaning and tin delivery”: It refers to the tin delivery length in the cleaning.

“Cleaning time”: It refers to the cleaning time.

“Cleaning coordinate”: It refers to the cleaning coordinate.

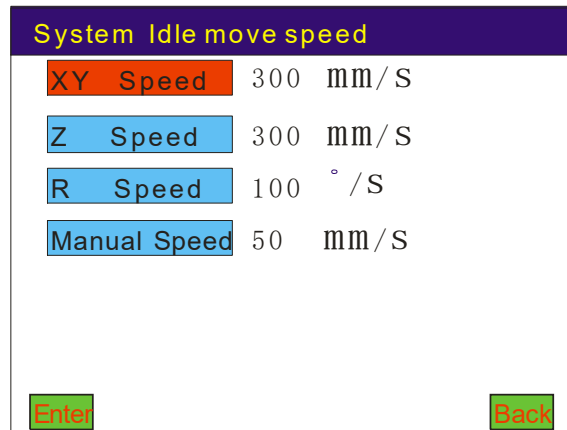
Remark: Press “MOVE” key and manually instruct the cleaning coordinate.

“Make-up tin delivery”: It refers to the tin make-up to the iron tip under cleaning; it is in the unit of mm.

### 4.19 Speed of Idled Travel

It refers to the idle travel speed of equipment without tin delivery; it aims to set up the idle travel speed of XY axis,

Z axis and B axis; the scope is between 0—1000 mm/s. direct input the value to change the idle travel speed.



## 4.20 Counterpoint Operation (Without MARK Point)

**Counterpoint function** (It is mainly adopted to offset the coordinate and make alignment upon replacement of iron tip or tools):

- ① **Counterpoint based on 1<sup>st</sup> command:** In the start screen, directly press “MOVE” key and press direction key for counterpoint; upon counterpoint of welding gun, press confirm key and complete the counterpoint. Therefore, all the commands realize offset.
- ② **Counterpoint based on any command:** In “command list—graph browse” screen, select the counterpoint command and press “#” key for counterpoint; upon counterpoint of welding gun, press confirm key and complete the counterpoint. Therefore, all the commands realize offset.

## 4.21 Operation of MARK Point Matching

- ① Locating of single MARK point:

The locating point must be 1<sup>st</sup> command of the command list. Press figure key 6 in the dialog box of command list and add more MARK points.

Edit the point coordinate for locating; download the procedure and refuse to execute the operation. Press “MOVE” key under the “start screen” status; the welding gun automatically points to 1<sup>st</sup> command (in the marking point).

- ② Locating of double MARK point:

Add two MARK points in the command list; select two obvious marking points remote from tools as MARK points; they will automatically display in 1<sup>st</sup> and 2<sup>nd</sup> positions of the command list (before or after edition of command, add two MARK points); press “6 more” in the dialog box of command list and add MARK point.

Edit the coordinate of two points for locating; download the procedure and refuse to execute the operation. Press “MOVE” key under the “start screen” status; the welding gun automatically points to 1<sup>st</sup> MARK point and spring out “whether descend Z axis”; select according to the actual demand; upon locating coordinate, press confirm key and welding gun automatically points to 2<sup>nd</sup> MARK point. The operation methods are same as 1<sup>st</sup> MARK point.

**The locating function of double MARK point can revise the error caused by angle and position deviation of work piece.**

# 5. Notice

## 5.1 Installation

1. Inspect the controller for completeness.
2. Connect hardware according to the wiring diagram; before electrification, inspect the power voltage: It is not above 24V.
3. Upon electrification, first reset the equipment in sequence:
  - ① Move Z axis to the original point direction; in case of reverse movement direction (in case of step system, exchange any group of A,A- or B,B- in the motor wires; in case of servo system, change the direction of servo driver), stop Z axis if original point switch of Z axis is sensed.
  - ② Move X and Y axis at the same time and towards the original point direction; in case of reverse movement direction (same settlement as reverse direction of Z axis), stop related axis if original point switch is sensed in a certain axis.
  - ③ Complete the reset if all the axis sense the sensor.
4. Make use of the portable box and set up the equipment original point as follows: In the menu, press “option” -> “equipment original point”; enter into the “position of equipment original point” dialog box; set up according to the position of equipment original point. The parameter is saved in the portable box.  
This is the end of equipment installation. In the real test, an integrated commissioning is made by connecting the gas route system.

## 5.2 Specification of Frequent Problems and Removal of Faults

Specification of frequent problems	Solution
1. The system fails to reset	a) Inspect the power supply for normal status. b) Inspect the driver for normal status. c) Inspect the sensor for normal status.
2. The communication is abnormal	a) Inspect the connective wire of serial port for any damage. b) Inspect the equipment for reset. c) In the normal operation of equipment, only respond to some commands such as “reset” and “pause”.
3. The equipment can not be started	a) First, inspect the production volume for completeness; connect with the portable box and search for the production volume; upon completion, clear the production volume. b) Inspect the start button for normal status; control the equipment start by portable box and thus remove the fault. c) If the portable box can not be started, upload command from the controller and inspect the controller for any action command. d) Inspect the equipment for authorization or not; in the connection with portable box, press “start” button and screen springs out registration dialog box—It means no authorization of the equipment.