

# 深圳市鼎华科技发展有限公司

SHENZHEN DINGHUA TECHNOLOGY DEVELOPMENT CO.,LTD



## DH-B2 BGA Rework Station Manual

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## 一、 Company profile

**SHENZHEN DINGHUA TECHNOLOGY DEVELOPMENT CO.,LTD** is a professional manufacturer of welding equipments.Our products: bga rework stations,automatic soldering machines,automatic screwdriving machines,welding kits and SMT materials etc.Our mission: “Research as basis, Quality as core, Service as guarantee” . Our goal: “Professional equipment, quality and service”

To ensure the quality, Dinghua was the first to pass UL、 E-MARK、 CCC、 FCC、 CE ROHS certificates. Meanwhile, to improve and perfect the quality system, Dinghua has passed ISO、 GMP、 FCCA、 C-TPAT on-site audit certification.

Science and technology are the primary productive forces, with over years of hardworking, Dinghua has owned core technology of temperature controlled and 38 patents and finished the development and production of manual, semi-auto and automatic series and realized the second revolution from traditional hardware combination to integrated control.Our products have been exported to Europe , America, Southeast Asia, Australia, Africa, the Middle East, Taiwan and more than 80 countries and regions and established the relatively sales network and terminal services system.We are becoming the pioneer and guide of SMT welding industrial and our products have been applied in individual maintenance,industrial and mining enterprises,teaching and research work,military manufacturing industry and aerospace industry and so on, which has treed good reputation among users.

We believe:your successes are our successes,let’s work together and build a better future!

## 二 Installation of BGA rework station

### (一) Installation sites

In order to ensure that the useful life of BGA rework station, installation of repair station must meet the following conditions:

- 1、 Away from flammable and explosive materials
- 2、 Do not splash water or other liquids
- 3、 Well-ventilated , dry place
- 4、 Stable , flat areas less susceptible to vibration
- 5、 Place less dust
- 6、 Prohibit Placing heavy objects on top of the control box
- 7、 Without the affect of air-conditioners,heaters and fans
- 8、 Reserved for 30cm to move and rotate around the upper for the back of rework station

## (二) Power Requirements

Use a smaller power supply voltage fluctuation

Voltage fluctuations:  $220V \pm 10$

Frequency fluctuations:  $50Hz \pm 3$

## 三、 Safety Precautions of rework station

- 1、 Do not use fans or other devices directly to the repair station hair when it works, otherwise it will lead to negative differential heating plate surface , burn the workpiece.
- 2、 When turned on, high-temperature heating zone can not be any direct contact with the object , it may cause fire or explosion ,and the PCB workpiece should be placed on the PCB support shelves.
- 3、 Do not shake rework station , and move gently
- 4、 Do not touch the high fever area , otherwise it will burn
- 5、 When turned on, do not use the flammable spray , liquid or flammable gas near the repair station.
- 6、 Do not try to modify rework station , otherwise it will cause fire or electric shock.
- 7、 Electrical box has the high-voltage components , do not attempt to disassemble
- 8、 If the metal objects or liquids fall into the repair station when it works , immediately disconnect the power , unplug the power cord until the machine to cool down , then completely remove litter , dirt ; if dirt left ,there is odor when reboot.
- 9、 When abnormal heating or smoking,immediately disconnect the power , and inform the technical service to repair.It needs to disconnect the wires between the electrical boxes and machine parts,and have to hold the plug,otherwise it leads to poor contact ,and does not work.
- 10、 Note that the repair station not to press or run over other electrical equipment or power lines or communication cable , and it may cause device malfunction or cause fire or electric shock.
- 11、 Before use the rework station, you must read this manual carefully

## 四、 Structures and specifications

### (一) Structures



## (二) Features

Name	Functions	Use ways
Limit bar	limit the lowest position of the upper heating	Rotate to the right place
Up/down adjust handle	Adjust the upper heater up / down	Rotating the handle
Front and back adjust handle	Adjust the upper heater forward / backward	Rotating the handle
LED lights	Lighting equipment at work	Press the button
PCB table	Hold or fix pcb board on the machine	
USB port	For future system update or download	Insert USB
Touch screen	Data storage system platform	
Top air reflow adjust	Adjust air speed to prevent tiny bga from movement when heating	Rotating
Cooling fan	Cross flow fan, cooling pcb and machine after heating	
Temperature sensor	Detect actual temperature of solders when heating	Connected with sensor wire
Universal fixture	To hold or fix pcb board which unregular shape.	Fixed with knob
Hot air nozzle	Nozzles size 2mm bigger than chip size, focus air.	With magnet
Bottom IR diode tube heat	Bottom large size IR diode tube pre-heating zone with glass guard	Preheating for pcb board
Lower air heater	2 <sup>nd</sup> hot air heater	
IR preheating	For PCB being preheated	
Top air heater	Top hot air heater	

### (三) Specification:

Total Power	4800W
Top heater	800W
Bottom heater	2nd 1200W, 3rd IR diode tube heating 2700W
Power	AC220V±10% 50Hz
Lighting	Taiwan led working light, any angle adjusted.
Operation mode	HD touch screen, intelligent conversational interface, digital system setting
Storage	50000 groups
Top heater movement	Right/left, forward/backward, rotate freely.
Positioning	Intelligent positioning, PCB can be adjusted in X, Y direction with “5 points support” + V-groov pcb bracket + universal fixtures.
Temperature control	K sensor, close loop
Temp accuracy	±2°C
PCB size	Max 500×400 mm Min 20×20 mm
BGA chip	2x2 mm - 80x80 mm
Minimum chip spacing	0.15mm
External temper sensor	4pc
Dimensions	650*700*650mm
Net weight	48KG

#### Special feature:

- Bottom Newest heating type, diode tube heating, temperature rising and down rapidly, more precise.
- Four External temperature sensors detect all round temperature of bga at the same time, enables temperature monitoring and accurate analysis of real time temperature profile.
- With top air reflow adjust function, prevent small bga from movement when heating.
- Double shadowless led lights, observe bga melting clearly when heating.
- Any size of nozzle can be custom if need.
- With vacuum tube, pick up the bga chip conveniently after desoldering.
- With USB 2.0 interface, can be connected with a computer or mouse, screenshot temperature curve or system update.
- Real-time settings and actual temperature profile display can be used to analyzed and correct parameters.
- K type close loop control, temperature accuracy will be on ±2°C
- High power cross flow cooling fan, prevent the PCB from deformation.

- Sound hint system: there is voice reminder 5s-10s before the completion of heating, to get the operator prepared
- security measure: overheat guard and emergency stop function

#### **Humanized design:**

- Upper heater can move up/down, front/back, rotate freely
- Lower heater can move up/down to keep best distance with pcb.
- Strong sense of thermometer, temperature measurement more accurate
- PCB clamp (V-groove) with universal fixture, suitable for all kinds of BGA.
- it can set 8 segments heating, massive storage of temperature profiles
- With different size of nozzles, easy replace and use, customized is available.
- Colorful buttons in English and chinese, easy recognize and use.
- CE certification, automatic power-off protection device when emergency happens.

## **五、 Operations:**

### **1、 Preheat**

Preheat the PCB board and BGA chip, and the temperature of constant temperature oven is set at 80 °C -100 °C, for 4-8 hours to remove internal moisture of the PCB and BGA, to prevent the burst phenomenon when heating.

### **2、 Remove**

Place the PCB board into the bracket on the repair station, and select the appropriate hot air reflow nozzle, and set the appropriate soldering curve, press the open button until it finishes, and then move the hot air manually, to suck the BGA chip away with the vacuum suction pen.

### **3、 Clean-up welding**

The BGA pad clean-up , one with desoldering line to drag flat, the second with iron; Best to remove the tin a short time after the BGA removed , then BGA has not completely cooled , and the temperature difference make less damage to the pad; use the flux can improve the activity of soldering tin, better to clean the soldering tin. Particular attention not to damage the PCB pad, and in order to ensure the reliability of BGA solder, when the cleaning pad to make use of some of the solder paste residues with more volatile solvents , such as plate washer water, industrial alcohol.

### **4、 BGA re-balling**

Wipe the paste flux equably with the brush pen on the BGA pad, choose the right steel mesh, and then plant tin beads by the re-balling kit on the right pad.

### **5、 BGA tin beads welding**

Heat the bottom heating zone of BGA re-balling station and then weld the tin beads on the pad.

### **6、 Besmear flux**

Wipe the paste flux with the brush pen on the PCB pad. If you wipe so much, it will cause connected welding, on the contrary, it will cause null welding. In order to wipe off dust and impurity of tin balls, and enhance welding effect, the welding paste must be wiped equally.

### **7、 Place the BGA chip**

Place the BGA chip on the PCB board with manual alignment and silk-screen borders, meanwhile the tension of the solder joint when melt will have a good self- alignment effect.

## 8、Weld

First, put the PCB board which is pasted with BGA chip on the positioning stand, and then move the hot wind head to the working place. Second, choose the appropriate backflow nozzle and set right welding temperature curve, start heating, open the switch, and then run the welding process. Besides, after the welding process is finished, you have to cool the BGA by the cooling fan. Hoist the upper hot wind head and make the bottom of hot wind nozzle apart from the surface of BGA 3-5mm, and stay 30-40 seconds, or, you can move the hot wind head after the starting switch is put out, withdraw the hot wind head. Finally, take away the PCB board from the heating zones.

### (1) null welding:

Because of counterpoint by hand will cause deviation between chip and welding plate, surface tension of tin ball will make BGA chip and welding plate in the process of automatic correction. Once heating, BGA falls not evenly, which cause the chip drops not evenly. If stop reflowing at this time, the chip will not fall normally, which will cause the phenomenon of empty welding and false welding. So you need to extend time of third and fourth temperature zones or add the bottom pre-heating temperature to make the tin balls meltdown and drop evenly.

### (2) short circuit:

When the ball reached the melting point, it is in a liquid state, if too long or too high temperature and pressure, it will destroy surface tension of solder balls and the supporting role, resulting in short-circuit phenomenon when reflows, the chips fall entirely on the PCB pads, so we need to appropriately reduce the heating section of the third and fourth soldering temperature and time, or reduce the bottom of the preheat temperature.

**Note: In normal use rework station it will produce small quantities of bad smelly, in order to ensure comfortable, safe and healthy operating environment, pls keep indoor and outdoor air flow.**



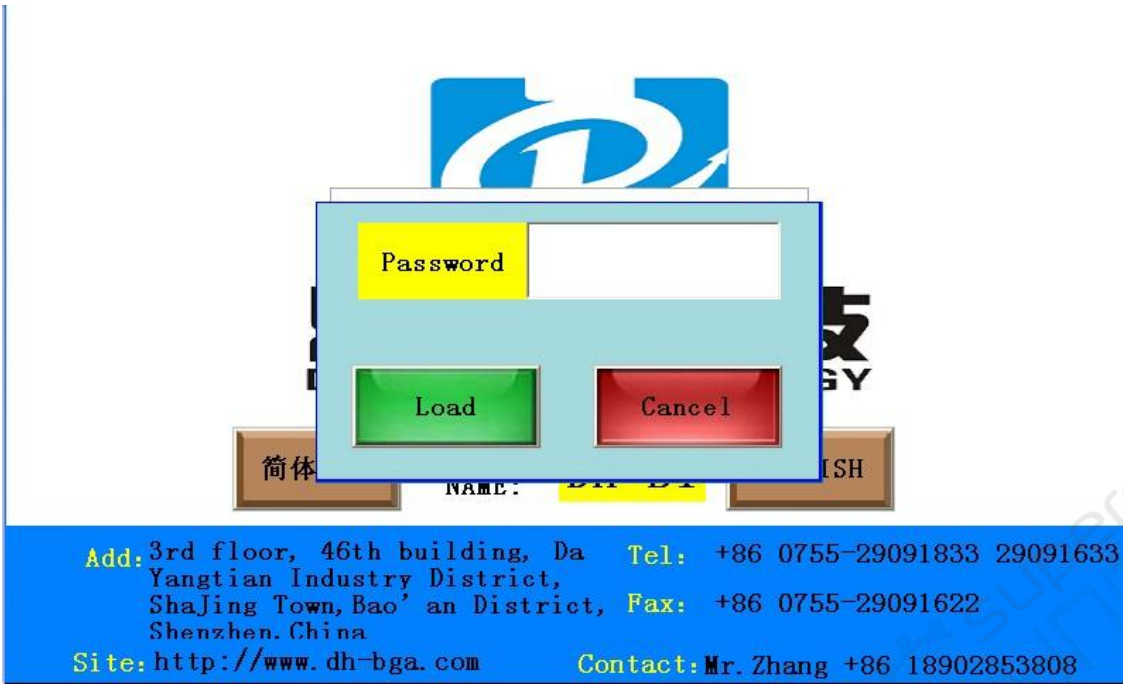
## 六、 Procedure setting and usage

### Introduction of touch screen operation

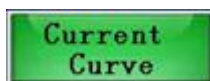
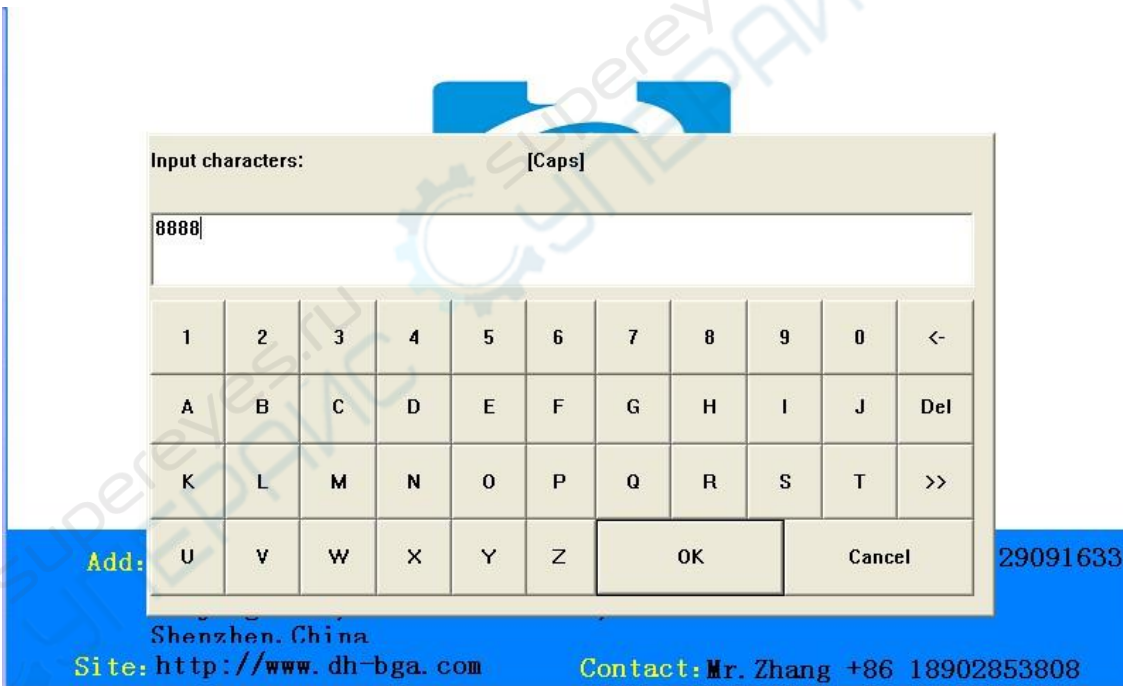
1. Switch on the power, the BGA rework station can connect with electricity. The home page of touch screen will appear the interface like the following picture, and then you can choose the language interface as required.



2. When we choose Chinese, it will appear the working interface like the following picture:



3. Input password, then click to enter



Click the button of “current curve” , enter “START” to operate the heating lines we need.They are separately target temperature, onstant temperature time,and the speed of heating ( the speed of heating with °C/SEC calculation).



Three-zone temperatures can be set 6 levels of variable and constant temperature controls. If need, you can change the related parameters, but it's not saved, just can heat it with this line. If saving is necessary, please refer to relative information of ingredient setting! If the temperature curve doesn't meet to the needed welding temperature; please press the return



button, returning to the main Interface.



3. Press "Curve Selection", it will show the following interface after entering.


Name	Selection	Saved	Deleted	Apply	Advanced	BACK		
有铅	1st	2cd	3rt	4th	5th	6th	7th	8th
Upper Temperature	165	195	215	225	0	0	0	0
Upper Rate	3	3	3	3	0	0	0	0
Time Constant	30	30	30	30	0	0	0	0
Lower Temperature	165	195	215	225	0	0	0	0
Lower Rate	3	3	3	3	0	0	0	0
Time Constant	30	30	30	30	0	0	0	0
Infrared Temperature	180	0	0	0	0	0	0	0
Infrared Rate	3	0	0	0	0	0	0	0
Time Constant	300	0	0	0	0	0	0	0

In this interface, the temperature can be changed and saved.

User can set the heating temperature, the constant time and the heat speed according to the requirements of the production process. The machine can be mass storage temperature curve. User can store a variety of manufacturing process parameters in the system. When replacing of the production process, direct call to the parameters saved in the system, equivalent to formulation saved in the system. There are different heating temperature with different products, it can save various kinds of parameters in the different formulation, and it will be easy to use it when changed the products, not need to change many parameters. It can click the line name to choose the right formulation directly.


Name		Selection		Saved	Deleted	Apply	Advanced	BACK	
有铅	1st	2cd					6th	7th	8th
Upper Temperature	165	195		1	有铅		0	0	0
Upper Rate	3	3		2	无铅1		0	0	0
Time Constant	30	30		3	无铅2		0	0	0
Lower Temperature	165	195		4	CPU座		0	0	0
Lower Rate	3	3		5			0	0	0
Time Constant	30	30		6			0	0	0
Infrared Temperature	180	0		7			0	0	0
Infrared Rate	3	0		8			0	0	0
Time Constant	300	0		9			0	0	0
				10			0	0	0
							0	0	0
							0	0	0



If have to input new parameter, click the button of “curve choose” , and then click on the numerical place, the input button will appear.

Name	Selection	Saved	Deleted	Apply	Advanced	BACK						
有鉛	1st	2cd	3rt	4th	5th	6th	7th	8th				
Upper Temperature	Input characters: [Caps]							0				
Upper Rate	有鉛							0				
Time Constant								0				
Lower Temperature	1	2	3	4	5	6	7	8	9	0	<-	0
Lower Rate	A	B	C	D	E	F	G	H	I	J	Del	0
Time Constant	K	L	M	N	O	P	Q	R	S	T	>>	0
Infrared Temperature	U	V	W	X	Y	Z	OK		Cancel			0
Infrared Rate												0
Time Constant	300	0	0	0	0	0	0	0	0	0	0	0



Input the parameter you need, press“ENTER” key .When temperature parameters Settings of these three temperature zones are finished, click “save curve”, then all parameters you have set are all saved.

And it also can be changed and saved by “curve chooses”.

Click ‘Start’,the whole station starts to heating,and the working curve is showing the current parameter , and it will also clear the previous curve showed on screen.The whole heating will complete until the upper setting temperature or the upper part of the heating rate is zero,and just the machine stops running,with the alarm ringing, if the cooling vacuum interface has been set up within the cooling and vacuum state, then these two output also work.if click ‘stop’ in the normal operation process, the machine will stop heating.And click ‘Keep’, the button appears as flashing,showing the machine entering the temperature kept status,and the whole heating temperature will keep the current temperature constant working,until click the button again,it will return to normal heating.

Advanced Parameters have been set well, and they are not needed to change.The machine can monitor the speed of the cooling fans, and also can set the lowest speed.When the cooling fans stop running or the speed lower than the setting one, and the collection of hot air up and down the value of the actual temperature is higher than 300 degrees, the heating system will stop heating immediately. System can automatically set the early warning time, such as early warning: 10 second, showing that the buzzer alarm will sound when there is 10s left heating. When machine into the cooling state, in the main interface will show the corresponding fault tips! It can help the operator to quickly determine the point of failure!

When Click the ‘Back’, it wills pop-up function selection screen.it can choose the ‘English’

ENGLISH

interface.



#### NOTE:

When it alarm because of stoppage, all function buttons are in locked state! After managing the stoppage and starting up, it can recover to normal state!

#### 七、usual temperature parameters as follows:

##### Lead temperature curve welding

41\*41 BGA welding temperature setting

	<b>Preheating</b>	<b>Constant</b>	<b>Heating</b>	<b>Welding 1st</b>	<b>Welding 2nd</b>	<b>Reduction</b>
<b>Upper heating</b>	160	185	210	220	225	0
<b>Constant time</b>	30	30	35	40	20	0
<b>Bottom heating</b>	165	190	215	225	230	0
<b>Constant time</b>	30	30	35	40	70	0
<b>IR preheating</b>	110	120	130	140	150	0
<b>Constant time</b>	30	30	35	40	70	0
<b>Speed rate</b>	2	2	2	2	2	0

### 38\*38 BGA welding temperature setting

	<b>Preheating</b>	<b>Constant</b>	<b>Heating</b>	<b>Welding 1st</b>	<b>Welding 2nd</b>	<b>Reduction</b>
<b>Upper heating</b>	160	185	210	215	220	0
<b>Constant time</b>	30	30	35	40	20	0
<b>Bottom heating</b>	160	185	215	220	225	0
<b>Constant time</b>	30	30	35	40	40	0
<b>IR preheating</b>	110	120	130	140	150	0
<b>Constant time</b>	30	30	35	40	70	0
<b>Speed rate</b>	2	2	2	2	2	0

### 31\*31 BGA welding temperature setting

	<b>Preheating</b>	<b>Constant</b>	<b>Heating</b>	<b>Welding 1st</b>	<b>Welding 2nd</b>	<b>Reduction</b>
<b>Upper heating</b>	160	180	200	210	215	0
<b>Constant time</b>	30	30	35	45	20	0
<b>Bottom heating</b>	160	180	200	215	225	0
<b>Constant time</b>	30	30	35	45	60	0
<b>IR preheating</b>	110	120	130	140	150	0
<b>Constant time</b>	30	30	35	40	70	0
<b>Speed rate</b>	2	2	2	2	2	0

Above is lead type BGA chip reference temperature.

## Lead-free temperature curve welding

### 41\*41 BGA welding temperature setting

	<b>Preheating</b>	<b>Constant</b>	<b>Heating</b>	<b>Welding 1st</b>	<b>Welding 2nd</b>	<b>Reduction</b>
<b>Upper heating</b>	165	190	225	245	255	240
<b>Constant time</b>	30	30	35	55	25	15
<b>Bottom heating</b>	165	190	225	245	255	240
<b>Constant time</b>	30	30	35	55	25	15
<b>IR preheating</b>	110	120	130	140	150	160
<b>Constant time</b>	30	30	35	40	40	70
<b>Speed rate</b>	2	2	2	2	2	2



### 38\*38 BGA welding temperature setting

	Preheating	Constant	Heating	Welding 1st	Welding 2nd	Reduction
Upper heating	165	190	225	245	250	235
Constant time	30	30	35	45	25	15
Bottom heating	165	190	225	245	250	235
Constant time	30	30	35	45	25	15
IR preheating	110	120	130	140	150	160
Constant time	30	30	35	40	40	70
Speed rate	2	2	2	2	2	2

### 31\*31 BGA welding temperature setting

	Preheating	Constant	Heating	Welding 1st	Welding 2nd	Reduction
Upper heating	165	190	220	240	245	235
Constant time	30	30	35	40	20	15
Bottom heating	165	190	220	240	245	235
Constant time	30	30	35	40	20	15
IR preheating	110	120	130	140	150	160
Constant time	30	30	35	40	40	70
Speed rate	2	2	2	2	2	2

Above is lead-free type BGA reference temperature

When remove the BGA chip, the temperutre reduction is set at 0.

## 八、 Handling Precautions

1. After opening the power, firstly you should check whether the upper and bottom hot air nozzles have cold wind. If not, starting the power is strictly prohibited, or the heaters will be burnt. The bottom infrared heating areas are all controlled by switch, and you can choose the bottom heating areas depend on the PCB board size.
2. You should set different temperature curves when repair different BGA, each temperature should not higher than 300°C; Lead-free rework setting can refer to welding temperature curve of BGA tin bead.
3. When demount BGA, the cooling fan and vacuum should be setted to automatic transmission, the buzzer will warn automatically when temperature curve runs to the end. Meanwhile, remove the BGA from PCB board with vacuum pen, and then remove the PCB board from the positioning frame.
4. When welding the BGA chip, set the cooling fan to manual grade, close vacuum. After the temperature curve runs to the end, the buzzer will alarm automatically, the cooling fan begins to cooling the BGA chip and bottom heating zone, meanwhile, the warm heating head will blow a cold wind. Then elevate the upper heater, make the gap has 3-5mm space between the bottom of nozzle and the upper surface of BGA chip and keep cooling for 30-40 seconds, or move away the main heater after the starting light is off, finally take away the PCB board from the support.
5. Before installation of BGA chip, it is necessary to check that if the PCB pad and BGA tin bead are all in good condition. After welding, it have to check the exterior appearance by piece, if it is unusual, it should stop the BGA chip installation and test the temperature, and it has to be adjusted properly before welding, otherwise it will be damage the BGA chip or PCB board.
6. The machine surface needs to be clean at regular time, especially the infrared heating board. Avoid the dirt stay on the board, because the dirt can lead to heat radiation unnormally, bad welding quality and shorten the using time of infrared heating element.

**If the heating element was burn out because of these, our company is not responsible for free change!**

### Concluding remarks:

In the electric products line, especially the PC and electric production field, component trend to microminiaturization, multi Function and greening of management, various capsulation technology spring up, and BGA/CSP is the main trend.

In order to satisfy the growing need of BGA device circuit assembly, manufacturers should choose safer, more convenient, more speedily assembly and repair equipment craft.

### Packing list:

NO	Item	specification	Unit	Qty
1	BGA rework station	DH-B2	SET	1
2	Vacuum sucker		PCS	2
3	Instruction manual	DH-B2	COPY	1
4	Hot-air nozzle	Upper nozzle 31*31 38*38      41*41  bottom nozzle 50*50      34*34	PCS	5
5	Shaped clip		PCS	6
6	Plum knob		PCS	6

7	Supporting screw		PCS	4
8	Temperature sensor		PC	1

