

## DH-B1 BGA Rework Station Manual

**ADD:** 3rd floor, 46th building, Da Yangtian Industry District, Shajing Town,  
Bao'an District, Shenzhen, China

**Website:** [www.sinobga.com](http://www.sinobga.com)

**Tel.:** 86-755-29091633 29091833

**Fax:** 86-55-29091622

**E-mail:** [dh-smt@hotmail.com](mailto:dh-smt@hotmail.com)

# 一、 Company profile

Shenzhen Dinghua Technology & Development Co., Ltd is a professional manufacturer of BGA rework station, rework tools and associated equipments, engaging in design, production, sales and service. We commit us to make the professional equipment, provide the high quality a perfect service for the customer. As one of pioneer in this industry, we continue to improve and innovate along with the market demands by absorbing the advanced development experience from home and abroad to adhering to our vision of 'Professionalism, Honesty, Innovative and Responsibility'.

Science and technology are primary productive forces. Through teamwork, we achieved the core thermal-control technology with related patent. At the same time, our products cover 3 categories: high-end, mid-end and low-end for development and production using manual, semi-auto to fully automated processes. Our market had expanded into industries like: individual repair, factories, education, military and aerospace etc. And we had established the point-of sales and end service at locally and abroad.

Your satisfaction is our target, adhering to customer-focus, market oriented, and our company provides fist class products and high efficient services for customers through continuous innovation. We are honored to work with you to create a brighter 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

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

Number	Name	Functions	Use ways
1	Limit bar	limit the lowest position of the upper heating	Rotate to the right place
2	Tension adjustment knob	lock the upper heating of up and down , forward and back	Rotate the knob
3	Forward and back adjustment handle	Adjust the upper heating of Forward and back position	Rotating the handle
4	Up and down adjustment handle	Adjust the upper heating of up and down position	Rotating the handle
5	7 handle	lock the rotation angle of the upper heating	Rotating the handle
6	LED head light	Lighting equipment at work	Press the button
7	Top nozzle	To focus the hot air	Pull air from the BGA suitable location
8	Bottom nozzle	To focus the hot air	Pull air from the BGA suitable

			location
9	Switch	Turn on and off the machine	Push the switch
10	Bottom heater up and down handle	Adjust the lower nozzle distance from the PCB board	Rotating the handle
11	Vacuum pen	Remove the chips	Click vacuum on the touch screen
12	Emergency stop button	Emergency stop	Press the button
13	head light button	light switch	Press the button
14	Touch screen	Data storage system platform	
15	USB interface	External USB drive	
16	Temperature sensor	Connect an external galvanic , measure the actual temperature	Directly connect temperature line
17	IR preheating zone	BGA rework with warm-up	
18	PCB support	Move the right position , clamping the PCB	
19	Universal fixture	Adjust the PCB in any direction	
20	Powerful cross fan	Cooling the PCB board after welding	Click cooling on the touch screen

### (三) Specification:

Total Power	4800W
Top heater	800W
Bottom heater	Second heater 1200W, IR preheating 2700W
power	AC220V ±10% 50Hz
Dimensions	500x600x700mm
Positioning	V-groove, PCB support can be adjusted in any direction with external universal fixture
Temperature control	K Sensor, Closed loop
Temp accuracy	±2°C
PCB size	Max 500×400 mm Min 22×22 mm
BGA chip	2X2-80X80mm
Minimum chip spacing	0.15mm
External Temperature Sensor	1(optional)
Net weight	45kg

## Description:

1. Embedded Industrial PC, high definition touch screen interface, PLC control, and instant profile analysis function. Real-time settings and actual temperature profile display can be used to analyzed and correct parameters if necessary.
2. It uses precise K-type close circuit control and automatic temperature adjustment system, with PLC and temperature module to enable precision temperature control of  $\pm 2$  °C. External temperature sensor enables temperature monitoring and accurate analysis of real time temperature profile.
3. V-groove PCB support for rapid, convenience and accurate positioning that fits for all kinds of PCB board.
4. Flexible and convenient removable fixture on the PCB board which protects and prevent damage to PCB. It can also adapt to rework various BGA packages.
5. Various sizes of BGA nozzles, which can be adjusted 360 degree for easy installation and replacement;
6. Three temperature areas can independently heat and are multiple controllable and adjustable to ensure best integration of different temperature areas. Heating temperature, time, angle, cooling and vacuuming can all be set on the interface.
7. There are 6-8 levels of variable and constant temperature controls. Massive storage of temperature curves which are Instant accessible according to different BGA. Curve analysis, setting and adjustment are all accessible via touch screen. Three heating areas adopts independent PID calculation to control heating process to enable more accurate and precise temperature control
8. accurate and precise temperature control
9. It uses high powered blower to enable fast cooling of PCB board and prevent it from deformation. There are also internal vacuum pump and external vacuum pen to assist with fetching the BGA chip.
10. Including Voice "early warning" function. 5-10 seconds before the completion of uninstalling or welding, voice reminder / warning to get the workers prepared. Cooling system will start after vertical wind stopped heating. When the temperature drops to room temperature, the cooling process will stop, so that the machine will not age after heated up.
11. External USB interface, convenient for uploading and storing current curve. Available for computer mouse
12. CE certification, with emergency switch and 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 de-soldering 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 extent time of third, 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, please keep indoor and outdoor air flow.**



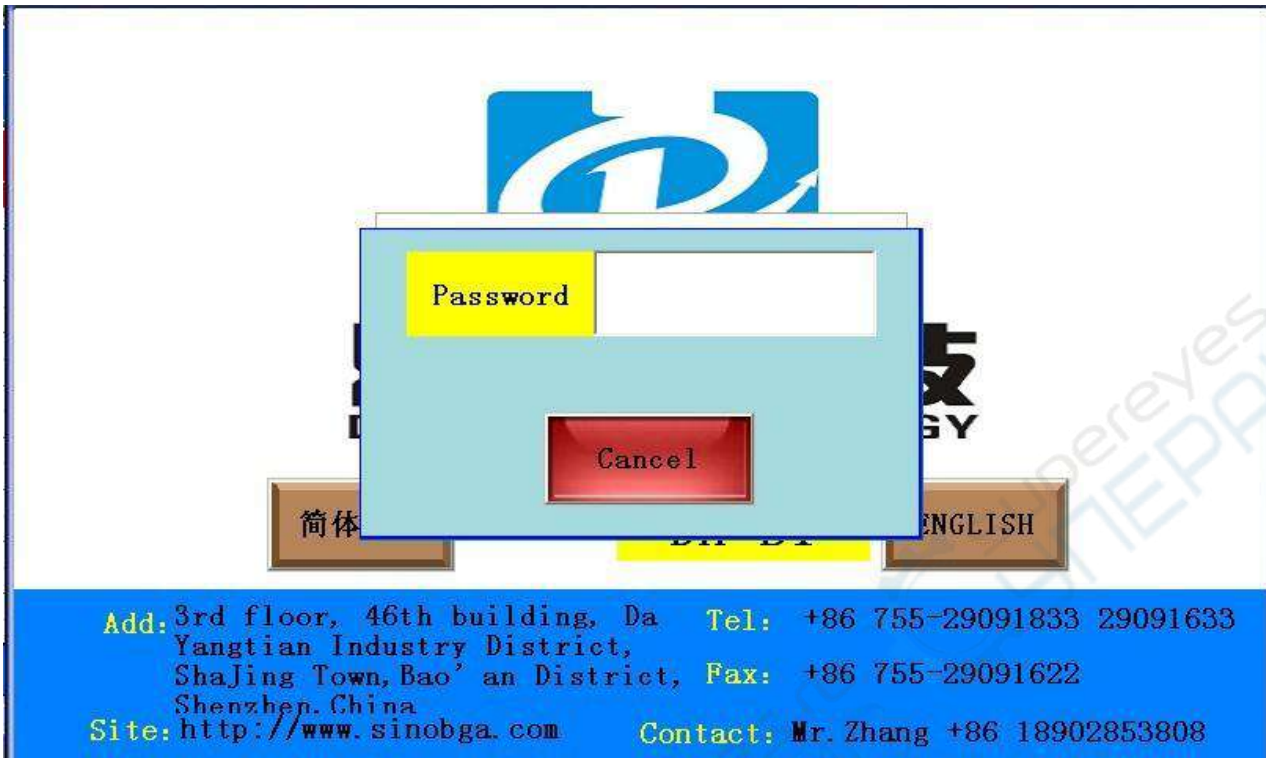
## 六、 Procedure setting and usage

### Introduction of touch screen operation

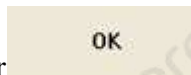
1. Switch on the power, the BGA rework station can connect with electricity. The home page of touch screen will appear the interface like the following picture, and then you can choose the language interface as required.



2、 When we choose English, it will appear the working interface like the following picture.








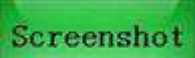
3. Input password, then click to enter

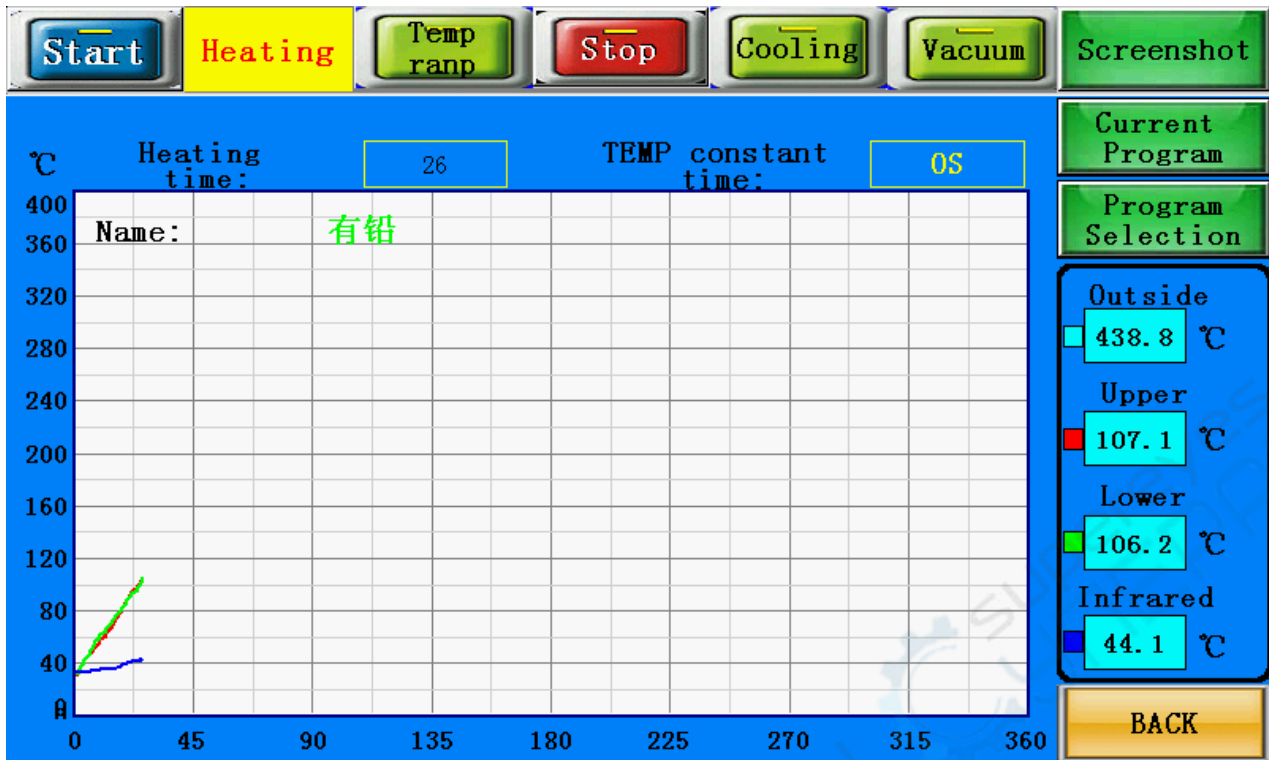


4. After logging in password, you will get the following homepage



### 5. Introduction of the homepage

- 1) Start : Heating button
- 2) Heating finish: Show in the display frame of the heating condition after the heating is finished,
- 3) Keep off 
- 4) Stop : Click this button the machine will stop heat
- 5) Cooling : Switch button of the fan. Manual control of the top and bottom hot air fan and cross flow cooling fan
- 6) Vacuum : Switch button of the vacuum pen. Manual control of the vacuum pen.
- 7) Screen shot : Store the current curve to the USB drive
- 8) Heating time: Total heating time
- 9) Curve name: current curve name
- 10) Constant temperature time: remaining time of the current curve constant temperature
- 11) Outside temperature: outside current temperature: the light curve
- 12) Upper temperature: upper current temperature: the red curve
- 13) Lower temperature: lower current temperature: the green curve
- 14) Infrared temperature: infrared current temperature: the dark blue curve



15) Current curve **Current Program** : Click **Current Program** to get in the current curve frames, the following picture shows the working temperature parameters after starting heating. They are target temperature, constant temperature time, and the speed of heating ( the speed of heating with °C/SEC calculation).

Current Curve	1st	2nd	3rd	4th	5th	6th	7th	8th	Curve Name
Upper Temperature	165	195	225	250	270	0	0	0	CPU座
Upper Rate	3	3	3	3	3	0	0	0	
Time Constant	30	30	30	40	45	0	0	0	
Lower Temperature	165	195	225	250	270	0	0	0	
Lower Rate	3	3	3	3	3	0	0	0	
Time Constant	30	30	30	40	45	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	BACK

Three-zone temperatures can be set 8 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 does not meet to the needed welding temperature; please press the return



button, returning to the main Interface.

16)Curve selection **Program Selection**: Click **Program Selection** you will get the following interface:

Name	Selection	Saved	Deleted	Apply	Advanced	BACK		
有鉛	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 **Program Selection** to choose the right formulation directly. Please refer to the following interface.

Name		Selection		Saved	Deleted	Apply	Smart program	BACK	
CPU座	1st	2nd	Number		Name		6th	7th	8th
Upper Temperature	165	195	1	有铅		0	0	0	
Upper Rate	3	3	2	无铅1		0	0	0	
Step Time(Sec)	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	
Step Time(Sec)	30	30	6			0	0	0	
Infrared Temperature	180	0	7			0	0	0	
Infrared Rate	3	0	8			0	0	0	
Step Time(Sec)	300	0	9			0	0	0	
			10			0	0	0	
			Confirm		Cancel		0	0	0
			0	0	0	0	0	0	

If have to input new parameter, click the parameter you will get the following interface.



Current Curve	1st	2nd	3rd	4th	5th	6th	7th	8th	Curve Name
Upper Temperature	165	195	225	250	270	0	0	0	CPU座
Upper Rate	3	3	3	3	3	0	0	0	
Time Constant	Float:								
Lower Temperature	165								
Lower Rate									
Time Constant	1	2	3	4	5	.	<	OK	
Infrared Temperature	6	7	8	9	0	-	CE	Cancel	
Infrared Rate	3	0	0	0	0	0	0	0	
Time Constant	300	0	0	0	0	0	0	0	BACK

OK




Input the parameter you need, press“ENTER” key .When temperature parameters

Settings of these three temperature zones are finished, click “save curve” **Saved** , then all



parameters you have set are all saved.

After finishing the temperature selection or temperature amendment, click , then click  you will get the following interface:



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 will pop-up function selection screen. it can choose the '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**

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



### 38\*38 BGA welding temperature setting

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

### 31\*31 BGA welding temperature setting

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

	Preheating	Constant	Heating	Welding 1st	Welding 2nd	Reduction
<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
<b>Upper heating</b>	165	190	225	245	250	235
<b>Constant time</b>	30	30	35	45	25	15
<b>Bottom heating</b>	165	190	225	245	250	235
<b>Constant time</b>	30	30	35	45	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

### 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 temperature 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℃ ; 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 un-normally, 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, multifunction 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-B1	SET	1
	Vacuum pen		PCS	1
2	Vacuum sucker		PCS	3
3	Instruction manual	DH-B1	COPY	1
4	Hot-air nozzle	31*31,38*38,41*4 1,55*55, 34*34	PCS	5
5	Universal fixture		PCS	6
6	Plum knob		PCS	6
7	Supporting screw		PCS	4
8	Temperature sensor		PCS	1