



深圳市卓茂科技有限公司  
SHENZHEN ZHUOMAO TECHNOLOGY CO., LTD.

BGA Rework Station ZM-R5830

Manual



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# Preface

Shenzhen ZhuoMao Technology Co., Ltd. is a high-tech enterprise involved in research, development, production and marketing. Since its establishment, with strong technical force, faithful business philosophy, a sound sales network, comprehensive and thoughtful after-sales service, through the absorption and the introduction of foreign advanced technology, we improved ourselves and won customers trust & supports in the field of BGA rework systems and peripheral auxiliary equipment.

Company's product are sold in most cities in China and exported to Japan, South Korea, North Africa, Vietnam, Southeast Asia, the Middle East, Europe and the United States etc. We got a strong vitality and higher visibility in the same industry. Our company will continue adhering to the idea of "profession, innovation and integrity", to provide our customers with more efficient high-quality and convenient services! Your smile is always Zhuomao's constant pursuit.

- Thank you so much for choosing BGA rework station ZM-R5830 of Shenzhen ZhuoMao Technology Co., Ltd.
- Before you operate the machine, please read the manual book carefully to make sure of the safety and Superior performance of the machine.
- As technology continues to update, Zhuo Mao Technology Co., Ltd. has the right to modify specifications of the product before notice.
- Please take care of the accessories of the machine.
- If you have any doubt and special requirements of this equipment, you may contact with our company at any time.
- The Company reserves the final right to interpret the Manual.

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## 1st 、 Features of ZM—R5830

- 1、 Adopt liner slide which makes X、 Y、 Z axis all can do precision adjustment or fast positioning, with high positioning accuracy and fast maneuverability.
- 2、 high definition touch screen , PCL control, can save multiple groups profile, password protection and modify function, and can save multiple groups profile, equipped with instant temperature curve analysis function.
- 3、 There are 3 independent heating areas from top to bottom. The 1st and 2nd are hot-air heaters, the 3rd is IR preheating, temperature controlled within  $\pm 3^{\circ}$ . Top heater can be adjusted freely, second heater can be adjusted up and down, and top and bottom temperature can control many groups and sections of temperature parameters at the same time. The third IR heater can be adjusted the power consumption.
- 4、 Offer all kinds of hot-air nozzle, it can rotate  $360^{\circ}$  .With magnet, easy to install and change, customized is available. Bottom IR heater ensure an even heat for PCB board.
- 5 、 Choose imported high-precision K-type thermocouple, closed loop control and automatic temperature compensation system, combined PLC module for the precision control of temperature.
6. Use a V-groove equipped with a flexible fixture for PCB positioning to protect the PCB from deformation when heated or cooled, and it can rework for any BGA package size.
- 7、 powerful cross-flow fan rapidly cool the PCB board to improve efficiency. Also built-in vacuum pump and external vacuum suction pen, pick up the chips rapidly.

## 2<sup>nd</sup> 、 Installation

- 1、 Be away from flammable, explosive, corrosive gas or liquid.
- 2、 Avoid damp places, the air humidity is less than 90%.
- 3、 Temperature  $-10\text{ }^{\circ}\text{C} \sim 40\text{ }^{\circ}\text{C}$ , avoid direct sunlight, prolonged sun exposure.
- 4、 No dust, fibers and metal particles floating in the operational environment.
- 5、 The place of installation needs to be flat, solid, no vibration.
- 6、 Place heavy objects on the body are strictly prohibited.
- 7、 Avoid the affection of direct airflow, such as air-conditioners, heaters or fans.
- 8、 The back of rework station should be reserved 30CM for heat dissipation.
- 9、 The placing table ( $900 \times 900\text{ mm}$ ) be flat, the relative level of a height  $750 \sim 850\text{ mm}$ .
- 10、 Distribute wiring must be handled by a qualified professional technician, the main line is 1.5 square feet. Equipment must be well grounded.
- 11、 Switch off the power after use, Power must be disabled if a long-term no need.

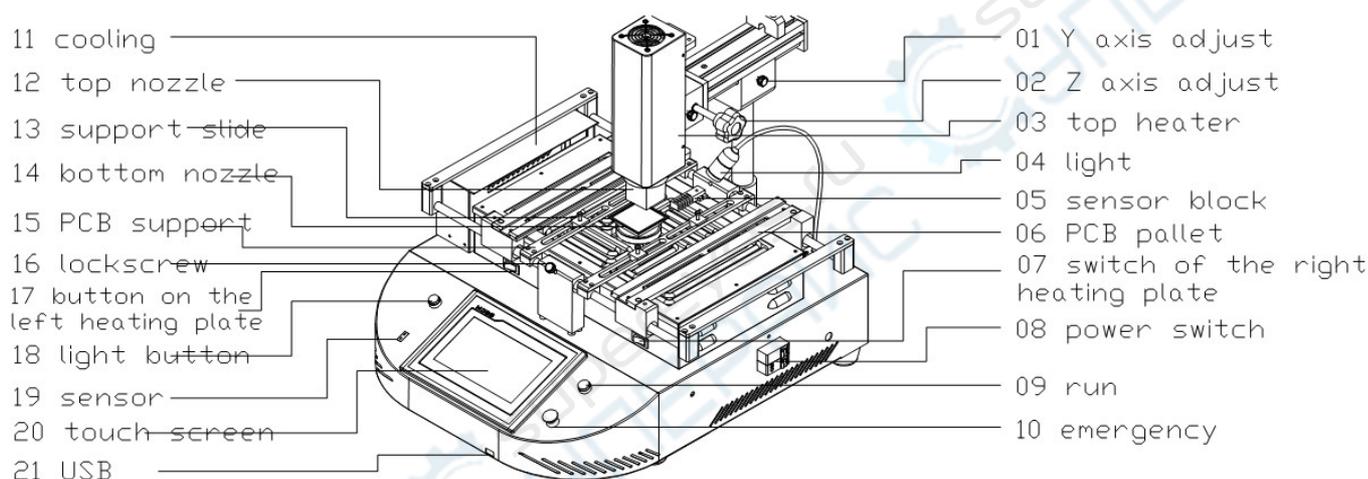
## 3rd 、 Specifications

- 1、 Power supply :  $220\text{V} \pm 10\%$  VAC      50/60Hz
- 2、 Power consumption: 4.5KW      Max
- 3、 Heater power: Top heater: 0.8KW; bottom heater: 1.2KW; IR: 2.4KW
- 4、 Electric material: PLC programmable controller + Large-screen TFT Touch Screen+ high precision intelligent temperature control module

- 5、 Temperature control: K-type closed-loop thermocouple, top and bottom heating independently, temperature error  $\pm 3^{\circ}\text{C}$
- 6、 Positioning: V-groove fixture for PCB positioning
- 7、 PCB size: 355×335 mm Max 50×50 mm Min
- 8、 Machine dimension: 535×650×600 mm
- 9、 Weight: 34kg
- 10、 Machine color: Black

## 4th 、 main structure description

### (1)、 structure introduction



### (2) Function Introduction

item	name	function	Use method
1	Y-axis adjust	Adjust the top heater at Y	Right-back, left-forward
2	Z-axis adjust	Adjust the top heater at Z	Right-up, left-down
3	Top heater	Solder the BGA	Adjust by Z-axis
4	LED light		
5	Temperature block		
6	PCB Pallet	Hold up the PCB board	
7	Button on the right side of heating plate	switch on the right heating board	
8	Power switch	power On / off the rework station	
9	Start button	Start the machine heating	

10	Cross-flow fan	Cool the PCB board	
11	Top nozzle	ensure the hot air focus on the BGA	a suitable position to BGA
12	Support the slide bar	Tighten the screws to hold PCB board	
13	Bottom nozzle	ensure the hot air focus on the PCB board	
14	PCB Article support	adjust and support the PCB board not to distort	To adjust the height of stud
15	<b>locknut</b>	Fixed pallet	
16	Button on the left side of heating plate	switch on the left heating board	
17	Lighting button	Turn on the light	
18	sensor	External galvanic, measure the actual temperature	
19	Touch screen	Set the temperaturel parameters to control the machine	
20	USB	Communication with the external memory	

## 5th 、 Program setting and operating instructions

### (1) “Setting screen” operation

1. Turn on the power supply, and then the touch screen will show boot screen (picture 1), then touch “SET UP”, it will show password input dialog box (the initial password is 8888). (Picture 2)



Pic 1



Pic 2

2. Input the password and then press the ENT button, it will show debugging curve screen (picture 3)

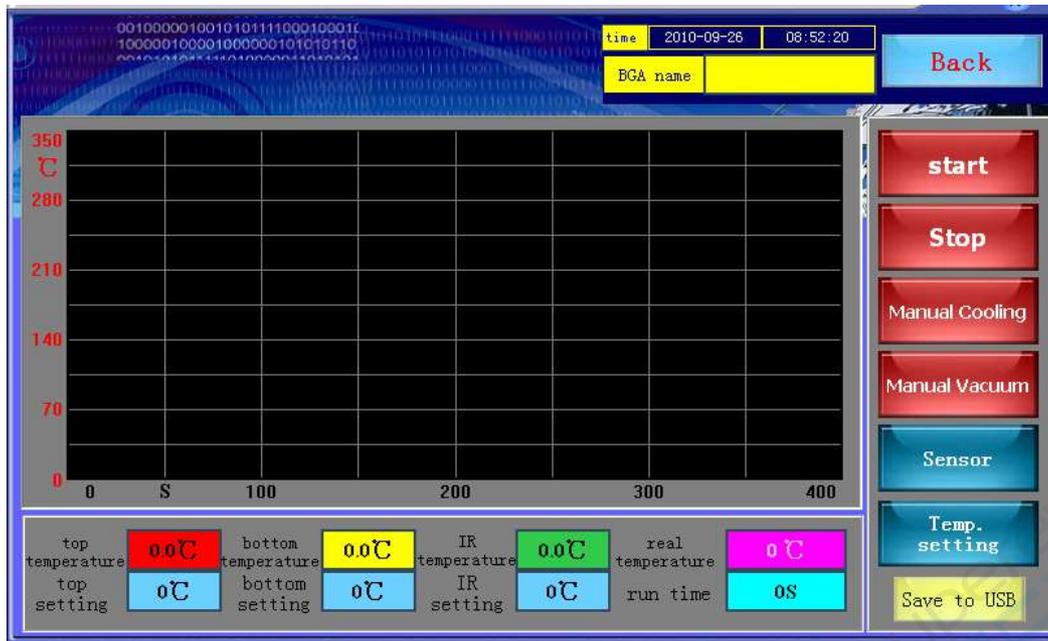


figure3 Temperature setting curve screen

Introduction of Temperature setting curve screen

Top temperature: it shows the internal galvanic actual temperature of the top hot-air heater (red curve)

Bottom temperature: it shows the internal galvanic actual temperature of the bottom hot-air heater (yellow curve)

Top setting: it shows the setting temperature of top hot-air heater

Bottom setting: it shows the setting temperature of top hot-air heater

Time: the time of heating

IR temperature: it shows the internal galvanic actual temperature of the bottom IR heater (green curve)

IR setting: it shows the setting temperature of IR heating plate

Outer measured temperature: shows the current Outer measured temperature: .

Run time: shows the time of the whole process.

Date: show the curren time.

BGA name: Shows the profile which is working now.

Start: trigger button. Click it, and then the system will start heating.

Stop: trigger button. Click it, and then the system will stop heating.

Cooling manual: cooling system manual or auto exchange button, to control the change of cooling system.(Note: when heating, it will not allow the cooling system work. So when you click this button during heating, it will not work.)

Cooling: change button of manual control of motion/stop of cross flow fan.

Vacuum: change button of manual control of motion/stop of vacuum sucker,

Vacuum manual:the button for manual control of the vacuum system, to control the sucker manually.

Curve analysis: screen change button, click it enter “curve analysis screen”.

Temperature setting: screen change button, click it enter: “temperature setting screen”.

Same screen to U disk: button for connect with USB, when insert External storage devices, click this button, then the current screen will be stored in the devices. (the format is BMP)

Back: screen back button, back to boot screen.

(Note: the curve will be shown from the start of heating to the end, and it will be saved until next start, and then it will show the new current temperature curve.)

3、 Click “temperature setting”button(picture 3),it will enter “temperature setting screen”.(picture 4)



figure4 temperature parameters setting screen

#### 4. Introduction for temperature parameters setting screen:

Top hot air temperature: top heater temperature enter window, you can set 8 sections, if do not need to use so many sections, then you can set 0 to the end.

Top hot air time: top heater setting temperature section time enter window, if do not use, then you can set to 0.

Top hot-air slope: the speed of the temperature increase, the reference is 3, the unit is °C/S.

Bottom hot air temperature: bottom heater temperature enter window, you can set 8 sections, if do not need to use so many sections, then you can set 0 to the end.

Bottom hot air time: bottom heater setting temperature section time enter window.

Bottom hot-air slope: the speed of the temperature increase, the reference is 3, the unit is °C/S.

IR temperature: IR heating plate setting temperature enter window, you had better do not set many segments.

IR time: IR heating time, it is better longer than the total time of top heater.

IR slope: the speed of IR heating temperature increase.

Name: the window to name this group data. (you can use letters or numbers).

Specific operations: click the input frame which needed to be changed, then it will show a number input window(as figure 5 showed), input the parameters, then press the “enter”button for finishing the setting.



figure5



figure6



figure7



figure8

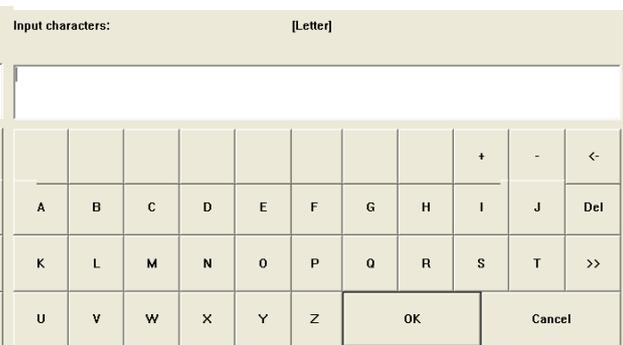


figure9

view the data

Click this button, then it will show you all the data it saved, such as figure 10, click the name, then the name will become red, it means that it is choosed, then click

the LOAD button, then it will show you all the information of this group.

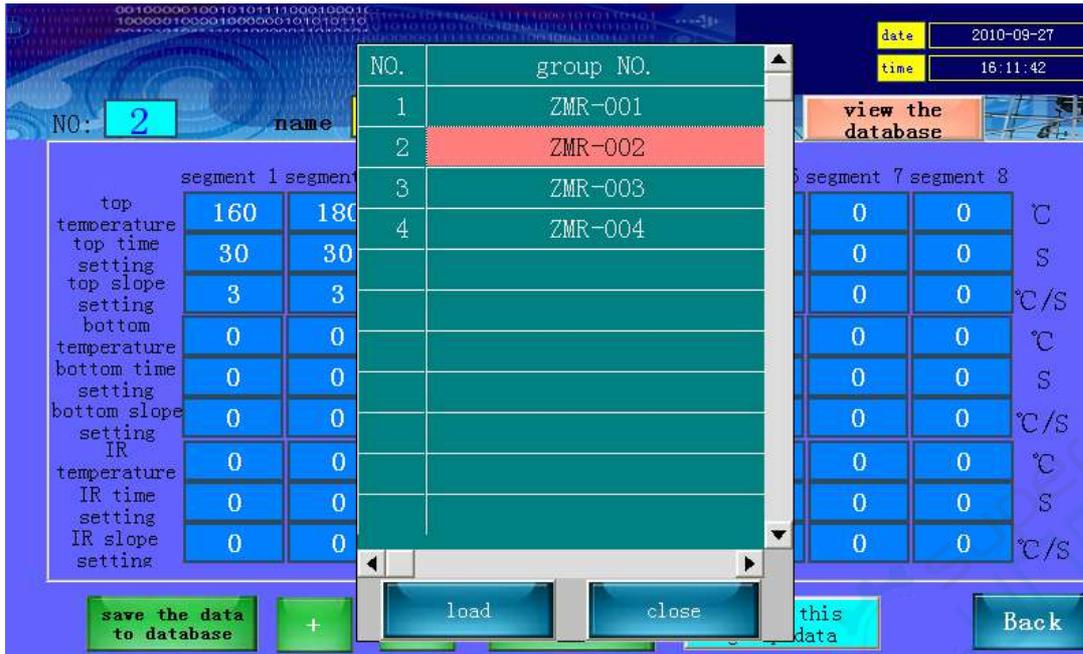


figure10

Save to database: when you finish the parameters setting, then click this button, then it will be save to database.

2) Groups setting: (This data is the group number.)

(Picture 11) click “Group”, it will show picture 12, then input the numbers (1-50), named it (this system can save 50 groups), such as picture 14, set it as group 2, and click ENT for confirmation.

Use the data: click it, it will show you figure15, the data is now which you will use.

Delete the data: delete all the data which you can see now.

Back: screen back button, back to curve screen.



figure11

5. The description of the whole process of heating (take picture 11 as an example)

Section 1(Preheating section.): when you start the program, the top heater will enter the process of heating, the slope of it is 3 degrees per second, when it reaches to 160 °C (the temperature setting of preheating section ), keep this temperature for 30 seconds (the time setting of preheating section, till now, the preheating section is finished, then the top heater will enter the next work process—insulation section.

The bottom heater start to heat from room temperature, the heating slope is 3 degrees per second, when it reaches to 160 °C (the temperature setting of preheating section ), keep this temperature for 30 seconds (the time setting of preheating section, till now, the preheating section is finished, then the top heater will enter the next work process—insulation section.

IR preheating: Set 180 °C, it means that the IR heating plate will be heated to 180 °C, and then keep it.

Section 2(Insulation section): The slope of the top heater is 3 degrees per second, start from 160 °C to 180 °C, then keep it for 30 seconds.

The slope of the bottom heater is 3 degrees per second, start from 160 °C to 180 °C,

then keep it for 30 seconds.

Section 3(Heating section): The slope of the top heater is 3 degrees per second, start from 180°C to 200°C, then keep it for 30 seconds.

The slope of the bottom heater is 3 degrees per second, start from 180°C to 200°C, then keep it for 30 seconds.

Section 4、 section 5 and cooling section are same as above.

The process of actual temperature control of this system can be less than the maximum control sections (8 sections). During the heating process, if you do not need to use the control section, then you can set 0 to close it.

## (2) “OPERATION”

1. Back to the boot screen, (Figure12); click “OPERATION”, (Figure13), then it will show operation curve screen.



figure12 Boot screen



figure13 Operating curve screen



figure14

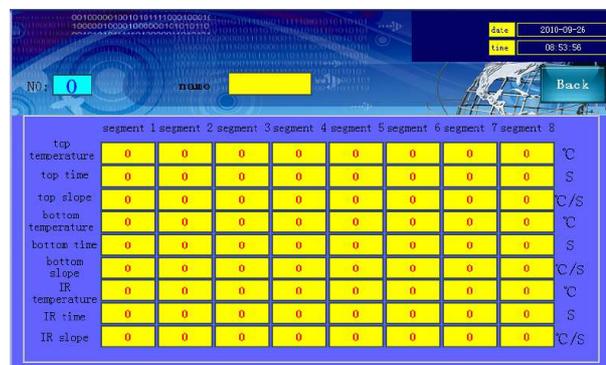


figure15

Note: the operation of “set up”and “operate”is almost same, the difference is as

following:

“set up” there is limit for user (need password), You can set up and change any parameters.

“operate” There is no limit for user(do not need password), you can not set up and change any parameters.



figure12

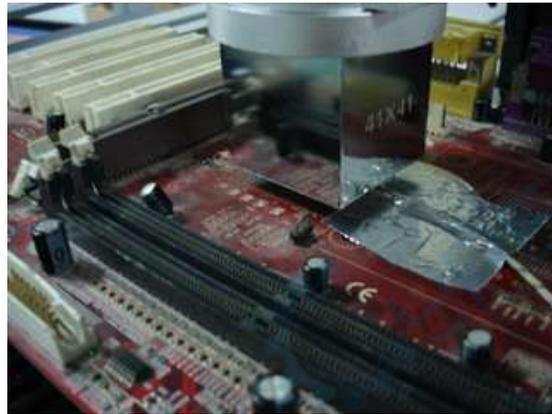


figure13

## 6th 、 The use of external measuring galvanic

### 1、 Function

- (1)、 More accurate to measure the actual temperature of the part to be heated during the welding process.
- (2)、 It is easy to move, so that it can be convenient to measure the temperature of the different parts of the welded components during the heating process.
- (3)、 After installing galvanic correctly, it will display the galvanic current measurement temperature in the touch-screen outside the measured temperature curve screen "measured" column.

### 2、 Installation

- (1)、 Check the galvanic lines, whether there are disconnected phenomena or not.
- (2)、 Insert the galvanic Plug into the "outer galvanic Socket" on the control panel according to the positive and negative mark.

(3)、 After GALVANIC installed correctly, click "analysis" button on the touch screen, switch to "curve analysis" screen, the corresponding galvanic current temperature will be displayed on the touch screen.

### 3、 Measurement

(1)、 PCB board will be installed on the rework station, with the galvanic fixed on the PCB board using foil stickers. (As shown in Figure 29)

(2)、 Adjust the height of the probe with the probe galvanic head located in the top 1-2mm of the test site (as shown in Figure 30)



Figure29

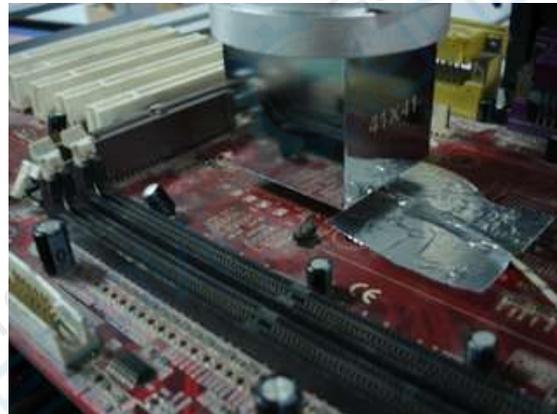


Figure30

3、 Adjust the related mechanical adjustment knob, so that the heating part just below the hot-air tube. (As shown in Figure 30)

4、 Adjust the up and down adjustment knob of the hot-air head to make the distance between the edge of PCB board side and the hot-air head is 3-5mm.

5、 Implementation of the welding / disordering process, that is to start the upper and lower heater.

6、 Then it will shows the red curve on the computer monitor screen (picture 31),that is the actual measurement temperature of the external galvanic curve.



Figure31

#### 4、 Using the outer galvanic to adjust the temperature curve

Statement: In this operation, it may be due to improper operation to cause the temperature deviation of the device or even lose control, please caution!

Take the upper hot-air tube as an example to make detailed description of adjustment method

- (1)、 Set the temperature, the time, the slope and so on parameters of the upper heater
- (2)、 Adjustment process proposed to do on a waste circuit board in order to prevent damage to the circuit board and on-board electronic components.
- (3)、 Implementation of the above process (3), installed the outer measured galvanic, in which the top of the PCB board just below the hot-air tube.
- (4)、 Close the lower part of the heating process, click on "Start" button to start the heating process, which will on the computer monitor screen will be displayed on the upper curve of the measured temperature (green) and external galvanic measuring temperature (red) the two curves
- (5)、 Green curves represent the actual measurement of the galvanic temperature curve of the upper heating wire inside, the red curve represents the actual measurement

of the galvanic temperature outside. the smaller the gap between the green curve and red curve, the closer between the actual temperature and set temperature of the heating parts, more standard of the upper heating process; On the contrary, the greater the gap between the two curves, the greater the actual temperature deviate from the set temperature, the more non-standard of the upper part during the heating process.

6、 If the deviation between the two curves is too much, you should make the appropriate adjustments

7、 The specific adjustment method is as follows, because of the impact of the system processes and the environmental, deviations in the objective is inevitable. If the temperature deviation does not affect the normal welding and desordering, non-professionals should avoid the following corrective actions!

A If the outer galvanic curve (red) lower than the upper one (green), adjust the internal hairdryer galvanic probe upward;

B If the outer galvanic curve (red) higher than the upper one(green), adjust the internal hairdryer galvanic probe downward;

C Adjustment must be small, try to control the amplitude of accommodation in 1mm or less;

D Repeated several adjustments;

E During adjustment process, the heated of galvanic probe is strictly prohibited from contacting with any objects, so as not to affect the accuracy of measuring temperature;

F After temperature adjustment, you should fix the probe, to avoid the probe vibration measurement of the temperature of the equipment

G The method of the adjustment applies only to the two parallel curves in a smooth uniform deviation, and it is invalid to the temperature which is from top to bottom jitter free-laws regulating!

H The upper part of the internal galvanic Duct location: Remove the upper heater nozzle, at a distance of 2-3cm at the edge wind-cone .

I operating the standard procedure to avoid the high-temperature burns!

8、 There is no booster thermocouple temperature curve on the bottom of the computer screen, so you have to adjust the process of the lower part of the heaters by visual.

9、 fixed the galvanic line with foil stickers on the bottom of PCB board (as opposed to the upper heater set back on the PCB board), so that the probe of the booster thermocouple is located just 2mm above the mouth of the bottom hot-air nozzle, and adjust the mechanical parts, make the upper hot-air nozzle deviate from the heated parts to avoid cold air affect the temperature of the heated parts.

10、 The caution is same as the top heater.

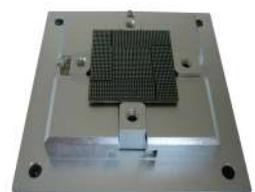
11、 The methods of adjustment:

A If the outer temperature is lower than the bottom, you should adjust the lower internal galvanic probe downward.

B If the outer temperature is higher than the bottom; you should adjust the lower internal galvanic probe upward.

## 7th 、 Reballing Process

1、 Fix the BGA chip on the base of our universal reballing



station; Adjust the four slipper blocks to fix the chip to make it on the center of the reballing kit.

2、 Select the appropriate steel mesh according to chip type. Fix the steel mesh to the ceiling cover and tighten it with 4 M3 screws, covered with lid.

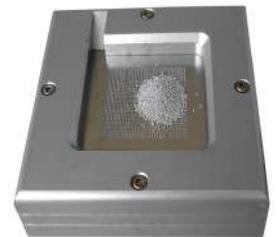
Adjust 4 Jimmy on the base to meet the suitable height required.

3、 Observe the hole on steel mesh which should be completely coincide with the solder holes on BGA. If not coincide, we must remove the cap to reposition to ensure steel mesh holes aligned with the chip, and then lock the four screws.

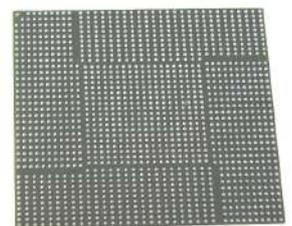


4、 Locking two no spring fixed slide, remove the BGA chip and coated with a thin layer of solder flux, card the chip into the base again, covered with lid(make sure the right direction).

5、 Put into solder ball, clench hands and gently swaying reballing station to ensure the solder ball completely filled in the holes and pour out extra solder balls.



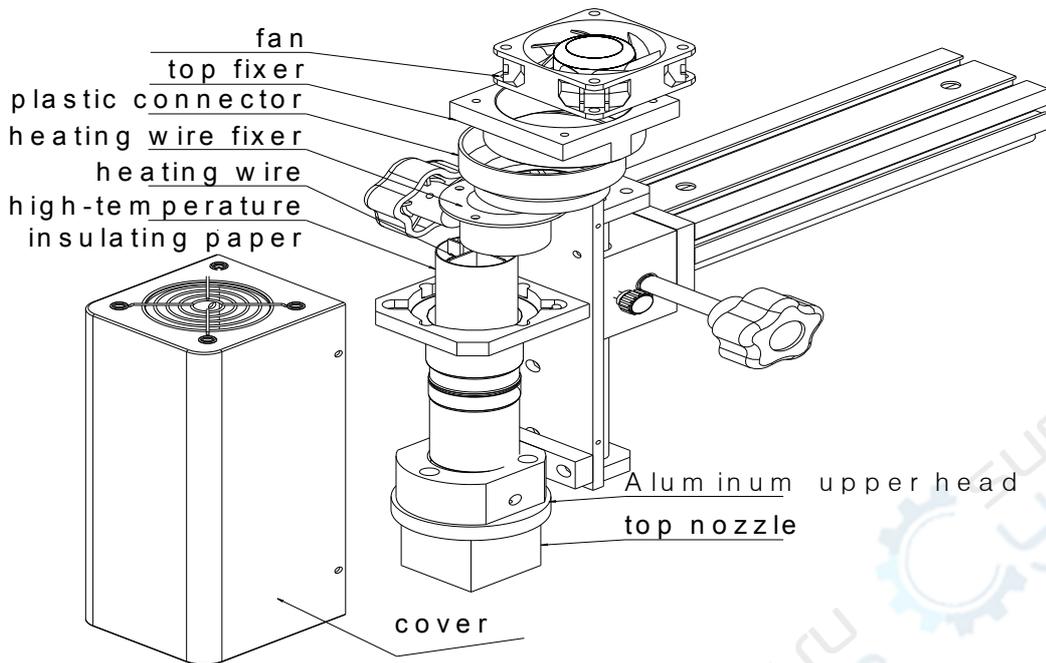
6、 Place the reballing station on the flat location; Remove the lid, carefully scored BGA chips. Observe the chip, if individual solder balls are not in the hole rightly, please correct it with forceps.



7、 It is convenient to use our different types of repair stations or welding machine to fix solder ball. Heat solders balls on the BGA to soldering it on BGA, thus reballing finished.

## 8th 、 Repair and Maintenance

(1) Upper heater: (Pictured)

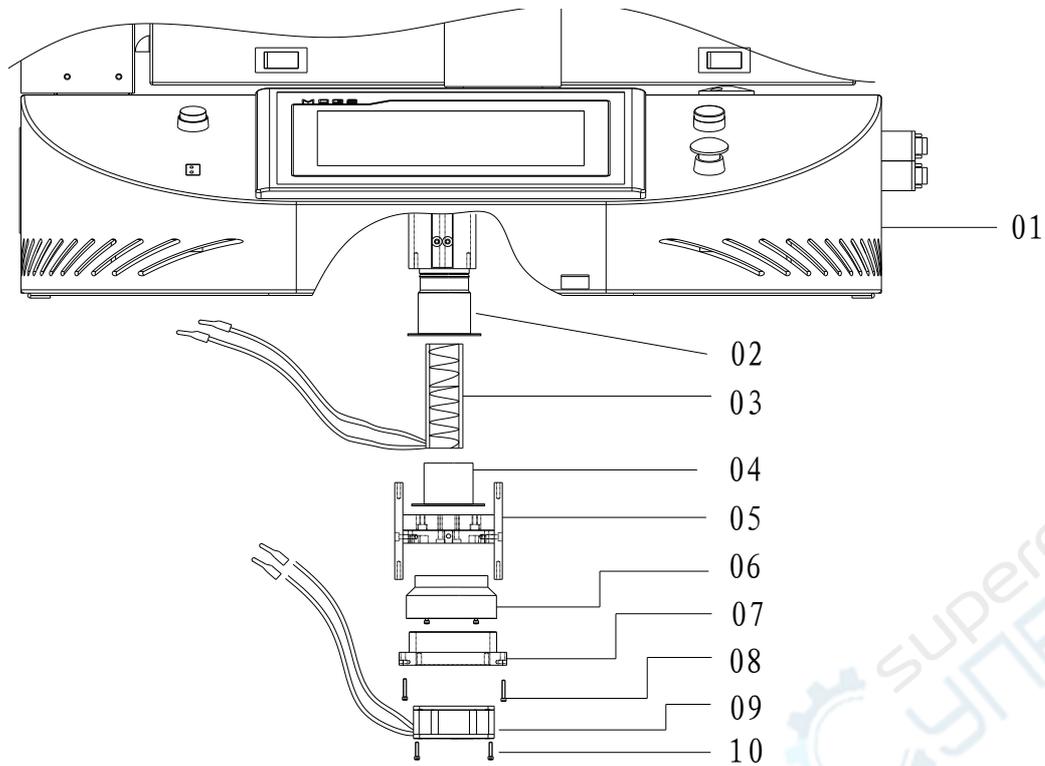


1. First switch off, make the top heater totally cool down;
2. the replace of fan: Remove the heater cover, and remove the insulation fiber block, then you can replace the fan.
3. The replacement of heating wire

Remove the heater cover , fan, remove the upper fixed block, Plastic Connector ,heater fixer one by one, and then take out the hot wire. Then it can be replaced.(as pictured)

Note: When you change the heating wire; it must be wrapped by High-temperature insulating paper.

(2) Replacement of bottom heater (as pictured)



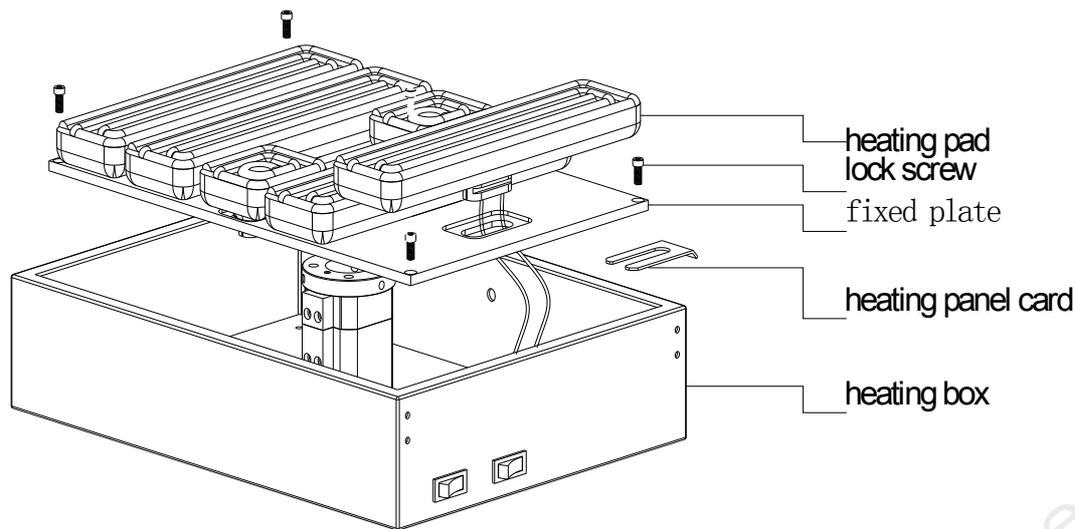
- |    |                      |    |                   |    |                   |
|----|----------------------|----|-------------------|----|-------------------|
| 01 | body                 | 02 | Heating Duct      | 03 | Heater            |
| 04 | Heating wire fixture | 05 | mounting deck     | 06 | Plastic Connector |
| 07 | Fan mounts           | 08 | Fan bracket bolts | 09 | fan               |
| 10 | fan Bolt             |    |                   |    |                   |

Replacement of bottom heater:

- 1)、 Remove the fixing screw, turn back the machine till the heaters appear..
- 2)、 Demolition of fans, fan holder, plastic connector and fan wire fixture, take out the hot wire. Then you can replace the heating wire,

Note: When you change the heating wire; it must be wrapped by High-temperature insulating paper.

- (3)、 The bottom heating panel (pictured)



## 1、 Replacement of heating plate:

- 1). Demolition of locking screws (4), remove the heating plate and the assembly of the fixed plate, placed on the table which is covered with a sponge (with heating plate surface facing down).
- 2). Removed the fixed heating plate card, you can break down the fixed plate and heating plate assembly, remove the heating plate then it can be replaced.

## 9th 、 safety precautions

(1)、 BGA Rework Station ZM-R5860 use AC220V power, working temperature may up to 400 °C, Improper operation may cause damage to the equipment and even endanger the safety of the operator. Therefore must strictly abide the following:

- 1)、No directly fan or other blowing air to the station when working, otherwise it may cause damage to the equipment or components as the distortion of heater thermometric;

- 2)、prohibited flammable gases or liquid around the machine; After booting, forbidden combustibles touch high temperature district and peripheral metal parts, otherwise it will easily cause fire or explosion;
- 3)、To avoid high temperature scald, forbidden touching high temperature fever zone during working. PCB board still warm when completed, operation process should take necessary protective measures;
- 4)、PCB board should be placed on V type support shelves and used slider pairs to support PCB board in the centre; e. Metal or angular and sharp objects are avoided on touch screen surface;
- 5)、upper and lower heater inlet must not be blocked, otherwise heating wire will be damaged;
- 6)、After work, please guarantee natural cooling for 5 minutes, then Switch off;
- 7)、if metal objects or liquid fall into rework station during working, you should power off immediately, unplug power plug, until it cooled, then eradicate litter and dirt; it will be influenced if grease on the heating panels and accompanied by odor when rebooting. Please keep the machine clean and timely maintenance.
- 8)、when appears abnormal warming or smoke on the machine, immediately disconnect power and notify technical service personnel to repair it; Remove the connections data line between computer and devices, hold the plug to unplug the data line, to avoid damaging internal connection.

(2) if it belongs to one of the following situations, and other damage caused by them;

It will not be in the Company guarantee scope!

- 1、Failing uses the method in manual to operate in wrong conditions or environmental operation;;

- 2、 The Company product outside reasons;
- 3、 Not the transformation and maintenance of the company;
- 4、 not accordance to the method stipulated when using the products ;
- 5、 unpredictable situation that the company scientific technical level not reached;
- 6、 Natural disasters or man-made destruction of non-responsibility of the company premises.

### **Normal BGA welding and disordering parameters (for reference)**

#### **1、 The temperature curve of lead welding**

41\*41 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	160	185	210	235	240	225
time	30	30	35	40	20	15
bottom	160	185	210	235	240	225
time	30	30	35	40	20	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	180					

38\*38 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	160	185	210	225	235	215
time	30	30	35	40	20	15
bottom	160	185	210	225	235	215
time	30	30	35	40	20	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	185					

31\*31 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	160	180	200	215	225	215
time	30	30	35	40	20	15
bottom	160	180	200	215	225	215
time	30	30	35	40	20	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	180					

The upper is the reference temperature of the lead BGA

## 2、 The temperature curve of Lead-free welding

41\*41 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	165	190	225	245	255	240
time	30	30	35	55	25	15
bottom	165	190	225	245	255	240
time	30	30	35	55	25	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	210					

38\*38 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	165	190	225	245	250	235
time	30	30	35	45	25	15
bottom	165	190	225	245	250	235
time	30	30	35	45	25	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	210					

31\*31 the temperature setting of the BGA welding:

	preheating	insulation	heating	welding1	welding2	cooling
upper	165	190	220	240	245	235
time	30	30	35	40	20	15
bottom	165	190	220	240	245	235
time	30	30	35	40	20	15
slope	3.0	3. 0	3. 0	3. 0	3. 0	3. 0
IR	210					

The upper is the reference temperature of the lead-free BGA

Such as set 0 when the demolition of the cooling section of BGA.