Pixel Interconnect

# Model DS-40A ACF Prebonder User Manual

Pixel Interconnect

# Contents

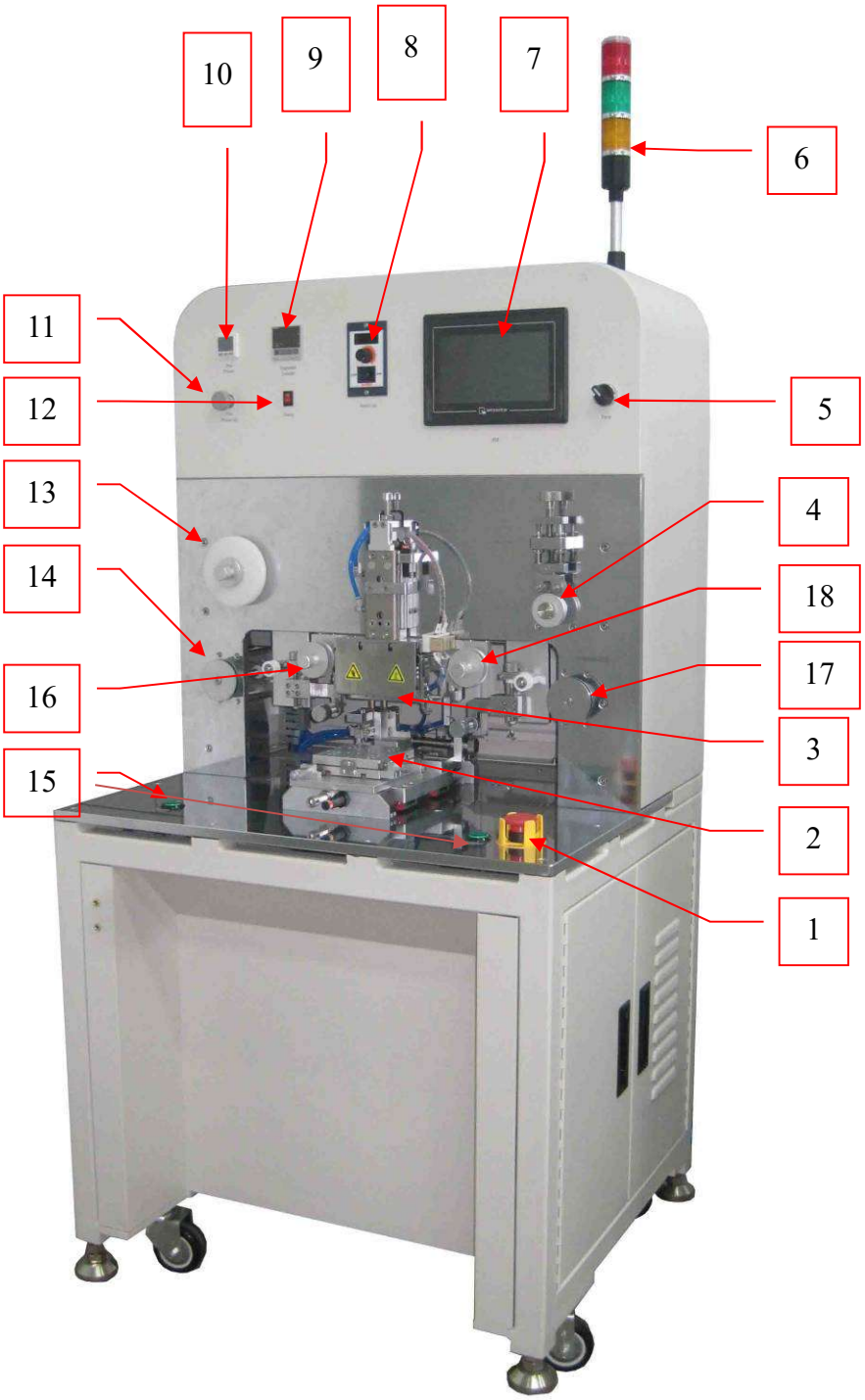
# Ⅰ. Functions and Features

1. The temperature control system is a constant temperature heating system used to realize accurate temperature control;
2. The stage in/out working mode is used and customer substrates or FPCs are positioned in the fixtures and secured with the use of a vacuum system;
3. The prebond head is manufactured from high-strength high-quality alloy materials to guarantee the flatness of the prebond surface after repeated high temperature cycles so as to ensure the quality of the final production;
4. The equipment is provided with a PLC control system and the touch screen HMI is used to realize the stable and reliable operation of the equipment;
5. The ACF tape transport length is controlled by a stepper motor to guarantee precision;
6. The convenient ACF half-cut tooling position facilitates easy height adjustment of the cutter;
7. The stage is provided with a multi-axis adjusting unit so as to facilitate the adjustment of the substrate or FPC prior to the ACF prebond;
8. The equipment is provided with large-capacity program storage and a multi-functional operation menu so that the operation and adjustment of the equipment is easier for the operator.

## Ⅱ. Specification

| Items | Specifications | Remarks |
|---|---|---|
| Equipment Main Power | AC220V±10%，50/60Hz，3A | |
| Cleanroom Working Conditions | Temperature:15-35°C, RH: 40%~95% | |
| Input Air Pressure | 0.5—0.7MPa | |
| Prebond Force Range | 1.5-11.9 kgf | |
| Prebond Time Time | 1~99s | |
| Prebond Temperature Setting | Room temperature --200°C | |
| Dimensions of Machine Body | 700mm(L)×610mm(W)×1400mm(H) | Not including the tricolor status light |
| Weight | About 200 kg | |

## Ⅲ. Structure Diagram



| | | | | | |
|---|---|---|---|---|---|
| 1 | Emergency stop button | 7 | Touch display screen | 13 | ACF supply reel |
| 2 | Stage with fixturing | 8 | ACF Tension adjusting knob | 14 | ACF take-up reel (for 3-layer ACF) |
| 3 | ACF Prebond head | 9 | Temperature controller | 15 | Dual start buttons |
| 4 | ACF feed mechanism | 10 | Prebond pressure indicator | 16 | Interposer supply reel |
| 5 | DS-40 main power switch | 11 | Prebond head pressure regulating valve | 17 | ACF take-up reel (for 2-layer ACF) |
| 6 | Tricolor status light | 12 | Prebond head heating switch | 18 | Interposer take-up reel |

## Ⅳ. Installation Methods and Requirements of Equipment

1、 The equipment should be installed in a dry, dust-free, non-corrosive gas room kept within a temperature range of 15°C~ 35°C;

2、 The equipment should be placed in the appropriate location according to the building structure and the production needs;

3、 Move the equipment to a flat installation position (and avoid too much foreign floor vibration) and adjust the leveling feet of the equipment using a level gauge until it is level. Verify that the equipment wheels are not touching the ground. Secure to floor per your local earthquake ordinance requirements.

4、 Check whether any parts of the equipment are loose or abnormal and tighten as required.

5、 Ground wires should be installed using soft copper core insulated wires with the sectional area more than 2mm, with the grounding resistance not greater than 4 Ω;

## V. Operation Methods

1. Verify that the main air source is open and allowing air pressure to the machine.
2. Turn on the Model DS-40A main power switch and turn on the prebond head heating switch. If the ACF take-up reel rotates freely, reduce the ACF tension by rotating the ACF tension knob CCW.
3. Load reel of ACF onto ACF prebond supply reel and thread under the prebond head and onto ACF take-up reel (Figure 4.4 and 4.5).
4. Adjust the prebond head pressure regulating valve and the temperature controller set point temperature to the required values for the product to be run.

| **Product Model Name** | **Prebond Head Pressure Setting (MPa)** | **Temperature Controller Set Point Temperature ($^{O}$C)** |
|---|---|---|
| | | |
| | | |

5. Select the product prebond profile to be run on the DS-40A by performing the following steps:
   a) Enter the Main Menu by pressing on any surface of the touchscreen
   b) Press the “Para. Setup” softkey on the Main Menu
   c) Input password “6666” for User 1 and press the Enter softkey on the touchscreen
   d) Press the “Para menu” softkey on the touchscreen then press “Para. Setup” softkey.
   e) Select the appropriate product by pressing on the product name on the touchscreen
   f) Press “Return” softkey. Press “Return” softkey again and you have returned to the Main Menu.
   g) Press “Manual Mode” softkey on the Main Menu.
   h) Press “Manual” softkey on the touchscreen
6. Perform the ACF half-cut alignment procedure
7. Load reel of interposer material onto interposer supply reel and thread under the prebond head

and onto interposer take-up reel

8. Mount the desired product prebond fixture to the stage.
9. Adjust the prebonding contact position between the prebond fixture and the prebond head using the stage micrometers if required.

| Product Model Name | Micrometer Setting (mm) |
|---|---|
| | X: , Y: |
| | X:, Y: |

Press “Production Mode” on Main Menu then press “Production Mode” on Production Menu. Finally press “Start” on touchscreen.

10. Place the production substrate or FPC onto the fixture and press the left start button to secure it with vacuum
11. Press dual start buttons simultaneously on the prebonder to begin the ACF prebond of the ACF to the substrate or FPC.
12. Remove finished product from the fixture when stage has returned to home position towards operator and stopped movement
13. Repeat steps 10-13 for additional products which use the same fixture and product prebond profile.
14. If a different product is to be run, repeat steps 4-13.

# Ⅵ. Function Description

## 1. Introduction of Operation Panel

1.1 Power switch: It is used to control the power of the whole machine;

1.2 Heating switch: It turns on/off the prebond head heating cartridges and indicates the heating status. After the heating switch is activated, if the indicator light is on and flashing, then it means that the prebond head is in a heating state;

1.3 Touch screen: It refers to the large-screen HMI intelligent setting system and can display all the operating interfaces;

1.4 Temperature controller: It is used to control the temperature of the prebond head and simultaneously indicate the control temperature;

1.5 Prebond pressure indicator: It is used to indicate the prebond pressure value of the prebond head cylinder;

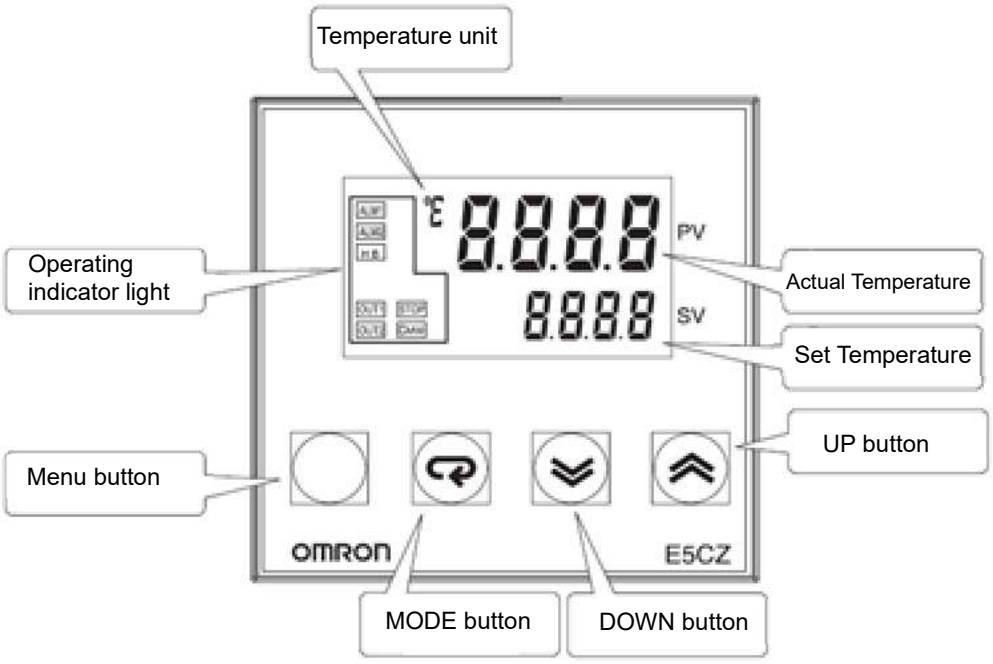
1.6 Pressure regulating valve: It is used to adjust the ACF prebond pressure; the air pressure will be increased through the clockwise rotation of the pressure regulating valve and reduced through the CCW rotation;

1.7 Tension adjusting knob: It is used to adjust the motor tension of the ACF unloading control mechanism;

1.8 “Start” buttons: Press the left start button once to generate the vacuum and press it again to shut off the vacuum; the equipment will begin automatic ACF prebond production after pressing both left and right “Start” buttons simultaneously;

1.9 “Emergency Stop” button: When the button is pressed down at any time, all functions of the equipment will be stopped (It will serve as the release switch with CCW rotation).

## 2. Setting of Temperature Controller




2.1 The above diagram defines the various indicators and controls located on the Omron temperature controller.

2.2 The set temperature (usually 5-10°C greater that the actual ACF temperature measured) is adjusted by carrying out the following steps:

2.2.1 Press the “Up” or “Down” buttons until the desired set temperature is shown

## 3. Substrate Stage and Product Alignment Fixturing

3.1 Different products frequently require different alignment fixtures to help in alignment of the ACF to the prebonding area. In order to change a fixture, remove the four bolts shown in red circles in figure 3.1 and remove and replace the fixture with a new fixture and tighten the four bolts. On the Manual Model menu, press ”Table Cyl in” -> to cause the fixture to move toward the prebond head. Press ”Heating tip down”-> after turning the prebond head pressure adjust knob to a low pressure such as 0.1mpa in order to cause the prebond head to descend to the fixture slowly. Align the prebond head to the prebond area (lift the prebond head using your hand and adjust micrometer slightly for adjustment).

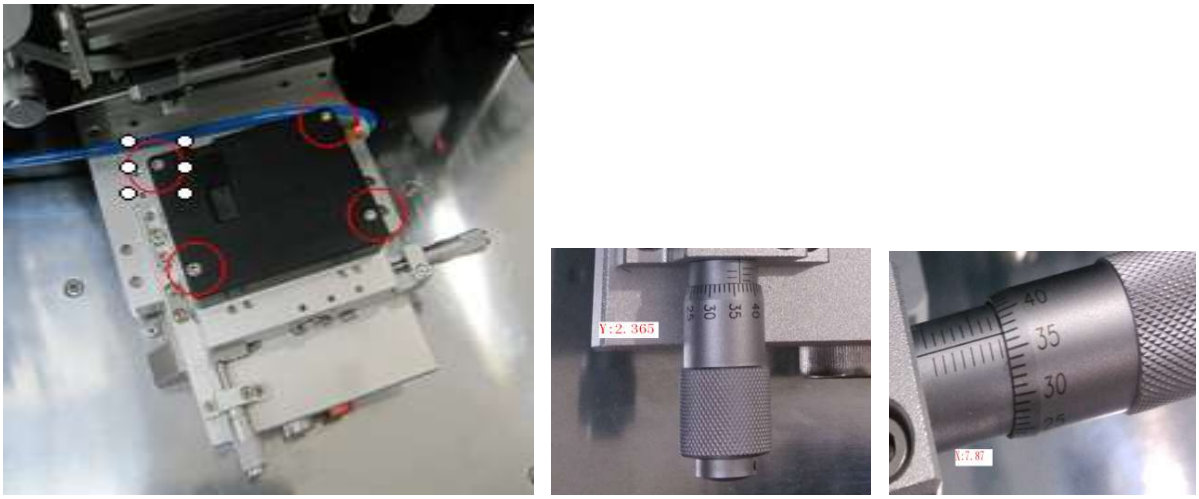



Figure 3.1

## 4. ACF Tape Transport Unit

4.1 **ACF feeding device**: The ACF take-up reel is driven by the stepper motor in conjunction with the ACF feeding device tension, it will move the corresponding angle according to the feeding length stored in the touchscreen profile, then the ACF half-cut will cut the ACF (not the backing layer) so that the length of ACF is ready for prebonding. Pictorials of the ACF feeding device and the ACF half-cut mechanism are shown in figures 4.1 and 4.2.

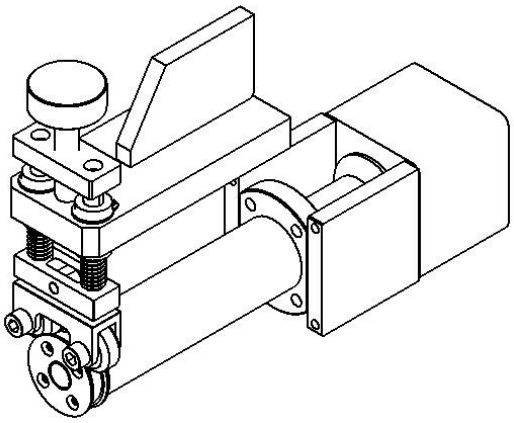


**Figure 4.1 ACF Feeding Device**

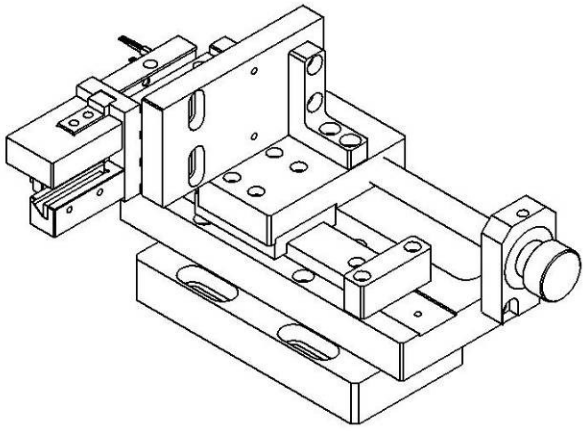


**Figure 4.2 ACF Half-Cut Mechanism**

4.2 **Half-Cut Mechanism:** This mechanism is provided with razor blades and works in conjunction with the ACF feeding-in/feeding-out mode so as to produce accurate ACF cutting and pressure

operations as well as more easy adjustment.

4.2.1 In order to adjust the depth of the half-cut, review the picture in figure 4.3 Loosen the “screw to control micrometer” circled in red, adjust ”cutter micrometer”—turn clockwise to make the cutter move up and turn counterclockwise to move the cutter down. Make sure only to cut off the ACF adhesive but not the backing release tape. Tighten the “screw to control micrometer” after adjustment is completed.

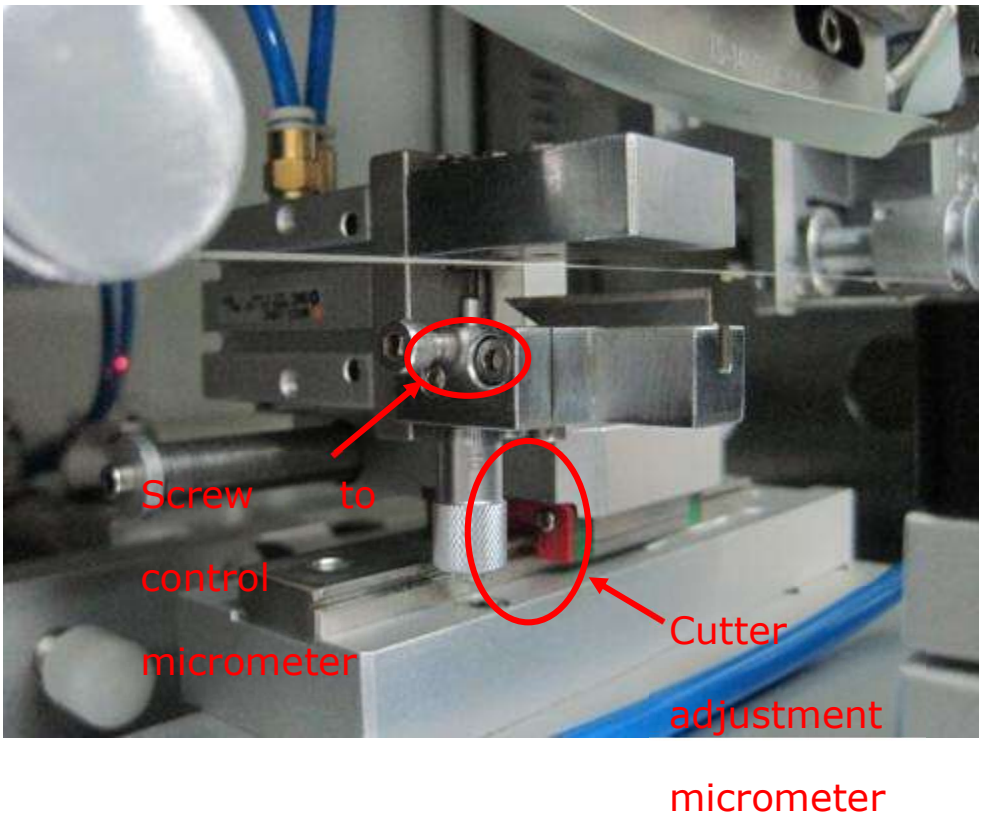



Figure 4.3

## 4.3 Threading of ACF and Alignment

4.3.1 The appropriate ACF threading is shown in figure 4.4. Red arrows are the path of ACF while blue arrows are the path of release tape. If there are two release tape layers, the under layer is received by the left rewind reel.

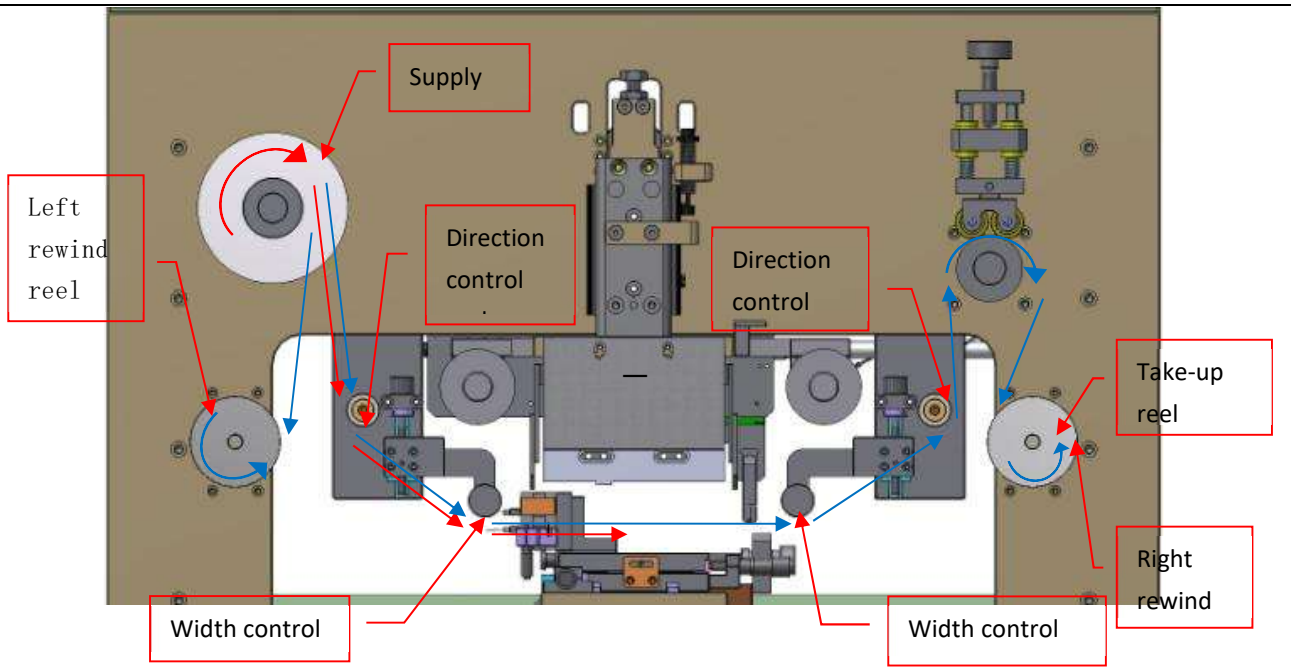



Figure 4.4

4.3.2 The method of mounting the ACF supply reel is shown in figure 4.5. In order to add the ACF reel to the ACF prebonder, remove nut 1 and nut 2, put the full ACF reel onto the supply reel shaft and insert and tighten nut 1 and nut 2 against reel. Thread ACF as shown in figure 4.4 and attach to the take-up reel. Turn cutter adjustment (if required) and ensure cutter's good position with prebond head. In touch panel, press "Manual Mode"->"Cutter Cyl in"->"Cutter Cyl out" in order to cut off the first end of ACF. Then use a piece of scotch tape to touch the exposed ACF on the right side of the half-cut blade and peel the extra ACF from the release tape. The end of the ACF should now be at the half-cut position of the blade. If done correctly, the right edge of the ACF is now aligned with the left edge of the thermode and the prebonder is ready to run a product program.

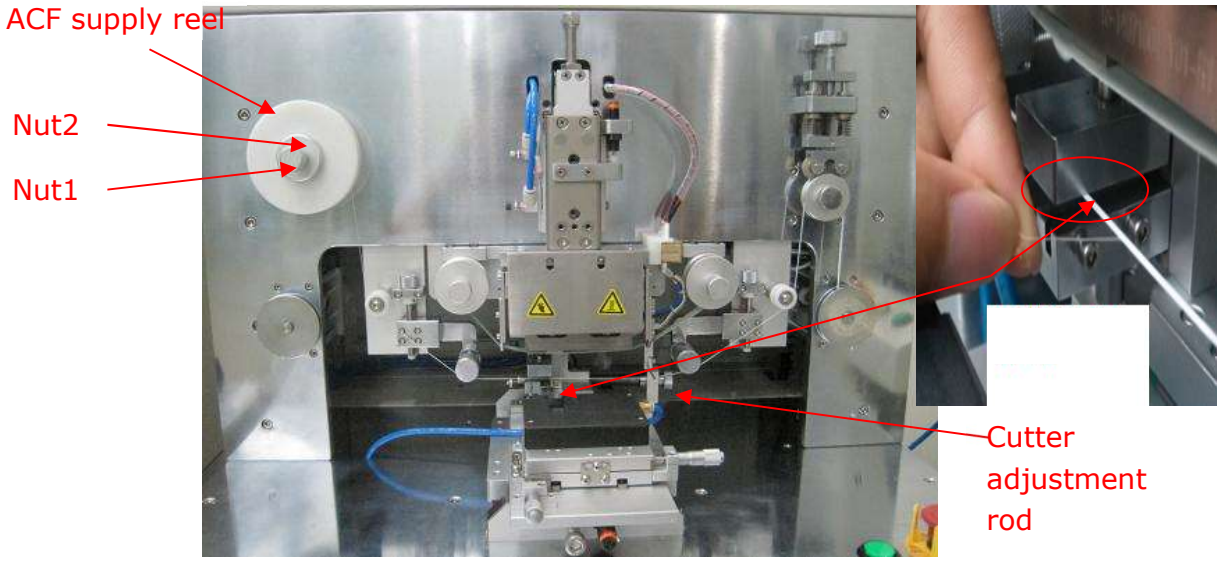



Figure 4.5

4.4 **Threading of Interposer**

4.3.1 Wind interposer onto the interposer supply reel until it is full of material. Thread it through prebonder and attach it to interposer take-up reel as shown in figure 4.6. Please note that you must wind it through the two slots in the alignment bars located to the left and right side of the thermode.

4.3.2 Advance interposer one thermode length after completing about 25 prebonds. However, with such a variety of products run on a prebonder, it is often more useful to simply advance the interposer after finishing each prebonding process on a substrate. The replacement interposer is Pixel p/n MS29008.

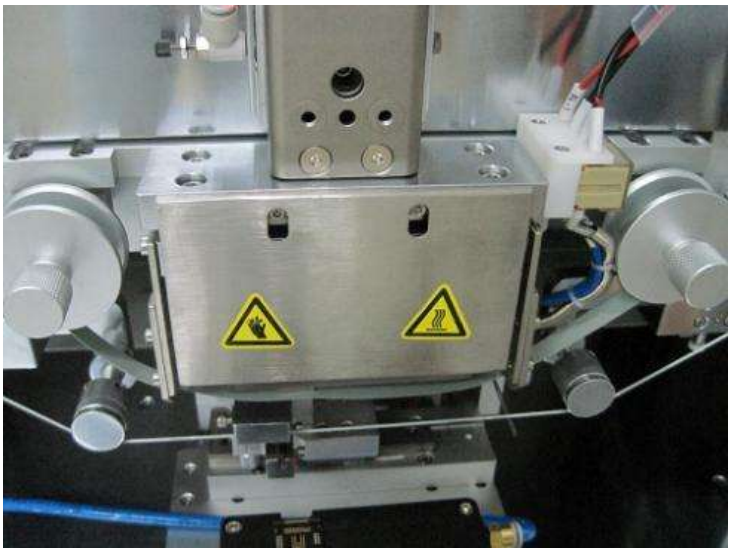


Figure 4.6

## 5. ACF Prebond Head

The ACF prebond head is heated through the use of heater cartridges (The temperature of the prebond head can reach 200℃ at maximum; therefore, if the prebond head is relatively small, the maximum temperature should be reduced to avoid the damage of the prebond head.). The major components of the prebond head assembly are shown in figure 5.1.

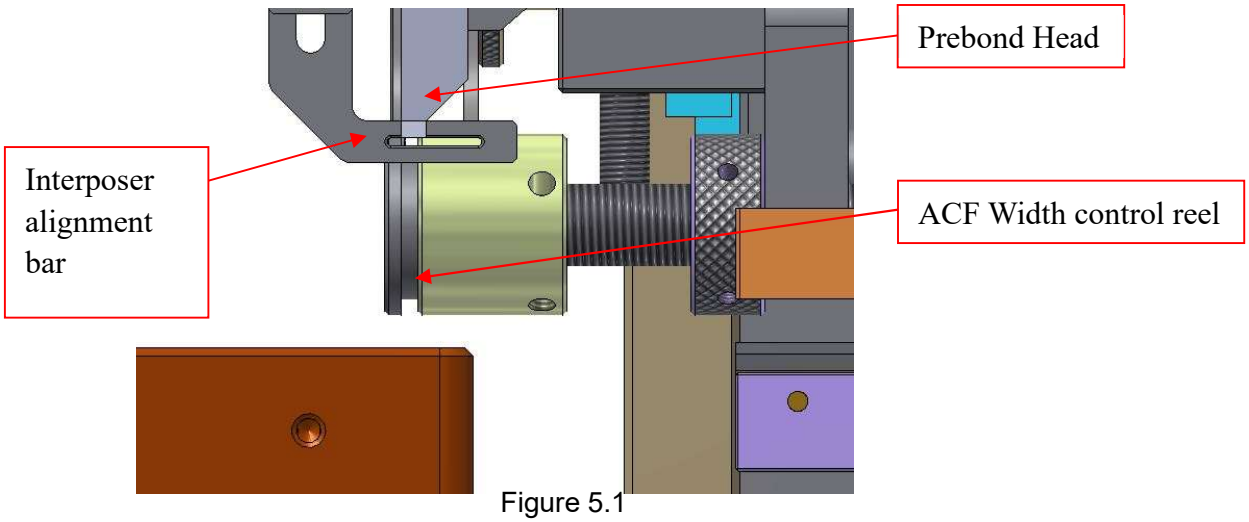



Figure 5.1

5.1 Replace the prebond head as required with the desired size (when the head is at room temperature) by removing the two bolts shown in figure 5.2 (and circled in red), removing and replacing the prebond head and then tighten the head by reinserting the two bolts. Align the left side of the head to be next to the half-cut prior to tightening the bolts.

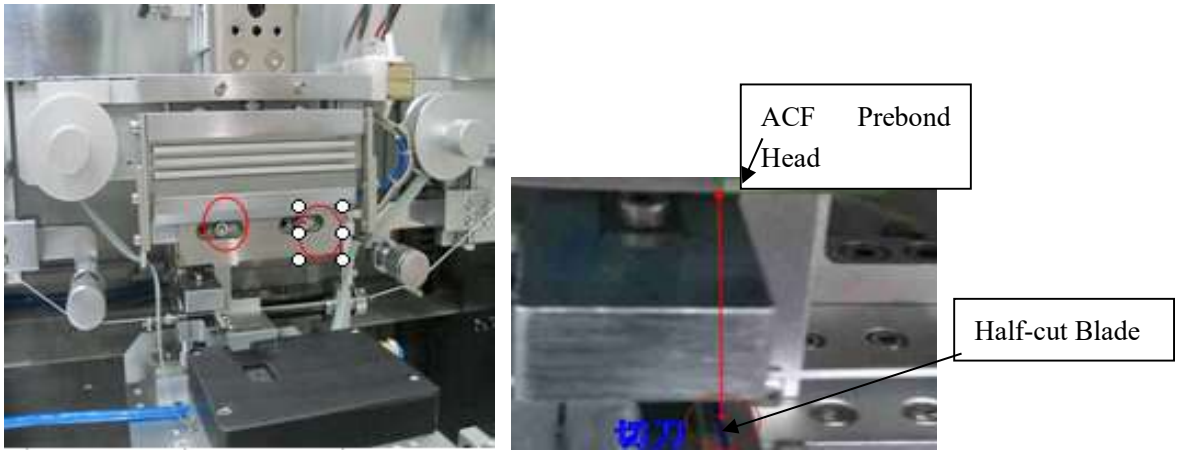



Figure 5.2

5.2 It is important to ensure that the prebond head is perfectly flat when it comes into contact with the ACF. To measure and adjust flatness, first put a piece of fuji film onto prebonding area of the product. Slide interposer and ACF out so that prebond head will not come into contact with them when it descends. Ensure that prebond head is at room temperature. Using the touchpanel, push “Manual Mode”, then “Table Cyl in” button to bring fuji film under the prebond head. Push “Heating tip down” for a few moments to cause the prebond head to descend and then push Heating tip up” to cause the prebond head to ascend.

5.3 Inspect the red pressure mark on the film. It should be an even color and have the same shape as the prebond head. If not, adjust prebond head flatness by loosening and tightening the four coplanarity bolts shown in figure 5.3 as directed in figure 5.4.

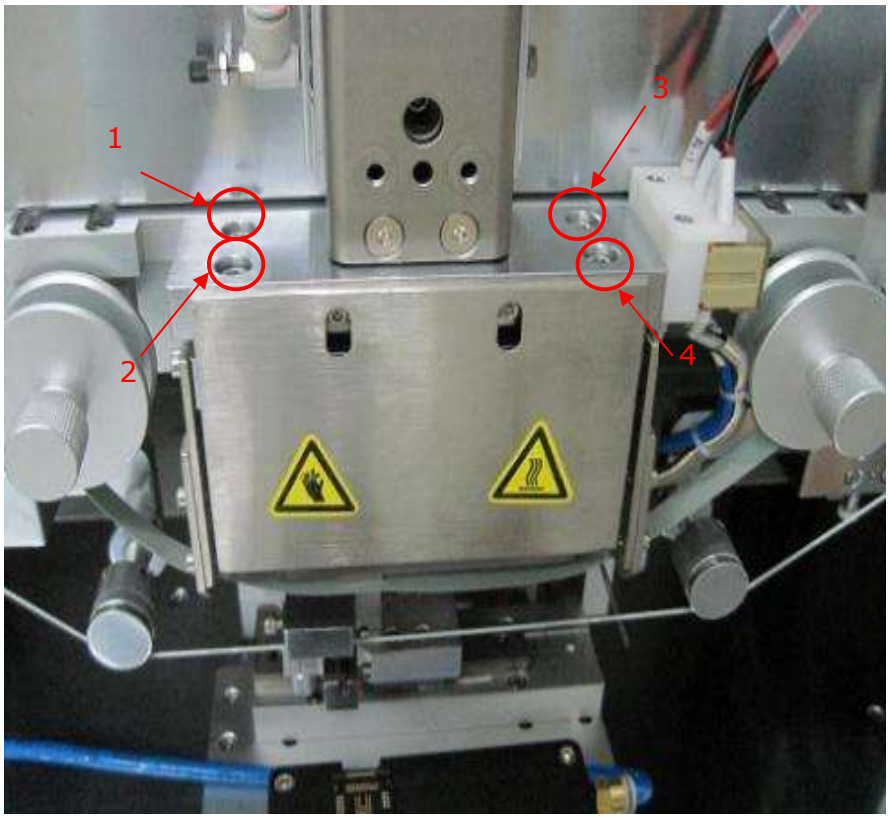
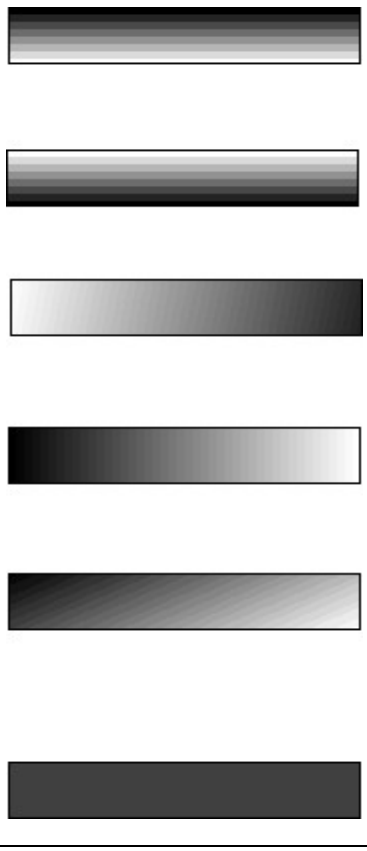



Figure 5.3



Pressure on rear of prebond head. First turn both front tilt adjustment bolts CCW and then turn both rear tilt adjustment bolts CW.

Pressure on front of prebond head. First turn both rear tilt adjustment bolts CCW and then turn both right tilt adjustment bolts CW.

Pressure on right of prebond head. First turn both left tilt adjustment bolts CCW and then turn both right tilt adjustment bolts CW.

Pressure on left of prebond head. First turn both right tilt adjustment bolts CCW and then turn both left tilt adjustment bolts CW.

Pressure on left and rear of prebond head. First turn both right tilt adjustment bolts and front left tilt adjustment bolt CCW and then turn rear left tilt adjustment bolt CW.

Figure 5.4

### 5.4 **Prebonding Head Pressure**

Based upon the ACF manufacturers specifications, adjust the prebonding pressure in order to place enough force on the ACF to ensure a reliable prebonding to the substrate. The force diagram for this particular ACF prebonder is shown in figure 5.5. This force was measured after setting the return cylinder pressure at 0.2MPa. The equation to determine the required prebond pressure in

$$\text{Required Prebond Pressure (MPa)} = \frac{(\text{Desired ACF Prebond Force in kgf}) + 4.1}{40.5}$$

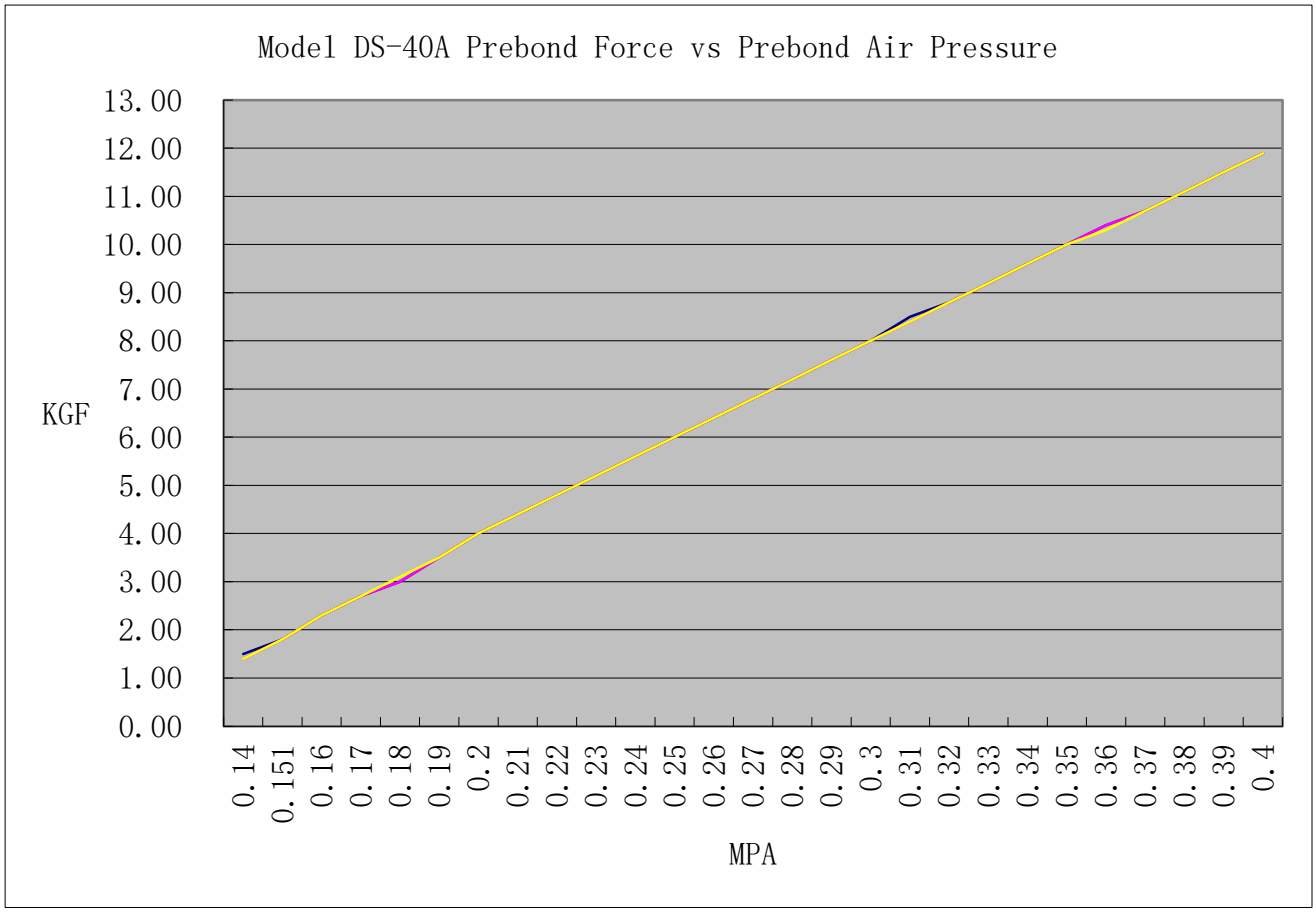
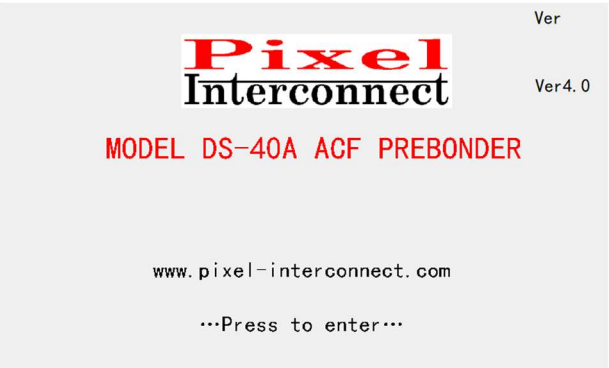

Model DS-40A Prebond Force vs Prebond Air Pressure
KGF
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0.14
0.151
0.16
0.17
0.18
0.19
0.2
0.21
0.22
0.23
0.24
0.25
0.26
0.27
0.28
0.29
0.3
0.31
0.32
0.33
0.34
0.35
0.36
0.37
0.38
0.39
0.4
MPA

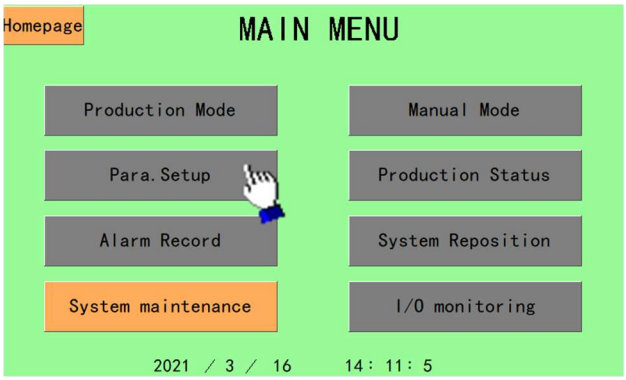
**Figure 5.5**

## Ⅶ. Introduction of Operation Interface

**1、 Entering the Main Menu:** Turn on the power switch to enter the booting interface (See Fig 7.1), and then press anywhere on the touchscreen to enter the Main Menu interface (See Fig 7.2);

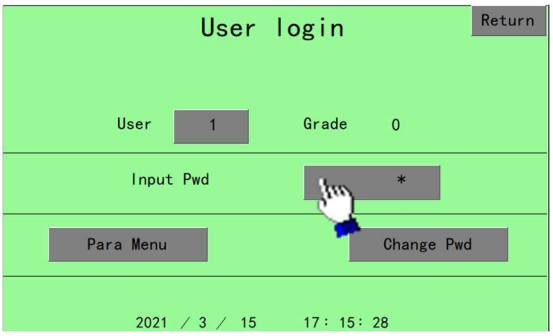



（Fig 7.1）

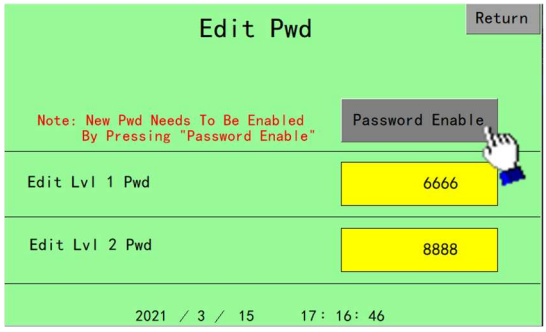



（Fig 7.2）

◆ The “Parameter Setup” of the products to have ACF prebonded to them is typically the first selection chosen by an operator when substrates or FPC require ACF to be prebonded to them (See Fig 7.2).




（Fig 7.3）




（Fig 7.4）

**2、 User Password:** After selecting the “Parameter Setup” interface from the Main Menu (See Fig 7.3), please input the corresponding user password and confirm it. That allows you to choose between “Para Menu” and “Change Pwd”. Choose “Para Menu” to enter the Parameter Selection Menu interface for the product prebonding parameters (Fig 7.5 - 7.10).

Choose “Change Pwd” to change the passwords of either user 1 or user 2 (Fig 7.4).

◆User: The users include two codes, namely “1”and “2”， which represent two operators；

◆ Input password: The original passwords of User “1”and User “2” are separately “6666” and “8888”. The operator needs to input the password before the modification of the parameter in order to avoid the parameter modification by the unauthorized personnel;

◆ The User “1” only can change the products selected for prebonding; User “2” can not only change the prebonding profile for each product, but also modify the passwords of User “1” and User “2” (Refer to Fig 7.5); The “Password Enable” button should be pressed to activate the new password after the modification of the password (Refer to Fig 7.5).

## 3、 Parameter Setup:

3.1 The different prebonding parameters for the products can be programmed according to the different types, 50 products (groups) can be stored (See Figs 7.5 – 7.9). You must select a group so that the prebonder knows which parameters it is to run next in production.

3.1.1 If you wish to gain access to a particular product, press that product group number and then choose or change the values for the eight ACF prebonding parameters of the product. These parameters are the heat press time, ACF length, vacuum delay, cycle time, receiving delay, roll of acf speed, cutter delay, and platform forward delay (See Fig. 7.10). Then press “Write Parameter” to save them in the system and also to instruct the prebonder that this is the product you will run next in production.

3.1.2 If there are many models of the products to be programmed, you can set the other 49 groups of parameters by using the “Copy the Data” and “Set No” buttons. The system will record and save these settings into the other groups.

3.1.3 Parameters Menu: The following are the descriptions of the prebonding parameters (Fig 7.10):

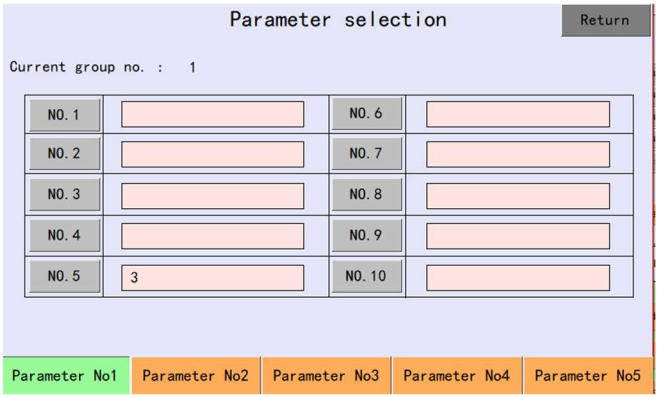
a. Heat Press Time: The time the bonder applies heat after descending to the substrate or FPC
b. ACF length: The length of ACF prebonded to the substrate or FPC
c. Vacuum Delay: The delay after pressing the left start button before the fixture vacuum activates
d. Cycle Time: The length of delay between bond cycles when running Demo Mode

e. Receiving delay: The delay before the ACF take-up reel rotates to take up the backing-layer slack

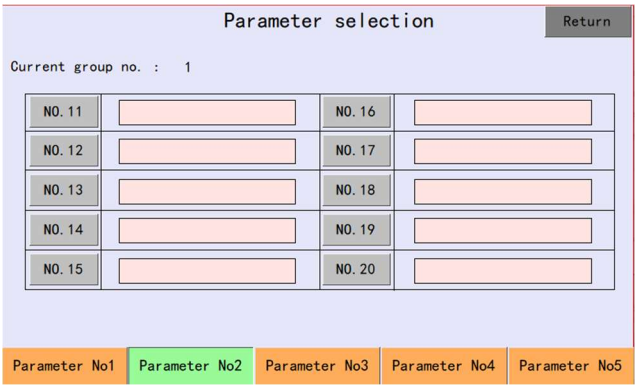
f. Roll of Acf speed: The speed at which the ACF moves through the Prebonder.

g Cutter Delay: The delay after pressing the manual button before the cutter actually cuts

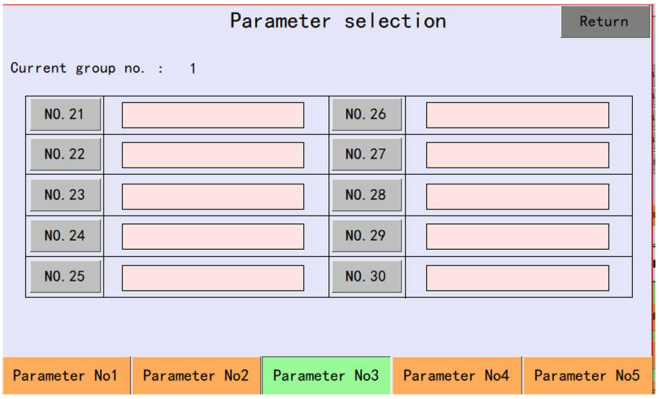
i. Platform forward delay: The delay after pressing the dual start buttons before the platform moves



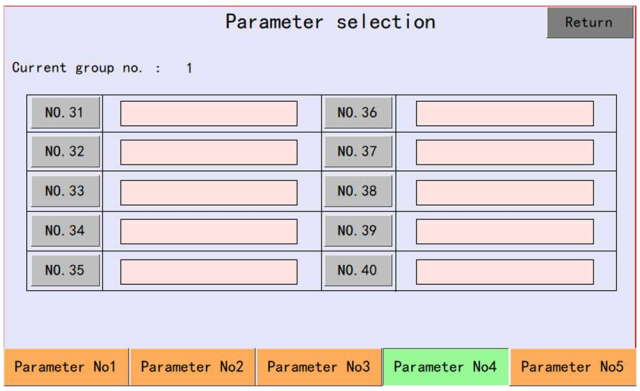

（Fig 7.5）



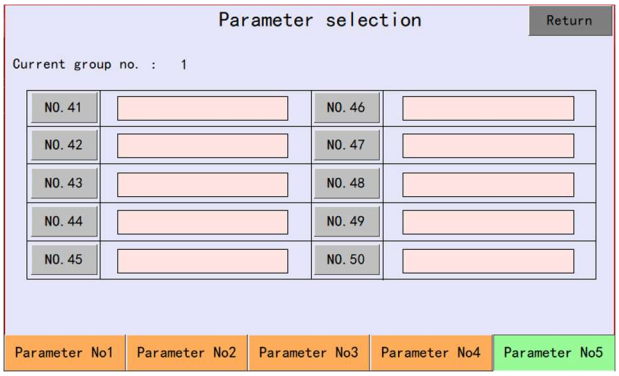

（Fig 7.6）



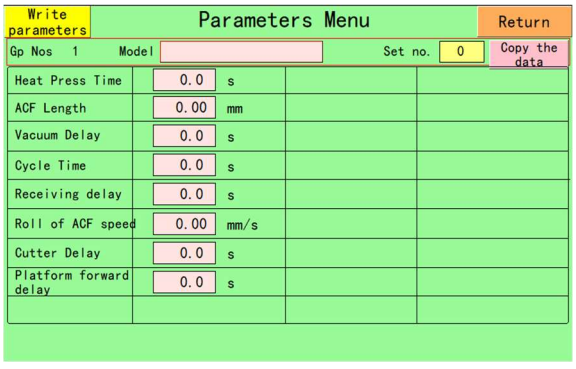

（Fig 7.7）




（Fig 7.8）

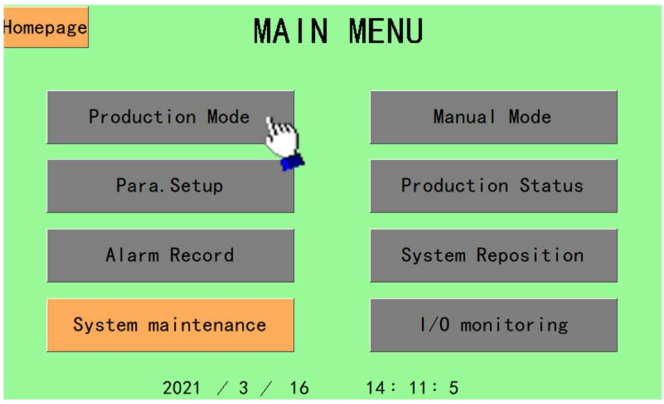



（Fig 7.9）

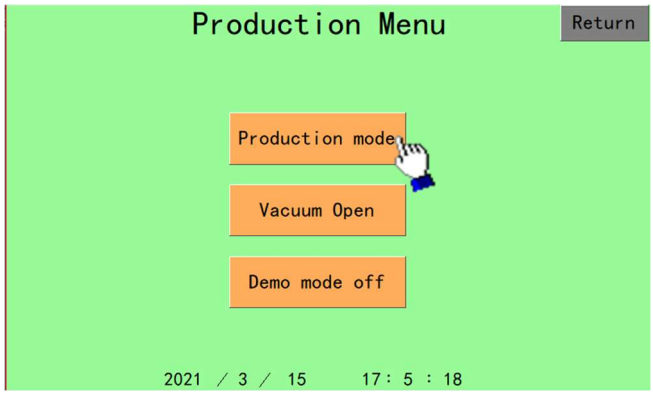



（Fig 7.10）

**4、 Production:** After entering the “Production Menu” by selecting the “Production Mode” button on the main menu, select the “Production Mode” button to activate the automatic production working mode of the system (Refer to Fig 7.10). Press the “Start” button on the Production Mode Menu (Refer to Fig 7.11). Place the substrate or FPC onto the fixture and press the left start button on the machine to secure with vacuum. Then press the dual start buttons simultaneously. The machine then prebonds the ACF to the substrate or FPC automatically.



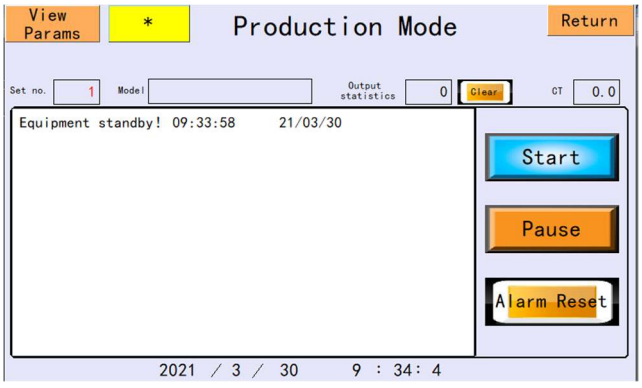

（Fig 7.11）



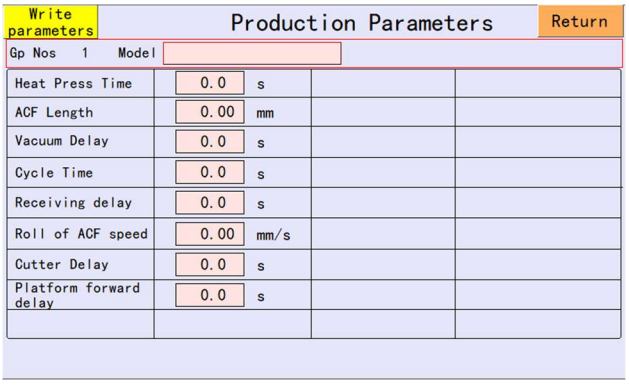

（Fig 7.12）

◆ “Vacuum Open/Close” button: You can control the Vacuum ON/OFF to the stage fixture. Sometimes you might prefer to run the machine without vacuum supplied to the fixture.

◆“Demo Mode Off/On” button: You can control the ON/OFF status of the demo mode. The demo mode just operates the machine in a dry-run fashion.




（Fig 7.13）




(Fig. 7.14)

4.1 Production Mode Menu: The descriptions of the production mode commands (Fig 7.13) are:

a. Start: Allows the bonder to begin the ACF prebond cycle once the dual start buttons are pressed. After the Start softkey on the touchscreen is pressed, it will change to “In Start”, which signifies that it is time to place the substrate or FPC in the machine onto the fixture.

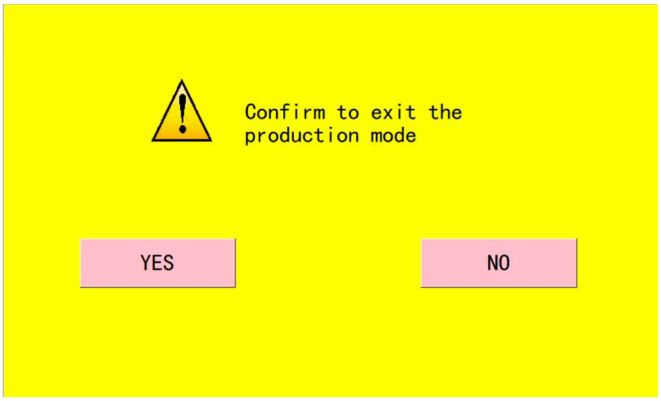
b. Pause: Pauses operation of the machine. Operator must press “Start” again on touchscreen to resume

c. Alarm Reset: Resets the alarm

d. View Parameters: Can be selected if operator wishes to view the ACF prebond parameters (Fig. 7.14) or possibly change them. After pressing this soft key, you will be asked to input password “9999” in order to see the parameters.

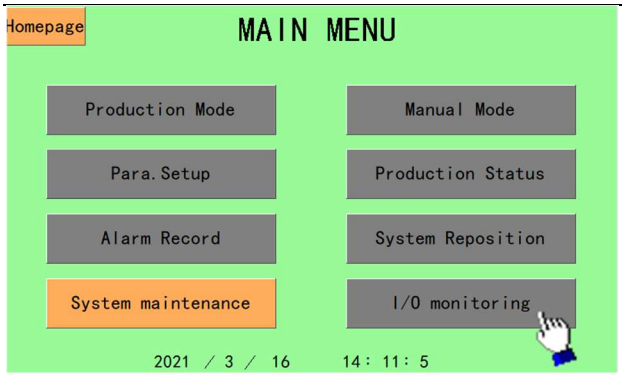
e. Set Number, Model, Output Statistics, CT: Set number is the group number and model is the name of the group (typically a customer product name), Output statistics show the number of ACF prebonds produced and CT is the current cycle time of the last ACF prebond produced.

f. Return: When selecting “Return” in the Production Model menu, a software screen appears requiring the operator to confirm that they wish to exit the production mode, (Fig 7.15). Selecting “Yes” sends you back to the Main Menu.

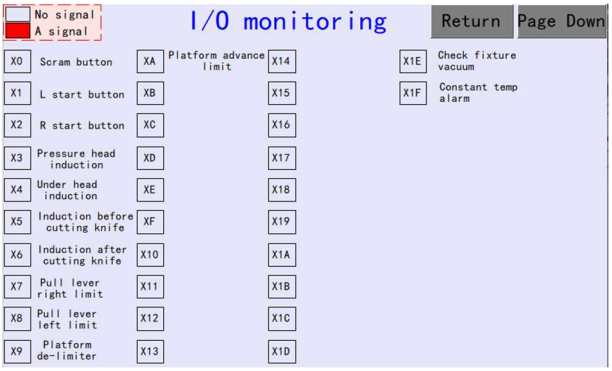



(Fig. 7.15)

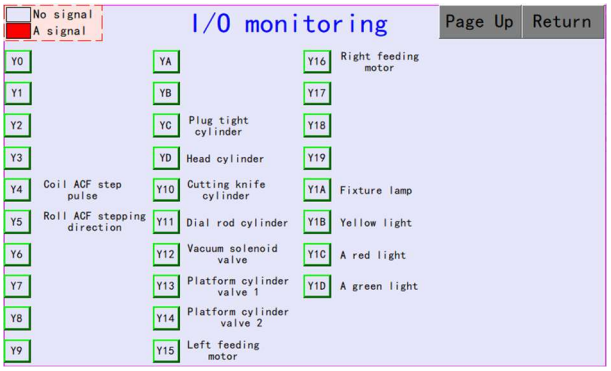
**5. I/O Monitoring:** Selecting “I/O Monitoring” in the Main Menu shows the operator the real-time actions of the moving systems of the machine when the machine works in the production mode (Refer to Fig 7.16 – 7.18);




（Fig 7.16）

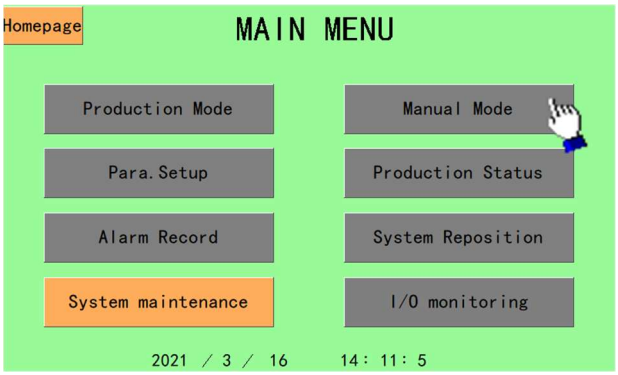



(Fig. 7.17)

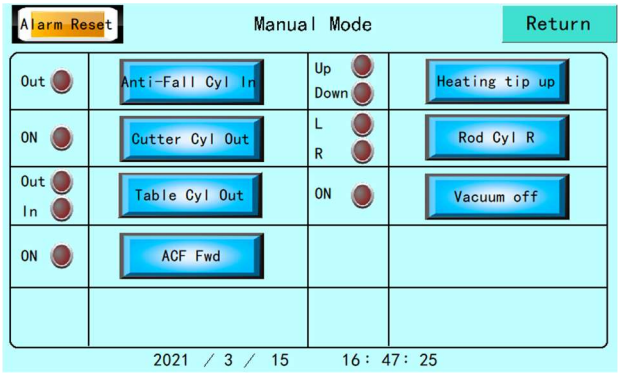



(Fig. 7.18)

**6、Manual Mode: E**nter “Manual Mode” by selecting “Manual Mode” on the main menu in order to activate the seven components by selecting any of their corresponding buttons (Refer to Fig 7.12-7.13)；




（Fig 7.19）




（Fig 7.20）

a. Anti-Fall Cylinder In/Out: When the power to the Prebonder is shut-off, this component locks the prebond head in-place so it can’t descend. This command allows a safety engineer to test this feature.

b. Cutter Cylinder In/Out: Allows the ACF cutter to perform its half-cut function

c. Table Cylinder In/Out: Allows the fixture table to move in/out

d. ACF Feed Fwd On/Off: Allows the ACF to feed forward or stop

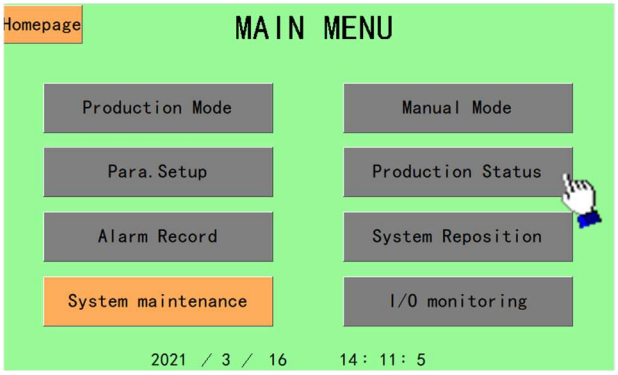
e. Heating Tip Up/Down: Allows prebond head to descend, ascend

f. Rod Cylinder Right/Left: Allows ACF backing layer rod to move right/left in order to remove backing layer from half-cut ACF

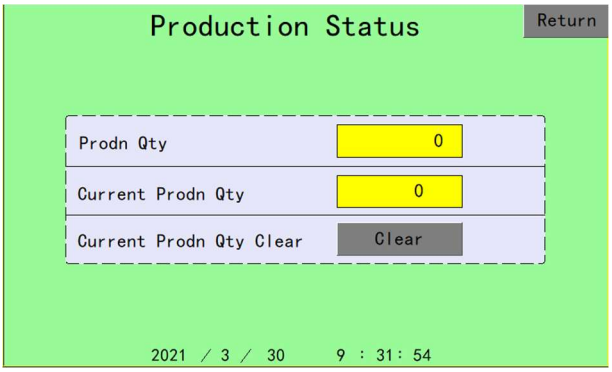
g. Vacuum On/Off: Allows fixture vacuum to be turned on/off

h. Alarm Reset: Resets alarm

**7、Production Status:** Selecting “Production Status” on the main menu (Fig 7.21) allows the operator to inspect and modify the planned production quantity. Clearing the “Production Quantity” (Fig 7.22) sets it back to 0. Once the machine reaches its planned production quantity, it will stop running until it is cleared.

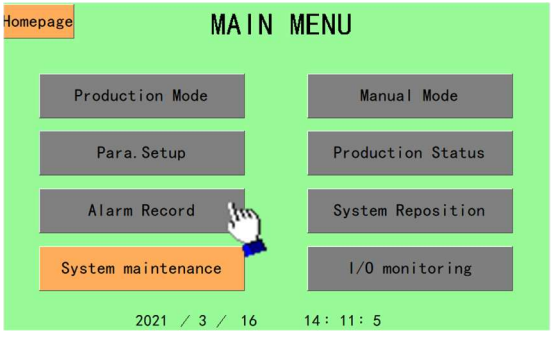



（Fig 7.21）

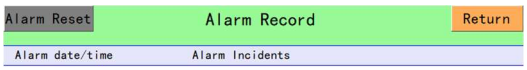



（Fig 7.22）

**8、Alarm History:** You can enter the “Alarm Information” interface by clicking the “Alarm Record” button on the main menu to view the information of faults appearing in the normal operation of the equipment (Refer to Fig 7.23 – 7.24)

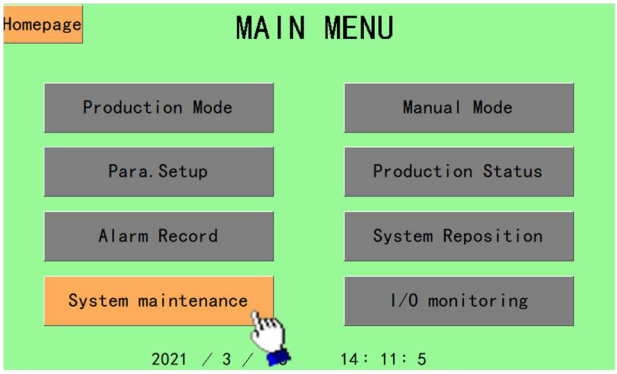



（Fig 7.23）

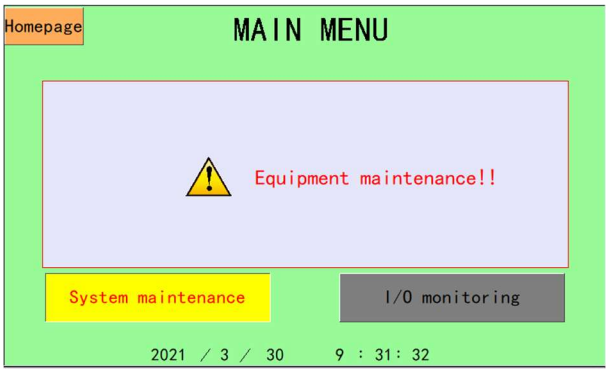



（Fig 7.24）

**9、System Maintenance:** Selecting “System Maintenance” on the main menu creates the window shown in Fig 7.26 and alerts everyone that the machine is not available for production.

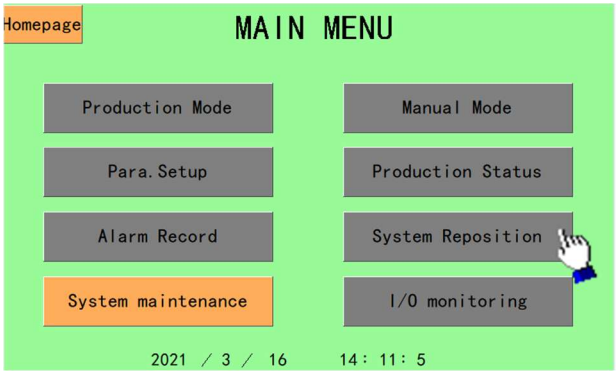



（Fig 7.25）




（Fig 7.26）

**8、System Reposition:** You can initiate “System Reposition”” by selecting the “System Reposition” button on the main menu to reset machine to home positions (Fig 7.27); this is most helpful after using manual mode to move things around manually in case the operator forgets to return a subassembly (like the fixture stage) to its home position. If the machine requires a system reposition, it will temporarily not show the “Production Mode” button on the Main Menu in order to keep the operator from making a mistake and damaging the machine.




(Fig 7.27）

## Ⅷ. Precautions

1. Maintain the inlet air pressure of the machine between the range of 0.5~0.7MPa;
2. The power supply should be grounded reliably;
3. Adjust the equipment feet down and fasten the nuts after adjusting the flatness of the machine;
4. Keep your hands and other objects away from the working area of the machine during operation;
5. Do not tear up, smear or modify the prompt labels, nameplate and other similar items on the machine body at will;

## Ⅸ. Maintenance and Service

### 1、 Daily Routine Inspection

1.1 The appropriate discharge schedule of the condensate water from the air filter should be made according to the drying conditions of your factory compressed air source. Discharge method: Turn off the main air pressure source valve and empty the air in the machine, then turn on the valve slowly and discharge the condensate of the filter through the tiny air pressure release valve (about 0.02 MPa);

1.2 Cleaning method of the prebond head: Clean the prebond surface of the head with the cotton swab after dipping in alcohol (IPA) so as to make sure that the surface is smooth and free from any residue. Never remove the residue on the prebond head with a blade or other similar hard objects.

### 2、 Weekly Routine Inspection

2.1 Air Circuit check: Turn off the power and then shut off the main source of air pressure to observe the time it takes from turning off the air source to the small amount of descent of the prebond head. If the time is less than 20s there may be air leakage in the equipment. If so, inspect all air lines and repair;

2.2 Use an ohm-meter to test the stage so as to confirm the machine body is grounded well.

### 3、 Monthly Routine Inspection

3.1 Check whether any fasteners are loose and tighten them if necessary;

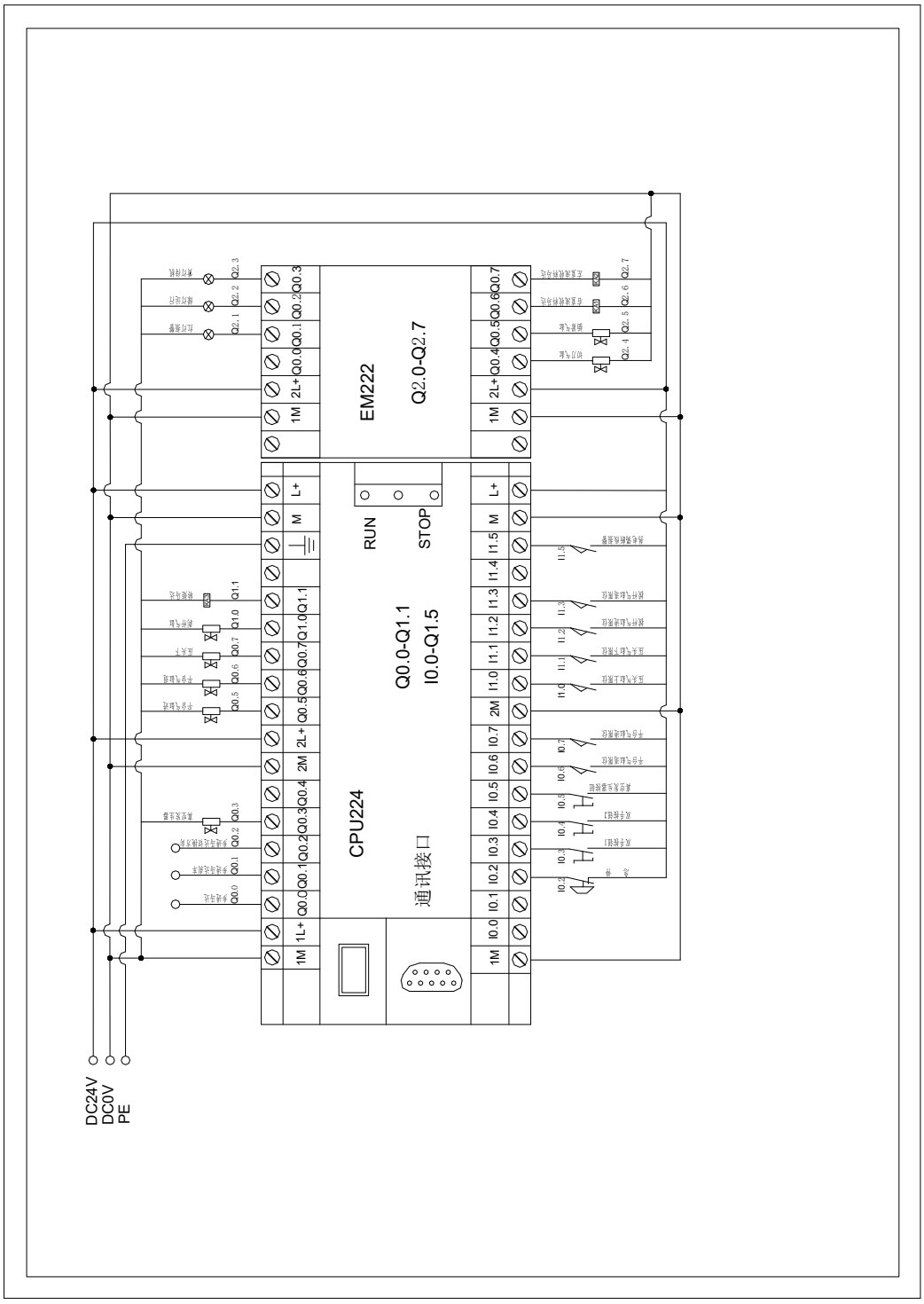
3.2 Get the cylinders to move back and forth manually to observe whether the movement is smooth. Clean the cylinder orbits and then lubricate it if necessary；Lubrication requirement: 32-150cst.

3.3 Cleaning the condensate filter: Shut off the air pressure source, and then rotate and disassemble the filter cup and the filter element by hands. Blow off the residue in the filter element with the compressed air and then clean the filter element in the reverse direction with IPA or equivalent

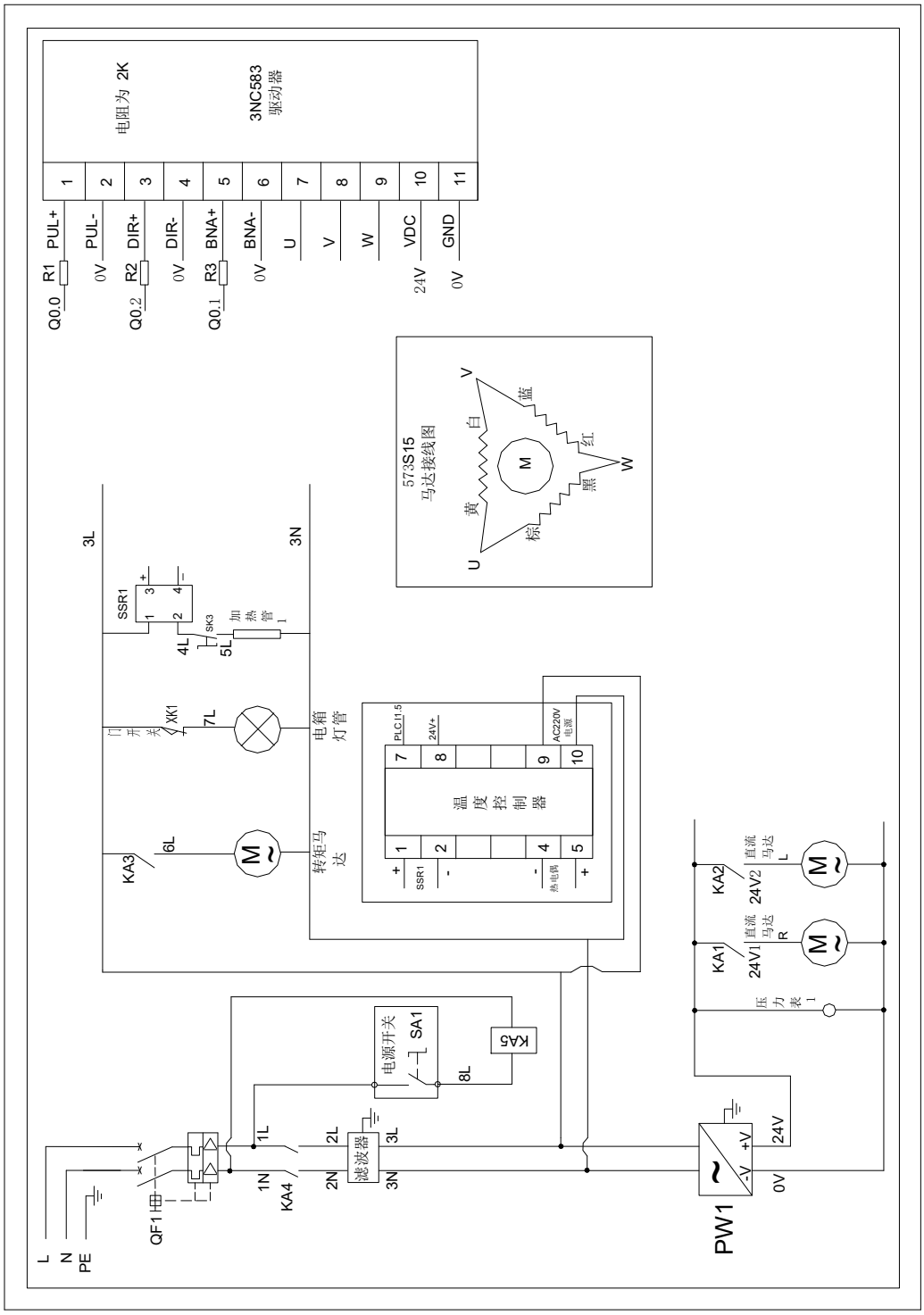
# X.Troubleshooting

| Symptoms | Causes | Solutions |
|---|---|---|
| **Insufficient ACF Prebond** | Incorrect air pressure | Adjust the air pressure regulating valve |
| | Prebond head not flat | Adjust the prebond head coplanarity regulating bolts |
| | Insufficient time/temperature | Measure temperature on substrate and adjust the time/temperature |
| **No temperature rise or instability of temperature** | The heater cartridge(s) is burnt out. | Replace the cartridge. |
| | The thermocouple is oxidized. | Replace the thermocouple. |
| | The bolts of the temperature control wires are loose. | Fasten the bolts of the temperature control wires |
| **No machine power** | The fuse is burnt out. | Replace the fuse. |
| **Stage movement failure** | The stage home switch is in poor contact. | Replace the switch. |
| **Prebond head movement failure** | The prebond head home switch is in poor contact. | Replace the switch. |
| **Thermocouple failure** | The thermocouple is in open circuit or fallen off. | Replace the thermocouple. |
| **Vacuum failure** | The vacuum valve is defective. | Replace the vacuum valve. |
| **Cooling failure** | The cooling air valve is defective. | Replace the cooling air valve. |

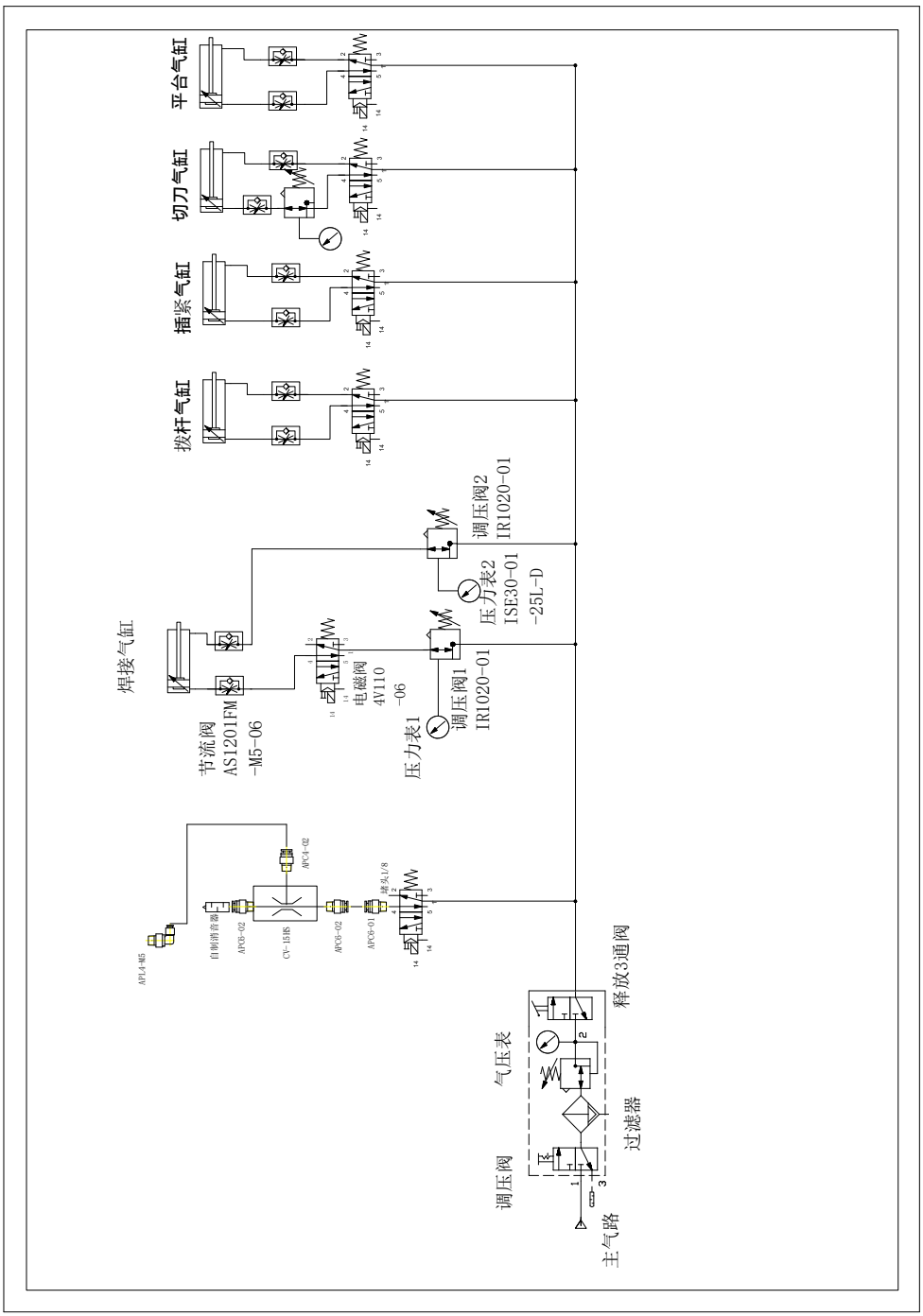
# Appendix Ⅰ: PLC Wiring Diagram



## Appendix Ⅱ: Main Circuit Wiring Diagram



## Appendix Ⅲ: Air Circuit Diagram



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