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Service Manual of PANA 9600S Full-automatic Nucleic Acid Workstation

# sopyright Sopyright Service Manual of PANA 9600S sci annono sci annono sci annono sci annono sci annono sci anno sc **Full-automatic Nucleic Acid Workstation**

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Xi'an Tianlong Science and Technology Co., Ltd.

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**Special instructions:** 

- **The maintenance manual is only applicable to PANA 9600S fully automatic nucleic acid** workstation;
- When receiving customer's feedback by phone, please implement fault diagnosis first according to the fault. If the fault can not be located, select one of the key points, and ask the customer for on-site confirmation to facilitate follow-up maintenance with spare parts;
- In case of fault during on-site instrument installment or training for the customer, check the cause of the fault according to "fault diagnosis";
- Communicate with customers to confirm whether there are faults before instrument installation, customer training and instrument upgrade; carry tools and common spare parts no matter whether there is a fault or not;
- **Repair the instrument according to the Maintenance Manual. Contact the relevant responsible person if there is any problem;**





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### 1. Common fault diagnosis

### 1.1 Blurred screen

### Fault description:

### Troubleshooting process:



Step 2: Power on the instrument, press the "Delete" key on the keyboard to enter the Boot interface, and ,09×ri select "Northbridge" in the "Chipset" column;



Step 3: confirm that the resolution rate is set to "1024x768 single 18 bit LVDS" in "CP LCD Panel

Aptic Setup Utili Chipset	lty - Cupyright (C) 2018 American
Totel IGD Configuration Triegnated Dephice Primery Dicolog DVGT Fre-Allocated UVGT Totel Ntz Men	(Englised) LIGN DP LCD Paries Type P00000 - Starts 10000 - 1000
Priners JOPA Boot Disview EP LED Pacel Type Of Parel Packlight Comtrol	1024x768 Single 16Bit LVOS 1024x768 Single 16Bit LVOS 1024x768 Single 24Bit LVOS 1280x768 Single 16Bit LVOS 1280x800 Single 16Bit LVOS
Mex TELUO	1280x000 Single 1681t LVDS 1280x1024 Dumi 2481t LVDS 1280x1024 Dumi 2481t LVDS 1366x768 Single 1881t LVDS 1366x768 Single 2481t LVDS

If the setting is incorrect, press "F10" to save and then press "Ctrl+Alt+Del" to restart. After the display is normal, it can be confirmed that the Boot setting cannot be saved because the COMS battery of the industrial control board has no power. Replace the CMOS battery on the industrial control board (battery model CR2032). See "1.10 Disassembly Process" for the method of disassembling the machine to the position of the industrial a crianons control board.

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If the setting is normal, it is necessary to continue the troubleshooting; Step 4: Disassemble the instrument to the position of industrial control board. See "1.10 Disassembly Process" for the disassembly method, and confirm whether the terminal of the screen wire is loose; ,084<sup>r</sup>

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If the wire is loose, confirm that the instrument is normal after re-plugging If the wire is not loose, it is necessary to continue the troubleshooting

Step 5: Connect the qualified display screen module to the industrial control board to verify whether the industrial control board or the display screen is abnormal.

If the display is normal, replace the display module. For the replacement method, see "2.2 Display Module Replacement";

If the display is abnormal, replace with the qualified industrial control board module. For the replacement method, see "2.11 Industrial Control Board Module Replacement"

### **1.2 Inaccurate touch screen position**

Fault description:

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Inaccurate touch screen, insensitive operation, and ineffective operation.

### **P** Troubleshooting process

Troubleshooting process Step 1: After the instrument is powered on, find "eGalaxTouch" in the program and run the screen sopyrios calibration program;



Step 2: After selecting "4-point calibration" in the "Tool" column of the calibration interface, start the screen calibration;

0	Edge Compensatio	on Hardware About Setting Tools Display
Ar.	Linearization Curv	
Υ,		
		50
	4 Points Calibration	Do 4 points alignment to match display.
	Clear and Calibrate	Clear linearization parameter and do 4 points alignment.
	Linearization	Do 9 points linearization for betters touchscreen linearity.
	Draw Test	Do draw test to verify the topo

Step 3: According to the prompts on the screen, click the center of the target to complete the calibration. After the completion, click Ok as shown by the prompt.



If the fault disappears, it is confirmed as a screen fault



If the fault remains, it is necessary to continue the troubleshooting

aniono Step 4: Disassemble the instrument to the position of industrial control board. See "1.10 Disassembly Process" for the disassembly method, and confirm whether the terminal of the screen wire is loose;

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If the wire is loose, confirm that the instrument is normal after re-plugging If the wire is not loose, it is necessary to continue the troubleshooting

Step 5: Connect the qualified display screen module to the industrial control board to verify whether the industrial control board or the touch screen is abnormal.

If the screen is normal, replace the display module. For the replacement method, see "2.2 Display Module Replacement";

If the screen is abnormal, replace the qualified industrial control board module with qualified one. For the replacement method, see "2.11 Industrial Control Board Module Replacement"

### 1.3 ADP fault

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### Fault description:

Various abnormalities prompted according the self-check of the instrument after being powered on, such as ADP fault, failed ADP reset, and no ADP response.

### Troubleshooting process

Step 1: Enter the engineering software interface, select the "Position Parameter" column, and respectively reset ADP1-4 by using the Z-axis function; Q.

Unit Control	Barcode & Photo	Heating & Cooling	Position Farameter	项目编辑	分组	编辑	M	enu
Pipetting	Extraction	拷机		N				
Sample Area		Sa	mple Area	Sample Hold	ler 1			
Sample Holder 1	Curr	ent(mm) T	arget(mm) Move	Stop	Reset	Current Setting(mm)		
Sample Holder 2	X Axis 0.00	0	Move X	Stop	Reset X	4.99	Save	
Sample Holder 3	Y Axis 0.00	0	Move Y	Stop	Reset Y	259.09	Save	
Sample Holder 4	Z Axis 🔘 AJ	DP1 O ADP2 C	ADP3 O ADP4 C	) all				
Sample Holder ö	Z Axis 3.00	0	Move Z	Stop	Reset Z	136.68	Save	
Sample Holder 6	X Axis Clearance	0				0.00	Sava	
	Y Axis Clearance	No				18.00	Save	

Step 2: find out the abnormal ADP, replace motor and photoelectric switch with qualified ones at the same time and then repeat step 1;

In case of abnormality, follow ADP and replace ADP materials. See "2.1 ADP replacement" If ADP is not followed, replace the circuit board connected with abnormal parts. Refer to "2.7 Replacement of driver board of biaxial motor"





### 1.4 Instrument disconnection

### Fault description:

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Reset timeout after the instrument is turned on, and failed action of ADP or extraction module.

### **Troubleshooting process**

,09×ri Step 1: Enter the Ethernet setting interface of the computer and check the attribute setting in "TCP/IPv4" scienc of "Ethernet 2";

Ethernet	Properties		
Networking	Sharing		
Connect			-0
🕎 Inte	l(R) I211 Gigabit Netwo	rk Connection #2	Oli
This conn	ection uses the followin	Configure g items:	
	ient for Microsoft Netwo le and Printer Sharing f S Packet Schedular	or Microsoft Net.	
	iternet Protocol Version	(ICF/IPv4)	
< - X:	crosoft LLDP Pretocol Dr:	iver >	
Insta Descrip	tion polimetal	Properties	
Transm The de provid	asion Control Protocol In ault wide area network pr as communication across di	ternet Protocol. otocol that Verse	
~			

Step 2: Confirm that the IP settings of the instrument are the same as the following figure. Two sets of IP must be set at the same time; at. Ononstian



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ced TCP/IP Settings				K	0
ttings DNS WI	NS			Ø,	
addresses			n	~	
IP address		Subnet mask	is		
192. 168. 41. 10 38. 38. 38. 10		255. 255. 255. 2 255. 255. 255. 0	5		
	.dd	Edil	Remove		
fault sateways:					

In case of inconsistency, re-insert and re-set IP

If it is consistent, it is necessary to continue the troubleshooting

Step 3: Enter the engineering software and select "Upgrade" in the "Menu" column to enter the upgrade interface.

			Light & UV Lamp		Drop Catcher	中文
Derect Kit Di	Wr1 L ADP2	ADP3 ADP4	Extract UV Lamp () Or	• Off	O On	English
Motor Reset	Un	oad Tip Plunger Reset	UV Lanp On	• Off	● 0ff	数据维护
1			Light O On	• Off	Reset	Upgrade ##
		Error Code	Camera Light 🔿 On	• Off		Exit
Status Light			System Configuration		cC	
Normal Warning	0 0n 0 0n	<ul> <li>Off</li> <li>Off</li> </ul>	Sample Scanner 2		5	
	and the second se					

Step 4: Select "pipetting upgrade" and "extracting upgrade" respectively, then "connect" to obtain the version, and confirm the software version of the board that can be read normally. If it cannot be read, replace the corresponding board. See the corresponding item of 2 Fault module replacement".

下位机升级 Pipetting upgrade	connect a my or Extracting ungrade	
IP 38.38.38.38 端口 49151	注接 断开 获取版本 ► Obtain the	
Driver board	version	
₩2300 0.0.0 0.0		de

Step 5: Check whether the network cable connection is loose or falling off. of i an



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### 1.5 Inaccurate camera identification

### Fault description:

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Leak identification of mixing sleeve of deep-well plate and Tip leak identification of gun head.

### Troubleshooting process

Step 1: Confirm the abnormality of consumables;

Deep-well plate: check whether the stirring sleeve and the magnetic beads are in the same hole during the experiment. It is easy to identify the magnetic beads as the stirring sleeve when they are in the same hole. Modify the program

Tip: Confirm whether Tip has no filter element, whether abnormal materials and other materials have obvious color difference, etc.

Step 2: Enter the engineering software and confirm the correction parameters in the "Photographing" interface in the "Barcode Photographing" column;



If all are 0, query the factory records and re-save the correction parameters If it is normal, it is necessary to continue the troubleshooting Step 3: Re-debug camera parameters in the engineering software interface



### 1.6 Failed loading of the mixing sleeve and inaccurate parameters of the

### horizontal pushing position

### Fault description:

Failed loading of the mixing sleeve, mixing sleeve falling off, the horizontal pushing position is inaccurate, and the mixing sleeve is crushed

### Troubleshooting process

Step 1: Confirm whether the motor top wire is loose. If it is loose, re-apply the middle-strength thread glue to fix it;

Method: When energized, the motor is in the state of self-lock. Pull the belt back and forth to confirm whether there is idle travel.

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Step 2: Enter the engineering software, select "Import" in the "Extraction" interface in the "Position Parameter" column, import the backup parameters in the D disk of the instrument, and confirm whether the parameters such as forward and backward pushing and loading are correct;



If the parameters are different, and the instrument parameters are abnormal, import them again If the parameters are the same, it is necessary to continue troubleshooting Step 3: Adjust all parameters of the extraction module

### 1.7 Inaccurate pipetting position and Tip loading failure

### **Fault description:**

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Abnormalities such as Tip loading failure, gun head dropping, and gun head hole offset.

### Troubleshooting process

Step 1: Confirm whether the top wire of X/Y/Z motor is loose. If it is loose, re-apply the middle-strength thread glue to fix it;

Method: When energized, the motor is in the state of self-lock. Pull the belt back and forth to



confirm whether there is idle travel.

, an long Step 2: Enter the engineering software, select "Import" in the "Extraction" interface in the "Position Parameter" column, import the backup parameters in the D disk of the instrument, and confirm whether the parameters such as forward and backward pushing and loading are correct;



If the parameters are different, and the instrument parameters are abnormal, import them again OIF the parameters are the same, it is necessary to continue troubleshooting sú Fault descore Step 3: Adjust all parameters of the extraction module

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After turning on the power supply, the instrument cannot be started and used normally.

### **Troubleshooting process**

Step 1: After powering on, first confirm whether the power button light is always on;



Step 2: If the power button lights up normally, analyze the failure of connection between the display screen and the instrument which will not be introduced in detail here;

If the power button light is not on, remove the left shell and confirm whether the power



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indicator lights (2 green lights) are on normally.





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If the power supply is not on normally, remove the fuse box in the power switch and confirm whether the fuse is burnt out. ier Iofianof





Step 4: If the fuse is burnt out, replace the fuse;

If the fuse is not burnt out, replace the power supply.

### 1.9 Blocked X/Y axis motion

### Fault description:

Abnormalities such as unsmooth running of guide rail, and block, stuck part.

### Troubleshooting process

Step 1: power off and manually move the motion module on the guide rail to confirm whether there is

mechanical jamming or uneven stress;

If so, confirm the interference of guide rails and foreign materials and consumables at

abnormal points, and clean them up.

Step 2: Power on and push the motion module by hand to confirm whether to use idle stroke

If so, re-fix the pulley top wire of the guide rail power motor and fix the belt pressure plate

Step 3: Connect the corresponding motor driver board with a new motor to confirm whether it is a motor fault or a driver board fault

If the new motor is trouble-free, replace the motor

If the new motor still fails, replace the driver board

### 1.10 Disassembly process

### **Process description:**

Auxiliary disassembly: disassemble the instrument until each board and module can be replaced, and guide the maintainer to replace materials and modules on site

### **Disassembly process**

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Step 1: remove the back plate: use M4 internal hexagonal screwdriver to remove the 12 fixing screws on the back plate and remove the back plate;

Visible: Y-axis motor driver board, general control board, nucleic acid control board, router, and ultraviolet lamp adapter board. la. sci anlonos ctianlonos



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Step 2: Remove the right side plate: remove the 3 fixing screws at the top of the right side plate with M4 internal hexagonal screwdriver, and then remove the right side plate; Visible: industrial control board, refrigeration board, nucleic acid module power board, reagent rack indicator light board, USB board, and refrigeration module.

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Step 3: Remove the left side plate: use M4 internal hexagonal screwdriver to remove the 3 fixing screws at the top of the left side plate and remove the left side plate; Visible: power indicator light, refrigeration board of status light board, power supply, power rp Atianono Mianono board of pipetting module, X-axis motor driver board, etc.



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with MZ.5 internal hexagonal screwdriver, and take off the ADP housing; Visible: ADP control board, ADP1-4 biaxial motor driver board, drip motor driver board, camera, 4 ADP, etc.





① Remove the 4 belt fixing plate screws on the left side of thermal module with M3 internal hexagonal screwdriver; Tianlong



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2 Remove the four drag chain fixing plate screws on the right side of the thermal module with M3 internal hexagonal screwdriver;

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③ Remove the 8 fixing screws above the thermal module with M3 internal hexagonal screwdriver;



④ After lifting the thermal module, remove the 5 fixable screws on the waterproof board; Visible: 3 thermal control boards and 24 heater strips tial



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### Step 6: Disassemble and remove the extraction module

antong ① Use M2.5 internal hexagonal screwdriver to remove and take off the 8 screws on the top shell, and remove the top



2 Remove and extract the 3 fixing screws on the left side with M3 internal hexagonal screwdriver;

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③ Use M2.5/3 internal hexagonal screwdriver to remove and extract 7 fixing screws on the right side, unplug the ultraviolet lamp wire and remove the right shell;

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(4) Unplug the extraction indicator wire and remove the front side plate of extraction;



Visible: lifting motor, magnetic motor, horizontal pushing motor, rotary sleeve, magnetic rod, top plate, rotary frame, magnetic frame, etc.

### Step 7: Disassemble the refrigeration module

1) Remove the 4 fixing screws on the right panel with M4 internal hexagonal screwdriver, and take off the right panel;



2 Unplug all connecting wires of the refrigeration module; nn sci ortianlono



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③ Unplug all connecting wires of the refrigeration module;

### 2. Fault module replacement

### 2.1 ADP replacement

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### **b** List of materials for fault replacement

u P	lt mod replac	lule replacement	t ci	1.01		
L	list of m	aterials for fault repla	acement			
L	List of m No.	aterials for fault repl Material code	acement Material name	QY	Remark	
L	List of m No.	aterials for fault replation of the second s	acement Material name ADP Module	<b>QY</b>	Remark	
I	<b>No.</b> 1 2	aterials for fault replation of the second state of the second sta	acement Material name ADP Module TL27_ADP_Mini_PCBA	<b>QY</b> 1	Remark	
L	<b>No.</b> 1 2 3	Aterials for fault replay           Material code           2402003500           4270002400           3270419600	ADP Module TL27_ADP_Mini_PCBA ADP Mounting base	<b>QY</b> 1 1 1	Remark	
L	<b>No.</b> 1         2         3         4	Aterials for fault replay           Material code           2402003500           4270002400           3270419600           3270330100	ADP Module TL27_ADP_Mini_PCBA ADP Mounting base FFC flat cable. 1.0-10P	QY           1           1           1           1	Remark	

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### Troubleshooting process

Step 1: with reference to the disassembly process, remove the ADP housing and unplug the long flat e ofi ofianion cable of the faulty ADP;





Step 2: Use M3 internal hexagonal screwdriver to remove two screws for fixing ADP, and remove ADP and small board;



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Step 4: After plugging in the long flat cable, manually move ADP up and down to make sure that the flat cable does not rub other accessories on both sides

### 2.2 Display module replacement

### List of materials for fault replacement

This is a pre-installed component. Please consult the after-sales project leader

### **Troubleshooting process**

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Step 1: Unplug all the connecting wires of the display module on the industrial control board, and remove the wire binding button on the back side of the front panel;



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Step 2: Remove the display screen support;



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Step 3: assemble in reverse order of disassembly.

### 2.3 Rotary sleeve replacement

### List of materials for fault replacement

	No.	Material code	Material name	QY	Remark
	1	4390600000	TL39 finished rotary sleeve	1	Subcontracting finished
Č.	.0		- 22 -		



### Troubleshooting process

Step 1: Disassemble the instrument according to the disassembly process until the extraction module can be seen;

product module

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Step 2: Manually rotate the lifting belt and the magnetic belt, and move the rotary frame and the magnetic rod frame to the lowest end;



Step 3: Remove the abnormal rotary sleeve and 6 fixing screws of the shielding cover with M3 screwdriver, and take off the shielding cover;





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Step 4: on the lower side of the rotary frame, remove 1 gear shaft fixing screw at the edge of the rotary sleeve with abnormal size, and remove the gear shaft and rotary sleeve;



Step 5: Install the  $\phi \Phi 3X30$  pin in the pin hole, then place the rotary sleeve and the adjacent gear shaft on the rotary frame at the same time, and fix the gear shaft from the lower side after leveling; ortianiono





Step 6: Complete the assembly recovery in reverse order of disassembly;

Step 7:Rotate the two belts. Adjust the rotary frame to the upper side of the lifting shielding plate and adjust the magnetic rod frame to the middle position of the magnetic shielding plate.



# cienu 2.4 Magnetic rod frame replacement

### List of materials for fault replacement

No.	Material code	Material name	QY	Remark
1	3390401900	Magnetic rod seat	1	
2	3390402801	Thin wall pipe 3.3*100 🕥	8	Pre-assembly is
3	3390402900	Grinding rod 3*76	8	required
4	3390403000	Magnetic rod-3*45	8	

### **Troubleshooting process**

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Step 1: Disassemble the instrument according to the disassembly process until the extraction module can be seen;

Step 2: Manually rotate the lifting belt and the magnetic belt, and move the rotary frame and the magnetic rod frame to the lowest end; w scient scient



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Step 3: Use M3 internal hexagonal screwdriver to remove the abnormal fixing screw of the magnetic rod seat, and take off the magnetic rod seat. The pins should not be lost;

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tanlong taced Step 4: Put back the pins, install the magnetic rod seat to be replaced into the instrument, and fix it with M3 screwdriver;





Step 5: Rotate the two belts. Adjust the rotary frame to the upper side of the lifting shielding plate and adjust the magnetic rod frame to the middle position of the magnetic shielding plate.

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### 2.5 Heater strip replacement

### List of materials for fault replacement

No.1/4 heater strip of deep-well plate:

No.	Material code	Material name	QY	Remark
1	3390402400	Temperature module-I	1	
2	2112001400	Temperature sensor (Murata NTC)	1	
3	3380301700	Heater strip 150	1	Pre-assembly is
4	3380301800	Temperature sensor wire 150	1	required
5	3100200200	Heater strip circuit board of extractor	1	

### No.1/4 heater strip of deep-well plate:

2	No.	Material code	Material name	QY	Remark
5	1	3390402500	Temperature module-I	1	
	2	2112001400	Temperature sensor (Murata	1	S
			NTC)		
	3	3380301700	Heater strip 150	1	Pre-assembly is
	4	3380301800	Temperature sensor wire 150	1	required
	5	3100200200	Heater strip circuit board of	1	
			extractor		
	Heat co	ntrol board	0,		

### Heat control board

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No.	Material code	Material name	QY	Remark
1	4380000500	TL38_Heat control board	1	Pre-heating program is
				required

### **P**Troubleshooting process

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Step 1: disassemble the thermal module according to the disassembly process and lean it against the extraction cabin door, and remove the 5 screws on the protective plate to take off the r, scient scient



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Step 2: Remove the 6 fixing screws on the thermal well plate with M3 screwdriver, and take off the control board (end here if the control board it to be replaced);

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Step 3: Remove the 6 fixing screws on the waterproof plate with M3 screwdriver. After removing the waterproof plate, the heater strip can be seen; opti

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Step 4: Remove 2 fixing screws of heating strip with M3 screwdriver, and complete the replacement of heater strip (mainly in the insulation pad and wire direction);



Step 5: Complete the assembly in reverse order of disassembly. When assembling the heater strip, it is necessary to debug the position of the heater strip with tooling;

### 2.6 Extraction control board replacement

### List of materials for fault replacement

No.	Material code	Material name 🕥	QY	Remark
1	4380000300	Extraction control circuit	1	Pre-heating program is
		board PCBA		required

### **P** Troubleshooting process

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Step 1: Disassemble the instrument according to the disassembly process until the board to be replaced can be seen;

Step 2: Make corresponding marks on the board card and connecting wire with a marker pen, and then unplug the wires one by one;

Step 3: Remove the 4 screws for fixing the board card with M3 screwdriver and replace it with new scie scie





Step 4: Complete the assembly according to the reverse order of disassembly;

### 2.7 Replacement of driver board of biaxial motor

### List of materials for fault replacement

No.	Material code	Material name	QY	Remark
29 <sup>1</sup>	4380000200	Biaxial stepping motor driver PCBA	1	Pre-heating program is required. Confirm 1/2 motor or 3/4 motor
<u> </u>				

### Troubleshooting process

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- Step 1: Disassemble the instrument according to the disassembly process until the board to be replaced can be seen;
- Step 2: Make corresponding marks on the board card and connecting wire with a marker pen, and then unplug the wires one by one;
- Step 3: Take off the shield, remove the 4 screws for fixing the board card with M3 screwdriver, and (0)replace it with the new board card; ,094 iom

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Step 4: Complete the assembly according to the reverse order of disassembly, wherein the dialing code is consistent with the board card to be replaced;

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### 2.8 Replacement of general control board

### **•** List of materials for fault replacement

	ist of m	naterials for fault repl	acement		all'
27	No.	Material code	Material name	QY	Remark
F	1	4380000000	Universal type I PCBA of TL control board	1	Pre-heating program is required

### Troubleshooting process

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- Step 1: Disassemble the instrument according to the disassembly process until the board to be replaced can be seen;
- Step 2: Make corresponding marks on the board card and connecting wire with a marker pen, and then unplug the wires one by one;
- Step 3: Take off the shield, remove the 4 screws for fixing the board card with M3 screwdriver, and replace it with the new board card;





Step 4: Complete the assembly according to the reverse order of disassembly, wherein the dialing code is consistent with the board card to be replaced

### 2.9 Replacement of other boards

### List of materials for fault replacement

	No.	Material code	Material name	QY	Remark
		4270000401	Universal stepping motor driver PCBA	1	Pre-heating program is
					required
	.0	4270002100	TL27_ main power board _PCBA	1	Pre-heating program is
	1				not required
	1	4270002500	TL27_ADP_Control_PCBA	1	Pre-heating program is
ζΩ,	Þ				required
		4270002600	TL27_ refrigeration board -V2.0	1	Pre-heating program is
			PCBA		required

### Troubleshooting process

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- Step 1: Disassemble the instrument according to the disassembly process until the board to be replaced can be seen;
- Step 2: Make corresponding marks on the board card and connecting wire with a marker pen, and then unplug the wires one by one;
- Step 3: Take off the shield, remove the 4 screws for fixing the board card with M3 screwdriver, and replace it with the new board card;

Universal stepping motor driver PCBA



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Main power board PCBA



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ADP\_Control PCBA



Refrigeration board



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Step 4: Complete the assembly according to the reverse order of disassembly, wherein the dialing scienc code is consistent with the board card to be replaced

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### 2.10 Refrigeration module replacement

### List of materials for fault replacement

No.	Material code	Material name	QY	Remark
1	4270101200	Refrigeration module	1	Pre-installed finished
				products in the factory

### Troubleshooting process

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Step 1: First disassemble the display module according to the disassembly process of the refrigeration module;

Step 2: Install the new refrigeration module on the instrument and fix 4 M3 screws, of which the left side needs pin positioning; JORY'

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Step 3: Connect all wires on the adapter plate according to the sequence during disassembly;



Step 4: Complete the assembly in reverse order of disassembly;

### 2.11 Industrial control board module replacement

### List of materials for fault replacement

No.	Material code	Material name	QY	Remark
1	2118000000	Embedded industrial	1	Deet
		mainboard		Δυυι

### Troubleshooting process

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Step 1: Disassemble the instrument according to the disassembly process until the board to be replaced can be seen;

Make corresponding marks on the board card and connecting wire with a marker pen, and then unplug the wires one by one;



Step 3: Remove the 4 screws for fixing the board card with M3 screwdriver and replace it with the new board card. When replacing, remove the fixed hard disk on the board card and re-install it on the new board card.

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Step 4: Complete the assembly according to the reverse order of disassembly; Step 5: Press the "Delete" key to enter the Boot interface by using the external keyboard. Complete the screen resolution and boot LOGO settings, in which the resolution is set to "1024x768 18Bit" and the boot logo is set to "Disabled";

len	Internet of Bandyto		Aptio Setup In Main Advanced Chiosot Set	ility - Copyright (C) 2018 Ameri curity Boot Save & Exit
	Michael Biochen Distriction Statistics Helling Statistics Michael I Michael Statistics Michael Michael Statistics Michael Statistics Michael Statistics	UCH 0 <sup>P</sup> LCD Panel Type 000x600 Single 1081t LVDS 1000x768 Single 2681t LVDS 1000x768 Single 2481t LVDS 1200x768 Single 1881t LVDS 1200x960 Single 1881t LVDS 1200x960 Single 1881t LVDS 1200x960 Single 1881t LVDS 1200x960 Single 2481t LVDS 1366x768 Single 2481t LVDS 1440x400 Duml 2481t LVDS 1400x1050 Duml 2481t LVDS 1400x1050 Duml 2481t LVDS 1400x1050 Duml 2481t LVDS 1400x0050 Duml	Boot Configuration Setup Proport Timeout Bootup Noback State Show Pell Logo Det Option Priorities Boot Option #2 Boot Option #3	1 [On] [Disabled] [UEFI: SanDisk] [SanDisk] [UEFI: Built-in FFI 1
	55	1680x1050 Dum1 2481t LVDS 1600x1200 Dum1 2481t LVDS 1900x1000 Dum1 2481t LVDS 1900x1200 Dum1 2481t LVDS	Hand Drive BBS Priorities	
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### 3. Software upgrade

### 3.1 Upgrade of nucleic acid module

### Software upgrade process

ont Tianlong Step 1: Open the instrument Engineering software "PANA-Engineer" and enter the "Engineer" interface.

Password: 666666;

Pipetting	Extrac	tion	拷	机								The Desidence
Sample Area				Sai	mple Are	3	Sample Hol	der 1				
Sample Holder 1		Currer	t(mm)	Ta	r setien)	Mov	e Stop	Reset	Curr	ent Setting(m	»)	
Sample Holder 2	X Axis	0.00		0		Move X	Stop	Reset X	4.99	Conder Services	]	Save
Sample Holder 3	Y Axis	0.00		5		Move Y	Stop	Reset ¥	259.0	9		lave
Sample Holder 4	Z Axis	• ADP		DP2 0	ADP3 (	) adp4	O ALL					
Sample Holder 5	Z Axis	3.00	d'i	0		Move Z	Stop	Reset Z	136.6	3	s	979
Sample Holder 6	X Axis C	learance		0					0.00			
	Y Aris C	learance		0					<u></u>		51	ive
Reservation Area	Single S	Step Fine T	uning	-					18.00		Sa	ve
Fluta Records And	B						Current(mm)					
Tip Area	X Axis	+10	+1	+0.5	+0, 1	+0.03	0.00	] -0.03	-0.1	-0, 5	-1	-10
Waste Area												
Lynis Position	Y Axis	+10	+1	+0.5	+0.1	+0.02	0.00	-0.02	-0.1	-0.5	-1	-10
Elution Position											7	
										. 01		The second state

Step 2: Select the "Menu" button and select "Upgrade" from the drop-down menu to enter the upgrade interface;

Unit Control	Barcode & Photo	Heating & Coo	ling Posit	ion Parameter	项目编辑	分组	目編編		Men
Pipetting	Extraction	拷机				1	5		中文
ample Area			Sample	Area	Sample Hold	ler 1	Upgrade		English
Sample Holder 1	Cur	rent(mm)	Target(mm	) Move	Stop	Quarat	Current Setting(m)	-	升级
Sample Holder 2	X Axis 0.00	0		Move X	Stop	Reset X	4.99	Sav	Exit
Sample Holder 3	Y Axis 0.00	0		Move Y	- Chr	Reset V	259.09	Sau	

Step 3: In the upgrade interface, select "Extraction Upgrade", click "Connect" and then click "Get Version" to confirm the version of the driver board and thermal board. If it is not the latest version, the instrument needs to be upgraded;



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机升级			-0	
<sup>移液升级→</sup> Pipetting upgrade	connect	● 提取升级	Extracting u	pgrade
38.38.38,38 端口 49151	连接	断开 · · · · · · · · · · · · · · · · · · ·	w版本 Obt	ain the
river board		A	vers	ion

Step 4: Click the "Browse" button of the board to be upgraded, select the upgrade file and click the "Upgrade" button to complete the upgrade;

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### 3.2 Upgrade of pipetting module

### Software upgrade process

Step 1: Open the instrument Engineering software "PANA-Engineer" and enter the "Engineer" interface. Password: 666666;

Pipetting	Extrac	tion	拷柯	ι								
ample Afres				Sam	mple Are	ea	Sample Hol	der 1				
Sample Holder 1		Curre	nt(mm)	Taz	rget(mm)	Move	Stop	Reset	Curre	nt Setting(m	,)	L.
Sample Holder 2	X Axis	0.00		0		Move X	Stop	Reset X	4.99	and the second	0	ave
Sample Holder 3	Y Axis	0.00		0		Move Y	Step	Reset ¥	259.09			
Sample Holder 4	Z Axis	() ADI	PI O AD	P2 ()	ADP3 (	O ADP4	ALL			S		AVE
Sample Holder 5	Z Axis	3.00		0		Move Z	Stop	Report 7	136.68			
Sample Holder 6	X Axis C	learance		0						9		lve
	¥ Axis C	learance		0				2	18.00		Sa	ye
Reservation Area	Single S	Step Fine 1	funing					. 2				
Elute Reserve Area		+10	+1	+0.5	-0.1	40.02	Current(mm)					
Tip Area	A AXIS					40.05	0.00	-0.03	-0.1	-0, 5	-1	-10
Waste Area							x					
Lysis Position	Y Axis	+10	+1	+0.5	+0.1	+0.02	0.00	-0.02	-0.1	-0.5	-1	
Elution Position						1	う					
Reagent Area		+10	+1	+0.5	+0.1	+0.02	3.00	-0.00				

Step 2: Select the "Menu" button and select "Upgrade" from the drop-down menu to enter the upgrade interface;

Pipetting	Extre	ction	拷机						
Sample Area	P		S	ample Area		Sample Hold	ler 1	Upgrade	E
Sample Holder 1		Current(mm)		Target(nm)	Move	Stop	Reset	Cwrent Setting(mm)	Ŧ
Sample Holder 2	X Axis	0.00	0		Move X	Stop	Reset X	4.99	Save
Sample Holder 3	¥ Axis	0.00	0		Move Y	Stop	Reset Y	259.09	Save



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Step 3: In the upgrade interface, select "Pipetting Upgrade", click "Connect" and then click "Get Version" to confirm whether the software versions of all boards in the pipetting part are up to date;

下位机升级	hanna		う	
O 移液升级→ Pipetting upgrade	connect	一提取升级	<ul> <li>Extracting u</li> </ul>	ipgrade
IP 38.38.38,38 端口 49151	连接し	断开	<del> </del>	ain the
Driver board	and the	TITLE	vers	sion
驱动板 0.0.0 0.0.0	~	CONTRACTOR OF STREET	浏览	升级
<sup>热学板</sup> Heating board			Browse 浏览	Upgrade <sub>升级</sub>

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Step 4: Upgrade the middle computer, click the "Browse" button, select the upgrade file, and then click the "Upgrade Middle Computer" button to complete the upgrade. Before upgrade, the refrigeration module must be closed, otherwise there will be risk of upgrade failure;



Step 5: Upgrade the lower computer: click the "Browse" button, select the corresponding "Lower Computer Address" and then click the "Upgrade" button to complete the upgrade;

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Step 6: After upgrade, exit the engineering software and re-enter, read the version, and confirm that all the software is upgraded to the latest version.

### 4. Regular maintenance items and list of wearing parts

### 4.1 Regular maintenance items

To ensure the normal operation of the instrument at client end, after-sales personnel should follow the following steps to check the instrument every year and maintain it regularly

### Step 1: Confirm the software version of the instrument

Confirm whether the instrument uses the latest version of software after starting up. If not, it must be upgraded to the latest version;

### Step 2: reliability of wire terminal

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reliably;

Semi-annually check whether all parts of the instrument are loose and ensure that all parts are fixed

Mainly confirm all board card terminals exposed after removing rear shell, left shell, right shell and ADP outer shell.

### Step 3: Guide rail cleaning and rust prevention

Confirm the X-axis guide rail, two Y-axis guide rails, two thermal guide rails, four ADP guide rails and two guide rails of the cabin door to ensure that the guide rail surface is clean, free of foreign matter and rust. If any, clean the foreign matter and rust, and use rust remover to remove rust and maintain the guide rail at the same time (wipe it with a dry rag dipped in rust remover);

### Step 4: debugging of pipetting and extracting position parameters

Open the engineering software and confirm all the position parameters of the instrument one by one by using the consumables used by the client:

Pipetting parameters: Hole 1 of rack 1 to 6 of sample area parameters

Carrier plate A1 of sample retention area parameters

1-6 A1 of Tip area parameters

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1-6 A1 (cracking hole)&A7 (elution hole) of deep-well plate parameters

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Hole 1 of rack 1 to 5 of reagent area parameters

1-2 A1 of PCR area parameters

Waste area parameters

Extract parameters: hole 2 of the horizontal pushing motor parameters

Loading stirring sleeve position & lifting motor limit position of lifting motor

parameters

Magnetic position of magnetic rod motor parameters

### Step 5: Instrument self-check confirmation

Turn the machine on and off to enter the application software, repeat the reset for three times, and confirm the abnormal sound, running status and error information during the reset process;

### Step 6: adjust the sealing performance of the upturned door

Check the gap after the upper flap door is closed. If the gap is too large, disassemble the shells on the left and right side, and debug the front door arm to adjust the gap to be qualified;

### Step 7: Clean the whole machine

Clean up the stains, reagent residual liquid, and consumable scrap inside the instrument, and confirm that there is no failure caused because the instrument is stuck during operation;

### 4.1 List of wearing parts

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The list of wearing parts refers to the list of parts that are easy to fail at the client end and can be replaced by the customer.

	No.	Material code	Material name	Quantity of single	Model
		of cour		machine	
	1	2038000500	Protective tube 10A	2	Littelfuse 0216010.MXP Littelfuse
1	2	2120001700	10V/3W ultraviolet bulb	1	Cnlight 10V/3W
Ĭ	3	2120001200	Ultraviolet lamp tube	3	Cnlight ZW10D15W-Z212
	4	2404007300	Dustproof three-in-one net	1	

## 5. Instrument self-check exception code

### PANA 9600S system fault codes and description

No.	Module	Fault code	Fault description
1		1001—1024	Open circuit of No.X heater strip of No.X deep-well plate
2	-	1025—1048	Short circuit of No.X heater strip of No.X deep-well plate
3		1049—1072	Too fast temperature control of No.X heater strip of No.X deep-well plate
4	Heater module	1073—1096	Too slow temperature control of No.X heater strip of No.X deep-well plate
5		1097—1120	Failed closing of No.X heater strip of No.X deep-well plate
6	, on <sup>0</sup>	1121—1144	Failed heat preservation of No.X heater strip of No.X deep-well plate
×	OT: 3M	<u>.</u>	- 40 -



7		1145—1168	Disconnected Can of The X heating strip of the X deep orifice plate Can be		
8		6001	Stirring motor had no response		
9		6002	Stirring motor reset failed Stirring motor failed to move Stirring motor position exceeded the limit		
10	- Stirring motor	6003			
11		6004			
12		6005	Magnetic rod motor had no response		
13		6006	Magnetic rod motor reset failed		
14	- Magnetic rod motor	6007	Magnetic rod motor failed to move		
15		6008	Magnetic rod motor position exceeded the limit		
16		6009 1# rotary motor had no response			
17		6010	1# rotary motor reset failed		
18	- Rotary motor	6011 C	I# rotary motor motion failed		
19	1	6012	1# rotary motor position exceeded the limit		
20		6013	2# rotary motor had no response		
21		6014	2# rotary motor reset failed		
22		6015	2# rotary motor motion failed		
23		6016	2# rotary motor position exceeded the limit		
24		6017	Horizontal pushing motor had no response		
25	Horizontal pushing	6018	Horizontal pushing motor reset failed		
26	motor	6019	Horizontal pushing motor motion failed		
27		6020	Horizontal pushing motor position exceeded the limit		
28	2	6021	Cabinet door motor had no response		
29		6022	Cabinet door motor reset failed		
30	Cabinet door motor	6023	Cabinet door motor motion failed		
31		6024	Cabinet door motor position exceeded the limit		
32		13002	The front door is open! (Prompt only when the experiment is running)		
33		12020	X-axis control motor reset failed!		
34		12023	X-axis control motor failed to obtain the current position!		
35		12030	X-axis control motor reset failed!		
36		12024	Y-axis control motor failed to obtain the current position !		
37	Directting machale	12031	Z1-axis control motor reset failed!		
38	- Pipetting module	12032	Z2-axis control motor reset failed!		
39	]	12033	Z3-axis control motor reset failed!		
40		12034	Z4-axis control motor reset failed!		
41	]	12035	Z1-axis control motor failed to obtain the current position !		
42	]	12036	Z2-axis control motor failed to obtain the current position !		
43	]	12037	Z3-axis control motor failed to obtain the current position !		
	7				

# Self-contained error codes of ADP materials:

No.	Fault code	<b>S</b> Fault description
1	11004	ADP1 initialization failed! (fault handling process has been added)
2	11005	ADP2 initialization failed! (fault handling process has been added)
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3	11006	ADP3 initialization failed! (fault handling process has been added)
4	11007	ADP4 initialization failed! (fault handling process has been added)
5	11038	ADP1 invalid instruction.
6	11039	ADP2 invalid instruction.
7	11040	ADP3 invalid instruction.
8	11041	ADP4 invalid instruction.
9	11042	ADP1 invalid operand.
10	11043	ADP2 invalid operand.
11	11044	ADP3 invalid operand.
12	11045	ADP4 invalid operand.
13	11046	ADP1 pressure sensor module was not configured or did not work.
14	11047	ADP2 pressure sensor module was not configured or did not work.
15	11048	ADP3 pressure sensor module was not configured or did not work.
16	11049	ADP4 pressure sensor module was not configured or did not work.
17	11050	ADP1 excessive pressure. (fault handling process has been added)
18	11051	ADP2 excessive pressure. (fault handling process has been added)
19	11052	ADP3 excessive pressure. (fault handling process has been added)
20	11053	ADP4 excessive pressure. (fault handling process has been added)
21	11054	ADP1 liquid level detection failure. (fault handling process has been added)
22	11055	ADP2 liquid level detection failure. (fault handling process has been added)
23	11056	ADP3 liquid level detection failure. (fault handling process has been added)
24	11057	ADP4 liquid level detection failure. (fault handling process has been added)
25	11058	ADP1 not initialized.
26	11059	ADP2 not initialized.
27	11060	ADP3 not initialized.
28	11061	ADP4 not initialized.
29	11062	ADP1 gun head ejection failure. (fault handling process has been added)
30	11063	ADP2 gun head ejection failure.(fault handling process has been added)
31	11064	ADP3 gun head ejection failure.(fault handling process has been added)
32	11065	ADP4 gun head ejection failure.(fault handling process has been added)
33	11066	ADP1 piston overload.
34	11067	ADP2 piston overload.
35	11068	ADP3 piston overload.
36	11069	ADP4 piston overload.
37	11070	ADP1 gun head was missing or did not exist. (fault handling process has been added)
38	11071	ADP2 gun head was missing or did not exist. (fault handling process has been added)
39	11072	ADP3 gun head was missing or did not exist. (fault handling process has been added)
40	11073	ADP4 gun head was missing or did not exist. (fault handling process has been added)
41	11074	ADP1 unused.
42	11075	ADP2 unused.
43	11076	ADP3 unused.
44	11077	ADP4 unused.
45	11078	ADP1 expansion error.
46	11079	ADP2 expansion error.
17	11079	ADP3 expansion error



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48	11081	ADP4 expansion error.
49	11082	ADP1 NVMEM access failure.
50	11083	ADP2 NVMEM access failure.
51	11084	ADP3 NVMEM access failure.
52	11085	ADP4 NVMEM access failure.
53	11086	ADP1 instruction buffer was empty or executed or not ready to repeat.
54	11087	ADP2 instruction buffer was empty or executed or not ready to repeat.
55	11088	ADP3 instruction buffer was empty or executed or not ready to repeat.
56	11089	ADP4 instruction buffer was empty or executed or not ready to repeat.
57	11090	ADP1 instruction buffer overflow.
58	11091	ADP2 instruction buffer overflow.
59	11092	ADP3 instruction buffer overflow.
60	11093	ADP4 instruction buffer overflow.
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