DiaSource®

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ELISA PLATE WASHER

DIA3000

User Manual

Version 09.23

DIAsource ImmunoAssays S.A.

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Content

1. General Information

1.1. Warranty Information:

Each Instrument is completely tested and guaranteed for twelve months from delivery. The warranty applies to all the mechanical and electrical parts. It is valid only for proper installation, use, and maintenance in compliance with the instructions given in this manual.

DIAsource ImmunoAssays S.A. will at its discretion repair or replace parts, which may be found defective in the warranty period. The warranty does not include any responsibility for direct or indirect personal and/or material damages, caused by improper use or maintenance of the instrument.

Parts that are inherently subject to deterioration are excluded from the warranty. In case of defects due to misuse of the instrument, any incidental expenses like travel and man-hour service charges will be charged extra.

1.2. Technical Service:

DIAsource ImmunoAssays S.A. is always accessible to the customers for any kind of information about installation, use, maintenance, etc. While asking for service, please refer to this manual, and report the printed serial no. on the identification label.

Only qualified technicians are entitled to fix the instrument; the user, as described in this manual, should carry out ordinary maintenance.

1.3. Disposal instruction:

In case of removal or disposal of instrument, following instructions need to be followed

• Do not dispose in municipal waste; follow local regulations for instrument disposal.
• Plastic parts, Electronic PCBs and components can be recycled, so return back the instrument to manufacturer.

1.4. Contacts:

DIAsource ImmunoAssays S.A.
Rue du Bosquet 2
BE-1348 Louvain-La-Neuve
BELGIUM

Instrumentation Support Service
Hotline phones availabilities : Monday to Friday; 08 :00 to 16:30 (Belgium time)
Hotline phone number : 0032 (0)10 849976
Fax : 0032 (0)10 849990
Email : instrumentation@diasource.be

2. General Safety Warnings

2.1. Security

Pay attention to the following general safety precautions during the operation or maintenance of this instrument. If the customer fails to comply with these precautions or any clear warning in this manual, we will not be responsible for any compensation for personal injury or machine damage.
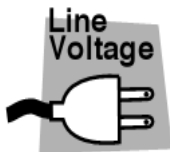
Be sure to read this manual carefully before use and please keep it safe.

Do not use the product for situations other than those described in the manual.

This product is only used in the case described in the product manual.

Before connecting the power supply, please check that the power supply meets the rated input value of the instrument, and make sure that the switch is in the off state.

Protective grounding: Before connecting power, make sure the connection protection grounding in order to prevent electric shock.

Necessity of protective grounding: Do not cut inside or outside protective grounding wire or interrupt the connection of the protective earth terminal. This will cause a potential shock hazard, which may bring harm to the human body

Fuse: Only use the rated current, voltage, and specific form of Fuse (normal fuses, time delay, etc). Do not use different specifications fuse or circuit fuse holder, otherwise it may cause electric shock or fire hazard.

Please do not tear down the shell of the instrument: the operator should not tear down the shell of the instrument. Parts replacement and internal adjustment can be performed by qualified maintenance personnel only.

Do not operate under the air condition of explosive or corrosive. Especially in the flammable gas or corrosion environment

Turn off the power switch and all connections when change its location. Products should be placed in the appropriate location, where can be quickly disconnect power supply connection when in emergency situations. Be careful when handling, especially the high bottle. Please attach the manual with the products when resetting position.

Check and ensure that the settings of AC input voltage are consistent with the fuse specification. There is no abnormality on the surface of power cord. Make sure to cut off the power supply cord or shut off the power switch before inspection.

If there is any abnormal phenomenon or fault, please stop using immediately and cut off the power cord or disconnect the power from the power supply distribution chest and you do not use before product maintenance well.

Please do not dismantle or change the product. If it must be changed, please contact DIAsource ImmunoAssays S.A.

Do not let water or metal objects enter into the product inside.

It won't in the product warranty range, if the product damage is caused by using the wrong power grid to enter.

The end of the cleaning head needle is very sharp and may cause physical injury. Do not place hands or fingers under the cleaning head needle when the instrument is running.

2.2. Precautions

1. The user should read this specification carefully before using the instrument and master the correct method.

2. When the liquid aspirating needle or liquid injection needle is blocked, use the special needle for dredging.

3. When a row of microplate is not the whole strip, it is necessary to supplement the plate to ensure that the microplate can be operated again under the whole strip state, so as to prevent the leakage of liquid and corrosion of machine parts.

4. Do not allow liquid to enter the pump. Dispose of the waste liquid in the waste liquid bottle in time after each use. Before each start-up, check whether the waste liquid bottle is empty. During the use, the waste liquid shall not exceed 80% of the total volume of the waste liquid bottle. Users should pay more attention to this point when cleaning more than two enzyme plates every day.

5. Avoid using in high temperature, high humidity and dusty environment.

6. Shut down immediately after use.

7. Before replacing the fuse tube, unplug the power plug, screw off the fuse tube cover, take out the fuse tube, and connect the standard fuse tube with the machine (Φ5× 20mm, 3A). Put it into the fuse box and tighten the fuse cover.

Note: do not use the fuse with unknown parameters at will, otherwise it may cause fire and electric shock risks.

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2.3. General Symbols

Symbol	Description
⏚	For internal and external grounding. Please ensure that the instrument is well grounded.
		Power-on
○	Power-off
⚠	Caution: To avoid injury, death, or damage to the instrument, the operator must comply with the instructions in the manual.
CE	CE mark
🏭	Symbol for "Manufacturer"
↑↑	Indicates correct upright position of the transport package.
🍷	Contents of the transport package are fragile therefore it shall be handled with care.
☔	Transport package shall be kept away from rain.
⊘	Transport package shall not be rolled.

3. Introduction

3.1. Use of the Instrument

Elisa Plate Washer (Ref. DIA3000) is a laboratory equipment and newly developed model which applying modern machinery and electronic technology. This machine is controlled by microcomputer and the operation is quite easy and quick. Plate washing solution can be arbitrarily set. The single row to the whole row washing can be automatic and accurate completed. The machine will play a major role in the tests in consideration of its exquisite structure, reliable quality and perfect after-sales service.

3.2. Specifications

Parameter	
Cleaning Head	8- 12 channels
Microplate Type	Flat, U, V, Round bottom
Average Residue	< 1µl / well
Liquid suction time	0,1 - 999,9 seconds, adjustable with an interval of 0,1 seconds
Line Flush Time	1-999 seconds
Washing Programs	up to 200 programs
Display	7-inch touch display
Wash Bottle	2 Wash Bottle + 1 Rinse Bottle
Adjustment Needle Position	6 types (Horizontal, left, middle, right, bottom, hole spacing)
Consumption	80 W
Power Supply	AC220V ± 10%, 110V± 10% , 50/60 Hz
Instrument size	47 x 37 x 17 cm
Packing size	72 x 48 x 40 cm
Gross Weight	20 Kg
Programming Mode	Plate Wash, Rinse, Prime
Volume	50-950 µl
Operating Conditions	From + 10°C to 40°C, Up to 80%
Storage Conditions	From -20°c to 55°c, up to 80%
Working Pressure	76.0KPa～106.0KPa

3.3. Basic Operating Principle

Elisa Plate Washer drives cleaning fluid into the microplate and waste exhaust with the principle of positive and negative pressure. The cushioning bottle is pressured during washing. Therefore, don't open the bottle or disconnect the pipe during pump starting.

When the touch screen gets the signal to start cleaning, MCU sends the pump signal and send pulses to the stepper motor drive circuit. Stepper motor forth moving, open the valve, cleaning MPP and then washing plates according to the selected plate washing solution. Man-machine conversation is realized through liquid crystal display.

4. Unpacking and Installation

4.1. Unpacking

The machine has a special packing. After open the packing cases, user should carefully check whether the instruments and accessories are in accordance with list of items in

Table 2-1.

If you find any missing or damaged, please immediately contact the local dealer or manufacturer and it will be helpful for processing.

Note: Please keep packaging materials for future transit or return to factory maintenance.

Table 2-1   Materials List

No.	Name	Units	Qty.	Note
1	Microplate Washer	PCS	1	
2	Certificate card	PCS	1	
3	Power Line	PCS	1	
4	Resistance pen	PCS	1	
5	User Manual	PCS	1	
6	250V/3A Fuse	PCS	2	
7	Washer cleaner	PCS	1	
8	12 needles washing head	PCS	1	12 needles
9	8 needles washing head	PCS	1	8 needles
10	Wash Bottle	PCS	2	
11	Waste Bottle	PCS	1	
12	Cushioning Bottle	PCS	1	
13	Pipe Flushing Bottle	PCS	1	
14	Silicone tube	Set	1	
15	Inspection report	PCS	1	

4.2. Installation

As shown in figure 2-1, Elisa Plate Washer water system consists of washer, wash bottle, waste bottle, pipe flushing bottle, electromagnetic valve, washing head and pipeline. Reference to the water system schematic diagram connect the wash bottle, waste bottle, cushioning bottle, pipe flushing bottle according to the interface name and complete to connect. The cleaning head has two interfaces, the upper interface is the liquid inlet which connecting the thin pipe, the lower interface is the waste liquid port which connecting the thick pipe. Please note the connection order, do not get reversed

Note: Because of the positive, negative pressure principle is used, each time the user open the bottle caps, please tighten the caps of each drum.
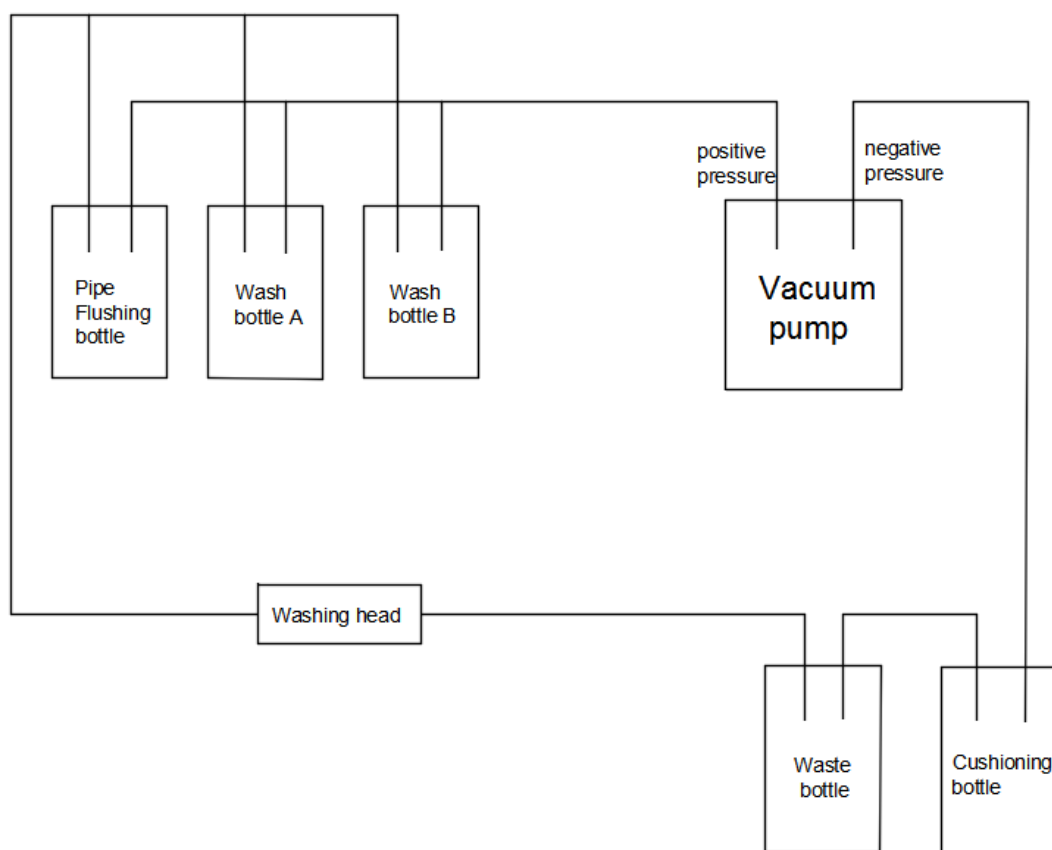
Figure 2-1 Schematic diagram of hydraulic system

Note: Do not use hand to push and pull the washing head fixing frame, it can automatically reset and initialization.

4.3. Testing

After all above works are completed, put some distilled water or pure water in the wash bottle, no more than a full bottle of 4/5 and tighten the caps. Insert the power cord into power supply input pin on the rear panel, then plug the power line to power supply AC220V/110V, 50Hz/60Hz. Notice of low or high voltage power grid volatility and places, users should increase UPS or AC voltage stabilizer before use.

5. Equipment Operation

5.1. Interface Introduction

Figure 3-1

Program Name: Define name according to different washing methods of different projects, and set common washing methods by yourself.

Needle Number: 8 rows of needle washing head and 12 rows of needle washing head can be selected freely.

Volume: 50ul-950ul, adjustable, and the interval of filling volume is 50ul.

Asp. Time: 0.1s-99.9s adjustable, Asp. time interval is 0.1s.

Wash Times: 1-999 times adjustable.

Soak time: (Shake time)**:** 0-999s adjustable, soak time interval is 1s.

Clean Mode: "Sock" and "Shake" can be selected. When the cleaning method is "shake", the soak time is the shake time.

Plate type: You can choose "flat ", "U-shape" and "V-shape" to adapt to different types of microplate.

Cleaning Fluid: Choose "A", " B" and " water". (the washing machine is equipped with five bottles in total, and the rest are Waste bottle and Cushioning bottle).

Start column: The start position of the board washing function can be selected. The default options are 1-12 (8 rows of needle washing head) and 1-8 (12 rows of needle washing head).

End column: The end position of the board washing function can be selected. The default options are 1-12 (8 rows of needle washing head) and 1-8 (12 rows of needle washing head).

5.2. Function Settings

5.2.1 Program Name

1.Click "New Project" to enter the following interface, enter the program name, click "Enter" to save the name and enter the program editing interface as shown in Figure 3-2.

Figure 3-2

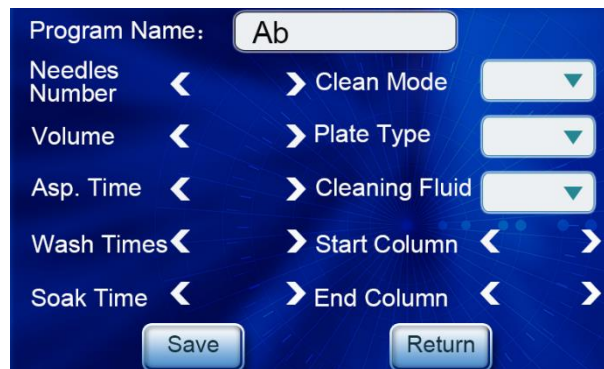2. The program parameters can be adjusted according to the actual washing needs. (see 3.1 for details).

Figure 3-3

3. Click "Save" to save the new program. Wait a moment to save successfully. The saving interface is as follows.
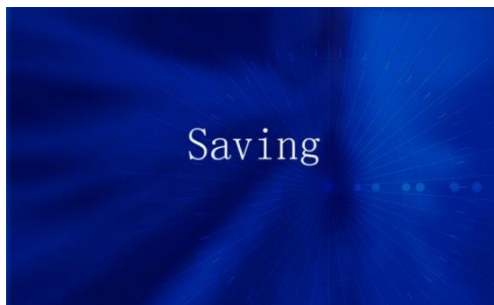

Figure 3-4   Figure 3-5

Note:

After saving, the interface will return to the main interface, as shown in Figure 3-1. Once a program is created, it cannot be deleted, but the program name and parameters can be modified according to the following operations:

- **Choose the program in the main interface, click the program name to modify the name and click "Enter" to finish the modification.**
- **Click any parameter to modify, after that, click "Start" to run the modified program, after the program runs, it can be automatically saved.**

5.2.2 Rinse

1. Click the "Rinse" button to enter the following interface.

Figure 3-6

2. The flushing time of the pipeline can be adjusted by up and down arrows, and the adjustment range is 0-999S, which can be adjusted freely according to different needs. (long press can realize rapid change of time).

3. After setting the pipeline flushing time, click "Rinse". Then enter the pipeline flushing state. After the preset time, the washer returns to the initial interface.

5.2.3 Set up

1. Click the "Setup" button to enter the following interface.

Figure 3-7

2. Click the "Check" button to enter the following interface.

Figure 3-8

: Indicates that the bottle is normal.

: Indicates that the bottle is abnormal.

3. Click "Return" to return to the previous interface.

4. Click the " Adjust" button to enter the following interface.

Figure 3-9

● Center 1, that is, the position of the aspirating needle (long needle) when it is in the center of the first row of holes in the microplate. Adjust or to move the horizontal position of the washing head. (The direction of adjustment shall be horizontal, with the suction needle facing the center of the hole.)

- Two points is the same as above. The first point is the position where the aspirating needle sticks to the bottom of the left wall cup of the hole, and the second point is the position where the aspirating needle sticks to the bottom of the right wall cup of the hole. (The debugging direction is horizontal.)

- Overflow, the operation mode is the same as above, and the standard position is that the tip of the extraction needle is located in the center of the hole mouth. (Debugging direction is vertical.)

- Bottom in the same way as above. The standard position is that the tip of the aspirating needle is at the bottom of the hole. (Debugging direction is vertical.)

- Center 12, that is, the position of the aspirating needle (long needle) when it is in the center of the last row of holes in the microplate. The operation mode is the same as above.

5. After the position is adjusted, click "Save" to save the debugging result. (Restore the position before saving when resetting, and cannot reset after saving.)

6. Click "Version" to enter the following interface.

Figure 3-10

7. Click the "Language" button to enter the following interface.

Figure 3-11

8. Click the drop-down box after selection to pop up a menu of three languages. After selecting English, all the interfaces are in English (The same as in French). The default language of the first boot after the first burn is English.

9. The "Aging" function is exclusive to the debugging staff, and users do not need to use it.

Figure 3-12   Figure 3-13

10. Rinse (automatic rinse interval) which can be set to 0-24, is based on a complete plate washing project. Automatic pipeline flushing will not be carried out until the number of intervals has been set. For example, the automatic flushing interval is set as 2, then the washing machine will automatically flush the pipeline after completing the plate washing task for 3 times.

5.2.4 Introduction to Washing Board Function

1. After all parameters are set, click "Start " to enter the washing interface.

Figure 3-14   Figure 3-15

2. During the washing process, the number of "Wash times No." and "Times Remina" number of washing can be displayed. The operation keys are "Pause" and "Stop".

After clicking the "Pause" key, the current plate washing can be stopped after the end of the action, "Pause" key is replaced by "Go", and then click "Go" again, the plate washing machine will resume normal operation.

After clicking the "Stop" key, the current plate washing operation will immediately end and return to the original position.

(Note: During the pause, if the washing machine is in the state of soak / shake , the timing method is different. If the "Soak" mode is selected, the soaking time starts from the washing plate. If the "Shake" mode is selected, the vibrating plate time starts from the vibrating plate. If paused in soak mode, the timing is suspended.)

5.3. Alarm

5.3.1. The Wrong Washing Settings

Figure 3-16

When the start column and end column of the washing board are inconsistent (that is, the number of the start column is greater than that of the end column), the above alarm will be generated. Click back and readjust the number of washing columns.

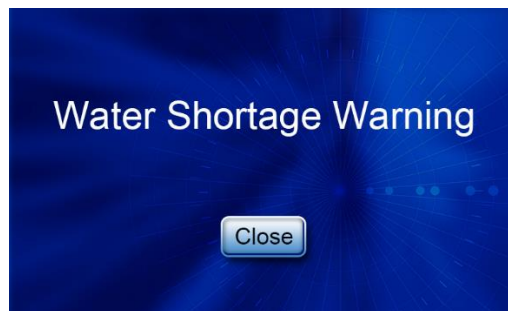### 5.3.2. Liquid Shortage Alarm

Figure 3-17

Take the clear water shortage alarm as an example. When the surplus of the Pipe flushing bottle is insufficient, the above alarm will occur. Click "Close " to end the alarm tone. During this operation, the bucket will not be given a liquid shortage alarm. Click "Cancel", that is, the washing machine will end this operation. After the washing machine returns to its original position, replace the bucket and tighten the bucket cover after adding. Make sure that there is no mistake before the last plate washing project. Click "Close" or "Cancel" when judging the alarm according to the actual liquid margin in the bottle.

(Note: It is forbidden to operate the washing machine when the bottle is empty and the end is not tightened!)

When several bottles are short of liquid at the same time, the alarm message will give multiple alarm messages according to the actual situation in the bottle. For example:
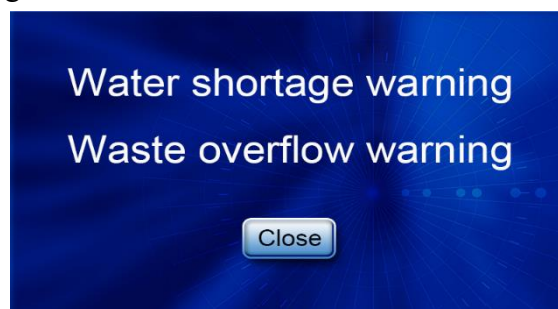
Figure 3-18

5.4 Shutdown

When the microplate washer is finished running, please do not turn off the power supply directly. Click the "Shutdown" key on the main interface, then the washing machine will be initialized and reset. After the reset, enter the following interface. At this time, you can choose to turn off the power supply directly or click the "Return" key. Click "Return" to return to the initial interface and cancel the shutdown.

Figure 3-19

6. Troubleshooting

No Response After Power on

1. No voltage supply or the power socket might be loose. Check the power socket whether there is a voltage .Whether the connection of the plug and socket is secure .Put the power plug into the socket again.

2. The power fuse fusing. Beside the power socket which is at the back of the instrument has two fuse holders, unscrew the fuse with the hand, check whether the fuse fusing. If the fuse burn-out, change the fuse in same model and specification.

> ⚡ NOTICE: When replacing the fuse, making sure to unplug the power plug from the instrument, in order to avoid the risk of electric shock risk of electric shock.

Low Flow or No Flow of Washing Fluid

1. Check whether a sufficient amount washing liquid in the washing bottle.

2. Check the dispensation volume parameter is set too small

3. The cover of the washing bottle is not tighten, the screw from the cover is loose, there is air leakage between cap and screw.

4. There is beam or gather in the silicone tube, the tube blocked. Check the silicone tube and make sure there is no beam or gather. If is beam or gather on the tube, make sure straighten out the gather and cut off cracked parts or replace parts of the silicone tube.

5. The injection position is too low, which causes the long needle (aspirating needle) to suck the injected detergent away. When washing the plate, the position of the long needle of the cleaning head should be about 1mm below the hole port of the enzyme label plate, and it is not allowed to penetrate too much below the hole mouth. if it is necessary to fill the microplate, the long needle can be adjusted to a position slightly higher than the hole bottom by about 0.5mm. (See 3.2.2 setting standard of anti-overflow height for details.)

Washing Fluid Residue

1. The cover of wash and waste bottle is loose, or the screw is loose, there is air leakage between cap and screw.

2. The aspiration needle is blocked. Check the aspiration needle whether there is bulkhead, Use the nozzle cleaner to clean up the tube ,and go on the operation of washing tube. Washing some times and make sure the waste is aspirated in the waste bottle.

3. The aspiration system is blocked .Check the aspiration system whether there is blocked. Removing the silicone tube if it is blocked .Clean up the inside of silicone tube, make sure the tube is good.

4. The aspiration position is too high, the aspiration needle didn't reach the bottom of microplate well. Check and make sure the distance of aspiration needle and microplate well is not too big .If the aspiration did not reach the bottom of microplate, please adjust the touch the bottom position parameter.(See 3.2.2 bottom touch height setting standard for details.)

Washing Liquid Overflow

1. Check and make sure the dispensation volume parameter is not too big.

2. The speed regulator valve is not good, the speed of dispensation is too fast. Counterclockwise rotating speed control valve, while adjusting the speed control valve while watching the dispensation speed until the dispensation speed is normal.

3. The distance between the long needle of the cleaning head and the end face of the microplate cup of the enzyme plate is too large, which causes the overflow function not to play a role. Adjust the "anti-overflow" parameter, adjust the end of the long needle of the cleaning head to about 1 mm below the end face of the hole of the microplate. (See 3.2.2 setting standard of anti-overflow height for details)

Washing Head Keep Dispensation when Washing

1. The valve is not working. Please connect with the manufacturer.

2. Main control board is not working, please connect with the manufacturer.

Positive Pressure Interface Spurt Water

1. The waste bottle is full and the cushioning bottle is not installed as required, the waste liquid was aspirated into the vacuum pump and discharge along the positive tube .Turn off the machine and stop the working ,and then pour out the waste liquid of the waste bottle and cushioning bottle .Connect the waste bottle and cushioning bottle (The wash bottle may be not connected at this time.) before open the machine. The instrument idle running for minutes so that the waste liquid in the vacuum pump may drain out.

2. The positive and negative pressure pipeline connection is wrong so that the waste liquid may be absorbed into the pump directly. According to the operating manual, check the connection of the pipeline is correct.

> ⚠ The waste liquid should not immersed in the vacuum pump for a long time.
> Or the component of pump may corroded by waste liquid and damage the vacuum pump.

Place of Washing Head and Plate Well Mismatching

1. The ELISA plate not be put into the groove of the tray. Reset the ELISA plate again. Make sure the bottom of ELISA plate and the tray is contacted entirely and be flat.

2. The position calibration is not set properly, please readjust the parameter value. (See 3.2.2 for details.)

7. Maintenance and Transport

7.1. Maintenance

- Use the instrument correctly and maintenance is useful for the machine's properly functioning and extend the operating life of the equipment .
- Turn off the power before the maintenance .

1. The storage environment of the instrument shall be dry to prevent moisture, corrosion and strong electromagnetic interference sources.

2. When replacing the fuse tube in the fuse, first cut off the power supply and replace it according to the specification of the fuse tube.

3. The instrument has been precisely adjusted before leaving the factory. In case of abnormal or abnormal operation of the instrument, contact the manufacturer in time, and the user is not allowed to disassemble and adjust it at will.

7.2. Transport

1. The storage environment of the instrument should be kept dry. Prevent the damp and corrosion and keep far away from the interference source of strong electromagnetic fields.

2. The power should be turn off when change the fuse. And change the fuse according to the specification as marked.

3. The instrument is adjusted precisely when it is ex-factory. Please connect with the manufacturer when the machine is abnormal or not working properly. The user should not dismantle and adjust the machine.