Kalstein

Freeze Dryer

(Pre-freezing curve, freezing-drying curve)

Model YR05197

Instruction Manual

Thank you very much for purchasing our Kalstein's Freeze Dryer (Pre-freezing curve, freezing-drying curve) Model YR05197

Please read the "Operating Instructions" and "Warranty" before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the "Warranty" at a hand place for future reference.

Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

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I Summary

The vacuum freezing–drying technology, which is also called sublimation drying, is a technical method that freezes the samples in advance, and then sublimates its moisture in the vacuum state. Goods are easier for long-term preservation after freezing-drying processing. They can be restored to the original state and maintain its chemical and biological characteristics after being watered. So, the freezing-drying technology is widely used in medicine, food, chemistry industry and biological products etc.

The product has five configurations:

- Ordinary drying configuration——the samples will be dried after being pre-frozen.
- Top-press drying configuration——the Xilin bottles containing the samples will be dried after being pre-frozen, then fastens down the bottle cap in hand in the vacuum state. The freeze-drying processing is equivalent to vacuum-packed.
- Multi-manifold drying configuration——samples are connected with freeze-drying cover by rubber valve after they are pre-frozen in special bottle. In freeze-drying process, you can replace freeze-drying bottle at any time, refrigerate different kinds of sample at any time and hang eight different capacities of special bottles at any time. The freeze-drying efficiency is high.
- Multi-manifold top-press drying configuration——the freeze-drying cover

can refrigerate samples which are placed in XiLin bottle. The freeze-drying cover may also hang bottle to dry. So freeze-drying is improved.

- Pre-freezing function——Put stainless steel tray, which is loaded with sample on the pre-freezing shelf, then put the pre-freezing shelf into cold trap and cover insulation lid to pre freeze. The drying process starts after the pre-freezing process finishes.

Ⅱ Characteristics and technical indices

1、Main characteristics

(1) France TaiKang compressor, the refrigeration process is rapid, and the cold trap temperature is low.

(2) LCD screen control system, simple operation and formidable function.

(3) The control system stores automatically the data, and the data can be viewed in the form of the curve. The whole freeze-drying process is clear.

(4) The drying chamber uses the colorless transparent organic glass lid. So may view clearly the samples and observe the whole freeze-drying process.

(5) The vacuum pump is connected with the main engine by international quick joint.

(6) The performance of the machine is stable, easy to operate and low noise.

2、Technical indices

(1) Cold trap temperature: -80℃(empty)

(2) Limit vacuum: less than 5Pa(empty)

Ⅲ Conditions in using

1、Environment temperature in normal working condition: 10℃-30℃.

Relative humidity: less than or equal 70%.

Power supply voltage: AC 220V±10% 50Hz.

The working environment should be no conductive dust, explosive, corrosive gases and strong electromagnetic interference.

2、Storage conditions

environnent temperature: -40℃～50℃.

Relative humidity: less than or equal 93%.

The storage conditions should be well-ventilated, no corrosive gases.

3、The safety classification: I Grade B Type.

Ⅳ Installation and preparations for freeze-drying

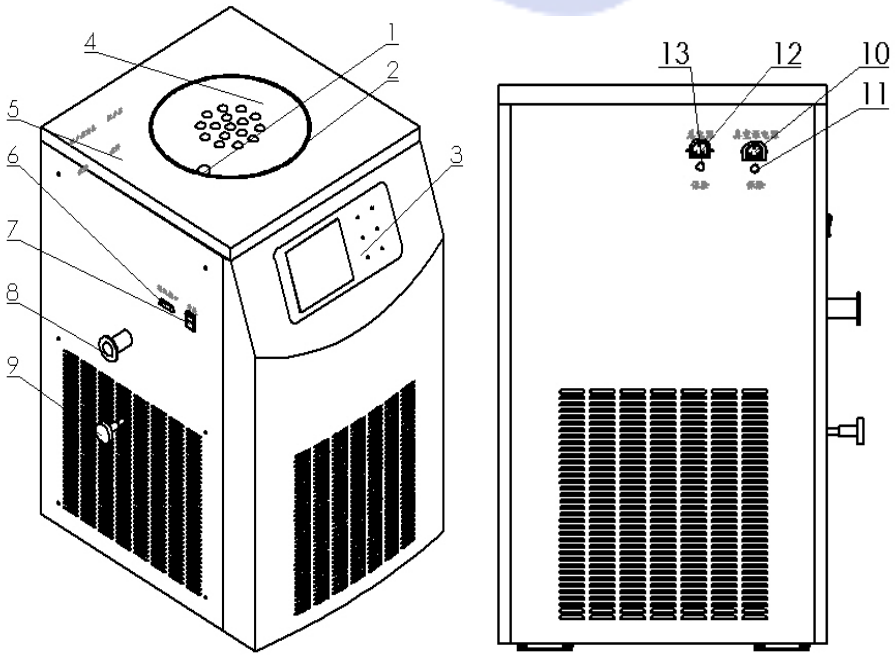

Figure 1-1 Structure of main engine

1、cold trap　2、sealed ring 3、control(display) panel

4、false cover 5、working desk-top 6、communication interface

7、switch　8、vacuum interface　9、drain(inlet) valve

10、vacuum pump power　11、insurance

12、power　13、insurance

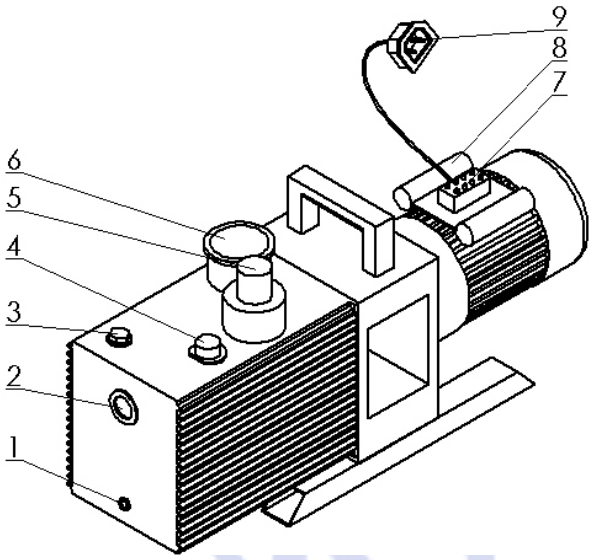

Figure 1-2 structure of vacuum pump

1、hole that drain out oil　2、oil level mirror

3、hole that add oil　4、valve　5、exhaust　6、inlet

7、interface　8、electric capacity　9、vacuum pump power

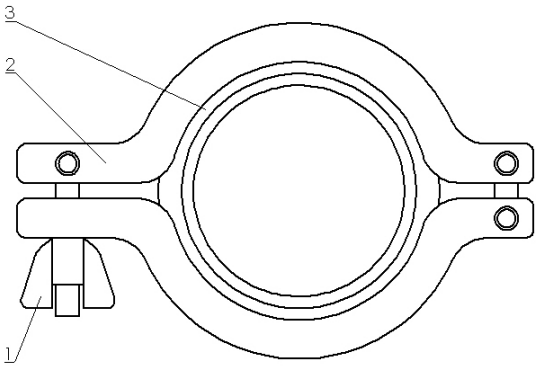

Figure 1-3 structure of clamp

1、screw nut 2、support 3、sealed ring

2、Installation of freeze dryer

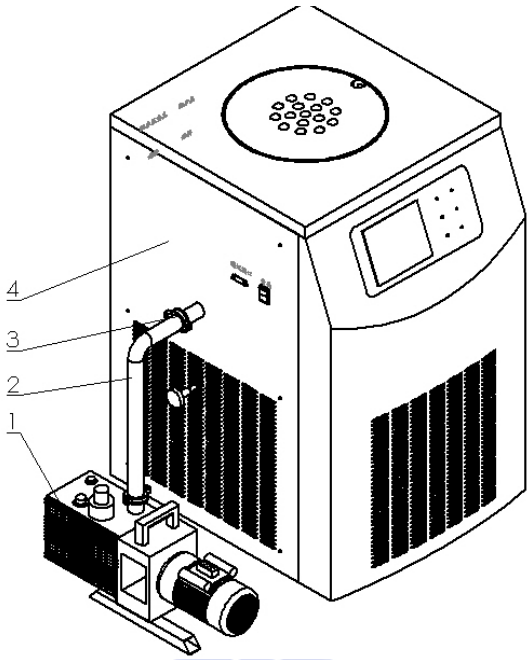

Figure 1-4 connection of the device

1、vacuum pump 2、tube that connect main engine and vacuum pump 3、clamp

4、 main engine

A、 Installation step:

1、 Check accessories after unpacking box;

2、 Add vacuum pump oil;

3、 Connect the inlet and tube by clamp;

4、 Connect the “vacuum pump power socket” into “vacuum pump power” interface;

5、 One end of the power line is inserted into “power” interface; The other end is connected to an electric power.

6、 Open the switch and test the index of freeze dryer. Then the device is running.

B、Notices:

1、Ensure there are no obstructions behind the main engine within 30cm;

2、Make sure that the vacuum pump oil has been filled.

3、Pre-freeze process

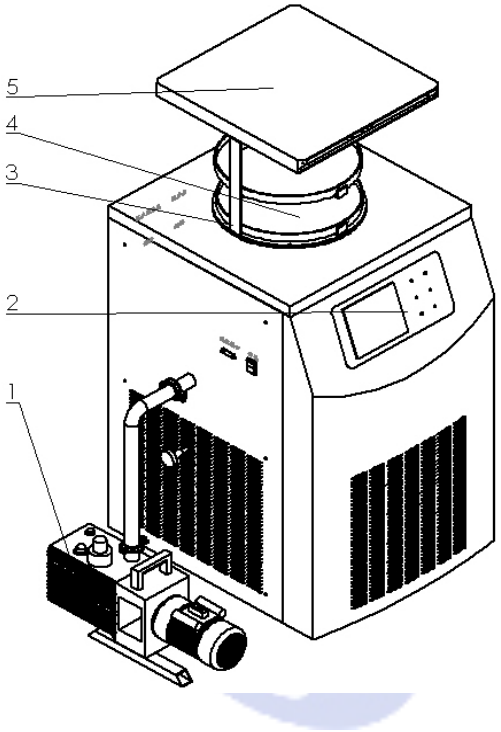

Figure 1-5 pre-freeze

1、vacuum pump 2、control panel 3、pre-freeze shelf

4、material tray 5、insulation cover

The general pre-freeze process (If you have low-temperature refrigerator, this process may be canceled.)

1、Open refrigerator and this device will be freeze. When the cold trap temperature is less than -40℃, you may freeze material.

2、Put material into material tray;

3、Put material tray into pre-freeze shelf and put the temperature sensor into material tray;

4、Put pre-freeze shelf into cold trap;

5、Cover the insulation cover;

6、The temperature of all parts of material is down to eutectic point. The process is maintained about one hour and then the pre-freezing process is over.

4、 Drying process

4.1 Ordinary configuration drying process

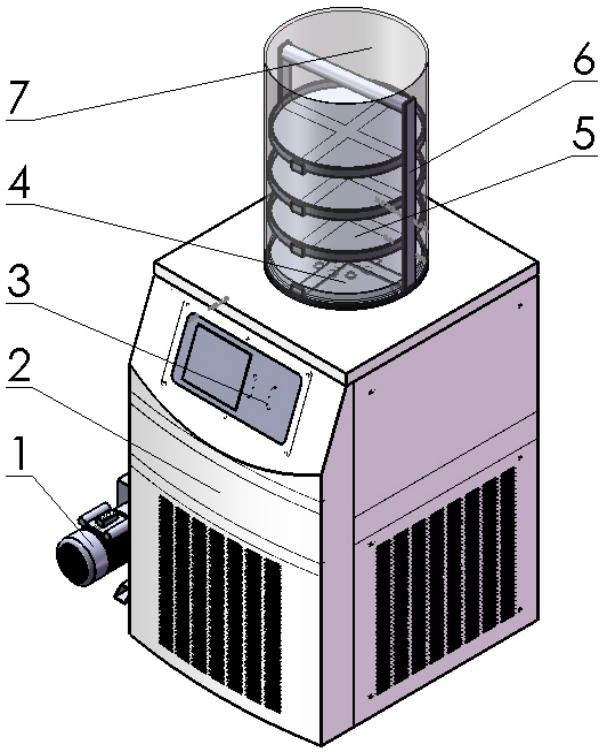

Figure 1-6 ordinary configuration drying process

1、vacuum pump 2、main engine 3、control panel 4、false cover

5、material tray 6、drying shelf 7、organic glass barrel

1、Take out the pre-freeze shelf from cold trap ;

2、Install the false cover above the cold trap,as shown;

3、Put the drying shelf on false cover, as shown;

4、Check sealed ring and cover the organic glass barrel;

5、Tight the drain valve in clockwise;

6、Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

7、Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.

8、Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

9、When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a、The refrigerator is mustn't turn off in drying process;

b、Drying time and freezing time is different because of differences in material properties.

4.2 multi-manifold configuration drying process

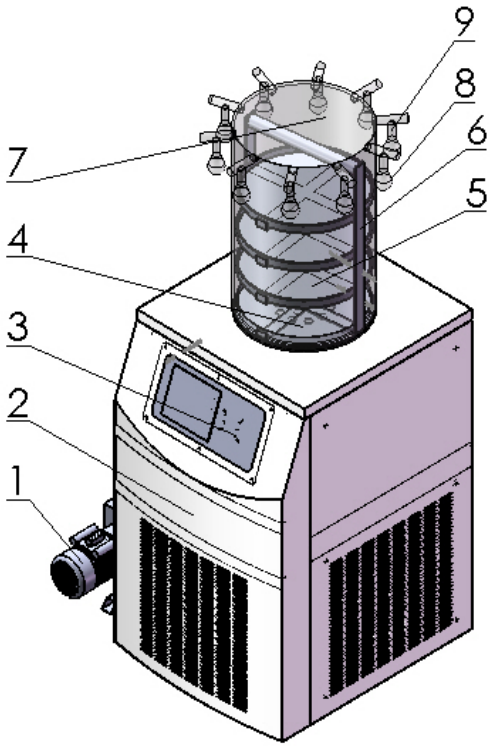

Figure 1-7 Multi-manifold drying process.

1、vacuum pump 2、main engine 3、control panel 4、false cover

5、material tray 6、drying shelf 7、organic glass barrel

8、flask 9、Manifold connector

1、Take out the pre-freeze shelf from cold trap ;

2、Install the false cover above the cold trap,as shown;

3、Put the drying shelf on false cover, as shown;

4、Check sealed ring and cover the organic glass barrel;

5、Tight the drain valve in clockwise;

6、Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

7、Hang up all bottles and open multi-manifold valve. When materials have been dried, please close multi-manifold valve.

8、Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.

9、Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

10、When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a、The refrigerator is mustn't turn off in drying process;

b、Drying time and freezing time is different because of differences in material properties.

4.3 Top-press configuration drying process

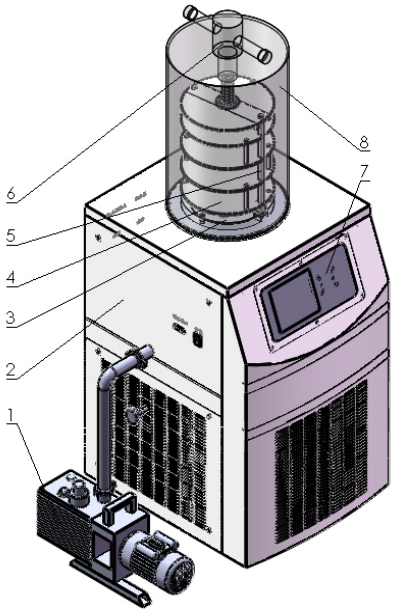

Figure 1-8 top-press configuration drying process

1、vacuum pump 2、main engine 3、false cover 4、material tray

5、drying shelf 6、handle 7、control panel 8、organic glass barrel

1、Take out the pre-freeze shelf from cold trap ;

2、Install the false cover above the cold trap,as shown;

3、Put the drying shelf on false cover, as shown;

4、Check sealed ring and cover the organic glass barrel;

5、Tight the drain valve in clockwise;

6、Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

7、Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.

8、Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

9、When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a、The refrigerator is mustn't turn off in drying process;

b、Drying time and freezing time is different because of differences in material properties.

4.4 Top-press multi-manifold configuration drying process

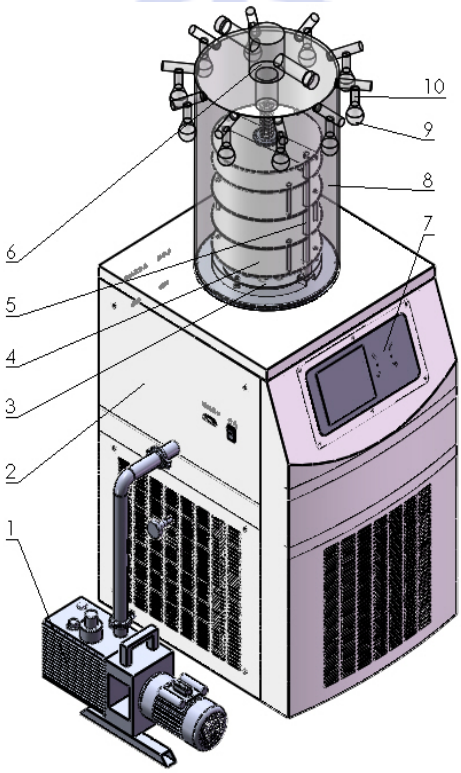

Figure 1-9 Top-press multi-manifold configuration drying process

1、vacuum pump 2、main engine 3、false cover 4、material tray

5、drying shelf 6、handel 7、control panel 8、organic glass barrel

9、flask 10、Manifold connector

1、Take out the pre-freeze shelf from cold trap ;

2、Install the false cover above the cold trap,as shown;

3、Put the drying shelf on false cover, as shown;

4、Check sealed ring and cover the organic glass barrel;

5、Tight the drain valve in clockwise;

6、Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

7、Hang up all bottles and open multi-manifold valve. When materials have been dried, please close multi-manifold valve.

8、Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.

9、Close power and close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.

10、When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: a、The refrigerator is mustn't turn off in drying process;

b、Drying time and freezing time is different because of differences in material properties.

4.5 T-type configuration drying process

1. Install the T-shaped device above the cold trap.

2. The interfaces of the T-type device are connected to ensure sealing.

3. open the vacuum pump (before the "refrigerator" has been opened), when the vacuum value drops to 10-30Pa, you can connect the materials that need to be dried one by one.

4. Remove the dry material.

5. After the drying is finished, first open the water discharge (intake) valve and then close the vacuum pump.

6. Turn off the power, turn off the water release (intake) valve, and defrost the equipment. After the defrosting is finished, open the draining (deflation) valve to drain the device and wipe the equipment clean.

7. When the vacuum pump is not working, please cover the vent hole to prevent dust from entering.

Ⅴ Control system operation

The control system uses LCD touch screen display, easy to operate and the running status is clear. The system displays sample temperature curve, condenser temperature curve and vacuum degree curve. System adopts a variety of stable measures so that control system runs stable and reliable.

The control system contains following display screens:

1. Turn on switch, system goes into initial interface. Touch the screen center, it enters main interface.

Figure 1: initial interface

2、On main interface, touch“compressor”,compressor starts to work. Touch “vacuum pump”, pump starts to work. Touch “vacuometer”, vacuum degree displays. Touch “Real-time curve” for curves check. “History record” for earlier data check.

Figure 2: main interface

3、Touch“real -time curve”, to enter real-time curve interface. On right side, there are “sample”, “condenser “and “vacuum” buttons to control relative curves. Please check interfaces as follows:

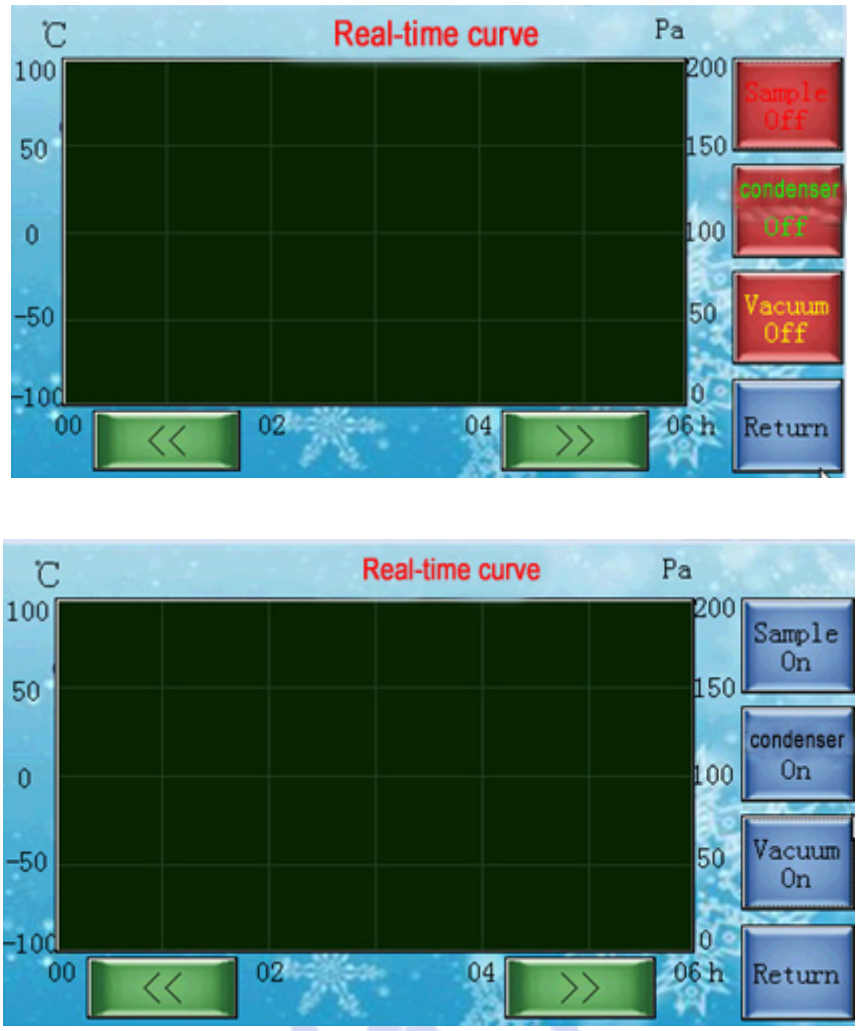

Figure 3: “real-time curve “interface

4. Click “history record “on main interface, it goes into “history select” interface.

User can choose specific file, to check this curve, delete it 。

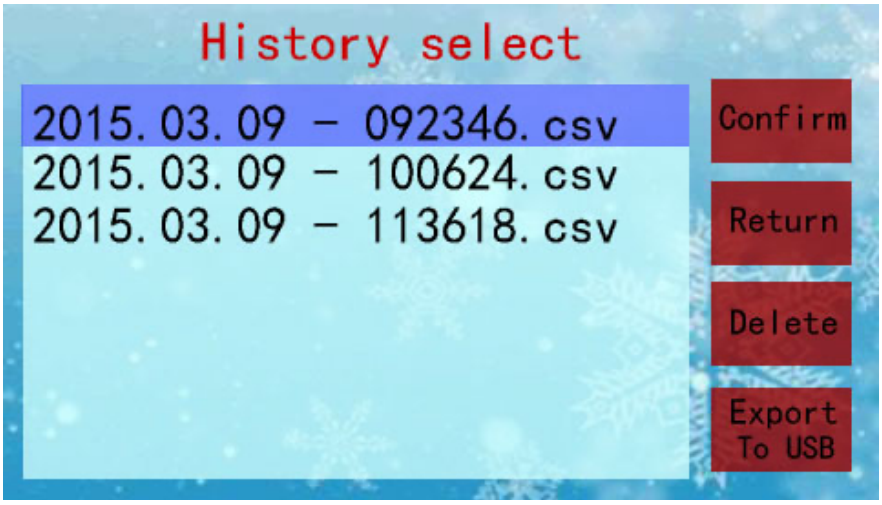

Figure 4: “history select” interface.

5.Click “confirm” on “history select” interface, user can see “history curve” interface.

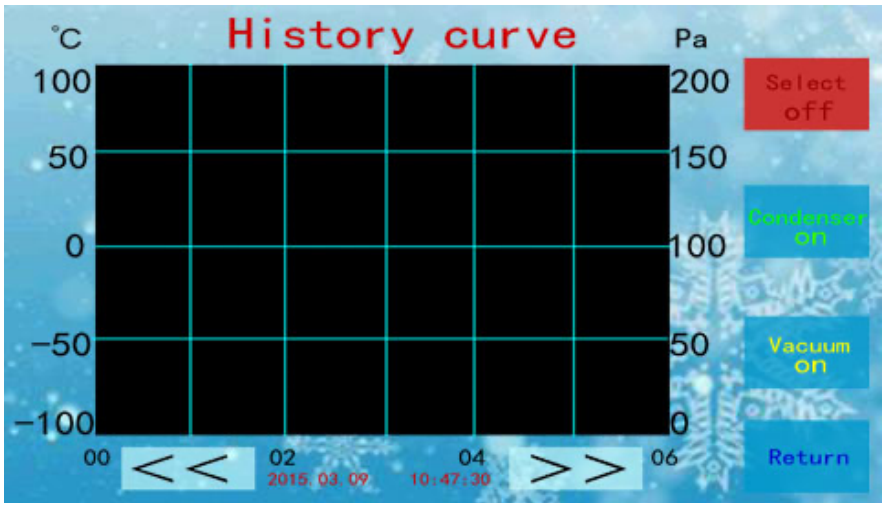

Figure 5: “history curve” interface

6. Click “Delete” button on “history select” interface. Selected file can be removed.

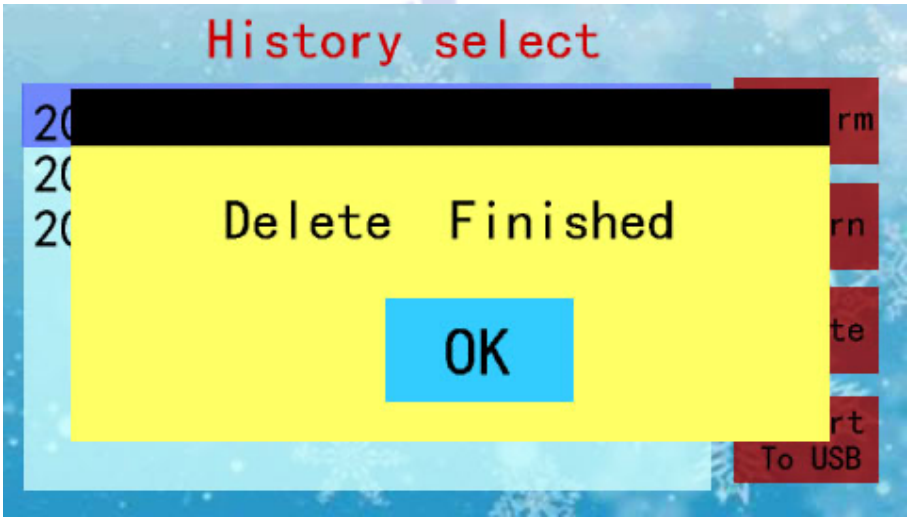

Figure 6: “Delete” interface.

Ⅵ Notices

1.The vacuum pump should be put on ground so that it maintains a certain height difference with host (at least 50cm), to prevent oil return if power is suddenly off. If power off, you should open air inlet valve to inflate the host, take out the

samples as soon as possible and properly store samples.

2.Working environment temperature should be less than or equal 32℃. Humidity should be ≤80%.

3.When turn off the machine, user should inflate host first, later turn off vacuum pump to prevent oil return and sample pollution.

4.The acrylic drum is connected with host by “O” sealed ring.

Sealed ring should be kept clean, without organic solvent cleaning; acrylic drum's touch end with sealed ring should be protected from strike and damage.

5.Grounding power socket must be used.

6.The vacuum pump oil should be replaced regularly after working 200 hours continuously.

7.Please don't frequently turn on and turn off power supply and compressor. If compressor stops working because of wrong operation, user needs to restart the compressor after waiting for at least 3 minutes.

Ⅶ Common breakdown and elimination

1.The vacuum degree cannot achieve below 15Pa.

(1) Check the connection between vacuum pump and host, to make sure clamp is tight

(2) Check whether the bottom of acrylic drum is clean, whether there is damage on the touch surface

(3) Check whether the “O” sealed ring is clean, whether its placement is correct.

(4) Check whether the vacuum pump works normally and whether the pump oil is clean.

(5) Check whether the air inlet valve is screwed tightly

2.High condenser temperature

Ambient temperature is too high, leading to bad heat dissipation. please place the machine in proper environment with well-ventilated condition.