



Multi-pipe Vacuum Freeze Dryer

LB-10MVFD

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1. Safety Measures

- 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°C. Humidity should be $\leq 80\%$.
- 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.
- 5) 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.
- 6) Grounding power socket must be used.
- 7) The vacuum pump oil should be replaced regularly after working 200 hours continuously.
- 8) 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.

2. Introduction

Multi-pipe Vacuum Freeze Dryer LB-10MVFD can reach temperatures as low as $\leq -60^{\circ}\text{C}$ to freeze and capture water vapor from samples effectively. The spacious 0.12m^3 freeze-drying area accommodates various sample volumes. It incorporates comprehensive protection features to ensure both equipment longevity and user safety. This dryer utilizes energy-efficient compressors and pumps for reliable vacuum and cooling performance. Our unit is equipped with a high-resolution 7-inch LCD touchscreen for user-friendly operation.

3. Features

1. GLP-compliant materials
2. Pre-freezing function
3. Gas flow control technology
4. Data logging system
5. Crafted from stainless steel
6. User-friendly interface with multilingual support
7. Intelligent defrosting technology

4. Specifications

Model No.	LB-10MVFD
Freeze Drying Area	0.12m ³
Cold Trap Temperature	≤ -60°C
Number of Trays	4 pcs
Number of Flasks	8 flasks
Tray Spacing	70 mm
Ice Collecting Capacity	3 to 4 kg/24h
Pumping Speed	2 L/s
Ultimate Vacuum	≤ 1Pa
Tray Diameter	200 mm
Material Capacity	1.2 L (thickness 10mm)
Eggplant-Shaped Bottle	100, 250, 500, 1000 ml
Wide-Mouth Bottle	600 ml
Defrosting Mode	Electric defrosting
Modular Control System	Next-gen controller and advanced system for enhanced reliability
Power Consumption	970 W
Drying Chamber Dimensions	260 × 430 mm
Overall Dimensions	580 × 500 × 720 mm
Weight	62 kg

5. Applications

Multi-pipe Vacuum Freeze Dryer is used to preserve sensitive samples in pharmaceuticals, food, biotech, and research, ensuring long-term integrity and quality across diverse applications.

6. Instrument Introduction

Structure of freeze dryer

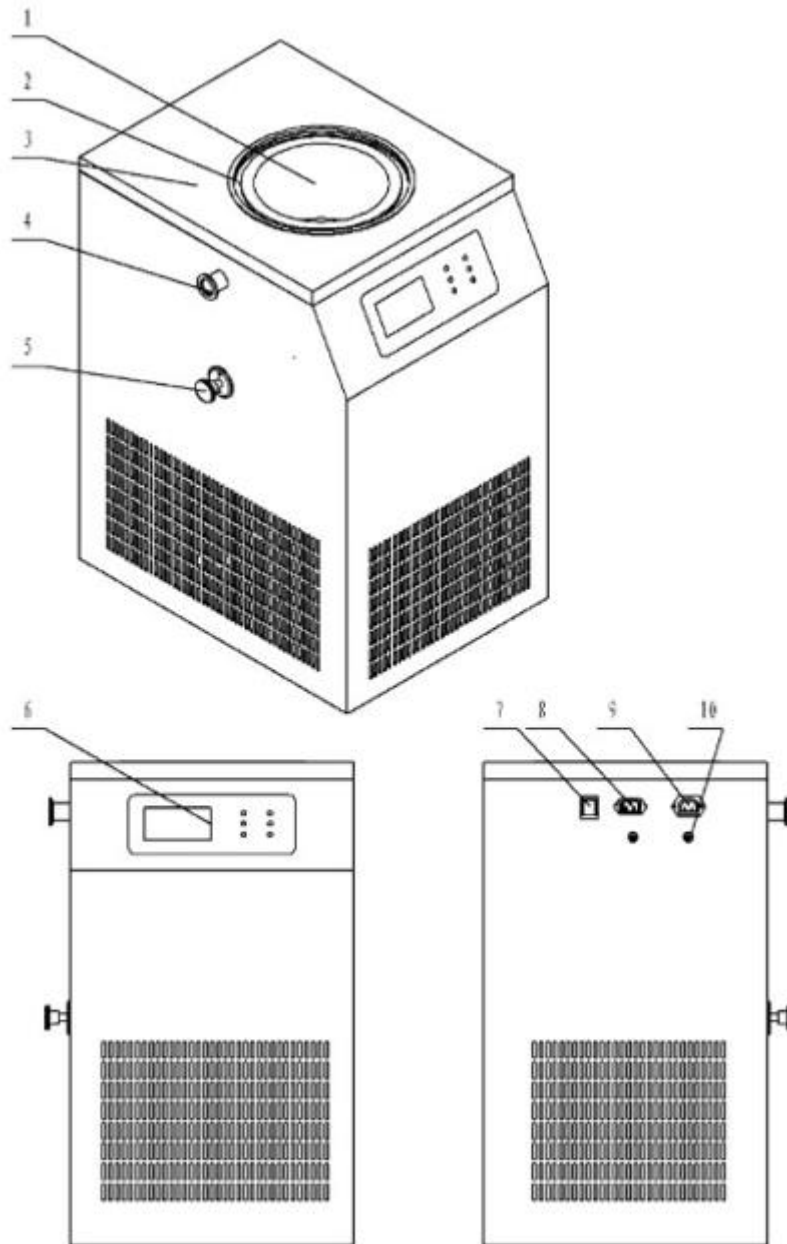


Figure-1 (Structure of host)

- | | |
|----------------------------------|----------------------|
| 1. Condenser | 6. Control panel |
| 2. Sealed ring | 7. Switch |
| 3. Workbench | 8. General power |
| 4. Vacuum port | 9. Vacuum pump power |
| 5. Drain valve (Air inlet valve) | 10. Fuse |

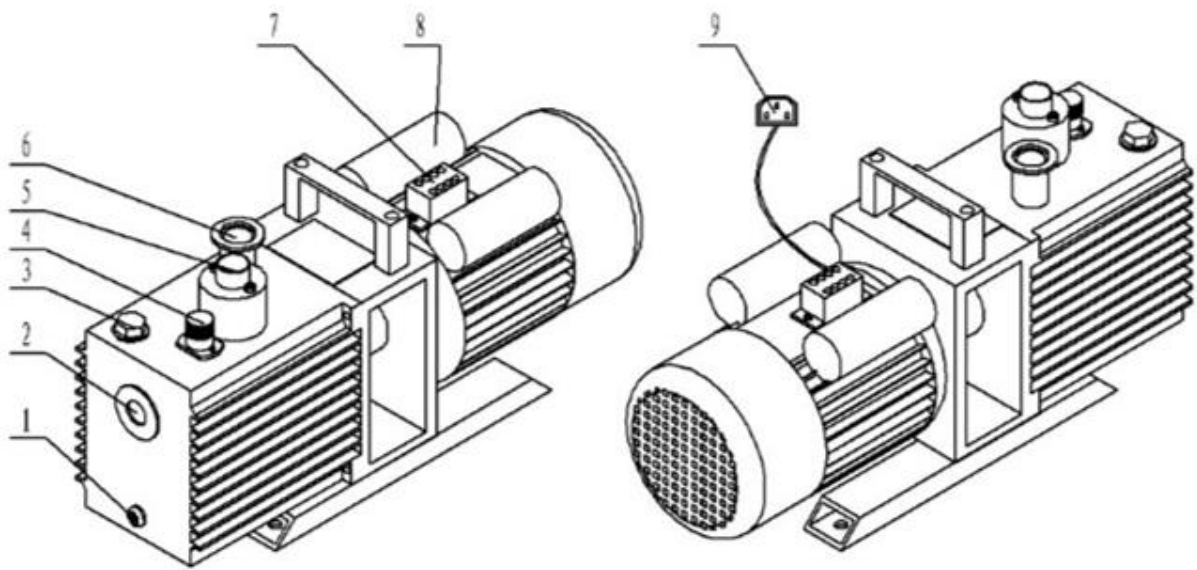


Figure-2 (Structure of vacuum pump)

- | | |
|----------------------|---------------------------|
| 1. Oil drain | 6. Air inlet |
| 2. Oil level glass | 7. Connecting terminal |
| 3. Oil filler hole | 8. Capacitor |
| 4. Gas ballast valve | 9. Vacuum pump power cord |
| 5. Exhaust port | |

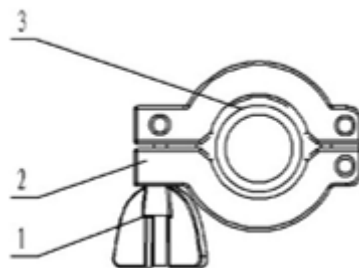


Figure-3 (Structure of clamp)

- | |
|----------------|
| 1. Screw nut |
| 2. Support |
| 3. Gasket ring |

7. Installation

7.1 Installation of the Equipment

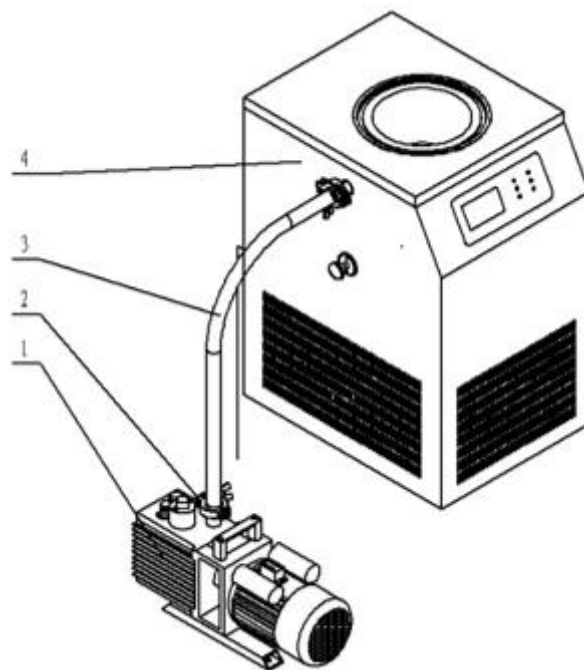


Figure-4 (Connection of the device)

1. Vacuum pump
2. Clamp
3. Connecting tube
4. Host

7.2 Installation steps

- 1) Check accessories completely and undamaged after unpacking box.
- 2) Add vacuum pump oil to middle of level glass, use the designated vacuum pump oil.

Vacuum pump oil parameters:

- **Coefficient of viscosity:** 100
- **Specific gravity:** 1
- **Flash point:** 120°C
- **Kinematic viscosity 40°C:** 100 (cSt)
- **Pour point:** 60°C

- 3) Connect the air inlet on pump and tube by clamp; the other end of tube connected with vacuum port on host.
- 4) Connect the “**vacuum pump power cord**” with “**vacuum pump power**” interface on host.

- 5) One end of the power line is inserted into “**general power**” interface on host; the other end is connected to power supply 220V,50Hz (the power should be connected with ground lead)
- 6) Turn on switch and test the index of freeze dryer (vacuum degree<10Pa, Minimum condenser temperature<-50°C). Then the device is put into use.

7.3 Test of freeze dryer

7.3.1 Test of condenser temperature

- 1) Cover the pre-freeze lid.
- 2) Turn on switch, to enter control system. Touch the screen, to go to main interface. Press “**compressor**” to turn on compressor to test refrigeration.
- 3) Condenser temperature drops to -50°C within 30 minutes, test is ok.

7.3.2 Test of vacuum degree

- 1) Press “vacuometer ” to turn on vacuum gauge, standard atmosphere is displayed.
- 2) Put on sealed ring, tighten the air inlet valve, place organic glass drum, drum bottom full contact with sealed ring.
- 3) Turn on vacuum pump by touching “**vacuum pump**”, vacuum degree rapidly decline.
- 4) Vacuum degree goes down below 10 Pa within 10 minutes, test is ok.
- 5) After finishing tests, open air inlet valve on host to inflate host and restore normal pressure. Then the machine is ready for running.

Notices:

- There are no obstructions behind and at sides of host within 30cm.
- Make sure that the vacuum pump oil has been filled before starting up.

8. Operations

8.1 Operation of Pre-Freezing Process

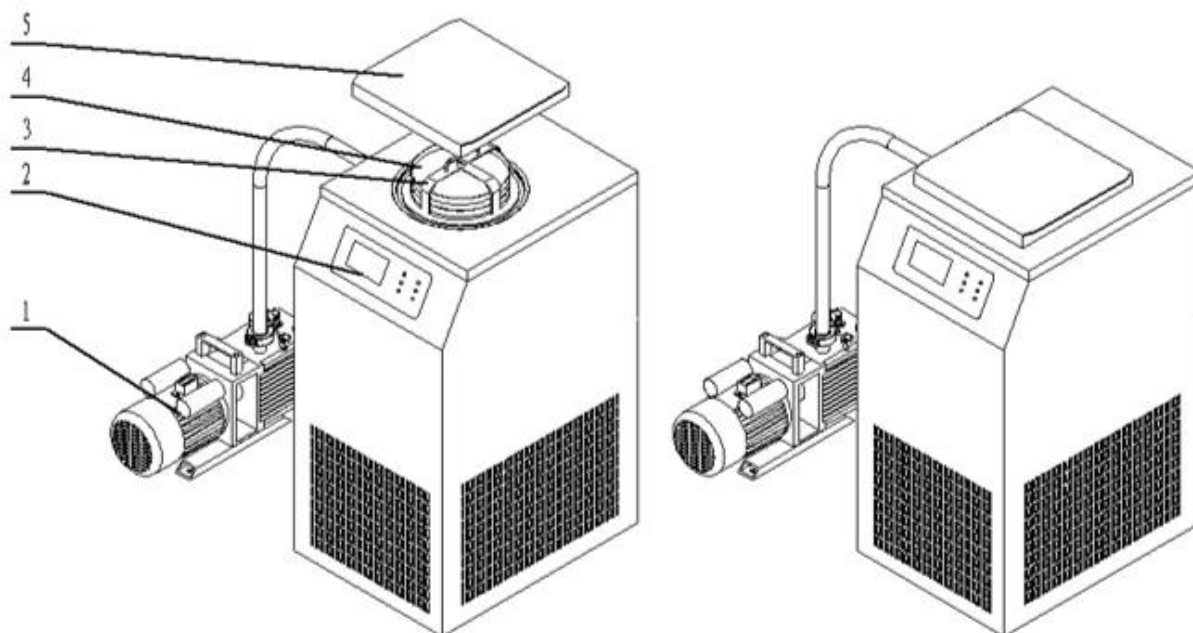


Figure-5

1. Vacuum pump
2. Control panel
3. Pre-freeze shelf
4. Material tray
5. Pre-freeze lid

The general pre-freezing process with steps:

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

- 1) Turn on machine and start compressor. When condenser temperature drops below -40°C , you begin to freeze material.
- 2) Put material into tray (liquid directly into tray, solid material and vials evenly put on tray)
- 3) Put material tray into pre-freeze shelf and put the temperature sensor into material with full touch, to reduce error of sample temperature and actual temperature.
- 4) Put pre-freeze shelf into condenser.
- 5) Cover the pre-freeze lid.
- 6) When temperature of all parts of material drop below eutectic point, this condition will be still keeping about one hour. Then pre-freezing process is over and ready to make drying process.

8.2 Drying Process

8.2.1 Ordinary configuration drying process

- 1) Take out the material from cold trap and put them on drying shelf.
- 2) Put the drying shelf on cold trap.
- 3) Check sealed ring and cover the organic glass barrel.
- 4) Tight the drain valve in clockwise.
- 5) Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.
- 6) Open drain(inlet) valve and then close vacuum pump. Remove organic glass cover and collect material.
- 7) Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.
- 8) When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: The refrigerator mustn't turn off in drying process. Drying time and freezing time is different because of differences in material properties.

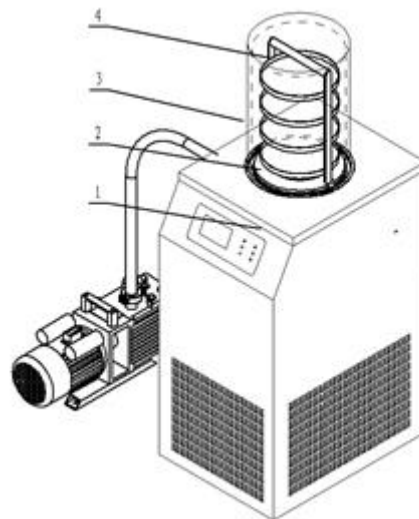


Figure-6 (Ordinary configuration drying process)

1. Main engine
2. Material tray
3. Organic glass barrel
4. Drying shelf

8.2.2 Multi-manifold configuration drying process

- 1) Take out the material from cold trap and put them on drying shelf.
- 2) Put the drying shelf on cold trap.
- 3) Check sealed ring and cover the organic glass barrel.
- 4) Tight the drain valve in clockwise.
- 5) Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.

- 6) Hang the flask one by one and open the manifold valve.
- 7) When the material in the flask is dry, close the manifold valve and remove the flask.
- 8) After drying, first open the "drain (inlet) valve" and then close the vacuum pump. Remove the organic glass cover and collect the dry matter.
- 9) Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.
- 10) When the vacuum pump doesn't work, cover the exhaust hole.

Notice: The refrigerator mustn't turn off in drying process. Drying time and freezing time is different because of differences in material properties.

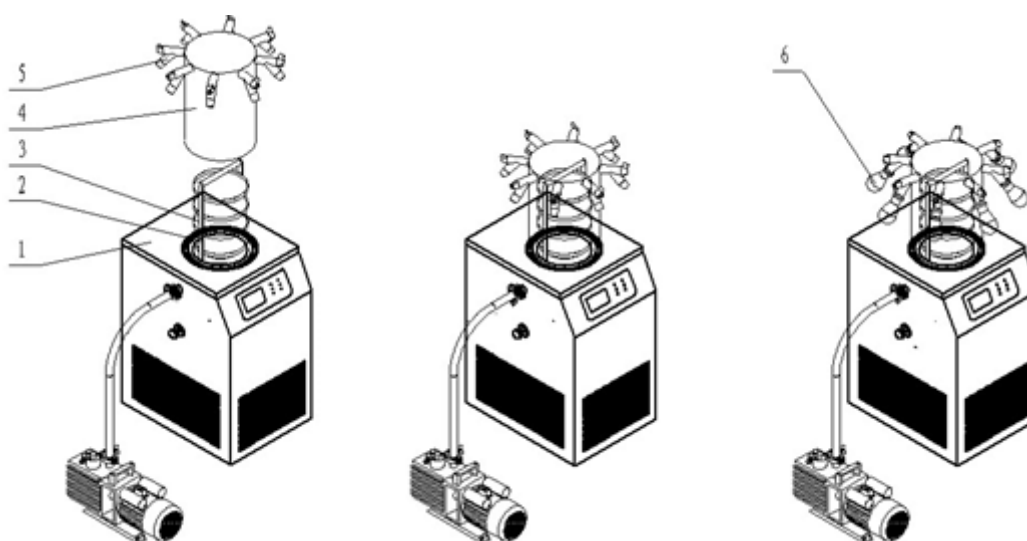


Figure-7 (Multi-manifold drying process)

1. Main engine
2. Drying shelf
3. Material tray

8.2.3 Top-press configuration drying process

- 1) Take out the material from cold trap and put them on drying shelf.
- 2) Put the drying shelf on cold trap.
- 3) Check sealed ring and cover the organic glass barrel.
- 4) Tight the drain valve in clockwise.
- 5) Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.
- 6) After the drying, first open the drain (inlet) valve and then close the vacuum pump (turn the lid handle clockwise if you need to press the cylinder, then press the cork and let off the air). Remove the organic glass cover and collect the dry matter.
- 7) Close drain(inlet) valve. Open drain (outlet) valve and clean this freeze dryer.
- 8) When the vacuum pump doesn't work, please cover the exhaust hole.

Notice: The refrigerator mustn't turn off in drying process. Drying time and freezing time is different because of differences in material properties.

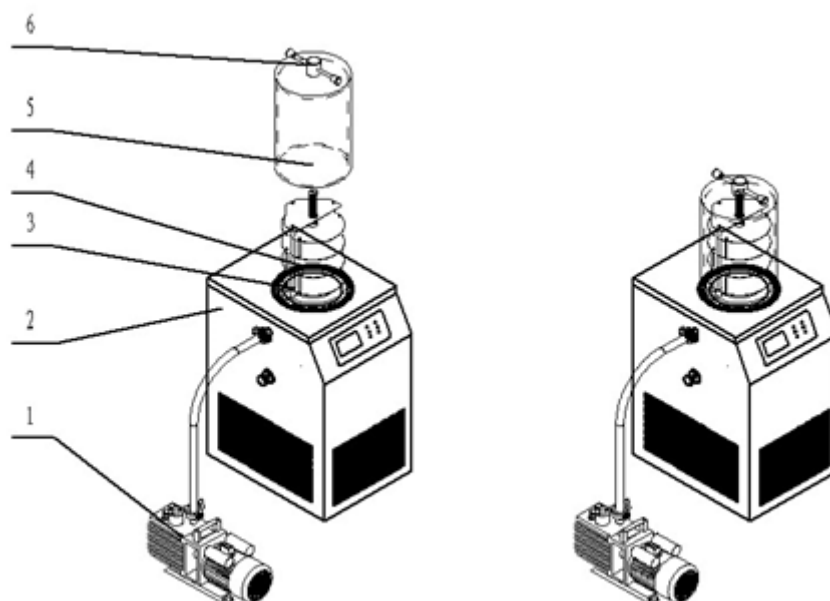


Figure-8 (Top-press configuration drying process)

1. Vacuum pump
2. Main engine
3. Top-press drying shelf
4. Material tray
5. Organic glass barrel
6. Handle

8.2.4 Top-press multi-manifold configuration drying process

- 1) Take out the material from cold trap and put them on drying shelf.
- 2) Put the drying shelf on cold trap.
- 3) Check sealed ring and cover the organic glass barrel.
- 4) Tight the drain valve in clockwise.
- 5) Open vacuum pump and vacuum gauge. The vacuum degree is decline. It's normal that the vacuum degree is less than 20Pa.
- 6) Hang the flask one by one and open the manifold valve.
- 7) When the material in the flask is dry, close the manifold valve and remove the flask.
- 8) After the drying, first open the drain (inlet) valve and then close the vacuum pump (turn the lid handle clockwise if you need to press the cylinder, then press the cork and let off the air). Remove the organic glass cover and collect the dry matter.
- 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: The refrigerator mustn't turn off in drying process. Drying time and freezing time is different because of differences in material properties.

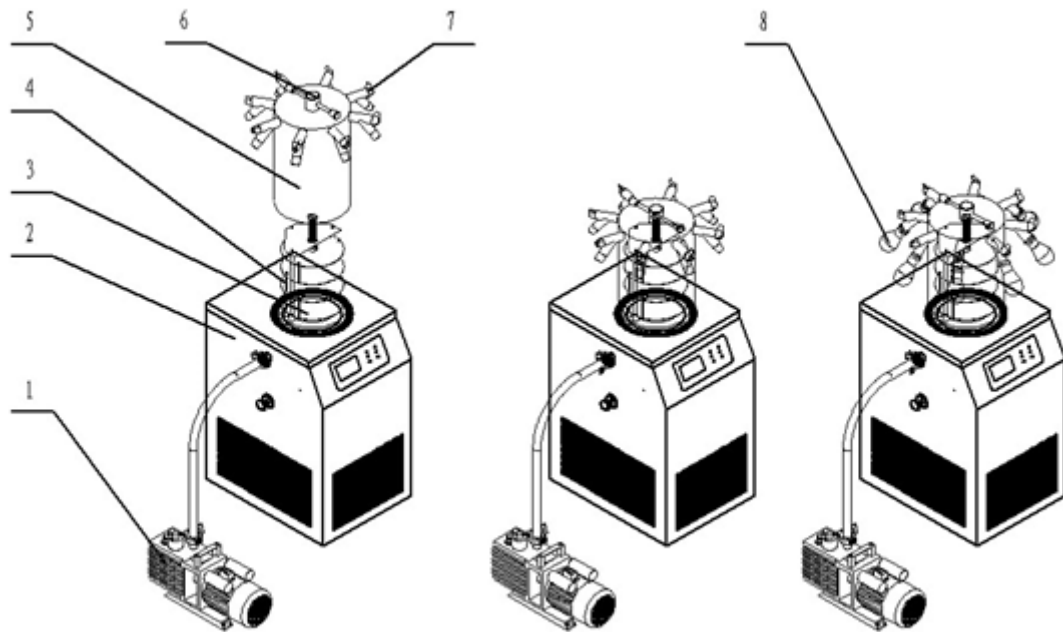


Figure-9 (Top-press multi-manifold configuration drying process)

1. Vacuum pump
2. Main engine
3. Top-press drying self
4. Material tray

Note: If material is loaded in vials, turn top press handle clockwise, to seal vial at vacuum state. Then open air inlet valve to inflate host.

8.2.5 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.

8.3 Turn Off Machine Operation

- 1) Turn off power switch.
- 2) Unplug the power cord.
- 3) Clean condenser, drying shelf and acrylic drum and other parts.
- 4) When the vacuum pump does not work, please cover exhaust port to prevent dust entering.

8.4 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-10 (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-11 (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. Check interfaces as follows:

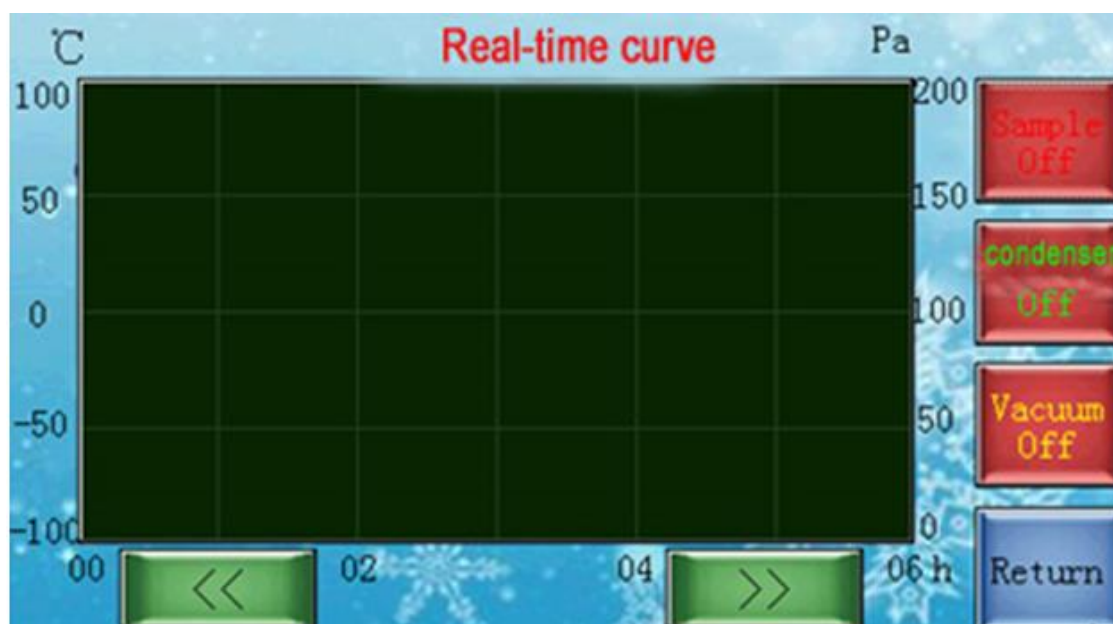


Figure-12

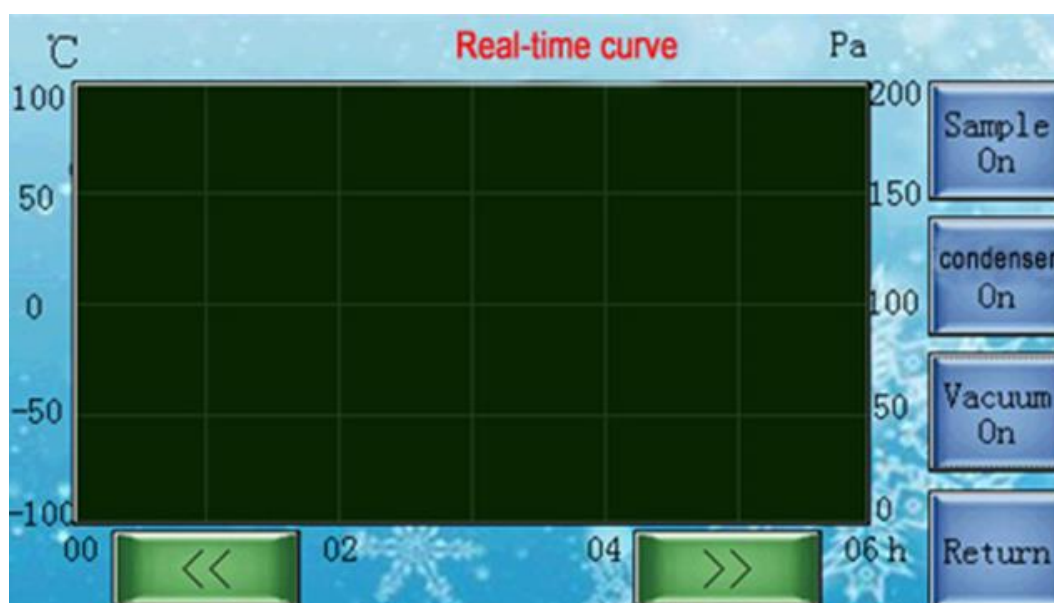


Figure-13 (Real-time curve interface)

- 4) Click “history record” on main interface, it goes into “history select” interface. User can choose specific file, to check this curve, delete it.

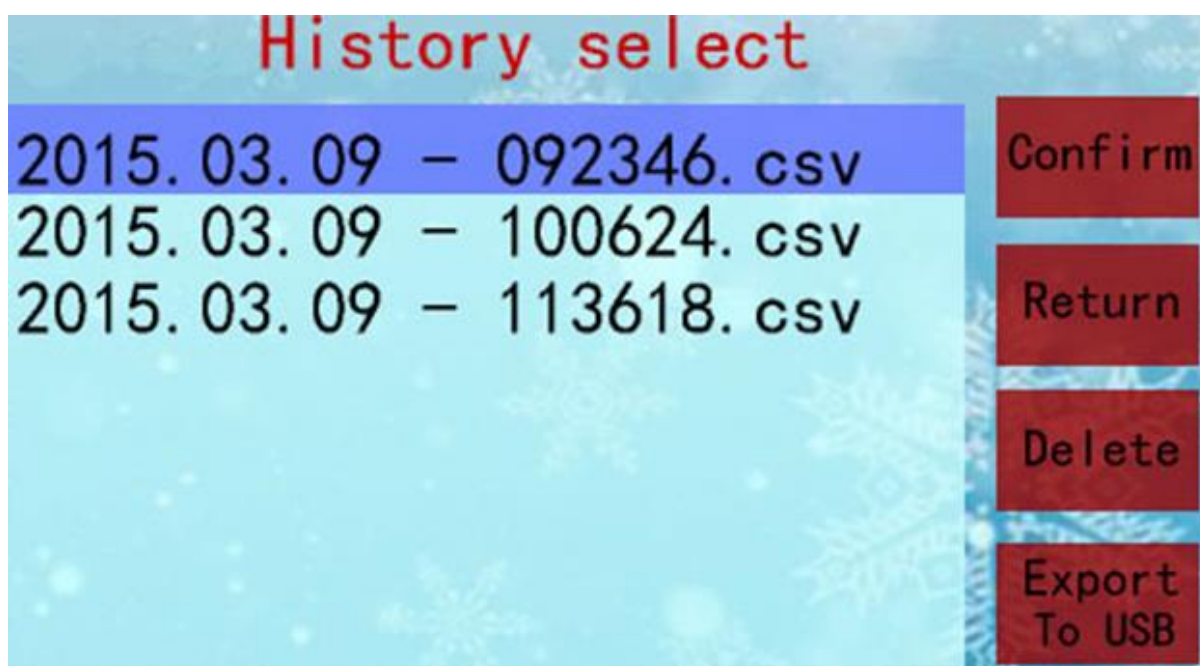


Figure-14 (History select interface)

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

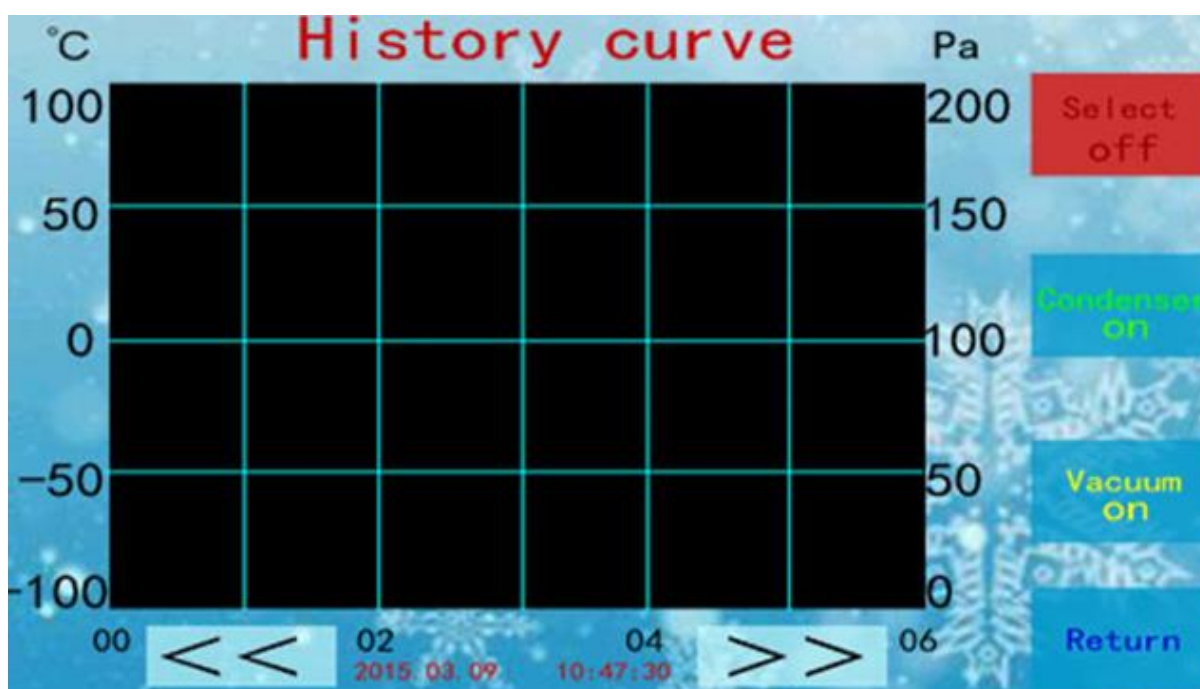


Figure-15 (History curve interface)

6) Click "Delete" button on "history select" interface. Selected file can be removed.

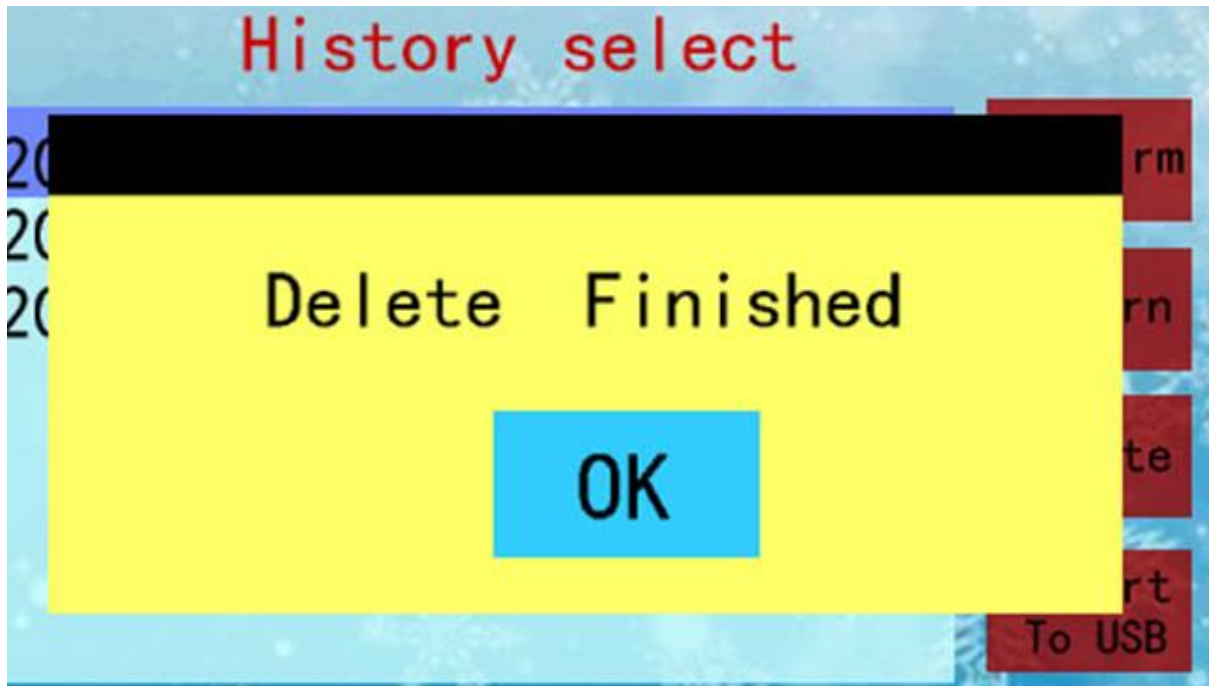


Figure-16 (Delete interface)

9. Troubleshooting

9.1 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.

9.2 High condenser temperature

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

10. Accessories

Standard Accessories

- Vacuum pump × 1
- Ordinary drying rack × 1
- Multi-manifold ordinary drying chamber × 1
- Sample tray $\Phi 200$ mm × 4
- Pre-freezing rack × 1
- Eggplant-shaped bottle × 8
- Rubber valve × 8



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