Operation Manual

BFFT-201-B

Freeze Dryer

Thank you for Choosing Biolab products. Please read the “Operating Instructions” and “Warranty” before operating this unit to assure proper operation.

Index

01 Summary

The vacuum freeze–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 freeze-drying processing. They can be restored to the original state and maintain their chemical and biological characteristics after being watered. So the freeze-drying technology is widely used in medicine, food, chemistry industry and biological products etc.

02 Characteristics and technical parameters

i. Main characteristics

- Pre-freezing of sample can be finished in condenser.
- Compressor refrigeration process rapid and condenser temperature low.
- Color LCD touch screen control system, simple operation and good function.
- The control system automatically stores data, data can be viewed in form of curves.
- The drying chamber uses acrylic. So user clearly observes sample change
- Vacuum pump is connected with the host by international standard quick joint.
- The performance of machine is stable, easy to operate and low noise.

ii. Main technical parameters

- Minimum Condenser temperature: -80℃ (no-load)
- Final vacuum degree: < 10Pa (no-load)
- Drying area: 0.27m2
- Bulk material capacity: 2.7 L (10 mm thickness)
- Tray: diameter 240 mm, 6 pieces

03 Conditions in use

i. Ambient temperature in normal working condition: 10℃-25℃.
Relative humidity: ≤70%.
Power supply: AC 220V±10%, 50Hz, Single phase
The working environment no conductive dust, explosive and corrosive gases and strong electromagnetic interference.

ii. Transport and storage conditions
Environment temperature: -40℃～50℃
Relative humidity: ≤70%
The storage conditions should be well-ventilated, no corrosive gases.

04 Installation and preparations for freeze-drying

Structure of freeze dryer and name of partition

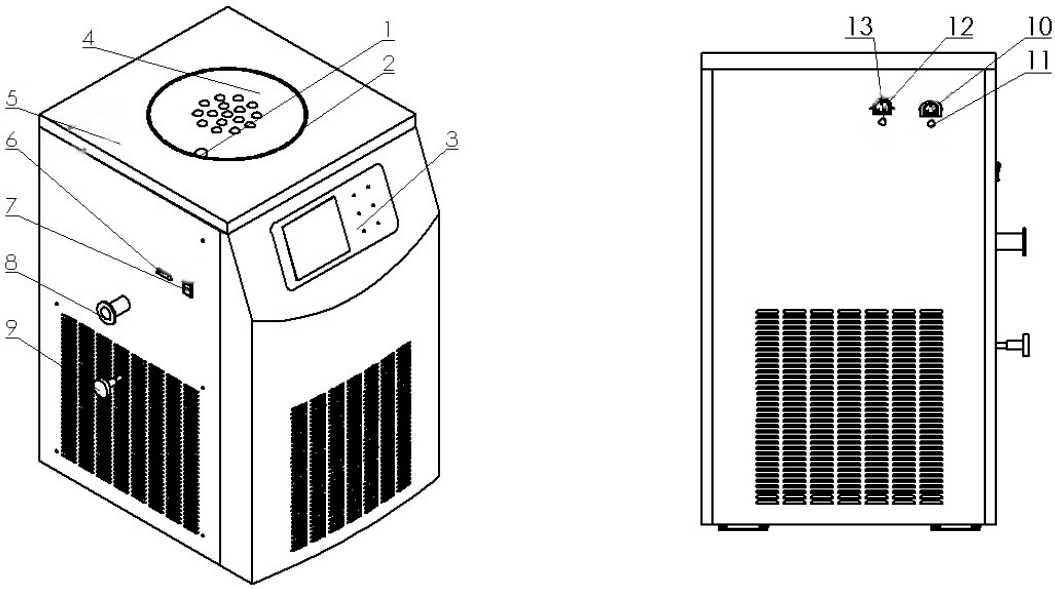


Figure 1-1 Structure of host

1. condenser 2. sealed ring 3. control panel 4 .support cover (canceled in new version)
5. workbench 6. USB port to output drying data 7. switch 8.vacuum port
9. drain valve (air inlet valve)
10. vacuum pump power 11. Fuse 12.general power 13.fuse

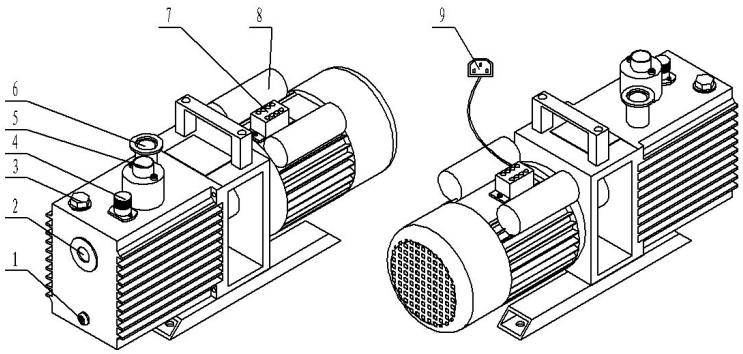


Figure 1-2 structure of vacuum pump

1. oil drain 2. oil level glass 3. oil filler hole 4. gas ballast valve 5. exhaust port
6. air inlet 7. connecting terminal 8. capacitor 9. vacuum pump power cord

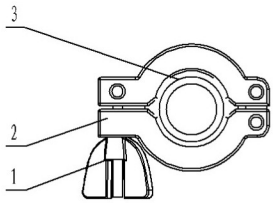
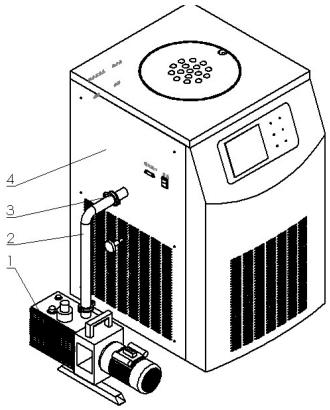


Figure 1-3 structure of clamp
1. screw nut 2. support 3. gasket ring

Installation of freeze dryer



iii. Installation steps:

1) Check accessories complete and undamaged;
2) Add vacuum pump oil to middle of level glass;
3) Connect the air inlet on pump and vacuum tube by clamp; the other end of tube connected with vacuum port on host;
4) Connect "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 parameters of freeze dryer (final vacuum degree<10Pa, condenser temperature -80℃).

iv. Test of freeze dryer

• 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 -80℃ within 90 minutes, test is ok.
• Test of vacuum degree
1) Press "vacuometer " to turn on vacuum gauge, standard atmosphere is displayed;
2) Put on sealed ring
3) close the air inlet valve
4) Place acrylic drum, drum bottom full contact with sealed ring.
5) Turn on vacuum pump by pressing "vacuum pump"key. Vacuum degree rapidly decline.
6) Vacuum degree goes down below 10 Pa within 30 minutes, test is ok.
7) After finishing tests, open air inlet valve on host to inflate host and restore normal pressure. Then the machine is ready for running.

Notices:

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

05 Operation of pre-freezing and drying process

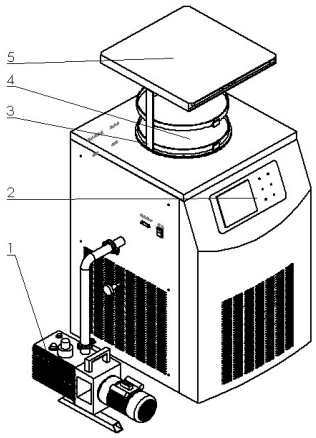


Figure 1-5 pre-freezing process
1. vacuum pump 2. control panel 3. pre-freeze shelf/ drying shelf
4. tray 5. pre-freeze lid

The general pre-freezing process with steps:
(If product has been frozen in a low-temperature freezer , this process can be skipped.)

1. Turn on machine and start compressor. When condenser temperature drops below -40℃, begin to freeze material;
2. Put material into tray (liquid directly into tray, solid material and vials evenly put on tray);
3. Put 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.

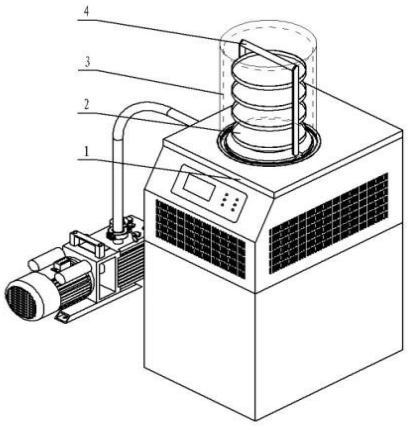


Figure 1-6 drying process

1. host 2. drying shelf (also working as pre-freeze shelf) 3. tray 4. acrylic drum

Drying process with steps:

1. Take out the pre-freeze shelf from condenser;

2. Turn the shelf to put it above condenser.

3. Put temperature sensor into material. Please note that sensor should be taken out through half round hole reserved at side of flange, in order to prevent damage by drying shelf.

4. Check sealed ring intact and without raffle, put on acrylic drum;
The bottom of drum should be completely in touch with “O” sealed ring.

5. Close the air inlet valve on host;

6. Turn on vacuum pump and vacuum gauge by pressing “vacuum pump” key and “vacuometer” key on touch screen. The vacuum degree declines. It’s normal that vacuum degree is less than 20Pa during drying process;

7. Drying time is different for material property. Generally speaking, material should be dry when material temperature reach room temperature.

8. When drying process is over, first open air inlet valve to inflate host, then turn off vacuum pump by pressing “vacuum pump” key. Press “vacuometer” key, the vacuum degree display will vanish. Turn off compressor by pressing “compressor” key.

9. Take off acrylic drum and collect dried material.

10. Close drain valve, machine begins to defrost. After finishing defrosting, open drain valve to drain water. Clean the equipment.

11. When vacuum pump does not work, please cover the exhaust port to prevent dust.

Notice:
a. Compressor cannot be turned off in whole freeze drying process;
b. For different materials, freezing time and drying time are not the same, because of differences in material properties.

06 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; Keep machine dry.

07 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 screen.

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

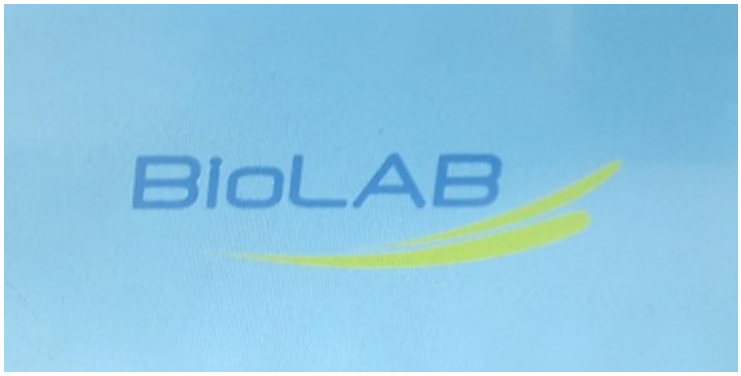


Figure 1: initial interface

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.

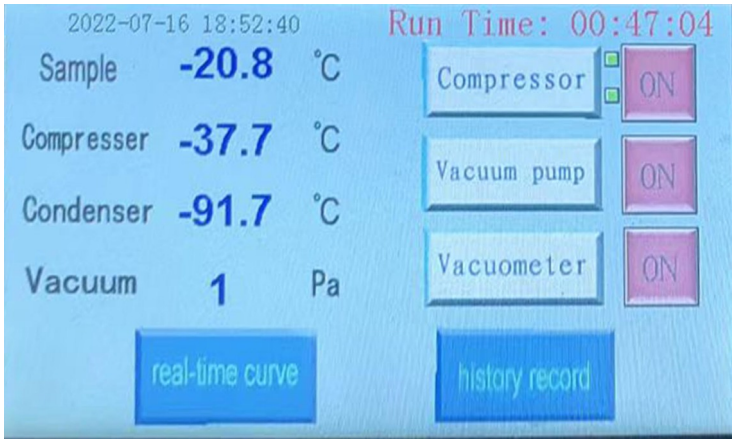


Figure 2: main interface

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.

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 or output it to U flash disk.

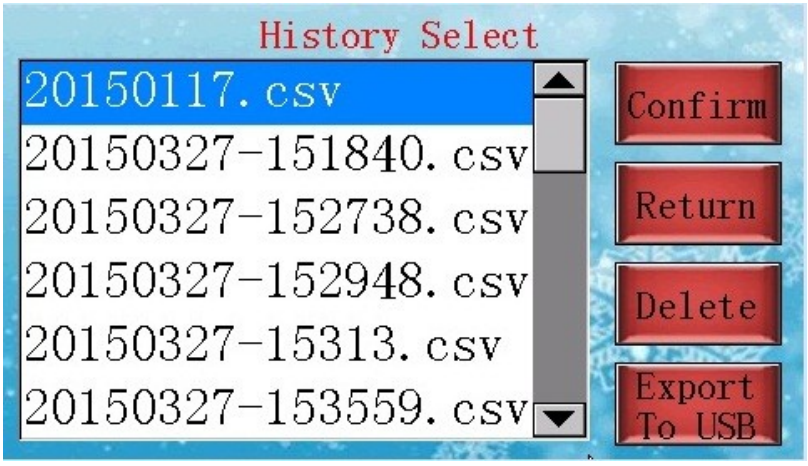


Figure 4: “history select” interface

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

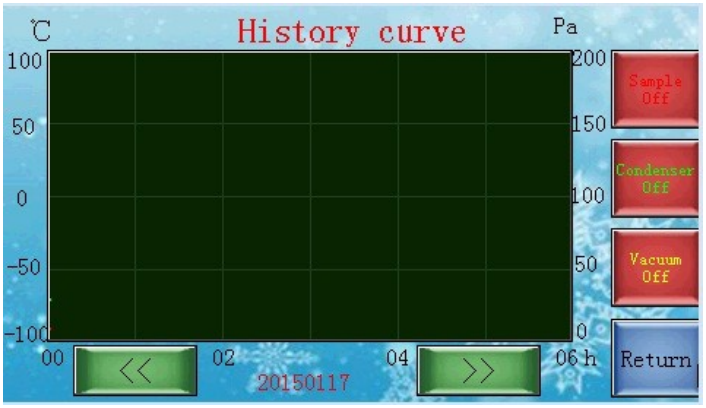


Figure 5: “history curve” interface

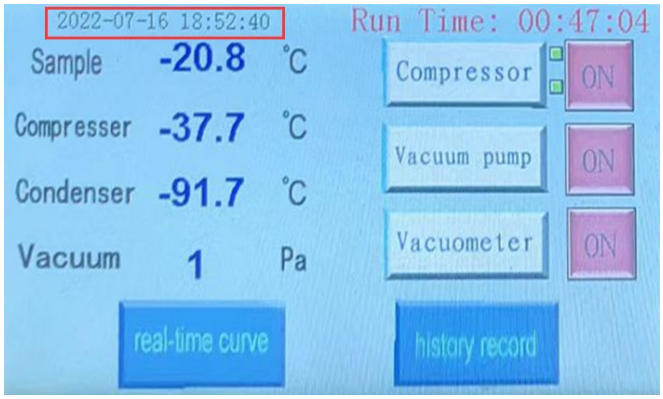
6. Click“Delete”button on “history select” interface. Selected file can be removed.

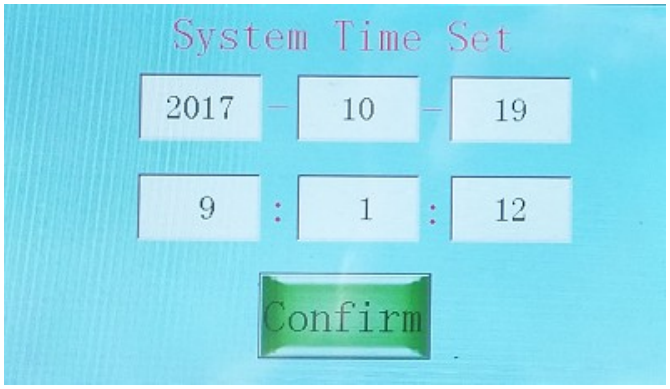
Figure 6: “Delete” interface

7. Click"export to USB"button on "history select" interface.
(U disk capacity should be less than 8G). User needs to insert U disk in advance, then turn on switch to export data. Data can be checked by Excel format.

Figure 7: "export to USB" interface

8. System time set
Please press system time place for some seconds, you can see a system time set screen.





08 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 ≤ 25℃. Humidity ≤70%.

3. When turn off machine, you should inflate host first, later turn off the 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, not 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. Vacuum pump oil need change 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, you need to restart the compressor after waiting for at least 3 minutes.

09 Common breakdown and elimination

I. The vacuum degree cannot achieve below 20Pa.

(1) Check the connection between vacuum pump and host, to make sure clamp is tight
(2) Check whether acrylic drum bottom is clean,whether there is damage on 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

II. High condenser temperature

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

BIOLAB SCIENTIFIC LTD.
3660 Midland Avenue, Suite 300, Toronto, Ontario M1V 0B8 Canada
Email: contact@biolabscientific.com Tel: +1 707 533 1445
Website: www.biolabscientific.com