

Freeze Dryer
BK-FD12S
User Manual

Preface

Dear customer:

Thanks for choosing LABEC products!

Sincerely hope that our products can bring the greatest help to your work.

In order to let you know more about the freeze dryer, please read the instructions carefully before use.

The content of this manual is very important to your safe and correct use of this machine!

After familiarizing yourself with the manual, please keep this manual in an easy-to-use place for easy reference at any time.

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1. Overview

1.1 Product overview

Vacuum freeze-drying technology is also called sublimation drying. The principle is to pre-freeze the water-containing sample, and then make its water sublime in a vacuum state. After freeze-drying, the original biological, chemical and physical properties remain basically unchanged, and it is easy to store for a long time. After adding water, it can be restored to the state before freeze-drying, and its original biochemical properties can be maintained. Therefore, freeze-drying technology has been widely used in medicine, food, chemical industry, biological products and other fields.

BK-FD12S vacuum freeze dryer (hereinafter referred to as "freeze dryer") realizes the drying of samples after pre-freezing in the material tray.

1.2 Features

- 1) This machine is refrigerated by high-quality imported compressor with high cooling rate.
- 2) LCD touch screen display and operation, simple and convenient, and powerful.
- 3) The control system automatically saves the freeze-drying data, which can be viewed in the form of a curve, and the entire freeze-drying process is clear.
- 4) The drying room adopts a colorless and transparent plexiglass cover (hereinafter referred to as "glass cover"), the sample is clear and intuitive, and the whole process of freeze-drying can be observed.
- 5) The connection between the vacuum pump and the host adopts the international standard KF quick connector, which is simple and reliable.
- 6) This machine has stable performance, simple operation and low noise.
- 7) Pre-freezing function: items can be put into the cold trap for pre-freezing, which saves the cost of low-temperature refrigerators for users.

1.3 Working conditions

- 1) Working condition:

Ambient temperature: 10°C ~ 30°C

Relative humidity: ≤ 80%

Power supply: Single phase 220V ± 10% 50Hz



Note: The working environment should be free from conductive dust, explosive, corrosive gases and strong electromagnetic field interference!

- 2) Transport/storage condition:

Ambient temperature:

Relative humidity:

The storage environment should be well ventilated and free from corrosive gases.

- 3) Security classification:

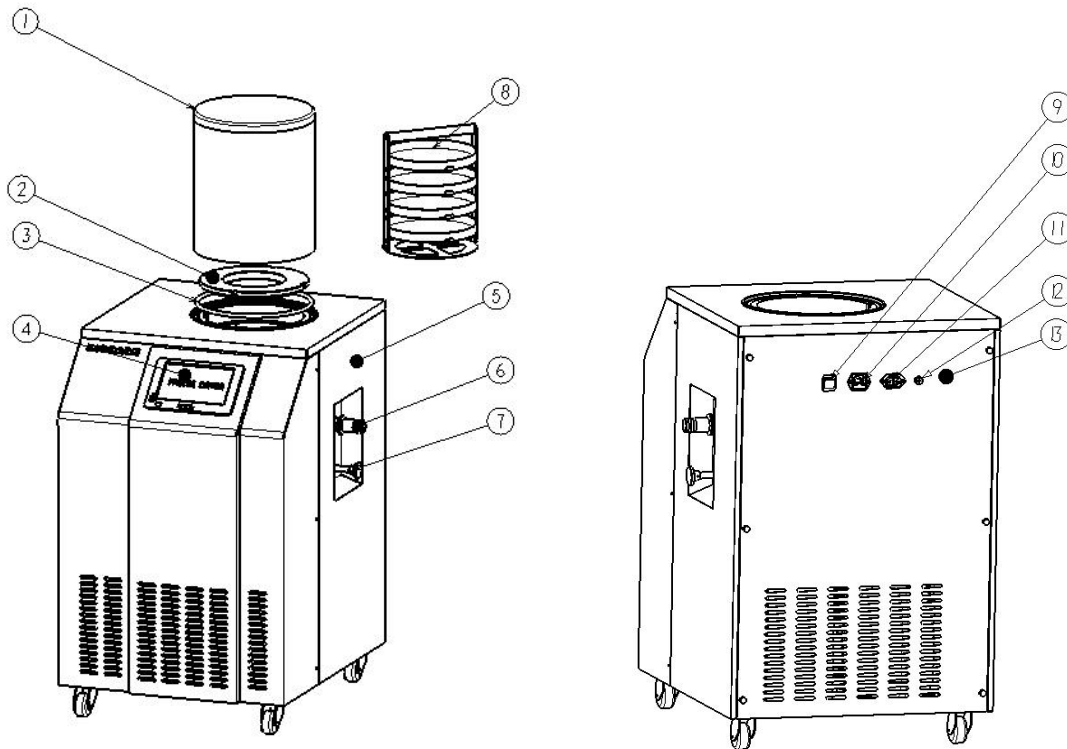
Class I Type B

1.4 Technical parameters

Model	BK-FD12S
Cold trap temperature (°C)	<-60 (no load)
Vacuum degree (Pa)	≤10
Freeze-dried area (m ²)	0.12
Water catch capacity (kg/24h)	3
Layers of Material Tray	4
Material tray specification (φ×h) mm	200×20
Loading material/pan (ml)	300
Freeze-drying time (h)	24
Dimensions (L×W×H) mm	520×625×865/1275

Note: The loading capacity of each material tray is the calculation result of liquid simulation.

2. Installation



- | | | | |
|---------------------|---|--------------------------------|--------------------------|
| ① Plexiglass cover | ② Drying rack support plate | ③ O-shaped sealing ring | ④ Touch screen |
| ⑤ Main unit | ⑥ Vacuum negative pressure pipe connection port | ⑦ Inflation and drainage valve | ⑧ Drying rack assembly |
| ⑨ Main power switch | ⑩ Main power supply (fuse 15A) | ⑪ Vacuum pump power supply | ⑫ Vacuum pump fuse (15A) |
| ⑬ Grounding bolt | | | |

1. The vacuum pump and the main engine are connected by a vacuum pressure-resistant tube, and the two ends are connected by a standard KF25 clamp. There is a sealing ring inside the clamp. Before connecting, apply an appropriate amount of vacuum grease on the sealing ring, and then tighten the clamp;
2. A "main power supply (fuse 15A)" is installed on the top of the rear panel of the main unit. Insert the power cord and connect the other end to a standard power socket. There is a "vacuum pump power supply" next to it to connect the vacuum pump power cord;
3. Please read the instruction manual of the vacuum pump in detail, check the vacuum pump, and confirm that the vacuum pump oil has been filled, and the oil level is not lower than the center line of the oil mirror, and do not run without oil;
4. The "o"-shaped sealing ring above the cold trap should be kept clean, and a layer of vacuum silicone grease can be evenly applied before use.

3. Operation



Note: Make sure the power supply and vacuum pump are connected in place before use!

3.1 Control panel operation

This machine is operated by a color LCD touch screen, and has a large-capacity FAT32 file system, which can store multiple sets of freeze-dried data. Standard USB interface, data can be exported after connecting the U disk, the system can display sample temperature, cold trap temperature, vacuum degree and other working parameters in curves.

1) Turn on the main power switch, and the system will display the "startup interface" (Figure 1):



Figure 1 Boot interface

2) Click the center of the screen to enter the "main operation interface" (Figure 2):

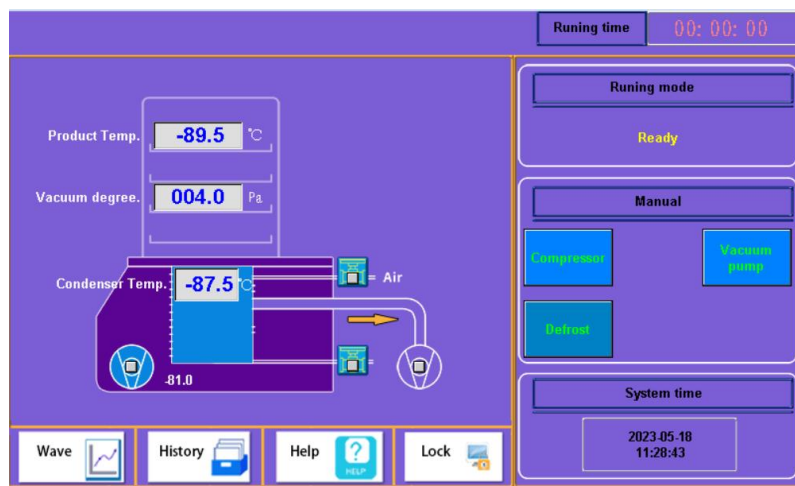
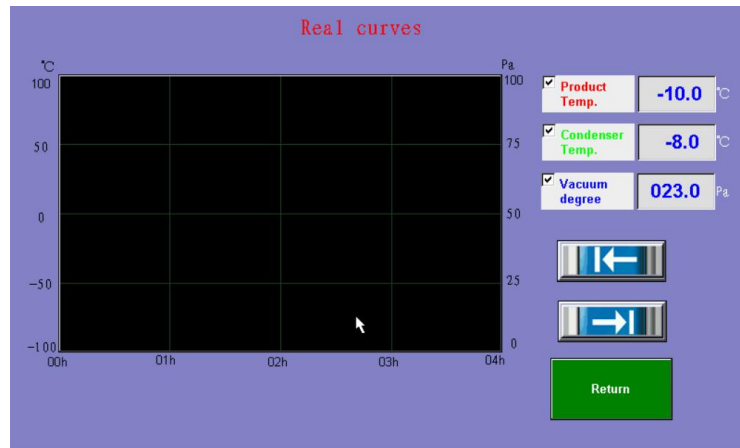


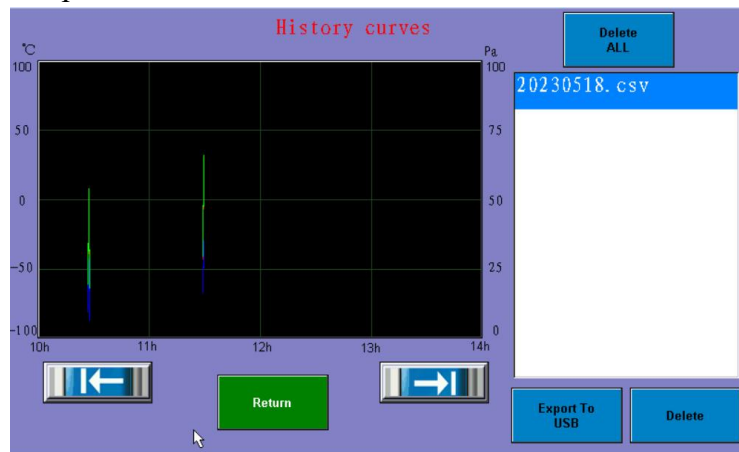
Figure 2 Main operation interface

3) Information displayed on the main operation interface:

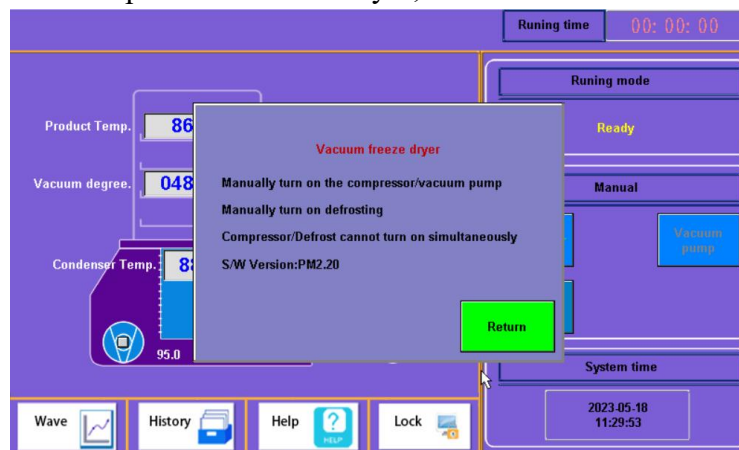
- ① Real-time display of relevant freeze-drying data such as sample temperature, cold trap temperature, vacuum degree, system time and running time;
- ② Working mode conversion on the right side: the ready mode is displayed when the machine is turned on, the compressor is turned on for the predetermined mode, and the vacuum pump is turned on for the drying mode.
- ③ Real-time curve: display the parameter curve of real-time sample, cold trap and vacuum degree, and the color of the curve corresponds to the color of the font of sample, cold trap and vacuum;



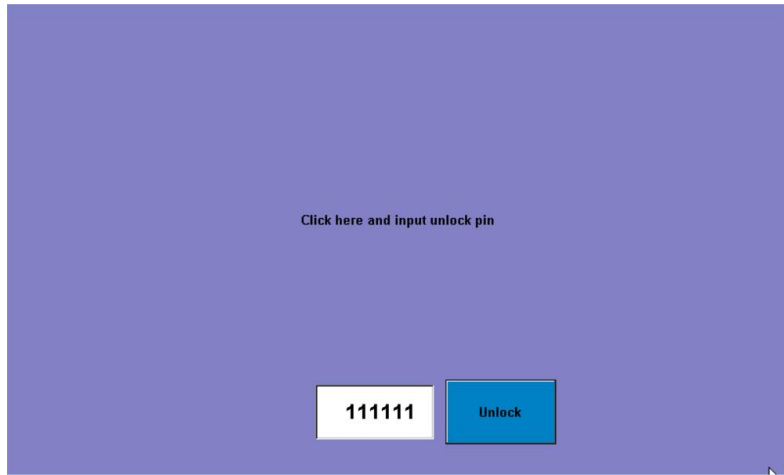
④ Historical records: You can query the freeze-drying curve within one month, and the system will automatically delete the freeze-drying curve of the previous month after one month; and you can access the U disk, click the export button.



⑤ Help: It can prompt the user to operate the freeze dryer;



⑥ Screen lock: In order to prevent the operation screen from being accidentally touched, resulting in the end of freeze-drying, the lock screen function is added, and when logging in again, enter the password 111111;



3.2 Freeze-drying operation

1) Sample placement:

- a. Put the pretreated items in the material tray, and then put the material tray on the freeze-drying rack;
- b. Place the temperature sensor in the material tray of any layer to measure the temperature of the material;
- c. Put the freeze-drying rack into the cold trap, cover the insulation cover, and prepare for pre-freezing.

2) Sample pre-freezing:

- a. Turn on the main power switch on the rear panel, and the control system will display the boot interface;
- b. After clicking the center of the screen to enter the interface in Figure 2, click the "Compressor" button to start pre-freezing (it is recommended to pre-freeze for about 4 hours);
- c. After the items are completely frozen, take the freeze-drying rack out of the cold trap.

3) Sample drying:

- a. Take the freeze-drying rack out of the cold trap, place the freeze-drying rack support plate on the mouth of the cold well, and place the freeze-drying rack on the support plate;
- b. Place the probe on the material tray of any layer, and cover the freeze-drying rack with the plexiglass cover;
- c. Tighten the drainage and inflation valve;
- d. The screen shows that the vacuum degree is 110KPa, then click the "Vacuum Pump" button to start the vacuum pump. The vacuum degree drops rapidly, and it is normal when the vacuum degree is less than or equal to 10Pa, and the drying officially begins (it is recommended to dry for about 24 hours, and the specific value depends on the moisture content of the material, which is determined by the user).



Note: The lower end of the glass cover is in full contact with the "○"-shaped sealing ring!

4) Sample removal:

- a. Check the sample curve and visually check that the sample is completely dry, you can open the drainage and inflation valve, and click the "vacuum pump" button on the screen to turn off the

vacuum pump.

b. Take off the glass cover, take out the material tray from the freeze-drying rack, and pack the samples in the tray. Click the "Compressor" button to turn off the compressor and the drying process is complete.



Note:

1. When picking and placing items, please wear antifreeze gloves to prevent frostbite!
2. After freeze-drying, inflate first, then turn off the vacuum pump to prevent the sample from being polluted by the oil returned by the vacuum pump!
3. When the equipment is inflated, the speed should be slow. It is forbidden to open the inflation and drain valve instantly, so as not to damage the vacuum sensor!

5) Shutdown operation:

- a. Turn off the main power switch and power off the control system of the whole machine;
- b. Unplug the power plug and the vacuum pump plug;
- c. Wipe the cold trap, freeze-drying rack, tray and plexiglass cover with a soft cloth;
- d. When the vacuum pump is not working, please cover the exhaust hole to prevent dust from entering.



Note: Do not use organic solvents (such as alcohol, acetone, etc.) to clean the plexiglass cover!

6) Drainage operation:

After the ice condensed on the inner wall of the cold trap completely melts into water, unscrew the drain and inflation valve, and use a container to collect the water.



Note: Before use, it is necessary to observe whether the accumulated water in the cold trap has been discharged, otherwise it will affect the use effect!

4. Notes

1. The working environment temperature of this machine should be within 10°C ~ 30°C, and the humidity should be $\leq 80\%$;
2. Be sure to use a grounded power socket; 3. Place the vacuum pump on a level ground and keep a certain height difference from the main machine. When the power fails suddenly, it can prevent the vacuum pump from returning oil. In the event of a power failure, unscrew the inflation valve immediately to inflate the main unit, take out the sample as soon as possible, and store it properly;
3. When shutting down, first inflate and then turn off the vacuum pump to prevent the sample from being polluted by the oil returned by the vacuum pump;
4. The plexiglass cover and the host are connected by the "O" type sealing ring to keep the sealing ring clean;
5. Do not use organic solvents to clean the plexiglass cover and the "O" sealing ring;
6. Do not switch the power supply and refrigerator frequently. If the refrigerator needs to be turned on again after turning off the refrigerator, wait at least 3 minutes before turning it on again;
7. Clean the dust of the condenser every three months to ensure the normal operation of the equipment.



Special attention: refer to the manual of the vacuum pump, the vacuum pump oil must be replaced after the cumulative operation of the machine reaches 200 hours to ensure the service life of the vacuum pump!

5. Troubleshooting

No.	Fault	Methods
1	Device not working	Check whether the power plug has power
2		Check whether the main power supply and vacuum pump power plug are plugged in or loose
3		Check whether the fuses of the main power supply and vacuum pump power supply are blown
4	Vacuum can not reach below 10Pa	Check the connection between the vacuum pump and the host, and whether the clamp is properly tightened
5		Check whether the lower end of the plexiglass cover is clean or damaged
6		Check whether the "o" sealing ring is clean and placed correctly
7		Check whether the vacuum pump works normally, whether the pump oil is adequate and clean
8		Check if the inflation valve is tight
9		Apply appropriate amount of vacuum silicone grease on the circumference of the "o" type sealing ring
10	Cold trap temperature is too high	Apply appropriate amount of vacuum silicone grease on the circumference of the "o" type sealing ring
11		If the refrigeration system fails, please contact the company's technical engineer in time
12	Vacuum pump oil leakage	Check the fuselage for damage or leakage, and contact the manufacturer to replace the required parts
13		Check if the vacuum pump is placed at an angle

6. Packing List

No.	Name	Qty.
1	Main machine	1
2	Drying rack assembly	1
3	Drying rack pallet	1
4	Material tray	4
5	Fuse (15A)	2
6	Plexiglass cover	1
7	Vacuum pump	1
8	Vacuum pump connection pipe	1
9	Vacuum pump oil	1
10	Vacuum pump pipe connection clamp (including sealing ring)	2
11	Vacuum silicone grease	1
12	User Manual	1
13	Certificate	1
14	Warranty	1
15	Inflatable drain valve	1

7. Warranty

- 1) The machine is guaranteed for 12 months from the date of sale.
- 2) We will take no responsibility for risks caused by improper operation and man-made damages.
- 3) After the expiration of warranty, our company is also responsible for repairs, but the corresponding maintenance cost should be charged.
- 4) We can provide equipment drawings and necessary technical data for maintenance companies or personnel trained by our company.



Warranty Declaration: One-year Warranty, Life-long Maintenance