

Scientz-18N/A

Freeze Dryer

Operation Manual

(Please read the instruction carefully before you use the machine)

I. Overview

The vacuum freeze-drying technique, also known as lyophilization, is a way to make aqueous sample into the pre-frozen condition, and then allow to moisture is sublimated under the vacuum state. The biological, chemical and physical characteristics of freeze-dried items will not change, and also they are easily to make a long-term preservation. After adding water, they can recover the state before the freeze-dried, and maintain its original biochemical characteristics. Therefore, the freeze-drying technology is widely used in fields such as medicine, food, chemical, biological products.

Scientz-N series freeze dryer machine have five configurations:

- Common dry configuration - the samples should be put in the sample tray for pre-freeze drying;
- Configuration gland - vials which contain the sample should pre-freeze drying firstly. After drying, it should cap tightly in a vacuum state, which is equal to the vacuum-packed;
- Manifold drying configuration - After pre-freezing, the sample in special bottle should be connected with lyophilize cover by rubber valve. During Lyophilization process, the lyophilized bottles can be replaced through the switching valve, and it can lyophilize many different kind of types at the same time, can be also linked to the special bottles of the eight different capacity, which shows that the drying efficiency is high;
- Configuration manifold gland drying - the lyophilized cover can lyophilize the samples and gland, it also can hang bottles for improving the efficiency of freeze-dried.
- pre-freezing- put the stainless steel tray which has the sample on the pre-freezing shelves, then put the shelves into the trap, covered with an insulated cover for pre-freezing. After that, you should dry them. This function can save the cost of a low-temperature refrigerator.

II. the characteristics and technical specifications

1、 the main features:

- (1) This machine uses the compressor refrigeration of international

brand "Danfoss", and can cool things rapidly, which has the function of the low temperature for the cold trap.

(2) Using 7 inch TFT LCD touch screen control system. Operation is simple, convenient, and powerful.

(3) Control system can save the lyophilized data automatically, and can view in the form of the curve so that you can see the whole process clarity.

(4) Drying chamber uses colorless organic glass, which is clear and intuitive. You can observe the whole process of freeze-dried samples.

(5) Vacuum pump is connected with the host of the international standard KF fast connector, which is simple and reliable.

(6) The machine can store freeze-drying curve many times, and can use U disk to extract data to the computer. Then you can use software to print.

2、 The technical indicators

(1) Cold trap coil temperature: -55°C (no load).

(2) Ultimate vacuum: Under 10Pa (no-load).

(3) Drying capacity:

Common functions: sample tray of four , the disk diameter (10N.12N) $\phi 200$ mm, (18N) $\phi 240$ mm, can accommodate samples (10N.12N) 1200ml (18N) 1800ml (material thickness is 10 mm), or placed $\Phi 22$ vials (10N.12N) 250, (18N) 280 bottles.

The gland functions: The diameter of sample tray (10N.12N) $\phi 180$ mm, (18N) $\phi 200$ mm for total of three levels, 160 bottles (10N.12N) or 183 bottles (18N) vials can be placed.

III. The conditions of use

1. Normal operating conditions:

Ambient temperature: $10^{\circ}\text{C} \sim 30^{\circ}\text{C}$

Relative humidity: $\leq 70\%$

Power supply voltage: single-phase $110\text{V} \pm 10\%$ 60Hz

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

2. Transport and storage conditions: ambient temperature: $-40\text{ }^{\circ}\text{C} \sim 50\text{ }^{\circ}\text{C}$

Relative humidity: $\leq 93\%$

Storage environment should be well-ventilated, non-corrosive gases.

3. Security classification: Class I, Type B.

IV. Installation and preparation

Structure and name:

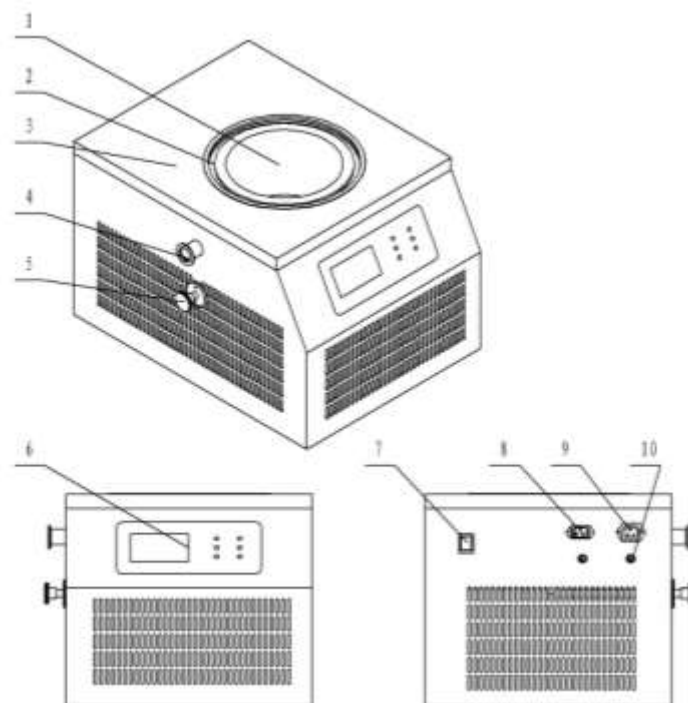


Figure 1-1 Main structure

1. Cold trap
2. Seal ring
3. Work surfaces
4. Vacuum pumping interface
5. Waterproof (inflow) valve
6. The control (display) panel
7. Switch
8. Power supply
9. The vacuum pump power source
10. Insurance

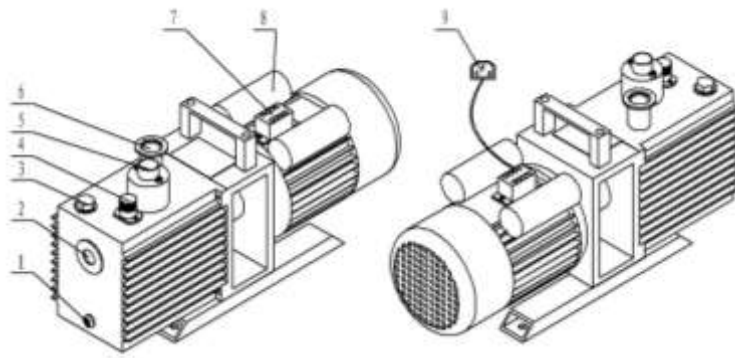


Figure 1-2 Vacuum Pump structure

1. The oil drain hole
2. the oil level sight glass
3. Oil of filling hole
4. The gas ballast valve
5. exhaust port
6. The intake port
7. the connection terminal
8. capacitor
9. vacuum pump power plug

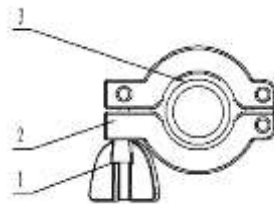


Figure 1-3 Clamp structure

1. Dovetail nut
2. bracket
3. seal rings

2. Installing of machine:

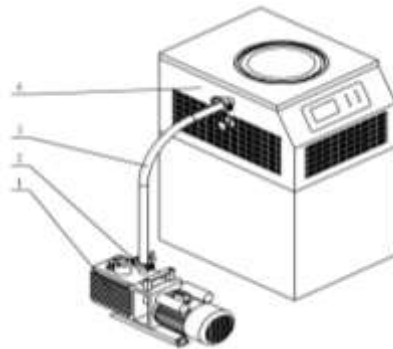


Figure 1-4 The connection of the apparatus

- 1, vacuum pump
- 2, clamp
- 3, the vacuum connecting pipe
- 4, the host

A, equipment installation steps:

- 1 、 You can check the accessories according to the packing list, and make sure that they are completely and undamaged.
- 2 "vacuum pump" filling “the vacuum pump oil” level to the Endoscopy Center (Please choose the specify of the vacuum pump oil GS-1 which our company applied.);
- 3, Using the rapid clamp to connect the intake port of the vacuum pump with the vacuuming pipe, then connect the vacuuming pipe to the other end with the host vacuum interface;
- 4, the vacuum pump power plug is connected to the "vacuum pump power “interface;
- 5, the power cord is plugged into the host interface, the other end of the power cord is connected to a power supply 220V 60Hz (power supply should be connected to the ground);
- 6, open the "switch" , then in accordance with the normal indicators of manual steps to test equipment (equipment indicators include vacuum degree $<10\text{Pa}$, cold trap temperature $<50\text{ }^{\circ}\text{C}$). After that, the equipment can be put into use.

B. Note:

1. Host is placed which should ensure that there are no obstructions around or behind the host for 30cm;
2. before starting, please be sure that the machine has been filling the vacuum pump oil.
3. Pre-freezing process

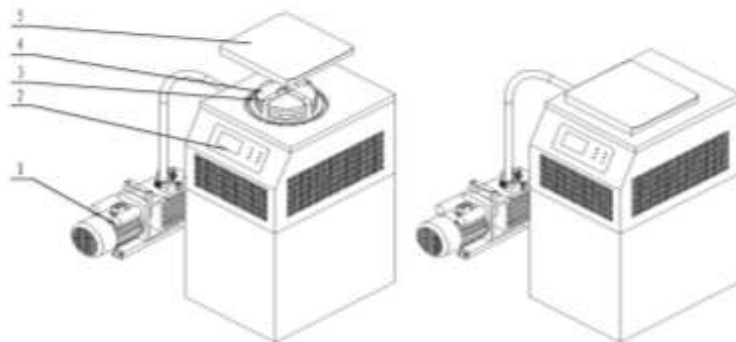


Figure 1-5 Pre-freezing

1. Vacuum pumps
2. Control panel
3. Pre-iced shelves
4. The material plate
5. Pre-frozen cap

General pre-freezing process (low temperature refrigerator users can ignore this step)

1, open the refrigerator, then pre-cooling for equipment, when the cold trap temperature is dropped to $-40\text{ }^{\circ}\text{C}$, the material can be pre-frozen;

2, Put the material into the material disc (liquid can be injected directly into the material disk, solid or bottled materials can be placed on the material disc) ;

3, Put the material plate into the pre-iced shelves, then put the probe into the material plate to make sure that they can contact with the material fully, in order to reduce the sample temperature and the actual temperature of the error;

4, Put the pre-iced shelves into a cold trap (Figure a);

5, cover with the pre-freezing cover;

6, when the temperature of each part is dropped to below the eutectic point of the material, maintain the pre-freeze about 1 hour, and then ready to enter the drying stage.

4、Drying Process:

4.1 Common configure

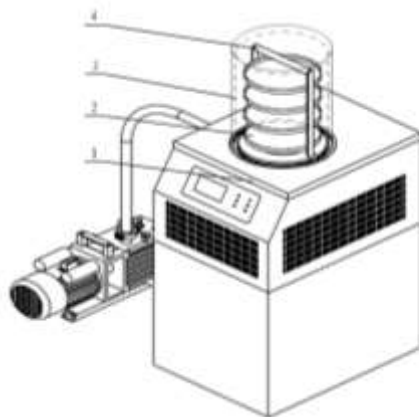


Figure 1-6 configurations drying

1. Host
2. Material disk
3. Plexiglass cylinder
4. Drying rack

- 1, get the pre-frozen good material out and then put them on the drying rack;
- 2, put the drying rack on the cold trap, as shown;
- 3, check the seal rings intact and over the organic glass before making sure that there is no debris
- 4, clockwise to tighten the drain valve;
- 5, open the vacuum pump, open the vacuum gauge. The degree of vacuum will be dropped. Normally, the value of the degree of vacuum should less than 20pa in the general drying process.
- 6, after drying, first open water (intake) valve, and then close the vacuum pump. Remove the organic glass, then collect the dried material.
- 7, Turn off the water (intake) valve device, then to defrost the machine. After that, you can open the "spending (deflated) valve" for draining, and also make sure that to wipe clean the equipment in the end.
- 8, when the vacuum pump is not working, please cover the vent which is to prevent dust from entering.

Note: a, During the entire drying process, the machine cannot be shut;

- b. Due to differences in the physical characteristics, the time of drying and pre-freezing will be differently.

4.4 The drying process of manifold configuration

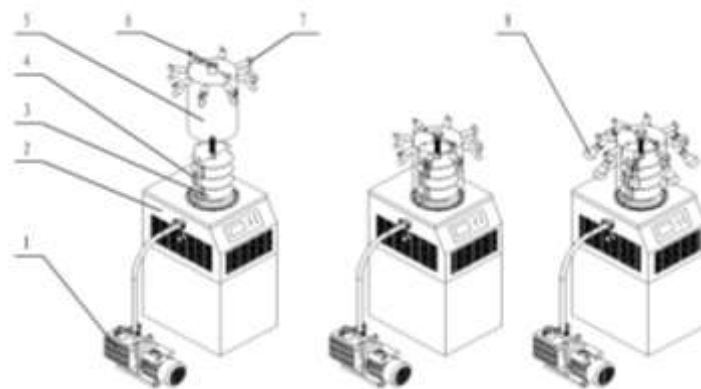


Figure 1-9 gland manifold drying process

1, vacuum pump 2, the host 3, gland drying rack 4, the material disk 5, capping multi manifold perspex cylinder 6, gland handle 7, manifold joint 8, flask

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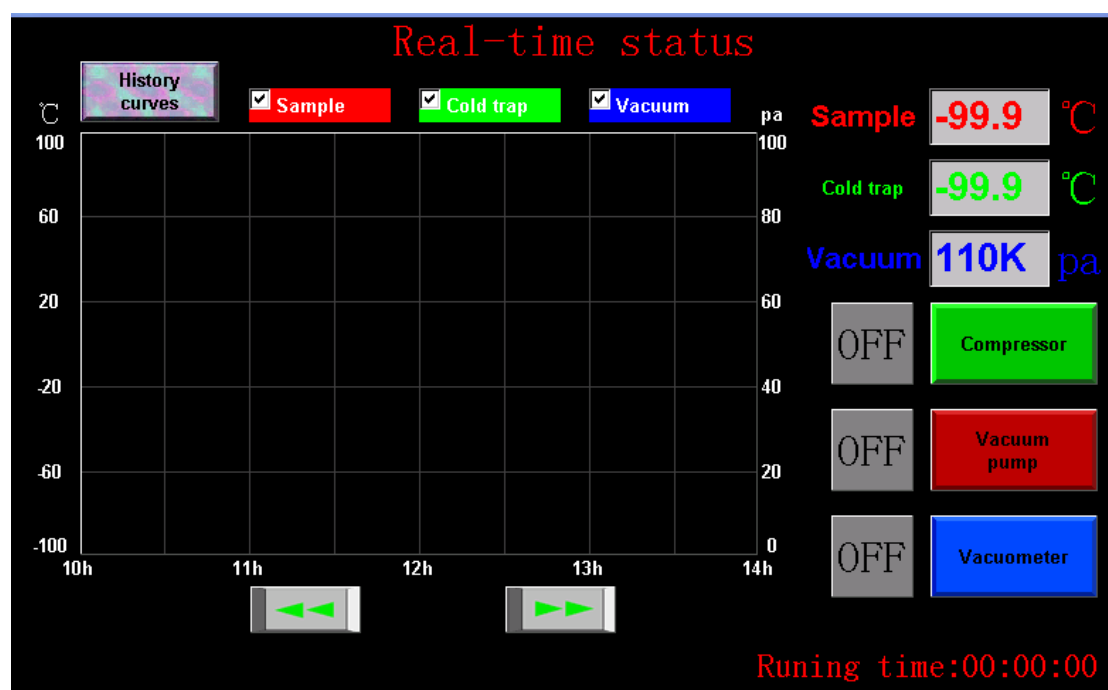
V. Control System Operation

The machine control system uses a 7-inch TFT LCD touch screen display, which is the human-machine interface. The device is easy to operate, running status can be also clearly showed. The system is able to use curve to show the sample temperature, the temperature of the cold trap, and the degree of vacuum freeze-drying curve. The system uses a variety of stability measures, control system operation is stable and reliable. Control systems have the following content.

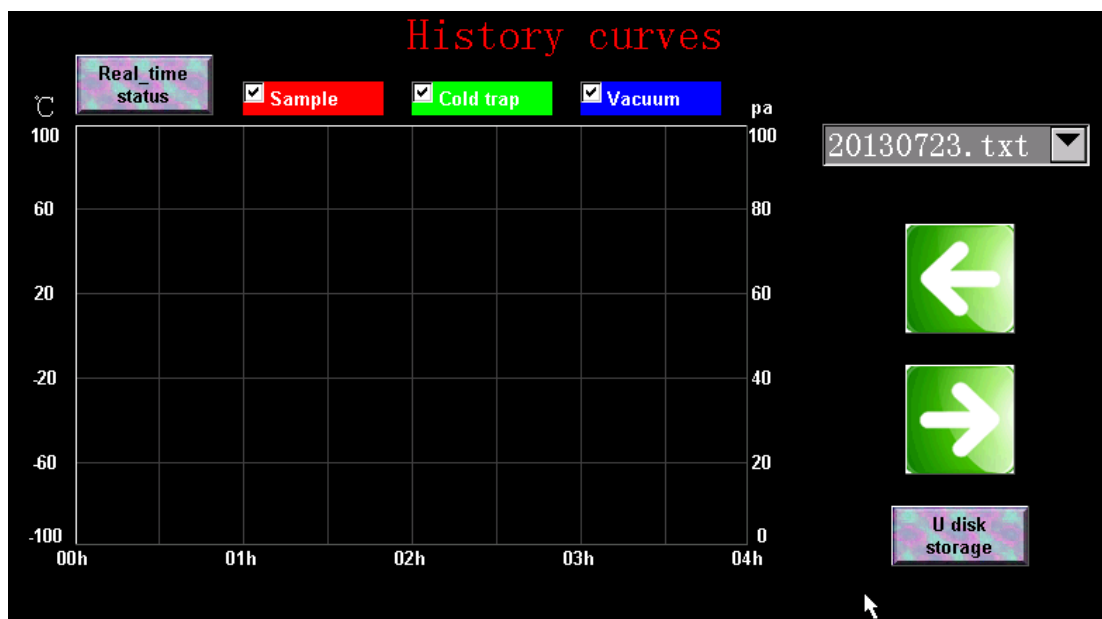
1, open the "power supply" switch, the system will display "the company logo and name". Then touch the middle of the screen, the real-time status of the interface will enter automatically.



2, pressing the refrigerator keys so that the curve will start recording. Then the compressor starts, and the cold trap start cooling. In this interface, you can select the curve type to show. According to the sample, cold trap, vacuum, \surd means that there has the curve type to show on the screen, while there has no \surd means that the screen will not show the curve type. Each screen will display the 4 hours curve. If you want to search the whole curve which is played today, you can press the key of forward and backward.



3. Under the historical curve, click on the triangular block which is located in the right side, then select the curve inquired data. If you want to extract data, please insert U disk before booting. Then go into the history curve, and select the copy date, click the key of storage of U disk, the screen will display copy successfully. Then click on the real-time status, and return to the real-time master interface.



VI . Notes

- 1, a vacuum pump is placed on the ground, and make sure that it has a certain height with the host. When the power outage happens suddenly, it can prevent oil back. If power outage occurs, you should unscrew inflatable valve immediately, to make the host inflatable. Samples should be removed as soon as possible, and storage properly.
- 2, operating ambient temperature $\leq 32^{\circ}\text{C}$, humidity $\leq 80\%$.
- 3, Before you shut down the machine, you should inflate firstly. Then turn off the vacuum pump to prevent the vacuum pump oil back, which can prevent contaminating samples.
- 4, organic glass can be connected with the host phase by the "o" type seal rings.
- 5, Using a grounded power outlet. The seals ring should be kept clean. Do not scrub with organic solvents. The contact part of the organic glass and "o" type seal ring should be protecting.
- 6, In accordance with the instructions, after 200 hours of continuous work, you should replace the vacuum pump oil, pay attention to the maintenance and repair work.
- 7, Do not switch power supplies and drying machine frequently. If you do so, and results the machine stop working, please wait at least three minutes, and then restart it.

VII. Common faults and troubleshooting

1, The degree of vacuum is not less than 15Pa

(1) Check the connection between the vacuum pump and the host, and make sure that the clamp is locked properly.

(2) Check the lower end of the organic glass plane , and make sure it is clean and undamaged.

(3) Check the "O" type seal rings are clean and placed correctly.

(4) Check the vacuum pump is working properly, also to observe pump oil, make sure it is clear.

(5) Check the vacuum valve is tightly.

2, vacuum pump oil spill

(1) Inspecting the aircraft parts, and should be replaced the required accessories.

3, if the cold trap temperature is high

(1) The ambient temperature is too high, which will result that the heat loss poorly. Please place the machine in the appropriate ambient temperature, and make sure it is a well-ventilated place.

(2) If the cooling system failure, please contact technical engineers of our company.

VIII. Guarantee and service

1, from the sale of the machine date, you can enjoy one year free warranty.

2, Our company will responsible for the maintaining of this machine in its whole life.

Please keep all of the accessories safety. After you checking all the things are in the package, please filling the product warranty card and send it to our company's sales department. Thanks for you cooperation.

VIII. Accessories

Sequence Number	Name	Quantity
1	Host	1
2	Material shelf	1
3	Φ200mm material tray	4
4	Vacuum pump	1
5	Power lead	1
6	Vacuum pressure tubing	1
7	Pre—freezing shelf	1
8	Thermal cover	1
9	“O” type seal ring	1
10	Operation Manual	1
11	Vacuum grease	1
12	Fuse 10A	2
13	Fuse 15A	2