

FREEZE DRYER

OWNER'S MANUAL

Applicable Models

DFD-04
DFD-06
DFD-10
DFD-20
DFD-40



Please read this manual carefully
before use and keep it for future reference.

Version 7.15 | 2026

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1.Packing List

Before installing or operating the appliance, carefully inspect the package. Make sure that all components are present and show no visible damage. If anything is missing or damaged in transit, contact your supplier or after-sales representative promptly.

The standard package includes:



· Freeze dryer main unit



· Power cord



· Vacuum pump



· Vacuum hose



· Shelf assembly



· Trays



· User manual

NOTE: Depending on the model or customer-specific configuration, the package may contain accessories not listed above, such as spare seals or tools. This is normal.

Unpacking and Handling

CAUTION

- Unpack the appliance on a flat, stable surface to prevent tipping or impact damage.
- When lifting the appliance, support it from the bottom or hold both sides of the cabinet.
- Never lift, pull, or support the appliance by its door.

Improper handling may cause:

- Door misalignment;
- Poor sealing;
- Failure to reach the required vacuum level;
- Reduced performance or failure to operate;
- Loss of warranty coverage.

Basic Safety Notice

WARNING!

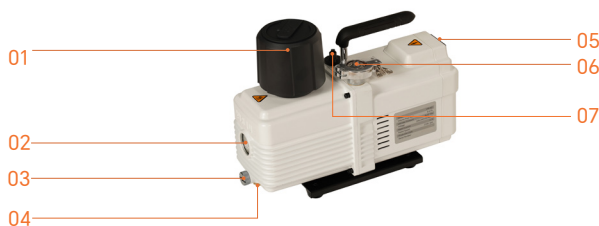
- Electric shock can cause serious injury or death.
- This appliance is designed for indoor installation only.
- Do not allow dust or debris to block the appliance.

2.Product Overview

This section introduces the overall construction of the freeze dryer and the function of its main components. Familiarize yourself with these items before use so that the appliance can be operated correctly and safely.



- | | | |
|----------------------------|----------------------------------|--------------------------------|
| 01.Touchscreen display | 02. Acrylic door | 03.Shelf assembly |
| 04.Rotary door handle | 05.SUS 304 stainless-steel trays | 06.Drain hose and drain valve |
| 07.USB port | 08.Vacuum chamber | 09.Freeze Dryer Power Switch |
| 10.Freeze Dryer Power Port | | 11.Vacuum Pump Power Connector |



- | | | |
|---------------------|-----------------------|---------------------|
| 01.Oil Mist Filter | 02.Oil Level Gauge | 03.Oil Drain Valve |
| 04.Oil Drain Port | 05.Vacuum Pump Switch | 06.Vacuum Tube Port |
| 07.Gas ballast knob | | |

2.1 Main Power Switch

The main power switch is located on the rear of the appliance and controls power to the complete unit:

- “O” = OFF
- “I” = ON

After the appliance has been connected to the power supply, use this switch to turn it on or off.

2.2 Vacuum Chamber

The vacuum chamber is the sealed cylindrical working space in which freeze-drying takes place.

- The shelf assembly is installed inside the chamber.
- Trays containing food or other suitable material are placed on the shelves.

During a cycle, the product is frozen and then dried by sublimation inside this sealed environment.

2.3 Trays

The trays hold the food or material to be processed and are placed on the shelf assembly.

For best results:

- Spread the product evenly across each tray;
- Avoid stacking food or loading it too thickly.

CAUTION ! Do not overload the trays. Excessive or uneven loading may significantly increase drying time, cause uneven drying, or leave part of the batch incompletely dried.

2.4 Power and Control System

Power connections are made at the rear panel:

- Connect one end of the appliance power cord to the rear power inlet and the other end to a power outlet that meets the electrical requirements.
- A dedicated vacuum pump outlet is provided on the rear panel so that the appliance can control power to the pump.
- Once power is connected and the main switch is turned on, the display illuminates and the appliance enters standby mode.

CAUTION!

- Verify that the supply voltage matches the rating plate.
- A properly grounded supply is required to reduce the risk of electric shock.
- Use a dedicated circuit. Sharing a circuit with other high-power appliances may cause voltage instability, circuit-breaker trips, or abnormal operation.

2.5 Vacuum Pump

The vacuum pump removes air from the chamber and creates the stable low-pressure environment required for freeze-drying.

Installation requirements:

- Connect the pump to the freeze dryer with the supplied vacuum hose.
- Hand-tighten both ends securely and make sure there is no air leakage.
- A loose connection can prevent the appliance from reaching the required vacuum and may interrupt the cycle.

Before starting, confirm that:

- The vacuum pump contains the correct quantity of vacuum pump oil.
- The pump power cord is connected to the dedicated outlet on the rear of the freeze dryer. Do not

connect the pump to a separate external supply.

- The pump's own power switch is in the ON (I) position.

NOTE:The vacuum pump does not run immediately when power is applied. It starts automatically when the program reaches the required stage.

2.6 Oil-Mist Filter

The black cylindrical oil-mist filter is installed on top of the vacuum pump. It reduces oil mist discharged while the pump is operating and helps keep the surrounding air cleaner.

2.7 Drain Hose

The clear drain hose is located at the lower rear of the appliance and drains condensate produced during the process. Place the end of the hose in a drain, bucket, or suitable container.

WARNING !

- Never open the drain valve while the end of the drain hose is submerged in water. Water may be drawn back into the chamber.
- Do not remove the drain valve or disconnect the drain hose from the appliance. Leakage or abnormal operation may result.
- Before starting a cycle, make sure the drain valve is closed. The small valve handle must be perpendicular to the hose. An open valve prevents the sublimation-drying process from operating correctly.

3 Safety Information

3.1 Important Information

IMPORTANT!Read and understand this manual before installing, connecting, operating, cleaning, or servicing the freeze dryer.

The instructions cover installation, operation, safe use, maintenance, and troubleshooting.

Following them will help:

- Prevent electric shock, burns, cold burns, pinch injuries, and other personal injury;
- Prevent damage caused by incorrect installation or operation;
- Keep the appliance operating safely, reliably, and efficiently;
- Extend the service life of the appliance and vacuum pump;
- Reduce the risk of faults during operation;

Keep this manual in a safe location that is readily accessible to operators.

3.2 General Safety Requirements

- Use the appliance only for the purposes described in this manual. It is designed to freeze-dry suitable water-containing foods or materials.
- Do not use the appliance for any unintended purpose. Misuse can reduce performance, damage components, or create a safety hazard.
- Do not modify the mechanical structure or electrical system. Unauthorized dismantling, modification, or use of non-original parts may compromise safety, sealing, vacuum performance, and refrigeration stability.
- Do not bypass, short-circuit, disable, or alter any safety protection.
- The appliance must be operated only by people who understand its operating requirements.

New users should read this manual and receive appropriate instruction before operation.

CAUTION! Damage, personal injury, or operating faults caused by misuse, unauthorized modification, non-original parts, or failure to follow this manual are not covered by the warranty.

3.3 Electrical Safety

WARNING

Follow all electrical safety instructions to prevent electric shock, fire, and equipment damage.

- Do not use an extension cord. Most extension cords cannot safely carry the operating current and may overheat, melt, or cause a fire. Connect the appliance directly to a compliant outlet.
- Do not use a surge protector or a GFCI/RCD-type outlet where nuisance tripping may occur. Such devices can react to normal current fluctuations and stop the appliance during a cycle. Follow applicable local electrical regulations and have the final circuit arrangement assessed by a qualified electrician.
- Use a dedicated circuit. Sharing a circuit with an air conditioner, oven, or other high-power appliance can cause unstable voltage or overload protection to trip.
- Do not handle the plug with wet hands.
- Keep the plug clean. Dust or contamination on the contacts can cause poor connection, overheating, or fire.
- Never pull the cord to unplug the appliance. Hold the plug body and pull it straight out.
- Do not operate with a damaged power cord. If the cord is worn, deformed, cut, or has exposed conductors, stop using the appliance immediately. It must be replaced by the manufacturer, an authorized service provider, or a qualified technician.

3.4 Operational Safety

NOTE:

- Keep children away from the appliance and do not allow them to operate it. Low temperatures, heat, vacuum, and moving door parts can cause injury. Adult supervision is required whenever children are present.
- Do not climb, stand, sit, or hang on the appliance. It is not a load-bearing structure and may tip, deform, or become damaged.
- Do not touch very cold surfaces during operation, particularly with wet hands. Skin can adhere to cold metal and cause a cold burn. Keep hands dry and wear protective gloves when necessary.
- Do not store or use flammable gases or liquids, including gasoline or alcohol, near the appliance.
- Keep hands and fingers clear of the door-closing area. Close the door slowly to prevent pinch injuries.

3.5 Maintenance and Service Safety

- Disconnect the appliance from power before cleaning or servicing it. Electrical hazards remain even while the appliance is in standby.
- Repairs should be performed by qualified technical personnel. The refrigeration, heating, and vacuum systems are complex, and unauthorized work can damage the appliance or create a hazard.
- Do not use a hair dryer, portable heater, or other external heat source to defrost the chamber. External heating may activate the overtemperature protection or damage internal components.

3.6 Abnormal Condition or Damage

WARNING!

Stop using the appliance and disconnect power immediately if it has been dropped or severely

impacted; if the enclosure or a critical component is damaged; or if unusual noise, vibration, or odor (including a burning smell) occurs.

Continued use may worsen the fault or cause an accident. Contact after-sales service or a qualified technician for inspection and repair.

3.7 Restrictions on Processed Materials

This appliance is intended only for suitable water-containing foods and compatible materials. Volatile, corrosive, or otherwise unsuitable substances may contaminate the chamber, disrupt the vacuum system, overload the refrigeration system, reduce performance, or damage the appliance. Damage caused by unsuitable materials is not covered by the warranty.

3.8 Vacuum Pump Safety

CAUTION!

- The vacuum pump produces heat during operation, and its housing may reach approximately 70° C (158° F).
- Do not touch the pump housing while it is hot. Allow it to cool before service.
- Install the pump where children cannot reach it.

3.9 Environmental and Temperature Requirements

- Permitted operating temperature: 2° C to 32° C (36° F to 90° F).
- Recommended temperature: 7° C to 25° C (45° F to 77° F).

Operation within the recommended range provides the most stable and efficient performance. At ambient temperatures of 32° C (90° F) or above, drying time may increase, refrigeration efficiency may fall, and the load on the compressor and vacuum system may increase. These effects are normal, but prolonged operation in excessive heat can shorten service life.

At approximately 25° C (77° F), a typical cycle may finish in about 24 hours. At higher ambient temperatures, some cycles may require 40 hours or more. Food type, thickness, moisture content, sugar content, loading, and other conditions also affect cycle time.

To improve performance in warm conditions:

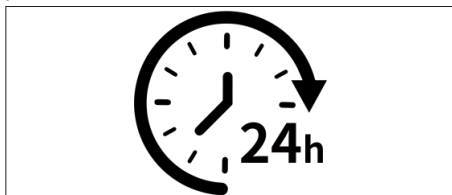
- Maintain good airflow around the appliance.
- Place an auxiliary cooling fan near the vacuum pump if necessary.

4. Installation

Follow these instructions before first use to ensure safe operation and a long service life.

4.1 Allow the Appliance to Stand - Very Important

After transportation, place the freeze dryer in its final operating position and allow it to stand upright for at least 24 hours before connecting power.



This allows refrigeration oil to return to the compressor and refrigerant conditions to stabilize. Starting the appliance without this standing period may damage the compressor or refrigeration system.

4.2 Installation Environment

After unpacking, place the appliance on a level, stable surface in a cool, dry, clean, and well-ventilated area. Avoid direct sunlight, excessive heat, dust, or airborne powder. Dust on the condenser fins reduces heat dissipation, decreases refrigeration efficiency, and shortens service life.

CAUTION!

- Maintain at least 20-30 cm (8-12 in.) of clearance around the appliance.
- Keep the side and rear ventilation openings unobstructed.

Poor ventilation may cause overheating, reduced efficiency, or a fault.

4.3 Door and Seal Inspection

- Check that the rubber door gasket is clean and free of dust, food residue, and foreign matter.
- Confirm that the gasket is not deformed or damaged.

A poor seal causes vacuum leakage and reduces freeze-drying performance.

4.4 Cleaning the Acrylic Door

Make sure both sides of the acrylic door are clean. Use only a soft cotton cloth dampened with warm water.

Do not use chemical cleaners, alcohol, or corrosive liquids. These can cloud, craze, or damage the acrylic surface.

4.5 Filling the Vacuum Pump with Oil

The vacuum pump must be filled with the correct quantity of vacuum pump oil before first use.

2ZL-1.5



VRI-4



VRI-8D/8D



VRD-30



1. Remove the oil-mist filter or oil-fill cap at the top of the pump, as applicable to the supplied pump.

2. Slowly add vacuum pump oil.
3. Fill until the oil level is slightly above the center of the sight glass.
4. Reinstall and tighten the cap or filter.

CAUTION

- Do not exceed the maximum oil-level mark.
- Make sure the oil drain valve at the bottom of the pump is closed.

Overfilling or leaving the drain valve open may cause leakage or abnormal operation.

4.6 Connecting the Vacuum Hose

Connect the hose securely to both the freeze dryer and vacuum pump. The appliance may be supplied with either a threaded hose or a KF25 vacuum connection.

① Threaded Hose

1. Check that the rubber sealing washer is correctly seated inside each hose fitting.



2. Hand-tighten both fittings.



3. If necessary, use a suitable tool only for slight additional tightening. Do not overtighten.
4. Never use PTFE thread tape or sealant. These can interfere with the O-ring seal and cause leakage.

② KF25 Connection

1. Position the centering O-ring correctly

between the two KF flanges.



2. Align the flanges and fit the clamp.



3. Tighten the clamp evenly by hand until it cannot be turned further.



4. Do not use a tool to force-tighten the clamp.



4.7 Connecting Appliance Power

- Connect the appliance power cord to the rear power inlet.
- Connect the other end directly to a compliant, properly grounded outlet.

IMPORTANT

The DFD-40 requires a dedicated 32 A circuit breaker and appropriately rated wiring installed in accordance with local electrical regulations.

4.8 Connecting Vacuum Pump Power

Connect the vacuum pump power cord to the dedicated outlet on the rear of the freeze dryer. Models with an integrated pump are already wired and require no additional connection.

4.9 Vacuum Pump Power Switch

Set the pump switch to ON (I). The switch is normally located on the rear of the pump. If it remains OFF, the pump cannot run when commanded by the freeze dryer.

4.10 Locking the Door

The door uses a two-stage locking action:

1. The first stage secures the door.



2. The second stage compresses the gasket.



Rotate the handle clockwise to the locked position. Do not use excessive force, which can damage the latch mechanism.

4.11 Checking the Door Seal



After closing the door, confirm that the acrylic door contacts the rubber gasket evenly and produces a continuous narrow compression

line. Once vacuum begins, the door must remain fully sealed.

4.12 Checking the Drain System - Critical Step

Make sure the drain valve is fully closed. The valve handle must be perpendicular to the drain hose.

WARNING!

An open drain valve causes vacuum leakage. This can cause a failed batch, waste food, damage the vacuum pump, and invalidate pump warranty coverage.

Place the drain hose in a bucket, drain, or suitable container, but keep its end above the water level to prevent water being drawn into the appliance.

4.13 Final Pre-Start Check

Before starting, verify that:

- The door is correctly closed and locked.
- The drain valve is closed.
- The vacuum hose is securely connected.
- The vacuum pump switch is ON.

Each item directly affects the operation of the vacuum system.

4.14 Starting and Initial Test

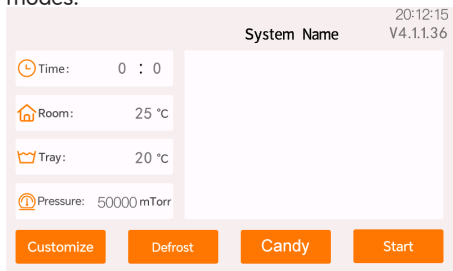
Set the main power switch to ON (I). Before the first test, make sure that the chamber is completely dry and contains no water, condensate, or other wet material.

4.15 Recommended Break-In Test

For a new appliance, run one test batch using a small quantity of damp bread. After the cycle, check that the bread has dried correctly, then discard it. This verifies basic operation and helps remove any residual manufacturing odor.

5. Operating Instructions

The freeze dryer provides three operating modes:



- **Automatic Mode (Start)**
- **Candy Mode**
- **Custom Mode**

5.1 Selecting a Mode

Automatic Mode

Recommended for most standard foods and materials, including fruit, vegetables, and meat. Press Start and the appliance automatically completes freezing, vacuum, drying, and completion stages. This is the simplest and recommended default mode.

Candy Mode

Designed for candies such as gummies and marshmallows. These products require different temperatures and drying behavior; the dedicated mode helps produce a better expansion or puffing effect.

Custom Mode

For users or processes with special requirements. Temperature, time, and other parameters can be adjusted for a specific product or process.

NOTE!

Use Automatic Mode for most products other than candy or special materials. Moisture content, thickness, sugar content, and arrangement on the trays affect actual cycle time even in Automatic Mode.

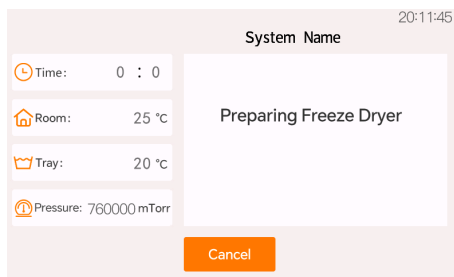
NOTE!

The screen captures reproduced from the

supplied source manual show the source-language interface. After the system language is changed to English, wording may vary slightly by firmware version. The bold English control names in this chapter identify the corresponding functions.

Some models display two tray-temperature values for separate tray zones. This is a normal design feature.

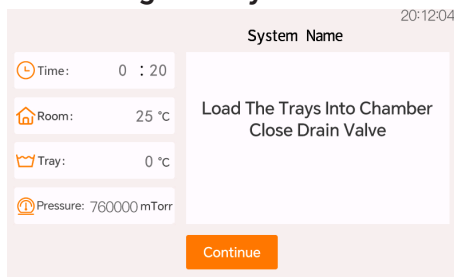
5.2 Chamber Preparation



When the display shows **Preparing Vacuum Chamber**, the appliance is lowering the chamber temperature to the level required for freeze-drying. This stage is essential for pre-frozen food and freeze-dried ice cream because it provides a stable, low-temperature environment before the later stages begin. While the chamber is preparing:

- Prepare the food and trays.
- Non-pre-frozen food may be loaded into the shelf assembly during this stage.
- Arrange the product evenly on the trays.

5.3 Loading the Trays



For consistent results:

- Use all available trays where practical to maintain even heat distribution.
- Spread food in one even layer; do not stack or overlap it.
- Keep the product below the rim of the tray so that it cannot touch the heater above or obstruct heat transfer.

Thick or uneven loading can lengthen the cycle, cause uneven drying, and leave some areas incompletely dried. Keep fully pre-frozen food out of room-temperature conditions for as little time as possible.

For pre-frozen food and ice cream, wait until the tray temperature reaches approximately 0 °C (32 °F) and the appliance sounds the loading prompt, or load at a lower temperature if appropriate.

1. Place the trays into the shelf assembly.
2. Close and lock the acrylic door. Confirm full, even contact with the gasket.
3. Close the vent/drain valve. The handle must be perpendicular to the hose.

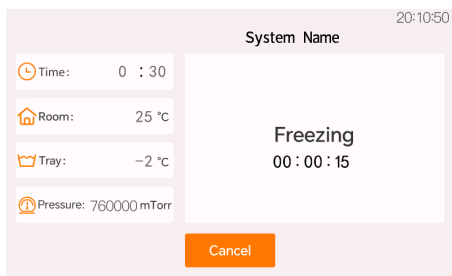
Load trays and close the vent valve prompt

Pre-frozen food must be frozen solid, preferably on the trays. Minimize the time the door remains open so the chamber does not warm unnecessarily.

CAUTION!

An unsealed door or open vent/drain valve prevents vacuum from forming. Food that is not completely frozen may produce poor results and extend the process.

5.4 Freezing Stage



When the appliance displays **Freezing**, it is

lowering the chamber and tray temperatures to the target value selected by the default or custom settings.

After the target temperature is reached, the program automatically proceeds through:

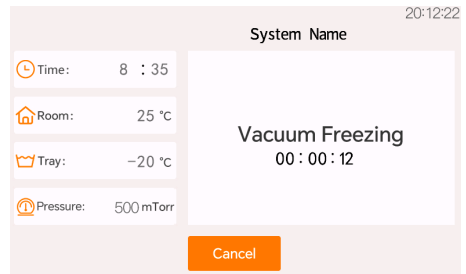
Freezing -> Vacuum -> Drying -> Complete

No manual intervention is normally required.

CAUTION

Do not press Cancel during operation unless you intentionally need to terminate the cycle. Cancelling can cause the batch to fail or remain incompletely dried.

5.5 Vacuum Freezing Stage

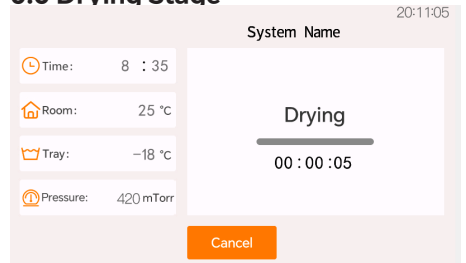


After the target freezing temperature is reached, the appliance enters **Vacuum Freezing**:

- The vacuum pump starts automatically.
- Air is removed from the chamber and vacuum gradually develops.
- Once the specified vacuum level is reached, the appliance automatically proceeds to drying.

Do not open the door or operate the vent/drain valve during this stage.

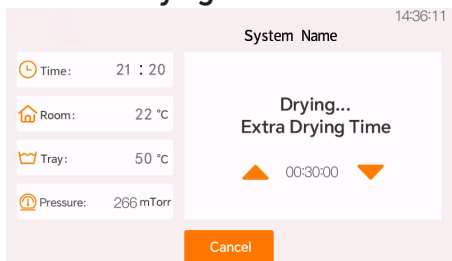
5.6 Drying Stage



When both the product temperature and chamber pressure meet the program requirements, the appliance enters **Drying**. Ice in the food sublimates and the released moisture freezes onto the chamber wall.

The display shows a drying progress bar and elapsed drying time. Actual completion depends on product type, moisture content, slice thickness, and tray loading, so the displayed time and apparent progress may not correspond exactly to remaining process time. Do not stop the appliance or repeatedly change settings during drying.

5.7 Extra Drying Time

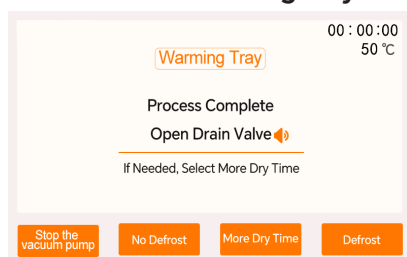


Near the end of drying, the appliance enters **Extra Dry Time** and displays a countdown.

- The default extra drying time is **30 minutes**.
- Before a cycle, it can be changed in Custom Mode.
- During a cycle, use the up and down arrows to increase or decrease it.

When in doubt, add extra drying time. This helps remove residual moisture from the center of the food and improves product quality and storage stability.

5.8 Cycle Complete: Releasing Vacuum and Removing Trays



When the display shows **Process Complete**:

1. Turn off the vacuum pump if required by the selected completion setting.

2. Make sure the drain hose end is above the water level.

3. Open the vent/drain valve and allow air to enter the chamber.

4. Wait until the chamber has returned to atmospheric pressure.

5. Open the acrylic door and remove the trays.

WARNING

- If the hose end is submerged, water may be drawn into the chamber when the valve is opened.

- Trays may be hot. Use suitable heat-resistant gloves.

Immediately check the product. Break open the thickest or largest piece and confirm that its center is dry. Even a small quantity of incompletely dried food can make an entire sealed package soften.

Package fully dried product immediately in airtight jars, vacuum bags, or foil-laminate bags. Use an oxygen absorber where appropriate.

If product remains moist:

1. Return the trays to the appliance.
2. Close and lock the door.
3. Close the vent/drain valve.
4. Select Add Dry Time and continue drying.

5.9 Warm Trays Function

If trays are not removed promptly after completion, the appliance may cool them again. Removing very cold trays can cause surface condensation, local rehydration or thawing, and discomfort to the user's hands.

Select **Warm Trays** to heat the trays toward room temperature. Remove them within

5-10 minutes after the target warming temperature is reached. If they are not removed, heating stops automatically and the trays cool again.

5.10 Defrosting

After all product has been removed, choose

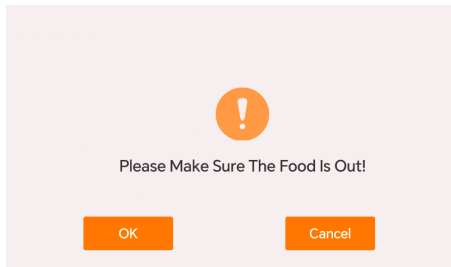
one of the following:

Natural Defrost

Leave the door open and allow the chamber ice to melt naturally.

Powered Defrost

1. Select Defrost.
2. When prompted to confirm that all food has been removed, select Confirm.
3. The shelf heaters operate to accelerate melting.



Run a defrost cycle whenever a substantial layer of ice has accumulated on the chamber wall. Excess ice reduces performance and can affect the next batch. If the ice layer is thin and another batch will begin immediately, defrosting may be skipped.

The default defrost time is 2 hours. Adjust it with the up and down arrows according to ice thickness. At the end, remove all ice and standing water and dry the chamber completely. Select Finish to return to the start screen.

5.11 Function Test and Settings

Accessing the Menus



1. Touch the logo area at the upper-left of the

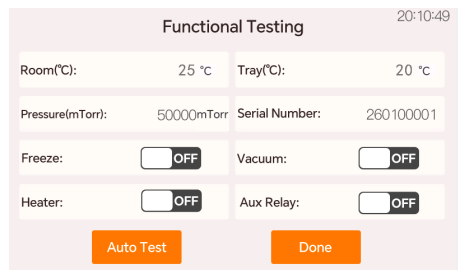
screen to open Function Test.

2. Touch the operating-status area to open Basic Settings.

3. Select Custom to open the freeze-drying parameter settings.

4. Select System Name to enter a custom appliance name using the on-screen keyboard.

Function Test



The Function Test screen provides individual ON/OFF controls for the refrigeration compressor, vacuum pump, shelf heater, and buzzer. It can be used to confirm component operation and to check system airtightness.

To check airtightness:

1. Select Freezing ON/OFF. Confirm that the refrigeration compressor starts.
2. Close the chamber door and drain valve, then allow the appliance to freeze for at least 30 minutes.
3. Select Vacuum ON/OFF. Confirm that the vacuum pump starts.
4. Within 20-30 minutes, pressure should fall progressively below 400 mTorr. If it does not, inspect the system for leakage and repeat the test.

A well-sealed system requires:

- A completely closed and locked door
- A closed drain valve
- Secure hose connections at both the pump and freeze dryer
- Full, clean contact between the door and gasket

High ambient temperature reduces refrigeration and vacuum pump efficiency. Place the appliance in a ventilated location and use auxiliary cooling if needed.

Selecting Drying ON/OFF energizes the shelf heaters and raises tray temperature. Turn the heaters off promptly after verification. When diagnosing refrigeration or vacuum faults, do not turn on heat unless the heater itself needs to be tested; test it only after other issues have been excluded.

Select Finish to leave the screen. All outputs that were turned on are then switched off automatically.

Automatic Test is intended mainly for factory inspection and commissioning and is not normally required by end users.

Basic Settings

Setup Configuration

Date:2026/04/15Time:20:11:05

System Hours(h):0Pump Hours(h):0

Batches Completed:1Serial Number:260100001

When the process is completed, the vacuum pump:OFFLanguage:English

Set TimeDone

Basic Settings allows the user to:

- Set the date and time;
- Change the system language;
- Select whether the vacuum pump remains ON or switches OFF after the process completes;
- View total system operating time;
- View accumulated vacuum pump operating time;
- View the number of completed freeze-drying cycles;
- View the factory serial number.

Custom Settings

冷冻温度(℃):-18

干燥温度(℃):果蔬/肉类50

温度设置:32℃0100

额外干燥时间(h):00:30

重置取消保存

Custom Settings allows adjustment of:

- Freezing temperature;
- Drying temperature;
- Extra drying time.

For foods or materials with high sugar or salt content, a lower freezing temperature may be beneficial. Excessive drying temperature can scorch or otherwise damage some products. Lower settings can extend the cycle but often improve finished quality.

The factory defaults for Automatic Mode are -18° C (0° F) freezing and 50° C (122° F) drying, which are suitable for most foods.

After changing a parameter, select Save. Subsequent cycles started with the main-screen Start button use the most recently saved values. Select Reset to restore factory defaults.

Select **System Name** to enter a custom name. The new name appears in the interface and helps identify multiple appliances.

System Name21:03:34

Time:

Room:

Tray:

Pressure:

CustomizeDefrostCandyStart

6. Vacuum System

During operation, the vacuum pump continuously removes air from the chamber to create a stable low-pressure environment. The ice crystals in the product can sublime correctly only when sufficient vacuum has been reached, so airtightness is critical to process performance.

6.1 Importance of Airtightness

To reach the normal working vacuum:

- All valves must be correctly closed.
- Every vacuum connection must be secure.
- The door must contact the gasket evenly and completely.
- The system must be free from leakage.

Even a small leak may prevent the required vacuum from being reached, significantly extend the cycle, reduce product quality, or prevent the program from entering the drying stage.

IMPORTANT!

A door that cannot be opened does not prove that the system is fully sealed. A partial vacuum can hold the door closed even when pressure is still too high for normal operation. Always use the pressure value shown on the display as the primary indicator.

6.2 Normal Vacuum Development

Under normal conditions, the displayed pressure should fall noticeably within approximately 10-15 minutes after the pump starts. The appliance can normally proceed with freeze-drying after pressure falls below 500 mTorr.

If pressure remains above 500 mTorr after approximately 30 minutes, or falls unusually slowly, inspect the system for leakage.

6.3 Checks Before Leak Diagnosis

Confirm that:

- The food is completely frozen.
- The drain valve is fully closed.
- The door is correctly closed and locked.
- The vacuum hose is securely connected.

- The vacuum pump oil level is correct.

6.4 Door-Gasket Inspection

Check the gasket for dust, food residue, foreign material, deformation, or damage. If cleaning is required, use warm water and allow the gasket to air-dry, or wipe it gently with a lint-free soft cloth. Do not use a cloth that sheds fibers, as dust or lint can interfere with sealing.

6.5 Possible Leakage at the Vacuum Pump

Inspect the following:

- Loose vacuum hose connections;
- Contaminated pump oil;
- Low oil level;
- Missing, damaged, or aged hose seals;
- A loose KF25 clamp or threaded fitting.

6.6 Possible Leakage at the Freeze Dryer

Inspect the following:

- Drain valve not fully closed;
- Incorrectly installed or loose vacuum hose;
- Door latch not fully engaged through both locking stages;
- Contamination on either side of the door gasket;
- Uneven door-to-gasket contact;
- Door requiring alignment adjustment.

6.7 Effect of High Ambient Temperature

High ambient temperature reduces both refrigeration efficiency and vacuum pump performance. Vacuum may develop more slowly, fail to reach the ideal value, and extend cycle time.

For more stable performance:

- Operate in a well-ventilated area.
- Avoid direct sunlight and excessive heat.
- Use an auxiliary fan near the vacuum pump if necessary.

6.8 Basic Indicators of a Properly Sealed System

In a normal system:

- The pressure value falls steadily.
- The pressure curve does not fluctuate sharply.
- The system does not repeatedly attempt to restore vacuum.

Pressure that remains high, fluctuates widely, or prevents the drying stage from starting usually indicates leakage or a sealing fault.

7. Loading Food and Packaging Finished Product

Correct loading and packaging are essential for even drying and long-term storage. Moisture content, thickness, and arrangement directly affect cycle time and finished quality.

7.1 Loading Trays

General Principles

- Spread food evenly over the tray.
- Use a single layer whenever possible; avoid stacking.
- Keep product below the rim of the tray.
- Maximize contact between the product and tray surface.

Greater contact area generally improves freezing and drying efficiency. Thick, stacked, or uneven product can extend the process, heat unevenly, and remain incompletely dried.

Fruit

For apples, bananas, peaches, pineapple, strawberries, raspberries, and similar fruit:

- Slice and spread the pieces over the tray.
- Pieces may be placed close together but should not overlap.
- Keep slice thickness consistent. Thicker pieces require more drying time.
- For strawberries, apricots, and similar fruit cut into halves, place the skin side down and cut face upward to help moisture escape evenly.

For fruit with an intact skin, such as blueberries, grapes, and cherry tomatoes, cut,

score, or puncture the skin before loading. An intact skin can restrict moisture release and greatly extend the cycle.

Liquids and Semi-Liquids

For raw egg, milk, soup, sauces, and similar products:

1. Place an empty tray onto the shelf.
2. Pull it partially out.
3. Pour the liquid slowly into the tray.
4. Gently slide the filled tray back into position. Do not pour quickly, overfill the tray, or push it back abruptly. Spillage can contaminate the chamber and affect operation.

Cooked Meals, Casseroles, and Pasta

Foods such as beef stroganoff, macaroni and cheese, stew, and rice dishes can be loaded somewhat thicker than sliced fruit. Keep the food below the tray rim and spread it as evenly as possible. Greater thickness normally requires a longer cycle.

7.2 Packaging After Freeze-Drying

Freeze-dried food is highly hygroscopic and can quickly absorb moisture from the air. Package it as soon as possible after confirming that it is completely dry.

Recommended procedure:



1. Place the product in a high-barrier package such as a polyester-laminate bag, foil-laminate pouch, or vacuum bag.



2. Add a correctly sized oxygen absorber where appropriate.



3. Heat-seal the package at a suitable temperature, producing a complete, flat, airtight seal.

Oxygen Absorbers

Oxygen absorbers begin working immediately when exposed to air. Do not open their outer package until the food has been loaded and is ready to seal. A slight rise in temperature during the chemical reaction is normal. If an absorber becomes noticeably warm before sealing, it may already have absorbed substantial oxygen and should be replaced.

Before Sealing

Confirm that:

- As much air as practical has been removed from the package.
- The sealing area is flat and free of food particles.
- The seal has no wrinkles or folds.

An incomplete or wrinkled seal allows air and moisture to enter, which can soften the product, shorten storage life, and cause spoilage.

Store sealed food in a cool, dry location away

from direct sunlight, high temperature, and humidity.

8. Vacuum Pump Maintenance

The condition of the vacuum pump directly affects vacuum development, drying efficiency, final product quality, and operating stability. Regular maintenance and clean pump oil are essential.

8.1 Pump Oil Maintenance

1. Keep the gas ballast valve open during normal freeze-drying operation. If it remains closed, the oil may need replacement after only 4-5 batches.
2. Keep the pump level. Do not tilt it excessively during handling or oil draining, as oil may enter the oil separator.
3. If the oil-mist filter becomes saturated while the pump is running, oil mist may spread into the room. Clean or service a saturated filter.
4. As a general guide, filter the pump oil after approximately every 4-5 batches and replace it after approximately every 20-30 batches. Actual intervals depend on product moisture and operating conditions.

Replace or service the oil promptly if:

- It becomes significantly darker.
- It appears cloudy or milky.
- Visible contamination is present.
- Vacuum develops more slowly than normal.

Contaminated oil reduces pumping efficiency and achievable vacuum.

8.2 Common Causes of Reduced Pump Life

Skipping Chamber Freezing

Do not bypass the appliance's freezing cycle. Even when food has been pre-frozen, the freeze dryer must complete its own chamber-preparation stage.

If any product water remains partially liquid when vacuum begins, that moisture may enter

the pump, contaminate the oil, reduce vacuum performance, and shorten pump life.

Excessive Loading

Overloading the trays can create more water vapor than the condensing system can capture. Excess vapor may enter the pump and cause rapid oil contamination, reduced vacuum performance, increased wear, and shorter pump life.

8.3 Changing Vacuum Pump Oil

Change oil while the pump is warm but safely switched off. Warm oil flows more freely and carries contamination out more effectively.

1. Switch off the pump and wait for it to stop.



2. Locate the oil drain valve, normally at the lower front of the pump.



4. Place a suitable waste-oil container below the valve.



5. Open the drain valve slowly and allow the oil to flow out naturally.



6. Observe the color and contamination level. Drain into a filter only if the oil is intended to be filtered and reused in accordance with local practice; otherwise collect it for proper disposal.



7. If necessary, raise the rear of the pump slightly to drain residual oil. Do not tilt excessively.



8. Close the drain valve when draining is complete.

9. Add new vacuum pump oil, or oil that has been properly filtered and confirmed clean, until the level is slightly above the center of the sight glass.

10. Confirm that the drain valve is closed, set the pump switch to ON, and check for normal operation.

CAUTION

- Do not fill above the maximum mark. Overfilling may cause oil discharge, excessive mist, or poor vacuum performance.
- Low oil can cause inadequate lubrication, loss of vacuum, and pump damage.

8.4 Assessing Oil Condition

Normal vacuum pump oil should be clear, not visibly emulsified, and free from heavy contamination.



Normal oil



Discolored - replace



Cloudy - replace promptly

Milky or cloudy oil, unusually slow vacuum development, or pressure that does not fall steadily usually indicates water or other contamination in the oil.

8.5 Long-Term Shutdown

If the appliance will not be used for an extended period:

- Replace the pump oil with clean oil.
- Disconnect the appliance from power.
- Store the pump in a dry environment.

This reduces moisture absorption and internal deterioration.

9. Care and Cleaning

Regular cleaning maintains hygiene, improves performance, and extends service life. Food residue, water, oil, and dust can cause odor, mold growth, reduced vacuum, lower refrigeration efficiency, and equipment faults.

9.1 Cleaning the Interior

Before internal cleaning, switch off the appliance and unplug it.

Use warm water, a mild neutral detergent, and a soft cloth or sponge to clean:

- The inside of the vacuum chamber
- Shelf surfaces
- Trays
- The inside of the door

After cleaning, dry all surfaces completely with a clean, soft cloth. Do not start another cycle while residual water remains, as moisture can interfere with vacuum development and drying.

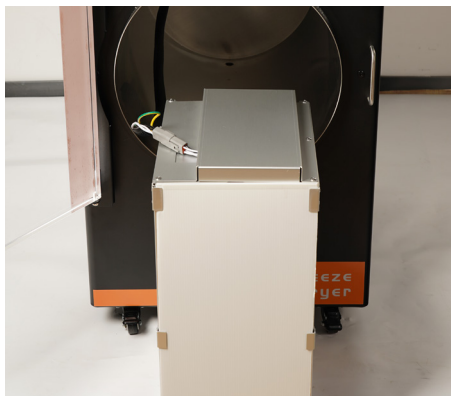
9.2 Removing and Deep-Cleaning the Shelf Assembly

Perform basic shelf cleaning after each use and deeper cleaning periodically.

1. Gently remove the black rubber door gasket.



2. Slowly pull the shelf assembly outward. Do not use excessive force.



3. Press the locking tab on the electrical connector and carefully separate the cable connection.



4. Clean the assembly and allow it to dry completely.
5. Confirm that the chamber contains no residual moisture.
6. Reconnect the cable, reinstall the shelf assembly, and refit the door gasket.

IMPORTANT

An incorrectly connected shelf cable can cause abnormal heating or prevent proper operation.

WARNING!

Never clean the shelf assembly or associated components in a dishwasher. Heat and aggressive washing can deform the shelves, damage surfaces, harm electrical components, and invalidate warranty coverage.

9.3 Cleaning the Exterior

Use warm water, a mild neutral detergent, and a soft cloth to clean the outside of the acrylic door, door handle, cabinet, and area around the control panel. Dry the surfaces with a clean, soft cloth.

9.4 Cleaning Restrictions

Do not use hard brushes, steel wool, abrasive cloths, or coarse cleaning pads. These can scratch the finish, dull surfaces, and damage the acrylic door.

Do not use benzene-based cleaners, paint thinner, strong chlorine cleaners, strong acids, strong alkalis, or other corrosive chemicals. They can corrode surfaces, age plastic parts, damage electrical components, and in severe cases create a fire hazard.

9.5 Long-Term Storage

Before an extended shutdown:

- Remove all food.
- Switch off and unplug the appliance.
- Dry all internal surfaces.
- Leave the door slightly open to reduce odor and mold growth and keep the chamber dry.
- Drain contaminated pump oil and refill the pump with clean oil.

Old contaminated oil left in the pump during storage can corrode internal components, reduce performance, and cause premature pump failure.

When moving the appliance, keep it upright. Do not lay it on its side or invert it. After transportation, allow it to stand upright for at least 24 hours before applying power.

10. Troubleshooting

10.1 Why Has the Cycle Run for More Than 48 Hours?

Cycle time is not fixed. Moisture content, thickness, sugar content, tray arrangement, loading, and ambient temperature all affect actual duration. Some batches may normally exceed 48 hours.

High Ambient Temperature

Heat reduces refrigeration and vacuum-pump efficiency, slows freezing and vacuum development, and extends the overall process. Above 32 °C (90 °F), improve airflow and place a cooling fan near the vacuum pump if required.

Difficult-to-Dry Product

High-sugar or high-moisture foods such as oranges, pineapple, strawberries, and blueberries may require more time because of their composition and cell structure.

The appliance evaluates moisture removal rather than ending solely on elapsed time. It continues operating while residual moisture is detected.

Excessive Product Moisture or Loading

Overloading can produce a thick ice layer in the chamber. If ice reaches the tray area, the system may have difficulty determining completion and the cycle can become unusually long.

If chamber ice is excessive:

1. Remove the trays.
2. Keep them frozen in a separate freezer.
3. Defrost and dry the appliance.
4. Return the trays and continue the process.

Aged or Contaminated Pump Oil

Old, cloudy, or water-contaminated oil slows vacuum development and extends drying time. As a general guide, filter the oil every 4-5 batches and replace it every 20-30 batches.

10.2 Why Was Water Drawn into the Chamber When the Drain Valve Was Opened?

The end of the drain hose was most likely

submerged. When the valve is opened to release vacuum, the chamber rapidly draws in air. A submerged hose acts like a drinking straw and draws water back into the chamber. Before opening the valve, always make sure the hose end is above the water level.

WARNING

Water drawn into the chamber can re-wet or damage the freeze-dried product.

10.3 Why Is the Vacuum Pump Discharging Oil?

Common causes include:

System Leakage

A leak may cause the pump to draw excessive air and water vapor. Check for:

- Open drain valve;
- Door not correctly sealed;
- Dirty door gasket;
- Loose vacuum hose;
- Loose KF clamp;
- Loose pump fitting or accessory.

Excessive Oil Level or Water in the Oil

Overfilling, or water vapor entering through the hose and condensing in the oil, can cause oil discharge during operation. Check the oil level, drain accumulated water where applicable, and replace contaminated oil.

10.4 Why Are the Trays Sometimes Hot and Sometimes Cold?

This is normal. When a cycle ends, the shelf heaters and vacuum pump stop, but the refrigeration system may continue operating. Trays removed immediately may therefore be warm; trays left in the appliance for longer can become cold again.

If trays have remained inside for an hour or more, wear insulated gloves or use a suitable protective cloth when removing them.

To check dryness, break open the thickest piece on the tray. A center that feels cold, soft, or damp indicates residual moisture. Return the trays and use Add Dry Time.

10.5 Why Did Packaged Food

Become Soft or Rehydrate?

Packaging Leakage

Freeze-dried food rapidly absorbs airborne moisture. Use high-barrier polyester-laminate or foil-laminate bags, vacuum bags, or airtight Mason-type jars. Use a suitable oxygen absorber, remove as much air as practical, and double-seal when necessary. Store in a cool, dry place away from sunlight, heat, and humidity.

Incomplete Drying

Uneven thickness or loading can leave part of a batch wet. Even a small amount of residual moisture can soften the complete package. Check the thickest, largest, and most difficult-to-dry pieces first. Return incompletely dried product to the appliance and extend drying time.

10.6 Why Did the Vacuum Pump Not Start?

Confirm that the pump plug is connected to the dedicated outlet on the rear of the freeze dryer and that the pump's own switch is set to ON (I). The freeze dryer controls the pump automatically, but the pump must remain connected and switched on.

11. Warranty and After-Sales Service

Thank you for choosing a DALLE freeze dryer. We are committed to providing professional and reliable long-term support. Read these terms before use. Warranty coverage applies only to qualifying product faults occurring under normal, correct use.

11.1 Warranty Period

- Complete freeze dryer: **1 year** from the date the customer receives the appliance.
 - Vacuum pump: **1 year**.
 - Compressor: **2 years**.
- IMPORTANT!

The vacuum pump is a service item that requires regular maintenance. Damage caused by failure to change the oil, severely contaminated oil, water entering the pump, or prolonged operation with insufficient oil is not considered a manufacturing defect.

11.2 Support Provided

For a fault confirmed to result from a product-quality issue within the warranty period, support may include:

- Telephone support;
- Email support;
- WhatsApp support;
- Video-guided diagnosis;
- Replacement-parts support;
- Software or system update support, where applicable.

To improve communication, DALLE may establish a dedicated after-sales group that includes sales, order-coordination, engineering, and service personnel. DALLE will assess the fault and determine the appropriate repair method and parts requirement based on the actual condition.

11.3 Response Time

DALLE aims to respond within 8 hours after receiving a service request; response is normally faster during business hours.

To support efficient diagnosis, provide:

- A video of the fault;
- Clear photographs;
- The error screen;
- Vacuum-pressure data;
- A description of operating status and the steps leading to the issue.

11.4 Replacement Parts Support

For a confirmed warranty issue, DALLE will provide the necessary qualifying parts at no charge, subject to assessment. Support may include international shipment of parts, video installation guidance, and step-by-step repair instructions. Most parts are designed to be replaced on site without returning the appliance to the factory.

Major replacement parts will remain available for at least 5 years, supporting long-term serviceability.

11.5 Major Faults

If a major product-quality fault cannot be repaired, or the appliance cannot be restored to normal operation after repair, DALLE and the customer may agree on replacement of the appliance or another reasonable solution.

After-sales service focuses on technical support, parts support, and repair support. It does not cover losses resulting from an end customer's business operations or other indirect causes.

11.6 Costs Normally Paid by the Customer

The customer is normally responsible for:

- Repair costs not related to a product-quality issue;
- Local labor charges;
- Parts freight and logistics charges;
- Repair arising from incorrect operation;
- Costs arising from local installation, electrical supply, or environmental conditions.

Because international freight can be costly, the customer may be asked to share certain international logistics costs even when a part qualifies for warranty support. The actual

arrangement is subject to agreement between both parties.

11.7 User Responsibilities

Warranty coverage requires normal use, correct installation, reasonable maintenance, and operation in a clean environment.

The user is responsible for:

1. Following this manual for installation, operation, cleaning, maintenance, packaging, and storage.
2. Providing the correct voltage, protective grounding, adequate circuit capacity, and an electrical installation that complies with local regulations.
3. Operating between 2 ° C and 32 ° C (36 ° F and 90 ° F) in a clean, dry, well-ventilated location.
4. Moving the appliance correctly and never lifting it by the door.
5. Filtering or replacing pump oil regularly, preventing water from entering the pump, and maintaining the proper oil level.
6. Confirming that food is completely dry before packaging.
7. Using high-barrier packaging, effective oxygen absorbers where appropriate, and cool, dry storage.

Damage caused by abnormal voltage, poor grounding, insufficient circuit capacity, a noncompliant outlet, or an extension cord is not covered. High heat, humidity, dust, or incorrect handling may reduce vacuum performance, refrigeration efficiency, sealing, and service life.

Food quality depends on the initial food condition, processing, packaging, storage, and user practice. DALLE does not accept responsibility for the quality or storage outcome of the freeze-dried food or material itself.

11.8 Exclusions from Warranty

Warranty does not cover:

- Unauthorized modification of the appliance, system, or wiring;
- Use of non-original parts;

- Use of an extension cord;
- Deliberate or accidental physical damage, dropping, or impact;
- Liquid entering electrical components;
- Long-term failure to maintain the vacuum pump;
- Dismantling, repair, or modification by unauthorized personnel;
- Fire, lightning, flood, earthquake, war, abnormal voltage, or other force-majeure events;
- A removed, altered, damaged, or illegible serial number.

DALLE is not liable under this warranty for loss of food, business, revenue, profit, time, or other indirect or consequential loss.

This warranty applies only to the original purchaser and automatically expires if the appliance is resold.

11.9 Before Contacting After-Sales Service

Check:

- Vacuum pump oil condition;
- Drain valve position;
- Door and gasket seal;
- Vacuum hose connections;
- Ambient temperature;
- Whether the food was completely frozen.

Vacuum problems, long cycle time, and food softening are often caused by environmental conditions, product condition, packaging, or operating practice rather than an appliance fault.

11.10 Contact Information

For technical support or after-sales service, contact your sales representative or email:

info@fsdalle.com