HARVESTRIGHT



HOME FREEZE DRYER
OWNER'S MANUAL

The Essential Guide for Every Home Freeze Dryer Owner

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U.S. Patent 9,459,044

FREEZE DRYER QUICK START GUIDE

For a video tutorial, go to: https://www.youtube.com/watch?v=qVrrY7lRjs8 (How to Setup Your Home Freeze Dryer).

1. Once your freeze dryer is unpacked, make certain that the bottom front feet are adjusted such that the unit slopes from front to back (the front of the freeze dryer should be ¼ inch to ½ inch higher than the back).

2. Make sure the rubber gasket is clean both inside and out. Remove gasket and run under water in order to remove lint/dirt.

3. Make sure the inside surface of the acrylic door is clean.

4. Follow the instructions for the vacuum pump, add the right amount of oil (See page 7, Figure 5.).

5. Connect the large clear hose to the vacuum pump and tighten hand tight. See Figure 1, A. **Do not add any additional Teflon tape, or any type of adhesive, when installing the vacuum hose. It almost always creates a vacuum leak!**

6. Plug the vacuum pump power cord into the receptacle on the back of the freeze dryer.

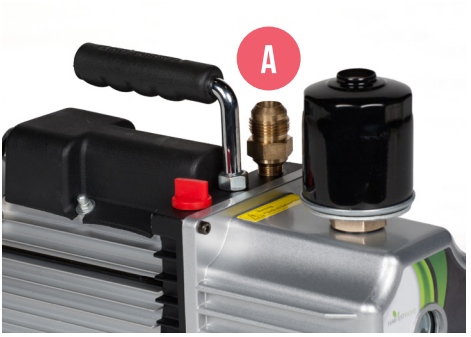


Figure 1 - Vacuum Pump Connection
(A) Connect large clear tube.

7. Make sure the power switch on the vacuum pump is on (located on the back of the vacuum pump).

8. Place the black insulator door pad through the rubber gasket to plug the gap between the shelving unit and the back edge of the gasket. Make sure your shelving unit is pulled forward close to the rubber door gasket so the pad will snuggly fit between the door and the shelf.

9. Secure the door latch to create a good seal. The door latch is a two-staged handle. Make sure you turn the handle as far to the right as possible.

10. Make sure to close the drain valve on the freeze dryer (located on the left side, toward the back, beneath your freeze dryer). If the drain valve is not closed, there will be a vacuum leak which could damage your vacuum pump, cause an oil spurt, and void the vacuum pump warranty.

11. As described in steps 6-11, it is your responsibility to make sure your door is closed properly, that the drain valve is closed, and that the hose connecting the vacuum pump to the freeze dryer is connected properly. If your freeze dryer doesn't pull a vacuum, an oil spurt will make a mess as it may spray a cup (or more) of oil out of the pump. Again, it is your responsibility to make sure that you have a good vacuum seal.

12. Turn on the freeze dryer (on the back of your freeze dryer press the switch to the "up" position). Next, in order to perform a quick test and assure that your freeze dryer is set up properly, please complete the following steps. To accomplish this task, your freeze dryer chamber must be free of any moist material, water, or condensation. It needs to be completely dry.

- Press "Start" on the touchscreen. You will then be reminded to "Please close drain valve." Ensure that this valve is closed.

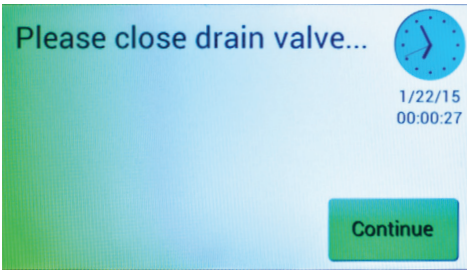


Figure 2 - Freeze Dryer LCD Display

- Initially, you will see "Freezing for 9 hours" appear on the display. Now, press the small blue clock in the top right corner of the display. This will automatically turn your vacuum pump on (the initial vacuum will be a bit loud, but will quickly settle to a hum that isn't too noticeable.)
- When the vacuum pump first turns on, the display will read ">2500 mTorr". Within 10-20 minutes the display will no longer read ">2500 mTorr", but will begin to show a lower number (starting with 2500 and moving down). This number represents the vacuum pressure inside the freeze dryer. A lower number represents a stronger vacuum pressure.
- Eventually, the pressure will go from 2500 down to 500 mTorr, and possibly lower. If you see that this is the case, it means that your freeze dryer has been set up properly and you are ready to start your first batch. If you are unable to achieve a vacuum of 500 mTorr, or lower, after 30 minutes (or if the screen still says ">2500 mTorr") check steps 2-11 of this Quick Start Guide to assure that there are no air leaks at any location on your freeze dryer.

- Once you are able to see a pressure of 500 or lower, you are ready to start your first batch. Turn off your freeze dryer and open the drain valve. This will release the pressure and allow the door to be opened so that you can begin freeze drying your desired product. Now that the pressure has been released, close the drain valve again (or you will not be able to achieve a vacuum when the freeze dryer is running.)
- If you are still unable to complete this test, call Customer Support at **1-800-865-5584** for assistance in setting up your freeze dryer.
- For a video tutorial, go to: https://youtu.be/s0AfFFqMG08 (Dry Chamber Test Tutorial).

13. Prepare the material that you want to freeze dry and place it on the trays, one layer thick, so that it can be uniformly warmed by the shelving unit. Food that is pre-frozen should go into a cold chamber; To accomplish this, run the freeze cycle for 30 minutes before taking your food out of the freezer and putting it in the freeze dryer.

14. Turn the freeze dryer on. The screen will now prompt you to press '**Proceed**' or '**Cancel**' within a limited amount of time. Press '**Cancel**'. This will return you to the home screen.

15. Place the trays in the shelving unit inside the freeze dryer; insert the black pad; close the door and press "**Start**."

16. The material will be frozen in the freeze dryer for 9 hours. The vacuum pump should then come on. If it doesn't, make sure it is plugged into the back of the freeze dryer. Make sure the power switch located on the back of the vacuum pump is turned on.

17. When the vacuum pump comes on it should reduce the pressure in the food chamber within about 10 minutes. If you can still open the door after 30 seconds, turn off the vacuum pump, release the pressure in the food chamber by opening the drain valve, open the door, and check the cleanliness of the rubber gasket. Close the door and turn the vacuum pump on. Wait for 1 minute and verify that the door cannot be opened. If your door is out of adjustment the gasket may not be able to make contact with the door. Readjusting the door may be necessary.

18. Once the food is frozen, and when adequate vacuum pressure is reached (500 mTorr), the heaters on the shelves turn on and stay on for a few minutes, then they will turn off when the pressure rises to 600 mTorr. Gradually the pressure will again go down to 500 mTorr; the heaters will turn on and the pressure will rise to 600 mTorr when the heaters will again shut off. This cycle repeats until the food is dry.

19. Toward the end of the freeze dry cycle, the heaters will stay on for six hours and then the process is complete. The freeze dryer will beep when it is finished. See Figure 3.

For additional questions and setup instructions, refer to the detailed Harvest Right Owner's Manual and User Guide, beginning on page 8.



Figure 3 - Freeze Dryer LCD Display
Complete message.

CHECKLIST: BEFORE EACH BATCH

- Drain valve closed
- Door clean
- Ensure black rubber gasket (door seal) is clean and free of debris. See Figure 4.
- Black insulator door pad in place.
- Door closed, compressed tight, and handle turned completely to the right.
- Assure that oil level is above the small circle in sight glass. See Figure 5.



Figure 4



Figure 5 - Vacuum Pump Sight Glass
Fill oil to the Oil Fill Level line.

VACUUM PUMP MAINTENANCE SCHEDULE

FREQUENCY	MAINTENANCE	INSTRUCTIONS
At the end or beginning of every batch	Drain Oil into Oil Filter	https://youtu.be/zivKzXNEjmQ
At the end or beginning of every batch	Add new or filtered oil	
Every 20 Batches or as needed	Remove Pump Cover Assembly	

To maintain the performance and long life of your vacuum pump, follow the instructions found above. This is required in order to process warranty claims (see page 31). Most importantly, when this maintenance schedule is followed, your freeze dryer will work more efficiently and perform better. For questions about how to perform any of this maintenance, please visit the link found in the table above, or, call Harvest Right Customer Support at 1-800-865-5584.

IMPORTANT SAFEGUARDS

IMPORTANT INFORMATION

Read all instructions carefully before using your Harvest Right Home Freeze Dryer. Following these instructions will help prevent injuries, damage to the freeze dryer, and will ensure that you have the best possible experience with your freeze dryer. Save these instructions.

1.1 SAFETY INFORMATION

When using this appliance always exercise basic safety precautions, including the following:

- Use this product only for its intended purpose as instructed in this Owner's Manual.
- ⚠**WARNING** Do not use an extension cord when plugging your freeze dryer into your power source. Many extension cords cannot handle a sufficient draw of power and may melt or deform causing a fire or other damage.
- Do not use surge protectors or plug your freeze dryer into a GFI outlet. These sources are very sensitive and may cause your freeze dryer to unnecessarily trip the power breaker.
- Do not allow children to climb, stand on the freeze dryer, or hang on the door or shelves. They could damage the freeze dryer and injure themselves.
- After your freeze dryer is in operation, do not touch the cold surfaces during the freezing cycle, particularly when hands are damp or wet. Skin may adhere to these extremely cold surfaces.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Keep fingers out of "pinch point areas". Clearances between the doors and closing mechanism are necessarily small. Be careful closing doors when children are in the area.
- Unplug your freeze dryer before cleaning or making repairs. We strongly advise that all service be done by a qualified individual.
- Refrigerants: All refrigeration products contain refrigerants, which under federal law must be removed prior to product disposal. If you choose to dispose of an old refrigeration product, check with the company handling the disposal about what to do.
- This appliance is not intended for use by small children or infirm persons without capable, adult supervision. Small children should be supervised when using the appliance.
- Do not use a wet or damp cloth when cleaning the plug at the end of the power cord. Remove any

dust or foreign matter from the power plug pins. A dirty power plug can increase the risk of fire.
- Do not block vent air holes. If the air holes are blocked, the freeze dryer could overheat.
- Never unplug your freeze dryer by pulling on the power cord. Always grip the power plug firmly and pull straight out from the outlet. Pulling on the power cord could cause a fire and/or electric shock. A damaged power cord must be replaced by the manufacturer, a certified service agent or qualified certified service personnel.
- Use caution when putting your hands under the appliance. Any sharp edges may cause personal injury.
- Do not insert the power plug with wet hands. It may cause electric shock.
- In general, power consumption will average 8-10 amps of power and spike near 16 amps. Usage of a dedicated 20 amp circuit will help prevent power outages and allow for proper freeze drying. (Power consumption will vary between models.)
- Do not defrost your freeze dryer with a blow dryer or other heating device. There is a thermal cut off that protects the machine and the food inside the chamber from overheating. If the thermal cutoff gets too hot, it will eliminate all power to your shelf heaters until the appropriate parts have been replaced.

1.2 NEVER OPERATE THE FREEZE DRYER IF IT APPEARS DAMAGED

If it is dropped or damaged in any way, call Harvest Right Customer Support at **1-800-865-5584** immediately for examination, repair, electrical or mechanical adjustment, or possible replacement of parts.

1.3 BE CAREFUL ABOUT WHAT YOU PUT IN YOUR FREEZE DRYER

This product is designed to freeze dry materials or products that contain water. Freeze drying other materials voids the warranty and may damage the freeze dryer.

1.4 VACUUM PUMP RUNS HOT

Use caution when running your freeze dryer as the vacuum pump that sits external to the unit will run hot. Keep your vacuum pump out of reach of children as it may cause injury if handled improperly. Your high quality vacuum pump is built to run hot. Use care and caution in order to prevent injury. Average operating temperature is 160 degrees Fahrenheit.

1.5 RECOMMENDED OPERATING TEMPERATURES

Your Harvest Right Freeze Dryer is designed to work in a wide variety of temperatures, but extreme heat and cold will affect performance. The recommended temperature range for operation is 35-90 degrees Fahrenheit. The most efficient temperature range is between 45-75 degrees Fahrenheit.

Although safe, operating your freeze dryer in temperatures above 90 degrees Fahrenheit could affect batch times and have an adverse effect on the condensing unit (freezer). As the temperature rises where your freeze dryer operates, so does the length of time it takes to finish batches of food.

This happens because with hotter operating temperatures it is harder to reach the extreme cold required for freeze drying.

For example: a batch that normally takes 24 hours to finish in a 75°F environment could take over 40 hours to complete in hot temperatures.

UNPACKING

2.1 UNPACKING YOUR FREEZE DRYER

You should have received the following items: see image on page 11.

- Harvest Right Home Freeze Dryer
- Vacuum pump with oil demister
- Power cord
- Vacuum hose
- Vacuum pump oil
- Shelving unit
- Food trays
- Owner's Manual
- Black insulator door pad
- Oil Filter
- Other materials, not listed here, may have been included.

1. Remove Harvest Right Freeze Dryer, vacuum pump, vacuum hose and power cord.

2. Inspect all items to ensure no damage occurred during shipping.

3. If any damage has occurred, call Harvest Right Customer Support immediately at **1-800-865-5584**.

4. Remove the vacuum pump from its packaging and place it beside or behind the freeze dryer.

5. Unwind power cord.

2.2 RETURNS

Within 30 days of ship date, customers may return their freeze dryers for a refund less shipping costs and less a restocking fee of 15%.

CAUTION: Do not lift freeze dryer from bottom of door. Doing this may cause misalignment and inability to achieve proper vacuum. Always lift your freeze dryer appliance from the base. Lifting the freeze dryer by the door voids the warranty.



WHAT IS IN THE BOX

You should have received the following items:

- **A** Harvest Right Home Freeze Dryer with shelving unit
- **B** Vacuum pump with oil demister
- **C** Vacuum pump oil
- **D** Power cord
- **E** Vacuum hose
- **F** Owner's Manual and Guide to Freeze Drying
- **G** Food trays
- **H** Black insulator door pad
- **I** Oil filter

Other materials, not listed here, may have been included.

GENERAL INFORMATION

BEFORE YOU BEGIN... 3.1 MAJOR COMPONENTS

Harvest Right Home Freeze Dryer

- Power Switch: Located on the back of the freeze dryer. Depressing the toggle switch to the up position turns the power on.
- Vacuum Chamber: This circular chamber includes a shelving unit for the food trays.
- Trays: These hold the food items to be freeze dried.
- Power Unit and display: The freeze dryer is powered by plugging the power cord into the back of the freeze dryer (one receptacle is for the power cord and the other is for powering the vacuum pump) and a functioning 110-120 volt power outlet in the wall of your house or garage.
- Vacuum Pump: Connect the vacuum hose to the connection on the side of the freeze dryer and to the appropriate fitting on the vacuum pump. The vacuum hose should be hand-tightened. Be sure to tighten both ends of the vacuum hose to properly connect the freeze dryer to the vacuum pump. Plug the vacuum pump power cord into the receptacle on the back panel of the freeze dryer. Make sure to add the right amount of oil to the vacuum pump as specified in the manufacturer's instructions (see image on page 7, figure 5). Make sure the vacuum pump "on/off" switch is set to the "on" position. It will not receive power until the freeze dryer completes the circuit at the appropriate time in the freeze drying process.
- Oil Demister: This is the black cylinder attached to the top of the front pump face.
- Drain Line: This is a clear tube beneath the left rear of the freeze dryer. You will need to pull this tube out from beneath the freeze dryer. It should easily fit in the notch provided. This tube should be un-coiled and the open end placed in a 5-gallon bucket, drain or similar container, to collect the water that is removed from the food during freeze drying and collects as ice on the sides of the vacuum chamber. Generally two people can easily tilt the freeze dryer and reach beneath it to pull out the drain hose.
- Before you start a freeze drying cycle make sure the valve on the drain tube is closed (the small handle on the valve is perpendicular to the direction of the drain tube). If the drain valve is not closed, there will be a vacuum leak which could damage your vacuum pump and void the vacuum pump warranty.

3.2 FREEZE DRYER ASSEMBLY

1. Wait 24 hours before running your freeze dryer in order to facilitate proper settling within the refrigerator condensing unit. Waiting 24 hours will allow the oil in the condensing unit to settle so that the freeze dryer can get cold enough.

2. The ideal location for operating your freeze dryer is a cool, dry, clean location. Operating your freeze dryer in temperatures higher than 75 degrees Fahrenheit may cause cycle times to take longer.

3. Place the freeze dryer on a level, stable surface and adjust the leveling feet so that the front end of the freeze dryer is about ¼ to ½ inch taller than the rear. This allows the water that accumulates in the chamber of the freeze dryer to exit through the drain hole in the rear of the vacuum chamber. Make sure the translucent (clear) drain line is placed in a 5-gallon bucket, a drain, or an equivalent container to catch the water. Make sure the drain valve is tilted slightly down and not flat on the table or cart.

4. Connect the freeze dryer power cord to the receptacle on the rear panel and to a 110 to 120 volt ac power supply (power may vary between models).

5. Connect the power cord on the vacuum pump to the receptacle on the rear panel of the freeze dryer.

6. Make sure the power switch on the vacuum pump is in the "on" position. The power button is located on the rear of the vacuum pump. The control circuit in the freeze dryer will control when to turn "on" and "off" the vacuum pump.

7. Connect the large clear hose to the freeze dryer (see Figure 6) and to the vacuum pump (see image on page 4, Figure 1, A) and tighten hand tight.



Figure 6 - Freeze Dryer Connection for Vacuum Pump Large Clear Tube
See Figure 1 on pg 4.

8. Make sure all other caps and ports on the vacuum pump are closed tightly (hand tightened only).

9. Pull off the rubber gasket that comes into contact with the acrylic door and clean with water inside and out. Assure that there are no particulates inside the gasket. If the gasket is not clean inside and out, the freeze dryer may have a hard time pulling a low vacuum. They are generally clean. Just look to make sure. Do not stretch the gasket apart too far while trying to clean the inside. Stretching too far could damage the gasket creating a crack that prevents achieving a proper seal.

10. Ensure that the acrylic door makes contact with the rubber gasket by examining the door in the fully closed position. You will see a thin line around the gasket as it presses up against the door. For the first couple batches, when the pump turns on, make sure the door fully seals around the gasket. If you have problems completing this step, call Harvest Right Customer Support at **1-800-865-5584** for assistance.

11. You are now ready to load freeze drying material onto trays. It is best to freeze dry materials that are somewhat similar in moisture content.

12. Place the trays that have the material on them in the shelving unit. Make sure the trays are fully supported by the heated shelf with no part of the tray extending out of the shelving unit. The trays are heated by the shelving unit and must fit well in order to receive the appropriate heat to drive off the moisture.

13. Place the black insulator door pad in the opening of the vacuum chamber (within the opening of the black rubber gasket). This insulates the acrylic door from the extreme cold in the chamber and prevents the cold from forming ice on the door.

14. Close the acrylic door and turn the door latch clockwise as far as it will go. This will compress the door closed against the rubber gasket. Visually check the seal to make sure the door is sealed properly to the gasket. If the door is not latched tight, there will be a vacuum leak which might damage your vacuum pump and void the vacuum pump warranty.

15. Close the drain valve. In the closed position, the drain valve is perpendicular to the hose.

16. Power on your unit (press the switch on the back of your freeze dryer to the up position). Now, press the "**Start**" button. You will then be reminded to "**Please close drain valve...**" Once you have done this, the word "**Freezing...**" will be displayed on the touch screen.



Figure 7 - Freeze Dryer Display
Press "Start" to begin.

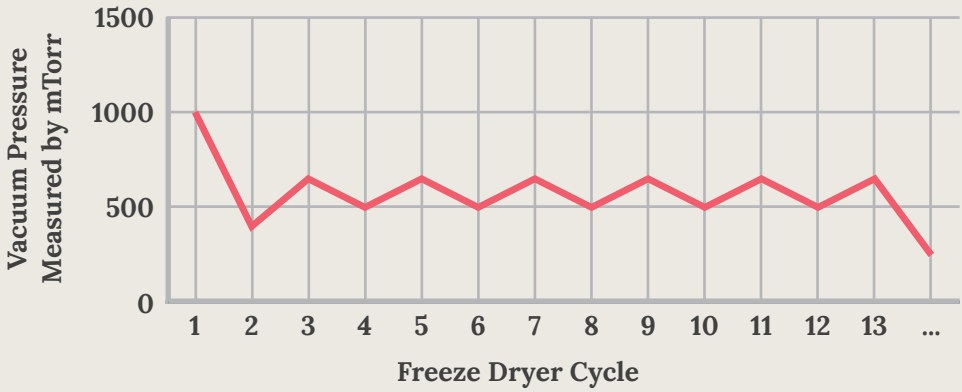
17. When the freezing cycle is completed the vacuum pump will power on automatically. The display will then read "**Drying...**" Within 10-20 minutes the display will show a vacuum pressure that displays a number below 2500 mTorr. (If your freeze dryer does not achieve a pressure within the specified time period, the vacuum pump will automatically turn off. This will alert you to a vacuum leak and likely

prevent oil from spurting out of the vacuum pump and creating a mess.) Once the freeze dryer recognizes that most of the moisture is removed from the material, the "**Final Dry**" (see image on page 16, Figure 8) cycle will then remain on for the default time or a customized time if the settings were adjusted at the beginning of the process. When the process is complete an audible signal will be heard and the display will read "**Complete**".

The graph shown below provides a representation of how the freeze dryer operates. The numbers to the left represent the mTorr pressure and the number of heating cycles are represented below. The number of cycles will vary depending on the moisture content and cellular structure of the food. Different foods will have more or fewer cycles than indicated. Also, cycle times will vary depending on the type of food that is being dried, age of vacuum pump oil, and cleanliness of vacuum pump. In order to achieve optimal freeze drying, be sure that your vacuum pump is working properly. *mTorr pressures may vary slightly from those in the graphic representation (see graphic on page 15).

18. When the process is complete the freeze dryer will instruct you to "**Open drain valve to vent**" (Before doing so, pull the drain hose out of the bucket and/or check to ensure bucket is completely empty of any water. Opening the drain valve vents the vacuum pressure. A hissing sound of air filling the vacuum chamber will be heard and then the door may be opened, the black insulator door pad removed, and the trays of food removed.) and "**If product is dry, remove, and select Defrost**". Check the material thoroughly to make sure it is dry. If you find that there is still

FREEZE DRYER CYCLE GRAPH



moisture in the material you are freeze drying, simply press "**More Dry Time**" and allow the freeze dryer to finish drying. Otherwise, you can remove the trays, ensure drain hose is properly placed for draining, and press "**Defrost**".

19. Immediately package your freeze dried material properly so that it doesn't rehydrate with the natural humidity in the air. When packaging food, you can use cans, Mylar bags, and bottles. Always use an appropriate oxygen absorber.

20. Make sure all of the ice and water are removed from the vacuum chamber before starting a new batch.



Figure 8 - Freeze Dryer Display
Notifying of final dry time.

3.3 USING THE "CUSTOMIZE" SETTINGS.

Turn the power on (press the switch on the back of your freeze dryer to the up position). Next, press "**Customize**" on the touch screen. This screen allows adjustment of the temperature for the warming elements inside your freeze dryer. The default setting is 125 degrees Fahrenheit, but may be adjusted, if desired (not necessary). On this screen you will notice a button that





allows you to "**Adjust Cycle Times**". This screen allows you to adjust the "**Freeze Time**" and "**Final Dry**" time. The default setting for your freeze dryer is 9 hours freeze and 7 hours dry. In order to temporarily adjust these times, press the arrows up or down to increase or decrease



the time (factory settings of 9 and 7 hours are sufficient for most foods). You will see the displayed time change in 15-minute increments.

Press "**Start Custom**" to begin your custom batch. You will then be reminded to "**Please close drain valve**". The word "**Freezing...**" will be displayed on the touch screen.

3.4 WHY FREEZE DRY?

The Best Preservation Method: Freeze-dried foods are more stable than dehydrated foods because of the very low temperature environment of the drying process (freeze drying). Freeze-dried foods do not need the sugars or salts used in the bottling and canning processes. They have an extremely long shelf life, up to 25 years, when packaged properly. It is ideal to promptly seal freeze-dried food in sturdy containers such as cans, canning jars, or Mylar pouches. It is important to include an appropriate oxygen absorber.

Freeze-dried foods retain up to 98% of their nutrients because the water in the food is sublimated out (ice to water vapor) at temperatures below the freezing point of water. Your freeze dryer removes the water, not the nutritional value. It also maintains the shape and appearance of the food. Other preservation methods destroy essential vitamins and minerals found in natural foods and dramatically change the appearance of the food.

EASY TO DO

Just press start! Our one button process makes freeze-drying easy. The display on the front of the machine shows what process the food is experiencing: freezing, drying and heating (very low temperature heating, just enough to remove the water vapor under vacuum pressure). At the end, the process will provide an audible signal that the freeze drying is complete and you can then remove your food.

FOOD TASTES GREAT

Children and adults love freeze-dried foods. Freeze drying preserves the freshness, color, and taste. Other methods for preserving food distort color and flavor of foods, but freeze drying does just the opposite. Make healthy snacks and meals the whole family will love.

CUT DOWN ON WASTE

The average family throws away approximately $2,000 of food each year. Your Harvest Right Home Freeze Dryer enables you to preserve your food for later use. Food that was once thrown away can be easily prepared, freeze dried and packaged for later use. You don't have to eat leftovers until gone or they spoil in the refrigerator. Just freeze dry them and eat them when you would like. The following are quotes of what research has determined with regards to food waste in The United States: "Approximately 40 percent of food in the U.S. is wasted, as about $165 billion in uneaten food is thrown out every year...That's a 50 percent jump since the 1970's." (National Defense Council) "Not only is it a waste of energy and water and land, but it's a tragedy in

its own right, given that some 870 million people suffer from chronic malnourishment. (Brad Plumer, Washington Post)

"But it's not just simply the food that's going to waste: think about all the wasted energy, water, chemicals and labor that went into producing, transporting and storing what is ultimately just left to rot." (Andrew Gunther, Huffington Post)

Use your Harvest Right Home Freeze Dryer to save money, cut down on waste, and respect the environment.

3.5 HOW TO FREEZE DRY

While freeze drying itself involves numerous complicated processes, the Harvest Right Home Freeze Dryer is a one button solution. Simply load your food into the freeze dryer and press start. Your machine will automatically take care of all the freeze dry processes and alert you when your food is ready.

3.6 WHAT CAN BE FREEZE DRIED?

You truly can freeze dry almost anything. All kinds of fruits, vegetables, and meats taste wonderful when freeze dried. These include: tomatoes, apples, bananas, pineapple, grapes, strawberries, peaches, green beans, peppers, onions, potatoes, spinach, shrimp, pork, beef, lobster, and nearly any other prepared dish.

Your favorite meals that include meat may be easily freeze dried. Foods like stroganoff, rice dishes, chili, beef stew, chicken a la king, casseroles, shrimp, lobster, pulled pork, bacon, pasta sauces or scrambled eggs are perfect for this process.

Some foods, however, are more challenging to freeze dry than others due to complex cellular structure, sugars in the foods, and other factors. The best way to find out is by following your Guide to Freeze Drying or your own thoughtful experimentation. You will find that it is a delight to experiment with different foods and meals in your freeze dryer. A great way to start is by picking fruits, vegetables and meals that are already favorites in your home and freeze drying those.

SETUP OVERVIEW

1. Place the freeze dryer on a flat, clean, dry surface. Adjust the feet, if necessary, so that all four are firmly on the table, cabinet, cart or floor. The front two feet should be adjusted ½" to ¼" taller than the two rear feet.

2. Make sure a plug outlet is available within three-five feet of the freeze dryer base.

3. Ensure that freeze dryer side vents are unobstructed to allow proper air flow during use.

4. Connect vacuum pump plug into the freeze dryer receptacle.

5. Connect vacuum pump hose to both the vacuum pump and to the freeze dryer.

6. Follow **Section 6** of this manual to ensure that you have a closed system.

OPERATIONAL OVERVIEW

5.1 MAIN POINTS OF OPERATION

1. Gather all of the ingredients.

2. Prepare your food to be freeze dried.

3. Load the freeze dryer, making sure that the food is spread evenly across the shelves. Load foods that are similar size/depth in order to assure optimal freeze-drying conditions.

4. Turn the freeze dryer on.

5. When cycle is complete, remove food from the freeze dryer and package for short-term or long-term use, as desired.

5.2 THE FREEZE DRY PROCESS

1. Fresh or cooked foods are placed into the freeze dryer where they are frozen.

2. After freezing, the freeze dryer creates a vacuum in the food chamber.

3. As the food is gradually warmed, the ice molecules in the food turn to vapor which condenses on the cold inside surfaces of the vacuum chamber.

4. When the vapor is removed, the food may be removed from the freeze dryer and sealed in moisture and oxygen proof bagging to ensure freshness until opened.

5. When water is added to the food, it is restored to its original fresh flavor, aroma, texture, and appearance!

5.3 PACKAGING AND STORING FREEZE-DRIED FOODS

In order to preserve food for 15+ years it is important to package freeze-dried foods in a moisture and oxygen free environment. We recommend that you immediately place your food in a Mylar pouch and include an oxygen absorber. Seal the bag and it will be protected against the two things that spoil food the fastest: oxygen and water. Another very effective way to package your freeze-dried meals is sealing the product in #10 cans or mason jars. Include an oxygen absorber to ensure fresh taste, color, and texture for many years.

5.4 PRETREATING FOOD

While your freeze dryer will freeze the food to temperatures below -30 degrees Fahrenheit, you may want, or need, to prepare larger quantities of food than your freeze dryer can process in one cycle. Freeze drying food that is already prepared and pre-frozen in your freezer will allow you to reduce the freeze time and allow you to do the freeze drying later. Freezers are typically set to about -2 to -10 degrees Fahrenheit. This pre-freezing would allow you to

reduce the freeze time in the freeze dryer by approximately 1 hour – 1.5 hours. Food that is pre-frozen should go into a cold chamber; Run the freeze cycle for 30 minutes before taking food out of the freezer and putting it in the freeze dryer.

5.5 OPENING THE FREEZE DRYER DURING OPERATION

There are three main processes that occur during freeze drying:

1. The food is frozen to very low temperatures.

2. Under vacuum pressure the oxygen in the chamber is removed (no oxidation of the food occurs) and the ice sublimates at low temperatures (about 7 degrees Fahrenheit).

3. A small amount of heat in the vacuum chamber begins the sublimation process and removes the moisture from the food. The moisture condenses on the inside, cooled walls of the vacuum chamber.

It is okay to open the freeze dryer chamber while it is in the freezing stage of the freeze dry process, but it is discouraged as extremely low temperatures may damage your skin and it renders useless the freezing part of the cycle (the food may not achieve a very low temperature if the door is left open).

Opening the chamber during the vacuum process (processes 2 and 3 listed above) is impossible because the vacuum tightly seals the door to the freeze dry machine. In order to open the door, turn off the vacuum pump and open the drain valve to vent the vacuum chamber. Opening the chamber door during these stages interrupts the freeze dry process because sublimation cannot take place unless the chamber is vacuum-sealed. The result may be a less than ideal freeze-dried product.

5.6 HOW DO I KNOW IF MY FOOD IS DRY?

Your freeze dryer will sense the moisture in the food and finish when it has sensed that all of the moisture is removed. While your freeze dryer is very accurate, it is a good practice to find one or two of the thickest pieces of food and either break them in half or taste them. If there is any moisture left in the food, it will be in the center. You will immediately feel or taste moisture which usually manifests itself as cold and wet.
If this happens, simply click the option to "**Add More Dry Time**" and your freeze dryer will add a couple of hours to finish the product.

A CLOSED SYSTEM

6.1 WHAT IS A CLOSED SYSTEM?

As previously described, in order to freeze dry food, your machine will use a vacuum pump that removes the air and creates a vacuum environment. In order to achieve adequate vacuum pressure, it is **VERY IMPORTANT** to ensure that all valves are closed tightly. If there is a leak somewhere in the system, the freeze drying process will not occur.

⚠**WARNING**: You may think there is not an air leak in your machine because the door will not open (a sign that you are pulling a vacuum). However, it is possible to achieve a less than suitable vacuum pressure for freeze drying yet have enough vacuum to be unable to open the door. Initially, >2500 is displayed. Within 10-20 minutes you should see the number 2500 begin to decrease. Drying occurs when the vacuum pressure descends to 500 mTorr (also displayed). If after 30 minutes the 500 mTorr has not been reached, then finding leaks is a logical next step. Check to make sure the drain valve is closed. Check to make sure the door gasket is sealing properly (clean the gasket in warm water and reinstall—do not wipe dry because lint may prevent a good seal).

While every precaution has been made to ensure that there are no leak points in your vacuum system, a situation could arise where there is a leak point. It is valuable to check the following possible leak spots in order to achieve optimal freeze drying.

6.2 POSSIBLE LEAK POINTS ON THE VACUUM PUMP

- Vacuum pump hose connections
- Vacuum pump oil is contaminated
- Vacuum pump oil level is too low
- Gaskets in vacuum hose are damaged (this may occur if the vacuum hose is fastened too tight)

For additional information about your vacuum pump, review the instruction manual that came with your vacuum pump.

6.3 POSSIBLE LEAK POINTS ON THE FREEZE DRYER

- Drain valve is open
- Vacuum pump hose not connected properly
- Door not properly shut
- Door gasket not clean inside and out
- Door needs adjustment

CARE AND CLEANING

7.1 VACUUM PUMP MAINTENANCE

Oil based vacuum pumps are ideal for freeze drying due to their increased performance with sublimation. We recommend you change your oil after every batch in order to ensure high performance.

Harvest Right has chosen a vacuum pump that lives up to its build quality and lifespan: See page 7, Vacuum Pump Maintenance Schedule, for recommended oil change.

Oil Change

To complete an oil change, you may want to place cardboard (or something similar) to avoid any spray or spills, and avoid a potential mess on the floor.

1. Turn off vacuum pump and disconnect it from the the freeze dryer.

2. Find a container (or containers) that can hold a quart of oil.

3. Locate the drain valve for the oil reservoir located at the bottom of the reservoir. (See figure 9)

4. Place your container beneath the drain valve to collect the oil.

5. Use your hand to open up the valve as far as it will go (you can't completely remove it without using tools, so turn with hand until it stops turning).



Figure 9 - Oil Reservoir
Location of the drain valve

6. Drain the oil from the vacuum pump reservoir into your container(s). Once drained, close the drain valve.

7. Tip the pump on its face, with the sight glass window on a table or cart, and drain the remaining oil from the drain valve. Once all the oil is drained, close the drain valve and place the pump back on its feet.

8. Using new oil, refill the oil reservoir to the appropriate level (covering the small circle inside the middle of the sight glass window, see image on page 7, Figure 5). *You may need to top off the oil slightly once the pump and oil warm up.*

9. Plug the vacuum pump back into the freeze dryer.

Oil Filtration
Using the oil filter provided to you is a great way to save money, preserve the life of your vacuum pump, allow your freeze dryer to perform as efficient as possible, and be more eco friendly. Filtering the oil is quick and easy, but will aid the performance of your freeze dryer. Changing the oil between each batch is required by the vacuum pump company for warranty purposes. When filtering used oil, you may want to use cardboard (or something similar) to absorb any oil that could potentially drip on the floor.

1. At the end of each batch (preferably when the oil is still warm) place the oil filter below the oil reservoir drain valve.

2. Open the oil reservoir drain valve and allow oil to drain into your Oil Filter. Assure all of the oil comes out by lifting the rear of the vacuum pump slightly.

3. Wait for the oil to filter through your filtration system (this could take a couple of hours).

4. Pour the filtered oil back into your vacuum pump.

5. Top off oil assuring the correct amount of oil is in your vacuum pump. See page 7, Figure 5.

6. Start your freeze dryer.

**Occasionally you may choose to pour your oil through the filter multiple times in order to better clean the oil*

How do I know that my filtered oil is clean for use? The best indications for cleanliness are as follows:

- Oil is void of debris or particulates
- Oil is not milky or chalky
- Oil has clarity (the color may be yellow or amber and still have clarity)
- Your vacuum pump is achieving a pressure (mTorr) suitable for freeze drying

How do I know when I need to replace my oil filter?

- Oil won't drain through filter (this can happen over time as debris builds up)
- Oil isn't cleaning well (I.e. The oil continues to be milky or full of debris)

What do I do to replace my oil filter?

- Replace the batting, the filter jar or purchase a replacement filter from Harvest Right

7.2 CLEANING THE INTERIOR AND EXTERIOR OF YOUR FREEZE DRYER

Interior: Clean the vacuum chamber and shelves with a mild detergent and then wipe dry with a soft cloth. You can remove shelves for a more thorough cleaning. In order to remove the shelves, you will need to take off the black rubber gasket that the door seals against. Pull the red locking mechanism towards the back of the plug. Once the red tab is unlocked, press the black tab down and pull the two pieces apart. When finished, ensure that the shelves are dry before returning them to the freeze dryer. Next, reconnect the power line to the shelving unit.
Exterior: The door, handle, and cabinet surfaces should be cleaned with warm water and a mild detergent and then wiped dry with a soft cloth. To keep your appliance looking its best, the exterior should be polished once or twice a year.

Cleaning the silicone door seal (gasket): If the silicone door seal is dirty, the door may not close properly, preventing the freeze dryer from operating. Keep the door seal free of grit or grime by running it under water. If necessary, clean the door with a mild detergent.

7.3 CLEANING CAUTIONS

Do not use stiff bristled brushes or abrasive cloths/pads to clean the freeze dryer, interior or exterior, as this will dull or scratch the surface.

Do not use Benzene, Thinner, or Clorox for cleaning. They may damage the surface of the appliance and may even cause fires.

7.4 MOVING OR LONG ABSENCES

If you have a long vacation planned, empty the freeze dryer and keep it turned off. Wipe excess moisture from the inside and leave the chamber door open to keep odor and mold from developing. Clean the pump and fill with fresh oil.

YOUR FIRST BATCH

8.1 FINAL CHECK

When running your freeze dryer for the first time (and every time) it is important to do a final check in order to assure that your food will freeze dry properly and optimally.

Check the following:

1. Drain valve is in the off position (perpendicular to the drain hose).

2. Acrylic door is clean (important for achieving a good seal).

3. Rubber gasket that the acrylic door compresses against is clean (important for achieving a good seal).

4. Place black insulator door pad inside the chamber to allow for more efficient freezing/drying times.

5. Turn the door handle ½ to ¾ turn in order to compress the door against rubber seal.

6. Assure that exterior hoses and connections are hand tight on both the freeze dryer as well as the vacuum pump.

8.2 START SIMPLE

When using your freeze dryer the first few times, it will be tempting to freeze dry many different foods at the same time. It will also be tempting to make these items extra thick because you want to create amazing freeze-dried food.

While it is okay to freeze dry thick servings of fruits, vegetables, ice cream, soups/stews, yogurt, etc., we recommend that you run the first few batches with simple 1/4" to 1/2" thick slices. Meats, fruits, or vegetables are a good place to start (extra thick slices will take longer because there is more water to remove from the food). As you become more comfortable with your freeze dryer, you can move into more challenging foods like pineapple and watermelon.

TROUBLESHOOTING

9.1 FREQUENTLY ASKED QUESTIONS

Why has the freeze dryer been running for over 46 hours and the process is not complete?
There are a number of factors that can contribute to longer cycle times. Some of which may be a combination of the following:

1. Some foods are more challenging to freeze dry than others. Because of their cellular structure and moisture content, oranges, pineapple, strawberries, blueberries, and other foods/meals with high amounts of liquid will take longer to freeze dry. The freeze dryer is measuring the moisture content and knows when the process is complete.

2. There is so much water in the food that the condensed ice ring has begun to form on the trays. While rare, if this occurs, the freeze dryer will not be able to recognize that the process is complete because it will sublimate the ice that is coming onto the trays. In a situation like this, it would not be able to verify that all of the moisture is removed because of all the ice. If this happens, simply remove the trays and put them in the freezer, defrost the ice in the freeze dryer, put the food back in the freeze dryer, and allow it to finish the process. Again, this is very rare.

3. Your vacuum pump oil needs to be changed after every batch. As the oil in your vacuum pump gets older, the cycle time for the foods will increase. If the oil in your vacuum pump needs to be changed, a batch of food that would normally take 24 hours to complete, could take 46 hours to complete.

4. The freeze dryer is working properly if during the vacuum pump/drying portion of the freeze dry cycle, the vacuum is reading between 400-800 mTorr. If the reading is consistently above 800 mTorr, it is likely time to change your vacuum pump oil, check for leaks, or clean your vacuum pump.

After my freeze dryer completed and I released the drain valve, water came rushing into my vacuum chamber. What happened?
Make sure to empty the sink or bucket that your freeze dryer drains into. If the drain hose is sitting in water (from previous batches of food) and the vacuum is released through the drain valve, water will suck through the drain hose and into the freeze dryer vacuum chamber like a giant straw.

We had oil spurt out of our vacuum pump, what is happening?

1. It is likely that there is a large leak in your system. This can happen if the drain valve is accidentally left open, the door isn't clean/aligned properly, the door seal isn't clean, or the vacuum hose is not completely tight on both ends. It can also occur if all of the caps/fittings on the pump aren't tight. These are the most common reasons for an oil spurt.

2. The oil level gets too high because of water vapor coming through the vacuum hose adding moisture to the oil level (it is important to drain this water out of your vacuum pump so that you can preserve the life of your oil as well as prevent an oil spurt).

3. Sometimes when the vacuum pump shuts off, a portion of the oil will get trapped in the vacuum pump cartridge. When this happens, the oil level will appear low in the sight glass because some of that oil is now in the cartridge. Often this will cause the user to believe that there isn't enough oil in the pump, so he/she will add oil to cover the small circle in the center of the sight glass window. Adding more oil in this circumstance will overload the pump with oil. When the pump is turned on, the oil that is trapped in the pump cartridge will be restored to the original oil reservoir. If the user has added additional oil, thinking that the level was low, there will now be too much oil in the pump and cause an oil spurt. If you recognize that the oil level has lessened, simply continue to run your freeze dryer as normal.

4. Possible moisture in the drain valve or in the oil. Verify that the food has been adequately frozen and the oil is not milky or opaque in appearance.

When the process is complete, sometimes the shelves are warm and sometimes they are cold. Why? The final step of the freeze dry process is a post-dry. The shelf heaters will turn off for the last hour of the freeze drying process. This is so the trays are not hot when pulled out. When the process finishes, the heaters turn off and the vacuum pump turns off. The condensing unit (freezer) stays on.

If the food is removed immediately after the process is completed, the trays will be hot from the heaters that are on during the post dry. If you take the food out a few minutes after it beeps, the trays will be cold. If you don't get the food out within a few hours, the trays will be very cold. In all cases, the trays should be removed with a glove because they will either be warm or cold.

Although the trays are at -40 F, because there is no water in the food to freeze and make the food cold, the food will be room temperature on -40 F trays.

A good way to test that the food is 100% complete is to break or bite

the thickest piece. If it is cold or wet in the middle, there may be a bit of moisture left in the food, and it should be put through the vacuum-dry cycle one more time. While rare, this may occasionally happen. In sum: Sometimes the trays will be warm, sometimes they will be cold. This depends on when the food is taken out. Either way, the food will be dry.

I packaged my food and it was very dry when it came out, but now it is not dry. Why?

1. Properly packaging the food is vital. It is important to promptly package your freeze-dried product in Mylar bags with an oxygen absorber (in order to seal thoroughly, we recommend you seal the bags at least twice to be safe), in a #10 can with an oxygen absorber, or a mason jar with an oxygen absorber. To ensure long shelf life, store in a cool, dry location.

2. Occasionally all of the food will be perfectly freeze dried with the exception of a couple of pieces. This can happen if you cut a few pieces of your product much thicker than the rest. If packaged, one wet piece will re-hydrate the whole batch. When a batch is complete, it is a good idea to break the thickest piece of food on your trays in half and taste it in order to be sure that the product has completed the drying process. If you find that the food is not completely dry, simply put the food back in the freeze dryer and press "**More dry time**" to get right back into the vacuum pump/drying portion of the freeze dry cycle. The freeze dryer will then finish the pieces that weren't quite complete.

What if my screen won't respond to my touch? Or, when I press a button on the screen, it recognizes it on a different part of the screen?
Your screen may need to be recalibrated. Reference calibration screen on page 40 for instructions.

9.2 MIST COMING OUT OF PUMP:

If mist/smoke is coming out of your pump for more than 5 minutes, it is likely that you need to do the following: make sure the drain valve is closed, assure that the seal on your door is latched tight, the vacuum hose is tight, and that there is no liquid on the food or chamber. Your freeze dryer WILL NOT pull a vacuum on the chamber if there is a major leak. If this happens, refer to Section 6 of this manual.

9.3 PUMP ISN'T TURNING ON DURING THE DRY CYCLE:

Make sure your pump is plugged into the back of the freeze dryer and is switched to the ON position. While the machine controls the pump turning on and off, it cannot do so unless the pump is switched to the ON position (switch is located on the back of the pump) and plugged into the freeze dryer.

WARRANTY

1 YEAR LIMITED WARRANTY

Harvest Right warrants its freeze dryer and accessories against defects in materials and workmanship, under normal use, maintenance and service for 1 year. The warranty covers components that, in the sole opinion of Harvest Right, are defective. The following are not included in the freeze dryer warranty coverage:

1. Normal wear and tear, adjustments, and damage from cleaning.

2. Repairs due to unauthorized service or modifications to the freeze dryer, product tampering, or use of non-standard parts or accessories without prior written approval from Harvest Right.

3. Damage caused by: improper setup, installation, and use of the freeze dryer; floods, storms, earthquakes, or other acts of God.

4. Parts or assemblies subjected to misuse, abuse, neglect or accidents, or lack of specified maintenance or operational procedures.

5. Damage or problems caused by relocation of unit, cleaning and/or maintenance procedures inconsistent with the technical instructions provided in the manual.

6. Claims for personal injuries, incidental or consequential damages, or economic loss (profit or revenue), however caused.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES OR GUARANTEES OF ANY KIND, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. In no event shall Harvest Right be liable for any special, indirect, incidental or consequential damages. Upon the expiration of the warranty period, Harvest Right's liability under this warranty shall terminate. The foregoing warranty shall constitute the sole liability of Harvest Right and the exclusive remedy of the customer or user.

Warranty is provided only in the country of origin in which the freeze dryer was purchased. Use of the freeze dryer outside the country of purchase voids all warranties, expressed or implied.

REPLACEMENT PARTS PLAN

For in-warranty freeze dryers, Harvest Right will provide the appropriate parts and send them directly to your location at no cost (for expedited delivery, you just pay the difference in cost between ground and expedited service).

PLAN DETAILS

During the warranty period Harvest Right will replace defective freeze dryer components and ship them directly to a customer location, freight prepaid. The replacement parts retain the remaining warranty of the original freeze dryer purchased components. A return label may be included with the shipment so the non-working parts can be returned prepaid. NOTE: You must return all required defective parts to Harvest Right within 30 days to avoid a charge for the components.

VACUUM PUMP REPLACEMENT POLICY (OIL PUMPS)

1. If the vacuum pump is out of warranty, Harvest Right will not repair nor replace the pump.

2. If the vacuum pump is still in warranty, and a member of the Harvest Right support staff believes the pump may be faulty, you may return the pump at your expense. Harvest Right will check the pump and make one of the following decisions:

a. If it is determined that there is nothing wrong with the pump, Harvest Right will send the pump back to you.

b. If Harvest Right determines that the returned pump has been misused, you have the option to purchase another pump. Harvest Right will not warrant pumps that have not been maintained properly.

c. If Harvest Right determines that there is a factory defect, you will be sent a new vacuum pump. Harvest Right will pay for shipping of the new pump and refund you the expense of shipping the damaged pump to us.

For more details, please speak to your local Harvest Right Authorized Dealer or call Harvest Right Customer Support at 1-800-865-5584.

FREEZE DRY TIMES

The following page shows a list of popular foods and their approximate freeze, dry, and total batch times. Because portion size, thickness, water content, quantity, and cellular structure of food are all different, this grid is meant to be used only as a reference for **approximate** batch times. When the food is very dense, or pieces are large, it may require extra freeze time and/or dry time. Once you have completed a few batches on your own, you will get a feel for which foods freeze dry quicker, and which ones require additional time. Again, the times listed are approximate and dependent on factors such as thickness, etc. Also, when the freeze dryer is running in a hot environment, batch times may significantly increase.

One important thing to remember is that the freeze dryer has the capability to determine when food is dry. When in doubt, add some extra time to your batch. You can't over-dry or over-freeze the food.



FOOD	FREEZING TIME	DRYING TIME	TOTAL BATCH TIME
Apple Wedges*	9	7	24-28 hrs
Asparagus**	9	7	20-24 hrs
Avocados	9	7	25-26 hrs
Bananas	9	7	25-27 hrs
Beef	9	7	22-26 hrs
Blueberries (and the like)+	12	12	48-52 hrs
Broccoli	9	7	24-28 hrs
Cheese (shredded)	9	7	20-25 hrs
Corn	9	7	24-28 hrs
Ice Cream Sandwiches	12	12	42-49 hrs
Grapes	12	12	46-52 hrs
Ground Beef	9	7	26-30 hrs
Ham	9	7	22-28 hrs
Kale	9	7	20-23 hrs
Lasagna	10	12	36-48 hrs
Milk	9	7	24-30 hrs
Peach Wedges	9	7	24-36 hrs
Peas	9	7	20-26 hrs
Pineapple	12	12	48-52 hrs
Potatoes***	9	7	32-36 hrs
Shrimp	9	7	22-24 hrs
Sliced (pre-cooked) Beef	9	7	22-30 hrs
Sour Cream	9	7	40-48 hrs
Soup	9	7	40-48 hrs
Strawberry Slices	9	7	26-32 hrs
Tomato Wedges	9	7	26-34 hrs
Turkey	9	7	20-26 hrs
Yogurt Drops	9	7	20-26 hrs

*Not required: Dip apples in citric acid or lemon water before freeze drying.
** Not required: Asparagus can be blanched before freeze drying.
***Blanch raw potatoes before freeze drying. Otherwise, they will oxidize and turn black when reconstituting.
+Blueberries, Blackberries, Elderberries, Cherries, etc.; pierce or crush before freeze drying
NOTE: Foods with excess sugar and moisture content, or with skins or shells, may require longer freeze times, as well.

TOUCH SCREEN INDEX

HOME SCREEN

- This is the home screen for the freeze dryer.
- In the top right corner you will see a clock, by pushing the clock you can skip to the next cycle (this is true on any screen).
- Below the clock is the date.
- Below the date is an elapsed timer.
- Vx.x.x represents the version of software you have loaded onto your freeze dryer. Version changes.



PLEASE CLOSE DRAIN VALVE

- By pushing "**Start**" on the main screen you are taken to this screen. On this screen is a warning to remind you to "**Please close drain valve**". By clicking "**Continue**" the freeze dryer will begin the freezing portion.



FREEZING

- The next screen is "**Freezing**". The default time for freezing is 9 hours (in the top left corner of the screen). After 9 hours (unless you customize it to something else) the freezing cycle will continue but the first of two drying modes will begin.



- The blue clock signifies we are in the freezing mode.
- Beneath the clock is the date and the elapsed timer (how long the freeze has been going). Be sure to keep an eye on this elapsed timer if you are looking to track a total batch time. This information can be helpful in diagnosing problems as well.

DRYING



- Once the freeze time has elapsed, it enters the first of two "**Drying**" modes. The clock is red to signify drying mode. Below the clock reads "**>2500mTorr**". Once the vacuum pressure pulls under 2500mT, you will begin to see the vacuum pressure fall, getting lower.
- Below the clock you can also see the elapsed time of the current cycle. This can be very helpful if you are trying to track cycle times for your own record keeping so that you can better estimate future batch times. The maximum time it will be in this first of two drying stages is 30 hours. Once it drops below 500mT, and stays there for one hour, it will skip what is remaining of the 30 hours.

FINAL DRY

- Once the vacuum pressure has gone to 500mT and stayed under 500mT for one hour, or the 30 hours has passed, it will immediately enter the "**Final Drying Stage**".



PROCESS COMPLETE

- This screen instructs you to "**Open drain valve to vent**" (located on the left hand side of the machine) and check the food. If the food is completely dry, it can be removed from the freeze dryer. Once the food is removed, select either "**No Defrost**" (food is done and the machine will NOT defrost the ice inside the machine), "**Defrost**" (food is done and the machine will use the heaters on the shelving unit to melt the ice in the machine), or, if the food is not completely dry, press "**More Dry Time**".
- A good way to check if the food is completely dry is to find the thickest piece, or spot, and check the center for cold or wet. If the food is cold or wet in the center, add additional drying time. If it is completely dry, the food can be safely packaged.



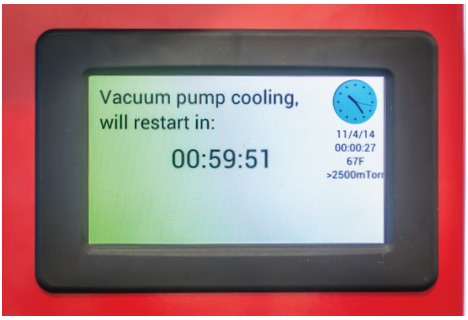
PLEASE CLOSE DRAIN VALVE

- If "**More Dry Time**" is selected, you will be prompted to "**Please close drain valve**".



VACUUM PUMP COOLING

- It may be necessary to allow the vacuum pump to cool down for a brief period of time (one hour). The reason for the pump cooling period is that the pump and oil are hot. If the pump is immediately turned on, it will spray oil out of the exhaust.



ADDITIONAL FINAL DRY

- After the pump cool down period you can now enter the additional "**Final Dry**" period.



DEFROST

- By pushing "**Defrost**" the freeze dryer will prompt you to remove the food and the black insulator door pad and close the door.



PROCESS COMPLETE

- After the "**Final Dry**" period, you are once again prompted to check the food. As before, you can select "**No Defrost**" (food is done and the machine will NOT defrost the ice inside the machine), "**More Dry Time**" (food is not done and needs additional dry time), "**Defrost**" (food is done and the machine will use the heaters on the shelving unit to melt the ice in the machine).



DEFROSTING

- When defrosting the machine, wait the allotted 2 hour default time.



DEFROST COMPLETED

- When defrost is complete, this screen will appear. By pushing "**Defrost**" you are able to add additional defrosting time.
- Pushing "**Done**" returns you to the home screen.
- Push "**Customize**" to go to the "**Temporary Temperature Settings**" screen.



CURRENT JOB TEMPERATURE SETTINGS

- From the "**Current Job Temperature Settings**" screen you can adjust the hottest temperature the heaters can go. Most users will **NOT HAVE A NEED** to adjust this temperature. 125 degrees is the preset temperature.
- To permanently change the settings, push the upper right-hand corner of this screen.
- To save any changes, press "**Done**".



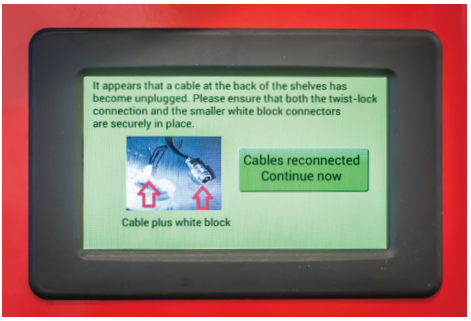
CURRENT JOB ADJUST TIME

- To increase or decrease the freezing and drying times, press "**Current Job Adjust Time**" in the customize menu. (If these times are adjusted, press "**Start Custom**" to begin customized batch. Pressing "**Done**" will return it to the preset 9 hours freezing and 7 hours drying.)
- To permanently change the time settings, press the upper right-hand corner of this screen. To switch to permanent settings adjustment changes, press "**Done**".



CABLE DISCONNECT ERROR

- If this message appears on the screen, a cable is disconnected. Most likely, it is the mobile connector attaching shelves to the machine. Try disconnecting and reconnecting this block. *Depending on your model, the picture shown will be the same, but the connectors may look different.*



SMALL BATCH CYCLE

- This screen appears when the freeze dryer wants to speed through the freezing and drying cycles too fast. Essentially the computer is telling the machine to slow down; nothing will freeze dry as fast as the machine is trying to. This occurs with low moisture foods and smaller batches, hence the name "**Small Batch Cycles**."



WRITING LOG FILES TO USB

- This screen appears during the boot up process. While the freeze dryer is running it records data. If there is a thumb drive inserted into the freeze dryer it would download the data to the thumb drive.



CALIBRATION SCREEN

- Occasionally this screen will appear during the boot up process. Simply push the 3 dots to recalibrate your touchscreen. If you don't see 3 dots then calibrate again.
- It is possible to force this screen to appear if, immediately after turning on the freeze dryer, you press and hold anywhere on the touchscreen until you hear a buzz. Once the buzz has sounded, immediately let go.



PREVIOUS JOB NOT COMPLETED

- This screen appears if the freeze dryer loses power during a batch. This can happen from a power outage, the machine being unplugged, turning the switch off on the machine.
- Pressing "**Cancel**" will return you to the home screen.
- Pressing "**Proceed**" will return the freeze dryer to the point where the process was interrupted.



ERROR IN DRYING, UNABLE TO ACHIEVE VACUUM

- This screen will appear when the freeze dryer isn't able to achieve proper vacuum in a set amount of time or it lost the vacuum pressure.
- There are fail safes to protect the vacuum pump:
  - Get under 2500mT within 15 minutes.
  - Then pull under 1000mT within 30 minutes.
- If the freeze dryer fails to achieve these pressures, this screen appears and prompts you to find the vacuum leak. Once the vacuum leak has been found and sealed, press "**Continue**" to return to the point where the process was interrupted.



NOTES



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