HARVESTRIGHT


# SCIENTIFIC FREEZE DRYER

# OWNER'S MANUAL

The Essential Guide For
Every Freeze Dryer Owner

HARVESTRIGHT

Please contact Harvest Right with all inquiries, including questions about setup, warranty, or repair. Do not contact the retail location where you purchased your freeze dryer.

801-386-8960

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# UNPACKING

## UNPACKING YOUR FREEZE DRYER

You should have taken the box off the freeze dryer and inspected for damage at the time you received your unit, before you signed the Shipper's Bill. Do not accept a damaged unit.

You should have received the following items:

- Harvest Right Freeze Dryer
- Vacuum Pump
- Power Cord
- Vacuum Hose
- Vacuum Pump Oil (not included with oil-free pump)
- Shelving Unit
- Trays
- Owner's Manual
- Oil Filter (not included with oil-free pump)
- Other materials, not listed here, may have been included

1. Remove Harvest Right Freeze Dryer, vacuum pump, vacuum hose, and power cord from packaging.
2. Inspect all items.
3. Remove the vacuum pump from its packaging and place it beside or behind the freeze dryer.
4. If there is a problem, call Harvest Right Customer Support at **801-386-8960.**

> ⚠ **CAUTION:** Do not lift the freeze dryer from the bottom of the door. Doing this may cause misalignment and inability to achieve proper vacuum, and voids the warranty. Always lift the freeze dryer from the base.

**WARNING:**

- Electrical shock can cause personal injury or death.
- This device is designed for indoor installation only.
- Do not allow the device to become clogged with dust or other debris.

# GENERAL INFORMATION

## MAJOR COMPONENTS

**Harvest Right Freeze Dryer**

**Power Switch:** Located on the back of the freeze dryer ("0" is off, "I" is on).

**Vacuum Chamber:** This circular chamber includes a shelving unit for the trays. The orange heating pads on the shelving unit should face down.

**Trays:** These hold the material to be freeze dried. Do not overload trays or batch times will be extra long.

**Power 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 one is for powering the vacuum pump) and a functioning 110 volt power outlet. A dedicated 20 amp circuit is required for large freeze dryers.

**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 tight. Be sure to hand 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 (Figure 1, page 5). Make sure the vacuum pump "on/off" switch is set to the "ON" position ("O" is off, "I" is on). It will not receive power until the freeze dryer completes the circuit at the appropriate time in the freeze drying process.

**Oil Demister:** The black cylinder attached to the top of the vacuum pumps that use oil.

**Drain Line:** This is a clear tube, located on the side, toward the bottom-back of the freeze dryer. This tube should be placed in a drain or a 5-gallon bucket (or similar container) to collect the water removed during freeze drying (collects as ice on the sides of the vacuum chamber). Don't open the drain valve with the open end of the clear hose in water or the water will be sucked into the freeze dryer.

Before you start a freeze drying cycle make sure the valve on the drain tube is closed. The small handle on the valve should be perpendicular to the tube (Figure 3, page 6).

# IMPORTANT SAFEGUARDS

## SAFETY INFORMATION

Read all instructions carefully before using your Harvest Right 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.

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. Most 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 the freeze dryer.
- 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 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. 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. Keep vents clean.

- 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 between 9-11 amps of power and spike near 16 amps. Usage of a dedicated 20 amp circuit will prevent power outages and allow for proper freeze drying.

- Do not defrost your freeze dryer with a blow dryer or other heating device. There is a thermal cutoff that protects the machine and the material inside the chamber from overheating. If the thermal cutoff gets too hot, it will eliminate all power to your shelf heaters and will need to be replaced with appropriate parts.

## NEVER OPERATE THE FREEZE DRYER IF IT APPEARS DAMAGED

If it is dropped or damaged in any way, call Harvest Right Customer Support immediately at 801-386-8960 for examination, repair, electrical or mechanical adjustment, or possible replacement of parts.

## BE CAREFUL ABOUT WHAT YOU PUT IN YOUR FREEZE DRYER

The freeze dryer is designed to freeze dry materials or products that contain water. Freeze drying other materials may void the warranty and could damage the freeze dryer.

## VACUUM PUMP RUNS HOT

Use caution when running your freeze dryer as the external vacuum pump can reach 160˚F during operation. Keep your vacuum pump out of the reach of children as it may cause injury if touched. Your vacuum pump is built to run hot. Use care and caution in order to prevent injury.

## RECOMMENDED OPERATING TEMPERATURES

Your Harvest Right freeze dryer is designed to work in a wide variety of environmental temperatures, but extreme heat and cold will affect performance. The recommended temperature range for operation is 35-90°F. The most efficient range is between 45-75°F. Although safe, operating your freeze dryer in temperatures above 90˚F will increase batch times and may 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. This happens because with hotter operating temperatures it is harder to reach the extreme cold required for freeze drying.

When running your freeze dryer in temperatures higher than 90˚F, place a small fan in a location where it can blow air on the vacuum pump. This will help the pump run more efficiently and may increase the life of the vacuum pump.

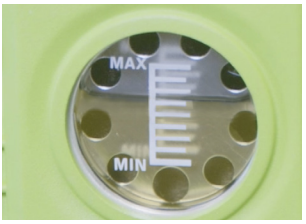
For example: a batch that normally takes 24 hours to finish in a 75°F environment could take over 40 hours to complete in hot temperatures.

# FREEZE DRYER ASSEMBLY

## ASSEMBLY INSTRUCTIONS

*Wait 24 hours before running your freeze dryer in order to facilitate proper settling of the refrigerant within the condensing unit.*

1. Once unpacked, place the freeze dryer on a level, stable surface. The ideal location for operating your freeze dryer is a cool, dry, clean location. Dirty air will clog the cooling fins in the condensing coil and reduce the life and efficiency of the refrigeration system. Ensure that the freeze dryer side vents are unobstructed to allow proper air flow during use.
2. Check rubber door gasket to make sure it is clean.
3. Make sure the inside of acrylic door is clean. Use only dry cotton cloth and warm water, no cleaners.
4. Put oil in your vacuum pump by unscrewing the oil demister on top of the pump. Fill your vacuum pump slightly higher than the center of the glass and replace the demister. (Figure 1).
5. Connect the hose to the freeze dryer and to the vacuum pump (Figure 2) and tighten. Hand tightening is generally adequate, but you may **gently** use pliers or vice grips, as required. Do not over-tighten. Do not add any additional Teflon tape, or any type of adhesive, when installing the vacuum hose. Doing this usually creates a vacuum leak because it interferes with the O-ring in the hose. Instructions for connecting the oil-free pump are on page 38.
6. Connect the freeze dryer power cord to the receptacle on the rear panel of the freeze dryer and to a 110 outlet. A dedicated 20 amp circuit is required for large freeze dryers.
7. Connect the vacuum pump power cord to the receptacle on the rear panel of the freeze dryer.



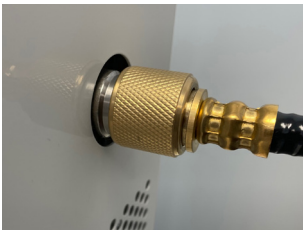



FIGURE 1

FIGURE 2

8. Make sure the power switch on the vacuum pump is in the “ON” position. (“O” is off, “I” is on). The power button is located on the back of the oil vacuum pump.

9. Secure the door latch to create a good seal. The door latch is a two-staged handle. Stage 1 latches the door and stage 2 compresses the door to the rubber gasket. Turn the handle as far to the right as possible. Do not apply too much force. Don’t break the door latch.

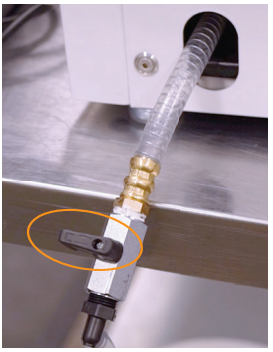


FIGURE 3

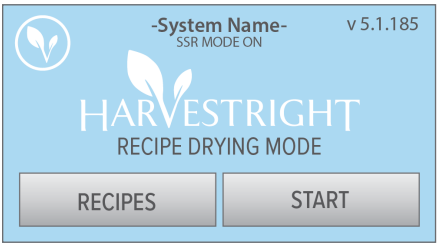
10. Make sure to close the drain valve on the freeze dryer, located on the side, toward the bottom-back of your freeze dryer. When in the closed position, the small handle on the valve should be perpendicular to the direction of the drain tube (Figure 3). If the drain valve is not closed, there will be a vacuum leak which could damage your vacuum pump and void the vacuum pump warranty. Be sure to place the open end in a 5-gallon bucket, drain, or similar container, to collect the water that is removed during the freeze drying defrost process. Be sure to keep the hose out of the water, as it will suck water into the chamber.

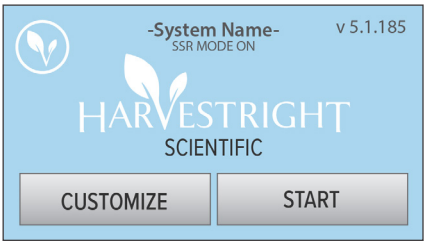
11. Ensure that the acrylic door makes contact with the rubber gasket by examining the door in the fully closed position. You will see a thin line in the middle of the gasket (that goes partially around the gasket) as it presses up against the door. When the pump turns on, make sure the door fully seals against the gasket.

12. As described in previous steps, it is your responsibility to make sure the door is closed properly, the drain valve is closed, and the hose connecting the vacuum pump to the freeze dryer is connected. The successful functioning of the vacuum pump depends on these steps being performed properly.

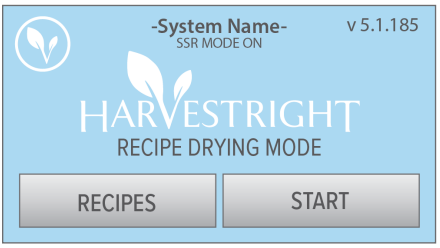
13. Turn on the freeze dryer by pressing the switch to the “ON” position (“O” is off, “I” is on). The On/Off switch is located on the back of the freeze dryer. Next, in order to perform a quick test and ensure that your freeze dryer is set up properly, complete the following steps. To accomplish this task, your freeze dryer chamber must be free of any damp or wet material such as water or condensation. It needs to be completely dry.

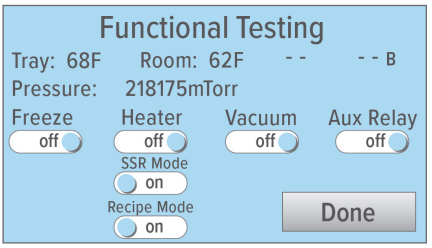
14. The Scientific freeze dryer has two operational modes: Harvest Right Standard Process, and Harvest Right Recipe Drying that is completely customizable. You can switch between the modes using the Setup Configuration screen or Functional Testing screen.



**15.** Press the circle leaf logo in the upper left corner. This will take you to a Functional Testing screen. Toggle "on" the **Freeze** by pressing the "off/on" button icon. You should hear the refrigeration condenser turn on. Close the door and the drain valve. Let it freeze for 30 minutes or more. Then toggle the **Vacuum** to "on" by pressing the "on/off" button icon. You should hear the vacuum pump turn on. Within 20-30 minutes the **Pressure** reading will decrease until it is below 400 mTorr. When this occurs, this test is successful. Press DONE to exit this screen. (Pressing DONE will automatically toggle the Freeze and the Vacuum to OFF.)




**16.** You can now open the drain valve, this will release the pressure and allow the door to be opened.

**17.** If 400 mTorr or lower was not reached, check for air leaks and repeat the test.

1. Door must be properly closed.
2. Hose connecting the vacuum pump to the freeze dryer should be securely tightened on both ends.
3. Drain valve must be closed.

If you are unable to successfully complete this test because the vacuum pressure won't go below 400 mTorr, please visit *harvestright.com/support* and submit a ticket.

**18.** You are now ready to start your first batch.

## IMPORTANT INFORMATION ABOUT YOUR FIRST BATCH:

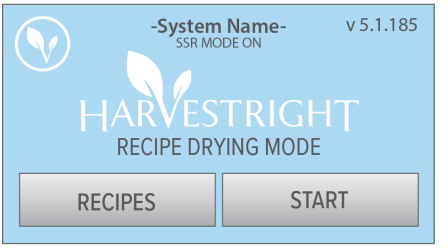
Throughout the freeze drying process, the system will monitor the cooling, vacuum, and heating functions. If it detects a problem, it will provide information to help you resolve the issue. While waiting for you to respond to the error message, the system will attempt to resolve the issue itself. If it is successful, it will no longer display an error message and continue processing the batch.

New freeze dryers need to have a one batch burn in period. That means, you should fill the freeze dryer with moist bread slices and freeze dry it. After the bread is finished, test it for dryness and throw it away. This way you can make sure your freeze dryer is working properly and it will help remove any manufacturing "new car" type smell.

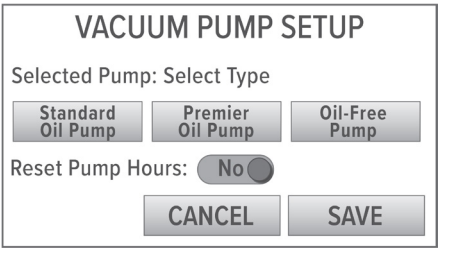
# FREEZE DRYER OPERATION

To customize freeze dryer name, please go to “Customize” settings, pg. 15.

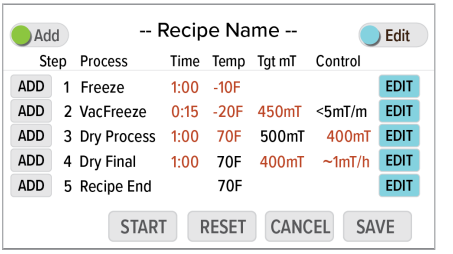
1. From the startup, press START. The first time you use your freeze dryer, the next screen prompts you to choose which type of vacuum pump you are using. Select Standard Oil Pump, Premier Oil Pump, or Oil-Free Pump.

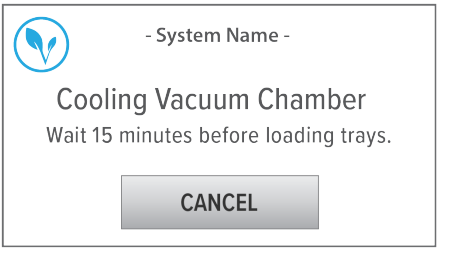



2. Once selected, press SAVE to continue. If you ever need to change the type of vacuum pump, see “Change Pump” on page 19.




3. The current saved recipe will appear. The Recipe may be changed prior to starting the batch (see Recipe Customization, page 19). If changes to the recipe were made, press SAVE, which will then return to the startup screen. Press RESET to reset the recipe to the default recipe. Press CANCEL to return to the startup screen. After reviewing the Recipe, press the Recipe START button to begin. The freeze dryer will cool for 15 minutes, or until the temperature is 32˚F, whichever comes first.



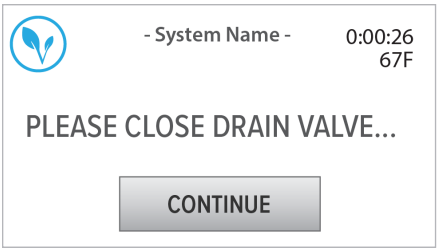



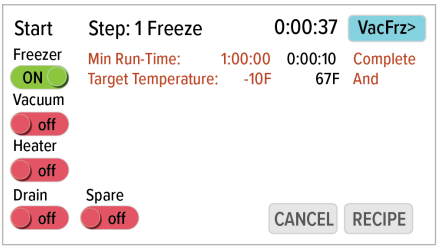
This is a good time to prepare your product for freeze drying. It should only be one layer and should be lower than the tops of the trays. If you are loading pre-frozen product, we recommend that it be frozen for at least 48 hours before loading it into the freeze dryer. This will help avoid potential vacuum issues later in the process.

After the 15 minutes of cooling, the next screen prompts you to load your product in the freeze dryer and close the drain valve. Load your food as soon as the screen prompts you.

4. Place trays in the shelving unit, close the acrylic door, and turn the door latch clockwise as far as it will go, compressing the door against the rubber gasket. Visually check to make sure the door is sealed properly to the gasket. If the door is not latched tight, there may be a vacuum leak.

5. Press CONTINUE. From here, everything is automatic. The unit will begin running the current recipe starting on Step 1. A default recipe is preloaded on the freeze dryer. The following is based on this default recipe. Customizing the recipe is described on page 19. Unless you get an error screen during the freeze drying process, it is safe to assume that the freeze dryer is working properly and operating as normal.




6. After pressing CONTINUE, the first Recipe step will now be displayed on screen. It will only show one step at a time, starting with Step 1. The parameters shown are dependent on the “step type”. The layout of each “step type” screen is essentially the same. The current step and step type are shown at the top of the screen. The current batch run time is shown to the right of the step type. To the right of the current run time is a button that shows the next step type and is used to move to the next step if needed. Note that moving to the next step can potentially ruin the product or damage the vacuum pump depending on the type of step. To move to the next step, tap the button. The button will turn yellow, and a countdown will begin. Tap the button again within the countdown to move to the next step. On Step 2 and onward, a button appears on the top left of the screen showing the previous step type. The recipe can also be moved back to the previous step in the same way as moving forward a step.

The screen is separated into 4 columns:

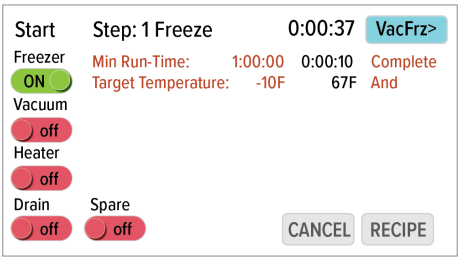
- The left column, **Column 1**, shows which freeze dryer component is on or off with slider button in green for ON and red for OFF. These slider buttons are automatically set based on the step type.
- **Column 2** shows all parameters for the current step. It will show requirements for “Minimum Run Time”, “Target Temperature”, “Target Pressure”, etc.
- **Column 3** shows real time values of the relative parameters in Column 2. It will display current step run time, shelf temperature, current vacuum pressure, etc.
- **Column 4** shows the requirements for completion of the current step. An easy way to read it is in the order of Right>Left>Down Right>Left and so on. For example, the step will Complete when it runs for a “Min Run-time” of 1:00:00 (HH:MM:SS) And the “Target Temperature” of -10F is reached.

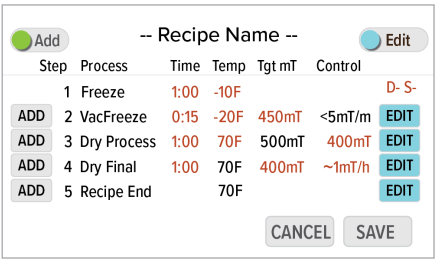
7. Step 1 in this default recipe is **Freeze**. A typical recipe should have Freeze as Step 1.

   During this step, the Freezer is ON, and Vacuum and Heater are OFF. The text in the brown font color are the parameters required for the current step. The column between the two brown font color columns is the current step run time and the current shelf temperature.

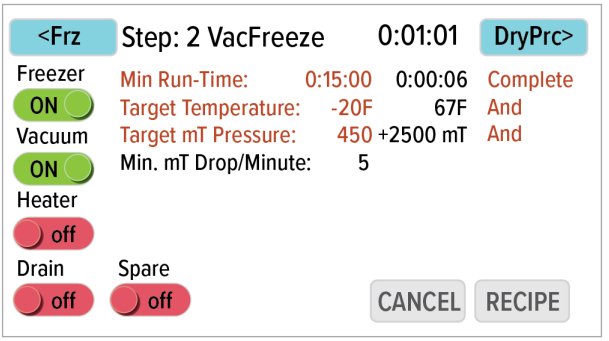
   For the **Freeze** step, the step will “Complete” when it runs for a “Min. Run-Time” of 1:00:00 (HH:MM:SS) *and* the “Target Temperature” of -10F is reached. If it runs for 1:00:00 and the temperature has not reached -10F, it will continue until -10F is reached and then move on to the next step.

   During any step of the recipe, the full recipe can be viewed and edited by tapping the RECIPE button. The current and past steps cannot be edited, but all following steps can be edited during a batch if needed (see Recipe Customization, page 19). If changes to the recipe were made, press SAVE to save changes and return to the previous screen. If changes were made, but don’t want to be saved, press CANCEL to return to the previous screen.

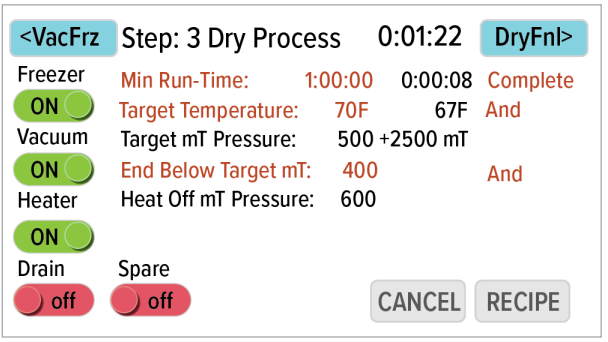


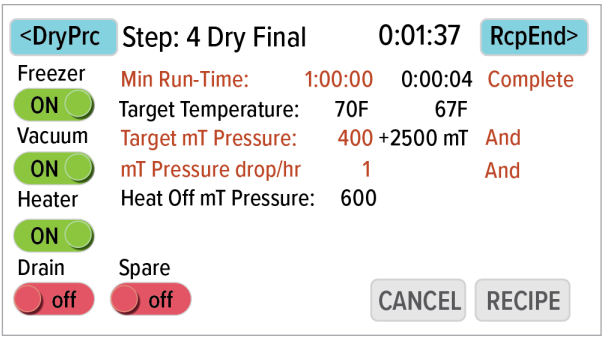
8. Once the completion parameters from Step 1 are met, the recipe will move onto Step 2. Step 2 in this default recipe is **VacFreeze**. During this step, the Freezer remains ON, and the Vacuum turns ON. The Heater remains OFF. This step will "Complete" when it runs for a "Min. Run-Time" of 0:15:00 *and* the Target Temperature of -20F is reached *and* the Target mT Pressure of 450 is reached. Once all the parameters are met, it will move onto Step 3.




9. Step 3 in this default recipe is the **Dry Process**. During this step, the Freezer and Vacuum remain ON, and the Heater turns ON. This step will "Complete" when it runs for a "Min. Run-Time" of 1:00:00 *and* the "Target Temperature" of 70F is reached *and* the "End Below Target mT" pressure of 400 is reached.

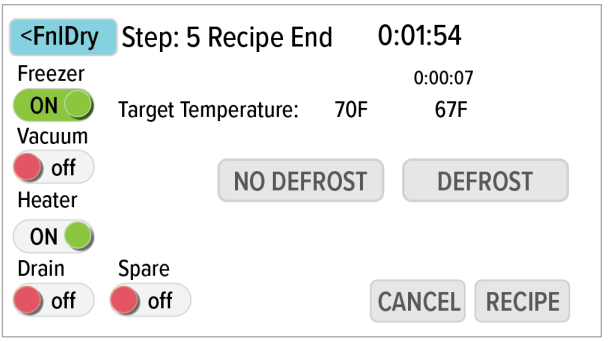


10. Step 4 in this default recipe is **Dry Final**. During this step, the Freezer, Vacuum, and Heater remain on. This step will "Complete" when it runs for a Min. Run-Time of 1:00:00 and the Target mT Pressure drops to 400 and the mT Pressure drop/hr is equal to 1 mT/hr.




11. The final step in any recipe will be **Recipe End**. In this default recipe, Step 5 is **Recipe End**. On the left side of the screen, it shows that the Freezer and Heater are ON at the Target Temperature while the Vacuum is OFF. Now is the time to check if the product is completely freeze dried. Open the drain valve to vent the vacuum but, before doing so, pull the drain hose out of the bucket and/or check to ensure bucket is completely empty of any water. If you open the drain valve while the hose is in water, it will suck the water into the chamber and ruin the material that was freeze dried.

    Opening the drain valve vents the vacuum and allows air to enter the chamber. Then the door may be opened, and the trays removed.



**12.** Check the material thoroughly to make sure it is completely dry. (If just a few pieces are not dry, when you package the food/material they will spoil the whole batch; everything in the bag will turn soft.)

Immediately package your freeze dried material so that it doesn't rehydrate from the natural humidity in the air. When packaging food/material, you can use cans, Mylar bags, and/or glass jars. Always use an appropriate oxygen absorber in an airtight container.

If you find that there is still moisture in the material, place food/material back in the freeze dryer, latch the door, and close the drain valve. Press the "Manual Advance" button at the top left of the screen, then again once yellow, to return to a previous step (in this example, either Dry Process or Dry Final) to continue drying the material.

When the process is complete, the condenser will continue to run, which will keep your material dry, even with the pump off. This will preserve your material until you are ready to unload the freeze dryer.

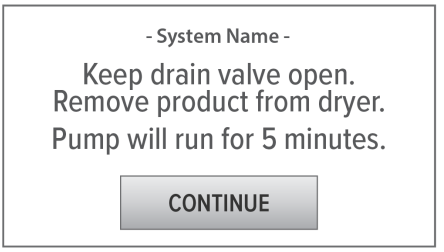
**13.** If the material is now completely dry, you will need to select "NO DEFROST" or "DEFROST".

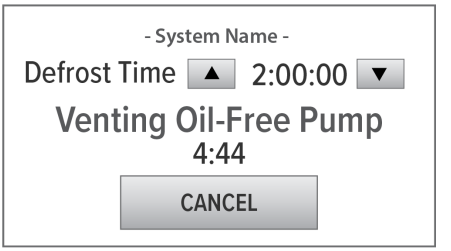
NO DEFROST: Allows ambient air to melt the ice over time. You may choose to leave the door open during this time.

DEFROST: Turns on the heaters in the shelving unit and accelerates melting the ice.

If you have an OIL PUMP, the following screen appears after pressing NO DEFROST or DEFROST. Press CONTINUE for the defrost process to begin.


If you have an OIL-FREE PUMP, the following screen appears after pressing the DEFROST or NO DEFROST button. Press CONTINUE and the vent process will begin as shown on the next screen:




During this time the pump will run for 5 minutes to purge any water that may have gotten in during the DRYING process. (This process must not run if you have an oil pump, as it will cause oil in the pump to discharge). It is important to know that you selected the correct style of pump the first time you run a batch and to upgrade that setting if you switch pumps. (See “Change Pump”, page 19).

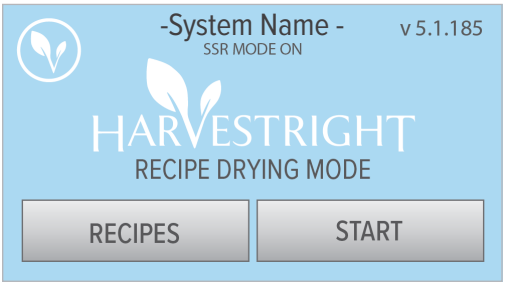

When the 5 minutes of venting have finished, and when the DEFROST process is complete, the screen will show “Defrost Completed”.

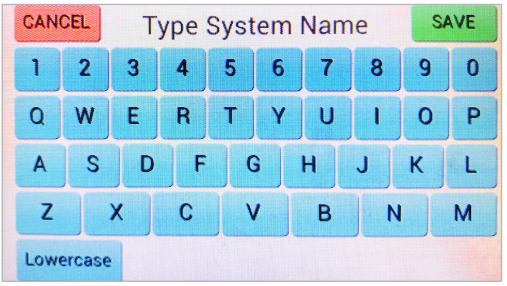

**14.** If there is still ice in the freeze dryer, press DEFROST. When the freeze dryer is finished with the DEFROST cycle, make sure all of the ice and water are now removed from the vacuum chamber and press DONE. The freeze dryer will return to the startup screen. You can now start a new batch.

## USING THE "CUSTOMIZE" SETTINGS

**To customize the name of your freeze dryer:**

Press **- System Name -** to customize the name of your freeze dryer, then follow on-screen instructions.

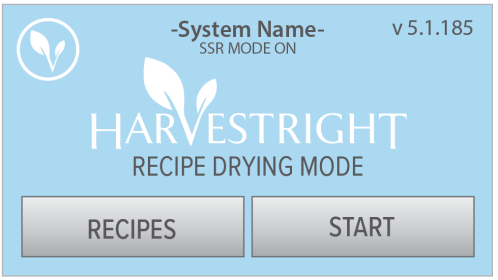


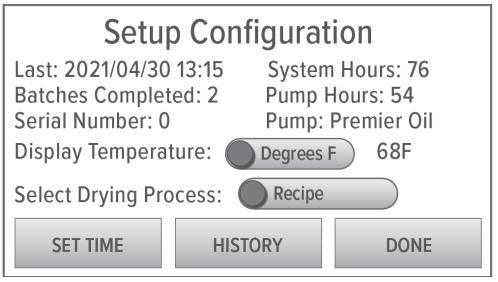



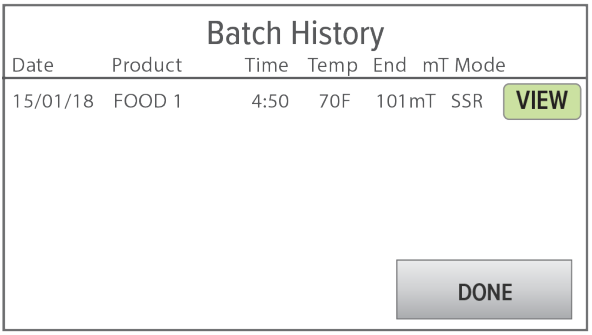

**Setup Configuration:**

To reach the "Setup Configuration" screen, press the Harvest Right logo on the startup screen.

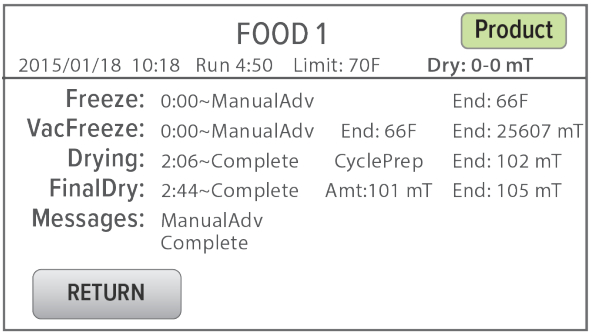
Here, you can change the "Display Temperature" from Fahrenheit to Celsius. You can also "Select Drying Process" to choose between "Recipe" or "Standard" modes. "Recipe" mode allows for complete customization of the freeze drying processes. "Standard" mode is Harvest Right's patented automated process. You can also set the time and view history from this menu by tapping HISTORY.

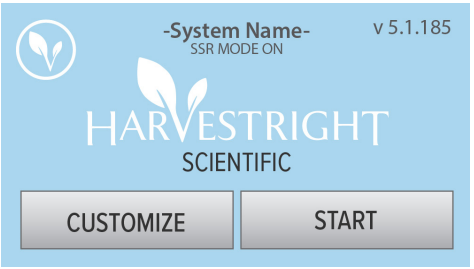





Tap the VIEW button to view batch data. The product description can be changed by tapping the Product button in the upper right corner. When “Select Drying Process” is set to “Standard”, the batch data can be viewed during a batch by tapping on the process name, for example, FREEZING, DRYING, etc. The product description can be changed this way as well.



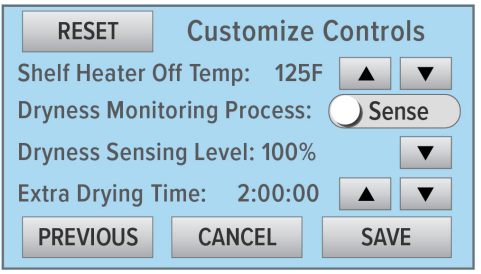




### Standard Mode

When “Select Drying Process” is set to “Standard”, the RECIPES button will change to CUSTOMIZE.

### Extra Dry Time

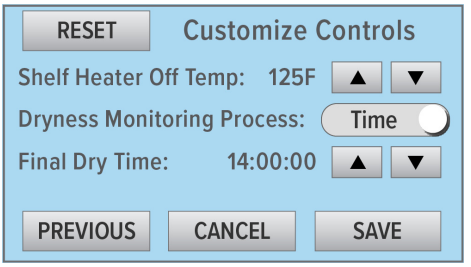
If you want to change the amount of extra dry time that is added to the end of the DRYING process, do the following: On the startup screen, press the CUSTOMIZE button. Go to the bottom of the screen where it states, “Extra Drying Time”. Press the up arrow until it shows the amount of extra time you wish to add.



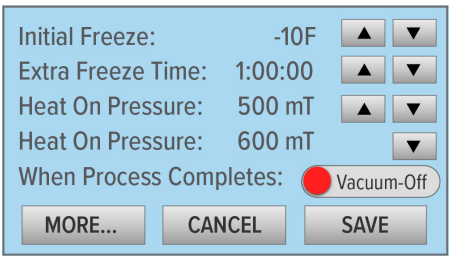

The “Shelf Heater Off Temp” may be adjusted by pressing the up and down arrows. Increasing drying temperatures may cause some material to scorch and decreasing the temperature will cause longer batches. The standard drying temperature is 125°F.

The RESET button can be pressed to set all dryness values back to the factory default values.

If the Dryness Monitoring Process is set to TIME, the below screen will appear. To get back the original setting to SENSE dryness (rather than timed drying), press the Dryness Monitoring Process” button until it displays “Sense”.



The PREVIOUS button can be pressed to view and change more controls. The first screen (after pressing PREVIOUS) states, “Initial Freeze Temp: -10F”. This can be increased or decreased.

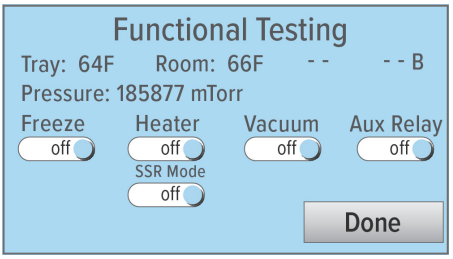


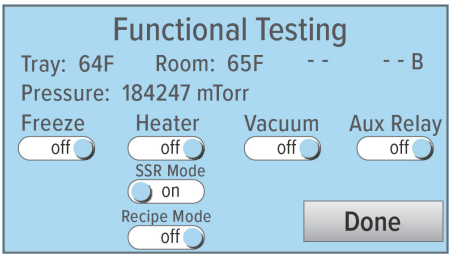

The next line indicates that you can add “Extra Freeze Time” in addition to reaching a set temperature.

The “Heat On Pressure” and “Heat Off Pressure” allow the user to select the drying cycle they wish to use. The standard drying cycle is 500 mT to 600 mT. This means that the heaters turn on when the vacuum pressure gets down to 500 mT and the heaters turn off when the pressure gets up to 600 mT. The water that sublimates out of the material being dried will freeze to the sides of the chamber. When this happens, the vacuum pressure will gradually pull down to 500 mT. When this happens, the cycle begins again. Heaters turn on until the pressure rises to 600 mT; then they again turn off. This cycle occurs over and over until the product is dry.

The previous screen allows you to change that cycle. Instead of 500 mT to 600 mT, you might change it to be 500 mT to 550 mT, or something that works best for the product you are drying.

Finally, the line that states, “When Process Completes: Vacuum Off” allows the user to choose whether or not the vacuum pump remains on at the end of a batch. Factory setting is “Vacuum-Off”. It is not necessary to have the vacuum pump running at the end of the batch.

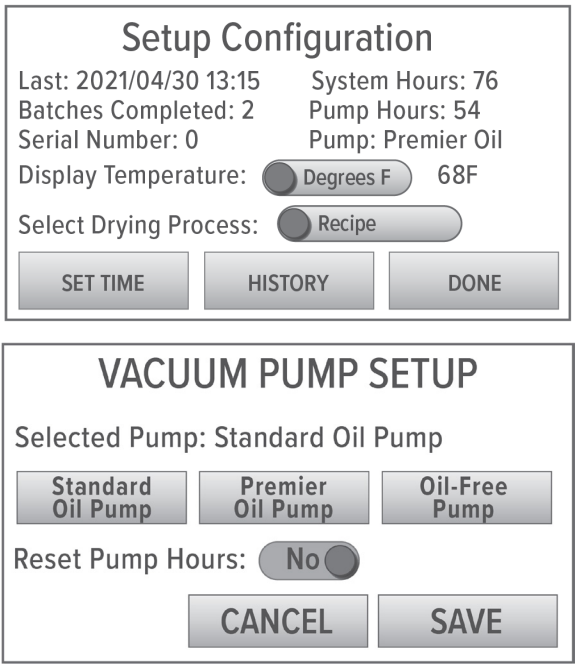



When “Select Drying Process” is set to “Standard”, the “Recipe Mode” button in the Functional Testing screen will change to “off”. The drying process can also be changed from “Recipe” to “Standard” in the Functional Testing screen by tapping this button. To operate the Scientific Freeze Dryer in Harvest Right Standard Mode, the “SSR Mode” button should be “on” to run normal drying, and “off” for fast drying, with the recipe mode turned “off”.

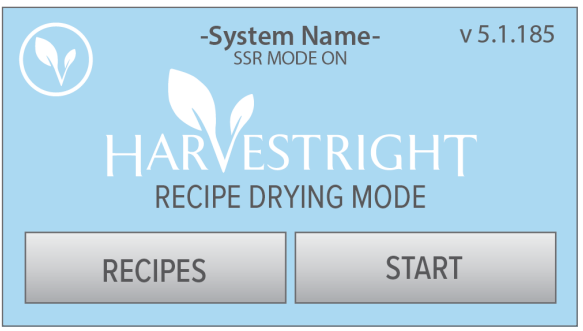
### Change Pump

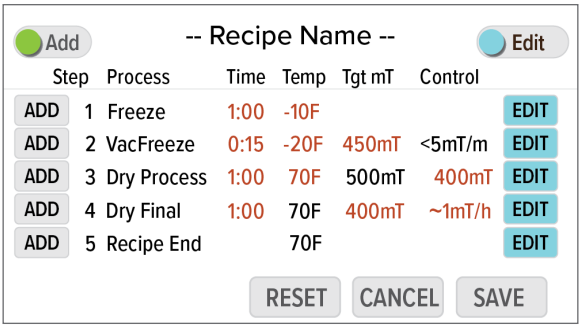
If you ever need to change the type of pump you are using, press the Harvest Right logo on the startup screen to see the selected pump. Press **“Pump:”** to change pump style.




### Recipe Customization

When the freeze dryer is set to “Recipe Drying Mode” in the Setup Configuration menu (“Select Drying Process: Recipe”), the RECIPES button will be available. To edit a Recipe, tap the RECIPES button at the bottom left of the startup screen. All aspects of the recipe are shown here. The “Recipe Name” is shown at the top. There are 6 columns.






- The Step column shows each step number.
- The Process column shows each step type for each step.
- The Time column shows time requirements, if applicable, for step completion.
- The Temp column shows target temperature requirements, if applicable, for step completion.
- The Tgt mT column shows target pressure requirements in mTorr, if applicable, for step completion.
- The Control column shows other requirements, if applicable, for step completion.

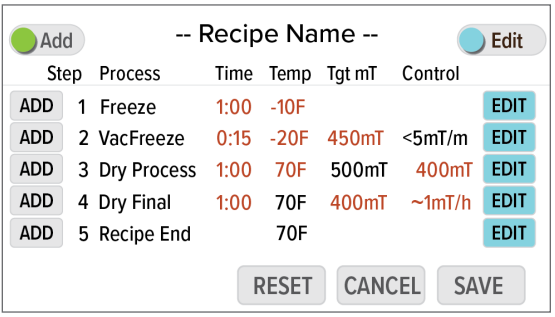
The recipe name can be changed by tapping on “Recipe Name”. The Steps can be added, removed, or step types changed.

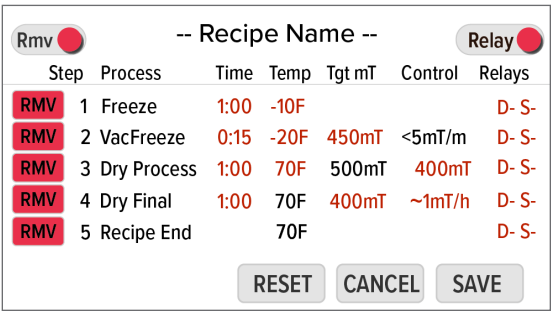
The Recipe Card screen can be accessed in both Setup and Run modes. When a Recipe is running, the Recipe Step screen displays the process that is running. You may press the RECIPE button without interrupting the current process. When you press the RECIPE button, the Recipe Card screen displays the process status of the current and previous Steps as well as subsequent steps to be processed. You may add, change and delete the Steps that have not yet processed. Press the SAVE button to save any changes or press the CANCEL button to discard any changes and return back to the current Recipe Step screen. When the Recipe Step screen is displayed and the recipe is running, you may also manually advance through the recipe steps, both <backwards and forwards> by pressing the blue colored buttons in the upper left and right corners. Press CANCEL to cancel the current running process. As a safety feature, after pressing one of these buttons, the firmware will require you press the same button a second time within 10 seconds to confirm your action before advancing or cancelling the process.

⚠ **WARNING:** Depending upon the condition of the product in the freeze dryer and the system status, manually advancing steps may ruin your product and damage the pump.

There are slide buttons located at the upper left and right side of the screen. If the left button displays “Add”, all buttons left of the Step column will be “Add”. If the slide button is tapped, it changes to RMV, for remove, and all the same buttons will change to RMV and be red in color. The “Edit” slide button at the upper right side of the screen will cause all the buttons to the right of the Control column to display EDIT and be blue in color. Tapping the “Edit” slide button will change it to “Relay” and display whether the two additional accessory relays are turned on or off for that step.

Tapping “Add” adds a copy of that step shown directly to the right and adds it below that step as the next step number. To edit a step, tap the EDIT button. The step type can be changed by tapping the CHANGE button at the top of the screen. The step number and type are displayed at the top of the screen. Steps can be cycled forward and backward by tapping the blue colored buttons at the top left and right of the screen.



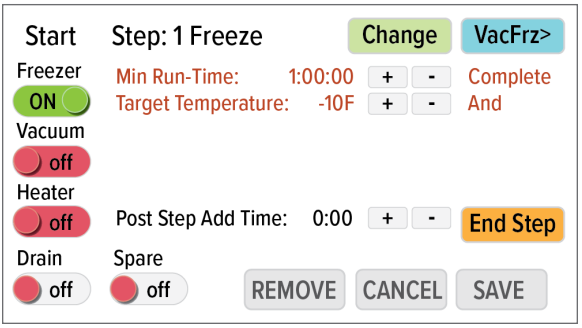

When editing a Step, there are two slide buttons located at the lower left side of the screen. These control two accessory relays. By default, the left button is titled “Drain”, and the right button is titled “Spare”. The name of each relay can be changed by tapping the button continuously until a keyboard pops up. During each step of the recipe, each accessory relay can be either on or off.

If changes to a step were made, press the SAVE button to save the changes and return the full Recipe Card. If changes were made, but don’t want to be saved, press CANCEL to cancel the changes and return to the full Recipe Card. If changes were made to the Recipe, press SAVE on the full Recipe Card to save the changes and return to the startup screen. Press CANCEL to return to the startup screen and not save changes if changes were made. Press RESET to reset the Recipe Card back to the default settings. When editing a Step, you can cycle between steps by pressing the blue buttons at the top left and right of the screen. Pressing the blue buttons will “Save and Advance” to different steps.

## Step Types

### Freeze:

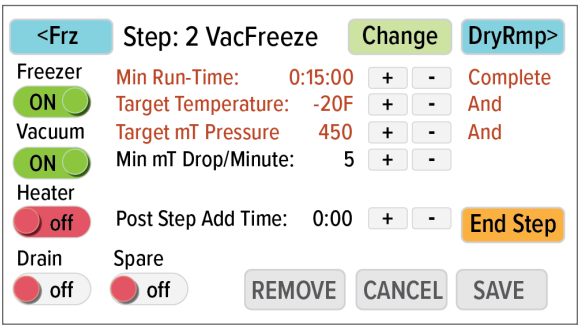
This is the step type used to freeze the product before the vacuum pump is turned on. Each parameter can be customized here.



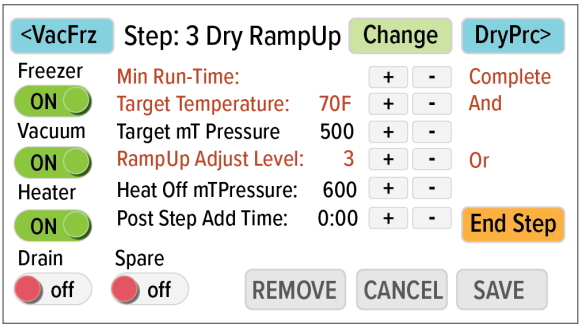

A “Post Step Add Time” feature is located toward the bottom. It’s used to add additional time after all the parameter requirements are met. The yellow End Step button changes how the step completion requirements are determined. For example, in the image below, the step will Complete when it runs for a Min. Run-Time of 1:00:00 (HH:MM:SS) And the Target Temperature of -10F is reached. This can be changed so that the “And Target Temperature” is removed and the only requirement is Min. Run-Time.

### VacFreeze:

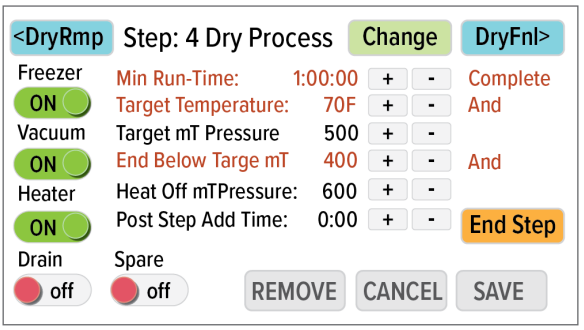
This is the step type used to further lower the temperature of the core of the product by reducing pressure to ensure that it’s frozen enough before heat is applied to the shelving unit. Each parameter can be adjusted here. A Post Step Add Time is also included here as well. The yellow End Step button changes the completion requirements between multiple variations of requirements.



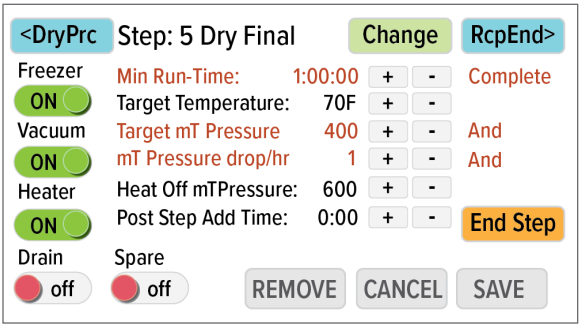
**Dry RampUp:**
In this step type, the temperature is ramped up at different rates to reach the Target Temperature. Shelf temperature is regulated by the vacuum pressure. The RampUp Adjust Level changes the speed at which the Heater ramps up. The lower the number, the slower the rate. Each parameter can be adjusted here. A Post Step Add Time is also included here as well. The yellow End Step button changes the completion requirements between multiple variations of requirements.



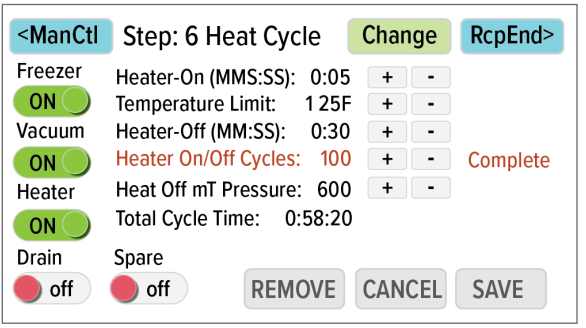

**Dry Process:**
In this step type, shelf temperature is regulated by the vacuum pressure. A Target Temperature and a pressure range is set. Once the vacuum pressure drops to the Target mT Pressure, the Heater will turn on. The Heat Off mT Pressure is the pressure at which the Heater will turn off. This regulates the vacuum pressure rise due to sublimation. The Heater tries to maintain the Target Temperature while the pressure is below the Heat Off mT Pressure. Each parameter can be adjusted here. A Post Step Add Time is also included here as well. The yellow End Step button changes the completion requirements between multiple variations of requirements.



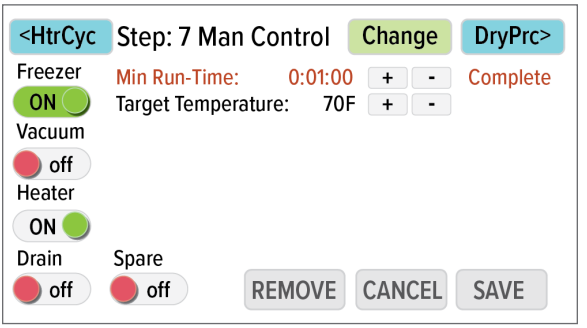
**Dry Final:**
This is a secondary drying step that its main objective is to measure the rate at which the pressure changes in order to determine if the product is completely freeze dried. Each parameter can be adjusted here. A Post Step Add Time is also included here as well. The yellow End Step button changes the completion requirements between multiple variations of requirements.




**Heat Cycle:**
This step type is used if precise control of the heaters is needed. The Heater can be set to be on for a set time and off for a set time. Use Heater-On (MM:SS) to set how long the Heater is on for. Use Heater-Off (MM:SS) to set how long the Heater is off for. The Temperature Limit is set so that the Heater doesn't exceed the set temperature. The number of cycles can be set by adjusting the Heater On/Off Cycles setting. Heat Off mT Pressure regulates the vacuum pressure due to sublimation.



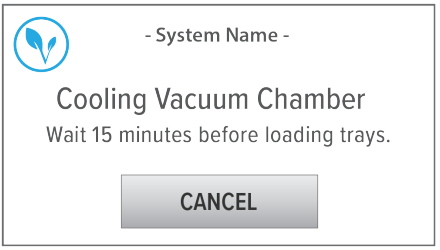

**Man Control:**
This step type is for manual control. The Freeze remains on, but the Vacuum and Heater can be either on or off. A Min. Run-Time and a Target Temperature is set.



# STANDARD FREEZE DRYER

When the freeze dryer is set to “Standard” in the Setup Configuration menu (“Select Drying Process: Standard”), the freeze dryer will operate using the Harvest Right patented automated process. There are two heating modes that can be selected in the Functional Testing screen (see images on page 18). SSR Mode can either be ON or OFF in “Standard Mode”. SSR Mode ON allows for more precise control of the heaters by adjusting the percentage of power supplied. SSR Mode OFF causes the heaters to cycle, with full power, on and off, which is identical to the Home Freeze Dryer.

1. Press START. The freeze dryer will cool for 15 minutes, or until the temperature is 32˚F, whichever comes first.

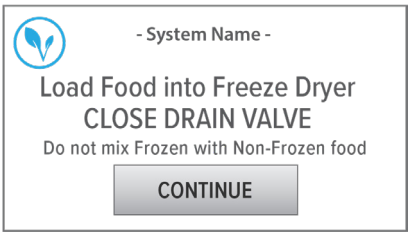



   This is a good time to prepare your food for freeze drying. It should only be one layer and should be lower than the tops of the trays. If you are loading pre-frozen food, we recommend that the food be frozen for at least 48 hours before loading it into the freeze dryer. This will help avoid potential vacuum issues later in the process.

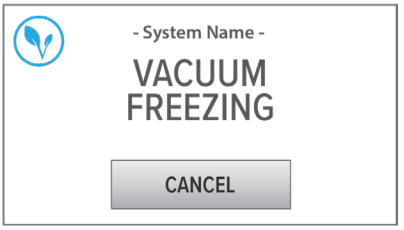
   After the 15 minutes of cooling, the next screen prompts you to load your food in the freeze dryer and close the drain valve. Load your food as soon as the screen prompts you. Do not let it continue to cool. Doing so could cause vacuum issues later in the process.

2. Place trays in the shelving unit, close the acrylic door, and turn the door latch clockwise as far as it will go, compressing the door against the rubber gasket. Visually check to make sure the door is sealed properly to the gasket. If the door is not latched tight, there may be a vacuum leak.

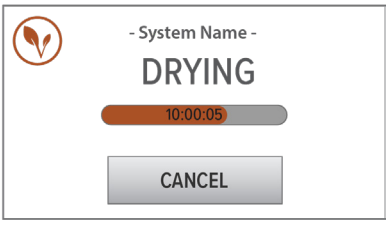
3. Press CONTINUE. The unit will begin freezing the material in the freeze dryer. From here, everything is automatic. Unless you get an error screen during the freeze drying process, it is safe to assume that the freeze dryer is working properly and operating as normal.




4. When the food or material being frozen is cold enough, the following screen will appear. Your vacuum pump will automatically turn on.




5. When the food is cold enough, and adequate vacuum is achieved, the DRYING process will begin, as shown. As the DRYING process continues, you will see an orange status bar:


6. When the DRYING process is nearly complete, the system will begin to countdown extra drying time. The EXTRA DRY TIME of 2 hours is pre-set, as shown on the following screen. This time can be also be adjusted to coordinate with your schedule and to ensure that product is completely dry. You can increase or decrease extra dry time, as desired. Extra dry time may not be required. The pre-set EXTRA DRY TIME of 2 hours can be permanently adjusted (see “Extra Dry Time”, page 17).

7. When EXTRA DRY TIME is finished, the PROCESS COMPLETE screen will appear and prompt 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. If you open the drain valve while the hose is in water, it will suck the water into the chamber and ruin the material that was freeze dried.

   Opening the drain valve vents the vacuum and allows air to enter the chamber. Then the door may be opened and the trays removed.

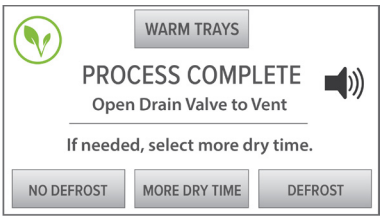

   *WARM TRAYS: The freeze drying process includes warming the trays. Trays will be warm immediately after the batch ends. If you are unable to remove trays immediately after a batch ends, the unit will cool and freeze the material that was freeze dried. This safely preserves your food until you are ready to remove it. The extremely cold trays can be uncomfortable to remove with bare hands. To avoid this, you may use gloves, hot pads, or, simply warm the trays. Push the WARM TRAYS option on the screen and wait 5-10 minutes before unloading.*

8. Check the material thoroughly to make sure it is completely dry. (If just a few pieces are not dry, when you package the food/material they will spoil the whole batch; everything in the bag will turn soft.)

   Immediately package your freeze dried material so that it doesn’t rehydrate from the natural humidity in the air. When packaging food/material, you can use cans, Mylar bags, and/or glass jars. Always use an appropriate oxygen absorber in an airtight container.

   If you find that there is still moisture in the material, place food/material back in the freeze dryer and latch door. Press MORE DRY TIME to allow the freeze dryer to finish drying. The screen will prompt you to close the drain valve. After drain valve is closed, press CONTINUE.

   When MORE DRY TIME is finished, the PROCESS COMPLETE screen will again appear.

9. If the material is now completely dry, you will need to select “NO DEFROST” or “DEFROST”.

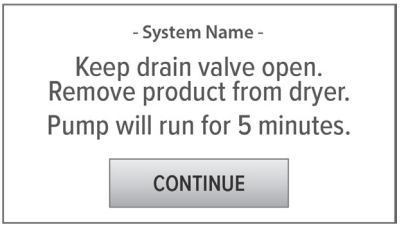
NO DEFROST: Allows ambient air to melt the ice over time. You may choose to leave the door open during this time.

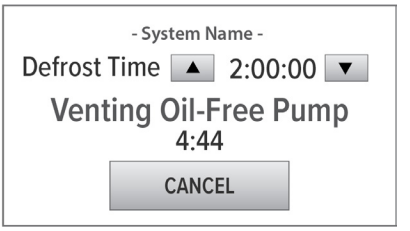
DEFROST: Turns on the heaters in the shelving unit and accelerates melting the ice.

**If you have an OIL PUMP,** the following screen appears after pressing NO DEFROST or DEFROST. Press CONTINUE for the defrost process to begin.



**If you have an OIL-FREE PUMP**, the following screen appears after pressing the DEFROST or NO DEFROST button. Press CONTINUE and the vent process will begin as shown on the next screen:




During this time the pump will run for 5 minutes to purge any water that may have gotten in during the DRYING process. (This process must not run if you have an oil pump, as it will cause oil in the pump to discharge). It is important to know that you selected the correct style of pump the first time you run a batch and to upgrade that setting if you switch pumps. (See “Change Pump”, page 19).

When the 5 minutes of venting have finished, and when the DEFROST process is complete, the screen will show “Defrost Completed”.


**10.** If there is still ice in the freeze dryer, press DEFROST. When the freeze dryer is finished with the DEFROST cycle, make sure all of the ice and water are now removed from the vacuum chamber and press DONE. The freeze dryer will return to the startup screen. You can now start a new batch.

# A CLOSED SYSTEM

## WHAT IS A CLOSED SYSTEM

In order to freeze dry items, 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 less than suitable vacuum pressure, yet have enough vacuum to hold the door closed. Within 10-15 minutes you should see that the pressure noted on the screen has decreased significantly. Drying can occur when the vacuum pressure descends to 500 mTorr (also displayed). If after 30 minutes, 500 mTorr has not been reached, checking for leaks is a logical next step. Make sure the drain valve is closed and the door gasket is sealing properly (clean gasket with warm water, let dry, and reinstall–do not wipe dry because lint may prevent a good seal).

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

## 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 the vacuum hose are damaged

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

## POSSIBLE LEAK POINTS ON THE FREEZE DRYER

- Drain valve is open
- Vacuum pump hose not connected properly or tightly
- Door not properly shut (2 stages of closing, latch and compression against gasket)
- Door gasket not clean inside and out
- Door needs adjustment

# PREMIER OIL PUMP MAINTENANCE

## PREMIER OIL PUMP MAINTENANCE

### Oil Filtration

In a properly maintained Premier Pump, an oil change will only need to take place every 20-30 batches if the oil remains clear. If the oil gets cloudy, or looks dirty, change it immediately. (See “Filtering FAQs on page 32.)

The system will display a reminder on the home screen after every 20th batch that says, “Premier vacuum pump owners, it is time to change oil.” The on-screen notification will go away after you start a new batch.

**BEFORE OPERATING YOUR PREMIER PUMP, PLEASE NOTE:**

- **Gas Ballast Must Always Be Open In Order For Pump To Work Properly.**

When you use this pump, please be sure that the gas ballast switch is open* (Figures 5 & 6, page 32). If the pump is used incorrectly, with the gas ballast closed, you will ruin it.

* *If you do not open the gas ballast the oil is only good for 4 to 5 batches, then it needs to be replaced.*

- **Pump Must Always Be Kept Level. Do Not Tilt While Carrying Or Draining Oil As That Will Cause Oil To Fill The Oil Demister.**

If the demister becomes saturated with oil when the pump is running, it may cause an oil mist cloud to fill the room. A saturated demister and will need to be cleaned. Refer to your Premier Pump Owner’s Manual for instructions on cleaning the demister filter.

### Oil Change

1. To ensure that the pump and oil are warm, run pump for approximately one minute prior to changing oil. Do not run longer than this, as it may be possible to damage the pump.
2. Turn off pump. Open the oil drain plug, and drain used oil into an appropriate vessel and filter or dispose of properly.
3. As oil stops draining, tip the pump to drain any remaining oil in the bottom of the pump. Do not over-tilt the pump. It will fill the demister with oil.
5. Close oil drain valve.
6. Unscrew and set aside oil demister. (Figure 7, page 32). Pour in new oil and fill your pump slightly above the center of the sight glass (Figure 8, page 32).
7. When finished, replace the oil demister.

OIL DRAINS OUT FROM HERE


FIGURE 5: Premier Oil Pump showing gas ballast switch location and oil demister

FIGURE 6: Gas ballast shown in “open” position

FIGURE 7: Demister removed, showing oil opening


FIGURE 8: Sight glass, showing oil level

## FILTRATION FAQS

**How do I know that my filtered oil is clean for use?**

The best indications for cleanliness are as follows:

- Oil has clarity (color may be yellow or amber and still be clear)
- Your vacuum pump achieves 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 (happens over time as debris builds up)
- Oil isn’t cleaning well

To order replacement cartridges or a new filter set, please contact Harvest Right at 801-386-8960 or visit www.harvestright.com.


Oil filter cartridge may be used approximately 20-30 batches (but may need to be changed sooner if the oil looks very dirty). See images above.

# STANDARD OIL PUMP MAINTENANCE

## STANDARD OIL PUMP MAINTENANCE

We recommend you change and filter your oil every 4-5 batches (or sooner if the oil is cloudy) in order to ensure high vacuum performance and to increase the life of your vacuum pump.

The system will display a reminder on the home screen after every 4th batch that says, “Standard vacuum pump owners, it is time to change oil.” The on-screen notification will go away after you start a new batch.

For optimum performance of your vacuum pump do not bypass the freezing cycle of your freeze dryer. For shorter freezing cycles you may pre-freeze the products until they are frozen solid before placing them in the freeze dryer but still do not bypass the freezing cycle. The unit is intelligent. It will only freeze to the temperature it needs in order to adequately dry a batch. Freeze drying products that have even a little non-solid moisture in them will reduce the performance and the life of the vacuum pump.

DO NOT overload the trays in the freeze dryer. Too much product will produce too much evaporated moisture which may exceed the ice capacity inside the vacuum chamber and cause the vacuum pump to suck in the excess moisture. This may affect the performance and shorten the life of the vacuum pump.

**Oil Change**

FIGURE 4

1. Turn off vacuum pump.
2. Locate the drain valve for the oil reservoir located at the bottom, front of the pump (Figure 4). Make sure it extends past the edge of the table or cart.
3. Place your oil filter beneath the drain valve to collect the oil.
4. Open the valve.
5. Drain the oil from the vacuum pump into your filter.
6. Elevate the back of the pump and drain the remaining oil from the drain valve. Once all the oil is drained, close the drain valve.
7. Using new or filtered oil, refill the oil reservoir to the appropriate level.
8. Turn the vacuum pump switch back on.

**Oil Filtration**

1. Approximately every 4-5 batches (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. Remove the water from the oil by pouring off the oil and discarding the water. Do not pour the water back into the vacuum pump.
5. Pour the filtered (or new) oil into your vacuum pump.
6. Start your freeze dryer.

# CARE AND CLEANING

## CLEANING THE INTERIOR AND EXTERIOR OF YOUR FREEZE DRYER

Interior: First unplug your freeze dryer from the wall. Clean the vacuum chamber and shelves with a mild detergent and then wipe dry with a soft cloth. Remove shelves for a thorough cleaning. In order to remove the shelves, you will need to take off the black rubber gasket that the door seals against. Gently pull out the shelf. Then disconnect the cable. Once the red tab is unlocked, press the black tab down and pull the two pieces apart. When finished cleaning, ensure that the shelves and chamber are dry. Next, reconnect the power line to the shelving unit.

It is important to clean the chamber and the shelf on a regular basis. It is necessary to do this by hand. You can put the shelf in a large sink and wash it with dish soap, brushes and rags; however, a dishwasher can get so hot that it will melt the glue and cause the heating pads to loosen and fall off.

Using a dishwasher to wash shelves will void the freeze dryer warranty.

Exterior: The outer door, handle, and cabinet surfaces should be cleaned with warm water and a mild detergent and then wiped dry with a soft cloth.

## 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.

## MOVING OR LONG ABSENCES

If you have a long vacation planned, or if the freeze dryer is not in use for an extended period of time, empty the freeze dryer and keep it turned off. Wipe any moisture from the inside and leave the door open to keep odor and mold from developing. **Drain the pump and fill with fresh oil**. If dirty oil is left inside the pump when it is not in use, it will corrode the internal parts and could cause premature failure.

# TROUBLESHOOTING

## FREQUENTLY ASKED QUESTIONS

**Why has the freeze dryer been running for over 46 hours and the process is not complete?**

Warmer temperatures will affect your freeze drying times. If your freeze dryer is in an area that gets hot, such as your garage, you should expect longer batch times. If temperatures exceed 90 degrees in the area you are freeze drying in, you may want to purchase a fan and have it blow on your vacuum pump. 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 items are more challenging to freeze dry than others. Because of their cellular structure, sugar, and moisture content, oranges, pineapple, strawberries, blueberries, and other foods/meals with high amounts of sugary liquid may take longer to freeze dry. The freeze dryer is measuring the removal and moisture and knows when the process is complete.
2. There is so much water in the material being dried that the condensed ice on walls of chamber has begun to encroach on the trays. While rare, if this occurs, the freeze dryer cannot recognize that the process is complete because it will sublimate the ice that is coming onto the trays. If this happens, remove the trays and put them in the freezer, defrost the ice in the freeze dryer, put the trays back in the freeze dryer, and allow it to finish the process.
3. The Standard Vacuum Pump oil should be changed and filtered every 4-5 batches (sooner if the oil is cloudy). Premier Vacuum Pump oil should be changed and filtered every 20-30 batches. As the oil in your pump gets older, the cycle time for food may increase.
4. The freeze dryer is working properly if during the drying portion of the freeze dry cycle, the vacuum is reading between 100-900 mTorr.

**After my freeze dry cycle finished and I released the drain valve, water came rushing into my vacuum chamber. What happened?**

Make sure to empty the container that your freeze dryer drains into. If the drain hose is sitting in water when the vacuum is released by opening the drain valve, water will suck through the drain hose and into the freeze dryer vacuum chamber like a giant straw.

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

1. It is likely that air is leaking into your freeze dryer chamber (or the vacuum pump is over-filled). 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 spray.

2. The oil level is too high. It may have been over-filled or because of water vapor coming through the vacuum hose and condensing as liquid into the oil (it is important to drain this water out of your vacuum pump and discard it so that you can preserve the life of your oil as well as prevent an oil spray).

**When the process is complete, sometimes the shelves are warm and sometimes they are cold. Why?**

When the process is finished, the "Process Complete" screen will appear. The shelf heaters and the vacuum pump turn off. The refrigeration unit will continue freezing until you stop the process or press "Defrost".

If you remove the food/material immediately after the process finishes, the trays will be warm. If you wait for an hour or longer, they will be very cold. Hot pads or gloves should be worn to remove these cold trays.

Test that the product is completely dry by breaking the thickest piece to check for ice. If it is cold or wet in the middle, there may be a bit of moisture remaining. If this is the case, add "More Dry Time".

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

1. Properly packaging the freeze-dried material is vital. It is important to promptly package your freeze-dried product. When packaging food, you can use Mylar bags (in order to seal thoroughly, we recommend you seal the bags twice to be safe), #10 cans, or mason jars. Always use the appropriate oxygen absorber. To ensure long shelf life, store in a cool, dry location.
2. Occasionally, all of the product 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 rehydrate and ruin the whole batch. When a batch is complete, it is a good idea to break the thickest piece on your trays in half and test it in order to be sure that the product has completed the drying process. If you find that the material is not completely dry, simply put it 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.

## 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. The freeze dryer controls the pump turning on and off, but it cannot do so unless the pump is switched on (switch is located on the back of the pump) and plugged into the freeze dryer.

# OIL-FREE PUMP SETUP

## OIL-FREE VACUUM PUMP SET UP

1. Connect the vacuum hose to the vacuum pump and to the freeze dryer, and tighten (Figure 9). Do not add any additional Teflon tape, or any type of adhesive, when installing the vacuum hose. Doing this almost always creates a vacuum leak.
2. Plug the vacuum pump power cord into the receptacle on the back of the freeze dryer.
3. Make sure the power switch on the vacuum pump is switched on.

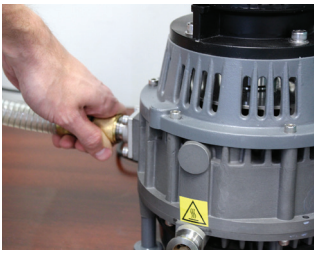


FIGURE 9

After each batch has completed, the system will run a 5-minute venting process. This will remove water and particulates that may have accumulated in the pump during the batch. Allowing this process to run is very important in extending the life of the oil-free vacuum pump.

For optimum performance of your vacuum pump, do not bypass the freezing cycle of your freeze dryer. For shorter freezing cycles, you may pre-freeze the products until they are frozen solid before placing them in the freeze dryer but still do not bypass the freezing cycle. Freeze drying products that have even a little non-solid moisture in them will reduce the performance and the life of the vacuum pump.

DO NOT overload the trays in the freeze dryer. Too much product will produce too much evaporated moisture which may exceed the ice capacity inside the vacuum chamber and cause the vacuum pump to suck in the excess moisture. This may affect the performance and shorten the life of the vacuum pump.

# LOADING AND PACKAGING FOOD

## GUIDELINES FOR LOADING THE TRAYS OF YOUR FREEZE DRYER.

- Fruits such as apples, bananas, peaches, pineapple, strawberries, and raspberries should be placed in one layer across the trays. The fruit slices may be placed close together, but should only be one layer deep.
- Fruit should be sliced and the skin side (if it is kept on) should be placed down on the tray with the cut side up. Pieces may be thickly sliced; however, if they are thick, they will take longer to dry. For instance, some people just cut strawberries and apricots in half and place them skin side down on the trays.
- Liquids are a little tricky to get in the freeze dryer. When freeze drying runny liquids such as raw scrambled eggs, milk, soup and so on, it is best to place the empty trays in the freeze dryer and then while partly pulled out, pour the liquid onto the trays. Once filled, gently slide the trays into the freeze dryer.
- Again, the thicker something is, the longer it will take to dry.
- Things like blueberries and grapes need to be cut so that the water can escape through the skin.
- Casseroles and pastas (such as beef stroganoff, mac and cheese) may be spread thickly across the trays. In general, foods should not be higher than the sides of the tray.

## PACKAGING FREEZE-DRIED MATERIAL: INSTRUCTIONS

- Fill the Mylar bags
- Add an oxygen absorber
- Seal immediately on the highest setting (8) of your Harvest Right sealer

**The following are things to consider:**

- When you open a pouch of oxygen absorbers, they need to be used immediately. Therefore, you should not open your oxygen absorbers until your freeze-dried material is in the bags and is ready to be sealed.
- Immediately reseal your bag of oxygen absorbers. And, immediately seal your bags that have the absorbers in them. The setting for sealing the bags of oxygen absorbers is less than for the Mylar bags. To seal bags of oxygen absorbers use setting 5 on your Harvest Right sealer.
- A chemical reaction takes place when the oxygen absorber is in the open air. During this process, the oxygen absorber package will get hot. This is normal. However, if you leave the oxygen absorbers in the open air too long they will get hot before you seal them in Mylar bags and they may not work.
- When you are sealing your bags, try to press all the air out of them before you seal them.
- There should be no folds in the seal of your bags. If you seal a fold, it likely will allow air in and spoil the food in the package.

# WARRANTY INFORMATION

## 3-YEAR LIMITED WARRANTY

All sales of Harvest Right Freeze Dryers after February 1, 2019, are covered by this warranty.

**Full One-Year Warranty (only includes the U.S. continental 48 states)**
Warranty Period: For one year from original ship date.
Included: Premier oil vacuum pump and oil-free vacuum pumps.
Harvest Right will be responsible for: Repair or, at our option, replace any part of this freeze dryer and/or pump which proves to be defective in workmanship or material.
Consumer will be responsible for: Costs of service calls. Consumer may also be responsible for replacement parts caused by consumer misuse and neglect of product. See Normal Responsibilities of the Consumer below.

**Limited 3-Year Warranty**
Warranty Period: For the second and third year from the original ship date.
Harvest Right will be responsible for: Repair or, at our option, replace any part of the sealed refrigeration system (compressor, condenser, evaporator, tubing) which fails because of defective workmanship or material.
Consumer will be responsible for: Diagnostic charges for determining defects, and any costs for transportation and delivery of the appliance required because of service.

**Limited Warranty (Alaska, Hawaii, Canada and Puerto Rico)**
Time periods listed above.
Included: Premier oil vacuum pump and oil-free vacuum pumps.
All provisions of this limited warranty are the same as listed above except that service will be provided by the customer or a qualified local service provider that is approved by Harvest Right.
The consumer will be responsible for the cost of transportation of the product to the repair shop or the travel cost of the technician to the consumer's location. In the event a consumer is required to ship the product directly to Harvest Right for repair, the consumer is eligible for a shipping credit in an amount determined by Harvest Right at the time of shipping.

**Limited International Warranty (includes all countries not described above)**
Warranty Period: For one year from original ship date.
Included: Premier oil vacuum pump and oil-free vacuum pumps.
Harvest Right will provide: Support through telephone and e-mail only. At our option, all parts deemed necessary will be provided by Harvest Right.
Consumer will be responsible for: Costs of local service and cost of parts for consumer misuse and neglect of product. Costs for transportation and delivery of all parts, for any reason, from Harvest Right to Consumer.

**Normal Responsibilities of the Consumer:**
This warranty applies only to freeze dryers used in clean environments and when operated in accordance with Harvest Right instructions. The consumer is responsible for the following items:

1. Proper use of the appliance in accordance with the instructions provided with the product.

2. Proper installation in accordance with the instructions provided with the appliance and in accordance with all local electrical codes.

3. Proper connection to a grounded power supply of sufficient voltage, replacement of blown fuses, repair of loose connections or defects in house wiring.

4. The appliance must be operated in a clean open area that has plenty of airflow and is not above 95°F (35°C) or below 35°F (2°C).

5. Damages to the appliance during or after installation. Do not lift the unit by holding onto the door.

6. Properly maintaining and operating the freeze dryer and vacuum pump.

7. Ensuring freeze-dried food, or other freeze-dried material, are completely dry prior to packaging.

8. Ensuring proper, durable containers are used. Containers, once sealed, must not allow water or air to penetrate them.

9. Ensuring sufficient/proper, fresh oxygen absorbers are included in the sealed container with the freeze dried material. They must not have expired or been exposed to the air prematurely for too long of a time.

*Harvest Right accepts no responsibility for the quality of freeze-dried food or freeze-dried materials; nor does it accept responsibility for the packaging of the food or other freeze-dried material.*

**Exclusions:**

1. Any modifications or add-on after-market accessories will void the warranty in its entirety.
2. Consequential or incidental damages such as, but not limited to, property damage and incidental expenses resulting from any breach of this written or any implied warranty.
3. Service calls which do not involve malfunction or defects in workmanship or material.

4. Damages caused by services performed by persons other than authorized by Harvest Right.
5. Parts other than Harvest Right repair parts or parts obtained from suppliers other than Harvest Right personnel.
6. External causes such as abuse, misuse, inadequate power supply, or acts of God.
7. Products with original serial numbers that have been removed or altered and cannot be readily determined.
8. Using an extension cord instead of direct line connection to available power supply.
9. Claims for personal injuries, incidental or consequential damages, or economic loss (profit or revenue), however caused.
10. If you are not the original owner of the freeze dryer, the warranty no longer applies.

**Service:**
Since it is the responsibility of the consumer to establish the warranty period by verifying the original purchase date, keep your delivery slip or purchase receipt or some other appropriate payment record. This written warranty gives you specific legal rights. You may have other rights that vary from state to state. Service under this warranty must be obtained by contacting Harvest Right directly:

Harvest Right
2320 N 2200 W
Salt Lake City, UT 84116
USA
801-386-8960

**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%.

**Inquiries**
Please contact Harvest Right with all inquiries, including questions about setup, warranty, or repair. Do not contact the retail location where you purchased your freeze dryer.

# SAFE USE OF FREEZE DRYERS & PUMPS

1. Harvest Right oil-sealed vacuum pumps and oil-free pumps are only to be used with foods and organic materials that are not harmful when swallowed or when vapors coming from those materials are also not harmful when inhaled.
    a. Harvest Right expressly warns users of its freeze dryers and vacuum pumps to not use them for any purposes other than freeze drying food or other healthy, non toxic materials. Harvest Right accepts no responsibility for such acts whether intentional or not.
    b. If someone uses the pump for freeze drying anything with harmful chemicals in it, the freeze dryer and vacuum pump warranties are breached and no longer valid. Harvest Right accepts no liability for these acts and it is understood by both the customer and Harvest Right the customer knowingly performs these acts at the risk of their own health and wellbeing; and that the customer accepts responsibility for all such acts.
2. Harvest Right freeze dryers, in conjunction with their vacuum pumps, must be used in well ventilated rooms. When using an oil pump, vaporization of oil is not expected at ambient temperatures. The oil is not expected to cause inhalation-related disorders under anticipated conditions of use.
3. Harvest Right freeze dryers and vacuum pumps must be operated correctly as described in Harvest Right's instruction documents and user manuals. When in use, drain valves must be closed, doors latched securely (with no obstructions between the doors and the door gaskets), hoses connecting pumps to freeze dryer must be connected properly. The users of the freeze dryers have the responsibility of ensuring that there are no leaks in the system whatsoever.
4. All Harvest Right instructions for operating the freeze dryer are to be explicitly followed by the user/customer. Harvest Right accepts no responsibility for acts that breach its instructions.
    a. If there are leaks in the system, the freeze dryer(s) will report that there is a vacuum error. Users of Harvest Right freeze dryers understand that they should respond quickly and responsibly to these messages.
5. When draining oil from vacuum pumps that use oil, the user must not tilt the vacuum pump so far forward that oil pours into and/or fills the oil demister/filter. Doing this can cause some oil to be in the demister that could then cause oil vapor to come out of the filter while operating. It should be noted that the oil demister used on Harvest Right's Premier Oil Pump has a drain in it that allows oil to drain back into the vacuum pump. However, if the white filter inside the oil demister becomes saturated with oil, it is important to wash and clean it with warm soapy water and then allow it to dry before using it again.
6. Freeze dryers should be allowed to run automatically. Those customers who take shortcuts and skip standard cycles such as "Freezing," "Vacuum Freeze,"

"Drying," and "Final Dry" do so at the peril of damaging their food and freeze dryer equipment. Harvest Right accepts no responsibility for intentional or unintentional acts performed by customers that circumvent Harvest Right's automatic "freeze dry" process(s).

7. Do not stand in puddles of water when using the freeze dryer.

8. Do not allow water to get on electric plugs and receptacles.

9. Do not touch exposed wires or any other components inside the freeze dryer while the unit is plugged into an electrical outlet.

10. Do not sleep in a room or other location where a freeze dryer and vacuum pump are being used.

11. On the back of the freeze dryer there is an electrical outlet for the vacuum pump to connect to. Do not plug anything else into that outlet.

12. Do not run the freeze dryer with the side panels removed. This may be an electrical hazard.

13. Do not add Teflon tape or other materials to hose joints.

14. Do not overfill oil vacuum pumps with oil and be sure to follow oil changing guidelines explicitly.

15. Keep the interior of the vacuum chamber and the shelves clean. Wash with warm soapy water. Do not place the shelf unit in a dishwasher. Wash it and rinse it by hand.

16. It is important to regularly pour a safe cleaning agent down the drain line to keep it clean and prevent mold and bacteria from growing inside it.

17. Make sure the drain hose is out of the water bucket before venting the vacuum chamber.

18. Make sure that food to be packaged is completely dry.

19. Food with animal fat may go rancid. Always freeze dry completely. Make sure a good oxygen absorber is in the package and that the Mylar bag is well sealed. Once opened, this food should be refrigerated or used immediately.

20. Harvest Right is not responsible for your use of the freeze dryer. Harvest Right is not responsible for food that has gone "bad" for any reason including lack of dryness, improper food storage techniques and materials.

801.386.8960 HARVESTRIGHT.COM

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