



LABCONCO CORPORATION 8811 Prospect Ave, Kansas City, MO 64132
(816) 333-8811 or (800) 821-5525 • (816) 363-0130 fax • labconco.com

Labconco Heated Product Shelves Instructions

3 Shelves (7808010xx Series) 3 Shelves w/ Valves (7808020xx Series)
5 Shelves (7808011xx Series) 5 Shelves w/ Valves (7808021xx Series)

Note: This instruction sheet may not provide all the information necessary to run your Freeze Dry System. Refer to the FreeZone® Freeze Dryer User's Manual for details and precautions.

Intended Use

The Heated Product Shelves are intended to be used in conjunction with Labconco Freeze Dryers in a laboratory setting to facilitate the lyophilization process.

Preparations

Proper Electrical Supply

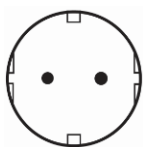
- 115V models
 - Power requirement: 5 Amp, single phase
 - Properly grounded receptacle for NEMA 5-15P plug.



- 230V models
 - Power requirement: 2.5 Amp, single phase
 - Properly grounded receptacle that matches the plug supplied with the unit (230V models are supplied with one of the following plugs):



US
(NEMA 6-15P)



EU



China



UK



India

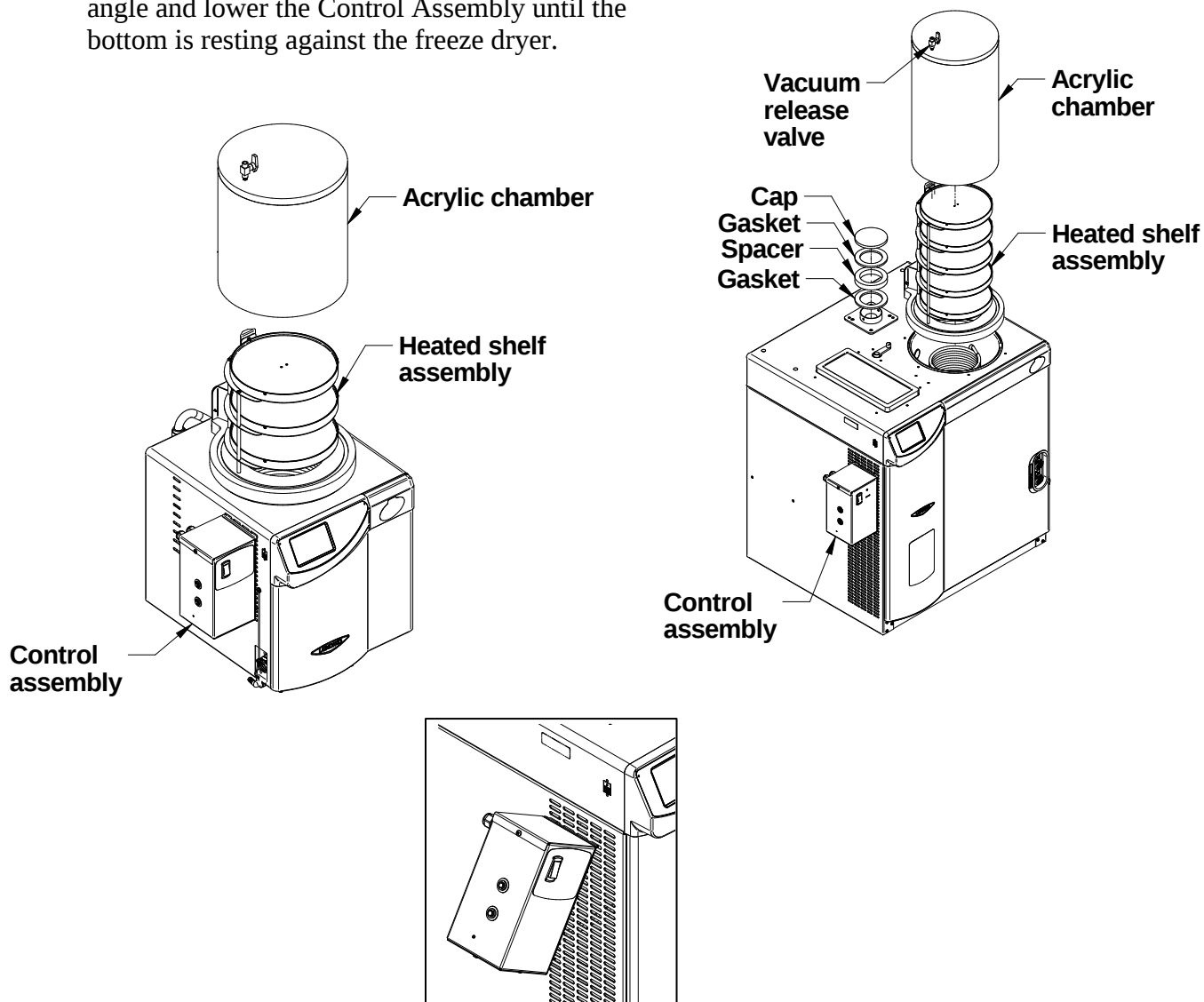
- If the plug does not match the available receptacle, remove the plug and replace it with an approved plug of the suitable style.



Do not use any detachable power cord that is not adequately rated for the unit.

Installation

- Remove the clear chamber and shelves from the heated product shelves
- Lift the Heated Product Shelves onto the freeze dryer. Make sure that the gasket on the Heated Product Shelves is resting on the top lip of the chamber.
- Attach the Control Assembly to the side of the freeze dryer. Insert the tabs on the top of the Control Assembly into the upper vent slots on the freeze dryer at about a 45 degree angle and lower the Control Assembly until the bottom is resting against the freeze dryer.



Electrical Connection

Plug the power cord into the receptacle on the back of the Heated Product Shelves Control Assembly and plug the other end into a suitable power receptacle. Make sure that the outlet that you intend to use meets the voltage and amperage requirements listed on the serial tag of the Heated Product Shelves.

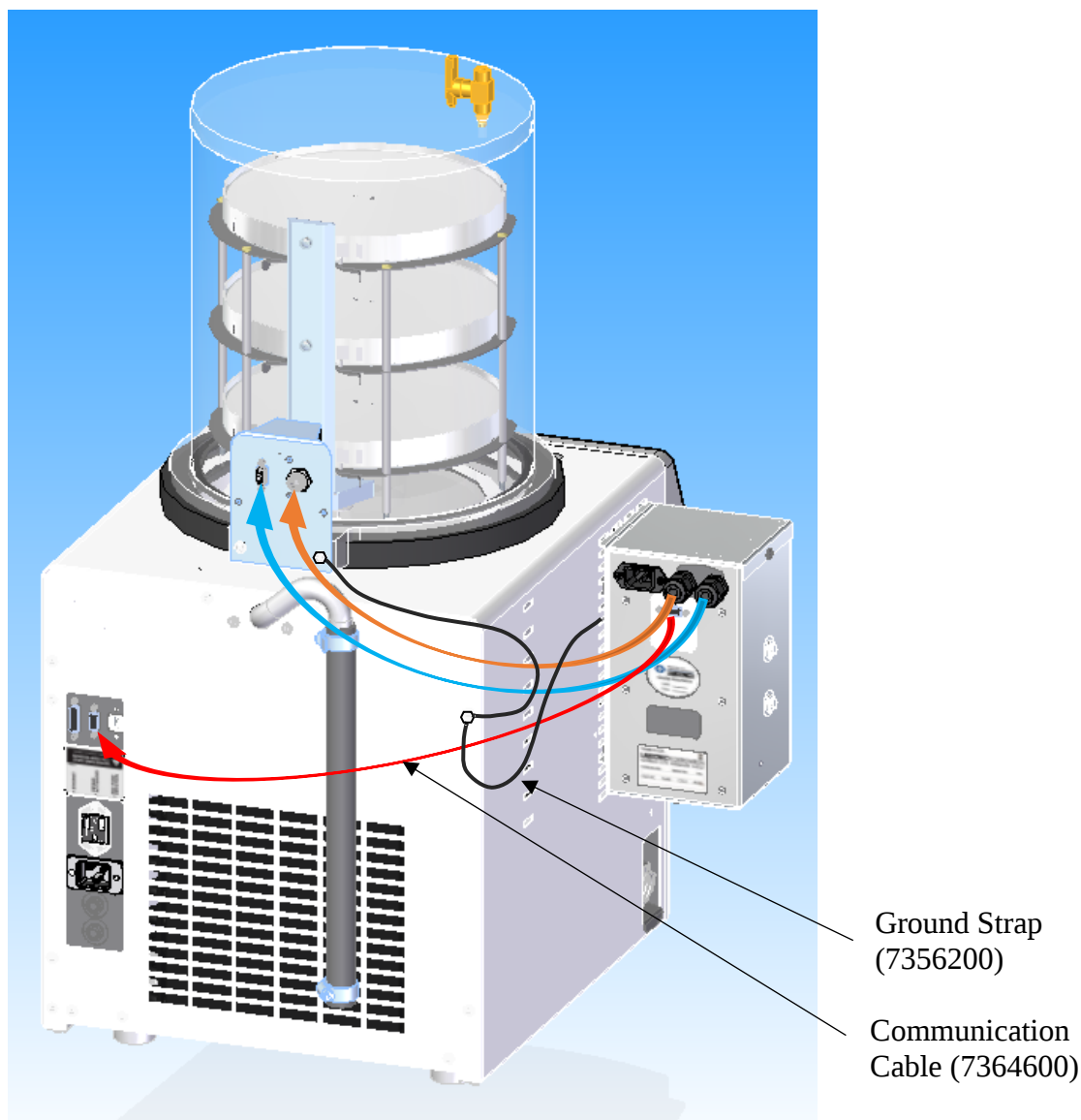


Do not attempt to plug the power cord from the Heated Product Shelves into the Freezone Freeze Dryer.

Cable connections

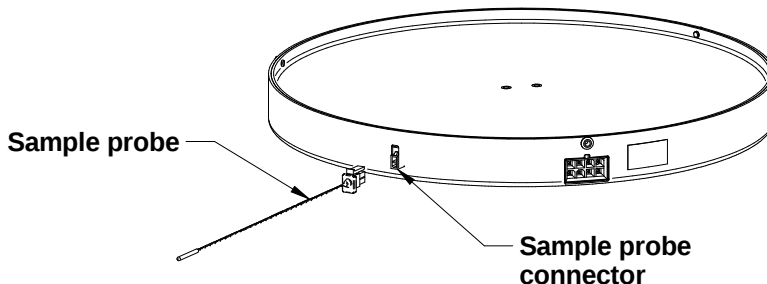
The Freeze Dryer power cord should be unplugged before connecting the communication cable.

- Connect one end of the communication cable (7364600) to the port on the back panel of the Heated Product Shelves control assembly labeled “OUTPUT TO FREEZE DRYER”. Connect the other end of the cable to the port on the Freeze Dryer labeled “DRYING ACCESSORY”.
 - **Note: The end of the communication cable with a black cylinder (Ferrite Core, 7215800) should be connected to the Heated Product Shelves Control Box.**
- Connect the two cables coming out of the back of the control box to their mating connectors on the back of the heated shelf assembly.
- Connect both Ground Straps (7356200) by removing one of the screws from the Freeze Dryer back panel and attaching the free end of the Ground Strap.
- Plug the Freeze Dryer power cord back into a suitable power receptacle.



Sample Probes

Connect the sample probes into the receptacles in the right rear of the shelves.



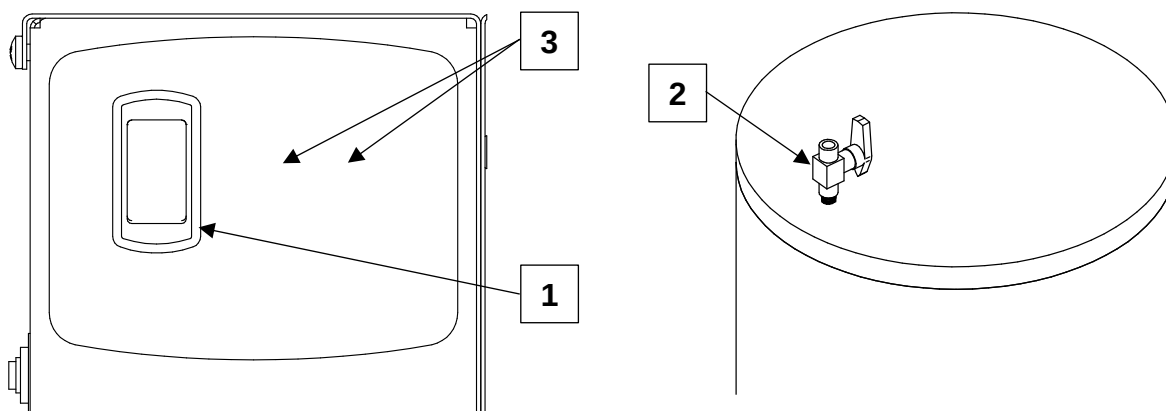
Testing and Start Up

Test System

- Turn on the Freeze Dryer base unit and let the collector reach -40°C or below.
- Place the Acrylic Chamber over the Heated Product Shelves. Make sure the VAC RELEASE valve is CLOSED. For chamber models with 8 valves, ensure that all valves are in the closed (bevel up) position. See below for valve operation instructions.
- Start the vacuum pump. With a dry system the vacuum should reach at least 0.133 mbar within 30 minutes and 0.040 mbar within 18 hours.

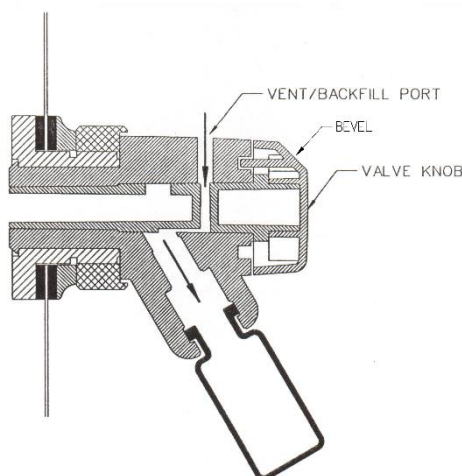
Heated Product Shelves Controls

1. **Power Switch**- Located on the Control Assembly, turns AC power ON or OFF.
2. **Vacuum Release**- Located on top of the Acrylic Chamber, vents the system so the acrylic chamber can be removed. For chamber models with valves, open one of the 8 valves to release the vacuum (see below for Valve Operation).
3. **Status indicators**- Power/Standby indicator (PWR) shows if the Heated Product Shelves is powered on and ready. The In Process indicator shows when the Heated Product Shelves is actively running a process (in Manual or Program mode).

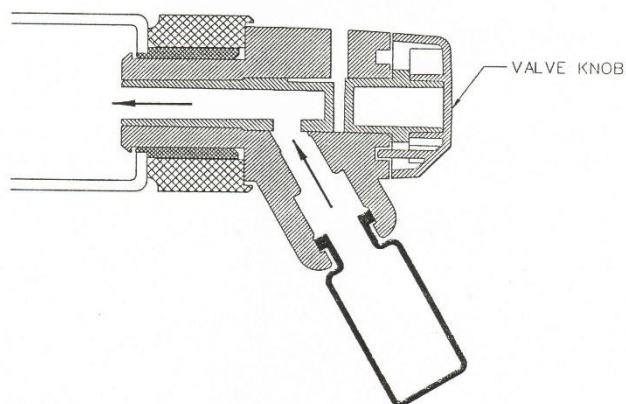


Valve Operation

When the Freeze Dry system is started the valves should all be in the vent position. (The bevel on the knob should point away from the sample port). This will allow vacuum to build up in the system.



When the system is ready to begin Lyophilization, attach the sample container to the valve. Apply vacuum to the sample by rotating the knob to the vacuum position. (The bevel on the knob should be positioned toward the sample port).



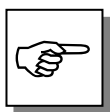
Let the samples run until primary and secondary freeze-drying is complete. Release vacuum by turning the valve to the vent position. The vent port may also be used to introduce sterile air or dry nitrogen into the sample container.

Operation Checklist

The checklist below should be followed prior to each use of your Heated Product Shelves.

1. Wipe out the interior of the Heated Product Shelves chamber with a soft cloth or paper towel to remove any moisture or debris.

2. Ensure that the Freeze Dryer collector chamber and drain line are free of water. Place the drain hose in a suitable container to collect the condensate from the collector chamber. Insert the quick connect drain fitting into the quick connect drain coupling. **Note: Freeze Dryer (Collector or Vacuum) will not start if moisture is detected in the drain line.**
3. After completely draining the system, disconnect the quick connect drain fitting from the quick connect drain coupling.



DISCONNECT THE QUICK CONNECT DRAIN FITTING BEFORE STARTING THE VACUUM PUMP. FAILURE TO REMOVE THE FITTING WILL RESULT IN A LARGE VACUUM LEAK.

4. Remove the Acrylic Chamber and Heated Product Shelves to access the collector chamber. You can also just remove the shelves in the Heated Product Shelves to access the Freeze Dryer's collector chamber through the opening in the base of the Heated Product Shelves. Wipe the interior of the collector chamber with a soft cloth or paper towel to remove any accumulated moisture.
5. Using a soft, lint-free cloth or paper towel, wipe the Heated Product Shelves gaskets to remove any dirt and contaminants that could cause a vacuum leak. Vacuum grease is not required on the gasket to obtain a proper vacuum seal.

Operating the Heated Product Shelves

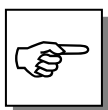
1. Adjust the shelf spacing - Prior to loading the shelves with the product to be freeze dried, adjust the shelf spacing to accommodate the size and quantity of the samples. The Heated Product Shelves comes equipped with 3 or 5 heated shelves (depending on model). At least one shelf must be used and any number of shelves up to 3 or 5 (depending on model) may be used. Shelves may be connected at any of the available positions. Be certain to push the shelf to the back of the rack until the electrical connector is fully engaged to ensure a positive electrical connection to the heaters. To remove a shelf, gently squeeze the ejector levers to disconnect it from the connector. Do not remove the shelf by pulling on the shelf, this may upset any vials on the shelf.



Ejectors

2. Temperature Sensors – Each shelf is equipped with a “Shelf” sensor that is used to accurately control the temperature of the shelf. A “Sample” sensor can also be plugged into the two pin connector at the rear of the shelf that can be used to monitor the sample temperature during the freeze drying process. The sensors will be displayed as Shelf 1, 2, 3, 4, & 5 and Sample 1, 2, 3, 4, & 5 on the Freeze Dryer display Screen.
3. Freeze the Sample - Before the freeze dry process can occur the product must be in a frozen state. This must be done in a freezer separate from the Heated Product Shelves.

4. Start the Freeze Dryer - Turn ON the Freeze Dryer COLLECTOR (See Freeze Dryer User's Manual).
5. Turn ON the Heated Product Shelves by toggling the power switch located on the Control Assembly. The POWER/STANDBY LED on the front will turn ON.
6. Position the Vacuum Release valve to "CLOSE".
7. Load Samples- Position samples on the shelves. Return the Acrylic Chamber onto the Heated Product Shelves. SAMPLE SHOULD BE LOADED AFTER THE FREEZE DRYER COLLECTOR TEMPERATURE REACHES -40°C OR BELOW. If the collector is not cold when the samples are loaded (and the freeze dry process is started), then water vapor will bypass the collector and go into the vacuum pump. This will contaminate the pump oil and can cause premature failure of the vacuum pump.
8. Turn ON the vacuum pump.
9. Start the Heated Product Shelves in either MANUAL or PROGRAM mode to control the shelf temperature to a set point value.



ALL ELECTRONIC CONTROL OF THE HEATED PRODUCT SHELVES WILL BE DONE BY USING THE TOUCH SCREEN DISPLAY ON THE FREEZE DRYER.

The main features that are used to control the Heated Product Shelves will be described below. For a complete description of the Freeze Dryer operating system, consult the Freeze Dryer User's Manual.

Drying Accessory Screen

If the Heated Product Shelves is NOT connected to the Freeze Dryer (via the communication cable), the Drying Accessory icon will NOT appear in the main menu bar. If it has been properly connected to the Freeze Dryer, the Drying Accessory icon will appear in the main menu bar and you will be able to control and monitor the Drying Accessory from this screen.

Drying Accessory			
Name	Value	Name	Value
Shelf 1	24.1°C	Sample 1	23.8°C
Shelf 2	---	Sample 2	---
Shelf 3	24.0°C	Sample 3	23.7°C
Shelf 4	---	Sample 4	---
Shelf 5	24.2°C	Sample 5	23.8°C
Drying Accessory OFF		Data Log OFF	
PROGRAM		MANUAL	

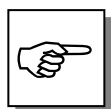
Drying Accessory Sensor Table – The middle section of the screen displays a list of all the sensors that are available for the connected Drying Accessory. Sensors that are disconnected will have three dashes (---) for their value.

Drying Accessory Status Box – The status box is located directly below the sensor table. The text on the left side will indicate the current operation mode of the Drying Accessory (OFF, Manual, or Program). When in Manual mode, the word “Manual” and the current Shelf Temp Set Point value will be displayed in this location. If a program is running the program name, Step #, and Time Remaining (TR) in the current Step will be displayed in this location. The right side of the status box will indicate if Data Logging is currently ON or OFF.

- **PROGRAM** – Pressing this button will take you to the Programs screen, where you can create a new program, or start, edit, view, copy or delete a saved program.
- **MANUAL** – Use this button to enter a Shelf Temp Set Point and/or start the Drying Accessory in manual mode.

Manual Mode

Manual mode can be used to control the shelf temperature to a single set point value between -20°C and +60°C.

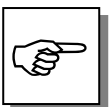


THE SHELVES HAVE NO COOLING MECHANISM, THEREFORE ANY COOLING BELOW ROOM TEMPERATURE IS DONE BY THE FROZEN SAMPLES AND THE COOLING FROM THE SUBLIMATION PROCESS THAT IS OCCURRING.

Primary Drying Phase - Allow the vacuum to pull down to the desired value. Start the Heated Product Shelves in MANUAL mode. At no time during the primary drying phase should the product temperature be allowed to rise above the eutectic temperature. The set point temperature should be lower than the eutectic temperature of the sample. If the eutectic temperature is below -20°C, do not set the heater temperature for primary drying and do not start the Heated Product Shelves (in Manual or Program mode).

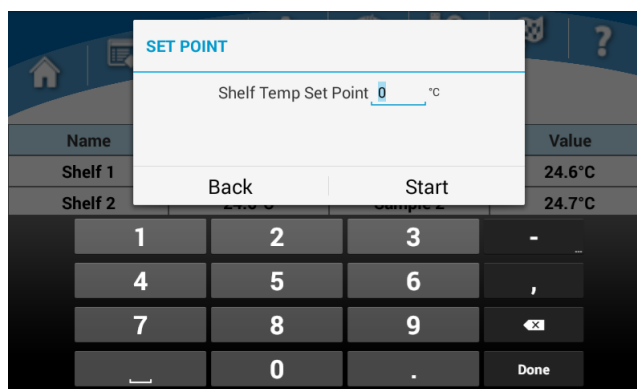
Secondary Drying Phase - After all the free moisture is removed in the primary drying phase, the temperature may be increased for the secondary drying phase.

Starting MANUAL mode



BEFORE STARTING THE HEATED PRODUCT SHELVES, ENSURE THAT THE COLLECTOR IS “ON” AND HAS COOLED TO -40°C OR BELOW.

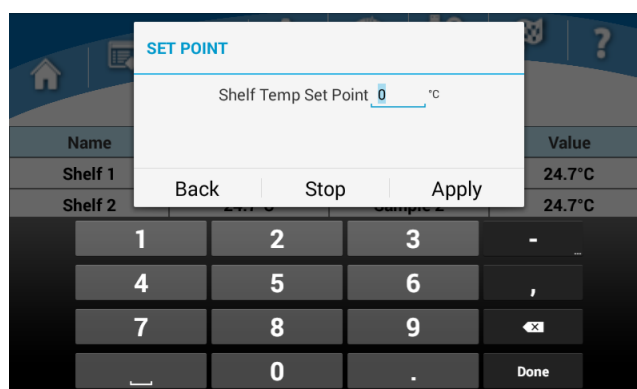
1. Turn the Heated Product Shelves power switch ON. The POWER / STANDBY LED Indicator will turn ON.
2. On the Freeze Dryer display, go to the Drying Accessory screen
3. Press the “MANUAL” button
4. Enter a Set Point value between -20°C & +60°C, then press “Start”.
5. The IN PROCESS LED Indicator will turn ON.



Changing the Shelf Temp Set Point Value

If the Heated Product Shelves is already running in MANUAL mode and you want to change the current Shelf Temp Set Point value:

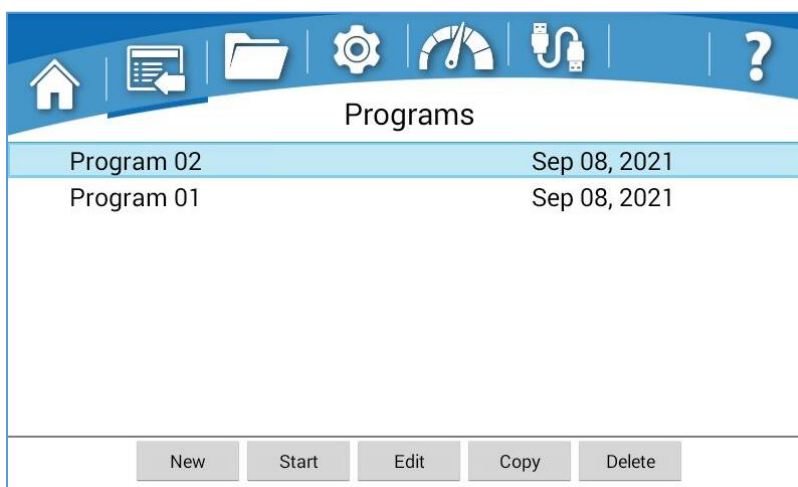
1. Go to the Drying Accessory screen.
2. Press the “MANUAL” button.
3. Enter a new Set Point value and press “Apply”.



Stopping MANUAL mode

1. Go to the Drying Accessory screen
2. Press the “MANUAL” button
3. Press the “Stop” button
4. The IN PROCESS LED Indicator will turn OFF.
5. Turn OFF the vacuum pump.
6. Position the “Vac Release” valve to OPEN.
7. Allow the vacuum to bleed to atmospheric pressure, then remove the acrylic chamber and remove the samples.
8. Turn OFF the Freeze Dryer collector, defrost the ice, drain the collector chamber and dry.

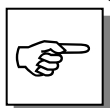
Programs



The Programs screen will allow you to create and store programs that are used to control the shelf temperature and vacuum level. Programs can be designed that take the product through both the primary and secondary drying phases.

When no program has been selected the “New” button will be the only active button along the bottom of the screen. A program can be selected from the program list by pressing the program name. When a program has been selected, the program row will be highlighted (blue). With a program selected, the rest of the buttons along the bottom of the screen will become active (Start, Edit/View, Copy & Delete).

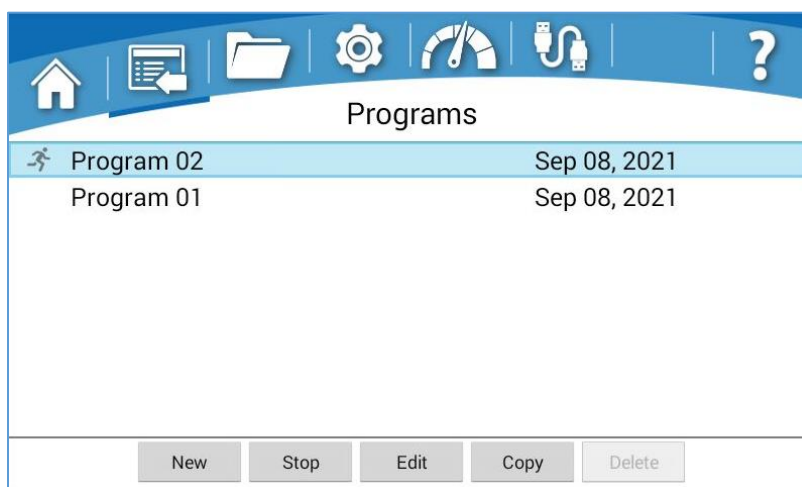
- **New** – Use this button to add a new program to the program list. The new program name will be defaulted to a two-digit sequential number (starting with “Program 01”) that will be incremented as new programs are added to the list (i.e., Program 02, Program 03...). The default name can be edited as desired in the New or Edit screen.
- **Start/Stop** – Use this button to start or stop a program. The wording on this button will change from “Start” to “Stop” depending on whether a program is currently running.



THE HEATED PRODUCT SHELVES MUST BE ATTACHED TO THE FREEZE DRYER (VIA THE COMMUNICATION CABLE) TO RUN A PROGRAM. IF IT IS NOT ATTACHED TO THE FREEZE DRYER, THE START BUTTON WILL BE INACTIVE.

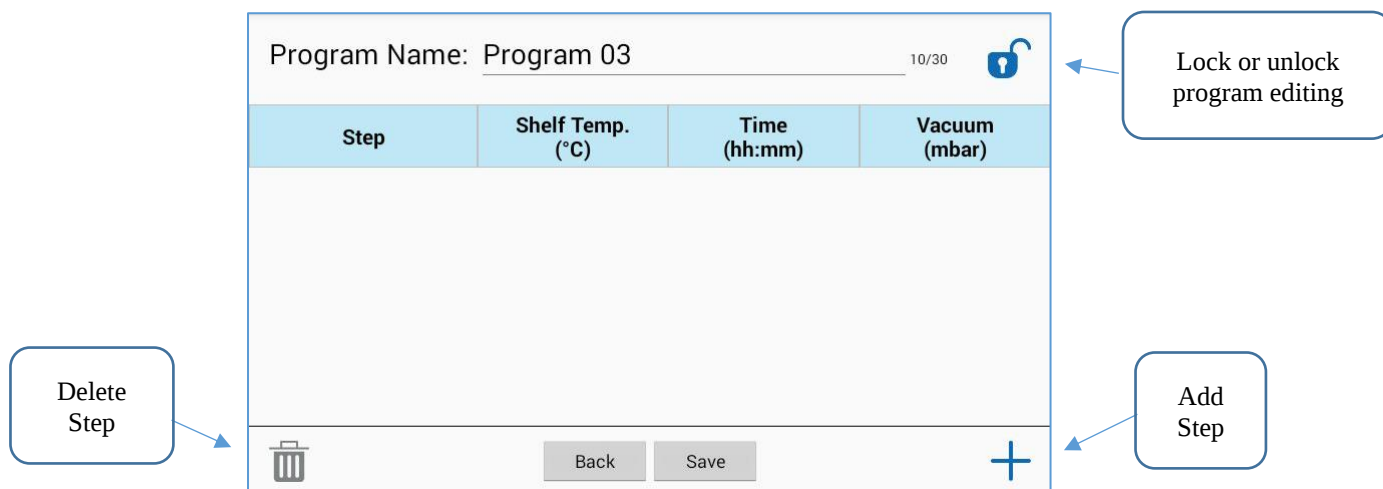
- **Edit/View** – Use this button to Edit or View the parameters of a saved program (the wording on this button will change from “Edit” to “View” depending on whether the program is locked or unlocked for editing).
- **Copy** – Use this button to Copy a selected program. The default name will be “*Program Name_copy*”. The program name can be edited as desired.
- **Delete** – Use this button to delete a saved program from the list.

When a program is currently in progress, a “running man” icon will appear to the left side of the program name. If the running program is selected (highlighted), the “Stop” button will be active, and the “Delete” button will be inactive.



Creating a New Program

When the “New” button is selected, the following screen will be displayed.



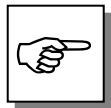
Pressing the program name field will allow you to edit the program name.

The “Add” button will add a new Step to the program and take you through a series of screens to set the Shelf Temp., Time, and Vacuum. Values can be edited by pressing any of the cells.

Pressing the “Delete” button will delete the selected step from the program. Changes will not be saved until the “Save” button is pressed. Pressing the “Back” button will return to the Programs screen without saving changes.

- **Shelf Temp.** - May be set anywhere from -20°C to +60°C in 1°C increments.
- **Time** – This time represents how long the system will hold at the Shelf Temp that has been programmed for each Step. The time can be set from 00:01 to 99:59 (1 min to 99 hrs 59 min). It can also be set to an indefinite amount of time, which is represented by the infinity symbol (∞).
- **Vacuum** – Vacuum control can be set from 0.000 to 1.500 mbar.

Starting a Program



BEFORE STARTING A PROGRAM, ENSURE THAT THE COLLECTOR IS “ON” AND HAS COOLED TO -40°C OR BELOW.

1. Go to the Programs screen. You can access the Programs screen in two different ways, both lead to the same location.
 - a. Directly access the Programs screen by selecting the Programs icon from the main menu bar at the top of the display.
 - b. Go to the Drying Accessory screen, then select the PROGRAM button at the bottom of the screen.
2. Select a program from the saved programs list, or create a new program.
3. With the desired program selected from the list, press the START button.
4. The IN PROCESS LED Indicator will turn ON.

Stopping a Program

1. At the end of the last programmed step, the Heated Product Shelves will turn OFF automatically. The IN PROCESS LED Indicator will turn OFF and a “Program Complete” alert will be displayed on the Freeze Dryer touch screen. The Freeze Dryer refrigeration (collector) and vacuum systems will continue to run until they are turned off by the user.
2. To stop the Heated Product Shelves before the completion of the last programmed step
 - Go to the Programs screen
 - Select (highlight) the program that is currently running
 - Press the STOP button
 - The IN PROCESS LED Indicator will turn OFF
3. Turn OFF the vacuum pump.
4. Position the “Vac Release” valve to OPEN. For chamber models with valves, open one of the 8 valves.
5. Allow the vacuum to bleed to atmospheric pressure, then remove the acrylic chamber and remove the samples.
6. Turn OFF the Freeze Dryer collector, defrost the ice, drain the collector chamber and dry.

Maintaining Your Heated Product Shelves

Service Safety Precautions



- Always ensure that only authorized technicians service the equipment.
- If performing any electrical maintenance, always disconnect the power at the main disconnect.
- After servicing, verify that all access panels or covers are in place before resuming normal operation of the equipment.

Routine Maintenance Schedule

Under normal operation, the Heated Product Shelves requires little maintenance. The following maintenance schedule is recommended:

1. The user has the responsibility for carrying out appropriate decontamination if hazardous material is spilled on or inside the equipment. Ensure that the any decontaminant used is compatible with acrylic and will not craze the surface of the acrylic chamber or base. Before using any cleaning or decontamination method except those recommended by Labconco, users should check with Labconco that the proposed method will not damage the equipment.
2. Clean up all spills; remove liquids from the shelves.
3. Clean gaskets using soft cloth, sponge or chamois and a mild, non-abrasive soap or detergent.

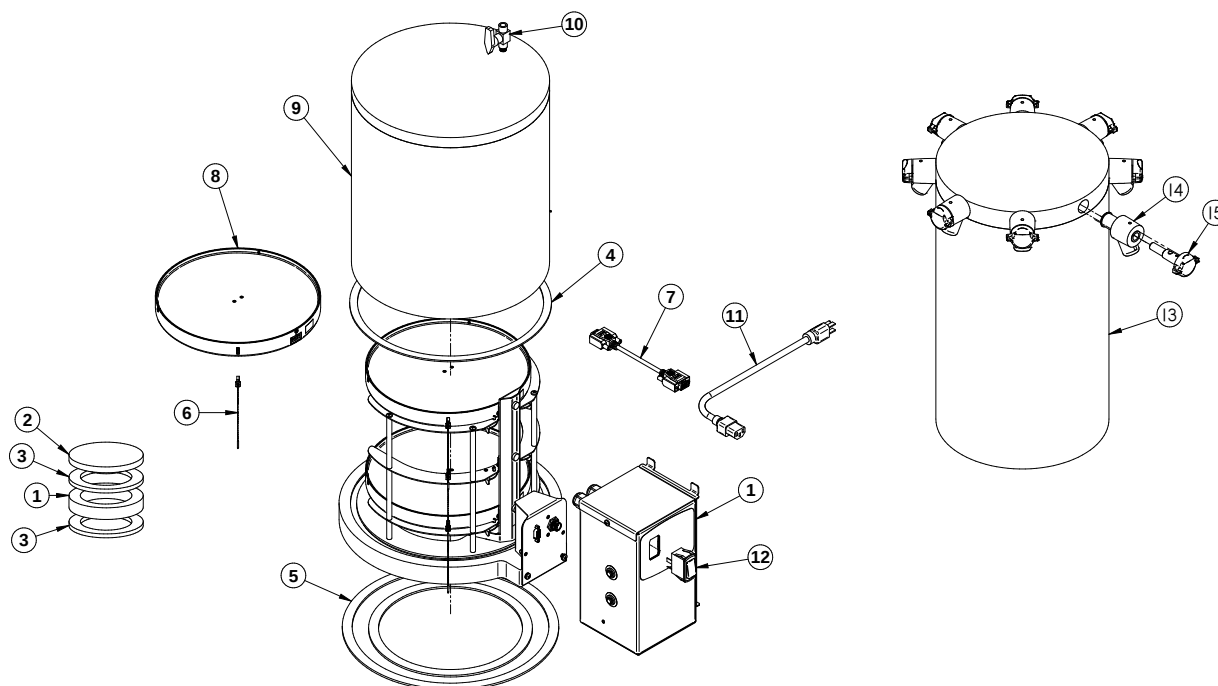
Decontamination

When freeze drying biological substances, it may be necessary to decontaminate the system. A surface decontaminant should be used to clean the accessible surfaces. The use of ethylene oxide is not recommended because of its hazardous and corrosive nature. Contact Labconco for additional information.

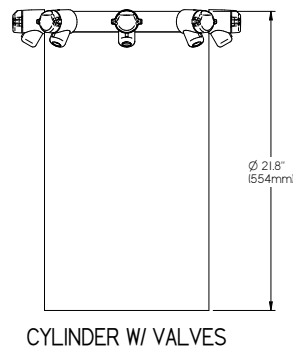
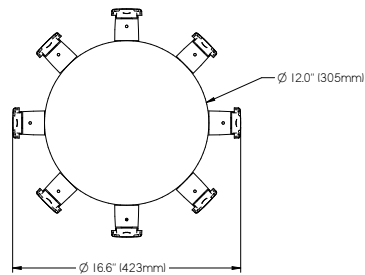
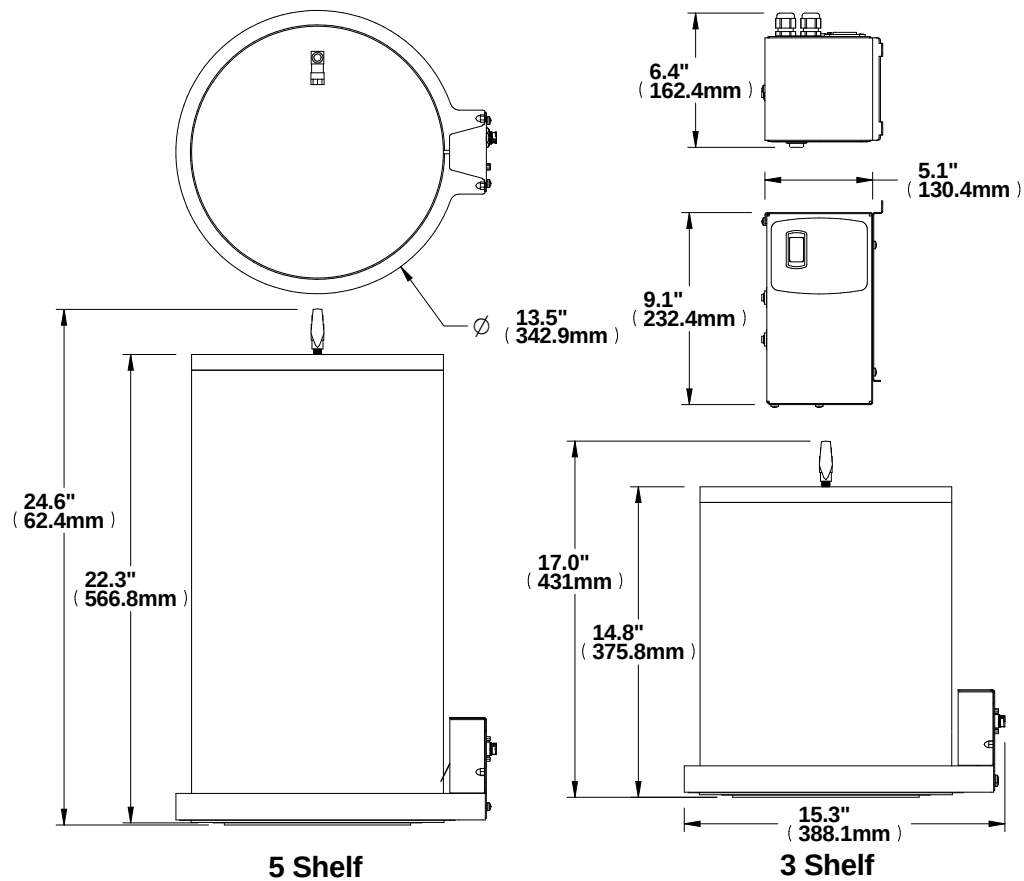
Heated Product Shelves Components

The following list of components are available for your Heated Product Shelves. The parts shown are the most common replacement parts. If other parts are required, contact Labconco Product Service.

Item	3 Shelf Qty	5 Shelf Qty	3 Shelf w/ Valves Qty	5 Shelf w/ Valves Qty	Part No.	Description
1	1	1	1	1	7742800	Spacer
2	1	1	1	1	7641800	Cap
3	2	2	2	2	7607300	Gasket
4	1	1	1	1	7439601	Gasket Upper (Silicone)
5	1	1	1	1	7375700	Gasket Set Lower
6	3	5	3	5	7365801	Temperature Probe Sample
7	1	1	1	1	7364601	Communication Cable
8	3	5	3	5	7363301	Shelf Assembly 230V
					7363300	Shelf Assembly 115V
9	1	-	-	-	7359601	Cylinder 3 Shelves
	-	1	-	-	7359600	Cylinder 5 Shelves
10	1	1	-	-	1364200	Valve
11	1	1	1	1	1345700	Power Cord 230V 50Hz India
					1332600	Power Cord 230V 50Hz UK
					1332700	Power Cord 230V 50Hz China
					1336100	Power Cord 230V 50Hz EU
					1338000	Power Cord 230V 60Hz US
					1334500	Power Cord 115V 60Hz US
12	1	1	1	1	1302301	Switch
13	-	-	-	1	7343700	5 Shelf Cylinder w/ Valves
	-	-	1	-	7343701	3 Shelf Cylinder w/ Valves
14	-	-	8	8	7505600	Valve Body
15	-	-	8	8	7508600	Knob & Stem Assembly



Heated Product Shelves Dimensions



Electrical Specifications

		Voltage		Frequency	Current Rating
Catalog #	Description	Nominal	Operating Range	(Hz)	Amps
780801000	Heated Product Shelves (3 Shelf)	115V	103 - 127	50/60	2
780801010 780801015 780801030 780801040 780801050 780801070 780801090	Heated Product Shelves (3 Shelf)	230V	207 - 253	50/60	2
780801100	Heated Product Shelves (5 Shelf)	115V	103 - 127	50/60	3
780801110 780801115 780801130 780801140 780801150 780801170 780801190	Heated Product Shelves (5 Shelf)	230V	207 - 253	50/60	2

		Voltage		Frequency	Current Rating
Catalog #	Description	Nominal	Operating Range	(Hz)	Amps
780802000	Heated Product Shelves (3 Shelf) w/ Valves	115V	103 - 127	50/60	2
780802010 780802015 780802030 780802040 780802050 780802070 780802090	Heated Product Shelves (3 Shelf) w/ Valves	230V	207 - 253	50/60	2
780802100	Heated Product Shelves (5 Shelf) w/ Valves	115V	103 - 127	50/60	3
780802110 780802115 780802130 780802140 780802150 780802170 780802190	Heated Product Shelves (5 Shelf) w/ Valves	230V	207 - 253	50/60	2

Environmental Conditions

- Indoor use only.
- Ambient temperature range: 41° to 104°F (5° to 40°C).
- Maximum relative humidity: 80% for temperatures up to 88°F (31°C), decreasing linearly to 50% relative humidity at 104°F (40°C).
- Main supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage.
- Transient over voltages according to Installation Categories II (Over voltage Categories per IEC 1010). Temporary voltage spikes on the AC input line that may be as high as 1500V for 115V models and 2500V for 230V models are allowed.
- Used in an environment of Pollution degrees 2 (i.e., where normally only non-conductive atmospheres are present). Occasionally, however, a temporary conductivity caused by condensation must be expected, in accordance with IEC 664.