

User's Manual

FreeZone® Benchtop and Console Freeze Dry Systems

Models

7750000	7751000
7750001	7751001
7750003	7751003
7750004	7751004

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- Carts carry a lifetime warranty.
- Glassware is not warranted from breakage when dropped or mishandled.

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Contacting Labconco Corporation



If you have questions that are not addressed in this manual, or if you need technical assistance, contact Labconco's Customer Service Department or Labconco's Product Service Department at 1-800-821-5525 or 1-816-333-8811, between the hours of 7:00 a.m. and 6:00 p.m., Central Standard Time.

Visit Labconco's web site at: <http://www.labconco.com> or email Labconco at: labconco@labconco.com.

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CHAPTER 1

INTRODUCTION

Congratulations on your purchase of a Labconco Freeze Dry System. Benchtop and console models are available for operation on 115V or 230V.

The Labconco FreeZone® 4.5 Liter Freeze Dry System is designed for laboratory lyophilization procedures. It is CFC-free so it will not endanger the environment. The unit is easy to install and maintain. Proper care and maintenance of this product will result in many years of dependable service.

Freeze Dry Process

Dehydration is an important process for the preservation and storage of biologicals, pharmaceuticals and foods. Of the various methods of dehydration, freeze drying (lyophilization) is especially suited for substances that are heat sensitive. Other than food processing (e.g., coffee, whole dinners), freeze drying has been extensively used in the development of pharmaceuticals (e.g., antibiotics) and preservation of biologicals (e.g., proteins, plasma, viruses and microorganisms). The nondestructive nature of this process has been demonstrated by the retention of viability in freeze dried viruses and microorganisms.

Freeze drying is a process whereby water is removed from frozen materials by converting the frozen water

directly into its vapor without the intermediate formation of liquid water. The basis for this sublimation process involves the absorption of heat by the frozen sample in order to vaporize the ice; the use of a vacuum pump to enhance the removal of water vapor from the surface of the sample; the transfer of water vapor to a collector; and the removal of heat by the collector in order to condense the water vapor. In essence, the freeze dry process is a balance between the heat absorbed by the sample to vaporize the ice and the heat removed from the collector to convert the water vapor into ice.

Freeze Dry Rates

The efficiency of the freeze drying process is dependent upon the surface area and the thickness of the sample; the collector temperature and vacuum obtained; the eutectic point and solute concentration of the sample. It is important to remember these three factors when trying to obtain efficient utilization of your freeze dry system. A listing of selected materials and their approximate drying times are shown in Table 1 for your reference.

Table 1

SAFE TEMPERATURE AND DRYING TIMES FOR SELECTED MATERIALS			
Material 10mm Thick	Safe Temperature °C	Collector Temperature °C	Hours (Approx.)
Milk	-5	-40	10
Urea	-7	-40	10
Blood Plasma	-10 to -25	-40	16
Serum	-25	-40	18
Vaccinia	-30 to -40	-50	22
Influenza Vaccine	-30	-50	24
Human Tissue	-30 to -40	-50	48
Vegetable Tissue	-50	-80	60

*Total sample quantities are contingent on various freeze dryer capacities.

Up to the point of overloading the system, the greater the surface area of the sample, the faster the rate of freeze drying. By contrast, for a given surface area, the thicker the sample the slower the rate of freeze drying. This is based on the fact that the heat of sublimation is usually absorbed on one side of the frozen sample and must travel through the frozen layer to vaporize ice at the other surface. In addition, as the sample is freeze dried, the water vapor must travel through the layer of dried material. The thicker the sample, the greater the chance that the dried layer may collapse which would cause an additional decrease in the rate of freeze drying.

The surface area and thickness of the sample can usually be ignored when each sample contains only a few milliliters. However, for larger volumes, the samples should be shell frozen to maximize the surface area and minimize the thickness of the sample. The volume of the freeze dry flask should be two to three times the volume of the sample.

In order for lyophilization to occur, ice must be removed from the frozen sample via sublimation. This is accomplished by the collector and the vacuum pump. The collector, which should be at least 10 to 15°C colder than the eutectic temperature (melting temperature) of the sample, traps vapor as ice. Since the vapor pressure at the collector is lower than that of the sample, the flow of water vapor is from the sample to the collector. Since this vapor diffusion process occurs very slowly under normal atmospheric conditions, a good vacuum is essential to maintain an efficient rate. In most applications, the maintenance of a vacuum of 133×10^{-3} mBar or less is required for freeze drying to occur.

The rate of freeze drying is directly proportional to the vapor pressure and the vapor pressure is dependent upon both eutectic temperature and solute concentration of the sample. For example, a solution of sodium chloride would freeze dry at a slower rate than pure water. The eutectic temperature of a sodium chloride solution is about -21°C and at this temperature the vapor pressure is about 1/16 that at 0°C. Although the eutectic temperature is not dependent upon the

concentration of sodium chloride, the vapor pressure of the water would decrease as the concentration of sodium chloride increased. This is due to the fact that as the solute concentration increases, less of the surface area of the frozen sample is occupied by water. In general, most solutions or biological samples will have a eutectic temperature of -10 to -25°C . However, if the sample contains a simple sugar such as glucose or if the sample is animal or plant tissue, the eutectic temperature may be as low as -30 to -50°C .

Freeze Dry Capacity

The volume of a sample that can be freeze dried at one time is related to factors discussed previously and the size and design of the freeze dry system. With any given instrument, the capacity is based on the surface area of the sample; the eutectic temperature and concentration of the sample; and the rate and amount of heat transferred to the frozen sample. Of these factors, the eutectic temperature is the most important factor in determining the amount of sample that can be freeze dried at one time, particularly when flasks are used. This is because as the eutectic temperature decreases, the vapor pressure decreases but the rate of heat absorption by the sample does not change. This tends to promote melting of the sample which leads to a marked increase in vapor pressure and ultimately overloads the collector and vacuum pump. Samples that have eutectic temperatures of -20°C or lower should be placed on the freeze dry system one flask at a time so that the vacuum in the system may recover before adding another sample to the system. If the vacuum does not recover to less than 133×10^{-3} mBar, the capacity of the freeze dry system has been exceeded and the sample should be removed.

If there is a problem with a particular type of sample melting when placed on the freeze dry system, dilution of the sample with more water or providing some insulation around the flask to decrease the rate of heat absorption by the sample may help. If the eutectic temperature of the sample is -40 to -60°C , the freeze dry system selected for use must be equipped with

cascade type refrigeration so that the collector temperature can be cooled to below -75°C , or a dry ice/solvent trap can be used between the collector and the vacuum pump.

Samples Containing Volatile Substances

In certain cases the solvent in a sample to be freeze dried may contain volatile components such as acetic acid, formic acid or pyridine. In addition to these substances having an effect on the eutectic temperature, they may enhance the vapor pressure at the surface of the sample. Also, compared to water, they will require the absorption of less heat for sublimation to occur. Hence, freeze drying samples that contain volatile substances will have a greater tendency to melt, particularly when placed in flasks or exposed to room temperature. If a sample containing a volatile substance tends to melt when placed on a freeze dry system, dilution of the sample with more water will help keep the sample frozen. For example, a 0.2M solution of acetic acid is much easier to freeze dry than a 0.5M solution.

About This Manual

This manual is designed to help you learn how to install, use, and maintain your Freeze Dryer. Instructions for performing routine maintenance and making minor modifications to your Freeze Dryer are also included.

Chapter 1: Introduction provides a brief overview of the Freeze Dryer, explains the organization of the manual, and defines the typographical conventions used in the manual.

Chapter 2: Prerequisites explains what you need to do to prepare your site before you install your Freeze Dryer. Electrical requirements are discussed.

Chapter 3: Getting Started contains the information you need to properly unpack, inspect and install your Freeze Dryer.

Chapter 4: Using Your Freeze Dryer discusses the basic operation of your Freeze Dryer. Information on how to attach samples and run the Freeze Dryer is included.

Chapter 5: Maintaining Your Freeze Dryer explains how to perform routine maintenance on your Freeze Dryer.

Chapter 6: Using the Recorder Jack describes how to attach a recorder or computer for monitoring the operation.

Chapter 7: Troubleshooting contains a table of problems you may encounter while using your Freeze Dryer, including the probable causes of the problems, and suggested corrective actions.

Appendix A: Freeze Dryer Components contains labeled diagrams of the components of the Freeze Dryer.

Appendix B: Freeze Dryer Dimensions contains comprehensive diagrams showing the dimensions for the Freeze Dryer.

Appendix C: Freeze Dryer Specifications contains product specifications. A wiring diagram for the Freeze Dryer is also included.

Appendix D: Freeze Dryer Accessories lists the part numbers and descriptions of all of the accessories available for your Freeze Dryer.

Typographical Conventions

Recognizing the following typographical conventions will help you understand and use this manual:

- Book, chapter, and section titles are shown in italic type (e.g., *Chapter 3: Getting Started*).
- Steps required to perform a task are presented in a numbered format.
- Comments located in the margins provide suggestions, reminders, and references.
- Critical information is presented in boldface type in paragraphs that are preceded by the exclamation icon. Failure to comply with the information following an exclamation icon may result in injury to the user or permanent damage to your Freeze Dryer.
- Important information is presented in capitalized type in paragraphs that are preceded by the pointer icon. It is imperative that the information contained in these paragraphs be thoroughly read and understood by the user.



Your Next Step

If your Freeze Dryer needs to be installed, proceed to *Chapter 2: Prerequisites* to ensure your installation site meets all of the requirements. Then, go to *Chapter 3: Getting Started* for instructions on how to install your Freeze Dryer and make all of the necessary connections.

For information on the operational characteristics of your Freeze Dryer, go to *Chapter 4: Using Your Freeze Dryer*.

If your Freeze Dryer is installed and you need to perform routine maintenance on the Freeze Dryer, proceed to *Chapter 5: Maintaining Your Freeze Dryer*.

Refer to *Chapter 7: Troubleshooting* if you are experiencing problems with your Freeze Dryer.

CHAPTER 2

PREREQUISITES

Before you install your Freeze Dryer, you need to prepare your site for installation. Carefully examine the location where you intend to install your Freeze Dryer. You must be certain that the area is level and of solid construction. An electrical source must be located near the installation site.

Carefully read this chapter to learn:

- the electrical supply requirements.
- the vacuum pump requirements.

Refer to *Appendix C: Freeze Dryer Specifications* for complete Freeze Dryer electrical and environmental conditions, specifications and requirements.

Electrical Requirements

The Freeze Dryer requires a dedicated electrical outlet. This outlet requires a 20 Amp circuit breaker or fuse for models rated at 115V (60 Hz). An outlet equipped with a 10 Amp circuit breaker or fuse is required for models rated at 230V (50/60 Hz). 115V models are equipped with a 20 Amp NEMA 5-20P plug. 230V models are not equipped with a plug. It will be necessary to install a plug to match the available receptacle.

Location Requirements

The Freeze Dryer should be located in an area that provides an unobstructed flow of air around the cabinet. This air cools the refrigeration system. The refrigeration system draws air through the grill on the front panel and exhausts it through the back. A minimum of 3" must be allowed between the back of the Freeze Dryer and adjacent wall surfaces. Restriction of airflow during operation could adversely affect performance.

Vacuum Pump Requirements

A vacuum pump must be provided by the user. A vacuum pump with a displacement of 113 liters per minute and 0.2×10^{-3} mBar blank off pressure is adequate for most samples. The inlet fitting on the vacuum pump must be suitable for 3/4" ID vacuum hose, which is provided.

Vacuum pumps used with 115V models should be equipped with a 115V, 15 Amp NEMA 5-15P plug. Vacuum pumps used with 230V models should be equipped with a “reverse” IEC 320 plug (an IEC 320 plug is included with 230V models). This will allow the vacuum pump to be plugged into the receptacle on the back of the Freeze Dryer. See *Appendix D: Freeze Dryer Accessories* for vacuum pumps available from Labconco.

Space Requirements

Refer to *Appendix C: Freeze Dryer Specifications* for dimensional drawings of the Freeze Dryer.

Your Next Step

After you have determined that the location for your Freeze Dryer accommodates the installation and operational requirements, you are ready to unpack and install your Freeze Dryer. Proceed to *Chapter 3: Getting Started*.

CHAPTER 3

GETTING STARTED

Now that the site for your Freeze Dryer is properly prepared, you are ready to unpack, inspect, install and test your Freeze Dryer. Read this chapter to learn how to:

- unpack and move your Freeze Dryer.
- set up your Freeze Dryer.
- connect the electrical supply source to your Freeze Dryer.
- properly exhaust your Freeze Dryer.
- safely use solvents with your Freeze Dryer.



The Benchtop 4.5 Liter Freeze Dry System weighs over 122 lbs. (55 Kg) and the 4.5 Liter Console Freeze Dry System weighs over 180 lbs. (82 Kg). The carton allows for lifting with a mechanical lift truck or hand truck. If you must lift the Freeze Dryer manually, use at least two (2) persons and follow safe lifting guidelines.

Unpacking Your Freeze Dryer

The United States Interstate Commerce Commission rules require that claims be filed with the delivery carrier within fifteen (15) days of delivery.

Carefully unpack your Freeze Dryer and inspect it for damage that may have occurred in transit. If your Freeze Dryer is damaged, notify the delivery carrier immediately and retain the entire shipment intact for inspection by the carrier.



DO NOT RETURN GOODS WITHOUT THE PRIOR AUTHORIZATION OF LABCONCO. UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED.



IF YOUR FREEZE DRYER WAS DAMAGED IN TRANSIT, YOU MUST FILE A CLAIM DIRECTLY WITH THE FREIGHT CARRIER. LABCONCO CORPORATION AND ITS DEALERS ARE NOT RESPONSIBLE FOR SHIPPING DAMAGE.

Do not discard the carton or packing material for your Freeze Dryer until you have checked all of the components and installed and tested the Freeze Dryer.

Freeze Dryer Components

The 4.5 Liter Freeze Dry System is available as a benchtop or console, in 115V/60 Hz, 208-230V/60 Hz, and 220-240/50 Hz models. Locate the model of Freeze Dryer you received in the following table. Verify that the components listed are present and undamaged.

Catalog #	Product Description
7750000	Benchtop – 115V, 60 Hz
7750001	Benchtop – 220/240V, 50 Hz
7750003	Benchtop with PTFE-coated Chamber – 115V, 60 Hz
7750004	Benchtop – 208/230V, 60 Hz
7751000	Console – 115V, 60 Hz
7751001	Console – 220/240V, 50 Hz
7751003	Console with PTFE-coated Chamber – 115V, 60 Hz
7751004	Console – 208/230V, 60 Hz

Plus the Following:

Part #	Component Description
7519800	User's Manual
7688500	Lid Gasket
7730700	Lid
1336400	Power Cord – 115V or
1337300	Power Cord – 230V
7646000	Tubing
1967600	Clamps (2)
1291000	Plug, 230V, IEC 320 (230V Models only)

If you did not receive one or more of the components listed for your Freeze Dryer, or if any of the components are damaged, contact Labconco Corporation immediately for further instructions.

Setting Up Your Freeze Dryer

After you verify receipt of the proper components, move your Freeze Dryer to the location where you want to install it. Then, follow the steps listed below.

Component Orientation

The refrigeration system in the Freeze Dryer exhausts air through the rear of the cabinet. A minimum of 3" should be allowed between the back of the Freeze Dryer and the adjacent wall surface. Restriction of the airflow through the cabinet during operation could adversely affect performance.

Vacuum Pump Connection

A vacuum pump with a rated capacity of 113 liters per minute is required to operate your Freeze Dry System properly. The unit is provided with a 3/4" ID, heavy wall, vacuum hose for connecting the vacuum pump to the collector chamber on the unit.

Position the vacuum pump near the vacuum exhaust port on the rear of the benchtop cabinet. For console models, from the back of the unit, place the vacuum pump on the floor of the cabinet. Connect the vacuum pump power cord to the receptacle on the back of the cabinet. If the vacuum pump has an off/on switch, turn the switch on. The vacuum pump will be controlled by the Freeze Dryer. Connect the vacuum pump inlet port to the collector chamber with the vacuum hose and clamp provided. If necessary, cut the hose to proper length to allow for gentle bends without kinks.

Electrical Connection

Plug the power cord into the receptacle on the back of the Freeze Dryer and plug the other end into a suitable power receptacle.



Solvent Safety Precautions

Solvents used in the Freeze Dryer may be flammable or hazardous. Use extreme caution and keep sources of ignition away from the solvents.

When using flammable or hazardous solvents, the vacuum pump should be vented to or operated inside a fume hood.

Hazardous materials such as strong acids or bases, radioactive substances and volatile organics must be handled carefully and promptly cleaned up if spilled. If a sample is spilled in the collector chamber it must immediately be cleaned up.

Several components of the Freeze Dryer, which are located inside the chamber, are made of stainless steel which can be attacked by acids. Use of acids can result in degradation of the product and the vacuum pump.

Use care when using aggressive liquids which can damage the Freeze Dryer and thoroughly clean the Freeze Dryer after each use. Instructions for cleaning are in *Chapter 5: Maintaining Your Freeze Dryer*.

WARNING: The disposal of substances used in connection with this equipment may be governed by various Federal, State or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials in or upon water, land or air and to comply with such regulations.

Your Next Step

The installation and setup of your Freeze Dryer is now complete. To learn how to load and operate your Freeze Dryer, proceed to *Chapter 4: Using Your Freeze Dryer*. To perform additional diagnostics on your Freeze Dryer, proceed to *Chapter 7: Troubleshooting*. To learn about the maintenance requirements for your Freeze Dryer, proceed to *Chapter 5: Maintaining Your Freeze Dryer*.

CHAPTER 4

USING YOUR

FREEZE DRYER

After your Freeze Dryer has been installed as detailed in *Chapter 3: Getting Started*, you are ready to begin using your Freeze Dryer. Read this chapter to learn how to:

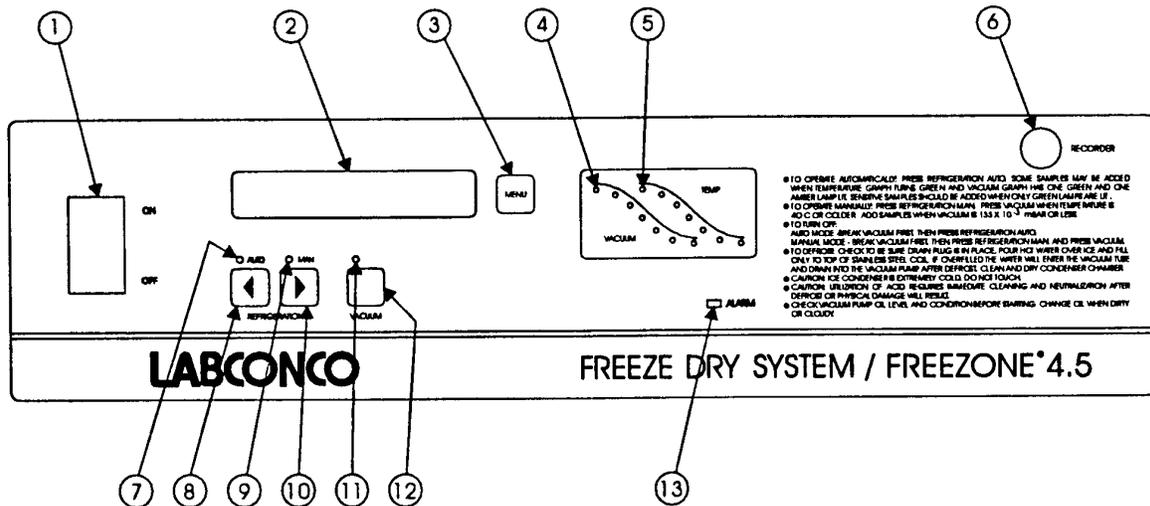
- operate the controls.
- understand the display.
- connect samples.



Do not use the Freeze Dryer in a manner not specified by the manufacturer (refer to *Appendix C: Freeze Dryer Specifications*). The electrical protection properties of the Freeze Dryer may be impaired if the Freeze Dryer is used inappropriately.

Freeze Dryer Controls

The control panel for the Freeze Dryer is shown below with a description about its function.



1. Main Power Switch – Turns the unit on or off.
2. LCD Display – Displays system parameters and alarm messages. Parameters displayed are system vacuum (10^{-3} mBar) and collector temperature ($^{\circ}\text{C}$). Displays type of alarm when an alarm has occurred.
3. Menu Switch – This switch is used to change the display from system parameters to alarm messages.
4. Vacuum Graph Display – This display indicates the relative system vacuum level. The highest LED indicates that the vacuum level is above 2000×10^{-3} mBar. The indicators will sequence down when the vacuum level reaches 2000, 1000, 800, 600, 450, 133×10^{-3} mBar. The lower green LED flashes when the system vacuum level is 450 to 133×10^{-3} mBar and illuminates steadily below 133×10^{-3} mBar.

5. Collector Temperature Graph Display – This display indicates the temperature of the collector. The highest LED indicates the collector temperature is warmer than 10°C. The indicators will sequence down when the temperature reaches 10, 0, -10, -20, -30 –40°C. When the collector temperature is –40°C or lower the green indicator will light.
6. Recorder Jack – This standard 8 pin DIN connector allows the user to monitor the system parameters with a remotely connected instrument. Signal outputs from this jack are 1) collector temperature, 2) vacuum level and 3) RS232 data stream.
7. Auto Mode Annunciator – When lit, the green LED indicates that the Freeze Dryer is in the Auto Mode. In this mode, the vacuum pump will start when the collector temperature reaches –40°C.
8. Auto Mode Switch – Used to start or stop the refrigeration and the Auto Mode process.
9. Manual Operation Annunciator – When lit, the green LED indicates the Freeze Dryer is being controlled manually by the operator. Each function must be started by the operator.
10. Manual Refrigeration Switch – Used to start only the refrigeration module.
11. Vacuum Annunciator – This green LED indicates that power is being supplied to the vacuum pump receptacle on the back of the unit.
12. Vacuum Switch – Used to start or stop the vacuum pump manually.
13. Alarm Annunciator – This red LED indicates that a system Alarm has occurred. Depress the Menu Switch to display the alarm message on the LCD display.

Operation Checklist

The following checklist should be followed prior to each use of your Freeze Dryer:

1. Wipe the interior of the collector chamber with a soft cloth or paper towel to remove any accumulated moisture.
2. Check the collector chamber drain hose to insure that the hose is free of moisture and that the drain plug is securely installed.
3. Using a soft, lint-free cloth or paper towel, wipe the collector chamber lid gasket to remove any dirt and contaminants that could cause a vacuum leak. Vacuum grease is not required on the lid gasket to obtain a proper vacuum seal.
4. Inspect each sample valve and check for any visible damage and for improper installation that might cause a vacuum leak. Also check that each sample valve is closed or in the “vent” position.

Vacuum Pump Ballast Setting

Most vacuum pumps are equipped with a gas ballast mechanism. The freeze dry process requires high vacuum ($<133 \times 10^{-3}$ mBar or <100 microns). Therefore, it is recommended that the gas ballast be closed during the operation of the Freeze Dry System. If the gas ballast is left open for extended periods of operation, the oil can be pumped out the exhaust, causing the pump to fail.

Operating the Freeze Dryer

Automatic Start-Up

To run the Auto Mode press the panel switch labeled REFRIGERATION AUTO. The green annunciator above the switch will illuminate. This will start the refrigeration system. When the collector reaches -40°C the vacuum pump will start. The Temperature and Vacuum Graph will indicate collector temperature and system vacuum. The LCD display will show the actual temperature of the collector. When the vacuum in the system is above 2000×10^{-3} mBar the vacuum display will indicate "HI." At 2000×10^{-3} mBar and below, the display will show the actual vacuum.

When the system vacuum is between 450 and 133×10^{-3} mBar, the lower green vacuum graph LED will flash. When the system vacuum level is $<133 \times 10^{-3}$ mBar, the green LED will be lit steadily indicating that samples may be added.

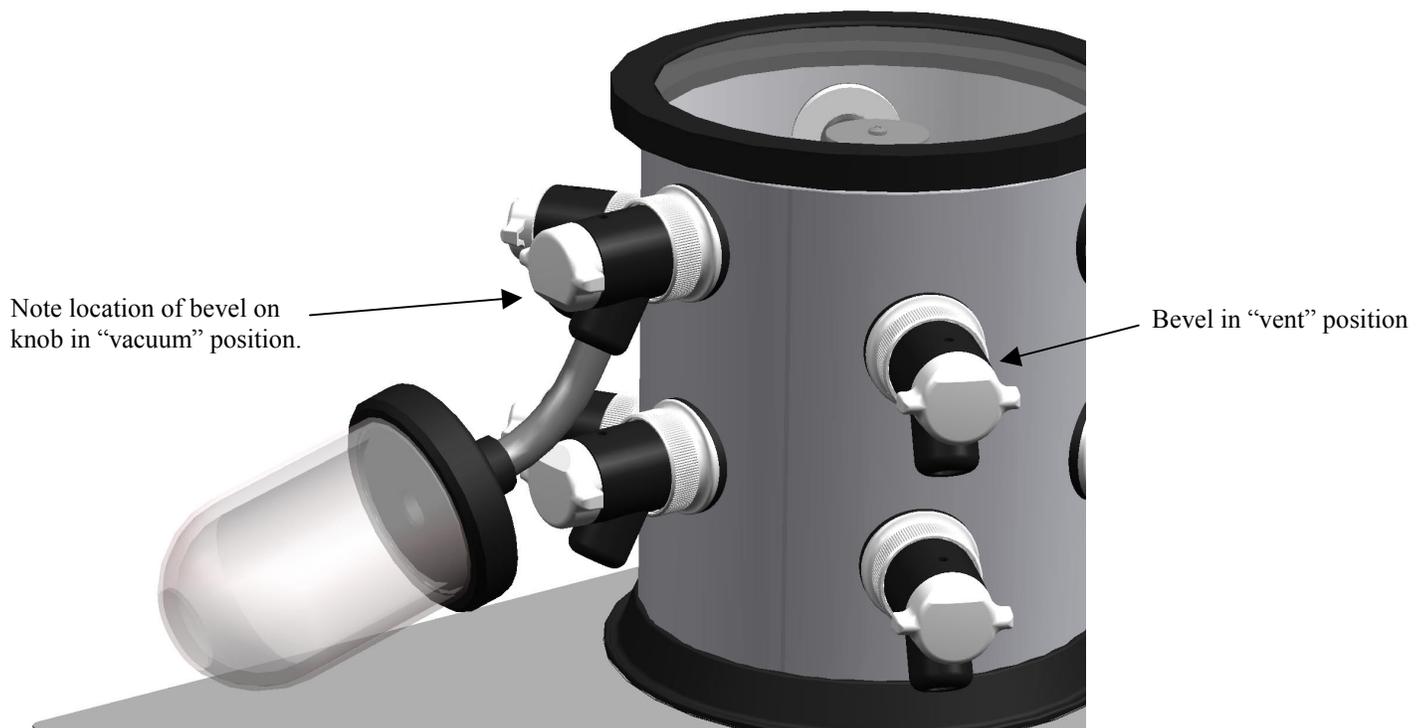
Manual Start-Up

To manually run the freeze dry process press the REFRIGERATION MAN switch. This will start the refrigeration system. The green LED above the switch will illuminate. When the collector temperature reaches -40°C , the vacuum pump may be started by pressing the VACUUM switch.

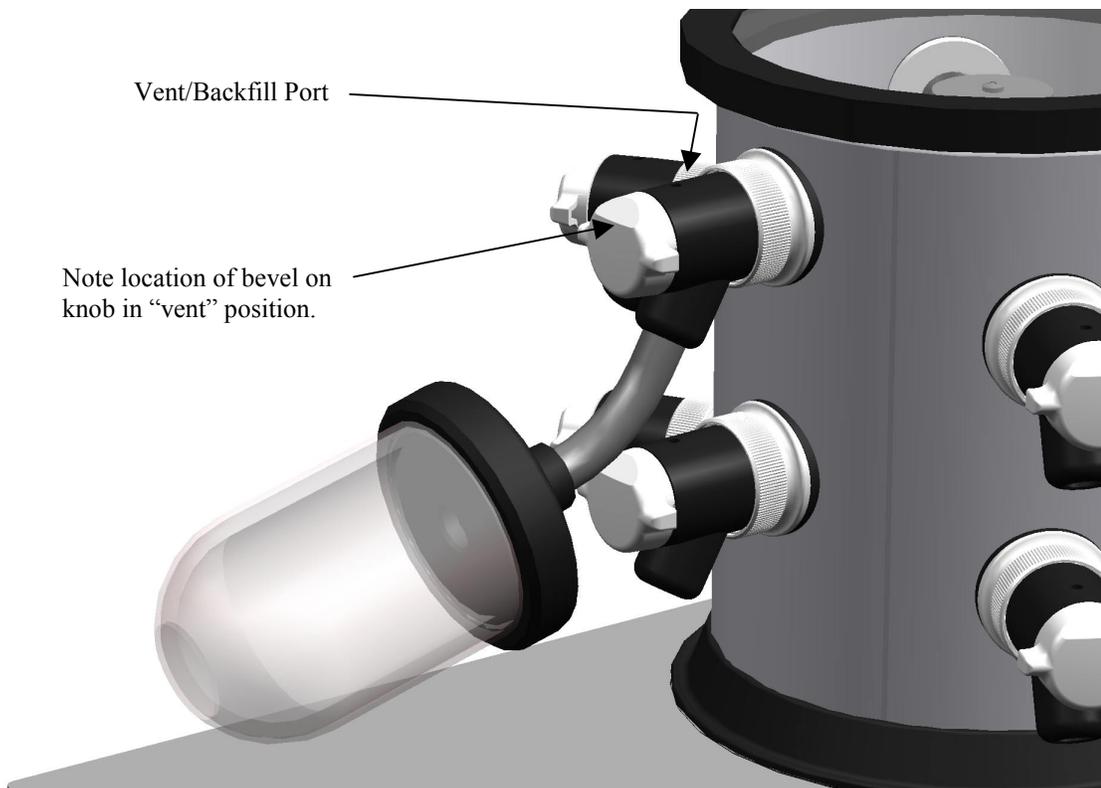
Adding Sample

The following procedure should be followed when freeze drying:

1. Pre-freeze samples. Appropriate containers for freeze drying include ampules, serum bottles, and wide mouth freeze drying flasks. Shell freezing of samples is recommended for wide mouth freeze drying flasks. Smaller samples in ampules and serum bottles may be frozen in a freezer. The sample container size should always be at least two to three times the sample size (i.e., 150 ml samples should be prepared in 300 ml containers or larger).
2. Connect a pre-frozen sample to a sample valve on the collection chamber using an adapter. After connecting a pre-frozen sample to a valve, turn the plastic valve knob to the "VACUUM" position to open the valve which connects the attached sample to system vacuum. The bevel on the knob should be positioned toward the sample port.



3. Before adding another sample, allow system vacuum to return to 133×10^{-3} mBar or lower. Any combination of valves and sample sizes may be utilized at one time provided that the system vacuum and collector temperature remain sufficiently low to prevent melting of the frozen sample.
4. When all the frost has disappeared from the outer surface of the sample container and no cold spots can be detected by handling the container, the sample is nearly dry. To be certain of low final moisture content, dry the sample for several hours past this point.
5. To remove a container after drying is complete, turn the plastic knob on the valve to the “VENT” position which closes the valve and vents the container. Should backfilling with an inert gas be required, simply connect the gas supply line to the vent port on the valve. The sample container may now be removed. In the vent position the bevel on the knob should point away from the sample port.



6. Ampules may be flame sealed while connected to a valve by using a sealing torch. Care must be taken not to burn the valve. An insulation material placed between the valve and the torch is recommended.

Alarms and Informational Messages

If any of the following events occur during the freeze dry process, the alarm LED will illuminate to notify the user.

1. **Power Interruption** – If power to the electrical control system is interrupted either by a power failure or by turning the main power switch off during a freeze dry process, the alarm will be set. When power is restored, the Freeze Dryer will continue to run and the alarm indicator will flash. The display will continue to show the operating parameters of the system. Press MENU to display the alarm “POWER FAIL.” Pressing MENU multiple times will identify other alarms if they have occurred. The alarm indicator can be cancelled by turning the REFRIGERATION switch off.
2. **Power Line Voltage Out of Range** – If the voltage to the Freeze Dryer drops or raises beyond a safe level, the alarm indicator will FLASH. Press MENU to display the alarm “LINE VOLTAGE ERROR.” Pressing MENU multiple times will identify other alarms if they have occurred. This alarm self cancels when proper voltage is restored.
3. **Temperature Out of Range** – If the temperature of the collector rises above -40°C , the alarm indicator will flash. Press MENU to display the alarm “COLLECTOR TEMPERATURE.” Pressing MENU multiple times will identify other alarms if they have occurred. The alarm indicator can be cancelled by turning the REFRIGERATION switch off.

- 4. Service Vacuum Pump** – The vacuum pump normally plugs into the vacuum pump receptacle on the back of the Freeze Dryer. When the Freeze Dryer has accumulated a total of 1000 operating hours, the alarm indicator will flash. Press MENU to display the alarm “CHANGE VACUUM PUMP OIL.” Pressing MENU multiple times will identify other alarms if they have occurred. This alarm can be cancelled by pressing MENU until the display says “NO ALARMS” and then pressing the VACUUM button and holding until the message disappears. This will reset the 1000 hour timer. **It may be necessary to service the vacuum pump more frequently than every 1000 hours depending on the operation of the freeze dryer.** The pump oil should be regularly monitored to verify that it is clean.

Shut Down

When a sufficient amount of condensate accumulates on the collector coil, the collected frozen solvent will obstruct the flow of vapor to the collector chamber. At this point the unit should be defrosted. First, release system vacuum by turning the plastic knob on a valve to the “vent”/open position or by pulling the collector chamber drain hose plug. Now turn the vacuum and refrigeration switches on the control panel to “off.” When operating in the automatic start-up mode, the vacuum automatically shuts off when the refrigeration switch is turned to “off.”

Defrosting

The following procedure should be followed when defrosting the collector coil:

1. Pull the collector chamber drain hose out from the front panel of the unit and remove the drain plug. Place the drain hose in a suitable container to collect the condensate that will melt off the collector coil.
2. Flush the collector chamber with water and wipe chamber dry.
3. If rapid defrost is desired, pour warm water over the collector coil. **Do not fill the chamber above the collector coil as water will enter the vacuum stand pipe and drain into the vacuum pump.**
4. Reinstall the drain hose plug and slide drain hose back into cabinet through the front panel. Dispose of the liquid appropriately.



Utilization of acid requires immediate cleaning and neutralization after defrost or physical damage to the collector chamber and collector coil will result.

Do not attempt to chip ice from the collector coil as damage may occur to the coil.

CHAPTER 5

MAINTAINING YOUR

FREEZE DRYER

Under normal operation, the Freeze Dryer requires little maintenance. The following maintenance schedule is recommended:

As needed:

1. Clean up all spills; remove liquids from the chamber.
2. Clean lid and gasket using soft cloth, sponge or chamois and a mild, non-abrasive soap or detergent.
3. Check oil level of the vacuum pump. It should be between MIN and MAX. If the oil level is less than an inch (25.4 mm) above MIN, add oil to proper level.
4. If oil shows cloudiness, particles or discoloration, drain the pump and replace with fresh oil.
5. Utilization of acids requires immediate cleaning and neutralization after a run or physical damage to the collector chamber and collector coil will result.
6. Check the collection chamber for condensed or frozen solvents and dispose of appropriately. Completely empty the collector chamber before the next run.

Monthly:

1. The rubber components on the Freeze Dryer may eventually deteriorate and require replacement. The effective life of rubber parts depends upon both their usage and the surrounding environment. Check all rubber hoses and gaskets and replace any that show signs of hardening, permanent set or deterioration.
2. Using a soft cloth, sponge or chamois and a mild, non-abrasive soap or detergent, clean the acrylic chamber lid.
3. Using a soft cloth, sponge, or chamois and a mild, non-abrasive soap or detergent, clean the exterior surfaces of the unit. Liquid spray cleaners and polishes may be used on the exterior surfaces. Do not use solvents to remove stains from the exterior surfaces as they may damage the finish.

Annually:

1. Every 12 months, or more often if the Freeze Dryer is operated in a dusty environment, the refrigeration system condenser should be cleaned. Using a vacuum cleaner with brush attachment, clean the condenser to ensure proper airflow for peak performance.

CHAPTER 6

USING THE RECORDER JACK

The operation of your Freeze Dryer can be monitored using either a recorder or a computer. Read this chapter to learn how to:

- connect a recorder to the Freeze Dryer.
- connect a computer to the Freeze Dryer.
- interpret the data received.

Recorder Jack Pin Configuration

The system vacuum and collector temperature can be recorded during operation by connecting an appropriate device to the recorder jack on the control panel. The recorder jack is a DIN 8 pin connector. The pin configuration is as follows:

Pin 1 – RS232 Transmit Data

Pin 2 – Blank

Pin 3 – Blank

Pin 4 – Analog Ground for Recorder/RS232

Pin 5 – System Vacuum

Output: 10×10^{-3} mBar = 0 VDC

1024×10^{-3} mBar = 1 VDC

Pin 6 – Collector Temperature

Output: -68°C = 0 VDC

$+32^{\circ}\text{C}$ = 1 VDC

Pin 7 – Blank

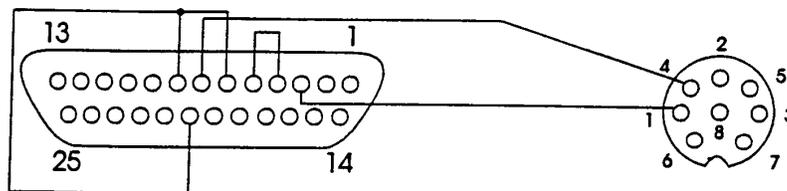
Pin 8 – Blank

Computer Connection

Connect the recorder jack on your freeze dryer to a communication port on your computer with a properly configured cable. If your computer is equipped with either a 25 pin D-sub male connector, or a 9 pin D-sub male connector for the communication port, refer to the following schematics for connection cable configuration.

Either of these cables can be purchased from Labconco as an accessory. The part numbers for these cables are listed with the following schematics and are also listed in *Appendix D: Freeze Dryer Accessories*.

Cable Configuration for 25 pin male connector (Labconco accessory cable part number 7534100)



View from back of computer

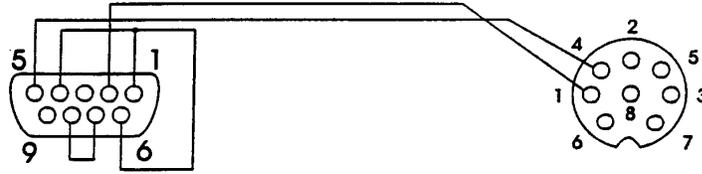
- 2-TX (Transmit Data)
- 3-RX (Receive Data)
- 4-RTS (Request to Send)
- 5-CTS (Clear to Send)
- 6-DSR (Data Set Ready)
- 7-GND (Signal Ground)
- 8-DCD (Data Carrier Detect)
- 20-DTR (Data Terminal Ready)

View from front of Labconco Freeze Dryer

- 1-TXD (Transmit Data)
- 4-AGND (Analog Ground)

Cable configuration for 9 pin male connector

(Labconco accessory cable part number 7534000)



View from back of computer

- 1-DCD (Data Carrier Detect)
- 2-RX (Receive Data)
- 4-DTR (Data Terminal Ready)
- 5-GND (Signal Ground)
- 6-DSR (Data Set Ready)
- 7-RTS (Request to Send)
- 8-CTS (Clear to Send)

View from front of Labconco Freeze Dryer

- 1-TXD (Transmit Data)
- 4-AGND (Analog Ground)

The purpose of the RS232 interface is to send data to a data collection computer to monitor the state and activity of the freeze dryer. This data is half duplex data. The data properties are as follows:

1. Data Rate 2400 Baud
2. 8 Bit word length
3. 1 Start bit, 1 Stop bit
4. No parity is transmitted
5. Standard ASCII character set

The format of the transmitted message is as follows:

BASE: <COLLCTR=-48 VAC=0018 RFG=ON VAC=ON>

COLLCTR = -48 – indicates the temperature of the collector in degrees Celsius.

VAC = 0018 – indicates the vacuum level of the system in mBar x 10⁻³.

RFG =ON – indicates the state of the refrigeration compressor.

VAC = ON – indicates the state of the vacuum pump.

There are several commercially available software packages which can read RS232 data and enter the data into a computer program such as a word processor (to create a text file) or spreadsheet (to tabulate and plot the data). Consult your laboratory supply catalog regarding the latest software available.

The following describes how to use an IBM compatible computer with Hyper Terminal™ software (included with Windows® 95, 98, 2000 operating systems) to collect the RS232 data from your freeze dryer:

1. Make sure that the Freeze Dryer is properly connected to the communication port on the computer.
2. Open Hyper Terminal™ software.

i) Windows® 95 or 98 use:
START/PROGRAMS/ACCESSORIES.

ii) Windows® 2000 use:
START/PROGRAMS/ACCESSORIES/COMMUNICATIONS

The first time Hyper Terminal™ is opened, a dialogue box requesting an area code and phone number will appear. Enter the appropriate numbers and continue.

3. The “Connection Description” dialogue box will open. Type in a user defined name and select an icon for the new connection. Press “OK.”



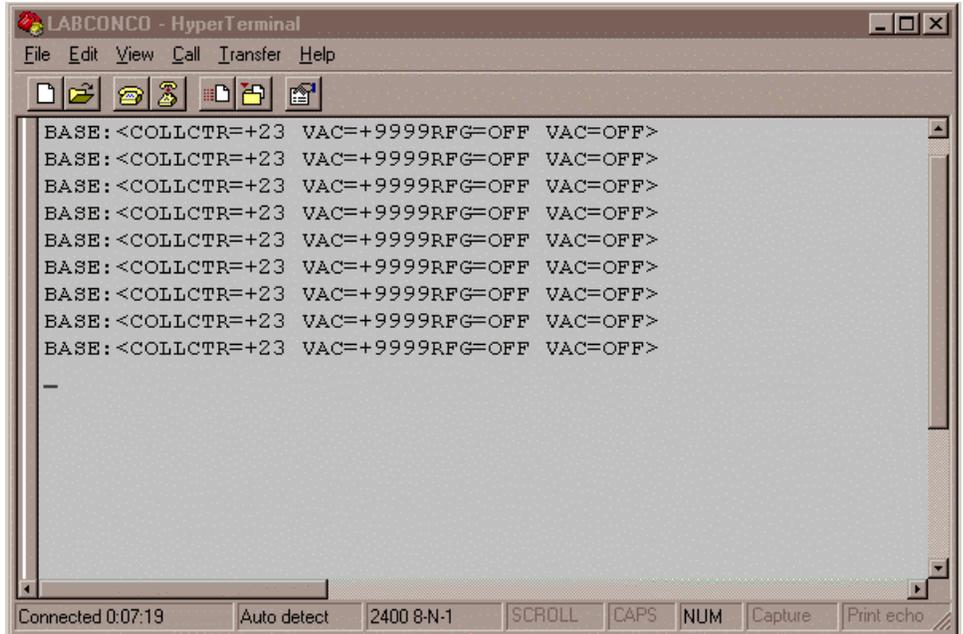
- The “Connect To” dialogue box will open. Using the down arrow selection button, select the communication port to which the cable has been connected. Press “OK.”



- The “Com X Properties” dialogue box will open. Enter the appropriate data properties and press “OK.”



6. When the Freeze Dryer main power switch is on, the data will be transmitted and updated every ten seconds.



CHAPTER 7

TROUBLESHOOTING

Refer to the following if your Freeze Dryer fails to operate properly. If the suggested corrective actions do not solve your problem, contact Labconco for additional assistance.

Labconco Freeze Dry Systems should reach a vacuum of 133×10^{-3} mBar within 10 minutes and should achieve an ultimate vacuum of 33×10^{-3} mBar within 18 hours. If the Freeze Dryer does not obtain a satisfactory vacuum, perform the following maintenance tests.

I. Vacuum Pump

First make sure that the vacuum pump operates. If it fails to operate check the electrical connections of the Freeze Dryer to the power source and then check the electrical connection of the vacuum pump to the Freeze Dryer. If the vacuum pump has a power switch, make sure that it is turned on. If the vacuum is not adequate when the vacuum pump is operating, proceed with the following steps:

1. Check the oil and ensure it is clear and clean. If the oil looks cloudy or has any particulates, replace the pump oil. Sometimes it may be necessary to flush the pump with clean oil several times. To flush the pump, run the pump 5 or 10 minutes to allow the oil to warm up.

Drain the oil and refill with clean oil. Repeat as necessary.

2. Check the oil level in the pump. Ensure it is filled to the correct level.
3. Check vacuum hose connections from the pump to the Freeze Dryer and try running the unit.

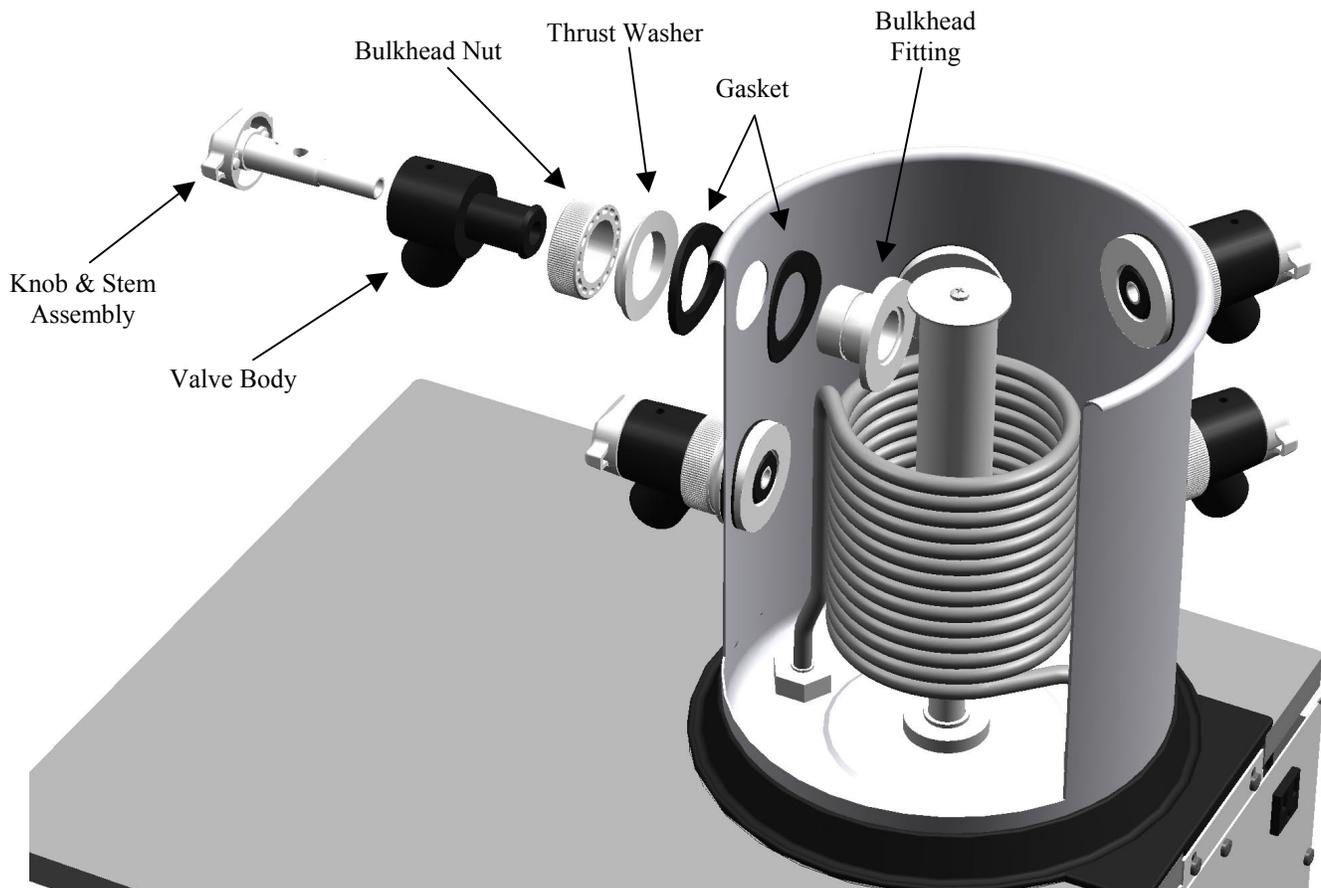
If vacuum problems continue, consider obtaining a second vacuum gauge capable of reading a vacuum of 10×10^{-3} mBar. It is often useful in determining if the vacuum pump is good and the vacuum sensor reading is accurate.

4. Isolate the pump by disconnecting the vacuum hose from the Freeze Dryer. Deadhead the pump by inserting the vacuum sensor from a secondary vacuum gauge into the end of the vacuum hose and observe the vacuum reading obtained. Confirm that the pump is capable of achieving an ultimate vacuum less than 10×10^{-3} mBar or approximately 10 microns. If an inadequate vacuum reading is obtained, the pump has most likely failed and may need to be replaced or rebuilt.

II. Gaskets, Tubing, Connections, Sample Valves

1. Inspect gasket(s) for cracks or defects. Ensure the gasket is clean. Apply a thin coat of vacuum grease to the gasket. Keep in mind, too much vacuum grease can actually cause leaks.
2. Check the drain line and ensure the drain plug is installed and the tube appears to be in good condition.
3. Check all rubber vacuum tubing for signs of deterioration or cracking.
4. Check all connections and make sure they are secure and leak tight.
5. Check all sample valves on the collection chamber and ensure all valves are closed or in the vent position. Check to ensure all fittings are tight and sealed properly against the chamber. Inspect valves for cracks or cuts.

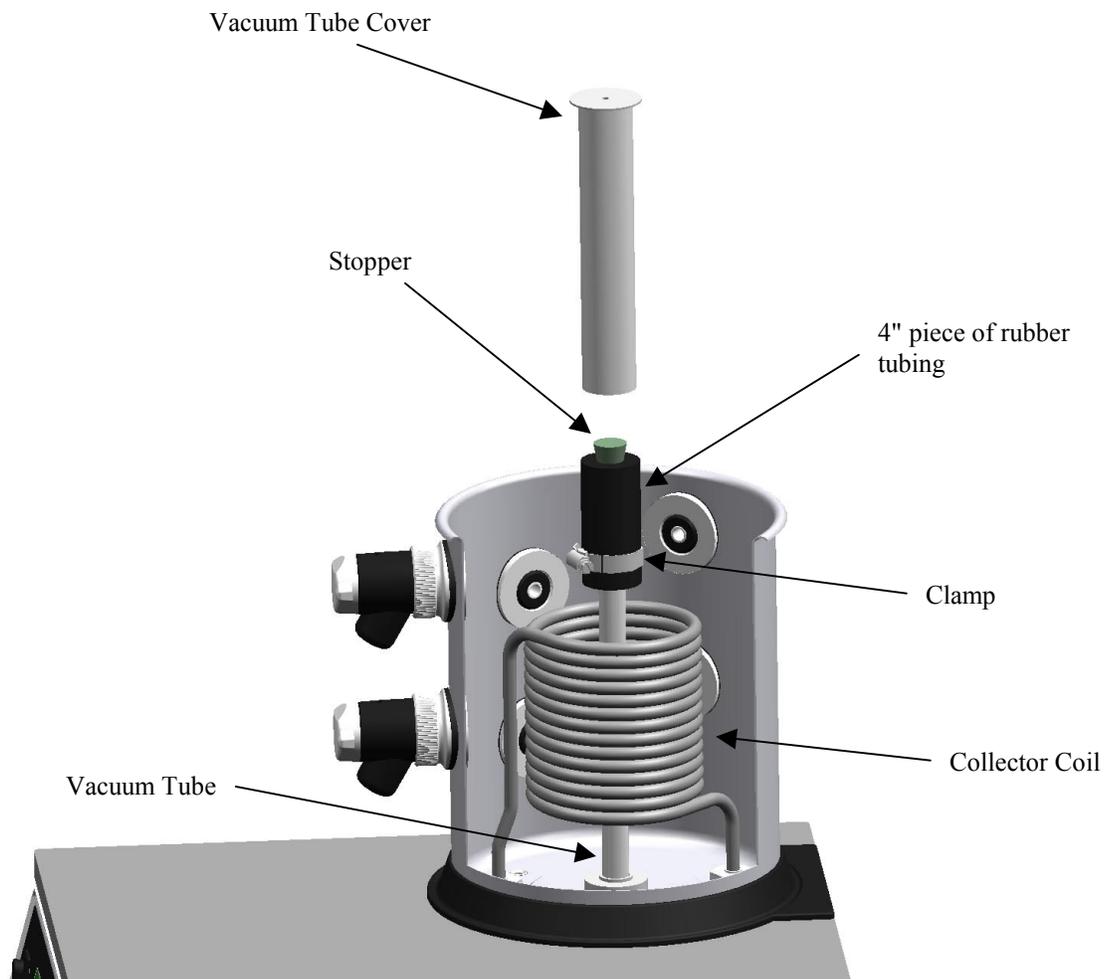
6. When checking the sample valves, pull as much vacuum as possible. If a vacuum indication is displayed, wiggle or rotate the valves and watch the gauge for any fluctuations. Fluctuations can indicate a potential vacuum leak. If the valve seems to be in good condition, remove the valve and apply vacuum grease and reinstall the valve. **DO NOT APPLY VACUUM GREASE TO THE GASKETS ON A COLLECTION CHAMBER SAMPLE VALVE.** If the valve still seems to be the source of the problem, remove the valve and stopper the hole with a rubber stopper. Continue checking the other valves.



III. System Components and Collection Chamber Isolation

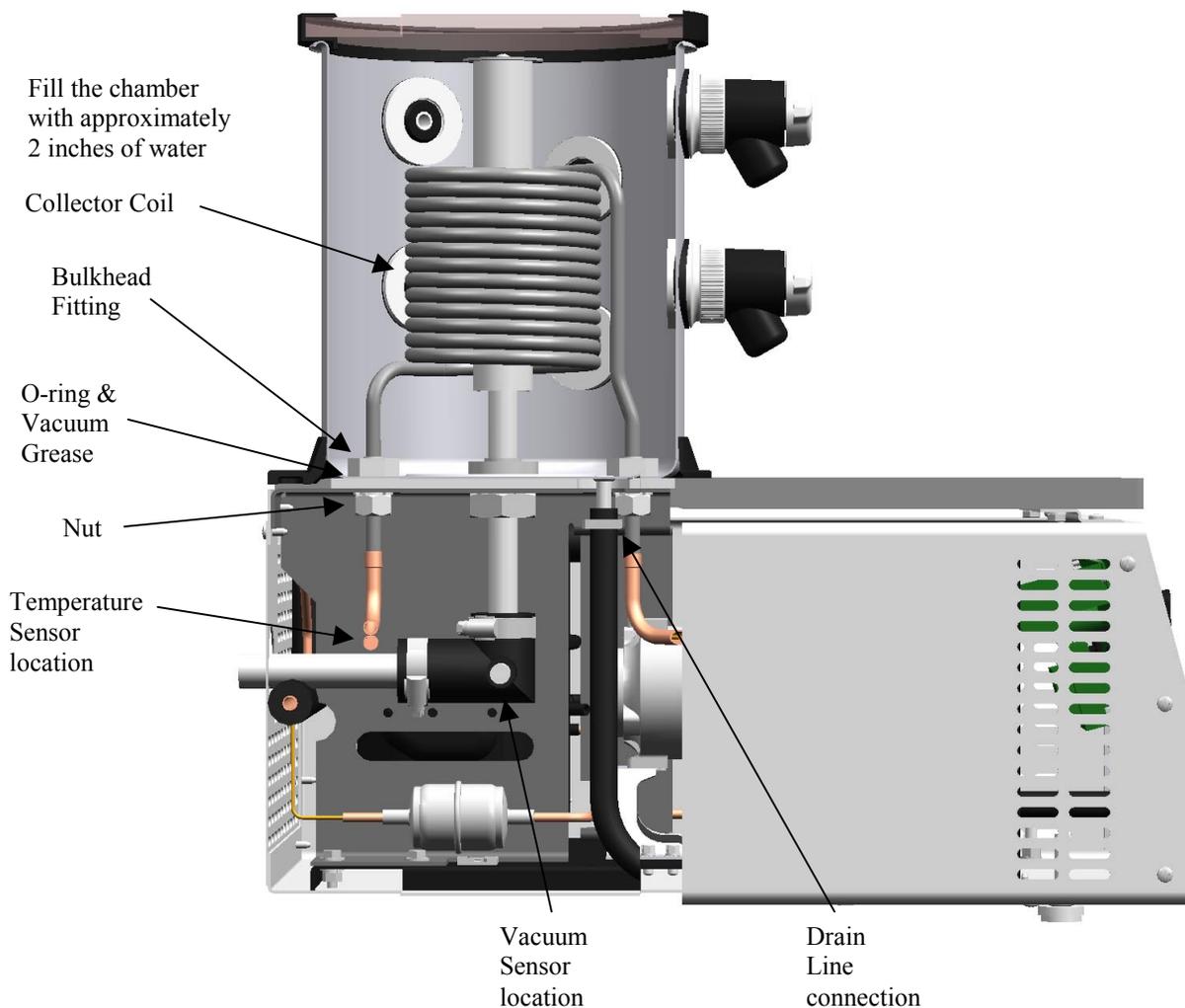
The next test allows you to check the pump and the connections from the pump to the vacuum tube.

1. Remove the screw from the center of the vacuum tube cover and slide the cover off.
2. Take a 3 or 4 inch piece of vacuum hose and place it over the vacuum tube. Stopper and clamp the vacuum hose to the tube. Restart the system and check your vacuum indication. Insufficient vacuum indicates a bad pump or a leak in the connections from the pump to the bottom of the chamber.



The next test is used to check the collection chamber integrity and connections.

1. Fill the collection chamber with approximately 2 inches of water, enough to cover all fittings in the bottom of the collection chamber. Replace the collection chamber lid and turn on the vacuum pump. Allow the vacuum pump to run for approximately 5 to 10 seconds. (If the vacuum pump is left on, the water will begin to boil and the test will not be correct.) Look inside the chamber for any bubbling while the pump is running and after you shut the pump off.



2. If bubbling is observed around the bulkhead fittings, access the bottom of the chamber and remove the insulation. Tighten the appropriate fitting by placing a wrench on the fitting inside the chamber and use a second wrench to turn the nut on the bottom of the chamber. Be careful not to damage the collector coil or the brazed joints to the refrigeration system. Once the fitting is tightened, perform the test again. Should the bubbling still be present, loosen the bulkhead fittings and apply vacuum grease to the O-rings, then reassemble and test.
3. If bubbling was observed on the chamber surface, the chamber must be replaced. This type of leak cannot be successfully repaired. The leading cause of a chamber surface leak is corrosive residue left in the chamber after use.

Refrigeration Module Operation

Under a no-load condition, the FreeZone 4.5 Liter Freeze Dry System can achieve a collector temperature of -40°C or lower, depending on ambient temperature and humidity. If the collector temperature does not reach -40°C within 20 minutes, then the refrigeration module is not functioning properly.

If any repairs are required on the refrigeration module, contact your local laboratory supply dealer. If your laboratory supply dealer is unable to provide assistance, please call Labconco. Repairs should only be undertaken by a competent refrigeration technician or through an authorized Labconco service agency.

APPENDIX A

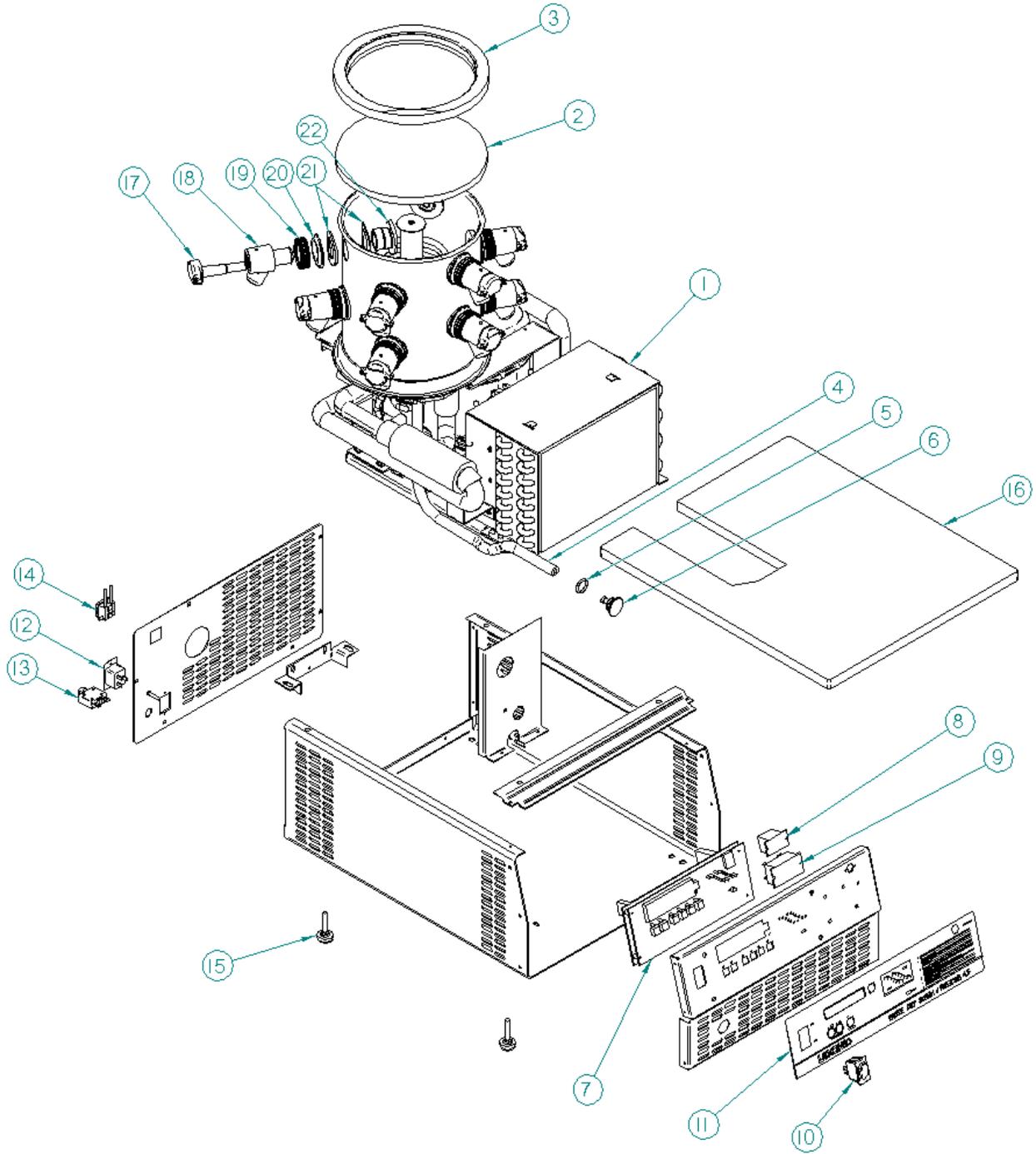
FREEZE DRYER

COMPONENTS

The following pages list components that are available for your Freeze Dryer. The parts shown are the most common replacement parts. If other parts are required, contact Product Service.

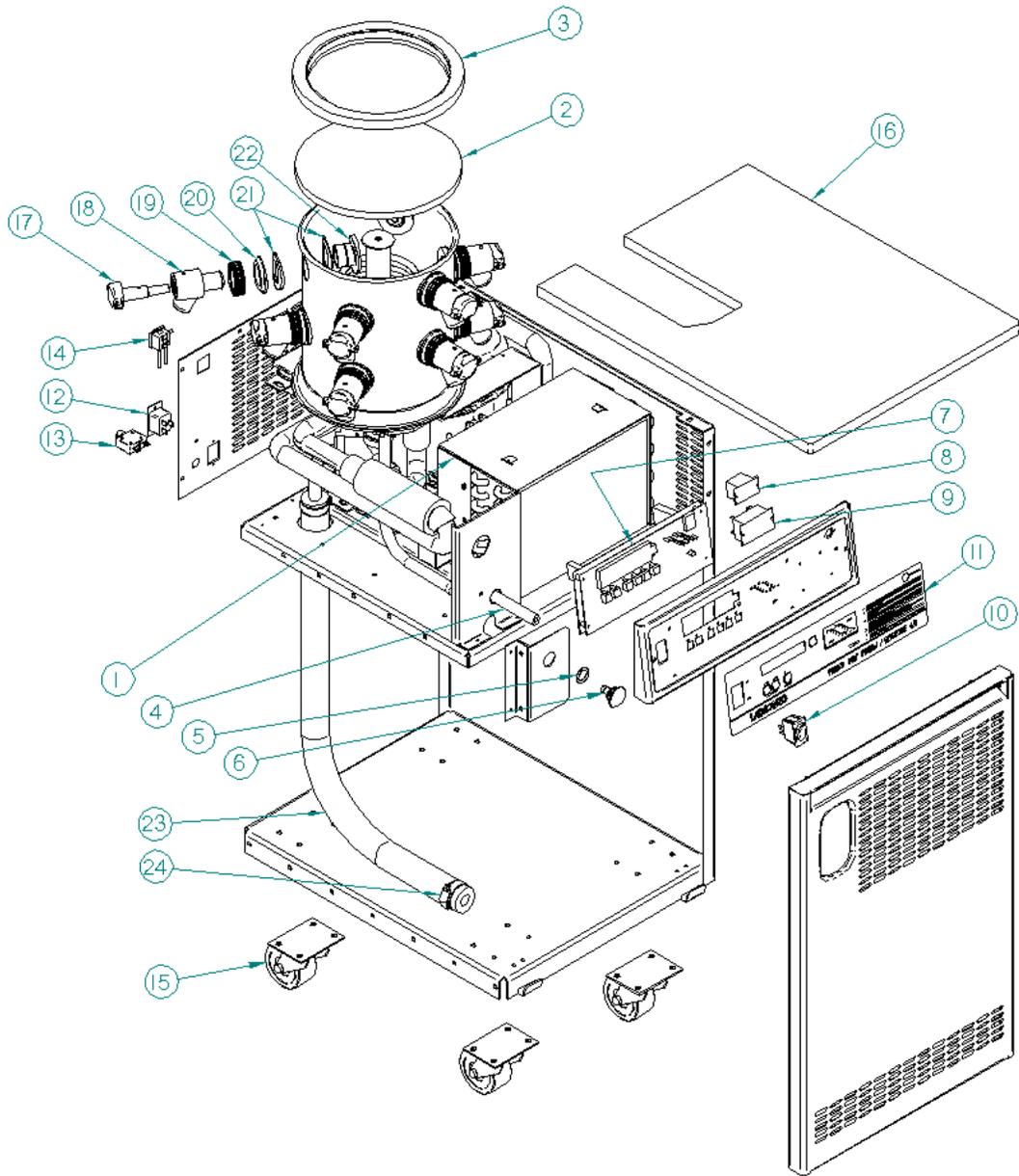
77500 SERIES FREEZONE 4.5 LITER BENCHTOP

Item	Quantity	Part No.	Description
1	1	7525300	Condensing Module 115V, 60 Hz
1A	1	7525301	Condensing Module 115V, 60 Hz, PTFE-coated
1B	1	7525302	Condensing Module 220/240V, 50 Hz
1C	1	7525303	Condensing Module 208/230V, 60 Hz
2	1	7730700	Lid
3	1	7688500	Lid Gasket
4	1	7624100	Drain Hose
5	1	1643600	O-Ring
6	1	7728000	Drain Plug
7	1	7515500	PC Board
8	1	1289200	Relay, Refrigeration
9	1	1289100	Relay, Vacuum
10	1	1302300	Switch
11	1	7518800	Control Panel Label
12	1	1229300	Power Inlet Connector
13	1	1289320	Circuit Breaker, 20 Amp, 115V
13A	2	1289312	Circuit Breaker, 12 Amp, 230V
14	1	7907802	Vacuum Pump Receptacle, 115V
14A	1	1290900	Vacuum Pump Receptacle, 230V
15	4	1879800	Glide
16	1	7739700	Cabinet Top
17	10	7508600	Knob & Stem Assembly
18	10	7505600	Valve Body
19	10	7505300	Bulkhead Nut
20	10	7505400	Thrust Washer
21	20	7505800	Gasket
22	10	7505500	Bulkhead Fitting
23	1	1336400	Power Cord, 115V (Not Shown)
23A	1	1337300	Power Cord, 230V (Not Shown)
24	1	7646000	Vacuum Hose (Not Shown)
25	2	1967600	Clamp (Not Shown)
26	1	7515200	Vacuum Sensor (Not Shown)
27	1	7515300	Temperature Sensor (Not Shown)



77510 SERIES FREEZONE 4.5 LITER CONSOLE

Item	Quantity	Part No.	Description
1	1	7525300	Condensing Module 115V, 60 Hz
1A	1	7525301	Condensing Module 115V, 60 Hz, PTFE-coated
1B	1	7525302	Condensing Module 220/240V, 50 Hz
1C	1	7525303	Condensing Module 208/230V, 60 Hz
2	1	7730700	Lid
3	1	7688500	Lid Gasket
4	1	7624100	Drain Hose
5	1	1643600	O-Ring
6	1	7728000	Drain Plug
7	1	7515500	PC Board
8	1	1289200	Relay, Refrigeration
9	1	1289100	Relay, Vacuum
10	1	1302300	Switch
11	1	7518900	Control Panel Label
12	1	1229300	Power Inlet Connector
13	1	1289320	Circuit Breaker, 20 Amp, 115V
13A	2	1289312	Circuit Breaker, 12 Amp, 230V
14	1	7907802	Vacuum Pump Receptacle, 115V
14A	1	1290900	Vacuum Pump Receptacle, 230V
15	4	1941400	Caster
16	1	7733200	Cabinet Top
17	10	7508600	Valve & Stem Assembly
18	10	7505600	Valve Body
19	10	7505300	Bulkhead Nut
20	10	7505400	Thrust Washer
21	20	7505800	Gasket
22	10	7505500	Bulkhead Fitting
23	1	7646000	Vacuum Hose
24	2	1967600	Clamp
25	1	1336400	Power Cord, 115V (Not Shown)
25A	1	1337300	Power Cord, 230V (Not Shown)
26	1	7515200	Vacuum Sensor (Not Shown)
27	1	7515300	Temperature Sensor (Not Shown)

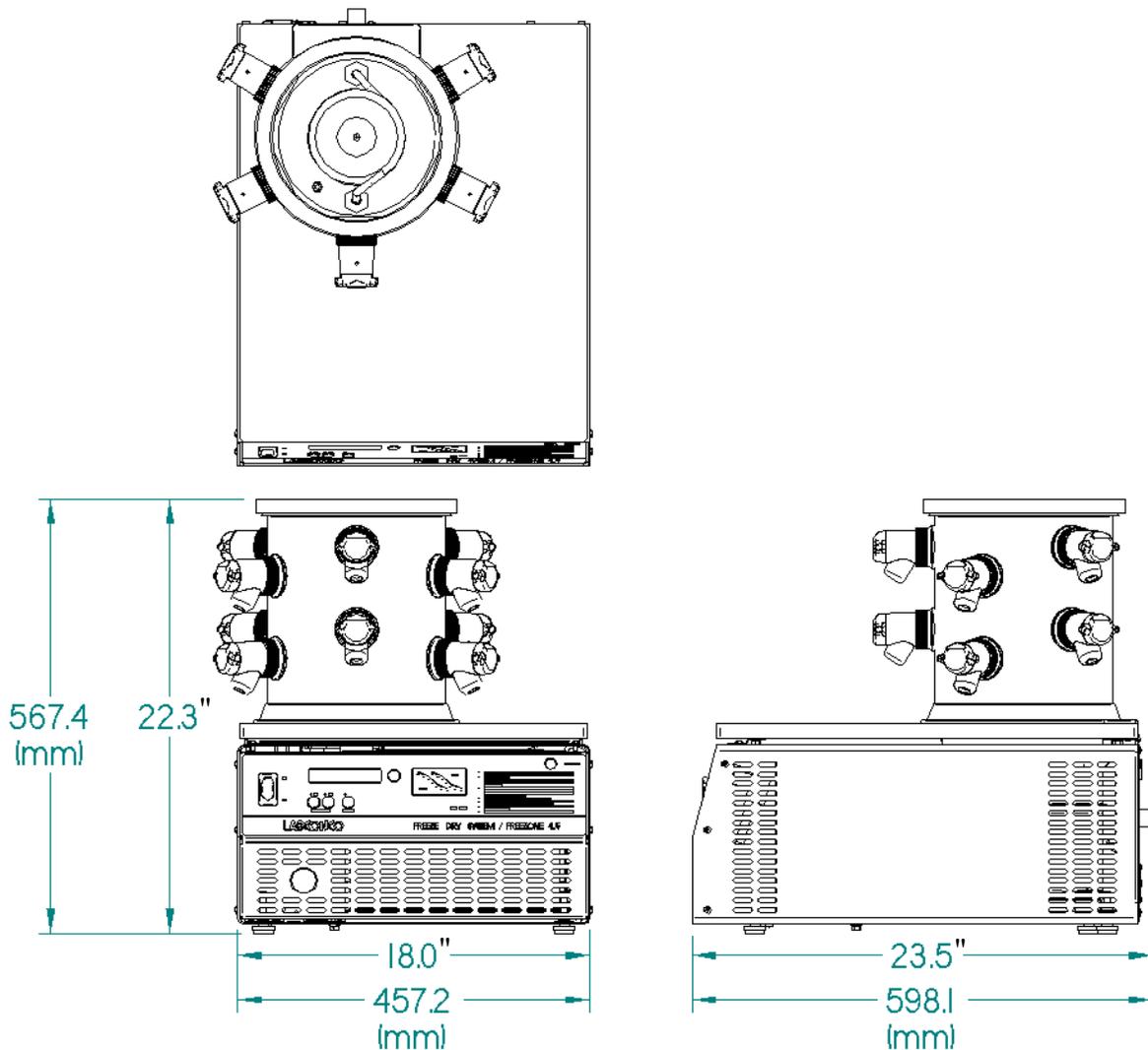


APPENDIX B

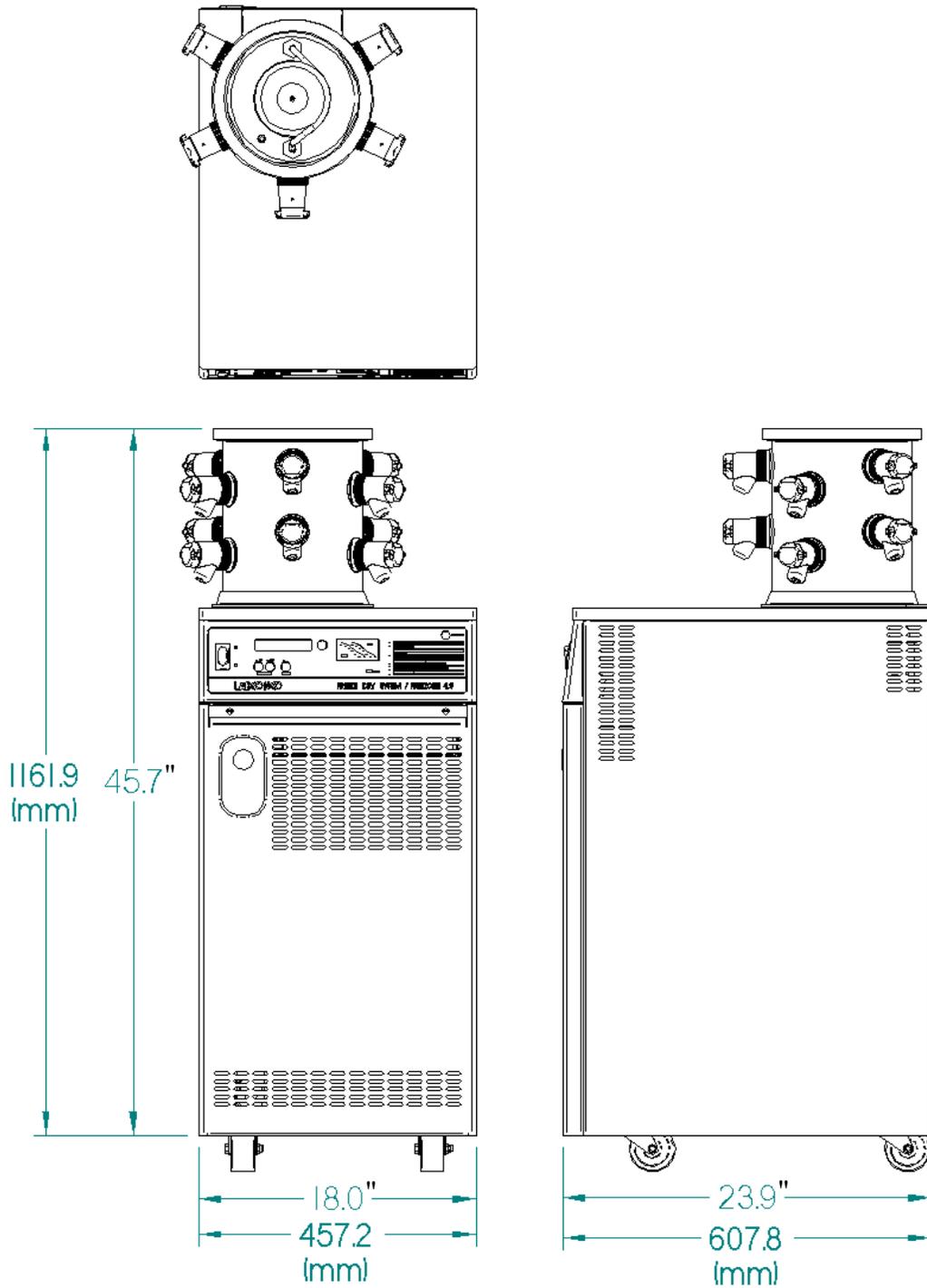
FREEZE DRYER

DIMENSIONS

77500 SERIES FREEZONE 4.5 LITER BENCHTOP



77510 SERIES FREEZONE 4.5 LITER CONSOLE



APPENDIX C

FREEZE DRYER

SPECIFICATIONS

This Appendix contains technical information about the Freeze Dryer including specifications, environmental operating conditions and wiring diagrams.

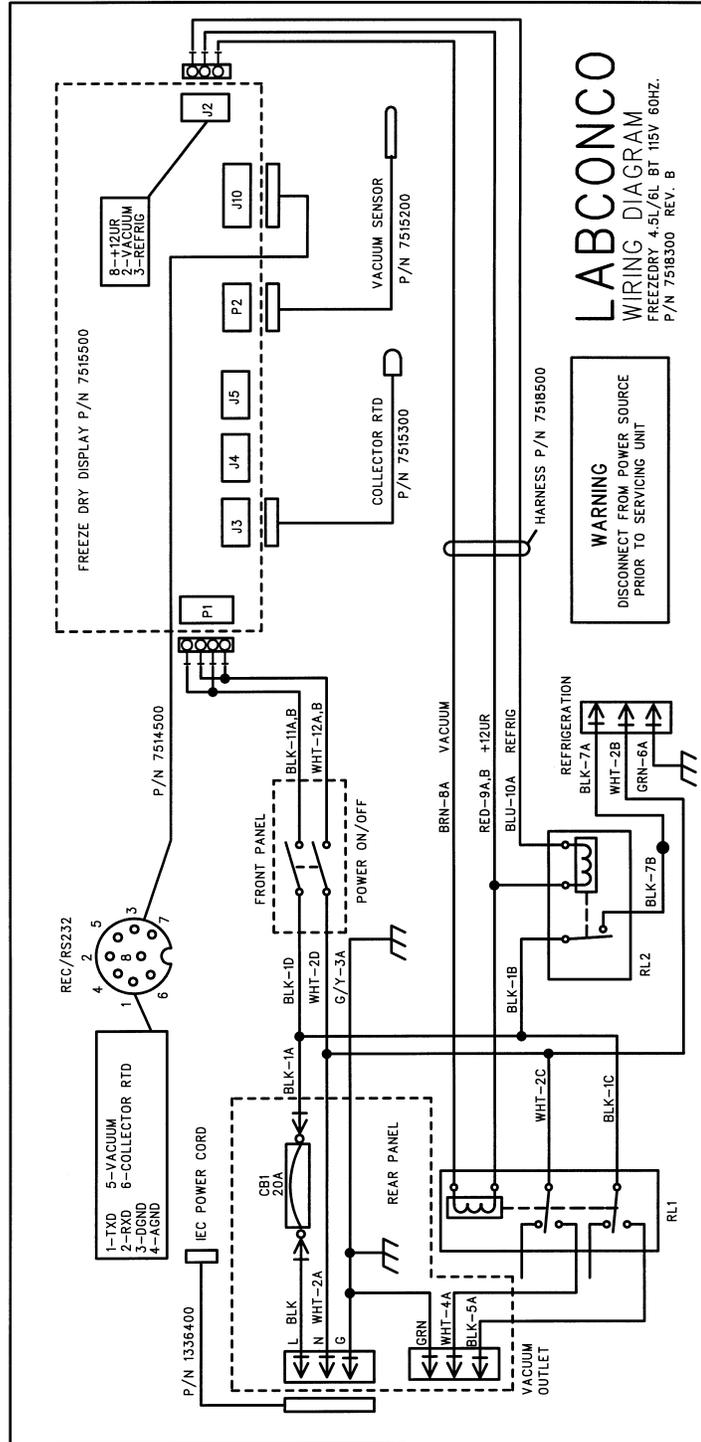
Electrical Specifications

- Nominal Voltage:
Models 7750000, 7750003, 7751000, 7751003 – 115 Volt
Models 7750001, 7751001 – 220/240 Volt
Models 7750004, 7751004 – 208/230 Volt
- Nominal amperage (excluding vacuum pump):
Models 7750000, 7750003, 7751000, 7751003 – 7.0 Amps
Models 7750001, 7750004, 7751001, 7751004 – 3.5 Amps
- Frequency:
Models 7750000, 7750003, 7750004, 7751000, 7751003, 7751004 – 60 Hz
Models 7750001, 7751001 – 50 Hz
- Phase:
All Models – Single

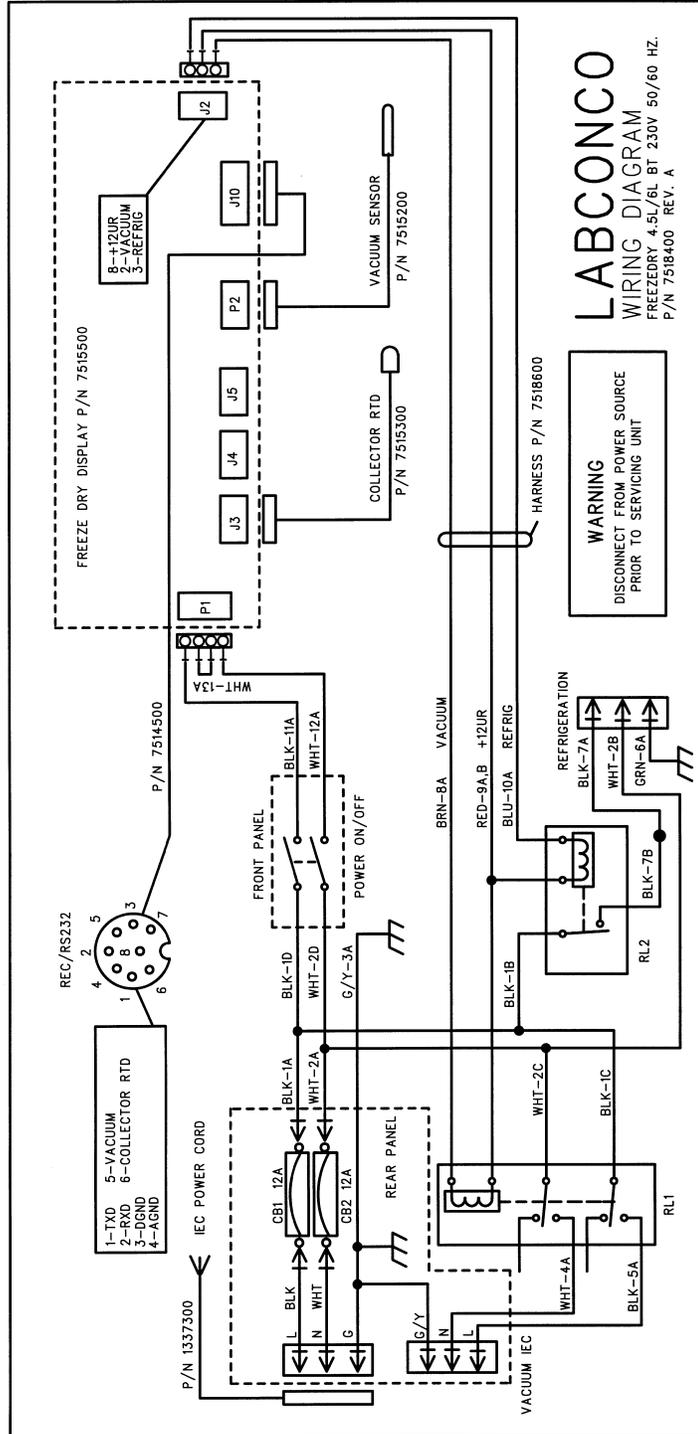
Environmental Conditions

- Indoor use only.
- Maximum altitude: 6562 feet (2000 meters).
- 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 overvoltages according to Installation Categories II (Overvoltage 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.

Wiring Diagram (115V, 60 Hz Models)



Wiring Diagram (230V, 50 or 60 Hz Models)



APPENDIX D

FREEZE DRYER

ACCESSORIES

The following accessories are available for the Freeze Dryer.

PART #	DESCRIPTION
1467700	Vacuum Pump Two stage direct drive pump, 195 liters/minute. 115 VAC, 50/60 Hz, single phase, 7.8 amps. Includes Pump Exhaust Filter 1473400.
7739403	Vacuum Pump Two stage direct drive pump, 195 liters/minute. 230 VAC, 50/60 Hz, single phase, 4.0 amps with reverse IEC plug. Includes Pump Exhaust Filter 1473400.
1472100	Vacuum Pump Two stage direct drive pump, 117 liters/minute. 115 VAC, 50/60 Hz, single phase, 4.6 amps. Includes Pump Exhaust Filter 1473400.
7739402	Vacuum Pump Two stage direct drive pump, 117 liters/minute. 230 VAC, 50/60 Hz, single phase, 2.4 amps with reverse IEC plug. Includes Pump Exhaust Filter 1473400.

PART #	DESCRIPTION
1472200	Pump Inlet Filter Disposable filter that prevents oil back streaming and protects vacuum pump from submicron particles.
1473400	Pump Exhaust Filter Disposable filter that removes visible oil mist and odor from vacuum pump exhaust. Included with Labconco direct drive rotary vane pumps.
1473200	Replacement Element, Oil Mist, Pump Exhaust Filter
1473300	Replacement Element, Odor, Pump Exhaust Filter, package of 5
1988000	Vacuum Pump Oil, 1 Liter
7772000	Soda Acid Trap Secondary trap that prevents migration of corrosive chemicals into vacuum pump.
7772100	Replacement Media for Soda Acid Trap
7772500	Carbon Solvent Trap Secondary trap that prevents migration of organic solvents into vacuum pump.
7772600	Replacement Activated Carbon Media for Charcoal Solvent Trap
7538000	Secondary Vacuum Trap 9 3/4" high x 7 7/8" diameter, 304 stainless steel with 3/4" vacuum connections. For use with dry ice and solvent.

PART #	DESCRIPTION
7538200	Secondary Vacuum Trap 9 ¾" high x 7 7/8" diameter, 304 stainless steel with ½" vacuum connections. For use with dry ice and solvent.
7538400	Secondary Vacuum Trap 7 7/8" high x 6 5/8" diameter, 304 stainless steel with ½" vacuum connections. For use with dry ice and solvent.
7522800*	12 Port Chamber 9 ¾" high x 7 7/8" diameter, 304 stainless steel with 12 freeze dry valves.
7522900*	16 Port Chamber 13" high x 138" diameter, 304 stainless steel with 16 freeze dry valves.
7867000*	Clear Drying Chamber 13" high x 13" diameter clear acrylic chamber with clear acrylic end caps.
7521000*	Heated Drying Chamber 10 ½" high x 9" diameter type 304 stainless steel. The 3 shelf product heaters heat to 43°C (110°F). 115V
7521001*	Heated Drying Chamber 10 ½" high x 9" diameter type 304 stainless steel. The 3 shelf product heaters heat to 43°C (110°F). 230V
7509200*	Product Heater For use in chamber 7522800. Provides 3 heated shelves operating at 43°C (110°F). 115V

* Requires Accessory Port Lid 77628-00

PART #	DESCRIPTION
7509201*	Product Heater For use in chamber 7522800. Provides 3 heated shelves operating at 43°C (110°F). 230V
7509300*	Product Heater For use in chamber 7522900. Provides 3 heated shelves operating at 43°C (110°F). 115V
7509301*	Product Heater For use in chamber 7522900. Provides 3 heated shelves operating at 43°C (110°F). 230V
7509400*	Product Heater with Variable Heat For use in chamber 7522900. Provides variable heat up to 43°C (110°F). 115V
7509401*	Product Heater with Variable Heat For use in chamber 7522900. Provides variable heat up to 43°C (110°F). 230V
7522300*	20 Port Manifold 10" high x 27 ½" wide x 8 5/8" deep. Type 304 stainless steel manifold with 20 freeze dry valves.
7868500*	48 Port Ampule Manifold 28 5/8" high x 5" wide x 5" deep. Type 304 stainless steel with 48 each ¼" tube stems.
7762800	Attachment Port Lid Lid has 3" diameter opening to permit the use of a chamber or manifold atop the FreeZone 4.5 Liter Freeze Dry System.

*Requires Accessory Port Lid 7762800

PART #	DESCRIPTION
7750200	Wire Shelf Racks, Pair Racks easily attach without tools to the sides of the 4.5 Liter cabinet to provide additional support for glassware attached to the collection chamber.
7509600	Sample Valve Kit Includes Neoprene valve body, knob and installation parts.
7534000	Cable Connects the RS 232 output from the Freeze Dryer (or Freeze Dryer/Tray Dryer combination) to an IBM compatible computer with a 9-pin serial data port.
7534100	Cable Connects the RS 232 output from the Freeze Dryer (or Freeze Dryer/Tray Dryer combination) to an IBM compatible computer with a 25-pin serial data port.

Fast-Freeze® Flasks



Fast-Freeze Flasks are specially designed to be easier to handle, faster to load and more convenient to use than other freeze dry glassware now in your laboratory. Compatible with all major brands of laboratory freeze dry equipment, Fast-Freeze Flasks eliminate the risk of contamination from vacuum grease, reduce spillage of valuable samples and require no washers, gaskets or retainers.

How to select Fast-Freeze Flasks for your Freeze Dry System

Select Fast-Freeze Flasks based on your sample sizes. Flasks should be filled no more than one-third of their volume so that maximum surface area is achieved and efficient lyophilization is assured. A complete Fast-Freeze Flask includes a rubber top, glass bottom and a supply of filter paper. Tops, bottoms and filter paper are available separately as replacement components. Adapters are required to attach flasks to freeze dry valve ports.

Flask Size	Complete Flask	Flask Bottom	Flask Top	Flask Top Adapter Diameter*	Dimensions/Flask Bottom H x D
40 ml	7540000	7542000	7544000	1/2"	76 mm x 34 mm
80 ml	7540200	7542200	7544000	1/2"	115 mm x 34 mm
120 ml	7540300	7542300	75442-00	3/4"	68 mm x 59.2 mm
150 ml	7540400	7542400	7544200	3/4"	85 mm x 59.2 mm
300 ml	7540600	7542600	7544200	3/4"	145 mm x 59.2 mm
600 ml	7540800	7542800	7544400	3/4"	135 mm x 90.2 mm
900 ml	7540900	7542900	7544400	3/4"	190 mm x 90.2 mm
1200 ml	7541000	7543000	7544400	3/4"	240 mm x 90.2 mm
2000 ml	7541200	7543200	7544400	3/4"	380 mm x 90.2 mm

*Valves on the freeze dry systems, drying chambers and manifolds offered in this catalog fit adapters of both 1/2" and 3/4" sizes. Size information is provided for selecting adapters for older Labconco models and other freeze dryers.

Variety of adapters available. You may select from glass or stainless steel adapters, available straight or with 45° bend. (Required — order separately.)

Top seals easily. The flexible silicone rubber top snaps on and off easily, yet provides a reliable, high vacuum seal.

Only two pieces per flask. The complete Fast-Freeze Flask has only two components:

- a high strength borosilicate glass bottom to withstand extreme temperatures and high vacuum.
- a flexible, non-contaminating silicone rubber top.

No vacuum grease is necessary.

No threads, hooks or springs are needed.

Entire flask may be autoclaved.

Compatible with all major brands of laboratory freeze dry apparatus.

No complex filter retainer is necessary. For those who use filters, they are easily inserted between the adapter and top of the flask. One hundred filters are supplied with each flask.

Wide mouth opening loads fast, cleans easily.

Horizontal shell freezing. Flask may be placed in a horizontal position and rotated in a bath for shell freezing.

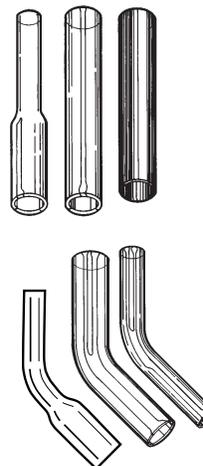
Available in nine convenient sizes.

Flat bottom reduces spills, provides better balance.

Adapters

Add the Adapters for connecting the Fast-Freeze Flasks to the valve ports on your drying chamber or manifold. Choose borosilicate glass or stainless steel adapters in 1/2" and 3/4" diameters.

Diameter	Straight Adapter	45° Bend Adapter
Borosilicate Glass		
1/2" flask top to 1/2" valve*	7545000	7545600
3/4" flask top to 3/4" valve*	7545200	7545800
1/2" flask top to 3/4" valve*	7545400	7546000
3/4" flask top to 1/2" valve*	7545400	7546000
Stainless Steel		
1/2" flask top to 1/2" valve*	7547000	7547400
3/4" flask top to 3/4" valve*	7547200	7547600



7544810 Replacement Filter Paper

1000 (10 packages of 100). 1" diameter (28mm). Pore size 17 microns. Shipping weight 0.5 lb.

Lyph-Lock® Flasks



Lyph-Lock Flasks simplify your lyophilization procedures because they have only three pieces per flask — a high strength borosilicate glass top and bottom with a silicone rubber ring seal. The unique wide-mouth design helps you load samples easily and lyophilize efficiently.

How to select Lyph-Lock Flasks for your Freeze Dry System

Select the Lyph-Lock Flasks based on your sample sizes. Flasks should be filled to no more than one-third of their volume so that maximum surface area is achieved and efficient lyophilization is ensured. A complete Lyph-Lock Flask includes a glass top and bottom and a rubber ring seal. Tops, bottoms and seals are available separately as replacement components. Adapters are required to attach flasks to freeze dry valve ports.

Flask Size	Complete Flask 19/38 STJ	Complete Flask 24/40 STJ	Flask Top 19/38 STJ	Flask Top 20/40 STJ	Lyph-Lock Seal	Flask Bottom	Dimensions Flask Bottom H x ID
25 ml	7550000	7554000	7552000	7556000	75590-00	75570-00	37 mm x 34 mm
50 ml	7550200	7554200	7552000	7556000	7559000	7557200	67 mm x 34 mm
100 ml	7550400	7554400	7552200	7556200	7559200	7557400	50 mm x 59.2 mm
250 ml	7550600	7554600	7552200	7556200	7559200	7557600	110 mm x 59.2 mm
500 ml	7550800	7554800	7552400	7556400	7559400	7557800	103 mm x 90.2 mm
750 ml	7550900	7554900	7552400	7556400	7559400	7557900	145 mm x 90.2 mm
1000 ml	7551000	7555000	7552400	7556400	7559400	7558000	187 mm x 90.2 mm

Borosilicate glass adapters with either 19/38 or 24/40 standard taper joints have 90° bend. (Required — order separately.)

Compatible with all major brands of laboratory freeze dry apparatus.

Only three pieces per flask — no hooks or springs. The complete Lyph-Lock Flask includes:

- a flask top of high strength borosilicate glass
- a flexible, non-contaminating silicone rubber seal
- a flask bottom of borosilicate glass to withstand extreme temperatures and high vacuum.

Silicone rubber seal grasps top and bottom. The flexible ring holds securely together during pre-freezing and lyophilization.

LABCONCO

Flat bottom reduces spills, provides better balance.

Available in seven convenient sizes.

Entire flask may be autoclaved.

Provides a high vacuum seal for efficient lyophilization.

Adapters

Add the Adapters for connecting the Lyph-Lock Flasks to the valve ports on your drying chamber or manifold.



90° Bend Adapter	Description
7568000	Connects 19/38 STJ Flask Top to 1/2" valve*
7568200	Connects 19/38 STJ Flask Top to 3/4" valve*
7568400	Connects 24/40 STJ Flask Top to 1/2" valve*
7568600	Connects 24/40 STJ Flask Top to 3/4" valve*

*Valves on the freeze dry systems, drying chambers and manifolds offered in this catalog fit adapters of both 1/2" and 3/4" sizes. Size information is provided for selecting adapters for older Labconco models and other freeze dryers.

Serum Bottles and Vials



Perfect for long term storage of freeze dried samples. Labconco Serum Bottles and Threaded Vials are specifically designed for lyophilization applications. Their uniform thin wall construction ensures even freezing and drying. Bottles and vials are ideal containers for use in the FreeZone Stoppering Tray Dryer. Serum bottles also connect to valve ports on drying chambers and manifolds.

Serum Bottles

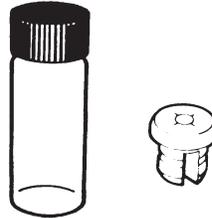
Serum Bottles, Stoppers and Seals are supplied in packages of 100.



Size	20 mm Corkage	13 mm Corkage	Split Stoppers	Aluminum Seals	Sleeve-Type Stoppers
2 ml		7575010	7576010	7577010	
3 ml		7575210	7576010	7577010	
5 ml	7573010		7576210	7577110	7577510
10 ml	7573210		7576210	7577110	7577510
20 ml	7573410		7576210	7577110	7577510
30 ml	7573610		7576210	7577110	7577510
50 ml	7573810		7576210	7577110	7577510
100 ml	7574010		7576210	7577110	7577510
125 ml	7574210		7576210	7577110	7577510

Threaded Vials

Stoppers and Threaded Vials with Screw Caps are supplied in packages of 200.



Size	Vials with Screw Caps	Stoppers
5 ml	7762300	7762200
10 ml	7762600	7762200

Accessories



Seal Crimper

Secures tear-away Aluminum Seals.

7578000 Seal Crimper for 13 mm corkage.

Shipping weight 3 lbs. (1.4 kg).

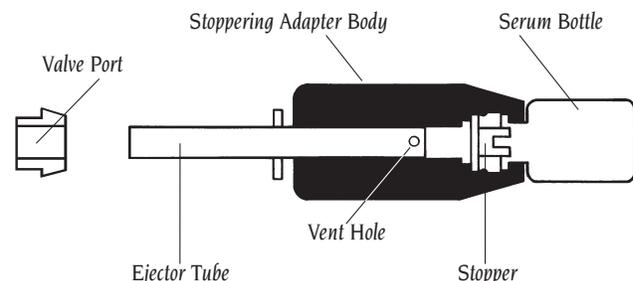
7578100 Seal Crimper for 20 mm corkage.

Shipping weight 3 lbs. (1.4 kg).

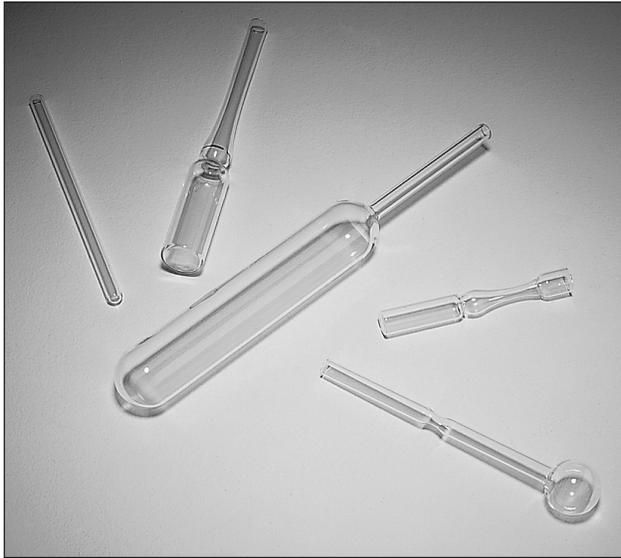
Vacuum Stoppering Adapter

7593000 Adapter connects to valve ports for manual stoppering of 20 mm corkage serum bottles under original vacuum. The stopper and serum bottle are inserted into the adapter body and lyophilization begins. After the process is completed, the researcher slides the stopper into position so when the valve is turned from vacuum to vent the serum bottle is tightly sealed by the stopper. The ejector tube is then used to force the serum bottle out of the adapter.

Shipping weight 1 lb. (0.4 kg).



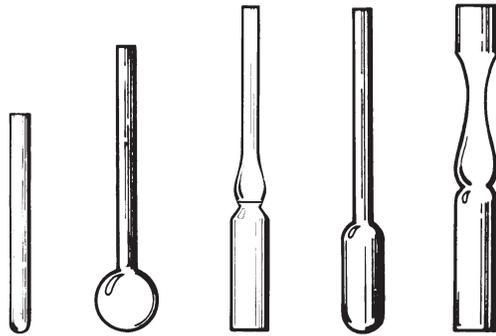
Ampules



Labconco Ampules are fabricated of highest quality borosilicate glass for strength and durability. They are available in five different configurations to provide the ideal ampule for your specific lyophilization requirements, from tray drying to flame sealing applications.

Ampules

Ampules are supplied in packages of 100.



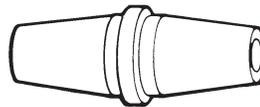
Size	Straight	Bulb-Type	Pre-Scored Flat Bottom	Round Bottom	Stoppering
1 ml	7572710	7570010	7570610		
2 ml			7570810		7572310
4 ml	7572810				
5 ml		7570210	7571010		
10 ml			7571210	7571610	
25 ml				7571810	
50 ml				7572010	

Accessories



Oxygen/Natural Gas Sealing Torch

7578500 Torch specifically designed for flame sealing freeze dry ampules. Seals all types of heat-resistant glass. Connects to natural gas, butane or propane and oxygen with 1/4" ID hose connectors. Shipping weight 3 lbs. (1.4 kg).



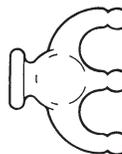
Ampule Valve Adapters

7593401 Adapter connects ampules to valve ports or stainless steel stems. Ten per package. Shipping weight 0.5 lb. (0.2 kg).



Stoppers

7572510 Stopper for Stoppering Ampules 75723-10. 100 per package. Shipping weight 3 lbs. (1.4 kg).



Trident Adapter

7762700 Three Way Adapter permits attachment of three ampules to a single valve port. Ampules are attached using Ampule Valve Adapters or 1/8" surgical tubing (not provided). Cavity in adapter body can be filled with cotton fiber media to help prevent contamination between samples. Shipping weight 3 oz. (0.1 kg).

DECLARATION OF CONFORMITY

Application Council Directive(s): 73/23/EEC, 89/336/EEC

Standard(s) to which conformity is declared: EN60950, EN55022, EN50082-1

Manufacturer's Name: Labconco Corporation

Manufacturer's Address: 8811 Prospect Avenue
Kansas City, MO 64132 USA

Importer's Name: See Shipping/Customs Documents*

Importer's Address: See Shipping/Customs Documents for your equipment

Type of Equipment: Laboratory Equipment – Freeze Dryer

Model No.: 775 followed by two digit number based on model size; followed by another two digit number based on options.
77400 followed by two digit number based on options.
79340 followed by two digit number based on options.
76700 followed by two digit number based on options.
79600 followed by two digit number based on options.

Serial No.: Various – See Individual Declaration

Year of Manufacture: 1995 and Subsequent

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

See individual Declaration of Conformity which will be signed by the importer for your country.

Place:

(Signature)

Date:

(Full Name)

(Position)

*An individual version of this declaration is included with your shipping/customs documentation.

Labconco P/N 36960-02, Rev. B, ECO A978

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• Product Protection • Free LabbyWear™ Merchandise

NAME _____ TITLE _____

DEPARTMENT _____ INSTITUTION _____

ADDRESS _____

CITY/STATE/ZIP/COUNTRY _____

TELEPHONE _____ EXT _____ FAX _____ E-MAIL _____

Which of the following comes closest to describing the type of activity in which you are engaged?

- Quality Control Teaching/Instructional Testing Other (please specify) _____
 Clinical/Diagnostic Research & Development Production

Of what type organization is your work a part?

- Industrial, Manufacturing, Utility Government (except Medical)
 Educational Institution (except Medical School) Independent, Foundation, Consulting
 Medical, Medical School, Hospital, Public Health Other (please specify) _____

Which comes closest to describing your scientific discipline?

- Biological Science Inorganic Chemistry Physical Chemistry
 Bio-Chemistry Analytical Chemistry/R & D Engineering or Physics
 Polymer Chemistry Analytical Chemistry/Quality Control Other (please specify) _____
 Organic Chemistry

Which FreeZone Freeze Dry System did you purchase*?

- | | | | | | |
|---|--|--|--|---|---|
| 1L Benchtop
<input type="checkbox"/> Model 77400-__ | 4.5L Console
<input type="checkbox"/> Model 77510-__ | 6L Benchtop
<input type="checkbox"/> Model 77520-__ | 6L Console
<input type="checkbox"/> Model 77530-__ | 12L Console
<input type="checkbox"/> Model 77540-__ | 18L Console
<input type="checkbox"/> Model 77550-__ |
| 2.5L Cascade
<input type="checkbox"/> Model 76700-__ | Dry Ice Benchtop
<input type="checkbox"/> Model 75227-__ | <input type="checkbox"/> Model 77580-__ | <input type="checkbox"/> Model 77535-__ | <input type="checkbox"/> Model 77545-__ | <input type="checkbox"/> Model 77555-__ |
| 4.5L Benchtop
<input type="checkbox"/> Model 77500-__ | | Benchtop Shell Freezer
<input type="checkbox"/> Model 79490-__ | <input type="checkbox"/> Model 77585-__
<input type="checkbox"/> Model 79340-__ | 12L Cascade
<input type="checkbox"/> Model 79600-__ | Stoppering Tray Dryer
<input type="checkbox"/> Model 79480-__ |
| | | | | Bulk Tray Dryer
<input type="checkbox"/> Model 78060-__ | |

Serial Number* _____ Date of Installation _____

**Model and Serial numbers are located on the back of the unit.*

How did you learn about the FreeZone Freeze Dry System?

- Dealer Sales Rep Dealer Catalog Colleague Advertisement
 Labconco Sales Rep Labconco Literature Trade Show Internet/WWW
 Other (please specify) _____

What factors most influenced your decision to purchase a FreeZone Freeze Dry System?

(Number up to 3, #1 being the most important)

- ___ Appearance ___ Reputation ___ Service Program ___ Performance Specifications
___ Ease of Operation ___ Safety Features ___ Price ___ Dealer Recommendation
___ Availability ___ Colleague Recommendation ___ Other (please specify) _____

From whom did you purchase your FreeZone Freeze Dry System? _____
(DEALER)

Please fold card over, tape edges and mail. No postage is required.



FREEZONE® FREEZE DRY SYSTEMS

800-821-5525 or 816-333-8811
Fax 816-363-0130

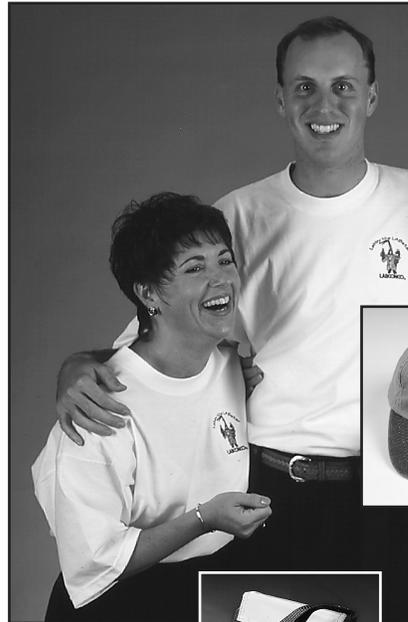
LabbyWear™ is the official uniform of LABsters everywhere! Be a LABster!



**Labby
The LABster**

As a token of our thanks for returning your Product Registration Card, we would like to send you the LabbyWear of your choice. Please select from one of the three items listed or collect Labby Bucks and redeem for other LabbyWear merchandise. Then just complete the information requested on the reverse side, fold, tape edges and mail.

- T-shirt.** 100% cotton, short-sleeved, white, with Labby The LABster embroidered on the front left side. Specify unisex size.
 - Large XLarge
- Twill cap.** Pigment-dyed, two-color, with six panels and Labby The LABster embroidered on the front.
- Lunch bag.** Insulated, teal with royal blue accent and Labby The LABster embroidered on the front.
- 10 Labby Bucks** and LabbyWear Catalog.



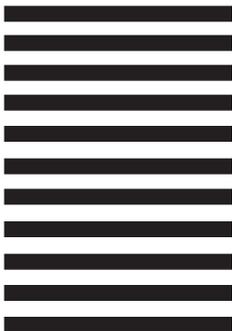
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