FreeZone® 6 Liter Benchtop

Freeze Dry System

Model 77520

INSTRUCTION MANUAL

Form 79536 ECO 7529
Printed in U.S.A.

Thank you for displaying confidence in us by selecting a Labconco Freeze Dry System. Our design engineers, assemblers and inspectors have utilized their skills and years of experience to ensure that the new Labconco FreeZone® 6 Liter Benchtop Freeze Dryer meets our high standards of quality and performance.

IMPORTANT NOTICE

This manual should be read carefully by all the end users in order to become familiar with the operation of the FreeZone® 6 Liter Benchtop Freeze Dryer. Recommendations are made within the manual to help you obtain maximum performance and life from your product.

We have included sections on initial set up, operation, maintenance and troubleshooting to provide you with all the tools necessary to achieve maximum performance.

If you have questions or concerns, do not hesitate to call us at 1-800-821-5525 for assistance.

Components Shipped

Carefully check the contents of the carton for damage that might have occurred in transit. Do not discard the carton or packaging material until all components have been checked against the following component list and the equipment has been installed and tested.

As shipped, the carton should contain the following:

Part Number	Description
77520-xx	6 Liter Benchtop Freeze Dry System
76460	Vacuum Hose
19676	Hose Clamp
79536	Instruction Manual
13341	Power Cord (Model 77520-01 only)
12910	Plug (Model 77520-01 only)

General Description

The Labconco FreeZone® 6 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. Shown below is a 6 liter benchtop unit.

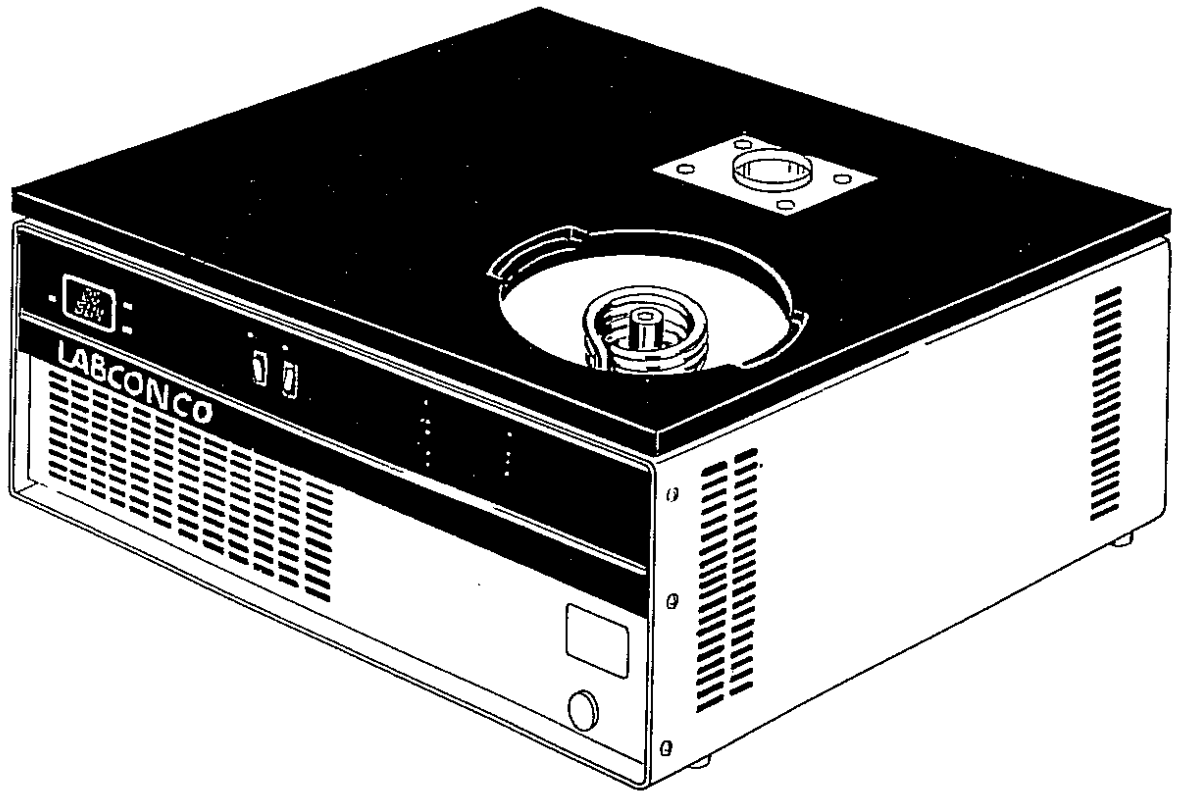


Figure 1

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 water; the use of a vacuum pump to enhance the removal of water vapor from the surface of the sample; the transfer and deposit of water vapor onto a condenser; the removal of heat, due to ice formation, from the condenser by means of a refrigeration system. In essence, the freeze dry process is a balance between the heat absorbed by the sample to vaporize the water and the heat removed from the condenser 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 condenser 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.

SAFE TEMPERATURE AND DRYING TIMES FOR SELECTED MATERIALS

Material 10MM Thick	Safe Temperature °C	Condenser 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.

Table 1

Freeze Dry Rates (Con't)

Up to the point of overloading the system, the greater the surface area of the sample, the greater 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 water 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 condenser and the vacuum pump. The condenser, which should be at least 10 to 15°C colder than the eutectic temperature (melting temperature) of the sample, traps water vapor as ice. Since the vapor pressure at the condenser is less than that of the sample, the flow of water vapor is from the sample to the condenser. 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 there is a simple sugar such as a 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

Freeze Dry Capacity (Con't)

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 condenser 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 condenser temperature can be cooled to below -75°C, or a dry ice/solvent trap can be used between the condenser 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.

Component Identification (See Figure 2)

(1) **Cabinet.** The cabinet is epoxy coated steel for strength and durability.

(2) **Cabinet Top**. The cabinet top is corrosion resistant and smooth.

(3) **Control Panel.** The control panel contains readouts for pressure and temperature and contains all control switches. The control panel also contains a recorder jack.

(4) **Connection Port.** The port is designed to accept any of Labconco's drying chambers or manifolds or the Labconco Stoppering Tray Dryer.

(5) **Access Panel.** The removable panel provides access to the charge ports on the refrigeration module compressor.

(6) **Condenser Chamber.** Constructed of 304 stainless steel, it contains the stainless steel collector coil and vacuum stand pipe.

(7) **Condenser Chamber Lid.** The lid is clear acrylic so that the amount of condensate may be monitored.

(8) **Condenser Chamber Lid Gasket.** Molded of neoprene, the gasket forms a tight seal between condenser chamber and lid.

(9) **Drain Plug.**

(10) **Condenser Chamber Drain Hose.** The drain hose extends from the control panel for draining condensate.

(11) **Refrigeration Module.** The system is a mechanical, capillary tube system.

(12) **Vacuum Hose with clamps.**The hose connects the vacuum pump to the freeze dry unit.

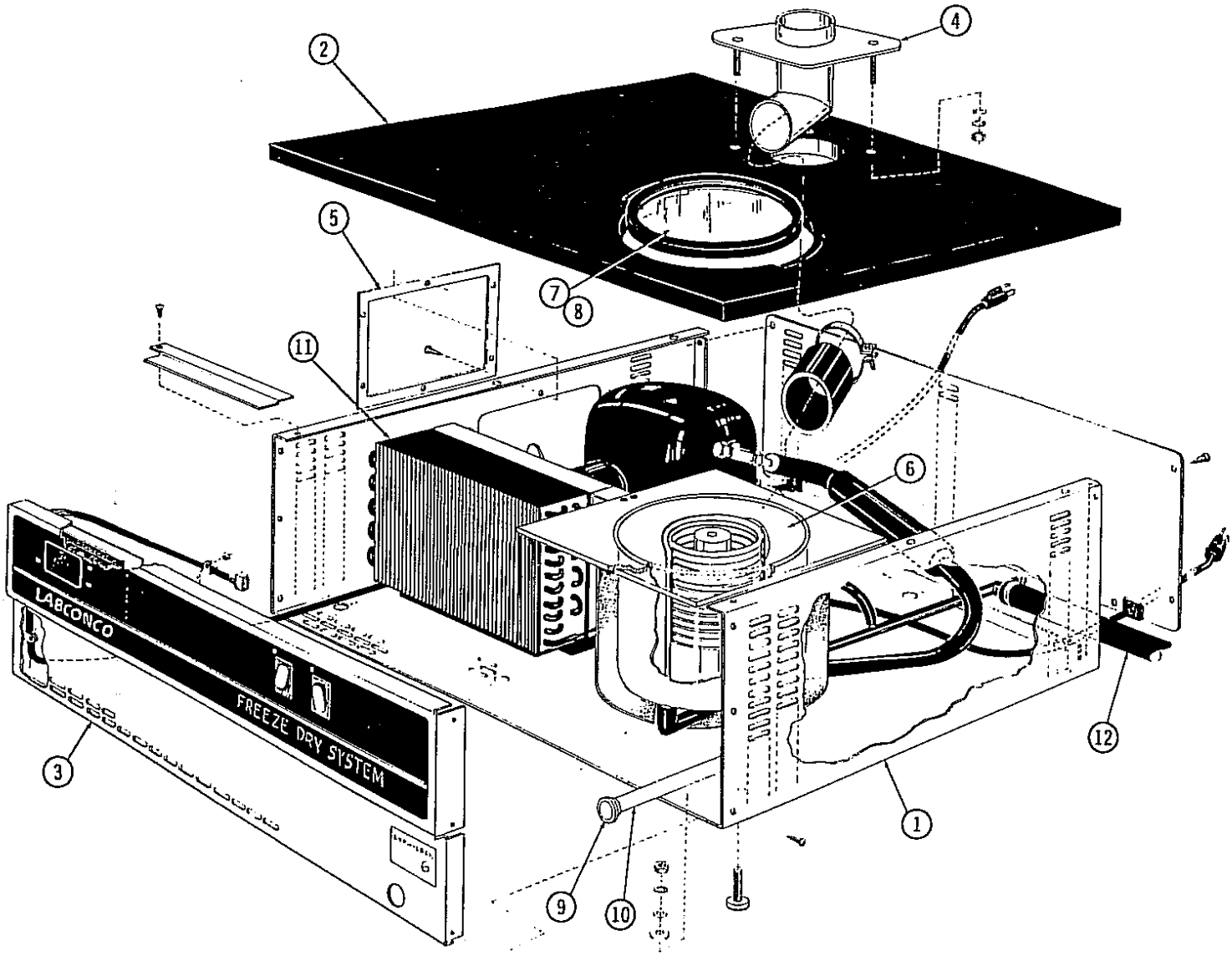


Figure 2

Preparation

Remove the back panel from the freeze dry unit and inspect all refrigeration components for visible damage. Check to see that the condenser fan on the refrigeration module spins without obstruction.

Location

The freeze dry unit 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 out through the back of the cabinet. A minimum of 3" must be allowed between the back of the freeze dry unit and adjacent wall surface. Restriction of airflow into the unit during operation could adversely affect performance.

Vacuum Pump Connection

A vacuum pump with a rated capacity of 100 liters per minute is required to operate your freeze dry system properly. The unit is provided with a 3/4" I.D., heavy wall, vacuum hose for connecting the vacuum pump to the condenser chamber on the unit.

Connect the vacuum pump power cord to the receptacle on the back of the unit. Connect the vacuum pump inlet port to the vacuum tube on the back of the unit with the vacuum hose and clamps provided.

Utility Connections

Models 77520-00,-03 should be plugged into an electrical outlet rated at 115 VAC, 60 Hz, single phase, 20 amps. Model 77520-01 should be plugged into an electrical outlet rated at 220 VAC, 50 Hz, single phase, 10 amps.

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

Do not attempt to chip ice off of the collector coil as serious damage to the refrigeration module may result. The release of refrigerant could injure your eyes.

Notes

Operation Checklist

The following checklist should be followed prior to each use of your freeze dry unit:

(1) Wipe the interior of the condenser chamber with a soft cloth or paper towel to remove any accumulated moisture.

(2) Check the condenser 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 condenser 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) Remove the accessory drying chamber or manifold from the connection port and using a soft, lint free cloth or paper towel, wipe the port gasket and sealing surfaces of the drying chamber/manifold to remove any dirt and contaminants that could cause a vacuum leak. Reinstall the drying chamber or manifold on the port. Vacuum grease is not required on the port gasket to obtain a proper vacuum seal.

(5) Inspect each sample valve on the drying chamber or manifold 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.

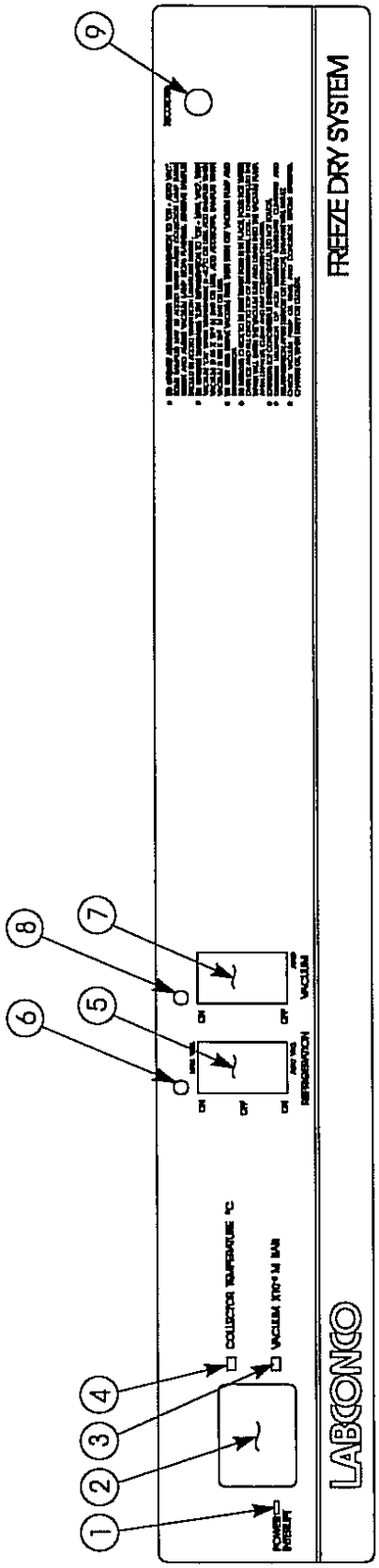


Figure 3

Control Panel Identification (See Figure 3)

(1) **Power Interrupt Indicating Light.** Flashes amber when power is restored after it has been interrupted. When the unit is first plugged in the indicating light will flash for approximately five seconds.

(2) **Control Panel Display.** Displays collector temperature (°C) and system vacuum (x 10^{-3}mBar). Above 4000 x 10^{-3}mBar, the vacuum display will indicate "HI".

(3) **System Vacuum Indicating Light.** Indicates relative vacuum of the system. Flashes amber when system vacuum is above 450 x 10^{-3}mBar; at system vacuum levels of 450 x 10^{-3} to 133 x 10^{-3}mBar, the indicating light will burn amber steadily. When system vacuum reaches 133 x 10^{-3}mBar or lower, the indicating light will burn green steadily.

(4) **Collector Temperature Indicating Light.** Indicates relative temperature of collector coil. Burns amber steadily when collector temperature is above -40°C; burns green steadily when collector temperature is -40°C or below.

(5) **Refrigeration Switch.** Controls freeze dry refrigeration module.

(6) **Refrigeration Module Annunciator.** Burns green steadily when freeze dry refrigeration module is in operation.

(7) **Vacuum Switch.** Controls vacuum receptacle on back of unit

(8) **Vacuum Pump Annunciator.** Burns green steadily when vacuum receptacle on back of unit is energized.

(9) **Recorder Jack.** DIN receptacle, 5 Pin, 180°. When a recorder is connected to this jack, the collector temperature and system vacuum can be recorded during operation.

Automatic Start-Up

Turn the refrigeration switch on the control panel to "on/auto vac" and the refrigeration module compressor will start. The green annunciator above the refrigeration switch will light to indicate refrigeration module operation. The collector temperature will start to decrease and is shown on the control panel display (°C). The collector temperature indicating light will burn amber when the collector temperature is above -40°C. When the collector temperature is -40°C or lower, the indicating light will burn green.

When the collector temperature reaches -40°C, the vacuum pump will automatically start. The green annunciator above the vacuum switch will light to indicate vacuum pump operation. The system vacuum will start to decrease and is shown on the control panel display (x 10^{-3}mBar). When system vacuum is above 4000 x 10^{-3}mBar, the control panel display will show "HI". The system vacuum indicating light will flash amber when system vacuum is above 450 x 10^{-3} mBar; at system vacuum levels of 450 x 10^{-3} to 133 x 10^{-3}mBar, the indicating light will burn amber steadily. When system vacuum reaches 133 x 10^{-3}mBar or lower, the indicating light will burn green steadily. When both the collector temperature and the system vacuum indicating lights burn green steadily, sample may be added.

Manual Start-Up

Turn the refrigeration switch on the control panel to "on/man.vac" and the refrigeration module compressor will start. The green annunciator above the refrigeration switch will light to indicate refrigeration module operation. The collector temperature will start to decrease and is shown on the control panel display (°C). The collector temperature indicating light will burn amber when the collector temperature is above -40 °C. When the collector temperature is -40 °C or lower, the indicating light will burn green.

When the collector temperature reaches -40°C, turn the vacuum switch on the control panel to "on". The vacuum pump will start and the green annunciator above the vacuum switch will light to indicate vacuum pump operation. The system vacuum will start to decrease and is shown on the control panel display (x 10^{-3}mBar). When system vacuum is above 4000 x 10^{-3}mBar, the control panel display will show "HI". The system vacuum indicating light will flash amber when system vacuum is above 450 x 10^{-3}mBar. At system vacuum levels of 450 x 10^{-3} to 133 x 10^{-3}mBar, the indicating light will burn amber steadily. When system vacuum reaches 133 x 10^{-3}mBar or lower, the indicating light will burn green steadily. When both the collector temperature and the system vacuum indicating lights burn green steadily, sample may be added.

Recorder Jack

The system vacuum and collector temperature can be recorded during operation by connecting a recorder to the recorder jack on the control panel. The recorder jack is a DIN receptacle, 5 pin, 180°. The pin configuration and output is as follows:

Pin 1 - Ground
Pin 2 - Blank
Pin 3 - System Vacuum
Output: 4000 x 10^{-3}mBar ≡ 2V
0 mBar ≡ 0V
Pin 4 - Blank
Pin 5 - Collector Temperature
Output: 0 °C ≡ 3200 mV
-70 °C ≡ 4000 mV

Power Interruption

If, during any time of operation, the power source to the freeze dry system is disconnected, the power interrupt indicating light will flash when the power source is reconnected. The power interrupt indicating light will continue to flash until the refrigeration switch on the control panel is turned "off".

Adding Sample

The following procedure should be followed when freeze drying samples:

(1) Pre-freeze samples; shell freezing of samples is recommended. Appropriate containers for freeze drying include ampules, serum bottles, and wide mouth freeze drying flasks. Proper 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 valve on the condenser chamber. Although samples may be connected to any size valve, a 1/2" valve is generally used for samples of less than 150 ml. The 3/4" valve can be used for either small or large samples. After connecting a pre-frozen sample to a valve, turn the plastic valve stem to the "vac" position which opens the valve and connects the attached sample to system vacuum.

(3) Before adding another sample, allow system vacuum to return to 133 x 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 valve stem 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.

(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.

Shut Down

When a sufficient amount of condensate accumulates on the collector coil, the collector temperature will not remain below -40°C. At this point the unit should be defrosted. First release system vacuum by turning a valve stem to the "vacuum" or open position or by pulling the condenser 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 condenser chamber drain hose out from the control panel on the unit and remove the drain plug. Place the drain hose in a suitable container to collect the condensate that will be defrosted off the collector coil.

(2) Remove the condenser chamber lid and pour warm water over the collector coil. Do not fill the condensing chamber above the collector coil as water will enter the vacuum stand pipe and drain into the vacuum pump. Dispose of the liquid appropriately.

(3) After all condensate is defrosted from the collector coil, flush the condenser chamber with water and wipe chamber dry.

(4) Reinstall the drain hose plug, and slide drain hose back into cabinet through the control panel.

Under normal operation, your freeze dry unit will require little routine maintenance. The following maintenance schedule is recommended:

Weekly

(1) Check the condition and level of the vacuum pump oil. If the oil level is low, then add oil. If the oil contains excessive amounts of moisture, detected by a cloudiness in the oil, it will be necessary to change the oil. For further information regarding procedures for changing the vacuum pump oil, refer to the vacuum pump manufacturer's instructions. To expel small amounts of water that may have accumulated in the pump oil, periodically operate the vacuum against a dry, leak-tight system. The gas ballast must be open.

Monthly

(1) The rubber components on the freeze dry unit may eventually deteriorate and require replacement. The effective life of rubber parts will depend 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 condenser chamber lid.

(3) Using a soft cloth, sponge, or chamois and a mild, non-abrasive soap or detergent, clean the top, side, and front panels of the unit. Liquid spray cleaners and polishes may be used on the side and front panels. Do not use solvents to remove stains from the panels as they may damage the finish.

(4) All weekly activities.

Semi-Annually

(1) Using a vacuum cleaner with brush attachment, clean the refrigeration module condenser to ensure proper air flow for peak performance. More frequent cleaning may be required if the freeze dry unit is operated in a dusty environment.

(2) All monthly activities.

Your freeze dry unit can achieve an ultimate vacuum of 33 X 10^{-3}mBar or lower under a no-load condition. To achieve sufficient vacuum, all joints and connections must be tight, the vacuum pump must be operating properly, and the collector temperature must be -40°C or lower. If your freeze dry unit does not obtain a satisfactory vacuum, the following procedure should be used to locate and correct any vacuum problems.

(1) Check each sample valve on the condenser chamber and look for visible damage and for proper installation. To isolate a suspect valve, remove the valve and insert a rubber plug in its place. If the valve proves to be leaking, the plug can be left in place so the unit can be used until a replacement valve can be obtained.

(2) Check vacuum pump oil sight glass. Replace the oil if it is dirty or cloudy; add oil to the pump if the level is low. Close the pump gas ballast valve. Refer to the vacuum pump manufacturer's instructions for further information.

(3) Check the condenser chamber lid gasket for indentions, cracks, or tears. Also clean the gasket using a soft, lint free cloth or paper towel.

(4) Check all vacuum hoses and lines for cracks.

(5) Check all vacuum connections and joints and tighten any loose hose clamps or fittings.

If any repairs are required on your freeze dry system, contact your local laboratory supply dealer. If satisfaction is not obtained through the dealer service network, please call Labconco at (800) 821-5525 or (816) 333-8811. Repairs should only be undertaken by a competent technician or through an authorized Labconco service agency.

Under a no-load condition, your freeze dry unit 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 satisfaction is not obtained through the dealer service network, please call Labconco at (800) 821-5525 or (816) 333-8811. Repairs should only be undertaken by a competent refrigeration technician or through an authorized Labconco service agency.

Back Panel Removal

(1) While supporting the back panel, loosen and remove the screws securing the back panel to the cabinet.

Access Panel Removal

(1) Remove the back panel as described above.

(2) Loosen and remove the screws securing the access panel to the cabinet.

Control Panel Removal

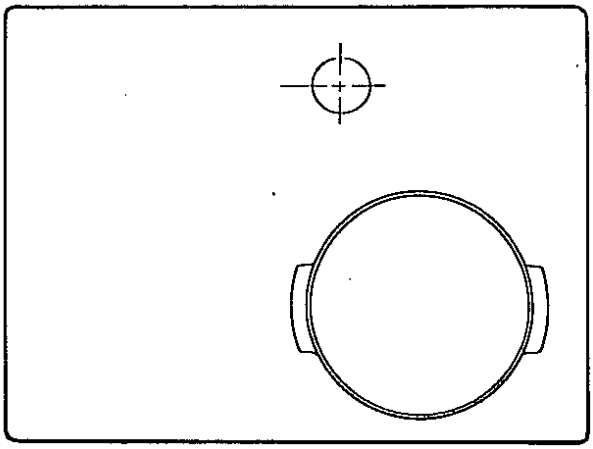
(1) Unplug the unit or disconnect it from power.

(2) Loosen and remove the top two screws at each end of the control panel which secure it to the cabinet.

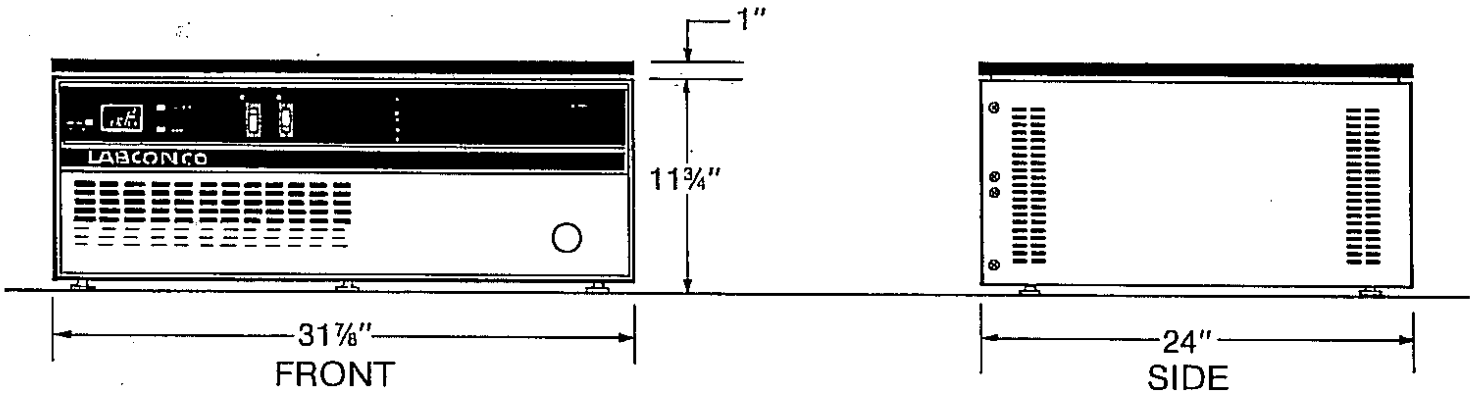
(3) Loosen the bottom screw at each end of the control panel and tilt the panel down.

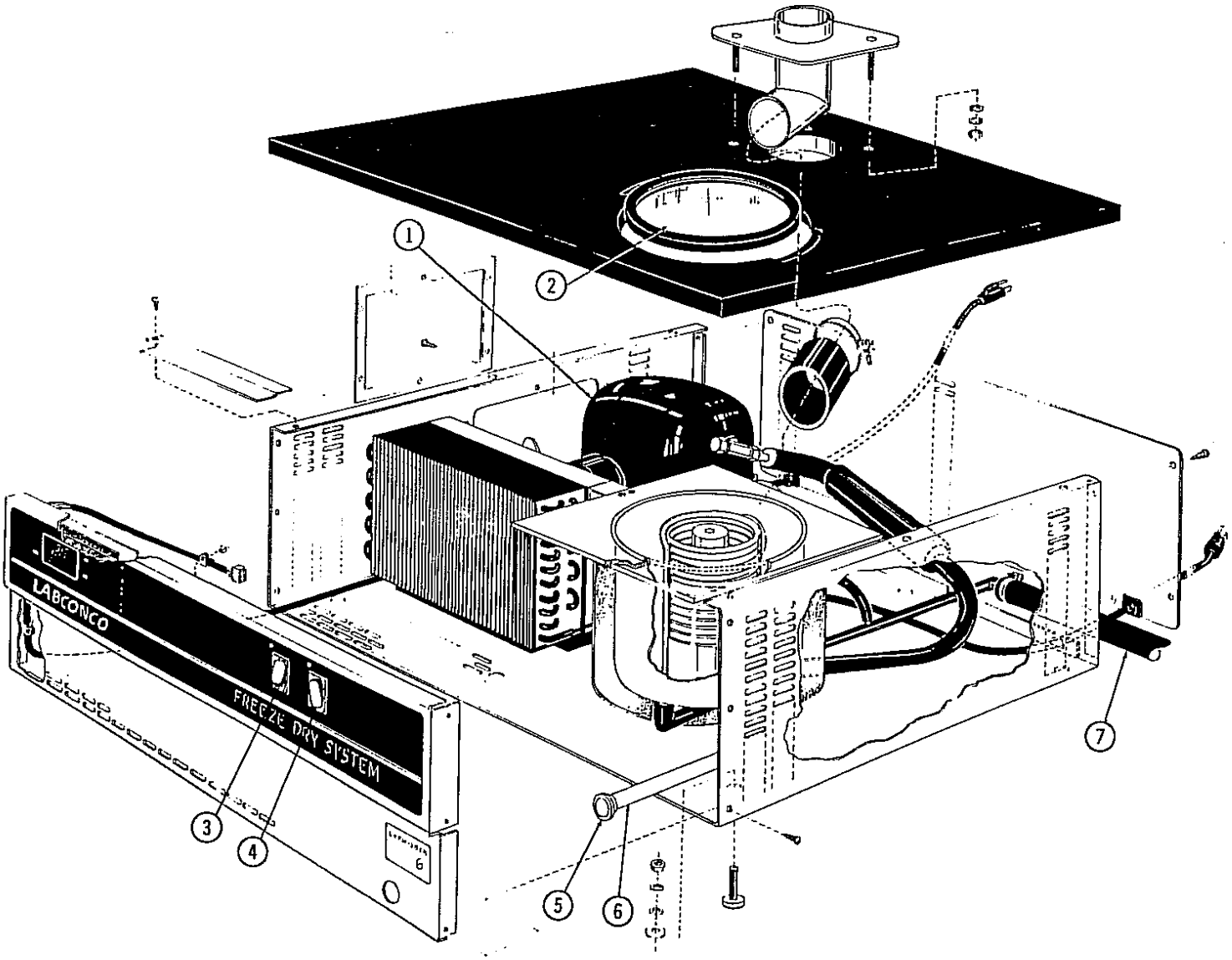
(4) Disconnect the main power harness, the vacuum sensor harness, and the temperature sensor harness from the back of the control panel.

(5) Remove the bottom screw at each end of the control panel and lift control panel away from unit.



TOP



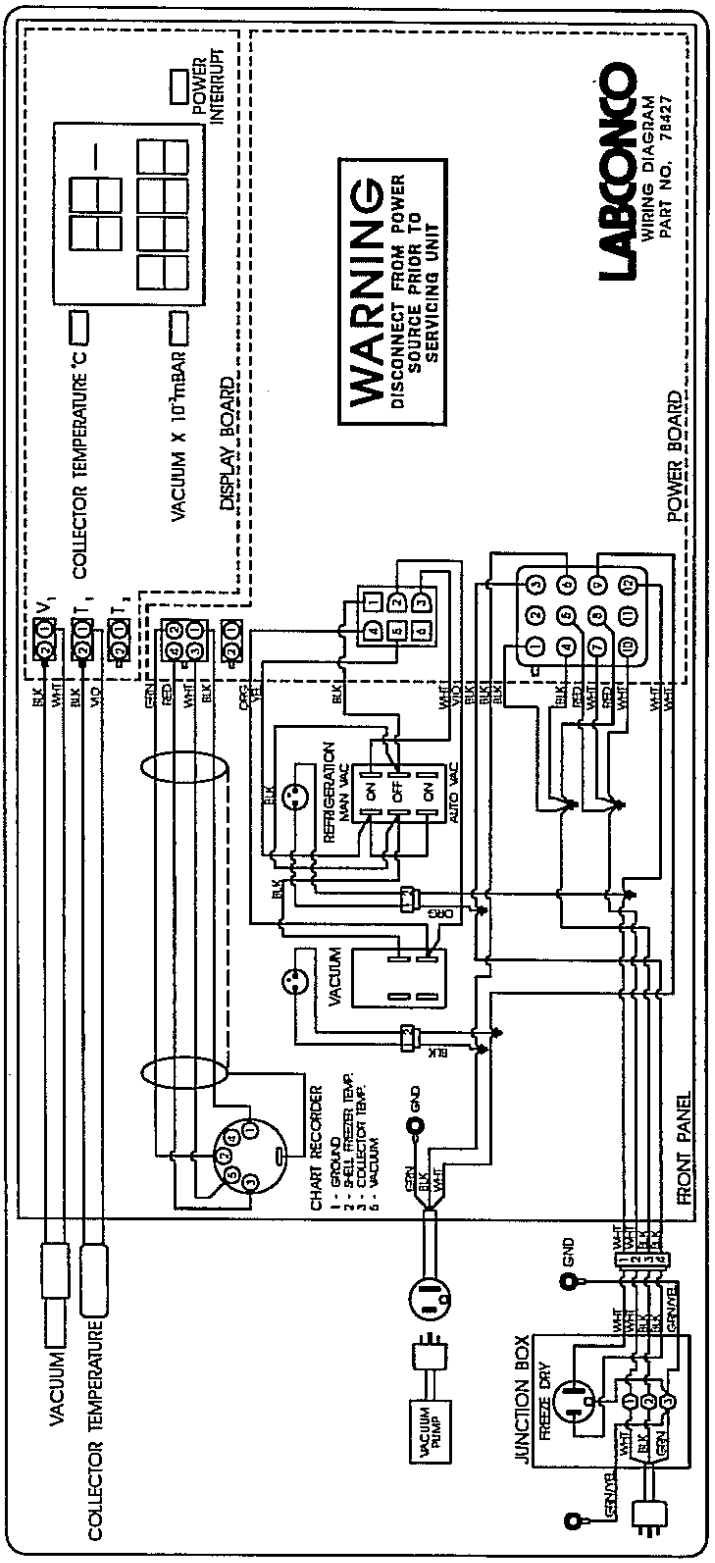

1
2
3
4
5
6
7
LABCONCO
FREEZE DRY SYSTEM

ITEM	QTY	PART NO.	DESCRIPTION	
1	1	79470-00	Condensing Module	Model 77520-00
1A	1	79470-01	Condensing Module	Model 77520-01
1B	1	79470-02	Condensing Module	Model 77520-03
2	1	77451	Condenser Lid	
2A	1	76885	Gasket	
3	1	13024	Switch	
4	1	13023	Switch	
5	1	77280	Drain Plug	
5A	1	16436	O-Ring	
6	1	76241	Drain Hose	
7	1	76460	Vacuum Hose	

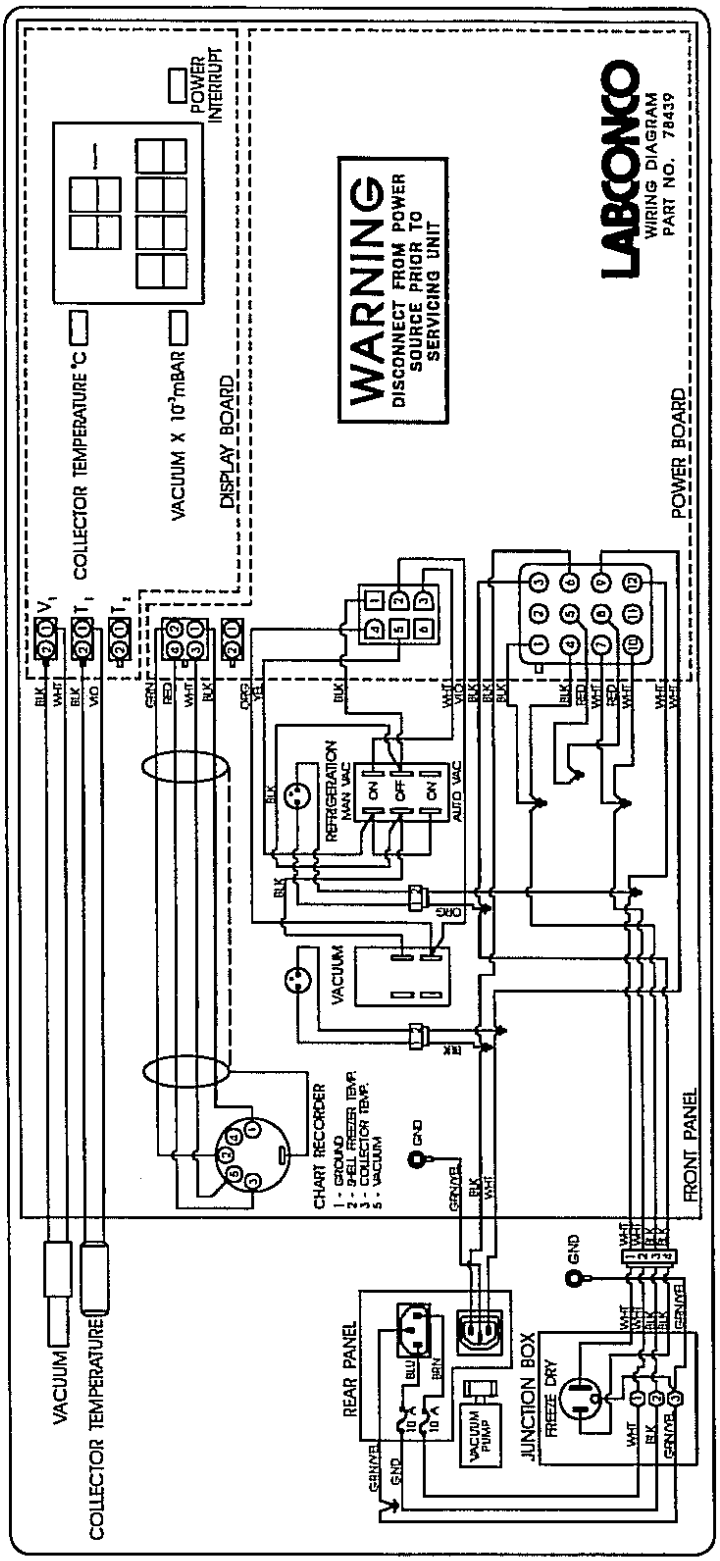
MODEL NUMBER	ELECTRICAL REQUIREMENTS
77520	115 VAC - 60 Hz 1 Phase - 9.6 Amp
77520-01	220 VAC - 50 Hz 1 Phase - 4.2 Amp
77520-03	115 VAC - 60 Hz 1 Phase - 9.6 Amp

All electrical specifications do not include vacuum pump electrical requirements.

Models 77520-00 and 77520-03
(115 VAC, 60 Hz, 1 Phase)



Model 77520-01
(220 VAC, 50 Hz, 1 Phase)



PROBLEM	CAUSES	CORRECTIVE ACTION
Unit will not operate No vacuum	Unit not connected to electrical power	Connect unit to proper electrical power
	Pump not on	Turn on pump
	Pump not connected to unit	Connect pump to unit
	Drain hose plug not installed	Install drain hose plug
	Sample valve open	Close sample valve
	Break or opening in vacuum lines or connections	Locate and repair
Poor Vacuum (greater than 500 x 10^{-3}mBar)	Vacuum pump oil level low	Add vacuum pump oil
	Excessive moisture in vacuum pump oil	Replace vacuum pump oil
	Vacuum pump gas ballast valve open	Close vacuum pump gas ballast valve
	Leaks in vacuum lines or connections	Locate and repair
	Foreign material on lid gasket	Clean gasket and lid
	Damaged sample valve	Locate and replace

If you are having problems with the operation of your freeze dry unit, call Labconco at (800) 821-5525 or (816) 333-8811.

We are committed to providing our customers with quality equipment and service after the sale. Part of this objective involves keeping you informed of changes and new product additions. We therefore request that you take a moment to fill out the product registration card so we may know your location as well as some of the reasons that prompted you to purchase our products.

Labconco Corporation warrants products of its manufacture for one year, from receipt of the equipment by the purchaser, against defects in materials and workmanship. This limited warranty covers parts and labor but not transportation and insurance charges. In the event of a warranty claim contact the dealer who sold you the product. If the cause is determined to be a manufacturing fault, the dealer or Labconco Corporation will repair or replace all defective parts to restore the unit to operation. **Under no circumstance shall Labconco Corporation be liable for indirect, consequential or special damages of any kind.** This statement of warranty may be altered by a specific published amendment. No individual has authorization to alter the provisions of this warranty policy or its amendments. Lamps and expendable items such as filters are not covered by this warranty. Damage due to corrosion or accidental breakage is also not covered.

WARNING: The disposal and/or emission 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.

If a shipment is received in visibly damaged condition, be certain to make a notation on the delivering carrier's receipt and have his agent confirm the damage on your receipt. Otherwise, the damage claim may be refused.

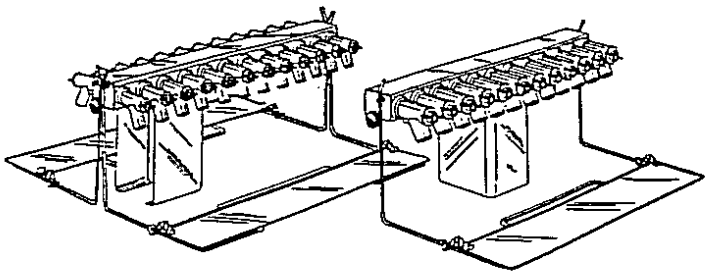
If concealed damage or pilferage is discovered, notify the carrier immediately and retain the entire shipment intact for inspection. Interstate Commerce Commission rules require that the claim be filed with the carrier within 15 days after delivery.

NOTE: **Do not return goods.** Goods returned without prior authorization will not be accepted. Labconco Corporation and its dealers are not responsible for shipping damage. Claims must be filed directly with the freight carrier by the recipient. If authorization has been received to return this product, by accepting this approval, the user assumes all responsibility and liability for biological and chemical decontamination and cleansing. Labconco reserves the right to refuse delivery of any products which do not appear to have been properly cleaned and/or decontaminated prior to return.

Accessory Part #	Description
14677	**Vacuum Pump** Two stage direct drive pump, 190 liters/minute. 115 VAC, 60 Hz single phase, 6.8 amps.
77394-01	**Vacuum Pump** Two stage direct drive pump, 190 liters/minute. 220/208-230 VAC, 50/60 Hz, single phase, 3.4 amps.
14721	**Vacuum Pump** Two stage direct drive pump, 113 liters/minute. 115 VAC, 60 Hz, single phase, 6.8 amps.
77394	**Vacuum Pump** Two stage direct drive pump, 113 liters/minute. 220/208-230 VAC, 50/60 Hz, single phase, 3.4 amps.
77560	**Stoppering Tray Dryer (115 V, 60 Hz)** Three shelves, 600 square inches of area, provides temperature control and stoppering under vacuum.
77560-01	**Stoppering Tray Dryer (220 V, 50 Hz)** Three shelves, 600 square inches of area, provides temperature control and stoppering under vacuum.
14722	**Pump Inlet Filter** Disposable filter that prevents oil back streaming and protects vacuum pump from submicron particles.
14723	**Pump Exhaust Filter** Disposable filter that removes visible oil mist from vacuum pump exhaust.
77720	**Soda Acid Trap** Secondary trap that prevents migration of corrosive chemicals into vacuum pump.
77721	**Replacement Soda Salt Media For Soda Acid Trap**
77725	**Charcoal Solvent Trap** Secondary trap that prevents migration of organic solvents into vacuum pump.

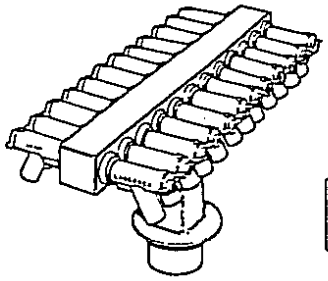
77726	**Replacement Activated Charcoal Media For Charcoal Solvent Trap**
75380	**Secondary Vacuum Trap** 9-3/4" high x 7-7/8 diameter, 304 stainless steel with 3/4" vacuum connections.
75382	**Secondary Vacuum Trap** 9-3/4" high x 7-7/8 diameter, 304 stainless steel with 1/2" vacuum connections.
75384	**Secondary Vacuum Trap** 7-7/8" high x 6-5/8" diameter, 304 stainless steel with 1/2" vacuum connections.
75900	**1/2" Valve** Neoprene valve body with polypropylene stem.
75910	**3/4" Valve** Neoprene valve body with polypropylene stem.

Drying Chambers Manifolds and Product Heaters

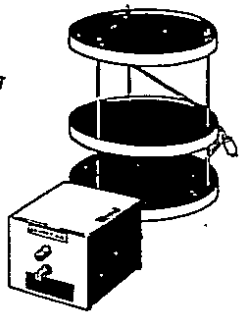


77710 Manifold, 10" h x 26" w x 9½" d. 24-port, type 304 stainless steel, complete with twenty-four ½" valves and two support shelves. For use with Lyph-Lock 18, 12 and 6 Liter Systems. Shipping weight 15 lbs.

77700 Manifold, 10" h x 26" w x 6⅝" d, 12-port, type 304 stainless steel, complete with twelve ¾" valves and support shelf. For use with Lyph-Lock 18, 12 and 6 Liter Systems. Shipping weight 11 lbs.

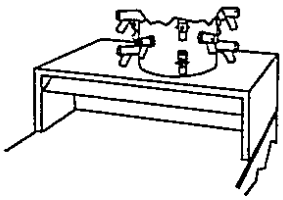


75180 Manifold, 9" h x 19" w x 5" d, 24-port, type 304 stainless steel, complete with twenty-four ½" valves. For use with Lyph-Lock 18, 12, 6 and 4.5 Liter Systems. The Attachment Port Lid Accessory #77628 is required for connection to the 4.5 Liter System. Shipping weight 11 lbs.

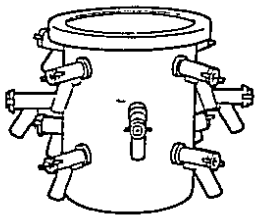


75130 Product Heater. 11¾" h x 10" diameter, for use with Drying Chambers 75100 and 75104. Shipping weight 17 lbs.

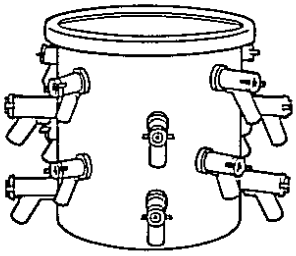
75132 Product Heater. 9" h x 6½" diameter, for use with Drying Chamber 75102. Shipping weight 13 lbs.



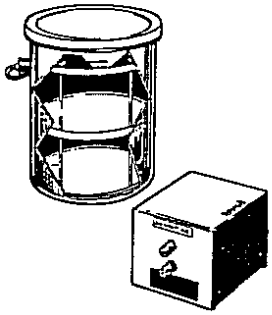
77715 Accessory Support Stand, 5" h x 30" w x 15" d, elevates drying chamber above work surface of Lyph-Lock Freeze Dry System to allow unobstructed access to condenser compartment. Shipping weight 20 lbs.



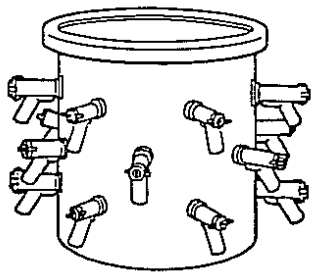
75102 Drying Chamber, 9¾" h x 8" diameter, 12-port, type 304 stainless steel, complete with twelve ½" valves. Chamber shall include ½" thick, clear acrylic cover and gaskets. Shipping weight 11 lbs.



75100 Drying Chamber, 13" h x 13" diameter, 16-port, type 304 stainless steel, complete with eight ½" valves and eight ¾" valves. Chamber shall include ½" thick, clear acrylic cover and gaskets. Shipping weight 21 lbs.

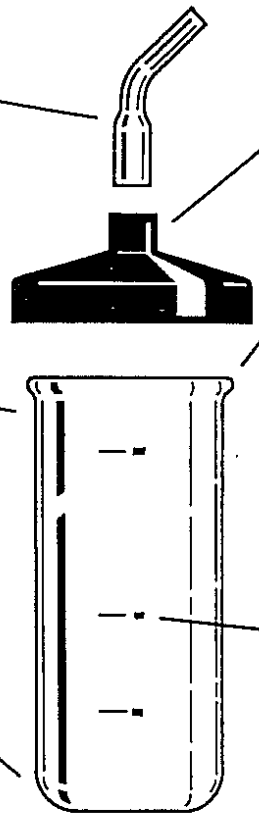


75210 Heated Drying Chamber, 10½" h x 9" diameter, type 304 stainless steel, complete with a 3-shelf product heater with +43°C (+110°F) high limit thermostat and 24 volt transformer. Chamber shall include ½" thick clear acrylic cover, gaskets and electrical pass-through for transformer cords. Shipping weight 19 lbs.



75104 Drying Chamber, 13" h x 13" diameter, 18-port, type 304 stainless steel, complete with eighteen ½" valves. Chamber shall include ½" thick, clear acrylic cover and gaskets. Shipping weight 21 lbs.

Fast-Freeze® Flasks simplify freeze drying.



Variety of adapters available. You may select from glass or stainless steel adapters available straight and with 45° bend.

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
- a flexible, non-contaminating silicone rubber top.

Flat bottom reduces spills, provides better balance.

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. Filters are supplied with each flask.

Wide mouth opening loads fast, cleans easily.

No vacuum grease is necessary.

No threads, hooks or springs are needed.

Horizontal shell freezing. Flask may be placed in a horizontal position in shell freezer, allowing more surface area for faster freezing.

Available in nine convenient sizes.

Entire flask is autoclavable.

Convenient volumetric guides indicate quantity in flask, and aid in reconstitution of sample.

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

Select the Fast Freeze 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 assured. A complete Fast Freeze Flask includes a rubber top, glass bottom and a supply of filter paper and retainer rings. Tops, bottoms and filter paper are available separately as replacement components.

Flask Size	Complete Flask	Flask Bottom	Flask Top	Flask Top/ Adapter Diameter	Dimensions/Flask Bottom H x I.D.
40 ml	75400	75420	75440	½"	76 mm x 34 mm
80 ml	75402	75422	75440	½"	115 mm x 34 mm
120 ml	75403	75423	75442	¾"	68 mm x 59.2 mm
150 ml	75404	75424	75442	¾"	85 mm x 59.2 mm
300 ml	75406	75426	75442	¾"	145 mm x 59.2 mm
600 ml	75408	75428	75444	¾"	135 mm x 90.2 mm
900 ml	75409	75429	75444	¾"	190 mm x 90.2 mm
1200 ml	75410	75430	75444	¾"	240 mm x 90.2 mm
2000 ml	75412	75432	75444	¾"	380 mm x 90.2 mm

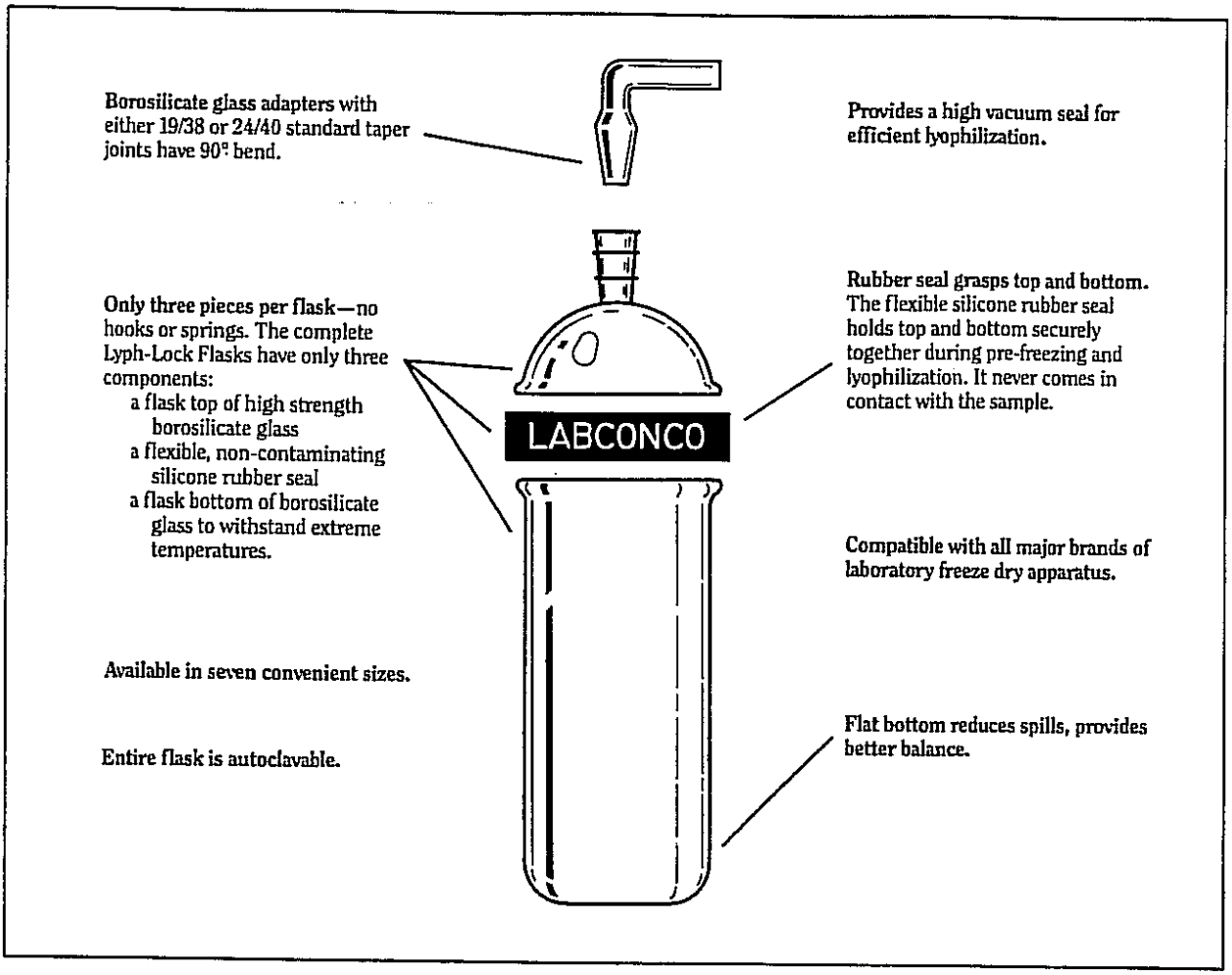
Accessories

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 ½" and ¾" diameters.

75448-10 FILTER PAPER
Package of 1000.

Diameter	Straight Adapter	45° Bend Adapter
Borosilicate Glass		
½" flask top to ½" valve	75450	75456
¾" flask top to ¾" valve	75452	75458
½" flask top to ¾" valve	75454	75460
¾" flask top to ½" valve	75454	75460
Stainless Steel		
½" flask top to ½" valve	75470	75474
¾" flask top to ¾" valve	75472	75476

Lyph-Lock® Flasks have easy-to-use features.



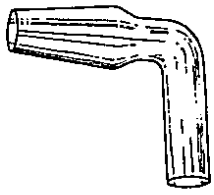
How to select Lyph-Lock Flasks for your Freeze Dry System.

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 assured. 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.

Flask Size	Complete Flask 19/38 STJ	Complete Flask 24/40 STJ	Flask Top 19/38	Flask Top 24/40	Lyph-Lock Seal	Flask Bottom	Dimensions/Flask Bottom H x I.D.
25 ml	75500	75540	75520	75560	75590	75570	37 mm x 34 mm
50 ml	75502	75542	75520	75560	75590	75572	67 mm x 34 mm
100 ml	75504	75544	75522	75562	75592	75574	50 mm x 59.2 mm
250 ml	75506	75546	75522	75562	75592	75576	110 mm x 59.2 mm
500 ml	75508	75548	75524	75564	75594	75578	103 mm x 90.2 mm
750 ml	75509	75549	75524	75564	75594	75579	145 mm x 90.2 mm
1000 ml	75510	75550	75524	75564	75594	75580	187 mm x 90.2 mm

Accessories

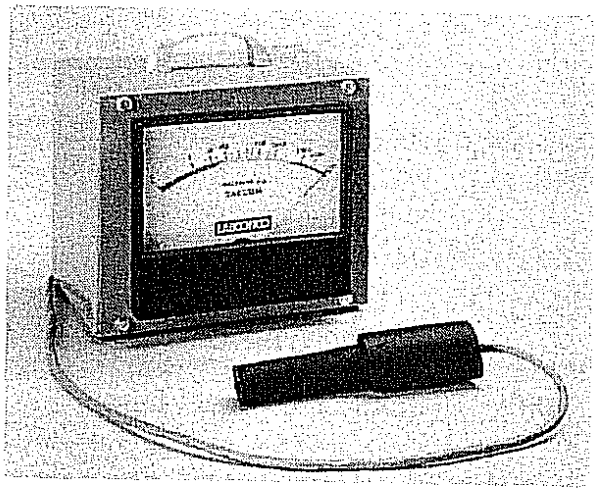
Add the Adapters for connecting the Lyph-Lock Flasks to the valve ports on your drying chamber or manifold.



90° Bend Adapter	Description
75680	Connects 19/38 STJ Flask Top to ½" valve
75682	Connects 19/38 STJ Flask Top to ¾" valve
75684	Connects 24/40 STJ Flask Top to ½" valve
75686	Connects 24/40 STJ Flask Top to ¾" valve

Vacuum Gauges and Accessories

Vacuum measurement in a freeze drying system is indispensible. It will indicate satisfactory performance of the condenser and vacuum pump. It can also act as a vapor pressure analyzer allowing you to draw qualitative conclusions about the stage that has been reached in the drying process.



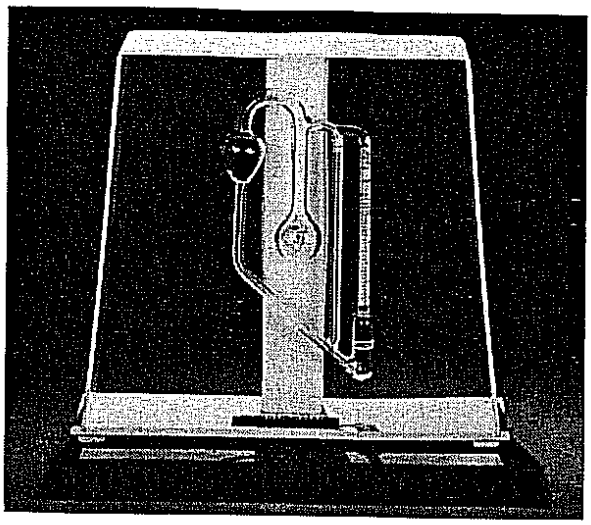
Electronic Vacuum Gauge

The Electronic Vacuum Gauge registers the constant, in-process vacuum level during lyophilization on its color coded dial. The electronic gauge has a range of 1 micron to 5000 microns (1 x 10^{-3} to 5 Torr). Solid state circuitry and internal voltage regulation insure accurate measurement.

The gauge is enclosed in a brown epoxy coated case 6⅛" w x 10" d x 8⅜" h, and includes an on/off switch and a line for connection to either the vacuum tubing or a valve on the freeze drying chamber.

All Lyph-Lock Series Freeze Dry Systems come complete with a built-in Electronic Vacuum Gauge. The Dry Ice Bench Top Freeze Dry System or other freeze dryers may use the Electronic Vacuum Gauge as an accessory.

75800 Electronic Vacuum Gauge, 115 volt, 50/60 Hz. Shipping weight 15 lbs.



McLeod Vacuum Gauge

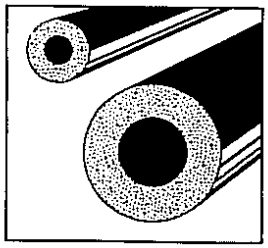
The McLeod Vacuum Gauge provides an accurate and reliable method of measuring vacuum level during lyophilization. It is a sampling instrument and does not provide continuous readout. In the McLeod Gauge, mercury is used to trap a known volume of gas and then compresses the gas in a closed end capillary tube of known volume at a known pressure. The gauge is fabricated of borosilicate glass with a permanently fused scale and a range of 5 microns to 5 mm (Torr). Its protective ABS plastic housing carefully supports the gauge, yet provides complete access for rotation and reading.

The McLeod Gauge may be easily connected to any Labconco freeze dryer, even the Lyph-Lock series on which the electronic vacuum gauge is standard equipment. The McLeod Gauge provides dual reading capabilities on these units.

Tubing and filter necessary for the use of the McLeod Gauge must be ordered separately. The McLeod Gauge requires approximately 13 to 14 milliliters of mercury which may be purchased through your laboratory supply dealer.

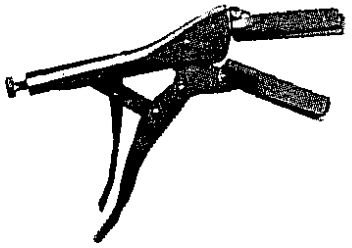
75850 McLeod Vacuum Gauge, shipping weight 5 lbs.

75851 McLeod Gauge Filter
Filter protects McLeod Gauge from dust and other contaminants. Borosilicate glass bulb filled with fiberglass has tube connections at both ends. Uses 5/16" I.D. x 3/16" wall rubber tubing for connection to gauge. Shipping weight 1 lb.



76460 Gum Rubber Tubing
Tubing for connection of vacuum pump to freeze dry system, ¾" I.D. x ⅜" wall, 3' length. Shipping weight 5 lbs.

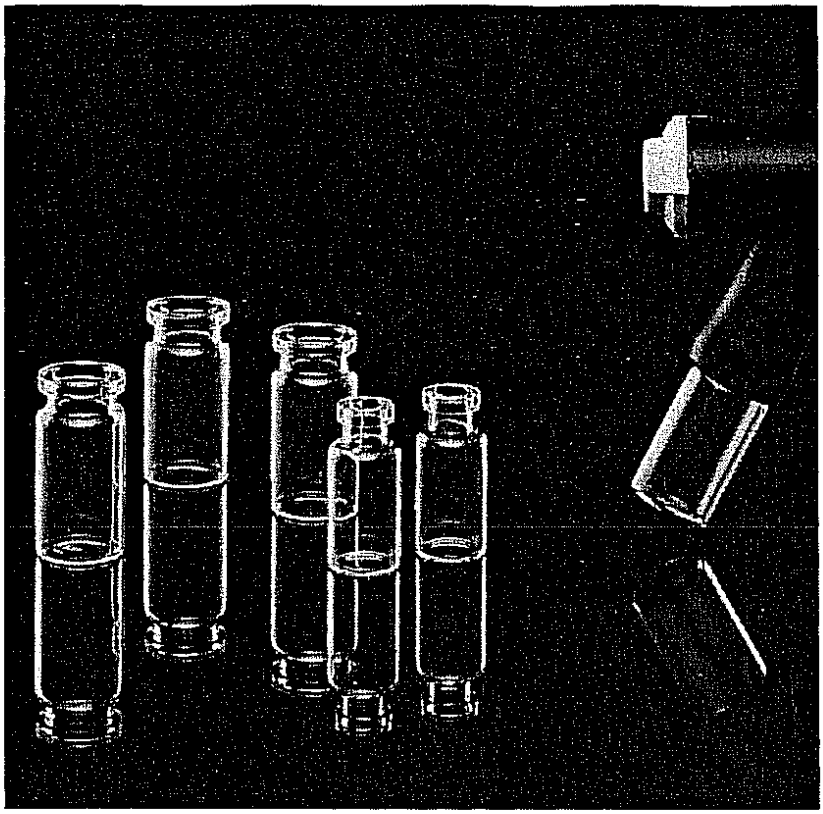
76459 Gum Rubber Tubing
Tubing for McLeod Gauge connections, 5/16" I.D. x 3/16" wall, 3' length. Shipping weight 5 lbs.



75790 Rubber Tubing Clamp
Clamp completely seals heavy wall vacuum tubing up to ¾" I.D. for use in leak detection. Shipping weight 5 lbs.

75021 Vacuum Release Tee
Tee connects to ¾" I.D. gum rubber tubing between freeze dry system and vacuum pump to facilitate release of vacuum when lyophilization is complete. Also simplifies McLeod Gauge connection and backfilling process. Shipping weight 1 lb.

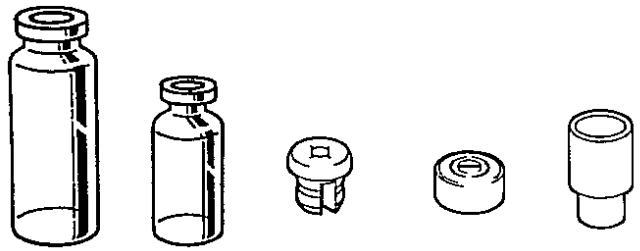
Serum Bottles and Vials



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 insures even freezing and drying. Bottles and vials are ideal containers for use in the Stoppering Tray Dryer. Serum bottles also connect to valves 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		75750-10	75760-10	75770-10	
3 ml		75752-10	75760-10	75770-10	
5 ml	75730-10		75762-10	75771-10	75775-10
10 ml	75732-10		75762-10	75771-10	75775-10
20 ml	75734-10		75762-10	75771-10	75775-10
30 ml	75736-10		75762-10	75771-10	75775-10
50 ml	75738-10		75762-10	75771-10	75775-10
100 ml	75740-10		75762-10	75771-10	75775-10
125 ml	75742-10		75762-10	75771-10	75775-10

Accessories

Seal Crimper

Seal crimper secures tear-away aluminum seals.

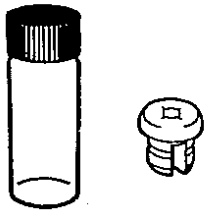
75780 Seal crimper for 13 mm corkage. Shipping weight 3 lbs.
75781 Seal crimper for 20 mm corkage. Shipping weight 3 lbs.

Vacuum Stoppering Adapter

75930 Adapter connects to valves for manual stoppering of 20 mm corkage serum bottles under original vacuum. Shipping weight 1 lb.

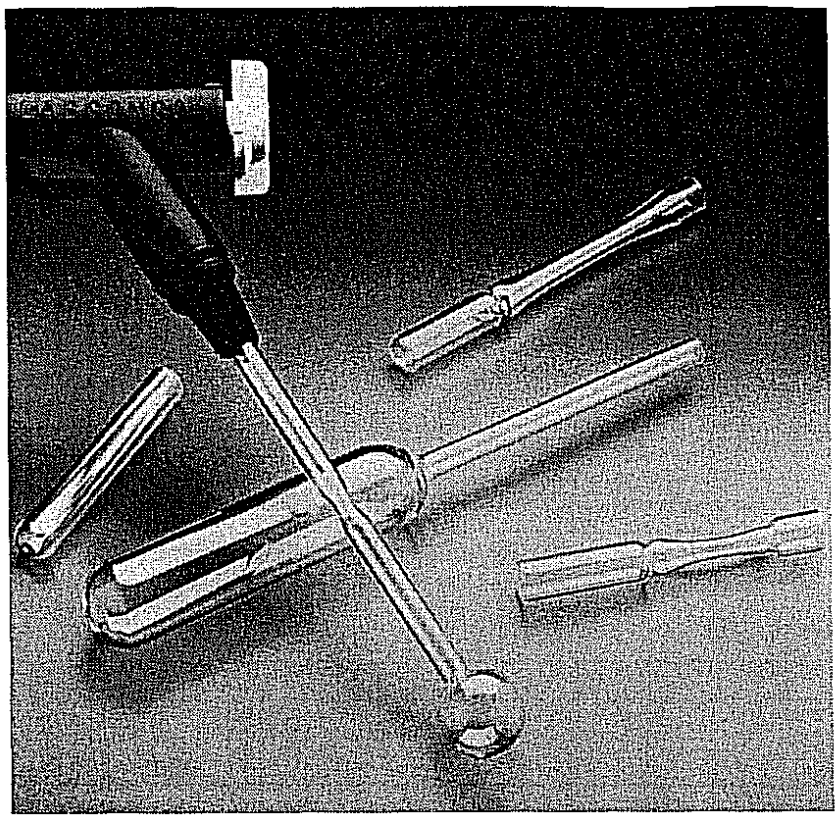
Threaded Vials

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



Size	Vials with Screw Caps	Stoppers
5 ml	77623	77622
10 ml	77626	77622

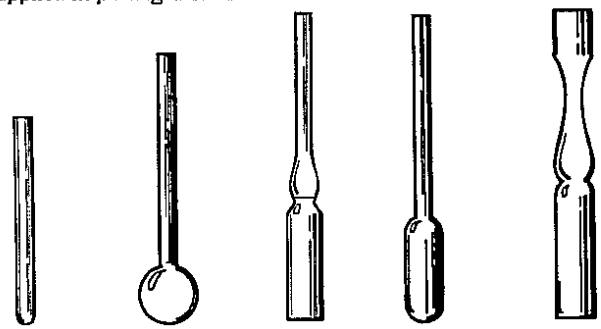
Ampules



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.

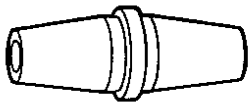


Size	Straight	Bulb-Type	Pre-Scored Flat Bottom	Round Bottom	Stoppering
1 ml	75727-10	75700-10	75706-10		
2 ml			75708-10		75723-10
4 ml	75728-10				
5 ml		75702-10	75710-10		
10 ml			75712-10	75716-10	
25 ml				75718-10	
50 ml				75720-10	

Accessories

Oxygen/Natural Gas Sealing Torch

75785 Torch specifically designed for flame sealing freeze dry ampules. Seals all types of heat-resistant glass. Shipping weight 3 lbs.

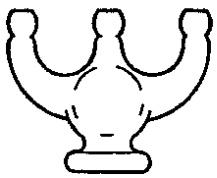


Adapter Valve

75934-01 Adapter connects ampules to ½" valves. Ten per package.

Stopper

75725-10 Stopper for stoppering ampules. 75723-10 100 per package.



Trident Adapter

77627 3-way adapter permits attachment of 3 ampules to a single ½" valve. Ampules are attached using ⅛" surgical tubing (not provided). Cavity in adapter body for cotton filter media helps prevent contamination between samples.

If you have any questions that are not addressed in this manual, or if you need technical assistance, please contact Labconco's Customer Service Department at either (800) 821-5525, or (816) 333-8811, between the hours of 8:00 a.m. and 5:00 p.m. Central Standard Time.