FreeZone® Stoppering Tray Dryer
Freeze Dry System

Model 79480

INSTRUCTION MANUAL

79486 Rev. F / ECO A894
Printed in U.S.A.

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Components Shipped

Carefully check the contents of the crate for damage that might have occurred in transit. Do not discard the crate 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 one the following:

Part Number	**Description**
79480-xx	Stoppering Tray Dryer
13364 or 13365	Power Cord 115V Power Cord 230V
75343	Cable, RS232
18807-20	Screw (4)
19065-21	Nut (4)
19114-16	Washer (8)
19100-16	Lock Washer (4)
79486	Instruction Manual

INTRODUCTION

General Description

The Labconco FreeZone® Stoppering Tray Dryer is designed for laboratory lyophilization procedure. It is CFC free so will not endanger the environment. Its three shelves, with 600 square inches of area, are ideally suited for either batch samples or bulk product processing. A microprocessor precisely controls the temperature of the heat transfer fluid that circulates throughout the channels within the shelves. In addition, samples may be automatically cooled or heated in a pre-programmed sequence to comply with the researcher's unique protocol.

Samples may be prepared for lyophilization by pre-freezing them directly on the shelves of the Tray Dryer. After lyophilization, serum bottles, vials or ampules may be stoppered under original vacuum on any of the three shelves using the unique pneumatic system. A Stoppering Tray Dryer is shown in Figure 1 below.

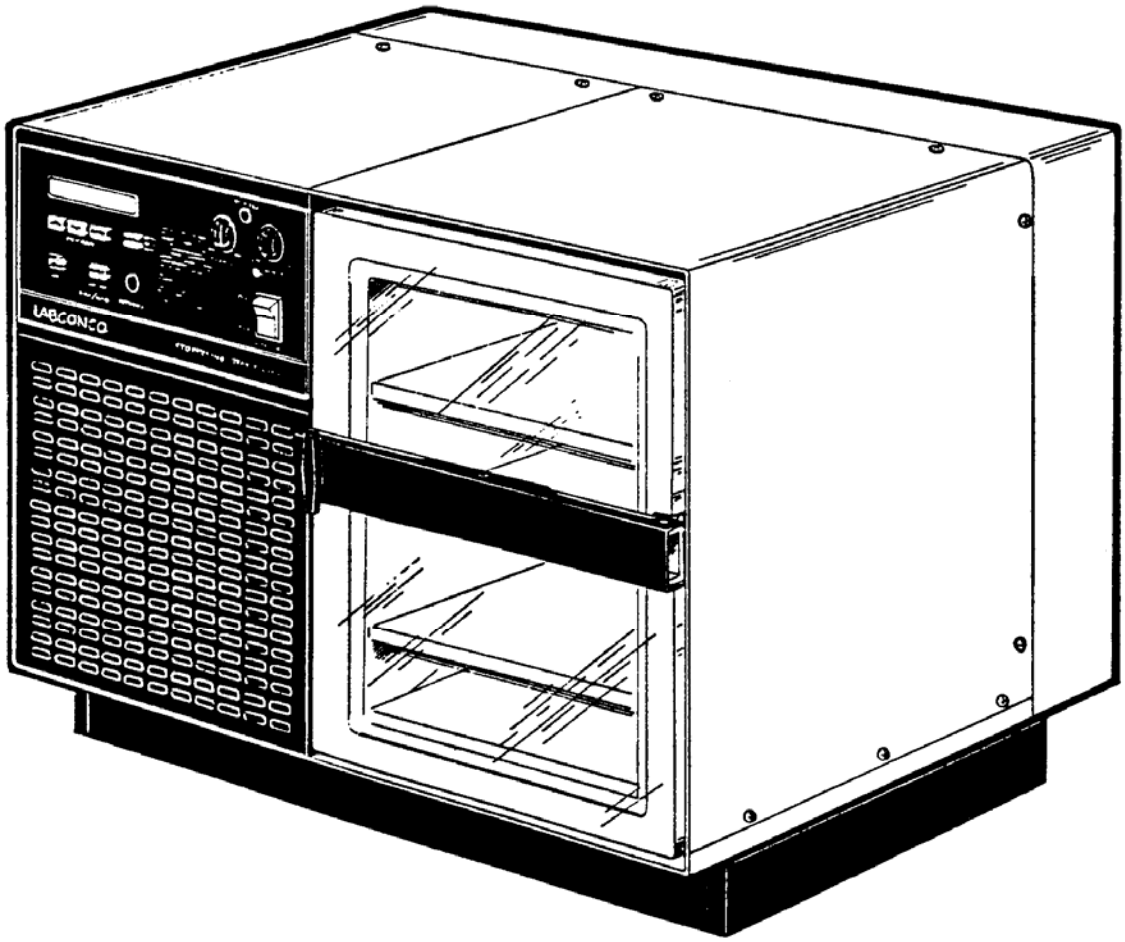


Figure 1

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 ice 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

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 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 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. 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.

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 lowering the shelf temperature 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.

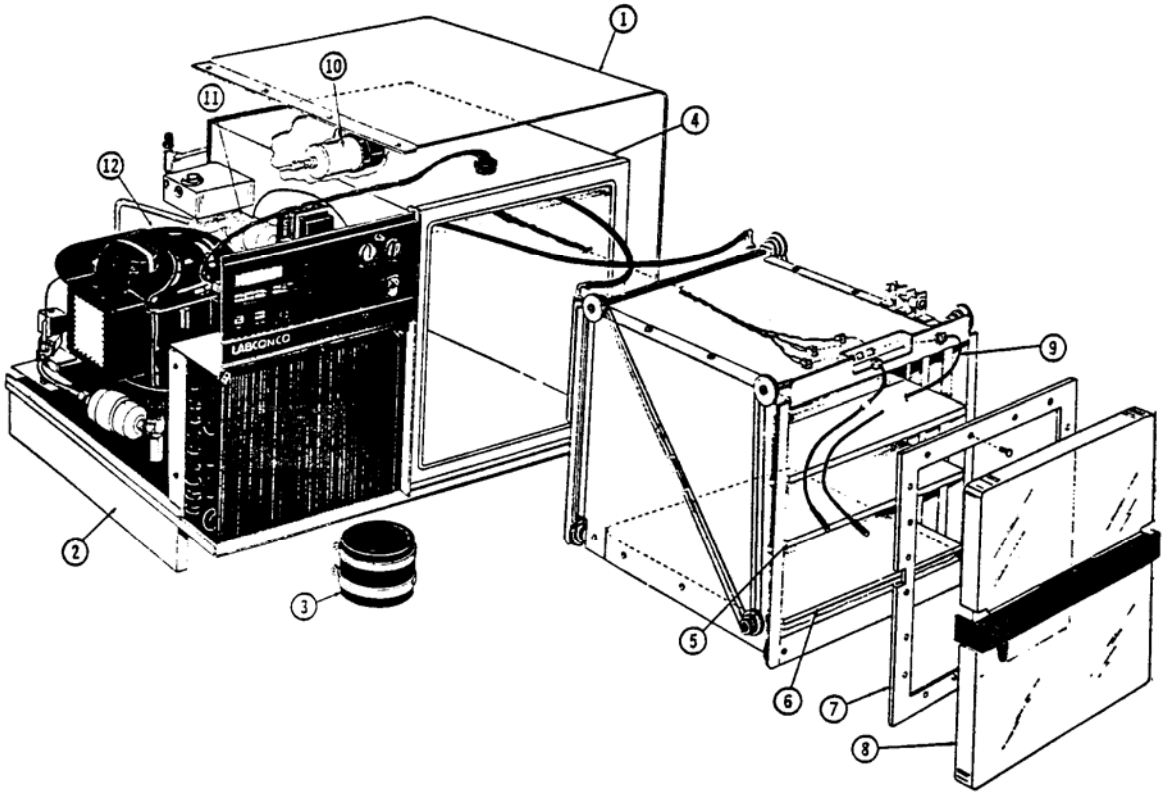


Figure 2

Component Identification (See Figure 2)

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

(2) **Stand.** The stand mounts the Stoppering Tray Dryer to the Base Unit.

(3) **Vacuum Coupling.** A neoprene hose connects the Stoppering Tray Dryer to the condenser and vacuum system of the Base Unit.

(4) **Vacuum Chamber.** The welded chamber is constructed from heavy gauge stainless steel for high strength and corrosion resistance.

(5) **Sample Shelf.** Three temperature controlled processing shelves are provided.

(6) **Stoppering Mechanism.** The built in pneumatically activated mechanism moves the 3 shelves to provide positive stoppering of sample vials.

(7) **Door Gasket.** The neoprene gasket forms a leak tight seal between the vacuum chamber and the door.

(8) **Chamber Door.** The door is clear acrylic to provide good visibility into the chamber.

(9) **Sample Temperature Probe.** Three probes are supplied to monitor the temperature of samples.

(10) **Heater.** A high capacity heater is used to modulate the temperature of the heat transfer fluid through the shelves.

(11) **Circulation Pump.** A pump is used to circulate heat transfer fluid through the shelves.

(12) **Refrigeration Module.** A capillary type refrigeration system is used to cool the heat transfer fluid that circulates through the shelves.

INSTALLATION

Preparation

FreeZone Stoppering Tray Dryers are designed to operate with the following Freeze Dry Systems.

6 Liter Benchtop	Model 77520-xx
6 Liter Console	Model 77530-xx & 77535-xx
6 Liter Console with Cascade Refrigeration System	Model 79340-xx
12 Liter Console	Model 77540-xx & 77545-xx
12 Liter Console with Cascade Refrigeration System	Model 79600-xx
18 Liter Console	Model 77550-xx & 77555-xx

These systems must first be prepared for operation as explained in their instruction manuals.

Assembly (See Figure 3)

The following tools are required to install the Stoppering Tray Dryer onto the Base Unit: Flat blade screw driver or 5/16" socket, and a 7/16" wrench or socket.

Remove the four plastic hole plugs from the work surface of the Freeze Dry System on which the Tray Dryer is to be mounted.

Remove the large sealing washer that is over the 3 inch port on the top surface of the base unit if your base unit has one in place.

Make sure the lower clamp provided on the vacuum coupling opposite the end connected to the Tray Dryer chamber is loose. Secure this clamp with tape while mounting the Tray Dryer.

Lift the Tray Dryer into place on your Freeze Dry System while fitting the vacuum coupling over the manifold port and aligning the four mounting holes in the Tray Dyer support stand with the four holes in the Freeze Dry System's work surface.

NOTE: Do not lift by the door or disturb it. Do not lift by the junction box in the rear.

Install the four bolts, nuts, lock washers and washers provided (in a bag in the Tray Dryer's chamber). Remove the tape securing the lower clamp on the vacuum coupling and slide down over manifold connecting port. Orient the clamp screw for easy access and tighten the clamp to provide a leak-free connection.

Remove the power cord and the packaging materials from inside the chamber.

The Tray Dryer is now installed and must be tested to make certain the system is free of leaks. To test, turn on the base unit refrigeration and allow the temperature to reach –40°C or lower. Close the door of the Tray Dryer and make sure the Stoppering Control is in the "LOWER" position and the Vac Release control is in the "CLOSED" position. Start the vacuum pump and monitor the vacuum gauge. The vacuum on the base unit should reach 133 x 10^{-3} mBar within 30 minutes and should achieve an ultimate vacuum of 35 x 10^{-3} mBar or lower within 18 hours.

If 35 x 10^{-3} mBar cannot be achieved, consult the troubleshooting section of this manual and of the manual supplied with the Freeze Dry System.

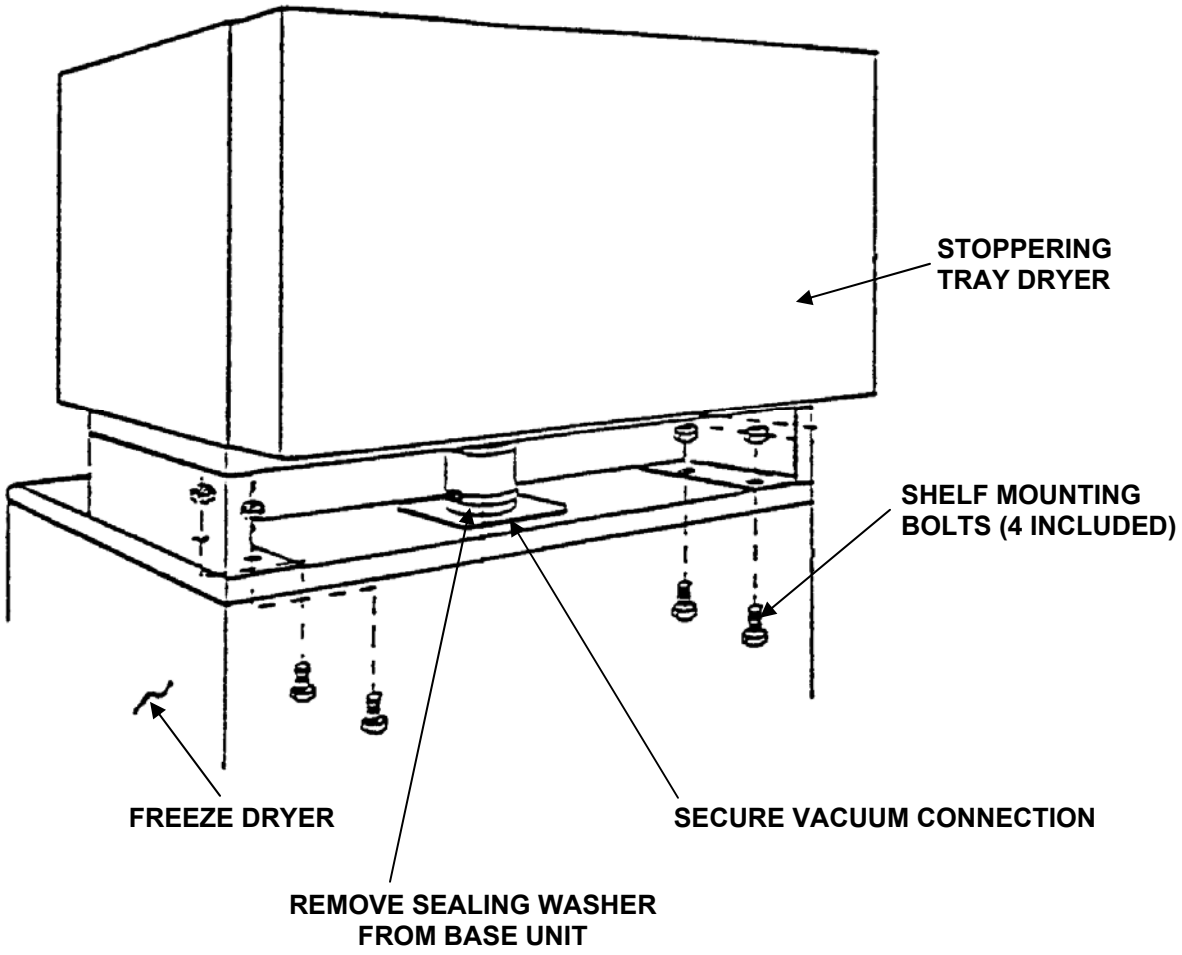


Figure 3

Utility Connections

Models 79480 and 79480-02 should be plugged into an electrical outlet rated at 115 VAC, 60 Hz, single phase, 20 amps. Model 79840-01 should be plugged into an electrical outlet rated at 230V, 50 Hz, single phase, 10 amps.

CAUTION: When the appropriate power cord is plugged into the power receptacle on the rear panel of the tray dryer, the clamp on this tray dryer receptacle should be tightened to prevent this cord from accidentally being switched with the freeze dryer cord located underneath the tray dryer. (This freeze dryer may require different mains A.C. voltage and switching these power cords may cause damage.)

Location

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

General Precautions

Never attempt to perform any maintenance work without first disconnecting the Stoppering Tray Dryer from its power supply.

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

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

Heat Transfer Fluid Precautions

The fluid's name and manufacturer are:

Name: Lexol 408M
Manufacturer: Santa Barbara Chemical Co.
927 Indio Muerto
Santa Barbara, CA 93140
805-963-7793

WARNING: The fluid used for heat transfer in this system is combustible and hazardous. Leaks and spills should be attended to immediately.

Handling and Storage Precautions – Dirty Solvent: Store in accordance with all applicable regulations. Tighten bungs and store in a cool area.

Precautions if Material is Released or Spilled: Spills should be contained immediately. Spills may be soaked up with absorbent materials, placed in closed containers, labeled, stored and disposed of properly. Persons performing this work should wear adequate personal protective equipment and clothing.

Disposal of Non-Recyclable Solvents: Dispose of in accordance with all federal, state, and local health and pollution regulations. Follow same guidelines as used when disposing kerosene.

Heat Transfer Fluid First Aid Procedures

Eye Contact: Immediately flush eyes with fresh water for at least 15 minutes. If irritation persists, get medical attention.

Skin Contact: Wash contaminated areas with soap and water. Remove contaminated clothing and footwear. Wash clothing before reuse. Discard footwear, which cannot be decontaminated. Medical attention may be required.

Inhalation: Remove patient to fresh air. If breathing stops, give artificial respiration, preferably mouth to mouth. Oxygen may be used if available. Get medical attention immediately, if required.

Ingestion: Get medical attention immediately.

Operation Checklist

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

(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 and the Stoppering Tray Dryer door gasket to remove any dirt and contaminants that could cause a vacuum leak. Vacuum grease is not required on the gaskets to obtain a proper vacuum seal.

(4) If the system contains the accessory support stand with valves, 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.

(5) Make sure that the Stoppering Control is in the "OFF" position and the Vac Break control is in the "CLOSED" position.

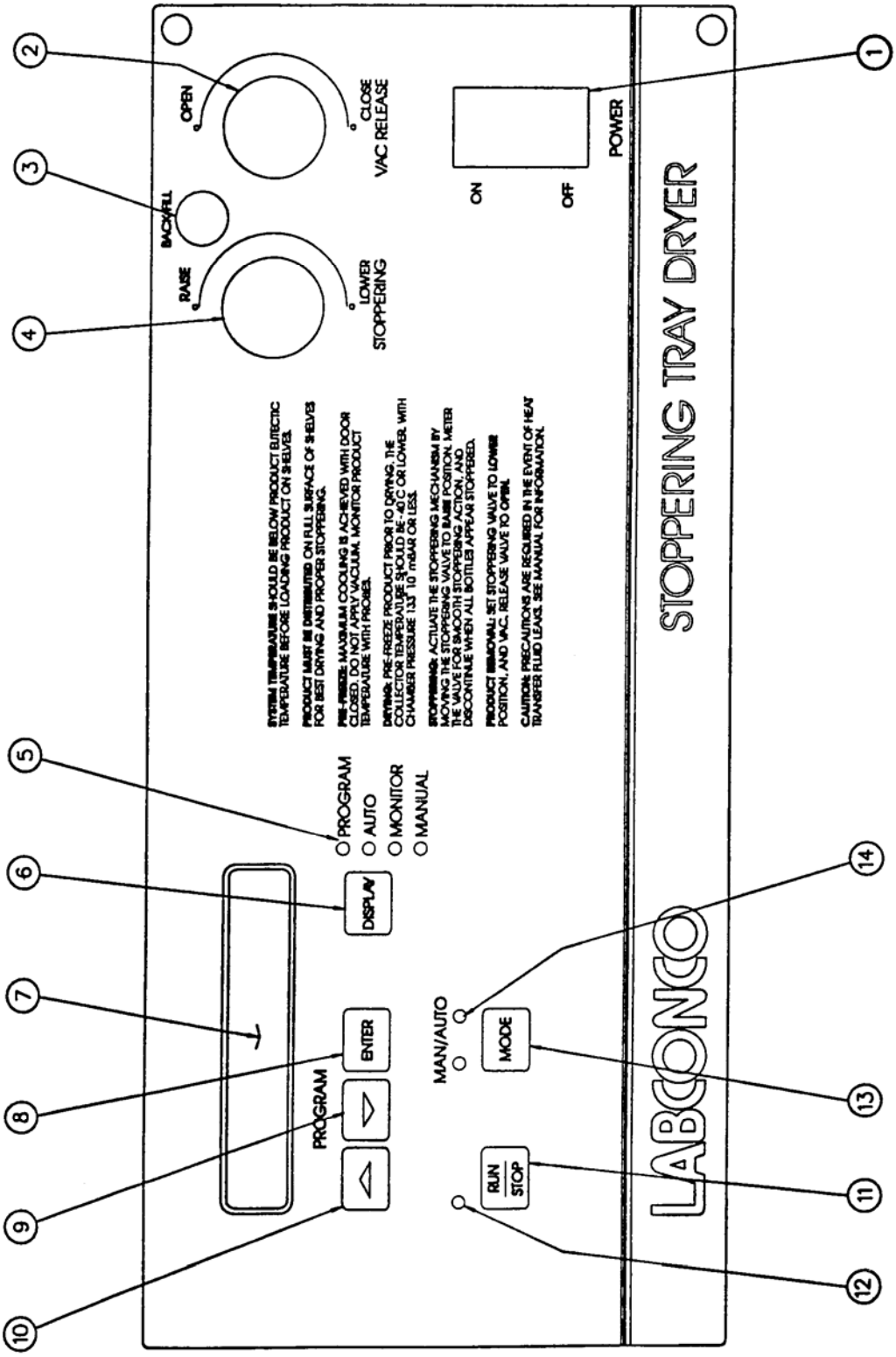

STOPPERING TRAY DRYER
LABCONCO
OPEN
CLOSE
VAC RELEASE
BACKFILL
RAISE
LOWER
STOPPERING
ON
OFF
POWER
PROGRAM
AUTO
MONITOR
MANUAL
DISPLAY
ENTER
MAN/AUTO
MODE
RUN
STOP
1
2
3
4
5
6
7
8
9
10
11
12
13
14

Figure 4

Control Panel Identification (See Figure 4)

(1) **Power Switch.** Turns all power to Tray Dryer on or off.

(2) **Vacuum Release.** Vents the chamber so the chamber door can be opened. This control can also vent gas into the chamber when the gas is properly connected to the backfill port.

(3) **Back Fill.** A regulated tank of gas may be connected to the port to allow the introduction of gas into the chamber during freeze drying. The port accepts 1/8" tubing.

NOTE: Ethylene Oxide is not recommended for use in this Tray Dryer for decontamination because of its hazardous and corrosive properties.

(4) **Stoppering.** Controls the stoppering up and down movement. The mechanism will function only while the chamber is under vacuum. The stoppering action should be closely monitored when operating this control.

(5) **Display Indicators.** Amber lamps indicated which display "screen" is shown.

(6) **Display Selector.** Changes format of display from "monitor" to "auto" to "manual" to "program" screen.

(7) **Display.** Displays all necessary programming and operational data. Provides prompts to aid in programming.

(8) **Enter Switch.** Used in programming to enter a selected set point into memory.

(9) **Decrease Switch.** Used in programming to decrease a parameter set point.

(10) **Increase Switch.** Used in programming to increase a parameter set point.

(11) **Run/Stop Switch.** Initiates the start or stop of the lyophilization process.

(12) **Run/Stop Indicator.** Amber lamp burns steady while freeze drying is in progress and turns off if either the programmed cycle is completed or the process is terminated in mid cycle. The amber lamp flashes if freeze drying is in progress and an out of specification condition exists.

(13) **Mode Selector Switch.** Selects the mode of operation – either manual or automatic.

(14) **Mode Indicator.** Amber lamp indicates whether the control is set to operate either in the automatic or manual mode.

Manual Control Operation

(1) Turn the Power switch On. The display will become active.

PROGRAM NUMBER: SELECTED 1

(2) Push the Display button until the Manual LED lights. This will cause the manual display screen to be shown with the previously entered set point temperature.

SET POINT TEMP –30°C

(3) If the set point needs to be changed, press the Increase or Decrease button until the desired set point temperature is displayed.

(4) Press Enter. If Enter is not pressed within 10 seconds, the set point will revert to the previously entered set point temperature.

(5) Press Mode button until the Manual LED lights.

(6) Press Run/Stop button. The amber LED by the button will light and the refrigeration system and/or heater will operate.

(7) To change the set point temperature in the middle of a run, repeat steps 2, 3 and 4. The system will adjust to the new temperature set point.

(8) To monitor system operation, press Display until the Monitor LED lights. The display will simultaneously show system temperature, vacuum and three sample temperatures if sensors were plugged into their jacks at the front of the chamber and inserted into sample vials. If sensors are not plugged into their jacks, the probe temperature display will show "LIM".

The segment number will always indicate "M" while operating in the manual mode. Segment numbers are used only in the automatic mode to identify portions of the programmed cycle. Temperatures are displayed as °C and vacuum is displayed as 10^{-3} mBar. Above 3000 x 10^{-3} mBar the display will show "HI" vacuum. System temperature rather than probe temperature is the parameter that is regulated by the controller.

P1	PRB	1=XX	2=XX	3=XX
TMP=XX		SEG=M	VAC=HI	

XX is temperature in Celsius.

(9) To stop, push Run/Stop button, which will turn off the amber LED over the switch, the refrigeration system and the heater. To turn off the entire system, turn the power switch off.

Automatic Control Operation

The Stoppering Tray Dryer is equipped with a microprocessor based controller that permits temperature to be programmed using as many as five different segments. Each segment consists of a temperature ramp function and a temperature hold function. There are five programs of 5 segments each that store the settings. One of the five may be selected by pressing the DISPLAY switch until the PROGRAM LED lights. Press the UP/DOWN keys to select the desired program, and then press "ENTER." The display will change to AUTO showing the parameters for this program. The ramp allows the temperature of the sample to be increased or decreased at any desired rate within the capacity of the heating and cooling systems of the Stoppering Tray Dryer.

A Stoppering Tray Dryer without samples on shelves is capable of cooling at a rate of approximately .5°C/minute and can heat at approximately 1.5°C/minute.

When the desired temperature is achieved, the hold function will maintain that temperature for the programmed length of time. The microprocessor control has a built in memory of the last entered program to allow the identical protocol to be repeated by simply pushing the RUN button. A typical 3 segment program is shown in Figure 5.

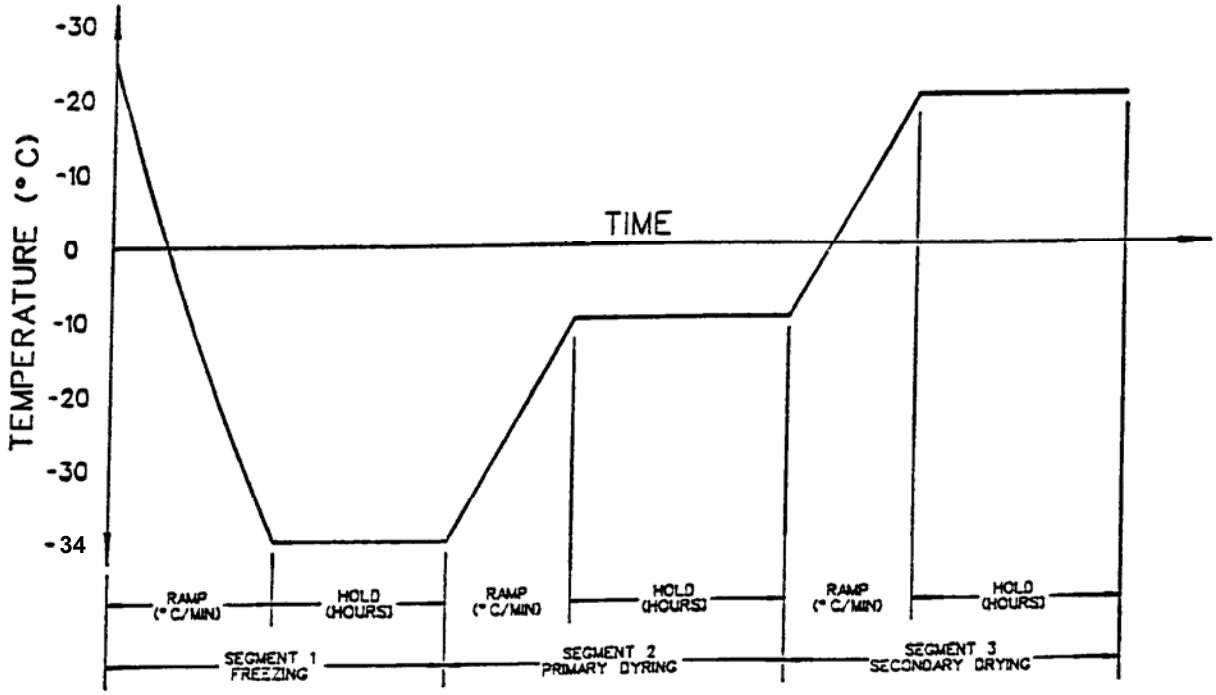


Figure 5

Automatic Start-up of Freeze Dryer Vacuum

At the end of segment 1 hold, if the Tray Dyer is connected to the Freeze Dryer base unit, the vacuum provided by the Freeze Dryer will start automatically. The Freeze Dryer base unit should have the refrigeration started in manual mode to allow it to reach temperature while the Tray Dryer is processing segment 1 of the program. (Do not start the Freeze Dryer base unit's refrigeration using automatic mode, this will not allow the Tray Dryer to start the vacuum on the Freeze Dryer). Connect the Tray Dryer to the Freeze Dryer with cable #75343 (this cable is shipped with the Tray Dryer). One end of the cable plugs into the 4 pin connector on the back of the Tray Dryer on the junction box in the lower right hand corner of the unit (when viewing the back of the unit), and the other end of the cable plugs into the 4 pin connector on the back of the Freeze Dryer in the upper right and corner of the unit (when viewing the back of the unit). If your Freeze Dryer does not have a 4 pin connector in the upper right hand corner on the back, then connect the Tray Dryer to the Freeze Dryer with cable #75321 (this cable may be obtained from Labconco by contacting the Product Support Department).

Programming

The Tray Dryer will store up to five programs numbered 1 through 5. The five programs, once programmed, will be retained in memory. To program a run, select the program number that you want to use and enter the parameters as follows.

Turn the Power switch to the ON position. The LCD system Status Display will show:

```
PROGRAM NUMBER:
SELECTED          1
```

NOTE: Values shown in this example are for reference only. The actual value will depend on the stored program.

This display shows that Program Number 1 will be used in the Auto Run mode. To select different programs, press the UP or DOWN key to change program number (Programs 1 through 5). When the desired program number is displayed, press the ENTER key to access the program.

The System Status Display will change to display the parameters that will be used for this program. The Display Mode will change to AUTO.

```
P1      SEG 1      RAMP    00.0°C/MN
HOLD –34°C                 TIME 00.0
```

If any of the parameters are changed, the ENTER key must be pressed for the new value to be stored. If the ENTER key is not pressed within 10 seconds after the last parameter adjustment, the

value will return to the previously stored value. The flashing parameter name indicates the parameter that will be changed. Pressing ENTER only will advance to the next parameter.

After the AUTO RUN cycle is started, segments with a value greater than the segment running may have their parameters changed. Only the selected program may be modified. To modify a different program, the system must be stopped and the desired program selected.

Starting the Freeze Dry Cycle

After the desired cycles have been programmed, push the mode button to SELECT-AUTO. Push the RUN/STOP key to start the program running. The RUN indicator will light. The System Status Display will change as follows and the Display Mode will change to MONITOR mode.

During the RAMP cycle of the active segment, the Status Display will be as follows:

```
P1      PRB 1=28     2=29       3=28
TMP=30       SEG=1R      VAC=0033
```

P1 -indicates what program is selected
PRB -shelf probes for shelf 1, 2 and 3
TMP -system temperature
SEG -indicates what segment is active and ramping temperature
VAC -system vacuum level

During the HOLD cycle of the active segment the Status Display will alternately be as follows:

```
P1      PRB 1=28     2=29       3=28
TMP=30       SEG=1H      VAC=0033
```

P1 -indicates what program is selected
PRB -shelf probes for shelf 1, 2 and 3
TMP -system temperature
SEG -indicates what segment is active and holding temperature
VAC -system vacuum level

```
P1      PRB 1=28     2=29       3=28
TMP=30       TR=4.55      VAC=0033
```

TR -indicates the amount of time remaining in the present segment. If time is 10.0 hours or more, the time is displayed in 1/10 hours. If time is less than 10.0 hours, the time is displayed in 1/100 hours.

Remote Monitoring – Using the "Recorder Jack" connector on a Labconco Freeze Dryer

When the Labconco Tray Dryer is connected to a Labconco Freeze Dryer (as detailed in "Automatic Operation", the Stoppering Tray Dryer's status may be monitored by any device that can receive standard ASCII data via RS232 interface level. The status output is a broadcast only mode. The system status is broadcast every ten seconds. The following detail describes the data content.

Data Type: ASCII
Data Range: 2400 baud – 8 bit – no parity – 1 stop bit
Data Packet Content:

1. :< lead in characters to identify status

2. PROG= (1 thru 5) the number of the selected program or
   STNDBY indicates the system is not running

3. SEG= (1R thru 5R) current active segment, system is RAMPING temperature
   (1H thru 5H) current active segment, system is HOLDING temperature

4. TRM= 0000 thru 9999 in 1/100ths hours
   INDF segment has been set to indefinite hold time
   RAMP segment is ramping temperature

5. SYS= System temperature in degrees Celsius
   LIM system temperature is greater than allowable range

6. PRB1, PRB2, PRB3= Shelf temperature in degrees Celsius
   LIM probe is disconnected or the system temperature is greater than allowable range

7. VAC= Vacuum level in units of 10^{-3} millibar
   9999 level is beyond sensor range

8. > (packet end flag) (newline character) (linefeed character)

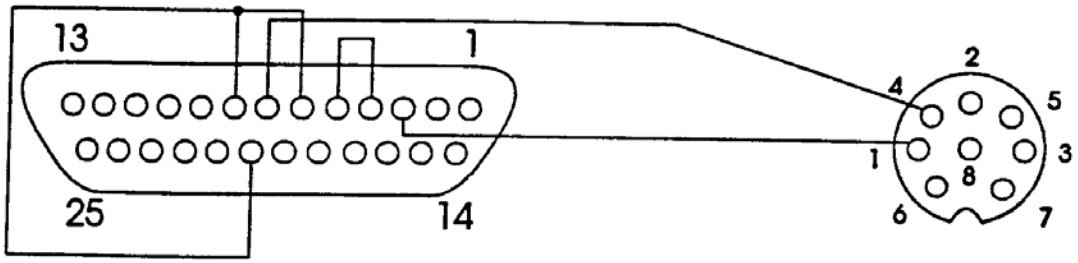
Connections for RS232 monitoring:

NOTE: The RS232 signals are available from the front panel "Recorder Jack" connector of a Labconco Freeze Dryer. The Freeze Dryer must be connected to the Tray Dryer using cable #75343 or #75321.

Connection diagrams for RS232 interface from Labconco equipment to a computer that supports either a 25 pin or 9 pin D-sub male connector for serial communication.

Check your computer to see which type of serial port is provided, then wire a connecting cable according to the appropriate diagram below:

1. Computer with a 25 pin male serial connector:



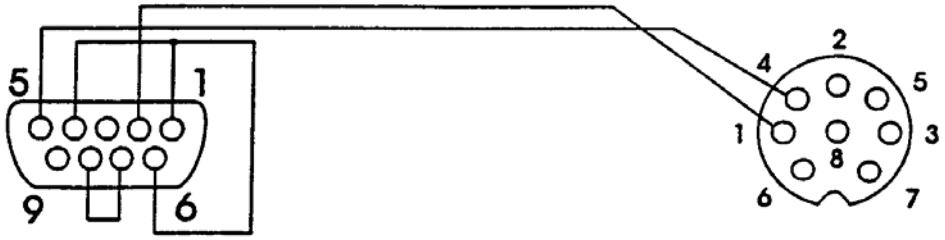
View from back of computer

View from front of Labconco Freeze Dry equipment

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)

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

2. Computer with a 9 pin male serial connector:



View from back of computer

View from front of Labconco Freeze Dry equipment

1 – DCD (Data Carrier Detect)
2 – RX (Receive Data)
3 – TX (Transmit 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)

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

Changing the Program Parameters in the Middle of a Run

(1) Press Display to obtain Monitor screen. Note current operating segment.

(2) Press Display to obtain Auto screen.

(3) Enter a segment number that will occur after the current segment that is running. The presently running segment cannot be modified while the system is running.

(4) Modify as required.

(5) Press Enter.

Stopping the Freeze Dry Cycle

1. At the end of the last programmed segment, the freeze dry system will automatically stop. The refrigeration system and the heater will shut off. The display will show Segment "E" (End).
2. To stop before the completion of the last programmed segment, press Run/Stop. The amber lamp will turn off as will the refrigeration system and heater. The display will remain active but time functions will stop operating.
3. The entire system can be shut off by pressing the Power switch.
4. If the Power switch is shut off prior to stopping the cycle with the Run/Stop switch, when the Power switch is again turned on, the system will resume operation and attempt to complete the programmed cycle from the point at which it was shut off. The display mode indicator "PROGRAM" will flash to indicate power loss during programmed run.

Monitoring the System Operation

Press the Display button until the monitor LED lights. The display will show system temperature, system vacuum and 3 sample temperatures if sensors were plugged into their jacks at the front of the chamber and inserted into sample vials. If sensors are not plugged into their jacks, the probe temperature display will show "LIM". The temperatures are displayed as °C while the vacuum is displayed 10^{-3} mBar. Above 3000 10^{-3} mBar the display will show "HI" vacuum.

Shelf Spacing Adjustment

Prior to loading the shelves with the product to be freeze dried, adjust the shelves to the 3-shelf, 2-shelf or 1-shelf position. It is best to observe the shelf supporting mechanism and practice while reading these procedures. In the 3-shelf position, the spacing between the shelves will accommodate a serum bottle with the stopper raised up to a maximum height of 75 mm (2.9 inches). Minimum serum bottle height with lower stopper for bottles on 3 shelves is 38 mm (1.5 inches).

For a 2-shelf system, grasp the top shelf and raise it until it latches in place. Then raise the middle shelf approximately 1 inch until it latches in a position to allow a two equally spaced shelf system. The spacing between shelves will accommodate a bottle with the stopper raised up to a maximum height of 107 mm (4.2 inches). Minimum serum bottle height with lowered stopper for a 2-shelf system is 56 mm (2.2 inches).

For a single shelf system, raise both the top and middle shelves until they latch in place in their top positions. The spacing for a single shelf system will accommodate a bottle with raised stopper up to a maximum height of 196 mm (7.7 inches), and the minimum height of a bottle with lowered stopper for successful stoppering is 114 mm (4.5 inches).

To unlatch the shelves, press the latch protruding from the side of the shelf support structure and move the latch until it clears the shelf and allows the shelf to drop. The top shelf has one latched position, the middle shelf has two latched positions, and the bottom shelf should not latch in any position.

Shelf Loading

The stoppering mechanism is capable of generating a very strong force, which can damage the shelves or mechanism. Therefore, it is important to distribute the serum bottles to be stoppered evenly across the entire surface of each shelf.

Your Stoppering Tray Dryer has a unique system for keeping the shelves level and moving smoothly while stoppering. If a problem occurs during stoppering, the system is designed to flex a small amount to lessen the possibility of damage to the unit.

The stoppering action should be monitored by looking through the chamber door. Cease stoppering when all bottles appear stoppered or if a problem occurs. Distributing the serum bottles evenly on the shelves also aids in consistent drying of all serum bottles on each shelf.

Sample Freezing

Before the freeze dry process can occur, the products to be dried must be in a frozen state. This can be accomplished in a freezer separate from the Stoppering Tray Dryer or on the shelves in the Stoppering Tray Dryer. First the shelves should be adjusted to accept the size of the selected sample containers. Next, turn On the power switch and set the controls to cool the shelves. This is most simply done by setting the temperature in the manual mode as described on Page 17, although segment 1 in the automatic mode can also be programmed to cool the shelves. Close the chamber door. Load the samples onto the shelves after the system temperature is below the sample eutectic temperature. If desired, place one temperature probe in a sample vial on each shelf. The temperature can be monitored by pressing the Display button until the Monitor LED lights.

Freeze Drying

After the product is frozen, turn ON the FreeZone® Freeze Dry System base unit. Following the instructions for the unit, this may be accomplished in either the automatic or manual mode.

When the collector temperature is less than –40°C and the vacuum is less than 133 x 10-3 mBar, the manual mode set point temperature may be adjusted or the automatic mode program may be initiated. At no time during the primary drying phase should the product temperature be allowed to rise higher than the eutectic temperature.

The ice collecting coil temperature and the vacuum level should be monitored. Higher than desired collector coil temperature or vacuum levels will inhibit or ruin the freeze dry process.

Stoppering

The stoppering operation (when desired) is performed after the freeze dry process is complete. To stopper, move the Stoppering control toward the “RAISE” position. This action allows the actuator beneath the bottom shelf to inflate causing the bottom shelf to rise. The bottles on the shelf will then contact the middle shelf causing it to rise and the top shelf will eventually be contacted and rise. When all three shelves have raised and made contact with each other, stoppers will be pressed into the vials. Monitor the stoppering process by looking through the chamber door.

When all of the bottles appear to be stoppered, move the Stoppering control to the “LOWER” position. This opens the diaphragm to the vacuum pump, which deflates the diaphragm. Opening the vacuum release control also deflates the stoppering diaphragm. The Stoppering control should be left in the “LOWER” position when not stoppering.

Vacuum Break/Backfilling

To open the chamber door, the vacuum must be released. To release the vacuum, move the Vacuum Release control to the "OPEN" position and shut off the vacuum pump using the switch on the base unit.

Air enters the vacuum chamber through the Back Fill port. When the sound of air through the Back Fill port is no longer audible, the chamber door is ready to open. To backfill the chamber with a gas, connect a cylinder of the desired gas to the Back Fill port. The port will accept 1/8" tubing. The bottle must be equipped with a regulator set to 15 psi maximum. The gas can be metered with the Vacuum Release control and chamber pressure monitored with the freeze dry system's vacuum gauge.

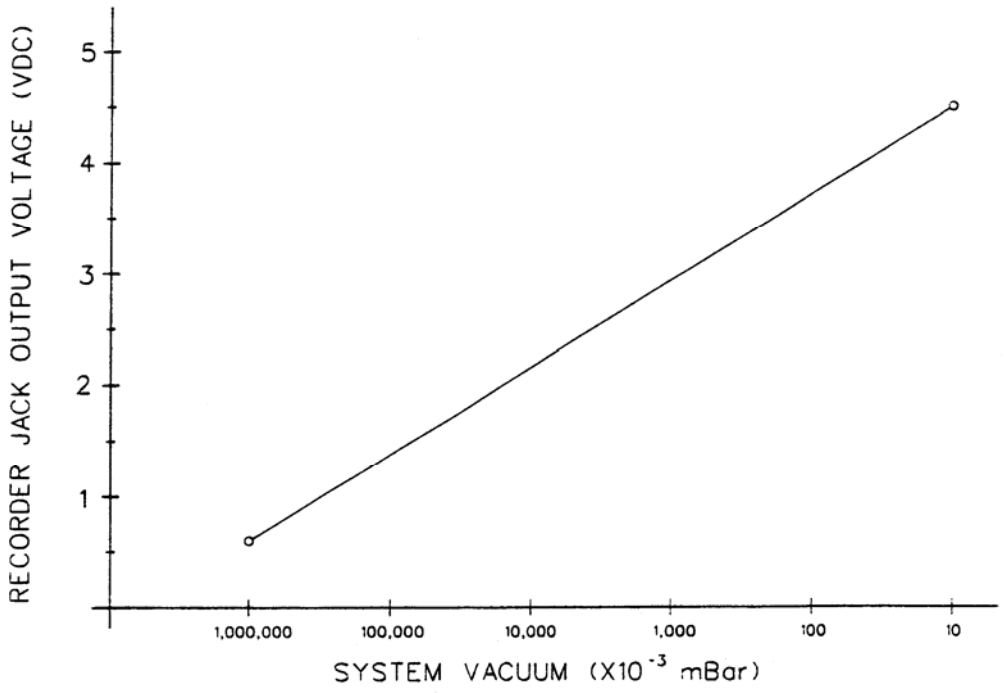
Recorder Jack – Located on the Rear Panel

The system temperature, 3 sample temperatures, vacuum level and segment number can be recorded during operation by connecting a recorder to the recorder jack on the control panel. The recorder jack is a DIN receptacle 8 pin 240°. The pin configuration and output is as follows:

Pin 1 – Common

Pin 2 – System Temperature – Output	40°C ≅ 4.600 VDC 0°C ≅ 4.016 VDC -34°C ≅ 3.520 VDC
Pin 3 – Sample Temperature #1 – Output	40°C ≅ 4.600 VDC 0°C ≅ 4.016 VDC -34°C ≅ 3.520 VDC
Pin 4 – Sample Temperature #2 – Output	40°C ≅ 4.600 VDC 0°C ≅ 4.016 VDC -34°C ≅ 3.520 VDC
Pin 5 – Sample Temperature #3 – Output	40°C ≅ 4.600 VDC 0°C ≅ 4.016 VDC -34°C ≅ 3.520 VDC

Pin 6 – Vacuum – This graph shows the approximate D.C. voltage output versus vacuum reading.



Pin 7 – Segment Number – Output

Prior to Start = O V DC
Seg 1 Ramp = .50
Seg 1 Hold = .75
Seg 2 Ramp = 1.00
Seg 2 Hold = 1.25
Seg 3 Ramp = 1.50
Seg 3 Hold = 1.75
Seg 4 Ramp = 2.00
Seg 4 Hold = 2.25
Seg 5 Ramp = 2.50
Seg 5 Hold = 2.75
Cycle Complete = 3.00

Pin 8 – Not Used

Warning System

Power Failure

If a power failure occurs while a run is in progress, the program indicator will flash when the power is restored. Once power is restored, the process will continue as programmed until completion. Turning the power switch Off cancels the flashing warning.

Temperature
Once the system temperature has stabilized for 20 minutes, if the manual set point temperature or automatic hold temperature varies more than ±2°C as measured by the system temperature sensor, the green Run indicator and the word “TEMP” on the display will flash until the end of the run.

Vacuum
Once the system vacuum has pulled down and stabilized at a point where it changes less than 20 x 10^{-3} mBar in 5 minutes, if the vacuum should decay more than 500 x 10^{-3} mBar, the green Run indicator and the word “VAC” on the display will flash until the end of the run.

ROUTINE MAINTENANCE SCHEDULE

Under normal operation, your Freeze Dry System 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 or close the purge valve if the base unit is equipped with a purge valve. The gas ballast must be open.

Monthly

(1) The rubber components on the freeze dry system 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 chamber door.

(3) Using a soft cloth, sponge or chamois and a mild, non-abrasive soap or detergent, clean the top, sides 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) The refrigeration system condenser should be cleaned once every 6 months. This aids in maintaining the proper air flow, which is essential to long life and peak performance of the Stoppering Tray Dryer. Access to the condenser requires removal of the two top screws which hold the front grille in place. The grille then is simply lifted free.

Cleaning on the refrigeration condenser face is best accomplished using a vacuum cleaner with brush attachment. More frequent cleaning is required if your unit is operated in a dirty environment.

(2) All monthly activities.

Decontamination

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

VACUUM LEAK DETECTION

The Freeze Dry System should achieve a vacuum of 133 x 10^{-3} mBar within 30 minutes and should achieve an ultimate vacuum of 35 x 10^{-3} mBar within 18 hours. This extended time interval may be necessary to allow all the components in the system to outgas. After components have outgassed, the pull down time will decrease. 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 System 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 manifold if so equipped 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 system 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. Refer to the vacuum pump manufacturer's instructions for further information.

(3) Check the collector chamber lid gasket and the Stoppering Tray Dryer door gasket for indentions, cracks or tear. 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.

(6) The Stoppering Tray Dryer chamber and collector chamber must be dry.

If any repairs are required on your Freeze Dry System, contact your local laboratory supply dealer or Labconco Corporation at 800-821-5525 or 816-333-8811. Repairs should be made by an authorized Labconco service agency.

Under a no-load condition in manual mode with the door closed and no vacuum, the shelves should reach –34°C in approximately 2 hours. This performance is based upon an ambient temperature of 24°C (75°F) at the rated voltage.

If any repairs are required on the refrigeration module, contact you local laboratory supply dealer or Labconco Corporation at 800-821-5525 or 816-333-8811. Repairs should be made by an authorized Labconco service agency.

Access to Mechanical Components

(1) To gain access to the refrigeration system, pump, tank, and the controller and control panel components, it is necessary to remove the cover on the left side.

(2) First remove the 10 screws, which hold the cover in place. Lift off the cover and set it aside. The wiring diagram label is on the inside of this cover.

(3) Additional access is available by removing the remaining 4 screws, which hold the rear panel in place, and lifting it off the unit.

Shelf and Stoppering System Removal

(1) The shelf and stoppering system may be removed from the chamber as an assembly for repairs if needed.

(2) Remove the Plexiglas door by taking out the two allen head screws located on the mounting frame of the cross bar.

(3) Remove the door gasket. Carefully pull loose all of the plastic fasteners (located around the periphery of the chamber) from the chamber. Leave the spacer blocks behind the gasket attached to the gasket.

(4) Place a support in front of the chamber and slide the shelf and stoppering system out approximately 2 inches.

(5) Loosen the clamp securing the stoppering diaphragm tube (located in the lower center at the back of the chamber) and remove the tube. Slide the assembly out of the chamber and onto the support.

(6) The assembly is now ready for repairs. Whenever possible, do not break the fluid system.

CAUTION: Read fluid precautions in this manual on page 11 and 12 when repairs concerning the fluid system are required.

(7) Reverse the removal procedures for installation of the shelf and stoppering system. Make sure the fluid inlet and outlet tubes are routed on top of the assembly.

Filling the Fluid System (See Figure 6)

(1) Make sure the Power switch is in the Off position.

(2) Remove the left cover.

(3) Remove the insulation and both caps from the fluid circulation valve, which is located directly behind the fluid reservoir (Item 1).

(4) Attach a flexible tube to the exposed port (service port). The port is 3/8" x 45° flare (Item 4).

(5) Remove the fluid reservoir cover (Item 2) and place the opposite end of the tubing into the fluid reservoir.

(6) Fill the reservoir slowly allowing the fluid to drain through the system. When the system appears full, prepare to start the circulation pump.

(7) Open the fluid circulation valve by completely "down-seating" (turn top valve stem completely clockwise) to direct fluid to by-pass through tubing to fluid reservoir.

(8) Activate the pump by moving the Power switch to the On position. The "Run/Stop" switch must be off. The fluid system will circulate with the fluid going through the add-on tubing, purging itself of air. Add fluid when needed to keep fluid in the reservoir. After the fluid stream is established, tilt the unit backward 1" for two minutes. Observe the fluid stream and repeat the tilt procedure if it is not free of bubbles.

(9) After the system is free of air, "up-seat" fluid circulation valve (turn valve stem completely counter-clockwise, closing the fluid/tubing by-pass).

(10) Set the controller to operate at 24°C (75°F) in the manual mode. Push the "Run/Stop" switch to start the system.

(11) When the system temperature stabilizes, add or remove fluid from the reservoir to the level indicated by the label.

(12) Apply vacuum to the unit and when the system is 133×10^{-3} mBar or less, install the cap on the tank.

(13) Remove the tubing. Replace the caps on the valve and replace insulation and covers.

Component Identification Illustration

1. Fluid Circulation Valve
2. Fluid Reservoir and Cap
3. Electrical Junction Block
4. Flexible Tubing

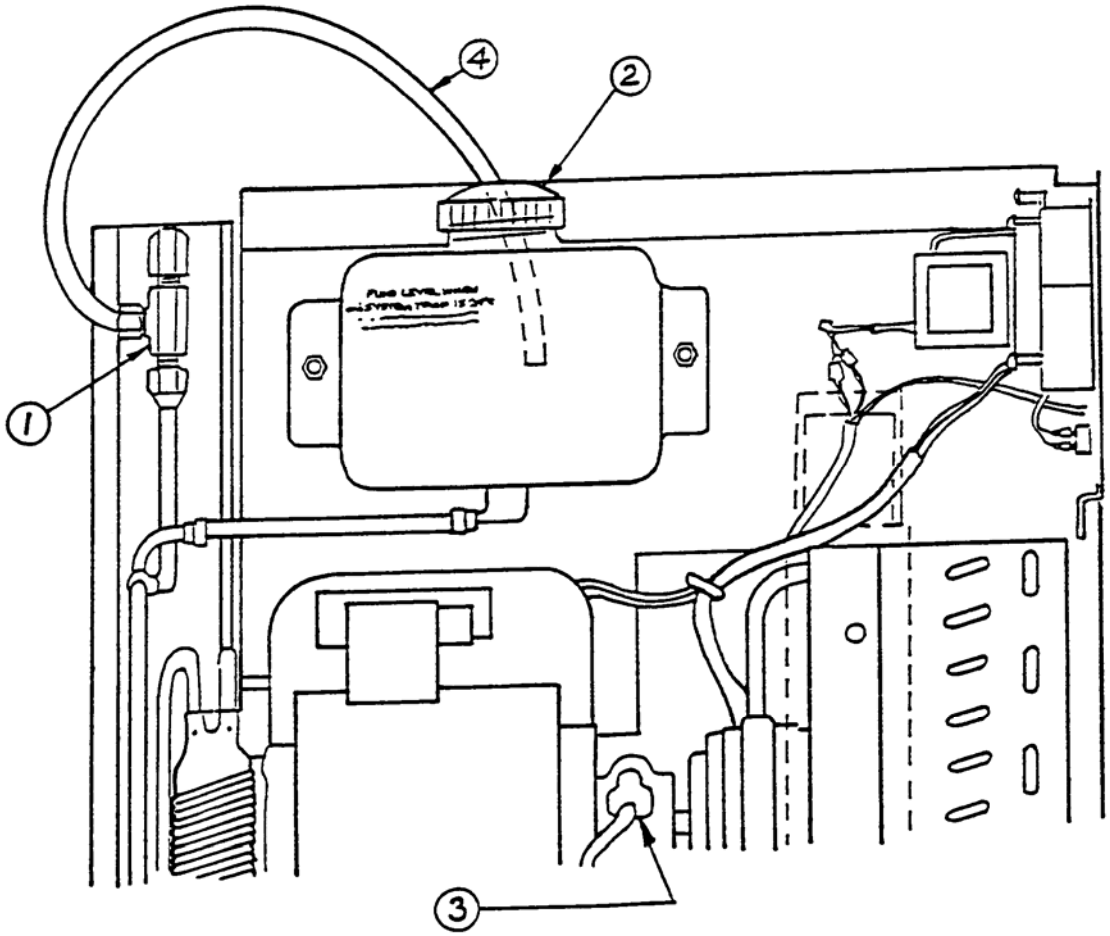


Figure 6

Serum Bottle Capacity of the Stoppering Tray Dryer

Size	Labconco No.	Shelf Capacity	No. of Shelves	Total Capacity
2 ml	75750-10	399	3	1197
3 ml	75752-10	296	3	888
5 ml	75730-10	255	3	765
5 ml	77623-10	255	3	765
10 ml	75732-10	195	3	585
10 ml	77626-10	255	3	765
20 ml	75734-10	132	3	396
30 ml	75736-10	86	3	258
50 ml	75738-10	72	2	144
100 ml	75740-10	42	2	84
125 ml	75742-10	36	1	36

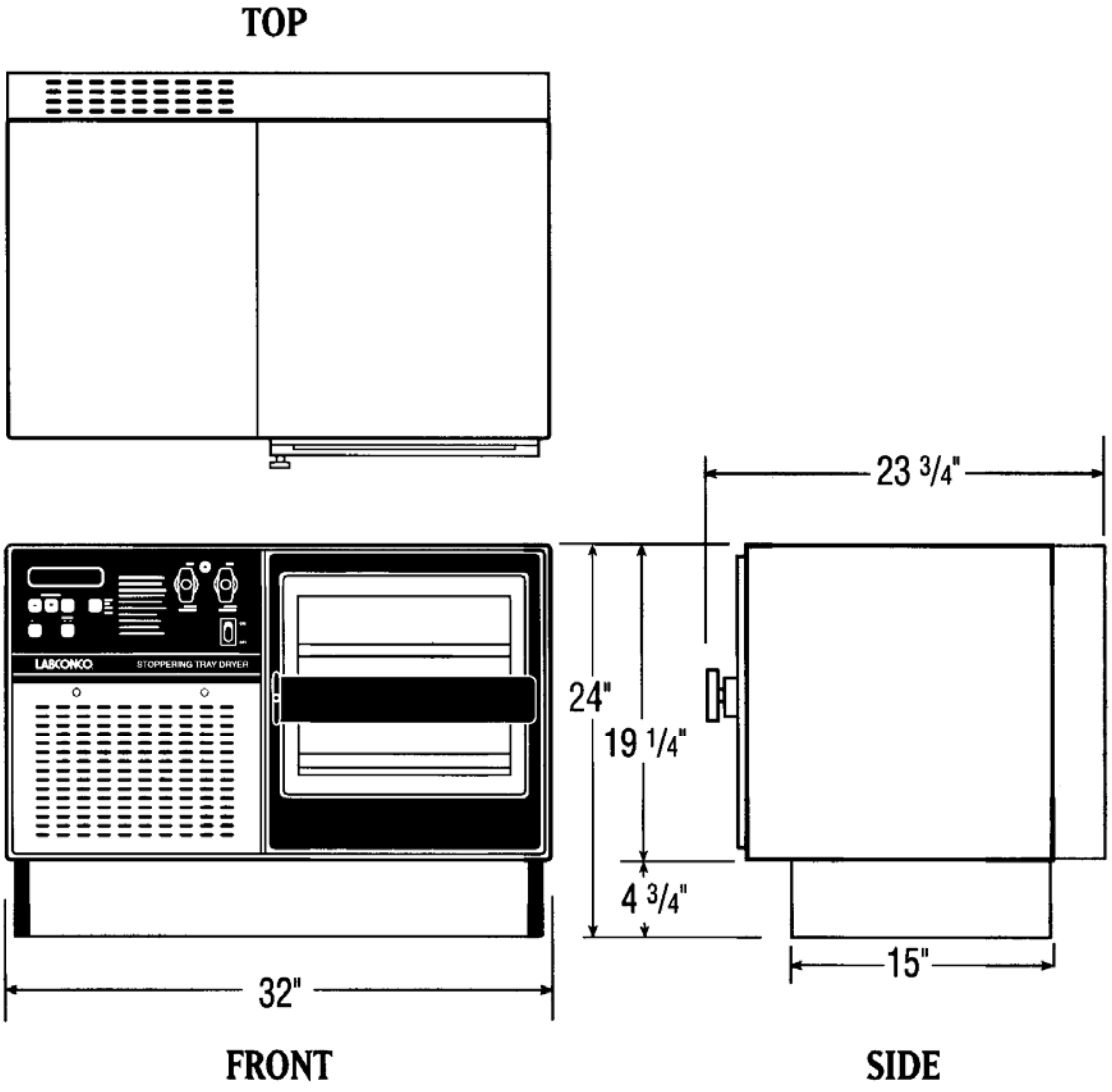


Figure 7

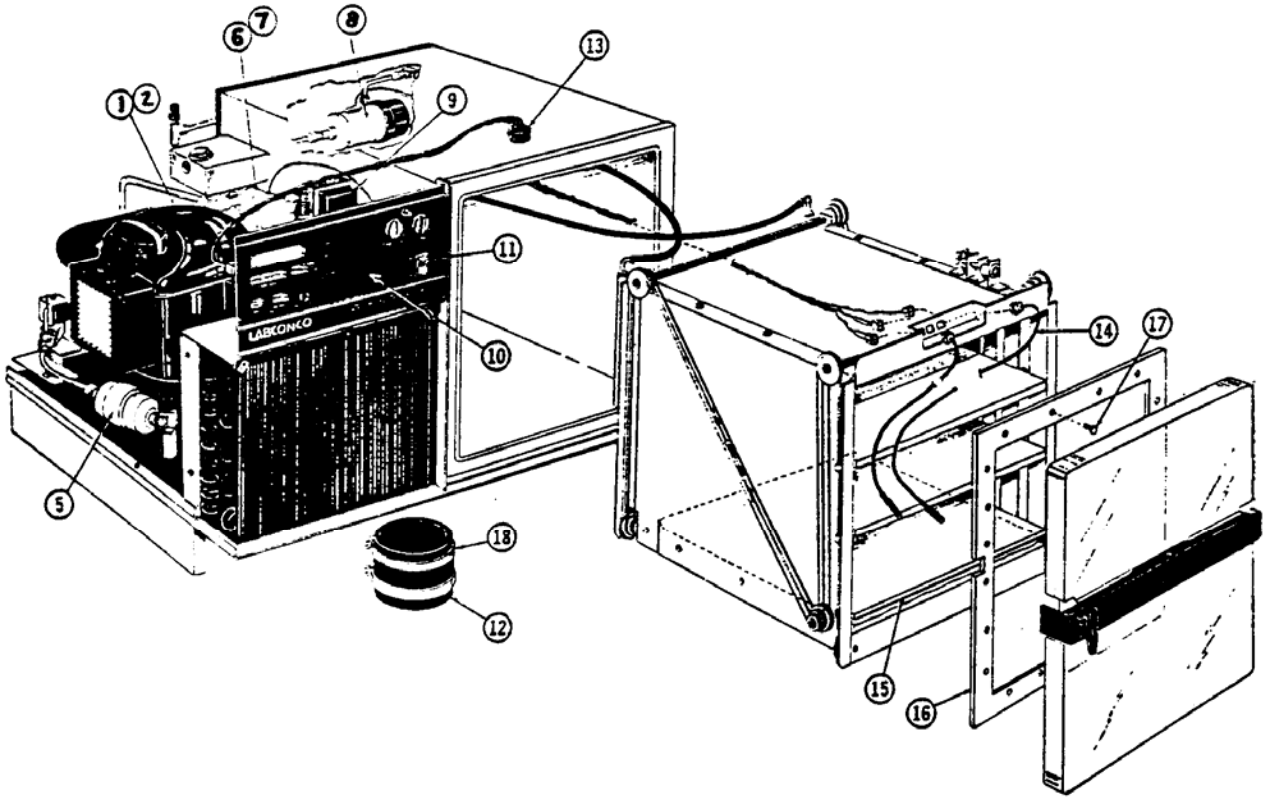


Figure 8

ITEM	QTY	PART NO.	DESCRIPTION
1	1	77440-00	Refrigeration Unit (115V)
1A	1	77441-02	Refrigeration Unit (230V)
2	17 oz.	76222-02	Refrigerant 69L
5	1	14895-00	Dryer – Refrigeration
6	1	75019-00	Pump (115V)
6A	1	75019-01	Pump (230V)
7	1 gal.	77944-00	Heat Transfer Fluid
8	1	75109-00	Heater (115V)
8A	1	75109-01	Heater (230V)
10	1	75280-00	Controller Panel Assembly (115V)
10A	1	75280-01	Controller Panel Assembly (230V)
11	1	13023-00	Switch
12	1	76352-00	Vacuum Coupling
13	1	79563-00	Bulkhead Harness
14	3	78645-00	Temperature Probe
15	1	77655-00	Diaphragm Assembly
16	1	77663-00	Chamber Gasket
17	20	19262-00	Clip – Gasket
18	2	19654-00	Hose Clamp
19	1	75343-00	Cable, RS232 (Not Shown)

ENVIRONMENTAL CONDITIONS

The Tray Dryer is designed to operate safely under the following conditions:

- Indoor use
- Altitude up to 2,000M (6,563 Ft.)
- Ambient Temperature 5°C to 40°C (41°F to 104°F)
- Maximum relative humidity 80% for temperatures up to 31°C (88°F) decreasing linearly to 50% relative humidity at 40°C (104°F)
- Main supply voltage fluctuations not to exceed ±10% of the nominal voltage
- Transient over – voltages according to installation category II (over – voltage categories per IEC 1010)
- Pollution degrees 2 (Normally only non-conductive foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.), in accordance with IEC 664

MODEL NUMBER	ELECTRICAL REQUIREMENTS
79480-00	115V – 60 Hz 1 Phase – 18.8 Amp
79480-01	230V – 50 Hz 1 Phase – 9.3 Amp
79480-02	115V – 60 Hz 1 Phase – 18.8 Amp

All ratings include only the Stoppering Tray Dryer without auxiliary equipment.

Models 79480-00 and 79480-02
(115 VAC, 60 Hz, 1 Phase)

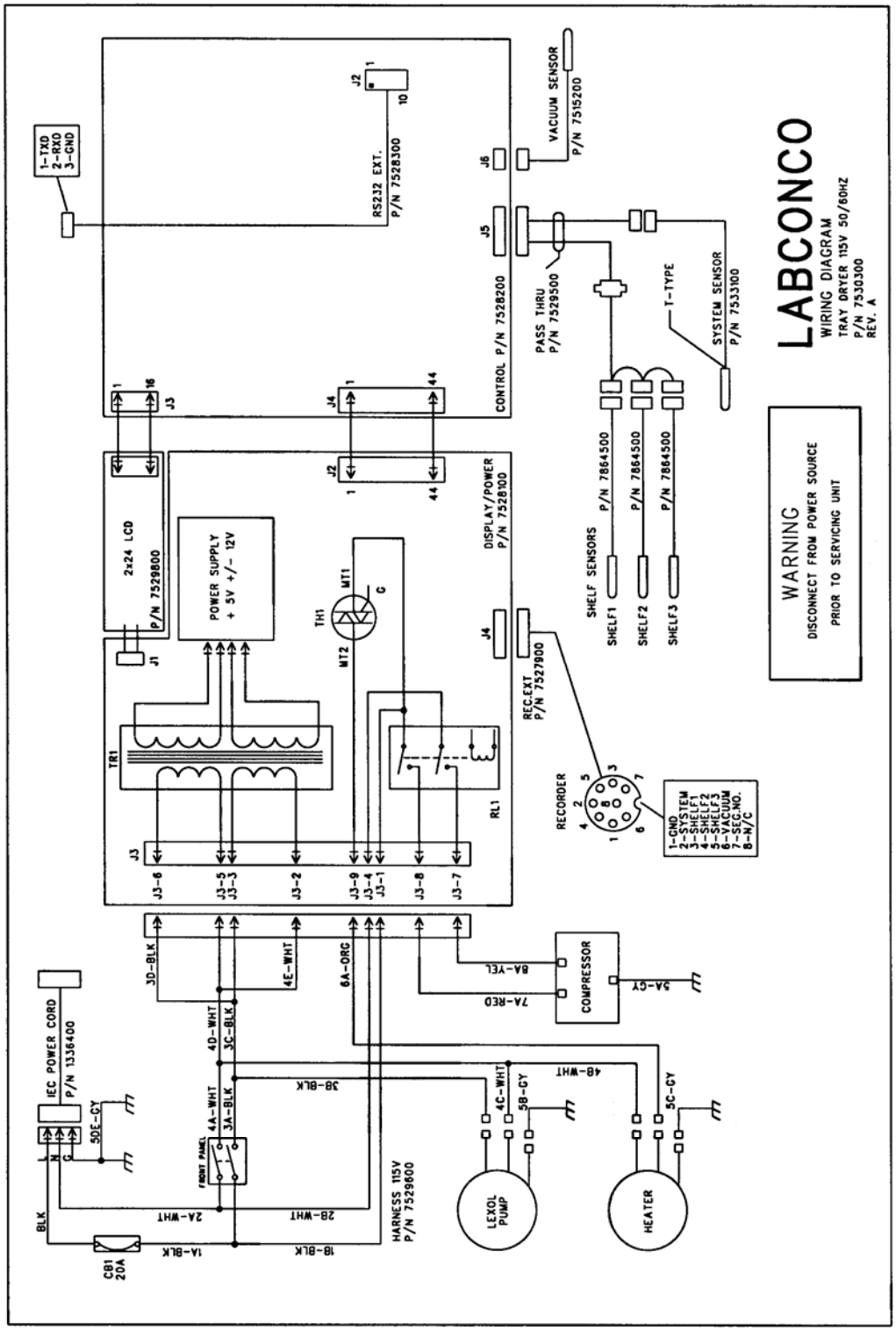


Figure 9

Model 79480-01
(230 VAC, 50 Hz, 1 Phase)

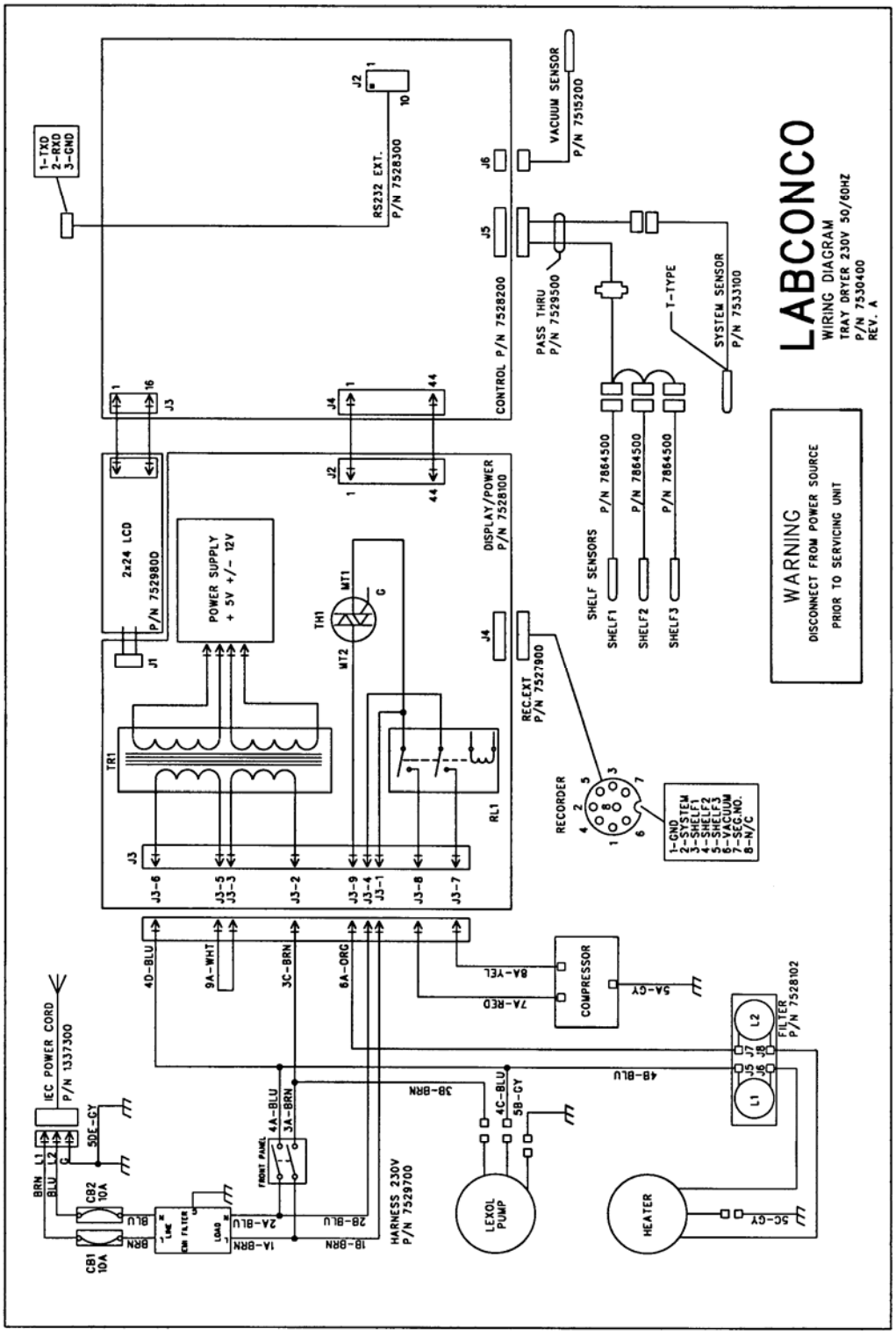


Figure 10

TROUBLESHOOTING

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 (if so equipped)	Close sample valve
	Purge valve closed (if so equipped)	Open purge valve
	Break or opening in vacuum lines or connections	Locate and repair
	Vacuum break control open	Move control to “close” position
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 or door gasket	Clean gasket and lid
	Damaged sample valve (if so equipped)	Locate and replace

PROBLEM	CAUSES	CORRECTIVE ACTION
Poor response of temperature control system	Fluid not circulating	Purge system of air or replace pump
	Refrigeration system solenoid valve not opening	Check connections to coil or replace coil, or replace valve
	Heater not operating	Check connections to heater or replace heater
	Fluid level low	Fill fluid to line when unit is at ambient temperature and not under vacuum. Check for leaks.
Fluid level low	Lexon leaks	Inspect all tubes visually and by touch. Observe "kerosene" small in chamber. Observe oil in collector. Scan all connections and tubes with a black light.

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

WARRANTY

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 many know your location as well as some of the reasons that prompted you to purchase our product.

Labconco provides a warranty on all parts and factory workmanship. The warranty includes areas of defective material and workmanship, provided such defect results from normal and proper use of the equipment.

The warranty for all Labconco products will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner, except the following:

- Purifier® Delta™ Series Biological Safety Cabinets carry a three-year warranty from date of installation or four years from date of shipment from Labconco, whichever is sooner.
- Carts carry a lifetime warranty.
- Glassware is not warranted from breakage when dropped or mishandled.

This limited warranty covers parts and labor, but not transportation and insurance charges. In the event of a warranty claim, contact Labconco Corporation or 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 circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This statement 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 filters are not covered by this warranty. Damage due to corrosion or accidental breakage is also not covered.

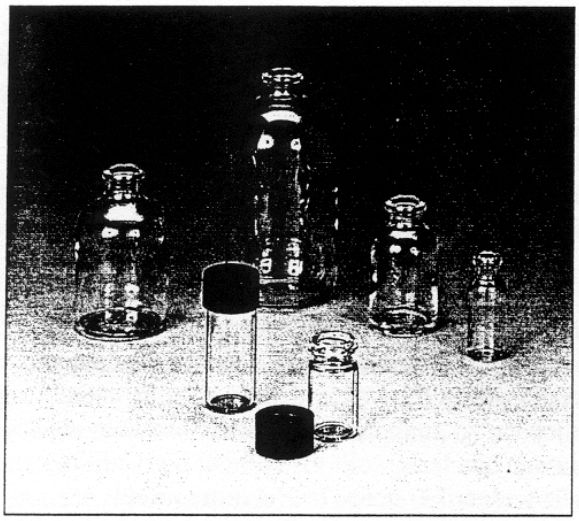
WARNING: The disposal and/or emission of substances used in connection with this equipment may be governed by various federal, state or local regulations. All users of this equipment are urged to become familiar with any regulations that apply in the user's area concerning the dumping of waste materials 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 their 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.

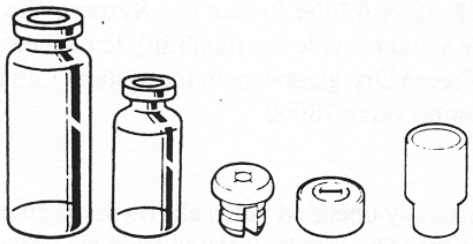
ACCESSORY PART NUMBER	DESCRIPTION
77561	**Tray with Slide-Out Bottom** 14" wide x 12" deep. Stainless steel tray has separate bottom, which slide out allowing serum bottles, and ampules direct contact with the shelf to facilitate the drying process.
77562	**Bulk Tray** 15" wide x 11-1/2" deep. Stainless steel tray will contain liquids for bulk drying.
77563	**Shelf Spacers** 2-1/2" high x 9" wide x 13" deep. Two stainless steel spacers placed on one or two empty shelves assist stoppering of partial loads of small vials or bottles.
75162	**Support Grid** 7" wide x 7" deep. Stainless steel tray with removable plastic grid provides support for stoppering ampules and other small specimen containers while stoppering under vacuum. Grid holds 144 ampules of 12 mm diameter.
77716	**Support Stand with Valves** 7-3/4" high x 30" wide x 15" deep. Supports Tray Dryer on any FreeZone® 18, 12 or 6 Liter Freeze Dry System. Six 3/4" valves on the stand provide the flexibility to connect flasks and other Freeze Dry glassware to the system. Cannot be used with isolation valve 78600.
78600	**Isolation Valve** Stainless steel annually operated valve allows the vacuum in the Stoppering Tray Dryer to be isolated from the vacuum in the remainder of the FreeZone® Freeze Dry System. Cannot be used with Support Stand with valves 77716.
75321	**Tray Dryer/Freeze Dry Interconnect Cable** Used to connect the Tray Dryer controller to the Base Freeze Dryer. Permits the automatic start-up of the vacuum pump.



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

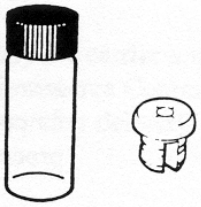
Serum Bottles, Stoppers and Seals are supplied in packages of 100.



Size	20 mm Corkage	13 mm Corkage	Split Stoppers	Aluminum Seals	Sleeve-Type Stoppers
2 ml		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

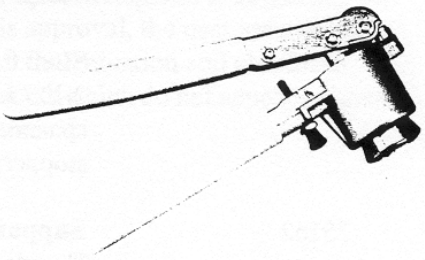
Threaded Vials

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



Size	Vials with Screw Caps	Stoppers
5 ml	77623-00	77622-00
10 ml	77626-00	77622-00

Accessories



Seal Crimper

Secures tear-away Aluminum Seals.

75780-00 Seal Crimper for 13 mm corkage. Shipping weight 3 lbs. (1.4 kg).
75781-00 Seal Crimper for 20 mm corkage. Shipping weight 3 lbs. (1.4 kg).

CONTACTING LABCONCO

If you have any questions that are not addressed in this manual, or if you need technical assistance, please contact Labconco at one the following numbers: Customer Service at 800-821-5525 or 816-333-8811, and Product Service at 800-522-7658 or 816-333-8811, between the hours of 7:00 a.m. and 6:00 p.m., Central Standard Time.

Labconco's mailing address is:

Labconco Corporation
8811 Prospect Avenue
Kansas City, MO 64132-2696

Visit Labconco through the Internet at:

http://www.labconco.com

Or email:

labconco@labconco.com

DECLARATION OF CONFORMITY

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

Standard(s) to which conformity is declared: EN61010, EN55014, EN55104

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 – Sample Preparation
Model No.:	Stoppering Tray Dryer – 230V - #79480-01
Serial No.:	Various – See Individual Declaration

Year of Manufacture: 1997 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 36960-10 REV. A ECO B296