



LABCONCO CORPORATION

8811 Prospect Avenue
Kansas City, MO 64132
(800) 821-5525, (816) 333-8811
(816) 363-0130 fax
labconco@labconco.com

User's Manual

CentriVap® Complete™

Models

73150 Series

To receive important product updates,
complete your product registration card
online at register.labconco.com

Please read the User's Manual before operating the equipment.

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Warranty

Labconco Corporation provides a warranty to the original buyer for the repair or replacement of parts and reasonable labor as a result of normal and proper use of the equipment with compatible chemicals. Broken glassware and maintenance items, such as filters, gaskets, light bulbs, finishes and lubrication are not warranted. Excluded from warranty are products with improper installation, erratic electrical or utility supply, unauthorized repair and products used with incompatible chemicals.

The warranty for the CentriVap® Complete™ will expire one year from date of installation or two years from date of shipment from Labconco, whichever is sooner. Warranty is non-transferable and only applies to the owner (organization) of record.

Buyer is exclusively responsible for the set-up, installation, verification, decontamination or calibration of equipment. This limited warranty covers parts and labor, but not transportation and insurance charges. If the failure is determined to be covered under this warranty, the dealer or Labconco Corporation will authorize repair or replacement of all defective parts to restore the unit to operation. Repairs may be completed by 3rd party service agents approved by Labconco Corporation. Labconco Corporation reserves the rights to limit this warranty based on a service agent's travel, working hours, the site's entry restrictions and unobstructed access to serviceable components of the product.

Under no circumstances shall Labconco Corporation be liable for indirect, consequential, or special damages of any kind. This warranty is exclusive and in lieu of all other warranties whether oral, or implied.

Returned or Damaged Goods

Do not return goods without the prior authorization from Labconco. Unauthorized returns will not be accepted. If your shipment was damaged in transit, you must file a claim directly with the freight carrier. Labconco Corporation and its dealers are not responsible for shipping damages.

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

Limitation of Liability

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 required 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. Labconco Corporation is held harmless with respect to user's compliance with such regulations.

Contacting Labconco Corporation

If you have questions that are not addressed in this manual, or if you need technical assistance, contact Labconco's Customer Service Department or Labconco's Product Service Department at 1-800-821-5525 or 1-816-333-8811, between the hours of 7:30 a.m. and 5:30 p.m., Central Standard Time.

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Chapter 1:

Introduction

Congratulations on your purchase of a Labconco CentriVap Complete. Models are available for operation on 115V or 230V.

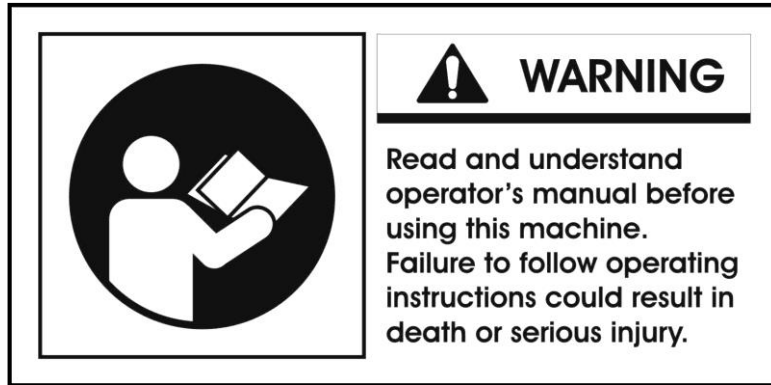
The CentriVap Complete combines a concentrator, cold trap, and vacuum pump in one cabinet. The concentrator uses centrifugal force with heat and vacuum to rapidly evaporate and condense solvents from biological and analytical samples. Centrifugation eliminates bumping and foaming as vacuum is applied and also concentrates the solute in the bottom of the vial. This allows recovery of solutes from sample volumes as small as a few microliters. The concentrator is equipped with a 300 watt heater to speed evaporation by warming the chamber during processing. The microprocessor delays the start of the vacuum pump until the rotor reaches operating speed. A safety switch prevents the concentrator from starting when the lid is in the open position and a latch prevents the lid from being opened while the rotor is turning.

The microprocessor, which controls the operation of the heater and the motor, provides excellent regulation and reproducibility of protocols. The end of the run can be signaled by a manually preset timer. Nine different protocols can be stored in memory so exact test parameters can be easily repeated.

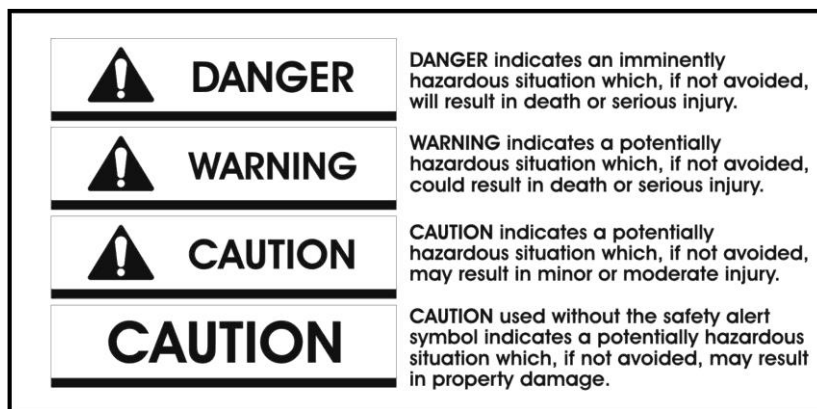
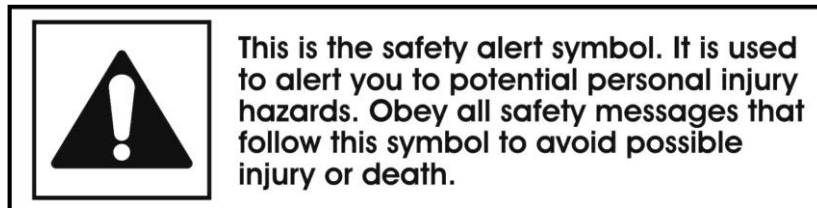
As an integral part of the CentriVap Complete, the cold trap can be used to trap moisture, vapors and corrosive fumes as they evaporate from the samples. Standard models can be used for aqueous and organic applications. Acid resistant models are recommended for corrosive applications. The 230V models comply with CE regulations.

Safety Symbols

Your CentriVap Complete was designed with safety in mind, however conditions may exist that could be hazardous.



Throughout this manual potentially hazardous conditions are identified using the following words and symbols.



It is important that you understand the warnings listed throughout this manual before you operate the CentriVap Complete.

Chapter 2: Prerequisites

Before you install your CentriVap, you need to prepare your site for installation. Carefully examine the location where you intend to install your CentriVap. You must be certain that the area is level and of solid construction. In addition, an exhaust means must be provided. An electrical source must be located near the installation site.

Carefully read this chapter to learn:

- The electrical supply requirements.
- The exhaust requirements.
- The vacuum pump requirements.

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

If the unit is not operated as specified in this manual it may impair the protection provided by the unit.

Electrical Requirements

The CentriVap Complete requires a dedicated grounded electrical outlet. This outlet requires a 15 Amp circuit breaker or fuse for models rated at 115V (60 Hz). An 8 Amp circuit breaker or fuse is required for models rated at 230V (50/60 Hz). Various models are available for use in different locations throughout the world. Each has a unique plug suitable for the specific location. See CentriVap Components in Chapter 3 for detailed plug specifications. If the plug supplied with the CentriVap does not match with the available receptacle, remove this plug and replace it with an approved plug of the suitable style.

It is recommend that an emergency switch for disconnecting the mains in the case of a malfunction be located remote from the CentriVap, preferably outside the room in which the CentriVap is housed, or adjacent to the exit from that room.

Chapter 2: Prerequisites



Do not position the CentriVap so that it is difficult to remove the power cord from the unit or to operate the power switch.

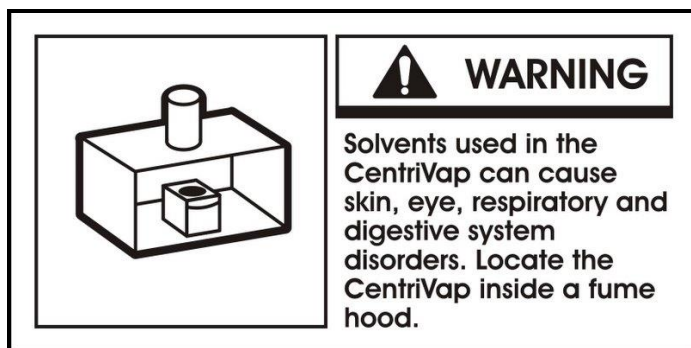
Do not use any detachable power cord that is not adequately rated for the unit.

Location and Exhaust Requirements

The CentriVap Complete should be located on a surface that is stable, flat and level.

WARNING: The CentriVap should be located within a fume hood if hazardous or flammable solvents are used. Heating of materials could lead to the liberation of hazardous gases. In all cases, regardless of the solvent used, it is strongly recommended that the vacuum pump is vented in a fume hood. An accessory secondary trap is available to minimize the exhausting of solvents into the atmosphere. This does not, however, negate the need to exhaust the vacuum pump into a fume hood. Failure to properly vent the CentriVap will expose personnel to potentially harmful chemicals.

The CentriVap has not been evaluated by an approval agency for the use of biological, radio toxins or flammable liquids or materials.



Space Requirements

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

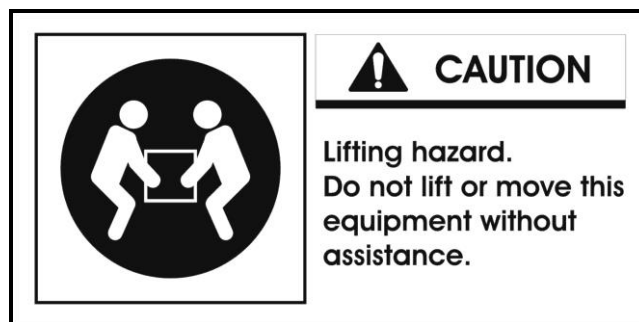
No person or any hazardous material should be within 12 inches of the CentriVap while it is operating.

Chapter 3: Getting Started

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

- Unpack and move your CentriVap Complete.
- Set up your CentriVap Complete.
- Connect the electrical supply source to your CentriVap Complete.
- Properly exhaust your CentriVap Complete.
- Safely use solvents with your CentriVap Complete.

CAUTION: The CentriVap Complete weighs 145 lbs. (66 Kg). The carton allows for lifting with a mechanical lift truck or hand truck. If you must lift the CentriVap manually, use at least two (2) persons and follow safe lifting guidelines.



Chapter 3: Getting Started

Unpacking Your CentriVap

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

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

NOTE: Do not return goods without the prior authorization of Labconco. Unauthorized returns will not be accepted. If your CentriVap was damaged in transit, you must file a claim directly with the freight carrier. Labconco Corporation and its dealers are not responsible for shipping damage.

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

CentriVap Components

As previously mentioned, the CentriVap Complete is available in 115V or 230V. Locate the model of CentriVap you received in the following table. Verify that the components listed are present and undamaged.

Catalog #	Description	Volts	Hz	Power Cords				
				1334500	1336100	1338000	1332600	1332700
7315020	CENTRIVAP COMPLETE (US)	115	60	X				
7315021	CENTRIVAP COMPLETE ACID RESISTANT (US)	115	60	X				
7315022	CENTRIVAP COMPLETE W/ HEAT BOOST (US)	115	60	X				
7315023	CENTRIVAP COMPLETE ACID RESISTANT W/ HEAT BOOST (US)	115	60	X				
7315030	CENTRIVAP COMPLETE (EU)	230	50		X			
7315031	CENTRIVAP COMPLETE ACID RESISTANT (EU)	230	50		X			
7315032	CENTRIVAP COMPLETE W/ HEAT BOOST (EU)	230	50		X			
7315033	CENTRIVAP COMPLETE ACID RESISTANT W/ HEAT BOOST (EU)	230	50		X			
7315040	CENTRIVAP COMPLETE (US)	230	60			X		
7315041	CENTRIVAP COMPLETE ACID RESISTANT (US)	230	60			X		
7315042	CENTRIVAP COMPLETE W/ HEAT BOOST (US)	230	60			X		
7315043	CENTRIVAP COMPLETE ACID RESISTANT W/ HEAT BOOST (US)	230	60			X		
7315060	CENTRIVAP COMPLETE UK	230	50				X	
7315061	CENTRIVAP COMPLETE ACID RESISTANT UK	230	50				X	
7315062	CENTRIVAP COMPLETE W/ HEAT BOOST UK	230	50				X	
7315063	CENTRIVAP COMPLETE ACID RESISTANT W/ HEAT BOOST (UK)	230	50				X	
7315070	CENTRIVAP COMPLETE (CHINA)	230	50					X
7315071	CENTRIVAP COMPLETE ACID RESISTANT (CHINA)	230	50					X
7315072	CENTRIVAP COMPLETE W/ HEAT BOOST (CHINA)	230	50					X
7315073	CENTRIVAP COMPLETE ACID RESISTANT W/ HEAT BOOST (CHINA)	230	50					X

Power Cord Part #	Plug Type
1334500	NEMA 5-15P
1336100	CEE 7/7
1338000	NEMA 6-15P
1332600	BS 1363
1332700	CH1-10P

Plus the following:

Part #	Component Description
7314000	User's Manual
7396206	Coupling Insert
7455100	Rotor, 12-13 mm (Standard Models)
7455101	Rotor, 12-13 mm PTFE (Acid Resistant Models)
7450200	Glass Jar

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

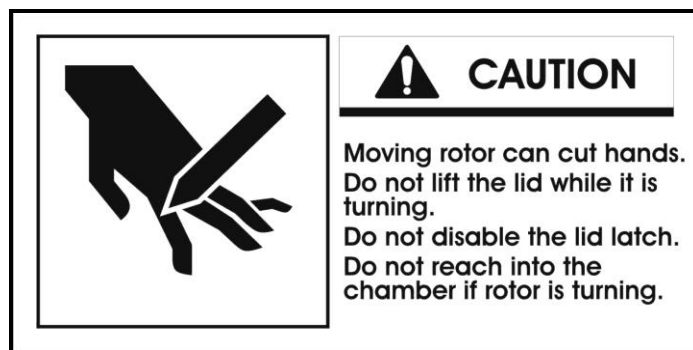
Setting Up Your CentriVap

After you verify receipt of the proper components, move your CentriVap to the level and sturdy location where you want to install it. There is no need to secure the CentriVap to the work surface. Then, follow the steps listed below.

Emergency Access Into the Chamber

The CentriVap is designed to prevent access to the chamber in the event of a power disruption. If it is necessary to open the lid when there is no electrical power connected to the CentriVap, insert a small screwdriver or similar instrument into the small round hole on the left side of the case near the top behind the control panel. This will unlock the lid latch mechanism. While holding the screwdriver in place, raise the lid with the other hand.

CAUTION: Never attempt to defeat the latch or open the lid while the CentriVap is running. Personnel injury can result from moving parts and chemicals.



Exhaust Port

If the CentriVap is not located in a fume hood, attach one end of a user-supplied 3/8" ID hose to the exhaust port on the back of the unit. Clamp securely. Route the other end to a fume hood or other laboratory ventilation device.

Electrical Connection

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

Rotor Installation

Place the rotor onto the shaft of the Concentrator. Rotate the rotor slightly to engage the drive pin in the shaft with the slots in the rotor hub. The top of the shaft should be in line with the top of the rotor hub.

IMPORTANT: Do not use a rotor if it shows any signs of damage.

Chemical Resistance of CentriVap Components

Your CentriVap Complete is designed to be chemical resistant to most compounds that are commonly used in the concentration processes that are performed in it. However, by necessity, the CentriVap is comprised of a number of different materials, some of which may be attacked and degraded by certain chemicals. The degree of degradation is obviously dependent on the concentration and duration of exposure. Some major components of the CentriVap that are susceptible to degradation are as follows:

COMPONENT	MATERIAL	Acids							Bases		Solvents													
		Acetic Acid 20%	Boric Acid	Formic Acid	Hydrobromic Acid 20%	Hydrochloric Acid 20%	Nitric Acid 20%	Sulfuric Acid 10%	Trifluoroacetic Acid (TFA)	Ammonium Hydroxide	Acetone	Acetonitrile	Chloroform	Dimethyl Formamide	Dimethyl Sulfoxide (DMSO)	Ethanol	Ethyl Acetate	Hexanes	Isopropanol	Methanol	Methylene Chloride	Methyl t-Butyl Ether (MTBE)	Toluene	Water
Standard CentriVap																								
Chamber	Epoxy coated Aluminum			C				D				C	D											
Lid	Acrylic						C	D	C	D			D	D	C	D		D	C	D		D	D	
Bearings	High Carbon Steel	D	D	D	D	D	D	D		D			D	D									D	D
Lid Gasket	EPDM						D	D				D		D			D				C	C	D	
Rotor Shaft	Stainless Steel				D	D	D	D										D						
Valve	Stainless Steel				D	D	D	D																
O Rings	Viton (Fluorocarbon)							C					C	C								C		
Fittings	Polypropylene	D														C								
Rotor	Anodized Aluminum					D	D																	
Rotor Hub	Acetal (Delrin)	C		C	C	D	D	D	C				D										C	
Tubing	PVC	D		C			D	D			D	D	D	D	D	C	D	D			D		D	
Acid Resistant CentriVap																								
Chamber	Teflon coated Aluminum																							
Lid	Glass																							
Bearings	Stainless Steel				D	D		D																
Lid Gasket	EPDM						D	D				D		D			D				C	C	D	
Rotor Shaft	Hastelloy																							
Valve	Teflon																D							
O Rings	Viton (Fluorocarbon)							C					C	C			D					C		
Fittings	Polypropylene	D															C							
Rotor	Teflon coated Aluminum																							
Rotor Hub	Polypropylene	D															C							
Tubing	PVC	D		C			D	D			D	D	D	D	D	C	D	D			D		D	
Cold Trap -50°C																								
Chamber	Stainless Steel				D	D		D																
Lid	Acrylic						C	D	C		D	D	D	D	C	D		D	C	D	D	D	D	
Cold Trap Gasket	Neoprene		D		D	C	D	D				C	D	D	D		D				D	C	D	
Cold Trap -84°C & -105°C																								
Chamber	Stainless Steel				D	D		D																
Lid	Stainless Steel				D	D		D																
Cold Trap Gasket	Neoprene		D		D	C	D	D				C	D	D	D		D				D	C	D	
C- Moderate Degradation- Questionable use																								
D- Severe Degradation- Infrequent use recommended- immediate thorough cleaning required																								

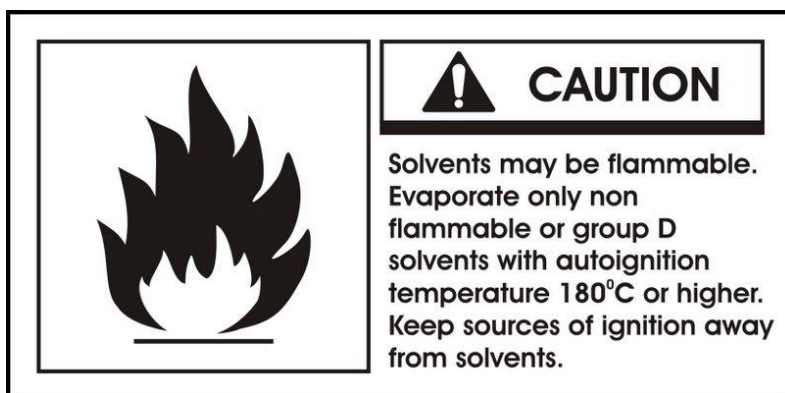
When using compounds in the CentriVap that are hostile to the materials of construction, it is imperative that the equipment is appropriately maintained.

- After each run, clean up all residues, spills and materials that might have splashed in the chamber using agents suitable for the substance involved.
- Drain the cold trap immediately after the collected ice is melted to prevent corrosive liquids from residing in the trap. Flush out the trap with water after draining.

DO NOT chip ice off the cold trap walls as damage may occur.

Solvent Safety Precautions

CAUTION: The CentriVap is not classified as “explosion proof.” It has been designed with safety as a primary consideration and should be used in a prudent manner using “good laboratory practices.” It has been designed for use with compounds as described in the United States National Electrical Code Class I, Group D. The heater may be programmed to run as hot as 100°C, however, the heater element may normally run at 110°C. A thermal fuse limits the heater to a maximum temperature of 141°C. In an over-temperature or “run away” heater situation occurs, the thermal fuse will stop all power to the heating element. You will see the temperature on the display reduce. The thermal fuse will automatically reset and restore power to the heating element once the temperature drops below 120°C. It is important that the solvents used are compatible with these temperatures. Do not evaporate solvents that have an autoignition temperature below 180°C. Do not evaporate solvents that are classified as Group A, B, or C by the National Electrical Code. Evaporate only non-flammable or Group D solvents with autoignition temperatures 180°C or above. Use of other compounds could cause an explosion.



CAUTION: Solvents used in the CentriVap may be flammable or hazardous. Use extreme caution and keep sources of ignition away from the solvents. When using flammable or hazardous solvents, the CentriVap should be operated inside a fume hood.

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

Do not store flammable or hazardous solvents within 12 inches (300 mm) of the CentriVap.

IMPORTANT: Various Federal, State or local regulations may govern the disposal of substances used in connection with this equipment. 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.

Chapter 4: Using Your CentriVap Complete

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

- Set operating parameters.
- Operate the controls.
- Properly select and position glassware inside your CentriVap.
- Understand the display.
- Interrupt a cycle after it has begun.

NOTE: See *Appendix C: CentriVap Specifications* for electrical requirements.

NOTE: Do not store or stack supplies or equipment on top of the CentriVap.

Planning

Thoroughly understand procedures and the equipment operation prior to beginning work. The unique performance of the CentriVap is dependent upon the proper balance of heat, vacuum and centrifugal force. If the proper balance is not established, it is possible to damage or lose a portion of the sample. Therefore, if you are unfamiliar with the CentriVap or are attempting a new protocol, it may be helpful to make a trial run that is void of the sample you are attempting to concentrate.

Glassware Selection

Sample tubes should be filled no more than half full with substances having a density no greater than 1400 kg/m³. Select the size of the sample tube so it is compatible with the rotor and the desired sample size. Tubes should not be loose in the rotor. Rotors are available with holes for various size tubes. Refer to *Chapter 6: Accessories for your CentriVap Complete* for available rotor sizes.

Loading Glassware Into the CentriVap

Smooth operation of the CentriVap is dependent upon proper balance of the machine. Therefore, if less than a full load of samples is run, it is important to load samples into the CentriVap in a fairly symmetrical manner distributing the weight of the samples evenly in the sample rotor.

Temperature Setting Guidelines

The evaporation rate achieved by the CentriVap is dependent upon a variety of factors. These include the nature of the solvent, the temperature and the pressure in the vacuum system.

As a general guideline, to speed the evaporation process, the CentriVap temperature should be set as high as possible as long as the temperature will not damage the sample or cause the sample to bump.

Time Setting Guidelines

The CentriVap Complete has two timers. The “RUN TIME” turns the entire concentrator off after the user set period of time. This stops the rotation, turns off the heater and vacuum pump and bleeds vacuum from the system. The heater may be turned off prior to the concentrator turning off so heat-sensitive samples may be protected from exposure to excessive heat after the solvent has evaporated. To turn the heater off prior to stopping the entire system, enter a set time into the memory at the “HEATER TIME.” When the programmed time expires, the heater will turn off but the rotation and vacuum will continue until the run time expires.

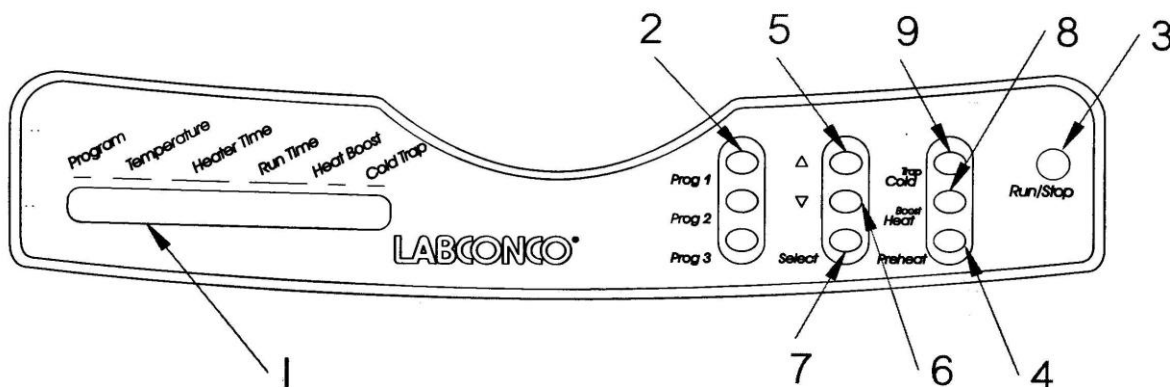
The tables in *Appendix C: CentriVap Specifications* indicate approximate times required to evaporate various common solvents. Actual times must be determined by the user. The CentriVap can be set to alarm after a preset period of operation. When the time expires, the CentriVap will give an audible alarm and turn itself off.

Heat Boost Operation

Some CentriVap models are equipped with a secondary “Heat Boost” heater, which is positioned on the sidewall of the chamber near the top. It provides additional heat to the samples to speed evaporation. The “Heat Boost” heater is controlled by the microprocessor to maintain the set point temperature at the bottom of the chamber to prevent excessive overheating of the samples.

CentriVap Controls

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



1. Display – The liquid crystal display (LCD) shows set point parameters and actual measured conditions.
2. Program Buttons – Used to initiate the start of a run with the use of just one button.
3. Run/Stop Button – Used to start or stop a run.
4. Preheat Button – Used to turn on the heater to preheat the chamber prior to loading samples.
5. Increase Button – When pressed, the last selected set point will increase.
6. Decrease Button – When pressed, the last selected set point will decrease.

Chapter 4: Using Your CentriVap Complete

7. Set Point Select Button – To select a parameter to change, press the select button. Arrows on the display will point to the parameter that may be altered.
8. Heat Boost Button – If the model is so equipped, pressing the button will activate or deactivate the auxiliary Heat Boost heater.
9. Cold Trap Button – Used to start or stop the refrigeration system for the cold trap.

Operating the CentriVap Controls

Preheat:

To preheat the chamber, press the “PREHEAT” button. The display will show:

SP: XXX ACT: XXX

Press the increase or decrease button until the desired set point (SP) is displayed. The actual chamber temperature, (ACT) is displayed to the right. When power is being supplied to the heaters, a bar under the actual temperature will illuminate. The chamber will continue to preheat until either the “PREHEAT” button is pressed again or the “RUN” button is pressed.

Select existing program:

Operating parameters can be stored in memory so protocols can be repeated. Nine programs can be stored. To select a program, press the set point “SELECT” button until arrows point to the program number indicating that this set point can be run or altered. To change the program number, press the increase or decrease button until the desired program number is displayed. When the program number is changed, all its set points change also to indicate the last entered parameters for that program.

Store frequently run protocols in program 1, 2, or 3. Then, by pressing “PROG 1,” “PROG 2” or “PROG 3,” the stored program will be initiated without having to press any other button. Pressing just the one button starts the rotor, the heater, the timers and the vacuum pump.

Change “Temperature” Set Point:

To change the “Temperature” set point, press the set point “SELECT” button until arrows point to the “Temperature” set point, which can be changed from - (OFF) up to 99° by pressing the increase or decrease buttons. The set point is 100°C if the display shows “HI.” The last entered set point is stored in memory.

Change “Run Time” or “Heater Time” set point:

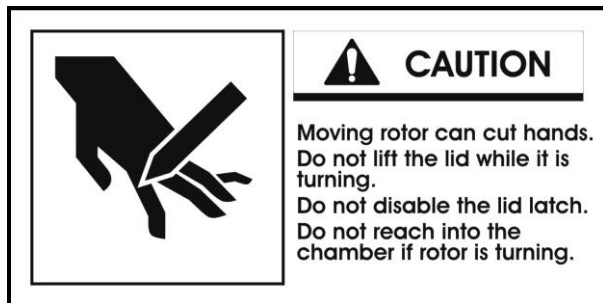
To change the time set point, press the set point “SELECT” button until arrows point to the “Heater Time” or “Run Time” set point which can be changed from 1 to 999 minutes by pressing the increase or decrease buttons. If it is desired to have the CentriVap run continuously without alarming at the end of a time period, press the increase button until the “Run Time” display says “ON.” The last entered set point is stored in memory.

If during a run the “STOP” button is pressed, the timers remember the time at which stop occurred. If “RUN” is then pressed, the timers continue to count down from the time at which they were stopped. If you are running program 1, program 2 or program 3, pressing “PROG 1,” “PROG 2” or “PROG 3” resets the timers to the original set point time and the CentriVap starts a new run.

To reset the timers to the original set point time when running programs other than program 1, program 2 or program 3, press the start button and hold it for five seconds. The display will indicate that the timer is reset.

Operating the CentriVap

CAUTION: To avoid personnel injury; Do not operate the CentriVap if the lid is scratched or nicked, or shows signs of damage. A damaged lid could fail under vacuum.



While the CentriVap is operating, do not lean on the lid, do not stand near it longer than necessary and do not place hazardous materials within 12 inches.

1. Turn “ON” the CentriVap power switch.
2. Press the Cold Trap “ON” switch. The “Y” in the display under the cold trap will flash. When the trap reaches operating temperature the “Y” will illuminate steady.
3. Select a program or set the set point parameters.
4. Preheat the chamber if desired.
5. Turn on Heat Boost if the CentriVap is so equipped and additional heat is desired.
6. Place samples in vials. Normally the vials should be no more than half full. Place vials in a rotor.
7. Load the rotor with samples into the chamber.
8. Close the lid.

Chapter 4: Using Your CentriVap Complete

9. Press “RUN.” If the display was showing set point parameters, it will change to show actual parameters. Press “RUN” again. The “S” (STOP) in the display changes to “R” (RUN). The program on the display alternately displays “R” or the number of the program that is running. If you intend to run program 1, 2 or 3, simply press “PROG 1,” “PROG 2” or “PROG 3” to quick start the CentriVap. The rotor will start, the vacuum break valve will close and the vacuum pump will start after the rotor reaches operating speed.
10. Set point parameters can be altered at any time during a run by first selecting the parameter using the set point “SELECT” button and then pressing the “INCREASE” or “DECREASE” switch.
11. If the run time set point is used, at the end of the set time an alarm sounds. All functions cease.
12. Press “STOP” to terminate operation if the CentriVap has not already stopped itself.
13. When the evaporation is complete, allow the rotor to stop moving, lift the lid and remove the samples.

CentriZap™ Strobe Light

The CentriZap will enable you to see the samples as they are rotating in the rotor. To use the strobe light while the CentriVap is operating, remove the light from its holder on the front of the unit, press the trigger and shine the light on the samples in the rotor.

Operational Notes

As solvent is evaporated in the Concentrator and then condensed in the Cold Trap, it is normal for the Cold Trap temperature to rise as its load increases.

Depending on which solvent is used, the volume of the sample and the system operating parameters, the Cold Trap may warm up sufficiently to cause the “READY” indicator to turn off. As the sample reaches completion, the load on the Cold Trap will decrease and its temperature will decrease. The “READY” indicator will once again illuminate.

When the CentriVap is turned on, the CentriVap returns to the same mode (“RUN” or “STOP”) that it was in when the power was turned off. If the CentriVap was in the “RUN” mode when the power was turned off, when the power is turned on, the CentriVap attempts to return to the programmed set points and continue the run.

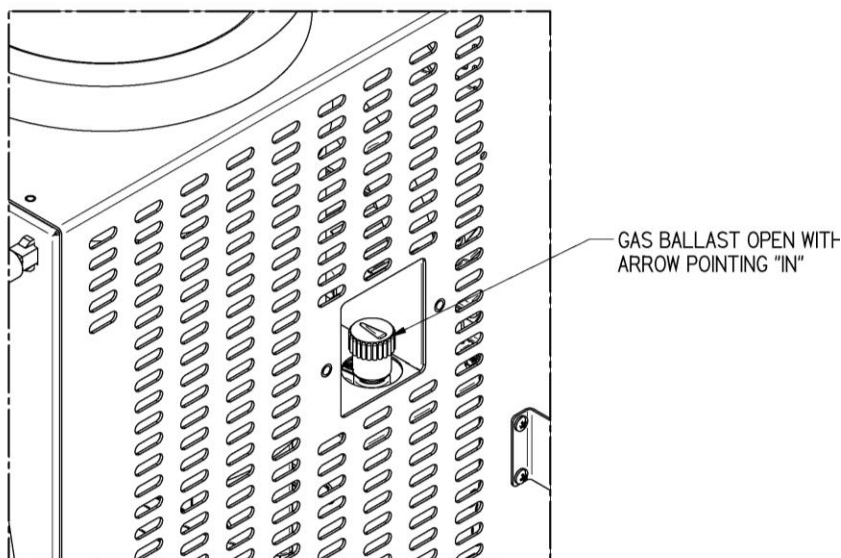
To reset the timers to the original set point when running programs other than program 1, program 2 or program 3, press the start button and hold it for five seconds. The display will indicate that the timer is reset.

Interrupting a Cycle After it Has Begun

At any time during a run, the cycle may be stopped by pressing the “STOP” button. This shuts off all operating functions. After the rotor stops, the lid may be opened. If it is necessary to re-start the CentriVap, close the lid and press “RUN.” The CentriVap resumes operation at the same set point parameters and the timer continues to count down from the time at which the CentriVap was stopped.

Gas Ballast

The vacuum pump has a gas ballast that can be used to reduce condensation of vapors in the pump and exhaust line. This is most likely to occur if the Cold Trap is not running in conjunction with the evaporation process. The gas ballast is OPEN if the arrow on the gas ballast cap is pointing “IN” towards the CentriVap. The gas ballast is CLOSED if the cap is rotated 180°, so that the arrow is pointing “OUT” of the CentriVap.



Safety Precautions

Special precautions must be observed if the materials used in the CentriVap Concentrator are known to be hazardous, toxic, radioactive, or contaminated with pathogenic micro organisms. These actions should include but are not limited to the following:

- Refer to the World Health Organization Laboratory Biosafety Manual, paying special attention to information about centrifuges and the handling of hazardous materials.
- Operate or vent the CentriVap Concentrator inside a suitable fume hood or ventilation device. Load rotors in a ventilation device.
- Periodically inspect all parts of the CentriVap Concentrator including the lid, gasket, chamber, plumbing components and rotors.

Chapter 5: Maintaining Your CentriVap Complete

Under normal operation, the CentriVap Complete requires little maintenance. The following maintenance schedule is recommended. Before servicing the CentriVap, disconnect electrical power. Special precautions must be observed if materials used in the CentriVap are known to be hazardous, toxic, radioactive or contaminated with pathogenic micro organisms. Before servicing, the CentriVap must be suitably decontaminated. Wear appropriate eyewear, gloves and other safety apparel.

As needed:

Before using any cleaning or decontamination method except those recommended by the manufacturer, users should check with the manufacturer that the proposed method will not damage equipment.

1. Clean up all spills; remove liquids from the chamber. Clean or decontaminate all surfaces using agents suitable for the substance spilled.
2. Clean lid and gasket using soft cloth, sponge or chamois and a mild, non-abrasive soap or detergent.
3. Utilization of acids requires immediate cleaning and neutralization after a run or physical damage to the stainless steel collection chamber will result.
4. Check the Cold Trap for condensed or frozen solvents and dispose of appropriately. Completely empty the trap before the next run.
5. If the media in the optional clear canister has changed color, discard and replace the insert with a new insert. For the radiochemical trap insert, no indicator exists; therefore, it should be discarded after each use. In radioactive applications, the system should be monitored with a Geiger counter.
6. Check rotors for loose or missing parts. Tighten or replace as required. Do not use defective rotors.
7. Inspect the chamber to insure that there are not cracks or structural damage. Call Labconco if defects exist.

8. Check continuity of the protective earth between the ground terminal on the power inlet and a bare metal housing panel. Contact Labconco if there is no continuity.
9. Repair any defects to the surface where the CentriVap is installed.

Monthly:

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

Annually:

1. Every 12 months, or more often, if the Cold Trap is operated in a dusty environment, the refrigeration system condenser of the Cold Trap should be cleaned. Using a vacuum cleaner with brush attachment, clean the condenser to ensure proper airflow for peak performance. Disconnect power before removing covers.

Chapter 6: Accessories for Your CentriVap Complete

The configuration of your CentriVap Complete can be changed to accommodate your needs. Read this chapter to learn how to:

- Install a vacuum gauge.
- Install a secondary chemical trap.

The following accessories are available for the CentriVap Complete.

PART #	DESCRIPTION
7462900 7462901*	Rotor (DNA) Holds (72) 0.5 ml microcentrifuge tubes and (60) 1.5 ml microcentrifuge tubes or (60) 2.0 ml microcentrifuge tubes
7450700 7450701*	Rotor (1.5 ml) Holds (132) 1.5 ml microcentrifuge tubes or (132) 2.0 ml microcentrifuge tubes
7455000 7455001*	Rotor (15 ml) Holds (44) 12 x 55 mm tubes or (36) 12 x 75 mm tubes or (36) 12 x 95 mm tubes or (36) 13 x 75 mm tubes or (36) 13 x 100 mm tubes and (24) 16 x 100 mm tubes or (18) 16 x 120 mm conical tubes or (18) 17 x 95 mm tubes or (18) 17 x 100 mm centrifuge tubes or (18) 17 x 120 mm tubes
7455100 7455101*	Rotor (12-13 mm) Holds (40) 1.5 ml microcentrifuge tubes or (40) 2.0 ml microcentrifuge tubes and (16) 12 x 55 mm tubes or (100) 12 x 75 mm tubes or (64) 12 x 95 mm tubes or (100) 13 x 75 mm tubes or (64) 13 x 100 mm tubes
7455200 7455201*	Rotor (50 ml) Holds (32) 1.5 ml microcentrifuge tubes or (32) 2.0 ml microcentrifuge tubes and (12) 28 x 115 mm conical tubes or (12) 28 x 135 mm conical tubes or (12) 28 x 140 mm conical tubes
7553100 7553101*	Rotor (100 ml pear shaped flask) Holds (8) 100 ml flasks
7553000 7553001*	Rotor (6 microtiter) Holds (6) Standard 96 well plates or (3) Deep well plates

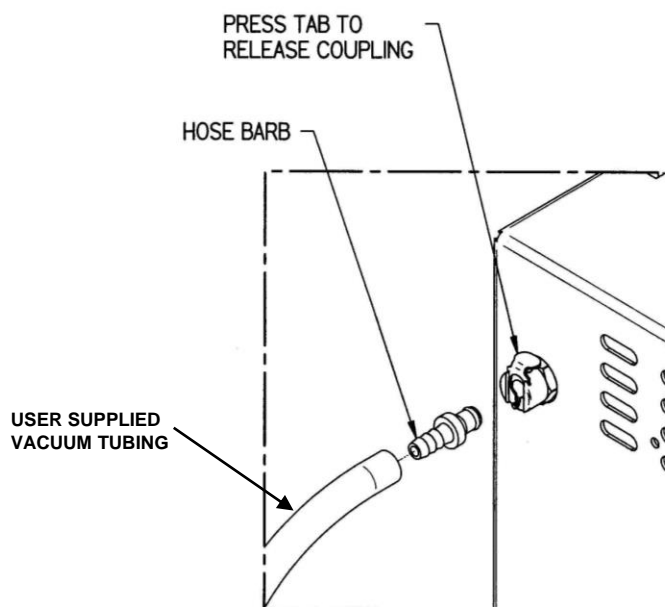
*PTFE Coated

Chapter 6: Accessories for Your CentriVap Complete

PART #	DESCRIPTION
7461900	Rotor (96 well plate)
7461901*	Holds (4) Standard 96 well plates or (2) Deep well 96 well plates
7460900	Clear Canister – Accommodates inserts listed below
7814800	Acid Trap Insert
7814900	Moisture Trap Insert
7995600	Ammonia Trap Insert
7815000	Radiochemical Trap Insert
7815200	Solvent Trap Insert

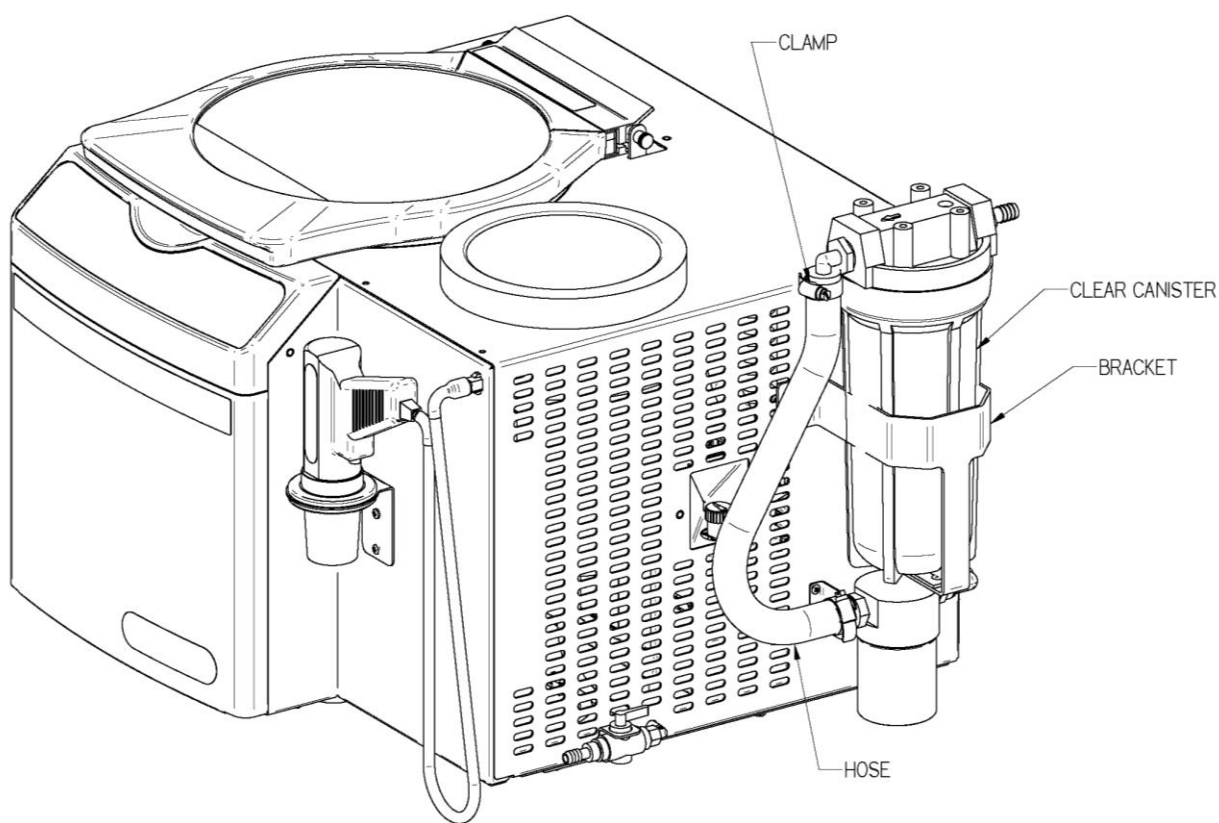
Installing a Vacuum Gauge

A user-supplied vacuum gauge may be attached to the CentriVap to monitor the vacuum level. Attach the vacuum gauge to the barb end of the Quick Disconnect Coupling fitting that was supplied with the CentriVap using a length of suitable rubber hose. The Quick Disconnect Coupling fitting can then be pushed into the mating connector on the rear left side of the CentriVap. The Quick Disconnect Coupling fitting can be removed from the mating connector by pressing on the tab on the connector and then pulling out the Quick Disconnect Coupling fitting. Always remove the Quick Disconnect Coupling from the CentriVap when a vacuum gauge is not attached to it.



Installing a Secondary Chemical Trap

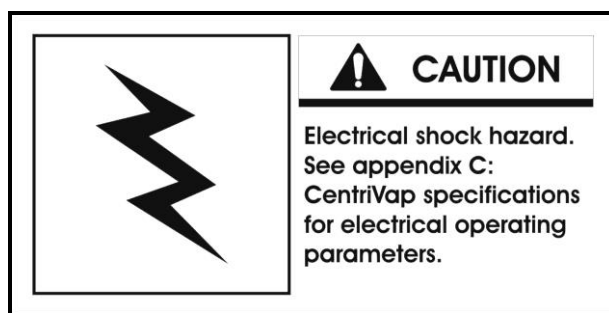
An accessory secondary chemical trap is available to minimize the exhausting of solvents into the atmosphere. Attach the bracket to the right hand side of the housing using the screws provided. Attach the hose from the outlet on the vacuum pump to the “out” connector of the canister housing. Unscrew the clear bowl of the canister housing from the head. Remove both the upper and lower caps from the filter cartridge and insert the small end of the cartridge into the hole in the center of the head. Reinstall the clear bowl.



Chapter 7: Troubleshooting

Refer to the following if your CentriVap fails to operate properly. If the suggested corrective actions do not solve your problem, contact Labconco for additional assistance. The following failure codes may appear on the display when problems are sensed by the internal self check routine.

CAUTION: Disconnect power before corrective action is taken.



DISPLAY ERROR CODE	CAUSE	CORRECTIVE ACTION
Heat Sensor	Sensor failure	Replace sensor assembly.
	Connection failure	Repair connection.
Close Lid	Lid open	Close lid.
Latch Fail	Solenoid failure	Check component.
	Switch or sensor failure	Check connections.
Mem Fail P1	Memory failure	Push program button #1.
	New memory IC chip	Push program button #1.
	Bad memory IC chip	Call Labconco – Replace IC chip or control PCB.
MOTOR ERROR	Defective motor	Replace motor.
	Hall effect sensor failure	Replace sensor.
	Wire failure	Replace wire.

Other corrective actions for potential problems are as follows:

PROBLEM	CAUSE	CORRECTIVE ACTION
Unit will not operate	Unit not connected to electrical power	Connect unit to proper electrical receptacle.
	Circuit breaker blown	Correct electrical problem and reset circuit breaker by pressing button.
	Lid open	Close lid.
Excessive vibration	Sample tubes not located symmetrically in rotor	Reposition sample tubes.
Sample odor in lab	Vent hose exhausting into lab area	Redirect hose to fume hood.
Evaporation rate is reduced	Heater inoperable	Contact Labconco.
	Vacuum pump failure	Check pump.
	Obstruction in hose	Remove obstruction or replace hose.
	Lack of adequate vacuum	See below.
No vacuum/poor vacuum	Pump not on	Turn on pump.
	Control valve open	Check control valve.
	Leaks in lines or connectors or gasket	Locate and repair.
	Foreign material on lid gasket	Clean gasket and lid.
	Pump is not functioning properly	Check pump by locating vacuum gauge closer to pump and close off rest of system. If pump is faulty, seek authorized service or replace pump.
	Cold Trap or Concentrator gasket is not sealing properly	Check gasket for cleanliness. Adjust gasket as needed.
	Cold Trap lid not seated	Hold lid down until vacuum is initiated.
	Ice formed on Cold Trap lid sealing surface	Defrost and wipe dry.

Chapter 7: Troubleshooting

PROBLEM	CAUSE	CORRECTIVE ACTION
Recovery of condensate in Cold Trap is less than normally expected	Cold Trap is not ON	Check to make sure switch is ON and condensing unit fan is moving air out of the sides of the cabinet.
	Cold Trap does not cool down	Turn vacuum pump OFF and allow Cold Trap to cool for at least 30 min. to reach temperature. -50°C temperature can be checked with a solvent thermometer or digital thermometer.
Unit starts and shuts off	Latch optical sensor improperly calibrated	Unplug power cord. Wait 10 seconds. Plug in power cord.

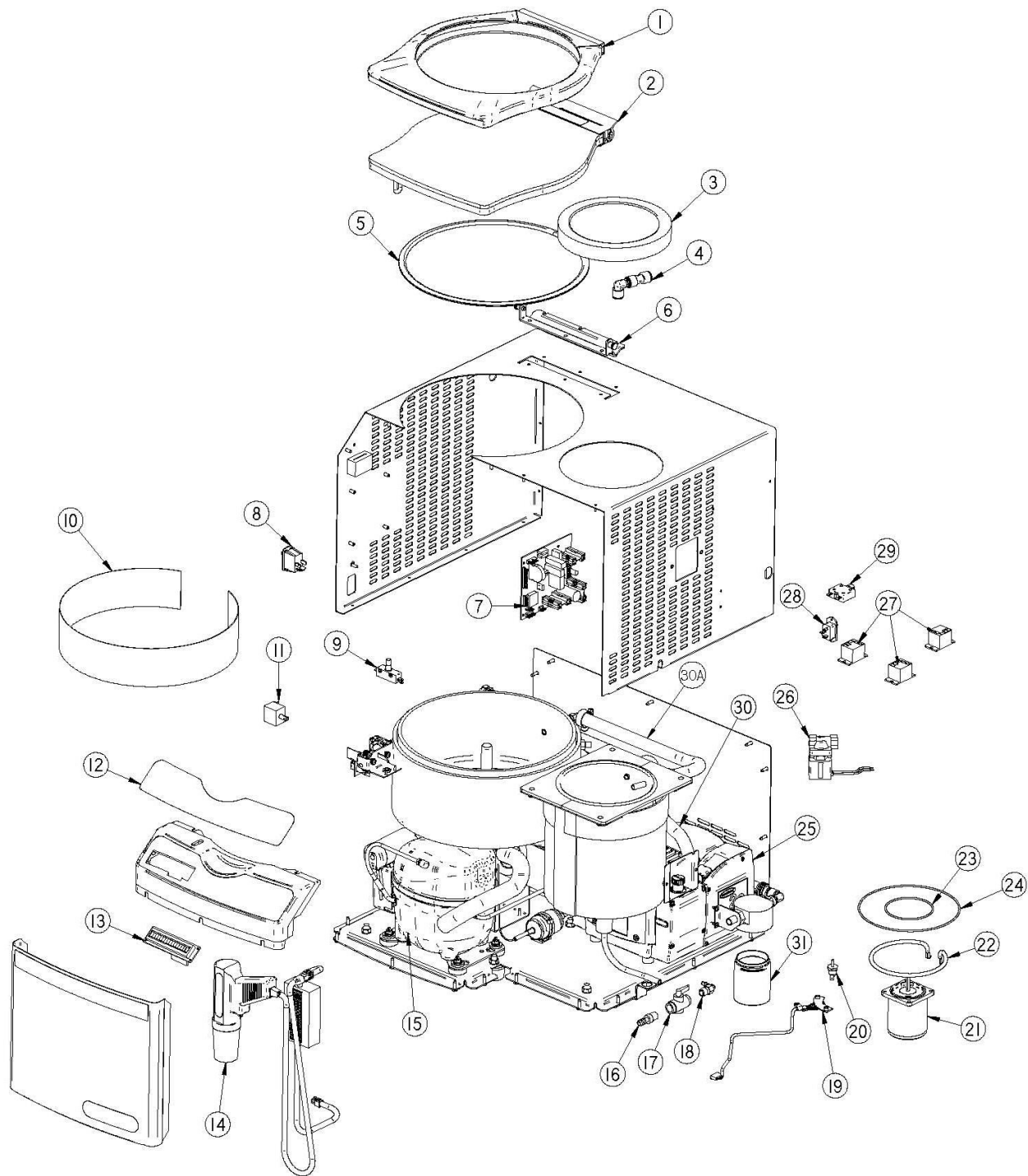
Appendix A:

CentriVap Components

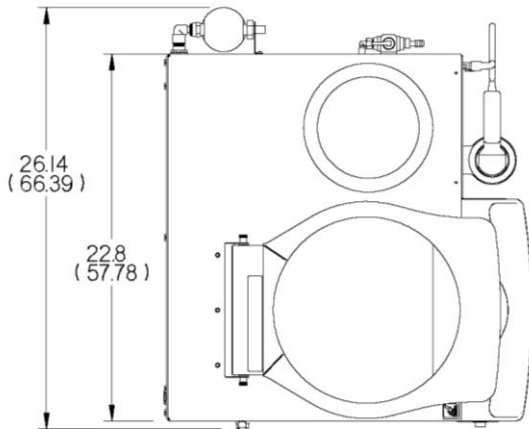
The following pages list components that are available for your CentriVap Complete. The parts shown are the most common replacement parts. If other parts are required, contact Product Service.

Item	Quantity	Part No.	Description
1	1	7452600	Lid Gasket
2	1	7456600	Lid Assembly (Gasket Included)
3	1	7312100	Cold Trap Lid
3A	1	7312101	Cold Trap Lid – PTFE Coated
4	1	7314900	Inlet Connection
5	42.2"	7451700	Extrusion
6	1	7308500	Lid Bracket
7	1	7441000	Print Circuit Board, Concentrator
8	1	1302301	Power Switch
9	1	7826000	Switch, Latch
10	1	7460600	Heater, Boost 115V
10A	1	7460601	Heater, Boost 230V
11	1	7478700	Solenoid, Latch
12	1	7118402	Label/Switch Pad
12A	1	7118403	Label/Switch Pad with Heat Boost
13	1	4503702	Display
14	1	7315300	Strobe Light
15	1	7591805	Compressor, 115V/60Hz
15A	1	7591806	Compressor, 230V/50Hz
15B	1	7591807	Compressor, 230V/60Hz
16	1	1420501	Fitting, 3/8" Hose Barb
17	1	1360500	Drain Valve
18	1	7312700	Fitting 90 Deg.
19	1	7456000	Harness, Temp & Speed Sensor
20	1	7325101	Thermostat
21	1	7310607	Motor
22	1	7453500	Heater, 115V
22A	1	7453501	Heater, 230V
23	1	1647105	O-Ring, Inner
24	1	1647106	O-Ring, Outer
25	1	7312400	Vacuum Pump, Dual Voltage
26	1	7546700	Valve, Vacuum Break, 115V
26A	1	7546701	Valve, Vacuum Break, 230V
27	1	1289100	Relay, 115V (Vacuum, Refrig, Heat Boost)
27A	1	1289200	Relay, 230V (Vacuum, Refrig, Heat Boost)
28	1	1333800	Power Cord Inlet, 115V
28A	1	1338101	Power Cord Inlet, 230V
29	1	1289315	Circuit Breaker, 115V
29A	2	1289308	Circuit Breaker, 230V
30	1	7313901	Vacuum Hose, Vacuum Pump
30A	1	7313902	Vacuum Hose, Chamber
31	1	7450200	Glass Jar

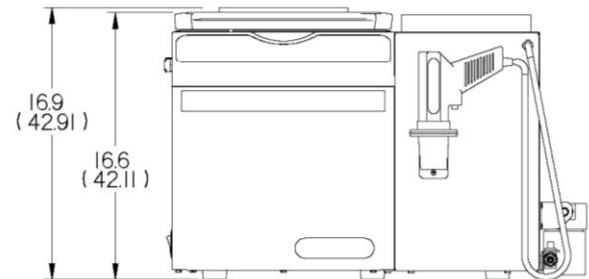
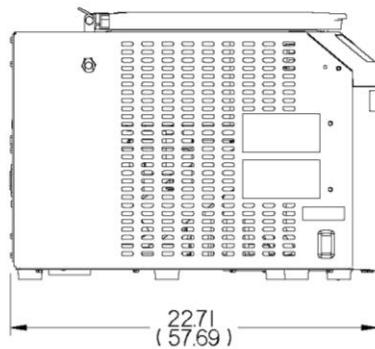
Appendix A: CentriVap Components



Appendix B: CentriVap Dimensions



inches
(centimeters)



Appendix C

CentriVap Specifications

This Appendix contains technical information about the CentriVap including specifications, environmental operating conditions and evaporation rates.

Mechanical Specifications

- Weight: 145 lbs. (66 kg)
- Dimensions: See Appendix B

Electrical Specifications

- Nominal amperage for 115V/60 Hz CentriVap: 12A.
- Nominal amperage for 230V/50Hz CentriVap: 6.5A.
- Nominal amperage for 230V/60Hz CentriVap: 6.5A.
- Phase: Single
- Heater Power: 300 watts – Main heater
- Heater Power: 300 watts – Heat boost
- Rotor Speed: Up to 1,725 RPM

Environmental Conditions

- Indoor use only.
- Maximum altitude: 6562 feet (2000 meters).
- Ambient temperature range: 41° to 104°F (5° to 40°C).
- Maximum relative humidity: 80% for temperatures up to 88°F (31°C), decreasing linearly to 50% relative humidity at 104°F (40°C).
- Main supply voltage fluctuations not to exceed $\pm 10\%$ of the nominal voltage.
- Transient overvoltages according to Installation Categories II (Overvoltage Categories per IEC 1010). Temporary voltage spikes on the AC input line that may be as high as 1500V for 115V models and 2500V for 230V models are allowed.
- Used in an environment of Pollution degrees 2 (i.e., where normally only non-conductive atmospheres are present). Occasionally, however, a temporary conductivity caused by condensation must be expected, in accordance with IEC 664.

Appendix C: CentriVap Specifications

Evaporation Rates

Methylene Chloride bp 40

<i>Tube Size (ml)</i>	<i>Number of Samples</i>	<i>Sample Size (ml)</i>	<i>Heater Temp (C)</i>	<i>Heat Boost</i>	<i>Vacuum Pump</i>	<i>Time to Dry (min)</i>	<i>Cold Trap</i>	<i>Rate Overall (ml/min)</i>
50	12	25	45	off	Diaphragm	93	yes	3.23
50	12	25	45	on	Diaphragm	89	yes	3.37
15	18	10	45	off	Diaphragm	57	yes	3.16
15	18	10	45	on	Diaphragm	55	yes	3.27

Toluene bp 111

50	12	25	45	off	Diaphragm	213	yes	1.41
50	12	25	45	on	Diaphragm	151	yes	1.99
50	12	25	100	off	Diaphragm	63	yes	4.76
50	12	25	100	on	Diaphragm	57	yes	5.26
15	18	10	45	off	Diaphragm	93	yes	1.94
15	18	10	45	on	Diaphragm	85	yes	2.12
15	18	10	100	off	Diaphragm	42	yes	4.29
15	18	10	100	on	Diaphragm	37	yes	4.86

Acetonitrile bp 82

50	12	25	45	off	Diaphragm	182	yes	1.65
50	12	25	45	on	Diaphragm	178	yes	1.69
50	12	25	100	off	Diaphragm	97	yes	3.09
50	12	25	100	on	Diaphragm	89	yes	3.37
15	18	10	45	off	Diaphragm	117	yes	1.54
15	18	10	100	off	Diaphragm	63	yes	2.86
15	18	10	100	on	Diaphragm	53	yes	3.40
1.5	132	1	45	off	Diaphragm	57	yes	2.32
1.5	132	1	60	off	Diaphragm	44	yes	3.00
1.5	132	1	75	off	Diaphragm	37	yes	3.57
1.5	132	1	100	off	Diaphragm	27	yes	4.89
1.5	132	1	100	on	Diaphragm	25	yes	5.28

Methanol bp 65

50	12	25	45	off	Diaphragm	245	yes	1.22
15	18	10	45	off	Diaphragm	145	yes	1.24
1.5	132	1	45	off	Diaphragm	75	yes	1.76
1.5	132	1	60	off	Diaphragm	58	yes	2.28
1.5	132	1	75	off	Diaphragm	51	yes	2.59
1.5	132	1	100	off	Diaphragm	38	yes	3.47
1.5	132	1	100	on	Diaphragm	34	yes	3.88

Water bp 100

<i>Tube Size (ml)</i>	<i>Number of Samples</i>	<i>Sample Size (ml)</i>	<i>Heater Temp (C)</i>	<i>Heat Boost</i>	<i>Vacuum Pump</i>	<i>Time to Dry (min)</i>	<i>Cold Trap</i>	<i>Rate Overall (ml/min)</i>
50	12	25	45	off	Diaphragm	1120	yes	0.27
50	12	25	100	off	Diaphragm	416	yes	0.72
50	12	25	100	on	Diaphragm	383	yes	0.78
15	18	10	45	off	Diaphragm	618	yes	0.29
1.5	132	1	45	off	Diaphragm	358	yes	0.37
1.5	132	1	60	off	Diaphragm	251	yes	0.53
1.5	132	1	75	off	Diaphragm	193	yes	0.68
1.5	132	1	100	off	Diaphragm	137	yes	0.96
1.5	132	1	100	on	Diaphragm	122	yes	1.08

Vacuum Pump – Rated at 7 mbar ultimate vacuum and 38 L/min displacement

Chamber preheated prior to each run to run temp.