

# Speed-Vap<sup>®</sup> IV Evaporation System



## Users Guide



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# Preface

## Your Speed-Vap<sup>®</sup> IV Evaporation System

Congratulations on your purchase of the Speed-Vap IV Evaporation System, the latest generation of evaporation systems from Horizon Technology! The Speed-Vap IV System offers an economical evaporation system to a laboratory to increase productivity. We are confident the Speed-Vap IV System will be a welcome addition to your laboratory.

The Speed-Vap IV 220V module is marked for CE compliance and has passed TÜV CUE certification and EMC testing.

### **NRTL (USA)**

In the US the Speed-Vap IV System is compliant with NRTL safety standards through evaluation by TÜV Laboratories.

### **Product Safety**

The Speed-Vap IV System is designed with operator safety in mind. However, the product use is at the discretion and risk of the operator or laboratory supervisor/manager. Use the product as described in this manual. Refer to Section 1.2, *Product Safety Notice and Certification*.

### **Statement of Proper Use**

The Speed-Vap IV is designed for rapid controlled evaporation of volatile solvents, such as hexane. Proper evacuation and removal of explosive solvent vapor requires a compressed air supply and suitable exhaust vent. The solvent vapor is directed out of the sealed box in an air flow, allowing recovery by the Solvent Trap<sup>®</sup> solvent trap system, offered by Horizon Technology. Use outside of proper usage described in this manual can cause explosion and harm and must be avoided.



### **WARNING**


To reduce the risk of electrical shock, do not disassemble the module. There are no serviceable parts inside. Refer repairs to qualified service personnel.

## Manual Audience and Intent

This manual, which is intended for all Speed-Vap IV System users in the laboratory environment, provides the information needed to operate and maintain the Speed-Vap IV System. The information may contain typographical errors or technical inaccuracies and is subject to change without notice. Modifications or enhancements may also be made to the product at any time. For the most current information, consult the Horizon Technology website at [www.horizontechinc.com](http://www.horizontechinc.com).






## Conventions

The following texts are examples of conventions used in this manual.

Example	Description
<i>Declaration of Conformity</i>	Italicized text indicates document and section titles as well as special notes.
 <b>WARNING</b>	Symbols to the left of a <b>NOTE</b> or <b>WARNING</b> indicate the type of danger that could be present, such as high voltage, fire, explosion, etc. See the Table of Symbols, below, for details.

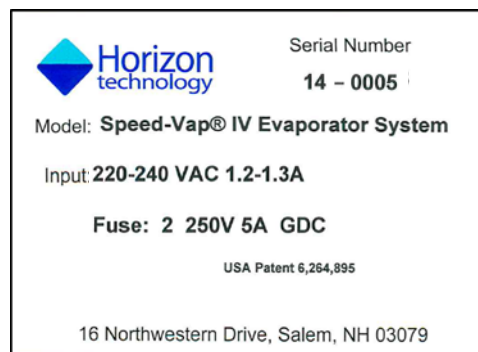
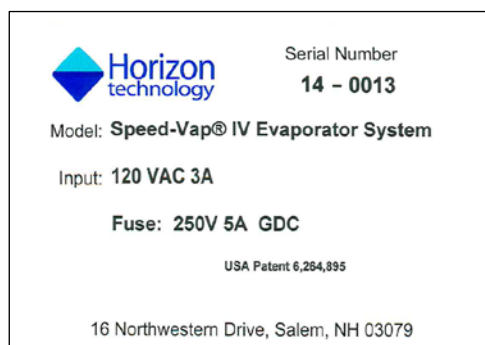
## Table of Symbols

The following symbols point out important information and alert you to potential hazards.

Symbol	Type	Description
	Warning	A potentially hazardous situation, which if not avoided could result in death or serious injury.
	Warning	A potentially hazardous situation that may result in an explosion.
	Caution	A caution concerning potential eye injury. Eye protection in the form of safety glasses or goggles is highly recommended when operating the Speed-Vap IV system and any chemical processing. If reagents, liquids, or vapors come into contact with the eyes, follow the appropriate first aid procedures set forth in the laboratory's safety manual.
	Caution	A caution concerning the potential of a fire.
	Caution	A caution to wear protective gloves when handling harmful reagents.

## Serial Number Label

The following are samples of the serial number label located on the back of the Speed-Vap IV System.



## Technical Support

Visit the Horizon Technology website for technical information in addition to that provided in this manual: [www.horizontechinc.com](http://www.horizontechinc.com). If you have questions about the Speed-Vap IV System that are not fully addressed in this manual or our website, please contact the Horizon Technology Technical Customer Support Center:

Phone: (603) 893-3663

Fax: (603) 893-4994

E-mail: [support-service@horizontechinc.com](mailto:support-service@horizontechinc.com)

Customer Support Center hours are Monday through Friday, 8:00 a.m. to 5:00 p.m. EST. The Center provides expert technical support including troubleshooting, repair instructions, depot service, and replacement part information.

### Notes:

# 1 Introduction and Safety

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## 1.1 System Overview

The Speed-Vap IV is a modern evaporation system providing safe and simultaneous monitored evaporation of up to nine pans of evaporating solvent for extractable hydrocarbons such as hexane oil and grease extractions generated using methods such as US EPA 1664, ISO 11349:2010 or Standard Methods 5520. It can also be used to evaporate solvents from extracted soil hydrocarbons and fats from foods. The system provides an important step in the workflow while remaining independent, allowing for easy interaction with samples of varying evaporation rates. The Speed-Vap IV can be used with the SPE-DEX<sup>®</sup> 1000XL/3000XL, SPE-DEX 4790 or other sources of extracts. Features of the Speed-Vap IV include:

- Can accommodate five or nine pans to match higher or lower solvent volumes, depending on the solid phase extraction (SPE) disk size or extraction source
- The 120-V version is NRTL safety approved and the 240-V version is further CE marked for sale in Europe
- The evaporation temperature is adjustable from ambient/20°C up to 60°C , allowing flexibility for a range of solvents, such as hexane, methanol, petroleum ether, and MTBE
- A vacuum generates a gentle flow of air over all samples, speeding the evaporation process by 25-50%
- Timer and chime allow the analyst to walk away with confidence and return when needed to monitor the final steps in evaporation



**Figure 1-1. Speed-Vap IV, Cover closed**

The Speed-Vap IV system comes in two models, one for 120V and one that can be used with 220-240V. One rack is provided with the system and can be chosen to accommodate either five 105-mm solvent pans or nine 70-mm pans.

The Speed-Vap IV can be combined with the in-line Solvent Trap<sup>®</sup> solvent recovery system to capture the solvent for purification and reuse or proper disposal.

The Speed-Vap IV is an economical way to provide more efficiency for any laboratory requiring the gravimetric measurement of hydrocarbons.

## 1.2 Product Safety Notice and Certification

### 1.2.1 General Safety



- Eye protection in the form of safety glasses or goggles is highly recommended when operating the Speed-Vap IV System or any chemical processing. If reagents, liquids, or vapors come into contact with the eyes, follow the appropriate first aid procedures set forth in the laboratory's safety manual.
- Lab coats should be provided for protection. They should be worn at all times when operating the Speed-Vap IV System.



- Protection of the hands is essential when working with reagents or any hazardous material. Wear gloves selected on the basis of the hazard. If reagents or other chemicals come into contact with the skin, follow the appropriate first aid procedures set forth in the laboratory's safety manual.
- The Speed-Vap IV System is designed for bench top or fume hood operation. If installed on a bench top, the end of the exhaust hose should be ducted into a local exhaust device to avoid the discharge of potentially toxic vapors and fumes into the laboratory atmosphere. The equipment must be set up and operated in a well-ventilated area.



- The Speed-Vap IV requires a compressed air source to generate vacuum and correctly exhaust explosive solvent vapors. Do not operate the unit with lid closed without pressure applied and vacuum exhausted.
- Do not work with volatile reagents without adequate ventilation from chemical fume hoods or other protective devices.
- Disconnect the power cord before working on the module.

### 1.2.2 Chemical Safety

- A Material Safety Data Sheet (MSDS) or Safety Data Sheet (SDS) is the source for chemical hazard information including basic information on the manufacturer or distributor, identification of the chemical, the product's hazardous ingredients, physical data, fire and explosion data, toxicity information, protection information, and more. The laboratory is responsible for having a MSDS for every chemical or substance being used. It is also the laboratory's responsibility to make the MSDS available and accessible to all employees and to provide training in the safe handling of hazardous chemicals. The MSDS can be obtained from the vendor.
- All hazardous reagents and chemicals must be disposed in accordance with appropriate federal, state, and local regulations.
- The Speed-Vap IV allows the use of a pressurized gas source to create the gentle vacuum. If a gas cylinder is used (not recommended), secure the gas cylinder to avoid tipping.



- The Speed-Vap IV System uses organic reagents that can pose inhalation, skin, and ingestion hazards with potential chronic health effects. Some of the reagents may also be flammable, which could cause fire and/or explosion hazards. All reagents must be handled using appropriate personal protection equipment and in a properly operating fume hood to eliminate inhalation hazards. For handling and safety instructions, refer to the Material Safety Data Sheet (MSDS) for the specific chemical.

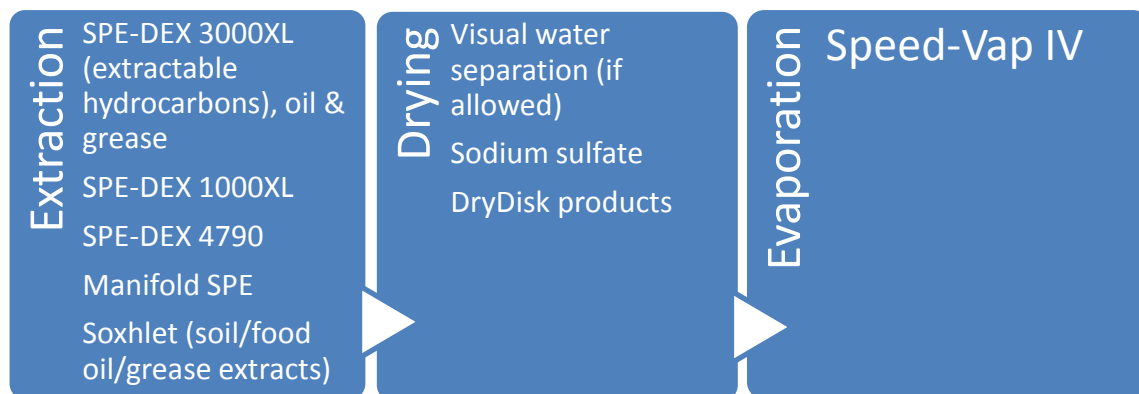
#### Notes:



# 2 Theory of Operation

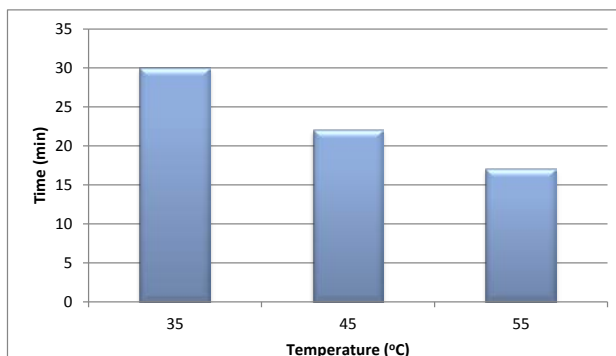
## 2.1 The Overall Sample Preparation Process

The Speed-Vap IV provides one step in an important process of sample preparation.



The objective is to evaporate the solvent extract to a constant weight without losing the volatile compounds extracted from the sample.

A vacuum creates a gentle flow of air over the extracts, creating a swirling motion in the solvent that helps to lessen the evaporation time. The vacuum is produced by running compressed air through the unit. A minimum of 60 psi at 2.0 SCFM is required for adequate air flow. Compressed air flows through the Speed Vap IV System and an internal venturi generates a vacuum, the amount of vacuum is controlled by an adjustment knob on the front panel. Proper flow adjustment is key to both the speed of the concentration and the quality of the final data. The flow should be set so that the air flow just dimples the surface of the extract and the user should set the internal chime to sound prior to the pan being completely dry.



**Figure 2-1: Evaporation Rates as a Function of Temperature**

When the last few milliliters of solvent remain in the pan it is prudent to remove the pan from the system and allow the evaporation to finish in a safe, clean, dry place (such as a desiccator) before weighing.

One variable to be considered is the temperature at which to evaporate the extracted sample. Using the Speed-Vap Evaporation System, data was collected at three different evaporation temperatures. Figure 2-1 shows the time to evaporate the extract at three different temperatures.

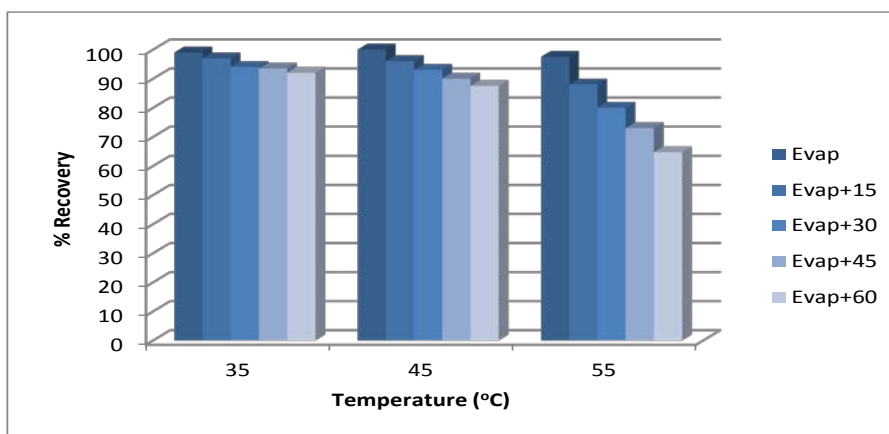
As would be expected, using a higher temperature significantly reduces the evaporation time. However, the possibility of losing more volatile compounds exists and must be taken into account

## 2: Theory of Operation

depending on the sample. For a US EPA 1664, Revision B extraction, the evaporation temperature is typically set at 40°C.

One of the most important factors resulting in low recoveries is leaving the pan on the heat source for too long after the extract has evaporated. The recovery loss becomes more pronounced when using higher temperatures. To demonstrate this point, both the post-drying heat application time and the temperature were varied and the recovery was calculated for a number of samples (Figure 2-2).

The data shows that evaporating at a higher temperature does not significantly affect recovery, if the pan is removed from the heat as soon as the evaporation is close to complete. The percent recovery of the standard in this example, upon complete evaporation at 55°C, was over 98%. However, the hexadecane contained in the standard is volatile enough to be lost after the sample is evaporated: the higher the evaporation temperature, the more rapid the loss of analytes.



**Figure 2-2: Recovery as a Function of Time and Temperature**

Therefore, if higher temperatures are used to reduce the evaporation times, it is critical to remove the pan from the evaporator immediately before the pan reaches complete evaporation. If the pan is not removed, the recovery will drop considerably over time. (Refer to Figure 2-2).

To remind the operator that the evaporation process is nearing completion, the use of the built-in timer and chime is recommended. The operator should determine the length of time that it takes for a standard quality control sample to evaporate using the settings that they desire and then set the timer to warn the operator to return to the Speed-Vap IV to remove the pan as appropriate.

**Notes:**

# 3 Site Preparation and Installation Instructions

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The Horizon Technology Speed-Vap IV is customer installable.

## 3.1 Preparing the Site

When setting up the Speed-Vap IV System, determine a suitable installation location with compressed air, electrical sources, and an exhaust vent. Enough space should be available around the unit to easily open and close the lid and add and remove sample pans from the unit.

### Facility Requirements

Be sure the site for the Speed-Vap IV System meets the facility requirements outlined below.

Physical Dimensions	16 inches ( 40.6 cm) wide 20 inches ( 50.8 cm) depth 6 inches ( 15.2 cm) high, including handle, 19 inches (48.3 cm) when the lid is opened Weight of approximately 15 lbs (6.8 kg)
Electrical Requirements	Part Number 200-1000-04: Requires a line voltage of 100 to 120 VAC, 50- 60 Hz Part Number 200-1000-05: Requires a line voltage of 200-240 VAC , 50 -60 Hz Maximum Power - Total current draw <350 W Fuse –250V, 5A, GDC, 1 is used in the 120V model and two are used in the 220V model Uses an IEC type connector to accept various international power cords
Gas Requirements	Clean dry source of air, 60 to 120 PSI inlet pressure at 2 CFM (57 LPM)
Environmental	The instrument should be operated in a temperature range of 60-80°F (approx. 17 to 28°C) The instrument should be operated in a relative humidity environment of 10% to 70%, non-condensing
Ventilation	Based on the reagents to be used, each laboratory will need to make their own decision to operate on the bench top or in a fume hood.

## 3.2 Unpacking the Speed-Vap IV System

Unpack the Speed-Vap IV system (Figures 3-1 and 3-2) and check the parts received against the list below:

- Speed-Vap IV Evaporator Unit, Part # 200-1000-04(120V) or 200-1000-05 (220-240V)
- Power Cord appropriate for your location
- Pan Locator Rack, 9-position, Part # 01-0284-02 or 5-position, Part # 01-0284-03
- Air Line, polyurethane tubing, Part # 50-0487
- Exhaust Line, polyurethane tubing, Part # 50-0489
- Dry Trap, Part # 50-0572
- User's Manual, Part # 29-2401-03
- Clean-out tool for Speed-Vap IV Window air inlets, 0.016 Pin Gauge, Part # 99-0326
- Aluminum Weighing Pans, 70 mm, Part # 50-002-HT or 105 mm, Part # 50-002-02-HT



**Figure 3-1. Looking into the Speed-Vap box with packing materials**



**Figure 3-2. Looking into the Speed-Vap accessory box**

### 3.3 Overview of the System Hardware

#### Overview of the Speed-Vap IV Solvent Evaporation System

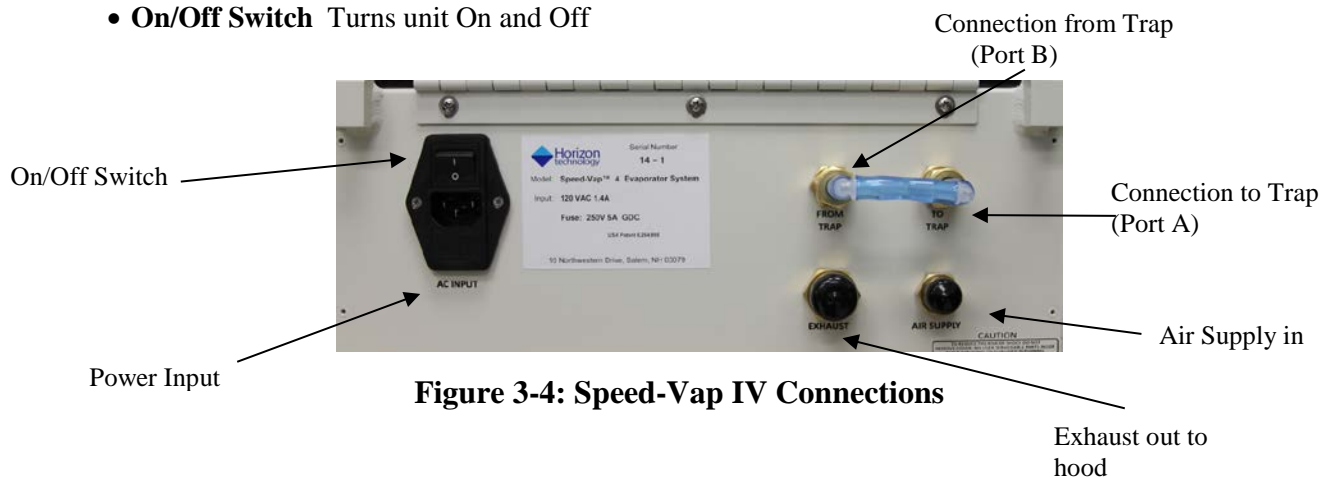
Use Figures 3-3 and 3-4 to identify the major components of the Speed-Vap IV unit.

- **Controller** Provides the inputs to set and monitor heating temperatures and timer
- **Vacuum Adjust Knob** Regulates the vacuum supplied to the chamber
- **Vac On/Off** Turns the vacuum supply “On” or “Off”.



**Figure 3-3: Speed-Vap IV Controls**

- **Power Input** Connects the Evaporator to a power source via the power cord
- **Air Supply** Connection fitting for the 10-foot polyurethane tubing to the compressed air source
- **Exhaust** Connection Fitting for the polyurethane tubing vented to a fume hood
- **To Trap** Connection fitting for the polyurethane tubing connecting the Speed-Vap IV to Port A of the Solvent Trap
- **From Trap** Connection fitting for the polyurethane tubing connecting the Speed-Vap IV to Port B of the Solvent Trap
- **On/Off Switch** Turns unit On and Off



**Figure 3-4: Speed-Vap IV Connections**

## 3.4 Installing the Speed-Vap IV System

It is recommended to install the Speed-Vap IV System unit in a fume hood. However, if proper ducting is available to minimize solvent vapors when the cover is opened, the unit can be operated on the lab bench. Follow the instructions below to install the unit.

- 1.) Remove the protective foam padding taped to the top of the Speed-Vap IV unit.
- 2.) Open the Speed-Vap IV System cover. Remove and discard the protective foam paper. Close the cover.
- 3.) Place the Speed-Vap IV System unit in the desired location.
- 4.) Locate the bag with Part # 50-0489, containing the polyurethane exhaust tubing. Connect one end to the connector labeled “Exhaust” on the back of the Speed-Vap IV System (refer to Figure 3-4). Place the other end of the tubing in a hood. Be certain the hexane vapors are properly vented, well away from any ignition source.
- 5.) Locate the bag with Part # 50-0487, containing the polyurethane air tubing. Attach the fitting to the connector labeled “Air Supply” on the back of the Speed-Vap IV System (refer to Figure 3-4). Connect the other end of the tubing to the air compressor. (Fittings to connect to the compressor are to be supplied by the user)
- 6.) The air compressor requirements are a flow rate of 2 CFM and a minimum pressure of 60 psi.
- 7.) The Speed-Vap IV System comes with a shunt connected to the fittings labeled From Trap and To Trap (refer to Figure 3-5). This shunt allows for the Speed-Vap IV to be used without the Solvent Trap System.

If installing in conjunction with the Solvent Trap, please refer to Manual 29-0545, which describes installation of the Speed-Vap III with the Solvent Trap.



**Figure 3-5: Back of Speed-Vap IV showing shunt**

- 8.) Insert the power cord into the power input receptacle on the back of the Speed-Vap IV. Plug the power cord into a properly protected earth-grounded outlet, and turn the Speed-Vap IV on using the On/Off switch located above the power input.
- 9.) The Controller on the Speed-Vap IV System will first cycle through its internal diagnostics and then start to heat to the preset value (40°C). The LCD will display the actual temperature.
- 10.) Located on the front panel of the Speed-Vap IV is the Vacuum On/Off switch. Verify that the switch is in the “Off” position. Refer to Figure 3-3.
- 11.) Open the cover and place an empty aluminum pan into any position. Carefully pour approximately 30 mL of hexane into the pan. Close the cover.

### 3: Site Preparation and Installation Instructions

- 12.) Turn the Vacuum Adjust Knob counter-clock-wise until it stops to ensure that the vacuum delivered to the chamber is low.
- 13.) Turn the Vacuum Control On/Off to the “On” position.
- 14.) Slowly increase the Vacuum Adjust knob on the Speed-Vap clockwise. Continue adjusting until the solvent in the pan begins to swirl. The swirling motion should not be too vigorous as this may cause some of the extract to be forced out of the pan.
- 15.) When the extract is nearing dryness switch the Vacuum On/Off to the “Off” position.
- 16.) Lift the lid slightly using the handle and switch the Vacuum On/Off to the “On” position to vent the chamber.
- 17.) After 10 seconds or so, turn the Vacuum On/Off to the “Off” position and lift the cover using the handle.
- 18.) Remove the aluminum pan, being careful not to spill any solvent. The use of tongs or gloves is highly recommended so that the final weight of the pan is not altered.

This completes the installation and testing of the Speed-Vap IV System. Turn off the main power to the system when it is not in use.

## 3.5 Programming the Temperature Control and Timer/Chime

When the unit is powered on, the display will show the current revision of firmware, for example r 1.12.

The display will automatically advance to temperature mode and will display the current temperature of the heated area while simultaneously heating to the previously set temperature (40°C factory default).

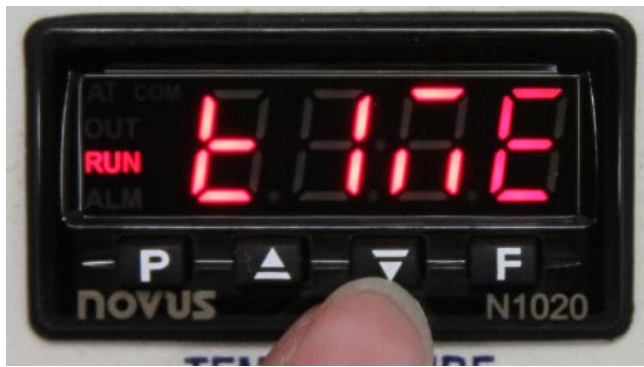


**Figure 3-6: Changing the temperature setting**

To change the temperature, press the **P** key repeatedly until SP (for Set Point) is seen (Figure 3-6). Use the **▼** and **▲** buttons to change the temperature to the desired setting. Press the **P** button twice again to observe the actual temperature. The temperature scale used is in degrees Celsius.

To set the timer press the **P** button repeatedly until the time is shown on the display as seen in Figure 3-7.





**Figure 3-7: Display indicating the timer can be set**

The timer is set in minutes, therefore setting the timer to 0:01 will make the timer count down from 1 minute. When the timer reaches zero, the chime will sound. No settings are possible for the chime volume, duration or type of sound. Press **P** again to return to the temperature display.

The **F** key controls the timer operation. Each time the **F** key is pressed, the timer holds or resumes counting down. The flashing colon (:) indicates the timer is counting down. Keeping the **F** key pressed for three seconds resets the timer to the full time, preparing for a new count down.

# 4 Daily Operating Procedure

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- 1) Obtain clean, empty aluminum pans from the original container. As dust can collect on the inside of the pans, use a clean wipe to gently wipe the inside of the pans. Using the back end of a pen, scribe the sample identification information on the bottom of each pan. This will eliminate any confusion when multiple pans are in use.

**NOTE:** Writing the sample identification information onto the pan using a permanent marker is not recommended as this may influence the weight of the extract.

**NOTE:** Only use pan transfer tongs or gloves to move or transfer the pans. Do not touch the pans with your fingers, as oils from the skin will contribute to the weight.

- 2) Once the pans have been cleaned and labeled, transfer them to the analytical balance. Record the weight of each pan on the worksheet provided in Appendix A.
- 3) Transfer the pans to the Speed-Vap IV System. Use the 9-place rack to hold the smaller pans and the 5-place rack to hold the larger pans.

**NOTE:** It may be necessary to remove excess water from extracts prior to the evaporation step. Consult your regulatory agency or internal department for more information.

- 4) Transfer the extract to a pre-weighed pan. If using a separatory funnel, and water was drained out of the stopcock, pour the extract out of the top of the funnel to ensure no water gets into the pan.
- 5) Using fresh n-hexane and a squeeze bottle, rinse down the walls of the collection vessel. Transfer the rinse hexane into the pan. Repeat the rinsing operation two more times to ensure all of the extracted material is transferred into the pan.

**NOTE:** Due to the nature of most samples, it is recommended to cap the container being rinsed and briefly shake the container prior to transferring the hexane to ensure optimal recoveries.

- 6) Perform Steps 4 and 5 for all samples extracted.
- 7) Close the cover of the Speed-Vap IV System. Make sure the air compressor is on, and that the Vacuum Adjust Knob is turned all the way counter-clock-wise. Turn the Vac On/Off switch to the "On" position and adjust the Vacuum Adjust Knob to achieve the desired swirling rate in the pans.
- 8) When there is only a small surface of solvent within the pan, turn the Vac On/Off switch to the "Off" position and lift the cover. Use tongs or forceps to transfer the pan to a clean, dry location (such as a desiccator) to complete evaporation.
- 9) Measure the weight of the pan with the dried extract. If the weight is stable, record the new weight on the worksheet in Appendix A. If the weight is slowly dropping, this may indicate solvent is still evaporating from the pan. In this case, place the pan in its clean location and re-measure the weight after some time has passed. Consult the regulations being followed or your laboratory operating procedures for the exact weight determination procedure.

- 10) Repeat the above steps for all extracted samples.



**NOTE:** Never turn off the Vac On/Off switch while samples are still in the Speed-Vap IV. This may cause vapors to condense on the lid causing cross contamination, crazing of the cover which may reduce pan visibility or build-up of explosive vapors.

- 11) When all samples have been completed and removed from the system, turn the Vac On/Off switch of the Speed-Vap IV to the "Off" position. Shut down the air compressor or at the source of the air. Finally, switch off the power to the Speed-Vap IV.

# 5 Maintenance

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To ensure proper functioning and longevity of the Speed-Vap IV system, follow the maintenance instructions below.

- Use the cleanout tool for the Speed-Vap IV System Window (part number 99-0326) to clean the small openings on the cover above each pan to ensure unrestricted air circulation. The frequency with which the holes must be cleaned will depend on the cleanliness of the room air.
- If the cover is cracked or distorted, please call Horizon Technology to order a replacement cover.
- Keep the heating surface clean and free of debris. Periodically remove the aluminum tray or rack, containing the cutouts for each pan, and visually inspect the surface. Wipe the heating surface clean and replace the aluminum tray.
- Check the line to and from the compressed air source to be certain that it is not crimped.
- Periodically inspect the sealing gaskets on the lid of the Speed-Vap IV. If the gasket appears to be significantly degraded, or the unit does not hold a vacuum, this gasket may need to be replaced. Contact Horizon Technology to troubleshoot the vacuum loss and to get a replacement gasket.
- The fuse is a consumable item and may need to be replaced. To replace the fuse, remove the power cord from power input module on the back of the unit. Use a small screw driver to pop out the top of the fuse box and remove it as shown in Figure 5-1. Replace the one fuse, if the 120V version or replace two fuses, if the 220V version (fuse Horizon Technology Part # 13-0308). Replace the fuse box in the unit.



**Figure 5-1. Fuse box being removed**

Call Horizon Technology at +1 (603) 893-3663 (800-997-2997 toll-free, inside the US) promptly if problems arise with the Speed-Vap IV system.

# 6 Troubleshooting

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To establish the cause of unexpected behavior, review the table below.

## System Troubleshooting

Symptom	Probable Cause	Solution
There is no vacuum in the system	Sufficient compressed air may not be flowing through the system	Ensure 2 CFM of air at 60 PSI is delivered to the system
There is no vacuum in the system	Exhaust line is blocked	Ensure that exhaust is safely vented from the system
There is no vacuum in the system	The seal on the lid is old or degraded	Replace the seal if applying pressure is not sufficient for a good seal
There is no vacuum in the system	If the Solvent Trap is used, the stopper going into the collection flask may not be sealed	Check that the stopper is positioned to seal
The swirling motion is not present	The holes in the Speed-Vap lid are plugged	Use the cleanout tool to clear the holes of debris
Equipment does not power up when switch is turned on	Fuse may have blown. Visually inspect for confirmation that the wire inside the fuse is broken	See maintenance section for changing the fuse

# 7 Appendices

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# A Example Worksheet

Use this worksheet to record and calculate sample weights, and percent recoveries for standards. See the example below.

## Oil & Grease Worksheet

Date	<i>June 30, 2014</i>	Date	
Sample ID	<i>980503-128</i>	Sample ID	
Temperature (°C)	<i>40</i>	Temperature (°C)	
Final weight (g)	<i>2.5835</i>	Final weight (g)	
Empty weight (g)	<i>2.5641</i>	Empty weight (g)	
Wt Δ (mg)	<i>19.4</i>	Wt Δ (mg)	
Std added (mg)	<i>20.0</i>	Std added (mg)	
%Recovery	<i>97</i>	%Recovery	
Date		Date	
Sample ID		Sample ID	
Temperature (°C)		Temperature (°C)	
Final weight (g)		Final weight (g)	
Empty weight (g)		Empty weight (g)	
Wt Δ (mg)		Wt Δ (mg)	
Std added (mg)		Std added (mg)	
%Recovery		%Recovery	
Date		Date	
Sample ID		Sample ID	
Temperature (°C)		Temperature (°C)	
Final weight (g)		Final weight (g)	
Empty weight (g)		Empty weight (g)	
Wt Δ (mg)		Wt Δ (mg)	
Std added (mg)		Std added (mg)	
%Recovery		%Recovery	

# B Limited Warranty

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Horizon Technology, Inc. warrants the **Speed-Vap IV** (Product) against defects in material or workmanship as follows:

1. **LABOR:** For a period of one year from the date of purchase, if this Product is determined to be defective, Horizon Technology will repair the Product, and will cover all labor charges. The Product must be returned to Horizon Technology, prepaid, for repair. Horizon Technology will pay the return shipping charges.
2. **PARTS:** Horizon Technology will supply, at no charge, new replacement parts for a period of one (1) year. Horizon Technology will send the replacement parts directly to the customer site, for customer installation. If the customer does not wish to install these parts, the Product must be returned to Horizon Technology for the necessary repairs. The customer is responsible for shipment of the Product to Horizon.

To obtain warranty service, the Product must be delivered prepaid, in the original packaging. If needed, new packaging is available from Horizon Technology.

This warranty does not cover customer installation, or set up adjustments and/or Product optimization. The warranty also does not cover cosmetic damage or damage due to acts of nature, accident, misuse, abuse, negligence, or modifications of, or to any part of the Product. This warranty does not cover damage due to improper operation or maintenance, or attempted repair of any electrical components.

No other warranties are expressed or implied.

For service assistance or resolution of a service problem, or for product information or operation, contact:

**Horizon Technology, Inc.**

+1 (603)-893-3663

1-(800)-997-2997 (Toll-free, US only)

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