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# ISS110

## Integrated SpeedVac®

### INSTRUCTION MANUAL

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**Thermo** Savant

A Thermo Electron business

# Table of Contents

Section	Section Title — Introduction	Page
1.0	Introduction-ISS110	1
Section	Section Title — Installation	Page
2.0	Installation	1
Section	Section Title — Operation	Page
3.0	Operation	1-3
3.1	Drying Rate	2
3.2	Starting and Stopping a Run	2
3.3	Chamber Cover	2
3.4	Simple System Integrity Test	3
Section	Section Title — Application Information	Page
4.0	Application Information	3
4.1	Solvent Handling	3-4
4.2	Accessories	4
4.3	Devising Protocols	4
Section	Section Title — Accessories	Page
5.0	Accessories	5
Section	Section Title — Trouble-Shooting	Page
6.0	Troubleshooting Troubleshooting Guide	5 7-8
Section	Section Title — Specifications	Page
7.0	Specifications	5
Section	Section Title — Warranty	Page
8.0	Warranty	6
Section	Section Title — Return	Page
9.0	To Return an Instrument for Repair	6

¡PEEDVAC®, VAPORNET® AND CRYOCOOL® ARE REGISTERED TRADEMARKS OF THERMOSAVANT, INC.

¡PEEDVAC® CONCENTRATOR IS PROTECTED UNDER U.S. PATENTNUMBER 4,226,669.

'APORNET® IS PROTECTED UNDER U.S. PATENTNUMBER 5,137,604, SUB-PATENTNUMBER 5,263,268, AND GERMAN PATENTNUMBER P41 13 74.6-16.

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## 1.0 INTRODUCTION

Thermo Savant's ISS110 Integrated SpeedVac® System is a complete system for solvent evaporation, sample concentration, and drying using a patented technique that combines centrifugal force, vacuum, and applied heat. It is intended for use with aqueous and non-aggressive solvents such as ethanol and methanol. It may also be used with small quantities of acetonitrile and ammonium hydroxide.

The ISS110 Integrated SpeedVac System combines a sample chamber, a rotor assembly, an oil-free vacuum pump and a refrigerated vapor trap in a small compact housing. The ISS110 applies vacuum to samples only when the rotor is spinning, thus preventing bumping and foaming. Where required, the ISS110 can apply thermal energy to the samples to counteract the cooling effect of evaporation under vacuum.

Polypropylene fittings and Teflon® coated sample chamber and vacuum pump heads resist corrosion and ensure reliable operation.

## 2.0 INSTALLATION

**UNPACKING.** Open the shipping carton. Compare the contents with the packing list. Inspect the system and components for any damage from shipment. If damage is evident, save the shipping carton and immediately notify the carrier or your distributor.

**SITE PREPARATION.** The ISS110 requires a stable, level surface for proper operation. Units configured for 115 VAC, 60Hz, should be plugged into a circuit rated for at least 10 amps. Units configured for 230 VAC, 50Hz, should be plugged into a circuit rated for, at least, 5 amps.

**IMPORTANT INFORMATION.** Before operating the unit, read section 3.0 Operation and Section 4.0 Application Information to determine your specific application requirements.

## 3.0 OPERATION

Start-of-day procedure. At the start of each day, ensure that the refrigerated trap contains a clean, dry, Glass Condensation Flask (GCF400) and that the supply of CryoCool® Heat Transfer Fluid is adequate.

The CryoCool fluid in the refrigerated trap must be cold before drying samples.

For the best results, maintain electrical power to the system at all times to keep the refrigerated trap cold and ready for use. When you first turn on the ISS110, wait 45 minutes for the system to reach operating temperature before processing samples!

**GLASS CONDENSATION FLASK INSTALLATION.** Prepare the refrigerated stainless steel trap chamber by adding approximately 800 ml of CryoCool fluid. A line scribed on the wall of the stainless steel trap indicates the minimum appropriate fluid level (with flask removed from trap). CryoCool conducts heat away from the Glass Condensation Flask, allowing vapors to condense on the flask walls.

Gently put a clean Glass Condensation Flask (GCF400) into the refrigerated chamber. As you lower the flask into the chamber, the CryoCool Fluid rises. Verify that the final CryoCool liquid level is 10 to 15 mm below the shoulder of the flask.

Immediately wipe clean any CryoCool Fluid that spills onto the rubber seal.

Fit the white insulating Flask Seal over the glass flask to secure the flask in the chamber. Its beveled side faces upward to admit the Flask Cap.

Snap the black rubber Flask Cap over the mouth of the glass flask. This provides easy tubing connection and a vacuum seal while also securing the Glass Condensation Flask and insulating Flask Seal in the refrigerated chamber.

**Rotor Installation.** Open the lid of the rotor chamber. Visually align the pin on the drive shaft with the groove on the bottom of the rotor. Carefully lower the rotor onto the drive shaft. Rotate the rotor by hand to be sure the pin is lined up with the groove. Secure the assembly by screwing the retaining knob into the drive shaft above the rotor. Tighten it firmly but not excessively. Load the rotor with samples and close the lid.

Always balance rotor loads. An unbalanced rotor causes vibration that will damage the bearings. Load the rotor symmetrically. There need not be a tube in each holder, but, you must be sure to evenly balance the rotor by placing an even number of tubes opposite each other. When using a rotor with aluminum tube holders, insert all tube holders.

### 3.1 DRYING RATE

By using the Drying Rate switch, thermal energy can be applied to the concentrator chamber to counteract the cooling effect of evaporation, maintain the samples in the liquid state, and accelerate the concentration run. The DRYING RATE switch selects the desired drying rate:

- LOW maintains the concentrator chamber at ambient temperature.
- MEDIUM maintains the concentrator chamber at approximately 43 °C.
- HIGH maintains the concentrator chamber at approximately 65 °C.

Select the drying rate according to the nature of your samples.

### 3.2 STARTING AND STOPPING A RUN

The CONCENTRATOR switch is normally in the OFF position. After loading and installing the rotor, closing the lid, selecting a DRYING RATE (you may even pre-heat the samples), press the CONCENTRATOR switch to the ON position to start the drying run. To stop the run, press the CONCENTRATOR switch to the OFF position. A run can be stopped at any point and restarted based on your criterion for sample dryness.

### 3.3 CHAMBER COVER

The chamber cover must be closed before a run can begin.

It is not possible to open the cover during a run because of the vacuum in the concentrator chamber. In addition, a cover lock is present on 220 and 230 volt models. The cover is locked at all times during a run and whenever power to the unit is interrupted.

The cover lock is a safety feature that further reduces the risk of injury or damage from the spinning rotor. Do not attempt to bypass the cover lock to conduct a run with an open cover.

To remove samples in the event of power failure, insert, at an upward 45° angle, the lid opening tool (provided with unit) into the vertical slot at the base of the front of the unit. Firmly raise the handle to a horizontal position and lift up the lid.

### **3.4 SIMPLE SYSTEM INTEGRITY TEST**

You can use this simple system integrity test to periodically verify the operational integrity of the vacuum pump and refrigerated vapor trap.

1. Install a clean, dry glass condensation flask.
2. Allow the refrigerated vapor trap to operate for 45 minutes.
3. Open the chamber lid and remove the rotor.
4. Fill a plastic beaker that will fit in the chamber with 50 ml of water and place it in the chamber. Close the lid.
5. Press the drying rate switch to the “LOW” position.
6. Start the system by pressing the concentrator switch to the “ON” position.
7. After fifteen minutes of operation press the concentrator switch to the “OFF” position.
8. Immediately open the lid and measure the water sample temperature.

A properly functioning system will bring the sample down in temperature within the range of 3 to 7 °C (33–37 °F).

## **4.0 APPLICATION INFORMATION**

The ISS110 Integrated SpeedVac® System is suitable for drying or concentrating primarily aqueous based samples. In addition, the small amount of ethanol commonly dried from preparations stemming from DNA precipitations can also be processed with this system.

Concentrating large quantities of organic solvents, such as hexane, chloroform, dichloromethane, or acetonitrile from extraction or elution systems are best suited to the AES1010 and AES2010 SpeedVac Systems.

### **4.1 SOLVENT HANDLING**

When processing hazardous samples, install the SCT120 Chemical Trap on the exhaust port to capture evaporated solvent. This trap, installed in addition to the integral refrig-

erated trap, provides more complete solvent trapping. The SCT120 accepts a variety of disposable cartridges to absorb volatile exhaust. Order the Thermo Savant DTK120R Chemical Trap Kit, which includes the trap, disposable cartridge, tubing, and fittings. These activated-charcoal cartridges trap radioactivity. (The same technology is commonly used in fume hood holders.)

To install a trap on the exhaust port, remove the muffler assembly from the VAPOR EXHAUST PORT. Attach a piece of vacuum tubing to this fitting. Attach the other end to the chemical trap. (Follow enclosed instructions supplied with the DTK120R kit).

The chemical trap requires periodic checking to ensure its continued effectiveness. Refer to the manual shipped with the trap.

When concentrating samples in ammonium hydroxide, install the ANT100 Ammonia Neutralizing Trap. The disposable ANS121 (Ammonia Neutralizing Solution) bottles, which screw onto the ANT100, neutralize ammonia gas, preventing unpleasant odors in the laboratory.

## 4.2 ACCESSORIES

The Thermo Savant **CC120/DX Deluxe Convenience Cart** is a useful accessory for the environmental lab. The SpeedVac® resides on the top shelf, while any additional trapping apparatus are placed on the bottom shelf. Addition of the cart produces a completely mobile concentration system.

Thermo Savant model **DVG50 Digital Vacuum Gauge**, can also be installed. Insertion of the vacuum gauge tube in the vacuum tubing, on the right hand side leading to the glass condensation trap, provides vapor pressure reading that can be generally correlated with the dryness level of the sample. Experience with your specific test samples will determine the correlation between vacuum levels and sample dryness.

## 4.3 DEVISING PROTOCOLS

Test runs are necessary to determine the correct time settings for a given procedure. To obtain data that is descriptive for both concentration (reducing a large volume to a small volume) and drying (removing all the solvent), conduct manual test runs, using the containers, the solvent and the volumes that you will use for actual samples. Interrupt the run every 15 minutes to measure remaining sample volume and sample temperature. Continue this test until the test samples are completely dry. Conduct additional runs at different drying settings.

The following drying rate table provides a guide, results will vary depending upon test sample make up.

SOLVENT	DRYING RATE		
	LOW	MEDIUM	HIGH
Water	1.0-2.0	2.0-3.5	3.5-5.0

## 5.0 ADDITIONAL ACCESSORIES

**DTK120R Chemical Trap Kit** Absorbs volatile radioactives and attaches to the exhaust port of the instrument.

**ANT100 Ammonia Neutralizing Trap Assembly** Use when concentrating samples in ammonium hydroxide. Attaches directly to the side of the instrument.

**ANS121 Ammonia Neutralizing Solution** Screws directly into the ANT100 assembly for neutralizing ammonia odors.

**CC120/DX Deluxe Convenience Cart** For easy transport of the system and accessories the Deluxe Convenience Cart is highly recommended. The Deluxe Cart has two corrosion resistant, fully adjustable polypropylene shelves and swivel casters.

**DVG50 Digital Vacuum Gauge** Ideal for monitoring the vacuum efficiency or sample drying efficiency. Insertion into the vacuum line between the rotor chamber and the refrigerated trap provides vapor pressure readings which can be correlated to sample dryness level. Insertion into the vacuum line between the refrigerated trap and vacuum pump allows for determining pump efficiency.

## 6.0 TROUBLESHOOTING

See attached chart

## 7.0 SPECIFICATIONS

Model Number:	ISS110
Refrigerated Trap:	-50 °C 4 liters CFC free Refrigerant
Vacuum Pump:	
Displacement:	36 L/min. @ 60 Hz
Maximum Vacuum:	7 Torr
Dimensions (W x D x H)	25 in. x 26 in. x 15 in. (62 cm x 65 cm x 37 cm)
Weight:	152 lbs. (69 kg)
Operative Power:	115VAC, 60 Hz, 10 amps 220VAC, 60 Hz, 5 amps 230 VAC, 50 Hz, 5 amps

Dependent upon ambient temperature, line voltage fluctuations, and load capacity.

## **8.0 WARRANTY**

All Thermo Savant products are covered under a full (one) year warranty from the date of delivery. this warranty covers all defects in materials and workmanship and does not cover incidental and consequential damages including, but not exclusively, the loss of profits. Equipment that has been found to be abused, neglected or serviced by unauthorized personnel will not be covered under warranty.

Thermo Savant will repair, free of charge, any product covered by this warranty, excluding the cost of shipping the item to Thermo Savant.

## **9.0 TO RETURN AN INSTRUMENT FOR REPAIR**

In order to receive proper attention to your repair, you must first contact the Thermo Savant Service Department or your Thermo Savant sales representative and receive: (1) an Return material Authorization (RMA) number and (2) sign the Health and Safety Clearance Form before shipping the equipment back to Thermo Savant. All items returned must be certified to be decontaminated and free of radioactivity. To coordinate a return contact the Service department, call 631-244-6942, 1-800-717-5509. For service outside the U.S. contact your local distributor.

When returning equipment that may contain hazardous materials, you must pack and label them in accordance with DOT regulations applying to the transportation of hazardous material. Your shipping documents must also meet DOT regulations.



## TROUBLESHOOTING GUIDE

### THERMO SAVANT ISS110 SPEEDVAC® TROUBLESHOOTING GUIDE

<u>SYMPTOM</u>	<u>POSSIBLE CAUSES</u>	<u>SOLUTION/EXPLANATION</u>
<b>GENERAL</b>		
No Response.	No current to the equipment. Power failure at source.	Check line cord for proper connections Check main circuit panel.
System trips circuit breaker or main line fuse.	Short circuit to ground in one of the components.	Call Thermo Savant for assistance.
Sample does not dry or noticeable change in the drying rate.	Flask cap plugged with ice.	Remove blockage. Change to dry flask
	Internal vacuum pump needs servicing.	Call Thermo Savant for assistance.
	Vacuum leak.	Check seal of cap on Glass Condensat Flask. Check cover gasket on sam chamber.
	Insufficient thermal energy applied to the sample chamber.	Evaporative cooling retards evaporati additional chamber heat will counter this effect.
	Refrigerated trap not reaching operating temperature.	Call Thermo Savant for assistance.
	Condensation flask full past 3/4 mark.	Change to new dry flask.
<b>SPEEDVAC® CHAMBER</b>		
Rotor does not rotate or makes a grinding noise.	No current to the SpeedVac®	Check line cord.
	Badly corroded upper magnetic assembly.	Upper magnetic assembly requir replacement. Call Thermo Savant service.
	Lower drive magnet bound up on the separation plate.	Call Thermo Savant for Service.
Rotor makes a loud clattering noise on initial start up.	Hold-down knob has been over-tightened.	Tighten hold-down knob until it make c tact with rotor, DO NOT OVER-TIGHTEN
Chamber does not seal properly.	Cracked or fouled cover gasket.	Clean or replace cover gasket.
	Automatic bleeder valve malfunction.	Call Thermo Savant for assistance.
Chamber does not reach temperature.	Radiant lamp burned out.	Replace lamp, or call Thermo Savant assistance.
	Heater control or element malfunction.	Call Thermo Savant for assistance.

<b><u>SYMPTOM</u></b>	<b><u>POSSIBLE CAUSES</u></b>	<b><u>SOLUTION/EXPLANATION</u></b>
<b>REFRIGERATED CONDENSATION TRAP</b>		
Refrigerated trap not cooling.	Insufficient air circulation.	Leave a minimum four-inch clearance on all sides. Clean the condenser of any accumulated dust or debris.
	Compressor system has lost its charge.	Call Thermo Savant for assistance.
Noisy vibration and/or excessive heat on top of cabinet.	Cabinet housing has become loose or circulation fan is rubbing an internal component.	Call Thermo Savant for assistance.
Glass Condensation Flask breakage.	Large ice build-up that expands during thawing.	Change and clean Glass Condensation Flask daily.
	Trap contents allowed to thaw and refreeze.	Leave the main power switch ON between runs and change the Glass Condensation Flask daily.
Glass Condensation Flask plugged with ice.	Excessive water/ice build up in thermal transfer fluid.	Use CryoCool® instead of ethanol. Remove the ice. CAUTION: Extreme cold may cause severe blistering.
Vacuum leak at flask cap.	Flask Cap seated improperly.	Verify that the cap is pressed securely over the mouth of the Glass Condensation Flask.
	Flask cap worn or fouled.	Replace flask cap.



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