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SpeedVac™ SRF110 Refrigerated Vacuum Concentrator

Installation and Operation Manual

80302318 • Revision A • 7/16/2021

ThermoFisher SCIENTIFIC

IMPORTANT Read this Installation and Operation Manual. Failure to follow the instructions in this manual can result in damage to the product, injury to operating personnel, and poor equipment performance.

CAUTION All internal adjustments and maintenance must be performed by qualified service personnel.

DISCLAIMER Thermo Fisher Scientific Inc. does not accept any responsibility for any damage caused to its products by unauthorized personnel.

The contents of this document are subject to change without notice. All technical information in this document is for reference purposes only. System configurations and specifications in this document supersede all previous information received by the purchaser.

Contents

Introduction

The Thermo Scientific SpeedVac™ SRF110 is a dedicated centrifugal vacuum concentration system for drying heat sensitive samples such as Proteins, Enzymes and DNA/RNA. SRF110 SpeedVac combines centrifugal force with vacuum for efficient sample drying.

SRF110 SpeedVac Concentrator combines a refrigeration system that cools to –4°C with a heater that warms to +100°C to reach user defined temperatures. The operator can select the drying temperature from –4°C to 100°C (24.8°F to 212°F), in 1°C increments.

The SRF110 is a Refrigerated Concentrator that helps to protect samples that may be sensitive to heat during the evaporation process. Samples widely used in Proteomics, Drug Discovery, Forensics, Food & Beverage, and Molecular Biology applications that must be processed & preserved at cooler temperatures. This method is often preferred to over freeze drying in applications where samples are affected by the freeze and thaw process. SRF110 features programming capability to refrigerate sample post processing an assurance that samples will not degrade due to heat.

The unique advantage of this Concentrator is that it may be cooled to –4°C to prevent damage to heat labile samples. For faster evaporation, the Concentrator is equipped with a 300 watt heater to warm the chamber during processing. The Concentrator may be placed on a benchtop or another laboratory work surface.

Safety Considerations

In this manual, the following symbols and conventions are used.

This symbol when used alone indicates important operating instructions which reduce the risk of injury or poor performance of the unit.

CAUTION: This symbol in the context of a CAUTION, indicates a potentially hazardous situation which if not avoided could result in minor to moderate injury or damage to the equipment.

WARNING: This symbol in the context of a WARNING, indicates potentially hazardous situations which if not avoided could result in serious injury or death.

This symbol indicates situations where dangerous voltages exist and potential for electrical shock is present.

The snowflake symbol indicates low temperatures and risk of frost bite. Do not touch bare metal or samples with unprotected body parts.

CAUTION: This symbol indicates possible pinch points which may cause personal injury.

This symbol indicates a need to use gloves during the indicated procedures. If performing decontamination procedures, use chemically resistant gloves.

WARNING: Before installing, using or maintaining this product, be sure to read the manual and product warning labels carefully. Failure to follow these instructions may cause the product to malfunction, which could result in injury or damage.

CAUTION: This symbol represents protective conductor terminal.

Below are important safety precautions that apply to this product.

CAUTION: Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING: Your unit must be properly grounded in conformity with national and local electrical codes. Do not connect the unit to overloaded power sources.

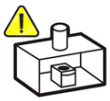
WARNING: Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls.

WARNING: Do not use this device in radioactive, highly reactive or explosive atmosphere.
Do not use this device to process any explosive, radioactive, highly reactive or explosive atmosphere creating substances.

WARNING: Unauthorized repair of your unit will invalidate your warranty. Contact Technical Service at 1-866-984-3766 for additional information.

CAUTION: Keep hands, hair and clothing clear of way of lid closing.
Do not drop cover, close gently.
Do not lift the cover until rotor has stopped.
Do not operate with unbalanced load.

CAUTION: Solvents may be flammable. Evaporate only non flammable or group D solvents with autoignition temperature 180°C or higher. Keep source of ignition away from solvents.



WARNING: Solvents used in this product can cause skin, eye, respiratory and digestive system disorders. Locate this product inside a fume hood.

Operating Standards

Product Specifications

Description	Specifications
Operative Power*	115 VAC; 60 Hz; 12 Amps 230 VAC; 50/60 Hz; 6 Amps
Vacuum Chamber	Epoxy coated Aluminum chamber
Chamber Seal	Phenol-free lid gasket
Cover	Epoxy coated Aluminum cover - includes a safety interlock
Induction Motor	Maintenance free
Bearings	Standard
Chamber temperature	–4°C to 100°C (24.8°F to 212°F), 1°C increments
Weight	95 lbs (43 kg)
Dimensions (W x D x H)	16.62 in x 25 in x 13.75 in (42.21 cm x 64 cm x 34.92 cm)
Fuse	For 115V Models: 1. 20 Amp NEMA 5-20P plug For 230 V 50 / 60 Hz Models: 1. NEMA 6-20P plug for use in the United States 2. PS1363 plug for use in the UK 3. CHI-10P plug for use in China or CEE7/7 plug for use in EU
IP Rating	IP 20

*Dependent upon ambient temperature, line voltage fluctuation, and load capacity.

Agency Approvals

Compliance & Certification	SRF110-115	SRF110-230
International	UL	CE, KC, RCM, UKCA
Refrigerant Compliance	Complies to **SNAP** requirements	Complies to **F-Gas** requirements

Environmental Conditions

These units are designed to operate Indoor only in the absence of hoarfrost, dew, percolating water, rain and solar radiation in a Pollution Degree 2 and Over voltage Category II environment.

- Maximum altitude: 2000 meters above mean sea level
- Ambient temperature range: 5°C to 40°C (41°F to 104°F)
- Humidity: 80% for temperatures up to 31°C (88°F), decreasing linearly to 50% relative humidity at 40°C (104°F)
- Main supply voltage fluctuations not to exceed ±10% of the nominal voltage.

Installation

Unpacking

Open the shipping cartons. Carefully remove the instrument and accessories. Lift and carry with two people, holding securely underneath with both hands. Use proper lifting technique (lift with the legs, not the back) to avoid personal injury. Compare the contents with the packing list. If there is a discrepancy, call Thermo Scientific technical service.

List Of Contents

S No.	Description	Qty
1	Thermo Scientific SpeedVac™ SRF110 Concentrator	01
2	Line Cord	01
3	RF132 - Hexagonal Micro Centrifuge Rotor	01

Inspection

Inspect the unit and accessories for damage that may have occurred during shipment. Should there be any damage, report it to the carrier and contact Thermo Scientific immediately. Make sure the carrier inspects the damage and leaves an inspection report. Register any claims for shipping damage against the carrier or his agent. Save the shipping carton in the event a return is necessary. Call Thermo Scientific technical service for further assistance.

Site Preparation

The SRF110 requires a stable surface that is clean, dry, level, and within 4 feet (1.2 meters) of a compatible electrical outlet. Place the unit in a convenient location with access to a vacuum source and a vapor trap.

The SRF110 units configured for 115 VAC, 60 Hz, should be plugged into a circuit rated for at least 20 Amps. The SRF110 units configured for 230 VAC, 50 Hz, should be plugged into a circuit rated for at least 8 Amps.

CAUTION: For better air circulation, be sure to leave at least 6-inch clearance on all sides of the unit. Overhead clearance, equal to 18 inch (46 cm), is required for raising the cover. Verify that the unit is on a leveled and stable platform. If necessary, move the unit to a more suitable location.

WARNING: Before connecting the unit to an electrical outlet, make certain that voltage, frequency, and amperage match the requirements indicated on the product label, name plate of the instrument. Use sockets with a protective earth conductor and correct mains cable.

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

Installation of SRF110

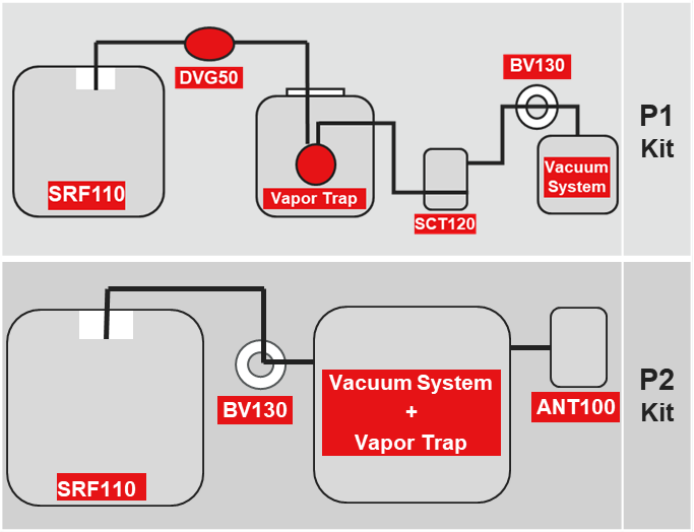


Figure 1. SRF110 Installation

CAUTION: Cold trap should be in line between the vacuum source and the SRF Unit.

Place the SRF110 unit & other components depending upon on ordered kit and place as shown in **Figure 1**. Leave at least 6-inch clearance on all sides of the units. This placement helps to optimize for better refrigeration performance.

To prevent damage to pump due to vapor exposures from sample solvent and to extend pump life, a vapor trap that condenses and traps vapors must be placed in line between the SpeedVac Concentrator and Vacuum Pump.

After the components placement, connect the system together using the Tubing set provided with kit. Connect the system based on kit ordered. For connection details & component details of each kit see, .

If the accessory Secondary Trap (SCT 120) is not used, attach the other end of the tube to the inlet port on the Vacuum Pump. If the accessory Secondary Trap (SCT 120) is used, install the Secondary Trap as explained in **Optional Post-Secondary Trap**. Then attach the tube from the Cold Trap Cover to the “IN” connector on the Secondary Trap. Attach another tube from the remaining connector on the Secondary Trap (SCT 120) to the outlet port on the vacuum.

Electrical Connection

Connect the power cord to the power inlet on the back of the unit and plug it into the appropriate outlet. Turn on the main power switch located on the front of the unit in the lower right to energize the unit. The safety lid locking mechanism on the SRF110 will automatically disengage. Do not attempt to open the lid unless the unit is plugged in.

The SRF110 Refrigerated Concentrator requires a dedicated grounded electrical outlet. This outlet requires a 20 Amp circuit breaker or fuse for models rated at 115 V (60 Hz). An 8 Amp circuit breaker or fuse is required for models rated at 230 V (50/60 Hz). 115 V models are equipped with a 20 Amp NEMA 5-20P plug. 230 V models are available with a PS1363 plug for use in the UK or a CHI-10P plug for use in China or a CEE7/7 plug for use in the EU. If this does not match with the available receptacle, remove this plug and replace it with an approved plug of the suitable style.

It is recommended that an emergency switch for disconnecting the mains in the case of a malfunction is located remote from the SRF110. It should be outside the room in which the SRF110 is housed, or adjacent to the exit from that room.

Rotor Installation

Open the lid of the rotor chamber. Carefully lower the rotor onto the drive shaft. 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 NOTE: Do not use a rotor if it shows any signs of damage. Failure of a spinning rotor could damage the SRF110 or cause samples to be lost.

CAUTION: Use appropriate Thermo Fisher Scientific designed rotors recommended for the product. Use of non standard rotors may damage the product.

CAUTION: Load the rotor and close the lid. Always balance rotor loads. An imbalanced rotor causes vibration that will damage the system’s bearings and equipment. Load the rotor symmetrically. There need not be a tube in each holder, but the load must be evenly distributed. When using a rotor with aluminum tube holders, insert all the tube holders.

Operation

Planning

Thoroughly understand procedures and the equipment operation prior to beginning work. The unique performance of the SRF110 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 SRF110 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.

Sample Format Selection

Normally, sample tubes should be filled no more than approximately half full. Select the size of the sample tube so it is compatible with the rotor and the desired sample size. Tubes should not be excessively loose in the rotor. Rotors are available with holes for various size tubes.

Loading Sample Format into the SRF110

Smooth operation of the SRF110 is dependent upon proper balance of the machine. Therefore, if less than a full load of samples are run, it is important to load samples into the SRF110 in a symmetrical manner distributing the weight of the samples evenly in the sample rotor.

Temperature Setting Guidelines

The evaporation rate achieved by the SRF110 is dependent upon a variety of factors. These include the nature of the solvent, the temperature and the pressure in the vacuum system.

Time Setting Guidelines

The Refrigerated SRF110 allows two different temperatures to be programmed for user specified periods of time. If sequential temperatures are not desired, set Time at “2” to “0”. When both programmed times expire, the rotor will stop, the heater and refrigeration systems shut off. An alarm sounds until any control button is pressed.

Description of Control Panel

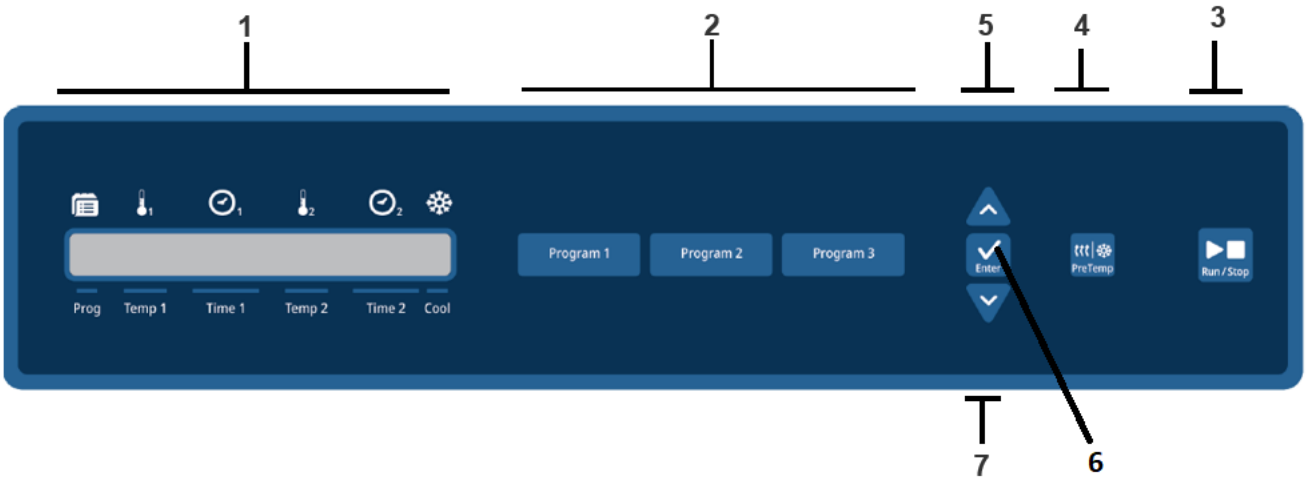


Figure 2. Control Panel Description

1. **Display** – The Liquid Crystal Display (LCD) shows parameter set during scheduling program and actual measured values.
2. **Program buttons** – 9 programs, 3 of which have quick start buttons that are modifiable. Loading a program is achieved by pressing the corresponding Program button. The following parameters are automatically loaded onto the screen:
   - Temperature set point
   - Heat time
   - Run time
3. **Run/Stop Button** – Press this to START or STOP a run.
4. **Preheat/Precool Button** – Used to turn on the heater or refrigeration system to heat or cool the chamber prior to loading samples.
5. **Increase Button** – When pressed, the last selected set point will increase.
6. **Enter Button** – To select a parameter to change, press the enter button. Arrows on the display will point to the parameter that may be altered.
7. **Decrease Button** – When pressed, the last selected set point will decrease.

Note: The programs are for convenience only. Prior to use, users are advised to conduct a risk assessment to confirm that the program parameters meet the user's application specific needs and conditions. Users accept the risks associated with using these programs.

To store a program in one of the 3 quick start programs, simply set the desired parameters and then press one of the Program 1, Program 2, or Program 3 buttons and the Program is stored.

The parameters displayed in the screen are stored into the program and can be loaded for use later.

- **PreTemp** - Use to pre-heat or cool the chamber to –4°C to 100°C prior to beginning a run or between runs. Once a run is initiated, the pre-heat automatically stops.

  Note that the PreTemp function is only enabled if the temperature set point is different than "no".

  When the temperature is set to "no", the heat time is defaulted to "0.00" while executing the run.

  Press the increase or decrease button until the desired set point is displayed. The actual chamber temperature, 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 maintain the set point temperature until either the "PREHEAT/COOL" button is pressed again or the "RUN" button is pressed.
- **Temperature Settings** - Temperature Display Indicates the set temperature or the actual temperature during a run in °C.
  The temperature set point can be set from –4°C to 99°C at a 1°C interval. In addition, to change the "Temperature" set point, press the set point "ENTER" button until arrows point to the "Temperature" set point, which can be changed from –4°C up to 99°C 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.
- **Time Settings** – Time display Indicates the heat timer or the run timer set points. The SRF110 allows two different temperatures to be programmed for user specified periods of time. If sequential temperatures are not desired, set Time at 2 to "0". When both programmed times expire, the rotor will stop, the heater and

refrigeration systems shut off, the vacuum pump stops and vacuum is purged from the chamber. An alarm sounds until any control button is pressed.

To change the time set points, press the set point "ENTER" button until arrows point to the "Time at 1" or "Time at 2" 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 SRF110 run continuously without alarming at the end of a time, press the increase button until the "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 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 SRF110 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 RUN/STOP button and hold it for five seconds. The display will indicate that the timer is reset.

- **Enter Button** - Press this button to select the parameters to be modified. The selection is from left to right, in a cyclic manner. The selected parameters are shown by the corresponding indicator that is illuminated.

  Operating parameters can be stored in memory so protocols can be repeated. Nine programs can be stored. To select a program, press the "ENTER" 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, refrigeration system, the timers and the vacuum pump.

- **Decrease Button** - Decrements the value of the selected parameter.

- **Increase Button** - Increments the value of the selected parameter.

- **Stop** - Terminates a "Manual" or "Auto" run.

Note: Restoring the factory default parameters for a given program is achieved by selecting it and then pressing and holding down the Stop button for 3 seconds. The default parameters associated with the program (factory default) will be restored and the screen updated accordingly.

Operating the SRF110

WARNING: Moving parts can crush and cut. Keep hands clear. Follow lock-out procedures before servicing.

The pre-heating function requires the temperature set point to be different than "no" and requires the lid to be closed.

To avoid injury, do not operate the SRF110 if the lid is scratched, nicked or shows signs of damage. A damaged lid could fail under vacuum.

Note: If the cover is not closed, the display will show "Lid" and the run will not start.

1. Connect the unit to its required voltage.
2. Press the SRF110 "ON" switch.
3. Select a program or set the set point parameters.
4. Preheat/Precool the chamber if desired.
5. Place sample tubes/vials in rotor in a manner to ensure load is balanced. Normally the vials should be no more than half full. Close cover (A safety switch prevents the SRF from starting when the lid is open).
6. Load the rotor with samples into the chamber.
7. Close the lid. A safety switch prevents the SRF110 from starting when the lid is open.
8. 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 start the SRF110. A latch will activate to lock the lid closed, the rotor will start, the vacuum break valve will close and the vacuum pump will start after the rotor reaches operating speed.
9. Set point parameters can be altered at any time during a run by first selecting the parameter using the set point "ENTER" button and then pressing the "INCREASE" or "DECREASE" button.
10. To reset the timers to the original set point time when running programs other than program 1, program 2 or program 3, press the RUN/STOP button and hold it for five seconds. The display will indicate that the timer is reset.
11. If the 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 SRF110 has not already stopped itself.
13. When the evaporation is complete, allow the rotor to stop moving, lift the lid and remove the samples.

General

During the run, display shows actual parameters. To check set parameters, press View button and Enter button. The display will revert temporarily to the set points for approximately 5 seconds.

Cycle Interruption

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 restart the SRF, close the lid and press “RUN.” The SRF resumes operation at the same set point parameters and the timer continues to count down from the time at which the SRF was stopped.

Safety Precautions

Special precautions must be observed if the samples used in the SRF110 Concentrator are known to be hazardous, toxic, radioactive, or contaminated with pathogenic microorganisms. 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 SRF110 Concentrator inside a suitable fume hood or ventilation device. Load rotors in a ventilation device.
- Periodically inspect all parts of the SRF110 Concentrator including the lid, gasket, chamber, plumbing components and rotors.

Location & Exhaust

WARNING: The SRF110 System 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 SRF110 will expose personnel to potentially harmful chemicals.

The SRF110 Refrigerated Concentrator has not been evaluated by an approval agency for the use of biological, radio toxins or flammable liquids or materials.

WARNING: Solvents used in the SRF110 can cause skin, eye, respiratory and digestive system disorders. Locate the SRF110 inside fume hood.

Emergency Access into the Chamber

The cover must be closed before beginning a run. The run will start after closing the cover and pressing the “Run/Start” button. Cover closure can be ensured by latch sound.

During a run the user cannot open the cover due to vacuum in the concentration chamber. The cover is locked down always during a run and whenever power to the unit is interrupted.

The cover lock is an additional safety feature that reduces the risk of injury or damage while rotor is spinning. Never bypass the cover lock mechanism during a run.

The SRF110 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 SRF110, insert a small screwdriver or similar instrument into the small round hole on the left side of the case 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 SRF110 is running. Personnel injury can result from moving parts and chemicals.

Figure 3. Opening chamber cover in emergency

Vacuum Pump Requirements

A Vacuum Pump must be provided by the user. A Vacuum Pump with a free air flow rate of 90 liters per minute and 2 x 10^{-4} mBar ultimate pressure is adequate for aqueous samples. More volatile samples can be satisfactorily processed using a diaphragm pump with a free airflow of 75 liters per minute and 2 mbar vacuum. The inlet fitting on the vacuum pump must be suitable for 0.50 ID tube.

Vacuum Pumps used with 115 V models should be equipped with a 115 V, 15 Amp NEMA 5-15P plug and with a 230 V models should be equipped with a “reverse” IEC 320 plug. This will allow the Vacuum Pump to be plugged into the receptacle on the back of the SRF110.

IMPORTANT NOTE: When selecting the Vacuum Pump, it is very important to consider the flammability of the solvent that will be used. If the solvents are flammable, an explosion-proof vacuum pump or one suitable for the solvents to be processed is recommended. See, **Appendix D: Chemical Resistance** for solvents suitable for use in the SRF110.

Maintenance and Care

Component	Before Each Use	As Needed/Periodic
Concentrator	• Make sure lid is clean. • Make sure no spill in chamber. • Rotor adapter is clean and free of any residue. • Check for any visible cracks or damage to chamber, lid, lid gasket, and rotor shaft.	• Decontaminate between use is needed. • Wipe clean chamber, lid, and gasket with soft cloth damped with mild/lab grade detergent or 1:10 dilution of 50% Methanol or 1:10 dilution of 50% Ethanol after each use. • Replace Lid Gasket as needed (frequency depends on frequency of product use and type of solvent used).
Pump	• Check oil level and refill as needed. • Oil level should be >2.5 cm above the MIN. • Wipe off any spilled oil.	• Check tubing and gasket- replace any that shows signs of hardening, permanent set, or deterioration. • Periodically replace oil mist filter. Refer to pump manual to identify suitable replacement option.
Vapor Trap	• Discard any condensed solvent. • Thaw any frozen solvents using cold water and discard. • Empty the trap prior to each run. • Inspect glass flask for any crack/damage. Replace if, cracked or damaged.	• Check tubing and gasket- replace any that shows signs of hardening, permanent set, or deterioration.
Universal Vacuum System	• Discard any condensed solvent. • Thaw any frozen solvents using cold water and discard. • Empty the trap prior to each run. • Inspect glass flask for any crack/damage-replace if cracked or damaged.	• Check all hoses and gaskets- replace any that shows signs of hardening, permanent set, or deterioration.
Secondary Post Trap	• Check for need of secondary post trap requirement for the application. • Refer, **Optional Post-Secondary Trap** for more information.	• Check for color change in the media- replace as needed. • Radiochemical trap must be discarded after each use. • Discard used media, filters, and traps following local regulation.

Troubleshooting

Refer to the following if your SRF110 fails to operate properly. If the suggested corrective actions do not solve your problem, contact Thermofisher for additional assistance. The following failure codes may appear on the display when problems are sensed by the internal self-check system.

CAUTION: Disconnect power before servicing the SRF110.

WARNING: Electrical shock hazard. See SRF110 **Product Specifications** for electrical operating parameters.

Display Error Code	Cause	Corrective Action
Heat Sensor	• Sensor failure • Connection failure	• Replace sensor assembly. • Repair connection.
Close Lid	• Lid open	• Close lid.
Latch Fail	• Solenoid failure • Switch or sensor failure	• Check component. • Check connections.
Mem Fail P1	• Memory failure • New memory IC chip • Bad memory IC chip	• Push program button #1. • Push program button #1. • Call Thermofisher – Replace IC chip or control PCB.
Motor Error	• Defective motor • Hall effect sensor failure • Wire failure	• Replace motor. • Replace sensor. • Replace wire.

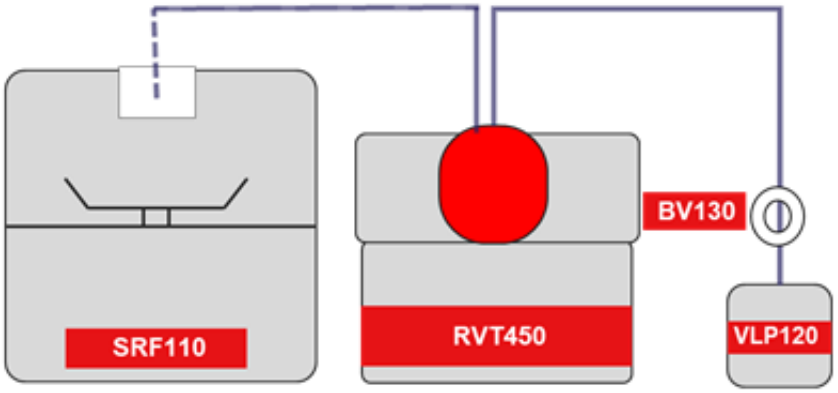
Problem	Cause	Corrective Action
Unit will not operate	• Unit not connected to electrical • Circuit breaker blown • Lid open	• Connect unit to proper electrical receptacle power. • Correct electrical problem and reset circuit breaker by pressing button. • Close lid.
Excessive vibration	• Sample tubes not located symmetrically in rotor	• Reposition sample tubes.
Sample odor in lab	• Vent hose exhausting into lab area	• Redirect hose to fume hood.

Problem	Cause	Corrective Action
Evaporation rate is reduced	• Heater inoperable	• Contact Thermofisher.
	• Pump is not functioning properly	• Check pump by locating vacuum gauge closer to pump and close off rest of the system. Checkup pump oil for cloudiness or particles or change. 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 is not seated	• Hold lid down until vacuum is initiated.
Ice formed on Cold Trap lid	• Defrost and wipe dry. the sealing surface	
	• Secondary Trap Canister not properly	• Tighten all connections to and fitted from Secondary Trap Canister.
	• Secondary Trap Insert is spent	• Replace with New Insert.
	• New Secondary Trap has moisture in it	• Run Vacuum Pump for 24 hours to remove moisture.
Frequent oil change needed in pump	• Secondary Trap Insert is spent	• Change insert often.
Unit starts and shuts off	• Latch optical sensor improperly calibrated	• Unplug Power Cord. Wait 10 seconds. Plug in power cord.
	• Vacuum too strong for chemical	• Use a Secondary Trap Insert and Diaphragm Pump.
	• Vacuum pump failure	• Check pump.
	• Obstruction in hose	• Remove obstruction or replace hose.
	• Lack of adequate vacuum	• See the following No vacuum/poor vacuum section.
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.
	• Cold Trap is not emptied after each run and dried	• Empty the traps (glass or stainless steel) after each run and replace.

Appendix

Appendix A: Installed configuration Diagrams

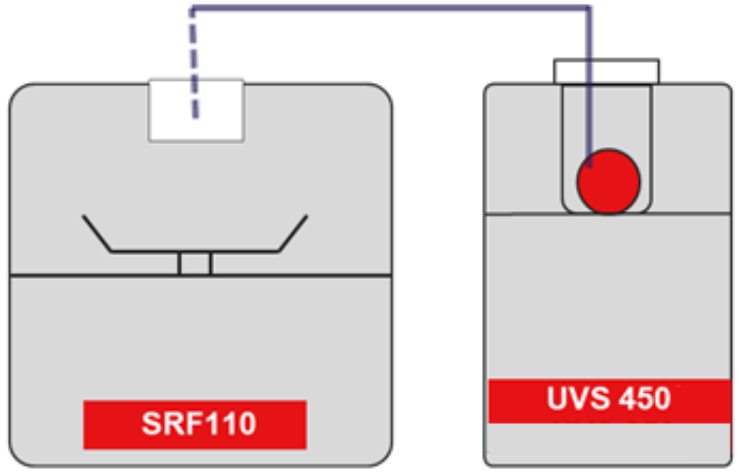
Configuration #P1 – Setup with Oil Pump and Cold Trap (High Vacuum System)



SRF110 P1 Kit	
SKU	Qty
SRF110	01
RVT450 (-50C)	01
VLP120	01
UTP-TYG	01
SCC1	01
GCF400/FC400	01

Figure 4. Setup with Oil Pump and Cold Trap

Configuration #P2 – Setup with Semi Integrated Vacuum System



SRF110 P2 Kit	
SKU	Qty
SRF110	01
UVS450	01
UTP-TYG	01
SCC1	01
GCF400/FC400	01

Figure 5. Setup with Semi Integrated Vacuum System

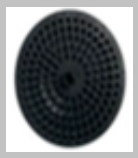
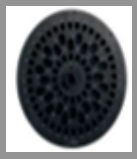
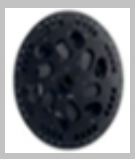
1. The relative position of the SRF 110, Cold Trap and Vacuum Pump should be as shown. There must be at least 6 inches between the Refrigerated SRF 110 and the Cold Trap. More space is better. There must be at least 3 inches between the back of the refrigerated SRF 110 and the adjacent wall surface. This is important to optimize the air flows of the refrigeration systems. Restriction of the airflow through the cabinet during operation could adversely affect performance.
2. After positioning the components, it is necessary to join the system together using the Tubing Kit provided.
3. Attach one tubing to the tube that extends out the back of the Concentrator. Attach the other end of this tubing to one of the barb fittings on the Cold Trap Cover. Secure the tubing with the clamps supplied.
4. Attach another tubing to the remaining barb fitting on the Cold Trap Cover and clamp securely. If the accessory Secondary Trap is not used, attach the other end of the

tubing to the inlet port on the vacuum pump. (For detailed Tubing connection refer, **Installation of SRF110**).

5. If the accessory Secondary Trap is used, install the Secondary Trap as explained in **Optional Post-Secondary Trap** for your SRF 110.
6. Then attach the tubing from the Cold Trap Cover to the "out" connector on the Secondary Trap and clamp securely. Attach another tube from the remaining connector on the Secondary Trap to the inlet port on the vacuum pump and clamp securely.

Note: Standard kits P1 & P2 can be customized for higher capacity vapor traps & Vacuum pumps. For higher capacity, equipment must be ordered separately. Refer below appendix for options available & other details. Other accessories and secondary traps can be ordered separately along with standard kits. For details refer below appendixes.

Appendix B: Rotor and Accessory List and Description

Rotor SKU		Type	No. of Samples	Description (Sample Number x Sample Volume)
RF132		Microcentrifuge	132	132 x 1.5 mL/2.0 mL
RF108		Tube: 12-13 mm	40 and 100	40 x 1.5 mL 40 x 2.0 mL; 16 x 3 mL 100 x 5 mL; 64 x 5 mL 100 x 6 mL; 64 x 10 mL
RF52		Tube: 12-17 mm	52, 44 and 36	52 x 2 mL 52 x 5 mL 44 x 3 mL 36 x 5-6 mL 36 x 10 mL
RF32		Tube: 28 mm	32 and 12	32 x 1.5 mL 32 x 2 mL 12 x 40 mL 12 x 50 mL
RFMT4		Microtiter Well plate	2 and 4	2 x Deep Well Plates 4 x Standard Micro Plate

Accessory List

Part No.		Description
GCF400		Glass Condensation flask

Part No.		Description
FC400		Flask cover for GCF400
145-6012-00		Foam insulating ring
SCC1*		CryoCool™ heat transfer fluid (1 liter)
SCC5*		CryoCool™ heat transfer fluid (4 liter)
UTP-TYG		Universal tubing pack - TYGON
DVG50		Digital Vacuum Gauge
CC120/DX		Convenience Carts

*Hazardous Materials - These items require special shipping/handling when shipped by air.

CAUTION: The use of accessories other than those recommended by Thermo Fisher Scientific may impair the safety and function of the device. Thermo Fisher Scientific cannot be held liable or accept any liability for damage resulting from the use of incorrect or non-recommended accessories and spare parts.

Optional Post-Secondary Trap

Some drying applications produce exhaust vapors that are hazardous. It is highly recommend using an appropriate trap in every system to protect from ammonia gas, acidic vapors, volatile radioactivity and organic vapors. This prevents release into the laboratory environment.

A typical configuration & Installation is shown in the figure in **Appendix A: Installed configuration Diagrams**.

Part Number		Description
SCT120		Chemical trap (order cartridges separately)
DC120A		Disposable cartridge for neutralizing acid
ANT100		Post-trap assembly for Oligo Preps - Used on UVS450DDA only
ANS121		Ammonia neutralizing solution for Oligo Preps - Used on UVS450DDA only

Appendix C: Configuring SpeedVac Setup

Components	Standard Kit Offered		User Configuration Custom Kit Options	
	SRF110P1 Kit (includes following components)	**SRF110P2 Kit (includes following components)**	**Add components to build your own - Option1**	**Add components to build your own - Option2**
Concentrator	SRF110	SRF110	SRF110	SRF110 (includes RF132)
Pump	VLP120 (Oil Pump)		VLP120 (Oil Pump) or OFP400 (Oil Free)	
Vapor Trap	RVT450 (–50°C)		RVT450 (–50°C) or RVT5105 (–105°C)	
Universal Vacuum System		UVS450 (–50°C Vapor Trap, Oil Free Pump)		UVS450 (–50°C Vapor Trap, Oil Free Pump) or UVS850DDA (–50°C Vapor Trap, Oil Free Pump)
Rotor Options	RF132	RF132	RF132, RF108, RF52, RF32, RFMT4	RF132, RF108, RF52, RF32, RFMT4
Accessory	GCF400 FC400 UTP-TYG SCC1	GCF400 FC400 UTP-TYG SCC1	GCF400 FC400 UTP-TYG SCC1 or SCC5	GCF400 FC400 UTP-TYG SCC1 or SCC5

1. UVS 450DDA has high capacity Vacuum Pump.
2. Custom kit option is to configure higher capacity Vapor Trap and Vacuum Pump.
3. For Rotor Options Details refer **Appendix B: Rotor and Accessory List and Description**.

Appendix D: Chemical Resistance

SRF110 Centrifugal Concentrator and Cold Trap are designed to be chemical resistant to most compounds that are commonly used in concentration processes. SRF110 have several enhancements to minimize chemical attack on components. The lid, the chamber and rotors are Epoxy coated, the rotor shaft is Stainless Steel, bearings are Steel, the coupling insert is polypropylene and all wetted parts in the vacuum release valves are made from Stainless Steel. Even though parts in SRF110 are considerably resistant to corrosion, it is very important that the SRF110 is immediately cleaned and neutralized.

The following table gives the list of SRF110 compatible Solvent and Solvent Combination:

Solvent & Solvent Combination	
Water + ACN + MeOH + low concentration of 1% formic acid	Water + ACN + MeOH + low concentration of 0.1% Trifluoroacetic acid
Acetonitrile	0.1% Acetic acid
Ammonium hydroxide	n-Butyl alcohol
PCR buffers (aqueous)	Isopropyl alcohol
Isobutyl alcohol	Methanol
n-propyl alcohol	0.1% Trifluoroacetic acid
Methanol	Ethanol

CAUTION: If your choice of solvents and applications are unique and not listed above, please contact Thermo Fisher Scientific Customer Support for advice.
Use of non recommended solvent may damage the product.

WARNING: Do not use this device in radioactive, highly reactive or explosive atmosphere.
Do not use this device to process any explosive, radioactive, highly reactive or explosive atmosphere creating substances.

CAUTION: Product Maintenance:
Maintenance of product is only permitted to be performed by trained service staff using suitable measuring and auxiliary equipment as well as detailed service instruction.
Untrained person can damage the product.

Wear gloves, eye protection, masks and lab coats while working on the system.

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WEEE Compliance

Great Britain

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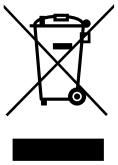

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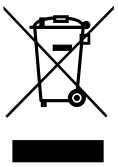

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