
**SC110/SC110A/SC210A
SPEEDVAC®
CONCENTRATORS
INSTRUCTION MANUAL**

Thermo Savant

A Thermo Electron business

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1.0 DESCRIPTION

The Thermo Savant SC110 SpeedVac® and SC110A/SC210A SpeedVac® Plus centrifugal vacuum concentrators rapidly evaporate liquids to concentrate or dry solutes, analytes, and residues in aqueous and organic solvents.

Vacuum, applied to the sample chamber from an external source, promotes solvent evaporation. As the rotor in the concentrator spins, centrifugal force keeps samples from foaming or bumping, preventing sample loss and resulting in superior analyte recovery.

Typical applications include concentrating or drying oligonucleotides, ethanol precipitates of DNA, hydrolysates of proteins, chromatography fractions, solid phase eluants, liquid/liquid extracts, and samples for analysis by HPLC, GC/MS, immunoassay, and bioassay. SpeedVac® concentrators are also used in organic chemistry residue analysis, such as pesticide and drug testing.

- The SpeedVac® SC110 model includes a built-in manual bleeder valve. This instruction manual contains an explicit operating sequence (see section 3.4, SPEEDVAC® SC110 OPERATION) that the user must follow to ensure vacuum is applied to the sample chamber only when the samples are spinning.
- The SpeedVac® Plus SC110A/SC210A models integrate an automatic bleeder valve that ensures application of vacuum at the appropriate time, without user intervention.

All SpeedVac® concentrators include a chamber heater to effectively counteract evaporative cooling and accelerate drying rate. The operator can select low chamber at ambient temperature), medium (chamber at 43 °C), or high (chamber at 65 °C). For even shorter drying times, an optional Radiant Cover further hastens drying rate by adding energy to the sample chamber.

Thermo Savant offers a wide variety of rotors for the SpeedVac® concentrators. They are designed to accommodate microtubes, bottles, glass, plastic tubes and even microtiter plates. The SC110/SC110A units hold up to 120 x 1.5mℓ sample tubes while the larger SC210A holds up to 200 x 1.5mℓ tubes. A line of large-volume (up to 500 mℓ), multi-sample rotors hold Savant's recovery flasks or pear-shaped flasks with receptacle ends.

2.0 INSTALLATION

Receiving. Inspect the shipping carton upon receipt. If the carton is damaged in any way, do not accept delivery. Call Thermo Savant at 1-800-634-8886, 631-244-2929, or (Fax) 631-244-0606.

Unpacking. Carefully remove the instrument from the shipping carton. Compare the packing list to the box contents. If there is a discrepancy, call Thermo Savant at 1-800-634-8886, 631-244-2929, or (Fax) 631-244-0606.

Inspection. Inspect the unit for any damage that may have occurred during shipment. Should there be any damage, report it to the carrier and contact Thermo Savant 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.

Set-up. To assure safe operation and best results, read this manual in its entirety before operating the instrument.

2.1 SITE PREPARATION

- Install the SpeedVac® on a clean, dry, level, stable surface within 4 ft (1.2 m) of a compatible electrical outlet.
- Place the unit in a convenient location with access to a vacuum source. Typically, the SpeedVac® Concentrator sits on a countertop or on the mobile Thermo Savant CC120/DX Deluxe Convenience Cart. Overhead clearance, roughly equal to the unit's depth, is required for raising the cover.

WARNING: Before connecting the SpeedVac® Concentrator to an outlet, make certain that voltage, frequency, and amperage match the requirements indicated on the label on the rear of the instrument:

SC110/SC110A: 120 VAC / 60 Hz,
4 A or 230 VAC / 50 Hz, 2 A;
SC210A: 120 VAC / 60 Hz,
8 A or 230 VAC /50 Hz, 4 A

If there are any questions, please consult an electrician.

Note: To manually open the lid prior to applying power, use the interlock over-ride tool. This tool may also be used to open the unit during a power outage. Insert the tool at an upward angle (approximately 45°) into the small hole in the upper right-hand panel of the SpeedVac® concentrator. While lifting up on the lid, pivot the tool handle upward, creating a downward movement within the SpeedVac®. This manually disengages the locking mechanism.

2.2 PREPARING CONCENTRATOR FOR USE

1. Make sure the ON/OFF switch on the front of the SpeedVac® is in the OFF position. Connect power cord to instrument and plug into appropriate outlet. The safety lid locking mechanism on SC110/SC110A- 240 V and SC210A 120 V/240 V units will automatically disengage.
2. Lift the lid and clean the chamber of any packing material or foreign items that may be present from shipping.

3. Lightly coat the drive shaft and rotor center with vacuum grease. This protects these surfaces from corrosive vapors. Do not lubricate the cover O-ring.
4. Attach the concentrator to a vacuum system (Refrigerated Vapor Trap plus Vacuum Pump) by connecting the 0.5 in (1.27 cm) O.D. hose fitting at the rear of the SpeedVac® Concentrator to the vacuum system. Coat fitting with a thin film of vacuum grease and thread vacuum tubing through the hole in the right side panel of the concentrator. Without twisting, carefully push vacuum tubing straight on over fitting.

Note: Read the reconfiguration section of this manual (see APPENDIX 2, page 11) before disconnecting or replacing vacuum hose.

Protecting the vacuum pump: A vacuum pump experiences loss of efficiency and ultimate damage if evaporated solvents from samples are allowed to enter. To prevent damage and extend pump life, a refrigerated vapor trap that condenses and preferably freezes solvent vapors must be placed in-line between the SpeedVac® concentrator and vacuum pump. A complete line of vacuum pumps and refrigerated vapor traps is available from Thermo Savant.

A chemical trap, placed in-line between the refrigerated vapor trap and the vacuum pump, further protects the pump from any vapors pulled through the trap. Thermo Savant's SCT120 Chemical Trap may be used with the DC120A cartridge to adsorb aqueous vapors and neutralize corrosive acid vapors, or with the DC120R cartridge to adsorb radioactivity and volatile organic vapors.

- System configuration may vary depending on the needs, preferences, and application requirements of the user. If uncertain of the optimal setup, call Thermo Savant Technical Services at 1-800-634-8886, 631-244-2929, or (Fax) 631-244-0606 for additional information.

3.0 OPERATION

The SpeedVac® or SpeedVac® Plus concentrator is an important component in a sample drying/concentration system that should also include vacuum gauge, refrigerated vapor trap, chemical trap, and vacuum pump, and may contain other equipment. Please refer to operating instructions of each component for details on use.

3.1 CONTROL PANEL

Two switches on the instrument front panel govern operation of the SpeedVac® SC110/SC110A/SC210A concentrators:

- The CONCENTRATOR switch controls rotation (ON/OFF).
- The DRYING RATE switch regulates sample chamber temperature:

HIGH	65 °C
MEDIUM	43 °C
LOW	ambient

Indicator lights illuminate when a function is switched on.

3.2 ROTORS

A wide variety of SpeedVac® rotors is available to suit every sample drying application.

CAUTION: Only these rotor series should be used in the SpeedVac®. DO NOT use rotors other than Thermo Savant rotors, in the SpeedVac® Concentrator even if they seem to fit the instrument.

CAUTION: Always balance rotor loads. An unbalanced rotor causes vibration that will wear out the bearings and may seriously damage the SpeedVac®.

Load the rotor uniformly. There need not be a tube in each place, but the tubes must be evenly spaced around the rotor. When using a rotor with aluminum tube holders, insert tube holders symmetrically. When drying different types of sample in the same drying run, distribute each type symmetrically so that their different drying rates do not introduce precession into the rotor's rotation. Always select a rotor into which the sample tubes fit snugly.

To install or change a rotor:

1. Switch the CONCENTRATOR to the OFF position.
2. Open the lid, unscrew the rotor hold-down knob and remove the existing rotor (if any).
3. Select desired replacement rotor (see rotor chart on page 9).
4. Align the notches in the rotor base with the drive pin of the motor shaft and place the rotor on the shaft being sure that the pins engage the notches.
5. Hand-tighten the rotor hold-down knob until firmly seated.

3.3 PREHEATING

Evaporative sample cooling that occurs under vacuum actually decreases sample drying rate. The sample chamber heater counteracts this effect to accelerate drying rate. If desired, operate the DRYING RATE switch at least 15 minutes before starting the concentration run.

- **LOW** leaves the chamber at ambient temperature (i.e., chamber heater is off).
- **MEDIUM** heats the chamber to 43 °C.
- **HIGH** heats the chamber to 65 °C.

3.4 SPEEDVAC® SC110 OPERATION

1. Load samples symmetrically and verify that the rotor is firmly seated and that the hold-down knob is hand-tight.
2. Close the cover and set the CONCENTRATOR switch to ON.
3. Allow rotor to reach full speed (approximately 20 seconds) before manually applying vacuum with the bleeder valve. (Located on the top right panel, towards the rear of the instrument). This valve exposes spinning samples in the sample chamber to vacuum from the vacuum system and, at the end of the run, bleeds the chamber back to atmospheric pressure. Premature application of vacuum can cause bumping and foaming; in some cases, sample could boil out of the tubes.
4. Turn arrowhead indicator of bleeder valve toward concentrator (OPEN) to apply vacuum.
5. Select DRYING RATE as described in section 3.3.
6. Continue the run until a predetermined time has elapsed, or until a vacuum gauge, configured in-line between the SpeedVac® and vapor trap, indicates a predetermined vapor pressure in the sample chamber. To devise a standardized end point (time or vapor pressure) for a specific application when repeatability of results is important, conduct one or more test runs with expendable batches of sample.
7. At the end of the run, turn arrowhead indicator on bleeder valve toward the left (CLOSED) to bleed the sample chamber to atmosphere; allow 10 seconds for pressurization.
8. Stop the run by setting the CONCENTRATOR switch to the OFF position. The rotor brakes until rotation decreases to 6 RPM. Do not open the cover until rotation has completely stopped. (All 240 V units have a cover lock that prevents cover release at rotor speeds >6 RPM).
9. To shut off chamber heater, set DRYING RATE switch to LOW.

3.5 SPEEDVAC® PLUS SC110A/SC210A OPERATION

1. Load samples symmetrically and verify that the rotor is firmly seated and the hold-down knob is hand-tight.
2. Close the cover and set the CONCENTRATOR switch to ON. (Bleeder valve operation in SpeedVac® Plus models is automatic. A speed sensor inside the concentrator applies vacuum when the rotor reaches 800 RPM).
3. Select DRYING RATE as described in section 3.3.
4. When the run is stopped by setting the CONCENTRATOR switch to the OFF position, the unit immediately bleeds the rotor chamber, then waits 10 seconds before braking the rotor. **Do not open the cover until rotation has completely stopped.**
5. Shut off chamber heater by setting DRYING RATE switch to LOW.

4.0 SPECIFICATIONS

Dimensions (W x D x H):

SC110/SC110A	11.0" x 18.0" x 13.0" (29.0 cm x 46.0 cm x 32.0 cm)
SC210A	18.0" x 25.0" x 18.0" (46 cm x 62.0 cm x 46 cm)

Weight:

SC110/SC110A	34 lbs (16 kg)
SC210A	86 lbs (39 kg)

Electrical Requirements:

SC110/SC110A	120 VAC / 60 Hz, 4 A or 230 VAC / 50 Hz, 2 A
SC210A	120 VAC / 60 Hz, 8 A or 230 VAC / 50 Hz, 4 A

Cabinet: Chemical-resistant, coated steel construction

Cover: Transparent 0.75 in (1.91 cm) acrylic (standard)
Optional radiant cover available for all units. Optional glass safety cover available for SC110/SC110A.

Safety interlock on SC110/SC110A (240 V models) and SC210A (120 V and 240 V models)

Caution: DO NOT apply heat to this cover-serious deformation will occur under vacuum.

Vacuum Chamber: Chemical-resistant, impregnated aluminum casting with inert, fluorocarbon coating (TEFLON®)

Vacuum Fitting: 0.5" (1.27 cm) O.D. vacuum fitting

Controls:

Concentrator Two-position switch (ON/OFF)

Drying rate Three-position switch (HIGH/MEDIUM/LOW)
(65 °C/43 °C/Ambient)

Drive: Magnetic coupling drive

5.0 ACCESSORIES AND ROTORS **(please refer to chart on page 9 for rotors)**

RC110A Radiant Cover for SC110A SpeedVac® Plus

RC210A Radiant Cover for SC210A SpeedVac® Plus

GSC110 Glass Safety Cover for SC110/SC110A

SCT120 Chemical Trap

DC120A Disposable Cartridge for SCT120 when trapping acid and water vapors

DC120A/4 Disposable Cartridge for SCT120 when trapping acid and water vapors (4 pack)

DC120R Disposable Cartridge for SCT120 when trapping radioactivity and organic solvent vapors

DC120R/4 Disposable Cartridge for SCT120 when trapping radioactivity and organic solvent vapors (4 pack)





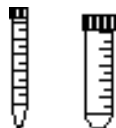
6.0 WARRANTY AND LIABILITY STATEMENTS

All Thermo Savant products (excluding glassware) are warranted against defects in material and workmanship for one year after the date of delivery to the original purchaser. Thermo Savant's warranty is limited to defective materials and workmanship. Warranty work is subject to our inspection of the unit. No instruments, equipment, or accessories will be accepted without a Return Material Authorization (RMA) number issued by Thermo Savant. The warranty obliges you to follow the precautions in this manual.

When returning apparatus that may contain hazardous materials, you must pack and label them following U.S. Department of Transportation (DOT) regulations applying to transportation of hazardous materials. Your shipping documents must also meet DOT regulations. All returned units must be decontaminated and free of radioactivity. It is the responsibility of the user to dispose of ALL materials in a manner in accordance with all federal, state and local regulations.

Under no circumstances shall Thermo Savant be liable for damages due to the improper handling, abuse, or unauthorized repair of its products. Thermo Savant assumes no liability, express or implied, for your use of this equipment.

ROTOR SELECTION GUIDE

	Working Volume (ml)	Number of Tubes	Description	Models SC110/SC110A SS11,SS21,SS31 AES1010,ISS110	Models SC210A SS22,SS32 AES2010,OP420	Rotor Model
MICROCENTRIFUGE TUBES 	1.2 - 1.6	40	1.5 - 2.0 ml	■		RH40-11
	1.2 - 1.6	64	1.5 - 2.0 ml	■		*RH64-11
	1.2 - 1.6	120	1.5 - 2.0 ml	■		RH120-11
	1.2 - 1.6	200	1.5 - 2.0 ml		■	RH200-12
GLASS AND PLASTIC TUBES 	0.3	100	0.5ml (8 x 29mm)	■		*RH100-8
	0.3	40	0.4ml (6x 50mm)	■		RH40-6
	0.3	100	0.4ml (6 x 50mm)	■		*RH100-6
	4	20	12 x 75mm	■		RH20-12
	4	40	1.5 - 2.0 (12 x 75mm)	■		*RH40-12
	4	72	12 x 75mm	■		RH72-12
	4	200	12 x 75mm		■	RH200-12
	8	10	13 x 100mm	■		RH20-12
	8	32	13 x 100mm	■		RH32-13
	8	118	13 x 100mm		■	RH200-12
	12	48	16 x 125mm		■	RH48-18-125
	10	60	17 x 100mm, 16 x 100mm		■	RH60-17-100
	10	8	18 x 100mm, 17 x 95, 16 x 100	■		RH8-18
	15	48	18 x 125mm		■	RH48-18-125
	24	4	18 x 150mm	■		RH4-18-150
	24	32	18 x 150mm		■	RH32-18-150
40	12	28 x 150mm		■	RH12-29	
CENTRIFUGE TUBES 	12	10	15ml conical (16 x 120mm)	■		RH10-15
	12	52	15ml conical (16 x 120mm)		■	RH52-15
	40	6	50ml conical (28 x 115mm)	■		*RH6-50
	40	12	50ml conical (28 x 115mm)		■	RH12-29
	40	26	50ml conical (28 x 115mm)		■	RH26-50
	40	48	50ml conical (28 x 115mm)		■	RH48-50
FLASKS 	35	8	50ml pear shaped flask	■		*RH8-50
	80	4	100ml pear shaped flask	■		RH4-100
	80	8	100ml pear shaped flask		■	RH8-200
	200	6	250ml pear shaped flask		■	RH6-400
	400	4	500ml pear shaped flask		■	RH4-500
	80	8	100ml recovery flask		■	RH8-100
VIALS 	2	60	12 x 32mm	■		*RH60-12-40
	3.0	192	1 dram vial (4ml)		■	RH192-15
	2.0	60	12 x 40mm vials	■		RH60-12-40
	2.4	12	20 x 47mm v-vials	■		RH12-20
	3	24	1 dram vials (15 x 45mm), 4ml	■		RH24-15
	4	12	20 x 60mm v-vials	■		*RH12-20
	5.6	24	18 x 52mm mini-scintillation vials	■		*RH24-18
	16	12	28 x 60mm scintillation vials	■		RH12-28
	16	50	28 x 60mm scintillation vials		■	RH50-28-60
BOTTLES	250	8	250ml centrifuge bottles		■	RH8-200
MICROTITER PLATES	0.3	2	Microplates	■		RH2MP
	0.3	12	Multiwell Plates (shallow)		■	MPTR12-210
	1 -2	8	Multiwell Plates (deepwell)		■	MPTR8-210

*Available for Acid Resistant SpeedVac, SC110AR, or OligoPrep®, OP120
 When ordering these rotors, please replace "RH" with "RNC".

APPENDIX 1 MAINTENANCE AND SERVICE

Maintenance: Maintaining a clean instrument is crucial for dependable results. Clean spills immediately. Dried solvents can build up, impairing rotor rotation. Periodic cleaning of the sample chamber prevents problems. Use a detergent solution on a sponge or gauze, then thoroughly wipe the chamber dry. Excess moisture in the chamber is removed on the next SpeedVac® run, but can alter the performance of this run. Keep the drive shaft and rotor center lightly coated with vacuum grease. **Do not lubricate the cover O-ring.**

Upper Magnet Assembly: Although the Upper Magnet Assembly (UMA) is equipped with sealed bearings, using the SpeedVac® with aggressive acids and bases can cause bearings to corrode over time. Should this occur, the UMA may need replacement (frequency depends on individual usage patterns). Call Thermo Savant's Service Department (1-800-717-5509, 631-244-6942, or (Fax) 631-244-6899) for parts or repair. For the SC110/SC110A, order Savant part # UMA100. For the SC210A, order part # UMA200.

To determine if bearings are worn:

1. Open the sample chamber cover and unplug the instrument.
2. Remove the rotor hold-down knob, rotor, and three screws (Phillips) on the chamber bottom mounting plate. This plate of blue-white plastic forms the top portion of the UMA, which houses the bearings.
3. Replace the hold-down knob and using the knob as a handle, pull the drive shaft upward until the UMA comes free.
4. Pull carefully to release the magnetic attraction between the UMA and the Lower Magnet Assembly (not visible), located beneath the metal plate in the SpeedVac® floor.
5. Hold the plastic mounting plate rigid and attempt to pivot the magnet (bottom portion of the UMA) around it. If there is excessive "play" (wobble) between the plate and magnet, replace with new UMA.

To replace the UMA:

1. Align holes, then secure new UMA with the three screws.
2. Replace rotor and verify that it is seated properly on the aligning pins and that the hold-down knob is hand-tight.
3. Reconnect the instrument to an appropriate electrical outlet and resume operation.

APPENDIX 2 APPLICATION INFORMATION

Dislocation due to braking: When highly discrete solutes are dried using ordinary rotors and the total rotor mass is small, some users note that the minute solute pellet is dislocated by the concentrator's braking action, impeding recovery. For these critical applications, Thermo Savant recommends the use of a heavier rotor. The conical tip of the sample tube swings out horizontally as rotation increases. This draws solute to the tip of the tube, minimizing pellet dislocation on braking.

Typical results: The following data were gathered using Thermo Savant's SC110 SpeedVac® concentrator, RVT100 (-55 °C) Refrigerated Vapor Trap, VP100 (113 liter/min) vacuum pump, the RH20-12 rotor, and 20 glass tubes of 12 x 75 mm, each containing 2 ml of solvent. Time is shown as hours:minutes.

SETTING OF DRYING RATE SWITCH			
SOLVENT	LOW	MEDIUM	HIGH
WATER	3:45	3:07	2:01
METHANOL	0:55	0:43	0:33

These approximate drying times are presented as a guide only. Results will differ depending on type of vacuum pump, temperature and capacity of vapor trap, integrity of seal between fittings and connections, degree of contamination, number of tubes per run, and other factors.

Further improvements in evaporation rate: Rotors with aluminum tube carriers, such as the RH20-12, conduct more heat to the samples and enhance evaporation.

To speed evaporation further, use a Thermo Savant Radiant Cover:

For the SC110/SC110A, order the Thermo Savant RC110B Radiant Cover.

For the SC210A, order the Thermo Savant RC210B Radiant Cover.

WARNING: Never shine a lamp or heat lamp through the standard acrylic chamber cover. The cover absorbs heat and will deform, especially while the sample chamber is under vacuum.

Reconfiguration: The polypropylene vacuum fittings **do not withstand strong lateral force**. Should you ever need to remove a vacuum line, carefully pull straight out to slide the tubing off the fitting. **DO NOT** twist the tubing to remove it as this may damage or loosen the fitting causing a vacuum leak. IF the tubing does not come off when pulled, **CAREFULLY** slit the existing tubing at the fitting (avoid scoring the fitting). Remove the tube and discard it. Reconfigure the SpeedVac® and system components as desired. To reattach the line, place a thin film of vacuum grease (or use some soapy water) on the fitting; carefully slide new tubing straight on over fitting.

APPENDIX 3
TIPS TO ENHANCE PERFORMANCE

1. TO INCREASE THE RATE OF SOLVENT EVAPORATION AND SHORTEN DRYING TIME, TRY ONE OR MORE OF THE FOLLOWING:

- Use glass tubes and vials in place of plastic.
- Install and use a Radiant Cover on the SpeedVac®.
- Preheat the SpeedVac® chamber and rotor using MEDIUM DRYING RATE.
- Use rotors with metal tube carriers instead of plastic rotors (e.g., RH12-20, RH8-18). These rotors conduct and transfer heat to tubes for faster sample drying.
- Prewash plastic tubes with methanol to remove materials that inhibit or prevent evaporation of aqueous samples.

2. TO KEEP VACUUM PUMP OIL CLEAN, TRY THE FOLLOWING:

- Empty solvent(s) collected in the Refrigerated Vapor Trap as frequently as possible.
- Change the oil in the vacuum pump when it becomes brown in color or smells of solvents being evaporated.
- Attach a Thermo Savant VPOF110 Vacuum Pump Oil Filter/Recirculator to your vacuum pump when evaporating acids (e.g., HCl, acetic, TFA) in the SpeedVac®.
- Attach a Thermo Savant SCT120 Chemical Trap with acid neutralization cartridge when evaporating acids (i.e. HCl, acetic, TFA) in the SpeedVac®.
- If you are using a gel dryer with your SpeedVac®, remove the gel dryer from the system. Use an oil-free/maintenance-free Thermo Savant GelPump™ GEP140 for the gel dryer.

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