
USER'S MANUAL

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Product specifications and features subject to change without notice.

1. OVERVIEW AND INSTALLATION

1.1 Overview

The Thermo Savant Explorer is a computer-controlled, sample dryer/concentration system designed to provide repeatable, accurate results with the ability to monitor sample temperature to protect samples from overheating.

The Explorer combines a centrifugal evaporation chamber with a refrigerated trap and a vacuum pump. Vapors are drawn away from the chamber to accelerate evaporation. Spinning the samples during evaporation reduces bumping and foaming. The samples can be heated, using the chamber heater and/or heat lamps, to counteract evaporative cooling. Computerized control of temperatures, set to user specifications, during and after the run, avoids heat-based damage to samples.

The refrigerated trap condenses out the vapors evaporated from the sample so they do not reach the vacuum pump nor are discharged into the atmosphere. The trap can be used with or without a Glass Insert Trap (see Section 1.7).

The vacuum pump, through a series of control valves, lets the Explorer apply its maximum pumping rate or modulate vacuum to the samples.

The computer provides precise control of the drying run. The Explorer can report the progress of the run to, and receive control from, external devices.

1.2 Configurations

The Explorer SpeedVac System is comprised of the concentrator, the refrigerated trap, and the vacuum pump. These three components can be configured in two ways:

◆ INTEGRATED ONE PIECE HORIZONTAL CONFIGURATION

When bench-top space is ample, or to assemble the Explorer on the top shelf of a pushcart, the L-shaped refrigerated trap and the vacuum pump are side by side and the concentrator resides on top of the vacuum pump and on top of the lower surface of the refrigerated trap.



Integrated Configuration

Recesses in the top of the lower surface of the refrigerated trap and vacuum pump hold the rubber feet of the concentrator. In the horizontal configuration, when refrigerated trap and vacuum pump are side-by-side, placing the concentrator on top holds the other two components in place.

◆ **TWO COMPONENT VERTICAL CONFIGURATION**

When bench-top space is at a premium, or to assemble the Explorer to use the upper and lower shelves of a pushcart, the refrigerated trap and the vacuum pump are placed together to form a box. The concentrator sits separately on the top shelf of the pushcart or on the top of the bench.



Two-Component Vertical Configuration

NOTE: To install the Explorer in the two-component vertical configuration, you must order the vertical configuration parts kit. Part number EXP-2KIT (213-1801-00).

For the vertical configuration, recesses in the top of the lower surface of the refrigerated trap hold the rubber feet of the vacuum pump.

Electric power is plugged into the concentrator through a modular plug. The other two components are connected using vacuum tubing and using an electrical connector that provides both power and signals.

1.3 Setup Requirements

The physical dimensions of each component are as follows:

	Width	Height	Depth
Concentrator	24.0" (610mm)	20.5" (521mm)	25.5" (648mm)
Refrigerated Trap	23.5" (597mm)	17.5" (445mm)	25.1" (638mm)
Vacuum Pump	11.8" (300mm)	6.8" (172mm)	25.1" (638mm)

The total physical dimensions of the assembled components are as follows:

Horizontal Configuration	36.0" (915mm)	27.0" (686mm)	25.5" (648mm)
Vertical configuration			
--Concentrator	24.0" (610mm)	20.5" (521mm)	25.5" (648mm)
--Pump and Refrigerated Trap	23.8" (603mm)	17.5" (445mm)	25.2" (638mm)

In the vertical configuration, the concentrator typically resides above the other two components. It must be located within 24 inches of them and it must be physically possible to route the vacuum tubing and the electrical cable to connect the concentrator to the other components. We recommend that the left edge of the concentrator be in line with the left edge of the refrigerated trap.

Clearance is required on all sides. On the right side, 4 inches (101mm) of clearance is required to ventilate the vacuum pump (and, through it, the refrigerated trap), to avoid bending the power cable and external communication cable, and to accommodate the secondary vapor trap. On the left side, 4 inches of clearance is required for access to the refrigerated trap drain spout and is helpful for access to the trap itself. In the rear, 1 inch of clearance is required to ventilate the concentrator.

Including clearance, the total space requirements of the assembled Explorer are as follows:

	Width	Height	Depth
Horizontal configuration	44.0" (1096mm)	27.0" (686mm)	26.5" (673mm)
Vertical configuration			
--Concentrator	32.0" (813mm)	20.5" (521mm)	26.5" (673mm)
--Pump and Refrigerated Trap	32.0" (813mm)	17.5" (445mm)	26.1" (664mm)

The unit's electrical requirements depend on the model ordered:

Explorer-220: 220 VAC, 60 Hz, single-phase, 20 amps
 Explorer-230: 230 VAC, 50 Hz, single-phase, 20 amps

1.4 Unpacking

Remove the upper portion of both crates and identify the following parts:

- ◆ The SpeedVac concentrator is crated in a dedicated single box. (See Photo 1)



Photo 1 (SpeedVac Concentrator)

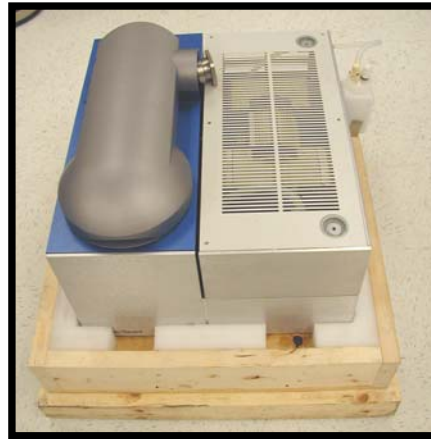
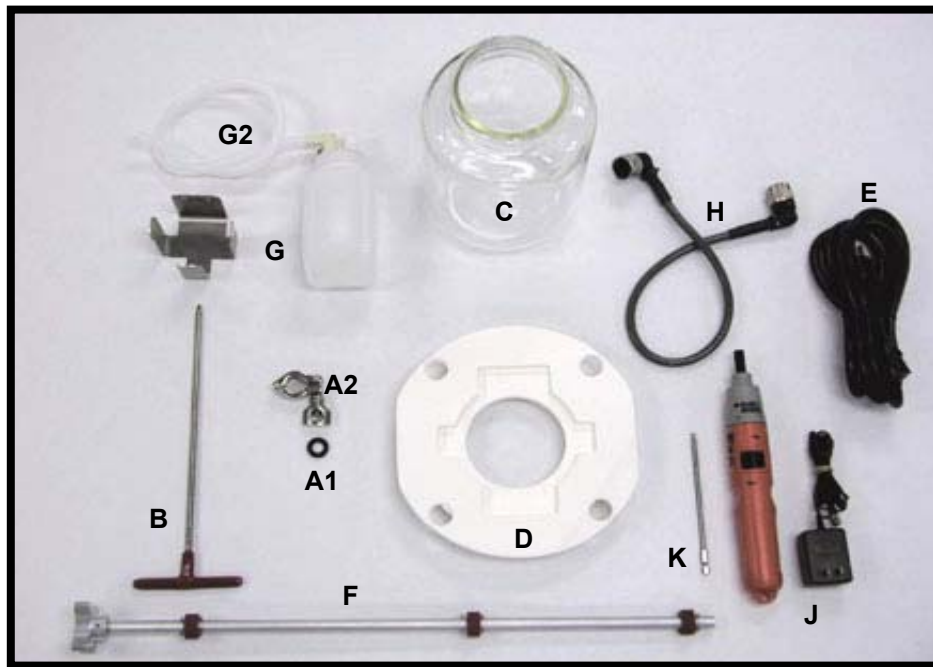


Photo 2 (Cold Trap and Vacuum Pump)

- ◆ The other crate contains both the refrigerated trap and the vacuum pump. The trap is the L-shaped module. The vacuum pump is shipped nestled on top of the trap. (See Photo 2)

- ◆ The single cardboard box should contain the remaining installation parts:
- ◆ (Installation Kit Part number 213-1802-00)



Description	Part Number
-- Rubber vacuum gasket [A1]	PM0595
-- Metal clamp for vacuum tubing [A2]	PM0594
-- 5/32" long-stem Allen wrench [B]	PM0653
-- Glass Insert Trap [C]	GCF4-EXP
-- Foam insulation flange [D]	213-6203-00
-- Power cord [E]	PM0645
-- Roller [F]	213-1066-00
-- Secondary post trap with bracket [G]	213-1022-00
-- Post trap exhaust hose (installed on secondary post trap) [G2]	M30-0061-02
-- Electrical cable, concentrator to vacuum pump [H]	213-2075-00
-- Electrical screwdriver and battery charger [J]	PM0620
-- Hex bit, for electrical screwdriver [K]	PM0700

Assemble the components in the desired location, referring to **Section 1.5** for the horizontal configuration and to **Section 1.6** for the vertical configuration.

1.5 Installation – Integrated One Piece Horizontal Configuration

Prepare a location for the unit that meets the space and electrical requirements set out in Section 1.3.

NOTE: Proper lifting technique is required for installation. Lift heavy equipment using your legs and not your back.

1. Remove the vacuum pump and set it aside. (Reference Photo 3)

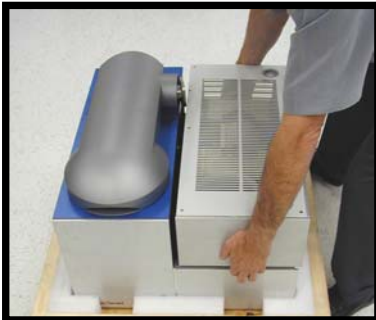


Photo 3 (Removing the Vacuum Pump)



Photo 4 (Removing front panel from Cold Trap)



Photo 5 (Removing front panel from vacuum pump)

2. Remove the front panels from the refrigerated trap and vacuum pump to allow for easier gripping and lifting (See photos 4 and 5). Both panels can be pulled out. You may need to temporarily disconnect the grounding strap for the front panel on the cold trap. Place the cold trap in the desired location.
3. Locate the vacuum pump on the right side of the refrigerated trap. Photo 6



Photo 6 Cold trap and vacuum pump placement

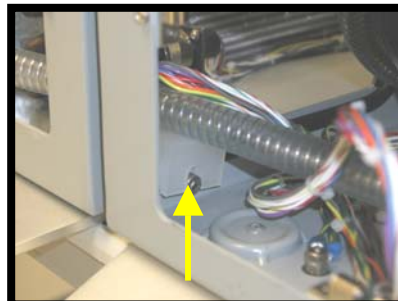


Photo 6a Front Spacer

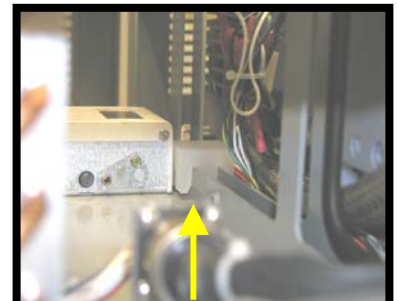


Photo 6b Rear Spacer

(The distance between these units is approximately 1/2 inch, so that the feet of the concentrator fit in the recesses on top of the refrigerated trap (lower surface) and vacuum pump. It may be necessary to move the two components closer or further away to achieve this fit (See photos 6a and 6b). The two components (cold trap and pump) are secured together with plastic spacers that hold them the correct distance apart (see photo 6a and 6b).

4. You now need to place the concentrator in position with the use of the rolling pin. Place the rolling pin halfway between the front and back where the concentrator will rest. Remove the concentrator from its crate and place the concentrator on top of the rolling pin. Slowly and carefully, use the wheels of the rolling pin to slide the concentrator into place. Lift the front of the concentrator to remove the pin and gently settle into place. Ensure that the feet of the concentrator seat inside the recesses on the top of the refrigerated trap and vacuum pump.

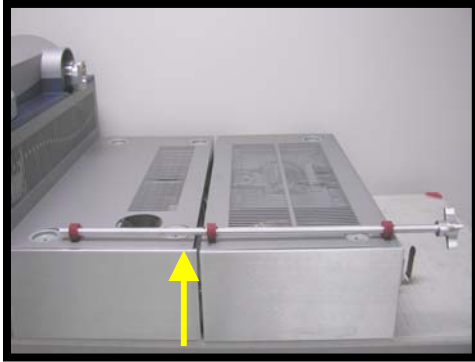


Photo 6c Rolling pin placement



Photo 6d Position concentrator on rolling pin



Photo 6e Removal of rolling pin

Connect the vacuum pump to the refrigerated trap.

5. Inside the vacuum pump, you should now see two parts designed for attachment inside the refrigerated trap:

- ◆ An electrical cable terminating in a male connector, and
- ◆ A length of $\frac{1}{2}$ " (12.7mm) vacuum tubing terminating in a nozzle.

Identify the receptacles for each part inside the refrigerated trap.

The vacuum tubing and the electrical cable travel through the sides of the component. These lines travel directly to the left from the vacuum pump into the mating connectors in the refrigerated trap.

6. Attach the vacuum tubing by joining the two pieces of vacuum tubing from the refrigerated trap and the vacuum pump, placing between them the rubber gasket from the installation parts kit.

Locate the tubing clamp in the installation parts kit. Wrap the clamp around the vacuum line and the solenoid where they are joined (Reference Photo 7). Fold the handle down to complete the enclosure, turning the handle counterclockwise to loosen the clamp if necessary. Retighten the clamp snugly by hand (Reference Photo 8).

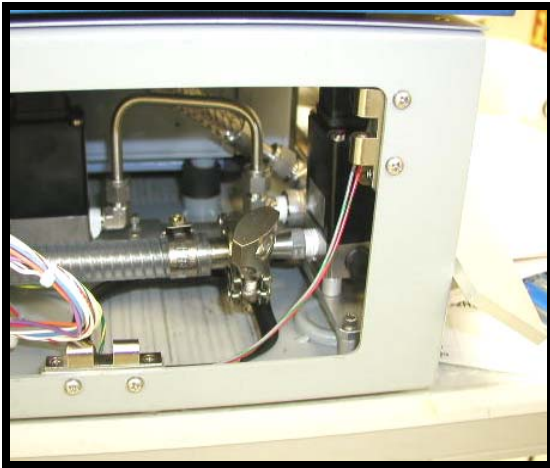


Photo 7



Photo 8

1. Attach the vacuum pump power cable by threading the electrical cable from the vacuum pump to the refrigerated trap as you did with the vacuum line. Align the plug with the socket attached to the frame of the refrigerated trap (Reference Photo 9). Orient the plug, pressing gently, until the grooves in the plastic housing matches and the plug goes in. Firmly push the plug into the socket. Finally, twist the knurled metal housing clockwise to secure the connection. Keep twisting it until it clicks into place.

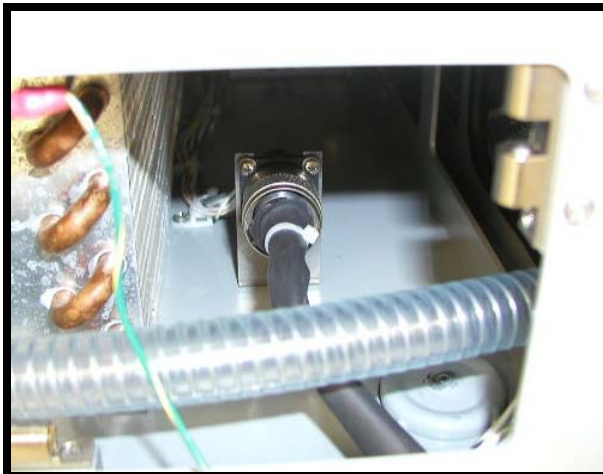


Photo 9 (attaching the power cable to the plug)

8. Lift the cover of the refrigerated trap (photo 10) and attach the large 2" (50.8mm) vacuum tubing of the refrigerated trap to the wall of the concentrator chamber (photo 11):

Guide the large vacuum tubing out the right rear exit of the cover. Put in place an O-ring from the installation parts kit. Remove the two screws from the 2 top holes of the vacuum port located of the concentrator. Place the notched flange in position latching onto the 2 lower screws. Replace the two upper screws and tighten all 4 securely. (Reference Photo 11) To tighten the screws, use the supplied long-stem Allen wrench. (Reference Photo 12)

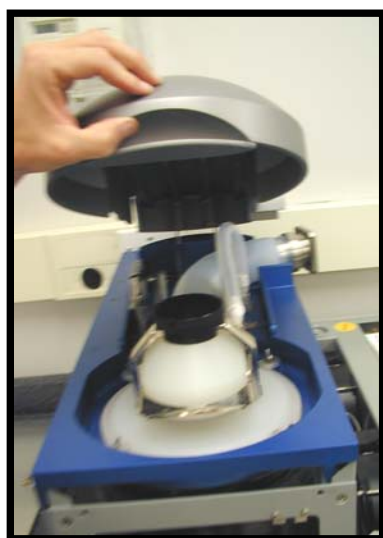


Photo 10

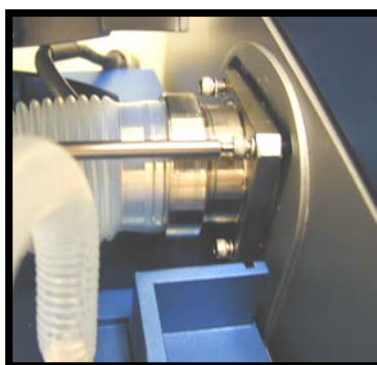


Photo 11

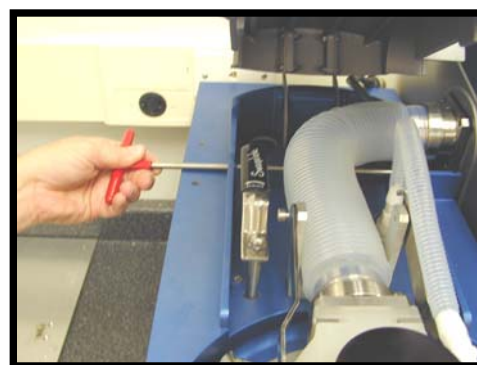


Photo 12

9. Electrically connect the vacuum pump to the concentrator chamber:

Use the electrical cable from the installation parts kit to connect the male connector, located on the right side of the concentrator, to the female connector on the right side of the vacuum pump. (Loop the cable and bind it with a cable tie to avoid excess loose cable.

Align the connector at each end of the cable with the mating connector on the concentrator or vacuum pump. Rotate the plug, pressing gently, until a groove in the plastic housing lines up and the plug goes in. Firmly push the plug into the socket. Finally, twist the knurled metal housing clockwise to secure the connection. Keep twisting it until it clicks into place. Re-connect the ground wire on the cold trap and replace both front panels by pressing back into place.



10. Install the Post trap bracket and container. Locate the stainless-steel over-flow post trap container bracket from the installation parts kit and use the 2 supplied screws to attach the bracket to the right side of the vacuum pump, fingers upward. The plastic post trap bottle in the installation parts kit is the secondary trap (post-trap). Install this bottle in the bracket.

Locate the narrow, articulated vacuum tube from the installation parts kit. Press the metal button on top of the post-trap and attach the right-angled side of this tube. Press the other end of the tube onto the nozzle at the rear corner of the concentrator.



Photo Completed Post Trap assembly

11. If you wish to use the Explorer Software Suite to remotely operate, collect data and store programs, connect the 9-pin plug labeled EXPLORER to the socket on the right side of the concentrator (just above the power cord). Attach the other end to the remote equipment as described in the software documentation for the Explorer Software Suite.

1.6 Installation – Two Component Vertical Configuration (brief overview)

THIS CONFIGURATION REQUIRES OPTIONAL PART #213-1801-00

FOR MORE DETAILED INSTRUCTIONS, PLEASE SEE THE ACCOMPANYING EXP-2KIT INSTRUCTIONS

Prepare a location for the unit that meets the space and electrical requirements set out in Section 1.3.

1. Remove the vacuum pump and set it aside.
2. Remove the refrigerated trap and place it in the desired location on the lower shelf.
3. Replace the vacuum pump on top of the refrigerated trap, as it was shipped, ensuring that the feet of the vacuum pump seat inside the recesses on the top of the refrigerated trap.

(If you are able to lift the vacuum pump and refrigerated trap as a single unit, you need not handle them separately.)

5. Remove the concentrator from its crate. Place the concentrator in its desired position above the cold trap/pump combination. Observe the recommendation in Section 1.3 on the placement and alignment of the concentrator relative to the refrigerated trap.
6. Connect the vacuum pump to the refrigerated trap:

Pry off the front cover of the vacuum pump. Also pry off the right front cover of the refrigerated trap.

6. Inside the vacuum pump, you should now see two parts designed for attachment inside the refrigerated trap:

- ◆ An electrical cable terminating in a male connector, and
- ◆ A length of 1/2" ((12.7mm) vacuum tubing terminating in a nozzle.

Identify the receptacles for each part inside the refrigerated trap.

The vacuum tubing and the electrical cable travel through the sides of the component. An installation will be messy and unreliable if these lines are routed on the outside of the boxes. The lines travel straight down from the vacuum pump. (They are longer than necessary; you may wish to loop the lines and loosely attach a cable tie in order to hold them in position.)

7. Attach the vacuum tubing by joining the two pieces of vacuum tubing from the refrigerated trap and the vacuum pump, placing between them the rubber gasket from the installation parts kit.

Locate the tubing clamp in the installation parts kit. Wrap the clamp around the two vacuum lines where they are joined (Reference Photo 10). Fold the handle down to complete the enclosure, turning the handle counterclockwise to loosen the clamp if necessary. Retighten the clamp snugly by hand (Reference Photo 11).

Push the vacuum tubing assembly up so that the metal bracket, located at the top of the refrigerated trap, holds each side of the tubing clamp. (Reference Photo 12)

8. Attach the vacuum pump power cord by threading the electrical cable from the vacuum pump to the refrigerated trap as you did with the vacuum line. Align the plug with the socket attached to the frame of the refrigerated trap (Reference Photo 15). Orient the plug, pressing gently, until the grooves in the plastic housing matches and the plug goes in. Firmly push the plug into the socket. Finally, twist the knurled metal housing clockwise to secure the connection. Keep twisting it until it clicks into place.

9. Guide the large 2" (50.8mm) vacuum tubing out the left rear exit of the cover. Note the two small, round knock-outs nearby on the top surface of the refrigerated trap. Remove the knock-outs to create holes in this surface. Screw into these holes the U-shaped bracket from the vertical configuration parts kit.

Locate the 2' (0.6 m) extension vacuum tube found in the vertical configuration parts kit. This assembly extends the vacuum line to the wall of the concentrator chamber.

- ◆ The end of the tube with six screw holes is the lower end. In the group of three holes on each side of the vacuum line, the middle hole is for attachment to the U-shaped bracket. The remaining holes are to attach the assembly to the vacuum tubing of the refrigerated trap.
- ◆ The end of the tube with four screw holes is the upper end. Put in place an O-ring from the installation parts kit. Remove the four screws from the vacuum port of the concentrator. Put the flange in position and attach it with these four screws.

Electrically connect the vacuum pump to the concentrator chamber:

10. Use the electrical cable from the installation parts kit to connect the concentrator to the vacuum pump. Connect the male connector located on the right hand side of the concentrator to the female connector located on the right side of the vacuum pump.

Align the connector at each end of the cable with the mating connector on the concentrator or vacuum pump. Orient the plug, pressing gently, until the grooves in the plastic housing lines up and the plug goes in. Firmly push the plug into the socket. Finally, twist the knurled metal housing clockwise to secure the connection. Keep twisting it until it clicks into place.

11. Use the side panel and screws from the vertical configuration parts kit, attach the side panel to the refrigerated trap.
12. Install the Post trap bracket and container. Locate the stainless-steel over-flow post trap container bracket from the installation parts kit and use the 2 supplied screws to attach the bracket to the right side of the vacuum pump, fingers upward. The plastic post trap bottle in the installation parts kit is the secondary trap (post-trap). Install this bottle in the bracket.

Locate the narrow, articulated vacuum tube from the installation parts kit. Press the metal button on top of the post-trap and attach the right-angled side of this tube. Press the other end of the tube onto the nozzle at the rear corner of the concentrator.

13. If you wish to remotely operate, or collect data from, the Explorer, locate the Y-cable and attach the 9-pin plug labeled EXPLORER to the socket on the right side of the concentrator (just above the power cord). Attach the other ends to the remote equipment as described in the software documentation for Explorer Observer and Explorer Remote Control.

1.7 Installation of Optional Glass Flask (GCF4-EXP)

NOTE: For maximum trapping efficiency, it is recommended to trap solvents directly into the refrigerated cold trap.

For sample solvents that are not hazardous and do not attack the stainless steel walls of the cold trap, you can operate the Explorer without installing a Glass Flask (GCF4-EXP). For other solvents such as HCl, you must install a Glass Flask. In addition, regardless of the solvent, using a Glass Flask speeds operation allowing quick change of collected solvents. When the flask fills with solvent, you can remove the filled one and install a clean empty one, instead of defrosting and draining the cold trap.

The installation procedure for the Glass Flask can be performed when you install the Explorer. It can also be performed later to install a clean Glass Flask, but any solvents already in the refrigerated trap must be completely defrosted, then drained out of the trap, before adding a Glass Flask (GCF4-EXP).

1. Lift the cover of the refrigerated trap to gain access to the trap chamber.
2. Turn the black knob counterclockwise until clamp arms spread and release their grip on the cold trap adapter cap (the white polypropylene cover).
3. Raise the stainless-steel arm to separate the cap mechanism from the adapter cap. A run of 2-inch vacuum tubing draws vapors to the manifold from the concentrator chamber; a run of 1/2-inch vacuum tubing goes to the vacuum pump. (Most vapors will condense and remain in the cold trap and never reach the vacuum pump.)
4. Locate the four wing nuts around the edges of the adapter cap. Loosen all four without removing them. In each corner, turn the metal clamp so that the flat side aligns with the edge of the adapter cap. Lift out the polypropylene adapter cap. Retighten the wing nuts.

Set aside the adapter cap and its O-ring in case you want to operate the Explorer without Glass Flask.

5. Ensure that the cold trap drain valve is shut by verifying that the black lever is facing towards the rear of the unit. The lever is usually in this position, and must be in this position to let the refrigerated trap cover close.
6. You must add CryoCool® coolant in order to draw heat away from the Glass Flask. To determine the correct amount of coolant to add before the Glass Flask is installed, fill the stainless steel chamber until the coolant level comes up to the line inscribed in the black plastic guide inside the trap chamber.
7. Gently install a clean Glass Flask. Fit the white foam ring around the top surface of the Glass Flask. This foam ring insulates the coolant and reduces condensation into the chamber. In this configuration, the four clamps held down by wing nuts are not used.
8. Push the stainless steel arm back down to lower the cap into place around the neck of the Glass Flask. Use one hand to keep downward pressure on this arm, use the other hand to turn the black knob clockwise until the arms on the right and left side grab the Glass Flask at the groove below the neck. Visually verify that the arms are not pressing the rim of the neck but contact the glass below the rim.
9. Lower the cover of the refrigerated trap.

1.8 Power-up and Complete Installation

The final steps of installation require power to be supplied to the unit:

1. Attach the power cord to the right side of the concentrator and plug it into a power outlet at the rated voltage and amperage.
2. Switch the main power into the ON position. The unit will take about 15 seconds to initialize. For most of this time, the control panel shows the count of seconds remaining in initialization.

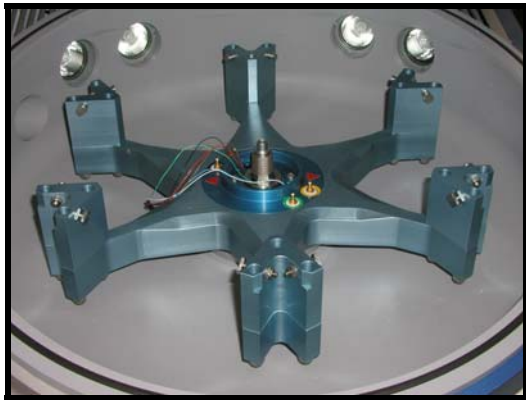
Complete the preparation of the concentrator chamber.

3. Press the large up arrow on the lower left of the control panel to open the cover.
4. Remove the packing material from the concentrator chamber

1.9 Installing the Rotor, Carriers and Temperature probes

To install the rotor, carefully insert the rotor into the keyed rotor shaft being careful not to pinch or break the temperature probe wires. Using the smaller, white rotor nut, secure the rotor to the shaft. Firmly hand tighten.

Gently press the multi-wired temperature probe plug into the center of the rotor shaft. The plug is 'keyed' and will only fit in one direction. Tuck all excess wires in and cover the plug/rotor nut with the large white master rotor cap. (See photos below)



Insert rotor onto motor shaft



Secure rotor with locking nut



Connect temperature probe plug



Cover plug/rotor nut assembly with Rotor Cap

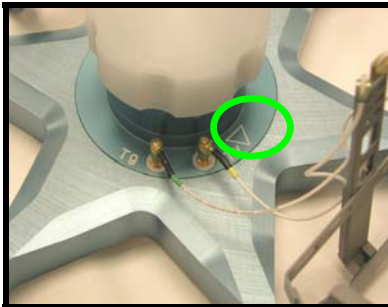
Attach the UPC1 Single shelf carriers to the rotor. There are 2 dedicated positions for the carriers that hold the temperature probes. The 2 positions are indicated on the rotor by two red arrows. Make sure the carrier with the block probe is attached on the correct side with the black temperature plug. Attach all 6 carriers. Connect the temperature block probe to its connector located on the rotor. If you are using the other 3 optional probes, connect them as well, matching the appropriate colored wire with the corresponding colored connector. The positions on the rotor are clearly marked (Tb = block probe; Tr = **red**; Tg = **green** and Ty= **yellow**)

When not in use, secure the “wire” probes (red, green and yellow) into their mounts located on the back of the carrier.

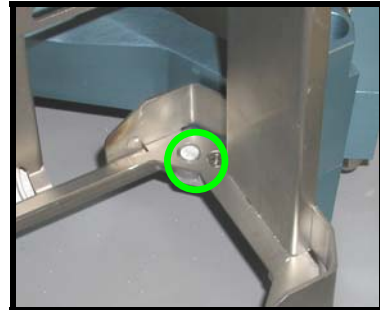
Verify that each carrier is free to swing from its rest position (in which the tray hangs down) through to its spin position (in which the tray will be drawn directly outward). Also verify that the wires for the probes are routed to neither impede this movement nor hang so freely they might touch the wall of the concentrator chamber and be damaged.



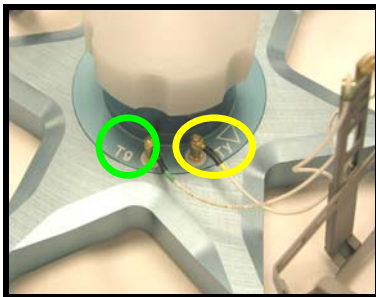
Insert Carriers (note insertion angle)



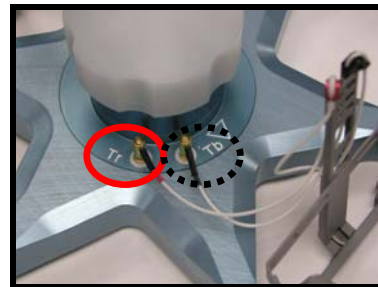
Position for Temperature Carriers



Close-up of Block Probe



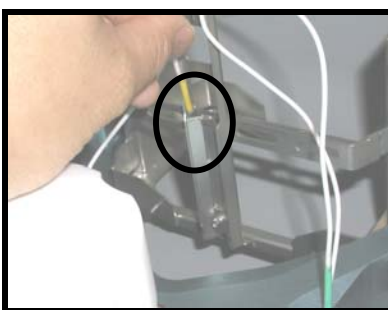
Green and **Yellow** Connection Point



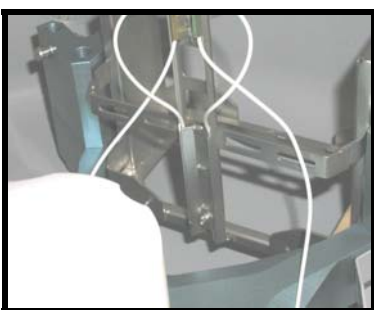
Red and **Block** Connection Point



Connect Individual Probes



Secure loose probe



Probes secured down into holders

IMPORTANT: A DISPOSABLE TEFLON SHEATH (Thermo Savant part # PTFE-SLV) MUST BE USED TO COVER THE TIP OF ANY WIRE PROBE WHEN PLACING PROBES IN SAMPLE LIQUID. Failure to do so may cause permanent damage to the probe. The sheath also prevents cross-contamination of samples and should be changed after each run. **WHEN DISCONNECTING PROBES FROM THE ROTOR, DO NOT PULL USING THE WIRE FROM THE PROBE. HOLD ONLY THE GOLD CONNECTOR AND PULL STRAIGHT UP. PULLING ON THE WIRE WILL PERMANENTLY DAMAGE THE PROBE.**

1A. QUICK START INSTRUCTIONS

If the Explorer SpeedVac System has already been installed and set up properly, you can start a run by performing the following steps:

1. At the right side of the concentrator, turn the green rocker switch to the ON position. Wait a few seconds for the control panel to show that initialization is complete.
2. If it is necessary, defrost the cold trap to ensure optimum trapping efficiency (see section 6.3 for further information). If a GCF4-EXP Glass Flask is inserted into the cold trap, replace the flask with a clean, empty flask.

You can load the concentrator (steps 3 and 4) while any required defrosting proceeds.

3. Press the large up arrow at the lower left of the control panel to raise the concentrator cover. Load blocks with samples into the carriers. Properly balance the blocks on the rotor to within 50 grams. If you are using direct in-sample probes, please make sure they are fully secured in the samples and that there is no slack on the wiring that can rub against the chamber.
7. If necessary, press the **REFRIGERATE** button to start the cold trap.
6. If the message display says "Cold trap over temp", wait until the cold trap reaches proper operating temperature before use.
7. For an **AutoDry** run, press the **Run Type** button until the "AutoDry" lamp is lit.
 - Press **Enter** to begin adjusting parameters.
 - Use the ← → **arrow keys** to navigate between parameters. Use the ↑ ↓ **up/down keys** to adjust the parameter values. You need to select:

• Chamber Temperature	[set range: 35 to 85 °C]
• Target Stop Temperature	[set range: 0 to 85 °C]
• Temperature Probe	[select probe: Tb, Tg, Ty, Tr]
• Run Type	[RUN or HOLD]
• Vacuum Level	[set range: 200Torr to MAX]
• Vacuum Ramp	[settings: FULL, 4,3,2,1]
 - Press **Enter** to save these settings
 - Symmetrically load samples into the carriers, maintaining equal balance between opposite samples.
 - [Optional] Insert temperature probe into sample making sure the wire is secure. Select the appropriate colored target probe in the settings to reflect the inserted temperature probe.
 - Press **Lid down** to close the cover. **There is a safety lid mechanism to prevent the cover from closing if an object is obstructing the cover.**
 - Press **Start** to begin run

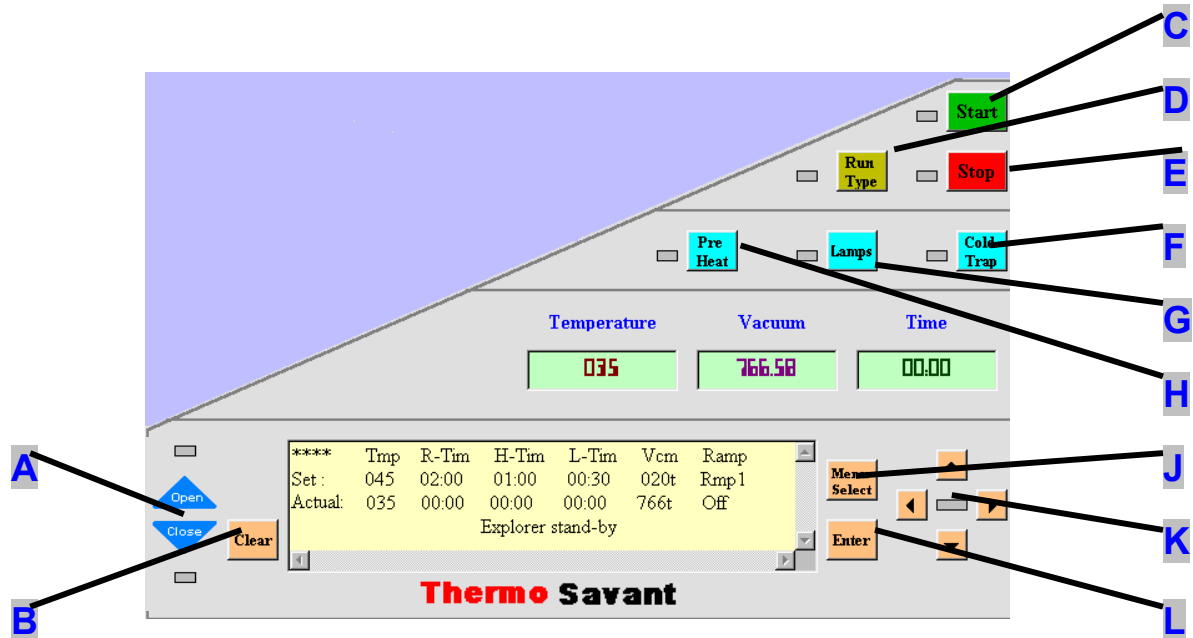
NOTE: The AutoDry mode will not operate without a temperature probe (Tb, Ty, Tg or Tr) attached.

8. For **Timed or Timed-Plus** modes, press the **Run Type** button until the nearby “Time” lamp is lit.
- Press **Enter** to begin adjusting parameters.
 - Use the ← → **arrow keys** to navigate between parameters. Use the ↑ ↓ **up/down keys** to adjust the parameter values. You need to select/adjust:
 - Chamber Temperature [set range: 35 to 85 °C]
 - Target Temperature (Time-Plus (+) Mode only) [set range: 0 to 85 °C]
 - Run Time [set range: 99h:59m to 1 minute]
 - Vacuum Level [set range: 200Torr to MAX]
 - Vacuum Ramp [settings: FULL, 4,3,2,1]
 - Lamp Time (Time Mode only) [set range: 99h:59m to 1 minute, OFF]
 - Heater Time (Time Mode only) [set range: 99h:59m to 1 minute, OFF]
 - Press **Enter** to save these settings
 - Symmetrically load samples into the carriers, maintaining equal balance between opposite samples.
 - Press **Lid down** to close the cover. **There is a safety lid mechanism to prevent the cover from closing if an object is obstructing the cover.**
 - Press **Start** to begin run

NOTE: The TIMED+ mode will not operate without a temperature probe attached.

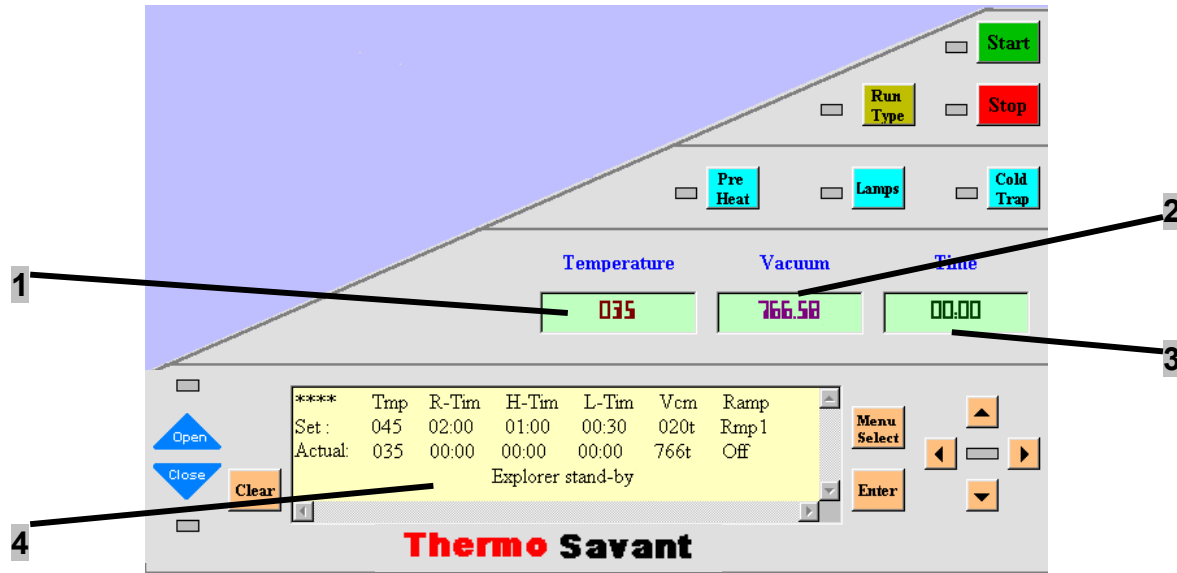
2. THE CONTROL PANEL

2.1 FUNCTION KEY IDENTIFICATION



- A** Open/Close Cover – raises and lowers the concentrator lid
- B** Clear – clears error messages
- C** Start – starts a run
- D** Run Type – selects the type of run (AutoDry; Time-Plus or Time)
- E** Stop – stops a run in progress
- F** Cold Trap – turns the refrigerated cold trap on or off (defrost)
- G** Lamps – turns lamps on or off during a run
- H** Pre-heat – preheats the chamber to a set 45 °C
- J** Menu Select – Engages the different menus available
- K** Directional Keys – for selecting and changing menu parameters
- L** Enter – confirms data entry

2.2 DISPLAY IDENTIFICATION



- 1 Real time TEMPERATURE display [in °C] (Range: -10 to 85 °C)
- 2 Real time VACUUM PRESSURE display [in mTorr or Torr] (Range: atm to 500 mTorr)
- 3 Real time RUN TIME display [hh:mm] (Range: 99hrs:59min to 1-min.)
- 4 Multi-function MENU, PROGRAM, SETTINGS and MESSAGES display

Real-Time Display

The real-time display shows the primary physical condition of the Explorer. It is designed to be visible from a distance. During a run, the same information is also visible on the blue display.

- ◆ The left (red) display shows CHAMBER TEMPERATURE in degrees Celsius.
- ◆ The center (green) display indicates the ELAPSED RUN TIME (HH:MM).
- ◆ The right (orange) display indicates CHAMBER VACUUM (xx.x = Torr; xxx = mTorr). If a decimal point appears, the reading is in Torr (for example, "20.0" means 20 Torr) else, the display is showing mTorr (for example, "900" means 900 mTorr).

Multi-function MENU, PROGRAM, SETTINGS and MESSAGE Display

The four line blue display outputs a variety of text and numeric information depending upon the mode chosen and the particular parameters available for viewing. To simplify the display, many of the parameters have been abbreviated. The display legend below explains the information on the multi-function display.

Display Abbreviations

Cbr	The internal Chamber temperature.
CSTM	Custom . This indicates a custom ramp setting.
R-Tim	Run Time . The length of time you wish to have the Explorer running. [For Time and Time-Plus (+) mode only]
H-Tim	Heat Time . The length of time you wish to have the Explorer's chamber heaters on during the run. [For Time and Time-Plus (+) mode only]
L-Tim	Lamp Time . The length of time you wish to have the Explorer's infrared lamps on during the run. [For Time mode only]
MAX	Maximum vacuum rate (no ramping)
NS	No Signal . Temperature probe is not attached or is damaged.
Rmp1	Vacuum Ramp Level 1. This is the lowest (slowest) setting for the vacuum ramp feature.
Rmp2	Vacuum Ramp Level 2.
Rmp3	Vacuum Ramp Level 3.
Rmp4	Vacuum Ramp Level 4.
FULL	Vacuum is set at Full (maximum) pulling power of the pump
Tb	Temperature probe, block . This probe is permanently attached to the sample carriers so that it comes in contact with any block installed in the carrier.
Tr	Temperature probe, red wire. [optional insert probe].
Tg	Temperature probe, green wire. [optional insert probe]
Ty	Temperature probe, yellow wire. [optional insert probe]
Vac	Vacuum

2.3 Operating Modes

There are 3 different modes available on the Explorer SpeedVac System.

AutoDry Mode automatically determines the completion of a run based upon a user preset target temperature. Typically, samples inside a SpeedVac undergo evaporative cooling and the sample temperature will begin to lower, even under chamber heating. Once there is no more solvent (and evaporative cooling), the sample temperature will begin to warm. The Explorer SpeedVac monitors this temperature change and shuts off when the preset temperature is obtained. The user can set the following parameters:

- Chamber Temperature [35 to 85 °C]
- Target Sample Temperature [0 to 85 °C]
- Target Sample Temperature Probe [Tb, Tg, Ty, Tr]
- Mode Select [RUN or HOLD]
- Lamps [On, Off]
- Vacuum Level [200Torr to MAX]
- Vacuum Ramping [FULL, 4, 3, 2, 1]

In **Timed-Plus (+) Mode**, the Explorer SpeedVac System monitors the sample temperature and regulates the heat on and off to maintain that level during the entire run. This prevents samples from overheating during the run. Completion of the run is based upon the preset timer. User parameters include:

- Chamber Temperature [35 to 85 °C]
- Run Time [99h:59m to 1-min.]
- Heat Time [99h:59m to 1-min.]
- Target Sample Temperature [0 to 85 °C]
- Probe Select [Tb, Tr, Tg, Ty]
- Vacuum Level [200 Torr to MAX]
- Vacuum Ramping (including Custom) [FULL, 4, 3, 2, 1, CSTM]

Timed Mode is a completely manual run where the end user pre-sets all parameters. Parameters that can be set in Time mode:

- Chamber Temperature [35 to 85 °C]
- Run Time [99h:59m to 1-min.]
- Heat Time [99h:59m to 1-min.]
- Lamp Time [99h:59m to 1-min.]
- Vacuum Level [200 Torr to MAX]
- Vacuum Ramp (including Custom) [FULL, 4, 3, 2, 1, CSTM]

IMPORTANT NOTE! Actual pressure values achieved within the system are dependent upon many factors including: solvent type, run time length, temperature settings (with/without Lamps), pump integrity, and also the amount of solvent contained in the vapor trap. Setting the system to achieve a particular vacuum level does not ensure that the system will reach that value due to these factors and will vary accordingly.

IMPORTANT NOTE! Actual displayed chamber temperature can be affected with the use of the IR Lamps. The displayed chamber temperature may exceed the set value when utilizing the Lamps. This is normal.

Menu Select

When you press the **Menu Select** button (1), the blue display presents a line with the following options:



- **SELECT** - allows users to select, by name, a previously saved program
- **CREATE** - allows users to create a new program
- **EDIT** - allows users to edit program settings.
- **DELETE** - allows users to delete a saved program
- **SAVE** - allows users to save the current settings under a specified name
- **LINK** - allows users to link 2 previously saved programs for sequential operation

Use the right and left ← → **arrow keys (2)** to navigate between selections. The highlighted selection will blink. Use the “Enter” key (3) to select the blinking option.

Select

The Select option from the Main Menu recalls up a specified program, by the name, to be loaded into the memory. Once transferred into the active memory, the program can be run.

- Press Menu Select to enter main menu.
- Utilizing the ← → **arrow keys**, highlight “Select”
- Press **Enter** to access the “Select” menu.
- Utilize the ↑ ↓ **up/down keys** to scroll between the different stored programs.
- Press **Enter** to load the program into the active memory.

The settings in this program become the current settings of the Explorer.

Create

The Create option from the Main Menu creates a new program. Upon power up, the Explorer begins with the initial settings (specified in Section 3.7) or if left on, the last program stored in the memory. Parameters shown on the display will depend on which mode the **Run Type** button is set to “Timed” or “AutoDry”. The initial name of the default program is “●●●●”.

- Press Menu Select to enter main menu.
- Utilizing the ← → **arrow keys**, highlight “Create”
- Press **Enter** to access the “Create” menu.
- Utilize the ← → **arrow keys** to navigate between parameters.
- Use the ↑ ↓ **up/down keys** to adjust the parameter values.
- Press **Enter** when complete
- The Explorer will prompt you to name your new program.

NOTE: THE PROGRAM IS ONLY TEMPORARILY STORED INTO THE UNIT'S MEMORY. IN ORDER TO KEEP THE SETTINGS FOR LATER RECALL, YOU MUST **SAVE** THE PROGRAM

Procedure for NAMING a Program

You can save the current settings as a program with a unique name that you specify. After making the desired settings, press Enter to complete this dialogue. Press Menu Select to call the Main Menu, move to Save, and press Enter.

Names can be up to ten (10) characters long and each of the characters can be a letter or a digit. The blue display asks you to "Name the program using the arrow keys". Utilize the ← → **arrow keys** to select a character position and ↑ ↓ **up/down keys** to select a letter or digit. Press **Enter** when the name is as desired.

If there is already a program by the name you selected, the Explorer notifies you that "A PROGRAM NAMED '1234' ALREADY EXISTS! Do you want to overwrite?" Following the directions on the blue display, press the left arrow for YES (to replace the saved program with the current settings) or press the right arrow for NO (to make no changes to the saved program).

Delete

The Delete option from the Main Menu deletes a program by a specified name from the Explorer's memory. The Explorer indicates how many saved programs are in the memory. Utilize the ↑ ↓ **up/down keys** to scroll between program names. Highlight the program name to be deleted and press **Enter** to delete. The Explorer asks you for confirmation before deleting the program. Following the directions on the blue display, press the ← **left arrow key** for YES (to delete the specified program) or press the → **right arrow key** for NO (to make no changes).

Save

Programs must be actively saved in order to be recalled for later use. If the set parameters listed on the multi-function display are acceptable, you may save the program.

- Press Menu Select to enter main menu.
- Utilizing the ← → **arrow keys**, highlight "Save"
- Press **Enter** to access the "Save" menu.
- Use the ↑ ↓ **up/down keys** to adjust change the alphanumeric character and utilize the ← → **arrow keys** to move between the 4 positions.
- Press **Enter** to complete

Link

The Link function allows the Explorer SpeedVac System to run two consecutive stored TIMED programs. This allows you to precisely tailor your complete run based upon your dual-solvent mixture. You can only link programs that have been previously stored.

- After you have previously saved each individual program under separate names, press **Menu Select**.
- Use the ← → **arrow keys** to select **Link**. Press **Enter**.
- The Explorer asks you to specify the first and second program by name. Utilize the ↑ ↓ **up/down keys** to scroll between program names and use the ← → **arrow keys** to navigate between the two programs.
- Once both programs have been selected, press **Enter** to confirm.

To cancel Link mode, press **Menu Select** and navigate to **Select**, or **Create** to choose a different program. Link mode is also cancelled when you switch the Explorer off.

IMPORTANT NOTE: AutoDry programs cannot be linked. There is no need to link a second program because the AutoDry run dries the samples.

3. OPERATION

Every drying run proceeds under control of a program, which is a set of parameters that control the Explorer's operation. Depending on the mode, parameters may include total run time, target temperature, and target vacuum. A program can be saved under a four-character name in the Explorer's memory, so that future runs use identical parameters.

3.1 General Rules

Types of Run

You can choose between 3 different types of RUNS - either an **AutoDry**, **Timed-Plus (+)**, or a **Timed Run**.

- **AutoDry** Run

The Explorer maintains a specified vacuum level and chamber temperature during the run. Due to evaporative cooling, the sample temperature drops, but as the samples dry, evaporative cooling lessens and the sample temperature will begin to rise. The run can stop when the sample temperature, as measured by a specified probe, reaches the users set point.

You may also select to "Hold" the run and continue drying without heat. When the target set point is reached, the heat is automatically turned off, but the system will continue to run with the vacuum on. When "hold" is selected, the run will continue until stopped by the end user.

For more information on the parameters of an AutoDry run, see Section 3.2.

- **Timed-Plus (+)** Run

A Time-Plus run is when the Explorer automatically modulates the chamber heater and heat lamps as necessary to maintain a specified sample temperature, as measured by one of the temperature probes. Modulating the heating protects against overheating or cooking samples.

The run is terminated when the preset timer has elapsed.

For more information on the parameters for a Time-Plus run, see Section 3.3.

- **Timed Run (manual)**

This run is a completely manual run and all parameters are preset including independent HEAT time, LAMP time, RUN time and Vacuum settings. The temperature probes are not used in this mode.

This mode ensures that the Explorer's operation does not vary even with differences in quantity and condition of the samples. In AutoDry and Time-Plus mode, the Explorer's operation depends on the measured condition of the samples.

For more information on the parameters of a Timed Run, see Section 3.3.

General Data Entry Rules

The Run Type button chooses between AutoDry and Timed Run (normally Time-Plus). Lamps next to the Run Type button indicate which run type is currently selected. To specify a Timed Run other than Time-Plus, press the Run Type button until the Timed lamp is lit, then complete the dialogue as described in Section 3.5.

Times are expressed in hours and minutes (hh:mm). They range can be set from one minute (00:01) through 99 hours and 59 minutes (99:59).

A vacuum reading or parameter is followed by the letter t for Torr, or m for milliTorr. Whenever the Explorer asks you to specify a vacuum level, you can select a level from 200t down to 1t. If you continue to press the down arrow button, the setting changes from 1t to 900m, 800m, 700m, and then MAX (maximum vacuum).

Temperatures are expressed in degrees Celsius and can vary from 0 through 85. A temperature setting has a label depending on which probe should be used to read the temperature.

Whenever you are not using the wired probes (red, green, and yellow), secure them by putting them in the compartment behind the carrier stem. Loose probes can touch the wall of the concentrator chamber and be damaged.

Data Entry Rules for Dialogues

Use the left and right ← → **arrow keys** to move to the desired field. The column heading flashes and a flashing arrow points to the field. Use the ↑ ↓ **up/down keys** arrows to change the selected value. When you have made all desired changes to all the fields, press **Enter** to put them into effect.

If you continue pressing the up arrow after reaching the highest allowed value, the value wraps around from the highest to lowest. Likewise, after going past the lowest allowed value, the value wraps around to the highest allowed value.

After pressing **Enter**, the Explorer may ask you to confirm your changes. Following the directions on the blue display, press the ← **left arrow key** for YES (to put your changes into effect) or press the → **right arrow key** for NO (to discard any changes you have made during the current edit). To make it easier to recall certain settings, save the program under a name, as described in Section 3.8.

Heat-Lamp Operation

Heat lamps in the concentrator chamber impart heat to the samples more quickly than the chamber heater in the concentrator wall. Depending on the run mode, you can specify heat-lamp operation either for a specified time or automate its function to maintain a specified sample temperature. Programmed operation of the heat lamps does not begin precisely at the start of the run. Activation is delayed to avoid initial overheating before evaporative cooling begins to occur.

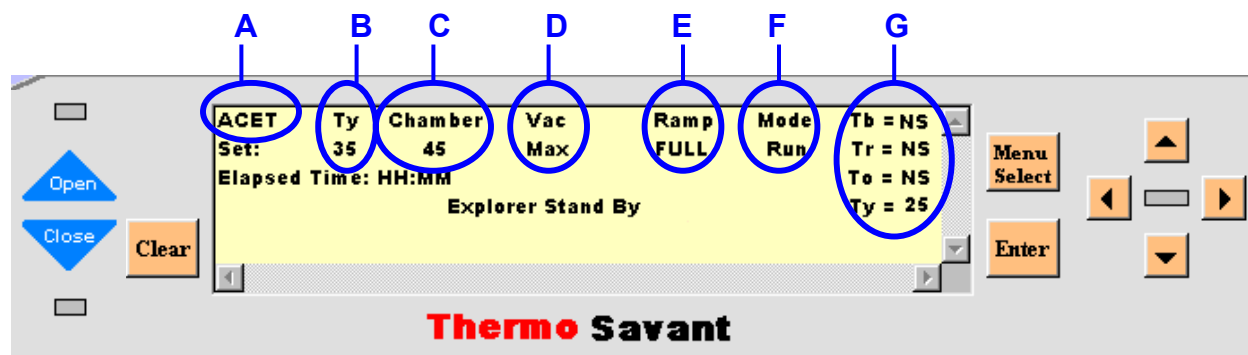
IMPORTANT: The actual displayed temperature will be higher than the set temperature when the Lamps are used.

Temperature Probe Usage and Temperature Variations

There are many variables that affect the temperature readings and also how the temperature is measured. Utilizing **the block probe (Tb)** provides the easiest way to measure sample temperature but **is also an indirect measurement**. The value read from the block probe is only a rough estimation of the actual sample temperature that can be affected by; the type of sample container the product is in (plastic, glass, metal); how fully in contact the sample container is to the block probe; and also, how clean the container is where the contact takes place. The most accurate way to measure sample temperatures during the run is with the use of the inserted temperature probes but its readings will be directly affected by the actual placement of the probe within the sample. It may not read accurately if not centered down into the bottom-most portion of the well/tube.

3.2 AutoDry Programming

To setup an AutoDry run, press the **Run Type** button until the “AutoDry” lamp is lit. Press **Enter** or use the “Create” option from the **Menu Select** button to call up the form. Utilize the ← → **arrow keys** to navigate between selections and ↑ ↓ **down keys** to change the setting. Press **Enter** to save settings.



The Menu Display for an AutoDry run has the following fields:

A Program Name

A scrolling 10-character program name will appear if the user has recalled a previous program from the main menu.

B Target Temperature Probe Selected (Tb, Tr, Tg, Ty)

The two-letter header designation indicates the selected target temperature probe that will determine the end of the run. You can change the set temperature and you can also set the column heading to any one of the 4 possible probes (Tb, Tr, Tg, Ty). If the appropriate temperature probe is not attached, the AutoDry function will not work. To determine if a colored probe is attached, see item G.

The target temperature can be set from 0 to 85 °C. and may be lower than the initial temperature. The Explorer does not abort the run prematurely, but only when the temperature reaches the target after evaporative cooling has drawn the temperature down to its lowest level.

C Chamber

This displays the desired CHAMBER TEMPERATURE. The Explorer maintains this temperature using a combination of the chamber heater and IR lamps.

D Vac

This displays the desired set VACUUM LEVEL. You can set the range from 200 Torr down to Max (full vacuum).

IMPORTANT NOTE! Actual pressure values achieved within the system are dependent upon many factors including: solvent type, run time length, temperature settings (with/without Lamps), pump integrity, and also the amount of solvent contained in the vapor trap. Setting the system to achieve a particular vacuum level does not ensure that the system will reach that value due to these factors and will vary accordingly.

E Ramp

This setting allows a VACUUM RAMP setting to help eliminate bumping of very volatile solvents. It modulates the vacuum in either a pre-set value or a custom setting; see Section 3.6.

F Mode

There are 2 Mode settings available:

RUN By selecting RUN, the program will stop running when the target temperature is reached.

HOLD By selecting HOLD, when the desired target temperature is reached, all heating will cease (chamber and IR lamps) but the run will continue with the applied vacuum. This mode can be selected when drying samples with different evaporation rates. Triggering the unit to stop heating early but continuing to run under vacuum will allow the remaining samples to be dried without overheating the already dried samples. In the HOLD mode, the Explorer will continue to run until terminated by the end user.

G Probe Monitoring

This real-time display shows the individual probe designations and temperatures. The display shows the temperature in °C. If a probe is not attached, the display will show “NS”.

DISABLING THE IR LAMPS IN AUTODRY

For customers with light sensitive samples, you can disable the Lamp function in the AutoDry mode. To disable the IR lamps, press the LAMP button on the keypad AFTER the AutoDry run has started. You will hear a 3-beep confirmation. The run will now commence without the use of the lamps for additional energy. Please note, your samples will take longer to dry without the use of the IR lamps.

Recommended Temperature Settings for AutoDry Mode

When using the AutoDry mode of the Explorer, proper setting of the target temperature is crucial to ensuring a valid, reproducible run. Many factors affect the temperature reading including:

- Solvent type (pure, mixture)
- the amount of analytes contained in the solvents
- probe placement (indirect, direct in-sample)
- type of sample container (glass, plastic, thin-walled, thick-walled)

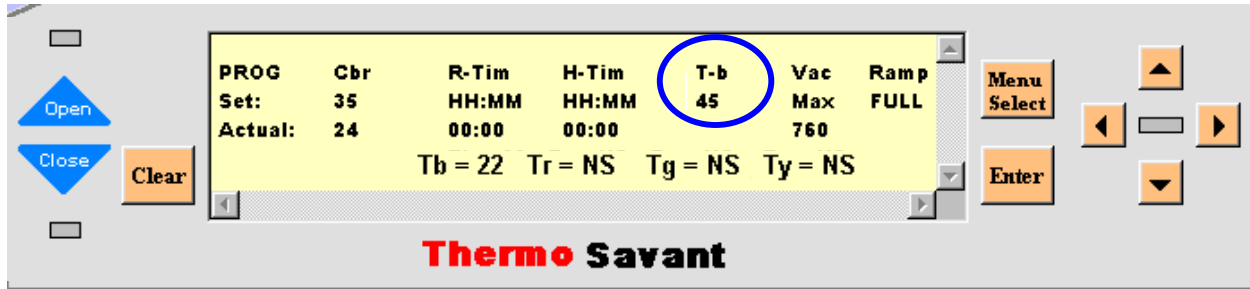
It is important for you to determine your required target temperature by trial and error on your specific application. These recommendations are just a starting point and will need adjusting for your application.

SOLVENT	SUGGESTED PROBE Settings
Acetonitrile (100%)	5 °C
Acetonitrile:Water (50:50)	30 °C
DMSO	55 °C
Methanol	5 °C
Water	30 °C

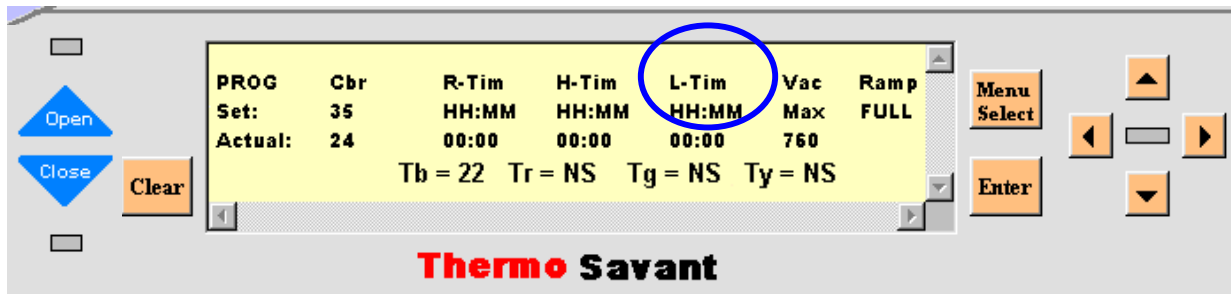
Please contact our applications lab for your specific application and/or solvents not listed.

3.4 Timed and Timed-Plus (+) Mode Programming

IMPORTANT: Data screens for **Time** and **Time-Plus** mode appear identical except for one parameter (as shown below).



Timed-Plus (+) Display Mode



Timed Display Mode

To change from Timed to Timed-Plus (+) mode and vice versa.

Depending upon which mode was selected previously you may wish to change from one mode to the other.

1. Press "Run Type" to select TIME.
2. If the 5th column parameter display shows:
 - "T-b", then you are in Time-plus (+) mode
 - "L-Tim", then you are in Time mode.

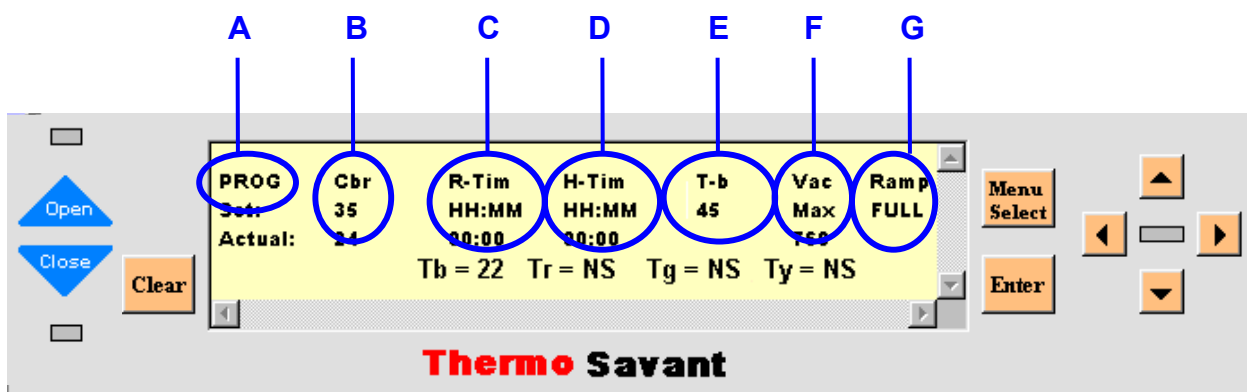
IF YOU ARE IN TIMED MODE AND WISH TO CHANGE TO TIMED-PLUS (+):

Press "Enter" to allow you to adjust parameters. Utilizing the ← → **arrow keys**, go to adjust the 5th parameter (should currently display "L-Tim"). Using the **Down arrow key**, lower the time setting below 00:00 (hh:mm). The **Timed-Plus (+)** mode will automatically appear. Once the "T-b" display heading displays shows, the parameter settings will revert from time to degrees Celsius. Set the target temperature (T-b) from 35 to 85 °C using the ↑ ↓ (**Up/Down**) **arrow keys**. Adjust other parameters as needed.

IF YOU ARE IN TIMED-PLUS (+) MODE AND WISH TO CHANGE TO TIMED MODE:

Press "Enter" to allow you to adjust parameters. Utilizing the ← → **arrow keys**, go to adjust the 5th parameter (should currently display "T-b"). Using the ↑ (**Up**) **arrow key**, raise the setting over 85 °C. The **Timed-Plus (+)** mode will disappear and the **Timed** mode will automatically appear. The display heading should now read "L-Tim." This is now the direct setting for the lamp timer. Continue using the ↑ ↓ (**Up/Down**) **arrow keys** to set your LAMP Time (hh:mm). No automatic sample temperature control will occur in **TIME** mode.

In **Time-Plus**, the Explorer operates for a specified time, modulating the chamber heater and heat lamps to maintain a specified sample temperature. To specify a **Time-Plus** run, press the Run Type button until the **Timed** lamp is lit.



Utilize the ← → **arrow keys** to navigate between parameter selections and ↑ ↓ **up/down keys** to adjust the parameter values. Press **Enter** to save settings.

TIMED-Plus (+) runs have the following displayed parameters:

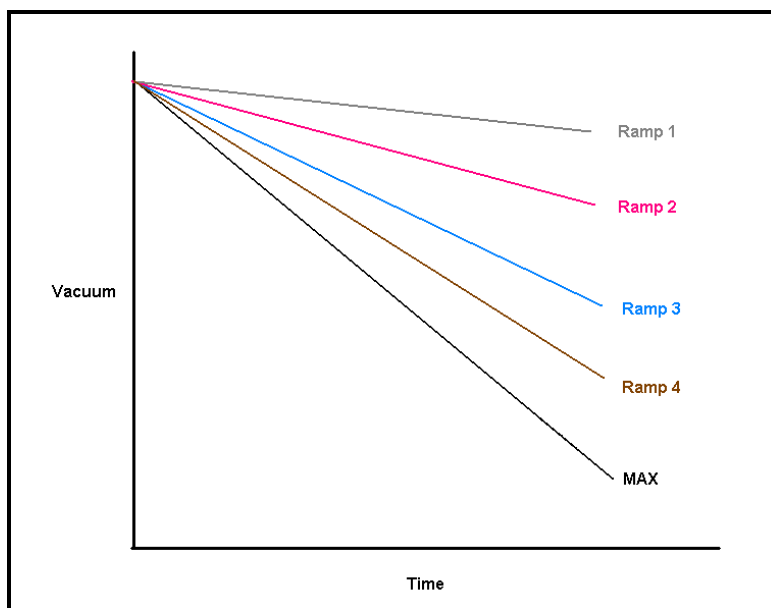
- A Program Name**
Displays the recalled program name.
- B Cbr**
This represents the preset CHAMBER TEMPERATURE for the Explorer. Temperatures can be set from 35 to 85 °C
- C R-Tim**
This is the heading for RUN TIMER. This determines the total run time. It can be set to a maximum setting of 99 hours and 59 minutes.
- D H-Tim**
This represents the preset HEAT TIMER for the Explorer. The HEAT TIMER controls the length of time that the chamber heaters are turned on and cannot be set for a higher time than the RUN TIMER. It can be set to a maximum of 99 hours and 59 minutes.
- E T-b**
This represents the preset maximum sample temperature that the Explorer is to maintain during the entire run. It is measured utilizing the block temperature probe (T-b). When this target temperature is reached, the system will automatically stop heating (chamber and IR lamps) the system. YOU MAY SELECT AN ALTERNATE TARGET PROBE IF YOU WISH [Tr, Ty, Tg]
- F Vac**
This represents the vacuum level inside the Explorer. You may utilize this to set a vacuum level to prevent samples from freezing. By setting the value to MAX, you allow the pump to pull down as low as possible. It can be incrementally set from 200 torr down to 0.7 torr (700 mtorr).
- G Ramp**
This displays the VACUUM RAMP rate, you can control volatile samples from bumping and/or splashing. There are 6 settings available - MAX, 4,3,2,1 (1= the slowest slope rate) and custom.

3.4 Vacuum Ramp

You can prevent abrupt application of vacuum to the samples by specifying a ramp parameter. By using vacuum ramping, you can eliminate bumping or splashing of volatile samples due to rapid degassing of the solvents.

The following ramp settings are available:

- Max Applies the maximum vacuum capable (no ramping).
- Rmp4 Apply ~80% of the maximum pumping rate.
- Rmp3 Apply ~60% of the maximum pumping rate.
- Rmp2 Apply ~40% of the maximum pumping rate.
- Rmp1 Apply ~20% of the maximum pumping rate.



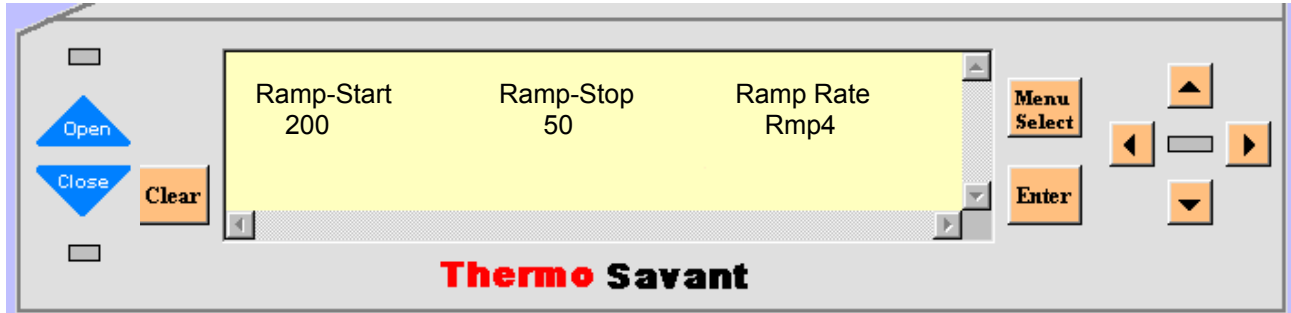
CSTM Use a custom (user-defined) ramp method--see Section 3.6.1.

The Explorer's ability to achieve specific chamber pressures depends on the type and condition of the samples. Chamber pressure reduction is almost linear at pressures above 50 Torr. At lower pressures, reduction of pressure proceeds more slowly.

3.5 Custom Ramp (Available with Timed and Timed-Plus (+) modes only)

Under custom vacuum modulation, the Explorer applies the maximum pumping rate until the chamber pressure goes down to a user-specified point (the ramp-start point). The Explorer then modulates the application of vacuum according to Rmp1, Rmp2, Rmp3, or Rmp4 as described in Section 3.6 (the ramp-rate). When a second level of chamber pressure is reached (the ramp-stop point), the Explorer again applies the maximum pumping rate until the end of the run.

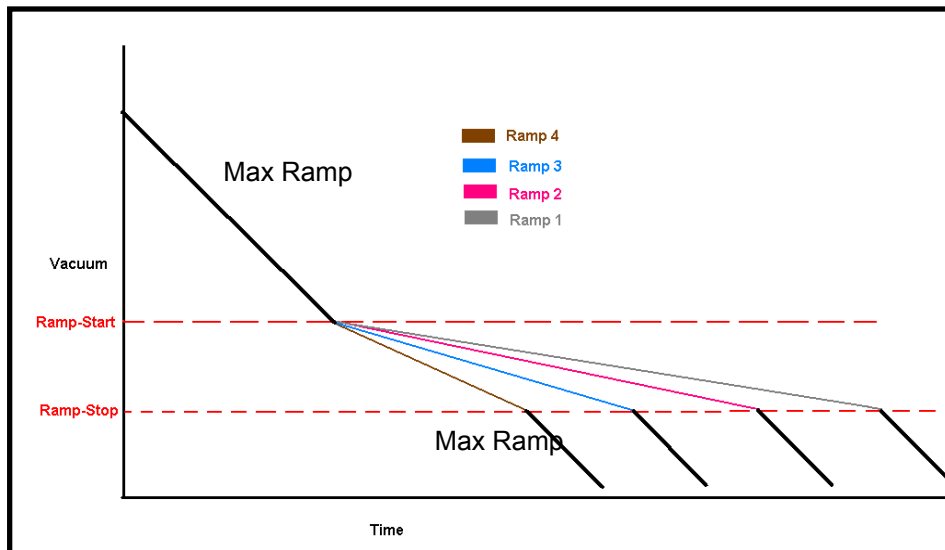
When CSTM (custom) is selected for Ramp parameter, a screen appears that asks you to enter Ramp-start, Ramp-stop, and Ramp-rate. See below.



CUSTOM RAMP RATE SCREEN

Use the ← → **arrow keys** to navigate between selections and ↑ ↓ **up/down keys** arrow keys to change these values. When finished, press **Enter**. Please be advised that you cannot set a Ramp Start and Ramp-Stop value lower than the Ultimate vacuum LEVEL as the Explorer will control the vacuum to the preset LEVEL and never reach your Ramp-Start and Ramp-Stop values.

You can set Ramp-Start and Ramp-Stop values from ATM (atmosphere) down to 700 mtorr. If you cancel this dialogue before entering all three parameters, the Cstm parameter is not retained; the Explorer reverts to the original ramp type was specified previously.



Graphic depicting CSTM (Custom) Ramping

3.6 Vacuum Level

The ultimate vacuum level can be adjusted to prevent samples from freezing. The level can be adjusted and stored within each program. Vacuum levels can be incrementally set from 200 Torr down to 0.7 torr. If no level is needed, set the vacuum level to "MAX" to achieve the maximum vacuum level that can be obtained by the vacuum pump.

IMPORTANT NOTE! Actual pressure values achieved within the system are dependent upon many factors including: solvent type, run time length, temperature settings (with/without Lamps), pump integrity, and also the amount of solvent contained in the vapor trap. Setting the system to achieve a particular vacuum level does not ensure that the system will reach that value due to these factors and will vary accordingly.

4.0 MESSAGES

A message is text that the Explorer displays for your information. Messages appear on the fourth (bottom) line of the blue display. Each message is one of the following types:

4.1 Status Messages

A Status Message (SM) is informational and does not require any response from the user. The Explorer can display the following Status Messages:

- Completing the program - Decelerating
- Explorer stand-by
- Manually stopped - Decelerating
- Manually stopped - Ready to open
- Program completed - Ready to open
- Running an AutoDry program
- Running Timed+
- Vacuum releasing
- pgm1 and pgm2 are linked
Linkage of programs is explained in Section 3.9.

4.2 Latched Messages

A Latched Message (LM) is an informational message that persists until the user clears it as described below. Any Latched Message aborts any run that may be in progress. The Explorer can display the following Latched Messages:

- Chamber safety switch tripped
You aborted a Close Cover operation by touching or lifting the cover lid, or there is an obstruction in the surface of the concentrator that prevents complete closure, or the samples are loaded incorrectly so as to prevent complete closure.

Probe Tb is not connected

You tried to start a Time-Plus run but the Tb (black) temperature sensor is disconnected or broken. Without a Tb reading with which to maintain sample temperature, the run cannot proceed.

Rotor out of balance

The concentrator spindle is wobbling excessively. Open the cover and adjust the positions of the samples. The rotor does not need to be completely loaded, but it must be loaded with radial symmetry: For every sample tray loaded, another sample tray should be present directly across the spindle and should be loaded to within 50 grams of it.

Selected probe is not connected

You tried to start an AutoDry run but the probe you selected in the dialogue is disconnected or broken. Without a valid reading, with which to maintain sample temperature, the run cannot proceed.

To acknowledge and clear a Latched Message, press the Clear Message button to the left of the blue display. If there are more than one Latched Message that you have not cleared, pressing Clear Message presents a list of Latched Messages on the blue display. Press the down (or up) arrows to select one of these and press Enter to clear it. You can repeat this procedure to clear more than one message.

4.3 Fault Messages

A Fault Message (FM) persists until the underlying problem is rectified. The user does not have to clear a Fault Message. The Explorer can display the following Fault Messages:

Chamber over temperature

The temperature sensed through the internal chamber temperature sensor is 5 or more degrees hotter than the target temperature for the run. This Fault Message persists until the temperature drops.

Check vacuum

The vacuum pump is not producing adequate vacuum. This Fault Message persists until adequate vacuum is detected. Stop any drying run and try the following remedies:

- Determine if excessive solvent has condensed in the refrigerated trap. If not using a Glass Insert Trap, see if a defrost cycle is warranted, referring to Section 6.3. If using a Glass Insert Trap, examine it and replace it with a clean Trap if warranted.
- Pry off the front cover of the refrigerated trap and visually verify that the vacuum tubing is securely connected.
- Inspect the 2-inch vacuum tubing from the concentrator to the refrigerated trap for punctures or loose fittings.

Close the cold trap drain valve

The drain valve below the cover of the refrigerated trap is not

in its operating position, in which the black handle points to the rear of the unit. Typically, it is not possible to close the cover when the handle is in this position. Correct the position of the handle, lower the refrigerated trap cover, and press the Start button again.

This Fault Message occurs only when you press the Start button with the handle not in the closed position. It persists until the handle is returned to the closed position. It prevents a run from starting.

Cold trap over temp.

The temperature of the cold trap exceeds -10 degrees. This Fault Message persists until the temperature of the cold trap drops below -10 degrees. This Fault Message appears when you first apply power to the Explorer. It takes 10-15 minutes to develop adequate cold in the trap.

If a defrost cycle was in progress, terminate it by pressing the Cold Trap button until the Refrigerate lamp is lit.

Lid over torque detected

During an attempt to raise or lower the cover, an over-torque sensor was activated. Check that no equipment is resting on top of the cover and that the cover is not obstructed from moving freely. This Fault Message persists until the over-torque condition is removed.

Motor error, stop the run

This Fault Message appears one minute into a run when the Explorer fails to detect rotation of the concentrator. It persists until you press the Stop button.

5. EXTERNAL COMMUNICATION PORT

Below the power switch, there is a nine-pin socket. This carries signals for two serial lines. The socket is not RS-232-compatible, but the supplied Y-cable brings the signals out to two female DB9S connectors, both of which are RS-232-compatible. These connectors are labeled Data Port and Control Port. Each of these connectors can be attached directly to an IBM-compatible personal computer (PC) at its serial port, such as COM1.

5.1 Data Port

The Explorer operates the Data Port at 300 Baud, no parity, and 1 stop bit. The attached equipment must be set to use these same parameters. On a PC, the Explorer Observer or other software must be set to inform it of the specific COM port to which the Data Port is attached. Please contact Thermo Savant for further information.

5.2 Control Port

The Control Port permits external operation of the Explorer using the Explorer Remote Control. Please contact Thermo Savant for further information.

6.0 ROUTINE MAINTENANCE

6.1 Purifying CryoCool

When you are using Glass Insert Traps and CryoCool (TM) coolant, water from the ambient air gradually condenses into the CryoCool. Under normal refrigeration, this water takes the form of ice. Excessive ice reduces the effectiveness of CryoCool and may raise the level of CryoCool.

Whenever you remove the glass flask and before you insert a clean one, you should visually inspect the level of CryoCool and verify that it does not contain ice. Ice can be strained out and discarded. Another way to remove ice is to drain the CryoCool into a reusable container. Then perform a defrost cycle (see Section 6.3) to melt the ice into water. Drain and dispose of the water. Close the cold trap drain valve and pour back the saved CryoCool into the cold trap. Add more CryoCool, as necessary, to raise the liquid level mark inscribed on the plastic guide.

6.2 Reconfiguring for Use without Glass Insert Trap

Perform the following procedure to reconfigure the Explorer for use without the Glass Insert Trap. This is the most efficient and effective way to configure the cold trap for maximum trapping efficiency.

1. Gain access to the trap chamber as follows:

- Lift the cover of the refrigerated trap.
- Turn the black knob counterclockwise until the arms on the right and left release the plastic flange.
- Lift the stainless-steel arm.

Remove the foam flange and remove any Glass Insert Trap that is in the trap chamber.

2. Drain any CryoCool from the trap chamber, following Step 5 of Section 6.3 below.
3. Locate the plastic flange with O-ring. Loosen but do not remove the four wing nuts. Turn the four metal clamps so that the flat side aligns with the edge of the trap chamber, permitting insertion of the plastic flange.
4. Insert the plastic flange and turn the four metal clamps to hold the flange in place. Retighten the wing nuts.
5. During the first run, to compensate for o-ring compression under vacuum, it is recommended to tighten the wing nuts again when unit is under vacuum below 200 Torr.

6.3 Defrost Cycle

When not using a Glass Insert Trap, sample solvent condenses on the stainless-steel inside walls of the refrigerated trap. Periodically, these solvents must be defrosted and drained out of the trap to preserve the trap's effectiveness. The Explorer reverses the hot vapors from the refrigerator compressor to actively heat the cold trap for rapid defrosting. Perform the following procedure to complete a defrost cycle:

1. Stop any run in progress, or wait until the end of the current run before defrosting the Explorer.

2. Press the **Cold Trap** button until the Defrost lamp lights.

Note: Do not drain the cold trap until the defrost operation is complete. The liquid solvent, remaining in the trap, helps to improve the defrosting of the frozen solid solvent.

3. The defrost cycle lasts 1 hour. Wait approximately this long and inspect the interior of the trap chamber as follows:
 - Lift up the refrigerated trap cover.
 - Turn the black knob counterclockwise until the arms on the right and left release the flange adapter.
 - Lift the arm.

If the trap chamber is empty, there is no need to drain it; proceed directly to Step 7.

4. A 1-hour defrosting may not be sufficient to melt certain solvents fully, such as a large amount of water/ice. You may need to start another 1-hour cycle by pressing the Cold Trap button so that Refrigerate is lit, then again so that Defrost is lit.
5. Drain the cold trap:
 - Locate a suitable container below the stainless-steel drain spout located on the left side of the refrigerated trap. Connect the provided tubing and hose clamp to the spout and route it to the container.
 - Turn the black drain lever (located on the top of the trap) 90 degrees counterclockwise (following the arrow on it labeled OPEN), so that it points to the left.
 - Wait until all liquid has drained out and turn the black lever back to its original position, facing the rear of the unit.
 - Dispose of the liquid appropriately.
6. Place the refrigerated trap arm back down into place around the neck of the plastic flange. Use one hand to keep downward pressure on this arm; use the other hand to turn the black knob clockwise until the arms on the right and left side grab the plastic flange at the groove below the neck. Visually verify that the arms are not pressing the rim but contact the flange below the rim.
7. Press the Cold Trap button so that Refrigerate is lit. It should require 10-15 minutes for the trap to chill to operating temperature. You will see the "Cold trap over temp." fault message and you will not be able to start a run until the trap cools and the message goes away.

6.4 Access to Concentrator During a Power Failure

In the event of a power failure, you can access the Explorer SpeedVac chamber manually.

An access port, located on the upper left side of the top cover of the concentrator chamber, allows you to insert a tool to manually lift up the lid. It is located behind a removable plastic plug. To remove this plug, push it down, rotate it, and remove it.

A battery-operated screwdriver with an attached 5" extension and 5/32" hexagonal tip is provided in the installation parts kit. Use the button on the screwdriver to select CLOCKWISE rotation.

Viewing through the plug hole, insert the screwdriver tip into the hexagonal recess of the motor shaft. Activate the screwdriver to manually open the cover. Open cover as much as need to remove the samples. Do not over extend open the lid.

To close the concentrator cover, you can either use the battery-operated screwdriver, pressing the button to achieve COUNTERCLOCKWISE rotation, or just wait for the power to come back on and close the cover using the control panel.

It is important that the screwdriver's battery stay fully charged in anticipation of a power failure.

7.0 SPECIFICATIONS (subject to change without notice)

Shipping Dimensions and Weights

	Dimensions	Weight
Crate #1 (concentrator)	33" x 26" x 31" (84 x 66 x 79 cm)	279 lbs. (127 kg)
Crate #2 (cold trap and pump)	33" x 26" x 28" (84 x 66 x 71 cm)	306 lbs. (139 kg)
Box (misc. items)	19" x 19" x 19" (48 x 48 x 48 cm)	15 lbs. (7 kg)

Order numbers referred to in this manual:

Explorer-220	Explorer SpeedVac System, complete with concentrator, refrigerated trap, vacuum pump, 6-position rotor with 6 single-shelf carriers, one block temperature probe and installation parts kit. 220 VAC, 60 Hz, single-phase, 20 amps.
Explorer-230	Explorer SpeedVac System, complete with concentrator, refrigerated trap, vacuum pump, 6-position rotor with 6 single-shelf carriers, one block temperature probe and installation parts kit. 230 VAC, 50 Hz, single-phase, 20 amps.
GCF4-EXP	Glass Flask, for insertion into cold trap
SCC1	CryoCool Fluid, 1L
EXP-2KIT	Vertical configuration parts kit 213-1801-0
PTFE-SLV	Teflon sheath (disposable cover for temperature probe) (box of 100)
PROBE-EXP	Optional Wired temperature probes, set of 3 (Ty, Tg and Tr)
UPC2-EXP	2 shelf carrier for Explorer standard rotor. Holds 2 deep- or shallow-well plates, set of 2.
UPC5-EXP	5 position carrier for Explorer standard rotor. Holds 5 shallow-well plates, set of 2.