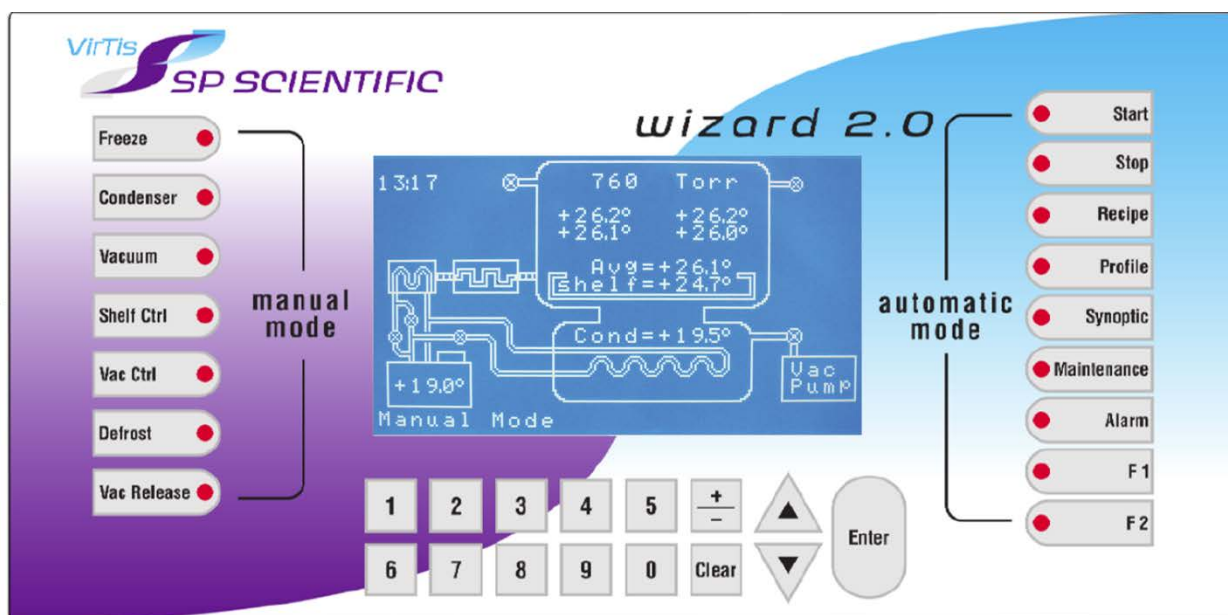


CONTROLLER OPERATOR'S MANUAL



VIRTIS WIZARD 2.0 LYOPHILIZER CONTROLLER

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Part Number 100005298

Rev 004, 01/16

Original Instructions

The U.S. English version of this document is the original instructions.

All other languages are a translation of the original instructions.

SP Scientific	3538 Main Street Stone Ridge, NY 12484 USA	935 Mearns Road Warminster, PA 18974 USA	815 State Route 208 Gardiner, NY 12525 USA
	(800) 251-1531 (845) 687-0071	(800) 523-2327 (215) 672-7800	(800) 431-8232 (845) 255-5000

SP Service (877) 548-4666

SP Service Fax (845) 687-0024

Website <http://www.spscientific.com>

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Important Symbols



WARNING! INJURY OR EVEN DEATH MAY RESULT IF A RECOMMENDATION MARKED WITH THIS SYMBOL IS NOT HEEDED.



CRUSH HAZARD. KEEP HANDS CLEAR WHEN OPERATING DOOR.



ELECTRIC SHOCK DANGER! USE APPROPRIATE CAUTION TO AVOID INJURY OR DEATH.



CORROSIVE CHEMICAL. WEAR SUITABLE GLOVES, SAFETY GLASSES, AND PROTECTIVE CLOTHING.



BURN DANGER! POTENTIALLY HOT SURFACE. USE APPROPRIATE CAUTION.



PROPERTY CAUTION! TO PREVENT DAMAGE TO CHAMBER EQUIPMENT AND/OR LOAD, ADHERE TO PROCEDURES MARKED BY THIS SYMBOL.



DO NOT STORE FLAMMABLE MATERIALS IN CHAMBER.



PRACTICAL OPERATING TIP. THESE RECOMMENDATIONS STREAMLINE UNIT OPERATION AND PREVENT COMMON OPERATOR ERRORS.



ALWAYS WEAR CERTIFIED PERSONAL PROTECTIVE EQUIPMENT (PPE) SUITED FOR THE TASK YOU ARE PERFORMING.



EXPLOSIVE MATERIALS HAZARD! KEEP OBJECTS AWAY FROM HEAT.

Safety Warnings

- ✓ Always transport the unit with care. Sudden jolts or drops may damage the refrigeration system.
- ✓ Always observe all warning labels.
- ✓ Always turn off the unit and disconnect the line cord from the available power source prior to performing any service or maintenance procedures.
- ✓ Always turn off the unit and disconnect the line cord from the available power source prior to moving the unit.
- ✓ Always empty the reservoir / bath chamber prior to moving the unit.
- ✓ Never operate equipment with damaged line cords.
- ✓ Never operate the unit without cooling fluid in the reservoir / bath chamber.
- ✓ Never remove warning labels.
- ✓ Never operate damaged or leaking equipment.

Warranty Information

VirTis Wizard 2.0 controllers are warranted by SP Scientific to be free of defects in material and workmanship when operated under normal conditions as specified in the instructions provided in this manual. Please take this opportunity to locate the serial tag on your new VirTis Wizard 2.0 and record the information below for future reference. SP Scientific also recommends that you complete and return your unit's warranty registration card.

Model Number _____

Serial Number _____

Part Number _____

Limited Warranty

SP Scientific (the "Company") shall warrant each of its products against defects in material or workmanship for a period of 12 months from the date of shipment (whichever comes first) provided that the product is used in a reasonable manner under appropriate conditions and consistent with the applicable operating instructions.

The obligation of the Company shall be, at its option, to repair or replace, without charge any parts that prove to be defective within the warranty period, if the purchaser notifies the Company promptly in writing of such defect. No product shall be returned to the Company without prior approval of the Company.

This limited warranty shall cover the costs of parts and labor to repair or replace all defective product(s) at the Seller's factory. For all products installed by the Company and located within the Company service travel areas, this warranty shall cover transportation charges to ship the product to and from the Company's factory and/or the costs of travel, room and board if the Company's employees conduct repair at the Buyer's location. In lieu of repair or replacement at the Company's factory, the Company may, in its discretion, authorize a third party to perform the repair or replacement at the Buyer's location, and at the Company's sole expense.

The Company shall not be responsible for labor charges payable with respect to persons other than Company employees. Replacement or repair of parts pursuant to this warranty shall not in any way extend the original warranty period. The Company shall not be responsible for any unauthorized repairs, replacements or product modifications, nor will it be responsible for any product failures resulting from such unauthorized repairs, replacements or product modifications negligently or otherwise made by persons other than Company employees or authorized representatives of the Company. The buyer shall assume transportation charges to ship the product to and from the Company's factory and the costs of travel, room and board if the Company's employees conduct repair at the Buyer's location within the warranty period if the product was not installed by the Company's and/or is not located within the Company's service travel areas.

THE COMPANY DOES NOT MAKE AND EXPRESSLY DISCLAIMS ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO THE SALE, INSTALLATION, DESIGN OR USE OF ITS PRODUCTS. ADDITIONALLY, THE COMPANY SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL DAMAGES RESULTING FROM THE USE OF OR ANY DEFECTS IN ITS PRODUCTS.

The Company's employees are available to provide general advice to customers concerning the use of the Company's products; however, oral representations are not warranties with respect to particular products or their uses and may not be relied upon if they are inconsistent with the relevant product specifications for the items set forth herein.

Notwithstanding the above, the terms and conditions set forth in the Company's formal sales contracts shall be controlling and supersede any inconsistent terms contained herein, and any changes to such contracts must be made in writing and signed by an authorized executive of the Company.



WARNING! THE DISPOSAL AND/OR EMISSION OF SUBSTANCES USED IN CONNECTION WITH THIS EQUIPMENT MAY BE GOVERNED BY VARIOUS FEDERAL, STATE OR LOCAL REGULATIONS. ALL USERS OF THIS EQUIPMENT ARE URGED TO BECOME FAMILIAR WITH ANY REGULATIONS THAT APPLY IN THE USERS AREA CONCERNING THE DUMPING OF WASTE MATERIALS IN OR UPON WATER, LAND OR AIR AND TO COMPLY WITH SUCH REGULATIONS.

Contents

Important Symbols	iii
Safety Warnings.....	iii
Warranty Information	iv
Introduction	1
Overview	1
Two Methods of Control	1
Key Features	2
Navigation	3
Overview	3
Button Functions	4
Manual Mode Buttons	4
Automatic Mode Buttons	5
Manual Mode	7
Overview	7
Manual Mode Settings	7
Manual Mode Operation	8
Automatic Mode	11
Overview	11
Creating a Recipe	11
Thermal Treatment Steps	12
Freeze, Condenser and Vacuum Phases.....	13
Drying Cycle Steps	14
Secondary Drying	15
Automatic Operation	16
Optional Features.....	17
Purge	17
Line Printer.....	18
Calibration	19
Overview	19
Temperature	20
Vacuum.....	21
Span Point Adjustment:	21
Zero Point Calibration:.....	21

Additional Vacuum Probes	21
Maintenance Settings.....	23
Overview	23
Clock Adjust.....	23
Configuration Settings.....	24
Alarm Settings.....	25
Factory Settings	26
Service Routines.....	26
Relay Test.....	26
Vacuum Pump Oil Time	27
Purge.....	27
Help Screen	27
Appendix A: Troubleshooting	29
Alarms.....	29
System Functions	31
Appendix B: Factory Settings.....	33
Factory Settings	33
Service Routines.....	34
PID Control Settings	34
Relay Test.....	35

Introduction

Overview

The Wizard 2.0 exceeds the power and user-friendliness of other embedded microprocessor controllers. With complete recipe management and full alarming, the Wizard 2.0 controller provides comprehensive process automation for VirTis-brand freeze dryers, including the AdVantage 2.0, AdVantage Plus, Genesis, Ultra and VirTual series lyophilizers.

The Wizard 2.0 controller handles single or multiple refrigeration compressor applications and offers an impressive list of options. Its powerful microprocessor is fast enough to accommodate multiple temperature sensors, while providing immediate alarms for adverse conditions.

Select any of the 16 full-cycle recipes and, with the push of a button, the large liquid crystal display plots the profile of the directed shelf temperature, while providing a cycle progress bar graph. The display continually scans all configured transducers. If an alarm occurs, the display indicates the out-of-tolerance condition.

To minimize warming during the condenser and vacuum phases, the Wizard 2.0 controller provides a special freeze assist mode. Once configured, the freeze assist will cool the shelves to the lowest possible temperature within the machine's capability.

Two Methods of Control

The Wizard's unique software configuration allows the freeze-dry cycle to be shelf- or product-driven, depending on your application requirements.

During product-driven mode, the Wizard 2.0 directs drying through a shelf temperature profile using the shelf temperature as the process variable. During the Freeze phase, the product average temperature is used as the process temperature. When the product average temperature reaches the Freeze setpoint, the cycle continues. During primary drying when the shelf temperature reaches the Secondary setpoint, the recipe skips to secondary drying (*i.e., post heat*).

During shelf-driven mode, the Wizard 2.0 directs drying through a shelf temperature profile. Product temperature probes can be used to monitor cycle conditions. During the Freeze phase, the shelf temperature is used as the process temperature. When the shelf temperature reaches the Freeze setpoint, the cycle continues. During primary drying when the shelf temperature reaches the Secondary setpoint, the recipe skips to secondary drying (*i.e., post heat*).

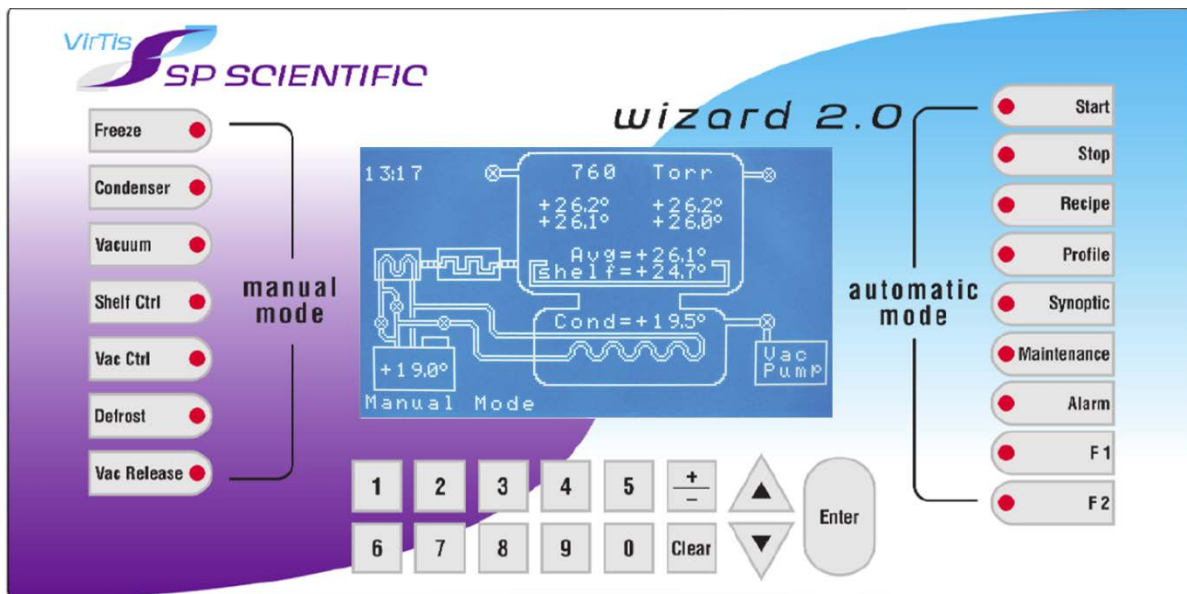
Key Features

- Full numeric keyboard and large, easy-to-read backlit liquid crystal display.
- Sixteen customizable, full-cycle freeze-dry recipes.
- Customizable recipe names of up to 10 characters.
- Freeze assist mode to keep product at low temperatures during evacuation and condenser cooling, ensuring product integrity.
- Full synoptic display with real-time status of all major equipment functions.
- Rugged control panel that is resistant to dust, oils and spills.
- Power outage protection with product recovery routines.
- Full process system alarms for fast diagnostics.
- Optional line printer connected via the printer output port.
- Optional computer workstation for data capture and recipe management.
- Door preseat routine, which performs a unit vacuum check with safety alarm notification.
- Drying cycle profile display.
- Alarm status window for easy troubleshooting.
- Maintenance status screen for systems evaluation.
- Alarm recovery from Safe Mode.
- Recipe development/verification start button function.

Note: SP Scientific builds each unit according to the options purchased. Review the standard sections, as well as the relevant optional sections of this manual.

Navigation

Overview



The Wizard 2.0 controller consists of four primary areas.

- The Manual Mode buttons allow you to activate various components of your freeze dryer.
- The LCD display shows the status of the freeze dryer in real time and indicates recipe progress and any active alarms.
- The tactile buttons below the LCD display allow you to enter recipe and configuration data, as well as navigate system menus.
- The Automatic Mode buttons allow you to control your freeze dryer, as well as navigate through various menus and screens of your Wizard 2.0 controller.

Button Functions

Manual Mode Buttons

- **Freeze** activates all components needed to cool the shelves to the Manual Freeze setpoint.
- **Condenser** activates the condenser refrigeration system and begins cooling the condenser.
- **Vacuum** activates the vacuum system. This button shall be used in conjunction with the Vac Ctrl button to control the vacuum pressure at a defined setpoint.

***Note:** Select your preferred unit of measure from the Configuration menu (i.e., millitorr, microbar or Pascal).*

- **Shelf Ctrl** initiates shelf temperature control at the Manual Heat setpoint.
***Note:** The Shelf Ctrl button should be used with the Condenser button to control the shelf temperature at the setpoint.*
- **Vac Ctrl** enables fine control of the vacuum at the Vacuum Control setpoint using the gas bleed or power save method when used in conjunction with the Vacuum button.
- **Defrost** heats the condenser to the Defrost Temperature setpoint and maintains that temperature for the Manual Defrost Time setpoint. This button is locked when any other mode is active.
- **Vac Release** breaks vacuum by admitting ambient air or inert gas into the chamber through the vacuum release valve. This button is locked when any other mode is active.



WARNING! NEVER CONNECT A GAS SOURCE WITHOUT A PRESSURE REGULATOR. THE PRESSURE REGULATOR MUST BE ABLE TO REDUCE SUPPLY PRESSURE TO 1 PSIG (70 MBAR OR 7 KPA) OR LESS.

Automatic Mode Buttons

- **Start** initiates an automatic cycle or recipe.
Note: For recipe verification/development while a cycle is active, press the Start button to advance to the next programmed step or phase. When in Alarm Safe Mode, press the Start button to recover the recipe from the Freeze phase onward.
- **Stop** terminates an automatic cycle or recipe.
Note: A Stop command must be confirmed by pressing F2.
- **Recipe** opens the Recipe Manager, which allows you to modify recipe parameters.
- **Profile** displays the recipe temperature trend line.
- **Synoptic** returns you to the Synoptic screen. System temperature and vacuum control loops are only active when the Synoptic screen is displayed.
- **Maintenance** displays the Maintenance menu. For more information, see the Maintenance Settings chapter of this manual.
- **Alarm** displays all possible system alarms. Alarms triggered during the freeze-dry process are highlighted by a black square and can be acknowledged and cleared from this menu.
- **F1** displays the Conversions screen, which shows comparable temperatures for existing vapor pressure.

Manual Mode

Overview

Manual Mode allows you to manually control the freeze, condenser, vacuum, heat, vacuum control, defrost and vacuum release functions. Each button has a corresponding red LED that illuminates when the mode is active. A button's LED may blink on and off while functioning.

Manual Mode Settings

Manual Mode settings may be modified from the Manual Mode Settings menu. To access this menu, press the Maintenance button and select 1.

The Manual Mode setpoints are defined as follows:

Parameter	Factory Default	Description
Manual Freeze Setpoint	-40 °C	The temperature that the product shelves will reach when the Freeze button is pressed (typically -40 °C).
Manual Heat Setpoint	25 °C	The temperature that the system will attempt to reach when the Shelf Ctrl button is selected. <i>Note: For low temperature control or accurate control at temperatures near ambient, the Condenser function should be used with the Shelf Control function.</i>
Vacuum Control Setpoint	200 millitorr	The vacuum pressure that the system will maintain when Vacuum and Vac Ctrl are selected. <i>Notes: Under heavy vapor loads, actual pressure may be higher than the setpoint. If this is the case, the shelf temperature may need to be lowered. To achieve the maximum low pressure, use the mT or uB setting. When set to Pa, the Wizard 2.0 controller is unable to reach below 7 Pa.</i>
Defrost Temperature Setpoint	60 °C	The maximum temperature that the freeze dryer will reach with the Defrost function enabled. <i>Note: For units with Hot Gas Defrost, the defrost function cannot be enabled unless the condenser temperature falls at least 20 °C below the Defrost Temperature Setpoint.</i>
Defrost Time Setpoint	60 minutes	The amount of time allotted to the Defrost function.
Purge	0 (disabled)	Enter 1 to activate the Purge function. If enabled, the Vacuum button will isolate the vacuum pump to allow the oil to be purged of contaminants. This function is only available in Manual Mode. <i>Note: The Purge setting appears only if the Purge option was purchased and enabled in the Factory Settings menu.</i>
Vacuum Release Time Setpoint	2-3 minutes (AdVantage series) 5 minutes (Genesis, Ultra & VirTual)	The length of time that the freeze dryer's vacuum release valve will remain open after powering off all manual functions and selecting Vac Release.

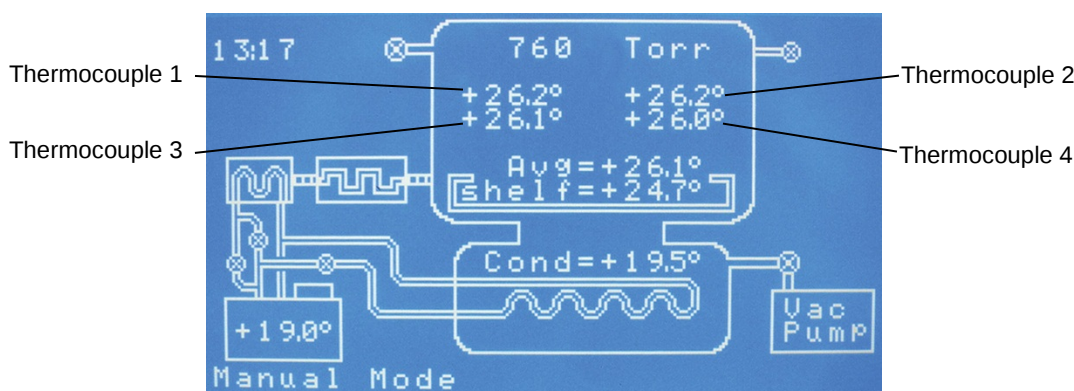
Manual Mode Operation

Before operating your system in Manual Mode, verify that the manual control setpoints are correct in the Manual Mode Settings menu. You can modify these setpoints at any time during the freeze-dry process. Changes are applied when you return to the Synoptic screen.

To begin manual operation of your freeze dryer:

1. Insert product probes, if desired, and load the prepared product into the chamber.

Thermocouple measurements are displayed on the Synoptic screen as shown below.



Note: The order of the displayed values is determined by the numbered thermocouple wires leading into the blue female connector.

2. Verify that the chamber door(s) and any valves are closed.
3. Press Vacuum and allow vacuum pressure to reach approximately 500 Torr, 667 mbar or 66 kPa. Press Vacuum again to disable the vacuum pump. Verify that the system is tightly sealed.
4. Press Freeze and allow the product to reach the desired temperature. If you are not using product probes, allow the shelf temperature to reach and hold at the Manual Freeze setpoint until product is uniformly frozen.
5. Press Condenser and allow the temperature to reach approximately -40 °C or 20 °C below the shelf / product average temperature, whichever is colder.
6. Press Vacuum and allow vacuum pressure to reach an acceptable value. This is generally less than 500 mTorr, 667 µbar or 66 Pa.
7. Press Shelf Ctrl to begin heating to the Manual Heat setpoint. Adjust the setpoint as desired to optimize primary drying.

Note: Use the Shelf Ctrl button together with the Condenser button to control the shelf temperature at the setpoint.

8. If vacuum control is desired, press the Vacuum Ctrl button. Adjust the vacuum control setpoint as needed to optimize primary drying.
9. To perform manual secondary drying, adjust the shelf/product temperature and vacuum control level as desired.

10. When the process is complete, turn off all Manual Mode functions in reverse order.
11. Press Vac Release to break vacuum. If your unit is equipped with stoppering and you are using this function, you may press Vac Release again while the system is equalizing to close the valve at the desired pressure. After stoppering your product, select Vac Release and allow the system to return to atmospheric pressure.

***Note:** There is no manual backfill setpoint. You must use the Vac Release button.*
12. Remove the product.
13. Press Defrost to defrost the condenser. When defrosting is complete, remove all condensate. Rinse and dry chamber and condenser surfaces.

Automatic Mode

Overview

Automatic Mode helps you to better manage the freeze-dry process. Each function has a corresponding red LED that illuminates when the button is active.

Note: All Manual Mode functions must be off prior to initiating the automated freeze-dry process.

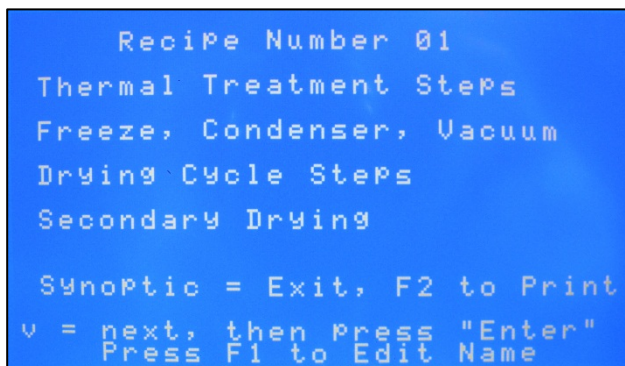
Creating a Recipe

A recipe must be created before beginning an automatic freeze-dry cycle. The recipe screens allow you to create and save up to sixteen recipes.

Note: Press the Profile button to display the recipe temperature trend line. It is good practice to verify that your recipe is correct prior to starting an automatic cycle. When a recipe is running, pressing the Start button will advance the recipe to the next active step or phase.

To program a recipe:

1. Press the Recipe button to access the main recipe menu.



```
Recipe Number 01
Thermal Treatment Steps
Freeze, Condenser, Vacuum
Drying Cycle Steps
Secondary Drying

Synoptic = Exit, F2 to Print
v = next, then Press "Enter"
Press F1 to Edit Name
```

2. Enter a Recipe Number (01-16) using the numeric keypad.
3. Select a recipe menu (e.g., Thermal Treatment Steps, Drying Cycle Steps, etc.) using the Up and Down arrow buttons and press Enter to proceed.

Note: Recipe menus are explained in the following sections.

4. Once in the recipe menu, use the numeric keypad to enter the desired value in each field and the Up and Down arrow keys to progress through the step parameters. Use the $\pm$ key to toggle between positive and negative values. Temperature, displayed in Celsius, may be adjusted in increments of one (1); Time, displayed in minutes, may be adjusted in increments of five (5). Vacuum pressure may be displayed in mTorr, μ Bar or kPa, depending on your Maintenance settings, and may be adjusted in increments of 10.

Note: Enter a zero (0) value in the time field of a step to skip the remaining steps and proceed to the next phase.

5. After entering appropriate values, press F1 to advance to the next recipe screen.
6. After completing all recipe screens, press the Synoptic button to return to the Synoptic screen. Recipe parameters are saved automatically.
7. To print recipe parameters to the optional line printer, press the Recipe button and then press F2. The active recipe will be printed.

Thermal Treatment Steps

The Thermal Treatment steps may be used to temper, condition and/or anneal your product sample prior to initiating the drying cycle steps. You can select and modify the parameters of up to 12 Thermal Treatment steps. Configurable settings include temperature, time and ramp or hold.

Step#	Temperature	Time	R/H
01	-125	01200	H
02	+225	01200	H
03	+000	00000	H
04	+000	00000	H
05	+000	00000	H
06	+000	00000	H
07	+000	00000	H
08	+000	00000	H
09	+000	00000	H
10	+000	00000	H
11	+000	00000	H
12	+000	00000	H

F1=Next Screen
 F2=Previous Screen

Note: These settings must be within the unit's ability. Consult your unit specifications or contact SP Scientific Service for more information.

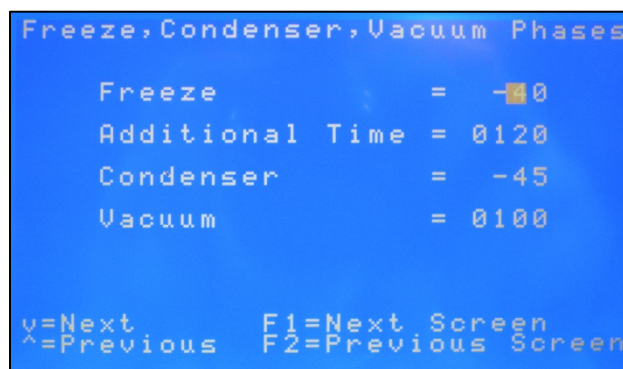
Setting	Description
Temp (°C)	Use the $\pm$ key and the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C.
Time (min.)	Use the numeric keypad to change the time in five-minute increments, up to 1255 minutes per step.
Ramp/Hold	Use the $\pm$ or Enter key to modify the Ramp or Hold value, or press Enter to select the current Ramp or Hold. This will allow a temperature to be held for a period or increased to a specific value over a fixed time.



CAUTION! SP SCIENTIFIC RECOMMENDS PROGRAMMING A HOLD FOR YOUR FIRST STEP TO PROVIDE A FIXED STARTING POINT FOR YOUR RECIPE.

Freeze, Condenser and Vacuum Phases

From this menu, you can modify the recipe's Freeze temperature, Additional Freeze Time, Condenser setpoint and Vacuum setpoint. These settings are used to establish the initial conditions for primary freeze-drying. Each of these points must be satisfied in sequence before the drying cycle steps can begin.



Note: These settings must be within the unit's ability. Consult your unit specifications or contact SP Scientific Service for more information.

The menu parameters are defined as follows:

Setting	Typical Value	Description
Freeze Temperature (°C)	-40 °C	The temperature that the product or shelf must reach before the system will proceed to the next phase. Use the ± key and the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C.
Additional Freeze Time (min.)	60 minutes	Additional freeze time is used to ensure product uniformity. The shelf temperature drops as low as possible for the specified period. Use the numeric keypad to change the time in five-minute increments, up to 1255 minutes per step.
Condenser Setpoint (°C)	-40 °C	The condenser must reach this temperature before proceeding to the vacuum phase. Use the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C.
Vacuum Setpoint (mTorr)	200 mTorr	The vacuum level that the system must reach before advancing to primary drying. Use the numeric keypad to change the vacuum setpoint in 10-degree increments, from 2540 to 0.

Drying Cycle Steps

Drying Cycle Steps allow you to modify the temperature, time, vacuum setpoint and ramp or hold settings. When modifying Drying Cycle Steps, enter a zero value in the time field to skip directly to Post Heat (Secondary Drying).

Note: If this is done during a freeze-dry run, all remaining steps in Primary Drying are skipped and Secondary Drying begins.

Drying Cycle Steps				
Step#	Temp	Time	R/H	Vacuum
01	-55	0120	H	0400
02	-25	0120	H	0300
03	+25	0400	H	0200
04	+00	0120	R	0100
05	+00	0060	H	0000
06	+25	0090	H	0000
07	+40	0090	H	0000
08	+65	0090	H	0000
y=Next F1=Next Screen x=Previous F2=Previous Screen				

Note: These settings must be within the unit's ability. Consult your unit specifications or contact SP Scientific Service for more information.

The menu parameters are defined as follows:

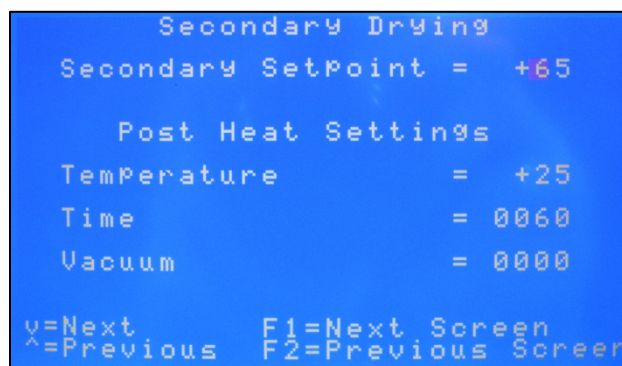
Parameter	Description
Temp (°C)	The product or shelf will hold or ramp to this temperature. Use the ± key and the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C.
Time (min.)	The unit will hold or ramp to the product or shelf temperature for the specified period. Use the numeric keypad to change the time in five-minute increments, up to 1255 minutes per step.
Ramp or Hold	Hold will adjust the product or shelf temperature as rapidly as possible to the setpoint and hold the temperature for the remaining period. Ramp will ramp the product or shelf temperature from its current value to the setpoint at a rate determined by the Wizard 2.0 controller.
Vacuum Setpoint (mTorr)	The unit will adjust the vacuum level to meet the Vacuum Setpoint. Use the ± key and the numeric keypad to change the vacuum setpoint in 10-degree increments, from 2540 to 0. Note: Under heavy vapor loads, the actual pressure may remain higher than the Vacuum Setpoint. If this is the case, it may be necessary to lower the shelf temperature setpoint.



CAUTION! SP SCIENTIFIC RECOMMENDS PROGRAMMING A HOLD FOR YOUR FIRST STEP TO PROVIDE A STARTING POINT FOR YOUR RECIPE.

Secondary Drying

You can modify the Secondary Drying setpoint, as well as the Post Heat Settings, from the Secondary Drying menu.



The Secondary Drying setpoint allows the freeze-drying process to finish as quickly as possible. If the product or shelf temperature reaches this temperature, the recipe will skip the remaining drying cycle steps and proceed to the Post Heat (Secondary Drying) phase.

Notes: The Secondary Drying setpoint must be set higher (e.g., 10 °C to 15 °C) than your highest recipe temperature to avoid inadvertent jumps to the Post Heat (Secondary Drying) phase.

These settings must be within the unit's reasonable ability. Consult your unit specifications or contact SP Scientific Service for more information.

The menu parameters are defined as follows:

Parameter	Description
Secondary Setpoint	When the product or shelf temperature reaches the Secondary Drying Setpoint, the unit will skip the remaining Primary Drying steps and advance to the Post Heat phase. Use the ± key and the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C.
Post Heat Settings	These settings – temperature, time and vacuum – will be maintained after the drying phase is complete. Use the ± key and the numeric keypad to change the temperature setting in one-degree increments, up to ± 99 °C; the time in five-minute increments, up to 1255 minutes per step; or to change the vacuum setpoint in 10-degree increments, from 2540 to 0.

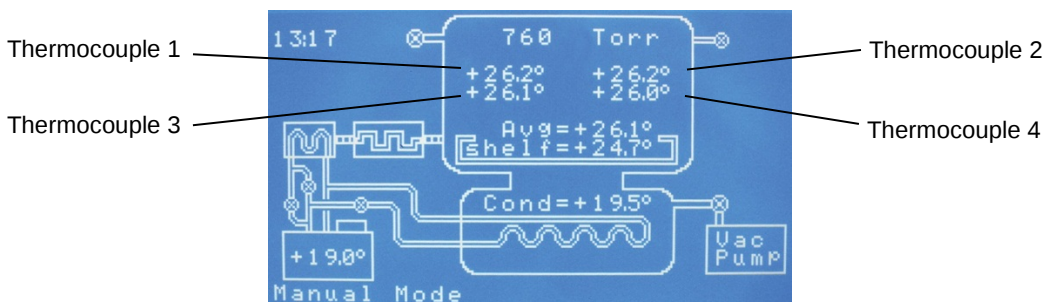
Automatic Operation

Prior to operating your system in Automatic Mode, ensure that a valid recipe is loaded into the Recipe screen and that all Manual Mode functions are disabled.

To begin automatic operation of your freeze dryer:

1. Insert product probes, if desired, and load the prepared product into the chamber.

Thermocouple measurements are displayed on the Synoptic Screen as shown below.



Note: The order of the displayed values is determined by the numbered thermocouple wires leading into the blue female connector.

2. Verify that the chamber door(s) and any valves are closed.
3. Ensure that all Manual Mode functions are turned off and all alarms have been cleared.
4. Verify that all Configuration and Alarm settings are appropriate for your application.
5. Press Profile to verify that your recipe temperature trend line appears correct.
6. Press Synoptic to return to the Synoptic screen.
7. Press Start. The vacuum system will energize and evacuate the system to a preseat value of approximately 500 Torr, 500 mbar or 50 kPa. If vacuum does not reach the preseat value within the allotted time, an alarm will trigger. If this happens, stop the process, check all valves and gaskets and restart automatic operation.
8. Your system will follow the selected recipe until the Secondary Drying phase is complete. You can terminate the process at any time by pressing Stop followed by F2.
9. When the system shuts down, vacuum will automatically release to the Backfill Pressure setpoint or release to atmospheric pressure (see Maintenance Settings).
10. If your system is equipped with stoppering and you have enabled the Backfill Pressure option from the configuration settings menu, the system will backfill to the desired pressure setpoint with the selected inert gas. Stopper vials following backfill and press the manual Vacuum Release button.
11. Press the Defrost button to defrost the condenser.
12. When defrosting is complete, remove the condensate and rinse and dry the chamber and condenser surfaces.

Optional Features

Purge

Moisture may accumulate in the vacuum pump oil after an aggressive freeze-dry run, resulting in poor vacuum control and pull-down. The purge function allows you to clean the vacuum pump oil between runs, extending the life of the oil.

Note: Purging the vacuum pump oil is not an alternative to performing regular oil changes.

To activate the purge function while the lyophilizer is idle:

1. Turn the purge switch to on. This will close the purge valve, isolating the vacuum pump from the unit.

Note: When the vacuum pump is isolated from the unit, vacuum cannot be pulled down within the unit.

2. Turn on the vacuum pump.

Note: With Wizard 2.0 controllers, this can be done under manual mode.

3. Open the vacuum pump ballast valve (i.e., turn from **0** to **1**). This will allow moisture to be forced out during purging.
4. Run the vacuum pump for approximately one (1) hour.
5. Close the vacuum pump ballast valve (i.e., turn from **1** to **0**).
6. Turn off the vacuum pump.

Note: With Wizard 2.0 controllers, this can be done under manual mode.

7. Turn the purge switch to off. This will open the purge valve, allowing the unit to pull down vacuum.

Line Printer

The optional line printer allows you to print recipe and process data directly from the Wizard 2.0 controller without the use of the optional Wizard Workstation. If the Line Printer option is purchased, your Wizard 2.0 controller will be factory-configured for proper output.

Note: The line printer requires a 25-pin to 25-pin RS-232 “straight through” DB25m – DB25f cable for connectivity.

When enabled, process data will automatically print at the defined interval during both Manual and Automatic Modes of operation. Process data includes the following:

- Product Probe Temperature(s).
- Product Probe Average.
- Shelf Temperature.
- Condenser Temperature.
- Vacuum Sensor 1.
- Vacuum Sensor 2 (if applicable).

The Print Interval time may be modified from the Configuration Settings menu. For more information, refer to Chapter 7: Maintenance Settings.

Note: Process data is sent directly to the printer and is not saved to memory. Without the optional Wizard Workstation, data cannot be retrieved if it is not printed.

Calibration

Overview



CAUTION! YOUR SYSTEM HAS BEEN PRECONFIGURED FOR NORMAL OPERATION. IMPROPER SETTINGS CAN DECREASE SYSTEM PERFORMANCE AND/OR CAUSE DAMAGE TO YOUR UNIT. USE EXTREME CAUTION WHEN MODIFYING CALIBRATION SETTINGS. RECORD DEFAULT VALUES SO YOU CAN RESET TO FACTORY SETTINGS IF REQUIRED.

Your Wizard 2.0 controller's temperature and vacuum readings may need to be recalibrated periodically. SP Scientific uses and recommends National Institute of Standards and Technology (NIST) traceable instruments that are within the acceptable window of accuracy of less than one year since the last calibration. This ensures that all measurements are referenced to a reliable standard.

Note: Only a qualified technician should calibrate temperature and vacuum readings

To begin calibrating the Wizard's temperature and vacuum readings:

1. Press the Maintenance button.
2. Select the Service Routines menu.
3. Enter the security code (678) and press Enter. This will open the Service Routines menu, allowing you to calibrate temperature and vacuum readings.

Temperature

For temperature measurements, SP Scientific recommends a high-quality thermocouple calibrator such as the Altek 4-Type Multiple Thermocouple Calibrator.¹

To calibrate the temperature readings:

1. Connect the thermocouple calibrator to the shelf probe input and set it to 30.0 °C in source mode.
2. Allow the system to equilibrate for at least five (5) minutes in a draft-free area.
3. Press the Maintenance button.
4. Select the Service Routines menu.
5. Enter the security code (678) and press Enter.
6. Record the current Temperature Calibration and Temperature Span values. Use these values as a basis to begin calibration.
7. Adjust the Temperature Calibration value until the Shelf Temperature value reads 30.0 °C. You must press Enter after entering a value for the change to take effect. The Shelf Temperature should stabilize between 30.0 °C and 30.1 °C to be considered calibrated.
8. Set the thermocouple calibrator to the value near the unit's specified low temperature value (e.g., -60.0 °C for ES and XL models and -85.0 °C for EL models).
9. Adjust the Temperature Span until the Shelf Temperature matches the value on the thermocouple calibrator. The Shelf Temperature reading should stabilize at a value no higher than the thermocouple calibrator temperature setting and no lower than -0.4 °C of that value (e.g., if the thermocouple calibrator is set to -60.0 °C, the Shelf Temperature value should read between -60.0 °C and -60.4 °C).
10. Repeat until both the high and low readings are within the stated accuracy limits.
11. Press Synoptic to return to the Synoptic screen and verify temperature values from -80 °C to 60 °C using the calibrator tool.

***Note:** Because of digital filtering, temperature values may take a few seconds to settle to the correct value after changing from one to the next.*
12. Remove the calibrator and reconnect the shelf probe.

¹ SP Scientific recommends the use of Altek 322-1 calibrators. Fluke 724 and Omega CL3512A are also approved for use with Wizard 2.0 controllers manufactured after August 2008.

Vacuum

Connect the system vacuum probe tube and all configured thermocouples. Allow the system to equilibrate for at least ten (10) minutes in a draft-free area.

Below is the factory procedure for vacuum calibration using a MKS Baratron and Manifold.

Note: SP Scientific recommends utilizing a high-quality calibrator that is NIST traceable, such as the MKS Baratron with Manifold.

For consistency perform all vacuum calibrations in Torr. After calibration, set the final vacuum units if necessary. Record the Vacuum Calibration Tool number on your form.

Span Point Adjustment:

1. Connect the Calibration device (e.g., MKS Baratron, etc.) so that the Wizard 2.0 controller reads the Varian 0531 gauge from the Baratron manifold.
2. Adjust the Vacuum 1 potentiometer, located next to the probe tube connector, so that the rough vacuum reads just 760 Torr. The clockwise direction increases the value, while counterclockwise decreases the value.

Note: If your atmospheric pressure is significantly different from 760 Torr due to altitude, please contact SP Scientific Technical Support for assistance with rough vacuum calibration.

Zero Point Calibration:

1. Connect the Calibration device (e.g., MKS Baratron, etc.) so that a full vacuum can pull within the manifold using the turbo pump on the Baratron, and the Wizard 2.0 controller reads the Varian 0531 gauge from the Baratron manifold.
2. Allow the Baratron to bottom out in reading. Record the Baratron bottom out value.
3. Record the Wizard 2.0 vacuum reading from the Service Routines screen while the Baratron is connected (as above) and bottomed out.
4. Enter offsets for the vacuum point so that the Wizard 2.0 reading matches the Baratron reading. The Wizard 2.0 vacuum reading should not be adjusted to read less than 2mT. Record the final offset.
5. Record the final vacuum reading on the Wizard 2.0 controller, from the Vacuum Reading display, after the final offset has been entered.

Additional Vacuum Probes

If the Vacuum Probe # 2 option is configured in the Wizard 2.0 controller, repeat the Span Point Adjustment and Zero Point Calibration procedures.

Maintenance Settings

Overview

The Wizard 2.0 controller is configurable for a variety of systems and applications. Most system parameters are preset to factory testing for normal use of your equipment.

Before using your freeze dryer, review the default user settings to verify suitability for your application. If desired, modify the controller settings to meet your specific needs.

The Maintenance button provides access to all manual, setup and test function parameters. The Maintenance menu consists of nine submenus and screens, including four with configurable control settings.

Clock Adjust

The Clock Adjust menu allows you to adjust date and time settings.

Parameter	Description
Date & Time	Use the Up/Down buttons to adjust. Press Enter to set the value. Use F1 to toggle between Month, Day, Year, Hour and Minute.

Configuration Settings

The Configuration Settings menu allows you to configure certain settings that will determine how your freeze dryer system operates.

Parameter	Factory Default	Description
Shelf Driven / Product Driven	1 (Shelf-Driven Mode)	Enter 1 to set the freeze dryer to Shelf-Driven Mode. When in Automatic Mode, the freeze dryer will advance to the next phase depending on the shelf temperature. Enter 0 to set the freeze dryer to Product-Driven Mode. When in Automatic Mode, the freeze dryer will advance to the next phase depending on the product temperature.
mTorr=1 µBar=2 Pa=3	1	Enter 1 to set the vacuum pressure units to millitorr. Enter 2 to set the vacuum pressure units to microbar. Enter 3 to set the vacuum pressure units to Pascal. Note: It is not recommended to attempt to control the vacuum level below 7 Pa.
Freeze Assist	1	Enter 1 to activate the Freeze Assist. When in Automatic Mode, Freeze Assist controls the self / product temperature while the condenser and vacuum pump are establishing initial conditions.
Backfill	0	Enter 1 to enable the Backfill Pressure option. Enter 0 to disable the Backfill Option.
Backfill Pressure	50 Torr	Sets the target backfill pressure. The system administers pressurized air or gas for stoppering or other purposes.
Printer interval	2 minutes	Sets the time between printouts of freeze-dry cycle data. Use with an optional line printer. Printable data includes cycle phase, product probe temperature(s), product probe temperature average, shelf temperature, condenser temperature and vacuum pressure.

Alarm Settings

The Alarm Settings menu allows you to set limits on system parameters to avoid jeopardizing your product and/or freeze dryer. If you experience excessive alarms, refer to the Appendix A: Troubleshooting.

Parameter	Factory Default	Description
Vacuum Safety Alarm Typical range: 800-1200 mT	1200 millitorr	Sets the vacuum safety alarm setpoint. Once the system has pulled down below this value, exceeding the value triggers the Vacuum Safety Alarm. If the set value is exceeded during primary drying, the freeze dryer will go into Vacuum Recovery Mode for 30 minutes and trigger the alarm. The alarm will clear if the system stabilizes within 30 minutes. If the value is exceeded in primary drying and the system does not recover, the freeze dryer will refreeze the product. Entering 0000 disables this alarm.
Condenser Overload Typical value: 20 °C warmer than the lowest specified condenser temperature	Unit's lowest specified condenser temperature +20 °C	Sets the condenser overload setpoint. Once the condenser has pulled down below this value, exceeding the temperature setpoint for two (2) minutes triggers the Condenser Overload Alarm. The freeze dryer will go into Condenser Recovery Mode for 15 minutes and then refreeze the product if the system does not recover. <i>Note: Condenser Recovery Mode activates the Vacuum and Condenser functions only.</i>
Power Outage Minutes Typical range: 10-20 minutes	10 minutes	Sets the maximum time allowed for a Short Duration Power Outage. In the event of a Short Duration Power Outage, when power is restored, the freeze dryer returns to the point of the power loss in the recipe and triggers the alarm. The point of power loss is the minute in the recipe that the power was lost. If a power outage exceeds this time limit, the freeze dryer goes into Safe Mode, refreezing the product and triggering the alarm. Follow the prompts at the bottom of the Wizard 2.0 screen to continue the cycle from the Freeze phase or to stop the cycle. <i>Note: While in Safe Mode, press Stop then F2 to end the cycle, or press Start to continue the recipe from the Freeze Phase forward.</i> <i>The Power Outage Alarm is active in both Manual and Automatic Modes. Due to a lack of power, some drift may occur.</i>
Freeze Time Limit Hours Typical Range: 4-6 hours	4 hours	Sets the maximum time allowed for the Freeze phase.
Condenser Time Limit Minutes Typical Value: 60 minutes	60 minutes	Sets the maximum time allowed to cool the condenser to the condenser setpoint (Condenser phase). The freeze dryer will go into Safe Mode and refreeze the product if this time is exceeded. <i>Note: This time limit establishes the vacuum phase time allowed.</i>
Door Seal Minutes Typical range: 2-15 minutes	2 minutes (AdVantage series) 5 minutes (Genesis units) 6 minutes (Ultra and VirTual units)	Sets the maximum time allowed for the vacuum to reach the Vacuum Seal setpoint (e.g., 500 Torr). ² The Check Door Seal Alarm triggers if this time is exceeded. You should examine all seals and valves according to the Vacuum Pump manufacturer's specifications before continuing. A setpoint of 0 will disable vacuum preseat. <i>Note: For more information, refer to the Operator's Manual for your freeze dryer.</i>
Pump Oil Change Hours Typical value: depends on product and frequency of use.	240 hours	Sets the time allowed between Vacuum Pump Oil changes. The Vacuum Pump Oil should be examined according to the manufacturer's specifications if this setpoint is exceeded. <i>Note: For more information, refer to the Operator's Manual for your freeze dryer.</i>

² 500 Torr is a reference value. This value may vary due to calibration, environmental conditions and tolerance.

Factory Settings

The Factory Settings menu is password-protected. These settings ensure that your freeze dryer functions according to manufacturer specifications.



WARNING! CHANGING THE FACTORY SETTINGS MAY CAUSE EQUIPMENT MALFUNCTION NOT COVERED BY YOUR WARRANTY. ONLY A QUALIFIED SP SCIENTIFIC TECHNICIAN SHOULD ACCESS AND MODIFY THE FACTORY SETTINGS MENU.

For assistance, contact SP Scientific Service at (877) 548-4666. For factory setting parameters, refer to Appendix B: Factory Settings.

Service Routines

The Service Routines menu is password-protected. This menu includes pre-configured system parameters based on your freeze dryer and specifications.



WARNING! CHANGING THE SERVICE ROUTINES MAY CAUSE EQUIPMENT MALFUNCTION NOT COVERED BY YOUR WARRANTY. ONLY A QUALIFIED SP SCIENTIFIC TECHNICIAN SHOULD ACCESS THE SERVICE ROUTINES MENU.

For assistance, contact SP Scientific Service at (877) 548-4666. For service routine parameters, refer to Appendix B: Factory Settings.

Relay Test

Access the Relay Test menu to perform output tests on each solid-state relay. These tests can assist when troubleshooting electrical or mechanical problems. Additionally, you can use the relay tests to observe the output sequence during a freeze dry run.

Only a qualified SP Scientific Service Technician should interpret the results of a relay function test. For relay test parameters, refer to Appendix B: Factory Settings.

Note: All control loops are disabled unless you are viewing the Synoptic screen.

Vacuum Pump Oil Time



WARNING! VACUUM PUMP OIL REQUIRES REGULAR SERVICE. FAILURE TO SERVICE YOUR VACUUM PUMP MAY RESULT IN DAMAGES NOT COVERED BY THE WARRANTY.

The Vacuum Pump Oil Time screen is designed to help protect and prolong the life of your vacuum pump. This screen displays the time since the last oil change (hours/minutes). The Vacuum Pump Maintenance alarm triggers when the Vacuum Pump Oil Time exceeds the Pump Oil Change Hours. A qualified technician should reset the Vacuum Pump Oil Time after each service.

Consult your freeze dryer and vacuum pump manuals for more information about your vacuum system. For more information about the alarm, refer to Appendix A: Troubleshooting.

Purge

Moisture may accumulate in the vacuum pump oil after an aggressive freeze-dry run, resulting in poor vacuum control and pull-down. Purging (by external electrical switch) allows you to clean the vacuum pump oil between runs, extending the life of the oil.

Note: *Purging the vacuum pump oil is not an alternative to performing regular oil changes.*

Help Screen

The Help screen lists contact information for SP Scientific Service. This screen also displays your current hardware and software revisions. Please have this information ready when contacting SP Scientific Service.

Appendix A: Troubleshooting

Alarms

The Wizard 2.0 controller incorporates an extensive alarm package designed to protect product, as well as the freeze dryer's critical sub-systems. The alarms are arranged by level or impact as related to product loss and/or subsystem malfunction.

Warning alarms are provided to alert the operator to minor problems related to system operation. Emergency alarms are also incorporated and alert the operator of the most serious issues. With the optional Wizard 2.0 alarm contacts package, both alarm types can be configured to produce a digital signal that may be connected to the master alarm system, audible horn or remote phone dialer.

Persistent emergency alarm conditions may result in product loss or equipment damage. For this reason, many emergency alarms cause the freeze dryer to enter a Safe Mode and reset the cycle to the Freeze phase in order to protect the loaded product/samples. Since some customers prefer to have manual control over the automatic freeze-dry cycle recipe, the Wizard 2.0 controller allows the operator to override the "reset to freeze phase" option and continue the product run from the point of alarm. The default procedure is to refreeze product whenever an emergency alarm condition causes the system to enter Safe Mode. The operator must manually choose to exit Safe Mode.

See the Maintenance Settings section for more information on alarm features and functionality, as well as how to configure alarms to better accommodate your recipes and protect your product.

Condition	Recommended Corrective Action
Power Outage Alarm	- Set the Power Outage Minutes so that your product will not be harmed in the event of a long-term power outage. - Have your maintenance manager check that your outlet is in good repair and that the unit is securely plugged in. - If you have excessive power outages, check with your building maintenance manager. You may need to consult with your local utility company. Note: A long-term power outage is one that exceeds the Power Outage Minutes setting in the Alarm Settings menu. A long-term power outage resets the recipe to the Freeze phase. A short-term power outage is one that is less than or equal to the Power Outage minutes. After a short-term power outage, the recipe resets to the point of the power loss in the recipe.
Freeze Time Exceeded Alarm	- The Freeze Time Limit Hours may be too short. Set the Freeze Time Limit Hours to a reasonable time. - The Recipe's Freeze Temperature may be set too low. Set the Freeze Temperature to a reasonable temperature. Ensure that your system is capable of reaching the set temperature within the Freeze Time Limit Hours. Shelf temperatures can cool between 0.5 °C and 1 °C per minute.

Condition	Recommended Corrective Action
Condenser Time Exceeded Alarm	- The Condenser Time Limit Minutes may be too short. Set the Condenser Time Limit Minutes to a reasonable time. - The Condenser Setpoint may be too low. Set the Recipe's Condenser Setpoint to a reasonable temperature. Ensure that your system is capable of reaching the set temperature within the Condenser Time Limit Minutes. - If you have Freeze Assist set to Yes, the condenser pull-down time will be greater. This is because some of the refrigerant is devoted to maintaining the shelf temperature. Set the condenser Time Limit Minutes to allow enough time for Freeze Assist. - Set the Condenser Time Limit Minutes to allow enough time for the vacuum phase to finish. This time may vary depending on your vacuum pump and chamber size.
Vacuum Time Exceeded Alarm	- The Condenser Time Limit Minutes establishes the duration of the vacuum phase. Set the Condenser Time Limit Minutes at or above the factory setting (at least 10 minutes). - If the Condenser Time Limit Minutes are set to a reasonable time and the vacuum will not pull down, you may have a vacuum leak. Ensure that all Quickseal valves and chamber doors are closed tightly and that the hoses and gaskets are in good repair. Note: Regular maintenance will reduce the potential for vacuum leaks. See your freeze dryer operator's manual for more information.
Vacuum Safety Alarm	- Check that the vacuum setpoint is above your active vacuum range. - Excessive Vacuum Safety alarms can indicate that a high level of product vapor exists in the system and is not being adequately captured by the condenser. This can be a symptom of excessively high shelf temperatures or insufficiently frozen product. - Test your refrigeration and vacuum systems without product to ensure system integrity. Note: Periodically test your condenser and vacuum systems in Manual Mode.
Check Door Seal Alarm	- The Door Seal Minutes should be at the factory setting or greater (typically 5 to 15 minutes). - Check all gaskets and hoses. Ensure that they are firmly connected and in good condition before proceeding. - Check that all Quickseal valves and chamber doors are closed.
Condenser Overload Alarm	- Set the Condenser Overload temperature at least 20 °C greater than your unit's Condenser Blank-Off Temperature. The Condenser Overload temperature will vary depending on your product, freeze dryer and the aggressiveness of your recipe. - If the recipe is aggressive and the product releases excessive vapor, you may need to increase this setting. - If the Vacuum Safety alarm triggers with the Condenser Overload alarm, test your refrigeration and vacuum systems without product to determine if the problem is related to the unit. If the systems are functioning correctly, confirm that your product is fully frozen before drying. Note: For more information, contact SP Scientific Service at (877) 548-4666.
Step Time Exceeded Alarm	- To prevent this alarm from triggering excessively, the recipe must be within the reasonable limits of your unit. Heating or cooling the shelf between 0.5 and 1 °C per minute is generally within reasonable limits. - The recipe will not go to the next step until the shelf temperature is within tolerance levels. The temperature acceptance band allows the recipe to continue to the next step if the shelf temperature is within a specified range. - Depending on industry and product requirements, you may be able to widen the temperature acceptance band. Note: Expanding the tolerance band may affect the properties of the recipe and your final product.
Vacuum Pump Maintenance Alarm	- Set the Pump Oil Change Hours to a reasonable number. - Reset the Pump Oil Time whenever the Vacuum Pump Oil is serviced.

System Functions

The Wizard 2.0 controls your freeze dryer's refrigeration, vacuum and temperature systems. These components are vital to the freeze drying process and it is important that these systems remain in good working condition. Failure to follow the manufacturer's guidelines may damage your freeze dryer and void the warranty. Refer to your freeze dryer operator's manual for further information.

Condition	Recommended Corrective Action
Vacuum Problems	• Test the vacuum system and vacuum control using the Manual Mode buttons. Turn the condenser on and allow it to cool to at least -40 °C. • Inspect and replace, if necessary, vacuum system hoses and gaskets. • Change your vacuum pump oil regularly even if this alarm is disabled. Failure to service the pump oil may result in damage not covered by your vacuum pump warranty. Consult your vacuum pump Operator's Manual for more information. • Observe the chamber door gaskets to determine the quality of your vacuum preseat. The gaskets should form a black ring around the contact surface between the chamber door and the gasket. If this ring is not visible, you may need to replace or apply a light coating of VirTis High Vacuum Grease to your chamber and condenser door gaskets. • Your vacuum pump is equipped with a gas ballast valve. This allows you to clean the vacuum pump oil following an aggressive recipe. To use the gas ballast, prepare the freeze dryer as you would for a product run and begin a recipe that uses vacuum. Open the gas ballast on the vacuum pump by turning the knob on the top of the pump until you can hear the pump get considerably louder. Alternatively, use the optional Purge function to clean the pump oil. • Never run the vacuum for more than a preseat without having the condenser on and cold (the condenser must be at least -40 °C). • If you have an isolation valve and external condenser, check that the isolation valve is open. This will ensure that both the product and condenser chambers are under vacuum.
Condenser Problems	• Press the Condenser button to run the condenser in Manual Mode. Refer to your freeze dryer specifications for lowest possible temperatures. • Check that the refrigeration system still has a sufficient charge. • Unplug your unit, remove the exterior panels and remove any dust from the vacuum and refrigeration systems. • Check that the louvered panels are free of dust and debris. Note: The refrigeration system dumps excess coolant to the condenser during Thermal Treatment. This may lower the condenser temperature.
Heat Problems	• The heat function is a pulsing function. The heater will turn on and off based on the Wizard 2.0 output to pulse toward the setpoint. During heating, the Negative Shelf solenoid will also pulse as the temperature reaches the setpoint (Manual Mode). When used in conjunction with the condenser, this allows for precise temperature control. • Depending on your freeze dryer, you should be able to heat the shelves between 0.5 °C and 1 °C per minute. • Test the heating system periodically by using the Shelf Ctrl button. Refer to your unit's specifications or contact SP Scientific Service at (877) 548-4666.
Freeze Problems	• The Freeze function is a constant function used during the Thermal Treatment phases, as well as during the Freeze and Extra Freeze phases. These phases require all refrigerant to cool the shelves and your product. You should be able to cool the shelf temperature between 0.5 °C and 1 °C per minute, depending on your unit. • Test the refrigeration system periodically by using the Freeze button. Refer to the specifications for your unit or contact SP Scientific Service at (877) 548-4666. • Problems with Freezing may be due to refrigeration system failure. Check that your refrigeration system has sufficient charge.

Appendix B: Factory Settings

Factory Settings



WARNING! YOUR SYSTEM HAS BEEN PRECONFIGURED FOR NORMAL OPERATION. IMPROPER SETTINGS CAN DECREASE SYSTEM PERFORMANCE AND DAMAGE YOUR UNIT. USE EXTREME CAUTION WHEN MODIFYING FACTORY SETTINGS. RECORD DEFAULT VALUES SO YOU CAN RESET TO FACTORY SETTINGS.

The Wizard 2.0 controller is designed to be configurable for use in virtually all freeze-drying systems. Certain parameters must be set prior to operating the freeze dryer. These parameters are located in the Factory Settings menu (See Maintenance Settings).

Note: Modifying the factory settings may result in damage not covered by your Warranty. Only a qualified SP Scientific Technician or designee should modify the configurations in the Factory Settings menu.

Parameter	Description
N Product in Avg 2, 4, 8	Sets the average number of product probes. This number appears on the synoptic screen. Use the numeric keypad to enter the number of product thermocouple probes used (2, 4 or 8).
N Vacuum Probes	Sets the number of vacuum probes used in the system (1 or 2). Use the numeric keypad to enter a value.
Defrost Ad=1 El=2 Hg=3	Sets the freeze dryer's defrost system. Selecting Ad means that the shelf heats using refrigerant and defrosts the condenser by radiant heat. Selecting El mean that the condenser is defrosted by a dedicated electric heater, but has additional piping. Selecting Hg means that the condenser is defrosted by Hot Gas refrigerant circulated within the condenser. Refer to your freeze dryer operator's manual for proper setup.
Vacuum Control 0=Bleed 1=Save	Sets the vacuum level control method. Bleed allows the VLC valve to introduce air or gas into the system and maintain vacuum within tight tolerances. Save allows the vacuum pump to pull down to the setpoint minus the Power Save Deadband $\pm$ tolerance. The vacuum pump then leaks back up to the setpoint plus the Power Save Deadband $\pm$ tolerance.
Power Save Deadband	Sets the amount of variance allowed above and below the vacuum setpoint. Vacuum control method must be set to Save.
Purge Option 0=No	The optional Purge feature is visible on the Factory Settings screen and should remain disabled (<i>i.e.</i> , set to 0).
Iso Valve 0=No	The Isolation Valve feature is visible on the Factory Settings screen and should remain disabled (<i>i.e.</i> , set to 0).
Pressure Rise Test (P-Rise) 0=No	The Pressure Rise (P-Rise) feature is visible on the Factory Settings screen and should remain disabled (<i>i.e.</i> , set to 0).

Parameter	Description
Interstage Control? 1=Yes	Enter 1 to enable Interstate Control.
Cascade On	Sets the Cascade On temperature if the unit is equipped with a cascade refrigeration system.
Diff.	Sets the temperature for the second compressor in a cascade system. If the temperature is higher, the compressor is enabled. If the temperature is lower, the compressor is disabled.

Service Routines

Parameter	Description
Temperature Span	Sets the temperature high point offset based on the 'zero' point.
Temperature Calibration	Sets the temperature offset at a known cold temperature using approved equipment.
Vacuum 1 Calibration	Sets the first vacuum offset at a known low pressure using approved equipment.
Vacuum 2 Calibration	Sets the second vacuum offset at a known low pressure using approved equipment. This is used only when the second vacuum option is selected.
Proportional Gain	Sets the gain coefficient for the proportional part of the PID controller.
Integral Gain	Sets the gain coefficient for the integral part of the PID controller.
Derivative Gain	Sets the gain coefficient for the derivative part of the PID controller.
Acceptance	Sets the acceptable temperature deviation from setpoint to allow the system to advance to the next step.
Vacuum Bleed Valve Size	Regulates the size of the air inlet aperture for vacuum control.

PID Control Settings

These settings are used in the proportional-integral-derivative (PID) tuning calculations for the heating and cooling controls.

Suggested settings are as follows:

Model	P	I	D
AdVantage 2.0	5	16	1
AdVantage Plus	2	16	0
Genesis, Ultra and VirTual	2	16	1

Note: PID Control Settings are factory-set based on performance during quality control testing. Your settings may not match the settings above. SP Scientific recommends recording your factory default settings before making any changes.

Relay Test

The Relay Test menu displays the four output groups. Use this screen for troubleshooting electrical or mechanical problems, as well as during a freeze-drying run to observe active outputs.

SSR 1	SSR 2	SSR 3	SSR 4
Vacuum	Heater	Defrost	Alarm Output
Vacuum Release	Condenser Valve	Fluid Pump	Stoppering ^
Compressor 1	Compressor 2	Spare	Stoppering -
Freeze Valve	Negative Shelf	Isolation Valve	Spare

Pressing the corresponding number on the numerical keypad will begin a test of each SSR group. The outputs in this SSR group will energize in sequence for approximately two seconds each. A dark square appears next to an active output.

Notes: All control loops are disabled unless you are viewing the Synoptic screen.

Only a qualified SP Scientific Service Technician should interpret the results of a relay function test. Not all functions are available on all units.

SP Scientific
3538 Main Street
Stone Ridge, NY 12484 USA
www.SPScientific.com
(800) 431-8232
(845) 255-5000