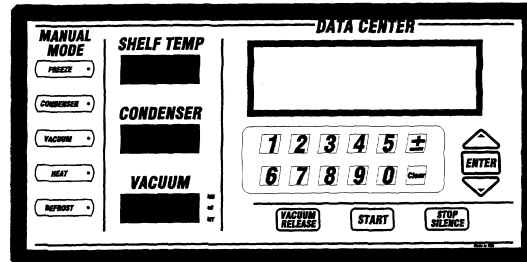


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Wizard Control System

The Wizard Control System provides for both the manual and automated control of the system functions.



Using the Manual Control

The Manual Mode buttons (FREEZE, CONDENSER, VACUUM, HEAT and DEFROST) can be used to manually control the freeze drying process. The display LEDs indicate Shelf Temperature, Condenser, and Vacuum Readings.

To use the Manual Control during the freeze drying process, follow the instructions listed in your unit manual. **Do not press the Manual Control buttons indiscriminately!** The proper sequential order must be followed as outlined in the Operational Summary of your unit manual.

Using the Automated Control Features

The Data Center display indicates the automated menu functions. The key pad below the Data Center allows up to 20 different recipes to be programmed. The three buttons along the bottom (VACUUM RELEASE, START, and STOP/SILENCE) allow the program recipes to be controlled.

To program or change a recipe, refer to the Automated Control Functions listed in this section.

Automated Control Functions

The Wizard Control System has three main options: **(1) Recipe Parameters** (2) **Setup Parameters** and **(3) Diagnostics**.

Use Menu option	To ...
(1) Recipe Parameters	Set freeze drying parameters for a specific cycle including, Thermal treatment, primary and secondary drying steps
(2) Setup Parameters	Set Vacuum Safety, Power Outage, and Print Intervals
(3) Diagnostics	View Thermocouple Temperatures, and Recipe Progress and Control Relay Status.

Use the UP/DOWN arrows to select the desired option and press ENTER to activate that option.

(1) Recipe Parameters Menu

To program a recipe select **Recipe Parameters** while in the main menu. You will then have the option to select a recipe number. Enter the recipe number by using the numeric key pad. You may clear any error or current recipe number by pressing the CLEAR button on the key pad. Once you have selected the desired recipe or entered the new recipe number, up to 20, press ENTER. This will bring you to the following sub menu.

Recipe Parameter Menu	To...
(1) Thermal Treatment	Set up to 12 Thermal Treatment steps. Steps include settings for Temp (°C), Time (min), and R/H (Ramp/ Hold).
(2) Freeze/ Condenser/ Vacuum	Set Product Freeze Temperature (°C), Additional Freeze Time (min), Condenser Setpoint (°C), and Vacuum Setpoint
(3) Drying Phase	Set up to 16 Primary Drying, Secondary Drying and Post Heat Values. Each step is divided into a temperature, time, vacuum and ramp/hold setting
(4) View Current Recipe Graph	Plots the recipe parameters for the selected recipe in the LCD display
(5) Print Current Recipe Parameters	Prints the current recipe to a line printer if available.
Return to Main Menu	Exits Recipe Parameters menu and returns to main menu

Use the UP/DOWN arrows to select the desired option and press ENTER to activate that option. You may return to the Main Menu by pressing and holding the ENTER button until a long beep is heard.

Thermal Treatment Settings

There are 12 available thermal treatment steps which consist of a Temperature (°C), Time (min), and a R/H (ramp or Hold).

Setting	Procedure
Temp (°C)	To change a temperature setting, press CLEAR then use the + / - key to indicate positive or negative temperatures and the numeric key pad to enter the value. Press ENTER to set the new value.
Time (min)	To change to time , press CLEAR and then input the desired time using the numeric key pad.
R/H	To set Ramp or hold use the +/- to select R (Ramp) or H (hold). This will allow for a temperature to be held for a period of time or increased to a value over a fixed time.

Use the UP and DOWN arrows to scroll through the thermal treatment steps and press ENTER to move from left to right.

If thermal treatment is not desired or only a few of the steps are used enter a value of 0 into both the time and temperature fields and this will alert the unit that it is to proceed to the Freeze, Condenser, Vacuum Phase and skip any other thermal treatment steps.

Once the desired thermal treatment steps are programmed select the <<<BACK display and press ENTER to return to the Recipe Parameter Menu. You may also press and hold ENTER to return to the Main Menu at any time.

Freeze, Condenser, Vacuum Parameters

There are 4 settings in this field: Freeze Temperature (°C), Additional Freeze Time (min), Condenser Setpoint (°C) and Vacuum Setpoint (mtorr).

Setting	Typical Value	Description
Freeze Temperature (°C)	-40°C	Freeze temperature is the temperature that you want your product to be below in Product Mode, or shelf temperature in Shelf Mode
Additional Freeze (min)	60 minutes	Additional freeze time is used to ensure product uniformity and will cool the shelves as cold as possible during this period of time.
Condenser Setpoint	-40°C	Condenser Setpoint is the condenser temperature that will start the vacuum phase.
Vacuum Setpoint (mtorr)	200 millitorr	Vacuum Setpoint is the vacuum level that needs to be achieved before advancing to primary drying.

Use the UP and DOWN arrows to scroll through the settings. Press CLEAR to reset a value and use the +/- key and the numeric keypad to enter the desired value in each field.

Once the desired values are programmed select the <<<BACK display and press ENTER to return to the Recipe Parameter Menu. You may also press and hold ENTER to return to the Main Menu at any time.

Drying Phase Menu

The drying phase menu consists of settings for Temperature (°C), Time (min), Vacuum setpoint (milliTorr), and Ramp or Hold.

Parameter	Description
Temp (°C)	This is the temperature that the shelf will hold or ramp to. <i>(Please note that these settings must be within the reasonable abilities of the machine)</i>
Time (min)	This is the time that the unit will hold the shelf temperature or the time it will take to get to the final shelf temperature in a ramp setting.
Vacuum Setpoint	This is the vacuum level that the machine will try to control at. <i>(Under heavy vapor loads the actual pressure may be higher. If this is the case the shelf temperature may need to be lowered.)</i>
Ramp or Hold	Ramp will ramp the shelf temperature from its previous value to the new value. Hold will adjust shelf temperature as rapidly as possible to the new setpoint and hold that temperature. <i>(Please note that these settings must be within the reasonable abilities of the machine)</i>
Secondary Drying Temp.	This is the temperature that when the product reaches it the unit will skip the remaining drying steps and progress to the post heat settings.
Post Heat	This is the temperature and vacuum level that will be maintained after the drying phase is finished.

Use the UP and DOWN arrows to scroll through the drying steps and press ENTER to move from left to right.

If only a few of the steps are used enter a value of 0 into both the time and temperature fields and this will alert the unit that it is to proceed to the post heat value.

Once the desired drying steps are programmed select the <<<BACK display and press ENTER to return to the Recipe Parameter Menu. You may also press and hold ENTER to return to the Main Menu at any time.

View Recipe Graph

This will plot the current recipe parameters on the LCD display. To exit, press and hold the ENTER button and you will return to the Main Menu.

Print Current Recipe Parameters

This will print the current recipe to a line printer if the optional printer is present. To exit, press and hold the ENTER button and you will return to the Main Menu.

(2) Setup Parameters Menu

The setup parameters are used to activate the alarm features within your Wizard controller. To enter this menu press ENTER while highlighting **(2) Set Up Parameters** from the Main menu.

Setting	Typical Value	Description
Vacuum Safety (mtorr)	0800	If the vacuum exceeds this value during the drying phase then the alarm will sound and the system resets to Freeze.
Power Outage (min)	0010	The cycle will continue as long as the power outage is less than the set value. Short duration power outage will be displayed. If power outage is longer the unit will display Long Duration Power Outage and will automatically freeze the product and hold in the Freeze Mode..
Print Interval (min)	0005	This is the interval that the data is sent to a line printer or the workstation. (optional Items) . Any value may be set when using the line printer, but 1 minute must be chosen for the workstations.

The above values may be changed by using the UP/Down arrows to select the desired parameter and entering a value using the numeric key pad.

Once the desired values are set select the <<<BACK display and press ENTER to return to the Main Menu. You may also press and hold ENTER to return to the Main Menu at any time.

(3) Diagnostic Menu

The diagnostics menu is used to monitor the status of your freeze dryer. It is broken down in two options; The Thermocouple Temperatures and Relay Status. By selecting 1) Thermocouple Status you will be able to view the following current system parameters.

Thermocouple Temperatures

System Parameter	Value or status	Description
Recipe Number	0000	Displays the recipe number of the current recipe.
Phase	None	Displays the current phase of the recipe being run.
Shelf	Temp (°C)	Displays the current shelf temperature.
Product Average	Temp (°C)	Displays the current product probe average.
Condenser	Temp (°C)	Displays the current condenser temperature.
Total Time	Time (min)	Displays the total run time.
Step Number	Number	Displays the current step number being run.
Step Time	Time (min)	Displays the time for the current step.
Step Temperature	Temp (°C)	Displays the current setpoint for the current step.
Vac Setpoint	mtorr	Displays the current vacuum setpoint for the current step.
Windmill	On/Off	Displays if the optional windmill feature is active.
Product Number (1-8)	Temp (°C)	Displays the current temperature value of the product with that probe in it.
Line Voltage	Volts	Displays current line voltage to the machine.

You may scroll through the above values by using the UP/Down arrows. You may not edit these values as they are the actual values or the setpoints obtained from the recipe.

To return to the Diagnostics Menu select the <<<BACK display and press ENTER. You may also press and hold ENTER to return to the Main Menu at any time.

Relay Status Menu

The relay status menu will allow you to view the current status that the control board is outputting to each device. This will help to determine if there is a problem with the control board or the unit. The value of a relay status may only be monitored and not changed.

To return to the Diagnostics Menu select the <<<BACK display and press ENTER. You may also press and hold ENTER to return to the Main Menu at any time.

WIZARD CALIBRATION

***Note:** Your system has been set at the factory for normal settings. Improper settings may cause performance problems and possibly damage the unit. Use extreme caution when entering the calibration mode and record initial values so you may retrieve initial settings in case of problems!!*

The temperature and vacuum readings may need to be calibrated periodically. Use the following procedure to do so.

Temperature:

To enter the calibration mode, press and hold the CLEAR key until "CALt" is shown in the vacuum display.

Attach an NIST traceable type thermocouple calibrator to the Shelf Temperature probe connector. This is the top two pins found on J200. The first pin being negative, the second positive.

Set the calibrator to -60°C. Wait for at least 30 minutes for the Wizard to warm up and the temperature to stabilize.

Use the up and down arrow keys to adjust the offset value, shown in the condenser temperature display, until the temperature matches the calibrator reading.

To exit this mode, briefly press the FREEZE key.

Vacuum:

To enter the calibration mode press and hold the CLEAR key until "CALt" is shown in the vacuum display.

Press the ENTER key once to show "CALU" in the temperature display.

Obtain a vacuum reference tube and connect it to the vacuum sensor cable instead of the normal vacuum sensor. If this is not available, attach a known calibrated vacuum sensor to the vacuum system and pull a vacuum to below 1000 millitorr.

Use the up and down arrow keys to adjust the offset value, shown in the condenser temperature display, until the vacuum matches the reference.

To exit this mode, briefly press the FREEZE key.

Wizard Setup and Configuration

***Note:** Your system has been set at the factory for normal settings. Improper settings may cause performance problems and possibly damage the unit. Use extreme caution when entering the calibration mode and record initial values so you may retrieve initial settings in case of problems!!*

The Wizard controller has been designed to be configurable for use in virtually every freeze drying system. In order to accomplish this, certain parameters must be set prior to operating the freeze dryer. These parameters are as follows:

1. Freeze dryer refrigeration type
2. Shelf assist mode
3. Number of product thermocouple probes
4. Defrost mode
5. Defrost time
6. Temperature control mode
7. Vacuum release time
8. Electronic Windmill option
9. Vacuum Control Method
10. Vacuum Preseal Time
11. PID settings for Heating/Cooling

Entering this mode is accomplished in the same way as the calibration mode. Press and hold the CLEAR key until "CALt" is shown in the vacuum display.

Press the ENTER key once to show "CALU" in the temperature display.

Now press the ENTER key again. This will show the freeze dryer model type in the shelf temperature display.

*Note: Subsequent pressing of the ENTER key will scroll through the list shown above. At any time pressing the freeze key will exit this mode.

Freeze Dryer Refrigeration “TYPE”

The choices are “LL” or “EL”

Use the following list to determine proper setup. Units not listed here must be handled on an individual basis.

“EL” Type:

Genesis models include:	ES, EL, XL, SL
Ultra models include:	ES, EL, LE, XXL, SL
Advantage models include:	ES, EL, XL, SL
Benchmark models include:	SL, LL, EL

“LL” Type:

Genesis LL and LE models only

Upon entering this setup mode, use the up and down arrow keys to change the setting.

Shelf Assist Mode Setup “ASST”

Upon entering this setup mode, use the up and down arrow keys to toggle assist on and off.

The shelf assist mode when ON will maintain the shelf temperature during the condenser and vacuum pulldown phases. However, when using this feature, the condenser pulldown rate will be extended slightly.

Assist OFF will supply full refrigeration to the condenser during the condenser and vacuum phases independent of shelf temperature.

Number of Product Probes Setup “PrOd”

Upon entering this setup mode, use the up and down arrow keys to set the number of product thermocouple probes used. Values range from 1 to 8 with 4 being the most common.

Defrost Mode “DEFr”

Upon entering this setup mode, use the up and down arrow keys to choose between Advantage (ADU) and standard (STD) modes. Use Advantage setting for the Advantage units and standard for all others.

Defrost Time “deF.t”

Upon entering this setup mode, use the up and down arrow keys to set the defrost phase time duration of the condenser. The standard setting is 60 minutes.

Temperature Control “Ctrl”

The PrOd setting will use the product probe average temperature to enter secondary drying and product freeze settings. If ShLF is selected the product probe temperatures will be discarded from a control standpoint.

Vacuum Release Time “UrEL”

Upon entering this setup mode, use the up and down arrow keys to set the vacuum release time.

The standard setting is 5 minutes.

Electronic Windmill Option “MILL”

Upon entering this setup mode, use the up and down arrow keys to choose between RPN.n (Revolutions per Minute), FPN.n (Feet per minute) or n.nPS (meters per second). If no electronic windmill option is located on the freeze dryer, choose “OFF”.

Proportional “P”

This setting is used in the PID tuning calculations for heating/cooling control. See the chart following this section to properly configure the unit based on the unit type.

Integral “I”

This setting is used in the PID tuning calculations for heating/cooling control. See the chart following this section to properly configure the unit based on the unit type.

Derivative “D”

This setting is used in the PID tuning calculations for heating/cooling control. See the chart following this section to properly configure the unit based on the unit type.

Vacuum Control Method “VACC”

SAU Mode turns the vacuum pump and the VBS valve on and off for vacuum level control (standard setting for the Advantage Units). VBS mode turns only the VBS solenoid on and off. Std mode turns the vacuum level solenoid on and off.

Vacuum Pre-Seal Time “VACC SEAL”

The automatic cycle allows presealing of the system upon starting a Recipe. The control pulls a vacuum preseal to 500 mbar before continuing. The number in the vacuum window is the number of minutes allowed for pull down. Setting the value to zero disables the preseal function.

PID Settings for Heating/Cooling

Suggested PID Settings:

Model	Choice	P	I	D
AdVantage ES	1	6	4	40
	2	6	10	40
AdVantage EL	1	6	4	40
	2	6	10	40
	3	5	4	50
AdVantage XL	1	6	10	40
	2	6	4	40
	3	5	5	30
Genesis ES	1	6	10	40
Genesis XL	1	6	10	40
	2	6	10	10
Genesis EL	1	6	10	40
Genesis LE	1	5	2	12
Ultra ES	1	6	10	40
Ultra EL	1	6	10	40
	2	4	2	12

Other Configuration Settings - Selecting Vacuum Measuring Units

The vacuum display can be set to read in either milliTorr or microbar. To change this, press and hold the VACUUM RELEASE key until a long beep is heard and the vacuum units LEDs flash. Then press the vacuum key to change to the desired unit of measure. Now press and hold the VACUUM RELEASE key again to exit this mode. The standard setting is milliTorr.

WIZARD WARNING ALARMS

Short Duration Power Outage Alarm

The Alarm occurs when a power outage event happens that is less than the programmed time set from the Setup Menu.

Long Power Outage During Drying Cycle Alarm

The alarm occurs when a power outage event happens that is greater than the programmed time set in the Setup Menu.

Freeze Time Exceeded Alarm

The Average Product Temperature is constantly monitored during the Freeze Phase. The Wizard will alarm if the Average Product Temperature is not less than or equal to the recipe Freeze setpoint in a four hour period after entering the Freeze Phase. If configured for shelf driven, the Shelf temperature will be substituted for the "Average Product Temperature".

Condenser Time Exceeded Alarm

The Condenser Temperature is constantly monitored during the Condenser Phase. The Wizard will alarm if the Condenser Temperature is not less than or equal to the Condenser Setpoint within one hour of entering the Condenser Phase. The Wizard will return the freeze dryer to the "Freeze" phase and wait for the alarm to be acknowledged. Once the alarm is cleared, the cycle will continue.

Vacuum Time Exceeded Alarm

The Vacuum Level is constantly monitored during the Vacuum Phase. The Wizard will alarm if the Vacuum Level is not less than or equal to the Vacuum Setpoint within one hour of entering the Vacuum Phase. The Wizard will return the Freeze Dryer to the "Freeze" Phase and wait for the alarm to be acknowledged. Once the alarm is cleared, the cycle will continue.

Vacuum Safety Exceeded Alarm

During Primary and Secondary Drying, the Wizard monitors the Vacuum Level against the Vacuum Safety Setpoint which is set from the Setup Menu. If the Vacuum level is greater than the Vacuum Safety Setpoint, the Wizard will alarm. If the alarm occurs in Primary Drying, the cycle is reset to the Freeze phase in order to protect the product. If the alarm occurs in Secondary Drying, the unit will still alarm, but remain in the current phase.

Check Vacuum Seal

Upon starting an automatic cycle, the Wizard will enable the Vacuum pump in order to pull a small vacuum on the chamber to seal the door. The Vacuum Level is constantly monitored against the Vacuum Seal setpoint (hard coded in the program at 500mB). The Vacuum level needs to be at or below the Vacuum Seal Setpoint within the Vacuum Seal time interval (set in the configuration parameters), or the alarm will occur. The Freeze dryer is then waiting to be re-started.