10107002

Xiros Mikro

Freeze Dryer

User Manual

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II. Safety

! DANGER (may cause serious damage to property and or casualties)

1. Please carefully read this User Manual prior to operating the instrument and observe and verify that all connections are properly secured.
2. Utility requirements: Please ensure that the electrical connections meet the local standards and that the power supply is compatible with the Instrument nameplate. The power source must be properly grounded.
3. The chamber and shelves may be extremely cold or hot – please check temperature first before opening the chamber to avoid injury from frostbite or burns.
4. Only trained refrigeration engineers may service the refrigeration system.
5. When conducting maintenance and or operations inside the chamber, ensure the door is securely held open.
6. Ensure appropriate PPE is worn at all times. Unprotected hands are not to open or close the door.
7. It is prohibited to use flammable liquids or gas inside or around the instrument. The instrument is not explosion rated and should not be operated in the presence of flammable liquids or vapours.

! WARNING (may cause property damage or personal injury)

1. Do not place heavy objects on top of or stand on the instrument.
2. Prior to operating this instrument, all operators are required to fully read this manual. Only trained and qualified operators should use the instrument.
3. It is prohibited to install any non-manufacturer authorised software onto this instrument
4. Power ‘OFF’ the power supply for PLC and all electrical equipment before working on the instrument.
5. Confirm the main power is ‘OFF’ prior to opening the cabinet door.

! ATTENTION (may affect operational performance or service life)

6. The overall safe operation of the instrument is the responsibility of the owner of the instrument and their assigned operator(s), who in turn are responsible for ensuring the user manual guidance is applied to ensure the safety and protection of personnel and the instrument before, during and after freeze-drying operation.
7. Timely maintenance of the instrument MUST be conducted to ensure continued safe operation and optimise the instrument’s service life.
8. Only accredited and qualified professional repair technicians can open the instrument or conduct required repairs. Persons performing repairs on the instrument other than those selected or approved by the Company shall operate to void any warranty contained hereinabove for the product.

III. Introduction

Users are advised to carefully read this manual prior to operating the freeze dryer so that they are aware of all precautions outlined and to ensure operation is in accordance with the instructions contained within this manual.

3.1 After Sales Support

If problems are encountered or technical support is required when installing or using the instrument, please contact serviceusa@hollandgreenscience.com

The company may provide technical assistance and information regarding the instrument or equipment or service without charge at its sole discretion. Buyer assumes sole responsibility for any reliance on or use of such assistance and information, and the company makes no warranty thereon.

Upon contact the following information is required:

- Product serial number (located on the instrument nameplate)
- Description of issue or problem
- Method and or operating steps you have undertaken towards resolution.
- Your contact details inclusive of telephone number and email address.

3.2 Proper Use

The instrument is designed for non-residential use and is to be used only in conjunction with accessories recommended within this manual and by the manufacturer.

IV. Technical Specifications

Model	10107002
Product Name	Xiros Mikro
Product Weight	87 kg
Rated Voltage	110 v +/-10%
Rated Frequency	60 Hz
Max Vacuum Pump Current	3 A
Total Condenser Volume	11 L
Ice Condenser Capacity	8 kg
Ice Condenser Performance	4 kg per 24 hours
Ice Condenser Temperature	-40 °C
Ultimate Vacuum	2.5 x 10^{-2} mbar
Minimum Shelf Temperature	-35 °C
Maximum Shelf Temperature	60 °C
Tray Dimensions	450 mm x 200 mm x 12 mm
Number of Trays	9
Shelf Stack Options	7, 5, 3 shelves
Typical Product Capacity	9.6 kg at 80% moisture
Distance Between Trays	9-shelf: 19 mm
External Dimensions (mm)	770 (D) x 748 (W) x 507 (H)

IV. Inspection

Packing List

Unpack the equipment carefully and check for any damage which may have arisen during transport. In the event of identified damage, please contact serviceusa@hollandgreenscience.com

The package includes the following items

Item Description	Quantity
Main Unit	1
Vacuum Hose	1
Clamps	2
Sealing Ring	2
Drain Hose	2
Tray	9
Quick Setup Card	1

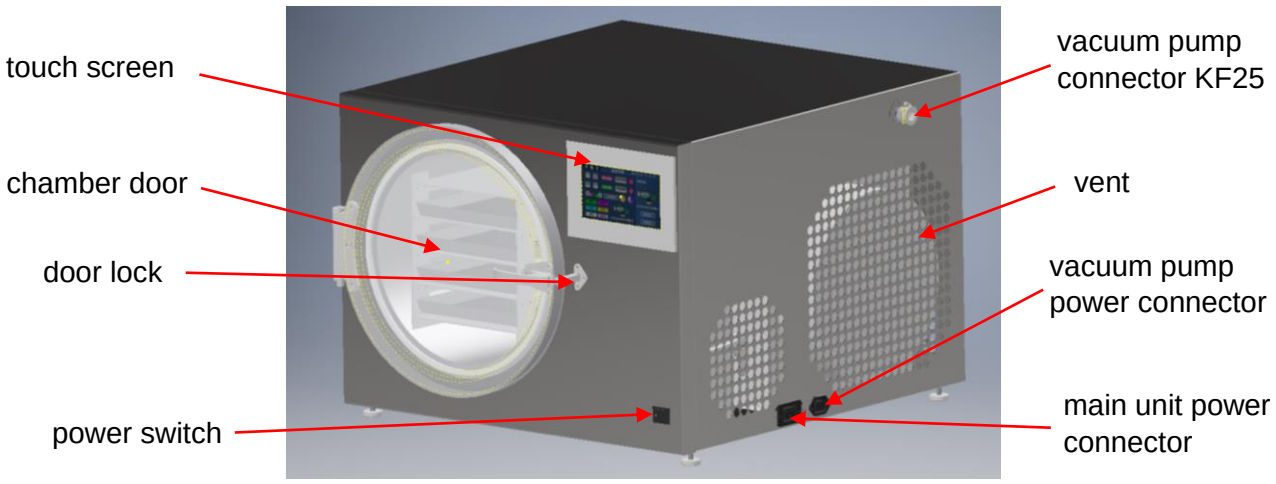
⚠	**CAUTION:** If there is any visible damage to the instrument, please do not connect the instrument to a power supply.	

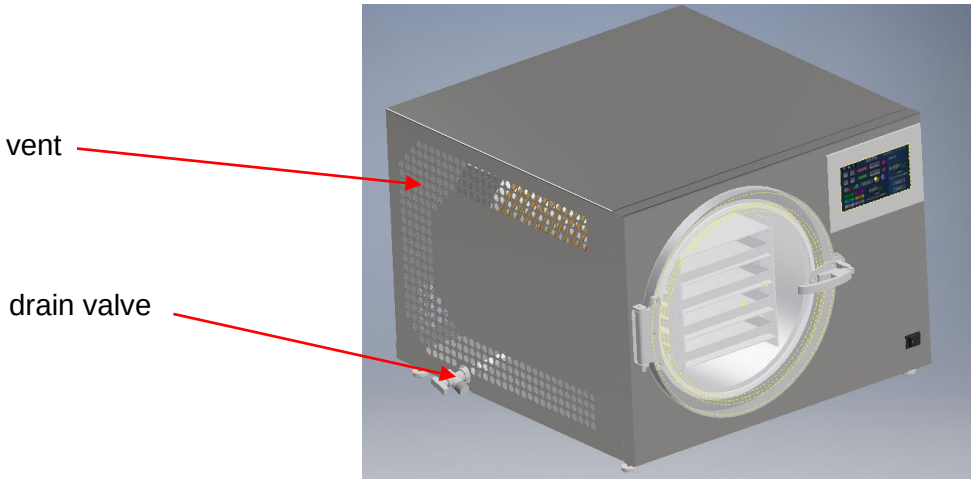
V. Precautions

- The power supply should be connected to the electrical outlets safely. It is important that anyone using this equipment do so with dry hands and dry shoes to minimize the risk of electric shock.
- A 120VAC 60Hz power supply is required for the freeze dryer operation. Any alternative supply voltage or frequency may damage the freeze dryer reduce its working lifespan.
- The electrical power cord is designed to be connected to the power outlet without knots, sharp bends, or heavy materials placed on the cord.
- If the power cord is damaged, please contact the service department at service@hollandgreenscience.com for repair or replacement.
- The freeze dryer should be properly grounded according to local electrical codes. This will minimize the risk of electric shock and fire. It is important that all power outlets are properly grounded.
- Never operate the freeze dryer if the freeze dryer chamber door is open. Doing so may lead to equipment failure.
- No residual water or foreign matter should be present inside the chamber prior to freeze-drying.
- Never open the freeze-drying chamber door during the freeze-drying process. Doing so may cause personal injury or equipment failure.
- If an abnormal sound, excessive heat, smoke, etc., is detected, stop the process immediately, disconnect the instrument from the power supply and contact the service department. The freeze dryer operates with a minimal level of noise when running if any significant changes happen, please stop the processing and contact the service department.
- If a power outage occurs when operating the freeze-dryer, open the drain valve and let the chamber pressure return to normal before opening the door to retrieve the product.
- When the freeze-drying process has finished, first open the drain valve and then turn off the vacuum pump.
- Be sure to keep the sealing ring and the chamber door clean. Only clean with soapy water and avoid using solvents or other cleaning agents.
- Do not rapidly power on/off the freeze dryer. Please wait for at least 3 minutes after powering off the freeze dryer to power it back on again.
- It is recommended that the freeze dryer be unplugged from the wall outlet when not in use.

VII. Components

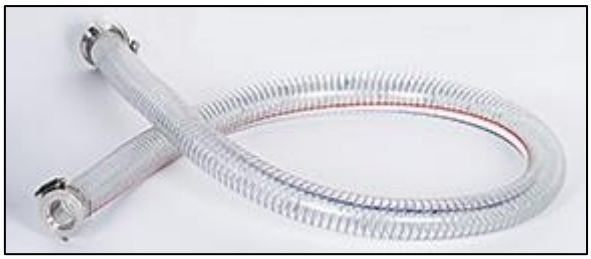
7.1 Main Unit





7.2 Other Components

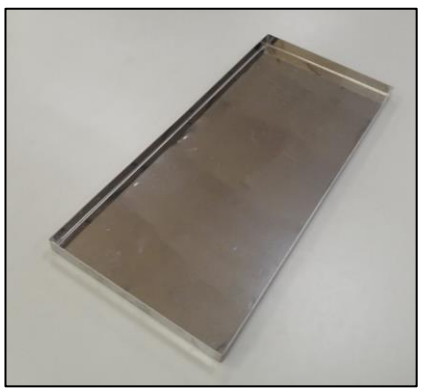
- Vacuum hose and KF 25 connectors



- Clamps and sealing rings

- Vacuum pump

- Tray



- Drain hose

7.3 Assembling the Freeze Dryer

7.3.1 Connect the vacuum pump to the freeze dryer

- The connector for the vacuum pump is located at the upper right corner at the back of the freeze dryer (Figure 1).

Figure 1

- Insert the sealing ring into the vacuum pump connector and place the clamp around the vacuum pump connector but do not tighten the clamp (Figure 2).

Figure 2

- Connect the vacuum pump hose to the connector and then tighten the clamp as shown is Figure 3. Please note that the clamp only needs to be done up finger tight – excessive tightening may cause damage to the fittings.

Figure 3

- Connect the inlet port to your vacuum pump as shown in Figure 4.

Figure 4

7.3.2 Connect the water drain hose to the freeze dryer

- The connector for the drain hose is located to the left side of the freeze dryer (Figure 5).

Figure 5

- Connect the drain hose to the connector and as shown in Figures 6, 7.

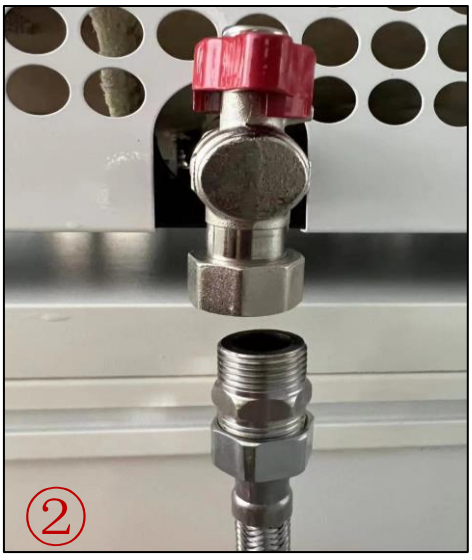


Figure 6

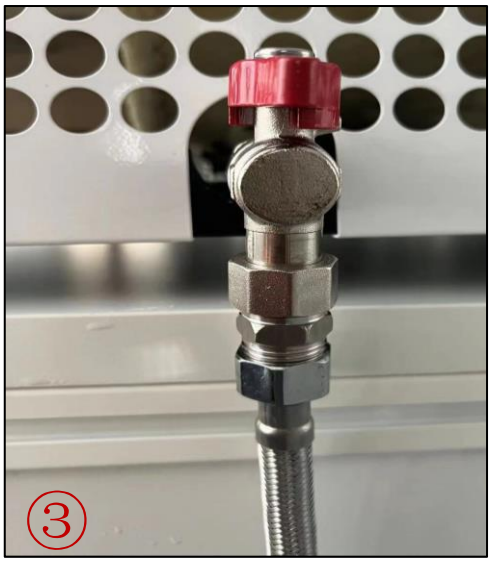


Figure 7

7.3.3 Connect the freeze dryer to the power supply

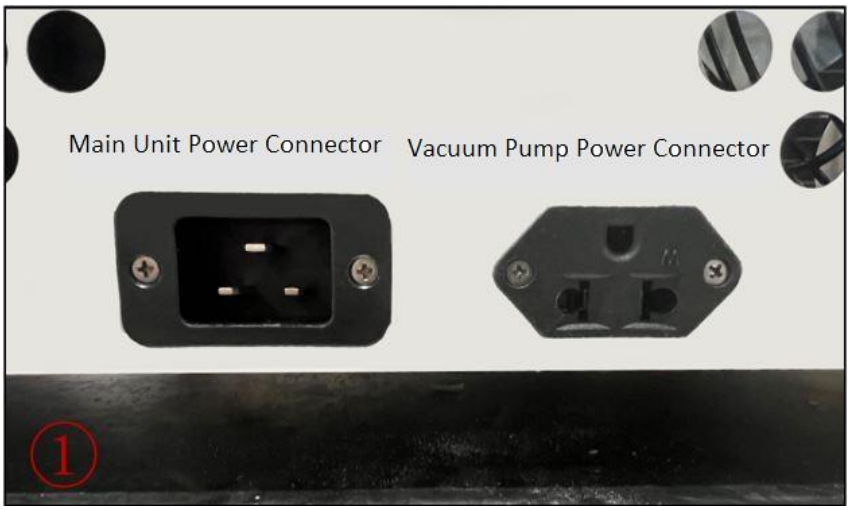


Figure 8

- Locate the power connectors for the main unit and the vacuum pump at the right side of the freeze dryer (Figure 8).
- Connect the vacuum pump power plug to the vacuum pump power connector.
- Connect one side of the main unit power cord to the power connector and connect the other side to the electrical power outlet.

Figure 9

- Locate the main unit power switch under the touch screen.
- Turn the power switch to “ON”. A red light will appear to indicate the power switch is “ON” as shown in Figure 9. The touch screen should also turn on.

VIII. Operation Instructions

Before running the freeze dryer, please check and ensure that:

- There is no residual water or foreign matter inside the chamber.
- The drain valve is closed.
- The vacuum pump is connected to the freeze dryer correctly.
- The freeze dryer main unit is connected to the power supply and the vacuum pump is connected to the freeze dryer main unit.
- The product that needs to be freeze dried has been placed on the trays.

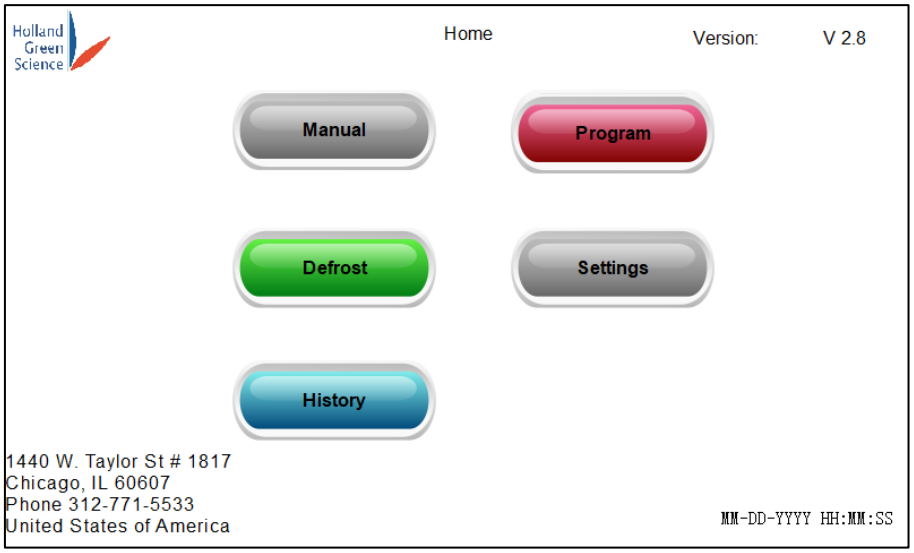


Figure 10

The home screen is shown once the touchscreen is powered on (Figure 10). There are five visible control buttons on the touchscreen: Manual, Program, Defrost, Settings, and History.

Click on  to return to the home page.

8.1 Manual freeze-drying mode

To enter the “Manual Control” page, click on the “Manual” button (Figure 11).

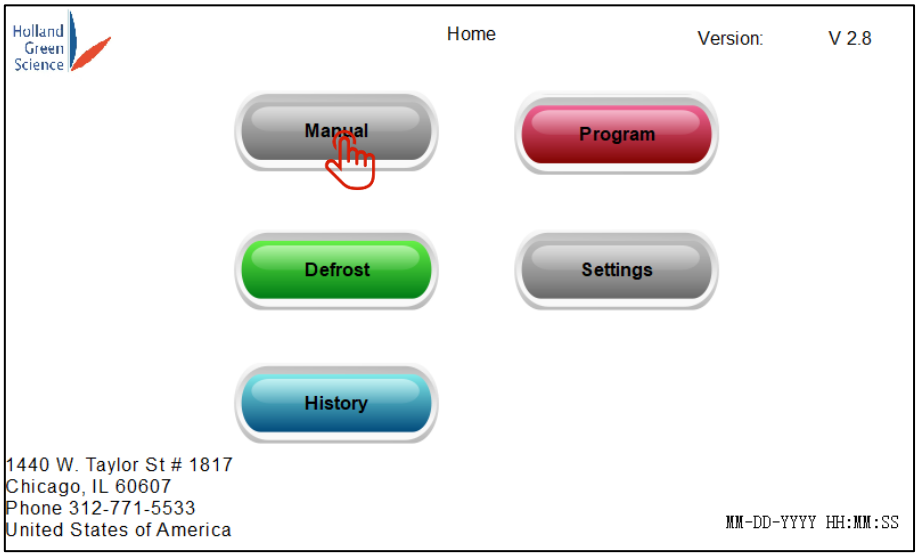


Figure 11

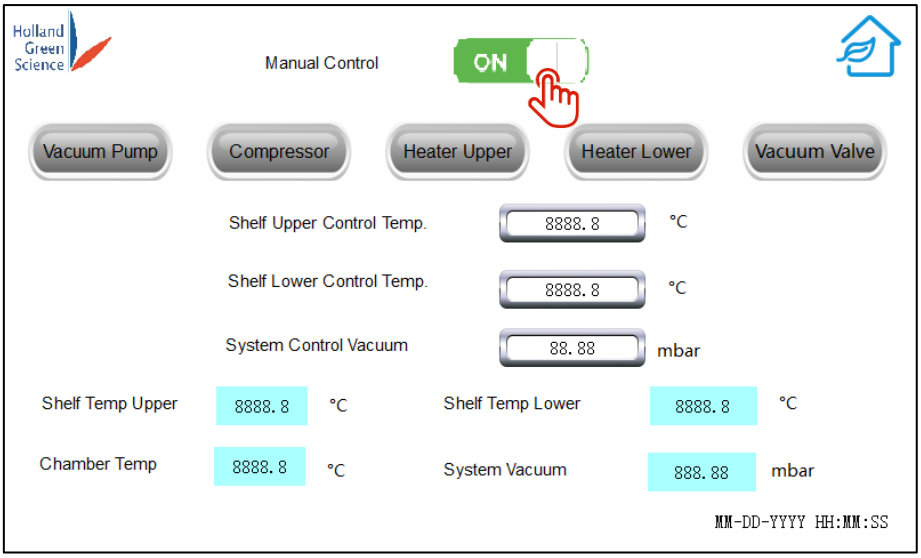


Figure 12

The “Manual Control” page has the flowing functions:

- Manual Control On/Off: click “On” to enter Manual Control Mode (Figure 12).

- Note, once Manual Control Mode has started, you can still go into the “Program Mode” to edit the programs. However, you will not be able to start a recipe under the “Program Mode” when Manual Control Mode is running. A warning message will come up if “Program Mode” is started while running in Manual Mode: “Manual Mode is still active. Please confirm switch off” (Figure 13).

Figure 13

- Set shelf temperature and chamber vacuum as desired (Figure 14).

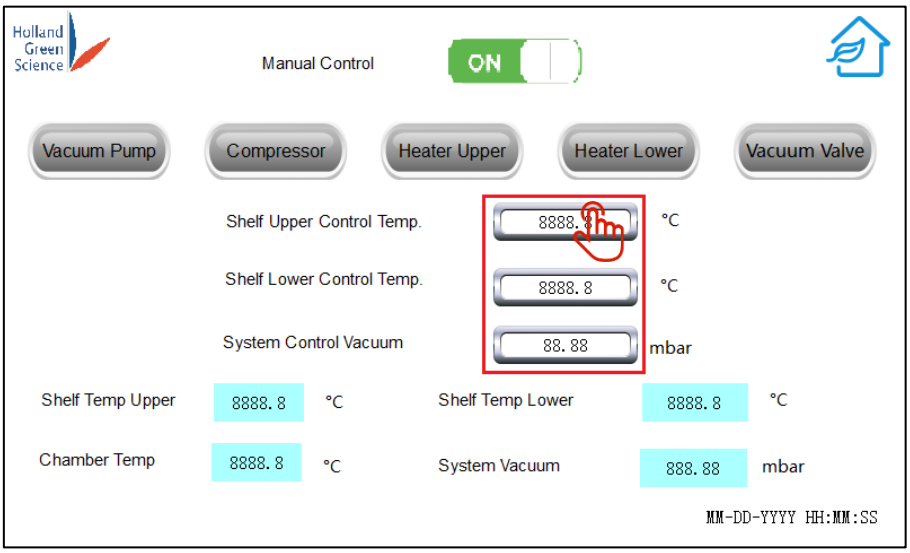


Figure 14

- Turn On/Off the following equipment as desired: vacuum pump, compressor, heater upper, heater lower, vacuum valve (Figure 15).

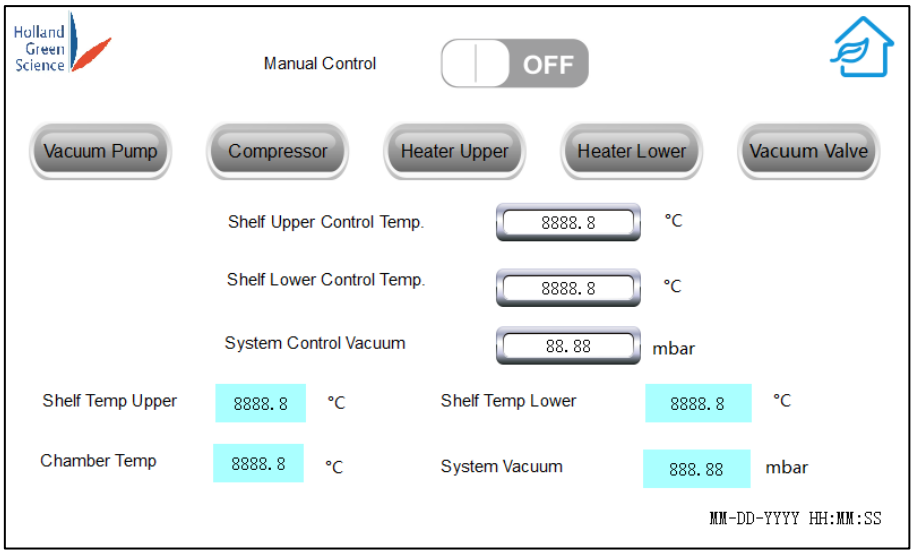


Figure 15

- When the freeze-drying process is finished, open the drain valve first and when the chamber is unpressurized, open the door to retrieve the product.
- Note: After the vacuum pump has been running for more than 5 minutes, if there's no obvious chamber pressure change detected, an error message will appear. This applies to both the manual and program freeze-drying mode.
- Shelf temperature, chamber temperature and chamber vacuum are displayed in real time.
- Please note: When operating in manual control mode, please ensure that product is fully frozen before opening the vacuum valve. Opening the vacuum valve while there is still liquid in the chamber may damage or cause premature wear to your vacuum pump.
- Note: the freeze-dryer will automatically start the compressor to cool the chamber and shelves when powering on the system. Disabling the compressor can only be done in the Manual Control mode.

8.2 Program Mode

Click on “Program” on the home screen to enter the “Recipe Selector” page (Figure 16).

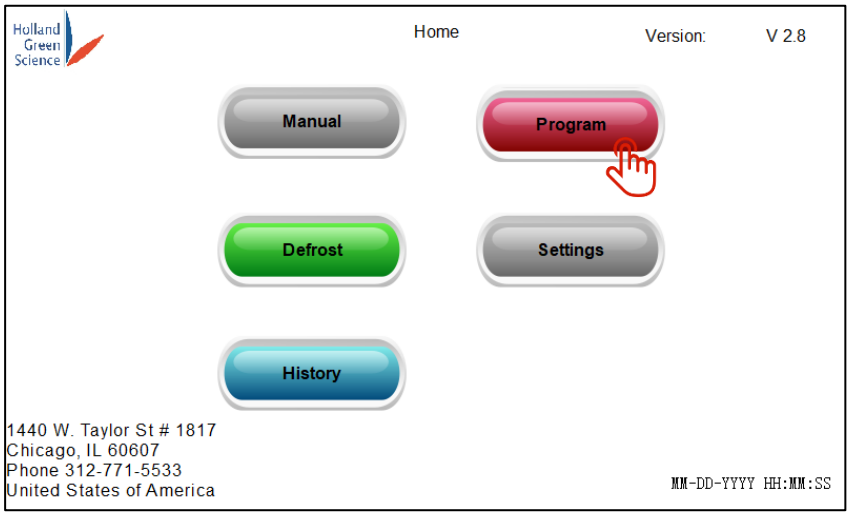


Figure 16

The “Recipe Selector” page has the following functions”

- “Flower”: used to freeze dry flowers.
- “Bubble Hash”: used to freeze dry bubble hash.
- “Store”: used to store product in the freeze dryer.
- “Custom”: customize a freeze-drying recipe.

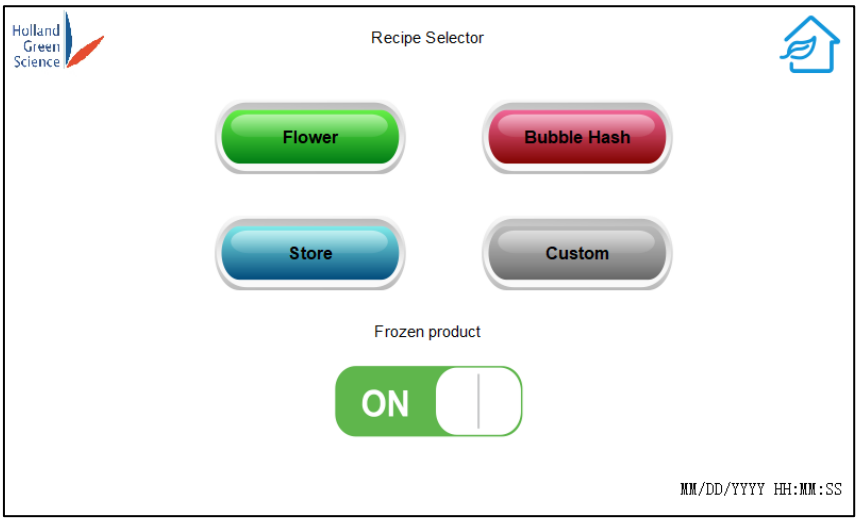


Figure 17

If the product is NOT frozen, turn on the “Frozen product” function (Figure 17). The program will check the pre-freeze timer and the pre-freeze temperature.
If the product is already frozen, leave the “Frozen product” function off. The program will skip the cooling process and jump to vacuum stage (The program ignores the

pre-freeze timer and pre-freeze temperature and runs the vacuum pump after 5 minutes).

“Flower”, “Bubble Hash” and “Store” settings already have predefined parameters. We highly recommend for users to adjust these parameters to suit individual requirements. Best possible drying parameters can vary significantly depending on factors such as plant genetics, terpene profiles, product size and moisture content. Holland Green Science cannot guarantee that our recommended parameters suit your needs. They are solely intended to provide you with a starting point to your freeze-drying tasks.

The user can enter self-defined parameters using the “Custom” function. Below is an example of how to set up a custom flower program.

- Click on “Flower” on the “Recipe Selector” page to enter the “Flower Program Custom” page (Figure 18, 19).

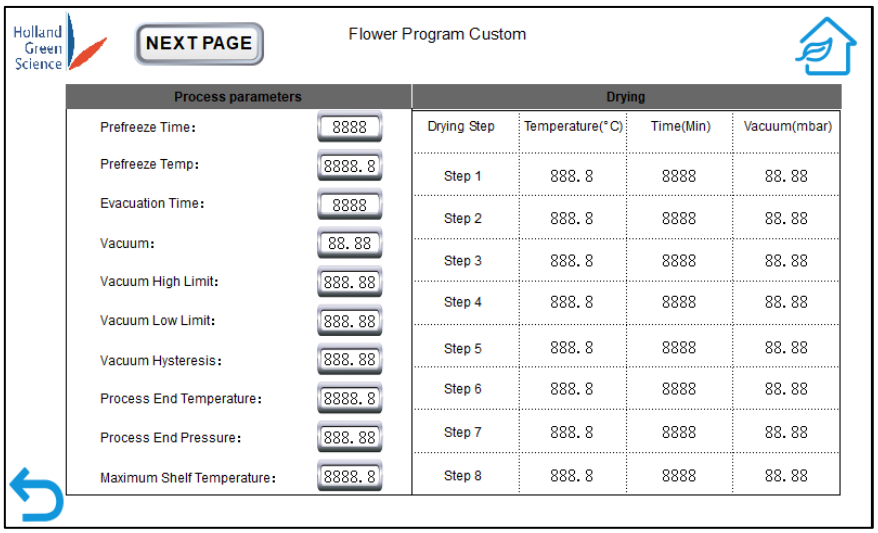


Figure 18

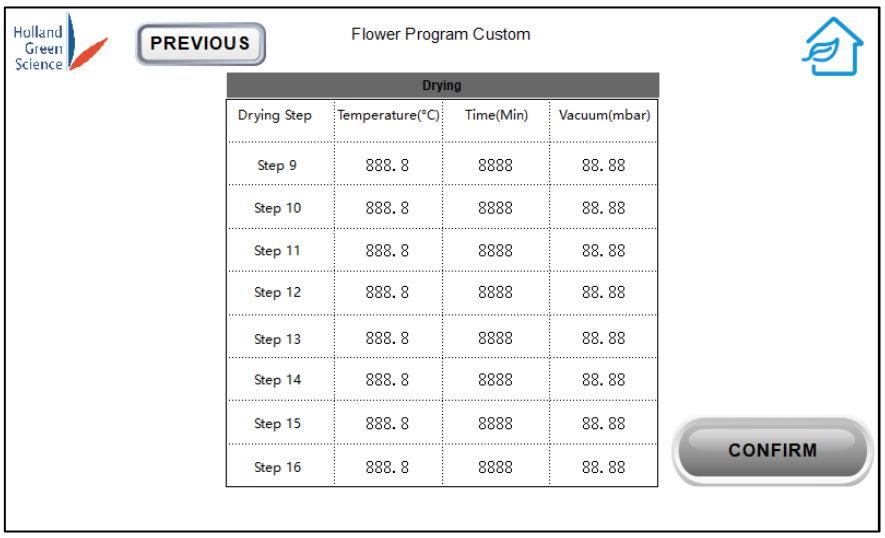


Figure 19

- Click on individual parameter that you wish to change, enter the new value.
- There are a total of 16 steps available. Even though not all steps need to have values, all steps are done in sequence. No blank step should be left between steps (A blank step would indicate the process is finished).
- Click on “CONFIRM” when you finish entering the parameters to enter the “Process Start” page (Figure 20). Note, when Program Mode is entered, the manual control mode will be disabled, and all the parameters set in manual control mode will be reset.
- **Note: for the parameter definitions in Figure 18, please see “Section XI. Terms Explained”.**

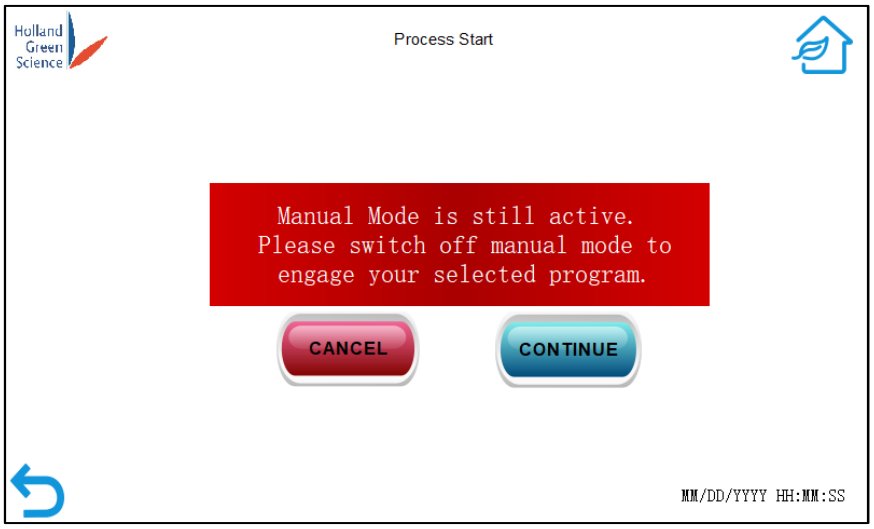


Figure 20

- Please ensure that the trays are placed on the shelves and the drain valve is closed. Close the chamber door.
- Click on “Continue” to enter the “Freezing” page.
- Click on “Cancel” to go back to the home screen.

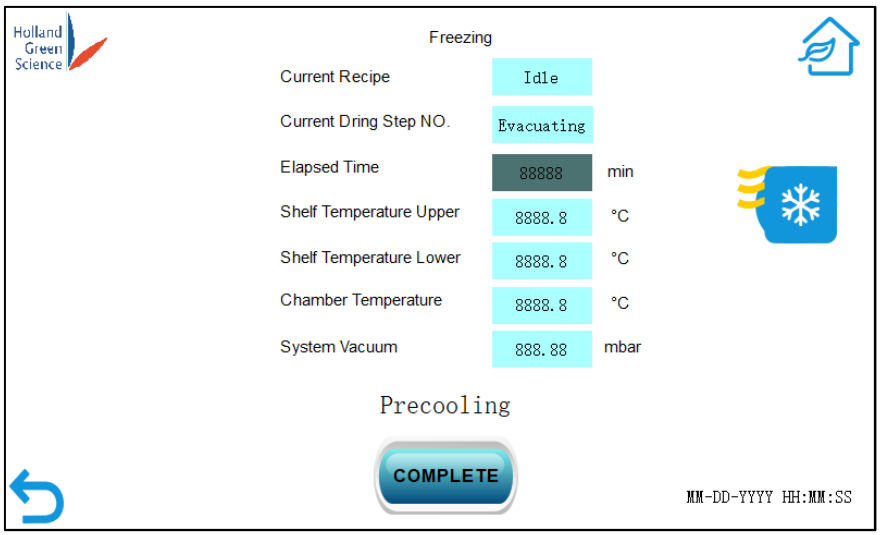


Figure 21

- The “Freezing” page displays real-time values of the shelf-temperature lower, chamber temperature, shelf-temperature upper and system vacuum (Figure 21).
- The “Freezing” page also displays the current processing step. There are five processing steps, and they are “Precooling”, “Evacuating”, “Primary Drying”, “Secondary Drying” and “Product Storage”.
- Clicking on “CANCEL” will stop the process and go back to the home screen (Figure 22).

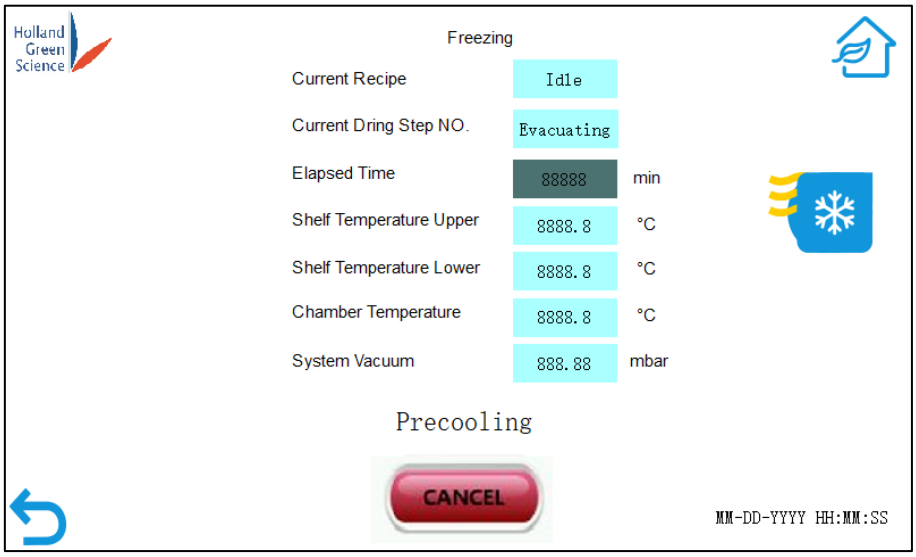


Figure 22

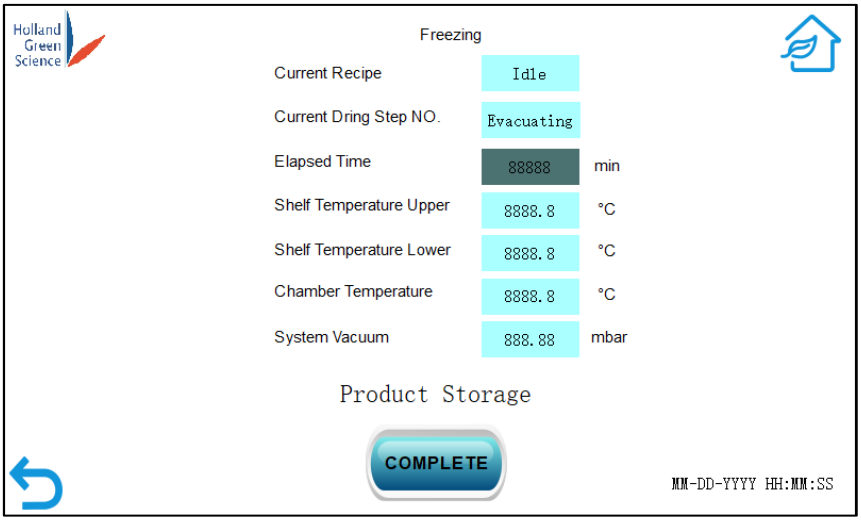


Figure 23

- When the processing step indicates “Product Storage” (Figure 23), the Program freeze-drying process is finished. **Open the drain valve and wait for the chamber pressure to return to normal before opening the chamber door** to retrieve the product (Figure 24).

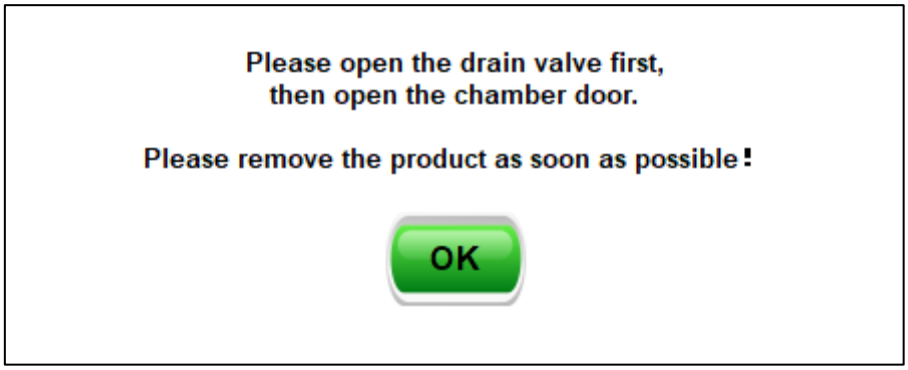


Figure 24

8.3 Defrost mode

When the freeze-drying process is finished, the user can click “Defrost” on the home screen to enter “System Defrost” page (Figure 25). Note, the user can also use the “Defrost” function before any freeze-drying process to defrost the chamber if needed.

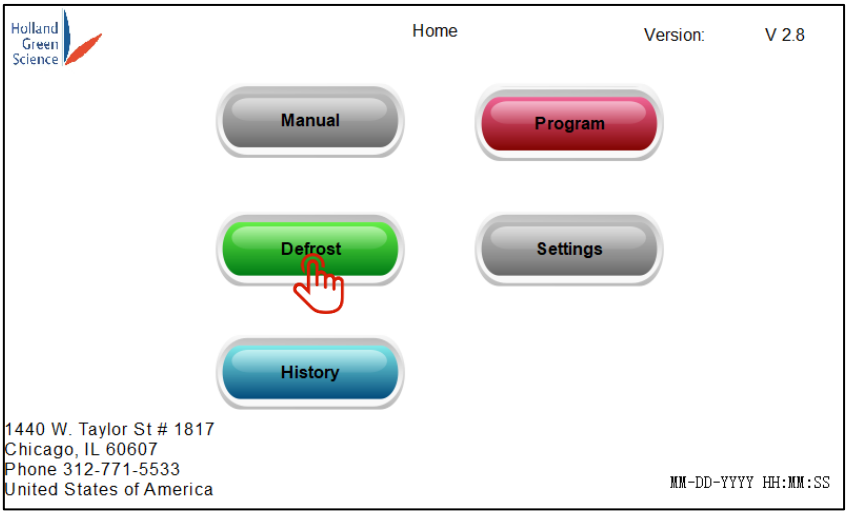


Figure 25

Before starting the “Defrost” process, please confirm:

- Product has been taken out.
- Drain valve is open.
- Chamber door is closed.

Users may set the defrost temperature and defrost time as desired (Figure 26).

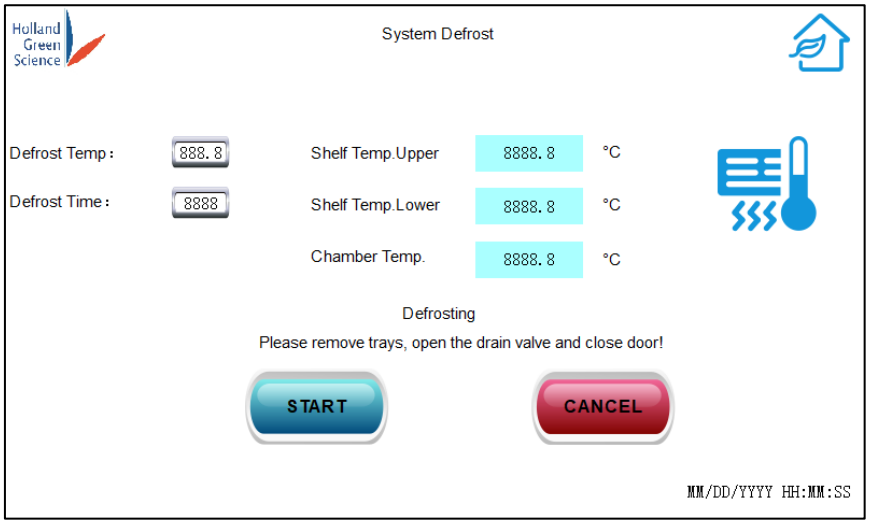


Figure 26

Click on “Start” to start the defrost process. The “System Defrost” page will display the real-time values of the temperature for the lower and upper shelf chamber temperatures (Figure 27).

Click on “CANCEL” to stop the defrosting process. This will cause the system to return to the home screen.

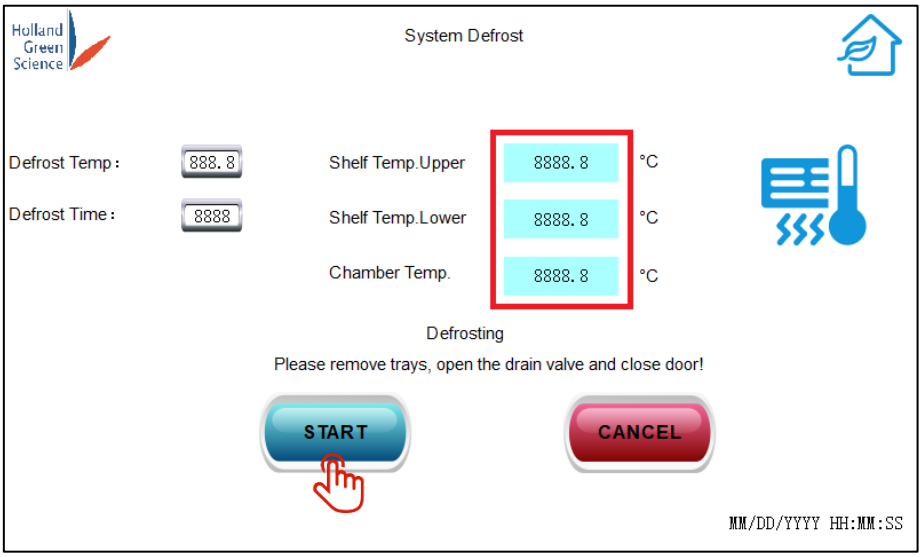


Figure 27

8.4 System settings

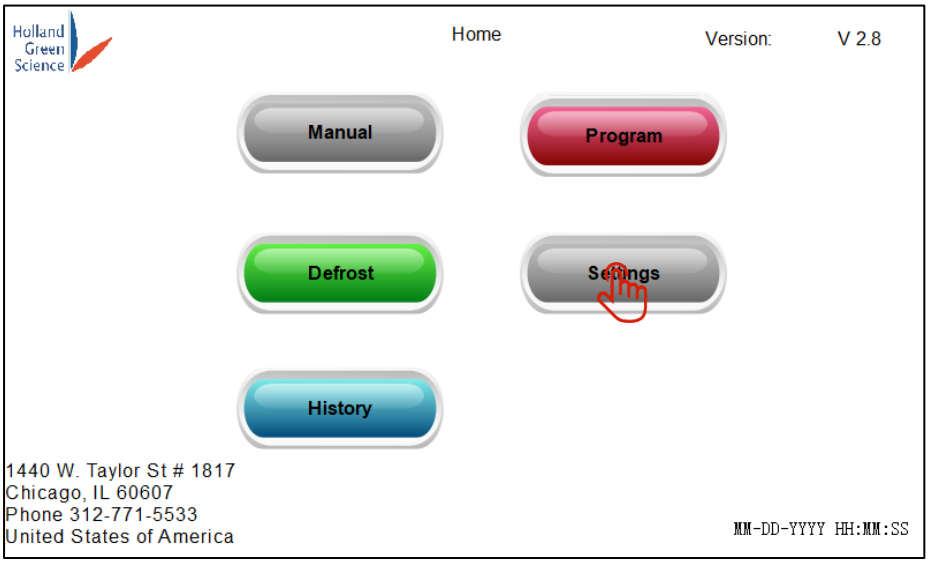


Figure 28

Click “Settings” on the home screen (Figure 28).

The following settings can be defined by user: password, time, screen save (Figure 29).

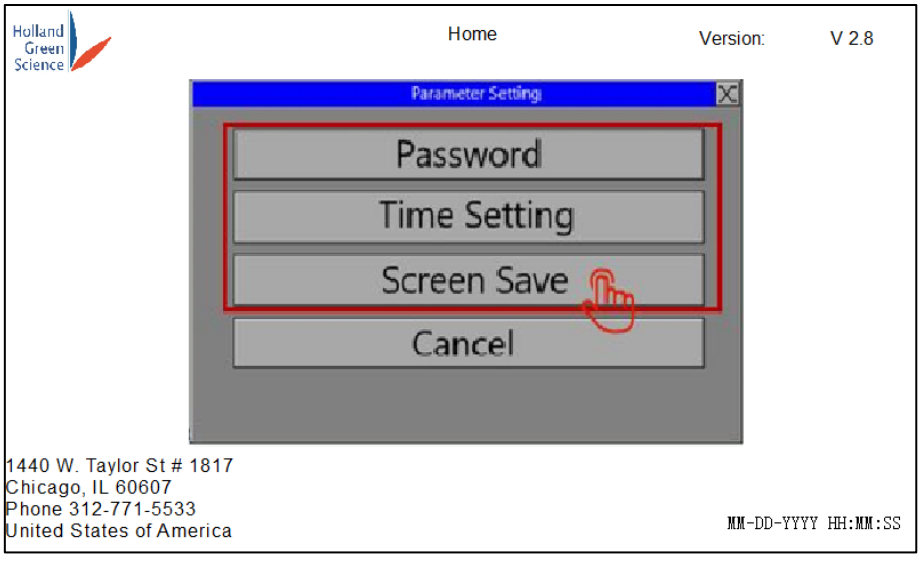


Figure 29

8.5 History data

To recover process history, click “History” on the home screen (Figure 30).

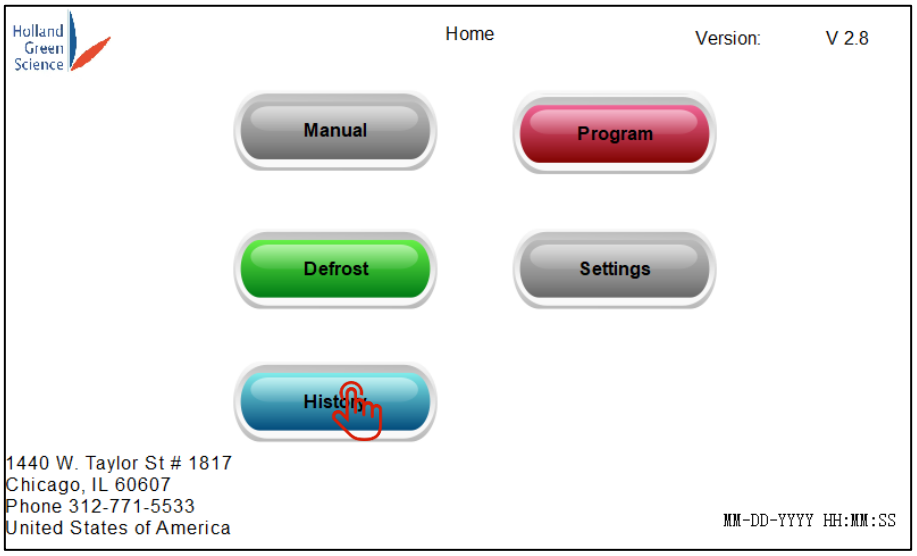


Figure 30

Then click “PAGE UP” and “PAGE DOWN” to view the history data (Figure 31).

Click “DATA EXPORT” to export the history data. Data can be exported to a USB stick inserted in the USB port on the side of the freeze dryer.

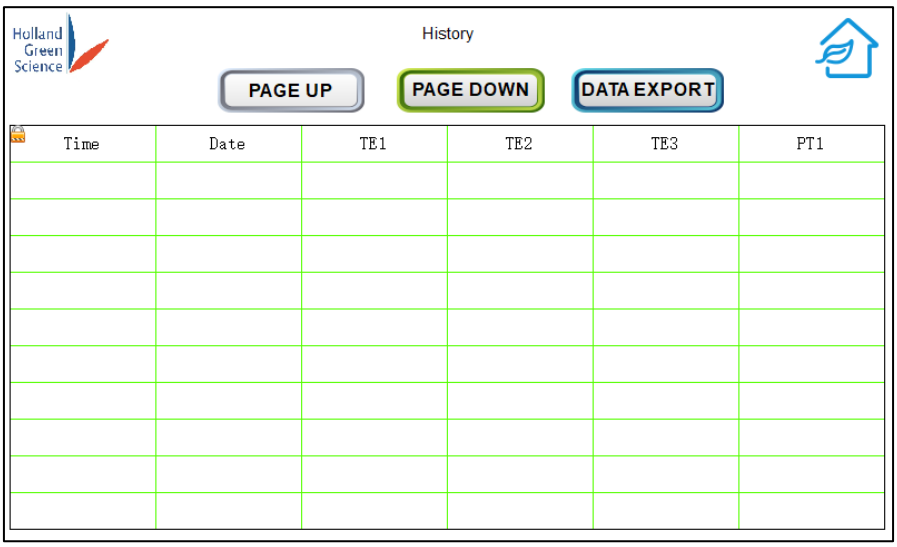


Figure 31

IX. Fault Diagnosis

Error	Solutions
Ultimate vacuum can't reach 50 Pa	Check that the vacuum pump is correctly connected to the main unit with the clamp (tightly).
	Check that the drain valve is closed.
	Check that the sealing ring is installed correctly.
	Check that the vacuum pump functions correctly and the vacuum pump oil is clear.
	If the error remains, contact the service department. Replacement parts may be required.
Vacuum pump oil leakage	Check that the drain valve is closed, and the chamber is vacuum sealed.
	Check the vacuum oil level from the viewing window and confirm it is not excessive.
	Check whether the vacuum oil has begun to solidify. If this does occur, change the oil.
	Make sure that the temperature inside the chamber is not excessive (>80°C). Wait until the temperature inside the chamber is below 40°C before starting the pump.
The Freeze Dryer chamber isn't cold	Check the chamber temperature on the HMI screen to make sure that cooling is working.
	Check that "Defrost" is not running.
	Make sure the compressor is running.
	If compressor is "ON" but the temperature inside the chamber is still high, check the air-cooled condenser and to make sure it is not clogged.
	Ensure that there is enough clearance around the vents and that ambient temperature of the room is below 30°C

X. Cleaning and Maintenance

10.1 Cleaning

- Condensation from the product may participate inside of the chamber, please be sure to clean the inside of the chamber periodically by wiping off any the chamber walls.
  Clean the trays after every freeze-drying process with detergent. Wipe dry afterwards.

10.2 Maintenance

- Check the sealing ring regularly to make sure it is not damaged or worn.
- Check the vacuum oil after every 100-hours of operation and replace the vacuum pump oil if the level is low or the oil is dirty.

XI. Terms Explained

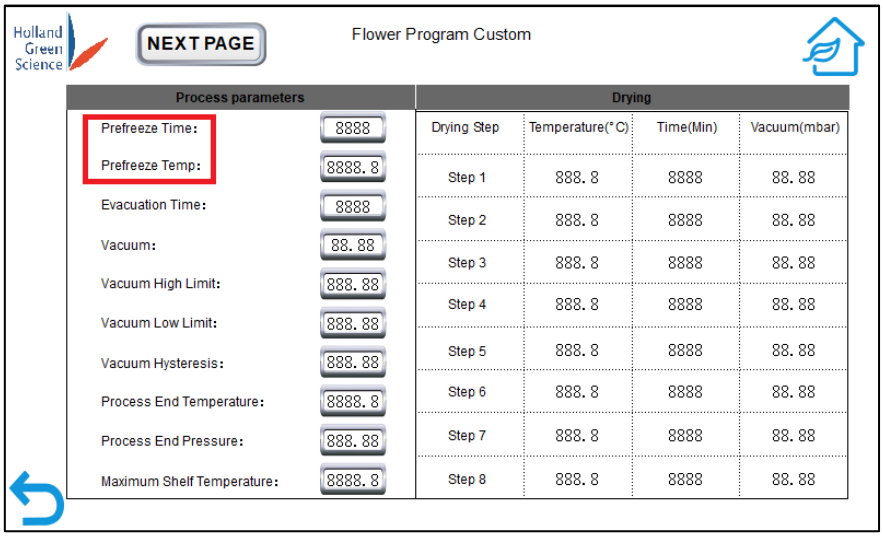


Figure 32

- **Prefreeze Time**: When the “Frozen product” option is switched “OFF” in the Recipe Selector page (Figure 33), meaning the product is not frozen, the program will start cooling the product once the auto-drying program starts. The program will move to the next stage (Evacuation stage) only when the shelf temperature has been lower than the *Prefreeze Temp* for the duration set in the *Prefreeze Time*.

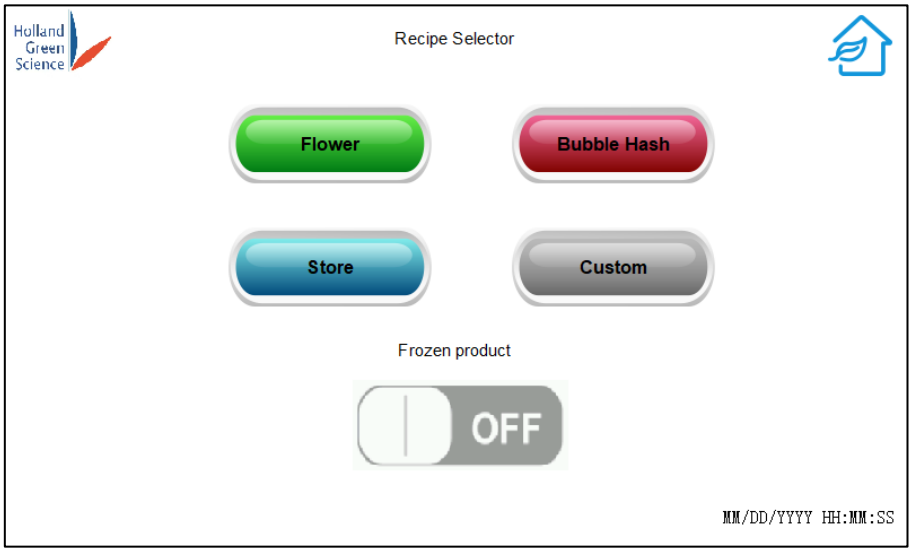


Figure 33

- **Prefreeze Temp**: This is the temperature which the shelves will cool down to when the ‘Frozen product’ option is switched ‘OFF’. This value should be below the expected freezing temperature of your product. See Prefreeze Time for additional information.

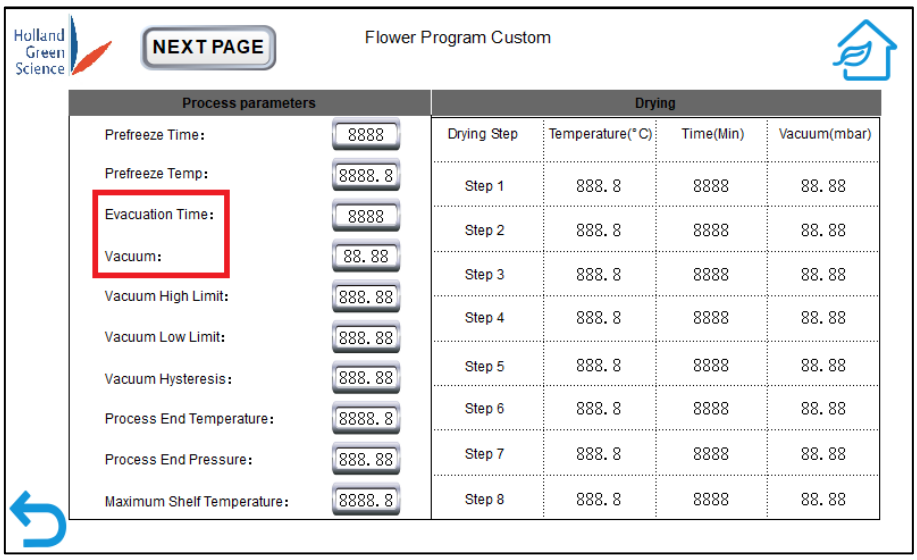


Figure 34

- **Evacuation Time**: *Evacuation Time* and *Vacuum* are used to control the evacuation stage. The program will turn the vacuum pump on when the evacuation stage begins. The program will progress to the next stage, the drying stage, when the chamber pressure has been lower than the pressure set in *Vacuum* for the duration set in the *Evacuation Time*.

- **Vacuum**: see Evacuation Time.

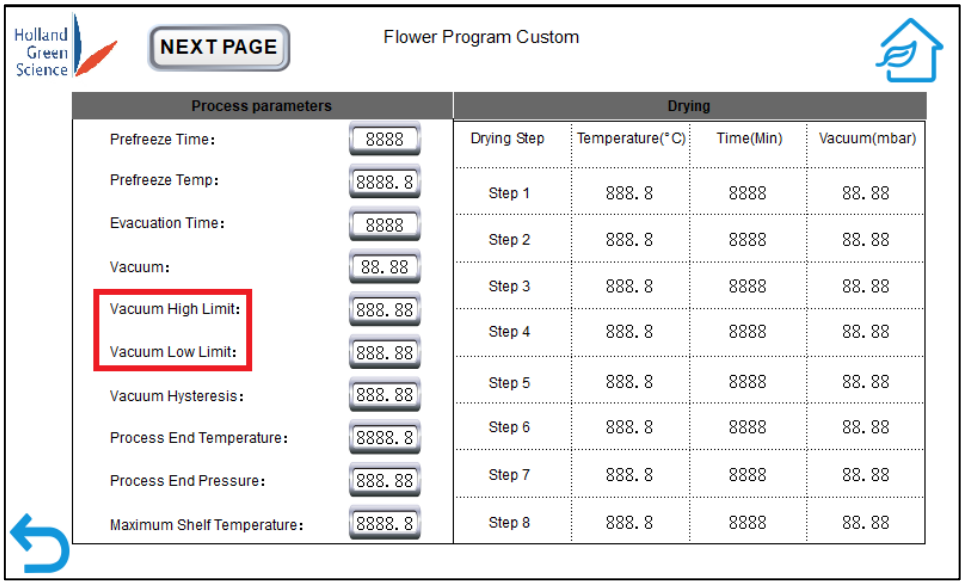


Figure 35

- **Vacuum High Limit**: When the chamber pressure is higher than the *Vacuum High Limit* or lower than the *Vacuum Low Limit*, the program will display a warning. The warning will be removed once the chamber pressure returns to normal (within the set boundaries).

- **Vacuum Low Limit**: see Vacuum High Limit.

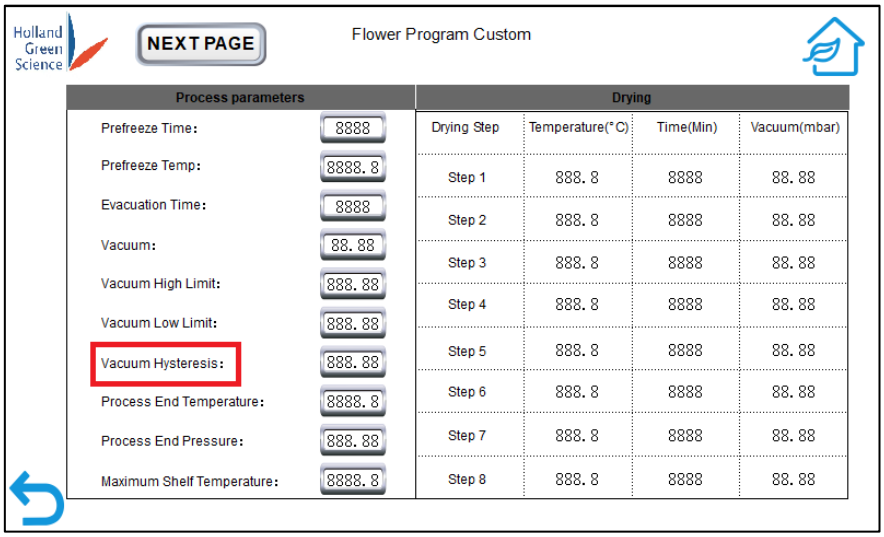


Figure 36

- **Vacuum Hysteresis**: *Vacuum Hysteresis* is used as the maximum allowable overshoot of the chamber pressure when the chamber pressure is controlled by the program via the vacuum valve. During each drying step, the range of the chamber pressure is between the current step's target *Vacuum* - 5Pa and the target *Vacuum* + *Vacuum Hysteresis*. For example, if the current step has a target *Vacuum* of 100Pa and a *Vacuum Hysteresis* of 20Pa, the actual chamber pressure will range from 95Pa (100Pa – 5Pa) to 120Pa (100Pa + 20Pa). If the chamber pressure exceeds the upper limit, the program will open the valve, allowing the pump to suck air out and lowering the pressure inside the chamber. If the chamber pressure drops below the lower limit, the program will close the valve to stop the air flow.

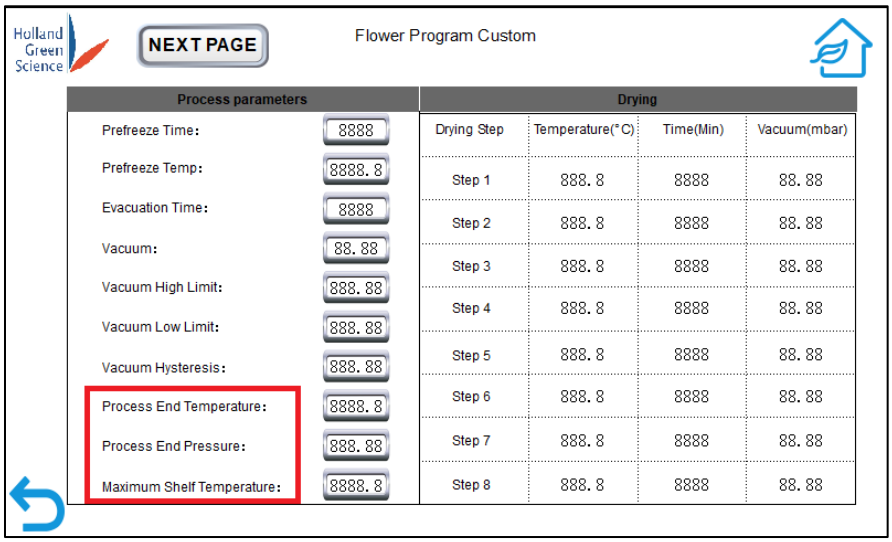


Figure 37

- **Process End Temperature**: *Process End Temperature* and *Process End Pressure* are used to hold the machine until an operator makes any changes once the drying program is completed.
- **Process End Pressure**: see Process End Temperature.
- **Maximum Shelf Temperature**: *Maximum Shelf Temperature* is a safety limit to prevent the shelves from reaching a temperature which may damage the product.